Darwin Information Typing Architecture (DITA) Version 2.0

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Additional artifacts:
This prose specification is one component of a work product that also includes:

- https://docs.oasis-open.org/dita/dita/v2.0/working-draft/dita-v2.0-wd01-dita.zip (DITA source)
- https://docs.oasis-open.org/dita/dita/v2.0/working-draft/dita-v2.0-wd01-grammars.zip (grammar files)

Related work:
This specification replaces or supersedes Darwin Information Typing Architecture (DITA) Version 1.3, a multi-part OASIS that includes:

- Darwin Information Typing Architecture (DITA) Version 1.3 Part 0: Overview. Latest version: https://docs.oasis-open.org/dita/dita/v1.3/dita-v1.3-part0-overview.html
Abstract:
The Darwin Information Typing Architecture (DITA) 2.0 specification defines both a) a set of document types for authoring and organizing topic-oriented information; and b) a set of mechanisms for combining, extending, and constraining document types.

Status:
This document was last revised or approved by the OASIS Darwin Information Typing Architecture (DITA) TC on the above date. The level of approval is also listed above. Check the “Latest stage” location noted above for possible later revisions of this document. Any other numbered Versions and other technical work produced by the Technical Committee (TC) are listed at https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=dita#technical.

TC members should send comments on this specification to the TC’s email list. Others should send comments to the TC’s public comment list, after subscribing to it by following the instructions at the “Send A Comment” button on the TC’s web page at https://www.oasis-open.org/committees/comments/index.php?wg_abbrev=dita.

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Note that any machine-readable content (Computer Language Definitions) declared Normative for this Work Product is provided in separate plain text files. In the event of a discrepancy between any such plain text file and display content in the Work Product's prose narrative document(s), the content in the separate plain text file prevails.

Citation format:
When referencing this specification, the following citation format should be used:

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Table of contents

1 Introduction.............................................................................................................................................. 10
   1.1 About the specification source............................................................................................................. 10
   1.2 Terminology......................................................................................................................................... 10
   1.3 References......................................................................................................................................... 10
      1.3.1 Normative references.................................................................................................................. 10
      1.3.2 Informative references............................................................................................................... 11
   1.4 Normative versions of DITA grammar files......................................................................................... 13
   1.5 Formatting conventions in the HTML5 version of the specification.................................................. 13
      1.5.1 Link previews.............................................................................................................................. 14
      1.5.2 Navigation links.......................................................................................................................... 14
2 DITA terminology, notation, and conventions......................................................................................... 16
   2.1 Normative and non-normative information....................................................................................... 16
   2.2 Notation........................................................................................................................................... 16
   2.3 Basic DITA terminology................................................................................................................... 16
   2.4 Specialization terminology................................................................................................................ 18
   2.5 DITA module terminology................................................................................................................ 18
   2.6 Linking and addressing terminology............................................................................................... 19
   2.7 Key terminology................................................................................................................................ 19
   2.8 Map terminology................................................................................................................................ 20
   2.9 File extensions................................................................................................................................... 20
3 Overview of DITA...................................................................................................................................... 21
   3.1 Basic concepts................................................................................................................................... 21
   3.2 Producing different deliverables from a single source....................................................................... 22
   3.3 DITA topics....................................................................................................................................... 23
      3.3.1 The topic as the basic unit of information...................................................................................... 23
      3.3.2 The benefits of a topic-based architecture.................................................................................. 24
      3.3.3 Disciplined, topic-oriented writing............................................................................................. 24
      3.3.4 Information typing...................................................................................................................... 25
      3.3.5 Generic topics............................................................................................................................ 26
      3.3.6 Topic structure............................................................................................................................ 26
      3.3.7 Topic content............................................................................................................................. 27
   3.4 DITA maps......................................................................................................................................... 28
      3.4.1 Definition of DITA maps.............................................................................................................. 28
      3.4.2 Purpose of DITA maps................................................................................................................. 28
      3.4.3 DITA map attributes.................................................................................................................... 29
      3.4.4 Examples of DITA maps.............................................................................................................. 32
   3.5 DITA metadata.................................................................................................................................. 35
      3.5.1 Metadata elements....................................................................................................................... 36
      3.5.2 Metadata attributes..................................................................................................................... 36
      3.5.3 Metadata in maps and topics...................................................................................................... 37
      3.5.4 Window metadata for user assistance....................................................................................... 37
4 Accessibility and translation..................................................................................................................... 38
   4.1 Accessibility....................................................................................................................................... 38
      4.1.1 Handling accessibility in content and in processors................................................................. 38
      4.1.2 Accessible content..................................................................................................................... 39
      4.1.3 Accessible tables......................................................................................................................... 39
      4.1.4 Examples of DITA markup for accessibility............................................................................ 40
   4.2 Translation and localization.................................................................................................................. 45
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2.1</td>
<td>The @xml:lang attribute</td>
<td>45</td>
</tr>
<tr>
<td>4.2.2</td>
<td>The @dir attribute</td>
<td>47</td>
</tr>
<tr>
<td>4.2.3</td>
<td>The @translate attribute</td>
<td>49</td>
</tr>
<tr>
<td>5</td>
<td>DITA map processing</td>
<td>50</td>
</tr>
<tr>
<td>5.1</td>
<td>DITA maps and their usage</td>
<td>50</td>
</tr>
<tr>
<td>5.2</td>
<td>Subject scheme maps and their usage</td>
<td>51</td>
</tr>
<tr>
<td>5.2.1</td>
<td>Subject scheme maps</td>
<td>51</td>
</tr>
<tr>
<td>5.2.2</td>
<td>Defining controlled values for attributes</td>
<td>52</td>
</tr>
<tr>
<td>5.2.3</td>
<td>Binding controlled values to an attribute</td>
<td>53</td>
</tr>
<tr>
<td>5.2.4</td>
<td>Processing controlled attribute values</td>
<td>54</td>
</tr>
<tr>
<td>5.2.5</td>
<td>The @subjectref attribute</td>
<td>55</td>
</tr>
<tr>
<td>5.2.6</td>
<td>Examples of subject scheme maps</td>
<td>55</td>
</tr>
<tr>
<td>5.3</td>
<td>Metadata cascading</td>
<td>60</td>
</tr>
<tr>
<td>5.3.1</td>
<td>Cascading of metadata attributes in a DITA map</td>
<td>60</td>
</tr>
<tr>
<td>5.3.2</td>
<td>Reconciling topic and map metadata elements</td>
<td>62</td>
</tr>
<tr>
<td>5.3.3</td>
<td>Map-to-map cascading behaviors</td>
<td>64</td>
</tr>
<tr>
<td>5.3.4</td>
<td>Examples of metadata cascading</td>
<td>67</td>
</tr>
<tr>
<td>5.4</td>
<td>Chunking</td>
<td>70</td>
</tr>
<tr>
<td>5.4.1</td>
<td>About the @chunk attribute</td>
<td>70</td>
</tr>
<tr>
<td>5.4.2</td>
<td>Processing chunk=&quot;combine&quot;</td>
<td>71</td>
</tr>
<tr>
<td>5.4.3</td>
<td>Processing chunk=&quot;split&quot;</td>
<td>71</td>
</tr>
<tr>
<td>5.4.4</td>
<td>Using the @chunk attribute for other purposes</td>
<td>71</td>
</tr>
<tr>
<td>5.4.5</td>
<td>Examples of the @chunk attribute</td>
<td>71</td>
</tr>
<tr>
<td>6</td>
<td>DITA addressing</td>
<td>86</td>
</tr>
<tr>
<td>6.1</td>
<td>@id attribute</td>
<td>86</td>
</tr>
<tr>
<td>6.2</td>
<td>DITA linking</td>
<td>87</td>
</tr>
<tr>
<td>6.2.1</td>
<td>The @format attribute</td>
<td>87</td>
</tr>
<tr>
<td>6.2.2</td>
<td>The @href attribute</td>
<td>88</td>
</tr>
<tr>
<td>6.2.3</td>
<td>The @scope attribute</td>
<td>89</td>
</tr>
<tr>
<td>6.2.4</td>
<td>The @type attribute</td>
<td>90</td>
</tr>
<tr>
<td>6.3</td>
<td>URI-based (direct) addressing</td>
<td>91</td>
</tr>
<tr>
<td>6.4</td>
<td>Indirect key-based addressing</td>
<td>93</td>
</tr>
<tr>
<td>6.4.1</td>
<td>Core concepts for working with keys</td>
<td>93</td>
</tr>
<tr>
<td>6.4.2</td>
<td>Setting key names with the @keys attribute</td>
<td>95</td>
</tr>
<tr>
<td>6.4.3</td>
<td>The @keyref attribute</td>
<td>96</td>
</tr>
<tr>
<td>6.4.4</td>
<td>Using keys for addressing</td>
<td>96</td>
</tr>
<tr>
<td>6.4.5</td>
<td>Key scopes</td>
<td>97</td>
</tr>
<tr>
<td>6.4.6</td>
<td>The @keyscope attribute</td>
<td>98</td>
</tr>
<tr>
<td>6.4.7</td>
<td>Addressing keys across scopes</td>
<td>99</td>
</tr>
<tr>
<td>6.4.8</td>
<td>Cross-deliverable addressing and linking</td>
<td>100</td>
</tr>
<tr>
<td>6.4.9</td>
<td>Processing key references</td>
<td>102</td>
</tr>
<tr>
<td>6.4.10</td>
<td>Processing key references for navigation links and images</td>
<td>103</td>
</tr>
<tr>
<td>6.4.11</td>
<td>Processing key references on &lt;topicref&gt; elements</td>
<td>103</td>
</tr>
<tr>
<td>6.4.12</td>
<td>Processing key references to generate text or link text</td>
<td>104</td>
</tr>
<tr>
<td>6.4.13</td>
<td>Examples of keys</td>
<td>105</td>
</tr>
<tr>
<td>6.4.14</td>
<td>Examples of scoped keys</td>
<td>113</td>
</tr>
<tr>
<td>6.5</td>
<td>Context hooks for user assistance</td>
<td>122</td>
</tr>
<tr>
<td>7</td>
<td>DITA processing</td>
<td>123</td>
</tr>
<tr>
<td>7.1</td>
<td>Navigation</td>
<td>123</td>
</tr>
<tr>
<td>7.1.1</td>
<td>Table of contents</td>
<td>123</td>
</tr>
<tr>
<td>7.1.2</td>
<td>Alternative titles</td>
<td>123</td>
</tr>
<tr>
<td>7.2</td>
<td>Indexes</td>
<td>126</td>
</tr>
</tbody>
</table>
7.2.1 Index elements.......................................................................................................................... 127
7.2.2 Location of `<indexterm>` elements......................................................................................... 127
7.2.3 Index locators ............................................................................................................................. 127
7.2.4 Index redirection ......................................................................................................................... 128
7.2.5 Index ranges .............................................................................................................................. 129
7.2.6 Index sorting ............................................................................................................................. 131
7.2.7 Merging index elements ........................................................................................................... 132
7.2.8 Examples of indexing ............................................................................................................... 133

7.3 Content reference (conref) ........................................................................................................... 136
7.3.1 Conref overview....................................................................................................................... 136
7.3.2 The `@conaction` attribute .................................................................................................... 137
7.3.3 The `@conrefend` attribute .................................................................................................... 140
7.3.4 The `@conkeyref` attribute .................................................................................................... 144
7.3.5 The `@conref` attribute .......................................................................................................... 145
7.3.6 Using the “-dita-use-conref-target” value ............................................................................. 145
7.3.7 Processing conrefs .................................................................................................................. 147
7.3.8 Processing attributes when resolving conrefs ........................................................................ 147
7.3.9 Processing xrefs and conrefs within a conref ........................................................................ 148

7.4 Conditional processing ................................................................................................................ 150
7.4.1 About conditional processing .................................................................................................. 151
7.4.2 Expectations for conditional processing .................................................................................. 152
7.4.3 About the DITAVAL document ............................................................................................ 152
7.4.4 Conditional processing attribute values .................................................................................. 153
7.4.5 Conditional processing attribute values with groups ............................................................... 153
7.4.6 Conditional processing and subject schemes ......................................................................... 154
7.4.7 Filtering based on metadata attributes ................................................................................... 154
7.4.8 Flagging based on metadata attributes .................................................................................... 155
7.4.9 Examples of conditional processing ....................................................................................... 156

7.5 Branch filtering ............................................................................................................................ 161
7.5.1 Overview of branch filtering .................................................................................................. 161
7.5.2 How filtering rules interact ....................................................................................................... 162
7.5.3 Branch filtering: Single referenced DITAVAL document for a branch ................................... 162
7.5.4 Branch filtering: Multiple referenced DITAVAL documents for a branch ......................... 162
7.5.5 Branch filtering: Impact on resource and key names ............................................................... 163
7.5.6 Branch filtering: Implications of processing order ................................................................. 165
7.5.7 Examples of branch filtering .................................................................................................. 167

7.6 Sorting ........................................................................................................................................... 175
7.7 Determining effective attribute values ....................................................................................... 176

8 Configuration, specialization, generalization, constraints, and expansion .................................. 178

8.1 Overview of DITA extension facilities ......................................................................................... 178

8.2 Document-type configuration .................................................................................................... 179
8.2.1 Overview of document-type shells ......................................................................................... 179
8.2.2 Rules for document-type shells .............................................................................................. 180
8.2.3 Equivalence of document-type shells ...................................................................................... 180
8.2.4 Conformance of document-type shells .................................................................................... 181

8.3 Specialization ............................................................................................................................... 181
8.3.1 Overview of specialization ...................................................................................................... 181
8.3.2 Modularization ......................................................................................................................... 182
8.3.3 Vocabulary modules ................................................................................................................ 183
8.3.4 Specialization rules for element types ..................................................................................... 184
8.3.5 Specialization rules for attributes ........................................................................................... 184
8.3.6 The `@class` attribute rules and syntax .................................................................................. 185
8.3.7 The @specializations attribute rules and syntax................................................................. 186
8.3.8 Specializing to include non-DITA content........................................................................... 187
8.3.9 Sharing elements across specializations............................................................................. 188
8.4 Generalization......................................................................................................................... 189
8.4.1 Overview of generalization................................................................................................. 189
8.4.2 Element generalization....................................................................................................... 190
8.4.3 Processor expectations when generalizing elements......................................................... 190
8.4.4 Attribute generalization..................................................................................................... 191
8.4.5 Generalization with cross-specialization dependencies................................................... 192
8.5 Constraints.............................................................................................................................. 193
8.5.1 Overview of constraints...................................................................................................... 193
8.5.2 Constraint rules.................................................................................................................. 194
8.5.3 Constraints, processing, and interoperability.................................................................... 194
8.5.4 Examples: Constraints implemented using DTDs.............................................................. 195
8.5.5 Examples: Constraints implemented using RNG............................................................... 199
8.6 Expansion modules................................................................................................................ 204
8.6.1 Overview of expansion modules......................................................................................... 204
8.6.2 Expansion module rules....................................................................................................... 204
8.6.3 Examples: Expansion implemented using DTDs................................................................. 205
8.6.4 Examples: Expansion implemented using RNG................................................................. 211
9 Coding practices for DITA grammar files............................................................................... 218
9.1 DTD coding requirements...................................................................................................... 218
  9.1.1 DTD: Use of entities............................................................................................................ 218
  9.1.2 DTD: Coding requirements for document-type shells....................................................... 219
  9.1.3 DTD: Coding requirements for structural and element-domain modules......................... 223
  9.1.4 DTD: Coding requirements for structural modules............................................................ 225
  9.1.5 DTD: Coding requirements for element-domain modules............................................... 227
  9.1.6 DTD: Coding requirements for attribute-domain modules................................................. 228
  9.1.7 DTD: Coding requirements for element-configuration modules........................................ 228
9.2 RELAX NG coding requirements......................................................................................... 230
  9.2.1 RELAX NG: Overview of coding requirements................................................................. 230
  9.2.2 RELAX NG: Coding requirements for document-type shells........................................... 231
  9.2.3 RELAX NG: Coding requirements for element-type declarations.................................... 233
  9.2.4 RELAX NG: Coding requirements for structural modules................................................ 236
  9.2.5 RELAX NG: Coding requirements for element-domain modules....................................... 238
  9.2.6 RELAX NG: Coding requirements for attribute-domain modules..................................... 239
  9.2.7 RELAX NG: Coding requirements for element-configuration modules............................ 240
10 Element reference................................................................................................................... 242
  10.1 DITA elements, A to Z....................................................................................................... 242
  10.2 DITA attributes, A to Z...................................................................................................... 245
  10.3 Topic elements..................................................................................................................... 247
    10.3.1 Basic topic elements....................................................................................................... 247
    10.3.2 Body elements............................................................................................................... 256
    10.3.3 Multimedia elements.................................................................................................... 283
    10.3.4 Indexing elements......................................................................................................... 289
    10.3.5 Related links elements.................................................................................................. 292
    10.3.6 Table elements............................................................................................................. 295
  10.4 Map elements....................................................................................................................... 304
    10.4.1 Basic map elements....................................................................................................... 304
    10.4.2 Subject scheme elements............................................................................................... 316
  10.5 Metadata elements.............................................................................................................. 325
    10.5.1 Prolog (metadata) elements............................................................................................ 325
1 Introduction

The Darwin Information Typing Architecture (DITA) specification defines a set of document types for authoring and aggregating topic-oriented information, as well as a set of mechanisms for combining, extending, and constraining document types.

1.1 About the specification source

The DITA specification is authored in DITA. It is a complex document that uses many DITA features, including key references (keyrefs), content references (conrefs), and controlled values set in a subject scheme map.

The source files for the DITA specification are managed in a GitHub repository that is maintained by OASIS; they also can be downloaded from OASIS.

1.2 Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMEND", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC 2119] and [RFC8174] when, and only when, they appear in all capitals, as shown here.

Comment by Kristen J Eberlein on 21 April 2022

This is OASIS boiler plate. Ideally, we'd include information here about the following:

- Visual formatting of the normative statements
- Appendix of aggregated normative statements
- Maybe verbiage about how we use normative statements: focus on interoperability and NOT using them for things that are enforced by the grammar files

1.3 References

This section contains the normative and informative references that are used in this document.

While any hyperlinks included in this section were valid at the time of publication, OASIS cannot guarantee their long-term validity.

1.3.1 Normative references

The following documents are referenced in such a way that some or all of their content constitutes requirements of this document.

[RFC 2119]

[RFC 3986]

[RFC 5646]


1.3.2 Informative references
The following referenced documents are not required for the application of this document but might assist the reader with regard to a particular subject area.


[RELAX NG DTD Compatibility]

[SVG 1.1]

[Unicode BiDi]

[WCAG 2.1]

[XHTML 1.0]

[XHTML 1.1]

[XPointer 1.0]

[XML Catalogs 1.1]

[xml:tm 1.0]

[XSL 1.0]

[XSL 1.1]

[XSLT 2.0]
1.4 Normative versions of DITA grammar files

DITA document types and vocabulary modules can be constructed using several XML-document grammar mechanisms. The DITA specification provides coding requirements for DTDs and RNG, and it also includes grammar files that are constructed using those mechanisms. The RNG grammar files are normative.

The DITA Technical Committee chose the RELAX NG XML syntax for the following reasons:

**Easy use of foreign markup**

The DITA grammar files maintained by OASIS depend on this feature of RELAX NG in order to capture metadata about document-type shells and modules.

---

Comment by Kristen J Eberlein on 21 August 2022

Do we want to remove the preceding paragraph? While this was true for DITA 1.3, when we were generating DTD and XSD from the RNG grammar files, we hand edited the DTD for DITA 2.0.

The foreign vocabulary feature can also be used to include Schematron rules directly in RELAX NG grammars. Schematron rules can check for patterns that either are not expressible with RELAX NG directly or that would be difficult to express.

**RELAX NG <div> element**

This general grouping element allows for arbitrary organization and grouping of patterns within grammar documents. Such grouping tends to make the grammar documents easier to work with, especially in XML-aware editors.

**Capability of expressing precise restrictions**

RELAX NG is capable of expressing constraints that are more precise than is possible with DTDs. For example, RELAX NG patterns can be context specific such that the same element type can allow different content or attributes in different contexts. However, the grammar files that are provided by the OASIS DITA Technical Committee do not use any features of RELAX NG that cannot be translated into equivalent DTD constructs.

The DITA use of RELAX NG depends on the RELAX NG DTD Compatibility specification, which provides a mechanism for defining default-attribute values and embedded documentation. Processors that use RELAX NG for DITA documents in which required attributes (for example, the @class attribute) are not explicitly present must implement the DTD compatibility specification in order to get default attribute values.

1.5 Formatting conventions in the HTML5 version of the specification

Given the size and complexity of the specification, it is not generated as a single HTML5 file. Instead, each DITA topic is rendered as a separate HTML5 file.

The HTML5 version of the specification uses certain formatting conventions to aid readers in navigating through the specification and locating material easily: Link previews and navigation links.
1.5.1 Link previews
The DITA specification uses the content of the DITA `<shortdesc>` element to provide link previews for its readers. These link previews are visually highlighted by a border and a colored background.

The link previews serve as enhanced navigation aids, enabling readers to more easily locate content. This usability enhancement is one of the ways in which the specification illustrates the capabilities of DITA and exemplifies DITA best practices.

The following screen capture illustrates how link previews are displayed in the HTML5 version of the specification:

Figure 1: Link previews

1.5.2 Navigation links
To ease readers in navigating from one topic to another, each HTML5 file generated by a DITA topic contains navigation links at the bottom.

Parent topic
- Takes readers to the parent topic, which is the topic referenced by the closest topic in the containment hierarchy

Previous topic
- Takes readers to the previous topic in the reading sequence

Next topic
- Takes readers to the next topic in the reading sequence

Return to main page
- Takes readers to the place in the table of contents for the current topic in the reading sequence
The following screen capture illustrates how navigation links are displayed in the HTML5 version of the specification:

Comment by Kristen J Eberlein on 03 May 2019

Image needs to be updated, so that it reflects new colors for OASIS rebranding -- as well as DITA 2.0 content.

Figure 2: Navigation links

When readers hover over the navigation links, the short description of the DITA topic is also displayed.
2 DITA terminology, notation, and conventions

The DITA specification uses specific notation and terms to define the components of the DITA standard.

2.1 Normative and non-normative information

The DITA specification contains normative and non-normative information.

Normative information

Normative information is the formal portion of the specification that describes the rules and requirements that make up the DITA standard and which must be followed.

Non-normative information

Non-normative information includes descriptions that provide background, examples, notes, and other useful information that are not formal requirements or rules that must be followed.

All information in the specification is normative unless it is an example, a note, an appendix, or is explicitly labeled as non-normative.

The DITA specification contains examples to help clarify or illustrate specific aspects of the specification. Because examples are specific rather than general, they might not illustrate all aspects or be the only way to accomplish or implement an aspect of the specification. Therefore all examples are non-normative.

2.2 Notation

Certain conventions are used throughout the specification to identify attributes and elements.

attribute types

Attribute names are preceded by @ to distinguish them from elements or surrounding text, for example, the @props or the @class attribute.

element types

Element names are delimited with angle brackets (< and >) to distinguish them from surrounding text, for example, the <keyword> or the <prolog> element.

In general, the unqualified use of the term map or topic can be interpreted to mean "a <map> element and any specialization of a <map> element" or "a <topic> element or any specialization of a <topic> element." Similarly, the unqualified use of an element type name (for example, <p>) can be interpreted to mean the element type or any specialization of the element type.

2.3 Basic DITA terminology

Certain terminology is used for basic DITA components.

DITA document

An XML document that conforms to the requirements of this specification.

A DITA document MUST have as its root element one of the following elements:

- <map> or a specialization of the <map> element
- <topic> or a specialization of the <topic> element
- <dita>, which cannot be specialized, but which allows documents with multiple sibling topics
DITA document type
A unique set of structural modules, domain modules, and constraint modules that taken together provide the XML element and attribute declarations that define the structure of DITA documents.

DITA document-type shell
A set of DTD or RELAX NG declarations that implement a DITA document type by using the rules and design patterns that are included in the DITA specification. A DITA document-type shell includes and configures one or more structural modules, zero or more domain modules, and zero or more constraint modules. With the exception of the optional declarations for the <dita> element and its attributes, DITA document-type shells do not declare any element or attribute types directly.

DITA element
An XML element instance whose type is a DITA element type. DITA elements must exhibit a @class attribute that has a value that conforms to the rules for specialization hierarchy specifications.

Comment by Kristen J Eberlein on 02 July 2019
Suggest removing the last sentence of the definition. It uses the word 'must'; also, it needs to be better aligned with the topic about architectural attributes.

Comment by robander on 26 may 2021
Having @class is such a core part of being a DITA element that I’d be inclined to keep it, except that 1) we could just remove "must" (it's a statement of fact, not a rule) and 2) I am continually confused by the term "exhibit" in this context. Also, <dita> doesn't have class and is a DITA element, so it's an oddball.

DITA element type
An element type that is either one of the base element types that are defined by the DITA specification, or a specialization of one of the base element types.

map instance
An occurrence of a map type in a DITA document.

map type
A map or a specialization of map that defines a set of relationships among topic instances.

structural type instance
An occurrence of a topic type or a map type in a DITA document.

topic instance
An occurrence of a topic type in a DITA document.

topic type
A topic or a specialization of topic that defines a complete unit of content.
2.4 Specialization terminology

Certain terminology is used to discuss DITA specialization.

**base type**
An element or attribute type that is not a specialization. All base types are defined by the DITA specification.

**extension element**
Within a vocabulary module, an element type that can be extended, replaced, or constrained for use in a DITA document type.

**generalization**
The process by which a specialized element is transformed into a less-specialized ancestor element or a specialized attribute is transformed into a less-specialized ancestor attribute. The original specialization-hierarchy information can be preserved in the generalized instance; this allows the original specialized type to be recreated from the generalized instance.

**specialization**
1. The act of defining new element or attribute types as a semantic refinement of existing element or attribute types
2. An element or attribute type that is a specialization of a base type
3. A process by which a generalized element is transformed into one of its more specialized element types or a generalized attribute is transformed into a more specialized attribute.

**specialization hierarchy**
The sequence of element or attribute types, from the most general to most specialized, from which a given element or attribute type is specialized. The specialization hierarchy for a DITA element is formally declared through its `@class` attribute.

**structural type**
A topic type or map type.

2.5 DITA module terminology

Certain terminology is used to discuss DITA modules.

**attribute domain module**
A domain module that defines a specialization of either the `@base` or `@props` attribute.

**constraint module**
A set of declarations that imposes additional constraints onto the element or attribute types that are defined in a specific vocabulary module.

**domain module**
A vocabulary module that defines a set of element types or an attribute type that supports a specific subject or functional area.

**element domain module**
A domain module that defines one or more element types for use within maps or topics.

**structural module**
A vocabulary module that defines a top-level map type or topic type.

**vocabulary module**
A set of element or attribute declarations.
2.6 Linking and addressing terminology

Certain terminology is used for discussing linking and addressing.

**referenced element**

An element that is referenced by another DITA element. See also *referencing element*.

**Example**

Consider the following code sample from a *installation-reuse.dita* topic. The `<step>` element that it contains is a referenced element; other DITA topics reference the `<step>` element by using the @conref attribute.

```xml
<step id="run-startcmd-script">
  <cmd>Run the startcmd script that is applicable to your operating-system environment.</cmd>
</step>
```

**referencing element**

An element that references another DITA element by specifying an addressing attribute. See also *referenced element and addressing attribute*.

**Example**

The following `<step>` element is a referencing element. It uses the @conref attribute to reference a `<step>` element in the *installation-reuse.dita* topic.

```xml
<step conref="installation-reuse.dita#reuse/run-startcmd-script">
  <cmd/>
</step>
```

**addressing attribute**

An attribute, such as @conref, @conkeyref, @keyref, and @href, that specifies an address.

---

Comment by robander on 26 may 2021

Nit-picking: conkeyref / keyref do not specify an address, they specify a key that can indirectly result in an address. Maybe rephrase something like this, but not sure where to put the "such as" here:

An attribute that specifies an address or a that specifies key that resolves to an address.

or maybe

An attribute that specifies an address or that specifies a key.

---

2.7 Key terminology

Certain terminology is used to discuss keys.

**resource**

For the purposes of keys and key resolution, one of the following:

- An object addressed by URI
- Metadata specified on a resource, such as a @scope or @format attribute
- Text or metadata located within a `<topicmeta>` element

**key**

A name for a resource. See 6.4.4 Using keys for addressing (96) for more information.

**key definition**

A `<topicref>` element that binds one or more key names to zero or more resources.
key reference
An attribute that references a key, such as @keyref or @conkeyref.

key space
A list of key definitions that are used to resolve key references.

effective key definition
The definition for a key within a key space that is used to resolve references to that key. A key might have multiple definitions within a key space, but only one of those definitions is effective.

key scope
A map or section of a map that defines its own key space and serves as the resolution context for its key references.

2.8 Map terminology
Certain terminology is used for DITA maps.

root map
The DITA map that is provided as input for a processor.

submap
A DITA map that is referenced with a @scope attribute that evaluates as "local". The value of the scope attribute might be explicitly set, be defaulted, or cascade from another element.

peer map
A DITA map that is referenced with a @scope attribute that evaluates as "peer". The value of the scope attribute might be explicitly set, be defaulted, or cascade from another element.

map branch
A <topicref> element or a specialization of <topicref>, along with any child elements and all resources that are referenced by the original element or its children.

2.9 File extensions
DITA uses certain file extensions for topics, maps, and conditional processing profiles.

Files that contain DITA content SHOULD use the following file extensions:

DITA topics
*.dita (preferred)
*.xml

DITA maps
*.ditamap

Conditional processing profiles
*.ditaval
3 Overview of DITA

The Darwin Information Typing Architecture (DITA) is an XML-based architecture for authoring, producing, and delivering topic-oriented, information-typed content that can be reused and single-sourced in a variety of ways. While DITA historically has been driven by the requirements of large-scale technical documentation authoring, management, and delivery, it is a standard that is applicable to any kind of publication or information that might be presented to readers, including interactive training and educational materials, standards, reports, business documents, trade books, travel and nature guides, and more.

DITA is designed for creating new document types and describing new information domains based on existing types and domains. The process for creating new types and domains is called specialization. Specialization enables the creation of specific, targeted XML grammars that can still use tools and design rules that were developed for more general types and domains; this is similar to how classes in an object-oriented system can inherit the methods of ancestor classes.

Because DITA topics are conforming XML documents, they can be readily viewed, edited, and validated using standard XML tools, although realizing the full potential of DITA requires using DITA-aware tools.

Comment by Kristen J Eberlein on 03 June 2019

This section of the spec now contains material about topics, maps, and metadata that was previously in the “DITA markup” section.”

We need to carefully consider what of this content is appropriate. Some of it – information about map elements and attributes, metadata – is duplicated elsewhere. If we think it is useful to have a high-level overview here, we should mark it as non-normative – and point users to the normative coverage of the topic.

In a parallel move, I think we'll need to move coverage of critical DITA attributes into a more prominent place in the spec.

3.1 Basic concepts

DITA has been designed to satisfy requirements for information typing, semantic markup, modularity, reuse, interchange, and production of different deliverable forms from a single source. These topics provide an overview of the key DITA features and facilities that serve to satisfy these requirements.

DITA topics

In DITA, a topic is the basic unit of authoring and reuse. All DITA topics have the same basic structure: a title and, optionally, a body of content. Topics can be generic or more specialized; specialized topics represent more specific information types or semantic roles, for example, <concept>, <task>, or <reference> See DITA topics (23) for more information.

DITA maps

DITA maps are documents that organize topics and other resources into structured collections of information. DITA maps specify hierarchy and the relationships among the topics; they also provide the contexts in which keys are defined and resolved. See DITA maps (28) for more information.

Information typing

Information typing is the practice of identifying types of topics, such as concept, reference, and task, to clearly distinguish between different types of information. Topics that answer different reader questions (How do I? What is?) can be categorized with different information types. The base information types provided by DITA specializations (for example, technical content, machine industry,
and learning and training) provide starter sets of information types that can be adopted immediately by many technical and business-related organizations. See Information typing (25) for more information.

**DITA addressing**

DITA provides two addressing mechanisms. DITA addresses either are direct URI-based addresses, or they are indirect key-based addresses. Within DITA documents, individual elements are addressed by unique identifiers specified on the `@id` attribute. DITA defines two fragment-identifier syntaxes; one is the full fragment-identifier syntax, and the other is an abbreviated fragment-identifier syntax that can be used when addressing non-topic elements from within the same topic. See DITA addressing (86) for more information.

**Content reuse**

The DITA `@conref`, `@conkeyref`, `@conrefend`, and `@conaction` attributes provide mechanisms for reusing content within DITA topics or maps. These mechanisms can be used both to pull and push content. See Content reuse (136) for more information.

**Conditional processing**

Conditional processing is the filtering or flagging of information based on processing-time criteria. See Conditional processing (150) for more information.

**Configuration**

A document-type shell is an XML grammar file that specifies the elements and attributes that are allowed in a DITA document. The document-type shell integrates structural modules, domain modules, and element-configuration modules. In addition, a document-type shell specifies whether and how topics can nest. See 8.2 Document-type configuration (179) for more information.

**Specialization**

The specialization feature of DITA allows for the creation of new element types and attributes that are explicitly and formally derived from existing types. This facilitates interchange of conforming DITA content and ensures a minimum level of common processing for all DITA content. It also allows specialization-aware processors to add specialization-specific processing to existing base processing. See Specialization (181) for more information.

**Constraints**

Constraint modules restrict content models or attribute lists for specific element types, remove certain extension elements from an integrated domain module, or replace base element types with domain-provided, extension element types. See Constraints (193) for more information.

### 3.2 Producing different deliverables from a single source

DITA is designed to enable the production of multiple deliverable formats from a single set of DITA content. This means that many rendition details are specified neither in the DITA specification nor in the DITA content; the rendition details are defined and controlled by the processors.

Like many XML-based applications for human-readable documentation, DITA supports the separation of content from presentation. This is necessary when content is used in different contexts, since authors cannot predict how or where the material that they author will be used. The following features and mechanisms enable users to produce different deliverable formats from a single source:

**DITA maps**

Different DITA maps can be optimized for different delivery formats. For example, you might have a book map for printed output and another DITA map to generate online help; each map uses the same content set.

**Specialization**

The DITA specialization facility enables users to create XML elements that can provide appropriate rendition distinctions. Because the use of specializations does not impede interchange or
interoperability, DITA users can safely create the specializations that are demanded by their local delivery and rendition requirements, with a minimum of additional impact on the systems and business processes that depend on or use the content. While general XML practices suggest that element types should be semantic, specialization can be used to define element types that are purely presentational in nature. The highlighting domain is an example of such a specialization.

**Conditional processing**
Conditional processing makes it possible to have a DITA topic or map that contains delivery-specific content.

**Content referencing**
The conref mechanism makes it possible to construct delivery-specific maps or topics from a combination of generic components and delivery-context-specific components.

**Key referencing**
The keyref mechanism makes it possible to have key words be displayed differently in different deliverables. It also allows a single link to resolve to different targets in different deliverables.

@outputclass attribute
The @outputclass attribute provides a mechanism whereby authors can indicate specific rendition intent where necessary. Note that the DITA specification does not define any values for the @outputclass attribute; the use of the @outputclass attribute is processor specific.

While DITA is independent of any particular delivery format, it is a standard that supports the creation of human-readable content. As such, it defines some fundamental document components including paragraphs, lists, and tables. When there is a reasonable expectation that such basic document components be rendered consistently, the DITA specification defines default or suggested renderings.

3.3 DITA topics
DITA topics are the basic units of DITA content and the basic units of reuse. Each topic contains a single subject.

3.3.1 The topic as the basic unit of information
In DITA, a topic is the basic unit of authoring and reuse. All DITA topics have the same basic structure: a title and, optionally, a body of content. Topics can be generic or more specialized; specialized topics represent more specific information types or semantic roles, for example, `<concept>`, `<task>`, or `<reference>`.

DITA topics consist of content units that can be as generic as sets of paragraphs and unordered lists or as specific as sets of instructional steps in a procedure or cautions to be considered before a procedure is performed. Content units in DITA are expressed using XML elements and can be conditionally processed using metadata attributes.

Classically, a DITA topic is a titled unit of information that can be understood in isolation and used in multiple contexts. It is short enough to address a single subject or answer a single question but long enough to make sense on its own and be authored as a self-contained unit. However, DITA topics also can be less self-contained units of information, such as topics that contain only titles and short descriptions and serve primarily to organize subtopics or links or topics that are designed to be nested for the purposes of information management, authoring convenience, or interchange.

DITA topics are used by reference from DITA maps. DITA maps enable topics to be organized in a hierarchy for publication. Large units of content, such as complex reference documents or book chapters, are created by nesting topic references in a DITA map. The same set of DITA topics can be used in any number of maps.

DITA topics also can be used and published individually; for example, one can represent an entire deliverable as a single DITA document that consists of a root topic and nested topics. This strategy can
accommodate the migration of legacy content that is not topic-oriented; it also can accommodate information that is not meaningful outside the context of a parent topic. However, the power of DITA is most fully realized by storing each DITA topic in a separate XML document and using DITA maps to organize how topics are combined for delivery. This enables a clear separation between how topics are authored and stored and how topics are organized for delivery.

### 3.3.2 The benefits of a topic-based architecture

Topics enable the development of usable and reusable content.

While DITA does not require the use of any particular writing practice, the DITA architecture is designed to support authoring, managing, and processing of content that is designed to be reused. Although DITA provides significant value even when reuse is not a primary requirement, the full value of DITA is realized when content is authored with reuse in mind. To develop topic-based information means creating units of standalone information that are meaningful with little or no surrounding context.

By organizing content into topics that are written to be reusable, authors can achieve several goals:

- **Content is readable when accessed from an index or search, not just when read in sequence as part of an extended narrative.** Since most readers do not read technical and business-related information from beginning to end, topic-oriented information design ensures that each unit of information can be read independently.
- **Content can be organized differently for online and print delivery.** Authors can create task flows and concept hierarchies for online delivery and create a print-oriented hierarchy to support a narrative content flow.
- **Content can be reused in different collections.** Since a topic is written to support random access (as by search), it should be understandable when included as part of various product deliverables. Topics permit authors to refactor information as needed, including only the topics that apply to each unique scenario.
- **Content is more manageable in topic form whether managed as individual files in a traditional file system or as objects in a content management system.**
- **Content authored in topics can be translated and updated more efficiently and less expensively than information authored in larger or more sequential units.**
- **Content authored in topics can be filtered more efficiently, encouraging the assembly and deployment of information subsets from shared information repositories.**

Topics written for reuse should be small enough to provide opportunities for reuse but large enough to be coherently authored and read. When each topic is written to address a single subject, authors can organize a set of topics logically and achieve an acceptable narrative content flow.

### 3.3.3 Disciplined, topic-oriented writing

Topic-oriented writing is a disciplined approach to writing that emphasizes modularity and reuse of concise units of information: topics. Well-designed DITA topics can be reused in many contexts, as long as writers are careful to avoid unnecessary transitional text.

#### Conciseness and appropriateness

Readers who are trying to learn or do something quickly appreciate information that is written in a structure that is easy to follow and contains only the information needed to complete that task or grasp a fact. Recipes, encyclopedia entries, car repair procedures; all serve up a uniquely focused unit of information. The topic contains everything required by the reader.

#### Locational independence

A well-designed topic is reusable in other contexts to the extent that it is context free, meaning that it can be inserted into a new document without revision of its content. A context-free topic avoids transitional text. Phrases like "As we considered earlier" or "Now that you have completed the initial step" make little sense if a topic is reused in a new context in which the relationships are different or
no longer exist. A well-designed topic reads appropriately in any new context because the text does not refer the reader outside the topic.

Navigational independence

Most print publications or web pages are a mixture of content and navigation. Internal links lead a reader through a sequence of choices as he or she navigates through a website. DITA supports the separation of navigation from content by assembling independent topics into DITA maps. Nonetheless, writers might want to provide links within a topic to additional topics or external resources. DITA does not prohibit such linking within individual topics. The DITA relationship table enables links between topics and to external content. Since it is defined in the DITA map, it is managed independently of the topic content.

Links in the content are best used for cross-references within a topic. Links from within a topic to additional topics or external resources are best avoided because they limit reuse of the topic. To link from a term or keyword to its definition, use the DITA keyref facility to avoid creating topic-to-topic dependencies that are difficult to maintain. See Key-based addressing (93)

3.3.4 Information typing

Information typing is the practice of identifying types of topics, such as concept, reference, and task, to clearly distinguish between different types of information. Topics that answer different reader questions (How do I? What is?) can be categorized with different information types. The base information types provided by DITA specializations (for example, technical content, machine industry, and learning and training) provide starter sets of information types that can be adopted immediately by many technical and business-related organizations.

Information typing has a long history of use in the technical documentation field to improve information quality. It is based on extensive research and experience, including Robert Horn’s Information Mapping and Hughes Aircraft’s STOP (Sequential Thematic Organization of Proposals) technique. Note that many DITA topic types are not necessarily closely connected with traditional Information Mapping.

Information typing is a practice designed to keep documentation focused and modular, thus making it clearer to readers, easier to search and navigate, and more suitable for reuse. Classifying information by type helps authors perform the following tasks:

- Develop new information more consistently
- Ensure that the correct structure is used for closely related kinds of information (retrieval-oriented structures like tables for reference information and simple sequences of steps for task information)
- Avoid mixing content types, thereby losing reader focus
- Separate supporting concept and reference information from tasks, so that users can read the supporting information if needed and ignore if it is not needed
- Eliminate unimportant or redundant detail
- Identify common and reusable subject matter

DITA currently defines a small set of well-established information types that reflects common practices in certain business domains, for example, technical communication and instruction and assessment. However, the set of possible information types is unbounded. Through the mechanism of specialization, new information types can be defined as specializations of the base topic type (<topic>) or as refinements of existing topics types, for example, <concept>, <task>, <reference>, or <learningContent>.

You need not use any of the currently-defined information types. However, where a currently-defined information type matches the information type of your content, use the currently-defined information type, either directly, or as a base for specialization. For example, for information that is procedural in nature,
use the task information type or a specialization of task. Consistent use of established information types helps ensure smooth interchange and interoperability of DITA content.

3.3.5 Generic topics
The element type `<topic>` is the base topic type from which all other topic types are specialized. All topics have the same basic structure.

For authors, typed content is preferred to support consistency in writing and presentation to readers. The generic topic type is best used only if authors are not trained in information typing or when a specialized topic type is inappropriate. The OASIS DITA standard provides several specialized topic types, including concept, task, and reference that are critical for technical content development.

For those pursuing specialization, specialize new topic types from appropriate ancestors to meet authoring and output requirements.

3.3.6 Topic structure
All topics have the same basic structure, regardless of topic type: title, description or abstract, prolog, body, related links, and nested topics.

All DITA topics must have an XML identifier (the `@id` attribute) and a title. The basic topic structure consists of the following parts, some of which are optional:

**Topic element**
The topic element holds the required `@id` attribute and contains all other elements.

**Title**
The title contains the subject of the topic.

**Alternate titles**
Titles specifically for use in navigation or search. When not provided, the base title is used for all contexts.

**Short description or abstract**
A short description of the topic or a longer abstract with an embedded short description. The short description might be used both in topic content (as the first paragraph), in generated summaries that include the topic, and in links to the topic. Alternatively, the abstract lets you create more complex introductory content and uses an embedded short description element to define the part of the abstract that is suitable for summaries and link previews.

While short descriptions are not required, they can make a dramatic difference to the usability of an information set and should generally be provided for all topics.

**Prolog**
The prolog is the container for topic metadata, such as change history, audience, product, and so on.

**Body**
The topic body contains the topic content: paragraphs, lists, sections, and other content that the information type permits.

**Related links**
Related links connect to other topics. When an author creates a link as part of a topic, the topic becomes dependent on the other topic being available. To reduce dependencies between topics and thereby increase the ability to reuse each topic, authors can use DITA maps to define and manage links between topics, instead of embedding links directly in each related topic.

**Nested topics**
Topics can be defined inside other topics. However, nesting requires special care because it can result in complex documents that are less usable and less reusable. Nesting might be appropriate for
information that is first converted from desktop publishing or word processing files or for topics that are unusable independent from their parent or sibling topics.

The rules for topic nesting can be configured in a document-type shells. For example, the standard DITA configuration for concept topics only allows nested concept topics. However, local configuration of the concept topic type could allow other topic types to nest or disallow topic nesting entirely. In addition, the @chunk attribute enables topics to be equally re-usable regardless of whether they are separate or nested. The standard DITA configuration for database document-type documents allows unrestricted topic nesting and can be used for holding sets of otherwise unrelated topics that hold re-usable content. It can also be used to convert DITA topics from non-DITA legacy source without first determining how individual topics should be organized into separate XML documents.

### 3.3.7 Topic content

The content of all topics, regardless of topic type, is built on the same common structures.

#### Topic body

The topic body contains all content except for that contained in the title or the short description/abstract. The topic body can be constrained to remove specific elements from the content model; it also can be specialized to add additional specialized elements to the content model. The topic body can be generic while the topic title and prolog are specialized.

#### Sections and examples

The body of a topic might contain divisions, such as sections and examples. They might contain block-level elements like titles and paragraphs and phrase-level elements like API names or text. It is recommend that sections have titles, whether they are entered directly into the `<title>` element or rendered using a fixed or default title.

Either body divisions or untitled sections or examples can be used to delimit arbitrary structures within a topic body. However, body divisions can nest, but sections and examples cannot contain sections.

- `<bodydiv>`

  The `<bodydiv>` element enables the arbitrary grouping of content within the body of a topic for the purpose of content reuse. The `<bodydiv>` element does not include a title. For content that requires a title, use `<section>` or `<example>`.

- `<div>`

  The `<div>` element enables the arbitrary grouping of content within a topic. The `<div>` element does not include a title. For content that requires a title, use `<section>` or `<example>` or, possibly, `<fig>`.

#### Block-level elements

Paragraphs, lists, figures, and tables are types of “block” elements. As a class of content, they can contain other blocks, phrases, or text, though the rules vary for each structure.

#### Phrases and keywords

Phrase level elements can contain markup to label parts of a paragraph or parts of a sentence as having special semantic meaning or presentation characteristics, such as `<uicontrol>` or `<b>`.

Phrases can usually contain other phrases and keywords as well as text. Keywords can only contain text.

#### Images

Images can be inserted to display photographs, illustrations, screen captures, diagrams, and more. At the phrase level, they can display trademark characters, icons, toolbar buttons, and so forth.
Multimedia

The `<object>` element enables authors to include multimedia, such as diagrams that can be rotated and expanded. The `<foreign>` element enables authors to include media within topic content, for example, SVG graphics, MathML equations, and so on.

3.4 DITA maps

This topic collection contains information about DITA maps and the purposes that they serve. It also includes high-level information about DITA map elements, attributes, and metadata.

3.4.1 Definition of DITA maps

DITA maps are documents that organize topics and other resources into structured collections of information. DITA maps specify hierarchy and the relationships among the topics; they also provide the contexts in which keys are defined and resolved.

Maps draw on a rich set of existing best practices and standards for defining information models, such as hierarchical task analysis. They also support the definition of non-hierarchical relationships, such as matrices and groups, which provide a set of capabilities that has similarities to Resource Description Framework (RDF) and ISO topic maps.

DITA maps use `<topicref>` elements to reference DITA topics, DITA maps, and non-DITA resources, for example, HTML and TXT files. The `<topicref>` elements can be nested or grouped to create relationships among the referenced topics, maps, and non-DITA files; the `<topicref>` elements can be organized into hierarchies in order to represent a specific order of navigation or presentation.

DITA maps impose an architecture on a set of topics. Information architects can use DITA maps to specify what DITA topics are needed to support a given set of user goals and requirements; the sequential order of the topics; and the relationships that exist among those topics. Because DITA maps provide this context for topics, the topics themselves can be relatively context-free; they can be used and reused in multiple different contexts.

DITA maps often represent a single deliverable, for example, a specific Web site, a printed publication, or the online help for a product. DITA maps also can be subcomponents for a single deliverable, for example, a DITA map might contain the content for a chapter in a printed publication or the troubleshooting information for an online help system. The DITA specification provides specialized map types; book maps represent printed publications, subject scheme maps represent taxonomic or ontological classifications, and learning maps represent formal units of instruction and assessment. However, these map types are only a starter set of map types reflecting well-defined requirements.

DITA maps establish relationships through the nesting of `<topicref>` elements and the application of the `@collection-type` attribute. Relationship tables also can be used to associate topics with each other based on membership in the same row; for example, task topics can be associated with supporting concept and reference topics by placing each group in cells of the same row. During processing, these relationships can be rendered in different ways, although they typically result in lists of "Related topics" or "For more information" links. Like many aspects of DITA, the details about how such linking relationships are presented is determined by the DITA processor.

DITA maps also define keys and organize the contexts (key scopes) in which key references are resolved.

3.4.2 Purpose of DITA maps

DITA maps enable the scalable reuse of content across multiple contexts. They can be used by information architects, writers, and publishers to plan, develop, and deliver content.

DITA maps support the following uses:
Defining an information architecture
Maps can be used to define the topics that are required for a particular audience, even before the topics themselves exist. DITA maps can aggregate multiple topics for a single deliverable.

Defining what topics to build for a particular output
Maps reference topics that are included in output processing. Information architects, authors, and publishers can use maps to specify a set of topics that are processed at the same time, instead of processing each topic individually. In this way, a DITA map can serve as a manifest or bill of materials.

Defining navigation
Maps can define the online navigation or table of contents for a deliverable.

Defining related links
Maps define relationships among the topics they reference. These relationships are defined by the nesting of elements in the DITA map, relationship tables, and the use of elements on which the @collection-type attribute is set. On output, these relationships might be expressed as related links or the hierarchy of a table of contents (TOC).

Defining an authoring context
The DITA map can define the authoring framework, providing a starting point for authoring new topics and integrating existing ones.

Defining keys and key scopes
Maps can define keys, which provide an indirect addressing mechanism that enhances portability of content. The keys are defined by <topicref> elements or specializations of <topicref> elements, such as <keydef>. The <keydef> element is a convenience element; it is a specialized type of a <topicref> element with the following attributes:

- A required @keys attribute
- A @processing-role attribute with a default value of "resource-only".

Maps also define the context or contexts for resolving key-based references, such as elements that specify the @keyref or @conkeyref attribute. Elements within a map structure that specify a @keyscope attribute create a new context for key reference resolution. Key references within such elements are resolved against the set of effective key definitions for that scope.

Specialized maps can provide additional semantics beyond those of organization, linking, and indirection. For example, the subjectScheme map specialization adds the semantics of taxonomy and ontology definition.

3.4.3 DITA map attributes
DITA maps have unique attributes that are designed to control the way that relationships are interpreted for different output purposes. In addition, DITA maps share many metadata and linking attributes with DITA topics.

Comment by rodaande
We currently redefine a lot of attributes in this topic that are more comprehensively defined in the element reference; we need to reconcile those that are defined differently and ideally reuse definitions.

DITA maps often encode structures that are specific to a particular medium or output, for example, Web pages or a PDF document. Attributes, such as @deliveryTarget and @toc, are designed to help processors interpret the DITA map for each kind of output.

Comment by Kristen J Eberlein on 04 July 2019
The following paragraph seems off ...
Many of the following attributes are not available in DITA topics; individual topics, once separated from
the high-level structures and dependencies associated with a particular kind of output, should be entirely
reusable regardless of the intended output format.

@collection-type
The @collection-type attribute specifies how the children of a <topicref> element relate to
their parent and to each other. This attribute, which is set on the parent element, typically is used by
processors to determine how to generate navigation links in the rendered topics. For example, a
@collection-type value of "sequence" indicates that children of the specifying <topicref>
 element represent an ordered sequence of topics; processors might add numbers to the list of child
topics or generate next/previous links for online presentation. This attribute is available in topics on
the <linklist> and <linkpool> elements, where it has the same behavior. Where the
@collection-type attribute is available on elements that cannot directly contain elements, the
behavior of the attribute is undefined.

@linking
By default, the relationships between the topics that are referenced in a map are reciprocal:

- Child topics link to parent topics and vice versa.
- Next and previous topics in a sequence link to each other.
- Topics in a family link to their sibling topics.
- Topics referenced in the table cells of the same row in a relationship table link to each other.
  A topic referenced within a table cell does not (by default) link to other topics referenced in
  the same table cell.

This behavior can be modified by using the @linking attribute, which enables an author or
information architect to specify how a topic participates in a relationship. The following values are
valid:

- linking="none"
  Specifies that the topic does not exist in the map for the purposes of calculating links.

- linking="sourceonly"
  Specifies that the topic will link to its related topics but not vice versa.

- linking="targetonly"
  Specifies that the related topics will link to it but not vice versa.

- linking="normal"
  Default value. It specifies that linking will be reciprocal (the topic will link to related topics, and
  they will link back to it).

Authors also can create links directly in a topic by using the <xref> or <link> elements, but in
most cases map-based linking is preferable, because links in topics create dependencies between
topics that can hinder reuse.

Note that while the relationships between the topics that are referenced in a map are reciprocal, the
relationships merely imply reciprocal links in generated output that includes links. The rendered
navigation links are a function of the presentation style that is determined by the processor.

@toc
Specifies whether topics are excluded from navigation output, such as a Web site map or an online
table of contents. By default, <topicref> hierarchies are included in navigation output; relationship
tables are excluded.

@search
Specifies whether the topic is included in search indexes.
@chunk
Specifies that the processor generates an interim set of DITA topics that are used as the input for the final processing. This can produce the following output results:

- Multi-topic files are transformed into smaller files, for example, individual HTML files for each DITA topic.
- Individual DITA topics are combined into a single file.

Specifying a value for the @chunk attribute on a <map> element establishes chunking behavior that applies to the entire map, unless overridden by @chunk attributes that are set on more specific elements in the DITA map. For a detailed description of the @chunk attribute and its usage, see 5.4 Chunking (70).

@processing-role
Specifies whether the topic or map referenced is processed normally or treated as a resource that is only included in order to resolve key or content references.

processing-role="normal"
- The topic is a readable part of the information set. It is included in navigation and search results. This is the default value for the <topicref> element.

processing-role="resource-only"
- The topic is used only as a resource for processing. It is not included in navigation or search results, nor is it rendered as a topic. This is the default value for the <keydef> element.

If the @processing-role attribute is not specified locally, the value cascades from the closest element in the containment hierarchy.

@cascade
Specifies whether the default rules for the cascading of metadata attributes in a DITA map apply. The following values are specified:

merge
- Indicates that the metadata attributes cascade, and that the values of the metadata attributes are additive. This is the processing default for the @cascade attribute.

nomerge
- Indicates that the metadata attributes cascade, but that they are not additive for <topicref> elements that specify a different value for a specific metadata attribute. If the cascading value for an attribute is already merged based on multiple ancestor elements, that merged value continues to cascade until a new value is encountered. That is, setting cascade="nomerge" does not undo merging that took place on ancestor elements.

Aggregation of constraint modules
The content model of an element can be modified by either of the following element-configuration modules:

- Constraint module
- Expansion module

For any document-type shell, the content model of an element can only be modified by a single element-type configuration module. If multiple constraints or extensions need to be applied to a single element, the element configurations must be combined into a single module that reflects all the constraints and expansions that were defined in the original separate modules.

Processors also MAY define additional values for the @cascade attribute.
For more information, see 3.4.4 Example: How the cascade attribute functions (35).

@keys
Specifies one or more key names.

@keyscope
Defines a new scope for key definition and resolution, and gives the scope one or more names. For more information about key scopes, see 6.4 Indirect key-based addressing (93).

Attributes in the list above are used exclusively or primarily in maps, but many important map attributes are shared with elements in topics. DITA maps also use many of the following attributes that are used with linking elements in DITA topics, such as <link> and <xref>:

- @format
- @href
- @keyref
- @scope
- @type

The following metadata and reuse attributes are used by both DITA maps and DITA topics:

- @rev, @status, @importance
- @dir, @xml:lang, @translate
- @id, @conref, @conrefend, @conkeyref, @conaction
- @props and any attribute specialized from @props, including those integrated by default in the OASIS-provided document-type shells: @audience, @deliveryTarget, @platform, @product, @otherprops
- @search

When new attributes are specialized from @props or @base as a domain, they can be incorporated into both map and topic structural types.

### 3.4.4 Examples of DITA maps

This section of the specification contains simple examples of DITA maps. The examples illustrate a few of the ways that DITA maps are used.

#### 3.4.4.1 Example: DITA map that references a subordinate map

This example illustrates how one map can reference a subordinate map using either <mapref> or the basic <topicref> element.

The following code sample illustrates how a DITA map can use the specialized <mapref> element to reference another DITA map:

```xml
<map>
  <title>DITA work at OASIS</title>
  <topicref href="oasis-dita-technical-committees.dita">
    <topicref href="dita_technical_committee.dita"/>
    <topicref href="dita_adoption_technical_committee.dita"/>
  </topicref>
  <mapref href="oasis-processes.ditamap"/>
<!-- ... -->
</map>
```
The `<mapref>` element is a specialized `<topicref>` intended to make it easier to reference another map; use of `<mapref>` is not required for this task. This map also could be tagged in the following way:

```xml
<map>
  <title>DITA work at OASIS</title>
  <topicref href="oasis-dita-technical-committees.dita">
    <topicref href="dita_technical_committee.dita"/>
    <topicref href="dita_adoption_Technical_committee.dita"/>
  </topicref>
  <topicref href="oasis-processes.ditamap" format="ditamap"/>
</map>
```

With either of the above examples, during processing, the map is resolved in the following way:

```xml
<map>
  <title>DITA work at OASIS</title>
  <topicref href="oasis-dita-technical-committees.dita">
    <topicref href="dita_technical_committee.dita"/>
    <topicref href="dita_adoption_Technical_committee.dita"/>
  </topicref>
  <!-- Contents of the oasis-processes.ditamap file -->
  <topicref href="oasis-processes.dita">
  </topicref>
</map>
```

### 3.4.4.2 Example: DITA map with a simple relationship table

This example illustrates how to interpret a basic three-column relationship table used to maintain links between concept, task, and reference material.

The following example contains the markup for a simple relationship table:

```xml
<map>
  <!-- ... -->
  <reltable>
    <relheader>
      <relcolspec type="concept"/>
      <relcolspec type="task"/>
      <relcolspec type="reference"/>
    </relheader>
    <relrow>
      <relcell><topicref href="A.dita"/></relcell>
      <relcell><topicref href="B.dita"/></relcell>
      <relcell><topicref href="C1.dita"/></relcell>
    </relrow>
    <relrow>
      <relcell><topicref href="A.dita"/></relcell>
      <relcell><topicref href="B.dita"/></relcell>
      <relcell><topicref href="C2.dita"/></relcell>
    </relrow>
  </reltable>
</map>
```

A DITA-aware tool might represent the relationship table graphically:

<table>
<thead>
<tr>
<th>type=&quot;concept&quot;</th>
<th>type=&quot;task&quot;</th>
<th>type=&quot;reference&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C2</td>
</tr>
</tbody>
</table>
When the output is generated, the topics contain the following linkage:

A
  Links to B, C1, and C2

B
  Links to A, C1, and C2

C1, C2
  Links to A and B

3.4.4.3 Example: How the @collection-type and @linking attributes determine links

In this scenario, a simple map establishes basic hierarchical and relationship table links. The @collection-type and @linking attributes are then added to modify how links are generated.

The following example illustrates how linkage is defined in a DITA map:

**Figure 3: Simple linking example**

```xml
<topicref href="A.dita" collection-type="sequence">
  <topicref href="A1.dita"/>
  <topicref href="A2.dita"/>
</topicref>
<reltable>
  <relrow>
    <relcell><topicref href="A.dita"/></relcell>
    <relcell><topicref href="B.dita"/></relcell>
  </relrow>
</reltable>
```

When the output is generated, the topics contain the following linkage. Sequential (next/previous) links between A1 and A2 are present because of the @collection-type attribute on the parent:

A
  Links to A1, A2 as children
  Links to B as related

A1
  Links to A as a parent
  Links to A2 as next in the sequence

A2
  Links to A as a parent
  Links to A1 as previous in the sequence

B
  Links to A as related

The following example illustrates how setting the @linking attribute can change the default behavior:

**Figure 4: Linking example with the @linking attribute**

```xml
<topicref href="A.dita" collection-type="sequence">
  <topicref href="B.dita" linking="none"/>
  <topicref href="A1.dita"/>
  <topicref href="A2.dita"/>
</topicref>
<reltable>
  <relrow>
    <relcell><topicref href="A.dita"/></relcell>
    <relcell linking="sourceonly"><topicref href="B.dita"/></relcell>
  </relrow>
</reltable>
```
When the output is generated, the topics contain the following linkage:

A

<table>
<thead>
<tr>
<th>Links to A1, A2 as children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does not link to B as a child or related topic</td>
</tr>
</tbody>
</table>

A1

<table>
<thead>
<tr>
<th>Links to A as a parent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Links to A2 as next in the sequence</td>
</tr>
<tr>
<td>Does not link to B as previous in the sequence</td>
</tr>
</tbody>
</table>

A2

<table>
<thead>
<tr>
<th>Links to A as a parent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Links to A1 as previous in the sequence</td>
</tr>
</tbody>
</table>

B

| Links to A as a related topic |

3.4.4.4 Example: How the @cascade attribute functions

The following example illustrates how the @cascade attribute can be used to fine tune how the values for the @platform attribute apply to topics referenced in a DITA map.

Here a DITA map contains a collection of topics that apply to Windows, Linux, and Macintosh OS; it also contains a topic that is only applicable to users running the application on Linux.

```xml
<map product="PuffinTracker" platform="win linux mac" cascade="nomerge">
  <title>Puffin Tracking Software</title>
  <topicref href="/introduction.dita/>
  <topicref href="/setting-up-the-product.dita/>
  <topicref href="/linux-instructions.dita" platform="linux="/>
</map>
```

The values of the @platform attribute set at the map level cascade throughout the map and apply to the introduction.dita and setting-up-the-product.dita topics. However, since the value of the @cascade attribute is set to "nomerge", the value of the @platform attribute for the linux-instructions.dita topic does not merge with the values that cascade from above in the DITA map. The effective value of the @platform attribute for linux-instructions.dita is "linux".

The same results are produced by the following mark-up:

```xml
<map product="PuffinTracker" platform="win linux mac">
  <title>Puffin Tracking Software</title>
  <topicref href="/introduction.dita/>
  <topicref href="/setting-up-the-product.dita/>
  <topicref href="/linux-instructions.dita" platform="linux" cascade="nomerge="/>
</map>
```

3.5 DITA metadata

Metadata can be applied in both DITA topics and DITA maps. Metadata that is specified in DITA topics can be supplemented or overridden by metadata that is assigned in a DITA map. This design facilitates the reuse of DITA topics in different DITA maps and use-specific contexts.

DITA defines a core set of metadata elements to cover a variety of common scenarios. Because metadata requirements vary so widely, it is expected that few implementations will use the full range of these elements.
DITA also provides two generic elements, `<data>` and `<othermeta>`, which are intended for use when the core metadata elements do not provide the correct semantic. In addition, `<data>` is especially useful as a specialization base.

Requirements for rendering metadata vary widely. For that reason, any rendering of metadata in published content is left up to implementations.

### 3.5.1 Metadata elements

Metadata elements are available in both topics and DITA maps. This design enables authors and information architects to use identical metadata markup in both topics and maps.

When used in maps, metadata elements are located in the `<topicmeta>` element. When used in topics, metadata elements are located in the `<prolog>` element.

In general, specifying metadata in a `<topicmeta>` element that is a child of a `<topicref>` element is equivalent to specifying it in the `<prolog>` element of the referenced topic. The value of specifying the metadata in the map is that the topic then can be reused in other maps where different metadata might apply. Many items in the `<topicmeta>` element cascade to nested `<topicref>` elements within the map. See 5.3.2 Reconciling topic and map metadata elements (62) for information about which elements cascade.

### 3.5.2 Metadata attributes

Metadata attributes specify properties of the content that can be used to determine how the content is processed. Specialized metadata attributes can be defined to enable specific business-processing needs, such as semantic processing and data mining.

Metadata attributes typically are used for the following purposes:

- Filtering content based on the attribute values, for example, to suppress or publish profiled content
- Flagging content based on the attribute values, for example, to highlight specific content on output
- Performing custom processing, for example, to extract business-critical data and store it in a database

The base DITA vocabulary includes five specializations of the `@props` attribute as domains: `@audience`, `@deliveryTarget`, `@platform`, `@product`, and `@otherprops`. These five attributes are included in all the map and topic document-type shells that are provided with the specification.

Metadata attributes fall into the following categories.

#### Architectural attributes

The `@class`, `@DITAArchVersion`, and `@specializations` attributes provide metadata about the DITA source itself, such as what version of the grammar is used. These attributes are not intended for use in authored content.

#### Filtering and flagging attributes

The `@props` attribute and its specializations are intended for filtering. This includes the five specializations added to the OASIS document-type shells: `@audience`, `@deliveryTarget`, `@platform`, `@product`, and `@otherprops`. These attributes plus the `@rev` attribute are intended for flagging.

#### Other metadata attributes

The `@status` and `@importance` attributes, many of the attributes available on the `<ux-window>` element, as well as custom attributes specialized from `@base`, are intended for application-specific
behaviors. Such behaviors include aiding in search and retrieval, as well as controlling how a user assistance window is rendered.

**Translation and localization attributes**

The `@dir`, `@translate`, and `@xml:lang` attributes are intended for use with translating and localizing content.

### 3.5.3 Metadata in maps and topics

Metadata can be specified in both maps and topics. In most cases, metadata in the map either supplements or overrides metadata that is specified at the topic level.

Metadata can be specified by all the following mechanisms:

- Metadata elements that are located in the DITA map
- Specifying attributes on the `<map>` or `<topicref>` elements
- Metadata elements or attributes that are located in the DITA topic

Metadata elements and attributes in a map might apply to an individual topic, a set of topics, or globally for the entire document. Most metadata elements authored within a `<topicmeta>` element associate metadata with the parent element and its children. Because the topics in a branch of the hierarchy typically have some common subjects or properties, this is a convenient mechanism to define metadata for a set of topics.

Comment by rodaande on 8 Feb 2022

We should have a related link from this topic to the section on cascading; this is a conceptual topic about metadata and should not repeat the processing rules, but reading this I immediately want to know *which* elements cascade and how that works.

When the same metadata element or attribute is specified in both a map and a topic, by default the value in the map takes precedence. The assumption is that the map author has more knowledge of the reusing context than the topic author.

### 3.5.4 Window metadata for user assistance

Some user assistance topics might need to be displayed in a specific window or viewport, and this windowing metadata can be defined in the DITA map within the `<ux-window>` element.

In some help systems, a topic might need to be displayed in a window with a specific size or set of features. For example, a help topic might need to be displayed immediately adjacent to the user interface control that it supports in a window of a specific size that always remains on top, regardless of the focus within the operating system.

Application metadata that is specified on the `<ux-window>` element is closely tied to that specific application. It might be ignored when content is rendered for other uses.

**Related reference**

resourceid (333)

A resource ID is an identifier that is designed for applications that need to use their own identifier scheme, such as context-sensitive help systems and databases.

ux-window (314)

A UX window specification is a collection of metadata for a window or viewport in which a user assistance topic or web page can be displayed. The window or viewport can be referenced by the `<resourceid>` element that is associated with a topic or `<topicref>` element.
4 Accessibility and translation

Content needed

4.1 Accessibility
DITA has markup and features that enable producing output that is accessible by all audiences.

4.1.1 Handling accessibility in content and in processors
Accessibility requirements vary depending on how content is rendered. Making content accessible is work that involves both content authors and the processors that render DITA content.

The foundation for accessible content is the Web Content Accessibility Guidelines (WCAG) from W3C. While content formats and content authors might have unique or additional accessibility needs, the rules outlined in the WCAG provide a reference point for considering how to create accessible content in DITA.

The guidelines fall into several categories:

General content guidelines

Many accessibility guidelines and best practices apply to all content. Such guidelines are generally outside the scope of this specification.

For example, a guideline might recommend against multiple levels of nested unordered lists, because such lists are difficult to navigate with a screen reader. As a general content standard, DITA cannot prohibit such nesting. However, implementations can prevent such nesting through business processes or rule-based processing such as Schematron.

Another common accessibility recommendation is to avoid flashing or flickering video content. The DITA `<video>` element is a general mechanism for including video, and the content of that video is outside the scope of this specification.

Markup guidelines

Other accessibility guidelines require the use of specific DITA markup. Such guidelines are addressed in this specification.

For example, a requirement that images specify alternate text requires the use of the `<alt>` element within the `<image>` element. However, a guideline that the alternate text be meaningful is not something that can be enforced by DITA markup.

Guidelines that require enablement by DITA processors

Some accessibility guidelines require processors to take advantage of specific DITA markup.

Authors can use specific markup to enable accessible output. For example, by specifying a header row in a table, an author can define a header for every cell in the table body. However, to make the relationship between the table cell and header cell specific in a rendered format like HTML, the processor must make those relationships explicit in the output.

Processor requirements outside the scope of DITA markup

Processors have many other accessibility concerns that are outside the scope of this specification.

For example, WCAG has a requirement for contrast ratios when rendering substantive content. That requirement is unrelated to the source content. Such requirements apply to rendering mechanisms such as the CSS that is used to style DITA content in a browser.
As another example, a DITA processor might generate automated headings or include characters in output, such as:

- A section heading for an element specialized from `<section>`, such as “Requirements” for the `<prereq>` element in a task topic
- The greater-than character (`>` that is typically used between phrases that are part of a menu navigation

It is up to the processor to use correct rendering for these cases, such as heading markup and accessible text alternatives for character displays such as the menu separator.

**Related information**

Web Content Accessibility Guidelines 2.0

The currently effective versions of WCAG are 2.0 and 2.1. WCAG 2.1 extends the 2.0 standard.

### 4.1.2 Accessible content

DITA provides elements and attributes that are designed to make content accessible.

Many common types of content are not accessible to all readers. For example, an image cannot be rendered by a screen reader, and a video cannot be rendered in many formats. DITA includes markup features that are designed to convey alternate versions of such content.

**Alternate text for images**

Alternate text is a textual description of an image. Systems often render the alternate text when the reader is using assistive technology or the image cannot be rendered.

The `<alt>` element is available inside of images as a way to specify alternate text.

**Alternate text for areas of image maps**

Within an image map, each defined area of the image can specify a cross reference. Whether or not the cross reference actually specifies a URI reference, the text within that cross reference functions as alternate or hover text.

**Long descriptions for media**

A long description reference is a reference to a textual description of a graphic or object. This is typically used to provide an extended description when the graphic or object is too complicated to describe with alternate text.

Processors can handle the reference in the following ways:

- Render the graphic or object as a link
- Make the extended description available to accessibility tools such as screen readers

While DITA provides the markup to enable these accessibility features, it is up to DITA processors to render output that uses the markup properly. For example, when a processor generates HTML5, alternate text must be specified using the `@alt` attribute on the `<img>` element.

### 4.1.3 Accessible tables

The complexity of table rendering requires authors and processors to be aware of several table-specific elements and attributes if they want to ensure that tables are accessible.

DITA topics support two types of tables: complex table and simple table.
The `<table>` element uses the OASIS Exchange Table Model, a simplification of the CALS table model. The complex table provides a wide variety of controls over the display properties of the data and even the table structure itself.

The `<simpletable>` element is structurally less complex than the `<table>` element and so is an easier base for specialization. It reflects a content model that is close to the HTML table. The `<simpletable>` element does not provide much control over formatting, although it permits titles and row and column spanning.

The following list provides information about table features that have an effect on table accessibility. Note that some features are applicable only to the complex tables that are produced by the `<table>` element.

**Captions**
Both table models allow for a caption to be provided by using the `<title>` element.

**Cell headers**
(Complex table only) When entries within a table function as headers, but do not fall into the categories of column or row headers, the `@id` and `@headers` attributes on `<table>` cells can be used. Specifying the `@id` attribute on the cell that functions as a header, and setting the `@headers` attribute to that ID value on table cell for which it acts as a header serves to relate table cells to headers.

**Column headers**
Both table models provide support for column headers:

- **Complex table**
  (First column) The `@rowheader` attribute can be set to "firstcol" to indicate that the first column is a header. Alternatively, the `@scope` attribute in the first entry in the first row to can be set to "col" to indicate that it is a header for the entire column.
  (Other columns) The `<colspec>` element can define which columns function as headers. For that case, set the `@rowheader` attribute to "headers" on the column or columns that function as headers. Alternatively, set the `@scope` attribute on each relevant entry in the first row to "col", indicating that the entry is a header for the entire column.

- **Simple table**
The `@keycol` attribute can be set to the number of the column that functions as a header.

**Row headers**
Both table models provide support for a row header:

- **Complex table**
The `<thead>` element can provide one or more header rows.

- **Simple table**
The `<sthead>` element can be used to provide a single row header.

**Summaries**
(Complex table only) While the `@summary` attribute on tables is deprecated in HTML5, the `<desc>` element within a `<table>` can be used to store a summary. Since the content of the `<desc>` element is typically rendered as part of the content flow when used within `<table>`, processors might need special configuration to support this usage.

**4.1.4 Examples of DITA markup for accessibility**
This section contains examples of how DITA markup facilitates accessibility.
A couple of comments:

- This section does not include examples of simple tables and accessibility. Do we need an example here? Can we simply point to the examples in the `<simpletable>` topic?
- The example topics about `<table>` were relocated from the element-reference `<table>` topic. They were reviewed as part of that content, but might need some slight tweak now that they are part of the "Accessibility" topic.

4.1.4.1 Example: Alternate text for an image

In this scenario, an image of a ticketing workflow also provides alternate text that describes the image.

The following code sample references an image and provides alternate text:

```xml
<image href="workflow.png">
  <alt>A workflow diagram that shows a ticketing workflow. The workflow states are described in the text.</alt>
</image>
```

4.1.4.2 Example: Alternate text for an image map

Comment by robander

We have an example in the imagemap.dita element reference topic, which already includes alternate text. Not sure it's the best example for alt text, but also not sure whether it makes sense to come up with a new one?

Comment by Kristen J Eberlein on 09 June 2022

I think we need a realistic example here in this section which focuses on accessibility. The `<imagemap>` topic is in the "Utilities domain,", which has not yet been reviewed. The example there is old and not very good; it dates back to DITA 1.0.

Here are some possible ideas for what to showcase:

- A simple pie chart of application users by industry sectors
- A collage of photos of a company's executive team
- A diagram of a sampler quilt, with various blocks linked to pages that explain the specific blocks

4.1.4.3 Example: Fallback information for multimedia content

In this scenario, fallback content is provided for systems that cannot display multimedia content.

The referenced video provides an image as fallback. If a system does not support video, it will display the image `video-not-available.png`, which specifies its own alternate text.

```xml
<video height="300px"
  loop="false"
  muted="false"
  poster="demo1-video-poster"
  width="400px">
  <desc>A video that illustrates how to conduct a system health scan.</desc>
  <fallback>
    <image href="video-not-available.png">
      <alt>This video cannot be displayed.</alt>
    </image>
  </fallback>
</video>
```
4.1.4.4 Example: Complex table with accessibility markup

In the following code sample, the table uses the `<thead>` element to identify header rows and the `@rowheader` attribute to identify a header column. These header relationships can be used to automatically create renderings of the table in other formats, such as HTML, that can be navigated using a screen reader or other assistive technology.

```xml
<table frame="all" rowheader="firstcol">
  <title>Sample of automated table accessibility</title>
  <desc>Names are listed in the column c1. Points are listed in both data columns, with expected points in column c2 and actual points in column c3.</desc>
  <tgroup cols="3">
    <colspec colname="c1"/>
    <colspec colname="c2"/>
    <colspec colname="c3"/>
    <thead>
      <row>
        <entry morerows="1">Name</entry>
        <entry namest="c2" nameend="c3">Points</entry>
      </row>
      <row>
        <entry>Expected</entry>
        <entry>Actual</entry>
      </row>
    </thead>
    <tbody>
      <row>
        <entry>Mark</entry>
        <entry>10,000</entry>
        <entry>11,123.45</entry>
      </row>
      <row>
        <entry>Peter</entry>
        <entry>9,000</entry>
        <entry>11,012.34</entry>
      </row>
      <row>
        <entry>Cindy</entry>
        <entry>10,000</entry>
        <entry>10,987.64</entry>
      </row>
    </tbody>
  </tgroup>
</table>
```

In this code sample, navigation information for assistive technology is derived from two sources:

- The `<thead>` element contains two rows, and indicates that each entry in those header rows is a header cell for that column. This means that each body cell can be associated with the header cell or cells above the column. For example, in the second body row, the entry "Peter" can be associated with the header "Name"; similarly, the entry "9,000" can be associated with the headers "Expected" and "Points".

- The `@rowheader` attribute that is specified on `<table>` indicates that the first column plays a role as a header. This means that each body cell in columns two and three can be associated with the header cell in column one. For example, in the second body row, the entry "9,000" can be associated with the header "Peter".

As a result of these two sets of headers, a rendering of the table can associate the entry "9,000" with three headers: "Peter", "Expected", and "Points", thus making it fully navigable by a screen reader or other assistive technology.

The output might be rendered in the following way:
4.1.4.5 Example: Complex table with some manually-specified accessibility markup

In some complex tables, the `<thead>` element and `@rowheader` attribute might not be enough to support all accessibility needs. Assume that the table above is flipped so that the names are listed across the top row, instead of in the first column, as shown in the following screen capture:

<table>
<thead>
<tr>
<th>Name</th>
<th>Points</th>
<th>Mark</th>
<th>Peter</th>
<th>Cindy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark</td>
<td>10,000</td>
<td>11,123.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peter</td>
<td>9,000</td>
<td></td>
<td>11,012.34</td>
<td></td>
</tr>
<tr>
<td>Cindy</td>
<td>10,000</td>
<td></td>
<td></td>
<td>10,987.64</td>
</tr>
</tbody>
</table>

Here, the `@rowheader` attribute cannot be used, because it only able to specify the first column as a header column. In this case, the `@scope` attribute can be used to indicate that entries in the first and second columns function as headers for the entire row (or row group, in the case of a cell that spans more than one row).

The following code sample demonstrates the use of the `@scope` attribute to facilitate navigation of these rows by a screen reader or other assistive technology. Note that the `<thead>` element is still used to imply a header relationship with the names at the top of each column.

```xml
<table frame="all">
    <title>Sample with two header columns</title>
    <tgroup cols="5">
        <colspec colname="c1"/>
        <colspec colname="c2"/>
        <colspec colname="c3"/>
        <colspec colname="c4"/>
        <colspec colname="c5"/>
        <thead>
            <row>
                <entry name="c1" nameend="c2">Name</entry>
                <entry>Mark</entry>
                <entry>Peter</entry>
                <entry>Cindy</entry>
            </row>
        </thead>
        <tbody>
            <row>
                <entry morerows="1" scope="rowgroup">Points</entry>
                <entry scope="row">Expected</entry>
                <entry>10,000</entry>
                <entry>9,000</entry>
                <entry>10,000</entry>
            </row>
            <row>
                <entry scope="row">Actual</entry>
                <entry>11,123.45</entry>
                <entry>11,012.34</entry>
                <entry>10,987.64</entry>
            </row>
        </tbody>
    </tgroup>
</table>
```
4.1.4.6 Example: Complex table with manual accessibility markup

In extremely complex tables, such as those with a single header cell in the middle of the table, fine-grained accessibility controls are available to explicitly associate any content cell with any header cell. This might also be useful for cases where processors do not support the implied accessibility relationships described above.

In the following sample, header cells are identified using the @id attribute, which is referenced using the @headers attribute on appropriate content cells. This makes all header relationships in the table explicit. Note that this sample ignores the @scope attribute, which could be used to exercise manual control without setting as many attribute values; it also ignores the fact that <thead> creates a header relationship even when the @id and @headers attributes are not used.

```xml
<table frame="all">
  <title>Sample with fully manual accessibility control</title>
  <desc>Names are listed in the column c1. Points are listed in both data columns, with expected points in column c2 and actual points in column c3.</desc>
  <tgroup cols="3">
    <colspec colname="c1"/>
    <colspec colname="c2"/>
    <colspec colname="c3"/>
    <thead>
      <row>
        <entry morerows="1"> </entry>
        <entry namest="c2" nameend="c3" id="pts">Points</entry>
      </row>
      <row>
        <entry id="exp" headers="pts">Expected</entry>
        <entry id="act" headers="pts">Actual</entry>
      </row>
    </thead>
    <tbody>
      <row>
        <entry id="name1">Mark</entry>
        <entry headers="name1 exp pts">10,000</entry>
        <entry headers="name1 act pts">11,123.45</entry>
      </row>
      <row>
        <entry id="name2">Peter</entry>
        <entry headers="name2 exp pts">9,000</entry>
        <entry headers="name2 act pts">11,012.34</entry>
      </row>
      <row>
        <entry id="name3">Cindy</entry>
        <entry headers="name3 exp pts">10,000</entry>
        <entry headers="name3 act pts">10,987.64</entry>
      </row>
    </tbody>
  </tgroup>
</table>
```

The output might be rendered in the following way:
4.2 Translation and localization

DITA has markup that facilitates translation and localization. This markup includes the `@xml:lang` attribute, the `@dir` attribute, and the `@translate` attribute.

4.2.1 The `@xml:lang` attribute

The `@xml:lang` attribute specifies the language and optional locale of the content that is contained in an element. The `@xml:lang` attribute is described in the XML Recommendation.

Since the `@xml:lang` attribute is an inherent property of the XML document, it does not behave in the same way as other DITA metadata attributes do.

Within topic and map documents, the `@xml:lang` attribute applies to the content and attributes that are contained by the element on which it is specified. This means that it supplies a value for lower-level elements in the containment hierarchy that do not supply their own value for the `@xml:lang` attribute. However, any such value is overridden when an `@xml:lang` attribute with a different value is specified on lower-level elements in the containment hierarchy.

When the `@xml:lang` attribute is specified on a topic reference, it does not apply to the referenced resource. This means that the value of the `@xml:lang` attribute on a topic reference (or the root element of the map) does not automatically supply a default value for the referenced topic or DITA map.

For topic and map documents, if no value for the `@xml:lang` value is specified explicitly or on a higher-level element in the containment hierarchy, a processor-determined default value is assumed.

4.2.1.1 Recommendations for the `@xml:lang` attribute

Specifying the `@xml:lang` attribute in the DITA source facilitates translation and helps ensure that processors will handle content appropriately. Accordingly, this specification makes certain best-practices recommendations for where the `@xml:lang` attribute should be set.

Setting the `@xml:lang` attribute in the source-language document facilitates the translation process. Some translation tools do not support adding new markup to the document that is being translated, so if the source language content does not set the `@xml:lang` attribute, it might be difficult or impossible for a translator to add the `@xml:lang` attribute to the translated document.

In addition, setting the `@xml:lang` attribute in the DITA source ensures that processors handle content in a language- and locale-appropriate way. If the `@xml:lang` attribute is not set, processors might assume a default value which is inappropriate for the DITA content.

The following table outlines the recommended use of the `@xml:lang` attribute in topics and maps. These recommendations ensure that DITA resources have an effective default language.
### 4.2.1.2 Processing expectations regarding the @xml:lang attribute

When the @xml:lang attribute is specified as recommended, a language for the content is clearly indicated. However, when the @xml:lang attribute is not specified, processors might need to assign a default value.

- **004 (405)** If the root element of a map or a top-level topic has no value for the @xml:lang attribute, a processor SHOULD assume a default value. The default value of the processor can be either fixed, configurable, or derived from the content itself, such as the @xml:lang attribute on the root map.

- **005 (405)** When a @conref or @conkeyref attribute is used to include content from one element into another, the processor MUST use the effective value of the @xml:lang attribute from the referenced element. If the referenced element does not have an explicit value for the @xml:lang attribute, the processor SHOULD use the default value.

- **006 (405)** Processors SHOULD render each element in a way that is appropriate for its language as identified by the @xml:lang attribute.

### 4.2.1.3 Example: content reference and the @xml:lang attribute

This example outlines how processors determine the effective value of the @xml:lang attribute for content that is referenced by the @conref or @conkeyref attribute.

In this scenario, a company has a notices topic that contains warnings in multiple languages. The notices topic specifies an @xml:lang attribute of "en". However, it contains content that is reused from topics that explicitly set the @xml:lang attribute to "fr" and "de".

The following code block shows the content of the DITA topic that contains the referencing elements:

**Figure 5: Topic that contains the conrefs**

```xml
<topic xml:lang="en" id="notices">
  <title>NOTICES</title>
  <shortdesc>Be sure to read all product safety information before using the product.</shortdesc>
  <body>
    <note id="warning-english" conref="warnings-en.dita#warnings/general"/>
    <note id="warning-french" conref="warnings-fr.dita#warnings/general"/>
    <note id="warning-german" conref="warnings-de.dita#warnings/general"/>
  </body>
</topic>
```
The following code blocks show the content of the topics that contains the referenced elements:

**Figure 6: English warnings topic: warnings-en.dita**

```xml
<topic id="warnings" xml:lang="en">
  <title>Reusable warnings (English)</title>
  <body>
    <note id="general">General notice about using the product...</note>
    <note id="water">Warning about using the product near water...</note>
    <!-- Other reusable warnings -->
  </body>
</topic>
```

**Figure 7: French warnings topic: warnings-fr.dita**

```xml
<topic id="warnings" xml:lang="fr">
  <title>Reusable warnings (French)</title>
  <body>
    <note id="general">(French translation of: General notice about using the product...)</note>
    <note id="water">(French translation of: Warning about using the product near water...)</note>
    <!-- Other reusable warnings -->
  </body>
</topic>
```

**Figure 8: German warnings topic: warnings-de.dita**

```xml
<topic id="warnings" xml:lang="de">
  <title>Reusable warnings (German)</title>
  <body>
    <note id="general">(German translation of: General notice about using the product...)</note>
    <note id="water">(German translation of: Warning about using the product near water...)</note>
    <!-- Other reusable warnings -->
  </body>
</topic>
```

When the topic that contains the conrefed notes is processed, the following occurs:

- The `<note>` element with the `@id` attribute set to "warning-french" has an effective value for the `@xml:lang` attribute of "fr".
- The `<note>` element with the `@id` attribute set to "warning-german" has an effective value for the `@xml:lang` attribute of "de".

In each case, the effective value of the `@xml:lang` attribute for the note is determined by the value of the `@xml:lang` attribute that is specified on the topic that contains the referenced element, instead of the value of the `@xml:lang` attribute that is specified on the notices topic that contains the referencing elements.

### 4.2.2 The `@dir` attribute

The `@dir` attribute provides instructions to processors about how bidirectional text is rendered.

The `@dir` attribute identifies or overrides the text directionality. The following values are valid:

- **lro**
  - Indicates an override of the Unicode Bidirectional Algorithm, forcing the element into left-to-right mode.
ltr
Indicates left-to-right.

rlo
Indicates an override of the Unicode Bidirectional Algorithm, forcing the element into right-to-left mode.

rtl
Indicates right-to-left.

-dita-use-conref-target
See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

4.2.2.1 The Unicode Bidirectional Algorithm
The Unicode Bidirectional Algorithm plays a critical role in ensuring that bidirectional text is correctly rendered.

Bidirectional text is text that contains text in both text directionalities, right-to-left (RTL) and left-to-right (LTR). Common examples of bidirectional text include the following:

- Documents in RTL languages such as Arabic, Hebrew, Farsi, Urdu, and Yiddish that include numerics or embedded sections of LTR text
- Documents that contain text in both LTR and RLT languages, for example, a topic that lists the names of a movie in multiple languages

The Unicode Bidirectional Algorithm specifies how text should be rendered for a given language. For more information about the Unicode Bidirectional Algorithm, see the following resources:

- Unicode Bidirectional Algorithm, Unicode Standard Annex #9
- Specifying the direction of text and tables: the dir attribute, HTML 4.01 Specification
- Inline markup and bidirectional text in HTML, W3C internationalization article
- XHTML Bi-directional Text Attribute Module, XHTML 2.0 W3C Working Draft 22

4.2.2.2 Recommended usage of the @dir attribute
Typically, processors that fully support the Unicode Bidirectional Algorithm handle bidirectional text without the need to specify directionality in the DITA source, if the @xml:lang attribute is specified on the highest-level element.

The need to specify the @dir attribute primarily occurs in the following situations:

- Processors that do not fully support the Unicode Bidirectional Algorithm
- Documents that contain bidirectional text and characters with neutral bidirectionality

For the above situations, we recommend that DITA source documents, in addition to specifying the @xml:lang attribute, also specify the @dir attribute on the highest-level element that is necessary.

4.2.2.3 Processing expectations regarding the Unicode Bidirectional Algorithm
Processor support for the Unicode Bidirectional Algorithm is critical.

DITA processors SHOULD fully support the Unicode Bidirectional Algorithm. This ensures that processors can implement the script and directionality for each language that is used in a document.
4.2.3 The @translate attribute

The @translate attribute provides information about whether the content of an element is to be translated.

The following values are valid: "yes", "no", and "-dita-use-conref-target".

A few elements have the @translate attribute set by default to "no". These elements include <draft-comment> and <required-cleanup>, all elements that are designed to hold content that is not intended for publication.

The non-normative appendix, C.5 Element-by-element recommendations for translators (422), includes information on whether the element is block or inline, whether the element contents are likely to be suitable for translation, and whether the element has attributes whose values might need translation.
5 DITA map processing

Introduction to this chapter to be written later, when content is more stable.

5.1 DITA maps and their usage

New topic cluster to hold normative architectural content about DITA maps. Currently holds notes about material that we intend to cover in the new topic cluster.

Comment by Kristen J Eberlein on 02 December 2021

Zoe made the following comment during review A:

“Why are we talking about hierarchical links when discussing rendering expectations for related-links? I'm not sure this is the right location for this information. However, I'm not sure where that information is. I was trying to figure out where it's spelled out how parent/child links are 'expected' to be rendered and I didn't have luck finding it (partially because I went cross-eyed looking at the 104 references to "linking")."

Can we please add a related link [from the related-links topic] to the related-links section of the spec?

Topical areas

- How `<topicref>` elements establish hierarchies including parent/child relationships and next/previous relationships.
- Map-group elements
  - Role as convenience elements—in most (all?) cases, the same function can be accomplished with base elements. For example, `<topichead>` is effectively no different than `<topicref>` with nothing but a title.
  - Special role of `<topicgroup>`, which does not contribute to hierarchy
- How relationship tables establish linking relationships between topic references
- Meaning of titles (and navigation titles) on maps, submaps, mapgroup elements, and relationship tables
- Link relationships created by attributes and nesting in DITA maps

Current topics with applicable content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Applicable content</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.4.5.1 Example: DITA map that references a subordinate map</td>
<td>Resolution of a submap.</td>
</tr>
<tr>
<td>3.4.5.2 Example: DITA map with a simple relationship table</td>
<td>How links are generated from a relationship table; how processors might represent a relationship table.</td>
</tr>
<tr>
<td>3.4.5.3 Example: How the @collection-type and @linking determine links</td>
<td>Effect of @collection-type and @linking attributes on generated links.</td>
</tr>
<tr>
<td>6.1 Navigation</td>
<td>Container topic; incorporate into new “DITA maps and their usage” cluster.</td>
</tr>
<tr>
<td>Topic</td>
<td>Applicable content</td>
</tr>
<tr>
<td>-------</td>
<td>--------------------</td>
</tr>
<tr>
<td>6.1.1 Table of contents</td>
<td>All content is applicable and needs to be incorporated into the new &quot;DITA maps and their usage&quot; cluster – Closest thing we currently have to a topic about how maps create hierarchies.</td>
</tr>
<tr>
<td>9.3.1.1 &lt;map&gt;</td>
<td>Relationships between topics created by map hierarchy or @collection-type attribute; role of titles, especially in submaps.</td>
</tr>
<tr>
<td>9.3.1.2 &lt;topicref&gt;</td>
<td>Role of &lt;topicref&gt; nesting in creating containment hierarchies and parent-child relationships.</td>
</tr>
<tr>
<td>9.3.1.6 &lt;reltable&gt;</td>
<td>Relationship table titles – Processing expectations for relationship tables (not rendered, used to generate links) – &quot;Within a map tree, the effective relationship table is the union of all relationship tables in the map.&quot; – How a DITA-aware tool might represent the &lt;reltable&gt; element graphically.</td>
</tr>
<tr>
<td>9.3.1.10 &lt;relcolspec&gt;</td>
<td>How labels for related links from a relationship table are generated.</td>
</tr>
<tr>
<td>9.3.2.3 &lt;mapref&gt;</td>
<td>&quot;The hierarchy of the referenced map is merged into the container map at the position of the reference, and the relationship tables of the child map are added to the parent map.&quot;</td>
</tr>
<tr>
<td>9.3.2.4 &lt;topicgroup&gt;</td>
<td>How processors handle navigation titles within &lt;topicgroup&gt; elements.</td>
</tr>
<tr>
<td>9.8.13.10 The @format attribute</td>
<td>How processors determine the value of the @format attribute when it is not explicitly set.</td>
</tr>
</tbody>
</table>

**Possible new topics**

- DITA maps
- Relationship tables
- Creating navigational hierarchies
- Defining links between resources

**5.2 Subject scheme maps and their usage**

Subject scheme maps can be used to define controlled values and subject definitions. The controlled values can be bound to attributes, as well as element and attribute pairs. The subject definitions can contain metadata and provide links to more detailed information; they can be used to classify content and provide semantics that can be used in taxonomies and ontologies.

A DITA map can reference a subject scheme map by using a <mapref> element. Processors also MAY provide parameters by which subject scheme maps are referenced.

**5.2.1 Subject scheme maps**

Subject scheme maps use key definitions to define collections of controlled values and subject definitions. *Controlled values* are tokens that can be used as values for attributes. For example, the @audience attribute can take a value that identifies the users that are associated with a particular product. Typical values for a medical-equipment product might include "therapist", "oncologist", "physicist", and "radiologist". In a subject scheme map, an information architect can define a list of these values for the @audience attribute. An authoring tool can then provide a pick list for values for the attribute and generate a warning if an author attempts to specify a value that is not one of the controlled values. Controlled values can also be used to select content for filtering and flagging at build time.
**Subject definitions** are classifications and sub-classifications that compose a tree. Subject definitions provide semantics that can be used in conjunction with taxonomies and ontologies.

Key references to controlled values are resolved to a key definition using the same precedence rules as apply to any other key. However, once a key is resolved to a controlled value, that key reference does not typically result in links or generated text.

---

**Comment by Kristen J Eberlein on 14 December 2021**

Adding content from DITAweb review D:

Comment from Stan Doherty: FWIW -- I do not understand what the second sentence ["However, once a key is resolved ... "] means.

Comment from Kris Eberlein: Quite simply, that key references resolved within a subjectScheme map do NOT generate variable text or produce links. Within the context of a subjectScheme map, the key references provide bindings or associations with subjects.

Comment from Robert Anderson: I think the root of this problem / this misunderstanding is the poor design choice of using the same keys/keyref attribute for Subject Schemes as we do for normal linking / variable text. We had an item in the 2.0 queue to completely redesign that, but never had anyone with the time / energy to work on it (it would have been a big change).

The problem here is that we have to explain "These don't work like normal keys, and you shouldn't use them in links and expect them to resolve as text or links" -- in a way that is clear, accurate, and short enough that it actually gets read. So, I think we need some work on this paragraph.

---

### 5.2.2 Defining controlled values for attributes

Subject scheme maps can define controlled values for DITA attributes without having to define specializations or constraints. The list of available values can be modified quickly to adapt to new situations.

Each controlled value is defined using a `<subjectdef>` element, which is a specialization of the `<topicref>` element. The `<subjectdef>` element is used to define both a subject category and a list of controlled values. The parent `<subjectdef>` element defines the category, and the children `<subjectdef>` elements define the controlled values.

The subject definitions can include additional information within a `<topicmeta>` element to clarify the meaning of a value:

- A `<navtitle>` (or a `<titlealt>` element with a `@title-role` of `navigation`) can provide a more readable name for the controlled value.
- The `<shortdesc>` element can provide a definition.

In addition, the `<subjectdef>` element can reference a more detailed definition of the subject, for example, another DITA topic or an external resource.

---

| 009 (405) | The following behavior is expected of processors in regard to subject scheme maps:
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Authoring tools <strong>SHOULD</strong> use these lists of controlled values to provide lists from which authors can select values when they specify attribute values.</td>
</tr>
<tr>
<td></td>
<td>- Authoring tools <strong>MAY</strong> give an organization a list of readable labels, a hierarchy of values to simplify selection, and a shared definition of the value.</td>
</tr>
</tbody>
</table>
• Authoring tools MAY support accessing and displaying the content of the subject definition resource in order to provide users with a detailed explanation of the subject.

Example: Controlled values that provide additional information about the subject

The following code sample illustrates how a subject definition can provide a richer level of information about a controlled value:

```xml
<subjectdef keys="terminology" href="https://www.oasis-open.org/policies-guidelines/keyword-guidelines">
  <subjectdef keys="rfc2119" href="rfc-2119.dita">
    <topicmeta>
      <navtitle>RFC-2119 terminology</navtitle>
      <shortdesc>The normative terminology that the DITA TC uses for the DITA specification</shortdesc>
    </topicmeta>
  </subjectdef>
</subjectdef>
```

The content of the `<navtitle>` and `<shortdesc>` elements provide additional information that a processor might display to users as they select attribute values or classify content. The resources referenced by the `@href` attributes provide even more detailed information. A processor might render expandable links as part of a user interface that implements a progressive disclosure strategy, or an authoring tool might include the navigation title and short description in a window where the user selects a controlled value.

5.2.3 Binding controlled values to an attribute

The controlled values defined in a subject scheme map can be bound to an attribute or an element and attribute pair. This affects the expected behavior for processors and authoring tools.

The `<enumerationdef>` element binds the set of controlled values to an attribute. Valid attribute values are those that are defined in the set of controlled values. Invalid attribute values are those that are not defined in the set of controlled values. **If an enumeration specifies an empty `<subjectdef>` element that does not reference a set of controlled values, no value is valid for the attribute.** An enumeration can also specify an optional default value by using the `<defaultSubject>` element.

010 (406) If an enumeration is bound, processors SHOULD validate attribute values against the controlled values that are defined in the subject scheme map. For authoring tools, this validation prevents users from entering misspelled or undefined values. Recovery from validation errors is implementation specific.

The default attribute values that are specified in a subject scheme map apply only if a value is not otherwise specified in the DITA source or as a default value by the XML grammar.

Example: Binding a list of controlled values to the @audience attribute

The following code sample illustrates the use of the `<subjectdef>` element to define controlled values for types of users. It also binds the controlled values to the @audience attribute:

```xml
<subjectScheme>
  <!-- DEFINE TYPES OF USERS -->
</subjectScheme>
```
When the above subject scheme map is used, the only valid values for the `@audience` attribute are "therapist", "oncologist", "physicist", and "radiologist". Note that "users" is not a valid value for the `@audience` attribute, as it merely identifies the parent or container subject.

Example: Binding an attribute to an empty set

The following code sample specifies that there are no valid values for the `@outputclass` attribute:

```xml
<subjectScheme>
  <enumerationdef>
    <attributedef name="outputclass"/>
    <subjectdef/>  
  </enumerationdef>
</subjectScheme>
```

Authors will not be able to specify the `@outputclass` attribute on an element.

5.2.4 Processing controlled attribute values

An enumeration of controlled values can be defined with hierarchical levels by nesting subject definitions. This affects how processors perform filtering and flagging.

The following behavior is expected of processors in regard to subject scheme maps:

- Processors **SHOULD** be aware of the hierarchies of attribute values that are defined in subject scheme maps for purposes of filtering, flagging, or other metadata-based categorization.
- Processors **SHOULD** validate that the values of attributes that are bound to controlled values contain only valid values from those sets. **This requirement is needed because basic XML parsers do not validate the list of controlled values.** If the controlled values are part of a named key scope, the scope name is ignored for the purpose of validating the controlled values.
- Processors **SHOULD** check that all values listed for an attribute in a DITAVAL file are bound to the attribute by the subject scheme before filtering or flagging. If a processor encounters values that are not included in the subject scheme, it **SHOULD** issue a warning.

Processors **SHOULD** apply the following algorithm when they apply filtering and flagging rules to attribute values that are defined as a hierarchy of controlled values and bound to an enumeration:

1. If an attribute specifies a value in the taxonomy, and a DITAVAL or other categorization tool is configured with that value, the rule matches.
2. Otherwise, if the parent value in the taxonomy has a rule, that matches.
3. Otherwise, continue up the chain in the taxonomy until a matching rule is found.

Example: A hierarchy of controlled values and conditional processing
The following code sample shows a set of controlled values that contains a hierarchy.

```xml
<subjectScheme>
  <subjectdef keys="users">
    <subjectdef keys="therapist">
      <subjectdef keys="novice-therapist"/>
      <subjectdef keys="expert-therapist"/>
    </subjectdef>
    <subjectdef keys="oncologist"/>
    <subjectdef keys="physicist"/>
    <subjectdef keys="radiologist"/>
  </subjectdef>
  <enumerationdef>
    <attributedef name="audience"/>
    <subjectdef keyref="users"/>
  </enumerationdef>
</subjectScheme>
```

Processors that are aware of the hierarchy that is defined in the subject scheme map will handle filtering and flagging in the following ways:

- If "therapist" is excluded, both "novice-therapist" and "expert-therapist" are by default excluded.
- If "therapist" is flagged and "novice-therapist" is not explicitly flagged, processors automatically flag "novice-therapist" since it is a type of therapist.

5.2.5 The @subjectrefs attribute
The @subjectrefs attribute specifies one or more keys that are defined by a subject definition in a subject scheme map. Multiple values are separated by white space.

The @subjectrefs attribute cascades. When specified on a topic reference, the @subjectrefs attribute associates the referenced resource with subjects that are defined in subject scheme maps.

The DITA 2.0 specification does not indicate processing expectations for the @subjectrefs attribute. The DITA Technical Committee expects to specify such expectations in the future.

5.2.6 Examples of subject scheme maps
This section contains examples and scenarios that illustrate the use of subject scheme maps.

5.2.6.1 Example: a subject scheme map used to define taxonomic subjects
A subject scheme map can be used to define taxonomic subjects. Once defined, the subjects can be referenced by specifying a @subjectrefs attribute on a <topicref> element.

The following subject scheme map defines a set of subjects that are used to classify content:

```xml
<subjectScheme>
  <subjectdef keys="content-types">
    <subjectdef keys="conceptual-material"/>
    <subjectdef keys="reference"/>
    <subjectdef keys="tutorial"/>
  </subjectdef>
  <subjectdef keys="operating-systems">
    <subjectdef keys="linux"/>
    <subjectdef keys="macosx"/>
    <subjectdef keys="windows"/>
  </subjectdef>
</subjectScheme>
```
The keys assigned to the subject definitions can be referenced by specifying the `@subjectrefs` attribute on topic references in a navigation map:

```
<map>
  <title>User assistance for the Acme Widget</title>
  <!-- ... -->
  <topicref keyref="install-overview" subjectrefs="installing">
    <topicref keyref="install-linux"/>
    <topicref keyref="install-macosx"/>
    <topicref keyref="install-windows"/>
    <topicref keyref="install-troubleshooting" subjectrefs="troubleshooting"/>
  </topicref>
  <!-- ... -->
</map>
```

Because the `@subjectrefs` attribute cascades, the effective value of the above markup is the same as the following markup:

```
<map>
  <title>User assistance for the Acme Widget</title>
  <!-- ... -->
  <topicref keyref="install-overview" subjectrefs="installing">
    <topicref keyref="install-linux" subjectrefs="installing"/>
    <topicref keyref="install-macosx" subjectrefs="installing"/>
    <topicref keyref="install-windows" subjectrefs="installing"/>
    <topicref keyref="install-troubleshooting" subjectrefs="installing troubleshooting"/>
  </topicref>
  <!-- ... -->
</map>
```

### 5.2.6.2 Example: How hierarchies defined in a subject scheme map affect filtering

This scenario demonstrates how a processor evaluates attribute values when it performs conditional processing for an attribute that is bound to a set of controlled values.

