Service Component Architecture Spring Component Implementation Specification Version 1.1

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This specification replaces or supercedes:

- Service Component Architecture Spring Component Implementation Specification Version 1.00, March 21 2007

This specification is related to:

- Service Component Architecture Assembly Model Specification Version 1.1
- Service Component Architecture Policy Framework Specification Version 1.1
- Service Component Architecture Java Common Annotations and APIs Specification Version 1.1

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Abstract:

The SCA Spring component implementation specification specifies the how the Spring Framework can be used with SCA. The goals of this effort are:

Coarse-grained integration: The integration with Spring is at the SCA Component level, where a Spring application context provides a component implementation, exposing services and using references via SCA. This means that a Spring application context defines the internal structure of an implementation.

Start from SCA Component Type: It should be possible to use Spring to implement any SCA Component that uses WSDL or Java interfaces to define services, possibly with some SCA specific extensions.

Start from Spring context: It should be possible to generate an SCA Composite from any Spring application context and use that composite within an SCA assembly.

Status:

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1 Introduction

The SCA Java Client and Implementation model for Spring specifies the how the Spring Framework can be used with SCA. The goals of this effort are:

Coarse-grained integration: The integration with Spring is at the SCA Component level, where a Spring application context provides a component implementation, exposing services and using references via SCA. This means that a Spring application context defines the internal structure of a component implementation.

Start from SCA Component Type: It is possible to use Spring to implement any SCA Component that uses WSDL or Java interfaces to define services, possibly with some SCA specific extensions.

Start from Spring context: It is possible to generate an SCA Component from any Spring context and use that component within an SCA assembly.

1.1 Terminology

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in **[RFC2119]**.

1.2 Normative References

[RFC2119] S. Bradner, *Key words for use in RFCs to Indicate Requirement Levels*, http://www.ietf.org/rfc/rfc2119.txt, IETF RFC 2119, March 1997.

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[1] Spring Framework

http://static.springframework.org/spring/docs/2.0.x/reference/index.html

1.3 Non-Normative References

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2 Spring application context as component implementation

A Spring Application Context is used as an implementation within an SCA component. Conceptually, this may be represented as follows:

Figure 1 below illustrates a simple SCA domain composed of two components, both of which are implemented by Spring application contexts.