A company defines a subject category for "Operating system", with a key set to "os". There are subcategories for Linux, Windows, and z/OS, as well as specific Linux variants: Red Hat Linux and SuSE Linux. The company then binds the values that are enumerated in the "Operating system" category to the `@platform` attribute:

```
<subjectScheme>
  <subjectdef keys="os">
    <topiccmeta>
      <navtitle>Operating systems</navtitle>
    </topiccmeta>
  </subjectdef>
  <subjectdef keys="linux">
    <topiccmeta>
      <navtitle>Linux</navtitle>
    </topiccmeta>
    <subjectdef keys="redhat">
      <topiccmeta>
        <navtitle>RedHat Linux</navtitle>
      </topiccmeta>
    </subjectdef>
    <subjectdef keys="suse">
      <topiccmeta>
        <navtitle>SuSE Linux</navtitle>
      </topiccmeta>
    </subjectdef>
  </subjectdef>
</subjectScheme>
```
The enumeration limits valid values for the `@platform` attribute to the following: "linux", "redhat", "suse", "windows", and "zos". If any other values are encountered, processors validating against the scheme will issue a warning.

The following table illustrates how filtering and flagging operate when the above map is processed by a processor. The first two columns provide the values specified in the DITAVAL file. The third and fourth columns indicate the results of the filtering or flagging operation.

<table>
<thead>
<tr>
<th><code>att=&quot;platform&quot; val=&quot;linux&quot;</code></th>
<th><code>att=&quot;platform&quot; val=&quot;redhat&quot;</code></th>
<th><strong>How <code>platform=&quot;redhat&quot;</code> is evaluated</strong></th>
<th><strong>How <code>platform=&quot;linux&quot;</code> is evaluated</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><code>action=&quot;exclude&quot;</code></td>
<td><code>action=&quot;exclude&quot;</code></td>
<td>Excluded.</td>
<td>Excluded.</td>
</tr>
<tr>
<td></td>
<td><code>action=&quot;include&quot;</code> or <code>action=&quot;flag&quot;</code></td>
<td>Excluded. This is an error condition, because if all &quot;linux&quot; content is excluded, &quot;redhat&quot; also is excluded. Applications can recover by generating an error message.</td>
<td>Excluded.</td>
</tr>
<tr>
<td>Unspecified</td>
<td></td>
<td>Excluded, because &quot;redhat&quot; is a kind of &quot;linux&quot;, and &quot;linux&quot; is excluded.</td>
<td>Excluded.</td>
</tr>
<tr>
<td><code>action=&quot;include&quot;</code></td>
<td><code>action=&quot;exclude&quot;</code></td>
<td>Excluded, because all &quot;redhat&quot; content is excluded.</td>
<td>Included.</td>
</tr>
<tr>
<td></td>
<td><code>action=&quot;include&quot;</code></td>
<td>Included.</td>
<td>Included.</td>
</tr>
<tr>
<td></td>
<td><code>action=&quot;flag&quot;</code></td>
<td>Included and flagged with the &quot;redhat&quot; flag.</td>
<td>Included.</td>
</tr>
<tr>
<td>Unspecified</td>
<td></td>
<td>Included, because all &quot;linux&quot; content is included.</td>
<td>Included.</td>
</tr>
<tr>
<td>att=&quot;platform&quot; val=&quot;linux&quot;</td>
<td>att=&quot;platform&quot; val=&quot;redhat&quot;</td>
<td>How platform=&quot;redhat&quot; is evaluated</td>
<td>How platform=&quot;linux&quot; is evaluated</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------</td>
<td>-----------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>action=&quot;flag&quot;</td>
<td>action=&quot;exclude&quot;</td>
<td>Excluded, because all &quot;redhat&quot; content is excluded.</td>
<td>Included and flagged with the &quot;linux&quot; flag.</td>
</tr>
<tr>
<td>action=&quot;include&quot;</td>
<td></td>
<td>Included and flagged with the &quot;linux&quot; flag, because &quot;linux&quot; is flagged and &quot;redhat&quot; is a type of &quot;linux&quot;.</td>
<td>Included and flagged with the &quot;linux&quot; flag.</td>
</tr>
<tr>
<td>action=&quot;flag&quot;</td>
<td></td>
<td>Included and flagged with the &quot;redhat&quot; flag, because a flag is available that is specifically for &quot;redhat&quot;.</td>
<td>Included and flagged with the &quot;linux&quot; flag.</td>
</tr>
<tr>
<td>Unspecified</td>
<td></td>
<td>Included and flagged with the &quot;linux&quot; flag, because &quot;linux&quot; is flagged and &quot;redhat&quot; is a type of &quot;linux&quot;.</td>
<td>Included and flagged with the &quot;linux&quot; flag.</td>
</tr>
</tbody>
</table>

Unspecified

| action="exclude"           | Excluded, because all "redhat" content is excluded | If the default value for @platform set in the DITAVAL is "include", this is included. If the default value for @platform set in the DITAVAL is "exclude", this is excluded. |
| action="include"           | Included. | Included, because all "redhat" content is included, and general Linux content also applies to RedHat |
| action="flag"              | Included and flagged with the "redhat" flag. | Included, because all "redhat" content is included, and general Linux content also applies to RedHat |
| Unspecified                | If the default value for @platform set in the DITAVAL is "include", this is included. If the default value for @platform set in the DITAVAL is "exclude", this is excluded. | If the default value for @platform set in the DITAVAL is "include", this is included. If the default value for @platform set in the DITAVAL is "exclude", this is excluded. |

**5.2.6.3 Example: Defining values for @deliveryTarget**

You can use a subject scheme map to define the values for the @deliveryTarget attribute. This filtering attribute is intended for use with a set of hierarchical, controlled values.

In this scenario, one department produces electronic publications (EPUB, EPUB2, EPUB3, Kindle, etc.) while another department produces traditional, print-focused output. Each department needs to exclude a certain category of content when they build documentation deliverables.
The following subject scheme map provides a set of values for the @deliveryTarget attribute that accommodates the needs of both departments.

<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE subjectScheme PUBLIC "-//OASIS//DTD DITA Subject Scheme Map//EN" "subjectScheme.dtd">
<subjectScheme>
  <subjectHead>
    <subjectHeadMeta>
      <navtitle>Example of values for the @deliveryTarget attribute</navtitle>
      <shortdesc>Provides a set of values for use with the @deliveryTarget conditional-processing attribute. This set of values is illustrative only; you can use any values with the @deliveryTarget attribute.</shortdesc>
    </subjectHeadMeta>
  </subjectHead>
  <subjectHead>
    <subjectHeadMeta>
      <navtitle>Values for @deliveryTarget attributes</navtitle>
    </subjectHeadMeta>
  </subjectHead>
  <subjectdef keys="deliveryTargetValues">
    <topicmeta>
      <navtitle>Print-primary deliverables</navtitle>
    </topicmeta>
    <subjectdef keys="print">
      <topicmeta>
        <navtitle>PDF</navtitle>
      </topicmeta>
    </subjectdef>
    <subjectdef keys="css-print">
      <topicmeta>
        <navtitle>CSS for print</navtitle>
      </topicmeta>
    </subjectdef>
    <subjectdef keys="xsl-fo">
      <topicmeta>
        <navtitle>XSL-FO</navtitle>
      </topicmeta>
    </subjectdef>
    <subjectdef keys="afp">
      <topicmeta>
        <navtitle>Advanced Function Printing</navtitle>
      </topicmeta>
    </subjectdef>
    <subjectdef keys="ms-word">
      <topicmeta>
        <navtitle>Microsoft Word</navtitle>
      </topicmeta>
    </subjectdef>
    <subjectdef keys="indesign">
      <topicmeta>
        <navtitle>Adobe InDesign</navtitle>
      </topicmeta>
    </subjectdef>
    <subjectdef keys="open-office">
      <topicmeta>
        <navtitle>Open Office</navtitle>
      </topicmeta>
    </subjectdef>
    <subjectdef keys="online">
      <topicmeta>
        <navtitle>Online deliverables</navtitle>
      </topicmeta>
      <subjectdef keys="html-based">
        <topicmeta>
          <navtitle>HTML-based deliverables</navtitle>
        </topicmeta>
        <subjectdef keys="html">
          <topicmeta>
            <navtitle>HTML</navtitle>
          </topicmeta>
        </subjectdef>
        <subjectdef keys="html5">
          <topicmeta>
            <navtitle>HTML5</navtitle>
          </topicmeta>
        </subjectdef>
      </subjectdef>
      <subjectdef keys="help">
        <topicmeta>
          <navtitle>Contextual help</navtitle>
        </topicmeta>
      </subjectdef>
      <subjectdef keys="webhelp">
        <topicmeta>
          <navtitle>Web help</navtitle>
        </topicmeta>
      </subjectdef>
      <subjectdef keys="javahelp">
        <topicmeta>
          <navtitle>Java Help</navtitle>
        </topicmeta>
      </subjectdef>
      <subjectdef keys="eclipseinfocenter">
        <topicmeta>
          <navtitle>Eclipse InfoCenter</navtitle>
        </topicmeta>
      </subjectdef>
      <subjectdef keys="epub">
        <topicmeta>
          <navtitle>EPUB</navtitle>
        </topicmeta>
      </subjectdef>
      <subjectdef keys="epub2">
        <topicmeta>
          <navtitle>EPUB2</navtitle>
        </topicmeta>
      </subjectdef>
    </subjectdef>
  </subjectdef>
</subjectScheme>
5.3 Metadata cascading

Metadata cascading is the process by which metadata elements and attributes specified for a map or for a topic reference cascade to nested references. This allows metadata properties to be set once and apply to an entire map or branch of a map.

5.3.1 Cascading of metadata attributes in a DITA map

Certain attributes cascade throughout a map, which facilitates attribute and metadata management. When attributes cascade, they apply to the elements that are children of the element where the attributes were specified. Cascading applies to a containment hierarchy, as opposed to a specialization hierarchy.

The following attributes cascade when set on the `<map>` element or when set within a specialization:

- `@rev`
- `@props` and any attribute specialized from `@props`, including those integrated by default in the OASIS-provided document-type shells: `@audience`, `@deliveryTarget`, `@platform`, `@product`, `@otherprops`
- `@linking`, `@toc`, `@search`
- `@format`, `@scope`, `@type`
- `@xml:lang`, `@dir`, `@translate`
- `@processing-role`
- `@cascade`
- `@subjectrefs`

Cascading is additive for attributes that accept multiple values, except when `cascade="nomerge"` is specified. For attributes that take a single value, the value that is defined on the closest containing element takes effect.

In a relationship table, metadata can be applied to entire rows or columns, as well as individual cells. The metadata cascade operates differently due to the nature of this tabular structure. The cascade is not driven by a strict containment hierarchy because `<relcolspec>` elements do not contain child elements.

The following list illustrates how metadata cascades in a relationship table:

- `<reltable>`
5.3.1.1 Processing cascading attributes in a map

Certain rules apply to processors when they process cascading attributes in a map.

When determining the value of an attribute, processors **MUST** evaluate each attribute on each individual element in a specific order. This order is specified in the following list. Applications **MUST** continue through the list until a value is established or until the end of the list is reached, at which point no value is established for the attribute. In essence, the list provides instructions on how processors can construct a map where all attribute values are set and all cascading is complete.

For attributes within a map, the following processing order **MUST** occur:

1. The @conref and @keyref attributes are evaluated.
2. The explicit values specified in the document instance are evaluated. For example, a `<topicref>` element with the @toc attribute set to "no" will use that value.
3. The default or fixed attribute values are evaluated. For example, the @toc attribute on the `<reltable>` element has a default value of "no".
4. The default values that are supplied by a controlled values file are evaluated.
5. The attributes cascade.
6. The processing-supplied default values are applied.
7. After the attributes are resolved within the map, any values that do not come from processing-supplied defaults will cascade to referenced maps.

For example, most processors will supply a default value of toc="yes" when no @toc attribute is specified. However, a processor-supplied default of toc="yes" does not override a value of toc="no" that is set on a referenced map. If the toc="yes" value is explicitly specified, is given as a default through a DTD, RNG, or controlled values file, or cascades from a containing element in the map, it will override a toc="no" setting on the referenced map. See 5.3.3 Map-to-map cascading behaviors (64) for more details.

8. Repeat steps 1 (61) to 4 (61) for each referenced map.
9. The attributes cascade within each referenced map.
10. The processing-supplied default values are applied within each referenced map.
11. Repeat the process for maps referenced within the referenced maps.
For example, in the case of `<topicref toc="yes">`, applications must stop at item 2 (61) in the list; a value is specified for @toc in the document instance, so @toc values from containing elements will not cascade to that specific `<topicref>` element. The toc="yes" setting on that `<topicref>` element will cascade to contained elements, provided those elements reach item 5 (61) when evaluating the @toc attribute.

### 5.3.1.2 Merging of cascading attributes

The @cascade attribute can be used to modify the additive nature of attribute cascading, although it does not turn off cascading altogether. The attribute has two predefined values: "merge" and "nomerge".

- **merge**
  
  Indicates that the metadata attributes cascade, and that the values of the metadata attributes are additive. This is the processing default for the @cascade attribute.

- **nomerge**
  
  Indicates that the metadata attributes cascade, but that they are not additive for `<topicref>` elements that specify a different value for a specific metadata attribute. If the cascading value for an attribute is already merged based on multiple ancestor elements, that merged value continues to cascade until a new value is encountered. **That is, setting cascade="nomerge" does not undo merging that took place on ancestor elements.**

#### Aggregation of constraint modules

The content model of an element can be modified by either of the following element-configuration modules:

- Constraint module
- Expansion module

**For any document-type shell, the content model of an element can only be modified by a single element-type configuration module. If multiple constraints or extensions need to be applied to a single element, the element configurations must be combined into a single module that reflects all the constraints and expansions that were defined in the original separate modules.**

---

015 (407)  
**Implementers MAY** define their own custom, implementation-specific tokens for the @merge attribute. To avoid name conflicts between implementations or with future additions to the standard, implementation-specific tokens **SHOULD** consist of a prefix that gives the name or an abbreviation for the implementation followed by a colon followed by the token or method name. For example, a processor might define the token "appToken:audience" in order to specify cascading and merging behaviors for only the @audience attribute.

016 (407)  
**The predefined values for the @cascade attribute MUST precede any implementation-specific tokens,** for example, `cascade="merge appToken:audience"`.

### 5.3.2 Reconciling topic and map metadata elements

The `<topicmeta>` element in maps **can contain** numerous metadata elements. These metadata elements **can have** an effect on the parent `<topicref>` element, any child `<topicref>` elements, and – if a direct child of the `<map>` element – on the .

For each element that can be contained in the `<topicmeta>` element, the following table addresses the following questions:

- **How does it apply to the topic?**
  
  This column describes how the metadata specified within the `<topicmeta>` element interacts with the metadata specified in the referenced topic. In most cases, the properties are additive. **For**
example, when a topic reference in a map contains `<category>installation</category>`, `<category>installation</category>` is added during processing to any metadata that is specified in the topic prolog.

**Does it cascade to other topics in the map?**
This column indicates whether the specified metadata element cascades to nested `<topicref>` elements. For example, when a topic reference in a map contains `<author>Jane Doe</author>`, `<author>Jane Doe</author>` is added during processing to the metadata for all child topic references. Some elements do not cascade.

**What is the purpose when specified on the `<map>` element?**
The map element permits metadata to be specified for the map. This column describes the effect that an element has when specified at this level.

**When set on the `<map>` element, does it apply to all topics referenced in the map?**
When specified on the `<map>` element, some metadata elements then apply to all the topics that are referenced in the map.

### Table 1: `<topicmeta>` elements and their properties

<table>
<thead>
<tr>
<th>Element</th>
<th>How does it apply to the topic?</th>
<th>Does it cascade to child <code>&lt;topicref&gt;</code> elements?</th>
<th>What is the purpose when set on the <code>&lt;map&gt;</code> element?</th>
<th>When set on the <code>&lt;map&gt;</code> element, does it apply to all topics referenced in the map?</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>&lt;audience&gt;</code></td>
<td>Add to the topic</td>
<td>Yes</td>
<td>Specify an audience for the map</td>
<td>Yes</td>
</tr>
<tr>
<td><code>&lt;author&gt;</code></td>
<td>Add to the topic</td>
<td>Yes</td>
<td>Specify an author for the map</td>
<td>Yes</td>
</tr>
<tr>
<td><code>&lt;category&gt;</code></td>
<td>Add to the topic</td>
<td>Yes</td>
<td>Specify a category for the map</td>
<td>Yes</td>
</tr>
<tr>
<td><code>&lt;copyright&gt;</code></td>
<td>Add to the topic</td>
<td>Yes</td>
<td>Specify a copyright for the map</td>
<td>Yes</td>
</tr>
<tr>
<td><code>&lt;critdates&gt;</code></td>
<td>Add to the topic</td>
<td>Yes</td>
<td>Specify critical dates for the map</td>
<td>Yes</td>
</tr>
<tr>
<td><code>&lt;data&gt;</code></td>
<td>Add to the topic</td>
<td>No, unless specialized for a purpose that cascades</td>
<td>No stated purpose</td>
<td>No</td>
</tr>
<tr>
<td><code>&lt;foreign&gt;</code></td>
<td>Add to the topic</td>
<td>No, unless specialized for a purpose that cascades</td>
<td>No stated purpose</td>
<td>No</td>
</tr>
<tr>
<td><code>&lt;keytext&gt;</code></td>
<td>Not added to the topic</td>
<td>No</td>
<td>No stated purpose</td>
<td>No</td>
</tr>
<tr>
<td><code>&lt;keywords&gt;</code></td>
<td>Add to the topic</td>
<td>No</td>
<td>No stated purpose</td>
<td>No</td>
</tr>
<tr>
<td><code>&lt;metadata&gt;</code></td>
<td>Add to the topic</td>
<td>Yes</td>
<td>Specify metadata for the map</td>
<td>Yes</td>
</tr>
<tr>
<td><code>&lt;othermeta&gt;</code></td>
<td>Add to the topic</td>
<td>No</td>
<td>Define metadata for the map</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### 5.3.3 Map-to-map cascading behaviors

When a DITA map or map branch is referenced by another DITA map, by default certain rules apply. These rules pertain to the cascading behaviors of attributes, metadata elements, and the roles that are assigned to content, for example, the role of “Chapter” that is assigned by a `<chapter>` element. Attributes and elements that cascade within a map generally follow the same rules when cascading from one map to another map, but there are some exceptions and additional rules that apply.

#### 5.3.3.1 Cascading of attributes from map to map

Certain attributes cascade from map to map.

The following attributes cascade from map to map:

- `@rev`
• @props and any attribute specialized from @props, including those integrated by default in the OASIS-provided document-type shells: @audience, @deliveryTarget, @platform, @product, @otherprops
• @linking, @toc, @search
• @type
• @translate
• @processing-role
• @cascade
• @subjectrefs

As with values that cascade within a map, the cascading is additive if the attribute permits multiple values, such as @audience. For attributes that take a single value, the value that is defined on the closest containing element takes effect.

The following attributes do not cascade from map to map

@format
The @format attribute is set to “ditamap” when a map or map branch is referenced, so it cannot cascade through to the referenced map.

@scope
The value of the @scope attribute describes the map itself, rather than the content. For example, when the @scope attribute is set to “external”, it indicates that the referenced map itself is external and unavailable, so the value cannot cascade into that referenced map.

@xml:lang and @dir
Cascading behavior for @xml:lang is defined in 4.2.1 The xml:lang attribute (45). The @dir attribute follows the same rules as @xml:lang.

While the @class attribute is unique and does not cascade, the value of the attribute is used to determine the processing roles that cascade from map to map. See 5.3.3.3 Cascading of roles from map to map (65) for more information.

5.3.3.2 Cascading of metadata elements from map to map

Elements that are contained within <topicmeta> elements follow the same rules for cascading from map to map as the rules that apply within a single DITA map.

For a complete list of which elements cascade within a map, see the column “Does it cascade to child <topicref> elements?” in the topic 5.3.2 Reconciling topic and map metadata elements (62).

Note It is possible that a specialization might define metadata that is intended to replace rather than add to metadata in the referenced map, but DITA, by default, does not have a mechanism to specify this behavior.

5.3.3.3 Cascading of roles from map to map

When specialized <topicref> elements, such as <chapter> or <mapref>, reference a map, they typically imply a semantic role for the referenced content.

Comment by Kristen J Eberlein on 04 July 2019

We need to look at the instances of “should” in this topic. Can they be recast? Do we need to introduce RFC-2119 language?

The semantic role reflects the @class hierarchy of the referencing <topicref> element. It is equivalent to having the @class attribute from the referencing <topicref> cascade to the top-level <topicref>
elements in the referenced map. Although this cascade behavior is not universal, there are general guidelines for when a role based on the @class attribute cascades.

When a <topicref> element or a specialization of a <topicref> element references a DITA resource, it defines a role for that resource. In some cases this role is straightforward, such as when a <topicref> element references a DITA topic (giving it the already known role of “topic”), or when a <mapref> element references a DITA map (giving it the role of “DITA map”).

Comment by rodaande on 8 Feb 2022
The following paragraph includes the statement: "the non-default behavior should be clearly specified"
We do not say how or where. For mapgroup, I believe it is only specified here in this topic. I think either we need this as part of every mapgroup element definition, in "Processing expectations", or we need a clear table here listing every element where this behavior does not apply.

Unless otherwise instructed, a specialized <topicref> element that references a map supplies a role for the referenced content. This means that, in effect, the @class attribute of the referencing element cascades to top-level topicref elements in the referenced map. In situations where this should not happen—such as all elements from the mapgroup domain—the non-default behavior should be clearly specified.

For example, when a <chapter> element from the bookmap specialization references a map, it supplies a role of “chapter” for each top-level <topicref> element in the referenced map. When the <chapter> element references a branch in another map, it supplies a role of “chapter” for that branch. In effect, the @class attribute for <chapter> ("- map/topicref bookmap/chapter ") cascades to the top-level <topicref> elements in the nested map, although it does not cascade any further.

017 (407)  
Because the <mapref> element is a convenience element, the top-level <topicref> elements in the map referenced by a <mapref> element MUST NOT be processed as if they are <mapref> elements. The @class attribute from the <mapref> element ("+ map/topicref mapgroup-d/mapref ") does not cascade to the referenced map.

018 (407)  
In some cases, preserving the role of the referencing element might result in out-of-context content. For example, a <chapter> element that references a bookmark might pull in <part> elements that contain nested <chapter> elements. Treating the <part> element as a <chapter> will result in a chapter that nests other chapters, which is not valid in bookmark and might not be understandable by processors. The result is implementation specific. Processors MAY choose to treat this as an error, issue a warning, or simply assign new roles to the problematic elements.
5.3.4 Examples of metadata cascading

These examples illustrate the processing expectations for cascading metadata. The processing examples use either before and after sample markup or expanded syntax that shows the equivalent markup without cascading.

5.3.4.1 Example: How map-level metadata elements cascade to the referenced topics

In this scenario, elements located in the <topicmeta> element for a map cascade to the referenced topics.

The following code sample illustrates how an information architect can apply certain metadata to all the DITA topics in a map:

```xml
<map xml:lang="en-us">
  <title>DITA maps</title>
  <author>Kristen James Eberlein</author>
  <copyright>
    <copyryear year="2020"/>
    <copyrholder>OASIS</copyrholder>
  </copyright>
  <topicref href="dita-maps.dita"/>
  <topicref href="definition_ditamaps.dita"/>
  <topicref href="purpose_ditamaps.dita"/>
  <!-- ... -->
</map>
```

The author and copyright information cascades to each of the DITA topics that are referenced in the DITA map. When the DITA map is processed to HTML5, for example, the author and copyright metadata apply to each generated HTML5 file.

5.3.4.2 Example: How metadata elements cascade from one map to another

In this scenario, a metadata element that is located in a map reference cascades to the topics that are referenced in a nested map.

Assume the following references in test.ditamap:

```xml
<map>
  <topicref href="a.ditamap" format="ditamap" toc="no"/>
  <mapref href="b.ditamap" audience="developer"/>
  <mapref href="c.ditamap#branch2" platform="myPlatform"/>
  <mapref href="d.ditamap" subjectrefs="puzzles"/>
</map>
```

- The map a.ditamap is treated as if toc="no" is specified on the root <map> element. This means that the topics that are referenced by a.ditamap do not appear in the navigation generated by test.ditamap, except for branches within the map that explicitly set toc="yes".

- The map b.ditamap is treated as if audience="developer" is set on the root <map> element. If the @audience attribute is already set on the root <map> element within b.ditamap, the value "developer" is added to any existing values.

- The element with id="branch2" within the map c.ditamap is treated as if platform="myPlatform" is specified on that element. If the @platform attribute is already specified on the element with id="branch", the value "myPlatform" is added to existing values.
5.3.4.3 Example: How attributes cascade from one map to another

In this scenario, attributes in one map cascade to a nested map.

Assume the following references in test.ditamap:

```
<map>
  <topicref href="a.ditamap" format="ditamap" toc="no"/>
  <mapref href="b.ditamap" audience="developer"/>
  <mapref href="c.ditamap#branch2" platform="myPlatform"/>
</map>
```

- The map a.ditamap is treated as if toc="no" is specified on the root <map> element. This means that the topics that are referenced by a.ditamap do not appear in the navigation generated by test.ditamap, except for branches within the map that explicitly set toc="yes".
- The map b.ditamap is treated as if audience="developer" is set on the root <map> element. If the @audience attribute is already set on the root <map> element within b.ditamap, the value "developer" is added to any existing values.
- The element with id="branch2" within the map c.ditamap is treated as if platform="myPlatform" is specified on that element. If the @platform attribute is already specified on the element with id="branch", the value "myPlatform" is added to existing values.

5.3.4.4 Example: How the @cascade attribute affects attribute cascading

In this scenario, the @cascade attribute is used to modify how metadata attributes cascade within a map.

**Figure 9: Example of cascade="merge"

Consider the following code example:

```
<map audience="a b" cascade="merge">
  <topicref href="topic.dita" audience="c"/>
</map>
```

In this map, the cascade="merge" attribute instructs a processor to merge attribute values while cascading. With @audience specified on both the <map> element and the <topicref> element, the effective @audience attribute value for the reference to topic.dita is "a b c".

**Figure 10: Example of cascade="nomerge"

Consider the following code example:

```
<map audience="a b" cascade="nomerge">
  <topicref href="topic.dita" audience="c"/>
</map>
```

In this map, the cascade="nomerge" attribute instructs a processor not to merge attribute values while cascading. With @audience specified on both the <map> element and the <topicref> element, the
effective @audience attribute value on the reference to \texttt{topic.dita} is not merged with the value from the map and remains "c".

\textbf{Figure 11: Example of changing the @cascade value within the map}

Consider the following code example:

```xml
<map platform="a" product="x" cascade="merge">
  <topicref href="one.dita" platform="b" product="y">
    <topicref href="two.dita">
      <topicref href="three.dita" cascade="nomerge" product="z">
        <topicref href="four.dita"/>
      </topicref>
    </topicref>
  </topicref>
</map>
```

In this map, the @cascade attribute is set to "merge" at the map level but changes to "nomerge" on a topic reference.

- For the \texttt{topic} reference to \texttt{one.dita}, cascade="merge" is specified. This results in an effective @platform value of "a b" and an effective @product value of "x y".
- The \texttt{topic} reference to \texttt{two.dita} does not specify any additional attributes. The effective values for the @platform and @product attributes are the same as those on the parent \texttt{topic} reference to \texttt{one.dita}. The effective value of the @platform attribute is "a b", and the effective value for the @product attribute is "x y".
- The \texttt{topic} reference to \texttt{three.dita} specifies cascade="nomerge", so attribute values from other elements do not merge with anything specified on the \texttt{topic} reference. The @platform attribute is not specified, so the effective value is "a b", which still cascades from the parent element. The @product value does not merge with values from the parent, so the effective value is "z".
- The \texttt{topic} reference to \texttt{four.dita} does not specify any additional attributes. The effective values for the @platform and @product attributes are the same as those on the parent \texttt{topic} reference to \texttt{three.dita}. The effective value of the @platform attribute is "a b", and the effective value for the @product attribute is "z".

\subsection{Example: How <topicref> roles cascade to referenced maps}

In this scenario, a specialized \texttt{topicref} element references content in another map.

Consider the scenario of a \texttt{chapter} element from the Book map specialization that references a DITA map. This scenario could take several forms:

- **Referenced map contains a single top-level \texttt{topicref} element**
  The entire branch functions as if it were included in the bookmap. The top-level \texttt{topicref} element is processed as if it were the \texttt{chapter} element.

- **Referenced map contains multiple top-level \texttt{topicref} elements**
  Each top-level \texttt{topicref} element is processed as if it were a \texttt{chapter} element, since the processing role of the \texttt{chapter} element cascades.

- **Referenced map contains a single \texttt{appendix} element**
  The \texttt{appendix} element is processed as it were a \texttt{chapter} element.

- **Referenced map contains a single \texttt{part} element, with nested \texttt{chapter} elements**
  The \texttt{part} element is processed as it were a \texttt{chapter} element. Nested \texttt{chapter} elements might not be understandable by processors, although applications can recover as described above.
5.4 Chunking

Content often needs to be delivered in a different granularity than it is authored. The @chunk attribute enables map authors to specify that multiple source documents should be combined into a single document for delivery or that a single source document should be split into multiple documents for delivery.

5.4.1 About the @chunk attribute

The @chunk attribute specifies how a processor should split or combine source DITA documents into alternate organizational schemes for rendering purposes. This means that the @chunk attribute is only relevant when the organization of source DITA documents has an effect on the organization of published documents.

The @chunk attribute only operates on topics and nested topics. It does not operate on other topic content, such as sections.

The @chunk attribute is composed of a single token without any white space. DITA defines the following tokens for the @chunk attribute:

- **combine**: Instructs a processor to combine the referenced source documents for rendering purposes. This is intended for cases where a publishing process normally results in a single output artifact for each source XML document.

- **split**: Instructs a processor to split each topic from the referenced source document into its own document for rendering purposes. This is intended for cases where a publishing process normally results in a single output artifact for each source XML document, regardless of how many DITA topics exist within each source document.

Applications can use custom tokens for the @chunk attribute.

The @chunk attribute does not cascade.

The following rules apply to all values of the @chunk attribute:

- When the source document organization has no effect on published output, such as when producing a single PDF or EPUB, processors **MAY** ignore the @chunk attribute.

- When the @chunk attribute results in more or fewer documents based on the combine or split tokens, the hierarchy of topics within the resulting map and topic organization **SHOULD** match the hierarchy in the original topics and maps.

- When the @chunk attribute results in more or fewer documents, processors **MAY** create their own naming schemes for those reorganized documents.

- The @chunk attribute values apply to DITA topic documents referenced from a map. Processors **MAY** apply equivalent processing to non-DITA documents.
5.4.2 Processing chunk="combine"

The presence of chunk="combine" instructs a processor to combine the referenced source documents for rendering purposes.

The following rules apply:

- When chunk="combine" is specified on the root element of a map, all source DITA documents that are referenced by the map are treated as one DITA document.
- When chunk="combine" is specified on a branch of a map, all source DITA documents that are referenced within that branch are treated as one DITA document.

  **Note**: This is true regardless of whether the element that specifies @chunk refers to a topic or specifies a heading. In cases such as `<topicgroup>` where a grouping element specifies chunk="combine", the equivalent DITA document would be a single DITA document with a root element that groups peer topics.

- When chunk="combine" is specified on a map, map branch, or map reference, all source DITA documents that are grouped by the reference are treated as a single resource. Any additional @chunk attributes on elements within the grouping are ignored.

Comment by Kristen J Eberlein on 04 February 2022

What's the difference between the content of li[3] and [li4]?

5.4.3 Processing chunk="split"

The presence of chunk="split" instructs a processor to split each topic from the referenced source document into its own document for rendering purposes.

The following rules apply:

- When chunk="split" is specified on the root element of a map, it sets a default operation for all source DITA documents in the navigation structure of the map. The default split value is used except where a combine value is encountered, in which case combine takes over for that entire branch.
- When chunk="split" is specified on a `<topicref>` element that references a source DITA document, it indicates that all topics within the referenced document should be rendered as individual documents.
- When chunk="split" is specified on an element such as `<topicgroup>` that does not reference a source DITA document or result in published output, the attribute has no meaning.

5.4.4 Using the @chunk attribute for other purposes

Applications can define additional tokens for use in the @chunk attribute. These tokens are implementation dependent and might not be supported by other applications.

5.4.5 Examples of the @chunk attribute

These examples illustrate the processing expectations for various scenarios that involve the @chunk attribute. The processing examples use either before and after sample markup or expanded syntax that shows the equivalent markup without the @chunk attribute.

  **Note**: The examples use sample files with modified file names to help illustrate the equivalent before and after resolution of @chunk attributes. However, there is no requirement for implementations processing the @chunk attribute to generate files, as long as the rendered
result is split or combined as described. If generating files, the file names are implementation dependent.

5.4.5.1 Example: Using @chunk to combine all documents into one

When a processor would typically render each topic document as an independent result document, the @chunk attribute can be used to render all content as a single result document.

Figure 12: Root map and the topics that it references

Consider the following DITA map:

```xml
<map>
  <title>Lesson plan</title>
  <topicref href="background.dita">
    <!-- More topic references to background topics -->
  </topicref>
  <topicref href="goals.dita">
    <!-- More topic references to goal topics -->
  </topicref>
  <!-- More topic references -->
</map>
```

The following code samples show the content of `background.dita` and `goals.dita`:

```xml
<!-- Content of background.dita -->
<topic id="background">
  <title>Prerequisite concepts</title>
  <shortdesc>This information is necessary before starting ...</shortdesc>
  <body> <!-- ... --> </body>
</topic>

<!-- Content of goals.dita -->
<topic id="goals">
  <title>Lesson goals</title>
  <shortdesc>After you complete the lesson ...</shortdesc>
  <body> <!-- ... --> </body>
</topic>
```

For many systems or output formats, each document in the map is typically rendered as an independent document. For example, rendering this map as HTML5 might result in `background.html` and `goals.html`, in addition to other HTML5 files.

Figure 13: Root map with chunking specified

If the output requirements demand only a single result document, specifying chunk="combine" on the root map element instructs a processor to render a single document that combines all topics:

```xml
<map chunk="combine">
  <title>Lesson plan</title>
  <topicref href="background.dita">
    <!-- More topic references to background topics -->
  </topicref>
  <topicref href="goals.dita">
    <!-- More topic references to goal topics -->
  </topicref>
</map>
```
Figure 14: Equivalent content of source documents after evaluation

The result of evaluating the @chunk attribute is equivalent to the following map and topic documents:

```xml
<!-- Root map -->
<map>
  <title>Lesson plan</title>
  <topicref href="combinedTopics.dita"/>
</map>

<dita>
  <!-- original content of background.dita -->
  <topic id="background">
    <title>Prerequisite concepts</title>
    <shortdesc>This information is necessary before starting</shortdesc>
    <body> <!-- ... --> </body>
  </topic>

  <!-- More background topics -->
</dita>

The content from all topics within the map is combined into a single result document, with a topic order and topic nesting structure that matches the original map hierarchy:

5.4.5.2 Example: Using @chunk to render a single document from one or more branches

When a publishing system typically would render each topic document as an independent result document, the @chunk attribute can be used to render individual branches of a map as single documents.

Figure 15: Root map and the topics that it references

Consider the following DITA map:

```xml
<map>
  <title>Lesson plan</title>
  <topicref href="goals.dita">
    <!-- More topic references to goal topics -->
  </topicref>
  <topicref href="firstLesson.dita">
    <!-- More topic references to first lesson topics -->
  </topicref>
  <topicref href="nextLesson.dita">
    <!-- More topic references to second lesson topics -->
  </topicref>
  <!-- More map branches -->
</map>
```

The following code samples show the content of firstLesson.dita and nextLesson.dita:

```xml
<!-- firstLesson.dita -->
<task id="firstLesson">
  <title>Starting to work with scissors</title>
  <shortdesc>This lesson will teach ...</shortdesc>
  <taskbody> <!-- ... -->
```

---

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For many systems or output formats, each document in the map is typically rendered as an independent document. For example, rendering this map as HTML5 might result in goals.html, firstLesson.html, and nextLesson.html, while the child documents within each branch would each result in their own HTML files.

**Figure 16: Root map with chunking specified for certain branches**

When output requirements demand that portions of the map be combined into a single document, specifying `chunk="combine"` on a map branch instructs a processor to render one document that combines all topics in that branch.

In the following code sample, `chunk="combine"` is specified on the map branches for the lessons. This indicates that each lesson branch should rendered as a single result document. **Topics** in the first branch with `goals.dita` will not be affected.

```xml
<map>
  <title>Lesson plan</title>
  <topicref href="goals.dita">
  <!-- More topic references to goal topics -->
  </topicref>
  <topicref href="firstLesson.dita" chunk="combine">
    <!-- More topic references to first lesson topics -->
  </topicref>
  <topicref href="nextLesson.dita">
    <!-- More topic references to second lesson topics -->
  </topicref>
  <!-- More map branches -->
</map>
```

**Figure 17: Equivalent content of source documents after evaluation**

The result of evaluating this `@chunk` attribute is equivalent to the following map and topic documents:

```xml
<!-- Root map -->
<map>
  <title>Lesson plan</title>
  <topicref href="goals.dita">
  <!-- More topic references to goal topics -->
  </topicref>
  <topicref href="firstLesson.dita"/>
  <topicref href="nextLesson.dita"/>
  <!-- More map branches -->
</map>

<!-- firstLesson.dita -->
<task id="firstLesson">
  <title>Starting to work with scissors</title>
  <shortdesc>This lesson will teach ... </shortdesc>
  <taskbody>
  <!-- ... -->
  </taskbody>
</task>
```
Content from each branch where `@chunk` attribute is specified is combined into a single result document, with a topic order and topic nesting structure that matches the original map hierarchy. Content from outside of those branches remains unchanged.

### 5.4.5.3 Example: Using `@chunk` to combine groups of topics

The `@chunk` attribute can be used on grouping elements to combine multiple source documents into one result document.

**Figure 18: Root map with `@chunk` specified on grouping elements**

Consider the following DITA map, where `@chunk` is specified on both `<topicgroup>` and `<topichead>` elements:

```xml
<map>
  <title>Groups are combined</title>
  <topicgroup chunk="combine">
    <topicref href="ingroup1.dita"/>
    <topicref href="ingroup2.dita"/>
  </topicgroup>
  <topichead chunk="combine">
    <topicmeta>
      <navtitle>Heading for a branch</navtitle>
    </topicmeta>
    <topicref href="inhead1.dita"/>
    <topicref href="inhead2.dita"/>
  </topichead>
</map>
```

The result of evaluating the `@chunk` attribute on the `<topicgroup>` element is equivalent to a single DITA document that contains the content of both `ingroup1.dita` and `ingroup2.dita`.

The result of evaluating the `@chunk` attribute on `<topichead>` is also a single result document. In many applications, a `<topichead>` is equivalent to a single title-only topic. In that case, the chunked result is equivalent to a root topic with the title "Heading for a branch", that contains as child topics the content of both `inhead1.dita` and `inhead2.dita`. If `<topichead>` is ignorable in the current processing context, the chunked result would be equivalent to processing `<topicgroup>`: a single DITA document with the content of both `inhead1.dita` and `inhead2.dita`.

**Figure 19: Equivalent content of source documents after evaluation**

The result of evaluating the `@chunk` attribute is equivalent to the following map and topic documents:

```xml
<map>
  <title>Groups are combined</title>
  <topicref href="chunkgroup-1.dita"/>
  <topicref href="chunkgroup-2.dita"/>
</map>
```
The following code blocks show the content of `chunkgroup-1.dita` and `chunkgroup-2.dita`:

```xml
<!-- chunkgroup-1.dita -->
<dita>
<!-- Content of ingroup1.dita -->
<!-- Content of ingroup2.dita -->
</dita>

<!-- chunkgroup-2.dita -->
<dita>
  <topic id="head">
    <title>Heading for a branch</title>
    <!-- Content of inhead1.dita -->
    <!-- Content of inhead2.dita -->
  </topic>
</dita>
```

### 5.4.5.4 Example: How chunk="combine" effects the map hierarchy

Special attention is necessary when combining a nested map hierarchy that includes documents with their own nested topics.

**Figure 20: Source DITA map**

Consider the following DITA map:

```xml
<map chunk="combine">
  <title>Generation example</title>
  <topicref href="ancestor.dita">
    <topicref href="middle.dita">
      <topicref href="child.dita"/>
    </topicref>
  </topicref>
</map>
```

In this case, the `@chunk` attribute instructs a processor to treat the three topics as a single combined document, while preserving the original map hierarchy.

**Figure 21: Source documents with nested structures**

Now consider the following three source documents, each of which includes nested or peer topics: `ancestor.dita`, `middle.dita`, and `child.dita`.

```xml
<!-- ancestor.dita -->
<dita>
  <topic id="ancestor-first">
    <title>First major topic in ancestor composite document</title>
    <!-- ... Topic content ... -->
  </topic>
  <!-- More topics in ancestor composite document -->
  <topic id="ancestor-last">
    <title>Last major topic in ancestor composite doc</title>
    <!-- ... Topic content ... -->
  </topic>
  <topic id="ancestor-last-child">
    <title>Child of last major topic in ancestor composite document</title>
    <!-- ... Topic content ... -->
  </topic>
</dita>

<!-- middle.dita -->
<title>Root topic in middle document</title>
<body>
  <!-- ... -->
</body>
```

```xml
<!-- chunkgroup-2.dita -->
<dita>
  <topic id="head">
    <title>Heading for a branch</title>
    <!-- Content of inhead1.dita -->
    <!-- Content of inhead2.dita -->
  </topic>
</dita>
```
When chunk="combine" is evaluated, the three source documents are combined into one. Both the ancestor and middle documents have child topics that need to be taken into account:

- **ancestor.dita** has a root `<dita>` element, with several root-level topics. After evaluating the @chunk attribute, content from **middle.dita** is placed after the topic with id="ancestor-last-child"in **ancestor.dita**.
- **middle.dita** does not have a `<dita>` element, but it does have a nested topic, so content from **child.dita** is located after that nested topic.

In each case, the original map hierarchy is preserved.

**Figure 23: Equivalent content of source documents after evaluation**

The result of evaluating the @chunk attribute is equivalent to the following map and topic documents:
5.4.5.5 Example: Using @chunk to split documents

When topics are authored or generated in a single DITA document, specifying `chunk="split"` instructs processors to render them individually when possible.

This topic contains two examples: Splitting a single topic document and splitting all topic documents.

Splitting a single topic document

This example covers the scenario of splitting a single topic document that is referenced in a DITA map.

Figure 24: Root map and the topic documents that it references

Consider the following DITA map, which references generated topics that document the messages that are produced by an application:

```xml
<map>
  <title>Message guide</title>
  <topicref href="about.dita"/>
  <topicref href="messages-install.dita"/>
  <topicref href="messages-run.dita"/>
  <topicref href="messages-other.dita"/>
</map>
```

The following code samples show the contents of the four topic documents: `about.dita`, `messages-install.dita`, `messages-run.dita`, and `messages-other.dita`.

```
<!-- about.dita -->
<topic id="about">
  <title>About this guide</title>
  <shortdesc>Warnings or errors are displayed when ...</shortdesc>
</topic>

<!-- messages-install.dita -->
<dita>
  <topic id="INS001">
    <title>INS001: Installation failure</title>
    <!-- Explanation and recovery steps ... -->
  </topic>
  <!-- More topics that document installation messages ... -->
</dita>

<!-- messages-run.dita -->
<dita>
  <topic id="RUN001">
    <title>RUN001: Failed to initialize</title>
    <!-- Explanation and recovery steps ... -->
  </topic>
  <!-- Hundreds of message topics ... -->
  <topic id="RUN999">
    <title>RUN999: Out of memory</title>
    <!-- Explanation and recovery steps ... -->
  </topic>
</dita>

<!-- messages-other.dita -->
<topic id="othermsg">
  <title>Other messages</title>
  <shortdesc>You could also encounter ...</shortdesc>
  <topic id="OTHER001">
    <title>OTHER001: Analyzer is tired</title>
    <!-- Explanation and recovery steps ... -->
  </topic>
  <topic id="OTHER002">
    <title>OTHER002: Analyzer needs to be updated</title>
    <!-- Explanation and recovery steps ... -->
  </topic>
</topic>
```
When processed to HTML5, this map might result in four result documents: about.html, messages-install.html, messages-run.html, and messages-other.html.

**Figure 25: Splitting topics in one topic document**

With hundreds of messages in messages-run.dita, it might be better in some situations to render one result document for each message topic in the document. This can be done by specifying chunk=“split” on the topic reference to messages-run.dita:

```xml
<map>
  <title>Message guide</title>
  <topicref href="about.dita">
    <topicref href="messages-install.dita"/>
    <topicref href="messages-run.dita" chunk="split"/>
    <topicref href="messages-other.dita"/>
  </topicref>
</map>
```

**Figure 26: Equivalent content of source documents after evaluation**

The result of evaluating @chunk in this case is equivalent to the following map. While messages-run.dita now is split into hundreds of topics, the other topics in the map are unaffected.

```xml
<map>
  <title>Message guide for WidgetAnalyzer</title>
  <topicref href="about.dita">
    <topicref href="messages-install.dita"/>
    <topicref href="RUN001.dita"/>
    <!-- Hundreds of topic references to message topics ... -->
    <topicref href="RUN999.dita"/>
    <topicref href="messages-other.dita"/>
  </topicref>
</map>
```

**Note**  Because the @chunk attribute does not cascade, even if the topic reference to messages-run.dita had child topic references, they would be unaffected by the chunk="split" operation in this example.

**Splitting all topic documents in a map**

This example covers the scenario of splitting all the topic documents that are referenced in a DITA map.

**Figure 27: Root map with chunking specified**

Specifying chunk="split" on the <map> element sets a default for the entire map. The following change to the DITA map results in every referenced DITA document being split into one document per topic. The only source document that is not affected by this splitting operation is about.dita, because it only contains only one topic.

```xml
<map chunk="split">
  <title>Message guide</title>
  <topicref href="about.dita">
    <topicref href="messages-install.dita"/>
    <topicref href="messages-run.dita"/>
    <topicref href="messages-other.dita"/>
  </topicref>
</map>
Figure 28: Result of evaluating chunk="split"

The result of evaluating chunk="split" specified on the map element yields the following results:

- `about.dita` is unchanged.
- `messages-install.dita` is split into one document for each message.
- `messages-run.dita` is split into one document for each message, exactly as in the previous example.
- `messages-other.dita` contains a root topic and two child topics, so it results in three documents. The hierarchy of those documents is preserved in the map.

Figure 29: Equivalent content of source documents after evaluation

The result of evaluating the @chunk attribute is the following map:

```xml
<map>
  <title>Message guide</title>
  <topicref href="about.dita">
    <!-- More topic references to installation messages ... -->
  </topicref>
  <topicref href="RUN001.dita"/>
  <topicref href="RUN999.dita"/>
  <topicref href="othermsg.dita">
    <topicref href="OTHER001.dita"/>
    <topicref href="OTHER002.dita"/>
  </topicref>
</map>
```

5.4.5.6 Example: How chunk="split" affects the map hierarchy

Special attention is necessary when evaluating the map hierarchy that results from splitting documents that contain nested topics.

Figure 30: Source DITA map with chunking specified

Consider the following DITA map:

```xml
<map chunk="split">
  <title>Generation example</title>
  <topicref href="ancestor.dita">
    <topicref href="middle.dita">
      <topicref href="child.dita"/>
    </topicref>
  </topicref>
</map>
```

Here, the @chunk attribute instructs a processor to render every topic in each of the three documents as its own document, while preserving any hierarchy from those documents.

Figure 31: Source topic documents with nested or peer topics

Now consider the following three topic documents, each of which includes nested or peer topics:

```xml
<!-- ancestor.dita -->
<dita>
  <topic id="ancestor-first">
    <title>First major topic in ancestor composite document</title>
    <!-- ... Topic content ... -->
  </topic>
  <!-- More topics in ancestor composite document -->
</dita>
```
When chunk="split" is evaluated, both ancestor.dita and middle.dita are split and treated as multiple topic documents. child.dita is only a single topic and has nothing to split.

The following list addresses how the split operation effects the map hierarchy:

- ancestor.dita has a root <dita> element, so it results in multiple peer topic references (or branches) in the map. Topic references that were nested within the original reference to ancestor.dita are now located within the reference to "ancestor-last" (the last topic child of the <dita> element).
- middle.dita has nested topics, so it results in its own new hierarchy within the map. Content from the nested topic reference is now located within the reference to the root topic from middle.dita, but after any references to child topics.

The result of evaluating the @chunk attribute is equivalent to the following DITA map:

```xml
<map chunk="split">
  <title>Generation example</title>
  <topicref href="ancestor-first.dita"/>
  <!-- More topics in ancestor composite document -->
  <topicref href="ancestor-last.dita"/>
  <topicref href="ancestor-last-child.dita"/>
  <!-- middle.dita now located here, as final child of final topic child of <dita> in ancestor.dita -->
  <topicref href="middle-root.dita"/>
  <topicref href="middle-child.dita"/>
  <!-- child.dita now located here, as final topic of child root topic in middle.dita ancestor.dita -->
  <topicref href="child.dita"/>
</map>
```
5.4.5.7 Example: When @chunk is ignored

The @chunk attribute is ignored in some cases, such as when chunk="combine" is already in effect or when chunk="split" is specified on a grouping element.

Figure 34: Ignoring @chunk when already combining topics

In the following code sample, evaluating chunk="combine" results in one rendered document for each map branch. Any additional @chunk values within those branches are ignored, including any @chunk values within any referenced maps.

```xml
<map>
  <title>Ignoring chunking when already combined</title>
  <topicref href="branchOne.dita" chunk="combine">
    <!-- @chunk ignored for branchOneChild.dita -->
    <topicref href="branchOneChild.dita" chunk="split"/>
  </topicref>
  <topicref href="branchTwo.dita" chunk="combine">
    <!-- Any @chunk within submap.ditamap is ignored -->
    <topicref href="submap.ditamap" format="ditamap"/>
  </topicref>
</map>
```

Figure 35: Ignoring @chunk on a grouping element

In the following code sample, chunk="split" is specified on two grouping elements.

```xml
<map>
  <title>Trying to "split" groups</title>
  <topicgroup chunk="split">
    <topicref href="ingroup1.dita">!...!</topicref>
    <topicref href="ingroup2.dita">!...!</topicref>
  </topicgroup>
  <topichead chunk="split">
    <topicmeta>
      <navtitle>Heading for a branch</navtitle>
    </topicmeta>
    <topicref href="inhead1.dita">!...!</topicref>
    <topicref href="inhead2.dita">!...!</topicref>
  </topichead>
</map>
```

The result of evaluating chunking is the following:

- The @chunk attribute on the <topicgroup> element is ignored. The @chunk attribute does not cascade and there is no referenced topic, so it has no effect.
- In some cases, an implementation might treat the <topichead> element as equivalent to a single title-only topic, while in other cases it might be ignored. In either case, the @chunk value has no effect. If the <topichead> is treated as a title-only topic, it cannot be split further. If it is ignored for the current processing context, it is no different than the <topicgroup> element.
5.4.5.8 Example: Using chunk="combine" when the root map specifies chunk="split"

While @chunk attributes are ignored when chunk="combine" is already in effect, it is possible to use chunk="combine" when chunk="split" is in effect.

**Figure 36: Source DITA map**

Consider the following DITA map, where chunk="split" is specified on the root element. The effect of this operation is that all topic documents within the map structure are split by default. However, a map branch also specifies chunk="combine":

```xml
<map chunk="split">
  <title>Split most, but not one branch</title>
  <topicref href="splitme.dita">
    <!-- More topic references -->
  </topicref>
  <topicref href="exception.dita" chunk="combine">
    <!-- More topic references -->
  </topicref>
  <topicref href="splitmetoo.dita">
    <!-- More topic references -->
  </topicref>
</map>
```

Assume also that no other @chunk attributes are specified in the map.

**Figure 37: Evaluation of @chunk attributes in the map**

The following points are true when @chunk is evaluated:

- The document `splitme.dita` is rendered as one result document for each topic. The same is true for any other topic document within the map branch.
- The second map branch, where the outermost `<topicref>` elements references `exception.dita`, is rendered as a single result document that combines all topic documents within the map branch.
- The document `splitmetoo.dita` is rendered as one result document for each topic. The same is true for any other topic document within the map branch.

5.4.5.9 Example: Managing links when chunking

If a topic is referenced more than once and one of those instances involves chunking, links to that topic might be ambiguous. In most of such cases, using key references to keys that are defined directly on the chunked instance of the topic will give the correct result.

**Figure 38: Source map and the topic documents that it references**

Consider the following DITA map, which is used for all examples in this topic:

```xml
<map>
  <title>Map with chunks and key definitions</title>
  <!-- Key definitions -->
  <keydef href="splitThis.dita" keys="splitThisKey"/>
  <keydef href="splitThis.dita#splitThisChild" keys="splitThisChildKey"/>
  <!-- Navigational structure -->
  <topicref href="splitThis.dita" chunk="split" keys="explicitSplitKey"/>
  <topicref href="combineThis.dita" chunk="combine" keys="combineThisKey"/>
  <topicref href="combinedChild.dita" keys="combinedChildKey"/>
</map>
```
The DITA map references the following topics:

```xml
<!-- splitThis.dita -->
<topic id="splitThisRoot">
  <title>Root topic</title>
  <!-- ... -->
  <topic id="splitThisChild">
    <title>Child topic</title>
    <!-- ... -->
  </topic>
</topic>

<!-- combineThis.dita -->
<topic id="combineThisRoot">
  <title>Root topic</title>
  <!-- ... -->
  <topic id="combineThisChild">
    <title>Child topic</title>
    <!-- ... -->
  </topic>
</topic>

<!-- combinedChild.dita -->
<topic id="combinedChildRoot">
  <title>Topic in map branch, will be combined with parent topicref</title>
  <!-- ... -->
</topic>
```

Figure 39: Scenario in which the topic documents are rendered only once

Assume that the above map is a root map or a submap that is referenced in a context that does not include any references to the above topic documents.

The topic documents that are referenced in the above map are rendered in the following ways:

- **splitThis.dita**, which contains two topics, is rendered as two documents. For this example, assume the processor creates two documents with names that are based on the topic IDs: `splitThisRoot.dita` and `splitThisChild.dita`.
- The map branch with **combineThis.dita**, which contains two topic references, is rendered as one document: `combineThis.dita`. The document contains the merged content of both `combineThis.dita` and `combinedChild.dita`.

Links are resolved in the following ways. Note that the document names are those listed in the above explanation of how the topic documents are rendered in this scenario.

- All links that specify `href="splitThis.dita"`, `keyref="splitThisKey"`, or `keyref="explicitSplitKey"` resolve to `splitThisRoot.dita`, which is the only rendered instance of the topic.
- All links that specify `href="splitThis.dita#splitThisChild"` or `keyref="splitThisChildKey"` resolve to `splitThisChild.dita`, which is the only rendered instance of the topic.
- All links that specify `href="combinedChild.dita"` or `keyref="combinedChildKey"` resolve to that topic within `combineThis.dita`, which is the only rendered instance of the topic.

Figure 40: Scenario in which the topic documents are rendered more than once

Now assume that the above map is used as a submap in another context, where the root map also references the three topic documents. As a result, each of the three topic documents (`splitThis.dita`, `combineThis.dita`, and `combinedChild.dita`) are rendered more than once.
In this scenario, the topic documents are rendered in the following ways:

- The original source document `splitThis.dita` is rendered twice. Based on the map above, assume the processor creates two documents with names that are based on the topic IDs, so that topic becomes `splitThisRoot.dita` and `splitThisChild.dita`. At the same time, `splitThis.dita` is rendered in another context as a single document, with a different name.

- Based on the map above, the branch that starts with the original source document `combineThis.dita` is rendered as one document combined with the content of `combinedChild.dita`. At the same time, those two documents are rendered in another context as individual documents. For this example, assume a processor generates the combined document using the generated name `combinThis-2.dita`, while the documents `combineThis.dita` and `combinedChild.dita` retain their names in the other context.

In this scenario, the links to the topic documents are now problematic:

- All links in this map that use the direct URI references `href="splitThis.dita"`, `href="splitThis.dita#splitThisChild"`, `href="combineThis.dita"`, or `href="combinedChild.dita"` are ambiguous. They could resolve to either the chunked instance of the topic documents or to the individual topics in the other context. Implementations will have to guess which topic to target: the split or combined instances of the topic documents or the versions in the alternate context from the root map.

- All links that specify `keyref="splitThisKey"` or `keyref="splitThisChildKey"` are also ambiguous. The key definitions are not associated explicitly with the chunked or not-chunked instance. If key scopes are used, applications might more reliably guess that the intended target is the split copy in this map, but this is not guaranteed.

  All links that specify `keyref="explicitSplitKey"`, `keyref="combinedThisKey"`, or `keyref="combinedChildKey"` are unambiguous. These links can only resolve to the chunked instance of the topic documents, because the key definitions are defined directly within the chunked context.

  There is no way to unambiguously link to the child document that will result from splitting `splitThis.dita`. This is because a `<topicref>` element that specifies `@chunk` can only associate a key definition with the first or root topic in the document. While other key definition elements can be used to associate keys with other topics in the same document, that can only be done outside of the navigation context that uses `@chunk`. As a result, a processor cannot guarantee whether the intended link target is the split topic from the chunked context or a use of the same topic in the second context.

  It is possible for an implementation to define its own way to resolve this ambiguity. However, if a situation requires both multiple instances of split topics and unambiguous cross-implementation links to those split topics, alternate reuse mechanisms need to be considered.

Comment by Kristen J Eberlein on 03 February 2022

What do we mean by cross-implementation links? Can we rephrase this? Or simply remove the adjective "cross-implementation"?

I think that the situation that we are targeting involves the following:

- Multiple navigational references to a topic, at least one of which is chunked
- A need to have unambiguous links to each instance of the topic
6 DITA addressing

DITA provides two addressing mechanisms. DITA addresses either are direct URI-based addresses, or they are indirect key-based addresses. Within DITA documents, individual elements are addressed by unique identifiers specified on the @id attribute. DITA defines two fragment-identifier syntaxes; one is the full fragment-identifier syntax, and the other is an abbreviated fragment-identifier syntax that can be used when addressing non-topic elements from within the same topic.

Comment by Kristen J Eberlein on 01 March 2022
This needs a complete redo to be an effective introduction to the current content.

6.1 @id attribute

The @id attribute assigns an identifier to DITA elements so that the elements can be referenced.

The @id attribute is available for most elements. An element must have a valid value for the @id attribute before it can be referenced using a fragment identifier. The requirements for the @id attribute differ depending on whether it is used on a topic element, a map element, or an element within a topic or map.

All values for the @id attribute must be XML name tokens.

The @id attributes for <topic> and <map> elements are declared as XML attribute type ID; therefore, they must be unique with respect to other XML IDs within the XML document that contains the topic or map element. The @id attribute for most other elements within topics and maps is not declared to be XML ID; this means that XML parsers do not require that the values of those @id attributes be unique. However, the DITA specification requires that all IDs be unique within the context of a topic. For this reason, tools might provide an additional layer of validation to flag violations of this rule.

Within documents that contain multiple topics, the values of the @id attribute for all non-topic elements that have the same nearest-ancestor-topic element need to be unique with respect to each other. The values of the @id attribute for non-topic elements can be the same as non-topic elements with different nearest-ancestor-topic elements. Therefore, within a single DITA document that contains more than one topic, the values of the @id attribute of the non-topic elements need only to be unique within each topic.

Within a map document, the values of the @id attributes for all elements SHOULD be unique. When two elements within a map have the same value for the @id attribute, processors MUST resolve references to that ID to the first element with the given ID value in document order.

Figure 41: Summary of requirements for the @id attribute

<table>
<thead>
<tr>
<th>Element</th>
<th>XML attribute type for @id</th>
<th>Must be unique within</th>
<th>Required?</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;map&gt;</td>
<td>ID</td>
<td>document</td>
<td>No</td>
</tr>
<tr>
<td>&lt;topic&gt;</td>
<td>ID</td>
<td>document</td>
<td>Yes</td>
</tr>
<tr>
<td>sub-map (elements nested within a map)</td>
<td>NMTOKEN</td>
<td>document</td>
<td>Usually no, with some exceptions</td>
</tr>
<tr>
<td>sub-topic (elements nested within a topic)</td>
<td>NMTOKEN</td>
<td>individual topic</td>
<td>Usually no, with some exceptions</td>
</tr>
</tbody>
</table>
Comment by robander on 22 feb 2022
Changed “has no impact on processing” to “has no required impact on processing”. This is non-normative note so language does not need to be quite so rigorous but what we’re saying is that “adding or removing an ID does not change how the specification requires that you process something” … I’d be free to set up my *own* processing so that having an ID has an impact on processing.

Secondary thought though, we say "For all elements", but that’s not 100% true; not having an ID on topic, where it’s required, will result in parser errors and thus have an impact on processing. We could simply change this to "For most elements" while retaining the fn example.

Note For all elements other than footnote (&lt;fn&gt;), the presence of a value for the @id attribute has no impact on processing. For &lt;fn&gt;, the presence or absence of a valid @id attribute affects how the element is processed. This is important for tools that automatically assign @id attributes to all elements.

6.2 DITA linking
DITA supports many different linking elements, but they all use the same set of attributes: @format, @href, @scope, and @type. These four attributes act as a unit.

6.2.1 The @format attribute
The @format attribute identifies the format of the referenced resource.

The following values are explicitly supported:

dita
Indicates that the target is a DITA topic or an element in a DITA topic. Unless otherwise specified, when @format is set to "dita", the value for the @type attribute is treated as "topic".

ditamap
Indicates that the target is a DITA map. References to submaps can occur at any point in a map.

When a topic reference specifies format="ditamap", the topic reference resolves in one of the following ways:

<table>
<thead>
<tr>
<th>Target of &lt;topicref&gt;</th>
<th>Resolution of &lt;topicref&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>DITA map</td>
<td>The hierarchy of all the topic references in the targeted map</td>
</tr>
<tr>
<td>Map branch</td>
<td>The hierarchy of the targeted map branch</td>
</tr>
</tbody>
</table>

When a topic reference targets an entire DITA map and the referenced map contains a relationship table, there are special processing implications. Because relationship tables are only valid as direct children of the DITA map, referenced relationship tables are treated as children of the referencing map.

Comment by Kristen J Eberlein on 03 March 2022
I think we need to have an example of the expected processing behaviour. I think it is a good candidate for the new chapter on "DITA map processing".

Note If a &lt;topicref&gt; element that references a map contains child &lt;topicref&gt; elements, the processing behavior regarding the child &lt;topicref&gt; elements is undefined.
For other formats, the file extension without the "." character typically represents the format. For example, the following are all possible values for @format: "html", "pdf", or "txt".

If no value is explicitly specified for the @format attribute, the following precedence rules apply:

1. If the @format attribute is specified on a containing element within the map or within the related-links section of a topic, the value cascades from the closest containing element.
2. If a value for the @format attribute does not cascade, the processing default is used. The processing default for the @format attribute is determined by inspecting the value of the @href attribute:
   a. If the @href attribute specifies a file extension, the processing default for the @format attribute is that extension, after conversion to lower-case and with no leading period. The only exception to this is if the extension is .xml, in which case the default value for @format is "dita".
   b. If there is no file extension, but the @href value is an absolute URI whose scheme is "http" or "https", then the processing default is "html".
   c. In all other cases where no file extension is available, the processing default is "dita".

021 (407) If the actual format of the referenced content differs from the effective value of the @format attribute, and a processor is capable of identifying such cases, it MAY recover gracefully and treat the content as its actual format. The processor MAY also issue a message.

For processors that support Lightweight DITA, the following table summarizes values for the @format attribute:

<table>
<thead>
<tr>
<th>Document type</th>
<th>Value of the @format attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Map</td>
<td>hditamap</td>
<td>HDITA map</td>
</tr>
<tr>
<td></td>
<td>mditamap</td>
<td>MDITA map</td>
</tr>
<tr>
<td></td>
<td>xditamap</td>
<td>XDITA map</td>
</tr>
<tr>
<td>Topic</td>
<td>hdita</td>
<td>HDITA topic</td>
</tr>
<tr>
<td></td>
<td>mditata</td>
<td>MDITA topic</td>
</tr>
<tr>
<td></td>
<td>xditata</td>
<td>XDITA topic</td>
</tr>
</tbody>
</table>

6.2.2 The @href attribute

The @href attribute specifies the URI of the resource that is addressed. The referenced resource can be another DITA topic or map, an element inside a DITA topic or map, or a non-DITA resource.

022 (407) The value of the @href attribute MUST be a valid URI reference [RFC 3986]. If the value of the @href attribute is not a valid URI reference, an implementation MAY generate an error message. It MAY also recover from this error condition by attempting to convert the value to a valid URI reference.

The value of the @href attribute can optionally contain a fragment identifier.

When an @href attribute references a DITA resource using a URI without a fragment identifier, the URI resolves to the root element in the referenced document. For the purposes of rendering, such as when a topic reference to a DITA document is used to render the content as HTML, this means that all topics in the target document are included in the reference. For the purpose of linking, the reference resolves to the first topic in the document.
When an @href attribute references a DITA resource using a URI with a fragment identifier, the portion after the hash must be a DITA local identifier. A DITA local identifier takes the following forms:

<table>
<thead>
<tr>
<th>Target</th>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topic element</td>
<td>topicID</td>
</tr>
<tr>
<td>Element in a topic</td>
<td>topicID/elementID</td>
</tr>
<tr>
<td>Element in a map</td>
<td>mapElementID</td>
</tr>
</tbody>
</table>

Where:

- **topicID** is the value of the @id attribute of the DITA topic. If the topic referenced by a DITA local identifier is the same topic that includes the reference, then topicID can be replaced by a period.
- **elementID** is the value of the @id attribute of the non-topic element within a DITA topic.
- **mapElementID** is the value of the @id attribute of the element within a DITA map document.

See 7.3.9 Processing xrefs and conrefs within a conref (148) for more information on how this syntax relates to conref resolution.

**Example: Common syntax for the @href attribute**

The following table includes some examples of common @href syntax. Note that these examples represent only a few common scenarios and are not all-inclusive.

<table>
<thead>
<tr>
<th>Target</th>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>The first topic in a DITA document</td>
<td>href=&quot;file.dita&quot;</td>
</tr>
<tr>
<td>A specific topic in a DITA document</td>
<td>href=&quot;file.dita#topicId&quot;</td>
</tr>
<tr>
<td>A non-topic element inside a DITA topic</td>
<td>href=&quot;file.dita#topicId/elementId&quot;</td>
</tr>
<tr>
<td>A non-topic element inside the same DITA topic as the reference</td>
<td>href=&quot;#./elementId&quot;</td>
</tr>
<tr>
<td>An element in a DITA map</td>
<td>href=&quot;myMap.ditamap#map-branch&quot;</td>
</tr>
<tr>
<td>An image</td>
<td>href=&quot;exampleImage.jpg&quot;</td>
</tr>
<tr>
<td>An external resource</td>
<td>href=&quot;<a href="http://www.example.org">http://www.example.org</a>&quot;</td>
</tr>
</tbody>
</table>

where:

- **topicid** is the value of the @id attribute on the referenced DITA topic.
- **elementid** is the value of the @id attribute on the referenced (non-topic) DITA element.
- **map-branch** is the value of the @id attribute on the referenced DITA map element.

**6.2.3 The @scope attribute**

The @scope attribute identifies the closeness of the relationship between the current document and the target resource.

The @scope attribute takes the following values:

- **external**
  - Indicates that the resource is not part of the current set of content.

- **local**
  - Indicates that the resource is part of the current set of content.
peer
Indicates one of the following:

- The resource is part of the current set of content, but it might not be accessible at build time.
- The resource should be treated as a root map for the purpose of creating map-to-map key references (peer maps).
- The resource is a peer map. If @keyscope is also specified on the reference, it indicates that the map should be treated as a separate deliverable for the purposes of linking.

-dita-use-conref-target
See 7.3.6 Using the -dita-use-conref-target value (145) for more information on "-dita-use-conref-target"

If no value is specified for the @scope attribute, the following considerations apply:

- If the @scope attribute is specified on a containing element within a map or within the related-links section, the value cascades from the closest containing element.
- In most cases, the processing default is "local". However the processing default is "external" whenever the absolute URI in the @href attribute begins with one of the following schemes: "http", "https", "ftp", or "mailto"

023 (407) For the @scope attribute, processors can consider additional URI schemes as "external" by default. Processors MUST always consider relative URIs as "local" by default.

6.2.4 The @type attribute
On linking elements, the @type attribute describes the target of a reference. The @type attribute is also used on several non-linking elements for other purposes.

This topic describes how to interpret the @type attribute when it is used on linking elements. Usage information for the @type attribute on other elements, such as <note> or <copyright>, is described in the element reference topics for those elements.

If the @type attribute is specified on a linking element that references DITA content, the attribute value should reflect the @class attribute of the referenced element. The value can be an unqualified local name, for example, "fig", or a qualified name exactly as specified in the @class attribute, for example, "topic/fig". Processors might ignore qualified names or consider only the local name.

If not explicitly specified on an element, the @type attribute value cascades from the closest containing element. If there is no explicit value for the @type attribute specified on an ancestor element, the processor should retrieve the type from the target resource, if it is available. If the type cannot be determined, the processing default is "topic".

024 (407) Applications MAY issue a warning when the specified or inherited @type attribute value does not match the target or a specialization ancestor of the target. Applications MAY recover from this error condition by using the correct value detected.

Only the <xref> element can link to content below the topic level. The other linking elements only can link to topics.

The following table lists values for the @type attribute that are commonly used on <xref> elements:

<table>
<thead>
<tr>
<th>Value</th>
<th>Target element</th>
</tr>
</thead>
<tbody>
<tr>
<td>fig</td>
<td>&lt;fig&gt;</td>
</tr>
</tbody>
</table>
An application might generate cross-reference text that is based on the value of the `@format` attribute. 

"-dita-use-conref-target" is also a valid value for the `@type` attribute. See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

### 6.3 URI-based (direct) addressing

Content reference and link relationships can be established from DITA elements by using URI references. DITA uses URI references in `@href`, `@conref`, and other attributes for all direct addressing of resources.

URI references address resources and (in some cases) subcomponents of those resources. In this context, a resource is a DITA document (map, topic, or DITA base document) or a non-DITA resource (for example, an image, a Web page, or a PDF document).

URI references that are URLs must conform to the rules for URLs and URIs. Windows paths that contain a backslash (`\`) are not valid URLs.

**URIs and fragment identifiers**

For DITA resources, fragment identifiers can be used with the URI to address individual elements. The fragment identifier is the part of the URI that starts with a number sign (`#`), for example, `#topicid/elementid`. URI references also can include a query component that is introduced with a question mark (`?`).

025 (407) DITA processors MAY ignore queries on URI references to DITA resources. URI references that address components in the same document MAY consist of just the fragment identifier.

For addressing DITA elements within maps and topics or individual topics within documents containing multiple topics, URI references must include the appropriate DITA-defined fragment identifier. URI references can be relative or absolute. A relative URI reference can consist of just a fragment identifier. Such a reference is a reference to the document that contains the reference.

**Addressing non-DITA targets using a URI**

DITA can use URI references to directly address non-DITA resources. Any fragment identifier used must conform to the fragment identifier requirements that are defined for the target media type or provided by processors.

**Addressing elements within maps using a URI**

When addressing elements within maps, URI references can include a fragment identifier that includes the ID of the map element, for example, `filename.ditamap#mapId` or `#mapId`. The same-topic, URI-reference fragment identifier of a period (.) cannot be used in URI references to elements within maps.
### Addressing topics using a URI

When addressing a DITA topic element, URI references can include a fragment identifier that includes the ID of the topic element (filename.dita#topicId or #topicId). When addressing the DITA topic element that contains the URI reference, the URI reference might include the same topic fragment identifier of "." (# .).

Topics always can be addressed by a URI reference whose fragment identifier consists of the topic ID. For the purposes of linking, a reference to a topic-containing document addresses the first topic within that document in document order. For the purposes of rendering, a reference to a topic-containing document addresses the root element of the document.

Consider the following examples:

- Given a document whose root element is a topic, a URI reference (with no fragment identifier) that addresses that document implicitly references the topic element.
- Given a `<dita>` document that contains multiple topics, for the purposes of linking, a URI reference that addresses the `<dita>` document implicitly references the first child topic.
- Given a `<dita>` document that contains multiple topics, for the purposes of rendering, a URI reference that addresses the `<dita>` document implicitly references all the topics that are contained by the `<dita>` element. This means that all the topics that are contained by the `<dita>` element are rendered in the result.

### Addressing non-topic elements using a URI

When addressing a non-topic element within a DITA topic, a URI reference must use a fragment identifier that contains the ID of the ancestor topic element of the non-topic element being referenced, a slash ("/") and the ID of the non-topic element (filename.dita#topicId/elementId or #topicId/elementId). When addressing a non-topic element within the topic that contains the URI reference, the URI reference can use an abbreviated fragment-identifier syntax that replaces the topic ID with "." (# ./ elementId).

This addressing model makes it possible to reliably address elements that have values for the `@id` attribute that are unique within a single DITA topic, but which might not be unique within a larger XML document that contains multiple DITA topics.

### Examples: URI reference syntax

The following table shows the URI syntax for common use cases.

<table>
<thead>
<tr>
<th>Use case</th>
<th>Sample syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference a table in a topic at a network location</td>
<td>&quot;<a href="http://example.com/file.dita#topicID/tableID">http://example.com/file.dita#topicID/tableID</a>&quot;</td>
</tr>
<tr>
<td>Reference a section in a topic on a local file system</td>
<td>&quot;directory/file.dita#topicID/sectionID&quot;</td>
</tr>
<tr>
<td>Reference a figure contained in the same XML document</td>
<td>&quot;#topicID/figureID&quot;</td>
</tr>
<tr>
<td>Reference a figure contained in the same topic of an XML document</td>
<td>&quot;/figureID&quot;</td>
</tr>
<tr>
<td>Reference an element within a map</td>
<td>&quot;<a href="http://example.com/map.ditamap#elementID">http://example.com/map.ditamap#elementID</a>&quot; (and a value of &quot;ditamap&quot; for the <code>@format</code> attribute)</td>
</tr>
<tr>
<td>Use case</td>
<td>Sample syntax</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Reference a map element within the same map document</td>
<td></td>
</tr>
<tr>
<td>&quot;#elementID&quot; (and a value of &quot;ditamap&quot; for the @format attribute)</td>
<td></td>
</tr>
</tbody>
</table>
| Reference an external Web site                                         | "http://www.example.com" or "http://www.example.com#somefragment" or any other valid URI  
| Reference an element within a local map                                | "filename.ditamap#elementid" (and a value of "ditamap" for the @format attribute)  
| Reference a local map                                                  | "filename.ditamap" (and a value of "ditamap" for the @format attribute)  
| Reference a local topic                                                | Reference a local topic "filename.dita" or "path/filename.dita"  
| Reference a specific topic in a local document                         | "filename.dita#topicid" or "path/filename.dita#topicid"  
| Reference a specific topic in the same file                            | 
| "#topicid"                                                             |  
| Reference the same topic in the same XML document                      | 
| 
"..:/book-b/book-b.ditamap" (and a value of "ditamap" for the @format attribute, a value of "peer" for the @scope attribute, and a value for the @keyscope attribute)  

### 6.4 Indirect key-based addressing

DITA keys provide an alternative to direct addressing. The key reference mechanism provides a layer of indirection so that resources (for example, URIs, metadata, or variable text strings) can be defined at the DITA map level instead of locally in each topic.

For information about using keys to define and reference controlled values, see 5.2 Subject scheme maps and their usage (51).

**Note** The material in this section of the DITA specification is exceptionally complex; it is targeted at implementers who build processors and other rendering applications.

#### 6.4.1 Core concepts for working with keys

The concepts described below are critical for a full understanding of keys and key processing.

The use of the phases "<map> element" or "<topicref> element" should be interpreted as "<map> element and any specialization of <map> element " or "<topicref> element or any specialization of <topicref> element."

### Definitions related to keys

**resource**

For the purposes of keys and key resolution, one of the following:

- An object addressed by URI
- Metadata specified on a resource, such as a @scope or @format attribute
- Text or metadata located within a <topicmeta> element
key
A name for a resource. See 6.4.4 Using keys for addressing (96) for more information.

key definition
A <topicref> element that binds one or more key names to zero or more resources.

key reference
An attribute that references a key, such as @keyref or @conkeyref.

key space
A list of key definitions that are used to resolve key references.

effective key definition
The definition for a key within a key space that is used to resolve references to that key. A key might have multiple definitions within a key space, but only one of those definitions is effective.

key scope
A map or section of a map that defines its own key space and serves as the resolution context for its key references.

Key definitions
A key definition binds one or more keys to zero or more resources. Resources can be:

- Any URI-addressed resource that is referenced directly by the @href attribute or indirectly by the @keyref attribute on the key definition. References to the key are considered references to the URI-addressed resource.
- (If the key definition contains a child <topicmeta> element) The child elements of the <topicmeta> element. The content of those elements can be used to populate the content of elements that reference the key.

If a key definition does not contain a <topicmeta> element and does not refer to a resource by @href or @keyref, it is nonetheless a valid key definition. References to the key definition are considered resolvable, but no linking or content transclusion occurs.

Key scopes
All key definitions and key references exist within a key scope. If the @keyscope attribute is never specified within the map hierarchy, all keys exist within a single, default key scope.

Additional key scopes are created when the @keyscope attribute is used. The @keyscope attribute specifies a name or names for the scope. Within a map hierarchy, key scopes are bounded by the following:

- The root map.
- The root element of submaps when the root elements of the submaps specify the @keyscope attribute
- Any <topicref> elements that specify the @keyscope attribute

Key spaces
The key space associated with a key scope is used to resolve all key references that occur immediately within that scope. Key references in child scopes are resolved using the key spaces that are associated with those child scopes.

A key scope is associated with exactly one key space. That key space contains all key definitions that are located directly within the scope; it might also contain definitions that exist in other scopes. Specifically,
the key space associated with a key scope is comprised of the following key definitions, in order of precedence:

1. All key definitions from the key space associated with the parent key scope, if any.
2. Key definitions within the scope-defining element, including those defined in directly-addressed, locally-scoped submaps, but excluding those defined in child scopes. (Keys defined in child scopes cannot be addressed without qualifiers.)
3. The key definitions from child scopes, with each key prepended by the child scope name followed by a period. If a child scope has multiple names, the keys in that scope are addressable from the parent scope using any of the scope names as a prefix.

Note Because of rules 1 and 3, the key space that is associated with a child scope includes the scope-qualified copies of its own keys that are inherited from the key space of the parent scope, as well as those from other "sibling" scopes.

Effective key definitions

A key space can contain many definitions for a given key, but only one definition is effective for the purpose of resolving key references.

When a key has a definition in the key space that is inherited from a parent scope, that definition is effective. Otherwise, a key definition is effective if it is first in a breadth-first traversal of the locally-scoped submaps beneath the scope-defining element. Put another way, a key definition is effective if it is the first definition for that key name in the shallowest map that contains that key definition. This allows higher-level map authors to override keys defined in referenced submaps.

Note A key definition that specifies more than one key name in its @keys attribute might be the effective definition for some of its keys but not for others.

Within a key scope, keys do not have to be defined before they are referenced. The key space is effective for the entire scope, so the order of key definitions and key references relative to one another is not significant. This has the following implications for processors:

- All key spaces for a root map must be determined before any key reference processing can be performed.
- Maps referenced solely by key reference have no bearing on key space contents.

For purposes of key definition precedence, the scope-qualified key definitions from a child scope are considered to occur at the location of the scope-defining element within the parent scope. See 6.4.14.5 Example: How key scopes affect key precedence (118) for more information.

6.4.2 Setting key names with the @keys attribute

A @keys attribute consists of one or more space-separated keys. Map authors define keys using a <topicref> or <topicref> specialization that contains the @keys attribute. Each key definition introduces an identifier for a resource referenced from a map. Keys resolve to the resources given as the @href value on the key definition <topicref> element, to content contained within the key definition <topicref> element, or both.

Comment by robander on 19 May 2021
This topic was moved from the langref; it needs to be here as it defines normative rules about the syntax of a key attribute. The following paragraph comes from reuse-general but in the base spec this is the only use, so should probably be taken out of the reuse file. Need to go over this section more closely now that attribute content has moved here.

The @keys attribute uses the following syntax:
• The value of the @keys attribute is one or more space-separated key names.
• Key names consist of characters that are legal in a URI. The case of key names is significant.
• The following characters are prohibited in key names: "{", "}", "[", "]", "/", ":", ",", ",", ",", and whitespace characters.

A key cannot resolve to sub-topic elements, although a @keyref attribute can do so by combining a key with a sub-topic element id.

**Related concepts**

**Indirect key-based addressing** (93)

DITA keys provide an alternative to direct addressing. The key reference mechanism provides a layer of indirection so that resources (for example, URIs, metadata, or variable text strings) can be defined at the DITA map level instead of locally in each topic.

### 6.4.3 The @keyref attribute

The @keyref attribute provides an indirect, late-bound reference to topics, to collections of topics (ditabase), to maps, to referenceable portions of maps, to non-DITA documents, to external URIs, or to XML content contained within a key definition topic reference. When the DITA content is processed, the key references are resolved using key definitions from DITA maps.

**Comment by robander**

This topic moved from the arch spec section. It needs editing for

- Overlap with existing content - likely needs to merge, definitely remove duplication
- This topic uses a key and the langRef links to it from the definition for @keyref, so if this topic goes away, be sure to update that keyref

For elements that only refer to topics or non-DITA resources, the value of the @keyref attribute is a key name. For elements that can refer to elements within maps or topics, the value of the @keyref attribute is a key name, a slash (/), and the ID of the target element, where the key name must be bound to either the map or topic that contains the target element.

**Related concepts**

**Indirect key-based addressing** (93)

DITA keys provide an alternative to direct addressing. The key reference mechanism provides a layer of indirection so that resources (for example, URIs, metadata, or variable text strings) can be defined at the DITA map level instead of locally in each topic.

### 6.4.4 Using keys for addressing

For topic references, image references, and other link relationships, resources can be indirectly addressed by using the @keyref attribute. For content reference relationships, resources can be indirectly addressed by using the @conkeyref attribute.

**Syntax**

For references to topics, maps, and non-DITA resources, the value of the @keyref attribute is simply a key name (for example, keyref="topic-key").

For references to non-topic elements within topics, the value of the @keyref attribute is a key name, a slash (/), and the ID of the target element (for example, keyref="topic-key/some-element-id").
Example

For example, consider this topic in the document `file.dita`:

```xml
<topic id="topicid">
  <title>Example referenced topic</title>
  <body>
    <section id="section-01">Some content.</section>
  </body>
</topic>
```

and this key definition:

```xml
<map>
  <topicref keys="myexample"
    href="file.dita"/>
</map>
```

A cross reference of the form `keyref="myexample/section-01"` resolves to the `<section>` element in the topic. The key reference is equivalent to the URI reference `xref="file.dita#topicid/section-01"`.

6.4.5 Key scopes

Key scopes enable map authors to specify different sets of key definitions for different map branches.

A key scope is defined by a `<map>` or `<topicref>` element that specifies the `@keyscope` attribute. The `@keyscope` attribute specifies the names of the scope, separated by spaces. The legal characters for a key scope name are the same as those for keys.

A key scope includes the following components:

- The scope-defining element
- The elements that are contained by the scope-defining element, minus the elements that are contained by child key scopes
- The elements that are referenced by the scope-defining element or its descendants, minus the elements that are contained by child key scopes

If the `@keyscope` attribute is specified on both a reference to a DITA map and the root element of the referenced map, only one scope is created; the submap does not create another level of scope hierarchy. The single key scope that results from this scenario has multiple names; its names are the union of the values of the `@keyscope` attribute on the map reference and the root element of the submap. This means that processors can resolve references to both the key scopes specified on the map reference and the key scopes specified on the root element of the submap.

The root element of a root map always defines a key scope, regardless of whether a `@keyscope` attribute is present. All key definitions and key references exist within a key scope, even if it is an unnamed, implicit key scope that is defined by the root element in the root map.

Each key scope has its own key space that is used to resolve the key references that occur within the scope. The key space that is associated with a key scope includes all of the key definitions within the key scope. This means that different key scopes can have different effective key definitions:

- A given key can be defined in one scope, but not another.
- A given key also can be defined differently in different key scopes.

Key references in each key scope are resolved using the effective key definition that is specified within its own key scope.
Example: Key scopes specified on both the map reference and the root element of the submap

Consider the following scenario:

Figure 42: Root map

```xml
<map>
  <mapref keyscope="A" href="installation.ditamap"/>
  <!-- ... -->
</map>
```

Figure 43: installation.ditamap

```xml
<map keyscope="B">
  <!-- ... -->
</map>
```

Only one key scope is created; it has key scope names of "A" and "B".

6.4.6 The @keyscope attribute

The @keyscope attribute consists of one or more space-separated key scope names. Map authors define the boundaries for key scopes by specifying the @keyscope attribute on `<map>` elements, `<topicref>` elements, or elements that are specializations of `<map>` or `<topicref>`. Such elements, their contents, and any locally-scoped content referenced from within the element, are considered to be part of the scope. Keys defined within a scope are only directly referenceable from within the same scope. They can be referenced from the parent scope using the scope’s name, followed by a period, followed by the key name.

Comment by robander on 19 May 2021
This topic contains a lot of processor / implementation rules and was moved from the langref to the archspec section about keys. Need to merge with existing key scope rules to ensure no duplication / no conflicting content.

Update Oct 14 2021: there is now a longer example of the non-intersecting behavior in 6.4.14.6 Example: How key scopes with the same name interact (120) so probably want to remove the simpler example from this page

All key scopes are contiguous and non-intersecting. Within a root map, two distinct key scopes with the same name have no relationship with each other aside from that implied by their relative locations in the key scope hierarchy. They do not, for example, share key definitions. The only processing impact of a key scope's names is in defining the prefixes used when contributing qualified key names to the parent scope.

For example, consider the following map segment:

```xml
<map>
  <topicgroup keyscope="xyz" id="scope1">
    <keydef keys="a" id="def1"/>
    <!-- other topic references -->
  </topicgroup>
  <topicgroup keyscope="xyz" id="scope2">
    <keydef keys="a" id="def2"/>
    <!-- other topic references -->
  </topicgroup>
  <!-- lots of other content -->
</map>
```

This map creates two distinct scopes that happen to use the same name ("xyz"). This results in the following:
• Each `<topicgroup>` sets a scope of "xyz" and includes a key "a". From outside of those two scopes, references to keyref="xyz.a" (key "a" within the scope "xyz") will always resolve to the first instance of that value, which is in the first `<topicgroup>`.
• Within the first `<topicgroup>`, content uses keyref="a" will resolve to the key in that branch (defined on the element with id="def1").
• Within the second `<topicgroup>`, content uses keyref="a" will resolve to the key in that branch (defined on the element with id="def2").

6.4.7 Addressing keys across scopes
When referencing key definitions that are defined in a different key scope, key names might need to be qualified with key scope names.

A root map might contain any number of key scopes; relationships between key scopes are discussed using the following terms:

child scope
A key scope that occurs directly within another key scope. For example, in the figure below, key scopes "A-1" and "A-2" are child scopes of key scope "A".

parent scope
A key scope that occurs one level above another key scope. For example, in the figure below, key scope "A" is a parent scope of key scopes "A-1" and "A-2".

ancestor scope
A key scope that occurs any level above another key scope. For example, in the figure below, key scopes "A" and "Root" are both ancestor scopes of key scopes "A-1" and "A-2"

descendant scope
A key scope that occurs any level below another key scope. For example, in the figure below, key scopes "A", "A-1", and "A-2" are all descendant scopes of the implicit, root key scope

sibling scope
A key scope that shares a common parent with another key scope. For example, in the figure below, key scopes "A" and "B" are sibling scopes; they both are children of the implicit, root key scope.

key scope hierarchy
A key scope and all of its descendant scopes.

Figure 44: A key scope hierarchy
Keys that are defined in parent key scopes

The key space that is associated with a key scope also includes all key definitions from its parent key scope. If a key name is defined in both a key scope and its parent scope, the key definition in the parent scope takes precedence. This means that a key definition in a parent scope overrides all definitions for the same key name in all descendant scopes. This enables map authors to override the keys that are defined in submaps, regardless of whether the submaps define key scopes.

In certain complex cases, a scope-qualified key name (such as "scope.key") can override an unqualified key name from the parent scope. See 6.4.14.5 Example: How key scopes affect key precedence (118).

Keys that are defined in child key scopes

The key space associated with a key scope does not include the unqualified key definitions from the child scopes. However, it does include scope-qualified keys from the child scopes. This enables sibling key scopes to have different key definitions for the same key name.

A scope-qualified key name is a key name, prepended by one or more key scope names and separated by periods. For example, to reference a key "keyName" defined in a child scope named "keyScope", specify keyref="keyScope.keyName".

If a key scope has multiple names, its keys can be addressed from its parent scope using any of the scope names. For example, if a key scope is defined with keyscope="a b c", and it contains a key name of "product", that key can be referenced from the parent scope by keyref="a.product", keyref="b.product", or keyref="c.product".

Because a child scope contributes its scope-qualified keys to its parent scope, and that parent scope contributes its scope-qualified keys to its parent scope, it is possible to address the keys in any descendant scope by using the scope-qualified key name. For example, consider a key scope named "ancestorScope" that has a child scope named "parentScope" which in turn has a child scope named "childScope". The scope "childScope" defines a key named "keyName". To reference the key "keyName" from scope "ancestorScope", specify the scope-qualified key name: keyref="ancestorScope.childScope.keyName".

Keys that are defined in sibling key scopes

Because a parent key scope contains scope-qualified keys from all of its child scopes, and a child scope inherits all of the key definitions (including scope-qualified keys) from its parent scope, it is possible for a child scope to reference its own scope-qualified keys, as well as those defined by its sibling scopes.

For example, consider two sibling scopes, "scope1" and "scope2". Each scope defines the key "productName". References to "productName" in each scope resolve to the local definition. However, since each scope inherits the scope-qualified keys that are available in their parent scope, either scope can reference "scope1.productName" and "scope2.productName" to refer to the scope-specific definitions for that key.

6.4.8 Cross-deliverable addressing and linking

A map can use scoped keys to reference keys that are defined in a different root map. This cross-deliverable addressing can support the production of deliverables that contain working links to other deliverables.

When maps are referenced and the value of the @scope attribute is set to "peer", the implications are that the two maps are managed in tandem, and that the author of the referencing map might have access to the referenced map. Adding a key scope to the reference indicates that the peer map should be treated as a separate deliverable for the purposes of linking.
Comment by Kristen J Eberlein on 19 April 2022

When this topic is reviewed, we should also check the definition of scope="peer" in the @scope topic.

The keys that are defined by the peer map belong to any key scopes that are declared on the <topicref> element that references that map. Such keys can be referenced from content in the referencing map by using scope-qualified key names. However, processors handle references to keys that are defined in peer maps differently from how they handle references to keys that are defined in submaps.

DITA processors are not required to resolve key references to peer maps. However, if all resources are available in the same processing or management context, processors have the potential to resolve key references to peer maps. There might be performance, scale, and user interface challenges in implementing such systems, but the ability to resolve any given reference is ensured when the source files are physically accessible.

Comment by Kristen J Eberlein on 04 July 2019

Should the following statement about what processors do “when a reference to a peer map cannot be resolved” contain RFC-2119 language?

Note the inverse implication; if the peer map is not available, then it is impossible to resolve the key reference. Processors that resolve key references to peer maps should provide appropriate messages when a reference to a peer map cannot be resolved. Depending on how DITA resources are authored, managed, and processed, references to peer maps might not be resolvable at certain points in the content life cycle.

The peer map might specify @keyscope on its root element. In that case, the @keyscope on the peer map is ignored for the purpose of resolving scoped key references from the referencing map. This avoids the need for processors to have access to the peer map in order to determine whether a given key definition comes from the peer map.

Example: A root map that declares a peer map

Consider the DITA maps map-a.ditamap and map-b.ditamap. Map A designates Map B as a peer map by using the following markup:

```xml
<map>
  <title>Map A</title>
  <topicref
    scope="peer"
    format="ditamap"
    keyscope="map-b"
    href="./map-b/map-b.ditamap"
    processing-role="resource-only"
  />
  <!-- ... -->
</map>
```

In this example, map-b.ditamap is not a submap of Map A; it is a peer map.
**Example: Key resolution in a peer map that contains a @keyscope attribute on the root element**

Consider the map reference in map Map A:

```xml
<mapref
    keyscope="scope-b"
    scope="peer"
    href="map-b.ditamap"
/>
```

where `map-b.ditamap` contains the following markup:

```xml
<map keyscope="product-x">
    <!-- ... -->
</map>
```

From the context of Map A, key references of the form "scope-b.somekey" are resolved to keys that are defined in the global scope of map B, but key references of the form "product-x.somekey" are not. The presence of a `@keyscope` attribute on the `<map>` element in Map B has no effect. A key reference to the scope "scope-b.somekey" is equivalent to the unscoped reference "somekey" when processed in the context of Map B as the root map. In both cases, the presence of `@keyscope` on the root element of Map B has no effect; in the first case it is explicitly ignored, and in the second case the key reference is within the scope "product-x" and so does not need to be scope qualified.

### 6.4.9 Processing key references

Key references can resolve as links, as text, or as both. Within a map, they also can be used to create or supplement information on a topic reference. This topic covers information that is common to all key processing, regardless of how the key is used.

#### Processing of undefined keys

**026 (407)**

If both `@keyref` and `@href` attributes are specified on an element, the `@href` value **MUST** be used as a fallback address when the key name is undefined. If both `@conkeyref` and `@conref` attributes are specified on an element, the `@conref` value **MUST** be used as a fallback address when the key name is undefined.

#### Determining effective attributes on the key-referencing element

The attributes that are common to the key-defining element and the key-referencing element, other than the `@keys`, `@processing-role`, and `@id` attributes, are combined as for content references, including the special processing for the `@xml:lang`, `@dir`, and `@translate` attributes.

#### Keys and conditional processing

**027 (408)**

The effective key definitions for a key space might be affected by conditional processing (filtering). Processors **SHOULD** perform conditional processing before determining the effective key definitions. However, processors might determine effective key definitions before filtering. Consequently, different processors might produce different effective bindings for the same map when there are key definitions that might be filtered out based on their filtering attributes.

**Note** In order to retain backwards compatibility with DITA 1.0 and 1.1, the specification does not mandate a processing order for different DITA features. This makes it technically possible to determine an effective key definition, resolve references to that key definition, and then filter
out the definition. However, the preferred approach is to take conditional processing into account when resolving keys, so that key definitions which are excluded by processing are not used in resolving key references.

Reusing a topic in multiple key scopes

If a topic that contains key references is reused in multiple key scopes within a given root map such that its references resolve differently in each use context, processors **MUST** produce multiple copies of the source topic in resolved output for each distinct set of effective key definitions that are referenced by the topic.

In such cases, authors can use `<resourceid>` within topic references to specify distinct anchor components for each instance of the topic.

with the `appid-role` attribute set to "deliverable-anchor" to specify different source URIs for each reference to a topic.

Error conditions

If a referencing element contains a key reference with an undefined key, it is processed as if there were no key reference, and the value of the `@href` attribute is used as the reference. If the `@href` attribute is not specified, the element is not treated as a navigation link. If it is an error for the element to be empty, an implementation **MAY** give an error message; it also **MAY** recover from this error condition by leaving the key reference element empty.

6.4.10 Processing key references for navigation links and images

Keys can be used to create or redirect links and cross references. Keys also can be used to address resources such as images or videos. This topic explains how to evaluate key references on links and cross references to determine a link target.

When a key definition is bound to a resource that is addressed by the `@href` or `@keyref` attributes, and does not specify “none” for the `@linking` attribute, all references to that key definition become links to the bound resource. When a key definition is not bound to a resource or specifies "none" for the `@linking` attribute, references to that key definition do not become links.

When a key definition has no `@href` value and no `@keyref` value, references to that key will not result in a link, even if they do contain an `@href` attribute of their own. If the key definition also does not contain a `<topicmeta>` subelement, empty elements that refer to the key (such as `<link keyref="a"/>` or `<xref keyref="a" href="fallback.dita"/>`) are ignored.

The `<object>` element has an additional key-referencing attribute named `datakeyref`. Key names in this attribute are resolved using the same processing that is described for the normal `@keyref` attribute.

6.4.11 Processing key references on `<topicref>` elements

While `<topicref>` elements are used to define keys, they also can reference keys that are defined elsewhere. This topic explains how to evaluate key references on `<topicref>` elements and its specializations.

Determining the effective resource

For topic references that use the `@keyref` attribute, the effective resource bound to the `<topicref>` element is determined by resolving all
intermediate key references. Each key reference is resolved either to a resource addressed directly by URI reference in an @href attribute, or to no resource. Processors MAY impose reasonable limits on the number of intermediate key references that they will resolve. Processors SHOULD support at least three levels of key references.

Note This rule applies to all topic references, including those that define keys. The effective bound resource for a key definition that uses the @keyref attribute cannot be determined until the key space has been constructed.

Combining metadata

Content from a key-defining element cascades to the key-referencing element following the rules for combining metadata between maps and other maps and between maps and topics.

The combined attributes and content cascade from one map to another or from a map to a topic, but this is controlled by existing rules for cascading, which are not affected by the use of key references.

If, in addition to the @keys attribute, a key definition specifies a @keyref attribute that can be resolved after the key resolution context for the key definition has been determined, the resources bound to the referenced key definition take precedence.

6.4.12 Processing key references to generate text or link text

Variable text can be specified by key definitions. Processors determine the effective text by retrieving the content of elements in a specific sequence.

Empty elements

Empty elements that specify a key reference might get their effective content from the referenced key definitions. For the purpose of determining variable text, empty elements are defined as elements that meet the following criteria:

- Have no text content, including white space
- Have no sub-elements
- Have no attributes that would be used as text content

Key definitions with child <topicmeta> elements

When an empty element references a key definition that has a child <topicmeta> element, content from that <topicmeta> element is used to determine the effective content of the referencing element. Effective content from the key definition becomes the element content, with the following exceptions:

- For empty <image> elements, the effective content is used as alternate text. This is equivalent to creating an <alt> sub-element to hold that content.
- For empty <link> elements, the effective content is used as link text. This is equivalent to creating a <linktext> sub-element to hold that content.
- For empty <link> and <xref> elements, a key definition can provide a short description in addition to the normal effective content. If the key definition includes <shortdesc> inside of <topicmeta>, the content of the <shortdesc> element also provides effective content for a <desc> sub-element.
- The <longdescref> element is an empty element with no effective content. Key definitions do not set effective text for this element.
- The <param> element does not have any effective content, so key definitions do not result in effective content for <param> elements.
Comment by robander on 1 june 2021
we’ve allowed @keyref on <lq> for a while now. Based on discussion at today’s TC (1 june 2021)
this would be interpreted as the title of the source of the quotation - thus the removal of href/
reftitle. OK to update accordingly, or does that need further confirmation from TC?

Processing rules

<table>
<thead>
<tr>
<th>031 (408)</th>
<th>Processors MUST resolve variable text that is defined using keys by using the following sequence:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Effective text content is taken from the &lt;keytext&gt; element.</td>
</tr>
<tr>
<td>2.</td>
<td>Effective text content is taken from the &lt;titlealt&gt; element with @title-role set to &quot;linking&quot;.</td>
</tr>
<tr>
<td>3.</td>
<td>Effective text content is taken from the &lt;titlealt&gt; element with @title-role set to &quot;navigation&quot;.</td>
</tr>
<tr>
<td>4.</td>
<td>Effective text content is taken from the &lt;titlealt&gt; element with @title-role set to a processor-recognized value.</td>
</tr>
<tr>
<td>5.</td>
<td>Effective text content is taken from the title of the referenced document, if available.</td>
</tr>
<tr>
<td>6.</td>
<td>Effective text content is determined by the processor.</td>
</tr>
</tbody>
</table>

Generalization of effective content

| 032 (408) | When the effective content for a key reference element results in invalid elements, those elements SHOULD be generalized to produce a valid result. |

For example, <keytext> in the key definition might use a domain specialization of <keyword> that is not valid in the key reference context, in which case the specialized element is generalized to <keyword>. If the generalized content is also not valid, a text equivalent is used instead. For example, <keytext> might include <ph> or a specialized <ph> in the key definition, but neither of those are valid as the effective content for a <keyword>. In that case, the text content of the <ph> is used.

6.4.13 Examples of keys

This section of the specification contains examples and scenarios. They illustrate a wide variety of ways that keys can be used.

6.4.13.1 Examples: Key definition

The <topicref> element, and any specialization of <topicref> that allows the @keys attribute, can be used to define keys.

In the following example, a <topicref> element is used to define a key; the <topicref> element also contributes to the navigation structure.

```xml
<map>
<!--... -->
<topicref keys="apple-definition" href="apple-gloss-en-US.dita" />
<!--... -->
</map>
```

The presence of the @keys attribute does not affect how the <topicref> element is processed.
In the following example, a `<keydef>` element is used to define a key.

```xml
<map>
  <!--[if... -->
  <keydef keys="apple-definition" href="apple-gloss-en-US.dita"/>
  <!--[if... -->
</map>
```

Because the `<keydef>` element sets the default value of the `@processing-role` attribute to "resource-only", the key definition does not contribute to the map navigation structure; it only serves as a key definition for the key name "apple-definition".

### 6.4.13.2 Examples: Key definitions for variable text

Key definitions can be used to store variable text, such as product names and user-interface labels. Depending on the key definition, the rendered output might have a link to a related resource.

In the following example, a "product-name" key is defined. The key definition contains a child `<keyword>` element nested within a `<keydef>` element.

```xml
<map>
  <keydef keys="product-name">
    <topicmeta>
      <keywords>
        <keyword>Thing-O-Matic</keyword>
      </keywords>
    </topicmeta>
    <keydef/>
  </keydef>
</map>
```

A topic can reference the "product-name" key by using the following markup:

```xml
<topic id="topicid">
  <title>...</title>
  <body>
    <p><keyword keyref="product-name"/> is a product designed to ...</p>
  </body>
</topic>
```

When processed, the output contains the text "Thing-O-Matic is a product designed to ...".

In the following example, the key definition contains both a reference to a resource and variable text.

```xml
<map>
  <keydef keys="product-name" href="thing-o-matic.dita">
    <topicmeta>
      <keywords>
        <keyword>Thing-O-Matic</keyword>
      </keywords>
    </topicmeta>
    <keydef/>
  </keydef>
</map>
```

When processed using the key reference from the first example, the output contains the "Thing-O-Matic is a product designed to ..." text. The phrase "Thing-O-Matic" also is a link to the `thing-o-matic.dita` topic.
6.4.13.3 Example: Duplicate key definitions within a single map

In this scenario, a DITA map contains duplicate key definitions. How a processor finds the effective key definition depends on document order and the effect of filtering applied to the key definitions.

In the following example, a map contains two definitions for the key "load-toner":

```xml
<map>
    <!--... -->
    <keydef keys="load-toner" href="model-1235-load-toner-proc.dita"/>
    <keydef keys="load-toner" href="model-4545-load-toner-proc.dita"/>
    <!--... -->
</map>
```

In this example, only the first key definition (in document order) of the "load-toner" key is effective. All references to the key within the scope of the map resolve to the topic `model-1235-load-toner.proc.dita`.

In the following example, a map contains two definitions for the "file-chooser-dialog" key; each key definition specifies a different value for the `@platform` attribute.

```xml
<map>
    <!--... -->
    <keydef keys="file-chooser-dialog" href="file-chooser-osx.dita" platform="osx"/>
    <keydef keys="file-chooser-dialog" href="file-chooser-win7.dita" platform="windows7"/>
    <!--... -->
</map>
```

In this case, the effective key definition is determined not only by the order in which the definitions occur, but also by whether the active value of the platform condition is "osx" or "windows7". Both key definitions are potentially effective because they have distinct values for the conditional attribute. Note that if no active value is specified for the `@platform` attribute at processing time, then both of the key definitions are present and so the first one in document order is the effective definition.

If the DITAVAL settings are defined so that both "osx" and "windows7" values for the `@platform` attribute are excluded, then neither definition is effective and the key is undefined. That case can be avoided by specifying an unconditional key definition after any conditional key definitions, for example:

```xml
<map>
    <!--... -->
    <keydef keys="file-chooser-dialog" href="file-chooser-osx.dita" platform="osx"/>
    <keydef keys="file-chooser-dialog" href="file-chooser-win7.dita" platform="windows7"/>
    <keydef keys="file-chooser-dialog" href="file-chooser-generic.dita"/>
    <!--... -->
</map>
```

If the above map is processed with both "osx" and "windows7" values for the `@platform` attribute excluded, then the effective key definition for "file-chooser-dialog" is the `file-chooser-generic.dita` resource.

6.4.13.4 Example: Duplicate key definitions across multiple maps

In this scenario, the root map contains references to two submaps, each of which defines the same key. The effective key definition depends upon the document order of the direct URI references to the maps.

In the following example, a root map contains a key definition for the key “toner-specs” and references to two submaps.

```xml
<map>
    <keydef keys="toner-specs" href="toner-type-a-specs.dita"/>
    <mapref href="submap-01.ditamap"/>
</map>
```
The first submap, submap-01.ditamap, contains definitions for the keys “toner-specs” and “toner-handling”:

```xml
<map>
  <keydef keys="toner-specs" href="toner-type-b-specs.dita"/>
  <keydef keys="toner-handling" href="toner-type-b-handling.dita"/>
</map>
```

The second submap, submap-02.ditamap, contains definitions for the keys “toner-specs”, “toner-handling”, and “toner-disposal”:

```xml
<map>
  <keydef keys="toner-specs" href="toner-type-c-specs.dita"/>
  <keydef keys="toner-handling" href="toner-type-c-handling.dita"/>
  <keydef keys="toner-disposal" href="toner-type-c-disposal.dita"/>
</map>
```

For this example, the effective key definitions are listed in the following table.

<table>
<thead>
<tr>
<th>Key</th>
<th>Bound resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>toner-specs</td>
<td>toner-type-a-specs.dita</td>
</tr>
<tr>
<td>toner-handling</td>
<td>toner-type-b-handling.dita</td>
</tr>
<tr>
<td>toner-disposal</td>
<td>toner-type-c-disposal.dita</td>
</tr>
</tbody>
</table>

The key definition for “toner-specs” in the root map is effective, because it is the first encountered in a breadth-first traversal of the root map. The key definition for “toner-handling” in submap-01.ditamap is effective, because submap-01 is included before submap-02 and so comes first in a breadth-first traversal of the submaps. The key definition for “toner-disposal” is effective because it is the only definition of the key.

6.4.13.5 Example: Key definition with key reference

When a key definition also specifies a key reference, the key reference also must be resolved in order to determine the effective resources that are bound to that key definition.

In the following example, a `<topicref>` element references the key "widget”. The definition for "widget" in turn references the key "mainProduct".

```xml
<map>
  <topicref keyref="widget" id="example"/>
  <keydef keys="widget" href="widgetInfo.dita" scope="local" format="dita" rev="v1r2"
    keyref="mainProduct">
    <topicmeta><navtitle>Information about Widget</navtitle></topicmeta>
  </keydef>
  <keydef keys="mainProduct" href="http://example.com/productPage" scope="external"
    product="prodCode" audience="sysadmin">
    <topicmeta><navtitle>Generic product page</navtitle></topicmeta>
  </keydef>
</map>
```

For this example, the key reference to “widget” pulls resources from that key definition, which in turn pulls resources from “mainProduct”.

The resources from the key definitions are combined as follows:
• The metadata resources from "mainProduct" are combined with the resources already specified on the "widget" key definition, resulting in the addition of @product and @audience values.
• The navigation title on the "widget" key definition overrides those on the "mainProduct" key definition.
• The @href, @scope, and @format attributes on the "mainProduct" key definition override those on "widget".

Thus after key references are resolved, the original <topicref> element is equivalent to the following:

```
<topicref id="example"
    href="http://example.com/productPage" scope="external" format="html"
    product="prodCode" audience="sysadmin">
    <topicmeta><navtitle>Information about Widget</navtitle></topicmeta>
</topicref>
```

6.13.6.6 Example: Link redirection

This scenario outlines how different authors can redirect links to a common topic by using key definitions. This could apply to <xref>, <link>, or any elements (such as <keyword> or <term>) that become navigation links.

A company wants to use a common DITA topic for information about recycling: recycling.dita. However, the topic contains a cross-reference to a topic that needs to be unique for each product line; each such topic contains product-specific URLs.

1. The editing team creates a recycling.dita topic that includes a cross-reference to the product-specific topic. The cross reference is implemented using a key reference:

```
<xref keyref="product-recycling-info" href="generic-recycling-info.dita"/>
```

The value of the @href attribute provides a fallback in the event that a product team forgets to include a key definition for "product-recycling-info".

2. Each product documentation group creates a unique key definition for "product-recycling-info". Each group authors the key definition in a DITA map, for example:

```
<map>
  <!-- ... -->
  <keydef keys="product-recycling-info" href="acme-server-recycling.dita"/>
  <!-- ... -->
</map>
```

Each team can use the recycling.dita topic, and the cross reference in the topic resolves differently for each team.

3. A year later, there is an acquisition. The newly-acquired team wants to reuse Acme's common material, but it needs to direct its users to an external Web site that lists the URLs, rather than a topic in the product documentation. Their key definition looks like the following:

```
<topicref keys="product-recycling-info"
    href="http://acme.example.com/server/recycling"
    scope="external" format="html"/>
```

When newly-acquired team uses the recycling.dita topic, it resolves to the external Web site; however for all other teams, the cross reference in the topic continues to resolves to their product-specific topic.

4. A new product team is formed, and the team forgets to include a key definition for "product-recycling-info" in one of their root maps. Because the cross reference in the recycling.dita
6.4.13.7 Example: Link modification or removal

This scenario outlines how different authors can effectively remove or modify a `<link>` element in a shared topic.

A company wants to use a shared topic for information about customer support. For most products, the shared topic includes a link to a topic about extended warranties. But a small number of products do not offer extended warranties.

1. Team one creates the shared topic: `customer-support.dita`. The topic contains the following mark-up:

   ```
   <related-links>
     <link keyref="extended-warranties" href="common/extended-warranties.dita"/>
   </related-links>
   ```

2. The teams that need the link to the topic about extended warranties can reference the `customer-support.dita` topic in their DITA maps. When processed, the related link in the topic resolves to the `common/extended-warranties.dita` topic.

3. The teams that do not want the related link to the topic about extended warranties can include a key definition in their DITA map that does not include an `@href` attribute, for example:

   ```
   <map>
     <!-- ... -->
     <keydef keys="extended-warranties"/>
     <!-- ... -->
   </map>
   ```

   When processed, the related link in the topic is not rendered.

4. Yet another team wants to simply have a paragraph about extended warranties printed. They define the key definition for "extended-warranties" as follows:

   ```
   <map>
     <!-- ... -->
     <keydef keys="extended-warranties">
       <topicmeta>
         <keytext>This product does not offer extended warranties.</keytext>
       </topicmeta>
     </keydef>
     <!-- ... -->
   </map>
   ```

   When this team renders their content, there is no hyperlink in the output, just the text “This product does not offer extended warranties” statement.

6.4.13.8 Example: Links from `<term>` or `<keyword>` elements

The `@keyref` attribute enables authors to specify that references to keywords or terms in a DITA topic can be rendered as a link to an associated resource.

In this scenario, a company with well-developed glossary wants to ensure that instances of a term that is defined in the glossary always include a link to the glossary topic.

1. An information architect adds values for the `@keys` attribute to all of the `<topicref>` elements that are in the DITA map for the glossary, for example:

   ```
   <map>
     <title>Company-wide glossary</title>
   ```
2. When authors refer to a term in a topic, they use the following mark-up:

```xml
<term keyref="term-1"/>
```

When the `<term>` element is rendered, the content is provided by the `<title>` element of the glossary topic. The `<term>` element also is rendered as a link to the glossary topic.

### 6.4.13.9 Example: conref redirection

The `@conkeyref` attribute enables authors to share DITA topics that reuse content. It also enables map authors to specify different key definitions for common keys.

In this scenario, Acme produces content for a product that is also resold through a business partner. When the DITA content is published for the partner, several items must be different, including the following:

- Product names
- Standard notes that contain admonitions

Simply using the `@conref` attribute would not be possible for teams that use a component content management system where every DITA topic is addressed by a globally-unique identifier (GUID).

1. Authors reference the reusable content in their topics by using the `@conkeyref` attribute, for example:

```xml
<task id="reusable-product-content">
  <title><keyword conkeyref="reuse/product-name"/> prerequisites</title>
  <taskbody>
    <prereq><note conkeyref="reuse/warning-1"/></prereq>
    <!-- ... -->
  </taskbody>
</task>
```

2. Authors create two different topics; one topic contains elements appropriate for Acme, and the other topic contains elements appropriate for the partner. Note that each reuse topic must use the same element types (or compatible specializations) and values for the `@id` attribute. For example, the following reuse file is appropriate for use by Acme:

```xml
<topic id="acme-reuse">
  <title>Reuse topic for Acme</title>
  <body>
    <note id="warning-1">Admonitions for Acme</note>
    <p><keyword id="product-name">Acme product name</keyword></p>
    <!-- ... -->
  </body>
</topic>
```

The following reuse file is appropriate for use by the OEM partner:

```xml
<topic id="oem-reuse">
  <title>Reuse topic for OEM partner</title>
  <body>
    <note id="warning-1">Admonitions for partner</note>
    <p><keyword id="product-name">OEM product name</keyword></p>
    <!-- ... -->
  </body>
</topic>
```
3. The two versions of the DITA maps each contain different key definitions for the key name "reuse". (This associates a key with the topic that contains the appropriate reusable elements.) For example:

Figure 45: DITA map for Acme

```
<map>
  <!-- ... -->
  <keydef keys="reuse" href="acme-reuse.dita"/>
  <!-- ... -->
</map>
```

Figure 46: DITA map for OEM partner

```
<map>
  <!-- ... -->
  <keydef keys="reuse" href="oem-reuse.dita"/>
  <!-- ... -->
</map>
```

When each of the DITA maps is published, the elements that are referenced by `@conkeyref` will use the reuse topic that is referenced by the `<keydef>` element in the map. The product names and warnings will be different in the output.

6.4.13.10 Example: Keys and collaboration

Keys enable authors to collaborate and work with evolving content with a minimum of time spent reworking topic references.

In this scenario, authors collaborate on a publication that includes content for a product that is in the early stages of development. The company documentation is highly-structured and uses the same organization for all publications: "Introduction," "Example," and "Reference."

1. Author one creates a submap for the new product information. She knows the structure that the final content will have, but she does not want to create empty topics for information that is not yet available. She decides to initially author what content is available in a single topic. When more content is available, she'll create additional topics. Her DITA map looks like the following:

```
<map>
  <title>New product content</title>
  <topicref keys="1-overview 1-intro 1-example 1-reference" href="1-overview.dita"/>
</map>
```

2. Author two knows that he needs to add a `<topicref>` to the "Example" topic that will eventually be authored by author one. He references the not-yet-authored topic by key reference:

```
<topicref keyref="1-example"/>
```

His topic reference initially resolves to the `1-overview.dita` topic.

3. Author one finally gets the information that she was waiting on. She creates additional topics and modifies her DITA map as follows:

```
<map>
  <title>New product content</title>
  <topicref keys="1-overview" href="1-overview.dita">
    <topicref keys="1-intro" href="1-intro.dita"/>
    <topicref keys="1-example" href="1-example.dita"/>
    <topicref keys="1-reference" href="1-reference.dita"/>
  </topicref>
</map>
```
Without needing to make any changes to the content, author two’s topic reference now resolves to the \texttt{1-example.dita} topic.

### 6.4.14 Examples of scoped keys

This section of the specification contains examples and scenarios. They illustrate how scoped keys can be used.

#### 6.4.14.1 Example: Scoped key definitions for variable text

Scoped key definitions can be used for variable text. This enables you to use the same DITA topic multiple times in a DITA map, and in each instance the variable text can resolve differently.

The Acme Tractor Company produces two models of tractor: X and Y. Their product manual contains sets of instructions for each model; until now, the maintenance procedures have been different for each model. Now, the product manual needs to add instructions for changing the oil, and the procedure is identical for both model X and model Y. While most maintenance procedures are different for each model, the instructions for changing the oil are identical for both model X and model Y. The company policies call for including the specific model number in each topic, so a generic topic that could be used for both models is not permitted. Scoped keys can solve this problem.

1. The authoring team creates the new \texttt{changing-the-oil.dita}. The new topic uses the following markup to reference the product model:

   ```xml
   <keyword keyref="model"/>
   ```

2. The information architect examines the root map for the manual, and decides how to define key scopes. Originally, the map looked like the following:

   ```xml
   <map>
   <!-- Model X: Maintenance procedures -->
   <topicref href="model-x-procedures.dita">
   <topicref href="model-x/replacing-a-tire.dita"/>
   <topicref href="model-x/adding-fluid.dita"/>
   </topicref>
   <!-- Model Y: Maintenance procedures -->
   <topicref href="model-y-procedures.dita">
   <topicref href="model-y/replacing-a-tire.dita"/>
   <topicref href="model-y/adding-fluid.dita"/>
   </topicref>
   </map>
   ```

3. The information architect wraps each set of procedures in a \texttt{<topicgroup>} element and sets the \texttt{@keyscope} attribute.

   ```xml
   <map>
   <!-- Model X: Maintenance procedures -->
   <topicgroup keyscope="model-x">
   <topicref href="model-x-procedures.dita">
   <topicref href="model-x/replacing-a-tire.dita"/>
   <topicref href="model-x/adding-fluid.dita"/>
   </topicref>
   </topicgroup>
   <!-- Model Y: Maintenance procedures -->
   <topicgroup keyscope="model-y">
   <topicref href="model-y-procedures.dita">
   <topicref href="model-y/replacing-a-tire.dita"/>
   <topicref href="model-y/adding-fluid.dita"/>
   </topicref>
   </topicgroup>
   </map>
   ```
This defines the key scopes for each set of procedures.

4. The information architect then adds key definitions to each set of procedures, as well as a reference to the `changing-the-oil.dita` topic.

When the DITA map is processed, the `changing-the-oil.dita` topic is rendered twice. The model variable is rendered differently in each instance, using the text as specified in the scoped key definition. Without key scopes, the first key definition would win, and "model "X" would be used in all topics.

### 6.4.14.2 Example: References to scoped keys

You can address scoped keys from outside the key scope in which the keys are defined.
For this example, the effective key definitions are listed in the following tables.

**Figure 47: Effective key definitions for scope-1**

<table>
<thead>
<tr>
<th>Key reference</th>
<th>Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>key-1</td>
<td>topic-1.dita</td>
</tr>
<tr>
<td>scope-1.key-1</td>
<td>topic-1.dita</td>
</tr>
<tr>
<td>scope-2.key-1</td>
<td>topic-2.dita</td>
</tr>
</tbody>
</table>

**Figure 48: Effective key definitions for scope-2**

<table>
<thead>
<tr>
<th>Key reference</th>
<th>Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>key-1</td>
<td>topic-2.dita</td>
</tr>
<tr>
<td>scope-1.key-1</td>
<td>topic-1.dita</td>
</tr>
<tr>
<td>scope-2.key-1</td>
<td>topic-2.dita</td>
</tr>
</tbody>
</table>

**Figure 49: Effective key definitions for the key scope associated with the root map**

<table>
<thead>
<tr>
<th>Key reference</th>
<th>Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>key-1</td>
<td>Undefined</td>
</tr>
<tr>
<td>scope-1.key-1</td>
<td>topic-1.dita</td>
</tr>
<tr>
<td>scope-2.key-1</td>
<td>topic-2.dita</td>
</tr>
</tbody>
</table>

**6.4.14.3 Example: Key definitions in nested key scopes**

In this scenario, the root map contains nested key scopes, each of which contain duplicate key definitions. The effective key definition depends on key-scope precedence rules.

Consider the following DITA map:

```xml
<map>
  <title>Root map</title>
  <!-- Root scope -->
  <keydef keys="a" href="topic-1.dita"/>

  <!-- Key scope A -->
  <topicgroup keyscope="A">
    <keydef keys="b" href="topic-2.dita"/>
    <!-- Key scope A-1 -->
    <topicgroup keyscope="A-1">
      <keydef keys="c" href="topic-3.dita"/>
    </topicgroup>
    <!-- Key scope A-2 -->
    <topicgroup keyscope="A-2">
      <keydef keys="d" href="topic-4.dita"/>
    </topicgroup>
  </topicgroup>

  <!-- Key scope B -->
  <topicgroup keyscope="B">
    <keydef keys="a" href="topic-5.dita"/>
    <keydef keys="e" href="topic-6.dita"/>
  </topicgroup>
</map>
```
The key scopes in this map form a tree structure.

**Figure 50: Graphical representation of the key scopes**

Each box in the diagram represents a key scope; the name of the key scope is indicated in bold with upper-case letters. Below the name of the key scope, the key definitions that are present in the scope are listed. Different typographic conventions are used to indicate where the key definition occurs:

**No styling**
- The key definition occurs in the immediate key scope and is not overridden by a key definition in a parent scope. For example, key "a" in the root map.

**Parentheses**
- The key definition occurs in a child scope. For example, keys "A-1.c" and "A-2.d" in key scope A.

**Brackets**
- The key definition occurs in the immediate key scope, but it is overridden by a key definition in an ancestor scope. For example, key "a" in key scope B.

Arrows point from child to parent scopes.
Assume that each key scope contains numerous key references. The following tables demonstrate how key references resolve in key scopes A-2 and B. The first column shows the value used in key references; the second column shows the resource to which the key resolves.

**Figure 51: Key scope A-2**

<table>
<thead>
<tr>
<th>Key reference</th>
<th>Resource to which the key resolves</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>&quot;a&quot;, defined in the root map: topic-1.dita</td>
</tr>
<tr>
<td>d</td>
<td>&quot;d&quot;, as defined in the immediate key scope: topic-4.dita</td>
</tr>
<tr>
<td>A-2.d</td>
<td>&quot;d&quot;, as defined in the immediate key scope: topic-4.dita</td>
</tr>
<tr>
<td>c</td>
<td>Undefined</td>
</tr>
<tr>
<td>A-1.c</td>
<td>&quot;A-1.c&quot;, as defined in key scope A-1. This key name is available because it exists in the parent scope, key scope A. The key name resolves to topic-3.dita</td>
</tr>
<tr>
<td>A.A-1.c</td>
<td>&quot;A-1.c&quot;, as defined in key scope A-1. This key name is available because it exists in the root key scope. The key name resolves to topic-3.dita</td>
</tr>
</tbody>
</table>

**Figure 52: Key scope B**

<table>
<thead>
<tr>
<th>Key reference</th>
<th>Resource to which the key resolves</th>
</tr>
</thead>
<tbody>
<tr>
<td>e</td>
<td>&quot;e&quot;, defined in the immediate key scope: topic-6.dita</td>
</tr>
<tr>
<td>a</td>
<td>&quot;a&quot;, as defined in the root key scope. (While a key definition for &quot;a&quot; exists in the immediate key scope, it is overridden by the key definition that occurs in the parent key scope.) The key name resolves to topic-1.dita</td>
</tr>
<tr>
<td>B.a</td>
<td>&quot;a&quot;, as defined in the immediate key scope. Because the key reference uses the scope-qualified names, it resolves to the key &quot;a&quot; in scope B. The key name resolves to topic-5.dita</td>
</tr>
<tr>
<td>g</td>
<td>Undefined. The key &quot;g&quot; is defined only in key scope B-2, so no unqualified key named &quot;g&quot; is defined in scope B.</td>
</tr>
<tr>
<td>B-2.g</td>
<td>&quot;g&quot;, as defined in key scope B-2: topic-8.dita</td>
</tr>
</tbody>
</table>

**6.4.14.4 Example: Key scopes and omnibus publications**

Key scopes enable you to create omnibus publications that include multiple submaps that define the same key names for common items, such as product names or common topic clusters.

In this scenario, a training organization wants to produce a deliverable that includes all of their training course materials. Each course manual uses common keys for standard parts of the course materials, including "prerequisites," "overview", "assessment", and "summary."

An information architect creates a root map that contains the following markup:

```xml
<map xml:lang="en">
  <title>Training courses</title>
  <mapref href="course-1.ditamap"/>
</map>
```
Each of the submaps contain `<topicref>` elements that refer to resources using the `@keyref` attribute. Each submap uses common keys for standard parts of the course materials, including "prerequisites," "overview", "assessment", and "summary", and their key definitions bind the key names to course-specific resources. For example:

```xml
<map xml:lang="en">
  <title>Training course #1</title>
  <mapref href="course-1/key-definitions.ditamap"/>
  <topicref keyref="prerequisites"/>
  <topicref keyref="overview"/>
  <topicref keyref="assessment"/>
  <topicref keyref="summary"/>
</map>
```

Without using key scopes, the effective key definitions for the common keys resolve to those found in `course-1.ditamap`. This is not the desired outcome. By adding key scopes to the submaps, however, the information architect can ensure that the key references in the submaps resolve to the course-specific key definitions.

```xml
<map xml:lang="en">
  <title>Training courses</title>
  <mapref href="course-1.ditamap" keyscope="course-1"/>
  <mapref href="course-2.ditamap" keyscope="course-2"/>
  <mapref href="course-3.ditamap" keyscope="course-3"/>
  <topicref href="omnibus-summary.dita"/>
</map>
```

The information architect does not set `keys="summary"` on the `<topicref>` element in the root map. Doing so would mean that all key references to "summary" in the submaps would resolve to `omnibus-summary.dita`, rather than the course-specific summary topics. This is because key definitions located in parent scopes override those located in child scopes.

### 6.4.14.5 Example: How key scopes affect key precedence

For purposes of key definition precedence, the scope-qualified key definitions from a child scope are considered to occur at the location of the scope-defining element within the parent scope.

Within a single key scope, key precedence is determined by which key definition comes first in the map, or by the depth of the submap that defines the key. This was true for all key definitions prior to DITA 1.3, because all key definitions were implicitly in the same key scope. Scope-qualified key names differ in that precedence is determined by the location where the key scope is defined.

This distinction is particularly important when key names or key scope names contain periods. While avoiding periods within these names will avoid this sort of issue, such names are legal so processors will need to handle them properly.

The following root map contains one submap and one key definition. The submap defines a key named "sample".

**Figure 53: Root map**

```xml
<map>
  <!-- The following mapref defines the key scope "scopeName" -->
  <mapref href="submap.ditamap" keyscope="scopeName"/>
  <!-- The following keydef defines the key "scopeName.sample" -->
  <keydef keys="scopeName.sample" href="losing-key.dita"/>
</map>
```
When determining precedence, all keys from the key scope "scopeName" occur at the location of the scope-defining element—in this case, the <mapref> element in the root map. Because the <mapref> comes first in the root map, the scope-qualified key name "scopeName.sample" that is pulled from submap.ditamap occurs before the definition of "scopeName.sample" in the root map. This means that in the context of the root map, the effective definition of "scopeName.sample" is the scope-qualified key definition that references winning-key.dita.

The following illustration shows a root map and several submaps. Each submap defines a new key scope, and each map defines a key. In order to aid understanding, this sample does not use valid DITA markup; instead, it shows the content of submaps inline where they are referenced.

Figure 55: Complex map with multiple submaps and scopes

The sample map shows four key definitions. From the context of the root scope, all have key names of "scopeA.scopeB.MYKEY".

1. submapB.ditamap defines the key "MYKEY". The key scope "scopeB" is defined on the <mapref> to submapB.ditamap, so from the context of submapA.ditamap, the scope-qualified key name is "scopeB.MYKEY". The key scope "scopeA" is defined on the <mapref> to submapA.ditamap, so from the context of the root map, the scope-qualified key name is "scopeA.scopeB.MYKEY".
2. submapA.ditamap defines the key "scopeB.MYKEY". The key scope "scopeA" is defined on the <mapref> to submapA.ditamap, so from the context of the root map, the scope-qualified key name is "scopeA.scopeB.MYKEY".
3. submapC.ditamap defines the key "MYKEY". The key scope "scopeA.scopeB" is defined on the <mapref> to submapC.ditamap, so from the context of the root map, the scope-qualified key name is "scopeA.scopeB.MYKEY".
4. Finally, the root map defines the key "scopeA.scopeB.MYKEY".
Because scope-qualified key definitions are considered to occur at the location of the scope-defining element, the effective key definition is the one from `submapB.ditamap` (the definition that references `example-ONE.dita`).

### 6.4.14.6 Example: How key scopes with the same name interact

In a large publication it is possible that two sets of content will use the same key scope name. These scopes have no relationship with each other aside from the shared name; key definitions in one are not shared with the other.

This scenario is more likely in a large publication that pulls from multiple sources, where the root map refers to two sets of content that share a key scope name. Those key scopes are non-intersecting (98), meaning that key definitions within one scope are not automatically available to the other key scope that happens to share the same name.

In the following example, a root map refers to multiple product maps that are assembled into a custom product suite:

```xml
<map>
  <title>Custom product suite overview</title>
  <!-- Content from product A -->
  <mapref href="productA/productA.ditamap"/>
  <!-- Content from product B -->
  <mapref href="productB/productB.ditamap"/>
  <!-- ...Content from additional products... -->
</map>
```

In this scenario, both product A and product B share a key scope name "using". The full context, showing content from both A and B, shows the shared key scope names and one shared key name:

```xml
<map>
  <title>Custom product suite overview</title>
  <!-- Content from product A (from productA.ditamap) -->
  <topicref href="productA/overview.dita">
    <topicref href="productA/using.dita" keys="usingprodA" keyscope="using">
      <topicref href="productA/signup.dita" keys="signup"/>
      <topicref href="productA/logging-in.dita" keys="login"/>
      <!-- ... additional topics and keys -->
    </topicref>
  </topicref>

  <!-- Content from product B (from productB.ditamap) -->
  <topicref href="productB/using.dita" keys="usingprodB" keyscope="using">
    <topicref href="productB/request-access.dita" keys="access"/>
    <topicref href="productB/log-in-to-portal.dita" keys="login-portal"/>
    <!-- ... additional topics and keys -->
  </topicref>
</map>
```

In the resolved view shown above, each product defines the key scope "using", and within that key scope each defines the key name "troubleshooting". Keys are resolved as follows:

- Within the root map context:
  1. Keys unique to Product A's "using" scope can be referenced with that prefix: "using.usingprodA", "using.signup", and "using.login".
2. Keys unique to Product B’s “using” scope can be referenced with that prefix: "using.usingprodB", "using.access", and "using.login-portal".
3. The scoped reference "using.troubleshooting" is defined twice. In this case, normal key precedence rules apply. It resolves to the first definition, productA/issues.dita.
4. Product B's troubleshooting topic cannot be referenced by key because of the conflict. The easiest way to make this key definition available would be to add an additional scope around all of Product B’s content.

- Within the Product A context:
  1. keyref="usingprodA" resolves to productA/using.dita
  2. keyref="signup" resolves to productA/signup.dita
  3. keyref="login" resolves to productA/logging-in.dita
  4. keyref="troubleshooting" resolves to productA/issues.dita
  5. Keys that are in Product B’s "using" context, and are unique to that context, can be referenced with the scope prefix: "using.usingprodB", "using.access", "using.login-portal"

- Within the Product B context:
  1. keyref="usingprodB" resolves to productB/using.dita
  2. keyref="access" resolves to productB/request-access.dita
  3. keyref="login-portal" resolves to productB/log-in-to-portal.dita
  4. keyref="troubleshooting" resolves to productB/troubleshooting.dita
  5. Keys that are in Product A’s “using” context, and are unique to that context, can be referenced with the scope prefix: "using.usingprodA", "using.signup", "using.login"
  6. The shared key definition "using.troubleshooting" resolves against the root context, which means it resolves to the Product A context, productA/issues.dita

6.4.14.7 Example: @subjectrefs attribute with key scopes

Comment by Kristen J Eberlein on 29 July 2022

The following is content that Eliot Kimber suggested be included in the DITA 2.0 specification as part of the review of proposal #647. It has not been edited.

A subject scheme map may be included in a map as either a normal sub map or as a peer root map and associated with a key scope on the map reference.

Figure 56: A subject scheme map included as a sub map with a key scope:

```
<map>
  <title>User assistance for the Acme Widget</title>
  <mapref keyscope="subjects" href="subjectschemes/subject-scheme-01.ditamap"/>
  <topicref keyref="install-overview" subjectrefs="subjects.installing"/>
    <topicref keyref="install-linux"/>
    <topicref keyref="install-macosx"/>
    <topicref keyref="install-windows"/>
    <topicref keyref="install-troubleshooting" subjectrefs="subjects.troubleshooting"/>
  </topicref>
</map>
```

The keys defined in referenced subject scheme map are included in the referencing map's key space. References to the subject keys must be scope qualified (i.e., "subjects.installing"). Putting the subject scheme keys in a key scope ensures that the keys defined in the subject scheme do not conflict with any
keys defined elsewhere in the referencing map (although the referencing map could still override any keys defined in the subject scheme map).

The subject scheme map can also be referenced as a peer-scope root map in a key scope:

```xml
<map>
  <title>User assistance for the Acme Widget</title>
  <mapref keyscope="subjects" scope="peer" href="subjectschemes/subject-scheme-01.ditamap"/>
  <topicref keyref="install-overview" subjectrefs="subjects.installing">
    <topicref keyref="install-linux"/>
    <topicref keyref="install-macosx"/>
    <topicref keyref="install-windows"/>
    <topicref keyref="install-troubleshooting" subjectrefs="subjects.troubleshooting"/>
  </topicref>
</map>
```

As a peer map, the keys defined in the subject scheme map are not included in the referencing map’s key space but may be resolved using normal cross-deliverable key reference resolution. Processors that support cross-deliverable linking may also choose to resolve references from @"subjectrefs" to keys in peer subject scheme maps, for example to report keys specified on @"subjectrefs" that cannot be found in the peer subject scheme map.

### 6.5 Context hooks for user assistance

Context hook information can be specified in the `<resourceid>` element in a DITA map or DITA topic. This enables processors to generate the support files that are required to integrate the user assistance with a specific application.

*Context hooks* are identifiers that associate a part of the user interface with the location of a help topic. Context hooks can be direct links to URIs, but more often they are indirect links, such as numeric context identifiers and context strings, that can processed into external resource files. These external resource and mapping files are then used directly by context-sensitive help systems and other downstream applications.

Context hook information is defined within DITA topics and DITA maps through attributes of the `<resourceid>` element.

Context hooks can define either one-to-one or one-to-many relationships between user interface controls and target help content.
7 DITA processing

DITA processing is affected by a number of factors, including attributes that indicate the set of vocabulary and constraint modules on which a DITA document depends; navigation; linking; content reuse (using direct or indirect addressing); conditional processing; branch filtering; chunking; and more. In addition, translation of DITA content is expedited through the use of the @dir, @translate, and @xml:lang attributes.

7.1 Navigation

DITA includes markup that processors can use to generate reader navigation to or across DITA topics. Such navigation behaviors include table of contents (TOCs) and indexes.

7.1.1 Table of contents

Processors can generate a table of contents (TOC) based on the hierarchy of the elements in a DITA map. By default, each <topicref> element in a map represents a node in the TOC. These topic references define a navigation tree.

When a map contains a topic reference to a map (often called a map reference), processors integrate the navigation tree of the referenced map with the navigation tree of the referencing map at the point of reference. In this way, a deliverable can be compiled from multiple DITA maps.

**Note** If a <topicref> element that references a map contains child <topicref> elements, the processing behavior regarding the child <topicref> elements is undefined.

The effective navigation title is used for the value of the TOC node. A TOC node is generated for every <topicref> element that references a topic or specifies a navigation title, except in the following cases:

- The @processing-role attribute that is specified on the <topicref> element or an ancestor element is set to "resource-only".
- Conditional processing is used to filter out the node or an ancestor node.
- There is no information from which a TOC entry can be constructed; there is no referenced resource or navigation title.
- The node is a <topicgroup> element, even if it specifies a navigation title.

To suppress a <topicref> element from appearing in the TOC, set the @toc attribute to "no". The value of the @toc attribute cascades to child <topicref> elements, so if @toc is set to "no" on a particular <topicref>, all children of the <topicref> element are also excluded from the TOC. If a child <topicref> overrides the cascading operation by specifying toc="yes", then the node that specifies toc="yes" appears in the TOC (minus the intermediate nodes that set @toc to "no").

7.1.2 Alternative titles

This topic contains examples of alternative titles moved from the <titlealt> topic. It needs editing and to be restructured.

**Custom title roles**

A content architect could create a Topic specialization with custom <titlealt> specializations called <windowtitle> and <breadcrumbtitle>. These specializations specify default @title-role
values of window and breadcrumb, respectively, so that authors do not have to specify those roles explicitly. Content containing these specializations could look like the following.

```xml
<helpTopic id="topic167">
  <title>Doing the Thing in the Place where the Stuff Is</title>
  <prolog>
    <windowtitle>Doing Things</windowtitle>
    <breadcrumbtitle>Things</breadcrumbtitle>
  </prolog>
</helpTopic>
```

They could also incorporate these elements into their map document type shell, enabling map authors to override the values in topics.

```xml
<topicref href="topic167.dita">
  <topicmeta>
    <breadcrumbtitle>Thing Doing</breadcrumbtitle>
  </topicmeta>
</topicref>
```

**Navigation titles and precedence**

**Move to archSpec**

Consider the following series of topic references:

```xml
<topicref href="topics.dita#one"/>
<topicref href="topics.dita#two">
  <topicmeta>
    <titlealt title-role="navigation">Topic Two (Map navigation title)</titlealt>
  </topicmeta>
</topicref>
<topicref href="topics.dita#three">
  <topicmeta>
    <titlealt title-role="linking">Topic Three (Map linking title)</titlealt>
  </topicmeta>
</topicref>
<topicref href="topics.dita#four">
  <topicmeta>
    <titlealt title-role="linking">Topic Four (Map linking title)</titlealt>
  </topicmeta>
</topicref>
```

Here is the database document containing those topics:

```xml
<dita>
  <topic id="one">
    <title>Topic One</title>
  </topic>
  <topic id="two">
    <title>Topic Two</title>
    <prolog>
      <titlealt title-role="navigation">Topic Two (Topic navigation title)</titlealt>
    </prolog>
  </topic>
  <topic id="three">
    <title>Topic Three</title>
  </topic>
  <topic id="four">
    <title>Topic Four</title>
    <prolog>
      <titlealt title-role="navigation">Topic Four (Topic navigation title)</titlealt>
    </prolog>
  </topic>
</dita>
```

The resulting navigation structure would be as follows:
1. **Topic One** - The navigation title is pulled from the title of the topic, since neither the map nor the topic specify a navigation title.

2. **Topic Two (Map navigation title)** - The navigation title comes from the map, as its navigation title takes precedence over that in the topic.

3. **Topic Three (Map linking title)** - The navigation title comes from the map, which serves as the fallback for navigation titles when no navigation alternative title is provided.

4. **Topic Four (Topic navigation title)** - The navigation title comes from the topic. Even though the map specifies a `<titlealt>` with a role of `linking`, and normally maps take precedence, a linking alternative title is only used for navigation when there is no navigation alternative title available. In this case, the one from the topic is present, and is therefore used. To override the topic's navigation title in this case, the topic reference would have to explicitly provide a navigation alternative title. The `linking` title in the map still applies as the resource's linking title, just not its navigation title.

**Example: Reconciling Map and Topic Alternative Titles**

A `<topicref>` contains the following titles:

```xml
<topicref href="topic.dita">
  <topicmeta>
    <titlealt title-role="breadcrumbTitle">Doin' Stuff</titlealt>
    <titlealt title-role="longTitle">That thing you do when there's stuff that needs doing.</titlealt>
  </topicmeta.
</topicref>
```

The referenced topic has the following prolog:

```xml
<prolog>
  <titlealt title-role="subtitle">Doing Stuff</titlealt>
  <titlealt title-role="breadcrumbTitle flipbookTitle">Stuff</titlealt>
</prolog>
```

During processing, the two sets of elements will be concatenated together (logically, if not physically), with the map's elements coming first:

```xml
<titlealt title-role="breadcrumbTitle">Doin' Stuff</titlealt>
<titlealt title-role="longTitle">That thing you do when there's stuff that needs doing.</titlealt>
<titlealt title-role="subtitle">Doing Stuff</titlealt>
<titlealt title-role="breadcrumbTitle flipbookTitle">Stuff</titlealt>
```

Note that `breadcrumbTitle` is specified in both the map and the topic, and the map's value takes precedence. However, that same alternative title in the topic specifies an additional role of `flipbookTitle`, which is not overridden by the map, and so should be preserved.

The equivalent merged alternative titles, with duplicates removed, would look as follows.

```xml
<titlealt title-role="breadcrumbTitle">Doin' Stuff</titlealt>
<titlealt title-role="longTitle">That thing you do when there's stuff that needs doing.</titlealt>
<titlealt title-role="subtitle">Doing Stuff</titlealt>
<titlealt title-role="flipbookTitle">Stuff</titlealt>
```

**Keyrefs and alternative titles**

Move to archSpec. Content of `<titlealt>` needs to change; it's backwards.
Consider the following two topic references:

```xml
<topicref keys="a">
  <topicmeta>
    <titlealt title-role="linking">Linking Title from Keyref</titlealt>
    <titlealt title-role="navigation">Navigation Title from Keyref</titlealt>
  </topicmeta>
</topicref>
<topicref keyref="a">
  <topicmeta>
    <titlealt title-role="navigation">Navigation Title</titlealt>
  </topicmeta>
</topicref>
```

The resolved titles would look something like this:

```xml
<titlealt title-role="navigation">Navigation Title</titlealt>
<titlealt title-role="linking">Linking Title from Keyref</titlealt>
<titlealt title-role="navigation">Navigation Title from Keyref</titlealt>
```

That is, the "local" alternative titles come before those pulled from the key reference. In cases where only a single alternative title of a given role can be used, the first takes precedence, so the navigation title from the key reference has no effect.

## 7.2 Indexes

Processors can generate an index from the content of indexing elements.

**Comment by Kristen J Eberlein on 09 August 2019**

Comment by Eliot Kimber:

I think we need a general discussion of index processing and rendering that covers:

- Generation of page numbers or other locators (addresses "typical" question)
- General rules or expectations for merging entries to produce the "effective index markup"
- General guidance for reporting conditions such as see-also references to non-existent entries and missing @end for @start specified in maps.

The current writeup reflects a lot of unstated assumptions about how index processing does or should work, obviously reflecting how IBM's tools worked (and work today). These assumptions need to be surfaced.

**Comment by Kristen J Eberlein on 12 August 2019**

We need to clearly state our assumptions, but I think we need to be careful about specifying expected processing too precisely:

- We have no idea what output format people are transforming their DITA to; we cannot assume that it is print-based. And we have no idea what sort of output formats might emerge after DITA 2.0 is released!
- Not all DITA processors support indexing.

It would be good to be upfront about the fact that many details about index generation will be implementation specific.
7.2.1 Index elements
The content of `<indexterm>` elements provides the text for the entries in a generated index. `<indexterm>` elements can be nested to create secondary and tertiary index entries.

The following elements contain information that processors use to generate indexes.

- `<indexterm>`
  Instructs a processor to generate an index entry. The `@start` and `@end` attributes on the `<indexterm>` element can specify index ranges.

- `<index-see>`
  Instructs a processor to generate a see reference. See references direct a reader to the preferred term.

- `<index-see-also>`
  Instructs a processor to generate a see also reference. See also references direct a reader to an alternate index entry for additional information.

How the index elements are combined, the location of `<indexterm>` elements, and the hierarchy of the DITA maps all effect how the index elements are processed and the resulting generated index entries.

7.2.2 Location of `<indexterm>` elements
`<indexterm>` elements can occur in topic prologs, anywhere else in DITA topics, and in DITA maps.

The location of an `<indexterm>` element determines where the `<indexterm>` element points to, and where an `<indexterm>` element points to determines the locators that are rendered in a generated index.

- **Topic prologs**
  An `<indexterm>` element that is located in a topic prolog is a point reference to the title of the topic. If an `<indexterm>` element has an `@end` attribute, it is a point reference to the end of the topic.

- **Anywhere else in a DITA topic**
  An `<indexterm>` element that is located in a topic (and not the topic prolog) is a point reference to the location where the `<indexterm>` element occurs.

- **DITA maps**
  An `<indexterm>` element that is contained by a `<topicref>` element is a point reference to the title of the topic. If an `<indexterm>` element has an `@end` attribute, it is a point reference to the end of the topic. If the topic reference is not bound to a resource, the `<indexterm>` element has no stated purpose.

7.2.3 Index locators
Typically, an `<indexterm>` element instructs a processor to generate an index entry with a locator.

The nesting of `<indexterm>` elements and the presence of `<index-see>` elements determines whether locators are rendered in the generated index entries:

- An `<indexterm>` element that does not contain child `<indexterm>` elements (or an `<index-see>` element) contributes a locator to the generated index entry.
- An `<indexterm>` element that contains child `<indexterm>` elements contributes to the hierarchy of the multilevel index entry that is generated. Only the final nested `<indexterm>` element contributes a locator to the generated index entry.
- If an `<indexterm>` element also contains one or more `<index-see>` elements, no locator is included in the generated index entry.
• If an `<indexterm>` element also contains one or more `<index-see-also>` elements, the `<indexterm>` element contributes a locator to the generated index entry, and `<index-see-also>` element provides only a redirection.

### 7.2.4 Index redirection

The `<index-see>` and `<index-see-also>` elements enable redirection to other index entries within the generated index.

The `<index-see>` element contains text for an index entry that the reader should use *instead of* the current one, whereas the `<index-see-also>` element contains text for an index entry that the reader should use *in addition to* the current one.

Generated index entries should not contain both locators and redirections. Therefore, it is an error if the following conditions occur:

**An `<indexterm>` contains `<index-see>`**, and the publication contains other `<indexterm>` with matching content

- An `<indexterm>` element contains an `<index-see>` element, and the publication contains one or more `<indexterm>` elements with matching textual content.

For example, topics referenced by the master map include the following markup:

```xml
<!-- Topic A -->
<indexterm>memory stick</indexterm>
<index-see>USB drive</index-see>
</indexterm>

<!-- Topic B -->
<indexterm>memory stick</indexterm>
```

**An `<indexterm>` contains `<index-see>` and `<index-see-also>`**

- An `<indexterm>` element contains both an `<index-see>` element and an `<index-see-also>` element.

For example, a topic contains the following `<indexterm>` element:

```xml
<indexterm>
  memory stick
  <index-see>USB drive</index-see>
  <index-see-also>flash stick</index-see-also>
</indexterm>
```

**033 (408)**

A processor **MAY** give an error message when it encounters the following error conditions:

- An `<indexterm>` element contains an `<index-see>` element, and the publication contains one or more `<indexterm>` elements with matching textual content.
- Both `<index-see>` and `<index-see-also>` elements within the same `<indexterm>` element.

Processors **MAY** recover from these error conditions by treating the `<index-see>` element as an `<index-see-also>` element.

---

**Comment by Joyce Lam on 08 August 2019**

Context = Normative statement about "An `<indexterm>` contains `<index-see>` and `<index-see-also>`"
Because we emphasize "MAY", it also means that it "may not". I would like to ask "Who are we leaving the decision up to?"

Is this instead a question of "SHOULD"?

Comment by Eliot Kimber on 09 August 2019
I think SHOULD is better too

Comment by Kristen J Eberlein on 12 August 2019
I think we cannot make this a stronger statement here than MAY:

- There are no interoperability issues involved.
- Processors might choose to handle this error condition different. Basically, we (the TC) are suggesting one possible approach that seems well considered.

Reminder for people to review the following material when considering any spec statement that contains RFC-2119 terminology:

- 1.2 Terminology (10)
- Guidelines to Writing Conformance Clauses for OASIS Specifications

7.2.5 Index ranges
Authors can use the @start and @end attributes on <indexterm> elements to index extended discussions. Processors generate index entries that range over several locators.

The start of an index range is indicated by an <indexterm> with a @start attribute. This is called a start element.

The end of a range is indicated by whichever of the following occurs first:

- An <indexterm> element with an @end attribute with a value that matches the @start attribute on the <indexterm> element that begins the range. This is called an end element.
- The applicable scope boundary.

The applicable scope boundary depends on the location of the start element:

Topic body
End of the topic body.

Comment by Eliot Kimber on 09 August 2019
I'm not sure I agree with this rule. If I start a range in one topic body and end it in another topic body and the two topics are presented in a sequence such that the second topic follows the first I would expect the range to span from the first topic to the second.

So the rule is at least dependent on the presentation context--in a continuous presentation there's no reason to impose boundaries, but in a chunked presentation there might be.
I think there’s an unstated assumption that indexes are rendered for paged media where page numbers make sense but that’s not a necessary condition—for example, I could have chunked HTML output that includes knowledge of the page numbers the content is rendered on in some other paged rendering (i.e., the printed version of municipal code, where the page numbers are captured in an element-to-page-number mapping and the HTML rendering of the same content, where the page numbers are included as literal or meta data in the HTML pages).

Comment by Kristen J Eberlein on 12 August 2019
Comment updated on 19 August 2019:
FYI, these rules have been in the DITA spec since DITA 1.1, when the @start and @end attributes were added to <indexterm>.

Hopefully all references to "page numbers" have been changed to the more neutral term "locator".

Eliot, I think that for your use case, the appropriate markup would be to index in the map. Per the processing outlined in this draft, the range should begin at the start of one topic and end at the end of the other topic.

For example, given the following map, the generated index entry should be "test, x- y", where x = the title of index-page-references.dita and y = the end of merging-index-elements.dita.

```
<map>
  <title>Indexes</title>
  <topicref href="indexes.dita">
    <topicref href="index-elements.dita"/>
    <topicref href="location-of-indexterm-elements.dita"/>
    <topicref href="index-page-references.dita">
      <topicmeta>
        <keywords>
          <indexterm start="test">test</indexterm>
        </keywords>
      </topicmeta>
    </topicref>
    <topicref href="index-redirection.dita"/>
    <topicref href="index-ranges.dita"/>
    <topicref href="merging-index-elements.dita">
      <topicmeta>
        <keywords>
          <indexterm end="test">test</indexterm>
        </keywords>
      </topicmeta>
    </topicref>
  </topicref>
  <topicref href="examples-indexing.dita">
    <topicref href="example-of-nested-indexterm-elements.dita"/>
    <topicref href="example-of-an-index-range.dita"/>
  </topicref>
</map>
```

FYI, this is the markup for the map for the indexing content, with the start and end elements added.
Processors that support index ranges **SHOULD** do the following:

- Match `@start` and `@end` attributes by a character-by-character comparison with all characters significant and no case folding, occurring.
- Ignore `@start` and `@end` attributes if they occur on an `<indexterm>` element that has child `<indexterm>` elements.
- When index ranges with the same identifier overlap, the effective range is determined by matching the earliest start element from the set of overlapping ranges with the latest end element from the set of overlapping ranges.
- Handle an end-of-range `<indexterm>` element that is nested within one or more `<indexterm>` elements. The end-of-range `<indexterm>` element should have no content of its own; if it contains content, that content is ignored.
- Ignore unmatched end-of-range `<indexterm>` elements.

The `@start` and `@end` attributes are defined as CDATA. However, we recommend that authors do not include whitespace characters (spaces or tabs) or control characters in values for these attributes.

### 7.2.6 Index sorting

The combination of an `<indexterm>` and `<sort-as>` element specifies a sort phrase under which an index entry is sorted.

This gives an author the flexibility to sort an index entry in an index differently from how its text normally would be sorted. The common use for this is to disregard insignificant leading text, such as punctuation or words like "the" or "a". For example, the author might want `<data>` to be sorted under the letter D rather than the left angle bracket `<`. An author might want to include such an entry under both the punctuation heading and the letter D, in which case there can be two index entry directives differentiated only by the sort order.

**Comment by Kristen J Eberlein on 18 July 2019**

Comment from Dawn Stevens during the stage three review of proposal #253, "Indexing changes":

“So .. an author might want to sort `<data>` under both D and `<`. If that was the case, they would need two separate indexterm elements, each with its own `<sort-as>`?”

I think we need to clarify the above paragraph, but I think it will be better done as part of a targeted review of all spec content about indexing, rather than as part of the review for this proposal.

Certain languages have special sort order needs. For example, Japanese index entries might be written partially or wholly in kanji, but need to be sorted in phonetic order according to its hiragana/katakana rendition. There is no reliable automated way to map written to phonetic text: for kanji text, there can be multiple phonetic possibilities depending on the context. The only way to correctly sort Japanese index entries is to keep the phonetic counterparts with the written forms. The phonetic text would be presented as the sort order text for indexing purposes.
7.2.7 Merging index elements

Processors merge indexing elements in order to construct the effective index for a publication.

Processors **SHOULD** use the following criteria to match the content of `<indexterm>` elements:

- Ignore leading and trailing whitespace, as well as newline characters
- Be case sensitive

It is implementation-dependent as to whether processors consider the presence of phrase-level markup within `<indexterm>` elements when performing a matching operation.

**Comment by Kristen J Eberlein on 11 August 2019**

This is a new topic. It needs to lay out the rules and expectations for how a processor merges indexing elements and constructs the effective index, including:

- Matching the content of indexing elements
- Constructing multilevel index entries (as suggested in 7.2.8.1 Example: Merging `<indexterm>` elements (133))

What are other critical aspects?

**Comment by Kristen J Eberlein on 08 July 2019**

Do we make the following RFC-2119 statement for DITA 2.0. Thoughts?

FYI, the following text appeared in the DITA 1.1 - 1.3 specs: “All indexterms with the same content are "merged" to form a single index entry in the resulting index, and all contributed page numbers are included in that index entry.”

**Comment by Eliot Kimber on 09 August 2019**

This is the correct behavior. By "identical content" is a little too strict. Probably need to say something like "content that the processor considers to be the same. For example, by normalizing white space.”

**Comment by Kristen J Eberlein on 13 August 2019**

Eliot raised the following scenario in his review of the indexing content:

Consider a publication that contains the following index markup in different topics:

```xml
<!-- Topic A -->
<indexterm>apple</indexterm>

<!-- Topic B -->
<indexterm>apple
    <indexterm>computer</indexterm>
</indexterm>
```
What would the author of topic A expect to see in the index? What would the author of topic B expect to see? How might this combine with indexing markup added at the map level by the map owner?

Eliot suggested that a processor might produce any of the following (arrow character used to indicate indentation):

**Option #1**
- apple 12
- computer 14

**Option #2**
- apple 12
- apple
- computer 14

**Option #3**
- apple
- computer 14

My personal expectation would be to expect to see option #1, which matches the statement made in the DITA 1.1-1.3 specs: “All indexterms with the same content are "merged" to form a single index entry in the resulting index, and all contributed page numbers are included in that index entry.”

If a company’s styleguide does not want locators on parents of leaf nodes, I’d expect authors to spend time “massaging” index markup in order to generate an index that followed the styleguide requirements.

### 7.2.8 Examples of indexing

This section contains examples and scenarios that illustrate the use and processing of indexing elements.

#### 7.2.8.1 Example: Merging `<indexterm>` elements

This example contains a multilevel `<indexterm>` element.

Given the following `<indexterm>` elements:

```xml
<indexterm>cheese
  <indexterm>sheeps milk
  <indexterm>pecorino</indexterm>
</indexterm>
<indexterm>cheese
  <indexterm>goats milk
  <indexterm>chevre</indexterm>
</indexterm>
```

A processor treats the `<indexterm>` elements as equivalent to the following multilevel `<indexterm>` element:

```xml
<indexterm>cheese
  <indexterm>sheeps milk
  <indexterm>pecorino</indexterm>
</indexterm>
<indexterm>cheese
  <indexterm>goats milk
  <indexterm>chevre</indexterm>
</indexterm>
```
A processor generates the following index entries:

- A primary entry for "cheese"
- Secondary entries for "goats milk" and "sheeps milk"
- Tertiary entries for "chevre" and "pecorino" that include page numbers

The rendered index entry might look like the following:

```
cheese
  goats milk 9
  chevre 9
  sheeps milk
  pecorino 9
```

### 7.2.8.2 Example: Index range defined in a single topic

In this scenario, an index range is defined directly in the body of a topic. This strategy is useful for lengthy topics.

In the following code sample, the index range begins at the start of the second paragraph and continues to the beginning of the last paragraph. If the end element was not present, the index range would end at the end of the topic.

```xml
<topic id="accounting">
  <title>Accounting regulations</title>
  <body>
    <p>Be ethical in your accounting.</p>
    <p><indexterm start="acctrules">rules</indexterm>Remember to do all of the following: ...</p>
    <!-- ...pages worth of rules... -->
    <p><indexterm end="acctrules">Failure to comply will get you audited.</indexterm></p>
  </body>
</topic>
```

### 7.2.8.3 Example: Index range defined in a topic prolog

In this scenario, an index range is defined in the topic prolog. Ranges defined in a prolog cover subtopics, including those nested based on a map.

Specifying an index range in a topic prolog is useful for defining an index range that contains a topic and its children.

Consider the following DITA map which contains topics about a small company's operating procedures. The map contains a topic about accounting (acct.dita), which has child topics: procedures.dita and forms.dita.

```xml
<map>
  <title>Company procedures</title>
  <topicref href="acct.dita"/>
  <topicref href="procedures.dita"/>
  <topicref href="forms.dita"/>
  <!-- ... -->
</map>
```

The information developer wants an index entry that will span `acct.dita` and its children. He uses the following markup in `acct.dita`:

```xml
<topic id="accounting-at-acme">
  <title>Accounting at Acme</title>
  <prolog>
    <metadata>
      <keywords>
```

[Note: The text continues with additional examples and code samples related to DITA mapping and indexing.]
This markup specifies that the index range begins with the start of the topic title, and the end of the range is the end of the forms.dita topic. The index range includes the "Accounting at Acme" topic and its two child topics.

The information developer could have included an end element (for example, <indexterm end="acct"/> in the topic prolog, but it is not necessary. If the topic prolog had included an end element, the effective index range would be identical.

Comment by Eliot Kimber on 09 August 2019

I think this rule has the same problem as for ending the range at topic body boundaries: it means you couldn't start a range in one topic's prolog and end it in the prolog of another sibling topic.

That would be a hard thing to manage so probably not a realistic use case, so I can see an argument that prolog-defined ranges span the effective topic tree rooted at the topic with the prolog. But there's no particular reason to impose the constraint.

That is, a processor that can handle index ranges can also detect when a range is started in a topic prolog but not ended in one and report the case.

7.2.8.4 Example: Index range defined in a map

In this scenario, an index range is defined in the DITA map. Ranges defined in a DITA map can span peer topics.

Consider the following DITA map:

```xml
<map>
  <title>Food available in the Acme cafeteria</title>
  <!-- ... -->
  <topicref href="apples.dita">
    <topicmeta>
      <keywords>
        <indexterm start="acme-fruit">fruit</indexterm>
      </keywords>
    </topicmeta>
    <topicref href="oranges.dita"/>
    <topicref href="pineapples.dita">
      <topicmeta>
        <keywords>
          <indexterm start="acme-fruit"/>
        </keywords>
      </topicmeta>
      <!-- ... -->
    </topicref>
  </topicref>
</map>
```

The index range begins with the start of the first topic title in apples.dita, and it continues until the end of the last element in pineapples.dita. If an end element was not specified, the range would continue to the end of the map.

Comment by Eliot Kimber on 09 August 2019

I think this should be a reportable error or warning since it's almost certainly not the author's intent for a range to span to the end of the publication.
7.3 Content reference (conref)

The DITA conref attributes provide mechanisms for reusing content. DITA content references support reuse scenarios that are difficult or impossible to implement using other XML-based inclusion mechanisms like XInclude and entities. Additionally, DITA content references have rules that help ensure that the results of content inclusion remain valid after resolution.

7.3.1 Conref overview

The DITA `@conref`, `@conkeyref`, `@conrefend`, and `@conaction` attributes provide mechanisms for reusing content within DITA topics or maps. These mechanisms can be used both to pull and push content.

This topic uses the definitions of referenced element (19) and referencing element (19) as defined in 2.6 Linking and addressing terminology (19).

Pulling content to the referencing element

When the `@conref` or `@conkeyref` attribute is used alone, the referencing element acts as a placeholder for the referenced element, and the content of the referenced element is rendered in place of the referencing element.

The combination of the `@conrefend` attribute with either `@conref` or `@conkeyref` specifies a range of elements that is rendered in place of the referencing element. Although the start and end elements must be of the same type as the referencing element (or specialized from that element type), the elements inside the range can be any type.

Pushing content from the referencing element

The `@conaction` attribute reverses the direction of reuse from pull to push. With a push, the referencing element is rendered before, after, or in place of the referenced element. The location (before, after, or in place of) is determined by the value of the `@conaction` attribute. Because the `@conaction` and `@conrefend` attributes cannot both be used within the same referencing element, it is not possible to push a range of elements.

A fragment of DITA content, such as an XML document that contains only a single paragraph without a topic ancestor, does not contain enough information for the conref processor to be able to determine the validity of a reference to it. Consequently, the value of a conref must specify one of the following items:

- A referenced element within a DITA map
- A referenced element within a DITA topic
- An entire DITA map
- An entire DITA topic

Related reference

The conaction attribute (137)
The `@conaction` attribute allows users to push content from one topic into another. It causes the `@conref` attribute to work in reverse, so that the content is pushed from the current topic into another, rather than pulled from another topic into the current one.

**The conkeyref attribute (144)**

The `@conkeyref` attribute provides an indirect content reference to topic elements, map elements, or elements within maps or topics. When the DITA content is processed, the key references are resolved using key definitions from DITA maps.

**The conref attribute (145)**

The `@conref` attribute is used to reference content that can be reused. It allows reuse of DITA elements, including topic or map level elements.

**The conrefend attribute (140)**

The `@conrefend` attribute is used when referencing a range of elements with the conref mechanism. The `@conref` or `@conkeyref` attribute references the first element in the range, while `@conrefend` references the last element in the range.

### 7.3.2 The `@conaction` attribute

The `@conaction` attribute allows users to push content from one topic into another. It causes the `@conref` attribute to work in reverse, so that the content is pushed from the current topic into another, rather than pulled from another topic into the current one.

---

**Comment by robander on 19 May 2021**

This topic is moving into the arch spec, but needs further editing to split overview / conceptual info from processing info; this and other conref-attribute topics currently have a bunch of processing info that is missing from the actual "Processing conref" arch spec topics.

---

**Note** In the descriptions below, the word *target* always refers to the element referenced by a `@conref` attribute.

There are three possible functions using the `@conaction` attribute: replacing an element, pushing content before an element, and pushing content after an element. The `@conaction` attribute always declares the desired function while the `@conref` attribute provides the target of the reference using the standard `@conref` syntax.

In each case, an element pushed using `@conref` must be of the same type as, or more specialized than, its target. If the pushed element is more specialized than the target, then it should be generalized when the `@conref` is resolved. This ensures that the content will be valid in the target topic.

- It is valid to push using `@conref` when the two elements involved are of the same type. For example, a `<step>` element can use the conref push feature with another `<step>` as the target of the `@conref`.

- The target element can be more general than the source. For example, it is legal to push a `<step>` element to replace a general list item `<li>`; the `<step>` element should be generalized back to a list item during the process.

- It is not possible to push a more general element into a specialized context. For example, it is not legal to push a list item `<li>` in order to replace a `<step>`, because the list item allows many items that are not valid in the specialized context.
Replacing content in another topic

When the @conaction attribute is set to "pushreplace", the source element will replace the target specified on the @conref attribute. The pushed content remains in the source topic where it was originally authored.

For example, assume that a task in example.dita has the @id set to example", and it contains a <step> element with the @id set to "b":

```xml
<task id="example" xml:lang="en">
  <title>Example topic</title>
  <taskbody>
    <steps>
      <step id="a"><cmd>A</cmd></step>
      <step id="b"><cmd>B</cmd></step>
      <step id="c"><cmd>C</cmd></step>
    </steps>
  </taskbody>
</task>
```

In order to replace the step with id="b", another topic must combine a @conaction value of "pushreplace" with a @conref attribute that references this <step>:

```xml
<!-- Steps element within another task -->
<steps>
  <step conaction="pushreplace"
    conref="example.dita#example/b">
    <cmd>Updated B</cmd>
  </step>
</steps>
</task>
```

The result will be an updated version of example.dita which contains the pushed <step>:

```xml
<task id="example" xml:lang="en">
  <title>Example topic</title>
  <taskbody>
    <steps>
      <step id="a"><cmd>A</cmd></step>
      <step id="b"><cmd>Updated B</cmd></step>
      <step id="c"><cmd>C</cmd></step>
    </steps>
  </taskbody>
</task>
```

When resolving a conref push action, attributes are resolved using the same precedence as for normal @conref, with one exception. Attributes on the element with the @conref attribute (in this case, the source doing the push) will take priority over those on the referenced element. The exception is that if the source element does not specify an ID, the ID on the referenced element remains; if the source element does specify an ID then that replaces the ID on the referenced element.

037 (409) It is an error for two source topics to replace the same element. Applications MAY warn users if more than one element attempts to replace a single target.

Pushing content before or after another element

Setting the @conaction attribute to "pushbefore" allows an element to be pushed before the element referenced by the @conref attribute. Likewise, setting the @conaction attribute to "pushafter" allows an element to be pushed after the element referenced by the @conref attribute. Multiple sources can push content before or after the same target; the order in which that content is pushed is undefined.
When an element is pushed before or after a target, the resulting document will have at least two of that element. Because this is not always valid, a document attempting to push content before or after a target must take an extra step to ensure that the result will be valid. The extra step makes use of the `conaction="mark"` value.

When pushing before, the `@conref` attribute itself looks just as it did when replacing, but the `@conaction` attribute is set to `mark"` because it is marking the target element. This element remains empty; its purpose is to ensure that it is legal to have more than one of the current element. Immediately before the element which marks the target, you will place the content that you actually want to push. This element will set the `@conaction` attribute to "pushbefore".

When pushing after, the procedure is the same, except that the order of the elements is reversed. The element with `conaction="pushafter"` comes immediately after the element which marks the target.

Attributes on the element which is pushed (the one with `conaction="pushbefore"`) must be retained on the target, apart from the `@conaction` attribute itself. If this causes the result document to end up with duplicate IDs, an application can recover by dropping the duplicate ID, modifying it to ensure uniqueness, or warning the user.

The following restrictions apply when pushing content before or after an element:

- The elements that use `conaction="mark"` and `conaction="pushbefore"` are the same type as each other and appear in sequence. This restriction prevents a topic from trying to push a `<body>` element before or after another `<body>` element, because it is not valid to have two body elements in sequence.
- Either the container elements of the source and target match, or the container of the source element is a specialization of the target's container. This is also to ensure validity of the target; for example, while it is possible to include multiple titles in a `<section>`, it is not possible to do so in a figure. Comparing the parents prevents a second `<section>` title from being pushed before a figure title (the resulting figure would not be valid DITA). This restriction only applies to the "pushbefore" or "pushafter" actions, not to the "pushreplace" action.

When content is pushed from one topic to another, it is still rendered in the original context. Processors might delete the empty element that has the `conaction="mark"` attribute. In order to push content from a topic without actually rendering that topic on its own, the topic should be referenced from the map with the `@processing-role` attribute set to "resource-only".

**Example: pushing an element before the target**

The following example pushes a `<step>` before “b” in the example.dita file shown above.

```xml
<steps>
  <step conaction="pushbefore">
    <cmd>Do this before B</cmd>
  </step>
  <step conaction="mark" conref="example.dita#example/b">
    <cmd/>
  </step>
</steps>
```

The result contains the pushed `<step>` element before "b".

```xml
<task id="example" xml:lang="en">
  <title>Example topic</title>
  <taskbody>
    <steps>
      <step id="a"><cmd>A</cmd></step>
      <step id="b"><cmd>B</cmd></step>
      <step id="c"><cmd>C</cmd></step>
    </steps>
  </taskbody>
</task>
```
Example: pushing an element after the target

Pushing an element after a target is exactly the same as pushing before, except that the order of the "mark" element and the pushed element are reversed.

    <steps>
      <step conaction="mark" conref="example.dita#example/b">
        <cmd/>
      </step>
      <step conaction="pushafter">
        <cmd>Do this AFTER B</cmd>
      </step>
    </steps>

In this case the resulting document has the pushed content after <step> b:

    <task id="example" xml:lang="en">
      <title>Example topic</title>
      <taskbody>
        <steps>
          <step id="a"><cmd>A</cmd></step>
          <step id="b"><cmd>B</cmd></step>
          <step><cmd>Do this AFTER B</cmd></step>
          <step id="c"><cmd>C</cmd></step>
        </steps>
      </taskbody>
    </task>

Combining @conaction with @conkeyref or @conrefend

The @conkeyref attribute can be used as an indirect way to specify a @conref target. If the @conkeyref attribute is specified on an element that also uses the @conaction attribute, the @conkeyref attribute is used to determine the target of the conref push (as it would normally be used to determine the target of @conref).

The conref push function does not provide the ability to push a range of elements, so it is an error to specify the @conrefend attribute together with the @conaction attribute. If the two are specified together an application can recover by warning the user, ignoring the @conrefend attribute, or with some other implementation strategy.

7.3.3 The @conrefend attribute

The @conrefend attribute is used when referencing a range of elements with the conref mechanism. The @conref or @conkeyref attribute references the first element in the range, while @conrefend references the last element in the range.

Comment by robander on 19 May 2021

This topic is moving into the arch spec, but needs further editing to split overview / conceptual info from processing info; this and other conref-attribute topics currently have a bunch of processing info that is missing from the actual "Processing conref" arch spec topics.

Using @conref together with @conrefend

038 (409) The following markup rules apply when using or implementing @conrefend:
• The start and end elements of a range **MUST** be of the same type as the referencing element or generalizable to the referencing element.

• The start and end elements in a range **MUST** share the same parent, and the start element **MUST** precede the end element in document order.

• The parent of the referencing element **MUST** be the same as the parent of the referenced range or generalizable to the parent of the referencing element.

In addition, several other items must be taken into account:

• Processors will resolve the range by pulling in the start target and following sibling XML nodes across to and including the end target.

• As with @conref, if the @conrefend references a more specialized version of the referencing element, applications should generalize the target when resolving.

• It is not valid to use @conrefend to reference a more general version of an element (such as using `<step>` to reference an `<li>` element).

• Other nodes (such as elements or text) between the start and end of a range do not have to match the referencing element.

• With single conref, an @id attribute from the referenced element will not be preserved on the resolved content. With a range, an @id on both the start and the end elements will not be preserved. @id attributes on intermediate or child nodes should be preserved; if this results in duplicate @id values, an application can recover by changing the @id, warning the user, or implementing another strategy.

• With a single conref, attributes specified on the referencing element can be used to override attributes on the referenced element. With a conref range, the same is true, with the following clarifications:
  
  – When an @id attribute is specified on the referencing element, it will only be preserved on the first element of the resolved range.
  
  – When other attributes are specified, they will only apply to referenced elements of the same type. For example, if `<step>` is used to pull in a range of sequential `<step>` elements, locally specified attributes apply to all steps in the range. If `<ol>` is used to pull in a series of (`<ol>`, `<p>`, `<ol>`), locally specified attributes apply only to the `<ol>` elements in that range.

**Example: reusing a set of list items**

**Figure 57: List example: Source topic.dita with ids**

```xml
<topic id="x">
  <title>Sample file topic.dita</title>
  <body>
    <ol>
      <li id="apple">A</li>
      <li id="bear">B</li>
      <li id="cat">C</li>
      <li id="dog">D</li>
      <li id="eel">E</li>
    </ol>
  </body>
</topic>
```
Figure 58: List example: Reusing topic with conrefs

```xml
<topic id="y">
  <title>Sample file reusing content</title>
  <body>
    <ol>
      <li>My own first item</li>
      <li conref="topic.dita#x/bear" conrefend="topic.dita#x/dog"/>
      <li>And a different final item</li>
    </ol>
  </body>
</topic>
```

Figure 59: List example: Processed result of reusing topic

```xml
<topic id="y">
  <title>Sample file reusing content</title>
  <body>
    <ol>
      <li>My own first item</li>
      <li>B</li>
      <li id="cat">C</li>
      <li>D</li>
      <li>And a different final item</li>
    </ol>
  </body>
</topic>
```

Example: Reusing a set of blocks

Figure 60: Block level example: Source topic.dita with ids

```xml
<topic id="x">
  <title>Sample file topic.dita</title>
  <body>
    <p id="p1">First para</p>
    <ol id="mylist">
      <li id="apple">A</li>
      <li id="bear">B</li>
      <li id="cat">C</li>
      <li id="dog">D</li>
      <li id="eel">E</li>
    </ol>
    <p id="p2">Second para</p>
  </body>
</topic>
```

Figure 61: Block level example: Reusing topic with conrefs

```xml
<topic id="y">
  <title>Sample file reusing content</title>
  <body>
    <p conref="topic.dita#x/p1" conrefend="topic.dita#x/p2"/>
  </body>
</topic>
```

Figure 62: Block level example: Processed result of reusing topic

```xml
<topic id="y">
  <title>Sample file reusing content</title>
  <body>
    <p id="p1">First para</p>
    <ol id="mylist">
    </ol>
  </body>
</topic>
```
Using `@conrefend` together with `@conkeyref`

When the `@conkeyref` attribute is used in place of `@conref`, a key is used to address the target of the reference. The `@conrefend` attribute, which indicates the end of a `@conref` range, cannot use a key. Instead, the map or topic element addressed by the key name component of the `@conkeyref` is used in place of whatever map or topic element is addressed by the `@conrefend` attribute.

For example, if the value of the `@conkeyref` attribute is "config/step1" and the value of the `@conrefend` is "defaultconfig.dita#config/laststep", the `conref` range will end with the step that has id="laststep" in whatever topic is addressed by the key name "config". If the key name "config" is not defined, and the `@conref` attribute itself is not present for fallback, the `@conrefend` attribute is ignored.

Example: Combining `@conrefend` with `@conkeyref`

Figure 63: Defining and referencing a key with `@conkeyref`

In this example the key "xmp" is defined as the first topic in the file `examples.dita`.

```xml
<map>
  <!-- ... -->
  <keydef keys="xmp" href="examples.dita"/>
  <!-- ... -->
</map>

<!-- examples.dita: -->
<topic id="examples">
  <title>These are examples</title>
  <body>
    <ul>
      <li id="first">A first example</li>
      <li>Another trivial example</li>
      <li id="last">Final example</li>
    </ul>
  </body>
</topic>

To reuse these list items by using the key, the `@conkeyref` attribute combines the key itself with the sub-topic id (first) to define the start of the range. The `@conrefend` attribute defines a default high-level object along with the sub-topic id (last) that ends the range:

```xml
<li conkeyref="xmp/first"
    conrefend="default.dita#default/last"/>
```

The `@conkeyref` attribute uses a key to reference the first topic in `examples.dita`, so the range begins with the object `examples.dita#examples/first`. The high-level object in the `@conrefend`
attribute (default.dita#default) is replaced with the object represented by the key (the first topic in examples.dita), resulting in a range that ends with the object examples.dita#examples/last.

**Figure 64: Combining @conref, @conkeyref, and @conrefend**

When @conref, @conkeyref, and @conrefend are all specified, the key value takes priority.

```xml
<li conkeyref="thisconfig/start"
    conref="standardconfig.dita#config/start"
    conrefend="standardconfig.dita#config/end"/>
```

- If the key "thisconfig" is defined as mySpecialConfig.dita#myconfig, then the range will go from the list item with id="start" to the list item with id="end" in the topic mySpecialConfig.dita#myconfig.
- If the key "thisconfig" is defined as myConfig.dita, then the range will go from the list item with id="start" to the list item with id="end" within the first topic in myConfig.dita.
- If the key "thisconfig" is not defined, then the unchanged @conref and @conrefend attributes are used as fallback. In that case, the range will go from the list item with id="start" to the list item with id="end" within the topic standardconfig.dita#config.

### Error conditions

When encountering an error condition, an implementation can issue an error message.

<table>
<thead>
<tr>
<th>Condition or Issue</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>The @conref attribute cannot be resolved in the target document (the target element might have been removed or its id has changed).</td>
<td>The @conref is ignored.</td>
</tr>
<tr>
<td>The @conrefend attribute cannot be resolved in the target document (the target element might have been removed or its id has changed).</td>
<td>Range cannot be resolved, optional recovery processes the result as a simple conref.</td>
</tr>
<tr>
<td>Start and end elements are not siblings in the target document.</td>
<td>If the start element exists, optional recovery processes the result as a simple conref.</td>
</tr>
<tr>
<td>End element occurs before the start element in the target document.</td>
<td>If the start element exists, optional recovery processes the result as a simple conref.</td>
</tr>
<tr>
<td>An element has a @conrefend attribute but is missing the @conref attribute.</td>
<td>No result.</td>
</tr>
</tbody>
</table>

### 7.3.4 The @conkeyref attribute

The @conkeyref attribute provides an indirect content reference to topic elements, map elements, or elements within maps or topics. When the DITA content is processed, the key references are resolved using key definitions from DITA maps.

**Comment by robander on 19 May 2021**

This topic is moving into the arch spec, but needs further editing to split overview / conceptual info from processing info; this and other conref-attribute topics currently have a bunch of processing info that is missing from the actual "Processing conref" arch spec topics.

For content references from map elements to map elements or topic elements to topic elements, the value of the @conkeyref attribute is a key name, where the key must be bound to a map element (for references from map elements) or a topic element (for references from topic elements). For all other
elements, the value of the `@conkeyref` attribute is a key name, an optional slash ("/"), and the ID of the target element, where the key name must be bound to the map or topic that contains the topic element.

When the key name specified by the `@conkeyref` attribute is not defined and the element also specifies a `@conref` attribute, the `@conref` attribute is used to determine the content reference relationship. If no `@conref` attribute is specified there is no content reference relationship.

Processors **SHOULD** issue a warning when a `@conkeyref` reference cannot be resolved and there is no `@conref` attribute to use as a fallback. Processors **MAY** issue a warning when a `@conkeyref` cannot be resolved to an element and a specified `@conref` is used as a fallback.

The `@conrefend` attribute, which defines the end of a conref range, cannot include a key. Instead the map or topic element addressed by the key name component of the `@conkeyref` is used in place of whatever map or topic element is addressed by the `@conrefend` attribute. See **Using conrefend together with conkeyref** (143) for more information and for examples of this behavior.

### 7.3.5 The `@conref` attribute

The `@conref` attribute is used to reference content that can be reused. It allows reuse of DITA elements, including topic or map level elements.

**Note**  When using the `@conref` attribute on an element, the content of that element is ignored. For example, if a phrase is marked up like this:

```xml
<ph conref="#topic/ph">Something</ph>
```

the word "Something" will be replaced by the content of the referenced `<ph>` element.

**Related concepts**

**Content reference (conref)** (136)

The DITA conref attributes provide mechanisms for reusing content. DITA content references support reuse scenarios that are difficult or impossible to implement using other XML-based inclusion mechanisms like XInclude and entities. Additionally, DITA content references have rules that help ensure that the results of content inclusion remain valid after resolution.

### 7.3.6 Using the "-dita-use-conref-target" value

The value "-dita-use-conref-target" is available on enumerated attributes and can also be specified on other attributes. When an element uses `@conref` to pull in content, for any of its attributes assigned a value of "-dita-use-conref-target", the resulting value for those attributes is also pulled in from the referenced element.

**Comment by robander on 19 May 2021**

This topic is moving into the arch spec, but needs further editing to split overview / conceptual info from processing info; this and other conref-attribute topics currently have a bunch of processing info that is missing from the actual "Processing conref" arch spec topics.
This topic is moving into the arch spec, but needs further editing to split overview / conceptual info from processing info; this and other conref-attribute topics currently have a bunch of processing info that is missing from the actual "Processing conref" arch spec topics.

Ordinarily, when an element uses @conref, any other attributes specified locally will be preserved when the reference is resolved. This causes problems when attributes are required, because required attributes must be specified regardless of whether the @conref attribute is present. The purpose of the "-dita-use-conref-target" value is to allow the author to specify a value for a required attribute while still allowing the conref resolution process to use the matching attribute from the referenced element. The value has the same result when the attribute is not required.

The" -dita-use-conref-target" token is allowed on any attribute where it is not prohibited by the XML grammar files or by the specification. For example, while @cols on the <tgroup> element is defined as being a number, this token is implicitly allowed in order to support conref processing for <tgroup>. However, the token is not allowed for the @id attribute on the <topic> element, because "-dita-use-conref-target" does not fit the syntax required by the XML grammar files.

This example shows a DITA map where the <topichead> element uses @conref. It specifies the @deliveryTarget attribute as well as the @toc attribute. In the resolved element, @deliveryTarget from the referencing element is not preserved because it uses "-dita-use-conref-target". The @toc attribute from the referencing element overrides the @toc attribute on the referenced element using normal conref resolution rules.

**Figure 65: Before resolution**

```xml
<map>
  <title>Conref demonstration</title>
  <topichead id="heading"
    deliveryTarget="pdf"
    toc="yes"
    linking="normal">
    <topicmeta>
      <navtitle>This is a heading</navtitle>
    </topicmeta>
    <topicref href="topic.dita"/>
  </topichead>
  
  <topichead conref="#heading"
    deliveryTarget="-dita-use-conref-target"
    toc="no">
    <topicmeta>
      <navtitle>This is a heading</navtitle>
    </topicmeta>
    <topicref href="topic.dita"/>
  </topichead>
</map>
```

**Figure 66: Effective result post-resolution**

```xml
<map>
  <title>Conref demonstration</title>
  <topichead id="heading"
    deliveryTarget="pdf"
    toc="yes"
    linking="normal">
    <topicmeta>
      <navtitle>This is a heading</navtitle>
    </topicmeta>
    <topicref href="topic.dita"/>
  </topichead>
  
  <topichead deliveryTarget="pdf"
    toc="no"
    linking="normal">
    <topicmeta>
      <navtitle>This is a heading</navtitle>
    </topicmeta>
    <topicref href="topic.dita"/>
  </topichead>
</map>
```
The DITA conref attributes provide mechanisms for reusing content. DITA content references support reuse scenarios that are difficult or impossible to implement using other XML-based inclusion mechanisms like XInclude and entities. Additionally, DITA content references have rules that help ensure that the results of content inclusion remain valid after resolution.

7.3.7 Processing conrefs

When processing content references, DITA processors compare the restrictions of each context to ensure that the conrefed content is valid in its new context.

Note The DITA @conref attribute is a transclusion mechanism similar to XInclude and to HyTime value references. DITA differs from these mechanisms, however, in that conref validity does not apply simply to the current content at the time of replacement, but to the possible content given the restrictions of both the referencing document type and the referenced document type.

When content is reused between two documents with different domains or constraints, it is possible for the reused content to include domain extensions that are not defined for the new context, or to include elements that would be constrained out of the new context. When pulling or pushing content with the conref mechanism, processors resolving conrefs SHOULD tolerate specializations of valid elements. Processors MAY generalize elements in the pushed or pulled content fragment as needed for the resolving context.

A conref processor SHOULD NOT permit resolution of a reuse relationship that could be rendered invalid under the rules of either the reused or reusing content.

7.3.8 Processing attributes when resolving conrefs

When resolving conrefs, processors need to combine the attributes that are specified on the referencing and referenced element.

The attribute specifications on the resolved element are drawn from both the referencing element and the referenced element, according to the following priority:

1. All attributes as specified on the referencing element, except for attributes set to "-dita-use-conref-target".
2. All attributes as specified on the referenced element except the @id attribute.
3. The @xml:lang attribute has special treatment as described in 4.2.1 The xml:lang attribute (45).

The token "-dita-use-conref-target" is defined by the specification to enable easier use of @conref on elements with required attributes. The only time the resolved element would include an attribute whose specified value is "-dita-use-conref-target" is when the referenced element had that attribute specified with the "-dita-use-conref-target" value and the referencing element either had no specification for that attribute or had it also specified with the "-dita-use-conref-target" value.

If the final resolved element (after the complete resolution of any conref chain) has an attribute with the "-dita-use-conref-target" value, that element MUST be treated as equivalent to having that attribute unspecified.
A given attribute value on the resolved element comes in its entirety from either the referencing element or the referenced element; the attribute values of the referencing and referenced elements for a given attribute are never additive, even if the property (such as `@audience`) takes a list of values.

Comment by Kristen J Eberlein on 04 July 2019
Do we want the following paragraph to contain normative RFC-2119 wording?

If the referenced element has a `@conref` attribute specified, the above rules should be applied recursively with the resolved element from one referencing/referenced combination becoming one of the two elements participating in the next referencing/referenced combination. The result should preserve without generalization all elements that are valid in the originating context, even if they are not valid in an intermediate context.

For example, if topic A and topic C allow highlighting, and topic B does not, then a content reference chain of topic A-to-topic B-to-topic C should preserve any highlighting elements in the referenced content. The result, however it is achieved, must be equivalent to the result of resolving the conref pairs recursively starting from the original referencing element in topic A.

Related reference
Using the `-dita-use-conref-target` value (145)
The value `-dita-use-conref-target` is available on enumerated attributes and can also be specified on other attributes. When an element uses `@conref` to pull in content, for any of its attributes assigned a value of `-dita-use-conref-target`, the resulting value for those attributes is also pulled in from the referenced element.

7.3.9 Processing xrefs and conrefs within a conref

When referenced content contains a content reference or cross reference, the effective target of the reference depends on the form of address that is used in the referenced content. It also might depend on the map context, especially when key scopes are present.

Direct URI reference (but not a same-topic fragment identifier)
When the address is a direct URI reference of any form other than a same-topic fragment identifier, processors MUST resolve it relative to the source document that contains the original URI reference.

Same-topic fragment identifier
When the address is a same-topic fragment identifier, processors MUST resolve it relative to the location of the content reference (referencing context).

Key reference
When the address is a key reference, processors MUST resolve it relative to the location of the content reference (referencing context).

When resolving key references or same-topic fragment identifiers, the phrase `location of the content reference` means the final resolved context. For example, in a case where content references are chained (topic A pulls from topic B, which in turn pulls a reference from topic C), the reference is resolved relative to the topic that is rendered. When topic B is rendered, the reference is resolved relative to the content reference in topic B; when topic A is rendered, the reference is resolved relative to topic A. If content is pushed from topic A to topic B to topic C, then the same-topic fragment identifier is resolved in the context of topic C.

The implication is that a content reference or cross reference can resolve to different targets in different use contexts. This is because a URI reference that contains a same-topic fragment identifier is resolved in the context of the topic that contains the content reference, and a key reference is resolved in the context of the key scope that is in effect for each use of the topic that contains the content reference.
Note In the case of same-topic fragment identifiers, it is the responsibility of the author of the content reference to ensure that any element IDs that are specified in same-topic fragment identifiers in the referenced content will also be available in the referencing topic at resolution time.

Example: Resolving conrefs to elements that contain cross references

Consider the following paragraphs in `paras-01.dita` that are intended to be used by reference from other topics:

```xml
<topic id="paras-01"><title>Reusable paragraphs</title>
  <body>
    <p id="p1">See <xref href="#paras-01/p5"/>.</p>
    <p id="p2">See <xref href="topic-02.dita#topic02/fig-01"/>.</p>
    <p id="p3">See <xref href="#./p5"/>.</p>
    <p id="p4">See <xref keyref="task-remove-cover"/>.</p>
    <p id="p5">Paragraph 5 in paras-01.</p>
  </body>
</topic>
```

The paragraphs are used by content reference from other topics, including the `using-topic-01.dita` topic:

```xml
<topic id="using-topic-01"><title>Using topic one</title>
  <body>
    <p id="A" conref="paras-01.dita#paras-01/p1"/>
    <p id="B" conref="paras-01.dita#paras-01/p2"/>
    <p id="C" conref="paras-01.dita#paras-01/p3"/>
    <p id="D" conref="paras-01.dita#paras-01/p4"/>
    <p id="p5">Paragraph 5 in using-topic-01</p>
  </body>
</topic>
```

Following resolution of the content references and processing of the `<xref>` elements in the referenced paragraphs, the rendered cross references in `using-topic-01.dita` are shown in the following table.

<table>
<thead>
<tr>
<th>Paragraph</th>
<th>Value of @id attribute on conrefed paragraph</th>
<th><code>&lt;xref&gt;</code> within conrefed paragraph</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>p1</td>
<td><code>&lt;xref href=&quot;#paras-01/p5&quot;/&gt;</code></td>
<td>The cross reference in paragraph p1 is a direct URI reference that does not contain a same-topic fragment identifier. It can be resolved only to paragraph p5 in <code>paras-01.dita</code>, which contains the content &quot;Paragraph 5 in paras-01&quot;.</td>
</tr>
<tr>
<td>B</td>
<td>p2</td>
<td><code>&lt;xref href=&quot;topic-02.dita#topic02/fig-01&quot;/&gt;</code></td>
<td>The cross reference in paragraph p2 is a direct URI reference. It can be resolved only to the element with id=&quot;fig-01&quot; in <code>topic-02.dita</code>.</td>
</tr>
<tr>
<td>C</td>
<td>p3</td>
<td><code>&lt;xref href=&quot;#./p5&quot;/&gt;</code></td>
<td>The cross reference in paragraph p3 is a direct URI reference that contains a same-topic fragment identifier. Because the URI reference contains a same-topic fragment identifier, the reference is resolved in the context of the referencing topic (using-topic-01.dita).</td>
</tr>
<tr>
<td>Paragraph</td>
<td>Value of <code>@id</code> attribute on conrefed paragraph</td>
<td><code>&lt;xref&gt;</code> within conrefed paragraph</td>
<td>Resolution</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------------------------------------</td>
<td>----------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>D</td>
<td>p4</td>
<td><code>&lt;xref keyref=&quot;task-remove-cover&quot;/&gt;</code></td>
<td>The cross reference in paragraph p4 is a key reference. It is resolved to whatever resource is bound to the key name &quot;task-remove-cover&quot; in the applicable map context.</td>
</tr>
</tbody>
</table>

**Example: Resolving conrefs to elements that contain key-based cross references**

Consider the following map, which uses the topics from the previous example:

```xml
<map>
  <topicgroup keyscope="product-1">
    <topicref keys="task-remove-cover" href="prod-1-task-remove-cover.dita"/>
    <topicref href="using-topic-01.dita"/>
  </topicgroup>
  <topicgroup keyscope="product-2">
    <topicref keys="task-remove-cover" href="prod-2-task-remove-cover.dita"/>
    <topicref href="using-topic-01.dita"/>
  </topicgroup>
</map>
```

The map establishes two key scopes: "product-1" and "product-2". Within the map branches, the key name "task-remove-cover" is bound to a different topic. The topic `using-topic-01.dita`, which includes a conref to a paragraph that includes a cross reference to the key name "task-remove-cover", is also referenced in each branch. When each branch is rendered, the target of the cross reference is different.

In the first branch with the key scope set to "product-1", the cross reference from paragraph p4 is resolved to `prod-1-task-remove-cover.dita`. In the second branch with the key scope set to "product-2", the cross reference from paragraph p4 is resolved to `prod-2-task-remove-cover.dita`.

### 7.4 Conditional processing

Conditional processing is the filtering or flagging of information based on processing-time criteria. Conditional processing is based on attributes specified in the DITA source.

**Comment by Kristen J Eberlein on 13 March 2022**

The following content was in the container topic for the DITAVAL elements. I think it should be edited, rephrased as a normative statement, and covered here:

Conditional processing code should provide a report of any attribute values encountered in content that do not have an action associated with them.

**Comment by rodaande on 21 March 2022**

I'm less convinced it needs to be a normative statement. I think it can be a helpful addition to a processor, but it can also be a big annoyance. If anything about it is normative, I think it needs to be MAY, allowing processors to choose whether such notification is appropriate for their use cases.
7.4.1 About conditional processing

Certain concepts are critical for a full understanding of conditional processing.

conditional processing

A process that determines whether content is included, excluded, or flagged. This process is based on a comparison of conditional-processing attributes in the DITA source with the rules that are set in one or more DITAVAL documents.

conditional processing attribute

Attributes that can be used for filtering and flagging. These are the following attributes:

- @props and any attribute specialized from @props, including those integrated by default in the OASIS-provided document-type shells: @audience, @deliveryTarget, @platform, @product, @otherprops
- The @rev attribute, which supports flagging but not filtering

conditional-processing profile

A set of rules that are provided to a processor for use at rendering time. These rules are based on one or more DITAVAL documents.

DITAVAL document

A document that specifies a set of rules that define which elements to include, exclude, or flag. A DITAVAL document can be a file on the file system, a set of rules stored in memory, or another way of storing information that is expressed using DITAVAL syntax.

filtering

The process of excluding content at rendering time.
Do we need to broaden the definition of filtering and mention inclusion also?

Comment by rodaande on 25 March 2022
I'm wary of trying to pin down a broad term like "including", but I don't really know. The assumption of the spec, and I assumed of spec readers, was that the DITA content is rendered in some way (in an editor, as HTML, as PDF, etc), and that by default the DITA content is meant for publishing. For that reason, we go out of our way to say *not* to render data elements and foreign elements, but we don't do the reverse for paragraphs, tables, etc.

I'm not sure though, because "include" is clearly a value you can specify in DITAVAL.

flagging
The process of emphasizing content by inserting images, text, or stylistic formatting at rendering time.

7.4.2 Expectations for conditional processing
Certain behaviors are expected of processors when working with conditional processing.

043 (409) Processors SHOULD be able to perform filtering and flagging using the following attributes: @props, @audience, @deliveryTarget, @platform, @product, and @otherprops.

044 (409) The @props attribute can be specialized to create new attributes, and processors SHOULD be able to perform conditional processing on specializations of @props.

Although metadata elements exist with similar names, such as the <audience> element, the specification does not define any mechanism for conditional processing using metadata elements.

7.4.3 About the DITAVAL document
A DITAVAL document specifies a set of rules that defines which elements to include, exclude, or flag.

The markup for DITAVAL documents provides a standard way to define all conditional processing that is associated with the DITA specification.

Each rule in a DITAVAL document does one of the following:

- Defines a rendering behavior for an attribute and value pair, for example, audience="novice".
- Defines a default behavior for a conditional processing attribute, such as defining a default rendering behavior of "exclude" for the @deliveryTarget. With that default, any @deliveryTarget value not otherwise defined in the document uses that default behavior of "exclude".
- Defines a default behavior for all conditional processing attributes, such as defining a default rendering behavior of "exclude". With that default, any conditional-processing attribute not otherwise defined in the document uses that default behavior of "exclude".

Comment by Kristen J Eberlein on 21 March 2022
Ideally, I'd like this topic to provide a more detailed overview of what can be done with a DITAVAL document. What we say immediately above is technically accurate, but it largely restates what we have in the element-reference topics, rather than providing a good conceptual overview with supporting details. Given the complexity of conditional processing, I think that is what we need here.
While the DITAVAL markup is not part of the DITA topic or map vocabulary and cannot be specialized, the XML itself is part of the specification. See 10.7.2 DITAVAL elements (377) for details.

Comment by Kristen J Eberlein on 21 March 2022

The topic (or another archSpec topic) needs to include the following information:

Processors can implement default behaviors for flagging. This might include alternate text to indicate the start and end points of revised content or stylistic formatting when no specific flagging behavior is specified.

7.4.4 Conditional processing attribute values

Conditional processing attributes use space-delimited string values or grouped string values to support both filtering and flagging.

The simplest and most common way to specify metadata on a conditional processing attribute is using individual string values. For example, the values “basic” and “deluxe” within `<p product="basic deluxe">` indicate that the paragraph applies to the basic and deluxe products.

Setting a conditional processing attribute to an empty value, such as `product=""`, is equivalent to omitting that attribute from the element.

7.4.5 Conditional processing attribute values with groups

For more advanced needs, groups can be used to organize metadata into subcategories within a conditional processing attribute.

Grouped values are intended to support situations where a metadata attribute applies to multiple specialized subcategories. For example, if content is classified into two distinct types of product, those distinct types can become named groups within the `@product` attribute. The grouping syntax exactly matches the syntax used for generalized attributes, making it valid inside `@props` and any attribute specialized from `@props`, including those integrated by default in the OASIS-provided document-type shells: `@audience`, `@deliveryTarget`, `@platform`, `@product`, and `@otherprops`.

The following rules apply to groups within conditional processing attributes:

- Groups consist of a name immediately followed by a parenthetical group of zero or more space-delimited string values. For example, `"groupName(valueOne valueTwo)"`.
- Groups cannot be nested.
- If two groups with the same name are found in a single attribute, they are treated as if all values are specified in the same group. The following values for the `@otherprops` attribute are equivalent:

```
otherprops="groupA(a b) groupA(c) groupZ(APPNAME)"
otherprops="groupA(a b c) groupZ(APPNAME)"
```

- If both grouped values and ungrouped values are found in a single attribute, the ungrouped values belong to an implicit group; the name of that group matches the name of the attribute. Therefore, the following values for the `@product` attribute are equivalent:

```
product="a database(dbA dbB) b appserver(mySERVER) c"
product="product(a b c) database(dbA dbB) appserver(mySERVER)"
```

An empty group within an attribute is equivalent to omitting that group from the attribute. For example, `<ph product="database () A">` is equivalent to `<ph product="A">`. Similarly, `<ph
product="operatingSystem()" is equivalent to <ph product="">, which in turn is equivalent to <ph>.

If two groups with the same name exist on different attributes, a rule specified for that group will evaluate the same way on each attribute. For example, if the group "sample" is specified within both @platform and @otherprops, a DITAVAL rule for sample="value" will evaluate the same in each attribute. If there is a need to distinguish between similarly named groups on different attributes, the best practice is to use more specific group names such as platformGroupname and productGroupname. Alternatively, DITAVAL rules can be specified based on the attribute name rather than the group name.

If the same group name is used in different attributes, a complex scenario could be created where different defaults are specified for different attributes, with no rule set for a group or individual value. In this case a value might end up evaluating differently in the different attributes. For example, a DITAVAL can set a default of "exclude" for @platform and a default of "flag" for @product. If no rules are specified for group oddgroup(), or for the value oddgroup="edgecase", the attribute platform="oddgroup(edgecase)" will evaluate to "exclude" while product="oddgroup(edgecase)" will resolve to "flag". See 10.7.2 DITAVAL elements (377) for information on how to change default behaviors in DITAVAL profile.

7.4.6 Conditional processing and subject schemes
When a subject scheme defines controlled values for an attribute, a processor can make use of that scheme for conditional processing.

7.4.7 Filtering based on metadata attributes
When rendering content, a conditional processing profile can be used to specify whether an element's content is filtered based on its conditional processing attributes.

To determine whether content is filtered, a processor compares the conditional processing attributes on a DITA element to rules specified in a conditional processing profile. If any one of the conditional processing attributes evaluates as "exclude", that content is filtered.

Within a DITAVAL document, it is possible to specify a default action for conditional processing attributes. When no default is specified, the processing default for any attribute or value not otherwise listed is "include". For example, if no default action is provided for @audience and the value "novice" for that attribute is not defined, that attribute value will have a processing default of "include".

When deciding whether to include or exclude a particular element, a processor evaluates each attribute independently:

1. For each attribute:
   - If the attribute is empty, or contains only empty groups, it is equivalent to omitting the attribute from the element. If evaluated for the purposes of filtering, the attribute is treated as "include", because an omitted attribute cannot evaluate to "exclude".
   - If the attribute value does not contain any groups, then if any string token in the attribute value evaluates to "include", the element evaluates to "include". In other words, the attribute evaluates to "exclude" only when all string tokens in that attribute evaluate to "exclude".
• If the attribute value does include groups, evaluate as follows, treating ungrouped tokens together as an implicit group:
  
a. For each group (including any implicit group), if any string token inside the group evaluates to "include", the group evaluates to "include". In other words, a group evaluates to "exclude" only when all string tokens in that group evaluate to "exclude".
  
b. If any group within an attribute evaluates to "exclude", that attribute evaluates to "exclude". In other words, the attribute evaluates to "include" only when all groups in that attribute evaluate to "include".

2. If any single attribute evaluates to "exclude", the element is filtered.

For example, if a paragraph applies to three products and the publisher has chosen to exclude all of them, the processor will exclude the paragraph. This is true even if the paragraph applies to an audience or platform that is not excluded. But if the paragraph applies to an additional product that has not been excluded, then its content is still relevant for the intended output and is preserved.

Related reference

Metadata attributes (387)

The universal attribute group defines a set of common attributes that are available on almost every DITA element. The universal attribute group includes all attributes from the ID, localization, and metadata attribute groups, plus the @class and @outputclass attributes.

Comment by Kristen J Eberlein on 29 December 2021

This is something wrong with the organizational structure of this topic ... Look at it in outline form, and check that the sections, titles, and content all make logical sense with the topic title of "Universal attribute group".

DITAVAL markup with extended filtering example (385)
The <val> element is the root element of a DITAVAL document.

7.4.8 Flagging based on metadata attributes

When rendering content, a conditional processing profile can be used to specify whether an element's content is flagged based on its conditional processing attributes.

For example, flagging can be used to highlight the fact that content applies to a specific audience or operating system. Flagging can also draw a reader's attention to content that has been marked as being revised.

When deciding whether to flag a particular element, a processor evaluates each value. Wherever an attribute value that has been set as flagged appears (for example, audience="administrator"), the processor adds the flag. When multiple flags apply to a single element, multiple flags are rendered, typically in the order that they are encountered.

When the same element evaluates as both flagged and included, the element is both flagged and included. When the same element evaluates as both flagged and filtered (for example, flagged because of a value for the @audience attribute and filtered because of a value for the @product attribute value), the element is filtered.

Comment by Kristen J Eberlein on 21 March 2022

I moved the following content from the <style-conflict> topic, where it did not belong. It's general information about how processors should handle flagging.
When flagging methods are specified for elements at different levels of the containment hierarchy, the flagging method that is specified for the element at the lowest level of the hierarchy applies. For example, if a `<section>` element is to be flagged with green text and a `<p>` element within that section is to be flagged with red text, the `<p>` element should be rendered with red text.

**Related reference**
- DITAVAL markup with extended flagging example (385)
  The `<val>` element is the root element of a DITAVAL document.
- DITAVAL markup for flagging revisions (381)
  The `<revprop>` element in a DITAVAL document identifies a value of the `@rev` attribute for flagging. Unlike the conditional processing attributes, which can be used for both filtering and flagging, the `@rev` attribute can only be used for flagging.

### 7.4.9 Examples of conditional processing

This section provides examples that illustrate the ways that conditional processing attributes can be set and used.

**Related reference**
- DITAVAL markup with additional filtering and flagging examples (385)
  The `<val>` element is the root element of a DITAVAL document.

#### 7.4.9.1 Example: Setting conditional processing values

In this scenario, conditional processing attributes are set in DITA content. The following code sample illustrates how conditional processing attributes are set in DITA content.

```xml
<p audience="administrator">Set the configuration options:
  <ul>
    <li product="extendedProd">Set foo to bar</li>
    <li product="basicProd extendedProd">Set your blink rate</li>
    <li>Do some other stuff</li>
    <li>Do a special thing for Linux</li>
  </ul>
</p>
```

In the example,
- The entire paragraph and list of options applies to an audience of "administrator".
- The first configuration item applies only to the "extendedProd" product.
- The second configuration option applies to both the "baseProd" and "extendedProd" products.

When combined with a DITAVAL document, these attributes can be used as a way to filter or flag the content when it is rendered.

#### 7.4.9.2 Example: Simple DITAVAL document

In this scenario, a simple DITAVAL document sets up rules for filtering and flagging based on conditional processing attributes. The following code sample illustrates a simple DITAVAL document that sets up two rules for filtering, and two rules for flagging.

```xml
<val>
  <prop action="exclude" att="audience" val="advanced"/>
</val>
```
Based on those rules:

1. Any element with `audience="advanced"` will be filtered and will not appear in the rendered content.
2. Any element with `product="myProductPrime"` will be filtered and will not appear in the rendered content.
3. Any element with `product="myProduct"` will be flagged with a purple background color.
4. Any element with `rev="v1.2"` will be flagged with a yellow background color.
5. All other content will be rendered normally, because any other conditional processing attribute values default to "include".

### 7.4.9.3 Example: Changing the default behavior to "exclude"

In this scenario, a simple DITAVAL document resets the default behavior for unspecified values to "exclude".

The following code sample illustrates a simple DITAVAL document that resets the default behavior to "exclude", and then defines two rules to include content.

```xml
<val>
  <prop action="exclude"/>
  <prop action="include" att="audience" val="novice"/>
  <prop action="include" att="product" val="myProductPrime"/>
</val>
```

Based on those rules:

1. Any element with `audience="novice"` will be included and will appear in the rendered content.
2. Any element with `product="myProductPrime"` will be included and will appear in the rendered content.
3. All other values in conditional processing attributes evaluate to "exclude".

As a result, any element with conditional processing attributes that do not match either `audience="novice"` or `product="myProductPrime"` will be filtered and will not appear in the rendered content.

### 7.4.9.4 Example: Flagging with @outputclass

In this scenario, the `@outputclass` attribute in a DITAVAL document is used to enable CSS based flagging.

An additional expectation for this scenario is that the processor rendering DITA content preserves `@outputclass` values as CSS `@class` tokens in HTML5. For example, the phrase `<ph outputclass="bird">eagle</ph>` might be rendered in HTML5 as `<span class="bird">eagle</span>`.

The following code sample illustrates a simple DITAVAL document that sets up two rules for flagging using `@outputclass`.

```xml
<val>
  <prop action="flag" att="product" val="myProduct" outputclass="myProductToken"/>
  <prop action="flag" att="product" val="myOtherProduct" outputclass="myOtherProductToken"/>
</val>
```
Now, assume the following DITA content is processed using the rules from that DITAVAL document:

```dita
<ol>
  <li>This list item applies to all content</li>
  <li product="myProduct">This list item is specific to my product</li>
  <li product="myProduct" outputclass="example">This list item is an example of an edge case</li>
  <li product="myOtherProduct">This list item is specific to my OTHER product</li>
  <li product="myProduct myOtherProduct">This list item is specific to both of my products</li>
</ol>
```

Based on the rules from that DITAVAL document, the topic content is processed as follows:

1. The first item does not specify any conditional processing attributes, and is handled normally.
2. The second item specifies `product="myProduct"`. Based on the DITAVAL document, this results in a setting on `outputclass="myProductToken"`. The content is processed as if the original element was: `<li product="myProduct" outputclass="myProductToken">`.
3. The third item specifies `product="myProduct", but already has an @outputclass attribute specified in the source. Based on the DITAVAL document, the content is processed as if the original element was: `<li product="myProduct" outputclass="myOtherProductToken example">`. Note that the value supplied by the DITAVAL document is placed before any value already in the source.
4. The fourth item specifies `product="myOtherProduct"`. Based on the DITAVAL document, this results in a setting on `outputclass="myOtherProductToken"`. The content is processed as if the original element was: `<li product="myOtherProduct" outputclass="myOtherProductToken">`.
5. The fifth item specifies both products with `product="myProduct myOtherProduct"`. Based on the DITAVAL document, this results in a setting of either `outputclass="myProductToken myOtherProductToken"` or `outputclass="myOtherProductToken myProductToken"`. The order of the two tokens is unspecified; if a processor chooses the first, the content is processed as if the original element was: `<li product="myProduct myOtherProduct" outputclass="myProductToken myOtherProductToken">`.

With the expectation that the processor maps `@outputclass` values onto the HTML `@class` attribute, the rendered HTML5 result would look like this:

```html
<ol>
  <li>This list item applies to all content</li>
  <li class="myProductToken">This list item is specific to my product</li>
  <li class="myOtherProductToken" example="">This list item is an example of an edge case</li>
  <li class="myProductToken myOtherProductToken">This list item is specific to both of my products</li>
</ol>
```

### 7.4.9.5 Example: Filtering based on groups

In this scenario, groups are used for filtering within a conditional processing attribute.

The following code sample illustrates a list item that applies to two different types of product. It applies to one application server and two database applications:

```dita
<ol>
  <li>Common step</li>
  <li product="appServer(mySERVER) database(dbOne dbOther)"><ph>Do something special for databases dbTwo or dbOther when installing on mySERVER</ph></li>
</ol>
```
If a publisher decides to exclude the application server "mySERVER", then the `appServer()` group evaluates to exclude. This can be done by setting `product="mySERVER"` to exclude or by setting `appServer="mySERVER"` to exclude. This means the item is excluded, regardless of how the values "dbOne" or "dbOther" evaluate. If a rule is specified for both `product="mySERVER"` and `appServer="mySERVER"`, the rule for the more specific group name "appServer" takes precedence.

Similarly, if both "dbOne" and "dbOther" evaluate to exclude, then the `database()` group evaluates to exclude and the element is excluded regardless of how the "mySERVER" value is set.

In more advanced usage, a DITAVAL can be used to specify a rule for a group name. For example, an author could create a DITAVAL rule that sets `product="database"` to "exclude". This is equivalent to setting a default of "exclude" for any individual value in a `database()` group; it also excludes the more common usage of "database" as a single value within the `@product` attribute. Thus when "myDB" appears in a `database()` group within the `@product` attribute, the full precedence for determining whether to include or exclude the value is as follows:

1. Check for a DITAVAL rule for `database="dbOne"`
2. Check for a DITAVAL rule for `product="dbOne"`
3. Check for a DITAVAL rule for `product="database"` (default for the database group)
4. Check for a DITAVAL rule for "product" (default for the `@product` attribute)
5. Check for a default rule for all conditions (default of include or exclude for all attributes)
6. Otherwise, evaluate to "include"

### 7.4.9.6 Example: Filtering and flagging topic content

In this scenario, a publisher wants to flag information that applies to administrators and exclude information that applies to the extended product.

Consider the following DITA source fragment and conditional processing profile:

**Figure 67: DITA source fragment**

```xml
<p audience="administrator">Set the configuration options:
  <ul>
    <li product="extendedProd">Set foo to bar</li>
    <li product="basicProd extendedProd">Set your blink rate</li>
    <li>Do some other stuff</li>
    <li>Do a special thing for Linux</li>
  </ul>
</p>
```

**Figure 68: DITAVAL profile**

```xml
<val>
  <prop att="audience" val="administrator" action="flag">
    <startflag><alt-text>ADMIN</alt-text></startflag>
  </prop>
  <prop att="product" val="extendedProd" action="exclude"/>
</val>
```

When the content is rendered, the paragraph is flagged, and the first list item is excluded (since it applies to extendedProd). The second list item is still included; even though it does apply to extendedProd, it also applies to basicProd, which was not excluded.

Comment by rodaande on 21 March 2022
The result will look something like the following:

**ADMIN** Set the configuration options:

- Set your blink rate
- Do some other stuff
- Do a special thing for Linux

### 7.4.9.7 Example: Simple DITAVAL document

A DITAVAL document can reference tokens that pull in additional topics from a subject scheme.

**Comment by rodaande**

Show a ditaval doc and subject scheme - for example, ditaval that excludes "windows" and subject scheme that makes that cover "win2000 / winvista" etc. Or maybe we should just conref in the full example from 5.2.4 Processing controlled attribute values (54)

### 7.4.9.8 Example: DITAVAL with conditions for groups

In this advanced scenario, grouped values are used for filtering within a conditional processing attribute.