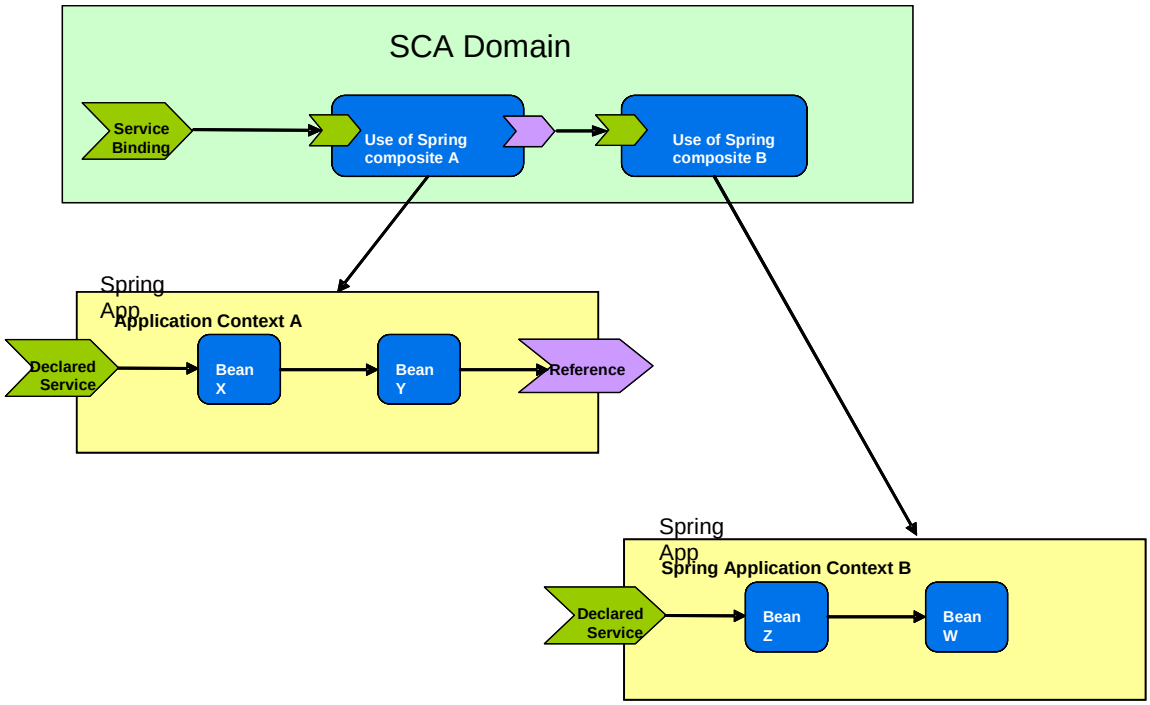

Figure 1 SCA Domain with two Spring application contexts as component implementations

In this figure, there are two components defined by separate Spring Application Contexts, each with one declared service. Component A is implemented by an application context Context A, composed of two Spring beans. Here, bean X is exposed through an SCA service. Bean Y has a reference to an external SCA service. This service reference is wired to a second component which is also implemented by another Spring context, Context B, which has a single declared service, which is wired to Bean Z.

A component that uses Spring for an implementation can wire SCA services and references without introducing SCA metadata into the Spring configuration. The Spring context knows very little about the SCA environment. All policy enforcement occurs in the SCA runtime implementation and does not enter into the Spring space.

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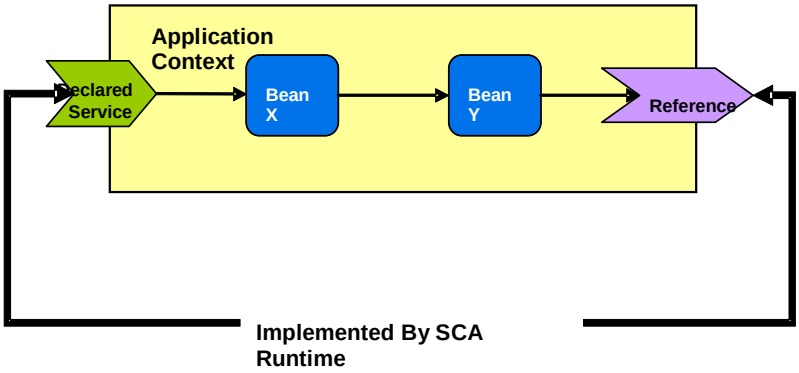

Figure 2

Figure 2 shows two of the points where the SCA runtime interacts with the Spring context: services and references. Any policy enforcement is done by the SCA runtime on calls into the Spring application context before the final message is delivered to the target Spring bean. On outbound calls from the application context, references supplied by the SCA may provide policy enforcement

2.1 Direct use of SCA references within a Spring configuration

The SCA runtime hosting the Spring application context implementing a composite creates a parent application context in which all SCA references are defined as beans using the SCA reference name as the bean name. These beans are automatically visible in the child (user application) context.

The following Spring configuration provides a model for Spring application context A, expressed in figure 1 above. In this example, there are two Spring beans, X and Y. The bean named "X" is the entry point from SCA into the Spring context and Spring bean Y contains a reference to a service supplied by SCA.

```
<beans>
   <bean id="X" class="org.xyz.someapp.SomeClass">
      <property name="foo" ref="Y"/>
    </bean>
   <bean id="Y" class"org.xyz.someapp.SomeOtherClass">
     <property name="bar" ref="SCAReference"/>
   </bean>
</beans>
```

Two beans are defined. The bean named "X" contains one property (i.e. reference) named "foo" which refers to the second bean in the context, named "Y". The bean "Y" also has a single property named "bar" which refers to the SCA service reference, given the name "SCAReference"

The SCA SCDL contains service and reference definitions for the Spring composite with appropriate binding information:

```
<composite name="BazComposite">
  <component name="SpringComponent">
     <implementation.spring location=".."/>
      <service name="X"/>
      <reference name="SCAReference" .../> <!-- binding info specified -->
    </component>
```