```xml
<val>
  <prop action="exclude" att="product" val="appserver"/>
  <prop action="include" att="product" val="mySERVER"/>
  <prop action="include" att="database" val="dbFIRST"/>
  <prop action="include" att="database" val="dbSECOND"/>
  <prop action="exclude" att="database" val="newDB"/>
</val>
```

Assume that "database" and "appServer" are used as group names within the `@product` attribute. In that case, the sample DITAVAL above performs the following actions:

- The first `<prop>` element excludes the value "appServer" when used within the `@product` attribute. It also sets a default of "exclude" for values within any appServer() group inside of the `@product` attribute.
- The second `<prop>` element sets "mySERVER" to include; this applies whether "mySERVER" appears alone in the `@product` attribute (product="mySERVER") or inside of any group (product="appServer(mySERVER)" or product="otherGroup(mySERVER)").
- The third and fourth `<prop>` elements set the database values "dbFIRST" and "dbSECOND" to include. If those values appear inside of a "database" group, they are explicitly set to "include". If they appear elsewhere in a conditional attribute (such as `product="dbFIRST"` or `platform="dbSECOND"`), this rule does not apply.
- The final `<prop>` element sets the database value "newDB" to exclude. If that value appears inside of a database group, it is explicitly set to "exclude". If it appears in any other group or attribute, this rule does not apply.

Remember that with groups, if all values inside of a single group evaluate to "exclude", that is equivalent to an entire attribute evaluating to "exclude", which results in the removal of the content. Using the above sample DITAVAL:

- `<p product="appServer">` is filtered out, because this value is excluded.
- `<p product="appServer(A B)">` is filtered out, because there is no explicit rule for A or B, and values in the "appServer" group inside of `@product` default to exclude.
- `<p product="appServer(A B mySERVER)">` is included, because `product="mySERVER"` evaluates to "include", which means the entire group evaluates to "include".
• `<p product="newDB">` is included, because no rule in the DITAVAL applies, so the "newDB" token defaults to "include".
• `<p product="database(newDB)">` is filtered out, because the token "newDB" is excluded when found in the database group.
• `<p product="database(dbFIRST dbSECOND newDB)">` is included, because both "dbFIRST" and "dbSECOND" are included, so the group evaluates to include.
• `<p product="database(newDB) appserver(mySERVER)">` is filtered out, because the token "newDB" is excluded when found in the database group. The entire "database" group on this paragraph evaluates to "exclude", so the element is excluded, regardless of how the "appServer" group evaluates.

**Note**  If two groups with the same name exist on different attributes, each group will evaluate the same way. For example, rules for the database group in this sample would evaluate the same whether the group is used within `@product` or `@platform`. See 7.4 Conditional processing (150) for suggestions on how to handle similar groups on different attributes.

### 7.5 Branch filtering

The branch filtering mechanism enables map authors to set filtering conditions for specific branches of a map. This makes it possible for multiple conditional-processing profiles to be applied within a single publication.

Conditional processing profiles are most often used for an entire root map, with rules applied to all content in that root map. The branch filtering mechanism uses the `<ditavalref>` element to apply rules from a single DITAVAL document against a subset of content.

The location of the `<ditavalref>` element determines the content to which filtering conditions are applied. The filtering conditions then are used to filter the map branch itself (that is, the map elements used to create the branch). In addition, it is used to filter local maps and topics that are referenced by that branch.

The `<ditavalref>` element also provides the ability to process a single branch of content multiple times, applying unique conditions to each instance of the branch.

### 7.5.1 Overview of branch filtering

Maps or map branches can be filtered by adding a `<ditavalref>` element that specifies the DITAVAL document to use for that map or map branch.

The `<ditavalref>` element is designed to manage conditional processing for the following use cases.

1. A map branch needs to be filtered using conditions that do not apply to the rest of the publication. For example, a root map might contain content that is written for both novice and expert users. However, the authors want to add a section that targets only novice users. Using branch filtering, a map branch can be filtered so that it only includes content germane to a novice audience, while the content of the rest of the map remains appropriate for multiple audiences.

2. A map branch needs to be presented differently for different audiences. For example, a set of software documentation might contain installation instructions that differ between operating systems. In that case, the map branch with the installation instructions needs to be filtered multiple times with distinct sets of conditions, while the rest of the map remains common to all operating systems.

045 (409) In addition to filtering, applications MAY support flagging at the branch level based on the referenced DITAVAL documents.
7.5.2 How filtering rules interact

With branch filtering, it is possible to set include or exclude rules globally, within a map, and within an already filtered map branch. The general rule for conflicts is that once specified, “exclude” conditions are in effect for the entire map or branch.

Filtering rules often are specified globally in a conditional processing profile, outside of the content. When global conditions set a property value to “exclude”, that setting overrides any other settings for the same property that are specified at a branch level. Global conditions that set a conditional property to “include” or “flag” do not override branch-level conditions that set the same property to “exclude”.

Using `<ditavalref>` elements, it is possible to specify one set of conditions for a branch and another set of conditions for a subset of the branch. As with global conditions, properties set to “exclude” for a map branch override any other settings for the same property specified for a subset of the branch. Branch conditions that set a conditional property to “include” or “flag” do not override conditions on a subset of the branch that explicitly set the same property to “exclude”.

7.5.3 Branch filtering: Single referenced DITAVAL document for a branch

Using a single `<ditavalref>` element as a child of a map or map branch indicates that the map or map branch is filtered using the rules specified in the referenced DITAVAL document.

The following rules outline how the filtering conditions that are specified in DITAVAL document are applied:

- `<ditavalref>` element as a direct child of a map
  - The filtering conditions are applied to the entire map.

- `<ditavalref>` element within a map branch
  - The filtering conditions are used to process the entire branch, including the parent element that contains the `<ditavalref>` element.

- `<ditavalref>` element within a `<topicref>` reference to a local map
  - The filtering conditions are applied to the submap.

- `<ditavalref>` element within a `<topicref>` reference to peer map
  - The reference conditions are **not** applied to the peer map.

7.5.4 Branch filtering: Multiple referenced DITAVAL documents for a branch

Using multiple `<ditavalref>` elements as the children of a map or map branch indicates that the map or map branch will be independently filtered using the rules that are specified in each referenced DITAVAL document.

When multiple `<ditavalref>` elements occur as children of the same element, the rules in the referenced DITAVAL documents are processed independently. This effectively requires a processor to maintain one copy of the branch for each `<ditavalref>`, so that each copy can be filtered using different conditions.

**Note** In most cases, it is possible to create a valid, fully-resolved view of a map with branches copied to reflect the different `<ditavalref>` conditions. However, this might not be the case when multiple `<ditavalref>` elements occur as direct children of a root map. In this case, it is possible that the map could be filtered in a manner that results in two or more distinct versions of the `<title>` or metadata. How this is handled is processor dependent. For example, when a root map has three `<ditavalref>` elements as children of `<map>`, a conversion to EPUB could produce an EPUB with three versions of the content, or it could produce three distinct EPUB documents.

When a processor maintains multiple copies of a branch for different condition sets, it has to manage situations where a single resource with a single key name results in two distinct resources. Key names...
must be modified in order to allow references to a specific filtered copy of the resource; without renaming, key references could only be used to refer to a single filtered copy of the resource, chosen by the processor. See 7.5.5 Branch filtering: Impact on resource and key names (163) for details on how to manage resource names and key names.

7.5.5 Branch filtering: Impact on resource and key names

When map branches are cloned by a processor in order to support multiple condition sets, processors must manage conflicting resource and key names. The DITAVALref domain includes metadata elements that authors can use to specify how resource and key names are renamed.

Note While the processing controls that are described here are intended primarily for use with map branches that specify multiple condition sets, they also can be used with map branches that include only a single <ditavalref> element.

When a map branch uses multiple condition sets, processors create multiple effective copies of the branch to support the different conditions. This results in potential conflicts for resource names, key names, and key scopes. Metadata elements inside of the <ditavalref> element are available to provide control over these values, so that keys, key scopes, and URIs can be individually referenced within a branch.

For example, the following map branch references two DITAVAL documents:

```xml
<topicref href="productFeatures.dita" keys="features" keyscope="prodFeatures">
  <ditavalref href="novice.ditaval"/>
  <ditavalref href="admin.ditaval"/>
</topicref>
```

In this case, the processor has two effective copies of productFeatures.dita and newFeature.dita. One copy of each topic is filtered using the conditions specified in novice.ditaval, and the other copy is filtered using the conditions specified in admin.ditaval.

If an author has referenced a topic using keyref="features" or keyref="prodFeatures.features", a processor cannot distinguish which filtered copy is the intended target. The metadata elements in the DITAVALref domain provide a way to control this scenario.

7.5.5.1 Using metadata elements in the DITAVAL reference domain

Metadata within the <ditavalref> element makes it possible to control changes to resource names and key scope names, so that each distinct filtered copy can be referenced in a predictable manner.

The DITAVALref domain defines four elements to control URI and key scope values within filtered map branches.

<dvrResourcePrefix>

The <dvrResourcePrefix> element specifies the prefix to use when constructing the effective file names or resource IDs of the resources that are referenced from within the map branch that is implied by the ancestor <ditavalref> element. This enables a map author to specify a prefix that is added to the start of resource names for each resource in the branch.

<dvrResourceSuffix>

The <dvrResourceSuffix> element specifies the prefix to use when constructing the effective file names or resource IDs of the resources that are referenced from within the map branch that is implied by the ancestor <ditavalref> element. This enables a map author to specify a suffix that is added to the end of resource names (before any extension) for each resource in the branch.
The `<dvrKeyscopePrefix>` element specifies the prefix to use when constructing the effective key scope names for the map branch that is implied by the ancestor `<ditavalref>` element. This enables a map author to specify a prefix that is added to the start of key scope names for each key scope in the branch. If no key scope is specified for the branch, this can be used to establish a new key scope, optionally combined with a value specified in `<dvrKeyscopeSuffix>`.

The `<dvrKeyscopeSuffix>` element specifies the suffix to use when constructing the effective key scope names for the map branch that is implied by the ancestor `<ditavalref>` element. This enables a map author to specify a suffix that is added to the end of key scope names for each key scope in the branch.

For example, the previous code sample can be modified as follows to create predictable resource names and key scopes for the copy of the branch that is filtered using the conditions that are specified in `admin.ditaval`.

```xml
<topicref href="productFeatures.dita" keys="features" keyscope="prodFeatures">
  <ditavalref href="novice.ditaval"/>
  <ditavalref href="admin.ditaval">
    <ditavalmeta>
      <dvrResourcePrefix>admin-</dvrResourcePrefix>
      <dvrKeyscopePrefix>adminscope-</dvrKeyscopePrefix>
    </ditavalmeta>
    <ditavalref>
      <topicref href="newFeature.dita" keys="newThing"/>
    </ditavalref>
  </ditavalref>
</topicref>
```

The novice branch does not use any renaming, which allows it to be treated as the default copy of the branch. As a result, when the topics are filtered using the conditions that are specified in `novice.ditaval`, the resource names and key names are unmodified, so that references to the original resource name and key name will resolve to topics in the novice copy of the branch. This has the following effect on topics that are filtered using the conditions specified in `admin.ditaval`:

- The prefix `admin-` is added to the beginning of each resource name in the admin branch.
  - The resource `productFeatures.dita` becomes `admin-productFeatures.dita`
  - The resource `newFeature.dita` becomes `admin-newFeature.dita`

- The prefix `adminscope-` is added to the existing key scope "prodFeatures".
  - The attribute value `keyref="adminscope-prodFeatures.features"` refers explicitly to the admin copy of `productFeatures.dita`
  - The attribute `keyref="adminscope-prodFeatures.newThing"` refers explicitly to the admin copy of `newFeature.dita`

**Note** In general, the best way to reference a topic that will be modified based on branch filtering is to use a key rather than a URI. Key scopes and key names (including those modified based on the elements above) must be calculated by processors before other processing. This means that in the example above, a key reference to `adminscope-prodFeatures.features` will always refer explicitly to the instance of `productFeatures.dita` filtered against the conditions in `admin.ditaval`, regardless of whether a processor has performed the filtering yet. References that use the URI `productFeatures.dita` or `admin-productFeatures.dita` could resolve differently (or fail to resolve), as discussed in **7.5.6 Branch filtering: Implications of processing order** (165).
7.5.5.2 Renaming based on multiple <ditavalref> elements

It is possible for a branch with <ditavalref> already in effect to specify an additional <ditavalref>, where each <ditavalref> includes renaming metadata.

When renaming, metadata on the <ditavalref> nested more deeply within the branch appears closer to the original resource or key name. For example:

```
<topicref href="branchParent.dita">
  <ditavalref href="parent.ditaval">
    <dvrResourcePrefix>parentPrefix-</dvrResourcePrefix>
  </ditavalmeta>
</ditavalref>
<!-- additional topics or layers of nesting -->
<topicref href="branchChild.dita">
  <ditavalref href="child.ditaval">
    <dvrResourcePrefix>childPrefix-</dvrResourcePrefix>
  </ditavalmeta>
</ditavalref>
</topicref>
```

In this situation, the resource `branchChild.dita` is given a prefix based on both the reference to `parent.ditaval` and the reference to `child.ditaval`. The value "childPrefix-" is specified in the <ditavalref> that is nested more deeply within the branch, so it appears closer to the original resource name. The resource `branchChild.dita` would result in `parentPrefix-childPrefix-branchChild.dita`. Suffixes (if specified) would be added in a similar manner, resulting in a name like `branchChild-childSuffix-parentSuffix.dita`. Note that the hyphens are part of the specified prefix; they are not added automatically.

7.5.5.3 Handling resource name conflicts caused by branch filtering

It is possible to construct a root map where the branch filtering mechanism results in resource name conflicts.

046 (410) It is an error if <ditavalref>-driven branch cloning results in multiple copies of a topic that have the same resolved name. Processors SHOULD report an error in such cases. Processors MAY recover by using an alternate naming scheme for the conflicting topics.

047 (410) In rare cases, a single topic might appear in different branches that set different conditions, yet still produce the same result. For example, a topic might appear in both the admin and novice copies of a branch but not contain content that is tailored to either audience; in that case, the filtered copies would match. A processor MAY consider this form of equivalence when determining if two references to the same resource should be reported as an error.

7.5.6 Branch filtering: Implications of processing order

The branch filtering mechanism can result in changes to the global key space for a root map. As a result, processors are required to evaluate branch filtering in order to construct the key space.

048 (410) The full effects of the branch filtering process MUST be calculated by processors before they construct the effective map and key scope structure. This requirement comes from the fact that the branch filtering process can result in new or renamed keys, key scopes, or URIs that make up the key space.
Comment by rodaande on 4 Apr 2022
Do we remember what "relaed attributes" are in the following note? Can we keep it simple and just say that keyref attribute is disallowed?

Note The @keyref attribute and related attributes are explicitly disallowed on <ditavalref>. This prevents any confusion resulting from a @keyref that resolves to additional key- or resource-renaming metadata.

In general, the DITA specification refrains from mandating a processing order; thus publication results can vary slightly depending on the order in which processes are run. With branch filtering, processors are not required to apply filter conditions specified outside of the map and filter conditions specified with <ditavalref> at the same time in a publishing process.

For example, a processor might use the following processing order:

1. Apply externally-specified filter conditions to maps
2. Apply filtering based on <ditavalref> elements

Because externally-specified "exclude" conditions always take precedence over branch-specific conditions, content excluded based on external conditions will always be removed, regardless of the order in which processors evaluate conditions.

Processors should consider the following points when determining a processing order:

- If links are generated based on the map hierarchy, those links should be created using the renamed keys and URIs that result from evaluating the <ditavalref> filter conditions, to ensure that the links are consistent within the modified branches. For example, sequential links based on a map hierarchy should remain within the appropriate modified branch.
- If URI-based content references are resolved in topics before the <ditavalref> filtering conditions are evaluated, content that applies to multiple audiences can be brought in and (later in the process) selectively filtered by branch. For example, if a set of installation steps is pulled in with conref (from outside the branch), it might contain information that is later filtered by platform based on <ditavalref>. This results in copies of the steps that are specific to each operating system. If conref is processed after the <ditavalref>, content might be pulled in that has not been appropriately filtered for the new context.
- The same scenario applies to conref values that push content into the branch.
  - Pushing content into a branch before resolving the <ditavalref> conditions allows content for multiple conditions to be pushed and then filtered by branch based on the <ditavalref> conditions.
  - If the branch using <ditavalref> pushes content elsewhere, resolving <ditavalref> first could result in multiple copies of the content to be pushed (one for each branch), resulting in multiple potentially conflicting copies pushed to the new destination.
7.5.7 Examples of branch filtering
The branch filtering examples illustrate the processing expectations for various scenarios that involve <ditavalref> elements. Processing examples use either before and after sample markup or expanded syntax that shows the equivalent markup without the <ditavalref> elements.

7.5.7.1 Example: Single <ditavalref> on a branch
In this scenario, a single <ditavalref> element is used to supply filtering conditions for a branch.

Consider the following DITA map and the DITAVAL document that is referenced from the <ditavalref> element:

**Figure 69: input.ditamap:**

```xml
<map>
  <topicref href="intro.dita"/>
  <topicref href="install.dita">
    <ditavalref href="novice.ditaval"/>
    <topicref href="do-stuff.dita" audience="admin"/>
  </topicref>
  <!-- more topics -->
  <!-- Several chapters worth of other material -->
</map>
```

**Figure 70: Contents of novice.ditaval**

```xml
<val>
  <prop att="audience" val="novice" action="include"/>
  <prop att="audience" val="admin" action="exclude"/>
</val>
```

When this content is published, the following processing occurs:

- The first topic (intro.dita) does not use any of the conditions that are specified in novice.ditaval. It is published normally, potentially using other DITAVAL conditions that are specified externally.
- The second topic (install.dita) is filtered using any external conditions as well as the conditions that are specified in novice.ditaval.
- The third topic (do-stuff.dita) is filtered using any external conditions as well as the conditions that are specified in novice.ditaval.
- The fourth topic (advanced-stuff.dita) is removed from the map entirely, because it is filtered out with the conditions that are specified for the branch.

In this example, no resources are renamed based on the <ditavalref> processing.

**Note** In cases where the original resource names map directly to names or anchors in a deliverable, the absence of renaming ensures that external links to those topics are stable regardless of whether a DITAVAL document is used.

7.5.7.2 Example: Multiple <ditavalref> elements on a branch
In this scenario, multiple <ditavalref> elements are used on a single map branch to create multiple distinct copies of the branch.

Consider the following DITA map that contains a branch with three peer <ditavalref> elements. Because topics in the branch are filtered in three different ways, processors are effectively required to handle three copies of the entire branch. Sub-elements within the <ditavalref> elements are used to
control how new resource names are constructed for two copies of the branch; one copy (based on the conditions in \texttt{win.ditaval}) is left with the original file names.

\textbf{Figure 71: input.ditamap}

```
<map>
  <topicref href="intro.dita"/>
  <!-- Beginning of installing branch -->
  <topicref href="install.dita">
    <ditavalref href="win.ditaval">
      <ditavalmeta>
        <dvrResourceSuffix>-apple</dvrResourceSuffix>
      </ditavalmeta>
    </ditavalref>
    <ditavalref href="linux.ditaval">
      <ditavalmeta>
        <dvrResourceSuffix>-linux</dvrResourceSuffix>
      </ditavalmeta>
    </ditavalref>
    <topicref href="do-stuff.dita">
      <!-- more topics and nested branches -->
      <topicref href="mac-specific-stuff.dita" platform="mac"/>
    </topicref>
  </ditavalref>
  <!-- End of installing branch -->
  <topicref href="cleanup.dita"/>
</map>
```

\textbf{Figure 72: Contents of win.ditaval}

```
<val>
  <prop att="platform" val="win" action="include"/>
  <prop att="platform" action="exclude"/>
</val>
```

\textbf{Figure 73: Contents of mac.ditaval}

```
<val>
  <prop att="platform" val="mac" action="include"/>
  <prop att="platform" action="exclude"/>
</val>
```

\textbf{Figure 74: Contents of linux.ditaval}

```
<val>
  <prop att="platform" val="linux" action="include"/>
  <prop att="platform" action="exclude"/>
</val>
```

When a processor evaluates this markup, it results in three copies of the installing branch. The following processing takes place:

- The first topic (\texttt{intro.dita}) is published normally, potentially using any other DITAVAL conditions that are specified externally.
- The installing branch appears three times, once for each DITAVAL document. The branches are created as follows:
  - The first branch uses the first DITAVAL document (\texttt{win.ditaval}). Resources use their original names as specified in the map. The \texttt{mac-specific-stuff.dita} topic is removed. The resulting branch, with indenting to show the hierarchy, matches the original without the mac topic:

```
install.dita
do-stuff.dita
```
The second branch uses the second DITAVAL document (`mac.ditaval`). Resources are renamed based on the `<dvrResourceSuffix>` element. The `mac-specific-stuff.dita` topic is included. The resulting branch, with indenting to show the hierarchy, is as follows:

```
install-apple.dita
do-stuff-apple.dita
  mac-specific-stuff-apple.dita
...more topics and nested branches...
cleanup-apple.dita
```

The third branch uses the last DITAVAL document (`linux.ditaval`). Resources are renamed based on the `<dvrResourceSuffix>` element. The `mac-specific-stuff.dita` topic is removed. The resulting branch, with indenting to show the hierarchy, is as follows:

```
install-linux.dita
do-stuff-linux.dita
...more topics and nested branches...
cleanup-linux.dita
```

The example used three DITAVAL documents to avoid triple maintenance of the installing branch in a map; the following map is functionally equivalent, but it requires parallel maintenance of each branch.

**Figure 75: input.ditamap**

```
<map>
  <topicref href="intro.dita"/>
  <!-- Windows installing branch -->
  <topicref href="install.dita">
    <ditavalref href="win.ditaval"/>
    <topicref href="do-stuff.dita">
      <!-- more topics and nested branches -->
    </topicref>
    <topicref href="cleanup.dita"/>
  </topicref>
  <!-- Mac installing branch -->
  <topicref href="install.dita">
    <ditavalref href="mac.ditaval">
      <ditavalmeta><dvrResourceSuffix>-apple</dvrResourceSuffix></ditavalmeta>
    </ditavalref>
    <topicref href="do-stuff.dita">
      <topicref href="mac-specific-stuff.dita" platform="mac"/>
      <!-- more topics and nested branches -->
    </topicref>
    <topicref href="cleanup.dita"/>
  </topicref>
  <!-- Linux installing branch -->
  <topicref href="install.dita">
    <ditavalref href="linux.ditaval">
      <ditavalmeta><dvrResourceSuffix>-linux</dvrResourceSuffix></ditavalmeta>
    </ditavalref>
    <topicref href="do-stuff.dita">
      <!-- more topics and nested branches -->
    </topicref>
    <topicref href="cleanup.dita"/>
  </topicref>
  <!-- Several chapters worth of other material -->
</map>
```
7.5.7.3 Example: Single <ditavalref> as a child of <map>

In this scenario, a <ditavalref> element is a direct child of the <map> element, which is equivalent to setting global filtering conditions for the map.

The following map is equivalent to processing all the contents of the map with the conditions in the novice.ditaval document. If additional conditions are provided externally (for example, as a parameter to the publishing process), those conditions take precedence.

```
<map>
  <title>Sample map</title>
  <ditavalref href="novice.ditaval"/>
  <!-- lots of content -->
</map>
```

7.5.7.4 Example: Single <ditavalref> in a reference to a map

In this scenario, a <ditavalref> element is used when referencing a map. This is equivalent to setting filtering conditions for the referenced map.

In the following example, other.ditamap is referenced by a root map. The <ditavalref> element indicates that all of the content in other.ditamap is filtered using the conditions specified in the some.ditaval document.

**Figure 76: Map fragment**

```
<topicref href="parent.dita">
  <topicref href="other.ditamap" format="ditamap">
    <ditavalref href="some.ditaval"/>
  </topicref>
</topicref>
```

**Figure 77: Contents of other.ditamap**

```
<map>
  <topicref href="nestedTopic1.dita">
    <topicref href="nestedTopic2.dita"/>
  </topicref>
  <topicref href="nestedTopic3.dita"/>
</map>
```

This markup is functionally equivalent to applying the conditions in some.ditaval to the topics that are referenced in the nested map. For the purposes of filtering, it could be rewritten in the following way. The extra <topicgroup> container is used here to ensure filtering is not applied to parent.dita, as it would not be in the original example:

```
<topicref href="parent.dita">
  <topicgroup>
    <ditavalref href="some.ditaval"/>
    <topicref href="nestedTopic1.dita">
      <topicref href="nestedTopic2.dita"/>
    </topicref>
    <topicref href="nestedTopic3.dita"/>
  </topicgroup>
</topicref>
```

For the purposes of filtering, this map also could be rewritten as follows.

```
<topicref href="parent.dita">
  <ditavalref href="some.ditaval"/>
  <topicref href="nestedTopic1.dita">
    <topicref href="nestedTopic2.dita"/>
  </topicref>
  <topicref href="nestedTopic3.dita">
```
Filtering based on the <ditavalref> element applies to the containing element and its children, so in each case, the files nestedTopic1.dita, nestedTopic2.dita, and nestedTopic3.dita are filtered against the conditions specified in some.ditaval. In each version, parent.dita is not a parent for the <ditavalref>, so it is not filtered.

7.5.7.5 Example: Multiple <ditavalref> elements as children of <map> in a root map

In this scenario, multiple instances of the <ditavalref> element are specified as direct children of the <map> element in a root map. This is equivalent to setting multiple sets of global filtering conditions for the root map.

Note Unlike most other examples of branch filtering, this example cannot be rewritten using a single valid map with alternate markup that avoids having multiple <ditavalref> elements as children of the same grouping element.

Processing the following root map is equivalent to processing all the contents of the map with the conditions in the mac.ditaval file and again with the linux.ditaval file. If additional conditions are provided externally (for example, as a parameter to the publishing process), those global conditions take precedence.

Figure 78: input.ditamap

```xml
<map>
  <title>Setting up my product on <keyword platform="mac">Mac</keyword><keyword platform="linux">Linux</keyword></title>
  <topicmeta>
    <othermeta platform="mac" name="ProductID" content="1234M"/>
    <othermeta platform="linux" name="ProductID" content="1234L"/>
  </topicmeta>
  <ditavalref href="mac.ditaval"/>
  <ditavalref href="linux.ditaval"/>
  <!-- lots of content, including relationship tables -->
</map>
```

Figure 79: Contents of mac.ditaval

```xml
<val>
  <prop att="platform" val="mac" action="include"/>
  <prop att="platform" val="linux" action="exclude"/>
</val>
```

Figure 80: Contents of linux.ditaval

```xml
<val>
  <prop att="platform" val="mac" action="exclude"/>
  <prop att="platform" val="linux" action="include"/>
</val>
```

Because the title and metadata each contain filterable content, processing using the conditions that are referenced by the <ditavalref> element results in two variants of the title and common metadata. While this cannot be expressed using valid DITA markup, it is conceptually similar to something like the following.

```xml
<!-- The following wrapperElement is not a real DITA element. It is used here purely as an example to illustrate one possible way of picturing the conditions. -->
<wrapperElement>
```
How this map is rendered is implementation dependent. If this root map is rendered as a PDF, possible renditions might include the following:

- Two PDFs, with one using the conditions from `mac.ditaval` and another using the conditions from `linux.ditaval``
- One PDF, with a title page that includes each filtered variant of the title and product ID, followed by Mac-specific and Linux-specific renderings of the content as chapters in the PDF
- One PDF, with the first set of filter conditions used to set book level titles and metadata, followed by content filtered with those conditions, followed by content filtered with conditions from the remaining `<ditavalref>` element.

### 7.5.7.6 Example: Multiple `<ditavalref>` elements in a reference to a map

In this scenario, multiple instances of the `<ditavalref>` element are specified in a reference to a map. This is equivalent to referencing that map multiple times, with each reference nesting one of the `<ditavalref>` elements.

In the following example, `other.ditamap` is referenced by a root map. The `<ditavalref>` elements provide conflicting sets of filter conditions.

**Figure 81: Map fragment**

```xml
<topicref href="parent.dita">
  <topicref href="other.ditamap" format="ditamap">
    <ditavalref href="audienceA.ditaval"/>
    <ditavalref href="audienceB.ditaval"/>
    <ditavalref href="audienceC.ditaval"/>
  </topicref>
</topicref>
```

This markup is functionally equivalent to referencing `other.ditamap` three times, with each reference including a single `<ditavalref>` elements. The fragment could be rewritten as:

**Figure 82: Map fragment**

```xml
<topicref href="parent.dita">
  <topicref href="other.ditamap" format="ditamap">
    <ditavalref href="audienceA.ditaval"/>
  </topicref>
  <topicref href="other.ditamap" format="ditamap">
    <ditavalref href="audienceB.ditaval"/>
  </topicref>
  <topicref href="other.ditamap" format="ditamap">
    <ditavalref href="audienceC.ditaval"/>
  </topicref>
</topicref>
```
7.5.7.7 Example: `<ditavalref>` within a branch that already uses `<ditavalref>`

In this scenario, a branch is filtered because a `<ditavalref>` element is present, and another `<ditavalref>` deeper within that branch supplies additional conditions for a subset of the branch.

In the following map fragment, a set of operating system conditions applies to installation instructions. Within that common branch, a subset of content applies to different audiences.

```xml
<topicref href="install.dita">
  <ditavalref href="linux.ditaval"/>
  <ditavalref href="mac.ditaval">
    <dvrResourceSuffix>-mac</dvrResourceSuffix>
  </ditavalmeta>
</ditavalref>
<ditavalref href="win.ditaval">
  <dvrResourceSuffix>-win</dvrResourceSuffix>
</ditavalref>
<topicref href="perform-install.dita">
  <!-- other topics-->
</topicref>

<!-- Begin configuration sub-branch -->
<topicref href="configure.dita">
  <ditavalref href="novice.ditaval">
    <dvrResourceSuffix>-novice</dvrResourceSuffix>
  </ditavalmeta>
</ditavalref>
<ditavalref href="advanced.ditaval">
  <dvrResourceSuffix>-admin</dvrResourceSuffix>
</ditavalmeta>
</ditavalref>
<!-- Other config topics -->
</topicref>

<!-- End configuration sub-branch -->
</topicref>
```

In this case, the effective map contains three copies of the complete branch. The branches are filtered by operating system. Because topics in the branch are filtered in different ways, processors are effectively required to handle three copies of the entire branch. The map author uses the `<dvrResourceSuffix>` elements to control naming for each copy. The Linux branch does not specify a `<dvrResourceSuffix>` element, because it is the default copy of the branch; this allows documents such as `install.dita` to retain their original names.

Within each operating system instance, the configuration sub-branch is repeated; it is filtered once for novice users and then again for advanced users. As a result, there are actually six instances of the configuration sub-branch. Additional `<dvrResourceSuffix>` elements are used to control naming for each instance.

1. The first instance is filtered using the conditions in `linux.ditaval` and `novice.ditaval`. For this instance, the resource `configure.dita` is treated as the resource `configure-novice.dita`. There is no renaming based on `linux.ditaval`, and the `<ditavalref>` the references `novice.ditaval` adds the suffix `-novice`.

2. The second instance is filtered using the conditions in `linux.ditaval` and `advanced.ditaval`. For this instance, the resource `configure.dita` is treated as the resource `configure-admin.dita`. There is no renaming based on `linux.ditaval`, and the `<ditavalref>` that references `advanced.ditaval` adds the suffix `-admin`.

3. The third instance is filtered using the conditions in `mac.ditaval` and `novice.ditaval`. For this instance, the resource `configure.dita` is treated as the resource `configure-novice-mac.dita`. The `<ditavalref>` that references `novice.ditaval` adds the suffix `-novice`,
resulting in configure-novice.dita, and then the <ditavalref> that references mac.ditaval adds the additional suffix -mac.

4. The fourth instance is filtered using the conditions in mac.ditaval and advanced.ditaval. For this instance, the resource configure.dita is treated as the resource configure-admin-mac.dita. The <ditavalref> that references admin.ditaval adds the suffix -admin, resulting in configure-admin.dita, and then the <ditavalref> that references mac.ditaval adds the additional suffix -mac.

5. The fifth instance is filtered using the conditions in win.ditaval and novice.ditaval. For this instance, the resource configure.dita is treated as the resource configure-novice-win.dita. The <ditavalref> that references novice.ditaval adds the suffix -novice, resulting in configure-novice.dita, and then the <ditavalref> that references win.ditaval adds the additional suffix -win.

6. The sixth instance is filtered using the conditions in win.ditaval and advanced.ditaval. For this instance, the resource configure.dita is treated as the resource configure-admin-win.dita. The <ditavalref> that references admin.ditaval adds the suffix -admin, resulting in configure-admin.dita, and then the <ditavalref> that references win.ditaval adds the additional suffix -win.

7.5.7.8 Example: <ditavalref> error conditions

In this scenario, multiple, non-equivalent copies of the same resource name are created as a result of branch filtering. In addition, the process results in duplicate key names, making it impossible to reliably reference individual result topics.

The following map fragment contains several error conditions that result in name clashes:

```xml
<topicref href="a.dita" keys="a">
  <ditavalref href="one.ditaval"/>
  <ditavalref href="two.ditaval"/>
  <topicref href="b.dita" keys="b"/>
</topicref>
<topicref href="a.dita"/>
<topicref href="c.dita" keys="c">
  <ditavalref href="one.ditaval">
    <ditavalmeta>
      <dvrResourceSuffix>-token</dvrResourceSuffix>
    </ditavalmeta>
  </ditavalref>
  <ditavalref href="two.ditaval">
    <ditavalmeta>
      <dvrResourceSuffix>-token</dvrResourceSuffix>
    </ditavalmeta>
  </ditavalref>
</topicref>
<topicref href="a.dita" keys="a">
  <!-- a.dita to be filtered by one.ditaval, key "a" ignored -->
  <topicref href="b.dita" keys="b"/>
  <!-- b.dita to be filtered by one.ditaval, key "b" ignored -->
</topicref>
<topicref href="a.dita"/>
<topicref href="c-token.dita" keys="c">
  <!-- c-token.ditaval to be filtered by one.ditaval -->
</topicref>
```

In this sample, the effective map that results from evaluating the filter conditions has several clashes. In some cases the same document must be processed with conflicting conditions, using the same URI. In addition, because no key scope is added or modified, keys in the branch are duplicated in such a way that only one version is available for use. When the branches are evaluated to create distinct copies, the filtered branches result in the following equivalent map:

```xml
<topicref href="a.dita" keys="a">
  <!-- a.dita to be filtered by one.ditaval -->
  <topicref href="b.dita" keys="b"/>
  <!-- b.dita to be filtered by one.ditaval -->
</topicref>
<topicref href="a.dita" keys="a">
  <!-- a.dita to be filtered by two.ditaval; key "a" ignored -->
  <topicref href="b.dita" keys="b"/>
  <!-- b.dita to be filtered by two.ditaval; key "b" ignored -->
</topicref>
<topicref href="a.dita"/>
<topicref href="c-token.dita" keys="c">
  <!-- c-token.ditaval to be filtered by one.ditaval -->
</topicref>
```
The equivalent map highlights several problems with the original source:

- The key names "a" and "b" are present in a branch that will be duplicated. No key scope is introduced for either version of the branch, meaning that the keys will be duplicated. Because there can only be one effective key definition for "a" or "b", it only is possible to reference one version of the topic using keys.
- The key name "c" is present on another branch that will be duplicated, resulting in the same problem.
- The file `c.dita` is filtered with two sets of conditions, each of which explicitly maps the filtered resource to `c-token.dita`. This is an error condition that processors need to report.
- In situations where resource names map directly to output file names, such as an HTML5 rendering that creates files based on the original resource name, the following name conflicts also occur. In this case a processor would need to report an error, use an alternate naming scheme, or both:
  1. `a.dita` generates `a.html` using three alternate set of conditions. One version uses `one.ditaval`, one version uses `two.ditaval`, and the third version uses no filtering.
  2. `b.dita` generates `b.html` using two alternate set of conditions. One version uses `one.ditaval`, and the other version uses `two.ditaval`.

### 7.6 Sorting

Processors can be configured to sort elements. Typical processing includes sorting glossary entries, index entries, lists of parameters or reference entries in custom navigation structures, and tables based on the contents of cells in specific columns or rows.

Each element to be sorted must have some inherent text on which it will be sorted. This text is the base sort phrase for the element. For elements that have titles, the base sort phrase usually is the content of the `<title>` element. For elements that do not have titles, the base sort phrase might be literal content in the DITA source, or it might be generated or constructed based on the semantics of the element involved; for example, it could be constructed from various attribute or metadata values.

049 (410) Processors that perform sorting SHOULD explicitly document how the base sort phrase is determined for a given element.

The `<sort-as>` element can be used to specify an effective sort phrase when the base sort phrase is not appropriate for sorting. For index terms, the `<sort-as>` element specifies the effective sort phrase for an index entry.

The details of sorting and grouping are implementation specific. Processors might provide different mechanisms for defining or configuring collation and grouping details. Even where the `<sort-as>` element is specified, two processors might produce different sorted and grouped results because they might use different collation and grouping rules. For example, one processor might be configured to sort English terms before non-English terms, while another might be configured to sort them after. The grouping and sorting of content is subject to local editorial rules.

050 (410) When a `<sort-as>` element is specified, processors that sort the containing element MUST construct the effective sort phrase by prepending the content of the `<sort-as>` element to the base sort phrase. This ensures that two items with the same `<sort-as>` element but different base sort phrases will sort in the appropriate order.
For example, if a processor uses the content of the `<title>` element as the base sort phrase, and the title of a topic is “24 Hour Support Hotline” and the value of the `<sort-as>` element is “twenty-four hour”, then the effective sort phrase would be “twenty-four hour24 Hour Support Hotline”.

Related reference

**sort-as** (374)
For elements that are sorted, the `<sort-as>` element provides text that is combined with the base sort phrase to construct the effective sort phrase.

### 7.7 Determining effective attribute values

Topic to be moved to more appropriate location: how to determine effective attribute values.

Need to reconcile the two different existing lists, in [5.3.1.1 Processing cascading attributes in a map](#) (61) and [5.2.3 Binding controlled values to an attribute](#) (53).

**From "processing cascading attributes"

For attributes within a map, the following processing order **MUST** occur:

1. The `@conref` and `@keyref` attributes are evaluated.
2. The explicit values specified in the document instance are evaluated. For example, a `<topicref>` element with the `@toc` attribute set to "no" will use that value.
3. The default or fixed attribute values are evaluated. For example, the `@toc` attribute on the `<reltable>` element has a default value of "no".
4. The default values that are supplied by a controlled values file are evaluated.
5. The attributes cascade.
6. The processing-supplied default values are applied.
7. After the attributes are resolved within the map, they cascade to referenced maps.

**Comment by Kristen J Eberlein on 15 May 2019**

The following note is problematic. It contains a normative statement, but we explicitly state that notes are non-normative.

Discussed at TC call on 28 May 2019.

**Note**

The processing-supplied default values do not cascade to other maps. For example, most processors will supply a default value of `toc="yes"` when no `@toc` attribute is specified. However, a processor-supplied default of `toc="yes"` **MUST** not override a value of `toc="no"` that is set on a referenced map. If the `toc="yes"` value is explicitly specified, is given as a default through a DTD, XSD, RNG, or controlled values file, or cascades from a containing element in the map, it **MUST** override a `toc="no"` setting on the referenced map. See [5.3.3 Map-to-map cascading behaviors](#) (64) for more details.
8. Repeat steps 1 (176) to 4 (176) for each referenced map.
9. The attributes cascade within each referenced map.
10. The processing-supplied default values are applied within each referenced map.
11. Repeat the process for maps referenced within the referenced maps.

From "binding controlled values"

To determine the effective value for a DITA attribute, processors check for the following in the order outlined:

1. An explicit value in the element instance
2. A default value in the XML grammar
3. Cascaded value within the document
4. Cascaded value from a higher level document to the document
5. A default controlled value, as specified in the `<defaultSubject>` element
6. A value set by processing rules
8 Configuration, specialization, generalization, constraints, and expansion

The extension facilities of DITA allow document-type shells, vocabulary modules, and element-configuration modules (constraint and expansion) to be combined to create specific DITA document types.

8.1 Overview of DITA extension facilities

DITA provides three extension facilities: Document-type configuration, specialization, and element-type configuration.

Document-type configuration

Document-type configuration enables the definition of DITA document types that include only the vocabulary modules that are required for a given set of documents. There is no need to modify the vocabulary modules. Document-type configurations are implemented as document-type shells.

Specialization

Specialization enables the creation of new element types in a way that preserves the ability to interchange those new element types with conforming DITA applications. Specializations are implemented as vocabulary modules, which are integrated into document-type shells.

Specialization modules declare the elements and entities that are unique to a specialization. The separation of the vocabulary and its declarations into modules makes it easy to extend existing modules, because new modules can be added without affecting existing document types. It also makes it easy to assemble elements from different sources into a single document-type shell and to reuse specific parts of the specialization hierarchy in more than one document-type shell.

DITA content that uses specializations can be treated as, or converted to, unspecialized markup through the process of generalization. The information about the original specialized form can be retained.

Element-type configuration

Element-type configuration enables DITA architects to modify the content models and attribute lists for individual elements, without modifying the vocabulary modules in which the elements are defined.

There are two types of element configuration: Constraint and expansion. Both constraint and expansion are implemented as modules that are integrated into document-type shells:

Constraint

Constraint modules enable the restriction of content models and attribute lists for individual elements.

Expansion

Expansion modules enable the expansion of content models and attribute lists for individual elements.
8.2 Document-type configuration

Document-type configuration enables the definition of DITA document types that include only the vocabulary modules that are required for a given set of documents. There is no need to modify the vocabulary modules. Document-type configurations are implemented using document-type shells.

8.2.1 Overview of document-type shells

A document-type shell is an XML grammar file that specifies the elements and attributes that are allowed in a DITA document. The document-type shell integrates structural modules, domain modules, and element-configuration modules. In addition, a document-type shell specifies whether and how topics can nest.

A DITA document either must have an associated document-type definition or all required attributes must be made explicit in the document instances. Most DITA documents have an associated document-type shell. DITA documents that reference a document-type shell can be validated using most standard XML processors. Such validation enables processors to read the XML grammar files and determine default values for the `@specializations` and `@class` attributes.

The following figure illustrates the relationship between a DTD-based DITA document, its document-type shell, the vocabulary modules that it uses, and the element-configuration modules (constraint and expansion) that it integrates. Similar structure applies to DITA documents that use other XML grammars.

**Figure 83: Document type shell**
The DITA specification contains a starter set of document-type shells. These document-type shells are commented and can be used as templates for creating custom document-type shells.

While the OASIS-provided document-type shells can be used without any modification, creating custom document-type shells is a best practice. If the document-type shells need to be modified in the future, for example, to include a specialization or integrate an element-configuration module (constraint or expansion), the existing DITA documents will not need to be modified to reference a new document-type shell.

### 8.2.2 Rules for document-type shells

This topic collects the rules that concern DITA document-type shells.

**XML grammars**

<table>
<thead>
<tr>
<th>Rule</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>052</td>
<td>While the DITA specification only defines coding requirements for DTD and RELAX NG, conforming DITA documents MAY use other document-type constraint languages, such as XSD or Schematron.</td>
</tr>
</tbody>
</table>

**Defining element or attribute types**

<table>
<thead>
<tr>
<th>Rule</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>053</td>
<td>With two exceptions, a document-type shell MUST NOT directly define element or attribute types; it only includes vocabulary and element-configuration modules (constraint and expansion). The exceptions to this rule are the following:</td>
</tr>
<tr>
<td></td>
<td>• The ditabase document-type shell directly defines the <code>&lt;dita&gt;</code> element.</td>
</tr>
<tr>
<td></td>
<td>• RNG-based document-type shells directly specify values for the <code>@specializations</code> attribute. These values reflect the details of the attribute domains that are integrated by the document-type shell.</td>
</tr>
</tbody>
</table>

**Document-type shells not provided by OASIS**

<table>
<thead>
<tr>
<th>Rule</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>054</td>
<td>Document-type shells that are not provided by OASIS MUST have a unique public identifier, if public identifiers are used.</td>
</tr>
<tr>
<td>055</td>
<td>Document-type shells that are not provided by OASIS MUST NOT indicate OASIS as the owner. The public identifier or URN for such document-type shells SHOULD reflect the owner or creator of the document-type shell.</td>
</tr>
</tbody>
</table>

For example, if example.com creates a copy of the document-type shell for topic, an appropriate public identifier would be `~//EXAMPLE//DTD DITA Topic//EN`, where "EXAMPLE" is the component of the public identifier that identifies the owner. An appropriate URN would be "urn:example.com:names:dita:rng:topic.rng".

### 8.2.3 Equivalence of document-type shells

Two distinct DITA document types that are taken from different tools or environments might be functionally equivalent.

A DITA document type is defined by the following:
• The set of vocabulary and element-configuration modules (constraint and expansion) that are integrated by the document-type shell
• The values of the @class attributes of all the elements in the document
• Rules for topic nesting

Two document-type shells define the same DITA document type if they integrate identical vocabulary modules, element-configuration modules (constraint and expansion), and rules for topic nesting. For example, a document-type shell that is an unmodified copy of the OASIS-provided document-type shell for topic defines the same DITA document type as the original document-type shell. However, the new document-type shell has the following differences:

• It is a distinct file that is stored in a different location.
• It has a distinct system identifier.
• If it has a public identifier, the public identifier is unique.

Note The public or system identifier that is associated with a given document-type shell is not necessarily distinguishing. Two different people or groups might use the same modules and constraints to assemble equivalent document-type shells, while giving them different names or public identifiers.

8.2.4 Conformance of document-type shells
DITA documents typically are governed by a conforming DITA document-type shell. However, the conformance of a DITA document is a function of the document instance, not its governing grammar. Conforming DITA documents are not required to use a conforming document-type shell.

Conforming DITA documents are not required to have any governing document-type declaration or schema. There might be compelling or practical reasons to use non-conforming document-type shells. For example, a document might use a document-type shell that does not conform to the DITA requirements for shells in order to meet the needs of a specific application or tool. Such a non-conforming document-type shell still might enable the creation of conforming DITA content.

8.3 Specialization
The specialization feature of DITA allows for the creation of new element types and attributes that are explicitly and formally derived from existing types. This facilitates interchange of conforming DITA content and ensures a minimum level of common processing for all DITA content. It also allows specialization-aware processors to add specialization-specific processing to existing base processing.

8.3.1 Overview of specialization
Specialization allows information architects to define new kinds of information (new structural types or new domains of information), while reusing as much of existing design and code as possible, and minimizing or eliminating the costs of interchange, migration, and maintenance.

Specialization modules enable information architects to create new element types and attributes. These new element types and attributes are derived from existing element types and attributes.

In traditional XML applications, all semantics for a given element instance are bound to the element type, such as <para> for a paragraph or <title> for a title. The XML specification provides no built-in mechanism for relating two element types to say "element type B is a subtype of element type A".

In contrast, the DITA specialization mechanism provides a standard mechanism for declaring that an element type or attribute is derived from an ancestor type. This means that a specialized type inherits the semantics and default processing behavior from its ancestor type. Additional processing behavior optionally can be associated with the specialized descendant type.
For example, the `<section>` element type is part of the DITA base. It represents an organizational division in a topic. Within the task information type (itself a specialization of `<topic>`), the `<section>` element type is further specialized to other element types (such as `<prereq>` and `<context>`) that provide more precise semantics about the type of organizational division that they represent. The specialized element types inherit both semantic meaning and default processing from the ancestor elements.

There are two types of DITA specializations:

**Structural specialization**

Structural specializations are developed from either topic or map types. Structural specializations enable information architects to add new document types to DITA. The structures defined in the new document types either directly use, or inherit from, elements found in other document types. For example, concept, task, and reference are specialized from topic, and bookmark is specialized from map.

**Domain specialization**

Domain specializations are developed from elements defined within topic or map, or from the `@props` or `@base` attributes. They define markup for a specific information domain or subject area. Domain specializations can be added to document-type shells.

Each type of specialization module represents an “is a” hierarchy, in object-oriented terms, with each structural type or domain being a subclass of its parent. For example, a specialization of task is still a task, and a specialization of the user interface domain is still part of the user interface domain. A given domain can be used with any map or topic type. In addition, specific structural types might require the use of specific domains.

Use specialization when you need a new structural type or domain. Specialization is appropriate in the following circumstances:

- You need to create markup to represent new semantics (meaningful categories of information). This might enable you to have increased consistency or descriptiveness in your content model.
- You have specific needs for output processing and formatting that cannot be addressed using the current content model.

Do not use specialization to simply eliminate element types from specific content models. Use constraint modules to restrict content models and attribute lists without changing semantics.

### 8.3.2 Modularization

Modularization is at the core of DITA design and implementation. It enables reuse and extension of the DITA specialization hierarchy.

The DITA XML grammar files are a set of module files that declare the markup and entities that are required for each specialization. The document-type shell then integrates the modules that are needed for a particular authoring and publishing context.

Because all the pieces are modular, the task of developing a new information type or domain is simplified. An information architect can start with existing base types (topic or map)—or with an existing specialization if it comes close to matching their business requirements—and only develop an extension that adds the extra semantics or functionality that is required. A specialization reuses elements from ancestor modules, but it only needs to declare the elements and attributes that are unique to the specialization. This saves considerable time and effort, reduces error, enforces consistency, and makes interoperability possible.

Because all the pieces are modular, it is simpler to reuse different modules in different contexts.
For example, a company that produces machines can use the hazard statement domain, while a company that produces software can use the software, user interface, and programming domains. A company that produces health information for consumers can avoid using the standard domains. Instead, it develops a new domain that contains the elements necessary for capturing and tracking the comments made by medical professionals who review information for accuracy and completeness.

Because all the pieces are modular, new modules can be created and put into use without affecting existing document-type shells.

For example, a marketing division of a company can develop a new specialization for message campaigns and have their content authors begin using that specialization, without affecting any of the other information types that they have in place.

### 8.3.3 Vocabulary modules

A DITA element type or attribute is declared in exactly one vocabulary module.

The following terminology is used to refer to DITA vocabulary modules:

- **structural module**: A vocabulary module that defines a top-level map or topic type.
- **element domain module**: A vocabulary module that defines one or more specialized element types that can be integrated into maps or topics.
- **attribute domain module**: A vocabulary module that defines exactly one specialization of either the @base or @props attribute.

For structural types, the module name is typically the same as the root element. For example, "task" is the name of the structural vocabulary module whose root element is `<task>`.

For element domain modules, the module name is typically a name that reflects the subject domain to which the domain applies, such as "highlight" or "software". Domain modules often have an associated short name, such as "hi-d" for the highlighting domain or "sw-d" for the software domain.

The name (or short name) of an element domain module is used to identify the module in `@class` attribute values. While module names need not be globally unique, module names must be unique within the scope of a given specialization hierarchy. The short name must be a valid XML name token.

Structural modules based on topic **MAY** define additional topic types that are then allowed to occur as subordinate topics within the top-level topic. However, such subordinate topic types **MAY NOT** be used as the root elements of conforming DITA documents.

For example, a top-level topic type might require the use of subordinate topic types that would only ever be meaningful in the context of their containing type and thus would never be candidates for standalone authoring or aggregation using maps. In that case, the subordinate topic type can be declared in the module for the top-level topic type that uses it. However, in most cases, potential subordinate topics are best defined in their own vocabulary modules.

Domain elements intended for use in topics **MUST** ultimately be specialized from elements that are defined in the topic module. Domain elements intended for use in maps **MUST** ultimately be specialized from elements defined by or used in the map module. Maps share some element types with topics but no map-specific elements can be used within topics.

Structural modules also can define specializations of, or reuse elements from, domain or other structural modules. When this happens, the structural module becomes dependent.
8.3.4 Specialization rules for element types

There are certain rules that apply to element type specializations.

Characteristics

A specialized element type has the following characteristics:

Comment by Kristen J Eberlein on 07 August 2022

Robert Anderson and I both think that the 2nd bullet point needs expansion, to cover the effects of expansion modules.

- A properly-formed @class attribute that specifies the specialization hierarchy of the element
- A content model that is the same or less inclusive than that of the element from which it was specialized
- A set of attributes that are the same or a subset of those of the element from which it was specialized, except for specializations of @base or @props
- Values or value ranges of attributes that are the same or a subset of those of the element from which it was specialized

Namespaces

DITA elements are never in a namespace. Only the @DITAArchVersion attribute is in a DITA-defined namespace. All other attributes, except for those defined by the XML standard, are in no namespace.

This limitation is imposed by the details of the @class attribute syntax, which makes it impractical to have namespace-qualified names for either vocabulary modules or individual element types or attributes. Elements included as descendants of the DITA <foreign> element type can be in any namespace.

Note  Domain modules that are intended for wide use should define element type names that are unlikely to conflict with names used in other domains, for example, by using a domain-specific prefix on all names.

Comment by Kristen J Eberlein on 31 August 2022

We should consider moving the above note elsewhere.

8.3.5 Specialization rules for attributes

There are certain rules that apply to attribute specializations.

A specialized attribute has the following characteristics:

- It is specialized from @props or @base.
- It can be integrated into a document-type shell either globally, which makes it available on all elements, or it can be assigned to specific elements by using an expansion module.
- It does not have values or value ranges that are more extensive than those of the attribute from which it was specialized.
- Its values must be alphanumerical, space-delimited values.
- In generalized form, the values must conform to the rules for attribute generalization.
8.3.6 The @class attribute rules and syntax

The specialization hierarchy of each DITA element is declared as the value of the @class attribute. The @class attribute provides a mapping from the current name of the element to its more general equivalents. The @class attribute also can provide a mapping from the current name to more specialized equivalents. All specialization-aware processing can be defined in terms of @class attribute values.

The @class attribute tells a processor what general classes of elements the current element belongs to. DITA scopes elements by module type instead of document type. Examples of module types are topic type, domain type, or map type. This enables document-type developers to combine multiple module types in a single document without complicating transformation logic.

The sequence of values in the @class attribute is important because it tells processors which value is the most general and which is most specific. This sequence is what enables both specialization aware processing and generalization.

Syntax

Values for the @class attribute have the following syntax requirements:

- An initial "-" or "+" character followed by one or more spaces. Use "-" for element types that are defined in structural vocabulary modules, and use "+" for element types that are defined in domain modules.
- A sequence of one or more tokens of the form "modulename/typename", with each token separated by one or more spaces, where modulename is the short name of the vocabulary module and typename is the element type name. Tokens are ordered left to right from most general to most specialized.
These tokens provide a mapping for every structural type or domain in the ancestry of the specialized element. The specialization hierarchy for a given element type must reflect any intermediate modules between the base type and the specialization type, even those in which no element renaming occurs.
- At least one trailing space character (" "). The trailing space ensures that string matches on the tokens can always include a leading and trailing space in order to reliably match full tokens.

Rules

058 (411) Every DITA element (except the <dita> element that is used as the root of a database document) MUST declare a @class attribute.

059 (411) When the @class attribute is declared in an XML grammar, it MUST be declared with a default value. In order to support generalization round-tripping (generalizing specialized content into a generic form and then returning it to the specialized form) the default value MUST NOT be fixed. This allows a generalization process to overwrite the default values that are defined by a general document type with specialized values taken from the document being generalized.

060 (411) A vocabulary module MUST NOT change the @class attribute for elements that it does not specialize, but simply reuses by reference from more generic levels.

061 (411) Authors SHOULD NOT modify the @class attribute. The @class attribute and its value is generally not surfaced in authored DITA topics, although it might be made explicit as part of a processing operation.
Example: DTD declaration for @class attribute for the <step> element
The following code sample lists the DTD declaration for the @class attribute for the <step> element:

```xml
<!ATTLIST step class CDATA "- topic/li task/step ">
```

This indicates that the <step> element is specialized from the <li> element in the topic module. It also indicates explicitly that the <step> element is available in a task topic. This declaration enables round-trip migration between upper level and lower level types without the loss of information.

Example: Element with @class attribute made explicit
The following code sample shows the value of the @class attribute for the <wintitle> element:

```xml
<wintitle class="+ topic/keyword ui-d/wintitle ">A specialized keyword</wintitle>
```

Example: @class attribute with intermediate value

**Comment by Kristen J Eberlein on 01 September 2022**

This example needs to be reviewed as part of the generalization content.

In addition, it would benefit by an edit that started by asking "What exactly are we trying to convey here? What are the critical points?"

The following code sample shows the value of a @class attribute for an element in the guiTask module, which is specialized from <task>. The element is specialized from <keyword> in the base topic vocabulary, rather than from an element in the task module:

```xml
>windowName class="- topic/keyword task/keyword guiTask/windowname ">...</windowName>
```

The intermediate values are necessary so that generalizing and specializing transformations can map the values simply and accurately. For example, if task/keyword was missing as a value, and a user decided to generalize this guiTask up to a task topic, then the transformation would have to guess whether to map to keyword (appropriate if task is more general than guiTask, which it is) or leave it as windowName (appropriate if task were more specialized, which it isn't). By always providing mappings for more general values, processors can then apply the simple rule that missing mappings must by default be to more specialized values than the one we are generalizing to, which means the last value in the list is appropriate. For example, when generalizing <guitask> to <task>, if a <p> element has no target value for <task>, we can safely assume that <p> does not specialize from <task> and does not need to be generalized.

8.3.7 The @specializations attribute rules and syntax
The @specializations attribute enables processors to determine what attribute specializations are available in a document. The attribute is declared on the root element for each topic or map type. Each attribute domain defines a token to declare the extension. The effective value of the @specializations attribute is composed of these tokens.

**Syntax and rules**
The @props and @base attributes are the only two core attributes available for specialization.

**062 (411) Each specialization of the @props and @base attributes MUST provide a token for use by the @specializations attribute.**
The `@specializations` token for an attribute specialization begins with either `@props` or `@base` followed by a slash, followed by the name of the new attribute:

```
'@', props-or-base, ('/', attname)+
```

For example:

- If `@props` is specialized to create `@myNewProp`, this results in the following token: `@props/myNewProp`
- If `@base` is specialized to create `@myFirstBase`, this results in the following token: `@base/myFirstBase`
- If that specialized attribute `@myFirstBase` is further specialized to create `@mySecondBase`, this results in the following token: `@base/myFirstBase/mySecondBase`

Note that the value for the `@specializations` attribute is not authored. Instead, the value is defaulted based on the modules that are included in the document type shell.

**Example: @specializations attribute for a task with multiple domains**

In this example, a document-type shell integrates the task structural module and the following domain modules:

<table>
<thead>
<tr>
<th>Domain</th>
<th>Domain short name</th>
</tr>
</thead>
<tbody>
<tr>
<td>User interface</td>
<td>ui-d</td>
</tr>
<tr>
<td>Software</td>
<td>sw-d</td>
</tr>
<tr>
<td><code>@deliveryTarget</code> attribute</td>
<td>deliveryTarget</td>
</tr>
<tr>
<td><code>@platform</code> attribute</td>
<td>platform</td>
</tr>
<tr>
<td><code>@product</code> attribute</td>
<td>product</td>
</tr>
</tbody>
</table>

The value of the `@specializations` attribute includes one value from each attribute module. The effective value is the following:

```
specializations="@props/deliveryTarget @props/platform @props/product"
```

If the document-type shell also used a specialization of the `@platform` attribute that describes the hardware platform, the new `@hardwarePlatform` attribute domain would add an additional value to the `@specializations` attribute:

```
specializations="@props/deliveryTarget @props/platform @props/platform/hardwarePlatform @props/product"
```

**8.3.8 Specializing to include non-DITA content**

You can extend DITA to incorporate standard vocabularies for non-textual content, such as MathML and SVG, as markup within DITA documents. This is done by specializing the `<foreign>` or `<unknown>` elements.

There are three methods of incorporating foreign content into DITA:

- A domain specialization of the `<foreign>` or `<unknown>` element. This is the usual implementation.
- A structural specialization using the `<foreign>` or `<unknown>` element. This affords more control over the content model.
• Directly embedding the non-DITA content within `<foreign>` or `<unknown>` elements. If the non-DITA content has interoperability or vocabulary naming issues such as those that are addressed by specialization in DITA, they must be addressed by means that are appropriate to the non-DITA content.

Do not use `<foreign>` or `<unknown>` elements to include textual content or metadata in DITA documents.

**Example: Creating an element domain specialization for SVG**

The following code sample, which is from the `svgDomain.ent` file, shows the domain declaration for the SVG domain.

```xml
<!-- ============================================================= -->
<!--                   SVG DOMAIN ENTITIES                         -->
<!-- ============================================================= -->
<!ENTITY % NS.prefixed "INCLUDE" >
<!ENTITY % SVG.prefix "svg" >
<!ENTITY % svg-d-foreign "svg-container" >

Note that the SVG-specific `%SVG.prefix` parameter entity is declared. This establishes the default namespace prefix to be used for the SVG content embedded with this domain. The namespace can be overridden in a document-type shell by declaring the parameter entity before the reference to the `svgDomain.ent` file. Other foreign domains might need similar entities when required by the new vocabulary.

For more information, see the `svgDomain.mod` file that is shipped with the DITA Technical Content edition. For an example of including the SVG domain in a document-type shell, see `task.dtd`.

**8.3.9 Sharing elements across specializations**

Specialization enables reuse of elements from ancestor specializations. However, it is also possible to reuse elements from non-ancestor specializations.

A structural specialization can incorporate elements from unrelated domains or other structural specializations by referencing them in the content model of a specialized element. The elements included in this manner must be specialized from ancestor content that is valid in the new context. If the reusing and reused specializations share common ancestry, the reused elements must be valid in the reusing context at every level they share in common.

Although a well-designed structural specialization hierarchy with controlled use of domains is still the primary means of sharing and reusing elements in DITA, the ability to also share elements declared elsewhere in the hierarchy allows for situations where relevant markup comes from multiple sources and would otherwise be developed redundantly.

**Example: A specialization of `<concept>` reuses an element from the task module**

A specialized concept topic could declare a specialized `<process>` section that contains the `<steps>` element that is defined in the task module. This is possible because of the following factors:

- The `<steps>` element is specialized from `<ol>`.
- The `<process>` element is specialized from `<section>`, and the content model of `<section>` includes `<ol>`.
The `<steps>` element in `<process>` always can be generalized back to `<ol>` in `<section>`.

Example: A specialization of `<reference>` reuses an element from the programming domain

A specialized reference topic could declare a specialized list (``apilist``) in which each `<apilistitem>` contains an `<apiname>` element that is borrowed from the programming domain.

8.4 Generalization

Generalization is the process of reversing a specialization. It converts specialized elements or attributes into the original types from which they were derived.

8.4.1 Overview of generalization

Specialized content can be generalized to any ancestor type. The generalization process can preserve information about the former level of specialization to allow round-tripping between specialized and unspecialized forms of the same content.

All DITA documents contain a mix of markup from at least one structural type and zero or more domains. When generalizing the document, any individual structural type or domain can be left as-is, or it can be generalized to any of its ancestors. If the document will be edited or processed in generalized form, it might be necessary to have a document-type shell that includes all non-generalized modules from the original document-type shell.

Generalization serves several purposes:

- It can be used to migrate content. For example, if a specialization is unsuccessful or is no longer needed, the content can be generalized back to a less specialized form.
- It can be used for temporary round-tripping. For example, if content is shared with a process that is not specialization aware, it can be temporarily generalized for that process and then returned to specialized form.
- It can allow reuse of specialized content in an environment that does not support the specialization. Similar to round-tripping, content can be generalized for sharing, without the need to re-specialize.

When generalizing for migration, the `<class>` attribute and `<specializations>` attribute need to be absent from the generalized instance document, so that the default values in the document-type shell are used.

When generalizing for round-tripping, the `<class>` attribute and `<specializations>` attribute SHOULD retain the original specialized values in the generalized instance document.

Note that when using constraints, a document instance can always be converted from a constrained document type to an unconstrained document type merely by switching the binding of the document instance to the less restricted `<document-type>` shell. No renaming of elements is needed to remove constraints.

However, a document whose document-type shell uses expansion modules might not be interchangeable without first generalizing the element and attribute types that were introduced by the expansion modules.
8.4.2 Element generalization

Elements are generalized by examining the @class attribute. When a generalization process detects that an element belongs to one of the modules that is being generalized, the element is renamed to a more general form.

For example, the <step> element has a @class attribute value of "- topic/li task/step ". If the task module is generalized, the <step> element is renamed to its more general form from the topic module: <li>.

For specific concerns when generalizing structural types with dependencies on non-ancestor modules, see 8.4.5 Generalization with cross-specialization dependencies (192).

While the tag name of a given element is normally the same as the type name of the last token in the @class value, this is not required. For example, if a generalization process has already run on the element, the @class attribute could contain tokens from two or more modules based on the original specialization. In that case, the element name could already match the first token or an intermediate token in the @class attribute. A second generalization process could end up renaming the element again or could leave it alone, depending on the target module or document type.

8.4.3 Processor expectations when generalizing elements

Generalization processors convert elements from one or more modules into their less specialized form. The list of modules can be supplied to a generalization processor, or it can be inferred based on knowledge of a target document-type shell.

The person or application initiating a generalization process can supply the source and target modules for each generalization, for example, "generalize from reference to topic". Multiple target modules can be specified, for example, "generalize from reference to topic and from user-interface domain to topic". When the source and target modules are not supplied, the generalization process is assumed to be from all structural types to the base (topic or map), and no generalization is performed for domains.

The person or application initiating a generalization process also can supply the target document-type shell. When the target document-type shell is not supplied, the generalized document will not contain a reference to a document-type shell.

A generalization processor SHOULD be able to handle cases where it is given:

- Only source modules for generalization (in which case the designated source types are generalized to topic or map)
- Only target modules for generalization (in which case all descendants of each target are generalized to that target)
- Both (in which case only the specified descendants of each target are generalized to that target)

For each structural type instance, the generalization processor checks whether the structural type instance is a candidate for generalization, or whether it has domains that are candidates for generalization. It is important to be selective about which structural type instances to process; if the process simply generalizes every element based on its @class attribute values, an instruction to generalize "reference" to "topic" could leave a specialization of reference with an invalid content model, since any elements it reuses from "reference" would have been renamed to topic-level equivalents.

The @class attribute for the root element of the structural type is checked before generalizing structural types:
For each element in a candidate structural type instance:

<table>
<thead>
<tr>
<th>Source module unspecified</th>
<th>Source module specified</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Target module unspecified</strong></td>
<td>Generalize this structural type to its base ancestor</td>
</tr>
<tr>
<td><strong>Target module specified</strong></td>
<td>Check whether the <code>@class</code> attribute contains the target module. If it does contain the target, rename the element to the value associated with the target module. Otherwise, ignore the element.</td>
</tr>
</tbody>
</table>

When renaming elements during round-trip generalization, the generalization processor **SHOULD** preserve the values of all attributes. When renaming elements during one-way or migration generalization, the process **SHOULD** preserve the values of all attributes except the `@class` attribute, which is supplied by the target document type.

### 8.4.4 Attribute generalization

DITA provides a syntax to generalize attributes that have been specialized from the `@props` or `@base` attribute.

Specialization-aware processors **MUST** process both the specialized and generalized forms of an attribute as equivalent in their values.

When a specialized attribute is generalized to an ancestor attribute, the value of the ancestor attribute consists of the name of the specialized attribute followed by its specialized value in parentheses.

For example, if `@jobrole` is an attribute specialized from `@person`, which in turn is specialized from `@props`:

- `jobrole="programmer"` can be generalized to `person="jobrole(programmer)"` or to `props="jobrole(programmer)"
- `props="jobrole(programmer)"` can be respecialized to `person="jobrole(programmer)"` or to `jobrole="programmer"`
In this example, processors performing generalization and respecialization can use the @specializations attribute to determine the ancestry of the specialized @jobrole attribute, and therefore the validity of the specialized @person attribute as an intermediate target for generalization.

If more than one attribute is generalized, the value of each is separately represented in this way in the value of the ancestor attribute.

Generalized attributes are typically not expected to be authored or edited directly. They are used by processors to preserve the values of the specialized attributes during the time or in the circumstances in which the document is in a generalized form.

A single element MUST NOT contain both generalized and specialized values for the same attribute.

For example, the following <p> element provides two values for the @jobrole attribute, one in a generalized syntax and the other in a specialized syntax:

```xml
<p person="jobrole(programmer)" jobrole="admin">
  <!-- ... -->
</p>
```

This is an error condition, since it means the document has been only partially generalized, or that the document has been generalized and then edited using a specialized document type.

### 8.4.5 Generalization with cross-specialization dependencies

Dependencies across specializations limit generalization targets to those that either preserve the dependency or eliminate them. Some generalization targets will not be valid and need to be detected before generalization occurs.

When a structural specialization has a dependency on a domain specialization, then the domain cannot be generalized without also generalizing the reusing structural specialization.

For example, a structural specialization `<codeConcept>` might incorporate and require the `<codeblock>` element from the programming domain. A generalization process that turns programming domain elements back into topic elements would convert `<codeblock>` to `<pre>`, making a document that uses `<codeConcept>` invalid. However, `<codeConcept>` could be generalized to concept or topic, without generalizing programming domain elements, as long as the target document type includes the programming domain.

When a structural specialization has a dependency on another structural specialization, then both must be generalized together to a common ancestor.

For example, if the task elements in checklist were generalized without also generalizing checklist elements, then the checklist content models that referenced task elements would be broken. And if the checklist elements were generalized to topic without also generalizing the task elements, then the task elements would be out of place, since they cannot be validly present in topic. However, checklist and task can be generalized together to any ancestor they have in common: in this case topic.

When possible, generalizing processes SHOULD detect invalid generalization target combinations and report them as errors.
8.5 Constraints

Constraint modules restrict content models or attribute lists for specific element types, remove certain extension elements from an integrated domain module, or replace base element types with domain-provided, extension element types.

8.5.1 Overview of constraints

Constraint modules enable information architects to restrict the content models or attributes of DITA elements. A constraint is a simplification of an XML grammar such that any instance that conforms to the constrained grammar also will conform to the original grammar.

A constraint module can perform the following functions:

- **Restrict the content model for an element**
  
  Constraint modules can modify content models by removing optional elements, making optional elements required, or requiring unordered elements to occur in a specific sequence. Constraint modules cannot make required elements optional or change the order of element occurrence for ordered elements.

  For example, a constraint for `<topic>` can require `<shortdesc>`, can remove `<abstract>`, and can require that the first child of `<body>` be `<p>`. A constraint cannot allow `<shortdesc>` to follow `<prolog>`, because the content model for `<topic>` requires that `<shortdesc>` precedes `<prolog>`.

- **Restrict the attributes that are available on an element**
  
  Constraint modules can restrict the attributes that are available on an element. They also can limit the set of permissible values for an attribute.

  For example, a constraint for `<note>` can limit the set of allowed values for the @type attribute to "note" and "tip". It also can omit the @othertype attribute, since it is needed only when the value of the @type attribute is "other".

- **Restrict the elements that are available in a domain**
  
  Constraint modules can restrict the set of extension elements that are provided in a domain. They also can restrict the content models for the extension elements.

  For example, a constraint on the programming domain can reduce the list of included extension elements to `<codeph>` and `<codeblock>`.

  **Note**  For DITA implementations that use RNG-based grammar files, restricting the set of extension elements that are provided in a domain can be handled simply by document-type configuration.

- **Replace base elements with domain extensions**
  
  Constraint modules can replace base element types with the domain-provided extension elements.

  For example, a constraint module can replace the `<ph>` element with the domain-provided elements, making `<ph>` unavailable.

8.5.2 Constraint rules

There are certain rules that apply to the design and implementation of constraints.

**Content model**

The content model for a constrained element must be at least as restrictive as the unconstrained content model for the element.
Domain constraints

When a domain module is integrated into a document-type shell, the base domain element can be omitted from the domain extension group or parameter entity. In such a case, there is no separate constraint declaration, because the content model is configured directly in the document-type shell.

A domain module can be constrained by only one constraint module. This means that all restrictions for the extension elements that are defined in the domain must be contained within that one constraint module.

Structural constraints

Each constraint module can constrain elements from only one vocabulary module. For example, a single constraint module that Constrains `<refsyn>` from `reference.mod` and Constrains `<context>` from `task.mod` is not allowed. This rule maintains granularity of reuse at the module level.

Constraint modules that restrict different elements from within the same vocabulary module can be combined with one another. Such combinations of constraints on a single vocabulary module have no meaningful order or precedence.

Aggregation of constraint modules

The content model of an element can be modified by either of the following element-configuration modules:

- Constraint module
- Expansion module

For any document-type shell, the content model of an element can only be modified by a single element-type configuration module. If multiple constraints or extensions need to be applied to a single element, the element configurations must be combined into a single module that reflects all the constraints and expansions that were defined in the original separate modules.

8.5.3 Constraints, processing, and interoperability

Because constraints can make optional elements required, documents that use the same vocabulary modules might have incompatible constraints. Thus the use of constraints can affect the ability for content from one topic or map to be used in another topic or map.

A constraint does not change basic or inherited element semantics. The constrained instances remain valid instances of the unconstrained element type, and the element type retains the same semantics and `@class` attribute declaration. Thus, a constraint never creates a new case to which content processing might need to react.

For example, a document type constrained to require the `<shortdesc>` element allows a subset of the possible instances of the unconstrained document type with an optional `<shortdesc>` element. Thus, the content processing for topic still works when `<topic>` is constrained to require a short description. Similarly, an unconstrained task is compatible with an unconstrained topic, because the `<task>` element can be generalized to `<topic>`.

However, if a topic document type is constrained to require the `<shortdesc>` element, a document type with an unconstrained task is not compatible with the constrained topic document type, because some instances of the task might not have a `<shortdesc>` element. But, if the task document type also has been constrained to require the `<shortdesc>` element, it is compatible with the constrained topic document type.
8.5.4 Examples: Constraints implemented using DTDs

This section of the specification contains examples of constraints implemented using DTD.

8.5.4.1 Example: Restrict the content model for the <topic> element using DTD

In this scenario, the DITA architect for Acme Incorporated wants to redefine the content model for the topic document type. They want to omit certain elements, make the <shortdesc> element required, and disallow topic nesting.

Specifically, the DITA architect wants to redefine the content model in the following ways:

- Remove <abstract>
- Require <shortdesc>
- Remove <related-links>
- Remove the %task-info-types; entity in order to disallow topic nesting

1. The DITA architect creates a constraint module: acme-TopicConstraint.mod.
2. They add the following content to acme-TopicConstraint.mod:

```
<!ENTITY % title            "title">
<!ENTITY % shortdesc        "shortdesc">
<!ENTITY % prolog           "prolog">
<!ENTITY % body             "body">

<!ENTITY % topic.content    "(%title;),
                          (%shortdesc;),
                          (%prolog;),
                          (%body;)" >
```
3. They add the constraint module to the catalog.xml file.
4. They then integrate the constraint module into the document-type shell for topic by adding the following content to the "Element-Type Configuration Integration section:

```
<!ENTITY % topic-constraints-c-def
  PUBLIC "-//ACME//ELEMENTS DITA Topic Constraint//EN"
  "acme-TopicConstraint.mod"/>
```
5. They check their test topic to ensure that the content model is modified as expected.

8.5.4.2 Example: Constrain attributes for the <section> element using DTD

In this scenario, a DITA architect wants to redefine the attributes for the <section> element. They want to make the @id attribute required.

1. The DITA architect creates a constraint module: idRequiredSectionContraint.mod.
2. They add the following content to `idRequiredSectionContraint.mod`:

```xml
<!-- Declares the entities referenced in the constrained content -->
<!-- model. -->
<!ENTITY % localization-atts
  "translate
    (no | yes | -dita-use-conref-target)
    xml:lang CDATA #IMPLIED
    dir (lro | ltr | rlo | rtl | -dita-use-conref-target) #IMPLIED">

<!ENTITY % filter-atts
  "props CDATA #IMPLIED
  %props-attribute-extensions;">

<!ENTITY % select-atts
  "%filter-atts;
  base CDATA #IMPLIED
  %base-attribute-extensions;
  importance (default | deprecated | high | low | normal | obsolete | optional | recommended | required | urgent | -dita-use-conref-target) #IMPLIED
  rev CDATA #IMPLIED
  status (changed | deleted | new | unchanged | -dita-use-conref-target) #IMPLIED">

<!ENTITY % conref-atts
  "conref CDATA #IMPLIED
  conrefend CDATA #IMPLIED
  conaction (mark | pushafter | pushbefore | pushreplace | -dita-use-conref-target) #IMPLIED
  conkeyref CDATA
```
Note that the DITA architect had to declare all the parameter entities that are referenced in the redefined attributes for `<section>`. If they did not do so, none of the attributes that are declared in the parameter entities would be available on the `<section>` element. Furthermore, since the `%select-atts;` parameter entity references the `%filter-atts;` parameter entity, the `%filter-atts;` must be declared and it must precede the declaration for the `%select-atts;` parameter entity. The `%props-attribute-extensions;` and `%base-attribute-extensions;` parameter entities do not need to be declared in the constraint module, because they are declared in the document-type shells before the inclusion of the constraint module.

3. They add the constraint module to the `catalog.xml` file.
4. They then integrate the constraint module into the applicable document-type shells by adding the following code:

```
<!-- ============================================================= -->
<!-- ELEMENT-TYPE CONFIGURATION INTEGRATION                      -->
<!-- ============================================================= -->
<!ENTITY % section-constraints-c-def
   PUBLIC "-//ACME//ELEMENTS DITA 2.0 Section Constraint//EN"
   "idRequiredSectionContraint.mod">
%section-constraints-c-def;
```

5. They check their test topic to ensure that the attribute list is modified as expected.

8.5.4.3 Example: Constrain a domain module using DTD

In this scenario, a DITA architect wants to use only a subset of the elements defined in the highlighting domain. They want to use `<b>` and `<i>` but not any other of the elements in the domain. They want to integrate this constraint into the document-type shell for task.

Specifically, the DITA architect wants to redefine the content model in the following ways:

- Use `<b>` and `<i>`
- Remove `<line-through>`, `<overline>`, `<sup>`, `<sup>`, `<tt>`, and `<u>`

1. The DITA architect creates a constraint module:
   `reducedHighlightingDomainConstraint.mod`.

2. They add the following content to `reducedHighlightingDomainConstraint.mod`:

```
<!-- CONSTRAINTED HIGHLIGHT DOMAIN ENTITIES                      -->
<!ENTITY % HighlightingDomain-c-ph "b | i" >
```

3. They add the constraint module to the `catalog.xml` file.
4. They then integrate the constraint module into the company-specific, document-type shell for the task topic by adding the content in the "DOMAIN CONSTRAINT INTEGRATION" section:

```dita
<!ENTITY % HighlightDomain-c-dec
PUBLIC "-://ACME//ENTITIES DITA Highlighting Domain Constraint//EN"
"acme-HighlightDomainConstraint.mod"
>%HighlightDomain-c-dec;
```

5. In the "DOMAIN EXTENSIONS" section, they replace the parameter entity for the highlighting domain with the parameter entity for the constrained highlighting domain:

```dita
<!ENTITY % ph           "ph |
 %HighlightDomain-c-ph; |
 %sw-d-ph; |
 %ui-d-ph;
 "">
```

6. They check their test topic to ensure that the content model is modified as expected.

### 8.5.4.4 Example: Replace a base element with the domain extensions using DTD

In this scenario, a DITA architect wants to remove the `<ph>` element but allow the extensions of `<ph>` that exist in the highlighting, programming, software, and user interface domains.

1. In the "DOMAIN EXTENSIONS" section, the DITA architect removes the reference to the `<ph>` element:

```dita
<!ENTITY % ph           "ph | 
 %pr-d-ph; |
 %sw-d-ph; |
 %ui-d-ph;
 ">
```

Note: Because no other entities are modified or declared outside of the usual "DOMAIN EXTENSIONS" section, this completes the architect's task. Because no new grammar file or entity is created that would highlight this change, adding a comment to highlight the constraint becomes particularly important, as shown in the example above.

### 8.5.4.5 Example: Apply multiple constraints to a single document-type shell using DTD

You can apply multiple constraints to a single document-type shell. However, there can be only one constraint for a given element or domain.

Here is a list of constraint modules and what they do:

<table>
<thead>
<tr>
<th>File name</th>
<th>What it constrains</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>example-TopicConstraint.mod</td>
<td><code>&lt;topic&gt;</code></td>
<td>• Removes <code>&lt;abstract&gt;</code></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Makes <code>&lt;shortdesc&gt;</code> required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Removes <code>&lt;related-links&gt;</code></td>
</tr>
<tr>
<td>example-SectionConstraint.mod</td>
<td><code>&lt;section&gt;</code></td>
<td>• Disallows topic nesting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Makes <code>@id</code> required</td>
</tr>
<tr>
<td>File name</td>
<td>What it constrains</td>
<td>Details</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>example-HighlightingDomainConstraint.mod</td>
<td>Highlighting domain</td>
<td>Reduces the highlighting domain elements to <code>&lt;b&gt;</code> and <code>&lt;i&gt;</code></td>
</tr>
<tr>
<td>N/A</td>
<td><code>&lt;ph&gt;</code></td>
<td>Remove the <code>&lt;ph&gt;</code> element, allowing only domain extensions (does not require a <code>.mod</code> file)</td>
</tr>
</tbody>
</table>

All of these constraints can be integrated into a single document-type shell for `<topic>`, since they constrain distinct element types and domains. The constraint for the highlighting domain typically is located in the "DOMAIN CONSTRAINT INTEGRATION" section, and it must be integrated before the "DOMAIN ENTITIES" section. The other constraints typically are located in the "ELEMENT-TYPE CONFIGURATION INTEGRATION" section, and the order in which they are listed does not matter.

### 8.5.5 Examples: Constraints implemented using RNG

This section of the specification contains examples of constraints implemented using RNG

#### 8.5.5.1 Example: Restrict the content model for the `<topic>` element using RNG

In this scenario, the DITA architect for Acme Incorporated wants to redefine the content model for the topic document type. They want to omit certain elements, make the `<shortdesc>` element required, and disallow topic nesting.

Specifically, the DITA architect wants to redefine the content model in the following ways:

- Remove `<abstract>`
- Require `<shortdesc>`
- Remove `<related-links>`
- Remove the `task-info-typespattern` in order to disallow topic nesting

1. The DITA architect creates a constraint module: `acme-TopicConstraintMod.rng`.
2. They update the `catalog.xml` file to include the new constraint module.
3. They add the following content to `acme-TopicConstraint.mod`:

```xml
<define name="topic.content" combine="interleave">
  <ref name="title"/>
  <ref name="shortdesc"/>
  <optional>
    <ref name="prolog"/>
  </optional>
  <optional>
    <ref name="body"/>
  </optional>
</define>
```

---

**Comment by Kristen J Eberlein on 21 April 2021**

I know that the override won't happen without `combine="interleave"`, but I don't know if we cover that in the coding requirements topic. If people start with copying-and-pasting from the module that they are overriding, they won't have that and will get errors.
4. They then integrate the constraint module into the document-type shell for topic by adding an `<include>` element in the "ELEMENT-TYPE CONFIGURATION INTEGRATION" section:

```
<div>
<!-- documentation --> ELEMENT-TYPE CONFIGURATION INTEGRATION
<!-- include href="acme-TopicConstraintMod.rng"/>
</div>
```

5. They then remove the `<include>` statement that references `topicMod.rng` from the "MODULE INCLUSIONS" section:

```
<div>
<!-- documentation --> MODULE INCLUSIONS
<!-- include href="urn:oasis:names:tc:dita:rng:topicMod.rng:2.0"/>
<!-- include href="urn:oasis:names:tc:dita:rng:audienceAttDomain.rng:2.0"/>
<!-- include href="urn:oasis:names:tc:dita:rng:deliveryTargetAttDomain.rng:2.0"/>
<!-- include href="urn:oasis:names:tc:dita:rng:platformAttDomain.rng:2.0"/>
<!-- include href="urn:oasis:names:tc:dita:rng:productAttDomain.rng:2.0"/>
<!-- include href="urn:oasis:names:tc:dita:rng:otherpropsAttDomain.rng:2.0"/>
<!-- include href="urn:oasis:names:tc:dita:rng:highlightDomain.rng:2.0"/>
</div>
```

6. They check their test topic to ensure that the content model is modified as expected.

### 8.5.5.2 Example: Constrain attributes for the `<section>` element using RNG

In this scenario, a DITA architect wants to redefine the attributes for the `<section>` element. They want to make the `@id` attribute required.

1. The DITA architect creates a constraint module: `id-requiredSectionContraintMod.rng`.
2. They update the `catalog.xml` file to include the new constraint module.
3. They add the following content to the constraint module:

```
<?xml version="1.0" encoding="UTF-8"?>
<grammar
   xmlns="http://relaxng.org/ns/structure/1.0"
   xmlns:a="http://relaxng.org/ns/compatibility/annotations/1.0"
   datatypeLibrary="http://www.w3.org/2001/XMLSchema-datatypes">

<define name="section.attributes">
   <attribute name="id" data type="NMTOKEN"/>
   <ref name="conref-atts"/>
   <ref name="select-atts"/>
   <ref name="localization-atts"/>
   <optional>
      <attribute name="outputclass"/>
   </optional>
</define>
```

Note that unlike a constraint module that is implemented using DTD, this constraint module did not need to re-declare the patterns that are referenced in the redefinition of the content model for `<section>`.

4. They then integrate the constraint module into the document-type shell for topic by adding an `<include>` element in the "CONTENT CONSTRAINT INTEGRATION" section:

```
<div>
<!-- documentation --> CONTENT CONSTRAINT INTEGRATION
<!-- include href="id-requiredSectionContraintMod.rng"/>
</div>
```
5. They then remove the `<include>` statement that references `topicMod.rng` from the "MODULE INCLUSIONS" section:

```xml
<include href="urn:oasis:names:tc:dita:rng:moduleInclDomain.rng:2.0"/>
<include href="urn:oasis:names:tc:dita:rng:audienceAttDomain.rng:2.0"/>
<include href="urn:oasis:names:tc:dita:rng:deliveryTargetAttDomain.rng:2.0"/>
<include href="urn:oasis:names:tc:dita:rng:productAttDomain.rng:2.0"/>
<include href="urn:oasis:names:tc:dita:rng:productAttDomain.rng:2.0"/>
<include href="urn:oasis:names:tc:dita:rng:highlightDomain.rng:2.0"/>
</include>
```

6. They check their test topic to ensure that the content model is modified as expected.

### 8.5.5.3 Example: Constrain a domain module using RNG

In this scenario, a DITA architect wants to use only a subset of the elements defined in the highlighting domain. They want to use `<b>` and `<i>` but not any other of the elements in the domain. They want to integrate this constraint into the document-type shell for task.

Specifically, the DITA architect wants to redefine the content model in the following ways:

- **Use** `<b>` and `<i>`
- **Remove** `<line-through>`, `<overline>`, `<sub>`, `<sup>`, `<tt>`, and `<u>`

Note that when using RNG, domains can be constrained directly in the document-type shells.

1. They open the document-type shell for topic in an XML editor, and then they modify the "MODULE INCLUSIONS" division to exclude the elements that they do not want the implementation to use:

```xml
<include href="highlightDomain.rng">
  <notAllowed/>
  <notAllowed/>
  <notAllowed/>
  <notAllowed/>
  <notAllowed/>
</include>
```

**Note** The DITA architect made a choice as to where in the document-type shell they would implement the constraint. It can be placed either in the "Element-type configuration integration" or the "Module inclusions" section.

2. They make similar changes to all the other document-type shells in which they want to constrain the highlighting domain.
8.5.5.4 Example: Replace a base element with the domain extensions using RNG
In this scenario, the DITA architect wants to remove the `<ph>` element but allow the extensions of `<ph>` that exist in the highlight, programming, software, and user interface domains.

1. They open the document-type shell for topic in an XML editor, and then they modify the "MODULE INCLUSIONS" division to exclude `<ph>`:

```xml
<div>
  <a:documentation>MODULE INCLUSIONS</a:documentation>
  <include href="urn:oasis:names:tc:dita:rng:topicMod.rng:2.0">
    <define name="ph.element">
      <notAllowed/>
    </define>
  </include>
  ...
</div>
```

2. They make similar changes to all the other document-type shells in which they want `<ph>` not to be available

8.5.5.5 Example: Apply multiple constraints to a single document-type shell using RNG
In this scenario, the DITA architect wants to apply multiple constraints to a document-type shell.

Here is a list of the constraint modules and what they do:

<table>
<thead>
<tr>
<th>File name</th>
<th>What it constrains</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>example-TopicConstraint.mod</td>
<td><code>&lt;topic&gt;</code></td>
<td>• Removes <code>&lt;abstract&gt;</code>&lt;br&gt;• Makes <code>&lt;shortdesc&gt;</code> required&lt;br&gt;• Removes <code>&lt;related-links&gt;</code>&lt;br&gt;• Disallows topic nesting</td>
</tr>
<tr>
<td>example-SectionConstraint.mod</td>
<td><code>&lt;section&gt;</code></td>
<td>Makes <code>@id</code> required</td>
</tr>
<tr>
<td>Not applicable</td>
<td>Highlighting domain</td>
<td>Reduces the highlighting domain elements to <code>&lt;b&gt;</code> and <code>&lt;i&gt;</code></td>
</tr>
<tr>
<td>Not applicable</td>
<td><code>&lt;ph&gt;</code></td>
<td>Remove the <code>&lt;ph&gt;</code> element, allowing only domain extensions</td>
</tr>
</tbody>
</table>

The constraint modules that target the `<topic>` and `<section>` elements must be combined, since both elements are defined in `topicMod.rng`. The other constraints can be implemented directly in the document-type shell.

1. The DITA architect creates a constraint module that combines the constraints from `example-TopicConstraint.mod` and `example-SectionConstraint.mod`:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<grammar xmlns="http://relaxng.org/ns/structure/1.0"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema-datatypes">
  <a:documentation>CONTENT MODEL AND ATTRIBUTE LIST OVERRIDES</a:documentation>
  <include href="topicMod.rng"/>
</grammar>
```
2. In the document-type shell, they integrate the constraint module (and remove the inclusion statement for `topicMod.rng`):

```xml
<div>
<a:documentation>ELEMENT-TYPE CONFIGURATION INTEGRATION</a:documentation>
<include href="acme-SectionTopicContraintMod.rng"/>
</div>
```

3. To constrain the highlight domain, they modify the include statement for the domain module:

```xml
...<include href="highlightDomain.rng">
<define name="line-through.element">
<notAllowed/>
</define>
<define name="overline.element">
<notAllowed/>
</define>
<define name="sub.element">
<notAllowed/>
</define>
<define name="sup.element">
<notAllowed/>
</define>
<define name="tt.element">
<notAllowed/>
</define>
<define name="u.element">
<notAllowed/>
</define>
</include>
...
</div>
```

4. Finally, to disallow `<ph>`, they add the following statement to the constraint module:

```xml
<define name="ph.element">
<notAllowed/>
</define>
```
8.6 Expansion modules

Expansion modules enable the extension of content models and attribute lists for individual elements. Expansion modules are the opposite of constraints. They add elements and attributes to specific content models and attribute lists, rather than removing them.

8.6.1 Overview of expansion modules

Expansion modules enable information architects to include specialized attributes or elements in specific element types, without making the specialized attributes or elements globally available.

An expansion module works in conjunction with an element or attribute specialization. An expansion module can perform the following functions:

Expand content models

Expansion modules can work in conjunction with element-specialization modules to extend the content models of specific elements. When an element-specialization module is combined with an extension module, the specialized elements can be made available only in specific contexts, rather than wherever the specialization bases are allowed.

For example, a DITA architect creates a new element-domain specialization that declares a new element specialized from `<p>`: `<sectionDesc>`. Using an extension module, the DITA architect can make `<sectionDesc>` available only as an optional child of `<section>`, rather than wherever `<p>` is permitted.

Expand attribute lists

Expansion modules extend the attribute lists of specific elements by adding attributes specialized from either `@base` or `@props`.

For example, an expansion for `<entry>`, `<row>`, and `<colspec>` can make `@cell-purpose` available only on those elements. The `@cell-purpose attribute` is specialized from `@base`.

The additional attribute can be either defined directly within the expansion module, or it can be defined in a separate attribute-specialization module. In either case, the token used as a value for the `@specializations` attribute must be defined.

8.6.2 Expansion module rules

There are certain rules that apply to the design and implementation of expansion modules. These rules all stem from the requirement that the content model of a specialized element must be consistent with the content model of the specialization base. After generalization, the content model of an element affected by an expansion module must match the original content model for that element.

Specialization base of expanded elements

Elements that are added to content models by expansion models must be specializations of existing elements that are permitted in the original content model.

Content model of expanded elements

Elements that are added to content models by expansion models must be allowed only where their specialization base is allowed.

For example, when creating an expansion model that adds a specialization of `<data>` to `<ol>`, the specialization of `<data>` must only be allowed before any `<li>` elements, as that is the only place that the `<data>` element is allowed in the content model for an ordered list.
Ordinality of expanded elements

Elements that are added to content models by expansion modules must not violate the ordinality of the original content model. If the original content model requires a child element to occur at least once, then the expanded content model cannot break this requirement. If the original content model only permits a child element to occur once, then the expanded content model cannot break this requirement.

For example, in the expansion module that adds a specialization of `<data>` to `<ol>`, the redefined content model for `<ol>` cannot make the `<li>` element optional.

However, an expansion module that adds a specialization of `<li>` (<`listIntro`>) to `<ol>` can redefine the content model of `<ol>` in the following ways:

- Make `<listIntro>` the first child element and be required
- Make `<li>` the second child element and optional

When a DITA topic affected by this expansion module is generalized, the resulting markup would be valid; the content model of `<ol>` would be respected.

Aggregation of constraint modules

The content model of an element can be modified by either of the following element-configuration modules:

- Constraint module
- Expansion module

For any document-type shell, the content model of an element can only be modified by a single element-type configuration module. If multiple constraints or extensions need to be applied to a single element, the element configurations must be combined into a single module that reflects all the constraints and expansions that were defined in the original separate modules.

8.6.3 Examples: Expansion implemented using DTDs

This section of the specification contains examples of extension modules that are implemented using DTDs.

8.6.3.1 Example: Adding an element to the `<section>` element using DTDs

In this scenario, a DITA architect wants to modify the content model for the `<section>` element. The DITA architect wants to add an optional `<sectionDesc>` element that is specialized from `<p>.

To accomplish this, the DITA architect needs to create the following modules and integrate them into the document-type shell:

- An element-domain specialization module that defines the `<sectionDesc>` element
- An expansion module that adds the `<sectionDesc>` element to the content model for `<section>`

1. First, the DITA architect creates the element specialization module: `sectionDescDomain.mod`. This single `.mod` file defines the parameter entity, content model, attributes, and value for the `@class` attribute for `<sectionDesc>`.

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!ENTITY % sectionDesc "sectionDesc">
<!ENTITY % sectionDesc.content "(%para.cnt;)*">
<!ENTITY % sectionDesc.attributes "%univ-atts;"> 
<!ELEMENT sectionDesc %sectionDesc.content;>
```
2. The DITA architect adds the element specialization module to the catalog.xml file.

3. Next, the DITA architect modifies the applicable document-type shell to integrate the applicable element specialization module:

```xml
<!-- ============================================================= -->
<!--                    DOMAIN ELEMENT INTEGRATION                 -->
<!-- ============================================================= -->
<!-- ... other domains ... -->
</ENTITY % sectionDesc-d-def
PUBLIC "-//ACME//ELEMENTS DITA 2.0 Section Description Domain//EN"
"sectionDescDomain.mod"
>%sectionDesc-d-def;
```

At this point, the new domain is integrated into the topic document-type shell. However, the new element is not added to the content model for `<section>`.  

4. Next, the DITA architect creates an expansion module: `acme-SectionExpansion.mod`. This module adds the `<sectionDesc>` element to the content model of `<section>`.

```xml
<!ENTITY % sectionDesc-content
"(#PCDATA |
  %dl; | %div; | %fig; |
```

---

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06 September 2022

Page 206 of 449
Note that the DITA architect needed to explicitly declare all the elements, rather than using the %section.cnt; parameter entity that is used in the definition of <section>. Because the element-configuration modules are integrated into the document-type shell before the base grammar modules, none of the parameter entities that are used in the base DITA vocabulary modules are available.

5. Finally, the DITA architect integrates the expansion module into the document-type shell:

```
<!-- Other constraint and expansion modules -->
<!ENTITY % acmeSection-def
PUBLIC "-//ACME//ELEMENTS DITA 2.0 Section Expansion//EN" "acme-SectionExpansion.mod"
>%acmeSection-def;
```

6. After updating the catalog.xml file to include the expansion module and testing it, the work is done.

8.6.3.2 Example: Adding an attribute to certain table elements using DTDs

In this scenario, a company makes extensive use of complex tables to present product listings. They occasionally highlight individual cells, rows, or columns for various purposes. The DITA architect wants to implement a semantically meaningful way to identify the purpose of various table elements.

The DITA architect decides to create a new attribute (@cell-purpose) and add it to the attribute lists of the following elements:

- <colspec>
- <entry>
- <row>
- <stentry>
• <strow>

The new attribute will be specialized from @base, and it will take a small set of tokens as values.

The DITA architect decides to integrate the attribute declaration and its assignment to elements into a single expansion module. An alternate approach would be to put each attribute-list pattern in its own separate expansion module, thus allowing DITA architects who construct document-type shells to decide the elements to which to apply the attribute.

1. First, the DITA architect creates the expansion module for the @cell-purpose attribute: acme-cellPurposeAttExpansion.ent.

```xml
<!-- Define the attribute -->
<!ENTITY % cellPurposeAtt-d-attribute-expansion
  "cell-purpose  (sale | out-of-stock | new | last-chance | inherit | none)  #IMPLIED"
>
<!-- Declare the entity to be used in the @specializations attribute -->
<!ENTITY cellPurposeAtt-d-att "@base/cell-purpose">

<!-- Add the attribute to the elements. -->
<!ATTLIST entry %cellPurposeAtt-d-attribute-expansion;>
<!ATTLIST row %cellPurposeAtt-d-attribute-expansion;>
<!ATTLIST colspec %cellPurposeAtt-d-attribute-expansion;>
<!ATTLIST strow %cellPurposeAtt-d-attribute-expansion;>
<!ATTLIST stentry %cellPurposeAtt-d-attribute-expansion;>

Note The attribute definition entity is optional. It is used here to enable the DITA architect to add the same attribute with the same tokens to several elements.

2. They then update the catalog.xml file to include the expansion module.

3. They integrate this module into the applicable document-type shell.

```xml
<!-- ENTITY % cellPurposeAttExpansion-d-dec
  PUBLIC "-//ACME//ENTITIES DITA Cell Purpose Attribute Expansion//EN"
  "cellPurposeAttExpansion.ent"
>%cellPurposeAttExpansion-d-dec;
```

4. They add the entity for the contribution to the @specializations attribute.

```xml
<!-- ENTITY included-domains
  "&audienceAtt-d-att;
  &cellPurposeAtt-d-att;
  &deliveryTargetAtt-d-att;
  &otherpropsAtt-d-att;
  &platformAtt-d-att;
  &productAtt-d-att;"
>
```

5. After checking the test topic to ensure that the attribute lists are modified as expected, the work is done.
8.6.3.3 Example: Adding an existing domain attribute to certain elements using DTDs

In this scenario, a company wants to use the `@otherprops` attribute specialization. However, they want to make the attribute available only on certain elements: `<p>`, `<div>`, and `<section>`.

The DITA architect will need to create an extension module and integrate it into the appropriate document-type shells.

1. The DITA architect creates an expansion module that adds the `@otherprops` attribute to the selected elements: `acme-otherpropsAttExpansion.mod`. The expansion module contains the following code:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!-- Add the otherprops attribute to certain elements -->
<!ATTLIST p %otherpropsAtt-d-attribute;>
<!ATTLIST div %otherpropsAtt-d-attribute;>
<!ATTLIST section %otherpropsAtt-d-attribute;>
```

Note that the `%otherpropsAtt-d-attribute;` is defined in the separate attribute-specialization module that defines the `@otherprops` attribute.

2. They then update the `catalog.xml` file to include the expansion module.

3. They integrate the extension module into the applicable document-type shell, after the declaration for the `@otherprops` attribute-specialization module:

```xml
<!ENTITY % otherpropsAtt-d-dec PUBLIC "-//OASIS//ENTITIES DITA 2.0 Otherprops Attribute Domain//EN" "otherpropsAttDomain.ent">
<!ENTITY % otherprops-expansion-e-def PUBLIC "-//ACME//DITA 2.0 Otherprops Expansion//EN" "acme-otherpropsAttExpansion.mod">
```

4. They remove the reference to the `@otherprops` attribute from the `props-attribute-extension` entity:

```xml
<!ENTITY % base-attribute-extensions "">
<!ENTITY % props-attribute-extensions "%audienceAtt-d-attribute;
%deliveryTargetAtt-d-attribute;
%otherpropsAtt-d-attribute;
%platformAtt-d-attribute;
%productAtt-d-attribute;">
```
5. They ensure that the `included-domains` entity contains the `@otherprops` contribution to the `@specializations` attribute:

```xml
<!ENTITY included-domains
  "&audienceAtt-d-att;
  &deliveryTargetAtt-d-att;
  &otherpropsAtt-d-att;
  &platformAtt-d-att;
  &productAtt-d-att;"
>
```

6. After checking the test topic to ensure that the attribute lists are modified as expected, the work is done.

### 8.6.3.4 Example: Aggregating constraint and expansion modules using DTDs

The DITA architect wants to add some extension modules to the document-type shell for topic. The document-type shell already integrates a number of constraint modules.

The following table lists the constraints that are currently integrated into the document-type shell:

<table>
<thead>
<tr>
<th>File name</th>
<th>What it constrains</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>example-TopicConstraint.mod</td>
<td>&lt;topic&gt;</td>
<td>- Removes &lt;abstract&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Makes &lt;shortdesc&gt; required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Removes &lt;related-links&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Disallows topic nesting</td>
</tr>
<tr>
<td>example-SectionConstraint.mod</td>
<td>&lt;section&gt;</td>
<td>- Makes &lt;title&gt; required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Reduces the content model of &lt;section&gt; to a smaller subset</td>
</tr>
<tr>
<td>example-HighlightingDomainConstraint.mod</td>
<td>Highlighting domain</td>
<td>Reduces the highlighting domain elements to &lt;b&gt; and &lt;i&gt;</td>
</tr>
</tbody>
</table>

The following table lists the expansion modules that the DITA architect wants to add to the document-type shell:

<table>
<thead>
<tr>
<th>File name</th>
<th>What it modifies</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>acme-SectionExpansion.mod</td>
<td>&lt;section&gt;</td>
<td>Adds an optional &lt;sectionDesc&gt; element to &lt;section&gt;</td>
</tr>
<tr>
<td>example-dlentryModeAttExpansion.ent</td>
<td>&lt;dlentry&gt;</td>
<td>Adds <code>@dlentryMode</code> to the attributes of &lt;dlentry&gt;</td>
</tr>
</tbody>
</table>

The constraint and expansion modules that target the &lt;section&gt; element must be combined into a single element-configuration module. An element can only be targeted by a single element-configuration module.
8.6.4 Examples: Expansion implemented using RNG

This section of the specification contains examples of extension modules implemented using RNG.

8.6.4.1 Example: Adding an element to the <section> element using RNG

In this scenario, a DITA architect wants to modify the content model for the <section> element. He wants to add an optional <sectionDesc> element that is specialized from <p>; the <sectionDesc> can occur once and must be directly after the section title.

To accomplish this, the DITA architect needs to create the following modules and integrate them into the document-type shells:

- An element domain module that defines the <sectionDesc> element
- An expansion module that adds the <sectionDesc> element to the content model for <section>

1. First, the DITA architect creates the element domain module: sectionDescDomain.rng. It contains the following code:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<grammar xmlns:a="http://relaxng.org/ns/compatibility/annotations/1.0"
   xmlns="http://relaxng.org/ns/structure/1.0">
   <div>
     <a:documentation>DOMAIN EXTENSION PATTERNS</a:documentation>
   </div>
   <div>
     <a:documentation>ELEMENT TYPE NAME PATTERNS</a:documentation>
     <define name="sectionDesc"> <ref name="sectionDesc.element"/>
     </define>
   </div>
   <div>
     <a:documentation>ELEMENT TYPE DECLARATIONS</a:documentation>
     <div>
       <a:documentation>LONG NAME: Section Description</a:documentation>
       <define name="sectionDesc.content"> <zeroOrMore> <ref name="para.cnt"/> </zeroOrMore> </define>
       <define name="sectionDesc.attributes"> <ref name="univ-atts"/> </define>
       <define name="sectionDesc.element" combine="interleave"> <element name="sectionDesc" dita:longName="Section Description"> <a:documentation/> <ref name="sectionDesc.attlist"/> <ref name="sectionDesc.content"/> </element> </define>
       <define name="sectionDesc.attlist" combine="interleave"> <optional> <attribute name="class" a:defaultValue="+ topic/p sectionDesc-d-p/sectionDesc"/> </optional> </define>
     </div>
   </div>
   <div>
     <a:documentation>SPECIALIZATION ATTRIBUTE DECLARATIONS</a:documentation>
     <define name="sectionDesc.attlist" combine="interleave"> <optional> <attribute name="class" a:defaultValue="+ topic/p sectionDesc-d-p/sectionDesc"/> </optional> </define>
   </div>
</grammar>
```
2. The DITA architect adds the element domain module to the `catalog.xml` file.
3. Next, the DITA architect modifies the document-type shell (in this example, the one for topic) to integrate the element domain module:

```xml
<include href="urn:example:names:tc:dita:rng:sectionDescDomain.rng:2.0"/>
```

At this point, the new domain is integrated into the document-type shell. However, the new element is not added to the content model for `<section>`.

4. Next, the DITA architect created an expansion module (`sectionExpansionMod.rng`) that adds the `<sectionDesc>` element to the content model of `<section>`:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<grammar xmlns="http://relaxng.org/ns/structure/1.0"
    xmlns:a="http://relaxng.org/ns/compatibility/annotations/1.0"
    datatypeLibrary="http://www.w3.org/2001/XMLSchema-datatypes">
    <div>
      <a:documentation>CONTENT MODEL AND ATTRIBUTE LIST OVERRIDES</a:documentation>
      <include href="urn:oasis:names:tc:dita:rng:topicMod.rng:2.0">
        <define name="topic-info-types">
          <ref name="topic.element"/>
        </define>
        <define name="section.content">
          <optional>
            <ref name="title"/>
          </optional>
          <optional>
            <ref name="sectionDesc"/>
          </optional>
          <zeroOrMore>
            <ref name="section.cnt"/>
          </zeroOrMore>
        </define>
      </include>
    </div>
</grammar>
```

Note that the expansion module directly integrates `topicMod.rng`.

5. Finally, the DITA architect integrates the expansion module into the document-type shell and removes the inclusion statement for `topicMod.rng`:

```xml
<include href="sectionExpansionMod.rng"/>
```

6. After updating the `catalog.xml` file to include the expansion module and testing, the work is done.
8.6.4.2 Example: Adding an attribute to certain table elements using RNG

In this scenario, a company makes extensive use of complex tables to present product listings. They occasionally highlight individual cells, rows, or columns for various purposes. The DITA architect wants to implement a semantically meaningful way to identify the purpose of various table elements.

The DITA architect decides to create a new attribute (@cell-purpose) and add it to the content model of the following elements:

- <entry>
- <row>
- <colspec>
- <stentry>
- <strow>

The new attribute will be specialized from @base, and it will take a small set of tokens as values.

The DITA architect decides to integrate the attribute declaration and its assignment to elements into a single expansion module. An alternate approach would be to put each <!ATTLIST declaration in its own separate expansion module, thus allowing DITA architects who construct document-type shells to decide the elements to which to apply the attribute.

1. The DITA architect creates an expansion module: cellPurposeAtt.rng. It contains the following code:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<grammar
  xmlns="http://relaxng.org/ns/structure/1.0"
  xmlns:a="http://relaxng.org/ns/compatibility/annotations/1.0"
  datatypeLibrary="http://www.w3.org/2001/XMLSchema-datatypes">
  <!-- DEFINE THE ATTRIBUTE SPECIALIZATION -->
  <define name="cellPurposeAtt"/>
  <attribute name="cellPurpose">
    <a:documentation>Specifies the purpose of the table cell. This is a specialized attribute for Acme Corporation.</a:documentation>
    <choice>
      <value>sale</value>
      <value>out-of-stock</value>
      <value>new</value>
      <value>last-chance</value>
      <value>inherit</value>
      <value>none</value>
    </choice>
  </attribute>
  <!-- ASSIGN THE ATTRIBUTE TO CERTAIN ELEMENTS -->
  <define name="entry.attributes" combine="interleave"/>
  <define name="stentry.attributes" combine="interleave"/>
  <define name="row.attributes" combine="interleave"/>
  <define name="strow.attributes" combine="interleave"/>
  <define name="colspec.attributes" combine="interleave"/>
</grammar>
```
2. They then update the catalog.xml file to include the expansion module.

3. They integrate the expansion module into the document-type shell:

```xml
<include href="urn:example:names:tc:dita:rng:cellPurposeAtt.rng:2.0"/>
```

4. They specify the value that the @cellPurpose attribute contributes to the @specializations attribute:

```xml
<attribute name="specializations" a:defaultValue="@props/audience @props/deliveryTarget @props/otherprops @props/platform @props/product @base/cellPurpose"/>
```

5. After checking the test file to ensure that the attribute lists are modified as expected, the work is done.

8.6.4.3 Example: Adding an existing domain attribute to certain elements using RNG

In this scenario, a company wants to use the @otherprops attribute specialization. However, they want to make the attribute available only on certain elements: `<p>`, `<div>`, and `<section>`.

The DITA architect will need to create an extension module and integrate it into the appropriate document-type shells.

1. The DITA architect creates an expansion module that adds the @otherprops attribute to the selected elements: `acme-otherpropsAttExpansion.mod`. The expansion module contains the following content:

```xml
  <define name="topic-info-types">...
  </define>
  <define name="p.attributes" combine="interleave">
    <optional>
      <attribute name="otherprops"/>
    </optional>
  </define>
  <define name="div.attributes" combine="interleave">
    <optional>
      <attribute name="otherprops"/>
    </optional>
  </define>
</grammar>
```
2. They then update the `catalog.xml` file to include the expansion module.

3. They integrate the extension module into the applicable document-type shell, and remove the `<include>` element for `topicMod.rng`:

4. They remove the reference to the `@otherprops` attribute from the `props-attribute-extensions` pattern:

5. They ensure that the `included-domains` entity contains the `@otherprops` contribution to the `@specializations` attribute:

6. After checking the test topic to ensure that the attribute lists are modified as expected, the work is done.

**8.6.4.4 Example: Aggregating constraint and expansion modules using RNG**

The DITA architect wants to add some extension modules to the document-type shell for `topic`. The document-type shell already integrates a constraint module.

The following table lists the constraint module and the extension modules that the DITA architect wants to integrate into the document-type shell for `topic`. 
<table>
<thead>
<tr>
<th>Type of element configuration</th>
<th>File name</th>
<th>What it does</th>
</tr>
</thead>
</table>
| Constraint                    | topicSectionConstraint.rng      | Constrains `<topic>`:  
• Removes `<abstract>`  
• Makes `<shortdesc>` required  
• Removes `<related-links>`  
• Disallows topic nesting  
Constrains `<section>`:  
• Makes `<id>` required  |
| Expansion                     | sectionExpansionMod.rng         | Adds `<sectionDesc>` to the content model of `<section>`                                                                                     |
| Expansion                     | tableCellAttExpansion.rng       | Adds `<cellPurpose>` to the attribute lists for certain table elements                                                                      |

Because all of these element-configuration modules target elements declared in `topicMod.rng`, the DITA architect needs to combine them into a single element-configuration module like the following:

```xml
<?xml version="1.0" encoding="UTF-8"/>
  schematypens="http://relaxng.org/ns/structure/1.0"?>
<grammar xmlns="http://relaxng.org/ns/structure/1.0"
  xmlns:a="http://relaxng.org/ns/compatibility/annotations/1.0"
  datatypeLibrary="http://www.w3.org/2001/XMLSchema-datatypes">
<include href="urn:oasis:names:tc:dita:rng:topicMod.rng:2.0">
  <!-- Redefines attribute list for section: Makes @id required -->
  <define name="section.attributes">
    <attribute name="id">
      <data type="ID"/>
    </attribute>
  </define>

  <!-- Adds sectionDesc to the content model of section -->
  <define name="section.content">
    <optional>
      <ref name="title"/>
    </optional>
    <optional>
      <ref name="sectionDesc"/>
    </optional>
    <zeroOrMore>
      <ref name="section.cnt"/>
    </zeroOrMore>
  </define>

  <!-- Adds @cellPurpose to certain table and simple table elements -->
  <define name="colspec.attributes" combine="interleave">
    <attribute name="cellPurpose"/>
  </define>
  <define name="entry.attributes" combine="interleave">
    <attribute name="cellPurpose"/>
  </define>
</include>
</grammar>
```
When the DITA architect edits the document-type shell to integrate the element configuration module, they also need to do the following:

- Remove the include statement for `topicMod.rng`
- Add `<section>` to the "ID-DEFINING ELEMENT OVERRIDES" division
9 Coding practices for DITA grammar files

This section collects all of the rules for creating modular DTD or RELAX NG-based grammar files that represent DITA document-type shells, specializations, constraints, and expansion modules.

9.1 DTD coding requirements
This section explains how to implement DTD based document-type shells, specializations, and element-configuration modules (constraint and expansion).

9.1.1 DTD: Use of entities
DITA-based DTDs use entities to implement specialization and element configuration. Therefore, an understanding of entities is critical when working with DTD-based document-type shells, vocabulary modules, or element-configuration modules (constraint and expansion).

Entities can be defined multiple times within a single document type, but only the first definition is effective. How entities work shapes DTD coding practices. The following list describes a few of the more important entities that are used in DITA DTDs:

Elements defined as entities
Every element in a DITA DTD is defined as an entity. When elements are added to a content model, they are added using the entity. This enables extension with domain specializations.

For example, the entity %ph; usually just means the <ph> element, but it can be defined in a document-type shell to mean "<ph> plus the elements from the highlighting domain". Because the document-type shell places that entity definition before the usual definition, every element that includes %ph; in its content model now includes <ph> plus every element in the highlighting domain that is specialized from <ph>.

Content models defined as entities
Every element in a DITA DTD defines its content model using an entity. This enables element configuration.

For example, rather than directly setting what is allowed in <ph>, that element sets its content model to %ph.content; that entity defines the actual content model. A constraint module can redefine the %ph.content; model to remove selected elements, or an expansion module can redefine the %ph.content; module to add elements.

Attribute sets defined as entities
Every element in a DITA DTD defines its attributes using an entity. This enables element configuration.

For example, rather than directly defining attributes for <ph>, that element sets its attributes using the %ph.attributes; entity; that entity defines the actual attributes. A constraint module can remove attributes from the attribute list, or an expansion module can add attributes to the attribute list.

Note When constructing an element-configuration module or document-type shell, new entities are usually viewed as "redefinitions" because they redefine entities that already exist. However, these new definitions only work because they are added to a document-type shell before the existing definitions. Most topics about DITA DTDs, including others in this specification, describe these overrides as redefinitions to ease understanding.
9.1.2 DTD: Coding requirements for document-type shells

A DTD-based document-type shell is organized into sections. Each section contains entity declarations that follow specific coding rules.

The DTD-based approach to configuration, specialization, and element configuration (constraint and expansion) relies heavily upon parameter entities. Several of the parameter entities that are declared in document-type shells contain references to other parameter entities. Because parameter entities must be declared before they are used, the order of the sections in a DTD-based document-type shell is significant.

A DTD-based document-type shell contains the following sections:

1. Topic [or map] entity declarations (219)
2. Domain constraint integration (219)
3. Domain entity declarations (220)
4. Domain attributes declarations (220)
5. Domain extensions (220)
6. Domain attribute extensions (221)
7. Topic nesting override (221)
8. Specializations attribute override (221)
9. Element-type configuration integration (222)
10. Topic [or map] element integration (222)
11. Domain element integration (222)

Each of the sections in a DTD-based document-type shell follows a pattern. These patterns help ensure that the shell follows XML parsing rules for DTDs. They also establish a modular design that simplifies creation of new document-type shells.

Topic [or map] entity declarations

This section declares and references an external parameter entity for each of the following items:

- The top-level topic or map type that the document-type shell configures
- Any additional structural modules that are used by the document-type shell

The parameter entity is named type-name-dec.

In the following example, the <concept> specialization is integrated into a document-type shell:

```xml
<!ENTITY % concept-dec
PUBLIC "-//OASIS//ENTITIES DITA 2.0 Concept//EN" "concept.ent"
>%concept-dec;
```

Domain constraint integration

This section declares and references an external parameter entity for each domain-constraint module that is integrated into the document-type shell.

The parameter entity is named descriptorDomainName-c-dec.
In the following example, the entity file for a constraint module that reduces the highlighting domain to a subset is integrated in a document-type shell:

```xml
<!ENTITY % HighlightingDomain-c-dec
PUBLIC "-//ACME//ENTITIES DITA Highlighting Domain Constraint//EN"
"acme-HighlightingDomainConstraint.mod"
>%basic-HighlightingDomain-c-dec;
```

**Domain entity declarations**

This section declares and references an external parameter entity for each element-domain module that is integrated into the document-type shell.

The parameter entity is named `shortDomainName-dec`.

In the following example, the entity file for the highlighting domain is included in a document-type shell:

```xml
<!ENTITY % hi-d-dec PUBLIC
"-//OASIS//ENTITIES DITA 2.0 Highlight Domain//EN"
"highlightDomain.ent"
>%hi-d-dec;
```

**Domain attributes declarations**

This section declares and references an external parameter entity for each attribute domain that is integrated into the document-type shell.

The parameter entity is named `domainName-dec`.

In the following example, the entity file for the `@deliveryTarget` attribute domain is included in a document-type shell:

```xml
<!ENTITY % deliveryTargetAtt-d-dec
PUBLIC "-//OASIS//ENTITIES DITA 2.0 Delivery Target Attribute Domain//EN"
"deliveryTargetAttDomain.ent"
>%deliveryTargetAtt-d-dec;
```

**Domain extensions**

This section declares and references a parameter entity for each element that is extended by one or more domain modules. These entities are used by later modules to define content models; redefining the entity adds domain specializations wherever the base element is allowed.

In the following example, the entity for the `<pre>` element is redefined to add specializations from the programming, software, and user interface domains:

```xml
<!ENTITY % pre
"pre        |
%pr-d-pre; |
Domain attribute extensions

This section redefines the parameter entity for each attribute domain that is integrated globally into the document-type shell. The redefinition adds an extension to the parameter entity for the relevant attribute.

In the following example, the parameter entities for the @base and @props attributes are redefined to include the @newfrombase, @othernewfrombase, @new, and @othernew attributes:

```xml
<!ENTITY % base-attribute-extensions
"%newfrombaseAtt-d-attribute;
%othernewfrombaseAtt-d-attribute;">  
<!ENTITY % props-attribute-extensions
"%newAtt-d-attribute;
%othernewAtt-d-attribute;">  
```

Topic nesting override

This section redefines the entity that controls topic nesting for each topic type that is integrated into the document-type shell.

The parameter entity is named topictype-info-types.

The definition usually is an "OR" list of the topic types that can be nested in the parent topic type. Use the literal root-element name, not the corresponding parameter entity. Topic nesting can be disallowed completely by specifying the <no-topic-nesting> element.

In the following example, the parameter entity specifies that <concept> can nest any number of <concept> or <myTopicType> topics, in any order:

```xml
<!ENTITY % concept-info-types "concept | myTopicType">  
```

Specializations attribute override

This section redefines the included-domains entity to include the text entity for each attribute domain that is included in the document-type shell. The redefinition sets the effective value of the @specializations attribute for the top-level document type that is configured by the document-type shell.

In the following example, parameter entities are included for the DITA conditional-processing attributes:

```xml
<!ENTITY included-domains
"&audienceAtt-d-att;
&deliveryTargetAtt-d-att;
&otherpropsAtt-d-att;
&platformAtt-d-att;
&productAtt-d-att;" 
" >
Element-type configuration integration

This section declares and references the parameter entity for each element-configuration module (constraint and expansion) that is integrated into the document-type shell.

The parameter entity is named `descriptionElement-c-def`.

In the following example, the module that constrains the content model for the `<taskbody>` element is integrated into the document-type shell for strict task:

```
<!ENTITY % strictTaskbody-c-def
  PUBLIC "-//OASIS//ELEMENTS DITA 2.0 Strict Taskbody Constraint//EN"
  "strictTaskbodyConstraint.mod"
>%strictTaskbody-c-def;
```

Topic [or map] element integration

This section declares and references a parameter entity for each structural module that is integrated into the document-type shell.

The parameter entity is named `structuralType-type`.

The structural modules are included in ancestry order, so that the parameter entities that are used in an ancestor module are available for use in specializations. When a structural module depends on elements from a vocabulary module that is not part of its ancestry, the module upon which the structural module has a dependency (and any ancestor modules not already included) need to be included before the module with a dependency.

In the following example, the structural modules that are required by the troubleshooting topic are integrated into the document-type shell:

```
<!-- ============================================================= -->
<!--                    TOPIC ELEMENT INTEGRATION                  -->
<!-- ============================================================= -->
<!ENTITY % topic-type
  PUBLIC "-//OASIS//ELEMENTS DITA 2.0 Topic//EN"
  "../../base/dtd/topic.mod"
>%topic-type;
<!ENTITY % task-type
  PUBLIC "-//OASIS//ELEMENTS DITA 2.0 Task//EN"
  "task.mod"
>%task-type;
<!ENTITY % troubleshooting-type
  PUBLIC "-//OASIS//ELEMENTS DITA 2.0 Troubleshooting//EN"
  "troubleshooting.mod"
>%troubleshooting-type;
```

Domain element integration

This section declares and references a parameter entity for each element domain that is integrated into the document-type shell.

The parameter entity is named `domainName-def`.

In the following example, the element-definition file for the highlighting domain is integrated into the document-type shell:

```
<!-- ============================================================= -->
<!--                    DOMAIN ELEMENT INTEGRATION                 -->
<!-- ============================================================= -->
<!-- -->
<!-- TOPIC ELEMENT INTEGRATION -->
<!-- -->
<!ENTITY % hi-d-def PUBLIC "-//OASIS//ELEMENTS DITA 2.0 Highlight Domain//EN" -->
```
If a structural module depends on a domain, the domain module needs to be included before the structural module. This erases the boundary between the final two sections of the DTD-based document-type shell, but it is necessary to ensure that modules are embedded after their dependencies. Technically, the only solid requirement is that both domain and structural modules be declared after all other modules that they specialize from or depend on.

9.1.3 DTD: Coding requirements for structural and element-domain modules

This topic covers general coding requirements for defining element types in both structural and element-domain vocabulary modules.

Module files

A vocabulary module that defines a structural or element-domain specialization is composed of two files:

Definition module file

This (.mod) file declares the element names, content models, and attribute lists for the element types that are defined in the vocabulary module.

Entity declaration file

This (.ent) file declares the text and parameter entities that are used to integrate the vocabulary module into a document-type shell.

Element definitions

A structural or element-domain vocabulary module contains a declaration for each element type that is named by the module. While the XML standard allows content models to refer to undeclared element types, the DITA standard does not permit this. All element types or attribute lists that are named within a vocabulary module are declared in one of the following objects:

- The vocabulary module
- A base module of which the vocabulary module is a direct or indirect specialization
- (If the vocabulary module is a structural module) A required domain module

The following components make up a single element definition in a DITA DTD-based vocabulary module.

Element name entities

For each element type, there is a parameter entity with a name that matches the element-type name. The default value is the element-type name.

For example:

```xml
<!ENTITY % topichead "topichead">
```

The parameter entity provides a layer of abstraction when setting up content models. It can be redefined in a document-type shell in order to create domain extensions or implement element configuration (constraint and expansion).

Element name entities for a single vocabulary module typically are grouped together at the top of the vocabulary module. They can occur in any order.
Content-model parameter entity

For each element type, there is a parameter entity that defines the content model. The name of the parameter entity is `tagname.content`, and the value is the content model definition.

For example:

```xml
<!ENTITY % topichead.content
 "((%topicmeta;)?,
 (%data.elements.incl; | %navref; | %topicref;))">
```

Attribute-list parameter entity

For each element type, there is a parameter entity that declares the attributes that are available on the element. The name of the parameter entity is `tagname.attributes`, and the value is a list of the attributes that are used by the element type (except for `@class`).

For example:

```xml
<!ENTITY % topichead.attributes
 "keys CDATA #IMPLIED
 %topicref-atts;
 %univ-atts;">
```

Consistent use and naming of the `tagname.content` parameter entity enables the use of element-configuration modules (constraint and expansion) to redefine the content model.

Element declaration

For each element type, there is an element declaration that consists of a reference to the content-model parameter entity.

For example:

```xml
<!ELEMENT topichead %topichead.content;>
```

Attribute list declaration

For each element type, there is an attribute list declaration that consists of a reference to the attribute-list parameter entity.

For example:

```xml
<!ATTLIST topichead %topichead.attributes;>
```

Specialization attribute declarations

A vocabulary module defines a `@class` attribute for every element that is declared in the module. The value of the attribute is constructed according to the rules in 8.3.6 The class attribute rules and syntax (185).

For example, the `ATTLIST` definition for the `<topichead>` element (a specialization of the `<topicref>` element in the base map type) includes the definition of the `@class` attribute, as follows:

```xml
<!ATTLIST topichead class CDATA "+ map/topicref mapgroup-d/topichead ">
Definition of the `<topichead>` element

The following code sample shows how the `<topichead>` element is defined in `mapGroup.mod`. Ellipses indicate where the code sample has been snipped for brevity.

```xml
<!ENTITY % topichead      "topichead" >
...
<!ELEMENT  topichead %topichead.content;>
<!ATTLIST  topichead %topichead.attributes;>
...
<!ATTLIST  topichead class CDATA "+ map/topicref mapgroup-d/topichead ">
<!-- ============================================================== -->
```

9.1.4 DTD: Coding requirements for structural modules

This topic covers general coding requirements for DTD-based structural modules.

Required topic and map element attributes

The topic or map element type sets the `@DITAArchVersion` attribute to the version of DITA in use, typically by referencing the `arch-atts` parameter entity. It also sets the `@specializations` attribute to the `included-domains` entity.

The `@DITAArchVersion` and `@specializations` attributes give processors a reliable way to check the architecture version and look up the list of attribute domains that are available in the document type.

The following example shows how the `@DITAArchVersion` and `@specializations` attributes are defined for the `<concept>` element in DITA 2.0. Ellipses indicate where the code is snipped for brevity:

```xml
<!-- ============================================================== -->
```

```xml
<!ELEMENT  topichead %topichead.content;>
<!ATTLIST  topichead class CDATA "+ map/topicref mapgroup-d/topichead ">
<!-- ============================================================== -->
```
Controlling nesting in topic types

A structural module that defines a new topic type typically uses a parameter entity to define what topic types are permitted to nest. While there are known exceptions described below, the following rules apply when using parameter entities to control nesting.

Parameter entity name

The name of the parameter entity is the topic element name plus the -info-types suffix.

For example, the name of the parameter entity for the concept topic is concept-info-types.

Parameter entity value

To set up default topic nesting rules, set the entity to the desired topic elements. The default topic nesting is used when a document-type shell does not set up different rules.

For example, the following parameter entity sets up default nesting so that <concept> will nest only other <concept> topics:

```xml
<!ENTITY % concept-info-types "%info-types;"
```

As an additional example, the following parameter entity sets up a default that will not allow any nesting:

```xml
<!ENTITY % glossentry-info-types "no-topic-nesting">
```

Default topic nesting in a structural module often is set up to use the %info-types; parameter entity rather than using a specific element. When this is done consistently, a shell that includes multiple structural modules can set common nesting rules for all topic types by setting %info-types; entity.

The following example shows a structural module that uses %info-types; for default topic nesting:

```xml
<!ENTITY % concept-info-types "%info-types;"
```

Content model of the root element

The last position in the content model defined for the root element of a topic type should be the toiptype-info-types parameter entity.

A document-type shell then can control how topics are allowed to nest for this specific topic type by redefining the toiptype-info-types entity for each topic type. If default nesting rules reference the info-types parameter entity, a shell can efficiently create common nesting rules by redefining the info-types entity.
For example, with the following content model defined for `<concept>`, a document-type shell that uses the concept specialization can control which topics are nested in `<concept>` by redefining the `concept-info-types` parameter entity:

```
<!ENTITY % concept.content
  "((%title;),
   (%titlealts;)?,
   (%abstract; | %shortdesc;)?,
   (%prolog;)?,
   (%conbody;)?,
   (%related-links;)?,
   (%concept-info-types;)*)"
>
```

In certain cases, you do not need to use an `info-types` parameter entity to control topic nesting:

- If you want a specialized topic type to never allow any nested topics, regardless of context, it can be defined without any entity or any nested topics.
- If you want a specialized topic type to only allow specific nesting patterns, such as allowing only other topic types that are defined in the same module, it can nest those topics directly in the same way that other nested elements are defined.

**Comment by Kristen J Eberlein on 07 April 2021**

Examples? I think the wording needs to be crisped up.

### 9.1.5 DTD: Coding requirements for element-domain modules

The vocabulary modules that define element domains have an additional coding requirement. The entity declaration file must include a parameter entity for each element that the domain extends.

#### Parameter entity name

The name of the parameter entity is the abbreviation for the domain, followed by a hyphen ("-"") and the name of the element that is extended.

For example, the name of the parameter entity for the highlighting domain that extends the `<ph>` element is `hi-d-ph`.

#### Parameter entity value

The value of the parameter entity is a list of the specialized elements that can occur in the same locations as the extended element. Each element is separated by the vertical line (|) symbol.

For example, the value of the `%hi-d-ph;` parameter entity is "b | i | line-through | overline | tt | sup | sub".

#### Example

The following code sample shows the parameter entity for the highlight domain, as declared in `highlightDomain.ent`:

```
<!-- ============================================================= -->
<!--                    ELEMENT EXTENSION ENTITY DECLARATIONS      -->
<!-- ============================================================== -->
<!ENTITY % hi-d-ph "b | i | line-through | overline | tt | sup | sub"  
<!-- ================ End DITA Highlight Domain ================== -->
```

```
9.1.6 DTD: Coding requirements for attribute-domain modules

The vocabulary modules that define attribute domains have additional coding requirements. The module must include a parameter entity for the new attribute, which can be referenced in document-type shells, as well as a text entity that specifies the contribution to the @specializations attribute for the attribute domain.

The name of an attribute domain is the name of the attribute plus "Att". For example, for the attribute named @deliveryTarget, the attribute-domain name is "deliveryTargetAtt". The attribute-domain name is used to construct entity names for the domain.

Parameter entity name and value
The name of the parameter entity is the attribute-domain name, followed by the literal -d-attribute. The value of the parameter entity is a DTD declaration for the attribute.

Text entity name and value
The text entity name is the attribute-domain name, followed by the literal -d-Att. The value of the text entity is the @specializations attribute contribution for the module. See 8.3.7 The specializations attribute rules and syntax (186) for details on how to construct this value.

Example
The @deliveryTarget attribute can be defined in a vocabulary module using the following two entities.

```xml
<!ENTITY % deliveryTargetAtt-d-attribute
 "deliveryTarget  CDATA  #IMPLIED"
 >

<!ENTITY deliveryTargetAtt-d-att "@props/deliveryTarget" >
```

9.1.7 DTD: Coding requirements for element-configuration modules

Element-configuration modules (constraint and expansion) have specific coding requirements.

The tagname.attributes parameter entity

When the attribute set for an element is constrained or expanded, there is a declaration of the tagname.attributes parameter entity that defines the modified attributes.

The following list provides examples for both constraint and expansion modules:

Constraint module

The following parameter entity defines a constrained set of attributes for the <note> element that removes most of the values defined for @type; it also removes @othertype:

```xml
<!ENTITY % note.attributes
 "type  {attention | caution | note } #IMPLIED
 %univ-atts;">
```

The following parameter entity restricts the highlighting domain to <b> and <i>:

```xml
<!ENTITY % HighlightingDomain-c-ph "b | i" >
```
Expansion module

The following parameter entity defines a new attribute intended for use with various table elements:

```xml
ENTITY % cellPurposeAtt-d-attribute-expansion
  "cell-purpose  (sale | out-of-stock | new | last-chance | inherit | none)  #IMPLIED"
>
```

For expansion modules, note the following considerations. The `tagname.attributes` parameter entity can be defined in an attribute-specialization module, or it can be defined directly in the expansion module.

The `tagname.content` parameter entity

When the content model for an element is constrained or expanded, there is a declaration of the `tagname.content` parameter entity that defines the modified content model.

The following list provides examples for both constraint and expansion modules:

Constraint module

The following parameter entity defines a more restricted content model for `<topic>`, in which the `<shortdesc>` element is required.

```xml
ENTITY % topic.content
  "((%title;),
   (%titlealts;)?,
   (%shortdesc;),
   (%prolog;)?,
   (%body;)?,
   (%topic-info-types;)*)"
>
```

Note that replacing a base element with domain extensions is a form of constraint that can be accomplished directly in the document-type shell. No constraint module is required.

In the following example, the `<pre>` base type is removed from the entity declaration, effectively allowing specializations of `<pre>` but not `<pre>` itself.

```xml
ENTITY % pre
  "%pr-d-pre; | %sw-d-pre; | %ui-d-pre;"
>
```

Expansion module

The redefinition of the content model references the parameter entity that was defined in the element-specialization module.

The following code sample shows the entity declaration file for an element-specialization module that defines a `<section-shortdesc>` element, which is intended to be added to the content model of `<section>`:

```xml
ENTITY sectionShortdesc-d-p-expansion "section-shortdesc"
ENTITY % section-shortdesc "section-shortdesc"
```

When the content model for `<section>` is redefined in the expansion module, it references the parameter entity defined in the entities file for the element specialization:

```xml
ENTITY % section.content
  "(#PCDATA   |
   %dl; |
```
Note that this expansion module also constrains the content model of `<section>` to only include certain block elements.

### 9.2 RELAX NG coding requirements

This section explains how to implement RNG based document-type shells, specializations, and element-configuration modules (constraints and expansions).

If you plan to generate DTD- or XSD-based modules from RELAX NG modules, avoid RELAX NG features that cannot be translated into DTD or XSD constructs. When RELAX NG is used directly for DITA document validation, the document-type shells for those documents can integrate constraint modules that use the full power of RELAX NG to enforce constraints that cannot be enforced by DTDs or XSDs.

#### 9.2.1 RELAX NG: Overview of coding requirements

RELAX NG modules are self-integrating; they automatically add to the content models and attribute lists that they extend. This means that information architects do not have much work to do when integrating vocabulary modules and element-configuration modules (constraints and expansion) into document-type shells.

**Self-integration of RELAX NG**

In addition to simplifying document-type shells, the self-integrating aspect of RELAX NG results in the following coding practices:

- Each specialization module consists of a single file, unlike the two required for DTDs.
- Domain modules directly extend elements, unlike DTDs, which rely on an extra file and extensions within the document-type shell.
- Element-configuration modules (constraint and expansion) directly include the modules that they extend, which means that just by referencing an element-configuration module, the document-type shell gets everything it needs to redefine a vocabulary module.

RELAX NG grammars for DITA document-type shells, vocabulary modules, and element-configuration modules (constraint and expansion) **MAY** do the following:

- Use the `<a:documentation>` element anywhere that foreign elements are allowed by RELAX NG. The `<a:documentation>` element refers to the `<documentation>` element type from the http://relaxng.org/ns/compatibility/annotations/1.0 as defined by the DTD compatibility specification. The prefix "a" is used by convention.
- Use `<div>` to group pattern declarations.
- Include embedded Schematron rules or any other foreign vocabulary. Processors **MAY** ignore any foreign vocabularies within DITA grammars that are not in the http://relaxng.org/ns/compatibility/
Syntax for RELAX NG grammars

The RELAX NG specification defines two syntaxes for RELAX NG grammars: the XML syntax and the compact syntax. The two syntaxes are functionally equivalent, and either syntax can be reliably converted into the other by using, for example, the open-source Trang tool.

DITA practitioners can author DITA modules using one RELAX NG syntax, and then use tools to generate modules in the other syntax. The resulting RELAX NG modules are conforming if there is a one-to-one file correspondence.

Conforming RELAX NG-based DITA modules MAY omit the annotations and foreign elements that are used in the OASIS grammar files to enable generation of other XML grammars, such as DTDs and XML Schema. When such annotations are used, conversion from one RELAX NG syntax to the other might lose the information, as processors are not required to process the annotations and information from foreign vocabularies.

The DITA coding requirements are defined for the RELAX NG XML syntax. Document-type shells, vocabulary modules, and element-configuration modules (constraints and expansion) that use the RELAX NG compact syntax can use the same organization requirements as those defined for the RELAX NG XML syntax.

9.2.2 RELAX NG: Coding requirements for document-type shells

A RNG-based document-type shell is organized into sections; each section follows a pattern. These patterns help ensure that the shell follows XML parsing rules for RELAX NG; they also establish a modular design that simplifies creation of new document-type shells.

Because RELAX NG modules are self-integrating, RNG-based document-type shells need only to include vocabulary modules and element-configuration modules (constraint and expansion).

An RNG-based document-type shell contains the following sections:

1. Root element declaration (231)
2. specializations attribute (232)
3. Element-type configuration integration (232)
4. Module inclusions (232)
5. ID-defining element overrides (233)

Root element declaration

Document-type shells use the RELAX NG start declaration to specify the root element of the document type. The <start> element defines the root element, using a reference to a tagname.element pattern.

For example:

```xml
<div>
  <a:documentation>ROOT ELEMENT DECLARATION</a:documentation>
  <start combine="choice">
    <ref name="topic.element"/>
  </start>
</div>
```
@specializations attribute

This section lists the tokens that attribute-domain and element-configuration modules contribute to the @specializations attribute.

For example:

```xml
<define name="specializations-att">
  <optional>
    <attribute name="specializations"
      a:defaultValue="@props/audience @props/deliveryTarget @props/otherprops @props/platform @props/product"/>
  </optional>
</define>
```

Element-type configuration integration

This section of the document-type shell contains includes for element-type configuration modules (constraint and expansion). Because the element-configuration module imports the module that it overrides, any module that is configured in this section (including the base topic or map modules) is left out of the following "Module inclusion" section.

For example, the following code sample shows the section of an RNG-based document-type shell that redefines the <taskbody> element to create the strict task topic.

```xml
<include href="strictTaskbodyConstraintMod.rng">
  <define name="task-info-types">
    <ref name="task.element"/>
  </define>
</include>
```

Module inclusions

This section of the RNG-based document-type shell includes all unconstrained domain or structural modules.

For example:

```xml
<include href="topicMod.rng">
  <define name="topic-info-types">
    <ref name="topic.element"/>
  </define>
</include>
<include href="audienceAttDomain.rng" dita:since="2.0"/>
<include href="otherpropsAttDomain.rng" dita:since="2.0"/>
<include href="platformAttDomain.rng" dita:since="2.0"/>
<include href="productAttDomain.rng" dita:since="2.0"/>
<include href="alternativeTitlesDomain.rng" dita:since="2.0"/>
<include href="hazardstatementDomain.rng"/>
<include href="highlightDomain.rng"/>
<include href="utilitiesDomain.rng"/>
```
ID-defining element overrides

This section declares any element in the document type that uses an @id attribute with an XML data type of "ID". This declaration is required in order to prevent RELAX NG parsers from issuing errors.

If the document-type shell includes domains for foreign vocabularies such as SVG or MathML, this section also includes exclusions for the namespaces used by those domains.

For example, the following code sample is from an RNG-based document-type shell for a task topic. It declares that both the <topic> and <task> elements have an @id attribute with a XML data type of ID. These elements and any elements in the SVG or MathML namespaces are excluded from the "any" pattern by being placed within the <except> element:

```xml
<define name="any">
  <zeroOrMore>
    <choice>
      <ref name="idElements"/>
      <element>
        <anyName/>
        <except>
          <name>topic</name>
          <name>task</name>
          <nsName ns="http://www.w3.org/2000/svg"/>
          <nsName ns="http://www.w3.org/1998/Math/MathML"/>
        </except>
      </element>
      <zeroOrMore>
        <attribute>
          <anyName/>
        </attribute>
      </zeroOrMore>
      <ref name="any"/>
    </choice>
    <text/>
  </zeroOrMore>
</define>
```

9.2.3 RELAX NG: Coding requirements for element-type declarations

This topic covers general coding requirements for element types in structural and element-domain vocabulary modules.

Module files

Each RELAX NG vocabulary module consists of a single module file.

Element definitions

A structural or element-domain vocabulary module contains a declaration for each element type that is named in the module. While the XML standard allows content models to refer to undeclared element types, the DITA standard does not permit it. All element types or attribute lists that are named in a vocabulary module are declared in one of the following objects:

- The vocabulary module
- A base module of which the vocabulary module is a direct or indirect specialization
- (If the vocabulary module is a structural module) A required domain or structural module

The element type patterns are organized into the following sections:
Element type name patterns

For each element type that is declared in the vocabulary module, there is a pattern whose name is the element type name and whose content is a reference to the element-type `tagname.element` pattern.

For example:

```xml
<div>
  <a:documentation>ELEMENT TYPE NAME PATTERNS</a:documentation>
  <define name="b">
    <ref name="b.element"/>
  </define>
</div>
```

The element-type name pattern provides a layer of abstraction that facilitates redefinition. The element-type name patterns are referenced from content model and domain extension patterns. Specialization modules can re-declare the patterns to include specializations of the type, allowing the specialized types in all contexts where the base type is allowed.

The declarations can occur in any order.

Common content-model patterns

Structural and element-domain modules can include a section that defines the patterns that contribute to the content models of the element types that are defined in the module.

Common attribute sets

Structural and element-domain modules can include a section that defines patterns for attribute sets that are common to one or more of the element types that are defined in the module.

Element type declarations

For each element type that is declared in the vocabulary module, the following set of patterns are used to define the content model and attributes for the element type. Each set of patterns typically is grouped within a `<div>` element.

`tagname.content`

Defines the complete content model for the element `tagname`. The content model pattern can be overridden in element-configuration modules (constraint and expansion).

`tagname.attributes`

Defines the complete attribute list for the element `tagname`, except for `@class`. The attribute list declaration can be overridden in element-configuration modules (constraint and expansion).

`tagname.element`

Provides the actual element-type definition. It contains an `<element>` element whose `@name` value is the element type name and whose content is a reference to the `tagname.content` and `tagname.attlist` patterns.

`tagname.attlist`

An additional attribute-list pattern with a `@combine` attribute set to the value "interleave". This pattern contains only a reference to the `tagname.attributes` pattern.

The following example shows the declaration for the `<topichead>` element, including the definition for each pattern described above.

```xml
<div>
  <a:documentation>Topic Head</a:documentation>
  <define name="topichead.content">
    <optional>
      <ref name="topicmeta"/>
    </optional>
  </define>
</div>
```
Comment by robander
Reminder to update this example with a 2.0 version of the declaration.

idElements pattern contribution

Element types that declare the @id attribute as type "ID", including all topic and map element types, provide a declaration for the idElements pattern. This is required to correctly configure the "any" pattern override in document-type shells and avoid errors from RELAX NG parsers. The declaration is specified with a @combine attribute set to the value "choice".

For example:

```xml
<define name="idElements" combine="choice">
  <ref name="map.element"/>
</define>
```

Specialization attribute declarations

A vocabulary module must define a @class attribute for every specialized element. This is done in a section at the end of each module that includes a tagname.attlist pattern for each element type that is defined in the module. The declarations can occur in any order.

The tagname.attlist pattern for each element defines that element's @class attribute. @class is declared as an optional attribute; the default value is declared using the @a:defaultValue attribute, and the value of the attribute is constructed according to the rules in 8.3.6 The class attribute rules and syntax (185).

For example:

```xml
<define name="topichead.attlist" combine="interleave">
  <optional>
    <attribute name="keys"/>
  </optional>
  <ref name="topicref-atts"/>
  <ref name="univ-atts"/>
</define>
```
9.2.4 RELAX NG: Coding requirements for structural modules

A structural vocabulary module defines a new topic or map type as a specialization of a topic or map type.

**Required topic and map element attributes**

The topic or map element type references the `arch-atts` pattern, which defines the `@DITAArchVersion` attribute in the DITA architecture namespace and sets the attribute to the version of DITA. In addition, the topic or map element type references the `specializations-att` pattern, which pulls in a definition for the `@specializations` attribute.

For example, the following definition references the `arch-atts` and `specializations-att` patterns as part of the definition for the `<concept>` element.

```xml
<define name="concept.attlist" combine="interleave">
  <ref name="concept.attributes"/>
  <ref name="arch-atts"/>
  <ref name="specializations-att"/>
</define>
```

The `@DITAArchVersion` and `@specializations` attributes give processors a reliable way to check the DITA version and the attribute domains that are used.

**Controlling nesting in topic types**

A structural module that defines a new topic type typically defines an `info-types` style pattern to specify default topic nesting. Document-type shells then can control how topics are allowed to nest by redefining the pattern. While there are known exceptions described below, the following rules apply when using a pattern to control topic nesting.

**Pattern name**

The pattern name is the topic element name plus the suffix `-info-types`.

For example, the `info-types` pattern for the concept topic type is `concept-info-types`.

**Pattern value**

To set up default topic-nesting rules, set the pattern to the desired topic elements. The default topic nesting is used when a document-type shell does not set up different rules.

For example:

```xml
<define name="mytopic-info-types">
  <ref name="subtopictype-01.element"/>
  <ref name="subtopictype-02.element"/>
</define>
```
To disable topic nesting, specify the `<empty>` element.

For example:

```xml
<define name="learningAssessment-info-types">
  <empty/>
</define>
```

The `info-types` pattern also can be used to refer to common nesting rules across the document-type shell.

**Comment by Kristen J Eberlein on 07 April 2021**

What does the above sentence mean?

For example:

```xml
<div>
  <a:documentation>INFO TYPES PATTERNS</a:documentation>
  <define name="mytopic-info-types">
    <ref name="info-types"/>
  </define>
  <!-- ... -->
</div>
```

**Content model of the root element**

In the declaration of the root element of a topic type, the last position in the content model is the `topic-type-info-types` pattern.

For example, the `<concept>` element places the pattern after `<related-links>`:

```xml
<div>
  <a:documentation>LONG NAME: Concept</a:documentation>
  <define name="concept.content">
    <!-- ... -->
    <optional>
      <ref name="related-links"/>
    </optional>
    <zeroOrMore>
      <ref name="concept-info-types"/>
    </zeroOrMore>
  </define>
</div>
```

In certain cases, you do not need to use the `info-types` pattern to control topic nesting:

- If a topic type will never permit topic nesting, regardless of context, it can be defined without any pattern or any nested topics.
- If a topic type will allow only specific nesting patterns, such as allowing only other topic types that are defined in the same module, it can nest those topics directly in the same way that other nested elements are defined.

**Comment by Kristen J Eberlein on 07 April 2021**

Examples? I think the wording needs to be crisped up.
9.2.5 RELAX NG: Coding requirements for element-domain modules

Element-domain modules declare an extension pattern for each element that is extended by the domain. These patterns are used when including the domain module in document-type shells.

Pattern name

The name of the pattern is the abbreviation for the domain, followed by a hyphen ("-"), and the name of the element that is extended.

For example, the name of the pattern for the highlight domain that extends the `<ph>` element is `hi-d-ph`.

Pattern definition

The pattern consists of a choice group that contains references to element-type name patterns. Each extension of the base element type is referenced.

For example:

```xml
<define name="hi-d-ph">
  <choice>
    <ref name="b.element"/>
    <ref name="i.element"/>
    <ref name="line-through.element"/>
    <ref name="overline.element"/>
    <ref name="sup.element"/>
    <ref name="sub.element"/>
    <ref name="tt.element"/>
    <ref name="u.element"/>
  </choice>
</define>
```

Extension pattern

For each element type that is extended by the element-domain module, the module extends the element-type pattern with a `@combine` value of "choice" that contains a reference to the domain pattern.

For example, the following pattern adds the highlight domain specializations of the `<ph>` element to the content model of the `<ph>` element:

```xml
<define name="ph" combine="choice">
  <ref name="hi-d-ph"/>
</define>
```

Because the pattern uses a `@combine` value of "choice", the effect is that the domain-provided elements automatically are added to the effective content model of the extended element in any grammar that includes the domain module.

Example

The following code sample shows the extension pattern for the highlight domain, as declared in highlightDomain.rng:

```xml
<div>
  <a:documentation>DOMAIN EXTENSION PATTERNS</a:documentation>
  <define name="hi-d-ph">
    <choice>
      <ref name="b.element"/>
      <ref name="i.element"/>
      <ref name="line-through.element"/>
      <ref name="overline.element"/>
    </choice>
  </define>
</div>
```
9.2.6 RELAX NG: Coding requirements for attribute-domain modules

An attribute-domain vocabulary module declares a new attribute specialized from either the @props or @base attribute.

The name of an attribute domain is the name of the attribute plus "Att". For example, for the attribute named @deliveryTarget, the attribute-domain name is "deliveryTargetAtt". The attribute-domain name is used to construct pattern names for the domain.

An attribute-domain module consists of a single file, which has three sections:

Specializations attribute contribution

The contribution to the @specializations attribute is documented in the module. The value is constructed according to the rules found in 8.3.7 The specializations attribute rules and syntax (186).

The OASIS grammar files use a <domainsContribution> element to document the contribution; this element is used to help enable generation of DTD and XSD grammar files. An XML comment or <a:documentation> element also can be used.

Attribute declaration pattern

The specialized attribute is declared in a pattern named domainName-d-attribute. The attribute is defined as optional.

For example, the following code samples shows the the @Audience specialization of @Props:

```xml
<define name="audienceAtt-d-attribute">
  <optional>
    <attribute name="audience" dita:since="2.0">
      <a:documentation>Specifies the audience to which an element applies.</a:documentation>
    </attribute>
  </optional>
</define>
```

Attribute extension pattern

The attribute extension pattern extends either the @props or @base attribute set pattern to include the attribute specialization.

Specializations of @props

The pattern is named props-attribute-extensions. The pattern specifies a @combine value of "interleave", and the content of the pattern is a reference to the specialized-attribute declaration pattern.

For example:

```xml
<define name="props-attribute-extensions" combine="interleave">
  <ref name="audienceAtt-d-attribute"/>
</define>
```
Specializations of @base

The pattern is named `base-attribute-extensions`. The pattern specifies a `@combine` value of "interleave", and the content of the pattern is a reference to the specialized-attribute declaration pattern.

For example:

```xml
<define name="base-attribute-extensions" combine="interleave">
  <ref name="myBaseSpecializationAtt-d-attribute"/>
</define>
```

9.2.7 RELAX NG: Coding requirements for element-configuration modules

An element-configuration module (constraint and expansion) redefines the content model or attribute list for one or more elements.

Implementation of element-configuration modules

Element-configuration modules are implemented by importing the element-configuration modules into a document-type shell in place of the vocabulary module that is redefined. The element-configuration module itself imports the base vocabulary module; within the import, the module redefines the patterns as needed to implement the constraint, expansion, or both.

Comment by Kristen J Eberlein on 14 July 2022

The above contradicts what we show in the "Example: Adding an attribute to certain table elements using RNG," where the expansion modules does not import the base vocabulary module." The current wording is true for constraints, inaccurate for expansion.

The same issue crops up several times in this topic ...

Constraint modules

For example, a constraint module that modifies the `<topic>` element imports the base module `topicMod.rng`. Within that import, it constrains the `topic.content` pattern:

```xml
<div>
  <a:documentation>ATTRIBUTES AND CONTENT MODEL OVERRIDES</a:documentation>
  <include href="urn:oasis:names:tc:dita:rng:topicMod.rng:2.0">
    <define name="topic.content" combine="interleave">
      <ref name="title"/>
      <optional>
        <ref name="shortdesc"/>
      </optional>
      <optional>
        <ref name="prolog"/>
      </optional>
      <ref name="body"/>
      </define>
  </include>
</div>
```

Expansion modules

For example, an expansion module that modifies the content model of `<section>` imports the base module `topicMod.rng`. Within that import, it expands the `section.content` pattern:

```xml
<a:documentation>CONTENT MODEL AND ATTRIBUTE LIST OVERRIDES</a:documentation>
<include href="urn:oasis:names:tc:dita:rng:topicMod.rng:2.0">
  <define name="section.content" combine="interleave">
    <optional>
    </define>
  </include>
```
Note that the specialized element `<sectionDesc>` must be declared in an element domain module that also is integrated into the document-type shell.

**Combining multiple element-configuration modules**

Because the element-configuration module imports the module that it modifies, only one element-configuration module can be used per vocabulary module; otherwise the vocabulary module would be imported multiple times. If multiple element configurations are combined for a single vocabulary module, they need to be implemented in one of the following ways:

**Combined into a single element-configuration module**

The element configurations can be combined into a single module.

For example, when combining separate constraints for `<section>` and `<shortdesc>`, a single module can be defined as follows:

```
<include href="topicMod.rng">
  <define name="section.content">
    <!-- Constrained model for section -->
  </define>
  <define name="shortdesc.content">
    <!-- Constrained model for shortdesc -->
  </define>
</include>
```

**Chaining element-configuration modules**

Element-configuration modules can be chained so that each element-configuration module imports another, until the final element-configuration module imports the base vocabulary module.

For example, when combining separate constraints for `<section>`, `<shortdesc>`, and `<li>` from the base vocabulary, the `<section>` constraint can import the `<shortdesc>` constraint, which in turn imports the `<li>` constraint, which finally imports `topicMod.rng`. 
10 Element reference

This section of the DITA specification contains a topic for each DITA element, as well as information about DITA attributes.

10.1 DITA elements, A to Z

This topics provides links to all of the DITA elements in alphabetical order.

10.3.1.1 abstract (247)
10.3.2.1 alt (256)
10.6.7.1 area (370)
10.4.2.1 attributedef (316)
10.5.1.1 audience (325)
10.3.3.1 audio (283)
10.5.1.2 author (326)
10.6.5.1 b (362)
10.3.1.2 body (249)
10.3.1.3 bodydiv (249)
10.5.1.3 brand (326)
10.5.1.4 category (326)
10.3.2.2 cite (257)
10.3.6.1 colspec (296)
10.5.1.5 component (327)
10.6.4.1 consequence (357)
10.6.7.2 coords (371)
10.5.1.6 copyrholder (327)
10.5.1.7 copyright (327)
10.5.1.8 copyryear (328)
10.5.1.9 created (328)
10.5.1.10 critdates (328)
10.5.2.1 data (339)
10.3.2.3 dd (257)
10.3.2.4 ddhd (257)
10.4.2.2 defaultSubject (317)
10.3.2.5 desc (257)
10.3.1.4 dita (250)
10.6.2.2 ditavalmeta (351)
10.6.2.1 ditavalref (349)
10.6.2.1 ditavalmeta (351)
10.6.2.1 ditavalref (349)
10.3.2.6 div (258)
10.3.2.7 dl (259)
10.3.2.8 dlentry (259)
10.3.2.9 dlhead (260)
10.3.2.10 draft-comment (260)
10.3.2.11 dt (261)
10.3.2.12 dthd (261)
10.4.2.7 subjectHead (323)
10.4.2.8 subjectHeadMeta (324)
10.4.2.9 subjectScheme (324)
10.4.2.6 subjectdef (322)
subjectref
10.6.5.6 sup (364)
10.3.6.8 table (301)
10.3.6.9 tbody (303)
10.3.2.36 term (280)
10.3.2.37 text (280)
10.3.6.10 tgroup (303)
10.3.6.11 thead (303)
10.3.1.8 title (253)
10.3.1.9 titlealt (254)
10.3.2.38 tm (281)
10.3.1.10 topic (256)
topicCell
topicSubjectHeader
topicSubjectRow
topicSubjectTable
topicapply
10.6.6.4 topicgroup (369)
10.6.6.5 topichead (369)
10.4.1.10 topicmeta (313)
10.4.1.9 topicref (312)
topicsubject
10.6.5.7 tt (364)
10.6.4.6 typeofhazard (361)
10.6.5.8 u (365)
10.3.2.39 ul (282)
10.5.2.5 unknown (343)
10.4.1.11 ux-window (314)
10.3.3.4 video (286)
10.5.1.26 vrm (338)
10.5.1.25 vrmlist (338)
10.3.2.40 xref (282)

10.2 DITA attributes, A to Z
This topics provides links to DITA attributes in alphabetical order.
   align (complex table attributes) (392)
   audience (specialized attribute) (388)
   author (260)
   base (388)
   @callout
cascade (common map attributes) (393)
   char (complex table attributes) (393)
charoff (complex table attributes) (393)
chunk (common map attributes) (394)
class (388)
collection-type (common map attributes) (394)
colsep (complex table attributes) (394)
compact (394)
conaction (388)
conkeyref (389)
conref (389)
conrefend (389)
datatype (data-element attributes) (394)
deliveryTarget (specialized attribute) (389)
dir (389)
disposition (260)
DITAArchVersion (architectural attributes) (394)
start (291)end (291)
encoding (inclusion attributes) (395)
expanse (display attributes) (395)
expiry (date attributes) (396)
format (link-relationship attributes) (396)
frame (display attributes) (396)
golive (date attributes) (396)
href (link-relationship attributes) (396)
id (389)
importance (390)
keycol (simpletable attributes) (396)
keyref (396)
keyref (396)
keys (397)
keyscope (common map attributes) (397)
linking (common map attributes) (397)
name (data-element attributes) (397)
otherprops (specialized attribute) (390)
outputclass (390)
parse (inclusion attributes) (397)
platform (specialized attribute) (390)
product (specialized attribute) (398)
props (390)
relcolwidth (simpletable attributes) (398)
rev (390)
role (398)
otherrole (397)
rowheader (complex table attributes) (399)
rowsep (complex table attributes) (399)
scale (display attributes) (399)
scope (link-relationship attributes) (400)
10.3 Topic elements
The base topic elements include elements that make up the core building blocks of the DITA topic, such as topic, body, and related-links, as well as elements like `<p>` and `<ph>` that are used in many topic specializations. Some of these elements are also available inside the `<topicmeta>` map element.

10.3.1 Basic topic elements
The basic topic elements provide the structural framework for a topic: title, short description, prolog, body, and related links.

10.3.1.1 `<abstract>`
An abstract summarizes the content of the topic; it appears at the start of the topic. It can contain multiple short descriptions, as well as block-level content such as paragraphs, lists, and tables.

Usage information
The `<abstract>` element is designed for use in the following circumstances:

- The initial paragraph of a topic contains lists, tables, or other block-level elements that are not permitted in the content model of `<shortdesc>`.
- Only a portion of the content of the initial paragraph is suitable for a link preview or hover text.
- A topic needs to contain multiple short descriptions, to facilitate conditional processing.

When the initial paragraph is suitable as a link preview, simply place the content in a `<shortdesc>` element rather than in an `<abstract>` element.

Rendering expectations
When a contained `<shortdesc>` occurs within phrase-level content, processors treat it as phrase-level content and do not create a separate paragraph when the topic is rendered. When the contained `<shortdesc>` occurs as a peer to paragraph-level content, processors treat it as block-level content and create a separate paragraph when the topic is rendered. When multiple `<shortdesc>` elements are
included in an `<abstract>`, they are concatenated when used for link previews or link summaries (separated by spaces).

**Attributes**

The following attributes are available on this element: universal attributes (387).

**Examples**

This section contains examples of how the `<abstract>` element can be used.

**Figure 84: `<abstract>` with phrase-level short description**

The following code sample shows an `<abstract>` element that contains phrase-level content, in addition to a short description:

```xml
<abstract>
  <shortdesc>Use the wonderful Widget to automatically vacuum your house.  
  It requires a 1800 lithium ion battery.</shortdesc>
</abstract>
```

While the complete content of the `<abstract>` element is rendered as the first paragraph of the topic, only the content of the `<shortdesc>` element is used for a link preview and hover text.

**Figure 85: `<abstract>` with block-level short description**

The following code sample shows an `<abstract>` element that contains block-level content, in addition to a short description:

```xml
<abstract>
  <shortdesc>You have many options for arranging lodging in Brussels:  
  hotels, bed and breakfasts, youth hostels, and flats. You can select  
  from a wide price range.</shortdesc>
  <p>The following table explains the symbols that are used to indicate the price  
  categories of the lodging options:</p>
  <simpletable> <!-- ... --> </simpletable>
</abstract>
```

**Figure 86: `<abstract>` with multiple short descriptions**

The following code sample shows an `<abstract>` element that contains multiple short descriptions, which will be filtered when the topic is processed:

```xml
<abstract>
  <shortdesc platform="free-version">The free version of the platform  
  provides a single e-mail list, storage for up to one gigabyte of  
  files, and will support up to 100 users.</shortdesc>
  <shortdesc platform="premium-version">The premium version of the platform  
  provides multiple e-mails lists, storage for up to 30 gigabytes of  
  files, and will support up to 400 users.</shortdesc>
</abstract>
```

**Related reference**

`shortdesc` (252)
A short description is a sentence or group of sentences that describes the purpose or main point of the topic.

10.3.1.2 <body>
The body contains the main content of a topic.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
The following code sample shows a DITA topic that contains a title and a body.

```dita
<topic id="styleguidebold">
  <title>MyCompany Style Guide: the <xmlelement>b</xmlelement> element</title>
  <body>
    <p>Use the bold tag <b>for visual emphasis only</b>. Do not use it if another phrase-level element better signifies the reason for the emphasis.</p>
  </body>
</topic>
```

10.3.1.3 <bodydiv>
A body division is a grouping of sequential elements within the body of a topic. There is no additional semantic meaning. It is useful primarily for reuse and as a specialization base.

Usage information
The <bodydiv> element cannot contain a title. If a title is required, use nested topics.

The <bodydiv> element is often used to group a sequence of related elements for reuse, so that another topic can reference the entire set with a single @conref or @conkeyref attribute.

The <bodydiv> element can nest itself, which makes it a good specialization base for general topic content. Because the <bodydiv> element allows <section> elements, it cannot be used within <section> elements. Use the <div> element to group content that might occur in both topic bodies and sections.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
The following code sample shows how the <bodydiv> element can be used to group a sequence of elements for reuse:

```dita
<topic id="sample" xml:lang="en">
  <title>Sample for bodydiv</title>
  <body>
    <bodydiv id="reuse">
      <p>This set of information is reusable as a group.</p>
      <ul>
        <li>This is one item.</li>
        <li>This is another item.</li>
        <li>This is the third item.</li>
      </ul>
    </bodydiv>
  </body>
</topic>
```
10.3.1.4 <dita>
The <dita> element is the root element for the ditabase document type.

Usage information
The ditabase document type is a container topic that can manage any sequence of any type of topic. It can be used to hold elements designed for reuse; it is also useful as an intermediate output for conversion operations.

The <dita> element cannot be specialized. Topic nesting rules can be configured in the document-type shell.

Attributes
The following attributes are available on this element: @xmlns:ditaarch (401), @DITAArchVersion (394), and localization attributes (387).

Example
The following code sample shows a ditabase document that contains multiple topics. The <concept>, <reference>, and <task> elements are all specializations of <topic>.

```xml
<dita>
  <concept id="batintro">
    <title>Intro to bats</title>
    <!-- ... -->
  </concept>
  <task id="batfeeding">
    <title>Feeding a bat</title>
    <taskbody>
      <!-- ... -->
    </taskbody>
  </task>
  <reference id="batparts">
    <title>Parts of bats</title>
    <!-- ... -->
  </reference>
</dita>
```

10.3.1.5 <prolog>
The prolog contains metadata about the topic, for example, author information or subject category.

Attributes
The following attributes are available on this element: universal attributes (387).
Example
The following code sample shows a `<prolog>` element that contains common metadata items:

```xml
<prolog>
  <author>Paul Norman</author>
  <copyright>
    <copyryear year="1930"/>
    <copyrholder>Paul Norman</copyrholder>
  </copyright>
</prolog>
```

10.3.1.6 `<related-links>`
Related links are a group of references to other topics or external information related to the current topic.

Rendering expectations
Related links usually are displayed at the end of the topic, although some web-based help systems might display them in a separate navigation frame.

Links specified within the `<related-links>` element typically are displayed together with any links that are generated based on the hierarchy of the DITA map.

PDF or print-oriented output commonly ignores hierarchical links such as those with roles of ancestor, parent, child, descendant, next, previous, or sibling.

Comment by rodaande
Assuming we add an architectural section that covers how link roles are implied by the map, and can result in generated links, we should link to it from this topic with a related link.

Processing expectations
Attributes that cascade between topic references in a map, such as the `@scope` and `@format` attributes, also cascade from this element to contained links.

Attributes
The following attributes are available on this element: universal attributes (387), `@format` (396), `@scope` (396), `@type` (396), `@role` (398), and `@otherrole` (397).

Example
The following code sample shows how the `<related-link>` element is used to specify stable links to external and local information:

```xml
<related-links>
  <link href="http://www.example.org" scope="external" format="html">
    <linktext>Example 1</linktext>
  </link>
  <link href="additional-details.dita">
    <!-- Link to a local topic for more detail, with link text automated based on the target's title -->
  </link>
</related-links>
```
10.3.1.7 <shortdesc>
A short description is a sentence or group of sentences that describes the purpose or main point of the topic.

Usage information
When present in topics, the short description is the first paragraph of the topic. It can also be used for hover text, link previews, search results, and more.

When present in maps, the <shortdesc> element is associated with <topicref> elements. This enables map authors to accomplish the following goals:

- Associate a short description with a non-DITA object
- Provide a short description that is specific to the map context and used for link previews

When a <shortdesc> element applies to an entire DITA map, it serves only as a description. DITA architects might use such a <shortdesc> element to store information about the purpose of the DITA map.

Rendering expectations

071 (412) Processors SHOULD render the content of the <shortdesc> element as the initial paragraph of the topic.

072 (412) When processors generate link previews that are based on the map context, they SHOULD use the content of the <shortdesc> that is located in the map rather than the <shortdesc> that is located in the DITA topic. However, when processors render the topic itself, they SHOULD use the content of the <shortdesc> element that is located in the DITA topic.

Processing expectations

When a <shortdesc> element occurs in a DITA map, it overrides the short description provided in the topic for the purpose of generating map-based link previews. It does not replace the <shortdesc> in the rendered topic itself. This means that generated map-based links to this topic will use the short description from the map for any link previews provided with the link, while the rendered topic continues to use the short description located in the topic.

Attributes
The following attributes are available on this element: universal attributes (387).

Examples
This section contains examples of how the <shortdesc> element can be used.

Figure 87: Short description in a topic
The following code sample shows how a <shortdesc> element can be used in a topic:

```xml
<topic id="intro-to-bird-calling">
  <title>Introduction to bird calling</title>
  <shortdesc>If you want to attract more birds to your Acme Bird Feeder, learn the art of bird calling. Bird calling is an efficient way to alert more birds to the presence of your bird feeder.</shortdesc>
  <body>
```
Bird calling requires learning:

- Popular and classical bird songs
- How to whistle like a bird

Figure 88: Short description in a map

The following code sample shows how a short description can be used in a DITA map to provide information about a non-DITA resource. The content of the `<shortdesc>` element is used when a link preview to the Web site for the American Birding Association is generated.

```
<map>
  <title>Enjoying birds</title>
  <!-- ... -->
  <topicref href="birds-in-colorado.dita"/>
  <topicref href="bird-calling.dita"/>
  <topicref href="https://www.birding.example.com/" format="external" type="html">
    <topicmeta>
      <shortdesc>The American Birding Association is the only organization in North America that specifically caters to recreational birders. Its mission is to "inspire all people to enjoy and protect wild birds."
    </topicmeta>
  </topicref>
  <!-- ... -->
</map>
```

Related reference

**abstract (247)**

### 10.3.1.8 `<title>`

A title is a heading or label for an object. Titles can be associated with topics, maps, sections, examples, figures, tables, and other structures.

#### Attributes

The following attributes are available on this element: `universal attributes` (387) (without the metadata attribute group), `@base` (388), and `@rev` (390).

#### Example

The following code sample shows how titles are used for both the topic and a figure within the topic:

```
<topic id="topicid">
  <title>Monitoring your heart rate with ThisDevice</title>
  <body>
    <!-- ... -->
    <fig id="adjust-the-monitor">
      <title>Adjusting your monitor</title>
      <p>If the monitor is not reporting, follow the directions in the video to adjust your equipment.</p>
    </title>
    <!-- ... -->
  </body>
</topic>
```
10.3.1.9 <titlealt>

An alternative title is used to convey information about a document in contexts other than straightforward display.

Usage Information

Alternative titles can be used in both maps and topics:

- When used in the `<topicmeta>` of a root `<map>` element, the alternative title applies to the map itself.
- When used inside a `<topicref>` element, the alternative title applies to the resource that is referenced by the `<topicref>` element.
- When the referenced resource is a DITA topic, the alternative titles from the `<topicref>` element are merged with those authored directly in the topic, with the alternative titles from the `<topicref>` element taking higher priority.

The roles of an alternative title are specified by the `@title-role` attribute. Multiple roles can be specified, separated by white space. An alternative title specifies at least one role. Other tokens for the `@title-role` attribute can be defined for specific purposes.

Some roles might not be meaningful in certain contexts. For example, a navigational alternate title is not meaningful in the context of a `<topicgroup>` element, since the element is not part of the navigation structure of a publication. Such alternate titles are ignored by processors.

The base DITA vocabulary contains an alternative titles domain that contains convenience elements that are equivalent to `<titlealt>` elements with the `@title-role` attribute set to the tokens outlined in Processing expectations (254).

Processing expectations

Comment by robander on 13 May 2021

Questions as I read this more closely:

Some of this language implies a specific type of processor, which we’ve had trouble with in the past; language may need to be more processor agnostic

Given the complications, the number of required samples, and the impact on processing, it feels like this deserves a page in the architectural specification.

The processing of an alternative title depends on its roles. Processors SHOULD support the following tokens for the `@title-role` attribute:

- **linking**
  - Specifies that the content of the `<titlealt>` element contains the title for use in references to the resources generated from DITA map structures, such as hierarchical parent/child/sibling links and links generated from relationship tables. In addition, this is the fallback alternative title for navigation and search roles. Custom title roles meant for use in link generation should also use this as a fallback.

- **navigation**
  - Specifies that the content of the `<titlealt>` element contains the title for use in tables of content and other navigation aids. In some cases, when processing a `<topicref>` that has no `@href`, this is also used as the title of the
generated topic, if applicable. If not present, this role is fulfilled by the linking role.

**search**
Specifies that the content of the `<titlealt>` element contains a title for use in search results for systems that support content search. If not present, this role is fulfilled by the linking role.

**subtitle**
Specifies that the content of the `<titlealt>` element contains a subtitle for the document.

**hint**
Specifies that the content of the `<titlealt>` element contains a hint about the referenced resource. This is intended for the benefit of map authors; it does not have an effect on processing or output.

**-dita-use-conref-target**
See 7.3.6 Using the `-dita-use-conref-target` value (145) for more information.

Alternative titles with the `@title-role` attribute set to tokens that are not recognized by the processor "SHOULD" be ignored and not appear in output.

**Attributes**
The following attributes are available on this element: universal attributes (387) and `@title-role` (400).

**Examples**
This section contains examples of how the `<titlealt>` element can be used.

**Figure 89: Subtitles**
The following code sample shows how a map can specify a subtitle for a publication:

```xml
<map>
  <title>Publication title</title>
  <topicmeta>
    <titlealt title-role="subtitle">Publication subtitle</titlealt>
  </topicmeta>
</map>
```

An identical result could be achieved by using the `<subtitle>` element that is provided by the alternative titles domain.

**Figure 90: Multiple alternative titles and their roles**
The following code sample shows how a topic reference can specify several alternative titles:

```xml
<topicref keys="about" href="about.dita">
  <topicmeta>
    <titlealt title-role="linking navigation">About the product</titlealt>
    <titlealt title-role="search">About</titlealt>
    <titlealt title-role="hint">About the Acme TextMax 5000</titlealt>
  </topicmeta>
</topicref>
```

1. "About the product" will be used for both linking and navigation titles, for example, when generating related links and rendering a table of contents.
2. "About" will be used for a search title, for example, when providing a title in systems that support dynamic content searches.
3. "About the Acme TextMax 500" provides a hint to map authors as to the contents of the referenced DITA resource. This title is not used in output.

If the alternative-titles domain is available, the following markup would be equivalent:

```xml
<topicref keys="about" href="about.dita">
  <topicmeta>
    <linktitle>About the product</linktitle>
    <searchtitle>About</searchtitle>
    <titlehint>About the Acme TextMax 500</titlehint>
  </topicmeta>
</topicref>
```

10.3.10 <topic>

A topic is a standalone unit of information.

Attributes

The following attributes are available on this element: universal attributes (387) and architectural attributes (391).

For this element, the @id attribute is required.

Example

The following code sample shows the primary structural components of a topic: title, short description, prolog, body, and related links.

```xml
<topic id="topic">
  <title>The basic structure of a topic</title>
  <shortdesc>A topic has a well-established structure.</shortdesc>
  <prolog><!-- Metadata can be stored here.-->
  </prolog>
  <body>
    <p>A typical topic contains a title, short description, and body.</p>
  </body>
  <related-links>
    <!--Related links can be defined directly in a topic or by using a relationship table.-->
  </related-links>
</topic>
```

10.3.2 Body elements

The body elements support the most common types of content for topics: paragraphs, lists, phrases, figures, and other common document components.

10.3.2.1 <alt>

Alternate text is a textual description of an image. Systems often render the alternate text when the reader is using assistive technology or the image cannot be rendered.

Attributes

The following attributes are available on this element: universal attributes (387).
Example
The following code sample shows how alternate text is associated with an image of a marketing banner:

```
<image href="newCampaign.jpg">
  <alt>Marketing banner for new product campaign</alt>
</image>
```

10.3.2.2 `<cite>`
A citation is the name or the title of a bibliographic resource, for example, a document, online article, or instructional video.

Attributes
The following attributes are available on this element: universal attributes (387) and @keyref (396).

Example
The following code sample shows how the `<cite>` element can be used to mark up the title of an article:

```
<p>The online article <cite>Specialization in the Darwin Information Typing Architecture</cite> provides a detailed explanation of how to define new topic types.</p>
```

10.3.2.3 `<dd>`
The definition description is the definition for an item in a definition list entry.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
See `<dl>` (259).

10.3.2.4 `<ddhd>`
A definition heading is an optional heading or title for descriptions or definitions in a definition list.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
See `<dlhead>` (260).

10.3.2.5 `<desc>`
A description is a statement that describes or contains additional information about an object.

Usage information
The following list outlines common uses of the `<desc>` element:

- `<table>` and `<fig>`
  Provides more information than can be contained in the title
<xref> and <link>
Provides a description of the target

<object>
Provides alternate content to use when the context does not permit the object to be displayed

Rendering expectations

When used in conjunction with <fig> or <table> elements, processors SHOULD consider the content of <desc> elements to be part of the content flow.

When used in conjunction with <xref> or <link> elements, processors often render the content of <desc> elements as hover help or other forms of link preview.

Attributes
The following attributes are available on this element: universal attributes (387).

Examples
This section contains examples of how the <desc> element can be used.

Figure 91: Description of a figure
In the following code sample, the <figure> element contains a reference to an image of a famous painting by Leonardo da Vinci. The <title> element provides the name of the painting, while the <desc> element contains information about when the portrait is thought to have been painted.

```xml
<fig>
  <title>Mona Lisa</title>
  <desc>Circa 1503-06, perhaps continuing until 1517</desc>
  <image href="mona-lisa.jpg">
    <alt>Photograph of Mona Lisa painting</alt>
  </image>
</fig>
```

Figure 92: Description of a cross reference
In the following code sample, the <link> element contains a <desc> element. Some processors might render the content of the <desc> element as hover help.

```xml
<link keyref="dita-13-02">
  <linktext>DITA 1.3 Errata 02</linktext>
  <desc>Final errata version of DITA 1.3, published 19 June 2018</desc>
</link>
```

10.3.2.6 <div>
A division is a grouping of contiguous content within a topic. There is no additional semantic meaning.

Usage information
The <div> element is useful primarily for reuse and as a specialization base.

Attributes
The following attributes are available on this element: universal attributes (387).
Example
In the following code sample, a `<div>` element is used to organize several elements together so that they can be referenced by `@conref` or `@conkeyref`:

```xml
...  
<div id="div-01">  
  <p>The first paragraph</p>
  <p>The second paragraph</p>
  <note>This is a note</note>
</div>
...  
```

Without using a `<div>` element, the content could not be grouped for content referencing since the start and end elements are of different types.

10.3.2.7 `<dl>`
A definition list is a list of items and their corresponding definitions.

Attributes
The following attributes are available on this element: universal attributes (387) and `@compact` (394).

Example
The following code sample shows how a definition list can be used to describe the message levels that are generated by a monitoring application. The `@compact` attribute instructs processors to tighten the vertical spacing.

```xml
<dl compact="yes">  
  <dlentry>  
    <dt>Warning</dt>  
    <dd>Problems were detected, but the software will continue to monitor activity.</dd>  
  </dlentry>  
  <dlentry>  
    <dt>Error</dt>  
    <dd>Problems were detected, and the software is in danger of shutting down.</dd>  
  </dlentry>  
  <dlentry>  
    <dt>Severe</dt>  
    <dd>Monitoring activity has ceased.</dd>  
  </dlentry>  
</dl>
```

10.3.2.8 `<dlentry>`
A definition list entry is a group within a definition list. It contains an item and its definitions.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
See `<dl>` (259).
10.3.2.9 <dlhead>
A definition list heading is a group that contains a heading for items and a heading for definitions within
the list.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
The following code sample shows a definition list with a header:

```xml
<dl>
  <dlhead>
    <dthd>Image selection</dthd>
    <ddhd>Resulting information</ddhd>
  </dlhead>
  <dlentry>
    <dt>File Type</dt>
    <dd>The file extension of the image</dd>
  </dlentry>
  <dlentry>
    <dt>Image class</dt>
    <dd>Whether the image is raster, vector, or 3D</dd>
  </dlentry>
  <dlentry>
    <dt>Fonts</dt>
    <dd>Names of the fonts contained within a vector image</dd>
  </dlentry>
</dl>
```

Rendering of definition lists will vary by application and by display format.

10.3.2.10 <draft-comment>
A draft comment is content that is intended for review and discussion, such as questions, comments, and
notes to reviewers. This content is not intended to be included in production output.

Rendering expectations

075 (413) By default, processors SHOULD NOT render <draft-comment> elements. Processes SHOULD provide a mechanism that causes the content of the
<draft-comment> element to be rendered in draft output only.

Attributes
The following attributes are available on this element: universal attributes (387) and the attributes defined
below.

For this element, the @translate attribute has a default value of "no".

@author
Designates the originator of the draft comment.

@disposition
Specifies the status of the draft comment.

@time
Specifies when the draft comment was created.
Example

The following code samples shows how a content developer can use a `<draft-comment>` element to pose a question to reviewers:

```xml
<draft-comment author="EBP" time="23 May 2017">
  <p>Where's the usage information for this section?</p>
</draft-comment>
```

Processors might render the information from the highlighted attributes at viewing or publishing time. Authors might use the value of the `@disposition` attribute to track the work that remains to be done on a content collection.

10.3.2.11 `<dt>`

A definition term is the term that is defined in a definition list entry.

Attributes

The following attributes are available on this element: universal attributes (387).

Example

See `<dl>` (259).

10.3.2.12 `<dthd>`

A definition term heading is an optional heading or title for the items in a definition list.

Attributes

The following attributes are available on this element: universal attributes (387).

Example

See `<dlhead>` (260).

10.3.2.13 `<example>`

An example illustrates the subject of the topic or a portion of the topic.

Attributes

The following attributes are available on this element: universal attributes (387).

Example

The following code sample shows an `<example>` element that contains a code block and a textual explanation of it:

```xml
<section id="AddingRecord">
  <title>ADD</title>
  <p>New database records are created using the ADD command.</p>
  <example>
    <p>The following example illustrates the creation of a new record. All parameter settings are strictly optional.</p>
    <codeblock>01 OPTIONS ABC,ADD,DEF,HIJK,LMNO,AOW=25000,HF=2</codeblock>
  </example>
</section>
```
10.3.2.14 <fallback>
Fallback content is content to be presented when multimedia objects or included content cannot be rendered.

Processing expectations
The contents of this element are displayed only when the media that is referenced by the containing element cannot be displayed or viewed.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
See <audio> (284) and <video> (289).

10.3.2.15 <fig>
A figure is a container for a variety of objects, including artwork, images, code samples, equations, and tables.

Usage information
A <fig> element enables associating other elements, such as a title or description, with the contents of the <fig> element.

Attributes
The following attributes are available on this element: universal attributes (387) and display attributes (392).

Example
The following code sample shows how a <fig> element can associate a title and a description with an image:

```xml
<fig>
  <title>The handshake</title>
  <desc>This image shows two hands clasped in a formal, business-like handshake.</desc>
  <image href="59j0p66.jpg">
    <alt>A handshake</alt>
  </image>
</fig>
```

10.3.2.16 <figgroup>
A figure group is a grouping of segments within a figure.

Usage information
The <figgroup> element is useful primarily as a base for complex specializations, such as nestable groups of syntax within a syntax diagram. The <figgroup> element can nest. It can also contain multiple cross-references, footnotes, and keywords.
Attributes

The following attributes are available on this element: universal attributes (387).

Example

For the most part, `<figgroup>` is intended to be used as a base for specialization. This example uses it directly for purposes of illustration.

The following code sample shows how the `<figgroup>` can group content with associated metadata:

```xml
<fig>
  <title>Sample complex figure</title>
  <figgroup>
    <data name="MetaItem" value="13"/>
    <data name="MetaThing" value="31"/>
    <ph>These elements are grouped with associated metadata</ph>
  </figgroup>
</fig>
```

10.3.2.17 `<fn>`

A footnote is ancillary information that typically is rendered in the footer of a page or at the end of an online article. Such content is usually inappropriate for inline inclusion.

Usage information

There are two types of footnotes: single-use footnote and use-by-reference footnote.

Single-use footnote

This is produced by a `<fn>` element that does not specify a value for the `@id` attribute.

Use-by-reference footnote

This is produced by a `<fn>` element that specifies a value for the `@id` attribute. It must be used in conjunction with an `<xref>` element with `@type` set to "fn".

To reference a footnote that is located in another topic, the conref or conkeyref mechanism is used.

Rendering expectations

The two footnote types typically produce different types of output:

Single-use footnote

When rendered, a superscript symbol (numeral or character) is produced at the location of the `<fn>` element. The superscript symbol is hyperlinked to the content of the footnote, which is placed at the bottom of a PDF page or the end of an online article. The superscript symbol can be specified by the value of the `@callout` attribute. When no `@callout` value is specified, footnotes are typically numbered.

Use-by-reference footnote

Nothing is rendered at the location of the `<fn>` element. The content of a use-by-reference footnote is only rendered when it is referenced by an `<xref>` with the `@type` attribute set to “fn”. If an `<xref>` with the `@type` attribute set to “fn” is present, a superscript symbol is rendered at the location of the `<xref>` element. Unless conref or conkeyref is used, the `<fn>` and `<xref>` must be located in the same topic.

However, the details of footnote processing and formatting are implementation dependent. For example, a tool that renders DITA as PDF might lack support for the `@callout` attribute, or footnotes might be collected as end notes for certain types of publications.
Attributes
The following attributes are available on this element: universal attributes (387) and the attribute defined below.

@callout
Specifies the character or character string that is used for the footnote link.

Examples
This section contains examples of how the `<fn>` element can be used.

Figure 93: An example of a single-use footnote
The following code sample shows a single-use footnote. It contains a simple `<fn>` element, with no `@id` or `@callout` attribute.

```
<p>The memory storage capacity of the computer is 2 GB<fn>A GB (gigabyte) is equal to 1000 million bytes</fn> with error correcting support.</p>
```

When rendered, typically a superscript symbol is placed at the location of the `<fn>` element; this superscript symbol is hyperlinked to the content of the `<fn>`, which is typically placed at the bottom of a PDF page or the end of an online article. The type of symbol used is implementation specific.

The above code sample might produce the following output similar to the following:

```
The memory storage capacity of the computer is 2 GB\(^1\) with error correcting support.

... 

1. A GB (gigabyte) is equal to 1000 million bytes.
```

Figure 94: An example of a single-use footnote with a `@callout` attribute
The following code sample shows a single-use footnote that uses a `@callout` attribute:

```
<p>The memory storage capacity of the computer is 2 GB<fn callout="#">A GB (gigabyte) is equal to 1000 million bytes</fn> with error correcting support.</p>
```

The rendered output is similar to that of the previous example, although processors that support it will render the footnote symbol as # (hashtag).

Figure 95: A use-by-reference footnote
The following code sample shows use-by-reference footnotes. The `<fn>` elements have `@id` attributes, and inline `<xref>` elements reference those `<fn>` elements:

```
<section>
  <fn id="dog-name">Fido</fn>
  <fn id="cat-name">Puss</fn>
  <fn id="llama-name">My llama</fn>
  <!-- ... -->
  <p>I like pets. At my house, I have a dog<xref href="#topic/dog-name" type="fn"/>, a cat<xref href="#topic/cat-name" type="fn"/>, and a llama<xref href="#topic/llama-name" type="fn"/>.</p>
</section>
```
The code sample might produce output similar to the following:

```xml
<!-- Content from footnotes.dita -->
<topic id="footnotes">
<title>Shared topic...</title>
<body>
<bodydiv>
<fn id="strunk">Elements of Style</fn>
<fn id="DQTI">Developing Quality Technical Information, 2nd edition</fn>
</bodydiv>
</body>
</topic>
```

To use those footnotes, authors conref them into the relevant topics:

```xml
<p>See the online resource<fn conref="footnotes.dita#footnotes/DQTI"/> for more information about how to assess the quality of technical documentation ...</p>
```

**Figure 96: A single-use footnote that uses conref**

The following code sample shows footnotes stored in a shared topic (footnotes.dita):

```xml
<!-- Content from footnotes.dita -->
<topic id="footnotes">
<title>Shared topic...</title>
<body>
<bodydiv>
<fn id="strunk">Elements of Style</fn>
<fn id="DQTI">Developing Quality Technical Information, 2nd edition</fn>
</bodydiv>
</body>
</topic>
```

To use those footnotes, authors conref them into the relevant topics:

```xml
<p>See the online resource<fn conref="footnotes.dita#footnotes/DQTI"/> for more information about how to assess the quality of technical documentation ...</p>
```

**Figure 97: A use-by-reference footnote that uses conref**

The following code sample shows a use-by-reference footnote that uses conref:

```xml
<!-- Content from footnotes.dita -->
<topic id="evaluating-quality">
<title>Evaluating documentation quality</title>
<body>
<bodydiv>
<fn conref="footnotes.dita#footnotes/DQTI" id="dqti"/>
</bodydiv>
</body>
</topic>
```

**10.3.2.18 <image>**

An image is a reference to artwork that is stored outside of the content.

**Rendering expectations**

The referenced image typically is rendered in the main flow of the content.

**076 (413)** Processors **SHOULD** scale the object when values are provided for the `@height` and `@width` attributes. The following expectations apply:
• If a height value is specified and no width value is specified, processors SHOULD scale the width by the same factor as the height.
• If a width value is specified and no height value is specified, processors SHOULD scale the height by the same factor as the width.
• If both a height value and width value are specified, implementations MAY ignore one of the two values when they are unable to scale to each direction using different factors.

Attributes

The following attributes are available on this element: universal attributes (387), href (link-relationship attributes) (396), format (link-relationship attributes) (396), scope (link-relationship attributes) (400), @keyref (396), and the attributes defined below.

@align
Controls the horizontal alignment of an image when @placement is specified as "break". Common values include "left", "right", and "center".

@height
Specifies the vertical dimension for the resulting display. The value of this attribute is a real number expressed in decimal notation, optionally followed by a unit of measure. The following units of measurement are supported: cm, em, in, mm, pc, pt, and px (centimeters, ems, inches, millimeters, picas, points, and pixels, respectively). The default unit is px (pixels). Possible values include:"5", "5in", and "10.5cm".

@placement
Indicates whether an image is displayed inline or on a separate line. The default value is inline. Allowable values are "inline", "break", and "-dita-use-conref-target" (145).

@scale
Specifies a percentage as an unsigned integer by which to scale the image in the absence of any specified image height or width; a value of 100 implies that the image should be presented at its intrinsic size. If a value has been specified for the @height or @width attribute (or both), the @scale attribute is ignored.

@scalefit
Specifies whether an image is scaled up or down to fit within available space. The allowable values are "yes", "no", and "-dita-use-conref-target" (145). If @height, @width, or @scale is specified, those attributes determine the graphic size, and the @scalefit attribute is ignored. If none of those attributes are specified and scalefit="yes", then the image is scaled by the same factor in both dimensions, so that the graphic will just fit within the available height or width, whichever is more constraining.

The available width would be that of the prevailing column or table cell, that is, the width a paragraph of text would have if the graphic were a paragraph instead of text. The available height is implementation dependent, but if feasible, it is suggested to be the page or table cell height or some other reasonable value.

@width
Specifies the horizontal dimension for the resulting display. The value of this attribute is a real number expressed in decimal notation, optionally followed by a unit of measure. The following units of measurement are supported: cm, em, in, mm, pc, pt, and px (centimeters, ems, inches, millimeters, picas, points, and pixels, respectively). The default unit is px (pixels). Possible values include:"5", "5in", and "10.5cm".
Example

The following code sample shows how an image is referenced. The @placement attribute is set to "break"; this ensures that the image is not rendered inline.

```xml
<image href="bike.gif" placement="break">
  <alt>Two-wheeled bicycle</alt>
</image>
```

10.3.2.19 `<include>`

Included content is a reference to non-DITA content outside the current document that will be rendered at the location of the reference. The resource is specified using either a URI or a key reference. Processing expectations for the referenced data can also be specified.

Usage information

The `<include>` element is intended as a base for specialization and for the following use cases:

- The transclusion of non-DITA XML within `<foreign>` element using `parse="xml"`
- The transclusion of preformatted textual content within `<pre>` element using `parse="text"`
- The transclusion of plain-text prose within DITA elements using `parse="text"`

In addition, processors can support additional values for the `@parse` attribute.

For example, the `<include>` element can be specialized to an element such as `<coderef>` as a way to include preformatted sample programming code.

The `<include>` element is not intended to reference DITA content. Use `@conref` or `@conkeyref` to reuse DITA content.

Processing expectations

The `<include>` element instructs processors to insert the contents of the referenced resource at the location of the `<include>` element. If the content is unavailable to the processor or cannot be processed using the specified `@parse` value, the contents of the `<fallback>` element, if any, are presented instead.

077 (413)  |  Processors SHOULD support the `@parse` values "text" and "xml".

078 (413)  |  Processors SHOULD detect the encoding of the referenced document based on the rules described for the `@encoding` (395) attribute.

Attributes

The following attributes are available on this element: universal attributes (387), inclusion attributes (392), link-relationship attributes (392), and `@keyref` (396).
Examples
For the most part, `<include>` is intended to be used as a base for specialization. The following examples use it directly for purposes of illustration.

Figure 98: Inclusion of XML markup other than SVG or MathML

In the following code sample, the `<include>` element references a tag library descriptor file:

```xml
<fig>
  <title>JSP Tag Library Elements and Attributes</title>
  <foreign outputclass="tld">
    <include href="../src/main/webapp/WEB-INF/jsp-tag-library.tld" parse="xml" format="tld"/>
  </foreign>
</fig>
```

Figure 99: Inclusion of README text into a DITA topic, with fallback

In the following code sample, a README text file is referenced in order to reuse a list of changes to a set of source code:

```xml
<topic id="readme">
  <title>Summary of changes</title>
  <shortdesc>This topic describes changes in the project source code.</shortdesc>
  <body>
    <section>
      <include href="../src/README.txt" parse="text" encoding="UTF-8">
        <fallback>See README.txt in the source package for a list of changes.</fallback>
      </include>
    </section>
  </body>
</topic>
```

Figure 100: Inclusion of preformatted text

In the following code sample, the `<include>` element references a JSON file:

```xml
<pre>
  <include href="../src/config.json" format="json" parse="text" encoding="UTF-8"/>
</pre>
```

Figure 101: Proprietary vendor handling for CSV tables

In the following code sample, the `<include>` element specifies a proprietary `@parse` value that instructs a processor how to render a comma-separated data set within the figure:

```xml
<fig>
  <title>Data Table</title>
  <include href="data.csv" encoding="UTF-8" parse="http://www.example.com/dita/includeParsers/csv-to-simpletable"/>
</fig>
```

10.3.2.20 `<keyword>`

A keyword is text or a token that has a unique or key-like value, such as a product name or unit of reusable text.

Processing expectations

When used within the `<keywords>` element, the content of a `<keyword>` element is considered to be metadata and should be processed as appropriate for the given output medium.
Elements that are specialized from the `<keyword>` element might have extended processing, such as specific formatting or automatic indexing.

**Attributes**
The following attributes are available on this element: universal attributes (387) and `@keyref` (396).

**Examples**
This section contains examples of how the `<keyword>` element can be used.

**Figure 102: `<keyword>` element used to store a product name**

In the following code sample, the `<keyword>` element holds a product name that can be referenced using content reference (conref) or content key reference (conkeyref):

```xml
<keyword id="acme-bird-feeder">ACME Bird Feeder</keyword>
```

To enable referencing variable text using `@keyref`, store the product name in a `<keytext>` element.

**Figure 103: `<keyword>` element referencing a product name**

In the following example, the `<keyword>` element references a product name using `@conkeyref`:

```xml
<p>To fill the <keyword conkeyref="productnames/acme-bird-feeder" />, unscrew the top ...</p>
```

**Figure 104: `<keyword>` element as metadata**

In the following code sample, "Big data" is specified as metadata that applies to the topic:

```xml
<prolog>
  <metadata>
    <keywords>
      <keyword>Big data</keyword>
    </keywords>
  </metadata>
</prolog>
```

**10.3.2.21 `<li>`**

A list item is an item in either an ordered or unordered list.

**Attributes**
The following attributes are available on this element: universal attributes (387).

**Example**
See `<ol>` (276) or `<ul>` (282).

**10.3.2.22 `<lines>`**

Lines are lines of text where white space is significant. The `<lines>` element can be used to represent dialogs, poetry, or other text fragments where line breaks are significant.

**Rendering expectations**

```
079 (413)  Processors SHOULD preserve or otherwise indicate white space within the <lines> element.
```
Attributes

The following attributes are available on this element: universal attributes (387), display attributes (392), and @xml:space (401).

Example

In the following code sample, a `<lines>` element contains the text of [Buffalo Bill’s], a poem by e. e. cummings:

```
Buffalo Bill’s
defunct
    who used to
    ride a watersmooth-silver
    stallion
and break one twofourofive pigeonsjustlikethat
    Jesus

he was a handsome man

and what i want to know is
how do you like your blue-eyed boy
Mister Death
```

10.3.2.23 `<longdescref>`

A long description reference is a reference to a textual description of a graphic or object. This is typically used to provide an extended description when the graphic or object is too complicated to describe with alternate text.

Attributes

The following attributes are available on this element: universal attributes (387), link-relationship attributes (392), and @keyref (396).

Examples

This section contains examples of how the `<longdescref>` element can be used.

Figure 105: `<longdescref>` which references a local DITA description

In the following code sample, the `<longdescref>` references a detailed image description that is stored in a DITA topic:

```
<image href="llama.jpg">
    <alt>Llama picture</alt>
    <longdescref href="my-pet-llama.dita"/>
</image>
```

Figure 106: `<longdescref>` which references an external description

In this code sample, the long description is stored remotely, on a external Web site:

```
<image href="puffin.jpg">
    <alt>Puffin picture</alt>
    <longdescref href="http://www.example.org/birds/puffin.html" scope="external" format="html"/>
</image>
```
10.3.2.24 <lq>
A long quotation is a quotation that contains one or more paragraphs. The title and source of the document that is being quoted can be specified.

Attributes
The following attributes are available on this element: universal attributes (387) and @keyref (396).

Example
The following code sample contains a quotation. The <cite> attribute specifies the title of the document that is quoted.

```xml
<p>This is the first line of the address that Abraham Lincoln delivered on November 19, 1863 for the dedication of the cemetery at Gettysburg, Pennsylvania.</p>
<lq>Four score and seven years ago our fathers brought forth on this continent a new nation, conceived in liberty, and dedicated to the proposition that all men are created equal. <cite>Gettysburg address</cite></lq>
```

10.3.2.25 <note>
A note is information that expands on or calls attention to a particular point.

Usage information
The nature of a note (for example, caution, danger, or warning) is indicated through the values selected for the @type attribute.

The values “danger”, “notice”, and “warning” have meanings that are based on ANSI Z535 and ISO 3864 regulations.

If @type is set to "other", the value of the @othertype attribute can be used as a label for the note. Many processors will require additional information on how to process the value.

Attributes
The following attributes are available on this element: universal attributes (387) and the attributes defined below.

@othertype
   Specifies an alternate note type. This value is used as the user-provided note label when the @type attribute value is set to “other”.

@type
   Specifies the type of a note. This differs from the @type attribute on many other DITA elements. The following are the allowable values:

   - attention
     Please pay extra attention to this note.

   - caution
     Care is required when proceeding.
danger
When used with the `<hazardstatement>` element, this indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

important
This note is important.

note
This is just a note.

notice
When used with the `<hazardstatement>` element, this indicates a potential situation which, if not avoided, might result in an undesirable result or state.

other
This is something other than a normal note.

remember
Don't forget to do what this note says.

restriction
You can't do what this note says.

tip
This is a fine little tip.

trouble
Provides information about how to remedy a trouble situation.

warning
Indicates a potentially hazardous situation. When used with the `<hazardstatement>` element, this indicates a situation which, if not avoided, could result in death or serious injury.

-dita-use-conref-target
See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

Example
The following code sample shows a `<note>` with @type set to "tip":

```xml
<note type="tip">Thinking of a seashore, green meadow, or cool mountain overlook can help you to relax and be more patient.</note>
```

10.3.2.26 <object>
The DITA `<object>` element corresponds to the HTML `<object>` element, and the attribute semantics derive from the HTML definitions. For example, the @type attribute differs from the @type attribute on many other DITA elements.

Usage information
The `<object>` element enables authors to include animated images, applets, plug-ins, video clips, and other multimedia objects in a topic.
Rendering expectations

080 (413) Processors SHOULD scale the object when values are provided for the @height and @width attributes. The following expectations apply:

- If a height value is specified and no width value is specified, processors SHOULD scale the width by the same factor as the height.
- If a width value is specified and no height value is specified, processors SHOULD scale the height by the same factor as the width.
- If both a height value and width value are specified, implementations MAY ignore one of the two values when they are unable to scale to each direction using different factors.

081 (413) When an object cannot be rendered in a meaningful way, processors SHOULD present the contents of the <fallback> element, if it is present.

Attributes

The following attributes are available on this element: universal attributes (387) and the attributes defined below.

@data
Contains a reference to the location of an object's data. If this attribute is a relative URL, it is specified relative to the document containing the <object> element. If this attribute is set, the @type attribute should also be set.

@datakeyref
Provides a key reference to the object. When specified and the key is resolvable, the key-provided URI is used. A key that has no associated resource, only link text, is considered to be unresolved. If @data is specified, it is used as a fallback when the key cannot be resolved to a resource.

@height
Specifies the vertical dimension for the resulting display. The value of this attribute is a real number expressed in decimal notation, optionally followed by a unit of measure. The following units of measurement are supported: cm, em, in, mm, pc, pt, and px (centimeters, ems, inches, millimeters, picas, points, and pixels, respectively). The default unit is px (pixels). Possible values include: “5”, “5in”, and “10.5cm”.

@name
Defines a unique name for the object.

@tabindex
Specifies the position of the object in tabbing order.

@type
Indicates the content type (MIME type) for the data specified by the @data or @datakeyref attribute. This attribute should be set when the @data attribute is set to avoid loading unsupported content types. Note that this differs from the @type attribute on many other DITA elements (it specifies a MIME type rather than a content type). If @type is not specified, the effective type value for the key named by the @datakeyref attribute is used as the this attribute’s value.

@usemap
Indicates that a client-side image map is to be used. An image map specifies active geometric regions of an included object and assigns a link to each region. When a link is selected, a document might be retrieved or a program might run on the server.
@width

Specifies the horizontal dimension for the resulting display. The value of this attribute is a real number expressed in decimal notation, optionally followed by a unit of measure. The following units of measurement are supported: cm, em, in, mm, pc, pt, and px (centimeters, ems, inches, millimeters, picas, points, and pixels, respectively). The default unit is px (pixels). Possible values include: "5", "5in", and "10.5cm".

Example

This section contains examples of how the `<object>` element can be used.

Figure 107: Referencing a web page for display in an HTML inline frame (iframe)

The following code sample shows how an `<object>` element can be used to render a web page in an inline frame. It assumes that the processing engine uses the `outputclass="iframe"` directive.