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```
</composite>
```

The only part of this that is specific to Spring is the **<implementation.spring>** element. The **location** attribute of that element specifies the target uri of an archive file or directory that contains the Spring application context files. The resource paths to the Spring application context configuration files that are used to create the application context are then identified as follows:

If the resource identified by the location attribute is an archive file, then the file META-INF/MANIFEST.MF is read from the archive. If the location URI identifies a directory, then META-INF/MANIFEST.MF must exist underneath that directory. If the manifest file contains a header "Spring-Context" of the format:

Spring-Context ::= path (';' path)*

Where path is a relative path with respect to the location URI, then the set of paths specified in the header identify the context configuration files. If there is no MANIFEST.MF file or no Spring-Context header within that file, then the default behaviour is to build an application context using all the *.xml files in the META-INF/spring directory.

Each **<service>** element used with **<implementation.spring>** should include the name of the Spring bean that is to be exposed as an SCA service in its name attribute. So, for Spring, the name attribute of a service plays two roles: it identifies a Spring bean, and it names the service for the component. The service element above has a name of "X", so there should be a Spring bean with that name. The SCDL also contains the <reference> element named "SCAReference". The reference name becomes an addressable name within the Spring application context – so, in this case, "SCAReference" can be referred to by bean "Y" in the Spring configuration above.

The SCA runtime is responsible for setting up the references and exposing them as beans with their indicated names in the spring context. This is usually accomplished by creating a parent context which has the appropriate beans defined and the context supplied by the implementation becomes the child of this context. Thus, the references – e.g. the "SCAReference" that bean "Y" uses for it's "bar" property – are available to the context.

2.2 Explicit declaration of SCA related beans inside a Spring Application Context

It is possible to explicitly declare SCA-related beans inside a Spring application context. A bean within the application context can be declared to be an SCA service. References to beans made within the application context can be declared to be either SCA properties or SCA references.

These capabilities are provided by means of a set of SCA extension elements, which can be placed within a Spring application context. The SCA extension elements are declared in the SCA Spring Extension schema - sca-spring-extension.xsd - which is shown in Appendix A.

For example, to declare a bean that represents the service referred to by an SCA reference named "SCAReference" the following is declared in the application context:

```
<sca:reference name="SCAReference" type="com.xyz.SomeType/>
```

The SCA Spring extension elements are:

- **<sca:reference>** This element defines a Spring bean representing an SCA service which is external to the Spring application context.
- **<sca:property>** This element defines a Spring bean which represents a property of the SCA component which configures the Spring composite.
- **<sca:service>** This element defines a bean that the Spring composite exposes as an SCA service.

2.2.1 SCA Service element

The SCA service element declares a service that is offered by the Spring application context as an SCA service. When an application context contains one or more SCA service elements, these elements declare all the services that are made available by the application context when it is

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A reference to an SCA service (known as an SCA reference) is declared using the Spring SCA namespace support.¶

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used as a component implementation. In this way, the service elements provide the developer with a means to control which Spring beans are exposed as SCA services - if no SCA service elements are present in the application context, the default behaviour is to expose all the Spring beans as SCA services.

The SCA service element can also declare other attributes of the SCA service. In particular, policy can be associated with the service using the @requires and @policySets attributes.

The pseudo-schema for the service element is:

```
<beans xmlns="http://www.springframework.org/schema/beans"
       xmlns:xs="http://www.w3.org/2001/XMLSchema"
       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
       xmlns:sca=
          "http://docs.oasis-open.org/ns/opencsa/sca-j/spring/200810"

...
    <sca:service name="xs:NCName"
                         type="xs:NCName"
                         target="xs:NCName"
                         requires="list of xs:QName"?
                         policySets="list of xs:QName"?/>
...