```
<object type="text/html"
    data="https://www.openstreetmap.org/export/embed.html?
    bbox=-0.004017949104309083%2C51.47612752641776
%2C0.00030577182769775396
%2C51.478569861898606
&layer=mapnik"
    width="800"
    height="600"
    id="map-uk-greenwich"
    outputclass="iframe">
<desc>Greenwich, England</desc>
<fallback><xref format="html" scope="external"
    href="https://www.openstreetmap.org/export/embed.html?
    bbox=-0.004017949104309083%2C51.47612752641776
%2C0.00030577182769775396
%2C51.478569861898606
&layer=mapnik"
    id="map-uk-greenwich"
    outputclass="iframe">
</object>
```

The above code might generate the following HTML:

```
<!DOCTYPE html>
<html>
<head>
<title>Test of Iframe</title>
</head>
<body>
<iframe src="https://www.openstreetmap.org/export/embed.html?
bbox=-0.004017949104309083%2C51.47612752641776
%2C0.00030577182769775396
%2C51.478569861898606
&layer=mapnik"
    id="map-uk-greenwich"
    outputclass="iframe">
<desc>Greenwich, England</desc>
</iframe>
</body>
</html>
```

Comment by eliot.kimber

The URL as shown works in my working example with the line breaks before the %2C escaped characters.
The following code sample shows how key definitions can be used to reference supporting resources for an `<object>`:

```
<object id="E5123_026.mp4"
       width="300" height="300">
    <fallback>Media not available.</fallback>
    <param name="poster" keyref="E5123_026_poster" />
    <param name="source" keyref="E5123_026_video" />
</object>
```

In this scenario, the keys could be defined as follows:

```
<map>
 <!-- ... -->
    <keydef keys="E5123_026_poster"
            href="/images/E5123_026_poster.png"
            type="video/mp4"/>
    <keydef keys="E5123_026_video"
            href="/media/E5123_026_poster.mp4"
            type="video/mp4"/>
 <!-- ... -->
</map>
```

The following code sample shows how key definitions can be used to reference the main content for an `<object>`:

```
<object id="cutkey370"
        datakeyref="cutkey370"
        height="280"
        width="370">
    <desc>Video illustration of how to cut a key</desc>
    <fallback>Media not available.</fallback>
    <param name="movie" keyref="cutkey370" />
    <param name="quality" value="high"/>
    <param name="bgcolor" value="#FFFFFF"/>
</object>
```

In this scenario, the keys could be defined as follows:

```
<map>
 <!-- ... -->
    <keydef keys="cutkey370"
            scope="external"
            href="https://www.example.com/cutkey370.swf"
            type="application/x-shockwave-flash"
            format="swf"/>
 <!-- ... -->
</map>
```
10.3.2.27 <ol>
An ordered list is a list of items that are sorted by sequence or order of importance.

Attributes
The following attributes are available on this element: universal attributes (387) and @compact (394).

Example
The following code sample shows the use of an ordered list:

```html
<p>Here is a list of the five longest-living people who were born in the 19th century:</p>
<ol>
  <li>Jeanne Calment (1875-1997)</li>
  <li>Sarah Knauss (1880-1999)</li>
  <li>Marie-Louise Meilleur (1880-1998)</li>
  <li>Emma Morano (1899-2017)</li>
  <li>Misao Okawa (1898-2015)</li>
</ol>
<p>Note that systematic verification has only been practised in recent years and only in certain parts of the world.</p>
```

10.3.2.28 <p>
A paragraph is a group of related sentences that support a central idea.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
The following code sample contains a paragraph:

```html
<p>A paragraph is a group of related sentences that support a central idea. Paragraphs typically consist of three parts: a topic sentence, body sentences, and a concluding or bridging sentence.</p>
```

10.3.2.29 <param>
The <param> (parameter) element specifies a set of values that might be required by an <object> at runtime.

Usage information
Any number of <param> elements might appear in the content of an <object> in any order, but must be placed at the start of the content of the enclosing object. This element is comparable to the HTML <param> element, and the attribute semantics derive from their HTML definitions. For example, the @type attribute differs from the @type attribute on many other DITA elements.

Processing expectations
The @keyref attribute on <param> has the following expectations:

1. When the key specified by @keyref is resolvable and has an associated URI, that URI is used as the value of this element (overriding @value, if that is specified).
2. When the key specified by `@keyref` is resolvable and has no associated resource (only link text), the `@keyref` attribute is considered to be unresolvable for this element. If `@value` is specified, it is used as a fallback.

3. When the key specified by `@keyref` is not resolvable, the value of the `@value` attribute is used as a fallback target for the `<param>` element.

**Attributes**

The following attributes are available on this element: universal attributes (387) and the attributes defined below.

- `@keyref`
  Specifies a key reference to the thing the parameter references.

- `@name` (REQUIRED)
  Specifies the name of the parameter.

- `@value`
  Specifies the value of a run-time parameter that is described by the `@name` attribute.

**Example**

See `<object>` (274).

10.3.2.30 `<ph>`

A phrase is a small group of words that stand together as a unit, typically forming a component of a clause.

**Usage information**

The `<ph>` element often is used to enclose a phrase for reuse or conditional processing.

The `<ph>` element frequently is used as a specialization base, to create phrase-level markup that can provide additional semantic meaning or trigger specific processing or formatting. For example, all highlighting domain elements are specializations of `<ph>`.

**Attributes**

The following attributes are available on this element: universal attributes (387) and `@keyref` (396).

**Example**

The following code sample shows `<ph>` elements that are used for conditional processing:

```
<p>The Style menu is the <ph product="Software1000"/>third item</ph>
<ph product="Software9000"/>fourth item</ph> from the left on the menu bar.</p>
```

10.3.2.31 `<pre>`

Preformatted text is text that contains line breaks and spaces that are intended to be preserved at publication time.

**Usage information**

The `<pre>` element is often used for ASCII diagrams and code samples. It is the specialization base for the `@codeblock` element in the Technical Content edition.
Rendering expectations

Processors \textbf{SHOULD} preserve line the breaks and spaces that are present in the content of a \texttt{<pre>} element.

Attributes

The following attributes are available on this element: \texttt{universal attributes} (387), \texttt{display attributes} (392), and \texttt{@xml:space} (401).

Example

The following code sample shows preformatted text that contains white space and line breaks. When the following code sample is published, the white space and line breaks are preserved.

\begin{verbatim}
<pre>
MEMO: programming team fun day
Remember to bring a kite, softball glove, or other favorite outdoor accessory to tomorrow's fun day outing at Zilker Park.
Volunteers needed for the dunking booth.
</pre>
\end{verbatim}

10.3.2.32 \texttt{<q>}

A quotation is a small group of words that is taken from a text or speech and repeated by someone other than the original author or speaker.

Rendering expectations

Processors add appropriate styling, such as locale-specific quotation marks, around the contents of the \texttt{<q>} element and render it inline.

Attributes

The following attributes are available on this element: \texttt{universal attributes} (387).

Example

In the following code sample, the \texttt{<q>} element contains a quotation. Note that no quotation marks are included; locale-specific quotation marks will be generated during processing.

\begin{verbatim}
<p>
George said, \texttt{<q>}Disengage the power supply before servicing the unit.\texttt{</q>}
</p>
\end{verbatim}

10.3.2.33 \texttt{<section>}

A section is an organizational division in a topic. Sections are used to organize subsets of information that are directly related to the topic.

Usage information

Multiple sections within a single topic do not represent a hierarchy, but rather peer divisions of that topic. Sections cannot be nested. \texttt{Sections can have titles}.

Note For maximum flexibility in creating specialization, sections allow plain text as well as phrase and block level elements. Because of the way XML grammars are defined within a DTD, any
element that allows plain text cannot restrict the order or frequency of other elements. As a result, the `<section>` element allows `<title>` to appear anywhere as a child of `<section>`. However, the intent of the specification is that `<title>` only be used once in any `<section>`, and when used, that it precede any other text or element content.

**Rendering expectations**

083 (413) Processors SHOULD treat the presence of more than one `<title>` element in a `<section>` element as an error.

**Attributes**

The following attributes are available on this element: universal attributes (387).

**Example**

The following code sample shows how element-reference topics in the DITA specification use titled sections to provide a consistent structure for grouping information:

```xml
<reference id="pb" xml:lang="en-us">
  <title>example</title>
  <shortdesc conkeyref="library-short-descriptions/p"/>
  <refbody>
    <section><title>Usage information</title>
      <p>...</p>
    </section>
    <section><title>Rendering expectations</title>
      <p>...</p>
    </section>
    <section><title>Processing expectations</title>
      <p>...</p>
    </section>
    <section><title>Specialization hierarchy</title>
      <p>...</p>
    </section>
    <section><title>Attributes</title>
      <p>...</p>
    </section>
    <example><title>Example</title>
      <p>...</p>
    </example>
  </refbody>
</reference>
```

10.3.2.34 `<sl>`

A simple list is a list that contains a few items of short, phrase-like content.

**Attributes**

The following attributes are available on this element: universal attributes (387) and @compact (394).

**Example**

The following code sample shows how a simple list could be used in a topic that discusses related modules:

```xml
<section>
  <title>Messages</title>
  <p>Messages from the ags_open module are identical with messages from:</p>
  <sl>
    <sli>ags_read</sli>
  </sl>
</section>
```
10.3.2.35 <sli>
A simple list item is a component of a simple list. A simple list item contains a brief phrase or text content, adequate for describing package contents, for example.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
See <sli> (279).

10.3.2.36 <term>
A term is a word or phrase that might have or require extended definitions or explanations.

Usage information
The @keyref attribute can be used to associate a term with a resource, typically a definition of the term. The @keyref attribute can also be used to supply the text content for <term> using standard @keyref processing for variable text.

Attributes
The following attributes are available on this element: universal attributes (387) and @keyref (396).

Example
The following code sample shows how the <term> element can be used:

```
<p>A <term>reference implementation</term> of DITA implements the standard, fallback behaviors intended for DITA elements.</p>
```

10.3.2.37 <text>
Text is a container for text with no associated semantics.

Usage information
The <text> element is primarily used as a base for specialization or to enable reuse. The <text> element can contain only text or nested <text> elements.

Attributes
The following attributes are available on this element: universal attributes (387).
Example

In the following code sample, the `<text>` element is used to contain text that is intended to be reused:

```xml
<p>This an example of <text id="reuse">Text that is reusable</text>, with no extra semantics attached to the text.</p>
```

10.3.2.38 `<tm>`

A trademark is a term or phrase that is trademarked. Trademarks include registered trademarks, service marks, slogans, and logos.

Usage information

The business rules for indicating and displaying trademarks differ from company to company. These business rules can be enforced by either authoring policy or processing.

Attributes

The following attributes are available on this element: universal attributes (387) and the attributes defined below.

@tmtype (REQUIRED)

Specifies the trademark type. Allowable values are:

- `tm` Trademark
- `reg` Registered trademark
- `service` Service mark

-dita-use-conref-target

See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

@trademark

Specifies the trademarked term.

@tmowner

Specifies the trademark owner, for example "OASIS".

@tmclass

Specifies the classification of the trademark. This can be used to differentiate different groupings of trademarks.

Example

The following code sample shows how a company might use the `<tm>` element:

```xml
<p>The advantages of using the
    <tm trademark="Acme" tmtype="reg">Acme</tm>
    <tm trademark="SuperFancyWidget" tmtype="tm">SuperFancyWidget</tm>
are well known to Bugs Bunny fans.</p>
```
10.3.2.39 <ul>
An unordered list is a list in which the order of items is not significant.

**Attributes**
The following attributes are available on this element: universal attributes (387) and @compact (394).

**Example**
The following code sample shows a list in which the order of items is unimportant:

```html
<p>Here are the countries that I have visited:</p>
<ul>
  <li>Germany</li>
  <li>France</li>
  <li>Japan</li>
  <li>Mexico</li>
</ul>
```

10.3.2.40 <xref>
A cross reference is an inline link. A cross reference can link to a different location within the current topic, another topic, a specific location in another topic, or an external resource such as a PDF or web page.

**Attributes**
The following attributes are available on this element: universal attributes (387), link-relationship attributes (392), and @keyref (396).

**Examples**
This section contains examples of how the <xref> element can be used.

**Figure 110: Cross reference to another topic, without link text**
The following code sample shows a cross reference to another topic. Link text is not provided. Processor typically use the topic title as the link text.

```html
<p>Background information about DITA is provided in <xref href="overview-of-dita.dita"/>.</p>
```

The same cross reference could be created using @keyref instead of @href. Using @keyref allows the link to be redirected to different resources when the topic is used in different contexts.

**Figure 111: Cross references with link text specified**
The following code sample shows a cross reference that specifies link text:

```html
<p>While this set of tutorials gives several simple examples of common DITA features, a comprehensive list of DITA features is available in the DITA specification <xref keyref="dita-conformance">conformance clause</xref>.</p>
```

**Figure 112: Cross reference to an external resource**
The following code sample shows a cross reference to a web page:

```html
<xref href="https://www.example.com/docview.wss?rs=757" scope="external" format="html">Part number SSVNX5</xref>
```
10.3.3 Multimedia elements

The multimedia elements are used to reference audio or video content. The elements in this domain are modeled on the HTML5 `<audio>` and `<video>` elements.

10.3.3.1 `<audio>`

Audio is sound that the human ear is capable of hearing.

Usage information

The `<audio>` element is modeled on the HTML5 `<audio>` element.

An audio resource can be referenced by @href, @keyref, and nested `<media-source>` elements.

Playback behaviors such as auto-playing, looping, and muting are determined by attributes. When not specified, the default behavior is determined by the user agent that is used to present the media.

Comment by Kristen J Eberlein on 16 November 2021

Need to add the following definition to spec terminology:

user agent
Software that retrieves and presents web content for end users or is implemented using Web technologies. User agents include web browsers, media players, and plug-ins, as well as operating system shells and web-enabled consumer electronics.

Rendering expectations

084 (413) | When an audio resource cannot be rendered in a meaningful way, processors SHOULD present the contents of the `<fallback>` element, if it is present.

Attributes

The following attributes are available on this element: universal attributes (387), format (link-relationship attributes) (396), href (link-relationship attributes) (396), keyref (396), scope (link-relationship attributes) (400), and the attributes defined below.

@autoplay
 Specifies whether the resource automatically plays when it is presented. The following values are recognized: "true", "false", and "-dita-use-conref-target ". The default value is "true".

@controls
 Specifies whether the presentation of the resource includes user interface controls. The following values are recognized: "true", "false", and "-dita-use-conref-target ". The default value is "true".

@loop
 Specifies whether the resource loops when played. The following values are recognized: "true", "false", and "-dita-use-conref-target ". The default value is "true".

@muted
 Specifies whether the resource is muted. The following values are recognized: "true", "false", and "-dita-use-conref-target ". The default value is "true".

@tabindex
 Specifies whether the audio resource can be focused and where it participates in sequential keyboard navigation. See @tabindex in the HTML specification (WHATWG version).
For this element:

- The `@format` attribute specifies the MIME type for the resource. This attribute enables processors to avoid loading unsupported resources. If `@format` is not specified and `@keyref` is specified, the effective type for the key named by the `@keyref` attribute is used as the value. If an explicit `@format` is not specified on either the `<audio>` element or key definition, processors can use other means, such as the URI file extension, to determine the effective MIME type of the resource.
- The `@href` attribute specifies the absolute or relative URI of the audio resource. If `@href` is specified, also specify `@format`.

Examples

**Figure 113: An `<audio>` element that uses direct addressing**

In the following code sample, an audio resource is referenced using direct addressing. The `@type` attribute specifies the MIME type of the audio resource.

```xml
<audio href="message.mp3" format="audio/mp3"/>
```

**Figure 114: An `<audio>` element that uses indirect addressing**

In the following code sample, the audio resource is addressed using a key reference:

```xml
<audio keyref="message"/>
```

Both the URI and the MIME type are specified on the key definition:

```xml
<keydef keys="message" href="message.mp3" format="audio/mp3"/>
```

**Figure 115: An `<audio>` element with multiple formats**

In the following code sample, `<media-source>` elements are used to specify the different audio formats that are available.

```xml
<audio>
  <media-source href="message.mp3" format="audio/mp3"/>
  <media-source href="message.wav" format="audio/wav"/>
</audio>
```

**Figure 116: Example of a complex `<audio>` element**

The following code sample specifies an audio resource and defines multiple presentational details. It also provides fallback behavior for when the audio resource cannot be rendered.

```xml
<audio autoplay="true" controls="true" loop="false" muted="false">
  <desc>A sound file narrating the performance of this procedure.</desc>
  <fallback>The audio track walking through this procedure is not available.</fallback>
  <!-- Multiple formats, with URI and MIME type referenced using a key -->
  <media-source keyref="walkthrough-mp3"/>
  <media-source keyref="walkthrough-wav"/>
</audio>
```
10.3.3.2 <media-source>
The media source specifies the location of an audio or video resource.

Usage information
The media source is modeled on the <source> element used in HTML5 media elements.

Rendering expectations
When multiple <media-source> elements are present, the user agent evaluates them in document order and selects the first resource that can be played.

Attributes
The following attributes are available on this element: universal attributes (387), format (link-relationship attributes) (396), href (link-relationship attributes) (396), keyref (396), and scope (link-relationship attributes) (400).

For this element, the @href attribute specifies the URI of the track resource.

Example
See <audio> (284) and <video> (288).

10.3.3.3 <media-track>
Media track settings specify the location of supplemental, text-based data for the referenced media, for example, subtitles or descriptions.

Usage information

Comment by Kristen J Eberlein on 22 April 2019
This topic currently uses all the following terms:

- Track resources
- Media track settings
- Track
- Track information

We need to pick our preferred terminology and stick with it.

The media track settings are modeled on the <track> element used in HTML5 media elements. They refer to track resources that use Web Video Text Track Format (WebVTT).

Attributes
The following attributes are available on this element: universal attributes (387), format (link-relationship attributes) (396), href (link-relationship attributes) (396), keyref (396), scope (link-relationship attributes) (400), and the attributes defined below.
@kind
Specifies the usage for the track resource. This attribute is modeled on the @kind attribute on the HTML5 <track> element, as described by the HTML specification, WHATWG version. The values for this attribute are derived from the HTML5 standard:

captions
Transcription or translation of the dialogue, sound effects, relevant musical cues, and other relevant audio information. This is intended for use when the soundtrack is unavailable, for example, because it is muted or because the user is hard-of-hearing. This information is rendered over the video and labeled as appropriate for hard-of-hearing users.

chapters
Chapter titles, which are intended to be used for navigating the media resource. The chapter titles are rendered as an interactive list in the interface for the user agent.

descriptions
Textual descriptions of the video component of the media resource. This is intended for audio synthesis when the visual component is unavailable, for example, because the user is interacting with the application without a screen or because the user is blind. Descriptions are synthesized as separate audio tracks.

metadata
Tracks intended for use from script. This metadata is not displayed by the user agent.

subtitles
Transcription or translation of the dialogue, suitable for when the sound is available but not understood, for example, because the user does not understand the language of the soundtrack. Subtitles are rendered over the video.

@dita-use-conref-target
See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

@srclang
Specifies the language of the track resource.

For this element, the @href attribute specifies the URI of the track resource.

Example
See Examples (288) in the <video> topic.

10.3.3.4 <video>
A video is a recording of moving visual images.

Usage information
The <video> element is modeled on the HTML5 <video> element.

A video resource can be referenced by @href, @keyref, and nested <media-source> elements. Playback behaviors such as auto-playing, looping, and muting are determined by attributes. When not specified, the default behavior is determined by the user agent that is used to present the media.

Rendering expectations
The video resource typically is rendered in the main flow of the content.
Processors **SHOULD** scale the video resource when values are provided for the `@height` and `@width` attributes. The following expectations apply:

- If a height value is specified and no width value is specified, processors **SHOULD** scale the width by the same factor as the height.
- If a width value is specified and no height value is specified, processors **SHOULD** scale the height by the same factor as the width.
- If both a height value and width value are specified, implementations **MAY** ignore one of the two values when they are unable to scale to each direction using different factors.

When a video resource cannot be rendered in a meaningful way, processors **SHOULD** render the contents of the `<fallback>` element, if it is present.

**Attributes**

The following attributes are available on this element: universal attributes (387), format (link-relationship attributes) (396), `href` (link-relationship attributes) (396), `keyref` (396), scope (link-relationship attributes) (400), and the attributes defined below.

**Comment by rodaande**

This list was significantly reworked when the element moved into the base vocabulary; need to validate that the list is still correct for LwDITA. Also: `href`, `keyref` were marked with platform=dita but that seems incorrect.

- **@autoplay**
  Specifies whether the resource automatically plays when it is presented. The following values are recognized: "true", "false", and "-dita-use-conref-target ". The default value is "true".

- **@controls**
  Specifies whether the presentation of the resource includes user interface controls. The following values are recognized: "true", "false", and "-dita-use-conref-target ". The default value is "true".

- **@height**
  Indicates the vertical dimension for the resulting display. The value of this attribute is a real number expressed in decimal notation, optionally followed by a unit of measure. The following units of measurement are supported: cm, em, in, mm, pc, pt, and px (centimeters, ems, inches, millimeters, picas, points, and pixels, respectively). The default unit is px (pixels). Possible values include: "5", "5in", and "10.5cm".

- **@loop**
  Specifies whether the resource loops when played. The following values are recognized: "true", "false", and "-dita-use-conref-target ". The default value is "true".

- **@muted**
  Specifies whether the resource is muted. The following values are recognized: "true", "false", and "-dita-use-conref-target ". The default value is "true".

- **@poster**
  Specifies the absolute or relative URI of the image that is rendered before video playback begins.

- **@posterkeyref**
  Specifies a key reference for the poster image.
@tabindex

Comment by rodaande
Need to add the linked version of the HTML spec into our resources.

Specifies whether the video resource can be focused and where it participates in sequential keyboard navigation. See @tabindex in the HTML specification (WHATWG version).

@width
Indicates the horizontal dimension for the resulting display. The value of this attribute is a real number expressed in decimal notation, optionally followed by a unit of measure. The following units of measurement are supported: cm, em, in, mm, pc, pt, and px (centimeters, ems, inches, millimeters, picas, points, and pixels, respectively). The default unit is px (pixels). Possible values include:"5", "5in", and "10.5cm".

For this element:

- The @format attribute specifies the MIME type for the resource. This attribute enables processors to avoid loading unsupported resources. If @format is not specified and @keyref is specified, the effective type for the key named by the @keyref attribute is used as the value. If an explicit @format is not specified on either the <video> element or key definition, processors can use other means, such the URI file extension, to determine the effective MIME type of the resource.
- The @href attribute specifies the absolute or relative URI of the video resource. If @href is specified, also specify @format.

Examples

This section contains examples of how the <video> element can be used.

Figure 117: Example of a <video> element that uses direct addressing

In the following code sample, a video resource is referenced using direct addressing. The @format attribute specifies the MIME type of the video.

```html
<video href="video.mp4" format="video/mp4"/>
```

Figure 118: Example of a <video> element that uses indirect addressing

In the following code sample, the video resource is addressed using a key reference:

```html
<video keyref="video"/>
```

The URI and the MIME type do not need to be specified on the <video> element, since they are specified on the key definition:

```html
<keydef keys="video" href="video.mp4" format="video/mp4"/>
```

Figure 119: Example of a <video> element with multiple formats

In the following code sample, <media-source> elements are used to specify the different video formats that are available.

```html
<video>
  <media-source href="video.mp4" format="video/mp4"/>
  <media-source href="video.ogg" format="video/ogg"/>
</video>
```
Figure 120: Example of a `<video>` element with multiple formats and multilingual subtitles

The following code sample defines multiple presentational details for a video that is available in multiple formats. The video is referenced using key reference and a fallback image is provided for use when the video cannot be displayed.

```xml
<video height="300px"
  loop="false"
  muted="false"
  poster="demo1-video-poster"
  width="400px">
  <desc>A video illustrating this procedure.</desc>
  <fallback>
    <image href="video-not-available.png">
      <alt>This video cannot be displayed.</alt>
    </image>
  </fallback>
  <!-- Multiple formats, referenced via key. The key definition specifies both the URI and the MIME type -->
  <media-source keyref="demo1-video-mp4"/>
  <media-source keyref="demo1-video-ogg"/>
  <media-source keyref="demo1-video-webm"/>
  <!-- Subtitle tracks in English, French and German. Each key definition provides a URI and sets type="subtitles". -->
  <media-track srclang="en" keyref="demo1-video-subtitles-en"/>
  <media-track srclang="fr" keyref="demo1-video-subtitles-fr"/>
  <media-track srclang="de" keyref="demo1-video-subtitles-de"/>
</video>
```

10.3.4 Indexing elements

The indexing elements provide content that a processor can use to generate an index.

10.3.4.1 `<index-see>`

An `<index-see>` element directs the reader to an index entry that the reader should use instead of the current one.

Usage information

There can be multiple `<index-see>` elements within an `<indexterm>` element.

Processing expectations

087 (414)  Processors SHOULD ignore an `<index-see>` element if its parent `<indexterm>` element contains any `<indexterm>` children.

Attributes

The following attributes are available on this element: universal attributes (387) and @keyref (396).
Examples
This section contains examples of how `<index-see>` elements can be used.

**Figure 121: Use of an `<index-see>` element**

The following code sample shows how an `<index-see>` element is used to refer readers to the preferred term:

```xml
<indexterm>Carassius auratus
  <index-see>goldfish</index-see>
</indexterm>
```

This markup will generate an index entry without a page reference. It might look like the following:

![Carassius auratus, see goldfish]

**Figure 122: Use of an `<index-see>` element to redirect to a multi-level index entry**

The following code sample shows how an `<index-see>` is used to redirect to a multilevel index entry:

```xml
<indexterm>feeding goldfish
  <index-see>goldfish
    <indexterm>feeding</indexterm>
  </index-see>
</indexterm>
```

### 10.3.4.2 `<index-see-also>`

An `<index-see-also>` element directs the reader to an index entry that the reader should use in addition to the current one.

#### Usage information

There can be multiple `<index-see-also>` elements within a single `<indexterm>` element.

#### Processing expectations

**088 (414)** Processors **SHOULD** ignore an `<index-see-also>` element if its parent `<indexterm>` element contains any `<indexterm>` children.

#### Attributes

The following attributes are available on this element: universal attributes (387) and `<keyref>` (396).

#### Examples

This section contains examples of how `<index-see-also>` elements can be used.

**Figure 123: Use of an `<index-see-also>` element**

The following code sample shows the use of an `<index-see-also>` element to generate a "see also" reference to the index entry for "goldfish".

```xml
<indexterm>carp
  <index-see-also>goldfish</index-see-also>
</indexterm>
```
This markup generates a primary index entry for "carp" and a redirection that instructs the reader to "see also goldfish".

**Figure 124: Use of an `<index-see-also>` element to redirect to a multilevel index entry**

The following code sample shows the use of an `<index-see-also>` element to redirect to a multilevel `<indexterm>` element:

```xml
<indexterm>feeding
  <index-see-also>goldfish
    <indexterm>feeding</indexterm>
  </index-see-also>
</indexterm>
```

### 10.3.4.3 `<indexterm>`

An `<indexterm>` element contains content that is used to produce an index entry in a generated index. Nested `<indexterm>` elements create multi-level indexes.

**Rendering expectations**

The content of `<indexterm>` entries is not rendered in the flow of body text; it is rendered only as part of a generated index.

**Attributes**

The following attributes are available on this element: universal attributes (387), `@keyref` (396), and the attributes defined below.

- `@start`
  - Specifies an identifier that indicates the start of an index range.

- `@end`
  - Specifies an identifier that indicates the end of an index range.

**Examples**

This section contains examples of how `<indexterm>` elements can be used.

**Figure 125: Index reference to a point within in a topic**

When index entries are placed in the body of a topic, they serve as point references to their location in the topic.

In the following code sample, the `<indexterm>` element provides a point reference to the beginning of the paragraph.

```xml
<p><indexterm>databases</indexterm>Databases are used to ...</p>
```

**Figure 126: Index entries within topic prologues or DITA maps**

When index entries are located within the `<prolog>` element in a topic or the `<topicmeta>` element in a DITA map, they serve as point references to the start of the topic.

In the following code sample, the `<indexterm>` element provides a reference to the topic as a whole; the generated index entry is associated with the start of the `<title>` element.

```xml
<topic id="about-databases">
  <title>About databases</title>
  <prolog>
    <metadata>
```
The effect is the same as if the `<indexterm>` element had been located in the map:

```xml
<map>
  <topicref href="aboutdatabases.dita">
    <topicmeta>
      <keywords>
        <indexterm>databases</indexterm>
      </keywords>
    </topicmeta>
  </topicref>
  <!-- ... -->
</map>
```

**Figure 127: A simple index range**

A simple index range will look something like this:

```xml
<indexterm start="cheese">cheese</indexterm>
<!-- ... additional content -->
<indexterm end="cheese"/>
```

This markup will generate a top-level index term for "cheese" that covers a series of pages, such as:

cheese 18-24

**Figure 128: A more complex index range**

Specifying a range for nested terms is similar. In this sample, the range is specified for the tertiary index entry "pecorino":

```xml
<indexterm>cheese
  <indexterm>sheeps milk
    <indexterm start="level-3-pecorino">pecorino</indexterm>
  </indexterm>
</indexterm>
<!-- ... additional content ... -->
<indexterm end="level-3-pecorino"/>
```

### 10.3.5 Related links elements

The related links elements define, group, and describe hyperlinks that are embedded in a DITA topic. The links are contained by the `<related-links>` element and apply to the DITA topic as a whole.

#### 10.3.5.1 <link>

A link is a reference to another DITA topic or a non-DITA resource.

**Processing expectations**

When displayed, links are typically sorted based on their attributes, which define the type or role of the link target in relation to the current topic.
Attributes

The following attributes are available on this element: universal attributes (387), @keyref (396), link-relationship attributes (392), @otherrole (397), and @role (398).

Example

The following code sample shows a simple collection of links in a DITA topic. There are four links: two to DITA topics and two to HTML pages. The <linktext> element provides link text for the HTML pages, and the <desc> element contain text that describes the resource that the link targets.

```
<related-links>
  <link href="covid-19.dita"/>
  <link href="covid-19-testing.dita"/>
  <link format="html" href="covid-19-nc.html">
    <linktext>COVID-19 in North Carolina</linktext>
  </link>
  <link format="html" href="239fh49.html#resources">
    <linktext>Public health resources in Durham, NC</linktext>
    <desc>When you work as a contact tracer, you need to know ...</desc>
  </link>
</related-links>
```

10.3.5.2 <linkinfo>

Link information is a description of the links that are contained in a <linklist> element. It can provide additional information about those links.

Rendering expectations

The <linkinfo> element is considered part of the content flow and typically rendered as a paragraph.

Attributes

The following attributes are available on this element: universal attributes (387).

Example

See <linklist> (294).

10.3.5.3 <linklist>

A link list is an author-ordered group of links that can include a title.

Processing expectations

Attributes that cascade between topic references in a map, such as the @scope and @format attributes, also cascade from this element to contained links.

Rendering expectations

When rendering links, processors preserve the order of links that are specified within <linklist> elements.
Attributes

The following attributes are available on this element: universal attributes (387), @collection-type (394), @duplicates (395), @format (396), @otherrole (397), @role (398), @scope (400), and @type (400).

Example

The following code sample shows how the `<linklist>` element is used to construct a list of related links. The `<linkinfo>` element provides additional information about the list of links.

```xml
<linklist>
  <title>Repairing widgets</title>
  <link href="debug.dita"/>
  <link href="repair.dita"/>
  <link href="test.dita"/>
  <linkinfo>To repair a reciprocating widget, follow the instructions carefully and in the specified order.</linkinfo>
</linklist>
```

10.3.5.4 `<linkpool>`

A link pool is a group of links. The order that the links are rendered in the output is determined by the processor.

Rendering expectations

The order in which links in a `<linkpool>` element are rendered is processor-specific. A processor might sort links based on role or type. A processor might move or remove links based on the context. For example, prerequisite links might be rendered at the beginning of a Web page, or links to the next topic might be removed if the two topics are rendered on the same page in a PDF.

Processing expectations

Attributes that cascade between topic references in a map, such as the `@scope` and `@format` attributes, also cascade from this element to contained links.

Attributes

The following attributes are available on this element: universal attributes (387), @collection-type (394), @duplicates (395), @format (396), @otherrole (397), @role (398), @scope (400), and @type (400).

Example

The following code sample shows how a `<linkpool>` element is used to group a set of conceptual information. The order in which the links are rendered in the output is processor-dependent. In this example, the `@type` attribute on the `<linkpool>` element cascades to nested `<link>` elements.

```xml
<related-links>
  <linkpool type="concept">
    <link href="czez.dita#czez" role="next"/>
    <link href="czunder.dita"/>
    <link href="czesqlj.htm#sqljemb" format="html" role="parent">
      <linktext>Overview of the CZ</linktext>
    </link>
    <link href="czez.dita#czez" format="html" role="parent">
      <linktext>Working with CZESQLJ</linktext>
      <desc>When you work with CZESQLJ, you need to know...</desc>
  </linkpool>
```

standards-track-work-product
10.3.5.5 <linktext>

Link text is the label for a link or resource.

Usage information

The <linktext> element provides descriptive text for a link. It is most commonly used when the target cannot be resolved during processing or when a title for the reference cannot be determined by a processor. For example, link text might be required when the link is to a peer, external, or non-DITA resource.

Rendering expectations

When a link contains a <linktext> element, the content of the <linktext> element is rendered instead of the text that retrieved from the resource.

Attributes

The following attributes are available on this element: universal attributes (387).

Example

The following code sample shows how a <linktext> element can be used to provide link text for a related link to a non-DITA resource:

```
<related-links>
  <link href="SQLJ-example.html" format="html" scope="local">
    <linktext>Accessing relational data with SQLJ</linktext>
  </link>
</related-links>
```

10.3.6 Table elements

DITA topics support two types of tables: complex table and simple table.

The <table> element uses the OASIS Exchange Table Model, a simplification of the CALS table model. The complex table provides a wide variety of controls over the display properties of the data and even the table structure itself.

The <simpletable> element is structurally less complex than the <table> element and so is an easier base for specialization. It reflects a content model that is close to the HTML table. The <simpletable> element does not provide much control over formatting, although it permits titles and row and column spanning.
10.3.6.1 <colspec>
A column specification provides information about a single column in a table that is based on the OASIS Exchange Table Model. The information might include a column name and number, cell content alignment, or column width.

Attributes
The following attributes are available on this element: universal attributes (387) (without the metadata attribute group), @align (392), @base (388), @char (393), @charoff (393), @colsep (394), @rowheader (399), @rowsep (399), and the attributes defined below.

@colnum
Specifies the number of the column in the table, where 1 represents the first logical column.

@colname
Specifies a name for the column. The <entry> element can use the @colname attribute to refer to the column.

@colwidth
Specifies the column width. Valid values are either a proportional or fixed measure:

Proportional measure
Specifies the width of each column in relationship to the width of the other columns. The value is a space-separated list of relative column widths. Each column width is specified as a positive integer or decimal number followed by an asterisk character.

Fixed measure
A value of a coefficient followed by a unit of measurement. The coefficients are positive integers or fixed point numbers. The fixed unit values are case-insensitive. The allowed units of measure are cm (centimeters), in (inches), pi (picas), and pt (points). The default unit of measure is pt.

If the @colwidth attribute is not specified or is empty, a proportional measure of "1*" is assumed.

Example
See <table> (302).

10.3.6.2 <entry>
A table entry represents a single cell in a table that is based on the OASIS Exchange Table Model.

Attributes
The following attributes are available on this element: universal attributes (387) (without the metadata attribute group), @align (392), @base (388), @char (393), @charoff (393), @colsep (394), @rev (390), @rowsep (399), @valign (400), and the attributes defined below.

@colname
Specifies the column name in which an entry is found. The value is a reference to the @colname attribute on the <colspec> element.

@headers
Specifies which entries in the current table provide headers for this cell. The @headers attribute contains an unordered set of unique, space-separated tokens, each of which is an ID reference of an entry from the same table.
@nameend
Specifies the last logical column that is included in a horizontal span. The value is a reference to the
@colname attribute on the <colspec> element.

@namest
Specifies the first logical column that is included in a horizontal span. The value is a reference to the
@colname attribute on the <colspec> element.

@morerows
Specifies the number of additional rows to add in a vertical span.

@rotate
Specifies whether the contents of the entry are rotated. The following values are valid:

0
Indicates that no rotation occurs.

1
Indicates that the contents of the cell are rotated 90 degrees counterclockwise.

-dita-use-conref-target
See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

@scope
Specifies that the current entry is a header for other table entries. The following values are valid:

col
Indicates that the current entry is a header for all cells in the column.

colgroup
Indicates that the current entry is a header for all cells in the columns that are spanned by this
entry.

row
Indicates that the current entry is a header for all cells in the row.

rowgroup
Indicates that the current entry is a header for all cells in the rows that are spanned by this entry.

-dita-use-conref-target
See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

Example
See <table> (302).

10.3.6.3 <row>
A table row is a single row in a table that is based on the OASIS Exchange Table Model.

Attributes
The following attributes are available on this element: universal attributes (387), @rowsep (399) and
@valign (400).

Example
See <table> (302).
10.3.6.4 <simpletable>

A simple table is a basic tabular environment that is designed to present organized content.

Usage information

The <simpletable> element is designed for close compatibility with HTML5 tables. It can contain a title and allows column and row spanning. The @keycol attribute indicates the key column. A key column contains content that represents the key to the tabular structure.

The <simpletable> element can also be used as the base for specialized structures, such as the property and choice tables that are available in the Technical Content edition.

Rendering expectations

When a key column is specified for a simple table, it is treated as a vertical header.

Attributes

The following attributes are available on this element: universal attributes (387), display attributes (392), and simpletable attributes (392).

Examples

This section contains examples of how the <simpletable> element can be used.

Figure 129: Example of a simple table

The following code sample shows a simple table that contains menu items and prices:

```xml
<simpletable>
  <sthead>
    <stentry>Menu item</stentry>
    <stentry>Price</stentry>
  </sthead>
  <strow>
    <stentry>Apple pie</stentry>
    <stentry>$7.00</stentry>
  </strow>
  <strow>
    <stentry>Cheese sandwich</stentry>
    <stentry>$10.00</stentry>
  </strow>
  <strow>
    <stentry>Milk shake</stentry>
    <stentry>$6.50</stentry>
  </strow>
</simpletable>
```

The simple table might be rendered in the following way:
The following code sample shows a simple table that tracks meals. The table has a title and column and row spans.

```xml
<simpletable>
  <title>Food log for Wednesday</title>
  <sthead>
    <stentry>Meal</stentry>
    <stentry>Food</stentry>
  </sthead>
  <strow>
    <stentry colspan="2">Fasting period</stentry>
  </strow>
  <strow>
    <stentry>Lunch</stentry>
    <stentry rowspan="2">Pasta</stentry>
  </strow>
  <strow>
    <stentry>Dinner</stentry>
  </strow>
</simpletable>
```

The simple table might be rendered in the following way:

![Table: Food log for Wednesday]

```
<table>
<thead>
<tr>
<th>Meal</th>
<th>Food</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting period</td>
<td></td>
</tr>
<tr>
<td>Lunch</td>
<td>Pasta</td>
</tr>
<tr>
<td>Dinner</td>
<td></td>
</tr>
</tbody>
</table>
```

The following code sample shows a simple table that contains information about the caloric content and prices of menu items. The `@keycol` attribute indicates that the first column, which contains the menu items, is the key column.

```xml
<simpletable keycol="1">
  <sthead>
    <stentry>Menu item</stentry>
    <stentry>Calories</stentry>
    <stentry>Price</stentry>
  </sthead>
  <strow>
    <stentry>Chicken dish</stentry>
    <stentry>850</stentry>
    <stentry>$12.00</stentry>
  </strow>
  <strow>
    <stentry>Vegetarian dish</stentry>
    <stentry>525</stentry>
    <stentry>$9.00</stentry>
  </strow>
</simpletable>

![Figure 131: Example of a simple table that uses @keycol]
This simple table might be rendered in the following way:

<table>
<thead>
<tr>
<th>Menu item</th>
<th>Calories</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicken dish</td>
<td>850</td>
<td>$12.00</td>
</tr>
<tr>
<td>Vegetarian dish</td>
<td>525</td>
<td>$9.00</td>
</tr>
<tr>
<td>Vegan dish</td>
<td>475</td>
<td>$7.00</td>
</tr>
</tbody>
</table>

In the sample rendering, the content of the key column is highlighted with bold formatting. However, note that rendering of the key column is left up to the implementation.

### 10.3.6.5 <stentry>
A simple table entry represents a single cell within a simple table.

#### Attributes
The following attributes are available on this element: universal attributes (387) and the attributes defined below.

- **@colspan**
  Specifies the number of columns that a cell is to span inside a simple table.

- **@headers**
  Specifies which entries in the current table provide headers for this cell. The `@headers` attribute contains an unordered set of unique, space-separated tokens, each of which is an ID reference of an entry from the same table.

- **@rowspan**
  Specifies the number of rows that a cell is to span inside a simple table.

- **@scope**
  Specifies that the current entry is a header for other table entries. The following values are valid:
    - **col**
      Indicates that the current entry is a header for all cells in the column.
    - **colgroup**
      Indicates that the current entry is a header for all cells in the columns that are spanned by this entry.
    - **row**
      Indicates that the current entry is a header for all cells in the row.
    - **rowgroup**
      Indicates that the current entry is a header for all cells in the rows that are spanned by this entry.

- **-dita-use-conref-target**
  See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

#### Example
See `<simpletable>` (298).
10.3.6.6 <sthead>
A simple table header is an optional header row for a simple table.

Usage information

Comment by Kristen J Eberlein on 21 December 2021
This topic needs to mention the role that table headers play in ensuring that content is accessible. It should link to the new material (not yet developed) about accessibility.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
See <simpletable> (298).

10.3.6.7 <strow>
A simple table row is a single row in a simple table.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
See <simpletable> (298).

10.3.6.8 <table>
A table based on the OASIS Exchange Table Model organizes arbitrarily complex relationships of tabular information. This standard table markup provides a wide variety of controls over the display properties of the data and even the table structure itself.

Usage information
The <table> element is based on the OASIS Exchange Table Model. However, it is augmented with DITA attributes that enable accessibility, content reference, specialization, and more.

An optional <title> inside the <table> element provides a caption to describe the table. In addition, the optional <desc> element enables a table description.

See 10.3.6.4 simpletable (298) for a simplified table model that is closely aligned with the HTML5 table model, and which can be easily specialized.

For <table>, in place of the @expanse attribute that is used by other DITA elements, the @pgwide attribute is used in order to conform to the OASIS Exchange Table Model.

Rendering expectations
If a <table> element contains a <desc> element, the content of the <desc> element is rendered as part of the content flow.
Attributes

The following attributes are available on this element: universal attributes (387), @colsep (394), @frame (396), @rowheader (399), @rowsep (399), @scale (399), and the attributes defined below.

@orient

Specifies the orientation of the table in page-based output formats. This attribute is primarily useful for print-oriented display. The following values are valid:

port

Indicates portrait page orientation. The page is oriented with its long side vertical and its short side horizontal.

land

Indicates landscape page orientation. The page is oriented with its long side horizontal and its short side vertical.

@dita-use-conref-target

See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

@pgwide

Specifies the horizontal placement of the element for print-oriented rendering. The following values are valid:

0

Aligns the element with the left margin of the current text line and takes indentation into account

1

Places the element on the left page margin

Example

The following code sample shows a table that is used to provide reference information about animals and gestation:

```xml
<table>
  <tgroup cols="2">
    <colspec colwidth="121*"/>
    <colspec colwidth="76*"/>
    <thead>
      <row>
        <entry valign="top">Animal</entry>
        <entry valign="top">Gestation (in months)</entry>
      </row>
    </thead>
    <tbody>
      <row>
        <entry>Elephant (African and Asian)</entry>
        <entry>19-22</entry>
      </row>
      <row>
        <entry>Giraffe</entry>
        <entry>15</entry>
      </row>
      <row>
        <entry>Rhinoceros</entry>
        <entry>14-16</entry>
      </row>
      <row>
        <entry>Hippopotamus</entry>
        <entry>7 1/2</entry>
      </row>
    </tbody>
  </tgroup>
</table>
```
The formatted output might be rendered in the following way:

<table>
<thead>
<tr>
<th>Animal</th>
<th>Gestation (in months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elephant (African and Asian)</td>
<td>19-22</td>
</tr>
<tr>
<td>Giraffe</td>
<td>15</td>
</tr>
<tr>
<td>Rhinoceros</td>
<td>14-16</td>
</tr>
<tr>
<td>Hippopotamus</td>
<td>7 1/2</td>
</tr>
</tbody>
</table>

In this example, the use of the `<thead>` element for the header enables processors or screen readers to identify a header relationship between any cell in the table body and the matching header cell above that column.

10.3.6.9 `<tbody>`
A table body is a collection of rows in a table that is based on the OASIS Exchange Table Model. It contains the table rows that contain content.

Attributes
The following attributes are available on this element: universal attributes (387) and `@valign` (400).

Example
See `<table>` (302).

10.3.6.10 `<tgroup>`
A table group is a grouping element that contains column specifications, a table header, and the table body in a table that is based on the OASIS Exchange Table Model.

Attributes
The following attributes are available on this element: universal attributes (387), `@align` (392), `@colsep` (394), `@rowsep` (399), and the attribute defined below.

`@cols` (REQUIRED)
Specifies the number of columns in a table group.

Example
See 10.3.6.8 table (301).

10.3.6.11 `<thead>`
A table header contains one or more header rows in a table that is based on the OASIS Exchange Table Model.

Usage information

Comment by Kristen J Eberlein on 21 December 2021
This topic needs to mention the role that table headers play in ensuring that content is accessible. It should link to the new material (not yet developed) about accessibility.
**Attributes**
The following attributes are available on this element: universal attributes (387) and @valign (400).

**Example**
See `<table>` (302).

### 10.4 Map elements
Map elements include the core components of DITA maps, such as the `<topicref>` and `<reltable>` elements.

#### 10.4.1 Basic map elements
DITA maps are built from a few core elements that are used for referencing and organizing topics. In addition, the `<topicmeta>` element can be used to specify metadata for the map, individual topics, or groups of topics.

#### 10.4.1.1 `<keytext>`
Key text is variable or link text that is used when resolving key references. It also specifies alternate text for images that are referenced by keys.

**Processing expectations**
See 6.4.12 Processing key references to generate text or link text (104).

**Attributes**
The following attributes are available on this element: universal attributes (387).

**Examples**
This section contains examples of how the `<keytext>` element can be used.

**Figure 132: Simple example**
The following code sample shows a variable-text definition that includes highlighting elements:

```xml
<keydef keys="company-name">
  <topicmeta>
    <keytext translate="no">
      <i>Super</i> Widget Squared<sup>2</sup>
    </keytext>
  </topicmeta>
</keydef>
```

**Figure 133: Alternate text for an image**
DITA implementations often reference images using keys. In such cases, the `<keytext>` element provides the alternate text for the image. The following code sample shows the markup for the `<keytext>` element:

```xml
<keydef keys="company-logo" href="images/logo.jpg" format="jpg">
  <topicmeta>
    <keytext>Acme Widgets logo</keytext>
  </topicmeta>
</keydef>
```
The image can be referenced by `<image keyref="company-logo"/>`. When rendered to mediums that support alternate text, the effective alternative text for the image is "Acme Widgets logo" as though a literal `<alt>` element had been a child of the `<image>`.

**Figure 134: Processing logic**

The following code sample shows a key definition that includes several elements within the `<topicmeta>` element:

```xml
<keydef href="http://www.example.com" keys="company-name" format="html" scope="external">
  <topicmeta>
    <keytext>Acme Tools</keytext>
    <navtitle>Acme Tools web site</navtitle>
    <linktitle>Acme Tools Web Portal</linktitle>
  </topicmeta>
</keydef>
```

Once processed, the effective text content of both `<ph keyref="company-name"/>` and `<xref keyref="company-name"/>` is "Acme Tools". This is because of the rules for how processors resolve key references to generate text or link text.

To set distinct text values for both the company name and the link text that is associated with the company Web site, use two different keys.

### 10.4.1.2 `<map>`

A DITA map is the mechanism for aggregating topic references and defining a context for those references. It contains references to topics, maps, and other resources. These references are organized into hierarchies, groups, and tables.

#### Usage information

**Comment by Kristen J Eberlein on 02 December 2021**

Most of the information below was authored for DITA 1.0 and subsequently edited.

Zoe Lawson identified a key problem with this information; it does not discuss key definition or key resolution. If this section is going to contain all this info about navigation relationships, then it really also needs to discuss keys.

And then the example should illustrate not just a DITA map creating navigational hierarchy, but also a map that references a key-definition map.

A map describes the relationships among a set of DITA topics. The following are some types of relationships that can be described in a map:

**Hierarchical**

Nested topics create a hierarchical relationship. The topic that does the nesting is the parent, and the topics that are nested are the children.

**Ordered**

Child topics can be labeled as having an ordered relationship, which means they are referenced in a definite sequence.

**Family**

Child topics can be labeled as having a family relationship, which means they all refer to each other.
In addition, a DITA map can contain relationship tables. Relationship tables can define relationships between resources that are not directly related based on their location in the navigation structure.

Comment by Kristen J Eberlein on 10 November 2021

I moved this content about titles in maps from "Rendering expectations," where I do not think it belonged. I think we probably ought to be clearer about the scenarios in which titles are rendered; certainly users get confused about this. And do we cover processing expectations for submaps somewhere?

The `<title>` element can be used to provide a title for the map. In some scenarios the title is purely informational and is present only as an aid to the author. In other scenarios, the title might be useful or even required. In a map referenced by another map, the title might be discarded as topics from the submap are aggregated into a larger publication.

Rendering expectations

When rendering a map, processors might make use of the relationships defined in the map to create a table of contents (TOC), aggregate topics into a PDF document, or create links between topics in the output.

Processing expectations

See 5 DITA map processing (50).

Attributes

The following attributes are available on this element: universal attributes (387), common map attributes (392), architectural attributes (391), `@type` (400), `@scope` (400), and `@format` (396).

Example

The following code sample contains four `<topicref>` elements. The `<topicref>` elements are nested and so have a hierarchical relationship. The file widget.dita is the parent topic, and the other topics are its children. The hierarchy could be used to generate a PDF, a navigation pane in a web-based information system, a summary of the topics, or related links between the parent topic and its children.

```xml
<map id="widget-setup">
  <title>Widget set up</title>
  <topicref href="widget.dita">
    <topicref href="widget-installation.dita"/>
    <topicref href="widget-configuration.dita"/>
    <topicref href="widget-integration.dita"/>
  </topicref>
</map>
```

10.4.1.3 `<navref>`

A navigation reference is a reference to another map that is preserved as a transcluding link in the result deliverable, rather than resolved when the deliverable is produced. Output formats that support such linking can integrate the referenced resource when displaying the referencing map to an end user.

Usage information

The `<navref>` element is intended as a reference to a navigation resource that can be resolved at rendering time. It enables DITA maps to be published into a web-based information system where the
referenced navigation is published independently (or might not be available at all). If available, the referenced navigation can then be resolved at rendering time.

**Attributes**

The following attributes are available on this element: universal attributes (387) and the attribute defined below.

@mapref

Specifies the URI of the map file or non-DITA resource to be referenced. It might reference a DITA map or a resource that is appropriate for a target help system. For example, it could reference an XML TOC file for use with Eclipse help.

**Example**

In the following code sample, the map titled “MyComponent tasks” references the maps othermap2.ditamap and othermap3.ditamap:

```dita
<map>
  <title>MyComponent tasks</title>
  <navref mapref="../com.example.plugin.xml.doc/othermap1.ditamap"/>
  <navref mapref="../com.example.plugin.xml.doc/othermap2.ditamap"/>
</map>
```

**10.4.1.4 <relcell>**

A cell in a relationship table is a group of one or more topic references that are related to the topic references in other cells of the same row.

**Usage information**

A relationship table cell does not imply a relationship between topics or resources that are referenced in the same cell, unless the @collection-type attribute set on the cell indicates that they are related.

**Attributes**

The following attributes are available on this element: universal attributes (387) and common map attributes (392) (without @keyscope), @type (400), @scope (400), @format (396).

**Example**

See `<reltable>` (311).

**10.4.1.5 <relcolspec>**

A column specification in a relationship table column that provides default attribute values for the references in that column of a relationship table.

**Usage information**

You can use the `<relcolspec>` element to set default values for the attributes of the topics that are referenced in the column. For example, when you set the @type attribute to “concept”, all `<topicref>` elements in the column that do not have a @type attribute specified are treated as concepts.

Adding a `<topicref>` element to the `<relcolspec>` element defines a relationship between the topics that are contained within the `<relcolspec>` element and the topics that are referenced in the column of the relationship table. Note that this does not define a relationship between two cells in the same column.
Rendering expectations

When a `<title>` element exists inside of the `<relcolspec>` element, the content of the `<title>` element is intended to be used as the label for the related links that are defined and generated by the column. If the `<title>` element is not present, the labels for the related links are generated in the following ways:

- If the `<relcolspec>` element contains a `<topicref>` element that specifies a navigation title, that navigation title is used for the label.
- If the `<relcolspec>` element contains a `<topicref>` element that does not specify a navigation title but does reference a DITA topic, the label is derived from the navigation title of the referenced topic or, lacking that, the title of the topic.
- If no title is specified and no `<topicref>` is present in the `<relcolspec>`, a rendering tool might choose to generate a title for the links generated from that column.

Processing expectations

When values are specified for attributes of `<relcell>` or `<relrow>` elements, those values override those defined for `<relcolspec>` attributes. Values specified for attributes of `<relcolspec>` elements override those defined for the `<reltable>` element.

Attributes

The following attributes are available on this element: universal attributes (387) and common map attributes (392) (without `@keyscope` or `@collection-type`), `@type` (400), `@scope` (400), and `@format` (396).

Examples

The following section contains examples of how the `<relcolspec>` element can be used.

Figure 135: Enforcing concept, type, and reference types with `<relcolspec>`

The following code sample shows how a `<relcolspec>` element can be used to define the types of topics that are referenced in a column. Three cells are defined within one row. The first cell contains one concept topic: `puffins.dita`. The second cell contains two task topics: `puffinFeeding.dita` and `puffinCleaning.dita`. The third cell contains a reference topic: `puffinHistory.dita`. Setting the `@type` on each column allows (but does not require) processors to validate that the topics in each column are of the expected type.

```xml
<map>
  <reltable>
    <relheader>
      <relcolspec type="concept"/>
      <relcolspec type="task"/>
      <relcolspec type="reference"/>
    </relheader>
    <relrow>
      <relcell><topicref href="puffins.dita"/></relcell>
      <relcell>
        <topicref href="puffinFeeding.dita"/>
        <topicref href="puffinCleaning.dita"/>
      </relcell>
      <relcell>
        <topicref href="puffinHistory.dita"/>
      </relcell>
    </relrow>
  </reltable>
</map>
```
Figure 136: Relationship table column headers with topics and titles

The following code sample shows how topics and titles can be specified in a column header for relationship table column header:

```dita
<reltable>
  <relheader>
    <relcolspec type="task">
      <topicref href="tbs.dita">
        <topicmeta><navtitle>Troubleshooting</navtitle></topicmeta>
      </topicref>
    </relcolspec>
    <relcolspec type="reference">
      <topicref href="msg.dita">
        <topicmeta><navtitle>Messages</navtitle></topicmeta>
      </topicref>
    </relcolspec>
  </relheader>
  <relrow>
    <relcell>
      <topicref href="debug_login.dita"/>
      <topicmeta><linktitle>Debugging login errors</linktitle></topicmeta>
    </topicref>
  </relcell>
  <relcell>
    <topicref href="login_error_1.dita">
      <topicmeta><linktitle>Login not found</linktitle></topicmeta>
    </topicref>
  </relcell>
  <relrow>
    <relcell>
      <topicref href="checking_access.dita">
        <topicmeta><linktitle>Checking access controls</linktitle></topicmeta>
      </topicref>
    </relcell>
    <relcell>
      <topicref href="login_error_2.dita">
        <topicmeta><linktitle>Login not allowed</linktitle></topicmeta>
      </topicref>
    </relcell>
  </relrow>
</reltable>
```

In addition to the relationships defined by the rows in the relationship table, the following relationships are now defined by the columns in the relationship table:

- `tbs.dita <--> debug_login.dita`
- `tbs.dita <--> checking_access.dita`
- `msg.dita <--> login_error_1.dita`
- `msg.dita <--> login_error_2.dita`

Ignoring the headers for a moment, the `<reltable>` here would ordinarily define a two-way relationship between `debug_login.dita` and `login_error1.dita`. This typically will be expressed as a link from each to the other. An application might render the link with a language-appropriate heading such as "Related reference", indicating that the target of the link is a reference topic.

The headers change this by specifying a new title. In the second column, the `<topicref>` specifies a title of "Messages", which should now be used together with the link to anything in that column. So, a generated link from `debug_login.dita` to `login_error1.dita` should be rendered together with the title of "Messages". How this is rendered together with the link is up to the application.
10.4.1.6 <relheader>
A header row in a relationship table is a group of column definitions for a relationship table.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
See <reltable> (311).

10.4.1.7 <relrow>
A row in a relationship table creates a relationship between the cells in that row, which is often expressed in output as links between the topics or resources that are referenced in those cells.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
See <reltable> (311).

10.4.1.8 <reltable>
A relationship table is a mechanism that creates relationships among topics, based on the familiar table model of rows, columns, and cells.

Usage information
Relationship tables can be used in conjunction with hierarchies and groups to manage all the related links in an information set.

Each column in a relationship table typically represents a specific role in a set of relationships, and each row defines relationships between the resources that are referenced in the different cells of that row.

A frequently-used type of relationship table uses the following structure:

- The first column contains references to task topics.
- The second column contains references to concept topics.
- The third column contains references to reference topics.

Such a relationship table establishes relationships between task topics and the concept and reference topics that support the tasks. It help authors and architects determine where related information is missing or undefined.

When a title is associated with a relationship table, the title typically is used as an authoring convenience and is not displayed in generated publications.

Comment by Kristen J Eberlein on 22 November 2021
It would be good to replace the reference to a CTR retable with an example of a reltable that provides links between topics and external resources.
**Processing expectations**

By default, the contents of a `<reltable>` element are not rendered in a table of contents; they are used only to define relationships that can be expressed as topic-to-topic links. The `<relcell>` elements can contain `<topicref>` elements, which are then related to other `<topicref>` elements in the same row (although not necessarily in the same cell).

Within a root map, the effective relationship table is the union of all relationship tables in the map hierarchy.

**Attributes**

The following attributes are available on this element: universal attributes (387), common map attributes (392) (without `@keyscope` or `@collection-type`), `@format` (396), `@scope` (400), and `@type` (400).

For this element, the `@toc` attribute has a default value of "no".

**Example**

```dita
<map>
  <reltable>
    <relheader>
      <relcolspec type="concept"/>
      <relcolspec type="task"/>
      <relcolspec type="reference"/>
    </relheader>
    <relrow>
      <relcell>
        <topicref href="about-MyDevice.dita"/>
      </relcell>
      <relcell>
        <topicref href="setting-up-MyDevice.dita"/>
        <topicref href="operating-MyDevice.dita"/>
      </relcell>
      <relcell>
        <topicref href="MyDevice-settings.dita"/>
        <topicref href="MyDevice-version-info.dita"/>
      </relcell>
    </relrow>
  </reltable>
</map>
```

In the following code sample, a relationship table is defined with three columns: one for "concept", one for "task", and one for "reference". Three cells are defined within each row. The first cell contains one concept topic: `about-MyDevice.dita`. The second cell contains two task topics: `setting-up-MyDevice.dita` and `operating-MyDevice.dita`. The third cell contains two reference topics: `MyDevice-settings.dita` and `MyDevice-version-info.dita`.

A graphical version of the relationship table in an editor might look like this:

```dita
Comment by Kristen J Eberlein on 22 November 2021
Consensus from editors' call today: this example needs a significant rework.
```

```dita
Comment by Kristen J Eberlein on 02 December 2021
Replace with a screen capture
```
When rendered, links are added to topics that are in the same row, but not in the same cell. This allows simple maintenance of parallel relationships: for example, in this case, `setting-up-MyDevice.dita` and `operating-MyDevice.dita` are two tasks that require the same supporting information (concept and reference topics) but might otherwise be unrelated. When topics in the same cell are in fact related, the `@collection-type` attribute for the cell can be set to "family". If some cells or columns are intended solely as supporting information and should not link back to topics in other cells, you can set the `@linking` attribute on the `<relcell>` or `<relcolspec>` to "targetonly".

In this example, the related links would be as follows:

<table>
<thead>
<tr>
<th>about-MyDevice.dita</th>
<th>setting-up-MyDevice.dita</th>
<th>MyDevice-settings.dita</th>
</tr>
</thead>
<tbody>
<tr>
<td>operating-MyDevice.dita</td>
<td>MyDevice-version-info.dita</td>
<td></td>
</tr>
</tbody>
</table>

Relationship tables are inherently an efficient way to manage these links. In particular, they increase the prospect for reuse among topics, because those topics do not contain context-specific links. A relationship table also makes it easy to see and manage patterns; for example, the fact that `operating-MyDevice.dita` and `setting-up-MyDevice.dita` have the same relationships to supporting information is clear from the table, but would require some comparison and counting to determine from the list summary just before this paragraph.

### 10.4.1.9 `<topicref>`

A topic reference is the mechanism for referencing a topic (or another resource) from a DITA map. It can nest, which enables the expression of navigation and table-of-content hierarchies, as well as containment hierarchies and parent-child relationships.

**Attributes**

The following attributes are available on this element: universal attributes (387), link-relationship attributes (392) (with a narrowed definition of `@href`, given below), common map attributes (392), `@keys` (397), and `@keyref` (397).
attribute-exception paragraph, reminding that topicref is meant to refer to topic-level elements, but before doing that, need to make sure the href topic is updated with the same info in arch spec.

@href
Points to the resource that is represented by the <topicref>. See 6.2.2 The href attribute (88) for detailed information on supported values and processing implications. References to DITA content cannot be below the topic level: that is, you cannot reference individual elements inside a topic. References to content other than DITA topics should use the @format attribute to identify the kind of resource being referenced.

Example
The following code sample shows a simple map that organizes several topics about the software product "Example Tool Builder". The <topicref> that refers to setup.dita uses the @collection-type attribute to indicate that the order of three children topics in that section is important.

```xml
<map>
<topicref href="setup.dita" collection-type="sequence">
    <topicref href="prerequisites.dita"/>
    <topicref href="installing.dita"/>
    <topicref href="validating.dita"/>
</topicref>
<br/>
<topicref href="everyday-use.dita">
    <!-- ... -->
</topicref>
<br/>
<topicref href="troubleshooting.dita">
    <!-- ... -->
</topicref>
</map>
```

10.4.1.10 <topicmeta>
Topic metadata is metadata that applies to a topic based on its context in a map.

Usage information
The metadata specified in a <topicmeta> element is specific to a given context within a map. If a reference to a single resource appears more than once in a map or set of maps, unique metadata can be specified in each instance. For example, when the parent <topicref> element results in a link, elements within the <topicmeta> element can be used to provide context-specific information about the link, such as link text, a short description, or a navigation title.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
The following code sample shows how the <topicmeta> element can contain a link title and short description:

```xml
<map>
    <topicref href="indexing.dita">
        <topicmeta>
            <linktitle>Indexing for company specialists</linktitle>
            <shortdesc>Guidelines for indexing company materials</shortdesc>
        </topicmeta>
    <!-- Additional topic references -->
</map>
```
When link previews for indexing.dita are generated, the link title and short description provided within the <topicmeta> element are used.

**Related concepts**

Cascading of metadata attributes in a DITA map (60)

Certain attributes cascade throughout a map, which facilitates attribute and metadata management. When attributes cascade, they apply to the elements that are children of the element where the attributes were specified. Cascading applies to a containment hierarchy, as opposed to a specialization hierarchy.

**Related reference**

Reconciling topic and map metadata elements (62)

The <topicmeta> element in maps can contain numerous metadata elements. These metadata elements can have an effect on the parent <topicref> element, any child <topicref> elements, and – if a direct child of the <map> element – on the .

### 10.4.1.11 <ux-window>

A UX window specification is a collection of metadata for a window or viewport in which a user assistance topic or web page can be displayed. The window or viewport can be referenced by the <resourceid> element that is associated with a topic or <topicref> element.

**Usage information**

The <ux-window> element can be used in any <topicmeta> element in a map. If more than one <ux-window> element in a map has the same @name attribute, the first window specification in document order with that @name attribute is used.

**Attributes**

The following attributes are available on this element: ID and conref attributes (387), metadata attributes (387), @class (388), and the attributes defined below.

- **@features**
  
  Provides a list of other window features, such as size, position, or scroll bars. Each feature name and value can not contain any blank space, and each feature name and value is separated by a comma or other delimiter character.

- **@full-screen**
  
  Indicates whether the window is initially displayed in a maximized state. Allowable values are "yes", "no", and -dita-use-conref-target (145). The default value is "no".

- **@height**
  
  Specifies the height of the window. The value of this attribute is a real number expressed in decimal notation, optionally followed by a unit of measure. The following units of measurement are supported: cm, em, in, mm, pc, pt, and px (centimeters, ems, inches, millimeters, picas, points, and pixels, respectively). The default unit is px (pixels). Possible values include: "5", "5in", and "10.5cm".

- **@left**
  
  Specifies the left position of the target help window, whether relative to the calling window or to the entire display. The value of this attribute is a real number optionally followed by a unit of measure.
from the set of pc, pt, px, in, cm, mm, em (picas, points, pixels, inches, centimeters, millimeters, and ems respectively). The default unit is px (pixels).

@name (REQUIRED)
Specifies the value used to refer to this window definition.

@on-top
Indicates whether the initial z-order of the target help window is on top of all windows on the desktop. Allowable values are: "yes", "no", and -dita-use-conref-target (145). The default value is "no".

@relative
Indicates whether the window dimensions are relative to the calling window or the entire target display. The default value is "no". The following are allowable values:

no
The window dimensions specified on this element are absolute positions; they are not relative to the calling window.

yes
The window dimensions specified on this element are relative to the calling window.

@top
Specifies the top position of the target help window, whether relative to the calling window or to the entire display. The value of this attribute is a real number optionally followed by a unit of measure from the set of pc, pt, px, in, cm, mm, em (picas, points, pixels, inches, centimeters, millimeters, and ems respectively). The default unit is px (pixels).

@width
Specifies the width of the window. The value of this attribute is a real number expressed in decimal notation, optionally followed by a unit of measure. The following units of measurement are supported: cm, em, in, mm, pc, pt, and px (centimeters, ems, inches, millimeters, picas, points, and pixels, respectively). The default unit is px (pixels). Possible values include: "5", "5in", and "10.5cm".

-dita-use-conref-target
See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

Examples
This section shows how the `<ux-window>` and `<resourceid>` elements work together to define and use window definitions.

Figure 137: Using `<ux-window>` with `<resourceid>`

The following code sample shows how a window with a name of "help" is defined in the map. The window name is later referenced by the @ux-windowref attribute on the `<resourceid>` element.
Figure 138: Using multiple `<ux-window>` definitions

The following code sample shows how multiple window specifications can be defined for alternate presentations, such as desktop computers and tablets:

```
<map>
  <title>Puggles Help</title>
  <topicmeta>
    <ux-window id="p76" name="ux-tablet" top="1cm" left="1cm" height="4cm" width="3cm"
               features="status=no,toolbar=no,menubar=no,location=no" relative="no"
               full-screen="no" />
    <ux-window id="p80" name="ux-desktop" top="5cm" left="10cm" height="16cm" width="12cm"
               features="status=yes,toolbar=no,menubar=no,location=yes" relative="no"
               full-screen="no" />
  </topicmeta>
  <topicref href="c_puggles_intro.dita" type="concept">
  <!-- ... -->
  </topicref>
</map>
```

Related concepts

Window metadata for user assistance (37)

Some user assistance topics might need to be displayed in a specific window or viewport, and this windowing metadata can be defined in the DITA map within the `<ux-window>` element.

10.4.2 Subject scheme elements

Subject scheme elements are used to define sets of controlled values and taxonomic subjects, bind controlled values to attributes as enumerations, and specify relationships among taxonomic subjects.

10.4.2.1 `<attributedef>`

The `<attributedef>` element specifies an attribute that is bound to a set of controlled values. This binding restricts the permissible values for the attribute to the set of controlled values.

Specialization hierarchy

The `<attributedef>` element is specialized from `<data>`. It is defined in the subject scheme module.

Attributes

The following attributes are available on this element: ID and conref attributes (387), `@base` (388), `@class` (388), `@name` (397), `@outputclass` (390), `@status` (391), and `@translate` (391).

For this element, the following considerations apply:

- The `@name` attribute is required. It specifies the name of the attribute to which the controlled values are bound.
- The `@translate` attribute has a default value of "no".
Example

In the following code sample, the enumeration definition for the `@otherprops` attribute limits the permissible values to the subject "values-otherprops":

```xml
<subjectScheme>
  <!-- DEFINE SETS OF CONTROLLED VALUES -->
  <!-- Values for @otherprops -->
  <subjectdef keys="values-otherprops">
    <subjectdef keys="examples"/>
  </subjectdef>

  <!-- BINDS SETS OF CONTROLLED VALUES -->
  <!-- Binding for @otherprops -->
  <enumerationdef>
    <attributedef name="otherprops"/>
    <subjectdef keyref="values-otherprops"/>
  </enumerationdef>
</subjectScheme>
```

This means that the only valid value for the `@otherprops` attribute is "examples".

10.4.2.2 `<defaultSubject>`

The `<defaultSubject>` element specifies the default value for the attribute in cases where no value is specified. The default value must be one of the controlled values that are bound to the attribute.

Processing expectations

Comment by Kristen J Eberlein on 03 December 2021

Do we want to make a normative statement about how processors should handle default values for attributes when they are specified by `<defaultSubject>`?

Comment by Kristen J Eberlein on 13 December 2021

Comments from review D:

Frank Wegmann: Let's assume, in the DTD or a specialization there is an attribute defined with an enumeration data type and some default value. Now a subject scheme imposes maybe different controlled values for that attribute with a different default value? How is an implementation supposed to validate a document instance? My naive understanding would be that the DTD/schema definitions have precedence. This would mean that if the subject scheme defines a set of controlled values none of which are in the attribute definition of the schema, then the default value of the DTD would be taken. But what is a tool like Oxygen supposed to be doing then? Maybe I ask this, because I have (apparently) no idea what's going on behind the scenes, but then I wonder if this is worth discussing in the spec? Not necessarily here, but earlier in the usage chapter.

Robert Anderson: I think we should add this as a draft comment in this page, and then make sure it is covered in the section about how to determine values: https://github.com/oasis-tcs/dita/blob/DITA-2.0/specification/archSpec/base/determining-effective-attribute-values.dita

I think the answer is implied by the language today, but it's not directly addressed. The spec says that if your scheme tells you "a" and "b" are the only valid values in an attribute, then specifying "x" and "y" are both in error, and processors / applications can treat that as an error. If you set up that scheme but your grammar files only allow "x" and "y", then you've set up a scheme that means every usage of that element is automatically an error condition.
Specialization hierarchy

The `<defaultSubject>` element is specialized from `<topicref>`. It is defined in the subject scheme module.

Attributes

The following attributes are available on this element: universal attributes (387), link-relationship attributes (392), `@keys` (397), `@keyref` (396), `@processing-role` (398), and `@toc` (400).

Example

The following code sample limits the values for `@platform` to the "os" subject and sets the default value to "linux":

```xml
<subjectScheme>
  <subjectdef keys="os">
    <subjectdef keys="linux"/>
    <subjectdef keys="mswin"/>
    <subjectdef keys="zos"/>
    <subjectdef keys="macos"/>
  </subjectdef>
  <enumerationdef>
    <attributedef name="platform"/>
    <subjectdef keyref="os"/>
    <defaultSubject keyref="linux"/>
  </enumerationdef>
</subjectScheme>
```

The result is that only the following values are permitted for `@platform`:

- linux
- macos
- mswin
- zos

If no value is specified for the `@platform` attribute in the DITA source, the value is assumed to be "linux".

10.4.2.3 `<elementdef>`

The `<elementdef>` element specifies an element to which an attribute and set of controlled values are bound.

Specialization hierarchy

The `<elementdef>` element is specialized from `<data>`. It is defined in the subject scheme module.

Attributes

The following attributes are available on this element: `ID` and `conref attributes` (387), `@status` (391), `@base` (388), `@outputclass` (390), `@translate` (391), `@class` (388), and `@name` (397).

For this element, the following considerations apply:

- The `@name` attribute is required. It specifies the name of an element to which the controlled attribute values are bound.
- The `@translate` attribute has a default value of "no".
**Example**

In this code sample, the `@type` attribute for the `<note>` element is bound to the specified set of values:

```xml
<subjectScheme>
  <subjectdef keys="note-values">
    <subjectdef keys="attention"/>
    <subjectdef keys="caution"/>
    <subjectdef keys="danger"/>
  </subjectdef>
</subjectScheme>
```

Processors limit the values for the `@type` attribute on the `<note>` element to the following set of values: "attention", "caution", and "danger". Other elements that have a `@type` attribute are not affected.

### 10.4.2.4 `<enumerationdef>`

An enumeration definition is a binding of an attribute to a set of controlled values. The set of controlled values can be limited to a specific element or it could be empty.

#### Usage information

An enumeration definition can accomplish the following goals:

**Bind a set of controlled values to an attribute**

When the `<enumerationdef>` element contains only an `<attributedef>` and a `<subjectdef>` element, the set of controlled values that are bound to the attribute apply to all elements. For example, when `<enumerationdef>` contains only `<attributedef name="value"/>`, the `@value` attribute is limited to the specified enumeration for all elements that can specify the `@value` attribute.

**Limit a set of controlled values to a specific element and attribute pair**

When the `<enumerationdef>` element contains an `<attributedef>`, a `<subjectdef>`, and an `<elementdef>` element, the enumeration applies to the specified attribute only on the specified element. The enumeration does not apply to the attribute on other elements.

For example, when the `<enumerationdef>` element contains both `<attributedef name="type"/>` and `<elementdef name="note"/>`, only the `@type` attribute on the `<note>` element is limited to the specified enumeration. The possible values for the `@type` attribute on other elements are not affected.

**Specify the default value for an attribute or element and attribute pair**

When the `<enumerationdef>` element contains a `<defaultSubject>` element, processors operate as if the value specified by the `<defaultSubject>` element is explicitly set in the DITA source and the XML grammar does not set a default value for the attribute.

For example, given the following `<enumerationdef>` element, if no value is set for the `@audience` attribute on `<draft-comment>` in the DITA source, processors operate as if the `@audience` attribute is explicitly set to "spec-editors":

```xml
<subjectScheme>
  <!-- ... -->
  <enumerationdef>
    <elementdef name="draft-comment"/>
    <attributedef name="audience"/>
    <subjectdef keyref="values-audience-draft-comment"/>
  </enumerationdef>
</subjectScheme>
```
Specify that an attribute is not valid.

When the `<enumerationdef>` element contains a `<subjectdef>` element that does not reference a subject, no value is valid for the attribute.

For example, the following code sample specifies that no tokens are valid for the `@props` attribute:

```
<subjectScheme>
  <!-- ... -->
  <enumerationdef>
    <attributedef name="props"/>
    <subjectdef/>
    <!-- ... -->
  </enumerationdef>
  <!-- ... -->
</subjectScheme>
```

Specialization hierarchy

The `<enumerationdef>` element is specialized from `<topicref>`. It is defined in the subject scheme module.

Processing expectations

See 7.7 Determining effective attribute values (176)

Comment by Kristen J Eberlein on 11 January 2022

We need to ensure that nothing in the "Usage information" section conflicts with what we specify in the final topic about "Determining effective attribute values."

Attributes

The following attributes are available on this element: `ID and conref attributes` (387), `@status` (391), `@base` (388), `@outputclass` (390), and `@class` (388).

Example

The following code sample contains three enumeration definitions:

```
<subjectScheme>
  <!-- DEFINE SETS OF CONTROLLED VALUES -->
  <!-- 1. Values for @audience on <draft-comment> -->
  <subjectdef keys="values-audience-draft-comment">
    <subjectdef keys="values-audience-draft-comment"/>
    <subjectdef keys="spec-editors"/>
    <subjectdef keys="tc-reviewers"/>
  </subjectdef>
  <!-- 2. Values for @otherprops -->
  <subjectdef keys="values-otherprops">
    <subjectdef keys="values-otherprops"/>
    <subjectdef keys="examples"/>
  </subjectdef>
  <!-- BINDS SETS OF CONTROLLED VALUES -->
</subjectScheme>
```
1. The permissible values for the @audience attribute on the <draft-comment> element are restricted to the subject "values-audience-draft-comment". This means that the only allowed values are "spec-editors" and "tc-reviewers". If no value for @audience is specified for a <draft-comment> element in the DITA source, it is assumed to be set to "spec-editors".

2. The permissible values for @otherprops are restricted to the subject "values-otherprops". This means that the only valid value for @otherprops is "examples".

3. The enumeration for the @props attribute contains a <subjectdef> element that does not reference a subject. That means that no values are valid for the @props attribute.

10.4.2.5 <schemeref>
A scheme reference is the mechanism for referencing a subject scheme map.

Specialization hierarchy
The <schemeref> element is specialized from <topicref>. It is defined in the subject scheme module.

Attributes
The following attributes are available on this element: universal attributes (387), link-relationship attributes (392), @keys (397), and @keyref (396).

For this element, the following considerations apply:

- The @format attribute has a default value of "ditamap".
- The @type attribute has a default value of "scheme".

Example
See 10.4.2.9 subjectScheme (324).
10.4.2.6 <subjectdef>

The `<subjectdef>` element defines a subject. A subject can be used to define a controlled value or a taxonomic classification.

Usage information

The `<subjectdef>` element can use a `<navtitle>` element to supply a label for the subject. The `@href` attribute on `<subjectdef>` can be used to reference a topic that provides more information about a subject and how authors should use it when classifying content or specifying a value for an attribute.

Specialization hierarchy

The `<subjectdef>` element is specialized from `<topicref>`. It is defined in the subject scheme module.

Attributes

The following attributes are available on this element: universal attributes (387), link-relationship attributes (392), `@collection-type` (394), `@keyref` (396), `@keys` (397), `@linking` (397), `@processing-role` (398), and `@toc` (400).

Examples

This section contains examples of how `<subjectdef>` elements can be used.

Figure 139: Example of defining a set of controlled values

The following code sample shows how `<subjectdef>` elements can be used to define a set of controlled values:

```xml
<subjectdef keys="values-product">
  <subjectdef keys="free"/>
  <subjectdef keys="premium"/>
</subjectdef>
```

When this set of controlled values is bound to an attribute, the only valid values for the attribute are "free" and "premium".

Figure 140: Example of defining a simple taxonomy

The following code sample shows how `<subjectdef>` elements can be used to define a simple taxonomy of recreational hobbies:

```xml
<subjectdef keys="hobbies">
  <subjectdef keys="fiber-arts">
    <subjectdef keys="knitting"/>
    <subjectdef keys="quilting"/>
    <subjectdef keys="sewing"/>
  </subjectdef>
  <subjectdef keys="woodworking">
    <subjectdef keys="scroll-sawing"/>
    <subjectdef keys="whittling"/>
    <subjectdef keys="wood-turning"/>
  </subjectdef>
</subjectdef>
```

The taxonomy might be used to classify DITA topics or maps.
10.4.2.7 `<subjectHead>`

The `<subjectHead>` element provides a heading for a group of subjects, for use if the subject scheme is rendered and displayed.

**Usage information**

The heading provided by the `<subjectHead>` element might be displayed when a subject scheme is rendered to let users select subjects as part of a faceted browsing experience.

The `<subjectHead>` element does not reference a resource. It also cannot specify either the `@keys` or `@keyref` attribute, so it does not define any controlled values.

**Specialization hierarchy**

The `<subjectHead>` element is specialized from `<topicref>`. It is defined in the subject scheme module.

**Attributes**

The following attributes are available on this element: universal attributes (387), `@processing-role` (398), `@toc` (400), `@collection-type` (394), and `@linking` (397).

For this element, the following considerations apply:

- The `@collection-type` attribute has an expected processing default value of "unordered", although this value is not defaulted in the grammar files. This element limits the available values for `@collection-type` to "unordered", "sequence", and "-dita-use-conref-target".
- The `@linking` attribute has a default value of "normal", and no other values are valid.

**Example**

In the following code sample, the `<subjectHead>` elements define two groupings of subjects and associate labels.

```xml
<subjectScheme toc="yes" search="no">
  <subjectdef keys="hobbies">
    <subjectdef keys="fiber-arts">
      <subjectHead>
        <subjectHeadMeta>
          <navtitle>Fiber arts</navtitle>
        </subjectHeadMeta>
        <subjectdef keys="knitting" href="knitting.dita"/>
        <subjectdef keys="quilting" href="quilting.dita"/>
        <subjectdef keys="sewing" href="sewing.dita"/>
      </subjectHead>
    </subjectdef>
  </subjectdef>
  <subjectdef keys="woodworking">
    <subjectHead>
      <subjectHeadMeta>
        <navtitle>Woodworking</navtitle>
      </subjectHeadMeta>
      <subjectdef keys="scroll-sawing" href="scroll-sawing.dita"/>
      <subjectdef keys="whittling" href="whittling.dita"/>
      <subjectdef keys="wood-turning" href="woodturning.dita"/>
    </subjectHead>
  </subjectdef>
</subjectScheme>
```
10.4.2.8 <subjectHeadMeta>
The <subjectHeadMeta> element enables a navigation title and short description to be associated with a subject heading, for use if the subject scheme is rendered and displayed.

Specialization hierarchy
The <subjectHeadMeta> element is specialized from <topicmeta>. It is defined in the subject scheme module.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
See <subjectHead> (323).

10.4.2.9 <subjectScheme>
The <subjectScheme> element defines controlled values and taxonomic subjects.

Specialization hierarchy
The <subjectScheme> element is specialized from <map>. It is defined in the subject scheme module.

Attributes
The following attributes are available on this element: universal attributes (387), common map attributes (392), architectural attributes (391), @type (400), @scope (400), and @format (396).

For this element, the following considerations apply:

- The @processing-role attribute has a default value of “resource-only”.
- The @toc attribute has a default value of “no”.

Example
The following code sample shows a subject scheme map:

```xml
<subjectScheme>
  <!-- Pull in a scheme that defines values for @deliveryTarget -->
  <schemeref href="deliveryTarget.ditamap"/>
  <!-- Define values for Windows and Linux -->
  <subjectdef keys="operating-systems">
    <subjectdef keys="windows">
      <subjectdef keys="windows-10"/>
      <subjectdef keys="windows-11"/>
    </subjectdef>
    <subjectdef keys="linux">
      <subjectdef keys="redhat"/>
      <subjectdef keys="suse"/>
    </subjectdef>
  </subjectdef>
  <!-- Define application values -->
  <subjectdef keys="applications">
    <subjectdef keys="apache-server" href="subject/apache.dita"/>
    <subjectdef keys="my-sql" href="subject/sql.dita"/>
  </subjectdef>
  <!-- Define an enumeration of the platform attribute. This makes the following values valuid for platform: windows, windows-10, windows-11, dita-2.0-specification
Standards Track Work Product  Copyright © OASIS Open 2022. All Rights Reserved. 06 September 2022 Page 324 of 449
```
10.5 Metadata elements

Metadata elements include information that is located within the `<topicmeta>` element (in maps) or `<prolog>` element (in topics), as well as indexing elements that can be placed in additional locations within topic content.

Comment by robander on 17 May 2021
The shortdesc here mentions indexterm, but those are not defined in this category, they have their own 3-element section of the TOC. Should those three be moved here?

10.5.1 Prolog (metadata) elements

The prolog elements represent metadata that is associated with a document. Most of these elements are valid in both topics and maps.

10.5.1.1 `<audience>`

An audience is the group of readers for whom a piece of content is intended.

Attributes

The following attributes are available on this element: universal attributes (387) and the attributes defined below.

@experiencelevel
Indicates the level of experience that the audience is assumed to possess. Different audiences might have different experience levels with respect to the same topic. For example, a topic might require general knowledge from a programmer but expert knowledge from a user.

@job
Specifies the high-level task that the audience for the content is trying to accomplish. Different audiences might read the same topic in terms of different high-level tasks. For example, a system administrator might read the topic when administering an application, while a programmer might read the same topic when customizing the application.

@name
Specifies a name for the audience.

@type
Specifies the type of audience for whom the content is intended. Note that this differs from the `@type` attribute on many other DITA elements.
Example
The following code sample shows how the `<audience>` element can specify that a topic is intended for experienced programmers:

```xml
<prolog>
  <metadata>
    <audience type="programmer" experiencelevel="expert"/>
  </metadata>
</prolog>
```

10.5.1.2 `<author>`
An author is the entity that created the content, such as a person, organization, or application.

Attributes
The following attributes are available on this element: universal attributes (387), @keyref (396), and link-relationship attributes (392).

Example
The following code sample shows that two people contributed to the topic:

```xml
<prolog>
  <author type="creator">Jane</author>
  <author type="contributor">John</author>
</prolog>
```

Jane is specified as a creator of the topic, and John is specified as a contributor to the topic.

10.5.1.3 `<brand>`
A brand is a name, term, design, or any other feature that uniquely identifies a good or service and distinguishes it from that of other sellers.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
See `<prodinfo>` (332)

10.5.1.4 `<category>`
A category is a group of things that have shared characteristics.

Usage information
A category can be used to classify content for navigation or retrieval. Such classifications are likely to come from an enumerated or hierarchical set. A processor might sort topics based on the associated categories and create a type of generated navigation.

Attributes
The following attributes are available on this element: universal attributes (387).
Example
The following code sample shows that a topic is associated with three categories:

```xml
<prolog>
  <metadata>
    <category>History</category>
    <category>Non-fiction</category>
    <category>Editors’ choice</category>
  </metadata>
</prolog>
```

10.5.1.5 <component>
A component is a part of a larger whole, such as a machine, software application, or vehicle.

Usage information
A product might be made up of many components, each of which is installable separately. Components might also be shared by several products so that the same component is available for installation with many products.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
See <prodinfo> (332).

10.5.1.6 <copyrholder>
A copyright holder is the entity that holds the legal rights to a work that has been assigned a copyright.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
See <copyright> (328).

10.5.1.7 <copyright>
A copyright is a legal device that gives the creator of a creative work the sole right to publish and sell that work.

Usage information
The `<copyright>` element is a grouping element that contains elements that specify the copyright holder and the copyright year.

Attributes
The following attributes are available on this element: universal attributes (387) and the attribute defined below.
@type

Indicates the legal status of the copyright holder. Note that this differs from the @type attribute on many other DITA elements.

Example

The following code sample shows that OASIS Open holds the copyright to the material covered in a topic. The copyright year is specified as 2020.

```xml
<prolog>
  <copyright>
    <copyryear year="2020"/>
    <copyrholder>OASIS Open</copyrholder>
  </copyright>
</prolog>
```

10.5.1.8 <copyryear>

A copyright year is the year in which an author first published a work or submitted it to a copyright-granting agency.

Attributes

The following attributes are available on this element: universal attributes (387) and the attribute defined below.

@year

Specifies the year in YYYY format

Example

See <copyright> (328).

10.5.1.9 <created>

The creation date is the date that a document was created.

Attributes

The following attributes are available on this element: universal attributes (387), date attributes (392), and the attribute defined below.

@date (REQUIRED)

Specifies the document creation date. The date is specified using the ISO 8601 format: YYYY-MM-DD, where YYYY is the year, MM is the month (01 to 12), and DD is the day (01-31).

Example

See <critdates> (329).

10.5.1.10 <critdates>

Critical dates are important dates in the document life cycle, such as creation and revision dates.

Attributes

The following attributes are available on this element: universal attributes (387).
**Example**

The following code sample shows that the topic was created on 12 June 2020. It was revised on 03 March 2021, and it will expire on 02 March 2024.

```xml
<prolog>
  <critdates>
    <created date="2020-06-12"/>
    <revised modified="2021-03-03" golive="2020-02-03" expiry="2024-03-02"/>
  </critdates>
</prolog>
```

### 10.5.1.11 <featnum>

A feature number is the number that is associated with a product feature.

**Attributes**

The following attributes are available on this element: [universal attributes](387).

**Example**

See [prodinfo](332).

### 10.5.1.12 <keywords>

Key words are terms that apply to the topic or map.

**Usage information**

The content of the `<keywords>` element can be used to optimize the rendered output:

- Processors might add metadata to the output format to facilitate search engine optimization.
- Processors might use the content of `<indexterm>` elements to generate an index for a document.

While the `<keyword>` element can be used inline, the `<keywords>` element is not an inline element. The `<keywords>` element only appears in the `<topicmeta>` or `<prolog>`, and it is used to specify keywords that apply to the topic.

**Processing expectations**

All `<keyword>` and `<indexterm>` elements contained in the `<keywords>` element are considered part of the topic or map metadata. How the content of these elements is processed depends on the output medium.

**Attributes**

The following attributes are available on this element: [universal attributes](387).

**Example**

The following code sample shows how several key words can be associated with a topic that is related to installing software:

```xml
<prolog>
  <metadata>
    <keywords>
      <keyword>installing</keyword>
    </keywords>
  </metadata>
</prolog>
```
10.5.1.13 <metadata>
Metadata is data about data.

Usage information
Elements inside of the <metadata> element provide information about the content and subject of an information resource.

When used in topics, metadata elements that are outside of the <metadata> element generally provide lifecycle information for the content unit, such as the author or copyright.

When used in maps, several metadata elements are allowed both inside and outside of the <metadata> container element. This is done to provide parity with topic prologs.

Comment by Kristen J Eberlein on 31 January 2022
Based on the DITA web review, consider moving this content into an architectural topic.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
The following code sample shows how metadata can be provided in a topic about jet packs:

```xml
<prolog>
  <metadata>
    <audience type="user" job="flying" experiencelevel="advanced"/>
    <keywords>
      <keyword>jet pack</keyword>
      <keyword>danger</keyword>
      <keyword>liability</keyword>
    </keywords>
  </metadata>
</prolog>
```

10.5.1.14 <othermeta>
Other metadata is metadata that specifies properties by using name and content pairs.

Usage information
The <othermeta> element enables implementations to specify custom metadata without specializing. <othermeta> element can also be used as a specialization base.

Attributes
The following attributes are available on this element: universal attributes (387) and the attributes defined below.
@name (REQUIRED)
   Specifies the name of the metadata property.

@content (REQUIRED)
   Specifies the value for the property named in the @name attribute.

@translate-content
   Indicates whether the @content attribute is translated. Allowable values are "yes", "no", and -dita-use-conref-target (145).

Example
The following code sample shows that the metadata ThreadWidthSystem has a value of "metric":

```xml
<prolog>
   <metadata>
      <othermeta name="ThreadWidthSystem" content="metric"/>
   </metadata>
</prolog>
```

10.5.1.15 <permissions>
Permissions are the level of entitlement that are needed to access content.

Attributes
The following attributes are available on this element: universal attributes (387) and the attribute defined below.

@view
   Specifies the classifications of viewers that are allowed to view the document

Example
The following code sample shows that the topic is only intended for an internal-user audience:

```xml
<prolog>
   <permissions view="internal-users"/>
</prolog>
```

10.5.1.16 <platform>
A platform is a group of technologies that are used as a base upon which other applications, processes, or technologies are developed.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
See <prodinfo> (332).
10.5.1.17 <prodinfo>
Product information is detailed information about a product, such as the product name, version number, brand name, associated components, and more.

Attributes
The following attributes are available on this element: universal attributes (387).

Examples
This section contains examples of how the <prodinfo> element can be used.

Figure 141: Example of product information for an item of cookware
The following code sample shows the <prodinfo> element can contain several elements that specify metadata about an item of cookware:

```xml
<prolog>
  <metadata>
    <prodinfo>
      <prodnname>12'' Stainless Steel Skillet</prodnname>
      <brand>Chef's Gourmet Kitchenware</brand>
      <prognm>4545455-AD</prognm>
      <platform>Electric</platform>
      <platform>Gas</platform>
      <platform>Induction</platform>
      <series>Stainless Cookware</series>
    </prodinfo>
  </metadata>
</prolog>
```

Figure 142: Example of product information for a software application
The following code sample shows that a topic is about the product "Transcription Assistant". The product is at version number 1.3.1, operates on the Linux platform, and has the program number SN-12345T.

```xml
<prolog>
  <metadata>
    <prodinfo>
      <prodnname>Transcription Assistant</prodnname>
      <vrlst>
        <vrmlst version="1" release="3" modification="1"/>
      </vrlst>
      <featnum>SN-12345T</featnum>
      <component>Voice Activation</component>
      <platform>Linux</platform>
      <platform>Windows</platform>
    </prodinfo>
  </metadata>
</prolog>
```

10.5.1.18 <prodname>
A product name is the name that a business, company, or enterprise chooses to give a product.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
See <prodinfo> (332).
10.5.1.19 <prognum>
A program number is an order number or a product tracking code.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
See <prodinfo> (332).

10.5.1.20 <publisher>
A publisher is an entity (person, company, or organization) who makes information, literature, music, software, and other content available to a reader.

Attributes
The following attributes are available on this element: universal attributes (387), link-relationship attributes (392), and @keyref (396).

Example
The following code sample shows that the content is published by OASIS Open Printing, Inc:

```dtd
<prolog>
  <author>Ivan</author>
  <publisher>OASIS Open Printing, Inc.</publisher>
</prolog>
```

10.5.1.21 <resourceid>
A resource ID is an identifier that is designed for applications that need to use their own identifier scheme, such as context-sensitive help systems and databases.

Usage information

Comment by rodaande on Jan 10, 2022
This topic needs to be sync'ed with content in the architectural spec. I think it would make sense for much of the appid-role content to be moved into a section of the "DITA Addressing" chapter, and that content really needs to be reviewed together with this topic after the sync.

The @appid and @appname attributes work in combination to specify a specific ID for an application. Multiple @appid values can be associated with a single @appname value, and multiple @appname values can be associated with a single @appid value. Accordingly, each combination of values for the @appid and @appname attributes need to be unique within the context of the main map.

When the @appid-role attribute is set to "deliverable-anchor", the value that it specifies contributes to deliverable anchors for a topic. According, certain limitations apply to the value of the @appid attribute:

- It specifies only a single URI component.
- It is limited to values that can contribute to the following URI components:
  - The last path component of a URI path
  - A fragment identifier
  - A query parameter
• It should not specify components of URIs that are specific to a particular deliverable, such as a file extension.

Processing expectations

By design, the `<resourceid>` element will not apply to all processors in all situations. Processors can examine the `@appname` and `@appid-role` attributes to determine whether a given `<resourceid>` element is relevant to a specific deliverable; if `@appname` is not present, processors can assume that the element applies.

When `@appid-role` is set to "deliverable-anchor", and the `<resourceid>` applies to a deliverable, processors SHOULD use the `@appid` value when constructing a URI for the delivered resource. Effective `@appid` values for this reflect the application of any prefix or suffix values from 10.6.2.5 `dvrKeyscopePrefix` (354) and 10.6.2.4 `dvrResourceSuffix` (353). Actual delivery anchors depend on the rendered format; for example, the anchor can be the base part of an HTML file name, a PDF anchor name, or a URI fragment identifier. While anchors values will vary by deliverable, the resulting URI should reflect the specified anchor as much as possible.

When `@appid-role` is set to "context-sensitive-help" or another value, processors can optionally use the `@appid` value IDs to construct deliverable anchors. Deliverable components MAY have any number of anchors when the deliverable format allows.

Processors can use other properties of the referenced resource, or properties of the reference itself, when constructing full deliverable anchors. For example, key scope names, key names, or source file names can all be used with the resource ID when constructing unique anchor values.

Attributes

The following attributes are available on this element: universal attributes (387) and the attributes defined below.

`@appname`
- Specifies a name for the external application.

`@appid`
- Specifies an ID that can be used by an application to identify the topic.
  
  When `@app-role` is set to "deliverable-anchor", certain restrictions apply to the value of the `@appid` attribute. See Usage information (333).

`@appid-role`
- Specifies the role that the `@appid` value plays for applications. The value is a single name token. The default value is "context-sensitive-help". While applications can define their own values, the following values are defined by OASIS:
  
  context-sensitive-help
  - Specifies that the value of the `@appid` attribute is used to connect the associated resource with applications that use the associated resource as context sensitive help.

  deliverable-anchor
  - Specifies that the value of the `@appid` attribute is used to construct anchors for the associated resource.
    
    When `@app-role` is set to "deliverable-anchor", certain restrictions apply to the value of the `@appid` attribute. See Usage information (333).
@ux-context-string
Specifies the value of a user-assistance context-string that is used to identify the topic.

@ux-source-priority
Specifies precedence for handling <resourceid> definitions that exist in both a map and a topic. This attribute is only valid when used within a <topicref> element in a map. The following values are valid:

map-only
Use IDs from the map only.

map-takes-priority
Use the IDs from the map, if they exist. Otherwise, use IDs from the topic.

topic-and-map
Use IDs from both the topic and map.

topic-only
Use IDs from the topic only.

topic-takes-priority
Use the IDs from the topic, if they exist. Otherwise, use IDs from the map.

-dita-use-conref-target
See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

@ux-windowref
References the @name attribute on the <ux-window> element that is used to display the topic when called from a help API.

Examples
This section contains examples of how the <resourceid> element can be used.

Figure 143: Example: Using a <resourceid> element in a map to generate hooks for online help

In the following code sample, user-assistance context hooks are applied to three topics that are referenced from a DITA map. The second topic has two hooks for the same topic.

```xml
<map>
  <title>Widget Help</title>
  <topicref href="file_ops.dita">
    <topicmeta>
      <resourceid appname="ua" appid="1234" ux-context-string="idh_filesave" ux-source-priority="topic-only"/>
    </topicmeta>
  </topicref>
  <topicref href="saving.dita">
    <topicmeta>
      <resourceid appname="ua" appid="2345" ux-context-string="idh_filedelete"/>
    </topicmeta>
  </topicref>
  <topicref href="deleting.dita">
    <topicmeta>
      <resourceid appname="ua" appid="6789" ux-context-string="idh_filekill"/>
    </topicmeta>
  </topicref>
  <topicref href="editing.dita">
    <topicmeta>
      <resourceid appname="ua" appid="5432" ux-context-string="idh_fileedit" ux-windowref="csh"/>
    </topicmeta>
  </topicref>
</map>
```
Figure 144: Example: Using a `<resourceid>` element in a topic to generate hooks for online help

In the following code sample, a user-assistance context hook is defined in the prolog of a task topic. The context hook is made up of a context ID (value for `@appid` attribute) and a context string (value for `@ux-context-string` attribute). A user-assistance window profile is also referenced for this topic.

```xml
<task id="fedt">
  <title>Editing a File</title>
  <prolog>
    <resourceid appname="ua"
      appid="5432" ux-context-string="idh_fileedit" ux-windowref="csh" />
  </prolog>
  <context>After you have created a new file, you can edit it.</context>
  <steps>
    <step><cmd>Open...</cmd></step>
    <step><cmd>Edit...</cmd></step>
    <step><cmd>Save...</cmd></step>
  </steps>
</task>
```

Figure 145: Example: Using a `<resourceid>` element to XXX

In the following code sample, anchor components are defined for two different references to the same topic. Each use of the topic represents the documentation for a different model of the same base device.

```xml
<map>
  <!-- ... -->
  <keydef keys="topic-0014" href="replacing-widgetA.dita"/>
  <!-- ... -->
  <topicref keyscope="model-01">
    <!-- ... -->
    <topicref keys="replace-widgetA" keyref="topic-0014">
      <!-- ... -->
      <topicmeta>
        <resourceid appid="replace_widgetA_model_01" appid-role="deliverable-anchor"/>
      </topicmeta>
    </topicref>
    <!-- ... -->
  </topicref>
  <!-- ... -->
  <topicref keyscope="model-02">
    <!-- ... -->
    <topicref keys="replace-widgetA" keyref="topic-0014">
      <!-- ... -->
      <topicmeta>
        <resourceid appid="replace_widgetA_model_02" appid-role="deliverable-anchor"/>
      </topicmeta>
    </topicref>
    <!-- ... -->
  </topicref>
  <!-- ... -->
</map>
```

The `replacing-widgetA.dita` topic is published twice, once in each scope. When the map is published, the following occurs:

- An HTML deliverable might use the specified anchors to construct base file names for the resulting HTML. In this case, the copy in the first scope would use the name `replace_widgetA_model_01.html`, while the copy in the second scope uses the name `replace_widgetA_model_02.html`.
- A PDF deliverable might simply add the application IDs as anchors for each instance of the topic, so that `replace_widgetA_model_01` and `replace_widgetA_model_02` would be available as anchors within the PDF.
Related concepts

Window metadata for user assistance (37)
Some user assistance topics might need to be displayed in a specific window or viewport, and this windowing metadata can be defined in the DITA map within the `<ux-window>` element.

10.5.1.22 <revised>
Revision information is used to maintain tracking dates that are important in a development cycle, such as the date of the last modification, the original availability date, and the expiration date.

Attributes
The following attributes are available on this element: universal attributes (387), date attributes (392), and the attribute defined below.

@modified (REQUIRED)
Specifies the last modification date. The date is specified using the ISO 8601 format: YYYY-MM-DD, where YYYY is the year, MM is the month (01 to 12), and DD is the day (01-31).

Example
See `<critdates>` (329).

10.5.1.23 <series>
A series is a set of related products or programs.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
See `<prodinfo>`. (332)

10.5.1.24 <source>
A source is a resource from which the present topic is derived, either completely or in part.

Usage information
The `<source>` element contains a description of the resource. Alternatively, the `@href` or `@keyref` attributes can be used to reference a description of the resource.

Processing expectations
It is undefined what it means when the `<source>` element has both content and an attribute-based reference to another resource. It is up to the implementation to determine the processing for this situation.

Attributes
The following attributes are available on this element: universal attributes (387), link-relationship attributes (392), and `@keyref` (396).

For this element, the `@href` attribute provides a reference to a resource from which the topic is derived.
Example

The following code sample shows that the content is based on information from the XML Exchange Table Model Document Type Definition:

```
<prolog>
  <source>XML Exchange Table Model Document Type Definition</source>
</prolog>
```

10.5.1.25 `<vrmlist>`

A version metadata list is a grouping of one or more `<vrm>` elements that specify information about the version, release, and modification levels of a product.

**Attributes**

The following attributes are available on this element: universal attributes (387).

Example

The following code sample shows the version numbers that are associated with "Widge-o-matic" product:

```
<prolog>
  <metadata>
    <prodinfo>
      <prodname>Widge-o-matic</prodname>
      <vrmlist>
        <vrm version="1" release="2" modification="0"/>
        <vrm version="1" release="2" modification="1"/>
      </vrmlist>
    </prodinfo>
  </metadata>
</prolog>
```

This indicates that the topic covers Version 1, release 2, modification levels 0 and 1 (often expressed as version 1.2.0 and 1.2.1).

10.5.1.26 `<vrm>`

Version metadata is metadata that is used to track the version, release, and modification numbers for a product.

**Attributes**

The following attributes are available on this element: universal attributes (387) and the attributes defined below.

- `@modification`
  - Specifies the modification level of the current version and release
- `@release`
  - Specifies the product release identifier
- `@version` (REQUIRED)
  - Specifies the released version number of the product

Example

See `<vrmlist>` (338).
10.5.2 Specialization elements
Several DITA elements exist either for architectural reasons or for support of specialized markup yet to be designed. Although there is little need to use these elements unless you are directed to, some of them, such as <state>, can be used if your content makes use of these semantic distinctions. For example, a discussion of signals on a gate of an integrated logic circuit might use the <state> element to represent either on or off conditions of that gate.

10.5.2.1 <data>
Data is a generic component that represents metadata within a topic or map. Complex metadata is represented by nested data structures.

Usage information
The primary purpose of the <data> element is as a specialization base. Because it can nest, it can be used to create complex metadata structures. Since it is available in both block and inline contexts, the <data> element can specify properties for most element types.

A metadata property specified using a <data> element usually applies to the structure that contains the <data> element.

When located in <prolog> and <metadata> elements, the property applies to the topic as a whole. When located in the <topicmeta> element, the property applies to the referenced topic.

CAUTION By default, processors do not render the content of the <data> element. Use the <data> element only for properties; do not use it to embed text as part of the content flow.

Rendering expectations
090 (414) By default, processors SHOULD treat a <data> element as unknown metadata. The contents of the <data> element SHOULD NOT be rendered.

Processors that recognize a particular <data> element MAY make use of it to trigger specialized rendering.

Attributes
The following attributes are available on this element: universal attributes (387), data-element attributes (392), link-relationship attributes (392), and @keyref (396).

Examples
Figure 146: Using the @name attribute on unspecialized <data> elements
The following code sample shows how the <data> element can be used to provide metadata. Rendering tools that recognize this metadata can automatically apply highlighting to the code.

<codeblock>
<data name="codestyle" value="javascript"/>
</codeblock>
Figure 147: Nesting `<data>` elements for complex metadata

The following code sample shows how nested `<data>` elements can provide complex inventory metadata for a part that is described in the topic.

```xml
<topic id="sample">
  <title>How to purchase items from the warehouse</title>
  <prolog>
    <data name="inventory">
      <data name="aisle" value="4"/>
      <data name="bin" value="13"/>
      <data name="restock" value="weekly"/>
    </data>
  </prolog>
  <body>
    <!-- ... -->
  </body>
</topic>
```

Figure 148: Specializing `<data>` for structured metadata

The following code sample contains specializations of the `<data>` element: `<change-item>`, `<change-completed>`, and `<change-summary>`. These specialized elements each provide a default for `@name` inside the grammar files, so that processors can work with the data without authors having to specify the attribute.

```xml
<topic id="data">
  <title><xmlelement>data</xmlelement></title>
  <prolog>
    <change-historylist>
      <change-item>
        <change-completed>2017-08-20</change-completed>
        <change-summary>Refactored topic to use new template</change-summary>
      </change-item>
      <change-item>
        <change-completed>2018-06-06</change-completed>
        <change-summary>Created new examples</change-summary>
      </change-item>
    </change-historylist>
  </prolog>
  <body>
    <!-- ... -->
  </body>
</topic>
```

10.5.2.2 `<foreign>`

Foreign content is non-DITA content, such as MathML, SVG, or Rich Text Format (RTF).

Usage information

The `<unknown>` element is intended primarily as a base for specialization. Specializations of the `<foreign>` element are typically implemented as domains, but it is also possible to implement foreign vocabularies as structural specializations.

The `<foreign>` element can contain non-DITA content or a mix of DITA and non-DITA content.

If alternate content is wanted, use or specialize the `<desc>` element inside of the `<foreign>` specialization. Such alternate content needs to be valid wherever the `<foreign>` specialization is valid. This way, if a processor is not able to recognize or render the `<foreign>` content itself, it can use the alternate content from `<desc>`.
Processing expectations

091 (414) Processors attempt to display <foreign> content unless otherwise instructed. If a processor cannot render the content, it MAY issue a warning.

Comment by Kristen J Eberlein on 28 December 2021
The following content needs editing.

The enabler of the foreign vocabulary must provide the processing and override the base processing for <foreign>.

- If <foreign> contains more than one alternative content element, they should all be processed. In the case of <desc> they should be concatenated in a similar way to <section>, but with no title (analogous to <div> in HTML).
- If no <desc>, <object>, or <image> element is found within an instance of the <foreign> element, the base processing can emit a warning about the absence of processable content.
- The base processing for <object> might emit the content of <foreign> as a file at the location specified by the @data attribute of the <object> element. The <object> element should have a data attribute or a <foreign> sub-element but not both. In the event that an <object> element contains both a data attribute and an <foreign> sub-element the processing system should ignore one of them.

Attributes

The following attributes are available on this element: universal attributes (387).

Example

Comment by Kristen J Eberlein on 28 December 2021
Is the following example valid now that we have an SVG reference domain?

The following code sample shows a specialization of <foreign> that is used to hold SVG elements. For this to work, the specialization module that defines <svg> also needs to include the definitions for the SVG elements.

```xml
<p>... as in the formula
<svg>
  <svg:svg width="100%" height="100%" version="1.1"
    xmlns="http://www.w3.org/2000/svg">
    <ellipse cx="300" cy="150" rx="200" ry="80"
      style="fill:rgb(200,100,50);
        stroke:rgb(0,0,100);stroke-width:2"/>
  </svg:svg>
</svg>.</p>
```

10.5.2.3 <no-topic-nesting>

The <no-topic-nesting> element is a placeholder in the DITA architecture.

Usage information

The <no-topic-nesting> element is not intended for use in DITA source files.
The `<no-topic-nesting>` element is designed for use only when configuring a document-type shell. It enables the DITA practitioner to disallow topic nesting for the topic type.

**Attributes**
The following attribute is available on this element: `class (not for use by authors)` (388).

**Example**
The following code sample shows how the `<no-topic-nesting>` can be used in a document-type shell to disallow topic nesting.

In the DTD document-type shell that is distributed by OASIS for the base topic, the `%topic-info-types;` entity is set to `topic`. This means that `<topic>` elements can nest other `<topic>` elements. The following code sample shows how a DITA practitioner redefines the entity to "no-topic-nesting":

```xml
<!ENTITY % topic-info-types
  "no-topic-nesting"
>
```

Now, topics that use that document-type shell can no longer nest other topics. DTD grammar rules require that some element be specified in this entity, so `<no-topic-nesting>` is used as a placeholder.

### 10.5.2.4 `<state>`
The `<state>` element represents a named property that has a variable state value.

**Usage information**
The `<state>` element is primarily intended for use in specializations. It could be used to represent logic circuit, chemical reaction, or airplane instrumentation states.

**Rendering expectations**
Rendering expectation for the `<state>` element are entirely implementation-dependent.

**Attributes**
The following attributes are available on this element: `universal attributes` (387) and the attributes defined below.

@name (REQUIRED)
Specifies the name of the property

@value (REQUIRED)
Specifies the state of the property

**Example**
The following code sample shows how `<state>` can be used to indicate a "high" value for a device flow rate:

```xml
<note type="warning">If the rate of flow reaches "high" on your measuring device (<state name="flowrate" value="high"/>), take quick action or you will risk dangerous levels of exposure.</note>
```
10.5.2.5 <unknown>

The <unknown> element is an open extension that enables information architects to incorporate XML fragments in DITA topics.

Usage information

The <unknown> element is intended primarily as a base for specialization. It might also be used in automatically-generated DITA topics or DITA used as a data-exchange format.

Processing expectations

Processors ignore the <unknown> element unless otherwise instructed.

Attributes

The following attributes are available on this element: universal attributes (387).

Example

The following code sample shows a specialized <unknown> element that contains non-DITA content:

```xml
<body>
  <my-unknown class="+ topic/unknown mything/my-unknown ">
    <thing value="4"/>
    <otherthing value="16"/>
  </my-unknown>
</body>
```

By definition, the content of <unknown> can only be understood by DITA processors as unknown XML. This means that processors generally ignore this content unless they are configured to recognize the <my-unknown> specialization.

10.6 Domain elements

A domain is a grouping of related DITA elements that can be integrated into document-type shells. The base edition of DITA includes a variety of domains for use in topics and maps.

10.6.1 Alternative-titles domain elements

The alternative title elements are designed to provide alternative titles for resources. The elements in the alternative-titles domain are specialized from the <titlealt> element.

10.6.1.1 <linktitle>

A link title is an alternative title for a resource. It is designed for use when a hyperlink or a cross-reference to a resource is generated based on relationships described in a DITA map.

Usage information

The <linktitle> element is a convenience element. It is equivalent to a <titlealt> element with @title-role set to "linking".

Features of DITA maps, such as relationship tables and hierarchies created by nesting <topicref> elements, generate the following kinds of links:

- Links from a topic to its child topics in the map hierarchy
- Links from a topic to its parent topic in the map hierarchy
• Links between sibling topics when the `@collection-type` attribute of the parent `<topicref>` element is set to "sequence" or "family"

Processors might also use a link title for custom linking scenarios.

**Processing expectations**

Processing expectations are dictated by the rules for the `<titlealt>` element.

**Specialization hierarchy**

The `<linktitle>` element is specialized from `<titlealt>`. It is defined in the alternative-titles domain module.

**Attributes**

The following attributes are available on this element: `universal attributes` (387) and `@title-role` (400).

For this element, `@title-role` has a default value of "linking".

**Examples**

This section contains examples of how the `<linktitle>` element can be used.

**Figure 149: Link title within a map**

The following code sample shows how a `<linktitle>` element can be used to provide text for a related link to a non-DITA resource:

```xml
<topicref href="SQLJ-example.html" format="html" scope="local">  
  <topicmeta> 
    <linktitle>Accessing relational data with SQLJ</linktitle> 
  </topicmeta> 
</topicref>
```

**Figure 150: Link title within a topic**

The following code sample shows how a `<linktitle>` element can be used to provide text for generated links to a topic:

```xml
<topic id="topic">  
  <title>Circuitry in the C-283 Drive Train</title>  
  <prolog>  
    <linktitle>Drive train circuitry</linktitle>  
  </prolog>
</topic>
```

Note that this link title might be overridden by a link title that is specified in a DITA map that references the topic.

10.6.1.2 `<navtitle>`

A navigation title is an alternative title for a resource. It is designed for situations where the topic title is unsuitable for use in a table of contents or navigation pane.

**Usage information**

The `<navtitle>` element is a convenience element. It is equivalent to a `<titlealt>` element with `@title-role` set to "navigation".
Processing expectations

Processing expectations are dictated by the rules for the `<titlealt>` element.

In some cases, when processing a `<topicref>` element that has no `<href>` attribute, the navigation title can also be used as the title of the generated topic, if applicable.

Specialization hierarchy

The `<navtitle>` element is specialized from `<titlealt>`. It is defined in the alternative-titles domain module.

Attributes

The following attributes are available on this element: universal attributes (387) and `<title-role>` (400).

For this element, `<title-role>` has a default value of "navigation".

Examples

This section contains examples of how the `<navtitle>` element can be used.

Figure 151: `<navtitle>` in a topic

The following code sample shows a `<navtitle>` element used in a topic. The `<navtitle>` element contains a shorter title that processors render in a TOC or navigation pane when the topic is published.

```xml
<task id="publishing-dita">
  <title>Publishing a DITA information set in PDF</title>
  <shortdesc>You can quickly publish your DITA information to PDF.</shortdesc>
  <prolog>
    <navtitle>Publishing in PDF</navtitle>
  </prolog>
</task>
```

Figure 152: `<navtitle>` in a map

The following code sample shows a `<navtitle>` element used in a DITA map. The navigation title in the map takes precedence over a navigation title that is specified in the topic.

```xml
<map xml:lang="en">
  <title>Publishing a DITA information set</title>
  <topicref href="2378d670f2op78.dita">
    <navtitle>Publishing to PDF</navtitle>
  </topicref>
</map>
```

10.6.1.3 `<searchtitle>`

A search title is an alternative title that is displayed by search tools.

Usage information

A search title is useful when the topic has a title that makes sense in the context of a single information set, but might be too general in a list of search results. For example, a topic title of “Markup example”
makes sense as part of a guide about DITA, but when found among thousands of unrelated topics, a search title of “DITA markup example” is more useful.

The `<searchtitle>` element is a convenience element. It is equivalent to a `<titlealt>` element with @title-role set to "search".

**Processing expectations**

Processing expectations are dictated by the rules for the `<titlealt>` element.

**Specialization hierarchy**

The `<searchtitle>` element is specialized from `<titlealt>`. It is defined in the alternative-titles domain module.

**Attributes**

The following attributes are available on this element: universal attributes (387) and @title-role (400).

For this element, @title-role has a default value of "search".

**Examples**

This section contains examples of how the `<searchtitle>` element can be used.

**Figure 153: Search title used in a topic**

In the following code sample, the title "Programming Example" is useful in a set of information about XSLT basics; however, the same title is not helpful among a set of search results from the entire Internet. In the latter case, a title of "Example of basic programming in XSLT" is more useful:

```xml
<topic id="programming-example">
  <title>Programming example</title>
  <prolog>
    <searchtitle>Example of basic programming in XSLT</searchtitle>
  </prolog>
  <body>
    <!-- ... -->
  </body>
</topic>
```

**Figure 154: Search title used in a map**

When `<searchtitle>` is used in maps, the element provides a new search title for the topic when used in that specific context. For example, if the following code sample is from a map that includes information about programming in many languages, searches among that information set will be most useful when they return "Example of programming in XSLT":

```xml
<topicref href="programming-example.dita">
  <topicmeta>
    <navtitle>Programming example</navtitle>
    <searchtitle>Example of programming in XSLT</searchtitle>
  </topicmeta>
</topicref>
```
10.6.1.4 <subtitle>
A subtitle is an subordinate title for a resource. It is designed to augment the information about the resource in certain display contexts.

Usage information
The <subtitle> element is a convenience element. It is equivalent to a <titlealt> element with @title-role set to "subtitle".

Processing expectations
Processing expectations are dictated by the rules for the <titlealt> element.

Specialization hierarchy
The <subtitle> element is specialized from <titlealt>. It is defined in the alternative-titles domain module.

Attributes
The following attributes are available on this element: universal attributes (387) and @title-role (400).
For this element, @title-role has a default value of "subtitle".

Examples
This section contains examples of how the <subtitle> element can be used.

Figure 155: Subtitle used within a map
The following code sample shows how a map can specify a subtitle for the publication:

```xml
<map>
  <title>Frankenstein</title>
  <topicmeta>
    <subtitle>The Modern Prometheus</subtitle>
  </topicmeta>
</map>
```

Figure 156: Subtitle used within a topic
The following code sample shows how a topic can specify a subtitle:

```xml
<topic id="topic">
  <title>Getting started</title>
  <prolog>
    <subtitle>An introduction to the Acme Inc. processing system</subtitle>
  </prolog>
</topic>
```
10.6.1.5 <titlehint>
A title hint provides information to map authors about the title of the referenced resource. This is useful if the referenced resources are not available.

Usage information
The <titlehint> element is a convenience element. It is equivalent to a <titlealt> element with @title-role set to "hint".

Processing expectations
Processing expectations are dictated by the rules for the <titlealt> element.

Specialization hierarchy
The <titlehint> element is specialized from <titlealt>. It is defined in the alternative-titles domain module.

Attributes
The following attributes are available on this element: universal attributes (387) and @title-role (400).
For this element, @title-role has a default value of "hint".

Example
The following code sample shows how a <titlehint> element is used to show the title of a referenced topic to map authors. This might be especially helpful in the context of a CCMS with opaque URIs.

```xml
<topicref href="x-id://AOE82KJAW1B0">
  <topicmeta>
    <titlehint>Getting started</titlehint>
  </topicmeta>
</topicref>
```

10.6.2 DITAVAL-reference domain element
The DITAVAL reference domain is used to reference a DITAVAL file that contains conditions that apply only to a subset of a DITA map. It also can be used to replicate a subset of a DITA map for multiple audiences.

Comment by robander
The child topics here all refer to a "map branch implied by a ditavalref" – we should probably define "implied" as a term in this case, that we can easily refer to (or if we already define it, uses of the phrase "implied by a ditavalref" should link there).
10.6.2.1 <ditavalref>

The <ditavalref> element references a DITAVAL document that specifies filter conditions to be used when processing a map or map branch.

Processing expectations

When a <ditavalref> element is included in a map, the conditions in the referenced DITAVAL document are used to filter the elements in the branch. The branch includes the parent element that contains the <ditavalref> element, any child elements, and all resources that are referenced by the parent element or its children. While there is no technical restriction that forces <ditavalref> to appear before peer topic references, placing them first is considered a best practice and all examples in the specification will use this convention.

In the simple case, a map can use <ditavalref> as follows:

```xml
<map>
  <topicref href="sampleBranch.dita" audience="admin">
    <topicmeta>
      <navtitle>Navigation title for branch</navtitle>
    </topicmeta>
    <ditavalref href="conditions.ditaval"/>
    <topicref href="insideBranch.dita" platform="win linux mac"/>
  </topicref>
  <!-- Other branches not affected by conditions.ditaval -->
</map>
```

The filtering conditions specified in the conditions.ditaval file apply to the following:

- The <topicref> element that references sampleBranch.dita and all child elements: <topicmeta>, <navtitle>, and <topicref> elements
- The sampleBranch.dita topic
- The insideBranch.dita topic

When more than one <ditavalref> element is specified in the same branch at the same level, the effective result is one copy of the branch for each <ditavalref> element. If the example above contains a reference to otherConditions.ditaval as a peer to the existing <ditavalref> element, the rendered version of this map would reflect two copies of "Sample branch", each reflecting the conditions that are specified in the corresponding DITAVAL document. One copy is created using the conditions in conditions.ditaval, while the other copy uses the conditions from otherConditions.ditaval. Map authors can use specific elements from the DITAVAL reference domain to indicate how resources are renamed, or processors can recover from naming collisions by using an alternate naming scheme. See Limitations (350) below for more information.

If DITAVAL conditions are specified at multiple levels within a single branch, “exclude” conditions that are specified at a higher level take precedence. In the following branch, assume alternate rules are specified for the condition audience=“novice”, with the value set to "exclude" in highLevel.ditaval and "include" in lowLevel.ditaval. In that case, the “exclude” condition specified in highLevel.ditaval takes precedence and so applies to the entire branch. This is true regardless of how the "exclude" condition is specified within highLevel.ditaval. That is, there might be a specific rule for audience="novice"; alternatively, the @audience attribute might be set to "exclude" by default, with no specific condition specified for the value audience="novice".

```xml
<topicref href="ancestor.dita">
  <ditavalref href="highLevel.ditaval"/>
  <topicref href="descendent.dita">
    <ditavalref href="lowLevel.ditaval"/>
  </topicref>
</topicref> <!-- Other topicrefs -->
```
If a `<ditavalref>` element is used that does not specify the `@href` attribute, the element is still processed but no additional filtering is applied. This can be used to create an unfiltered copy of a map branch alongside other filtered copies; other aspects of the `<ditavalref>` (such as any specified key scope or modified resource name) will still be applied to the branch.

**Limitations**

**Comment by robander**
This topic overall has far more processing information than seems appropriate for an element reference topic; there is likely a lot of overlap/duplication of information contained in the Branch Filtering section of the arch spec. Most of this information should be moved there, likely including the full set of Limitations.

The following limitations apply when using the `<ditavalref>` element; these limitations cannot be enforced in a DTD or other XML grammar files.

When the use of the `<ditavalref>` element results in multiple copies of a branch, resource names within that branch can be controlled with sub-elements of the effective `<ditavalref>`. For situations where resource names are relevant, it is an error condition for multiple `<ditavalref>` elements to result in conflicting resource names for different content. For example, the following map fragment would result in two distinct copies of the `c.dita` topic with the same file name:

```xml
<topicref href="c.dita">
  <ditavalref href="one.ditaval"/>
  <ditavalref href="two.ditaval"/>
</topicref>
```

Processors **MAY** recover by using an alternate naming scheme for the conflicting copies.

**Comment by Kristen J Eberlein on 15 May 2019**

Need more information about what situation the processor is recovering from ...

**Comment by robander**
For the above, it would be recovering from a map that instructs it to create two files of the same name, with different filter conditions applied.

**Specialization hierarchy**

The `<ditavalref>` element is specialized from `<topicref>`. It is defined in the DITAVAL-reference domain module.

**Attributes**

The following attributes are available on this element: **universal attributes** (387) (except for `@conkeyref`, which is removed for all elements in this domain), `@format` (396), `@href` (396), and `@scope` (400).

For this element:

- The `@format` attribute has a default value of "ditaval".
• The @href attribute specifies a reference to a DITAVAL document. If the @href attribute is unspecified, this <ditavalref> will not result in any new filtering behavior, but other aspects of the element are still evaluated.
• The @processing-role attribute has a default value of "resource-only".

Comment by robander
DITA 1.3 said that format MUST be ditaval, and that no value other than "resource-only" is valid for processing role. Should these be #FIXED in the grammar files?

Example
See 7.5.7 Examples of branch filtering (167) for several examples of the <ditavalref> element.

10.6.2.2 <ditavalmeta>
The <ditavalmeta> element defines metadata for use when processing a DITAVAL document for one branch of a map.

Usage information
Use the <ditavalmeta> element to specify the prefixes and suffixes that processors use to construct effective resource names, key scope names, and resource IDs within the map branch. The <ditavalmeta> element can also contain other information, such as navigation title, that might be useful for map architects but is not intended for rendering.

Specialization hierarchy
The <ditavalmeta> element is specialized from <topicmeta>. It is defined in the DITAVAL-reference domain module.

Attributes
The following attributes are available on this element: universal attributes (387) (except for @conkeyref, which is removed for all elements in this domain).

Example
See 7.5.7 Examples of branch filtering (167) for several examples of the <ditavalref> element.

10.6.2.3 <dvrResourcePrefix>
The <dvrResourcePrefix> element specifies the prefix to use when constructing the effective file names or resource IDs of the resources that are referenced from within the map branch that is implied by the ancestor <ditavalref> element.

Processing expectations
For map branches that are implied by <ditavalref> elements, the value of the <dvrResourcePrefix> element contributes to the effective file names and resource IDs of resources that are referenced within the branch. The effective resource file name starts with the value of the <dvrResourcePrefix> element. If a topic reference includes <resourceid> with the @appid-role attribute set to "deliverable-anchor", the effective @appid value for that <resourceid> value starts with the value of the <dvrResourcePrefix> element.
Some resources are not eligible for renaming, such as those marked with `scope="external"`.

Specialization hierarchy

The `<dvrResourcePrefix>` element is specialized from `<data>`. It is defined in the DITAVAL-reference domain module.

Attributes

The following attributes are available on this element: `universal attributes` (387) (except for `@conkeyref`, which is removed for all elements in this domain) and `@name` (397).

For this element, the `@name` attribute has a default value of "dvrResourcPrefix".

Example

```xml
<topicref href="branch-01.dita">
  <ditavalref href="condition-01.ditaval">
    <ditavalmeta>
      <dvrResourcePrefix>cond01-</dvrResourcePrefix>
    </ditavalmeta>
  </ditavalref>
  <topicref href="topics/subtopic-01.dita"/>
</topicref>
```

After the `<ditavalref>` is evaluated:

- The effective file name of the resource `subtopic-01.dita` is `cond01-subtopic-01.dita`.
- The effective file name of resource `branch-01.dita` is `cond01-branch-01.dita`.

Figure 158: How `<dvrResourcePrefix>` interacts with `<resourceid>`

The following code sample shows the same branch with a parent and child topic, but in this case the child topic specifies a deliverable anchor with `<resourceid>`.

```xml
<topicref href="branch-01.dita">
  <ditavalref href="condition-01.ditaval">
    <ditavalmeta>
      <dvrResourcePrefix>cond01-</dvrResourcePrefix>
    </ditavalmeta>
  </ditavalref>
  <topicref href="topics/subtopic-01.dita">
    <topicmeta>
      <resourceid appid="ae35-unit-fault" appid-role="deliverable-anchor"/>
    </topicmeta>
  </topicref>
</topicref>
```

After the `<ditavalref>` is evaluated:

- The effective file name of the resource `subtopic-01.dita` is `cond01-subtopic-01.dita`.
- The effective file name of resource `branch-01.dita` is `cond01-branch-01.dita`. 
The effective value of @appid on <resourceid> for the child topic is "cond01-ae35-unit-fault".

10.6.2.4 <dvrResourceSuffix>

The <dvrResourceSuffix> element specifies the prefix to use when constructing the effective file names or resource IDs of the resources that are referenced from within the map branch that is implied by the ancestor <ditavalref> element.

Processing expectations

For map branches that are implied by <ditavalref> elements, the value of the <dvrResourceSuffix> element contributes to the effective file names and resource IDs of the resources that are referenced within the branch. The base part of the effective resource file name ends with the value of the <dvrResourceSuffix> element. The base part of the resource file name consists of the portion of the file name after any directory information, and before any period followed by the file extension. For example, in the original file name task/install.dita, the base portion of the file name is "install".

If a topic reference includes <resourceid> with the @appid-role attribute set to "deliverable-anchor", the effective @appid value for that <resourceid> value ends with the value of the <dvrResourceSuffix> element.

Path information is not valid in <dvrResourceSuffix>.

Some resources are not eligible for renaming, such as those marked with scope="external".

Specialization hierarchy

The <dvrResourceSuffix> element is specialized from <data>. It is defined in the DITAVAL-reference domain module.

Attributes

The following attributes are available on this element: universal attributes (387) (except for @conkeyref, which is removed for all elements in this domain) and @name (397).

For this element, the @name attribute has a default value of "dvrResourceSuffix".

@name

The name of the metadata item. For this element the default value is "dvrResourceSuffix".

Example

Comment by robander

The ditavalmeta element refers to arch spec examples, that might be better here as well, given the new complexity of added resourceid elements.

Figure 159: How <dvrResourceSuffix> affects resource file names

The following code sample shows a simple branch with a parent and child topic, where the branch uses a <ditavalref> element and <dvrResourceSuffix>.

```xml
<topicref href="branch-01.dita">
  <ditavalref href="condition-01.ditaval">
    <ditavalmeta>
      <dvrResourceSuffix>-cond01</dvrResourceSuffix>
    </ditavalmeta>
  </ditavalref>
</topicref>
```
After the <ditavalref> is evaluated:

- The effective file name of the resource subtopic-01.dita is subtopic-01-cond01.dita.
- The effective file name of resource branch-01.dita is branch-01-cond01.dita.

Figure 160: How <dvrResourceSuffix> interacts with <resourceid>

The following code sample shows the same branch with a parent and child topic, but in this case the child topic specifies a deliverable anchor with <resourceid>.

```xml
<topicref href="branch-01.dita">
  <ditavalref href="condition-01.ditaval">
    <ditavalmeta>
      <dvrResourceSuffix>cond01-</dvrResourceSuffix>
    </ditavalmeta>
  </ditavalref>
  <topicref href="topics/subtopic-01.dita">
    <topicmeta>
      <resourceid appid="ae35-unit-fault" appid-role="deliverable-anchor"/>
    </topicmeta>
  </topicref>
</topicref>
```

After the <ditavalref> is evaluated:

- The effective file name of the resource subtopic-01.dita is subtopic-01-cond01.dita.
- The effective file name of resource branch-01.dita is branch-01-cond01.dita.
- The effective value of @appid on <resourceid> for the child topic is "ae35-unit-fault-cond01".

10.6.2.5 <dvrKeyscopePrefix>

The <dvrKeyscopePrefix> element specifies the prefix to use when constructing the effective key scope names for the map branch that is implied by the ancestor <ditavalref> element.

Processing expectations

For map branches that are implied by <ditavalref> elements, the value of the <dvrKeyscopePrefix> element contributes to the effective key scope names of the branch. The effective key scope names start with the value of the <dvrKeyscopePrefix> element. Note that if the branch as authored does not specify a @keyscope value, specifying <dvrKeyscopePrefix> (without also specifying <dvrKeyscopeSuffix>) results in the branch establishing a key scope whose name is the value of the <dvrKeyscopePrefix> element. The full key scope names will also reflect the value of a <dvrKeyscopeSuffix> element if one is specified, regardless of whether the branch as authored specifies a @keyscope value.

Specialization hierarchy

The <dvrKeyscopePrefix> element is specialized from <data>. It is defined in the DITAVAL-reference domain module.

Attributes

The following attributes are available on this element: universal attributes (387) (except for @conkeyref, which is removed for all elements in this domain) and @name (397).
For this element, the @name attribute has a default value of "dvrKeyscopePrefix".

**Example**
The following code sample shows how <dvrKeyscopePrefix> supplements the existing key scope name of "branch-01" to establish an effective key scope of "cond01-branch-01":

```xml
<topicref keys="branch-01"
  href="branch-01.dita"
  keyscope="branch-01"
>
  <ditavalref href="condition-01.ditaval">
    <ditavalmeta>
      <dvrKeyscopePrefix>cond01-</dvrKeyscopePrefix>
    </ditavalmeta>
  </ditavalref>
  <topicref href="topics/subtopic-01.dita"/>
</topicref>
```

### 10.6.2.6 <dvrKeyscopeSuffix>

The <dvrKeyscopeSuffix> element specifies the suffix to use when constructing the effective key scope names for the map branch that is implied by the ancestor <ditavalref> element.

**Processing expectations**

For map branches that are implied by <ditavalref> elements, the value of the <dvrKeyscopeSuffix> element contributes to the effective key scope names of the branch. The effective key scope names end with the value of the <dvrKeyscopeSuffix> element. Note that if the branch as authored does not specify a @keyscope value, specifying <dvrKeyscopeSuffix> (without also specifying <dvrKeyscopePrefix>) results in the branch establishing a key scope whose name is the value of the <dvrKeyscopeSuffix> element. The full key scope names will also reflect the value of a <dvrKeyscopePrefix> element if one is specified, regardless of whether the branch as authored specifies a @keyscope value.

**Specialization hierarchy**

The <dvrKeyscopeSuffix> element is specialized from <data>. It is defined in the DITAVAL-reference domain module.

**Attributes**

The following attributes are available on this element: universal attributes (387) (except for @conkeyref, which is removed for all elements in this domain) and @name (397).

For this element, the @name attribute has a default value of "dvrKeyscopeSuffix".

**Example**
The following code sample shows how <dvrKeyscopeSuffix> supplements the existing key scope name of "branch-01" to establish an effective key scope of "branch-01-cond01":

```xml
<topicref keys="branch-01"
  href="branch-01.dita"
  keyscope="branch-01"
>
  <ditavalref href="condition-01.ditaval">
    <ditavalmeta>
      <dvrKeyscopeSuffix>-cond01</dvrKeyscopeSuffix>
    </ditavalmeta>
  </ditavalref>
</topicref>
```
10.6.3 Emphasis domain elements
The emphasis elements are used to indicate text that has special meaning or importance, or text that needs to be distinguished from surrounding text.

10.6.3.1 <em>
Emphasis indicates special meaning or particular importance.

**Specialization hierarchy**
The `<em>` element is specialized from `<ph>`. It is defined in the emphasis-domain module.

**Attributes**
The following attributes are available on this element: `universal attributes` (387) and `@keyref` (396).

**Example**
The following code sample shows how the `<em>` element can be used to emphasize a phrase in a paragraph:

```xml
<p>A good plan once adopted and put into execution <em>should not be abandoned</em> unless it becomes clear that it can not succeed.</p>
```

10.6.3.2 <strong>
Strong text is text that is of greater importance than the surrounding text.

**Specialization hierarchy**
The `<strong>` element is specialized from `<ph>`. It is defined in the emphasis-domain module.

**Attributes**
The following attributes are available on this element: `universal attributes` (387) and `@keyref` (396).

**Example**
The following code sample shows how the `<strong>` element can be used to highlight an important detail:

```xml
<p>Your doctor prescribed this medicine to treat an infection. It is important that you <strong>take all of the medicine</strong> as described.</p>
```

10.6.4 Hazard-statement domain elements
The `<hazardstatement>` domain adds markup to support hazard statements. It is based on the regulations of ANSI Z535 and ISO 3864. The domain enables authors to provide all the information necessary for a hazard statement: a signal word, description of the hazard and its consequences, how to avoid the hazard, and one or more images.
10.6.4.1 <consequence>
A consequence is a result or effect of an action or condition. In the context of a hazard statement, it is the result of failing to avoid a hazard.

Specialization hierarchy
The <consequence> element is specialized from <div>. It is defined in the hazard-statement domain module.

Attributes
The following attributes are available on this element: universal attributes (387).

Example
The following code sample shows the markup for a hazard statement that warns about hot surfaces. The <consequence> element provides information about what might happen: “Contact may cause a burn.”

```xml
<hazardstatement type="caution">
  <messagepanel>
    <typeofhazard>
      <hazardsymbol keyref="hazard-hotsurface"/>
      HOT SURFACES
    </typeofhazard>
    <consequence>Contact may cause a burn.</consequence>
  </messagepanel>
</hazardstatement>
```

10.6.4.2 <hazardstatement>
A hazard statement provides information about a hazard and its consequences. It also explains how to avoid the hazard. It can also associate an image.

Specialization hierarchy
The <hazardstatement> element is specialized from <note>. It is defined in the hazard-statement domain module.

Attributes
The following attributes are available on this element: universal attributes (387) and the attribute defined below.

@type (REQUIRED)
Specifies the level of hazard. The values correspond to the signal words that are defined by the ANSI Z535.6 standard:

  caution
  Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

  danger
  Indicates a hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

  notice
  Indicates information considered important but not hazard-related, for example, messages relating to property damage.
**warning**

Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

*dita-use-conref-target*

See 7.3.6 Using the **-dita-use-conref-target** value (145) for more information.

**Examples**

This section contains examples of how the `<hazardstatement>` element can be used.

**Figure 161: Simple hazard statement**

The following code sample shows the markup for a hazard statement that warns about rotating blades:

```xml
<hazardstatement type="danger">
  <messagepanel>
    <typeofhazard>
      <hazardsymbol keyref="hazard-rotatingblade"/>
      Rotating blade</typeofhazard>
    <consequence>Moving parts can crush and cut.</consequence>
    <howtoavoid>Follow lockout procedure before servicing.</howtoavoid>
  </messagepanel>
</hazardstatement>
```

**Figure 162: Example of a hazard statement that contains multiple hazards**

The following code sample generates an ANSI Z535.6 grouped safety message that specifies information about multiple hazards:

```xml
<hazardstatement type="warning">
  <messagepanel>
    <typeofhazard>
      <hazardsymbol keyref="hazard-electricshock"/>
      ELECTRIC SHOCK HAZARD</typeofhazard>
    <consequence>The equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock</consequence>
    <howtoavoid>
      <hazardsymbol keyref="hazard-groundpowersource"/>
      <ul>
        <li>Turn off and disconnect power at main switch before disconnecting any cables or before servicing or installing any equipment.</li>
        <li>Connect only to grounded power sources.</li>
        <li>All electric wiring must be done by a qualified electrician and comply with all local codes and regulations.</li>
      </ul>
    </howtoavoid>
  </messagepanel>
  <messagepanel>
    <typeofhazard>
      <hazardsymbol keyref="hazard-hotsurface"/>
      BURN HAZARD</typeofhazard>
    <consequence>Electric surfaces and fluid can become very hot during operation.</consequence>
    <howtoavoid>
      To avoid burns:
      <ul>
        <li>Do not touch hot fluid or equipment.</li>
      </ul>
    </howtoavoid>
  </messagepanel>
</hazardstatement>
```
10.6.4.3 <hazardsymbol>

The <hazardsymbol> element specifies a graphic. The graphic might represent a hazard, a hazardous situation, a result of not avoiding a hazard, or any combination of these messages.

Usage information

When a <hazardsymbol> element is directly contained by <messagepanel>, the <hazardsymbol> is assumed to be associated with the <typeofhazard> element. Otherwise, the image is associated with the containing element.

Rendering expectations

Processors SHOULD scale the object when values are provided for the @height and @width attributes. The following expectations apply:

- If a height value is specified and no width value is specified, processors SHOULD scale the width by the same factor as the height.
- If a width value is specified and no height value is specified, processors SHOULD scale the height by the same factor as the width.
- If both a height value and width value are specified, implementations MAY ignore one of the two values when they are unable to scale to each direction using different factors.

Specialization hierarchy

The <hazardsymbol> element is specialized from <image>. It is defined in the hazard-statement domain module.

Attributes

The following attributes are available on this element: universal attributes (387), @format (396), @href (396), @keyref (396), @scope (400), and the attributes defined below.

For this element, @href specifies an image.

@height

Specifies the vertical dimension for the resulting display. The value of this attribute is a real number expressed in decimal notation, optionally followed by a unit of measure. The following units of measurement are supported: cm, em, in, mm, pc, pt, and px (centimeters, ems, inches, millimeters, picas, points, and pixels, respectively). The default unit is px (pixels). Possible values include:"5", "5in", and "10.5cm".

@width

Specifies the horizontal dimension for the resulting display. The value of this attribute is a real number expressed in decimal notation, optionally followed by a unit of measure. The following units of measurement are supported: cm, em, in, mm, pc, pt, and px (centimeters, ems, inches, millimeters, picas, points, and pixels, respectively). The default unit is px (pixels). Possible values include:"5", "5in", and "10.5cm".

@align

Specifies the horizontal alignment of an image when placement is specified as "break". Common values include "left", "right", and "center".

@scale

Specifies a percentage as an unsigned integer by which to scale the image in the absence of any specified image height or width; a value of 100 implies that the image should be presented at its...
intrinsic size. If a value has been specified for the @height or @width attribute (or both), the @scale attribute is ignored.

It is an error if the value of this attribute is not an unsigned integer. In this case, the implementation might give an error message and might recover by ignoring this attribute.

@scalefit
Specifies whether an image is scaled up or down to fit within available space. Allowable values are "yes", "no", and -dita-use-conref-target (145). For a given image, if any one of @height, @width, or @scale is specified, those attributes determine the graphic size and any setting of @scalefit is ignored. If none of those attributes are specified and scalefit="yes", then the image is scaled by the same factor in both dimensions, so that the graphic will just fit within the available height or width (whichever is more constraining).

The available width would be the prevailing column (or table cell) width—that is, the width a paragraph of text would have if the graphic were a paragraph instead. The available height is implementation dependent, but if feasible, it is suggested to be the page (or table cell) height or some other reasonable value.

@placement
Specifies whether an image is displayed inline or on a separate line. The default value is "inline". Allowable values are: "inline", "break", and -dita-use-conref-target (145).

Example
The following code sample defines a hazard statement that specifies an image that illustrates the type of hazard:

```xml
<hazardstatement type="danger">
  <messagepanel>
    <typeofhazard>
      <hazardsymbol keyref="hazard-rotatingblade"/>
      Rotating blade</typeofhazard>
    <consequence>Moving parts can crush and cut.</consequence>
    <howtoavoid>Follow lockout procedure before servicing.</howtoavoid>
  </messagepanel>
</hazardstatement>
```

10.6.4.4 <howtoavoid>
The <howtoavoid> element contains information about how a user can avoid a hazard, for example, "Do not use solvents to clean the drum surface."

Specialization hierarchy
The <howtoavoid> element is specialized from <div>. It is defined in the hazard-statement domain module.

Attributes
The following attributes are available on this element: universal attributes (387).
Example

The following code sample shows the markup for a hazard statement that warns about possible damage to machinery. The `<howtoavoid>` element provides specific information about what the reader needs to do to avoid the hazard.

```
<hazardstatement type="notice">
  <messagepanel>
    <typeofhazard>
      <hazardsymbol keyref="hazard-agressivesolvent"/>
      Machinery Damage</typeofhazard>
    <howtoavoid>
      <hazardsymbol keyref="hazard-readmanual"/>
      <ul>
        <li>Do NOT use solvents to clean the drum surface</li>
        <li>Read manual for proper drum cleaning procedure</li>
      </ul>
    </howtoavoid>
  </messagepanel>
</hazardstatement>
```

10.6.4.5 `<messagepanel>`

The `<messagepanel>` element contains the textual information that is displayed on the hazard statement. This information identifies the hazard, specifies how to avoid the hazard, states the probable consequences of failing to avoid the hazard, and might specify one or more images.

Specialization hierarchy

The `<messagepanel>` element is specialized from `<div>`. It is defined in the hazard-statement domain module.

Attributes

The following attributes are available on this element: `universal attributes` (387) and `@compact` (394).

Example

See `<hazardstatement>`.(358)

10.6.4.6 `<typeofhazard>`

The `<typeofhazard>` element contains a description of the type of hazard, for example, "Hot surfaces inside."

Specialization hierarchy

The `<typeofhazard>` element is specialized from `<div>`. It is defined in the hazard-statement domain module.

Attributes

The following attributes are available on this element: `universal attributes` (387).

Example

The following code sample shows the markup for a hazard statement that warns about a lifting hazard:

```
<hazardstatement type="caution">
  <messagepanel>
    ...
  </messagepanel>
</hazardstatement>
```
10.6.5 Highlighting domain elements

The highlighting elements are used to highlight text with styles such as bold, italic, and monospaced. These elements are intended solely for use by authors when no semantically appropriate element is available and a formatting effect is required.

10.6.5.1 <b>

Bold text is text that is used to draw a reader's attention to a phrase without otherwise adding meaning to the content.

Specialization hierarchy

The <b> element is specialized from <ph>. It is defined in the highlighting-domain module.

Attributes

The following attributes are available on this element: universal attributes (387) and @keyref (396).

Example

The following code sample shows a <b> element used to draw a reader's attention to a phrase:

```xml
<p>Use the bold tag <b>for visual emphasis only</b>; do not use it if another phrase-level element better signifies the reason for the emphasis.</p>
```

10.6.5.2 <i>

Italic text is text that is used to emphasize the key points in printed text, or when quoting a speaker, to show which words the speaker stressed.

Specialization hierarchy

The <i> element is specialized from <ph>. It is defined in the highlighting-domain module.

Attributes

The following attributes are available on this element: universal attributes (387) and @keyref (396).

Example

The following code sample shows an <i> element used to indicate the use of a foreign word:

```xml
<note type="tip">Take care to measure the right amount when mixing ingredients. A <i>laissez-faire</i> attitude to baking is a recipe for disaster.</note>
```
10.6.5.3 <line-through>
A strikethrough is a typographical presentation of words with a horizontal line through their center. It can indicate that words are a mistake and not intended for inclusion, or it can be used deliberately to imply a change of thought. A strikethrough is represented by the line-through value for the CSS text-decoration property.

Usage information
The <line-through> element is designed to enable authors to indicate a deletion or revision for rhetorical purpose; it is not intended to be used for indicating revisions.

Specialization hierarchy
The <line-through> element is specialized from <ph>. It is defined in the highlighting-domain module.

Attributes
The following attributes are available on this element: universal attributes (387) and @keyref (396).

Example
The following code sample shows a <line-through> element used to indicate a rhetorical revision:

```html
<p>After writing up an angry post for social media, the author <line-through> wisely reconsidered</line-through> decided to wait a day before sharing.</p>
```

10.6.5.4 <overline>
An overline is a horizontal line that is printed above a line of text, a mathematical symbol, or an illustration in a newspaper or journal.

Specialization hierarchy
The <overline> element is specialized from <ph>. It is defined in the highlighting-domain module.

Attributes
The following attributes are available on this element: universal attributes (387) and @keyref (396).

Example
The following code sample shows an <overline> element used to provide the highlighting used for mathematical notation:

```html
<p>Overline: <overline><i>x</i></overline> is the average value of<i>x<sub>i</sub></i></p>
```

10.6.5.5 <sub>
A subscript is text that is printed below the line. It is frequently used in chemical and mathematical formulas.

Specialization hierarchy
The <sub> element is specialized from <ph>. It is defined in the highlighting-domain module.
Attributes
The following attributes are available on this element: universal attributes (387) and @keyref (396).

Example
The following code sample shows how the <sub> element is used in a chemical formula:

```
<note>When cleaning, be sure to dilute the baking soda (NaHCO<sub>3</sub>) with water (H<sub>2</sub>O) before mixing in the vinegar (CH<sub>3</sub>COOH).</note>
```

10.6.5.6 <sup>
A superscript is text that is printed above the line. It is frequently used in chemical and mathematical formulas.

Specialization hierarchy
The <sup> element is specialized from <ph>. It is defined in the highlighting-domain module.

Attributes
The following attributes are available on this element: universal attributes (387) and @keyref (396).

Example
The following code sample shows a <sup> element used to ensure proper formatting of the exponent in the number ten to the power of five:

```
<p>The power produced by the electrohydraulic dam was 10<sup>5</sup> more than the older electric plant.</p>
```

10.6.5.7 <tt>
Teletype text is text that is displayed on a fixed-width display such as a teletype, text-only screen, or line printer.

Specialization hierarchy
The <tt> element is specialized from <ph>. It is defined in the highlighting-domain module.

Attributes
The following attributes are available on this element: universal attributes (387) and @keyref (396).

Example
The following code sample shows how the <tt> element can be used to apply monospaced highlighting:

```
<p>Make sure that the screen displays <tt>File successfully created</tt> before proceeding to the next stage of the task.</p>
```

While the example demonstrates a potential use of <tt>, use <systemoutput> if you have access to the elements in the software domain.
10.6.5.8 `<u>`

An underline, also called an underscore, is a line immediately below a portion of text.

**Specialization hierarchy**

The `<u>` element is specialized from `<ph>`. It is defined in the highlighting-domain module.

**Attributes**

The following attributes are available on this element: universal attributes (387) and `@keyref` (396).

**Example**

The following code sample shows underlining used to provide emphasis in a marketing blurb, without giving any extra meaning to the underlined phrase:

```
<p>Using our patented `<u>SuperFast BitSpeed Technology</u>`, our product will answer all of your questions only a few nanoseconds after you ask!</p>
```

10.6.6 Mapgroup domain elements

The mapgroup domain elements define, group, or reference content. Many of the mapgroup elements are convenience elements; they simply provide shortcuts for an author to use existing markup.

For example, the `<topichead>` element enables a map to specify a heading without a reference to a topic. While a `<topicref>` element might accomplish the same thing by creating a title and leaving off the `@href` attribute, the `<topichead>` element makes the intent clearer and prevents the accidental inclusion of an `@href` attribute.

10.6.6.1 `<keydef>`

A key definition provides a simple way to define a key without making the definition itself a part of rendered content.

**Usage information**

The `<keydef>` element is a convenience element. It is equivalent to a `<topicref>` element that defines a key while also setting `@processing-role` to “resource-only”.

Attributes defaulted on the `<keydef>` element ensure that key definitions do not appear in tables of contents, do not add extra links, and are not rendered as topics.

**Specialization hierarchy**

The `<keydef>` element is specialized from `<topicref>`. It is defined in the mapgroup-domain module.

**Attributes**

The following attributes are available on this element: universal attributes (387), link-relationship attributes (392), common map attributes (392), and `@keyref` (396).

For this element:

- The `@keys` attribute is required.
- The `@href` attribute might be omitted when the key definition is used for variable text.
• The @processing-role attribute has a default value of "resource-only".

**Example**

The following code sample shows several different types of key definitions:

```xml
<map>
  <title>Possible keys for use in the DITA specification</title>
  <!-- Key definition #1-->  
  <keydef keys="dita-tc" scope="external" format="html"
    href="https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=dita">
    <topicmeta>
      <keytext>DITA Technical Committee</keytext>
    </topicmeta>
  </keydef>
  <!-- Key definition #2-->  
  <keydef keys="addressing" href="dita-addressing.dita"/>
  <!-- Key definition #3-->  
  <keydef keys="dita-version">
    <topicmeta>
      <keytext>2.0</keytext>
    </topicmeta>
  </keydef>
</map>
```

1. The first `<keydef>` element defines a key that links to a web page. It contains link text; it also specifies the necessary `@scope` and `@format` attributes, so that authors do not need to include them when they reference this key.

2. The second `<keydef>` element defines a key for a local DITA topic about addressing in DITA; that topic is available to resolve link text.

3. The third `<keydef>` element defines a text-only key that specifies the current DITA version number.

**10.6.6.2 <mapref>**

A map reference is a mechanism for referencing a DITA map from a DITA map.

**Usage information**

The `<mapref>` element is a convenience element. It is equivalent to a `<topicref>` element with the `@format` attribute set to "ditamap".

**Processing expectations**

The hierarchy of the referenced map is merged into the container map at the position of the reference, and the relationship tables of the child map are added to the parent map.

---

**Comment by Kristen J Eberlein on 06 August 2018**

Should we make normative statements about the above points?

Discussed at DITA TC meeting on 02 July 2019.

Consensus: Yes, these need to be normative statements, but this is not the correct location. We need architectural topics that address processing of map hierarchy and relationship tables. This content should be located in the same chapter as the material about subjectScheme maps; it probably should absorb content currently in Processing > Navigation > TOC.

We should plan a review that covers both architectural and element-reference topics about maps.
Specialization hierarchy

The `<mapref>` element is specialized from `<topicref>`. It is defined in the `mapgroup-domain module`.

Attributes

The following attributes are available on this element: universal attributes (387), link-relationship attributes (392), common map attributes (392), `@keyref` (396), and `@keys` (397).

For this element, the `@format` attribute has a default value of "ditamap".

Example

The following code sample shows how a `<mapref>` element can be used to reference a submap. The `base-elements.ditamap` document references the `map-group-elements.ditamap`:

```xml
<map>
  <title>Base elements</title>
  <!-- ... -->
  <topicref href="containers/domain-elements.dita" >
  <!-- ... -->
  <mapref href="map-group-elements.ditamap"/>
  <!-- ... -->
  </topicref>
  <!-- ... -->
</map>
```

The `map-group-elements.ditamap` document contains references to the element-reference topics for the map group domain. It is constructed as a map in order to enable easy editing of the child topics.

```xml
<map>
  <title>Map group elements</title>
  <topicref keyref="mapgroup-d"> 
  <topicref keyref="keydef" />
  <topicref keyref="mapref" />
  <topicref keyref="topicgroup" />
  <topicref keyref="topichead" />
  </topicref>
  </map>
```

After processing, the `base-elements.ditamap` contains the topic references that originally were located in the submap:

```xml
<map>
  <title>Base elements</title>
  <!-- ... -->
  <topicref href="containers/domain-elements.dita" >
  <!-- ... -->
  <topicref keyref="mapgroup-d">
  <topicref keyref="keydef" />
  <topicref keyref="mapref" />
  <topicref keyref="topicgroup" />
  <topicref keyref="topichead" />
  </topicref>
  <!-- ... -->
  </topicref>
  <!-- ... -->
</map>
```
10.6.6.3 <mapresources>
Map resources are objects with a @processing-role set to "resource-only", for example, key definitions and subject scheme maps. Such resources do not contribute to the navigation structure, although they might be essential for authoring and processing.

Specialization hierarchy
The <mapresources> element is specialized from <topicref>. It is defined in the mapgroup-domain module.

Attributes
The following attributes are available on this element: universal attributes (387), link-relationship attributes (392), common map attributes (392) (excluding @chunk and @collection-type), @keys (397), and @keyref (396).

For this element, the @processing-role attribute has a default value of "resource-only".

Examples
This section provides examples of how the <mapresources> element can be used.

Figure 163: Specifying resource-only objects in an intuitive location in a book map

The following code sample illustrate how the <mapresources> element can group references to key definitions, subject schemes, and other resources in a bookmap:

```xml
<bookmap>
  <booktitle>Test bookmap</booktitle>
  <mapresources>
    <mapref href="key-definitions.ditamap"/>
    <mapref href="subject-scheme.ditamap" type="subjectscheme"/>
    <topicref href="cover-page.dita outputclass="cover-page"/>
  </mapresources>
  <!-- ... -->
</bookmap>
```

Note that this example illustrates that <mapresources> can be used to make topics available for resource-only processing. In this scenario, the company uses a processor that uses content contained in the cover-page.dita file to generate a PDF cover page.

Figure 164: Specifying resource-only objects in a map

The following code sample shows a map that contains information for a specific model of a controller. This map is referenced in an omnibus publication that contains information for an entire family of controllers.

```xml
<map keyscope="model-XNP09">
  <title>Model XNP09</title>
  <mapresources>
    <keydef keys="model-illustration" href="model-XNP09.png" format="png"/>
    <keydef keys="remove-cover" href="remove-cover-XNP09.png" format="png"/>
  </mapresources>
  <topicref href="model-overview.dita"/>
  <topicref href="installing.dita"/>
  <topicref href="uninstalling.dita"/>
  ...
</map>
```
10.6.6.4 <topicgroup>
A topic group is a set of topic references that share common attributes and linking relationships.

Usage information
The <topicgroup> element is a convenience element. It is equivalent to a <topicref> element without a navigation title or @href, @keys, or @keyref attributes.

The <topicgroup> element does not affect the navigation hierarchy of the map.

Most <titlealt> elements within the <topicmeta> element inside of a <topicgroup> have no effect on rendered publications, but they can be used to hold descriptive information about the grouped <topicref> elements.

Rendering expectations
094 (415) When a map that contains a <topicgroup> element with a navigation title is used to generate publication output, processors MUST ignore the navigation title and MAY issue an error message.

Specialization hierarchy
The <topicgroup> element is specialized from <topicref>. It is defined in the mapgroup-domain module.

Attributes
The following attributes are available on this element: universal attributes (387), common map attributes (392), @format (396), @scope (400), and @type (400).

Example
In the following code sample, the <topicgroup> element specifies common attributes (@audience and @linking) that are inherited by the topic references. The navigation hierarchy is not affected.

```
<topicgroup audience="novice" linking="none">
  <topicmeta>
    <titlehint>Topics used only in "Getting started" material.</titlehint>
  </topicmeta>
  <topicref href="getting-started.dita"/>
  <topicref href="basic-concepts.dita"/>
  <topicref href="cheat-sheet-reference.dita"/>
</topicgroup>
```

10.6.6.5 <topichead>
A topic head is a title-only entry in a DITA map.

Usage information
The <topichead> element is a convenience element. It is equivalent to a <topicref> element with the following components:

- A navigation title
- No @href, @keys, or @keyref attributes
Rendering expectations
When the navigation title associated with a `<topichead>` element is rendered, it appears as a heading in a table of contents. In print contexts, it also appears as a heading in the rendered body content.

Processing expectations

| 095 (415) | Processors SHOULD generate a warning if a navigation title is not specified on a `<topichead>` element. |

Specialization hierarchy
The `<topichead>` element is specialized from `<topicref>`. It is defined in the mapgroup-domain module.

Attributes
The following attributes are available on this element: universal attributes (387), common map attributes (392), `@format` (396), `@scope` (400), and `@type` (400).

Example
In the following example, the `<topichead>` elements provide titles (“Computers” and “Books”) for two groups of topics:

```xml
<map>
  <topichead>
    <topicmeta>
      <navtitle>Computers</navtitle>
    </topicmeta>
    <topicref href="eniac.dita"/>
    <topicref href="system360.dita"/>
    <topicref href="pdp8.dita"/>
  </topichead>
  <topichead>
    <topicmeta>
      <navtitle>Books</navtitle>
    </topicmeta>
    <topicref href="hardback.dita"/>
    <topicref href="paperback.dita"/>
  </topichead>
</map>
```

10.6.7 Utilities domain elements
The utilities domain elements represent common features of a language that might not necessarily be semantic, such as image maps.

10.6.7.1 `<area>`
The `<area>` element defines a linkable area within an `< imagemap >`.

Specialization hierarchy
The `<area>` element is specialized from `<div>`. It is defined in the utilities-domain module.
Attributes
The following attributes are available on this element: universal attributes (387).

Example
See 10.6.7.3 imagemap (371).

10.6.7.2 <coords>
The <coords> element specifies the coordinates of a linkable region in an <imagemap>.

Usage information
This element contains text data representing coordinates for a region in an image map. Pixels are the recommended units for describing coordinates. The syntax of the coordinate data depends on the shape described by the coordinates, and is based on the image map definition in HTML. It uses the following data for the appropriate shapes:

<table>
<thead>
<tr>
<th>Shape</th>
<th>Data format</th>
</tr>
</thead>
<tbody>
<tr>
<td>rect</td>
<td>left-x, top-y, right-x, bottom-y</td>
</tr>
<tr>
<td>circle</td>
<td>center-x, center-y, radius</td>
</tr>
<tr>
<td>poly</td>
<td>x1, y1, x2, y2, ... , xN, yN. To close the polygon, ensure that the first x and y coordinate pair and the last are the same.</td>
</tr>
</tbody>
</table>

Specialization hierarchy
The <coords> element is specialized from <ph>. It is defined in the utilities-domain module.

Attributes
The following attributes are available on this element: universal attributes (387) and @keyref (396). For this element, the @translate attribute has a default value of "no".

Example
See 10.6.7.3 imagemap (371).

10.6.7.3 <imagemap>
The <imagemap> element supports the basic functionality of the HTML "client-side" image map markup. <imagemap> allows you to designate a linkable area or region over an image, allowing a link in that region to display another topic.

Usage information
An HTML client-side image map binds an image to the navigation structure (the "map") by means of an ID association from the map to the image. In contrast, the DITA version of <imagemap> markup simply includes the target image as the first required element in the markup, followed by a sequence of <area> elements that represent the links associated with the contained image.

The <xref> content within <area> contains the intended alternative text or hover text for that image map area. Normal text retrieval for <xref> elements can be used to populate that alternative text.
Rendering expectations

An `<imagemap>` structure can be rendered as a standard HTML image map or as an alternative form of navigation (such as table-based image maps). When rendered in PDF, the minimal form would be to represent the image; advanced PDF output processors could provide equivalent region-oriented hyperlinks.

Specialization hierarchy

The `<imagemap>` element is specialized from `<div>`. It is defined in the utilities-domain module.

Attributes

The following attributes are available on this element: universal attributes (387) and display attributes (392).

Example

The following code sample shows a simple `<imagemap>` with five areas, using three different shapes:

```xml
<imagemap>
  <image href="imagemapworld.jpg">
    <alt>Map of the world showing 5 areas</alt>
  </image>
  <area shape="rect" coords="2,0,53,59">
    <xref href="d1-s1.dita">Section 1 alternative text</xref>
  </area>
  <area shape="rect" coords="54,1,117,60">
    <xref href="d1-s2.dita">!!-- Pull title from d1-s2.dita --!</xref>
  </area>
  <area shape="rect" coords="54,62,114,116">
    <xref href="#inline" type="topic">Alternative text for this rectangle</xref>
  </area>
  <area shape="circle" coords="120,154,29">
    <xref format="html" href="test.html">Link to a test html file</xref>
  </area>
  <area shape="poly">
    <coords>246,39,200,35,173,52,177,86,215,90,245,84,254,65</coords>
    <xref format="pdf" href="test.pdf">Link to a test PDF file</xref>
  </area>
</imagemap>
```

The areas defined correspond to this graphic image with the areas visible:
Comment by Robert
I think we should update this to use the HTML5 model, rather than HTML4.1: https://www.w3.org/TR/2011/WD-html5-20110525/the-map-element.html#the-area-element

The "latest" version is much newer, but is also a living standard, and creating a dependency would seem to turn this one element from DITA into its own living standard: https://html.spec.whatwg.org/multipage/image-maps.html#image-map-processing-model:the-area-element-10

The values for use in the `<shape>` and `<coords>` elements follow the guidelines defined for image maps in HTML 4.1, Client-side image maps: the MAP and AREA elements

10.6.7.4 `<shape>`
The `<shape>` element defines the shape of a linkable area in an `<imagemap>`.

Usage information
The `<shape>` element supports these values:

- **rect**
  Define a rectangular region. If you leave the `<shape>` element blank, a rectangular shape is assumed.

- **circle**
  Define a circular region.

- **poly**
  Define a polygonal region.

- **default**
  Indicates the entire diagram.

Specialization hierarchy
The `<shape>` element is specialized from `<keyword>`. It is defined in the utilities-domain module.
Attributes
The following attributes are available on this element: universal attributes (387) and @keyref (396).
For this element, the @translate attribute has a default value of “no”.

Example
See 10.6.7.3 imagemap (371).

10.6.7.5 <sort-as>
For elements that are sorted, the <sort-as> element provides text that is combined with the base sort phrase to construct the effective sort phrase.

Usage information
Sort text can be specified in the content of the <sort-as> element or in the @value attribute on the <sort-as> element. The <sort-as> element also is useful for elements where the base sort phrase is inadequate or non-existent, such as an index entry for a Japanese Kanji phrase.

If a <keyword> element is used within <sort-as>, the @keyref attribute can be used to set the sort phrase. If a <keyword> uses @keyref and would otherwise also act as a navigation link, the link aspect of the @keyref attribute is ignored.

Some elements in the base DITA vocabulary are natural candidates for sorting, including topics, definition list entries, index entries, and rows in tables and simple tables. Authors are likely to include <sort-as> elements in the following locations:

- For topics, the <sort-as> element can be included directly in <title> or <titlealt> when the different forms of title need different effective sort phrases. If the effective sort phrase is common to all the titles for a topic, the <sort-as> element can be included as a direct child of the <prolog> element in the topic.
- For glossary entry topics, the <sort-as> element can be included directly in <glossterm> or as a direct child of the <prolog> element.
- For topic references, the <sort-as> element can be included directly in the <titlealt> element with a @title-role of navigation, such as navtitle, within <topicmeta> or as a child of <topicmeta>.
- For definition list items, the <sort-as> element can be included in the <dt> element.
- For index entries, the <sort-as> can be included as a child of <indexterm>. In a multilevel <indexterm> element, the <sort-as> element only affects the level in which it occurs.

Processing expectations
If the @value attribute is not specified and the <sort-as> element does not contain content, then the <sort-as> element has no effect.

As a specialization of <data>, the <sort-as> element is allowed in any context where <data> is allowed. However, the presence of <sort-as> within an element does not, by itself, indicate that the containing element should be sorted. Processors can choose to sort any DITA elements for any reason. Likewise, processors are not required to sort any elements. See 7.6 Sorting (175) for more information on sorting.
• A `<sort-as>` element that is specified in a title takes precedence over a `<sort-as>` element that is specified as a child of the topic prolog.
• Except for instances in the topic prolog, processors only apply `<sort-as>` elements that are either a direct child of the element to be sorted or a direct child of the title- or label-defining element of the element to be sorted.
• When an element contains multiple, direct-child, `<sort-as>` elements, the first direct-child `<sort-as>` element in document order takes precedence.
• It is an error if there is more than one `<sort-as>` child for a given `<indexterm>`. An implementation encountering more than one `<sort-as>` in this case might give an error message.
• Sort phrases are determined after filtering and content reference resolution occur.

When a `<sort-as>` element is specified, processors that sort the containing element **MUST** construct the effective sort phrase by prepending the content of the `<sort-as>` element to the base sort phrase. This ensures that two items with the same `<sort-as>` element but different base sort phrases will sort in the appropriate order.

For example, if a processor uses the content of the `<title>` element as the base sort phrase, and the title of a topic is “24 Hour Support Hotline” and the value of the `<sort-as>` element is “twenty-four hour”, then the effective sort phrase would be “twenty-four hour24 Hour Support Hotline”.

**Specialization hierarchy**

The `<sort-as>` element is specialized from `<data>`. It is defined in the utilities-domain module.

**Attributes**

The following attributes are available on this element: universal attributes (387), `@name` (397), and `@value` (400).

For this element,

• The `@name` attribute has a default value of “sort-as”.
• The `@value` attribute specifies a text to combine with the base sort phrase to create an effective sort phrase. When the `<sort-as>` element has content and the `@value` attribute is specified, the `@value` attribute takes precedence.

**Example**

The following examples illustrate how a glossary entry for the Chinese ideographic character for “big” might specify an effective sort phrase of “dada” (the Pin-Yin transliteration for Mandarin):

**Figure 165: The `<sort-as>` element located within `<glossterm>`**

```xml
<glossentry id="gloss-dada">
  <glossterm><sort-as value="dada"/>&#x5927;&#x5927;</glossterm>
</glossentry>
```
10.7 Other elements

10.7.1 Legacy conversion elements
Conversion elements exist primarily to aid in the conversion of content to DITA.

10.7.1.1 <required-cleanup>
Required cleanup sections are placeholders for migrated elements that cannot be appropriately tagged without manual intervention, or for content that must be cleaned up before publishing.

Usage information
As the element name implies, the intent for authors is to clean up the contained material and eventually remove the <required-cleanup> element.

Rendering expectations

Comment by Robert on 20200831
The following statement was written as if RFC-level "must" was used, but was not marked with RFC. I've added the RFC notation; if this is not meant to be "MUST" then we need to find alternate wording.

We should probably also use a clearer definition of "Processors" in this context, as an editor is a processor that should not be forced to strip the content from displaying.

Update 2020-10-19: moving the "must strip" language into a rendering section. This is about not *rendering* the element.

Processors **MUST** strip this element from output by default. The content of <required-cleanup> is not considered to be publishable data.

Processing expectations
Processor options might be provided to allow a draft view of migrated content in context.
Attributes

The following attributes are available on this element: universal attributes (387) and the attribute defined below.

For this element, the @translate attribute has a default value of "no".

@remap

Specifies information about the origins of the content of the <required-cleanup> element. This provides authors with context for determining how migrated content was originally encoded.

Example

In the following example, an HTML document that used the <center> element was migrated to DITA. Because DITA has no clear equivalent element, the content is stored in <required-cleanup> until it can be marked up appropriately.

```xml
<section>
  <title>Using the display</title>
  <required-cleanup remap="center">If you cannot read your display, see "Adjusting the language setting" before you continue.</required-cleanup>
</section>
```

10.7.2 DITAVAL elements

A DITAVAL document identifies content that is filtered and flagged at rendering time. The DITAVAL document has an extension of .ditaval.

10.7.2.1 <alt-text>

The <alt-text> element in a DITAVAL document specifies alternate text for an image that is used to flag content. If an image is not specified, the text is used to mark the flagged content.

Rendering expectations

If no alternate text is specified, processors can provide default alternate text to indicate the start and end point of the flagged content.

Example

The following code sample shows a DITAVAL document that is used to render icons before content that is specific to particular audiences. The <alt-text> element provides alternate text for the icons:

```xml
<val>
  <prop action="flag" att="audience" val="novice">
    <startflag imageref="novice-icon.gif">
      <alt-text>Novice</alt-text>
    </startflag>
  </prop>
  <prop action="flag" att="audience" val="expert">
    <startflag imageref="expert-icon.gif">
      <alt-text>Expert</alt-text>
    </startflag>
  </prop>
</val>
```
10.7.2.2 <endflag>
The <endflag> element in a DITAVAL document specifies information that identifies the end of flagged content. The information can be an image, alternate text, or both.

Usage information
If the <endflag> element does not specify an image or provide alternate text, the element has no defined purpose.

Rendering expectations
Processors treat the information provided by the <endflag> element in the following way:

- If an image is specified, the image is used as a flag to identify the end of the flagged content. If the <alt-text> element contains content, the content is used as alternate text for the image.
- If alternate text is specified but the <endflag> element does not specify an image, the alternate text is used to indicate the end of the flagged content.

Attributes
The following attribute is available on this element:

@imageref
Specifies a URI reference to the image, using the same syntax as the @href attribute. See 6.2.2 The href attribute (88) for information on supported values and processing implications.

Example
The following code sample shows a DITAVAL document that is used to flag content that applies to administrators. The <startflag> and <endflag> elements provide text that is used to indicate the start and end point of the flagged content.

```
<val>
  <prop action="flag" att="audience" val="administrator">
    <startflag>
      <alt-text>Administrator content</alt-text>
    </startflag>
    <endflag>
      <alt-text>End of administrator content</alt-text>
    </endflag>
  </prop>
</val>
```

10.7.2.3 <prop>
The <prop> element in a DITAVAL document specifies filtering or flagging actions that occur when rendering. The actions target the @props attribute or specializations of @props, including @audience, @deliveryTarget, @otherprops, @platform, and @product.

Usage information
The following table lists the functions that are performed by the <prop> element in a DITAVAL document:

<table>
<thead>
<tr>
<th>Markup</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &lt;prop&gt; element that specifies both an @att and a @val attribute</td>
<td>Specifies an action (exclude, flag, include, or pass through) for the attribute or attribute group with the specified value</td>
</tr>
</tbody>
</table>
A `<prop>` element that specifies only an `@att` attribute

Sets a default action for the specified attribute or attribute group

A `<prop>` element without an `@att` and `@val` attribute

Sets a default action for all conditional-processing attributes not explicitly specified in the DITAVAL document

### Rendering expectations

**099 (415)**

For the `@color` and `@backcolor` attributes on `<prop>` and `<revprop>`, processors **SHOULD** support at least the following values:

- The color names listed under the heading "<color>" in the XSL version 1.1 specification
- The associated hex code

For the `@style` attribute on `<rev>` and `<revprop>`, processors **SHOULD** support the following tokens:

- bold
- double-underline
- italics
- overline
- underline

In addition, processors **MAY** support proprietary tokens for the `@style` attribute. Such tokens **SHOULD** have a processor-specific prefix to identify them as proprietary. If a processor encounters an unsupported style token, it **MAY** issue a warning, and it **MAY** render content that is flagged with such a style token by using some default formatting.

### Processing expectations

**100 (415)**

The following markup in a DITAVAL document is an error condition:

- More than one `<prop>` element with no `@att` attribute
- More than one `<prop>` element with the same `@att` attribute and no value
- More than one `<prop>` element with the same `@att` attribute and same `@val`

Processors **MAY** provide an error or warning message for these error conditions.

The following list outlines how processors apply `@outputclass` flags:

- If one or more DITAVAL properties apply `@outputclass` flags to the same element, and the element already specifies one or more values for the `@outputclass` attribute, processors treat the element as if the tokens for the `@outputclass` attribute that were provided in the DITAVAL document are specified first.
- If two or more DITAVAL properties apply `@outputclass` flags to the same element, processors treat the element as if each value was specified for the `@outputclass` attribute. The order of the tokens for the `@outputclass` attribute that were provided in the DITAVAL document is undefined.
Attributes

The following attributes are available on this element:

@action (REQUIRED)

Specifies the action to be taken. The following values are supported:

- exclude
  Indicates that the content is excluded from the output, if all values for the specified attribute are excluded.

- flag
  Indicates that the content is included in the output and flagged, if the content has not been excluded.

- include
  Indicates that the content is included in the output. This is the default behavior, unless otherwise set.

- passthrough
  Indicates that the content is included in the output and that the attribute value is preserved. This enables further processing by a runtime engine.

@att

Specifies the conditional-processing attribute that is targeted. The value is the literal attribute name or the name of a group within one of those attributes, with the group name specified using the generalized attribute syntax. If the @att attribute is absent, then the <prop> element declares a default behavior for anything not explicitly specified in the DITAVAL document.

@val

Specifies the attribute value that is targeted. If the @val attribute is absent, then the <prop> element declares a default behavior for any value in the specified attribute.

The following attributes are only applicable when the @action attribute is set to “flag”. If the @action attribute is not set to “flag”, any value specified for these attributes are ignored.

@backcolor

Specifies the background color for flagged text. Colors can be entered by name or hex code. When images are flagged, the background color is rendered as a thick border.

@color

Specifies the color for flagged text. Colors can be entered by name or hex code. When images are flagged, the color is rendered as a thin border.

@outputclass

Specifies a value for the @outputclass attribute. The flagged element is treated as if the specified @outputclass value was specified on that element.

@style

Specifies the formatting to use for flagged text. This attribute can contain multiple space-delimited tokens.

Example

The following code sample shows a DITAVAL document that contains three <prop> elements:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<val>
  <prop action="exclude"/>
  <prop action="passthrough" att="otherprops"/>
</val>
```
The following list outlines the actions that the DITAVAL document specifies:

1. Sets a default action of "exclude". With the exception of the other conditions that are specified in the above DITAVAL document, the content of any element that specifies a conditional-processing attribute is excluded from the rendered output.

2. Sets a default action of "passthrough" for the @otherprops attribute. The content of any element that specifies the @otherprops attribute is included in the output. In addition, the value for the @otherprops attribute is preserved in the rendered output, if supported by the output format.

3. Sets an action of "include" for any element that specifies a value of "base-product" for the @product attribute. The content of any element that specifies a value of "base-product" for the @product attribute is included in the rendered output.

When a DITA map is processed using the above DITAVAL document, the following DITA elements are excluded:

1. Any element for which the @audience, @deliveryTarget, @platform, and @props attributes (or specializations of @props) specify a non-null value.

2. Any element for which the @product attribute specifies a value that is not equal to "base-product".

All other content is included.

10.7.2.4 <revprop>

The <revprop> element in a DITAVAL document identifies a value of the @rev attribute for flagging. Unlike the conditional processing attributes, which can be used for both filtering and flagging, the @rev attribute can only be used for flagging.

Usage information

Neither the <reprop> element or the @rev attribute are designed to be used for version control.

Rendering expectations

If no alternate text is specified, processors can provide default alternate text to indicate the start and end point of the flagged content.

For the @color and @backcolor attributes on <prop> and <revprop>, processors SHOULD support at least the following values:

- The color names listed under the heading "<color>" in the XSL version 1.1 specification
- The associated hex code

For the @style attribute on <rev> and <revprop>, processors SHOULD support the following tokens:

- bold
- double-underline
- italics
- overline
- underline

In addition, processors MAY support proprietary tokens for the @style attribute. Such tokens SHOULD have a processor-specific prefix to identify them as
proprietary. If a processor encounters an unsupported style token, it MAY issue a
warning, and it MAY render content that is flagged with such a style token by using
some default formatting.

Processing expectations

It is an error to include more than one <revprop> element with the same @val
attribute. Recovery from this error is implementation dependent. In such cases
processors MAY provide an error or warning message.

The following list outlines how processors apply @outputclass flags:

- If one or more DITAVAL properties apply @outputclass flags to the same element, and the
element already specifies one or more values for the @outputclass attribute, processors treat
the element as if the tokens for the @outputclass attribute that were provided in the DITAVAL
document are specified first.
- If two or more DITAVAL properties apply @outputclass flags to the same element, processors
treat the element as if each value was specified for the @outputclass attribute. The order of the
tokens for the @outputclass attribute that were provided in the DITAVAL document is
undefined.

Attributes

The following attributes are available on this element:

@action (REQUIRED)

   Specifies the action to be taken. The following values are supported:

   flag
       Indicates that the content is included in the output and flagged, if the content has not been
       excluded.

   include
       Indicates that the content is included in the output and not flagged. This is the default behavior,
       unless otherwise set.

   passthrough
       Indicates that the content is included in the output and that the attribute value is preserved. This
       enables further processing by a runtime engine. The attribute value is preserved in the syntax
       that is required by the runtime engine.

@val

   Specifies the value of the @rev attribute. If the @val attribute is not specified, then the <revprop>
element declares a default behavior for any instance of the @rev attribute.

The following attributes are only applicable when the @action attribute is set to “flag”. If the @action
attribute is not set to “flag”, any value specified for these attributes are ignored.

@backcolor

   Specifies the background color for flagged text. Colors can be entered by name or hex code. When
   images are flagged, the background color is rendered as a thick border.

@changebar

   Specifies a color, style, or character to be used for rendering a change bar.

Comment by Kristen J Eberlein on 22 March 2022
Do we want to be more specify about what values are supported here? Hex codes or names for color, character, but what for styles? Refer to XSL: FO spec?

@color
Specifies the color for flagged text. Colors can be entered by name or hex code. When images are flagged, the color is rendered as a thin border.

@outputclass
Specifies a value for the @outputclass attribute. The flagged element is treated as if the specified @outputclass value was specified on that element.

@style
Specifies the formatting to use for flagged text. This attribute can contain multiple space-delimited tokens.

Example
The following code sample shows how the <revprop> element can be used to flag content that has been marked with the @rev attribute. Elements that specify rev="edits" are rendered in red text, and glyphs mark the start and end points of the flagged revision. Alternate text is provided.

```xml
<val>
  <revprop action="flag" color="red" val="edits">
    <startflag imageref="start-glyph.png">
      <alt-text>Start of revision</alt-text>
    </startflag>
    <endflag imageref="end-glyph.png">
      <alt-text>End of revision</alt-text>
    </endflag>
  </revprop>
</val>
```

Related concepts
Flagging based on metadata attributes (155)
When rendering content, a conditional processing profile can be used to specify whether an element's content is flagged based on its conditional processing attributes.

10.7.2.5 <startflag>
The <startflag> element in a DITAVAL document specifies information that identifies the beginning of flagged content. The information can be an image, alternate text, or both.

Usage information
If the <startflag> element does not specify an image or provide alternate text, the element has no defined purpose.

Rendering expectations
Processors treat the information provided by the <startflag> element in the following way:

- If an image is specified, the image is used as a flag to identify the beginning of the flagged content. If the <alt-text> element contains content, the content is used as alternate text for the image.
- If alternate text is specified but the <startflag> element does not specify an image, the alternate text is used to indicate the beginning of the flagged content.
Attributes

The following attribute is available on this element:

@imageref
Specifies a URI reference to the image, using the same syntax as the @href attribute. See 6.2.2 The href attribute (88) for information on supported values and processing implications.

Example

The following code sample shows a DITAVAL document that is used to render icons before content that is specific to a particular operating system. The <startflag> elements specify the icons, and the <alt-text> elements specify alternate text.

```xml
<val>
  <prop action="flag" att="platform" val="linux">
    <startflag imageref="linux-icon.gif">
      <alt-text>Linux</alt-text>
    </startflag>
  </prop>
  <prop action="flag" att="platform" val="mac">
    <startflag imageref="mac-icon.gif">
      <alt-text>Macintosh</alt-text>
    </startflag>
  </prop>
  <prop action="flag" att="platform" val="windows">
    <startflag imageref="windows-icon.gif">
      <alt-text>Windows</alt-text>
    </startflag>
  </prop>
</val>
```

10.7.2.6 <style-conflict>

The <style-conflict> element in a DITAVAL document declares the behavior to be used when one or more flagging methods collide on the same element.

Rendering expectations

The following table details how conflicts are resolved when different flagging methods are specified for the same element:

<table>
<thead>
<tr>
<th>Flagging method</th>
<th>Conflict behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>backcolor</td>
<td>Use the color specified by the @background-conflict-color attribute on the &lt;style-conflict&gt; element. If no background conflict color is specified, use a default color that is appropriate for the output format.</td>
</tr>
<tr>
<td>changebar</td>
<td>Add all change bars that apply.</td>
</tr>
<tr>
<td>color</td>
<td>Use the color specified by the @foreground-conflict-color attribute on the &lt;style-conflict&gt; element. If no foreground conflict color is specified, use a default color that is appropriate for the output format.</td>
</tr>
<tr>
<td>style</td>
<td>Add all font styles that apply. If two different kinds of underline are used, default to the heaviest (double underline) and use the color that is specified by the @foreground-conflict-color attribute. If no foreground conflict color is specified, use a default color that is appropriate for the output format.</td>
</tr>
<tr>
<td>&lt;endflag&gt;</td>
<td>Add all flags that apply.</td>
</tr>
</tbody>
</table>
Flagging method | Conflict behavior
---|---
<startflag> | Add all flags that apply.

**Attributes**

The following attributes are available on this element:

@background-conflict-color
- Specifies the color to be used when more than one background conflict color applies to a single element.
- Colors can be entered by name or code.

@foreground-conflict-color
- Specifies the color to be used when more than one color applies to a single element. Colors can be entered by name or code.

**Example**

The following code sample shows a DITAVAL document that specifies that a background color of "#ffffb3" is used when there are conflicts:

```xml
<val>
  <style-conflict background-conflict-color="#ffffb3"/>
  <prop action="flag" att="platform" val="dita" backcolor="#ccffb3"/>
  <prop action="flag" att="platform" val="lwdita" backcolor="#ffe6ff"/>
</val>
```

Any element that specifies a value of "dita lwdita" or "lwdita dita" is rendered with a light-yellow background color.

**10.7.2.7 <val>**

The `<val>` element is the root element of a DITAVAL document.

**Processing expectations**

For information about processing DITAVAL documents, including how to filter or flag elements with multiple property attributes or multiple properties within a single attribute, see 7.4 Conditional processing (150).

**Example**

This section contains examples of DITAVAL documents and how they can be used.

**Figure 167: Sample DITAVAL document**

The following code sample shows a DITAVAL document that excludes certain content, flags certain content, flags certain revisions, and provides a background color for when there are style conflicts:

```xml
<val>
  <style-conflict background-conflict-color="red"/>
  <prop action="exclude" att="audience" val="internal-test"/>
  <prop action="flag" att="product" val="YourProd" backcolor="purple"/>
  <prop action="flag" att="product" backcolor="blue" color="yellow" style="underline" val="MyProd">
    <startflag imageref="startflag.jpg">
      <alt-text>This is the start of my product info</alt-text>
    </startflag>
    <endflag imageref="endflag.jpg">
      <alt-text>This is the end of my product info</alt-text>
    </endflag>
  </prop>
</val>
```
This sample DITAVAL document performs the following actions:

- Elements that specify `audience="internal-test"` are excluded.
- Elements that specify `product="YourProd"` are rendered with a background color of purple.
- Elements with `product="MyProd"` get the following actions:
  - The image `startflag.jpg` is placed at the start of the element.
  - The image `endflag.jpg` is placed at the end of the element.
  - The element is rendered with a background color of blue.
  - The text in the element is rendered in yellow, and the text is underlined.
- Elements marked with `rev="1.2"` are flagged with the default revision flags, which are implementation dependent.
- When there are conflicts, for example, if an element is marked with `product="MyProd
YourProd"`, it will be flagged with a background color of red.

**Figure 168: DITAVAL document that overrides the default "include" action**

The following code sample shows a DITAVAL document that sets a default value of "exclude" for every conditional-processing attribute. That default value is then overridden by the `<prop>` elements with a value of "include."