</beans>
```

The ***service*** element has the following ***attributes***:

- ***name : NCName (1..1)*** - the name of the service. The value of the @name attribute of an <sca:service/> subelement of a <beans/> element must be unique amongst the <service/> subelements of the <beans/> element. [SPR20001]
- ***type : NCName (1..1)*** - the type of the service, declared as the fully qualified name of a Java class.
- ***target : NCName (1..1)*** - the name of a <bean/> element within the application context which provides the service declared by the sca:service element. The @target attribute of a <service/> subelement of a <beans/> element MUST have the value of the @name attribute of one of the <bean/> subelements of the <beans/> element. [SPR20002]
- ***requires : QName (0..1)*** - a list of policy intents. See the Policy Framework specification [POLICY] for a description of this attribute.
- ***policySets : QName (0..1)*** - a list of policy sets. See the Policy Framework specification [POLICY] for a description of this attribute.

2.2.2 SCA Reference element

The SCA reference element declares an SCA reference that is made by the Spring application context. When an application context contains one or more SCA reference elements, each of these elements acts as if it were a Spring <bean/> element, offering a target which can satisfy a reference from a <bean/> element within the application context. Each SCA reference element appears as an reference element in the componentType of the Spring implementation and the reference can be configured by the SCA component using that implementation - in particular, the reference can be wired to an appropriate target service.

The SCA reference element can also declare other attributes of the SCA reference. In particular, policy can be associated with the reference using the @requires and @policySets attributes.

The pseudo-schema for the reference element is:

```
<beans xmlns="http://www.springframework.org/schema/beans"
       xmlns:xs="http://www.w3.org/2001/XMLSchema"
       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
       xmlns:sca=
```

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```
          "http://docs.oasis-open.org/ns/opencsa/sca-j/spring/200810"

...
    <sca:reference name="xs:NCName"
                   type="xs:NCName"
                   default="xs:NCName"?
                   requires="list of xs:QName"?
                   policySets="list of xs:QName"?/>
...
</beans>
```

The ***reference*** element has the following ***attributes***:

- ***name : NCName (1..1)*** - the name of the reference. The value of the @name attribute of an <sca:reference/> subelement of a <beans/> element must be unique amongst the @name attributes of the <reference/> subelements, <property/> subelements and the <bean/> subelements of the <beans/> element. [SPR20003]
- ***type : NCName (1..1)*** - the type of the reference, declared as the fully qualified name of a Java class.
- ***default : NCName (0..1)*** - the name of a <bean/> element within the application context which provides the reference declared by the sca:reference element if the component using the application context as an implementation does not wire the reference to a target service. The @default attribute of a <reference/> subelement of a <beans/> element MUST have the value of the @name attribute of one of the <bean/> subelements of the <beans/> element. [SPR20004]
- ***requires : QName (0..1)*** - a list of policy intents. See the Policy Framework specification [POLICY] for a description of this attribute.
- ***policySets : QName (0..1)*** - a list of policy sets. See the Policy Framework specification [POLICY] for a description of this attribute.

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2.2.3 SCA Property element

The SCA property element declares an SCA property which can be used by the Spring application context. When an application context contains one or more SCA property elements, each of these elements acts as if it were a Spring <bean/> element, offering a target which can satisfy a referece from a <bean/> element within the application context. Each SCA property element appears as a property element in the componentType of the Spring implementation and the property can be configured by the SCA component using that implementation - the component can provide a value for the property.

The pseudo-schema for the property element is:

```
<beans xmlns="http://www.springframework.org/schema/beans"
       xmlns:xs="http://www.w3.org/2001/XMLSchema"
        xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        xmlns:sca="http://docs.oasis-open.org/ns/opencsa/sca-
j/spring/200810"

...
    <sca:property name="xs:NCName"
                  type="xs:NCName"/>
...
</beans>
```

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The ***property*** element has the following ***attributes***:

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- ***name : NCName (1..1)*** - the name of the property. The value of the @name attribute of an <sca:property/> subelement of a <beans/> element must be unique amongst the @name attributes of the <property/> subelements, <reference/> subelements and the <bean/> subelements of the <beans/> element. [SPR20005]
- ***type : NCName (1..1)*** - the type of the property, declared as the fully qualified name of a Java class.

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2.2.4 Example of a Spring Application Context with SCA Spring Extension Elements

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The following example shows an application context that exposes one service, SCAService, and explicitly defines a bean for an SCA reference, SCAReference. The "goo" property of bean Y is configured with the SCA property with name "sca-property-name".

```
<beans>

   <!-- this definition is not required, and the bean SCAReference could also
        have been inherited from the parent context -->
   <sca:reference name=”SCAReference” type="com.xyz.SomeType"/>

   <bean name="X">
      <property name="foo" ref="Y"/>
   </bean>

   <bean name="Y">
      <property name="bar" ref="SCAReference"/>
      <property name="goo" ref="sca-property-name"/>
   </bean>

   <!-- expose an SCA property named “sca-property-name” -->
   <sca:property name="sca-property-name" type="java.lang.String"/>

   <!-- expose the bean "X" as an sca service named "SCAService" -->
   <sca:service name="SCAService" type="org.xyz.someapp.SomeInterface"
target="X"/>

</beans>
```

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A. SCA Spring Extension schema - sca-spring-extension.xsd

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- Copyright(C) OASIS(R) 2005,2009. All Rights Reserved.
     OASIS trademark, IPR and other policies apply.  -->
<xsd:schema
  xmlns="http://docs.oasis-open.org/ns/opencsa/sca-j/spring/200810"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:sca="http://docs.oasis-open.org/ns/opencsa/sca/200903"
  xsi:schemaLocation="
        http://docs.oasis-open.org/ns/opencsa/sca/200903
        http://docs.oasis-open.org/opencsa/sca-assembly/sca-core-1.1-cd03.xsd"
  attributeFormDefault="unqualified"
  elementFormDefault="qualified"
  targetNamespace=
     "http://docs.oasis-open.org/ns/opencsa/sca-j/spring/200810">

      <xsd:element name="reference">
            <xsd:complexType>
                  <xsd:attribute name="name" type="xsd:NCName"
                        use="required"/>
                  <xsd:attribute name="type" type="xsd:NCName"
                        use="required"/>
                  <xsd:attribute name="default" type="xsd:NCName"
                        use="optional"/>
                  <xsd:attribute name="requires" type="sca:listOfQNames"
                        use="optional"/>
            <xsd:attribute name="policySets" type="sca:listOfQNames"
                  use="optional"/>

            </xsd:complexType>
      </xsd:element>

      <xsd:element name="property">
            <xsd:complexType>
                  <xsd:attribute name="name" type="xsd:NCName"
                        use="required"/>
                  <xsd:attribute name="type" type="xsd:NCName"
                        use="required"/>
            </xsd:complexType>
      </xsd:element>

      <xsd:element name="service">
            <xsd:complexType>
                  <xsd:attribute name="name" type="xsd:NCName"
                        use="required"/>
                  <xsd:attribute name="type" type="xsd:NCName"
                        use="required"/>
                  <xsd:attribute name="target" type="xsd:NCName"
                        use="required"/>
                  <xsd:attribute name="requires" type="sca:listOfQNames"
                        use="optional"/>
            <xsd:attribute name="policySets" type="sca:listOfQNames"
```

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```
                    use="optional"/>
            </xsd:complexType>
        </xsd:element>

</xsd:schema>
```

B. Acknowledgements

The following individuals have participated in the creation of this specification and are gratefully acknowledged:

Participants:

[Participant Name, Affiliation | Individual Member]

[Participant Name, Affiliation | Individual Member]

C. Non-Normative Text

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D. Revision History

[optional; should not be included in OASIS Standards]

Revision	Date	Editor	Changes Made
1	2007-09-26	Anish Karmarkar	Applied the OASIS template + related changes to the Submission
WD01	2008-11-24	Mike Edwards	Editorial cleanup Issue 64 resolution applied Issue 57 resolution applied

Page 8: [1] Deleted **Mike Edwards** **6/19/2009 11:09:00 AM**

It functions to provide component type information for the Spring composite. Specifically, the SCA runtime is responsible for creating the proper service bindings and applying required policies to those services based on SCDL configuration. If a <sca:service> entry is not configured in the parent SCDL, the SCA runtime must throw a configuration error. If no <sca:service> elements are specified in the Spring application context, any bean may be exposed as a service.
.