```xml
<val>
  <prop action="exclude"/>
  <prop action="include" att="audience" val="everybody"/>
  <prop action="include" att="audience" val="novice"/>
  <prop action="include" att="product" val="productA"/>
  <prop action="include" att="product" val="productB"/>
</val>
```

This DITAVAL document performs the following actions:

- The first `<prop>` element does not specify an attribute, which sets a default action of "exclude" for every conditional-processing attribute. This means that, by default, any property value not otherwise defined in this document evaluates to "exclude". Note that this same behavior can be limited to a single attribute. The following `<prop>` element sets a default action of "exclude" for all properties specified on the `@platform` attribute: `<prop action="exclude" att="platform"/>

- The second and third `<prop>` elements set an action of "include" for two values on the `@audience` attribute. All other values on the `@audience` attribute still evaluate to "exclude".
- The fourth and fifth `<prop>` elements set an action of "include" for two values on the `@product` attribute. All other values on the `@product` attribute still evaluate to "exclude".

**Related concepts**

- Filtering based on metadata attributes (154)
  When rendering content, a conditional processing profile can be used to specify whether an element’s content is filtered based on its conditional processing attributes.

- Flagging based on metadata attributes (155)
  When rendering content, a conditional processing profile can be used to specify whether an element’s content is flagged based on its conditional processing attributes.

- Examples of conditional processing (156)
This section provides examples that illustrate the ways that conditional processing attributes can be set and used.

### 10.8 Attributes
This section collects commonly used attributes, with common definitions. If an element uses a different definition, or narrows the scope of, an otherwise common attribute, it will be called out in the topic that defines the element. This section contains definitions for commonly-used attributes. If an attribute is defined differently on a specific element, that information is covered in the topic for the specific element.

**Comment by Kristen J Eberlein on 29 December 2021**

Add a brief overview of the fact that some specific attributes are overloaded – and have different meanings depending on what element they are specified upon.

#### 10.8.1 Universal attribute group
The universal attribute group defines a set of common attributes that are available on almost every DITA element. The universal attribute group includes all attributes from the ID, localization, and metadata attribute groups, plus the `@class` and `@outputclass` attributes.

**Comment by Kristen J Eberlein on 29 December 2021**

This is something wrong with the organizational structure of this topic ... Look at it in outline form, and check that the sections, titles, and content all make logical sense with the topic title of "Universal attribute group".

### Common attribute groups
The following attribute groups are referenced in this specification. They are also used in the grammar files when the element attributes are defined.

**Universal attributes**
Includes `@class` and `@outputclass`, along with every attribute in the ID, localization, and metadata attribute groups.

**ID attributes**
This group includes the attributes that enable the naming and referencing of elements: `@conaction`, `@conkeyref`, `@conref`, `@conrefend`, and `@id`.

**Localization attributes**
This group includes attributes that are related to translation and localization: `@dir`, `@translate`, and `@xml:lang`.

**Metadata attributes**

**Comment by Kristen J Eberlein on 31 December 2021**

Why do we need to mention that two attributes are available for specialization here? I think it makes the paragraph hard to read.

This group includes common metadata attributes, two of which are available for specialization: `@base`, `@importance`, `@props`, `@rev`, and `@status`. 
The base DITA vocabulary from OASIS includes several specializations of @props: @audience, @deliveryTarget, @otherprops, @platform, and @product. These attributes are defined as attribute-extension domains. By default, they are integrated into all OASIS-provided document-type shells, but they can be made unavailable by implementing custom document-type shells.

Comment by Kristen J Eberlein on 29 December 2021
Why do we provide information about specialization and custom document-type shells here? I think that information could be removed.

Universal attribute definitions

The universal attributes for OASIS DITA elements are defined below. Specialized attributes, which are part of the OASIS distribution but are only available when explicitly included in a shell, are noted in the list.

@audience (specialized attribute)
Indicates the intended audience for the element. If no value is specified but the attribute is specified on a containing element within a map or within the related-links section, the value cascades from the closest containing element.

@base
Specifies metadata about the current element. It is often used as a base for specialized attributes that have a simple syntax for values but are not filtering or flagging attributes.

The @base attribute takes a space-delimited set of values. However, when serving as a container for generalized attributes, the attribute values will be more complex. See 8.4.4 Attribute generalization (191) for more details.

@class (not for use by authors)
This attribute is not for use by authors. If an editor displays @class attribute values, do not edit them. Specifies a default value that defines the specialization ancestry of the element. Its predefined values allow DITA tools to work correctly with specialized elements. In a generalized DITA document the @class attribute value in the generalized instance might differ from the default value for the @class attribute for the element as given in the DTD or schema. See 8.3.6 The class attribute rules and syntax (185) for more information. This attribute is specified on every element except for the <dita> container element. It is always specified with a default value, which varies for each element.

@conaction
Specifies how the element content will be pushed into a new location. The following values are valid:

mark
The element acts as a marker when pushing content before or after the target, to help ensure that the push action is valid. The element with conaction="mark" also specifies the target of the push action with @conref. Content inside of the element with conaction="mark" is not pushed to the new location.

pushafter
Content from this element is pushed after the location specified by @conref on the element with conaction="mark". The element with conaction="pushafter" is the first sibling element after the element with conaction="mark".

pushbefore
Content from this element is pushed before the location specified by @conref on the element with conaction="mark". The element with conaction="pushbefore" is the first sibling element before the element with conaction="mark".
pushreplace
Content from this element replaces any content from the element referenced by the @conref attribute. A second element with conaction="mark" is not used when using conaction="pushreplace".

@dita-use-conref-target
See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

See 7.3.2 The conaction attribute (137) for examples and details about the syntax.

@conkeyref
Specifies a key name or a key name with an element ID that acts as an indirect reference to reusable content. The referenced content is used in place of the content of the current element. See 7.3.4 The conkeyref attribute (144) for more details about the syntax and behaviors.

@conref
Specifies a URI that references a DITA element. The referenced content is used in place of the content of the current element. See 7.3.5 The conref attribute (145) for examples and details about the syntax.

@conrefend
Specifies a URI that references the last element in a sequence of elements, with the first element of the sequence specified by @conref. The referenced sequence of elements is used in place of the content of the current element. See 7.3.3 The conrefend attribute (140) for examples and details about the syntax.

deliveryTarget (specialized attribute)
Specifies the intended delivery target of the content, for example, "html", "pdf", or "epub". If no value is specified but the attribute is specified on a containing element within a map or within the related-links section, the value cascades from the closest containing element.

@dir
Identifies or overrides the text directionality. The following values are valid:

lro
Indicates an override of the Unicode Bidirectional Algorithm, forcing the element into left-to-right mode.

ltr
Indicates left-to-right.

rlo
Indicates an override of the Unicode Bidirectional Algorithm, forcing the element into right-to-left mode.

rtl
Indicates right-to-left.

@dita-use-conref-target
See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

See 4.2.2 The dir attribute (47) for more information.

@id
Specifies an identifier for the current element. This ID is the target for references by @href and @conref attributes and for external applications that refer to DITA content. This attribute is defined with the XML data type NMTOKEN, except where noted for specific elements within the language reference. See 6.1 id attribute (86) for more details.
@importance
Specifies the importance or priority that is assigned to an element. The following values are valid: "default", "deprecated", "high", "low", "normal", "obsolete", "optional", "recommended", "required", "urgent", and "-dita-use-conref-target". This attribute is not used for DITAVAL-based filtering or flagging, although applications might use the importance value to highlight elements. For example, in steps of a task, the value of the @importance attribute indicates whether a step is optional or required.

@otherprops (specialized attribute)
Specifies a property or properties that provide selection criteria for the element. Alternatively, the @props attribute can be specialized to provide a new metadata attribute instead of using the general @otherprops attribute. If no value is specified but the attribute is specified on a containing element within a map or within the related-links section, the value cascades from the closest containing element.

@outputclass
Specifies a role that the element is playing. The role must be consistent with the basic semantic and expectations for the element. In particular, the @outputclass attribute can be used for styling during output processing; HTML output will typically preserve @outputclass for CSS processing.

Comment by robander
I don't like "The role must be consistent...", that seems like best practice that cannot be normative – and I could easily say outputclass="flashy" which makes my element show up with sparkles, and has nothing to do with "the basic semantic and expectations for the element".

@platform (specialized attribute)
Indicates operating system and hardware. If no value is specified but the attribute is specified on a containing element within a map or within the related-links section, the value cascades from the closest containing element.

Comment by robander
I think this could specify a platform that is not an operating system or hardware, right? The current definition explicitly limits platform to those two ... maybe "Specifies a platform or platforms to which the element applies, such as the operating system or hardware relevant to a task."

@product (specialized attribute)
Specifies the name of the product to which the element applies. If no value is specified but the attribute is specified on a containing element within a map or within the related-links section, the value cascades from the closest containing element.

@props
Specifies metadata about the current element. New attributes can be specialized from the @props attribute. This is an attribute that supports conditional processing for filtering or flagging. If no value is specified but the attribute is specified on a containing element within a map or within the related-links section, the value cascades from the closest containing element.

The @props attribute takes a space-delimited set of values. However, when acting as a container for generalized attributes, the attribute values will be more complex; see 8.4.4 Attribute generalization (191) for more details.

@rev
Specifies a revision level of an element that identifies when the element was added or modified. It can be used to flag outputs when it matches a run-time parameter. It cannot be used for filtering nor is it sufficient to be used for version control. If no value is specified but the attribute is specified on a containing element within a map or within the related-links section, the value cascades from the closest containing element.
@status
Specifies modification status of the current element. The following values are valid: "new", "changed", "deleted", "unchanged", and "-dita-use-conref-target".

@translate
Comment by Kristen J Eberlein on 31 December 2021

Does C.5 Element-by-element recommendations for translators (422) really provide suggested processing defaults for each element? I thought it covered whether an element was block or in-line and whether there were considerations that translators needed to be aware of.

Specifies whether the content of the element should be translated. The following values are valid: "yes", "no", and "-dita-use-conref-target". See C.5 Element-by-element recommendations for translators (422) for suggested processing defaults for each element.

@xml:lang
Specifies the language of the content contained in an element. The following values are valid: language tokens or the null string. The @xml:lang attribute and its values are described in the Extensible Markup Language 1.0 specification, fifth edition.

Related concepts
Filtering based on metadata attributes (154)
When rendering content, a conditional processing profile can be used to specify whether an element's content is filtered based on its conditional processing attributes.

Translation and localization (45)
DITA has markup that facilitates translation and localization. This markup includes the @xml:lang attribute, the @dir attribute, and the @translate attribute.

Specialization (181)
The specialization feature of DITA allows for the creation of new element types and attributes that are explicitly and formally derived from existing types. This facilitates interchange of conforming DITA content and ensures a minimum level of common processing for all DITA content. It also allows specialization-aware processors to add specialization-specific processing to existing base processing.

DTD: Coding requirements for attribute-domain modules (228)
The vocabulary modules that define attribute domains have additional coding requirements. The module must include a parameter entity for the new attribute, which can be referenced in document-type shells, as well as a text entity that specifies the contribution to the @specializations attribute for the attribute domain.

10.8.2 Common attributes
The common attributes topic collects defines most of the attributes that are used on more than one base element.

Common attribute groups
The following groups are referenced in this specification, and they are also used in grammar files when defining attributes for elements.

Architectural attributes
This group includes a set of attributes that are defined for document-level elements such as <topic> and <map>: @DITAArchVersion, @specializations, and @xmlns:ditaarch.
Common map attributes

This group includes attributes that are frequently used on map elements: @cascade, @chunk, @collection-type, @keyscope, @linking, @processing-role, @search, @toc, and @subjectrefs.

Complex table attributes

This group includes attributes that are defined on table elements but not simple table elements. These attributes are part of the OASIS Exchange Table Model, unless otherwise noted. Table elements generally use only a subset of the attributes that are defined in this group. This group contains the following attributes: @align, @char, @charoff, @colsep, @rowheader, @rowsep, and @valign.

Data-element attributes

Includes attributes defined on <data> and its many specializations: @datatype, @name, and @value

Date attributes

Includes attributes that take date values, and are defined on metadata elements that work with date information: @expiry and @golive

Display attributes

This group includes attributes that affect the rendering of many elements: @expanse, @frame, and @scale.

Inclusion attributes

Includes attributes defined on <include> and its specializations: @encoding and @parse.

Link-relationship attributes

This group includes attributes whose values can be used for representing navigational relationships: @format, @href, @type, and @scope.

Simple table attributes

This group includes attributes that are defined only on the <simpletable> element: @keycol and @relcolwidth. These attributes are listed in a group because the <simpletable> element is frequently used as a specialization base.

Other attributes (not in a group)

These are attributes that are used in the same way on more than one base element, but they are not formally grouped together: @compact, @duplicates, @otherrole, @role, and @title-role.

Common attribute definitions

Common attributes, including those in the groups listed above, are defined as follows.

@align (complex table attributes)

Specifies the horizontal alignment of text in table entries. The following values are valid:

- left
  Indicates left alignment of the text.

- right
  Indicates right alignment of the text.

- center
  Indicates center alignment of the text.
justify
Justifies the contents to both the left and the right.

char
Indicates character alignment. The text is aligned with the first occurrence of the character specified by the @char attribute.

-dita-use-conref-target
See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

The @align attribute is available on the following table elements: <colspec>, <entry>, and <tgroup>.

@cascade (common map attributes)

Comment by Kristen J Eberlein on 31 December 2021
We need to move the normative statement elsewhere. Should it go in 5.3.1 Cascading of metadata attributes in a DITA map (60)?

Specifies how metadata attributes cascade within a map. The specification defines the following values:

merge
Explanation needed

nomerge
Explanation needed

103 (416) If no value is set and no value cascades from a containing element, processors SHOULD assume a default of “merge”. Processors can define custom values for the @cascade attribute.

See 5.3.1 Cascading of metadata attributes in a DITA map (60) for more information about how this attribute interacts with metadata attributes.

@char (complex table attributes)

Specifies the alignment character, which is the character that is used for aligning the text in table entries. This attribute applies when align="char". A value of "" (the null string) means there is no aligning character.

For example, if align="char" and char="." are specified, then text in the table entry aligns with the first occurrence of the period within the entry. This might be useful if decimal alignment is required.

The @char attribute is available on the following table elements: <colspec> and <entry>.

@charoff (complex table attributes)

Specifies the horizontal offset of the alignment character that is specified by the @char attribute. The value is a greater-than-zero number that is less than or equal to 100. It represents the percentage of the current column width by which the text is offset to the left of the alignment character.

For example, if align="char", char=".", and charoff="50" are all specified, then text in the table entry is aligned 50% of the distance to the left of the first occurrence of the period character within the table entry.

The @charoff attribute is available on the following table elements: <colspec> and <entry>. 
@chunk (common map attributes)
Specifies how a processor should render a map or branch of a map. For example, it can be used to
specify that individual topic documents should be rendered as a single document, or that a single
document with multiple topics should be rendered as multiple documents.

The following values are valid:

**combine**
Instructs a processor to combine the referenced source documents for rendering purposes. This
is intended for cases where a publishing process normally results in a single output artifact for
each source XML document.

**split**
Instructs a processor to split each topic from the referenced source document into its own
document for rendering purposes. This is intended for cases where a publishing process
normally results in a single output artifact for each source XML document, regardless of how
many DITA topics exist within each source document.

*Application-defined token*
Other tokens can be defined by applications, but support for those tokens will vary.

For a detailed description of the `@chunk` attribute and its usage, see 5.4 Chunking (70).

@collection-type (common map attributes)
Specifies how topics or links relate to each other. The processing default is "unordered", although no
default is specified in the DTD or Schema. The following values are valid:

**unordered**
Indicates that the order of the child topics is not significant.

**sequence**
Indicates that the order of the child topics is significant; output processors will typically link
between them in order.

**choice**
Indicates that one of the children should be selected.

**family**
Indicates a tight grouping in which each of the referenced topics not only relates to the current
topic but also relate to each other.

@colsep (complex table attributes)
Specifies whether to render column separators between table entries. The following values are valid:
"0" (no separators) and "1" (separators).

The `@colsep` attribute is available on the following table elements: `<colspec>`, `<entry>`,
`<table>`, and `<tgroup>`.

@compact
Specifies whether the vertical spacing between list items is tightened. The following values are valid:
"yes", "no", and "-dita-use-conref-target". Some DITA processors or output formats might not support
the `@compact` attribute.

@datatype (data-element attributes)
Specifies the type of data contained in the `@value` attribute or within the `<data>` element. A typical
use of `@datatype` will be the identifying URI for an XML Schema datatype.

@DITAArchVersion (architectural attributes)
Specifies the version of the DITA architecture that is in use. The default value increases with each
release of DITA. This attribute is in the namespace `http://dita.oasis-open.org/`
architecture/2005/. This attribute is defined with the XML data type CDATA, but it uses a default value of the current version of DITA. The current default is "2.0".

@duplicates
Specifies whether duplicate links are removed from a group of links. Duplicate links are links that address the same resource using the same properties, such as link text and link role. How duplicate links are determined is processor-specific. The following values are valid:

  yes
  Specifies that duplicate links are retained.
  
  no
  Specifies that duplicate links are removed.

@dita-use-conref-target
See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

The suggested processing default is "yes" within <linklist> elements and "no" for other links.

@encoding (inclusion attributes)

Comment by robander on Dec 28 2021
"How duplicate links are determined is processor-specific" ==> this should be included in any updates to standardize language around "implementation dependent".

Comment by Kristen J Eberlein on 29 April 2019
Can we replace "should" in the following definition?

Specifies the character encoding to use when translating the character data from the referenced content. The value should be a valid encoding name. If not specified, processors may make attempts to automatically determine the correct encoding, for example using HTTP headers, through analysis of the binary structure of the referenced data, or the <xml> processing instruction when including XML as text. The resource should be treated as UTF-8 if no other encoding information can be determined.

When parse="xml", standard XML parsing rules apply for the detection of character encoding. The necessity and uses of @encoding for non-standard values of @parse are implementation-dependent.

@expansion (display attributes)
Specifies the horizontal placement of the element. The following values are valid:

  column
  Indicates that the element is aligned with the current column margin.

  page
  Indicates that the element is placed on the left page margin for left-to-right presentation or the right page margin for right-to-left presentation.

  spread
  Indicates that the object is rendered across a multi-page spread. If the output format does not have anything that corresponds to spreads, then "spread" has the same meaning as "page".

  textline
  Indicates that the element is aligned with the left (for left-to-right presentation) or right (for right-to-left presentation) margin of the current text line and takes indentation into account.

@dita-use-conref-target
See 7.3.6 Using the -dita-use-conref-target value (145) for more information.
For `<table>`, in place of the `@expanse` attribute that is used by other DITA elements, the `@pgwide` attribute is used in order to conform to the OASIS Exchange Table Model.

Some processors or output formats might not support all values.

**@expiry (date attributes)**
Specifies the date when the information should be retired or refreshed. The date is specified using the ISO 8601 format: `YYYY-MM-DD`, where `YYYY` is the year, `MM` is the month (01 to 12), and `DD` is the day (01-31).

**@format (link-relationship attributes)**
Specifies the format of the resource that is referenced. See 6.2.1 The format attribute (87) for detailed information on supported values and processing implications.

**@frame (display attributes)**
Specifies which portion of a border surrounds the element. The following values are valid:

- **all**
  Indicates that a line is rendered at the top, bottom, left, and right of the containing element.

- **bottom**
  Indicates that a line is rendered at the bottom of the containing element.

- **none**
  Indicates that no lines are rendered.

- **sides**
  Indicates that a line is rendered at the left and right of the containing element.

- **top**
  Indicates that a line is rendered at the top of the containing element.

- **topbot**
  Indicates that a line is rendered at the top and bottom of the containing element.

- **-dita-use-conref-target**
  See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

Some processors or output formats might not support all values.

**@golive (date attributes)**
Specifies the publication or general availability (GA) date. The date is specified using the ISO 8601 format: `YYYY-MM-DD`, where `YYYY` is the year, `MM` is the month (01 to 12), and `DD` is the day (01-31).

**@href (link-relationship attributes)**
Specifies a reference to a resource. See 6.2.2 The href attribute (88) for detailed information on supported values and processing implications.

**@keycol (simpletable attributes)**
Specifies the column that contains the content that represents the key to the tabular structure. If `@keycol` is present and assigned a numerical value, the specified column is treated as a vertical header.

**@keyref**
Specifies a key name that acts as a redirectable reference based on a key definition within a map. See 6.4.3 The keyref attribute (96) for information on using this attribute.

---

Comment by robander

The definition above for `@keyref` should be synchronized with the definition in the linked section on keys.
@keys
Specifies one or more names for a resource. See 6.4.2 Setting key names with the keys attribute (95) for information on using this attribute.

@keyscope (common map attributes)
Specifies that the element marks the boundaries of a key scope. See 6.4.6 The keyscope attribute (98) for information on using this attribute.

@linking (common map attributes)
Specifies linking characteristics of a topic specific to the location of this reference in a map. If the value is not specified locally, the value might cascade from another element in the map (for cascade rules, see 5.3.1 Cascading of metadata attributes in a DITA map (60)).

Comment by robander on Dec 28 2021
The text below matches 1.3 spec text but I'm nervous about "cannot link" type definition. It's describing how to generate links based on the current context in the map - it's not describing what the topic itself is allowed to link to, which is how I interpret "can".

The following values are valid:

targetonly
A topic can only be linked to and cannot link to other topics.

sourceonly
A topic cannot be linked to but can link to other topics.

normal
A topic can be linked to and can link to other topics. Use this to override the linking value of a parent topic.

none
A topic cannot be linked to or link to other topics.

-dita-use-conref-target
See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

@name (data-element attributes)
Defines a unique name for the object.

Comment by robander
Do we need to specify the scope of "unique" here?

@otherrole
Specifies an alternate role for a link relationship when the @role attribute is set to "other".

@parse (inclusion attributes)
Specifies the processing expectations for the referenced resource. Processors must support the following values:

text
The contents should be treated as plain text. Reserved XML characters should be displayed, and not interpreted as XML markup.

xml
The contents of the referenced resource should be treated as an XML document, and the referenced element should be inserted at the location of the <include> element. If a fragment identifier is included in the address of the content, processors must select the element with the
specified ID. If no fragment identifier is included, the root element of the referenced XML
document is selected. Any grammar processing should be performed during resolution, such
that default attribute values are explicitly populated. Prolog content must be discarded.

It is an error to use `parse="xml"` anywhere other than within `<foreign>` or a specialization
thereof.

Processors may support other values for the `@parse` attribute with proprietary processing semantics.
Processors should issue warnings and use `<fallback>` when they encounter unsupported `@parse`
values. Non-standard `@parse` instructions should be expressed as URLs.

**Note** Proprietary `@parse` values will likely limit the portability and interoperability of DITA
content, so should be used with care.

**@processing-role (common map attributes)**

Describes the processing role of the referenced topic. The processing default is "normal". If no value
is specified but the attribute is specified on a containing element within a map or within the related-
links section, the value cascades from the closest containing element. The following values are valid:

- **normal**
  Normal topic that is a readable part of the information.

- **resource-only**
  The topic is used as a resource for processing purposes. This topic should not be included in a
  rendered table of contents, and the topic should not be rendered on its own.

- **-dita-use-conref-target**
  See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

**@relcolwidth (simpletable attributes)**

Specifies the width of each column in relationship to the width of the other columns. The value is a
space-separated list of relative column widths. Each column width is specified as a positive integer or
decimal number followed by an asterisk character.

For example, the value `relcolwidth="1* 2* 3*"` gives a total of 6 units across three columns.
The relative widths are 1/6, 2/6, and 3/6 (16.7%, 33.3%, and 50%). Similarly, the value
`relcolwidth="90* 150*"` causes relative widths of 90/240 and 150/240 (37.5% and 62.5%).

**@role**

Specifies the role that a linked topic plays in relationship with the current topic.

For example, in a parent/child relationship, the role would be "parent" when the target is the parent of
the current topic, and "child" when the target is the child of the current topic. This can be used to sort
and classify links when rendering.

The following values are valid:

- **ancestor**
  Indicates a link to a topic above the parent topic.

- **child**
  Indicates a link to a direct child such as a directly nested or dependent topic.

- **cousin**
  Indicates a link to another topic in the same hierarchy that is not a parent, child, sibling, next, or
  previous.

- **descendant**
  Indicates a link to a topic below a child topic.
friend
   Indicates a link to a similar topic that is not necessarily part of the same hierarchy.

next
   Indicates a link to the next topic in a sequence.

other
   Indicates any other kind of relationship or role. The type of role is specified as the value for the
   @otherrole attribute.

parent
   Indicates a link to a topic that is a parent of the current topic.

previous
   Indicates a link to the previous topic in a sequence.

sibling
   Indicates a link between two children of the same parent topic.

@dita-use-conref-target
   See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

@rowheader (complex table attributes)
   Specifies whether the entries in the respective column are row headers. The following values are
   valid:

firstcol
   Indicates that entries in the first column of the table are row headers. This applies when the
   @rowheader attribute is specified on the <table> element.

headers
   Indicates that entries of the column that is described using the <colspec> element are row
   headers. This applies when the @rowheader attribute is specified on the <colspec> element.

norowheader
   Indicates that entries in the first column are not row headers. This applies when the
   @rowheader attribute is specified on the <table> element.

@dita-use-conref-target
   See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

   Note   This attribute is not part of the OASIS Exchange Table Model upon which DITA tables are
           based. Some processors or output formats might not support all values.

The @rowheader attribute is available on the following table elements: <table> and <colspec>.

@rowsep (complex table attributes)
   Specifies whether to render row separators between table entries. The following values are valid: "0"
   (no separators) and "1" (separators).

The @rowsep attribute is available on the following table elements: <colspec>, <entry>, <row>,
<table>, and <tgroup>.

@scale (display attributes)
   Specifies the percentage by which fonts are resized in relation to the normal text size. The value of
   this attribute is a positive integer. When used on <table> or <simpletable>, the following values
   are valid: "50", "60", "70", "80", "90", "100", "110", "120", "140", "160", "180", "200", and -dita-use-
   conref-target (145).

   This attribute is primarily useful for print-oriented display. Some processors might not support all
   values.
If the @scale attribute is specified on an element that contains an image, the image is not scaled. The image is scaled only if a scaling property is explicitly specified for the <image> element.

@scope (link-relationship attributes)
Specifies the closeness of the relationship between the current document and the referenced resource. The following values are valid: "local", "peer", "external", and "-dita-use-conref-target". See 6.2.3 The scope attribute (89) for detailed information on supported values and processing implications.

@search (common map attributes)
Specifies whether the target is available for searching. If the value is not specified locally, the value might cascade from another element in the map (for cascade rules, see 5.3.1 Cascading of metadata attributes in a DITA map (60)). The following values are valid: "yes", "no", and "-dita-use-conref-target".

@specializations (architectural attributes)
Specifies the attribute domain specializations that are included in the document-type shell. This attribute is set as a default within the document-type shell. The value varies depending on what domains are integrated into the document-type shell. For example, a grammar file that includes the specialized attributes @audience, @deliveryTarget, and @newBaseAtt would set the value to @props/audience @props/deliveryTarget @base/newBaseAtt.

@subjectrefs (common map attributes)
Specifies one or more keys that are each defined by a subject definition in a subject scheme map. Multiple values are separated by white space.

@title-role (REQUIRED)
Specifies the role that the alternative title serves. Multiple roles are separated by white space. The following roles are defined in the specification: "linking", "navigation", "search", "subtitle", and "hint".

Processors can define custom values for the @title-role attribute.

@toc (common map attributes)
Specifies whether a topic appears in the table of contents (TOC) based on the current map context. If the value is not specified locally, the value might cascade from another element in the map (for cascade rules, see 5.3.1 Cascading of metadata attributes in a DITA map (60)). The following values are valid:

yes
   The topic appears in a generated TOC.

no
   The topic does not appear in a generated TOC.

-dita-use-conref-target
   See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

@type (link-relationship attributes)
Describes the target of a reference. See 6.2.4 The type attribute (90) for detailed information on supported values and processing implications.

@value (data-element attributes)
Specifies a value associated with the current property or element.

@valign (complex table attributes)
Specifies the vertical alignment of text in table entries. The following values are valid:

bottom
   Indicates that text is aligned with the bottom of the table entry.
middle
Indicates that text is aligned with the middle of the table entry.

top
Indicates that text is aligned with the top of the table entry.

@dita-use-conref-target
See 7.3.6 Using the -dita-use-conref-target value (145) for more information.

The @valign attribute is available on the following table elements: <entry>, <tbody>, <thead>, and <row>.

@xml:space
Specifies how to handle white space in the current element. This attribute is provided on <pre>, <lines>, and on elements specialized from those. It ensures that parsers respect white space that is part of the data in those elements, including line-end characters. When defined, it has a fixed value of "preserve", making it a default property of the element that cannot be changed or deleted by authors.

@xmlns:ditaarch (architectural attributes)
Declares the default DITA namespace. Although this is technically a namespace rather than an attribute, it is specified as an attribute in the DTD-based grammar files that are distributed by OASIS. The value is fixed to "http://dita.oasis-open.org/architecture/2005/".

Related concepts
Cascading of metadata attributes in a DITA map (60)
Certain attributes cascade throughout a map, which facilitates attribute and metadata management. When attributes cascade, they apply to the elements that are children of the element where the attributes were specified. Cascading applies to a containment hierarchy, as opposed to a specialization hierarchy.
11 Conformance

An implementation is a conforming implementation of DITA if the implementation meets the conditions that are described in Section 4.1. A document is a conforming DITA document if the document meets the conditions in that are described in Section 4.2.

Conformance to the DITA specification allows documents and document types that are used with different processors to produce the same or similar results with little or no reimplementation or modification. Conformance also allows DITA specializations to work with any conforming DITA application, with at least the same level of support available to unspecialized documents.

4.1 Conformance of DITA implementations

The DITA specification defines several core features, as summarized in the following list. Any implementation that supports a feature MUST conform to all rules laid out in the section that describes the feature.

Comment by robander on 2017
It's quite possible the two keyref items should be combined. Left separate just because I could envision applications that support keys, but not keyscope.

Also possible the pulling/pushing of conref items should be combined. But I can more easily envision a distinction here - an editor that renders content references inline cannot know all instances of all topics that would push content into the same topic.

1. Specialization-based processing, as described in X.
2. Resolving links to elements in DITA documents, as described in section X.
3. Resolving @keyref attributes to a key defined in a map, as described in section X.
4. Resolving @keyref attributes across key scopes, as described in section X.
5. Pulling content references, as described in 7.3 Content reference (conref) (136)
6. Pushing content references, as described in 7.3 Content reference (conref) (136).
7. Resolving conditional processing based on DITAVAL documents, as described in 7.4 Conditional processing (150).
8. Resolving branch filtering markup, as described in 7.5 Branch filtering (161).
9. Resolving @chunk attributes, as described in 5.4 Chunking (70).

In addition, certain DITA elements have normative rules associated regarding how to render or process those elements.

1. <desc>, as described in 10.3.2.5 desc (257)
2. <draft-comment>, as described in 10.3.2.10 draft-comment (260)
3. <image>, as described in 10.3.2.18 image (265)
4. <linklist>, as described in 10.3.5.3 linklist (293)
5. <pre>, as described in 10.3.2.31 pre (277)
6. <q>, as described in 10.3.2.32 q (278)
7. <related-links>, as described in 10.3.1.6 related-links (251)
8. <recolspec>, as described in 10.4.1.5 recolspec (307)
9. <reftable>, as described in 10.4.1.8 reftable (310)
Conforming DITA implementations SHOULD include a conformance statement that gives the version of the DITA specification that is supported, indicate if all features from the list above are supported, and indicate that all normative rendering rules are supported.

If only a subset of features is supported, implementations SHOULD indicate which features are (or are not) supported. If an implementation supports rendering DITA elements but does not render all elements as described above, that application SHOULD indicate which elements are (or are not) supported.

Not all DITA features are relevant for all implementations. For example, a DITA editor that does not render content references in context does not need to conform to rules regarding the `@conref` attribute. However, any application that renders content references MUST conform to the rules described in 7.3 Content reference (conref) (136).

Implementations that support only a subset of DITA features are considered conforming as long as all supported features follow the requirements that are given in the DITA specification. An implementation that does not support a particular feature MUST be prepared to interoperate with other implementations that do support the feature.

### 4.2 Conformance of DITA documents

A document conforms with the DITA standard if it meets all of the following conditions.

1. A DITA document that refers to document type shells distributed by OASIS MUST be valid according to both the grammar files and any assertions provided in the language reference.

2. If a DITA document refers to a custom document type shell, that shell MUST also conform to the rules laid out in X.X.X.X Rules for document-type shells.

3. If a DITA document's custom document type shell includes constraints, that shell MUST also conform to the rules laid out in X.X.X.X Constraint rules.

4. If a DITA document uses specialized elements or attributes, those elements or attributes MUST also conform to the rules laid out in X.X.X.X Specialization rules for element types, X.X.X.X Specialization rules for attributes, and X.X.X.X Class attribute rules and syntax.
A Acknowledgments

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Zöe Lawson, Synopsys, Inc.
Tom Magliery, JustSystems
Chris Nitchie, Individual member
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Frank Wegmann, Individual member

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- Antenna House Formatter
- Congility Content Server
- DITA Open Toolkit
- Oxygen Content Fusion
- Oxygen XML Editor
- XMetaL Author Enterprise

We are grateful to Antenna House for providing licenses for Antenna House Formatter, Mekon for providing an instance of Congility Content Server, and Syncro Soft for the use of Oxygen Content Fusion.
## B Aggregated RFC-2119 statements

This appendix contains all the normative statements from the DITA 2.0 specification. They are aggregated here for convenience in this non-normative appendix.

<table>
<thead>
<tr>
<th>Item</th>
<th>Conformance statement</th>
</tr>
</thead>
</table>
| 001 (16) | A DITA document **MUST** have as its root element one of the following elements:  
- `<map>` or a specialization of the `<map>` element  
- `<topic>` or a specialization of the `<topic>` element  
- `<dita>`, which cannot be specialized, but which allows documents with multiple sibling topics |
| 002 (20) | Files that contain DITA content **SHOULD** use the following file extensions:  
**DITA topics**  
* `.dita` (preferred)  
* `.xml`  
**DITA maps**  
* `.ditamap`  
**Conditional processing profiles**  
* `.ditaval` |
| 003 (31) | Processors also **MAY** define additional values for the `@cascade` attribute. |
| 004 (46) | If the root element of a map or a top-level topic has no value for the `@xml:lang` attribute, a processor **SHOULD** assume a default value. The default value of the processor can be either fixed, configurable, or derived from the content itself, such as the `@xml:lang` attribute on the root map. |
| 005 (46) | When a `@conref` or `@conkeyref` attribute is used to include content from one element into another, the processor **MUST** use the effective value of the `@xml:lang` attribute from the referenced element. If the referenced element does not have an explicit value for the `@xml:lang` attribute, the processor **SHOULD** use the default value. |
| 006 (46) | Processors **SHOULD** render each element in a way that is appropriate for its language as identified by the `@xml:lang` attribute. |
| 007 (48) | DITA processors **SHOULD** fully support the Unicode Bidirectional Algorithm. This ensures that processors can implement the script and directionality for each language that is used in a document. |
| 008 (51) | A DITA map can reference a subject scheme map by using a `<mapref>` element. Processors also **MAY** provide parameters by which subject scheme maps are referenced. |
| 009 (52) | The following behavior is expected of processors in regard to subject scheme maps:  
- Authoring tools **SHOULD** use these lists of controlled values to provide lists from which authors can select values when they specify attribute values.  
- Authoring tools **MAY** give an organization a list of readable labels, a hierarchy of values to simplify selection, and a shared definition of the value. |
<table>
<thead>
<tr>
<th>Item</th>
<th>Conformance statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>010 (53)</td>
<td>If an enumeration is bound, processors <strong>SHOULD</strong> validate attribute values against the controlled values that are defined in the subject scheme map. For authoring tools, this validation prevents users from entering misspelled or undefined values. Recovery from validation errors is implementation specific.</td>
</tr>
</tbody>
</table>
| 011 (54) | The following behavior is expected of processors in regard to subject scheme maps:  
- Processors **SHOULD** be aware of the hierarchies of attribute values that are defined in subject scheme maps for purposes of filtering, flagging, or other metadata-based categorization.  
- Processors **SHOULD** validate that the values of attributes that are bound to controlled values contain only valid values from those sets. *This requirement is needed because basic XML parsers do not validate the list of controlled values.* If the controlled values are part of a named key scope, the scope name is ignored for the purpose of validating the controlled values.  
- Processors **SHOULD** check that all values listed for an attribute in a DITAVAL file are bound to the attribute by the subject scheme before filtering or flagging. If a processor encounters values that are not included in the subject scheme, it **SHOULD** issue a warning. |
| 012 (54) | Processors **SHOULD** apply the following algorithm when they apply filtering and flagging rules to attribute values that are defined as a hierarchy of controlled values and bound to an enumeration:  
1. If an attribute specifies a value in the taxonomy, and a DITAVAL or other categorization tool is configured with that value, the rule matches.  
2. Otherwise, if the parent value in the taxonomy has a rule, that matches.  
3. Otherwise, continue up the chain in the taxonomy until a matching rule is found. |
| 013 (61) | When determining the value of an attribute, processors **MUST** evaluate each attribute on each individual element in a specific order. *This order is specified in the following list.* Applications **MUST** continue through the list until a value is established or until the end of the list is reached, at which point no value is established for the attribute. In essence, the list provides instructions on how processors can construct a map where all attribute values are set and all cascading is complete.  
1. The `@conref` and `@keyref` attributes are evaluated.  
2. The explicit values specified in the document instance are evaluated. For example, a `<topicref>` element with the `@toc` attribute set to "no" will use that value.  
3. The default or fixed attribute values are evaluated. For example, the `@toc` attribute on the `<reltable>` element has a default value of "no".  
4. The default values that are supplied by a controlled values file are evaluated.  
5. The attributes cascade.  
6. The processing-supplied default values are applied.  
7. After the attributes are resolved within the map, **any values that do not come from processing-supplied defaults** will cascade to referenced maps.  
   For example, most processors will supply a default value of `toc="yes"` when no `@toc` attribute is specified. However, a processor-supplied default of `toc="yes"` does not override a value of `toc="no"` that is set on a referenced map. If the `toc="yes"` value is explicitly specified, is given as a default through a DTD, RNG, or controlled values file, or cascades from a containing element in the map, it will override a `toc="no"` setting on the referenced map. See 5.3.3 Map-to-map cascading behaviors (64) for more details.  
8. Repeat steps 1 to 4 for each referenced map.  
9. The attributes cascade within each referenced map.  
10. The processing-supplied default values are applied within each referenced map.  
11. Repeat the process for maps referenced within the referenced maps. |
<table>
<thead>
<tr>
<th>Item</th>
<th>Conformance statement</th>
</tr>
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<tbody>
<tr>
<td>015  (62)</td>
<td>Implementers <strong>MAY</strong> define their own custom, implementation-specific tokens for the <code>@merge</code> attribute. To avoid name conflicts between implementations or with future additions to the standard, implementation-specific tokens <strong>SHOULD</strong> consist of a prefix that gives the name or an abbreviation for the implementation followed by a colon followed by the token or method name. For example, a processor might define the token “appToken:audience” in order to specify cascading and merging behaviors for only the <code>@audience</code> attribute.</td>
</tr>
<tr>
<td>016  (62)</td>
<td>The predefined values for the <code>@cascade</code> attribute <strong>MUST</strong> precede any implementation-specific tokens, for example, <code>cascade=&quot;merge appToken:audience&quot;</code>.</td>
</tr>
<tr>
<td>017  (66)</td>
<td>Because the <code>&lt;mapref&gt;</code> element is a convenience element, the top-level <code>&lt;topicref&gt;</code> elements in the map referenced by a <code>&lt;mapref&gt;</code> element <strong>MUST NOT</strong> be processed as if they are <code>&lt;mapref&gt;</code> elements. The <code>@class</code> attribute from the <code>&lt;mapref&gt;</code> element (<code>&quot;+ map/topicref mapgroup-d/mapref &quot;</code>) does not cascade to the referenced map.</td>
</tr>
<tr>
<td>018  (66)</td>
<td>In some cases, preserving the role of the referencing element might result in out-of-context content. For example, a <code>&lt;chapter&gt;</code> element that references a bookmap might pull in <code>&lt;part&gt;</code> elements that contain nested <code>&lt;chapter&gt;</code> elements. Treating the <code>&lt;part&gt;</code> element as a <code>&lt;chapter&gt;</code> will result in a chapter that nests other chapters, which is not valid in bookmap and might not be understandable by processors. The result is implementation specific. Processors <strong>MAY</strong> choose to treat this as an error, issue a warning, or simply assign new roles to the problematic elements.</td>
</tr>
<tr>
<td>019  (70)</td>
<td>The following rules apply to all values of the <code>@chunk</code> attribute:</td>
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<tr>
<td></td>
<td>• When the source document organization has no effect on published output, such as when producing a single PDF or EPUB, processors <strong>MAY</strong> ignore the <code>@chunk</code> attribute.</td>
</tr>
<tr>
<td></td>
<td>• When the <code>@chunk</code> attribute results in more or fewer documents based on the <code>combine</code> or <code>split</code> tokens, the hierarchy of topics within the resulting map and topic organization <strong>SHOULD</strong> match the hierarchy in the original topics and maps.</td>
</tr>
<tr>
<td></td>
<td>• When the <code>@chunk</code> attribute results in more or fewer documents, processors <strong>MAY</strong> create their own naming schemes for those reorganized documents.</td>
</tr>
<tr>
<td></td>
<td>• The <code>@chunk</code> attribute values apply to DITA topic documents referenced from a map. Processors <strong>MAY</strong> apply equivalent processing to non-DITA documents.</td>
</tr>
<tr>
<td>020  (86)</td>
<td>Within a map document, the values of the <code>@id</code> attributes for all elements <strong>SHOULD</strong> be unique. When two elements within a map have the same value for the <code>@id</code> attribute, processors <strong>MUST</strong> resolve references to that ID to the first element with the given ID value in document order.</td>
</tr>
<tr>
<td>021  (88)</td>
<td>If the actual format of the referenced content differs from the effective value of the <code>@format</code> attribute, and a processor is capable of identifying such cases, it <strong>MAY</strong> recover gracefully and treat the content as its actual format. The processor <strong>MAY</strong> also issue a message.</td>
</tr>
<tr>
<td>022  (88)</td>
<td>The value of the <code>@href</code> attribute <strong>MUST</strong> be a valid URI reference [RFC 3986]. If the value of the <code>@href</code> attribute is not a valid URI reference, an implementation <strong>MAY</strong> generate an error message. It <strong>MAY</strong> also recover from this error condition by attempting to convert the value to a valid URI reference.</td>
</tr>
<tr>
<td>023  (90)</td>
<td>For the <code>@scope</code> attribute, processors can consider additional URI schemes as “external” by default. Processors <strong>MUST</strong> always consider relative URIs as “local” by default.</td>
</tr>
<tr>
<td>024  (90)</td>
<td>Applications <strong>MAY</strong> issue a warning when the specified or inherited <code>@type</code> attribute value does not match the target or a specialization ancestor of the target. Applications <strong>MAY</strong> recover from this error condition by using the correct value detected.</td>
</tr>
<tr>
<td>025  (91)</td>
<td>DITA processors <strong>MAY</strong> ignore queries on URI references to DITA resources. URI references that address components in the same document <strong>MAY</strong> consist of just the fragment identifier.</td>
</tr>
<tr>
<td>026  (102)</td>
<td>If both <code>@keyref</code> and <code>@href</code> attributes are specified on an element, the <code>@href</code> value <strong>MUST</strong> be used as a fallback address when the key name is undefined. If both <code>@conkeyref</code> and <code>@conref</code> attributes are</td>
</tr>
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<td>Item</td>
<td>Conformance statement</td>
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<tr>
<td>027 (102)</td>
<td>The effective key definitions for a key space might be affected by conditional processing (filtering). Processors <strong>SHOULD</strong> perform conditional processing before determining the effective key definitions. However, processors might determine effective key definitions before filtering. Consequently, different processors might produce different effective bindings for the same map when there are key definitions that might be filtered out based on their filtering attributes.</td>
</tr>
<tr>
<td>028 (103)</td>
<td>If a topic that contains key references is reused in multiple key scopes within a given root map such that its references resolve differently in each use context, processors <strong>MUST</strong> produce multiple copies of the source topic in resolved output for each distinct set of effective key definitions that are referenced by the topic.</td>
</tr>
<tr>
<td>029 (103)</td>
<td>If a referencing element contains a key reference with an undefined key, it is processed as if there were no key reference, and the value of the @href attribute is used as the reference. If the @href attribute is not specified, the element is not treated as a navigation link. If it is an error for the element to be empty, an implementation <strong>MAY</strong> give an error message; it also <strong>MAY</strong> recover from this error condition by leaving the key reference element empty.</td>
</tr>
<tr>
<td>030 (103)</td>
<td>For topic references that use the @keyref attribute, the effective resource bound to the <code>&lt;topicref&gt;</code> element is determined by resolving all intermediate key references. Each key reference is resolved either to a resource addressed directly by URI reference in an @href attribute, or to no resource. Processors <strong>MAY</strong> impose reasonable limits on the number of intermediate key references that they will resolve. Processors <strong>SHOULD</strong> support at least three levels of key references.</td>
</tr>
</tbody>
</table>
| 031 (105)          | Processors **MUST** resolve variable text that is defined using keys by using the following sequence:  
1. Effective text content is taken from the `<keytext>` element.  
2. Effective text content is taken from the `<titlealt>` element with @title-role set to "linking".  
3. Effective text content is taken from the `<titlealt>` element with @title-role set to "navigation".  
4. Effective text content is taken from the `<titlealt>` element with @title-role set to a processor-recognized value.  
5. Effective text content is taken from the title of the referenced document, if available.  
6. Effective text content is determined by the processor. |
| 032 (105)          | When the effective content for a key reference element results in invalid elements, those elements **SHOULD** be generalized to produce a valid result. |
| 033 (128)          | A processor **MAY** give an error message when it encounters the following error conditions:  
• An `<indexterm>` element contains an `<index-see>` element, and the publication contains one or more `<indexterm>` elements with matching textual content.  
• Both `<index-see>` and `<index-see-also>` elements within the same `<indexterm>` element.  
Processors **MAY** recover from these error conditions by treating the `<index-see>` element as an `<index-see-also>` element. |
| 034 (131)          | Processors that support index ranges **SHOULD** do the following:  
• Match @start and @end attributes by a character-by-character comparison with all characters significant and no case folding, occurring  
• Ignore @start and @end attributes if they occur on an `<indexterm>` element that has child `<indexterm>` elements. |
<table>
<thead>
<tr>
<th>Item</th>
<th>Conformance statement</th>
</tr>
</thead>
</table>
| • When index ranges with the same identifier overlap, the effective range is determined by matching the earliest start element from the set of overlapping ranges with the latest end element from the set of overlapping ranges.  
• Handle an end-of-range `<indexterm>` element that is nested within one or more `<indexterm>` elements. The end-of-range `<indexterm>` element should have no content of its own; if it contains content, that content is ignored.  
• Ignore unmatched end-of-range `<indexterm>` elements. | 035 (132) Processors **SHOULD** use the following criteria to match the content of `<indexterm>` elements:  
- Ignore leading and trailing whitespace, as well as newline characters  
- Be case sensitive  |
| (For processors that support indexing) If multiple `<indexterm>` elements exist that would result in matching index entries, a processor **SHOULD** generate only a single index entry, although all locations associated with the `<indexterm>` element contribute locators. | 036 (132)  |
| It is an error for two source topics to replace the same element. Applications **MAY** warn users if more than one element attempts to replace a single target. | 037 (138)  |
| The following markup rules apply when using or implementing `@conrefend`:  
- The start and end elements of a range **MUST** be of the same type as the referencing element or generalizable to the referencing element.  
- The start and end elements in a range **MUST** share the same parent, and the start element **MUST** precede the end element in document order.  
- The parent of the referencing element **MUST** be the same as the parent of the referenced range or generalizable to the parent of the referencing element. | 038 (140)  |
<p>| Processors <strong>SHOULD</strong> issue a warning when a <code>@conkeyrefs</code> reference cannot be resolved and there is no <code>@conref</code> attribute to use as a fallback. Processors <strong>MAY</strong> issue a warning when a <code>@conkeyrefs</code> cannot be resolved to an element and a specified <code>@conref</code> is used as a fallback. | 039 (145)  |
| When content is reused between two documents with different domains or constraints, it is possible for the reused content to include domain extensions that are not defined for the new context, or to include elements that would be constrained out of the new context. When pulling or pushing content with the conref mechanism, processors resolving conrefs <strong>SHOULD</strong> tolerate specializations of valid elements. Processors <strong>MAY</strong> generalize elements in the pushed or pulled content fragment as needed for the resolving context. | 040 (147)  |
| A conref processor <strong>SHOULD NOT</strong> permit resolution of a reuse relationship that could be rendered invalid under the rules of either the reused or reusing content. | 041 (147)  |
| If the final resolved element (after the complete resolution of any conref chain) has an attribute with the &quot;-dita-use-conref-target&quot; value, that element <strong>MUST</strong> be treated as equivalent to having that attribute unspecified. | 042 (147)  |
| Processors <strong>SHOULD</strong> be able to perform filtering and flagging using the following attributes: <code>@props</code>, <code>@audience</code>, <code>@deliveryTarget</code>, <code>@platform</code>, <code>@product</code>, and <code>@otherprops</code>. | 043 (152)  |
| The <code>@props</code> attribute can be specialized to create new attributes, and processors <strong>SHOULD</strong> be able to perform conditional processing on specializations of <code>@props</code>. | 044 (152)  |
| In addition to filtering, applications <strong>MAY</strong> support flagging at the branch level based on the referenced DITAVAL documents. | 045 (161)  |</p>
<table>
<thead>
<tr>
<th>Item</th>
<th>Conformance statement</th>
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<tbody>
<tr>
<td>046 (165)</td>
<td>It is an error if <code>&lt;ditavalref&gt;</code>-driven branch cloning results in multiple copies of a topic that have the same resolved name. Processors <strong>SHOULD</strong> report an error in such cases. Processors <strong>MAY</strong> recover by using an alternate naming scheme for the conflicting topics.</td>
</tr>
<tr>
<td>047 (165)</td>
<td>In rare cases, a single topic might appear in different branches that set different conditions, yet still produce the same result. For example, a topic might appear in both the admin and novice copies of a branch but not contain content that is tailored to either audience; in that case, the filtered copies would match. A processor <strong>MAY</strong> consider this form of equivalence when determining if two references to the same resource should be reported as an error.</td>
</tr>
<tr>
<td>048 (165)</td>
<td>The full effects of the branch filtering process <strong>MUST</strong> be calculated by processors before they construct the effective map and key scope structure. This requirement comes from the fact that the branch filtering process can result in new or renamed keys, key scopes, or URIs that make up the key space.</td>
</tr>
<tr>
<td>049 (175)</td>
<td>Processors that perform sorting <strong>SHOULD</strong> explicitly document how the base sort phrase is determined for a given element.</td>
</tr>
</tbody>
</table>
| 050 (175) | When a `<sort-as>` element is specified, processors that sort the containing element **MUST** construct the effective sort phrase by prepending the content of the `<sort-as>` element to the base sort phrase. This ensures that two items with the same `<sort-as>` element but different base sort phrases will sort in the appropriate order.  
For example, if a processor uses the content of the `<title>` element as the base sort phrase, and the title of a topic is "24 Hour Support Hotline" and the value of the `<sort-as>` element is "twenty-four hour", then the effective sort phrase would be "twenty-four hour24 Hour Support Hotline". |
| 051 (176) | For attributes within a map, the following processing order **MUST** occur:  
1. The `@conref` and `@keyref` attributes are evaluated.  
2. The explicit values specified in the document instance are evaluated. For example, a `<topicref>` element with the `@toc` attribute set to "no" will use that value.  
3. The default or fixed attribute values are evaluated. For example, the `@toc` attribute on the `<reltable>` element has a default value of "no".  
4. The default values that are supplied by a controlled values file are evaluated.  
5. The attributes cascade.  
6. The processing-supplied default values are applied.  
7. After the attributes are resolved within the map, they cascade to referenced maps. |

Comment by Kristen J Eberlein on 15 May 2019

The following note is problematic. It contains a normative statement, but we explicitly state that notes are non-normative.

Discussed at TC call on 28 May 2019.

**Note** The processing-supplied default values do not cascade to other maps. For example, most processors will supply a default value of `toc="yes"` when no `@toc` attribute is specified. However, a processor-supplied default of `toc="yes"` **MUST** not override a value of `toc="no"` that is set on a referenced map. If the `toc="yes"` value is explicitly specified, is given as a default through a DTD, XSD, RNG, or controlled values file, or cascades from a containing element in the map, it **MUST** override a `toc="no"` setting on the referenced map. See 5.3.3 Map-to-map cascading behaviors (64) for more details.

8. Repeat steps 1 to 4 for each referenced map.  
9. The attributes cascade within each referenced map.  
10. The processing-supplied default values are applied within each referenced map.
<table>
<thead>
<tr>
<th>Item</th>
<th>Conformance statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.</td>
<td>Repeat the process for maps referenced within the referenced maps.</td>
</tr>
<tr>
<td>052 (180)</td>
<td>While the DITA specification only defines coding requirements for DTD and RELAX NG, conforming DITA documents MAY use other document-type constraint languages, such as XSD or Schematron.</td>
</tr>
</tbody>
</table>
| 053 (180) | With two exceptions, a document-type shell MUST NOT directly define element or attribute types; it only includes vocabulary and element-configuration modules (constraint and expansion). The exceptions to this rule are the following:  
• The database document-type shell directly defines the `<dita>` element.  
• RNG-based document-type shells directly specify values for the `@specializations` attribute. These values reflect the details of the attribute domains that are integrated by the document-type shell. |
| 054 (180) | Document-type shells that are not provided by OASIS MUST have a unique public identifier, if public identifiers are used. |
| 055 (180) | Document-type shells that are not provided by OASIS MUST NOT indicate OASIS as the owner. The public identifier or URN for such document-type shells SHOULD reflect the owner or creator of the document-type shell. |
| 056 (183) | Structural modules based on topic MAY define additional topic types that are then allowed to occur as subordinate topics within the top-level topic. However, such subordinate topic types MAY NOT be used as the root elements of conforming DITA documents. |
| 057 (183) | Domain elements intended for use in topics MUST ultimately be specialized from elements that are defined in the topic module. Domain elements intended for use in maps MUST ultimately be specialized from elements defined by or used in the map module. Maps share some element types with topics but no map-specific elements can be used within topics. |
| 058 (185) | Every DITA element (except the `<dita>` element that is used as the root of a database document) MUST declare a `@class` attribute. |
| 059 (185) | When the `@class` attribute is declared in an XML grammar, it MUST be declared with a default value. In order to support generalization round-tripping (generalizing specialized content into a generic form and then returning it to the specialized form) the default value MUST NOT be fixed. This allows a generalization process to overwrite the default values that are defined by a general document type with specialized values taken from the document being generalized. |
| 060 (185) | A vocabulary module MUST NOT change the `@class` attribute for elements that it does not specialize, but simply reuses by reference from more generic levels. |
| 061 (185) | Authors SHOULD NOT modify the `@class` attribute. The `@class` attribute and its value is generally not surfaced in authored DITA topics, although it might be made explicit as part of a processing operation. |
| 062 (186) | Each specialization of the `@props` and `@base` attributes MUST provide a token for use by the `@specializations` attribute. |
| 063 (189) | When generalizing for round-tripping, the `@class` attribute and `@specializations` attribute SHOULD retain the original specialized values in the generalized instance document. |
| 064 (190) | A generalization processor SHOULD be able to handle cases where it is given:  
• Only source modules for generalization (in which case the designated source types are generalized to topic or map)  
• Only target modules for generalization (in which case all descendants of each target are generalized to that target)  
• Both (in which case only the specified descendants of each target are generalized to that target) |
<table>
<thead>
<tr>
<th>Item</th>
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</tr>
</thead>
<tbody>
<tr>
<td>065 (191)</td>
<td>When renaming elements during round-trip generalization, the generalization processor SHOULD preserve the values of all attributes. When renaming elements during one-way or migration generalization, the process SHOULD preserve the values of all attributes except the @class attribute, which is supplied by the target document type.</td>
</tr>
<tr>
<td>066 (191)</td>
<td>Specialization-aware processors MUST process both the specialized and generalized forms of an attribute as equivalent in their values.</td>
</tr>
<tr>
<td>067 (192)</td>
<td>A single element MUST NOT contain both generalized and specialized values for the same attribute.</td>
</tr>
<tr>
<td>068 (192)</td>
<td>When possible, generalizing processes SHOULD detect invalid generalization target combinations and report them as errors.</td>
</tr>
</tbody>
</table>
| 069 (230) | RELAX NG grammars for DITA document-type shells, vocabulary modules, and element-configuration modules (constraint and expansion) MAY do the following:  
- Use the `<a:documentation>` element anywhere that foreign elements are allowed by RELAX NG. The `<a:documentation>` element refers to the `<documentation>` element type from the http://relaxng.org/ns/compatibility/annotations/1.0 as defined by the DTD compatibility specification. The prefix "a" is used by convention.  
- Use `<div>` to group pattern declarations.  
- Include embedded Schematron rules or any other foreign vocabulary. Processors MAY ignore any foreign vocabularies within DITA grammars that are not in the http://relaxng.org/ns/compatibility/annotations/1.0 or http://dita.oasis-open.org/architecture/2005/ namespaces. |
| 070 (231) | Conforming RELAX NG-based DITA modules MAY omit the annotations and foreign elements that are used in the OASIS grammar files to enable generation of other XML grammars, such as DTDs and XML Schema. When such annotations are used, conversion from one RELAX NG syntax to the other might lose the information, as processors are not required to process the annotations and information from foreign vocabularies. |
| 071 (252) | Processors SHOULD render the content of the `<shortdesc>` element as the initial paragraph of the topic. |
| 072 (252) | When processors generate link previews that are based on the map context, they SHOULD use the content of the `<shortdesc>` that is located in the map rather than the `<shortdesc>` that is located in the DITA topic. However, when processors render the topic itself, they SHOULD use the content of the `<shortdesc>` element that is located in the DITA topic. |
| 073 (254) | The processing of an alternative title depends on its roles. Processors SHOULD support the following tokens for the @title-role attribute:  
- **linking**  
  Specifies that the content of the `<titlealt>` element contains the title for use in references to the resources generated from DITA map structures, such as hierarchical parent/child/sibling links and links generated from relationship tables. In addition, this is the fallback alternative title for navigation and search roles. Custom title roles meant for use in link generation should also use this as a fallback.  
- **navigation**  
  Specifies that the content of the `<titlealt>` element contains the title for use in tables of content and other navigation aids. In some cases, when processing a `<topicref>` that has no @href, this is also used as the title of the generated topic, if applicable. If not present, this role is fulfilled by the linking role.  
- **search**  
  Specifies that the content of the `<titlealt>` element contains a title for use in search results for systems that support content search. If not present, this role is fulfilled by the linking role. |
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>subtitle</strong></td>
<td>Specifies that the content of the <code>&lt;titlealt&gt;</code> element contains a subtitle for the document.</td>
</tr>
<tr>
<td><strong>hint</strong></td>
<td>Specifies that the content of the <code>&lt;titlealt&gt;</code> element contains a hint about the referenced resource. This is intended for the benefit of map authors; it does not have an effect on processing or output.</td>
</tr>
<tr>
<td><strong>-dita-use-conref-target</strong></td>
<td>See 7.3.6 Using the -dita-use-conref-target value (145) for more information.</td>
</tr>
<tr>
<td>074 (258)</td>
<td>When used in conjunction with <code>&lt;fig&gt;</code> or <code>&lt;table&gt;</code> elements, processors <strong>SHOULD</strong> consider the content of <code>&lt;desc&gt;</code> elements to be part of the content flow. When used in conjunction with <code>&lt;xref&gt;</code> or <code>&lt;link&gt;</code> elements, processors often render the content of <code>&lt;desc&gt;</code> elements as hover help or other forms of link preview.</td>
</tr>
<tr>
<td>075 (260)</td>
<td>By default, processors <strong>SHOULD NOT</strong> render <code>&lt;draft-comment&gt;</code> elements. Processors <strong>SHOULD</strong> provide a mechanism that causes the content of the <code>&lt;draft-comment&gt;</code> element to be rendered in draft output only.</td>
</tr>
</tbody>
</table>
| 076 (265) | Processors **SHOULD** scale the object when values are provided for the `@height` and `@width` attributes. The following expectations apply:  
- If a height value is specified and no width value is specified, processors **SHOULD** scale the width by the same factor as the height.  
- If a width value is specified and no height value is specified, processors **SHOULD** scale the height by the same factor as the width.  
- If both a height value and width value are specified, implementations **MAY** ignore one of the two values when they are unable to scale to each direction using different factors. |
| 077 (267) | Processors **SHOULD** support the `@parse` values "text" and "xml". |
| 078 (267) | Processors **SHOULD** detect the encoding of the referenced document based on the rules described for the `@encoding` (395) attribute. |
| 079 (269) | Processors **SHOULD** preserve or otherwise indicate white space within the `<lines>` element. |
| 080 (273) | Processors **SHOULD** scale the object when values are provided for the `@height` and `@width` attributes. The following expectations apply:  
- If a height value is specified and no width value is specified, processors **SHOULD** scale the width by the same factor as the height.  
- If a width value is specified and no height value is specified, processors **SHOULD** scale the height by the same factor as the width.  
- If both a height value and width value are specified, implementations **MAY** ignore one of the two values when they are unable to scale to each direction using different factors. |
<p>| 081 (273) | When an object cannot be rendered in a meaningful way, processors <strong>SHOULD</strong> present the contents of the <code>&lt;fallback&gt;</code> element, if it is present. |
| 082 (278) | Processors <strong>SHOULD</strong> preserve line the breaks and spaces that are present in the content of a <code>&lt;pre&gt;</code> element. |
| 083 (279) | Processors <strong>SHOULD</strong> treat the presence of more than one <code>&lt;title&gt;</code> element in a <code>&lt;section&gt;</code> element as an error. |
| 084 (283) | When an audio resource cannot be rendered in a meaningful way, processors <strong>SHOULD</strong> present the contents of the <code>&lt;fallback&gt;</code> element, if it is present. |</p>
<table>
<thead>
<tr>
<th>Item</th>
<th>Conformance statement</th>
</tr>
</thead>
</table>
| 085 (287) | Processors SHOULD scale the video resource when values are provided for the @height and @width attributes. The following expectations apply:  
- If a height value is specified and no width value is specified, processors SHOULD scale the width by the same factor as the height.  
- If a width value is specified and no height value is specified, processors SHOULD scale the height by the same factor as the width.  
- If both a height value and width value are specified, implementations MAY ignore one of the two values when they are unable to scale to each direction using different factors. |
| 086 (287) | When a video resource cannot be rendered in a meaningful way, processors SHOULD render the contents of the <fallback> element, if it is present. |
| 087 (289) | Processors SHOULD ignore an <index-see> element if its parent <indexterm> element contains any <indexterm> children. |
| 088 (290) | Processors SHOULD ignore an <index-see-also> element if its parent <indexterm> element contains any <indexterm> children. |
| 089 (334) | When @appid-role is set to "deliverable-anchor", and the <resourceid> applies to a deliverable, processors SHOULD use the @appid value when constructing a URI for the delivered resource. Effective @appid values for this reflect the application of any prefix or suffix values from 10.6.2.5 dvrKeyscopePrefix (354) and 10.6.2.4 dvrResourceSuffix (353). Actual delivery anchors depend on the rendered format; for example, the anchor can be the base part of an HTML file name, a PDF anchor name, or a URI fragment identifier. While anchors values will vary by deliverable, the resulting URI should reflect the specified anchor as much as possible. |
| 090 (339) | By default, processors SHOULD treat a <data> element as unknown metadata. The contents of the <data> element SHOULD NOT be rendered. Processors that recognize a particular <data> element MAY make use of it to trigger specialized rendering. |
| 091 (341) | Processors attempt to display <foreign> content unless otherwise instructed. If a processor cannot render the content, it MAY issue a warning. |
| 092 (350) | Processors MAY recover by using an alternate naming scheme for the conflicting copies.  
Comment by Kristen J Eberlein on 15 May 2019  
Need more information about what situation the processor is recovering from ...  
Comment by robander  
For the above, it would be recovering from a map that instructs it to create two files of the same name, with different filter conditions applied. |
| 093 (359) | Processors SHOULD scale the object when values are provided for the @height and @width attributes. The following expectations apply:  
- If a height value is specified and no width value is specified, processors SHOULD scale the width by the same factor as the height.  
- If a width value is specified and no height value is specified, processors SHOULD scale the height by the same factor as the width.  
- If both a height value and width value are specified, implementations MAY ignore one of the two values when they are unable to scale to each direction using different factors. |
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>094  (369)</td>
<td>When a map that contains a <code>&lt;topicgroup&gt;</code> element with a navigation title is used to generate publication output, processors <strong>MUST</strong> ignore the navigation title and <strong>MAY</strong> issue an error message.</td>
</tr>
<tr>
<td>095  (370)</td>
<td>Processors <strong>SHOULD</strong> generate a warning if a navigation title is not specified on a <code>&lt;topichead&gt;</code> element.</td>
</tr>
</tbody>
</table>
| 096  (374) | Processors **SHOULD** expect to encounter `<sort-as>` elements in the above locations. Processors that sort **SHOULD** use the following precedence rules:  
  - A `<sort-as>` element that is specified in a title takes precedence over a `<sort-as>` element that is specified as a child of the topic prolog.  
  - Except for instances in the topic prolog, processors only apply `<sort-as>` elements that are either a direct child of the element to be sorted or a direct child of the title- or label-defining element of the element to be sorted.  
  - When an element contains multiple, direct-child, `<sort-as>` elements, the first direct-child `<sort-as>` element in document order takes precedence.  
  - It is an error if there is more than one `<sort-as>` child for a given `<indexterm>`. An implementation encountering more than one `<sort-as>` in this case might give an error message.  
  - Sort phrases are determined after filtering and content reference resolution occur. |
| 097  (375) | When a `<sort-as>` element is specified, processors that sort the containing element **MUST** construct the effective sort phrase by prepending the content of the `<sort-as>` element to the base sort phrase. This ensures that two items with the same `<sort-as>` element but different base sort phrases will sort in the appropriate order.  
  For example, if a processor uses the content of the `<title>` element as the base sort phrase, and the title of a topic is "24 Hour Support Hotline" and the value of the `<sort-as>` element is "twenty-four hour", then the effective sort phrase would be "twenty-four hour 24 Hour Support Hotline". |
| 098  (376) | Processors **MUST** strip this element from output by default. The content of `<required-cleanup>` is not considered to be publishable data. |
| 099  (379) | For the `@color` and `@backcolor` attributes on `<prop>` and `<revprop>`, processors **SHOULD** support at least the following values:  
  - The color names listed under the heading "<color>" in the XSL version 1.1 specification  
  - The associated hex code  
  For the `@style` attribute on `<rev>` and `<revprop>`, processors **SHOULD** support the following tokens:  
  - bold  
  - double-underline  
  - italics  
  - overline  
  - underline  
  In addition, processors **MAY** support proprietary tokens for the `@style` attribute. Such tokens **SHOULD** have a processor-specific prefix to identify them as proprietary. If a processor encounters an unsupported style token, it **MAY** issue a warning, and it **MAY** render content that is flagged with such a style token by using some default formatting. |
| 100  (379) | The following markup in a DITAVAL document is an error condition:  
  - More than one `<prop>` element with no `@att` attribute  
  - More than one `<prop>` element with the same `@att` attribute and no value  
  - More than one `<prop>` element with the same `@att` attribute and same `@value` |
<table>
<thead>
<tr>
<th>Item</th>
<th>Conformance statement</th>
</tr>
</thead>
</table>
| 101 (381) | For the @color and @backcolor attributes on `<prop>` and `<revprop>`, processors SHOULD support at least the following values:  
  - The color names listed under the heading "<color>" in the XSL version 1.1 specification  
  - The associated hex code  
  For the @style attribute on `<rev>` and `<revprop>`, processors SHOULD support the following tokens:  
  - bold  
  - double-underline  
  - italics  
  - overline  
  - underline  
  In addition, processors MAY support proprietary tokens for the @style attribute. Such tokens SHOULD have a processor-specific prefix to identify them as proprietary. If a processor encounters an unsupported style token, it MAY issue a warning, and it MAY render content that is flagged with such a style token by using some default formatting. |
<p>| 102 (382) | It is an error to include more than one <code>&lt;revprop&gt;</code> element with the same @val attribute. Recovery from this error is implementation dependent. In such cases processors MAY provide an error or warning message. |
| 103 (393) | If no value is set and no value cascades from a containing element, processors SHOULD assume a default of &quot;merge&quot;. Processors can define custom values for the @cascade attribute. |
| 104 (402) | The DITA specification defines several core features, as summarized in the following list. Any implementation that supports a feature MUST conform to all rules laid out in the section that describes the feature. |
| 105 (403) | Conforming DITA implementations SHOULD include a conformance statement that gives the version of the DITA specification that is supported, indicate if all features from the list above are supported, and indicate that all normative rendering rules are supported. |
| 106 (403) | If only a subset of features is supported, implementations SHOULD indicate which features are (or are not) supported. If an implementation supports rendering DITA elements but does not render all elements as described above, that application SHOULD indicate which elements are (or are not) supported. |
| 107 (403) | Not all DITA features are relevant for all implementations. For example, a DITA editor that does not render content references in context does not need to conform to rules regarding the @conref attribute. However, any application that renders content references MUST conform to the rules described in 7.3 Content reference (conref) (136). |
| 108 (403) | Implementations that support only a subset of DITA features are considered conforming as long as all supported features follow the requirements that are given in the DITA specification. An implementation that does not support a particular feature MUST be prepared to interoperate with other implementations that do support the feature. |
| 109 (403) | A DITA document that refers to document type shells distributed by OASIS MUST be valid according to both the grammar files and any assertions provided in the language reference. |
| 110 (403) | If a DITA document refers to a custom document type shell, that shell MUST also conform to the rules laid out in X.X.X.X Rules for document-type shells. |
| 111 (403) | If a DITA document's custom document type shell includes constraints, that shell MUST also conform to the rules laid out in X.X.X.X Constraint rules |</p>
<table>
<thead>
<tr>
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<th>Conformance statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>112  (403)</td>
<td>If a DITA document uses specialized elements or attributes, those elements or attributes <strong>MUST</strong> also conform to the rules laid out in X.X.X Specialization rules for element types, X.X.X Specialization rules for attributes, and X.X.X Class attribute rules and syntax.</td>
</tr>
</tbody>
</table>
C Non-normative information

This section contains non-normative information, including topics about new features in DITA 2.0 and migrating to DITA 2.0.

C.1 Changes from DITA 1.3 to DITA 2.0

C.2 File naming conventions

The DITA OASIS Technical Committee uses certain conventions for the names of XML grammar files. We suggest using these conventions as a best practice to facilitate interchange of grammar files.

Globally unique identifiers

Vocabulary modules that are intended for use outside of a narrowly-restricted context should have one or more associated, globally-unique names by which the modules can be referenced without regard to their local storage location. The globally-unique names can be public identifiers, URNs, or absolute URLs.

Document-type shells

Document-type shells should be given a name that distinguishes their name, owner, or purpose; for example, acme-concept.dtd. The document-type shells that are provided by the DITA Technical Committee use the root element of the primary specialization as the basis for the file name.

Module names

Each vocabulary module has a short name that is used to construct entity names and other names that are used in associated declarations. Modules also can have abbreviated names that further shorten the short name, for example "hi-d" for the "highlight" domain, where "software" is the short name and "hi-d" is the abbreviated name.

For structural modules, the module name should be the element type name of the top-level topic or map type defined by the module, such as "concept" or "bookmark".

For element domain modules, the module name should be a name that reflects the subject domain to which the domain applies, such as "highlight" or "software". Domain module names should be sufficiently unique that they are unlikely to conflict with any other domains.

Comment by Kristen Eberlein on 27 May 2015

Let's be careful that we use the terms "short name" and "abbreviated name" consistently throughout the spec.

DTD-based specialization modules

Use the following file-naming conventions for DTD-based specialization modules.
<table>
<thead>
<tr>
<th>Module type</th>
<th>File name (entities)</th>
<th>File name (elements)</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural</td>
<td>ModuleName.ent</td>
<td>ModuleName.mod</td>
<td>concept.ent or concept.mod</td>
</tr>
<tr>
<td>Element domain</td>
<td>DomainNameDomain.ent</td>
<td>DomainNameDomain.mod</td>
<td>highlightDomain.ent or</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>highlightDomain.mod</td>
</tr>
<tr>
<td>Attribute domain</td>
<td>AttributeNameAttDomain.ent</td>
<td>Not applicable</td>
<td>deliveryTargetAttDomain.ent</td>
</tr>
</tbody>
</table>

where:
- `ModuleName` is the name of the element type, such as "concept" or "glossentry".
- `DomainName` is the name of the domain, for example, "highlight" or "utilities".
- `AttributeName` is the name of the specialized attribute, for example, "deliveryTarget".

**RELAX NG-based specialization modules**

Use the following file-naming conventions for RELAX NG-based specialization modules.

<table>
<thead>
<tr>
<th>Module type</th>
<th>File name</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural</td>
<td>ModuleNameMod.rng</td>
<td>conceptMod.rng</td>
</tr>
<tr>
<td>Element domain</td>
<td>DomainNameDomainMod.rng</td>
<td>highlightDomainMod.rng</td>
</tr>
<tr>
<td>Attribute domain</td>
<td>AttributeNameAttDomain.rng</td>
<td>deliveryTargetAttDomain.rng</td>
</tr>
</tbody>
</table>

where:
- `ModuleName` is the name of the element type, such as "concept" or "glossentry".
- `DomainName` is the name of the domain, for example, "highlight" or "utilities".
- `AttributeName` is the name of the specialized attribute, for example, "deliveryTarget".

**Constraint modules**

Use the following file-naming conventions for constraint modules.

**Structural modules**

Structural constraint modules should be named using the following format:

<table>
<thead>
<tr>
<th>DTD</th>
<th>RELAX NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>qualifierTagnameConstraint.mod</td>
<td>qualifierTagnameConstraintMod.rng</td>
</tr>
</tbody>
</table>

where:
- `qualifier` is a string that is specific to the constraints module and characterizes it, for example, "strict" or "requiredTitle" or "myCompany-".
- `Tagname` is the element type name with an initial capital, for example, "Topic".

For example, the file names for the constraint that is applied to the general task to create the strict task are `strictTaskbodyConstraint.mod`, `strictTaskbodyConstraintMod.rng`, or `strictTaskbodyConstraintMod.xsd`. 
Domain modules

Domain constraint modules should be named using the following format:

<table>
<thead>
<tr>
<th>DTD</th>
<th>qualifierdomainDomainConstraint.ent</th>
</tr>
</thead>
<tbody>
<tr>
<td>RELAX NG</td>
<td>qualifierdomainDomainConstraintMod.rng</td>
</tr>
</tbody>
</table>

where:

- **qualifier** is a string that is specific to the constraints module and characterizes it, for example, “noSyntaxDiagram” or “myCompany-”.
- **domain** is the name of the domain to which the constraints apply, for example, "Highlighting" or "Programming".

For example, the file name for a constraint module that removes the syntax diagram from the programming domain might be noSyntaxDiagramProgrammingDomainConstraint.ent.

C.3 Migrating to DITA 2.0

C.4 Considerations for generalizing <foreign> elements

The <foreign> element can contain a mixture of DITA and non-DITA content. Non-DITA content that is contained within a <foreign> element cannot be generalized. However, the <foreign> element itself, as well as any DITA elements that it contains, can be generalized using normal rules.

If a <foreign> element contains non-DITA content, the non-DITA content can be exported to a separate file and replaced in-line with an <object> element. The @data attribute of the <object> element would reference the generated file, and the @type attribute of the <object> element would be set to the value "DITA-foreign".

If an <object> element is present within the <foreign> element during generalization, it is not included with the content that is exported to the separate file. This original <object> element is used to specify alternate content in publishing systems that cannot display the foreign content. It would not be modified except as the ordinary rules of generalization require it.

In the exported file, exported content would be enclosed within a root <foreign> element in order to accommodate the possibility that it might contain several main elements apart from the alternate content.

For easy recognition, the name of the exported file would start with "dita-generalized-", and it is recommended that the file name also contain the topic ID, specialization type, and element ID or generated identifier.

Example: Simple object generalization

For example, a DITA document could contain a specialization of <foreign> for MathML using the OASIS MathML domain. It could look like this:

```xml
<mathml class="+ topic/foreign mathml-d/mathml ">
  <m:math>
    <m:mml:x</m:mml:mi><m:mo>=</m:mo><m:mml:mi><m:mo>=</m:mo><m:mml:mi><m:mo>+</m:mo><m:mml:mi><m:mo>=</m:mo><m:mml:mi><m:mn>3</m:mn></m:mml:mi>
  </m:math>
  <data>X plus three</data>
</mathml>
```
The `<mathml>` container is a DITA element, so it should be generalized using normal rules. The `<m:math>` element, which is not a DITA element, will be exported to another file. The `<data>` element will remain:

```xml
<foreign class="+ topic/foreign mathml-d/mathml ">
  <object data="dita-generalized-topicid_mathml1.xml" type="DITA-foreign"/>
  <data>X plus three</data>
</foreign>
```

<!-- Contents of dita-generalized-topicid_mathml1.xml: -->
```xml
<foreign class="+ topic/foreign mathml-d/mathml 
  xmlns:m="http://www.w3.org/1998/Math/MathML">
  <m:math>
    <m:mi>x</m:mi><m:mo>+</m:mo><m:mn>3</m:mn>
  </m:math>
</foreign>
```

**Example: Multiple object generalization**

An object might also contain multiple object elements:

```xml
<mathml class="+ topic/foreign mathml-d/mathml ">
  <m:math>
    <m:mi>x</m:mi><m:mo>+</m:mo><m:mn>3</m:mn>
  </m:math>
  <data>X plus three</data>
  <m:math>
    <m:mi>y</m:mi><m:mo>-</m:mo><m:mn>2</m:mn>
  </m:math>
</mathml>
```

The `<mathml>` container, which is a normal DITA element, should be generalized using normal rules. A file should be generated for each set of elements bounded by the container and any existing object elements. In this case, two files will be generated, and two new object elements added to the source.

The modified source:

```xml
<foreign class="+ topic/foreign mathml-d/mathml ">
  <object data="dita-generalized-topicid_mathml2.xml" type="DITA-foreign"/>
</foreign>
```

The contents of dita-generalized-topicid_mathml1.xml, the first exported file:

```xml
<foreign class="+ topic/foreign mathml-d/mathml 
  xmlns:m="http://www.w3.org/1998/Math/MathML">
  <m:math>
    <m:mi>x</m:mi><m:mo>+</m:mo><m:mn>3</m:mn>
  </m:math>
</foreign>
```

The contents of dita-generalized-topicid_mathml2.xml, the second exported file:

```xml
<foreign class="+ topic/foreign mathml-d/mathml 
  xmlns:m="http://www.w3.org/1998/Math/MathML">
  <m:math>
    <m:mi>y</m:mi><m:mo>-</m:mo><m:mn>2</m:mn>
  </m:math>
</foreign>
```
C.5 Element-by-element recommendations for translators

This topic contains a list of all OASIS DITA elements that are available in the edition. It includes recommendations on how to present the element type to translators, whether the element contents are likely to be suitable for translation, and whether the element has attributes whose values are likely to be suitable for translation. Examples of content that is not suitable for translation include code fragments and mailing addresses.

Since the distinction between block and inline elements is ultimately controlled by the container of the element and the processing associated with it, the same element might be a block in one context and an inline element in another. Specializing document types might vary this behavior according to the needs of the document type being created, and the distinctions given below are provided only as a guide to known behavior with the base DITA document types.

Notes on the tables below

- For specializations, the second column gives the ancestor element, and the third column gives a quick yes/no guide to indicate whether all behavior is inherited. If something is not inherited, the change will appear in bold.
- For any specialization not listed below, the suggested default is to fall back to the closest listed ancestor.
- The block/inline presentation column indicates whether the element is formatted as a single block.
- The block/inline translation column indicates whether the element represents a complete translatable segment. For example, the element `<cmd>` is presented inline with other elements, but represents a complete translation segment.
- Items marked as block*** are blocks on their own, but might appear in the middle of a segment. They should not break the flow of the current segment. These are considered "subflow" elements for translation. We recommend that, when possible, these elements should only be placed at sentence boundaries to aid in translation.
- For all elements, the `@translate` attribute will override the suggested default translation setting. So, a translation setting of "yes" or "no" in the table below does not guarantee that an element will always, or never, be translated.
- If an element has translatable attributes, they are listed in the last column.
- The `<keyword>` element (as well as specializations of `<keyword>`) is an inline, phrase-like element when it appears in the body of a document. It can also appear in the `<keywords>` element in `<topicmeta>` (for maps) or in the `<prolog>` (for topic). When it appears in the `<keywords>` element, each `<keyword>` represents an individual segment, and is not part of a larger segment; in that location, `<keyword>` can be considered a "subflow" element.

**Topic elements**

1 This element is considered a "subflow" element for translation. If it is located in the middle of a translation segment, it should not be translated as part of that segment. For example, `<indexterm>, <fn>, and <draft-comment>` might divide a sentence in two, but should be treated as blocks, and should not interrupt the sentence.
2 The block vs. inline designation for the `<foreign>` element is likely to change for some specializations.
3 The `<desc>, <object>, and <image>` elements inside `<foreign>` should still be translatable; they provide an alternative display if the foreign content cannot be processed.
<table>
<thead>
<tr>
<th>Element name</th>
<th>Specialized from</th>
<th>Block/Inline (presentation)</th>
<th>Block/Inline (translation)</th>
<th>Translatable content?</th>
<th>Translatable attributes?</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;abstract&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;alt&gt;</td>
<td>N/A</td>
<td>block***</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;audience&gt;</td>
<td>N/A</td>
<td>block (metadata)</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;audio&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;author&gt;</td>
<td>N/A</td>
<td>block (metadata)</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;body&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;bodydiv&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;brand&gt;</td>
<td>N/A</td>
<td>block (metadata)</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;category&gt;</td>
<td>N/A</td>
<td>block (metadata)</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;cite&gt;</td>
<td>N/A</td>
<td>inline</td>
<td>inline</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;colspec&gt;</td>
<td>N/A</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>&lt;component&gt;</td>
<td>N/A</td>
<td>block (metadata)</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;copyrightholder&gt;</td>
<td>N/A</td>
<td>block (metadata)</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;copyright&gt;</td>
<td>N/A</td>
<td>block (metadata)</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;copyryear&gt;</td>
<td>N/A</td>
<td>block (metadata)</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;created&gt;</td>
<td>N/A</td>
<td>block (metadata)</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;critdates&gt;</td>
<td>N/A</td>
<td>block (metadata)</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;data&gt;</td>
<td>N/A</td>
<td>N/A (metadata)</td>
<td>block</td>
<td>no (likely to change for some specializations)</td>
<td></td>
</tr>
<tr>
<td>&lt;dd&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;ddhd&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;desc&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;div&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;dl&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;dlentry&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;dihead&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;draft-comment&gt;</td>
<td>N/A</td>
<td>block***</td>
<td>block</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>&lt;dt&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;dthd&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;entry&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;example&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
</tbody>
</table>

4 The `<desc>`, `<object>`, and `<image>` elements inside `<foreign>` should still be translatable; they provide an alternative display if the foreign content cannot be processed.
<table>
<thead>
<tr>
<th>Element name</th>
<th>Specialized from</th>
<th>Block/Inline (presentation)</th>
<th>Block/Inline (translation)</th>
<th>Translatable content?</th>
<th>Translatable attributes?</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;fallback&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;featnum&gt;</td>
<td>N/A</td>
<td>block (metadata)</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;fig&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;figgroup&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;fn&gt;</td>
<td>N/A</td>
<td>block&lt;sup&gt;***&lt;sup&gt;</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;foreign&gt;&lt;sup&gt;5&lt;/sup&gt;</td>
<td>N/A</td>
<td>block&lt;sup&gt;2&lt;/sup&gt;</td>
<td>block&lt;sup&gt;2&lt;/sup&gt;</td>
<td>no&lt;sup&gt;3&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>&lt;image&gt;</td>
<td>N/A</td>
<td>block when @placement=break, otherwise inline</td>
<td>block when @placement=break, otherwise inline</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;include&gt;</td>
<td>N/A</td>
<td>inline</td>
<td>inline</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;index-see&gt;</td>
<td>N/A</td>
<td>block&lt;sup&gt;***&lt;sup&gt;</td>
<td>block</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>&lt;index-see-also&gt;</td>
<td>N/A</td>
<td>block&lt;sup&gt;***&lt;sup&gt;</td>
<td>block</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>&lt;indexterm&gt;</td>
<td>N/A</td>
<td>block&lt;sup&gt;***&lt;sup&gt;</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;keytext&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;keywords&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;li&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;lines&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;link&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;linkinfo&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;linklist&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;linkpool&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;linktext&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;lq&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td>@reftitle</td>
</tr>
<tr>
<td>&lt;media-source&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>&lt;media-track&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>&lt;metadata&gt;</td>
<td>N/A</td>
<td>block (metadata)</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;no-topic-nesting&gt;</td>
<td>N/A</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
</tbody>
</table>

<sup>5</sup> The block vs. inline designation for the `<foreign>` element is likely to change for some specializations.
<table>
<thead>
<tr>
<th>Element name</th>
<th>Specialized from</th>
<th>Block/Inline (presentation)</th>
<th>Block/Inline (translation)</th>
<th>Translatable content?</th>
<th>Translatable attributes?</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;note&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td>@othertype</td>
</tr>
<tr>
<td>&lt;object&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;ol&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;othermeta&gt;</td>
<td>N/A</td>
<td>block (metadata)</td>
<td>block</td>
<td>yes</td>
<td>@content</td>
</tr>
<tr>
<td>&lt;p&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;param&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;permissions&gt;</td>
<td>N/A</td>
<td>block (metadata)</td>
<td>block</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>&lt;ph&gt;</td>
<td>N/A</td>
<td>inline</td>
<td>inline</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;platform&gt;</td>
<td>N/A</td>
<td>block (metadata)</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;pre&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;prodinfo&gt;</td>
<td>N/A</td>
<td>block (metadata)</td>
<td>block</td>
<td>yes</td>
<td></td>
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<tr>
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<td>block</td>
<td>yes</td>
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<td>block (metadata)</td>
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</tr>
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<td>block</td>
<td>yes</td>
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</tr>
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<td>&lt;section&gt;</td>
<td>N/A</td>
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<td>block</td>
<td>yes</td>
<td></td>
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<tr>
<td>&lt;series&gt;</td>
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<td>block</td>
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<td></td>
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<tr>
<td>&lt;shortdesc&gt;</td>
<td>N/A</td>
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<td>block</td>
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<td>&lt;simpletable&gt;</td>
<td>N/A</td>
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<td>&lt;sl&gt;</td>
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<td>&lt;source&gt;</td>
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<td>inline</td>
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<td>block</td>
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<td></td>
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<td>&lt;strow&gt;</td>
<td>N/A</td>
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<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;table&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
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</tr>
</tbody>
</table>
### Map elements

<table>
<thead>
<tr>
<th>Element name</th>
<th>Specialized from</th>
<th>Block/Inline (presentation)</th>
<th>Block/Inline (translation)</th>
<th>Translatable content?</th>
<th>Translatable attributes?</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;map&gt;</td>
<td>N/A</td>
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<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;navref&gt;</td>
<td>N/A</td>
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<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>&lt;relcell&gt;</td>
<td>N/A</td>
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<td>block</td>
<td>yes</td>
<td></td>
</tr>
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<td>block</td>
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<td>&lt;relheader&gt;</td>
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<td>block</td>
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<td>&lt;relrow&gt;</td>
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<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;reltable&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;shortdesc&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;topicmeta&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;topicref&gt;</td>
<td>N/A</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;ux-window&gt;</td>
<td>N/A</td>
<td>N/A (empty)</td>
<td>N/A (empty)</td>
<td>no</td>
<td></td>
</tr>
</tbody>
</table>
## Alternative Title Elements

<table>
<thead>
<tr>
<th>Element name</th>
<th>Specialized from</th>
<th>Inherits everything from ancestor?</th>
<th>Block/Inline (presentation)</th>
<th>Block/Inline (translation)</th>
<th>Translatable content?</th>
<th>Translatable attributes?</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;linktitle&gt;</td>
<td>&lt;titlealt&gt;</td>
<td>yes</td>
<td>N/A (metadata)</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;navtitle&gt;</td>
<td>&lt;titlealt&gt;</td>
<td>yes</td>
<td>N/A (metadata)</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;searchtitle&gt;</td>
<td>&lt;titlealt&gt;</td>
<td>yes</td>
<td>N/A (metadata)</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;subtitle&gt;</td>
<td>&lt;titlealt&gt;</td>
<td>yes</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;titlehint&gt;</td>
<td>&lt;titlealt&gt;</td>
<td>yes</td>
<td>N/A (metadata)</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
</tbody>
</table>

## Emphasis domain elements (emphasis-d)

<table>
<thead>
<tr>
<th>Element name</th>
<th>Specialized from</th>
<th>Inherits everything from ancestor?</th>
<th>Block/Inline (presentation)</th>
<th>Block/Inline (translation)</th>
<th>Translatable content?</th>
<th>Translatable attributes?</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;em&gt;</td>
<td>&lt;ph&gt;</td>
<td>yes</td>
<td>inline</td>
<td>inline</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;strong&gt;</td>
<td></td>
<td>yes</td>
<td>inline</td>
<td>inline</td>
<td>yes</td>
<td></td>
</tr>
</tbody>
</table>

## Hazard statement domain (hazard-d elements)

<table>
<thead>
<tr>
<th>Element name</th>
<th>Specialized from</th>
<th>Inherits everything from ancestor?</th>
<th>Block/Inline (presentation)</th>
<th>Block/Inline (translation)</th>
<th>Translatable content?</th>
<th>Translatable attributes?</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;consequence&gt;</td>
<td>&lt;li&gt;</td>
<td>yes</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;hazardstatement&gt;</td>
<td>&lt;note&gt;</td>
<td>yes</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td>@othertype</td>
</tr>
<tr>
<td>&lt;hazardsymbol&gt;</td>
<td>&lt;image&gt;</td>
<td>yes</td>
<td>block when @placement=break, otherwise inline</td>
<td>block when @placement=break, otherwise inline</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;howtoavoid&gt;</td>
<td>&lt;li&gt;</td>
<td>yes</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;messagepanel&gt;</td>
<td>&lt;ul&gt;</td>
<td>yes</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;typeofhazard&gt;</td>
<td>&lt;li&gt;</td>
<td>yes</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
</tbody>
</table>

## Highlight domain elements (hi-d)

<table>
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<th>Block/Inline (presentation)</th>
<th>Block/Inline (translation)</th>
<th>Translatable content?</th>
<th>Translatable attributes?</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;b&gt;</td>
<td>&lt;ph&gt;</td>
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<td>inline</td>
<td>inline</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Element name</td>
<td>Specialized from</td>
<td>Inherits everything from ancestor?</td>
<td>Block/Inline (presentation)</td>
<td>Block/Inline (translation)</td>
<td>Translatable content?</td>
<td>Translatable attributes?</td>
</tr>
<tr>
<td>---------------</td>
<td>------------------</td>
<td>--------------------------------------</td>
<td>-----------------------------</td>
<td>---------------------------</td>
<td>------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>&lt;line-through&gt;</td>
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<td>inline</td>
<td>inline</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;i&gt;</td>
<td>&lt;ph&gt;</td>
<td>yes</td>
<td>inline</td>
<td>inline</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;overline&gt;</td>
<td>&lt;ph&gt;</td>
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<td>inline</td>
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<td></td>
</tr>
<tr>
<td>&lt;sub&gt;</td>
<td>&lt;ph&gt;</td>
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<td>inline</td>
<td>inline</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;sup&gt;</td>
<td>&lt;ph&gt;</td>
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<td>inline</td>
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<td>yes</td>
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</tr>
<tr>
<td>&lt;tt&gt;</td>
<td>&lt;ph&gt;</td>
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<td>inline</td>
<td>inline</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;u&gt;</td>
<td>&lt;ph&gt;</td>
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</table>

**Utilities domain elements**

<table>
<thead>
<tr>
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<th>Block/Inline (presentation)</th>
<th>Block/Inline (translation)</th>
<th>Translatable content?</th>
<th>Translatable attributes?</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;area&gt;</td>
<td>&lt;figgroup&gt;</td>
<td>yes</td>
<td>block</td>
<td>block</td>
<td>yes</td>
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<td>&lt;ph&gt;</td>
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<td>no</td>
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<td>&lt;imagemap&gt;</td>
<td>&lt;fig&gt;</td>
<td>yes</td>
<td>block</td>
<td>block</td>
<td>yes (can contain translatable alternate text)</td>
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</tr>
<tr>
<td>&lt;shape&gt;</td>
<td>&lt;keyword&gt;</td>
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<td>inline</td>
<td>inline</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>&lt;sort-as&gt;</td>
<td>&lt;data&gt;</td>
<td>NO</td>
<td>block**&lt;sup&gt;iii&lt;/sup&gt;</td>
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<td></td>
</tr>
</tbody>
</table>

**Classification domain elements (classify-d)**

<table>
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<tr>
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<th>Inherits everything from ancestor?</th>
<th>Block/Inline (presentation)</th>
<th>Block/Inline (translation)</th>
<th>Translatable content?</th>
<th>Translatable attributes?</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;subjectCell&gt;</td>
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<td>yes</td>
<td>block</td>
<td>block</td>
<td>yes</td>
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</tr>
<tr>
<td>&lt;subjectref&gt;</td>
<td>&lt;topicref&gt;</td>
<td>yes</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;topicapply&gt;</td>
<td>&lt;topicref&gt;</td>
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<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;topicCell&gt;</td>
<td>&lt;relcell&gt;</td>
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<td>block</td>
<td>yes</td>
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</tr>
<tr>
<td>&lt;topicsubject&gt;</td>
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<td>block</td>
<td>yes</td>
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</tr>
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<td>block</td>
<td>yes</td>
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</tr>
<tr>
<td>&lt;topicSubjectTable&gt;</td>
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<td>block</td>
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</tr>
</tbody>
</table>
### DITAVALref domain elements

<table>
<thead>
<tr>
<th>Element name</th>
<th>Specialized from</th>
<th>Inherits everything from ancestor?</th>
<th>Block/Inline (presentation)</th>
<th>Block/Inline (translation)</th>
<th>Translatable content?</th>
<th>Translatable attributes?</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;ditavalmeta&gt;</td>
<td>&lt;topicmeta&gt;</td>
<td>yes</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;ditavalref&gt;</td>
<td>&lt;topicref&gt;</td>
<td>yes</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;dvrKeyscopePrefix&gt;</td>
<td>&lt;data&gt;</td>
<td>yes</td>
<td>N/A (metadata)</td>
<td>block</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>&lt;dvrKeyscopeSuffix&gt;</td>
<td>&lt;data&gt;</td>
<td>yes</td>
<td>N/A (metadata)</td>
<td>block</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>&lt;dvrResourcePrefix&gt;</td>
<td>&lt;data&gt;</td>
<td>yes</td>
<td>N/A (metadata)</td>
<td>block</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>&lt;dvrResourceSuffix&gt;</td>
<td>&lt;data&gt;</td>
<td>yes</td>
<td>N/A (metadata)</td>
<td>block</td>
<td>no</td>
<td></td>
</tr>
</tbody>
</table>

### Map group domain elements (mapgroup-d)

<table>
<thead>
<tr>
<th>Element name</th>
<th>Specialized from</th>
<th>Inherits everything from ancestor?</th>
<th>Block/Inline (presentation)</th>
<th>Block/Inline (translation)</th>
<th>Translatable content?</th>
<th>Translatable attributes?</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;keydef&gt;</td>
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<td>block</td>
<td>block</td>
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</tr>
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<td>&lt;mapref&gt;</td>
<td>&lt;topicref&gt;</td>
<td>yes</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;mapresources&gt;</td>
<td>&lt;topicref&gt;</td>
<td>yes</td>
<td>block</td>
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<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;topicgroup&gt;</td>
<td>&lt;topicref&gt;</td>
<td>yes</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;topichead&gt;</td>
<td>&lt;topicref&gt;</td>
<td>yes</td>
<td>block</td>
<td>block</td>
<td>yes</td>
<td></td>
</tr>
</tbody>
</table>

### DITAVAL elements

The DITAVAL elements are not specialized, and are not rendered on their own, so related columns are dropped from this table. There are no translatable attributes in the DITAVAL element set.

The only element that directly contains text for translation is `<alt-text>`.

<table>
<thead>
<tr>
<th>Element name</th>
<th>Block/Inline (translation)</th>
<th>Translatable content?</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;alt-text&gt;</td>
<td>block</td>
<td>yes</td>
</tr>
<tr>
<td>&lt;endflag&gt;</td>
<td>block</td>
<td>yes (inside nested elements)</td>
</tr>
<tr>
<td>&lt;prop&gt;</td>
<td>block</td>
<td>yes (inside nested elements)</td>
</tr>
<tr>
<td>&lt;revprop&gt;</td>
<td>block</td>
<td>yes (inside nested elements)</td>
</tr>
<tr>
<td>&lt;startflag&gt;</td>
<td>block</td>
<td>yes (inside nested elements)</td>
</tr>
<tr>
<td>&lt;style-conflict&gt;</td>
<td>block</td>
<td>N/A (empty element)</td>
</tr>
<tr>
<td>&lt;val&gt;</td>
<td>block</td>
<td>yes (inside nested elements)</td>
</tr>
</tbody>
</table>
C.6 Formatting expectations

DITA is a standard that supports the creation of human-readable content. Accordingly, DITA defines fundamental document components. Since there is a reasonable expectation that such document components be rendered consistently, we suggest the following formatting conventions.

Comment by Kristen J Eberlein on 30 April 2019
This topic need to be edited for style and consistency.

Table 2: Formatting expectations for DITA elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Suggested formatting</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;b&gt;</td>
<td>Apply bold highlighting to the contents of the &lt;b&gt; element.</td>
</tr>
<tr>
<td>&lt;cite&gt;</td>
<td>Set citations apart from the surrounding text by a form of highlighting, for example, italics.</td>
</tr>
<tr>
<td>&lt;dd&gt;</td>
<td>See &lt;dl&gt;.</td>
</tr>
<tr>
<td>&lt;dl&gt;</td>
<td>Apply the following conventions:</td>
</tr>
<tr>
<td></td>
<td>• The term (&lt;dt&gt;) is against the starting margin of the page or column.</td>
</tr>
<tr>
<td></td>
<td>• The description or definition (&lt;dd&gt;) is either indented and on the next line or on the same line after the term.</td>
</tr>
<tr>
<td></td>
<td>• The &lt;dlhead&gt; looks like a table heading row.</td>
</tr>
<tr>
<td>&lt;dlhead&gt;</td>
<td>See &lt;dl&gt;.</td>
</tr>
<tr>
<td>&lt;dt&gt;</td>
<td>See &lt;dl&gt;.</td>
</tr>
<tr>
<td>&lt;em&gt;</td>
<td>For Western languages, apply italic highlighting to the contents of the &lt;em&gt; element.</td>
</tr>
<tr>
<td>&lt;i&gt;</td>
<td>For Western languages, apply italic highlighting to the contents of the &lt;i&gt; element.</td>
</tr>
<tr>
<td>&lt;li&gt;</td>
<td>Apply the following conventions:</td>
</tr>
<tr>
<td></td>
<td>• In ordered lists, list items are indicated by numbers or alphabetical characters.</td>
</tr>
<tr>
<td></td>
<td>• In unordered lists, list items are indicated by bullets or dashes.</td>
</tr>
<tr>
<td>&lt;lines&gt;</td>
<td>Render the contents of &lt;lines&gt; elements in a non-monospaced font.</td>
</tr>
<tr>
<td>&lt;line-through&gt;</td>
<td>Render the contents of the &lt;line-through&gt; element with a line struck through.</td>
</tr>
<tr>
<td>&lt;lq&gt;</td>
<td>Render the contents of the &lt;lq&gt; element as an indented block.</td>
</tr>
<tr>
<td>&lt;note&gt;</td>
<td>Render a label for notes. The content of the label depends on the values of the @type attribute. A note typically is formatted in a way that stands out from the surrounding content.</td>
</tr>
<tr>
<td>&lt;ol&gt;</td>
<td>See &lt;li&gt;.</td>
</tr>
<tr>
<td>&lt;overline&gt;</td>
<td>Render a line above the contents of the &lt;overline&gt; element.</td>
</tr>
<tr>
<td>&lt;pre&gt;</td>
<td>Render the content of a &lt;pre&gt; element in a monospaced font.</td>
</tr>
<tr>
<td>&lt;s1&gt;</td>
<td>See &lt;sli&gt;.</td>
</tr>
<tr>
<td>&lt;sli&gt;</td>
<td>Apply the following conventions:</td>
</tr>
<tr>
<td></td>
<td>• The content of each simple list item is placed on a separate line.</td>
</tr>
<tr>
<td></td>
<td>• The lines are not distinguished by numbers, bullets, or other icons.</td>
</tr>
</tbody>
</table>
C.7 DTD public identifiers

Each document-type shell (.dtd file) or module component (.mod or .ent file) has a public identifier. The public identifier can reference either the latest version or a specific version of the document-type shell or module component.

The public identifiers for the DTD files that are maintained by OASIS use the following format:

```
"-//OASIS//DTD DITA version information-type//EN"
```

where:

- **version** either is the DITA specific version number (for example, 2.0, 1.3, or 1.2), 2.x (representing the latest version of DITA 2.x), or 1.x (representing 1.3, which is the final version of 1.x).
  Omitting the version number entirely is also equivalent to the final release of DITA 1.x.
- **information-type** is the name of the topic or map type, for example, Concept or BookMap.

Note that "OASIS" is the owner identifier; this indicates that the artifacts are owned by OASIS. The keyword "DITA" is a convention that indicates that the artifact is DITA-related.

C.8 Domains and constraints in the OASIS specification

This section provides a summary of the domains and constraints that are available as part of the OASIS specification, as well as a summary of how they are used.

C.8.1 Domains and constraints in the OASIS specification

OASIS distributes grammar files for a set of domains and constraints.

A designation of (map) after the domain name indicates that the domain only specializes map elements; a designation of (topic) indicates that the domain specializes elements that are only available in topic or that it can only be used in topics. A designation of (map/topic) indicates that the domain specializes elements that are common to both maps and topics, so could be used in either even if it is generally intended for one or the other. Attribute domains can always be used in both topics and maps.

**Table 3: Base domains**

<table>
<thead>
<tr>
<th>Domain</th>
<th>Description</th>
<th>Short name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classify (map)</td>
<td>For associating content in a map with subjects in a subject scheme.</td>
<td>classify-d</td>
</tr>
<tr>
<td>@deliveryTarget attribute</td>
<td>Attribute for filtering based on delivery target.</td>
<td>N/A</td>
</tr>
<tr>
<td>DITAVALref (map)</td>
<td>For filtering a branch of a map.</td>
<td>ditavalref-d</td>
</tr>
</tbody>
</table>
### C.8.2 Base domains: Where they are used
This section provides a summary of which document types use each of the base OASIS domains.

<table>
<thead>
<tr>
<th>Domain</th>
<th>What includes it</th>
<th>What does NOT include it</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classify (map)</td>
<td>Base map, base topic</td>
<td>Base map, base topic</td>
</tr>
<tr>
<td>@deliveryTarget attribute (base)</td>
<td>Base map, base topic</td>
<td>N/A</td>
</tr>
<tr>
<td>DITAVALref (map)</td>
<td>Base map</td>
<td>Base topic</td>
</tr>
<tr>
<td>Hazard statement (map/topic)</td>
<td>Base map, base topic</td>
<td>Base topic</td>
</tr>
<tr>
<td>Highlighting (map/topic)</td>
<td>Base map, base topic</td>
<td>N/A</td>
</tr>
<tr>
<td>Indexing (map/topic)</td>
<td>Base map, base topic</td>
<td></td>
</tr>
<tr>
<td>Map group (map)</td>
<td>Base map</td>
<td>Base topic</td>
</tr>
<tr>
<td>Utilities (map/topic)</td>
<td>Base map, base topic</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### C.8.3 Base document types: Included domains
This topic provides a summary of which domains are used in each of the base document types.

#### Table 4: Domain usage in base document types

<table>
<thead>
<tr>
<th>Document type</th>
<th>Includes these domains</th>
<th>Does not include</th>
</tr>
</thead>
<tbody>
<tr>
<td>base map</td>
<td>@deliveryTarget attribute</td>
<td>Hazard statement (map/topic)</td>
</tr>
</tbody>
</table>
C.9 Processing interoperability considerations

The DITA specification does not require processors to perform filtering, content reference resolution, key space construction, and other processing related to base DITA semantics in any particular order. This means that different conforming DITA processors might produce different results for the same initial data set and filtering conditions. DITA users and DITA implementers need to be aware of these potential differences in behavior when DITA content will be processed by different processors.

In general, in any situation in which two elements interact during processing, applying filtering before or after the processing is done can result in different results when either or both of the elements is conditional.

For conditional elements, an element is "applicable" if it is filtered in and "inapplicable" if it is filtered out.

Filtering and content reference resolution

When two elements are merged as result of a content reference, the attributes of the two elements are combined. By default, the attributes of the referencing element take precedence over the referenced element. However, any attribute can specify the value "-dita-use-conref-target", which causes the referenced element attribute to take precedence. This means that the effective value of filtering attributes might reflect either the referencing element or the referenced element depending on how each attribute is configured on the referencing element. This in turn means that, in certain cases, filtering before resolving content references will produce a different result than when filtering is applied after resolving content references.

In two cases, the order in which filtering is applied results in either an element being in the effective result or an element not being in the effective result. There is a third case in which there will be either an empty element (and unresolvable content reference) or no element.

In the case where a referenced element is not applicable and the referencing element is explicitly applicable for the same condition (that is, both elements specify values for the same filtering attribute and the referencing element is applicable), if content references are resolved before filtering, the content reference is resolved and the effective value of the referencing element reflects the referenced element. If content referencing is resolved after filtering, the referenced element is filtered out and the content reference cannot be resolved, typically generating an error.

The same scenario results in different results for the case of conref push. An applicable, referencing element can use conref push to replace another element that would otherwise be filtered out. If content references are resolved before filtering, the content is pushed and the effective value of the referenced element reflects the referencing element. If content referencing is resolved after filtering, the referenced element will be filtered out and the content reference can no longer be resolved.

If the referencing element is not conditional and the referenced element is inapplicable, filtering applied before content reference resolution results in an unresolvable content reference. If filtering is applied after content resolution, the explicit condition on the referenced element becomes the effective value for that condition following content resolution and the result is then filtered out. The difference in these two cases
is that in the first case the content reference cannot be resolved, resulting in a processing error and a potentially nonsensical element if the referencing element has required subelements (for example, a content reference from a topic to another topic, where the referencing topic must have a title subelement), but in the second case the element is filtered completely out.

Different processing orders might also provide different results in the case where pushed content is grouped in an element that is filtered out. If filtering is applied before content resolution, that entire block of content (the grouping element and the content to be pushed) is filtered out before the content reference is resolved. If filtering is applied after content resolution, the push action will be resolved first so that content appears in the referenced location, after which the referencing element (along with its grouping element) is filtered from the original source location.

Filtering and key space resolution

See Keys and conditional processing (102) for a discussion of effective key definitions and conditional processing.

As an implementation detail for key-space-constructing processors, if filtering is applied before constructing the key space, then the set of effective key definitions is simply the first definition of each unique key name. However, if filtering is applied after key space construction, and in particular, if a processor needs to allow dynamic resolution of keys based on different filtering specifications applied to the same constructed key space, then the set of effective key definitions is the first definition of each pair of unique key name and unique selection specification set. This second form of constructed key space would be needed by processors such as editors and content management systems that need to quickly provide different filtering-specific key bindings without reconstructing the entire key space for each new set of filtering conditions.

For example, given a map that contains two definitions for the key “topic-01”, one with an @audience value of “expert” and one with an @audience value of “novice”, a filter-first processor would only have at most one effective key definition for the key name “topic-01”, whichever of the two definitions was filtered in by the active filter specification and was the first definition encountered (if both happen to be filtered in). In a processor that supports dynamic key definition filtering, there would be two effective definitions for the key name “topic-01”, one for @audience of “expert” and one for @audience of “novice”. The processor would also need to maintain knowledge of the definition order of the two key definitions in order to correctly handle the case when both “expert” and “novice” are applicable for a given key access request (in which case, whichever of the two definitions was first would be used as the effective value of the key).

Link resolution

If a cross reference, link, or other linking element is resolved to its target before filtering and the target is subsequently filtered out, the link would be to a non-existent target but might reflect properties of the target (for example, a cross reference link text might reflect the target title). If the link is resolved after filtering is applied and the target is filtered out, the link is to a non-existant target, which will result in a different link text. The rendition effect for the navigation link is the same: the link cannot be navigated because the target does not exist in the rendered result.

Topicref resolution

Resolution of <topicref> elements before filtering can result in use of topic-provided navigation titles or metadata that would not be used if the target topic was filtered out before resolution. In both cases, the topicref as rendered would be to a missing topic.
C.10 Specialization design, customization, and the limits of specialization

DITA specialization imposes certain restrictions. An inherent challenge in designing DITA vocabulary modules and document types is understanding how to satisfy markup requirements within those restrictions and, when the requirements cannot be met by a design that fully conforms to the DITA architecture, how to create customized document types that diverge from the DITA standard as little as possible.

DITA imposes the following structural restrictions:

- All topics must have titles.
- Topic body content must be contained within a body element.
- Section elements cannot nest.
- Metadata specific to an element type must be represented using elements, not attributes.

When markup requirements cannot be met within the DITA architecture, there still might be an interest in using DITA features and technology, or a business need for interoperability with conforming DITA documents and processors. In this case, the solution is to create customized document types. Customized document types are document types that do not conform to the DITA standard. To reduce the cost of producing conforming documents from non-conforming documents, custom document types should minimize the extent to which they diverge from the DITA standard.

Typical reasons for considering custom document types include the following:

- Optimizing markup for authoring
- Supporting legacy markup structures that are not consistent with DITA structural rules, for example, footnotes within titles
- Defining different forms of existing structures, such as lists, where the DITA-defined structures are too constrained
- Providing attributes required by specific processors, such as CMS-defined attributes for maintaining management metadata
- Embedding tool-imposed markup in places that do not allow the <foreign> or <unknown> elements

Remember that customized document types do not conform to the DITA standard, and thus are not considered DITA. In many of the cases above, it is possible to define document types that conform to the DITA standard. Explore this fully before developing customized document types.

Optimizing document types

Conforming DITA grammar files are modular, which facilitates exchange of vocabulary modules and constraints and simplifies the process of assembling document-type shells. In some cases there might be a reason to avoid the modular approach and use an optimized document type composed of a single file (or a smaller number of files). For example, this could be advantageous in situations where validation occurs over a network.

In an optimized DTD, entities might also be resolved to further optimize processing or validation. This could speed up processing for environments that process and validate large numbers of DITA maps and topics.

An optimized document type will still allow for the creation of conforming DITA content that follows all other rules in the DITA specification. In these cases it is still possible to create a document type that conforms completely to standard DITA coding practices. Maintaining a conforming copy ensures that the
Creating custom document types for non-standard markup

When the relaxed content models for DITA elements are inappropriately open for authoring purposes, document-type shells can remove undesirable domains or use constraint modules to restrict content models. If content models are not relaxed enough, and markup requirements include content models that are less constrained than those defined by DITA, custom document types might be the only option.

Customized document types do not conform to the DITA standard. Preprocessing can ensure compatibility with existing publishing processes, but it does not ensure compatibility with DITA-supporting authoring tools or content management systems. However, when an implementation is being heavily customized, a customized document type can help isolate and control the consequences of non-standard design.

For example, if an authoring group requires the `<p>` element to be spelled out as `<paragraph>`, the document type could be customized to change `<p>` to `<paragraph>` for authoring purposes. Such documents then could be preprocessed to rename `<paragraph>` back to `<p>` before they are fed into a standard DITA publishing process.

Because DITA document types are designed to enable constraints, such customized documents can still take advantage of existing override schemes. While still not valid DITA, a document-type shell could be set up that implements local requirements (such as adding global CMS-defined attributes), and then imports an otherwise valid document-type shell. This helps isolate non-compliant portions of the document type, while reusing as much as possible of the original DITA grammar.

Specialization design considerations

Requirements for new markup often appear to be incompatible with DITA architectural rules or existing markup, especially when mapping existing non-DITA markup practice to DITA, where the existing markup might have used structures that cannot be directly expressed in DITA. For example, you might need markup for a specialized form of list where the details are not consistent with the base model for DITA lists.

In this case you have two alternatives, one that conforms to DITA and one that does not.

- Specialize from more generic base elements or attributes.
- Define non-conforming structures and map them to conforming DITA structures as necessary for processing by DITA-aware processors or for interchange as conforming DITA documents.

Specializing from more generic base elements, such as defining a list using specializations of `<ph>` or `<div>`, while technically conforming, might still impede interchange of such documents. Generic DITA processors will have no way of knowing that what they see as a sequence of phrases or divisions is really a list and should be rendered in a manner similar to standard DITA lists. However, your documents will be reliably interchangeable with conforming DITA systems.

Defining non-conforming markup structures means that the resulting documents are not conforming DITA documents. They cannot be reliably processed by generic DITA-aware processors or interchanged with other DITA systems. However, as long as the documents can be transformed into conforming DITA documents without undue effort, interchange and interoperability requirements can be satisfied as needed. For example, a content management system could add its own required markup for management metadata, but strip the metadata when delivering content to conforming DITA processors.

Note that even if one uses the DITA-defined types as a starting point, any change to those base types not accomplished through specialization or the constraint feature defines a completely new document type.
that has no normative relationship to the DITA document types, and cannot be considered in any way to be a conforming DITA application. In particular, the use of DITA specialization from non-DITA base types does not produce DITA-conforming vocabularies.

**Specialize from generic elements or attributes**

Most DITA element types have relaxed content models that are specifically designed to allow a wide set of options when specializing from them. However, some DITA element types do impose limits that might not be acceptable or appropriate for a specific markup application. In this case, consider specializing from a more generic base element or attribute.

Generic elements are available in DITA at every level of detail, from whole topics down to individual keywords, and the generic `@base` attribute is available for attribute domain specialization.

For example, if you want to create a new kind of list but cannot usefully do so specializing from `<ul>`, `<ol>`, `<sl>`, or `<dl>`, you can create a new set of list elements by specializing nested `<div>` elements. This new list structure will require specialized processing to generate appropriate output styling, because it is not semantically tied to the other lists by ancestry. Nevertheless, it will remain a valid DITA specialization, with the standard support for generalization, content referencing, conditional processing, and more.

The following base elements in `<topic>` are generic enough to support almost any structurally-valid DITA specialization:

- `<topic>`
  - Any content unit that has a title and associated content
- `<section>`
  - Any non-nesting division of content within a topic, titled or not
- `<p>`
  - Any non-nesting non-titled block of content below the section level
- `<fig>`
  - Any titled block of content below the section level
- `<ul>`, `<ol>`, `<dl>`, `<simbletable>`
  - Any structured block of content that consists of listed items in one or more columns
- `<ph>`
  - Any division of content below the paragraph level
- `<text>`
  - Text within a phrase
- `<keyword>`
  - Any non-nesting division of content below the paragraph level
- `<data>`
  - Any content that acts as metadata rather than core topic or map content
- `<foreign>`
  - Any content that already has a non-DITA markup standard, but still needs to be authored as part of the DITA document. Processors should attempt to render this element, if at all possible.
- `<unknown>`
  - Any non-standard markup that does not fit the DITA model, but needs to be managed as part of a DITA document. Processors should not attempt to render this element.
- `<bodydiv>`
  - A generic, untitled, nestable container for content within topic bodies
A generic, untitled, nestable container for content within topic bodies or sections

The following attributes in topic are suitable for domain specialization to provide new attributes that are required throughout a document type:

@props
Any new conditional processing attribute

@base
Any new attribute that is universally available, has a simple syntax (space-delimited alphanumeric values), and does not already have a semantic equivalent

Whenever possible, specialize from the element or attribute that is the closest semantic match.
# D Revision history

The following table contains information about revisions to this document.

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Editor</th>
<th>Description of changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>10 May 2019</td>
<td>Kristen James Eberlein</td>
<td>Generated working draft #01. Contains updated TOC that reduces level of topic nesting.</td>
</tr>
<tr>
<td>02</td>
<td>17 May 2019</td>
<td>Kristen James Eberlein</td>
<td>Generated working draft #02. Contains reworked markup and styling for RFC-2119 statements.</td>
</tr>
<tr>
<td>03</td>
<td>24 May 2019</td>
<td>Kristen James Eberlein</td>
<td>Generated working draft #03. Contains a non-normative appendix of all conformance statements (generated with prototype code).</td>
</tr>
<tr>
<td>04</td>
<td>03 June 2019</td>
<td>Kristen James Eberlein</td>
<td>Generated working draft #04. Draft comments in &quot;Attribute generalization&quot; and &quot;&lt;lines&gt;&quot; topics resolved per TC call on 28 May 2019. TOC reorganized to move purely illustrative content from &quot;DITA markup&quot; and into &quot;Overview of DITA&quot;.</td>
</tr>
<tr>
<td>05</td>
<td>05 July 2019</td>
<td>Kristen James Eberlein</td>
<td>Generated working draft #05. &lt;topicgroup&gt; and &lt;topichead&gt; topics reworked per TC call on 02 July 2019. Renamed &quot;DITA markup&quot; to &quot;DITA processing&quot;. Added &quot;Chunking&quot; content and a new &quot;DITA maps and their usage&quot; topic. The new topic contains a list of material to cover.</td>
</tr>
<tr>
<td>06</td>
<td>15 July 2019</td>
<td>Kristen James Eberlein</td>
<td>Generated working draft #06 Conditional processing applied to element and attribute topics shared with LwDITA. Attribute definitions listed in alphabetical order. Attribute values tagged with &lt;keyword&gt; and rendered styled with quotation marks.</td>
</tr>
<tr>
<td>07</td>
<td>02 August 2019</td>
<td>Kristen James Eberlein</td>
<td>Generated working draft #07. Includes rework of indexing content</td>
</tr>
<tr>
<td>08</td>
<td>05 August 2019</td>
<td>Kristen James Eberlein</td>
<td>Generated working draft #08. Includes completed edits of multimedia domain topics (based on DITAweb review comments).</td>
</tr>
<tr>
<td>Revision</td>
<td>Date</td>
<td>Editor</td>
<td>Description of changes</td>
</tr>
<tr>
<td>----------</td>
<td>----------------</td>
<td>-------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>09</td>
<td>13 August 2019</td>
<td>Kristen James Eberlein</td>
<td>Generated working draft #09. Contains revised indexing content, based on reviews by Robert Anderson, Stan Doherty, Eliot Kimber, and Joyce Lam. Added (as yet incomplete) &quot;DITA attributes, A to Z&quot; topic.</td>
</tr>
<tr>
<td>10</td>
<td>20 August 20201</td>
<td>Kristen James Eberlein</td>
<td>Generated working draft #10. Includes additional edits to indexing content, plus new placeholder topic about effective attribute values.</td>
</tr>
<tr>
<td>11</td>
<td>27 August 2019</td>
<td>Kristen James Eberlein</td>
<td>Generated working draft #11. Includes fully implemented issue #253: Remove indexing domain.</td>
</tr>
<tr>
<td>12</td>
<td>29 August 2020</td>
<td>Kristen James Eberlein</td>
<td>Generated working draft #12. Includes bug fixes, spelling corrections, changes in organizational affiliation, updates to acknowledgments, and implementation of the following DITA 2.0 proposals:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• #29 Add &lt;mapresources&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• #34 Remove &lt;topicset&gt; and &lt;topicsetref&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• #217 Remove @domains attribute</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• #258: Add @outputclass to DITAVAL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• #277: Change specialization base of &lt;imagemap&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• #278 Remove @lockmeta</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• #292 Add attributes and &lt;title&gt; to &lt;simpletable&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• #297 Allow &lt;example&gt; in more places</td>
</tr>
<tr>
<td>13</td>
<td>29 July 2022</td>
<td>Kristen James Eberlein</td>
<td>Generated working draft #28. Implementation of #647, &quot;Replace classification domain with the @subjectrefs attribute&quot;.</td>
</tr>
</tbody>
</table>
Index

Special Characters
- dita-use-conref-target 147

A
<abstract>
short descriptions 247
accessibility
DITA markup 39
images 256, 265
tables 39
addressing mechanisms
effect on conref resolution 148
same-topic fragment identifier
authoring responsibility 148
effect on conref resolution 148
alternate text 256
alternative titles 254
<linktitle> 343
<navtitle> 344
overview 343
<searchtitle> 345
alternative titles domain
<linktitle> 343, 347
<navtitle> 344
<searchtitle> 345
attribute groups
universal 387
authoring recommendations
@dir 48
@xml:lang 45

B
base sort phrase 175
best practices
@dir 48
document-type shells 179
specialization 181
@xml:lang 45
bidirectional text 48
binding controlled values 53
body elements 256
branch filtering 161–163
examples 349

carp 291
See also
@cascade attribute (continued)
example 29
cascading
definition 60
map-to-map
attributes 64
exceptions 65
metadata elements 65
cascading metadata
example
cascading attribute 68
cascading attributes between maps 68
cascading elements 67
cascading elements between maps 67
cascading topicref roles 69
examples 67
chunking
attributes 70
examples
combining a map branch 73
combining all documents 72
combining documents within a split context 83
combining groups of documents 75
combining nested documents 76
effects on link resolution 83
ignoring 82
overview 71
splitting documents 78
splitting documents with nested topics 80
normative statements 70
overview 70
processing 71
citations 257
@class attribute
examples 185
generalization 189
rules and syntax 185
classifying content 51
coding requirements
DTD
attribute-domain modules 228
document-type shells 219
element-domain modules 227
element-type declarations 223
entities, use of 218
overview 218
structural modules 225
RNG
attribute-domain modules 239
document-type shells 231
element-domain modules 238
overview 230
structural modules 236
collation 175
conref
  combining attributes 147
  overview 136
  processing expectations 147
  pull 136
  push 136
  range 136
  validity of 147
  xrefs and conref within a conref 148
conref and @xml:lang
  example 46
  processing expectations 46
conref attributes
  @conaction 137
  @conkeyref 144
  @conref 145
  @conrefend 140
  values, "dita-use-conref-target" 145
constraints
  design and implementation rules 193
  examples
    applying multiple constraints 198, 202
    redefining the content model 195, 199
    replacing base element with domain extensions 198, 202
    restricting attributes for an element 195, 200
    restricting content model for a domain 197, 201
  overview 193
  processing and interoperability 194
content references, See conref
context-sensitive help 314
controlled values
  binding 316
  binding to attributes 53
  classifying content for flagging and filtering 51
  definition of 51
  overview 51, 52
  precedence rules 53
  validation of 53, 54
convenience elements
  <keydef> 365
  map group domain 365
  <mapref> 366
  <mapresources> 368
core concepts
  addressing 21
  conditional processing 21
  configuration 21
  constraints 21
  content reuse 21
  information typing 21
  maps 21
  specialization 21
  topics 21
D
  definition lists
    description 257
    entries 259
    headings 260
    definition columns 257
    term columns 261
    overview 259
    terms 261
definitions
  attribute domain modules 183
  base sort phrase 175
  cascading 60
  controlled values 51
  element domain modules 183
  structural modules 183
@deliveryTarget
  defining values for 53
descriptions 257
design and implementation rules
  attribute types 184
  document-type shells 180
  element types 184
  expansion modules 204
@dir
  best practices 48
  overview 47
  recommended usage 48
DITA maps, See maps
DITAVAL elements
  <alt-text> 377
  <endflag> 378
  <prop> 378
  <revprop> 381
  <startflag> 383
  <style-conflict> 384
  <val> 385
processing expectations 54
DITAVAL reference domain 348
  <ditavalmeta> 351
  <ditavalref> 349
  <dvrKeyscopePrefix> 354
  <dvrKeyscopeSuffix> 355
  <dvrResourcePrefix> 351
  <dvrResourceSuffix> 353
divisions 258
document-type shells
  conformance 181
DTD
  parameter entities 219
  sections, patterns of 219
  equivalence 180
document-type shells (continued)
  overview 179
  public identifiers 180
  RNG
    sections, patterns of 231
  rules 180
domains
  alternative titles 343
  DITAVAL reference 348
  emphasis 356
  hazard statement 356
  highlighting 362
  mapgroup 365
  utilities 370
draft comments 260
DTD
  coding requirements
    attribute-domain modules 228
    document-type shells 219
    element-domain modules 227
    element-type declarations 223
    entities, use of 218
    overview 218
    structural modules 225
    parameter entities, use of 219
effective sort phrase 175
element groups
  basic map 304
  body 256
  DITAVAL 377
  indexing 289
  legacy conversion 376
  prolog 325
  related links 292
  specialization 339
  subject scheme 316
  table 295
elements
  basic map
    <keytext> 304
    <map> 305
    <navref> 306
    <relcell> 307
    <relcolspec> 307
    <relheader> 310
    <relrow> 310
    <reltable> 310
    <topicmeta> 313
    <topicref> 312
    <ux-window> 314
  body
    <alt> 256
    <cite> 257
    <dd> 257
  DITAVAL
    <alt-text> 377
    <endflag> 378
    <prop> 378
    <revprop> 381
    <startflag> 383
    <style-conflict> 384
    <val> 385
  indexing
    <index-see> 289
    <index-see-also> 290
    <indexterm> 291
  legacy conversion
    <required-cleanup> 376
  prolog
entities, role in DTDs 218

examples

cascading metadata
cascade attribute 68
cascading attributes between maps 68
cascading elements 67
cascading elements between maps 67
cascading topicref roles 69
overview 67

chunking
combining a map branch 73
combining all documents 72
combining documents within a split context 83
combining groups of documents 75
combining nested documents 76
effects on link resolution 83
ignoring 82
overview 71
splitting documents 78
splitting documents with nested topics 80

@example class attribute 185
conref and @xml:lang 46

examples (continued)

constraints
applying multiple constraints 198, 202
redefining the content model 195, 199
replacing base element with domain extensions 198, 202
restricting attributes for an element 195, 200
restricting content model for a domain 197, 201
document-type shells
public identifiers 180

DTD
parameter entities for domain extensions 227
effective sort phrase 175

expansion modules
aggregating constraint and expansion modules 210
expanding attributes for an element 207, 209, 213, 214
expanding content model of <section> 205, 211
generalization
attribute types 191
element types 190
@href syntax 88

maps
audience definition 313
@collection-type and @linking in relationship tables 29
relationship tables 29
use of @cascade attribute 29

processing
filtering or flagging a hierarchy 54, 56
xrefs and conref within a conref 148
related links 292
relationship tables 307, 310

RNG
domain extension patterns 238

specialization
<context> and <prereq> 181
including non-DITA content 187
reuse of elements from non-ancestor specializations 188
@specializations attribute 186

subject scheme maps
binding controlled values 53
defining taxonomic subjects 55
defining values for @deliveryTarget 58
filtering or flagging a hierarchy 54, 56
providing a subject-definition resource 52

expansion modules
design and implementation rules 204
examples
aggregating constraint and expansion modules 210
expanding attributes for an element 207, 209, 213, 214
expansion modules (continued)
examples (continued)
  expanding content model of `<section>` 205, 211
overview 204

F
feeding goldfish, See
figures 262
file extensions
  conditional processing profiles 20
  DITAVAL 20
  maps 20
  topics 20
filtering 377
filtering and flagging
  classifying content for 51
  processing expectations 54
flagging 377, 381
  alternate text 377
footnotes 263
foreign vocabularies, including 340
  `@format`
    overview 87
    processing expectations 87
    undefined processing behavior 87
    values 87

G
generalization
  `@class` and `@specializations` attributes 189
  conref resolution 147
examples
  attribute types 191
  element types 190
overview 189
  processing expectations 190
syntax 191
grouping 175
grouping elements
  `<bodydiv>` 249
  `<div>` 258
  `<figgroup>` 262
  `<topicgroup>` 369

H
hazard statement domain 356
  `<consequence>` 357
  `<hazardstatement>` 357
  `<hazardsymbol>` 359
  `<howtoavoid>` 360
  `<messagepanel>` 361
  `<typeofhazard>` 361
highlighting domain
  `<b>` 362
  `<i>` 362
  `<line-through>` 363
  `<overline>` 363
  `<sub>` 363
  `<sup>` 364
  `<tt>` 364
  `<u>` 365
  `@href`
    overview 88
    processing expectations 88
    syntax examples 88

I
illustrations
  document-type shell 179
images
  accessibility 256
  alternate text 265
  long descriptions 270
  overview 265
  placement 265
  size 265
indexes
  elements 127
  location of index elements 127
  locators 127
  ranges 129
  redirections 128
  see also reference 127
  see reference 127
  terminology 127
information typing
  benefits 25
  history 25
  overview 25
interoperability
  constraints 194

K
key reference
  conref resolution, effect on 148
key reference attributes
  `@keyref` 96
  `@keys` 95
  `@keyscope` 98
key scopes
  conref resolution, effect on 148
keys
  definition
    examples 365
legacy conversion elements
  <required-cleanup> 376
link previews
  multiple <shortdesc> within 247
linking attributes
  @format 87
  @href 88
  @scope 89
  @type 90
links
  cross-references 282
  examples 292
  labels 295
lists
  definition
    definition columns 257
    description 257
    entries 259
    headings 260
    overview 259
    term columns 261
    terms 261
ordered
  list items 269
  overview 276
simple
  list items 280
  overview 279
unordered
  list items 269
  overview 282
localization
DITA markup 45
  @translate 49
  @xml:lang 45
maps (continued)
  examples (continued)
    relationship tables 29, 307, 310
    metadata 313
    overview 28, 305
    purposes 28
    short descriptions in 252
messages issued by processors
  <navtitle> within <topicgroup> 369
  <topichead> with no navigation title 369
metadata
  cascading 36
  elements 36
  maps 313
modularization
  overview 182
multimedia elements 283
  <audio> 283
  <media-source> 285
  <media-track> 285
  <video> 286
naming conventions
  attribute domain modules 183
  document-type shells
    parameter entities 219
  DTD
    parameter entity for element domains 227, 228
  element domain modules 183
  RNG
    parameter entity for element domains 239
    pattern for element domains 238
  structural modules 183
navigation title
  definition 344
nested topics 23, 26
non-normative references 11
normative
  references 10
normative statements
  chunking 70
    <desc> 257
    <draft-comment> 260
    <fn> 263
    @image 265
    <include> 267
    <object> 272
    <pre> 277
    <q> 278
    <title> in <section> 278

objects
related links elements
  <link> 292
  <linkinfo> 293
  <linklist> 293
  <linkpool> 294
  <linktext> 295
relationship tables
  cells 307
  column definitions 307
  examples 29, 307, 310
  headers 310
  labels for related links 307
  overview 310
  processing expectations 307
  rows 310
  titles 253
rendering expectations
  <desc> 257
  <draft-comment> 260
  <fn> 263
  <hazardsymbol> 359
  @image 265
  link previews 252
  <linklist> 293
  <navtitle> within <topicgroup> 369
  <object> 272
  <pre> 277
  <q> 278
  related links 251
  short descriptions 252
  <title> in <section> 278
  <topicgroup> 369
revisions 377
RNG
  coding requirements
    attribute-domain modules 239
    document-type shells 231
    element-domain modules 238
    overview 230
    structural modules 236

S
same-topic fragment identifier
  authoring responsibility 148
  effect on conref resolution 148
@scope
  overview 89
  processing expectations 89
  values 89
search titles 345
sections 278
short descriptions 252
simple lists
  list items 280
simple lists (continued)
  overview 279
simple tables 298
single sourcing 22
sorting 175
specialization
  benefits 182
  best practices 25, 181
  examples
    <context> and <prereq> 181
    including non-DITA content 187
    reuse of elements from non-ancestor specializations 188
    including non-DITA content 187
    modularization 182
    overview 181
    reuse of elements from non-ancestor specializations 188
    rules
      attribute types 184
      element types 184
specialization elements
  <data> 339
  <foreign> 340
  <no-topic-nesting> 341
  <state> 342
  <unknown> 343
  @specializations attribute
  examples 186
  generalization 189
  rules and syntax 186
specification
  formatting in HTML5 version 13
  link previews 14
  navigation links 14
subject scheme
  elements
    <defaultSubject> 317
    <elementdef> 318
    <enumerationdef> 319
    <schemeref> 321
    <subjectdef> 322
    <subjectHead> 323
    <subjectHeadMeta> 324
    <subjectScheme> 324
subject scheme maps
  binding controlled values 53
  defining controlled values 52
  elements
    <attributedef> 316
  examples
    binding controlled values 53
    defining values for @deliveryTarget 58
    filtering or flagging a hierarchy 54, 56
    providing a subject-definition resource 52
    extending 51
    overview 51
subject-definition resources 52
@subjectrefs
  overview 55
subtitles 347

T

table elements
  <colspec> 296
  <entry> 296
  <row> 297
  <simpletable> 298
  <stentry> 300
  <sthead> 301
  <strow> 301
  <table> 301
  <tbody> 303
  <tgroup> 303
  <thead> 303

tables
  complex
    body 303
    cells 296
    column specifications 296
    group 303
    headers 303
    overview 301
    rows 297
  simple
    cells 300
    headers 301
    overview 298
    rows 301

terminology
  attribute domain modules 183
  cascading 60
  element domain modules 183
  indexing
    see also reference 127
    see reference 127
  RFC 2119 10
  structural module 183

title hints 348

titles 253

topic nesting
  controlling 225, 236
  disabling 225, 236

topics
  benefits 24
  content 27
  generic topic type 26
  groups 369
  information typing 25
  overview 23
  reuse 24
  structure 26

trademarks 281

@translate
  overview 49

translation
  DITA markup 45
  @translate 49
  @xml:lang 45
@type
  overview 90
  processing expectations 90
  values 90

U

undefined processing behavior
  @format 87

Unicode Bidirectional Algorithm 48

universal attribute group 387

unordered lists
  list items 269
  overview 282

use by reference, See conref

user assistance 314

utilities domain
  <area> 370
  <coords> 371
  <imagemap> 371
  <shape> 373
  <sort-as> 374

V

validating controlled values 53, 54

X

@xml:lang
  best practices 45
  default value 45, 46
  overview 45
  processing expectations 46
  recommended usage 45

xrefs, See