Web Services Resource 1.2 (WS-Resource)

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Abstract:

This specification defines a WS-Resource, which describes the relationship between a Web service and a resource in the WS-Resource Framework. This document also defines the pattern by which resources are accessed through Web services, and the means by which WS-Resources are referenced.

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1 Introduction

This specification defines a WS-Resource, which describes the relationship between a Web service and a resource in the WS-Resource Framework. This document also defines the pattern by which resources are accessed through Web services, and the means by which WS-Resources are referenced.

1.1 Goals and Requirements

The goal of WS-Resource is to standardize the terminology and concepts needed to express the relationship between Web services and resources.

1.1.1 Requirements

In meeting this goal, the specification MUST address the following specific requirements:

- Define the term “resource.”
- Define the term “WS-Resource”, describing the relationship between Web services and resources.
- Define the means by which a resource can be distinguished in a message exchange between a requestor and a Web service.
- Define the means by which a WS-Resource is referenced.

1.2 Terminology

The keywords "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC 2119].

When describing abstract data models, this specification uses the notational convention used by the [XML Infoset]. Specifically, abstract property names always appear in square brackets (e.g., [some property]).

This specification uses a notational convention, refered to as “Pseudo-schemas” in a fashion similar to the WSDL 2.0 Part 1 specification. A Pseudo-schema uses a BNF-style convention to describe attributes and elements:

- `?′ denotes optionality (i.e. zero or one occurrences),
- `*′ denotes zero or more occurrences,
- `+′ one or more occurrences,
- `[′ and `]′ are used to form groups,
- `|′ represents choice.

Attributes are conventionally assigned values which correspond to their types, as defined in the normative schema.

```
<!-- sample pseudo-schema -->
```

```
<element
    required_attribute_of_type_QName="xs:QName"
    optional_attribute_of_type_string="xs:string"? >
 <required_element />
 <optional_element />?
 <one_or_more_of_these_elements />+
 [ <choice_1 /> | <choice_2 /> ]*
</element>
```

Where there is disagreement between the separate XML schema and WSDL files describing the messages defined by this specification and the normative descriptive text (excluding any pseudo-schema) in this document, the normative descriptive text will take precedence over the separate files. The separate files take precedence over any pseudo-schema and over any schema and WSDL included in the appendices.

1.3 Namespaces

The following namespaces are used in this document:

Prefix	Namespace
s11	http://schemas.xmlsoap.org/soap/envelope/
xs	http://www.w3.org/2001/XMLSchema
wsa	http://www.w3.org/2005/08/addressing
wsdl	http://schemas.xmlsoap.org/wsdl
wsrf-r	http://docs.oasis-open.org/wsrf/r-2
wsrf-rw	http://docs.oasis-open.org/wsrf/rw-2
wsrf-bf	http://docs.oasis-open.org/wsrf/bf-2

1.4 Fault Definitions

All faults generated by a WS-Resource SHOULD be compliant with the WS-BaseFaults [WS-BaseFaults] specification.

All faults defined by this specification MUST use the following wsa:Action URI:

http://docs.oasis-open.org/wsrf/fault

2 WS-Resource Terminology

The following terms are important in defining the relationship between a Web service and one or more resources.

2.1 Resource

A resource is a logical entity that has the following characteristics:

- It MUST be identifiable.
- It MUST have a set of zero or more properties, which are expressible in XML infoset.
- It MAY have lifecycle.

2.2 WS-Resource

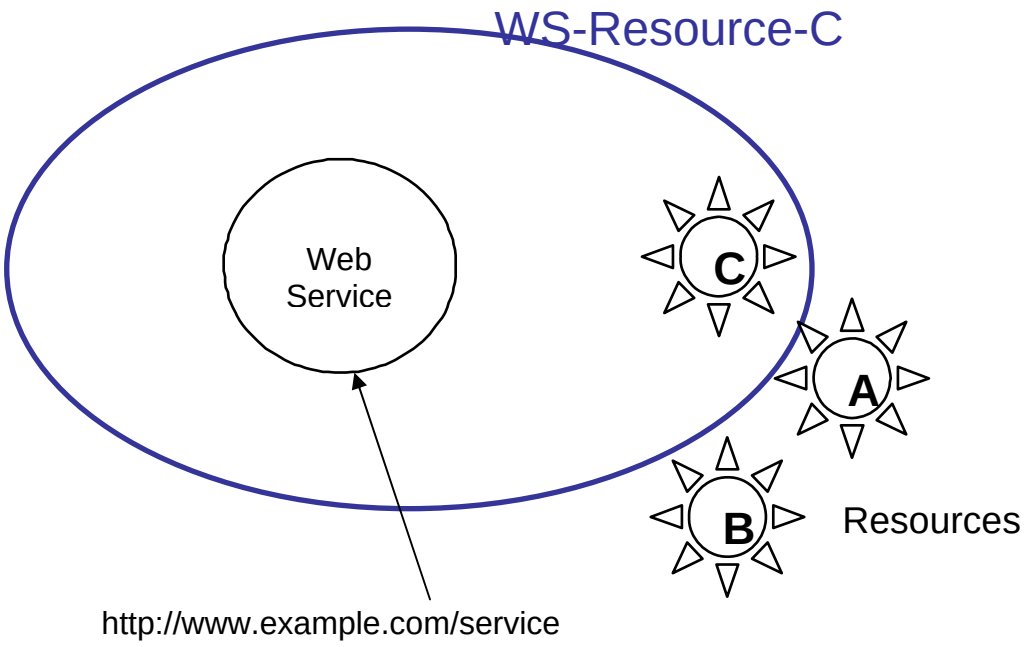
A WS-Resource is the composition of a resource and a Web service through which the resource can be accessed. A WS-Resource is further defined as follows:

- A reference to a WS-Resource is represented by an endpoint reference (EPR), or more precisely an XML element whose type is, or is derived (by extension), from the complexType named EndpointReferenceType defined by the [WS-Addressing] specification. Such EPRs MUST reference exactly one WS-Resource.
- The set of properties of the resource MUST be expressed using an XML Infoset described by XML schema. The WS-Resource MUST support accessing resource properties through message exchanges defined by the WS-Resource Properties specification [WS-ResourceProperties].
- A WS-Resource MAY support the message exchanges defined by the WS-Resource Lifetime specification [WS-ResourceLifetime].

For a given WS-Resource there may be many references. The way two references are compared for equality is implementation-specific and not defined by this specification.

2.2.1 Example SOAP encoding of a message to a WS-Resource

The following diagram illustrates an example set of components that comprise a small collection of WS-Resources:



In the example above, there is one Web service that has a URL address of "http://www.example.com/service". This Web service provides access to three resources, identified as "A", "B" and "C". WS-Resource-C is the composition of the Web service and the resource identified by "C" and a reference to WS-Resource-C might appear as follows:

```
<wsa:EndpointReference>
    <wsa:Address>
        http://www.example.com/service?res=C
    </wsa:Address>
    ...
</wsa:EndpointReference>
```

A message to the WS-Resource, so referenced, that uses a SOAP 1.1 binding would look as follows:

```
<s11:Envelope…>
   <s11:Header>
        <wsa:To>http://www.example.com/service?res=C</wsa:To>
        ...
   </s11:Header>
   <s11:Body>
        ...
```

```
   </s11:Body>
</s11:Envelope>
```

3 Faults

A WS-Resource may respond to any message with the following fault message:

wsrf-rw:ResourceUnknownFault

The resource identified in the message is not known to the Web service. The fault may contain additional resource- or application-specific information in it.

wsrf-rw:ResourceUnavailableFault

The resource identified in the message is unavailable. This fault SHOULD indicate a transient condition. A requester might respond to this fault by resending the message.

4 References

4.1 Normative

[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.

[WS-Addressing] **WS-Addressing 1.0,** http://www.w3.org/TR/ws-addr-core/

[WSDL 1.1] **Web Services Description Language (WSDL) 1.1,** http://www.w3.org/TR/wsdl

[WS-ResourceLifetime] **Web Services Resource Lifetime 1.2 (WS-ResourceLifetime),** http://docs.oasis-open.org/wsrf/wsrf-ws_resource_lifetime-1.2-spec-cs-01.pdf

[WS-ResourceProperties] **Web Services Resource Properties 1.2 (WS-ResourceProperties),** http://docs.oasis-open.org/wsrf/wsrf-ws_resource_properties-1.2-spec-cs-01.pdf

[XML-Infoset] **XML Information Set (Second Edition),** http://www.w3.org/TR/xml-infoset/

4.2 Non-Normative

[WSA-SOAP] **WS-Addressing 1.0 – SOAP Binding**, http://www.w3.org/TR/ws-addr-soap/

[WS-I Basic Profile 1.1] http://www.ws-i.org/Profiles/BasicProfile-1.1.html

Appendix A. Acknowledgments

The following individuals were members of the committee during the development of this specification:

Mario Antonioletti (EPCC, The University of Edinburgh), Akhil Arora (Sun Microsystems), Tim Banks (IBM), Jeff Bohren (OpenNetwork), Fred Carter (AmberPoint), Martin Chapman (Oracle), Glen Daniels (Sonic Software), David De Roure (University of Southampton), Thomas Freund (IBM), John Fuller (Individual), Stephen Graham (IBM), Anish Karmarkar (Oracle), Hideharu Kato (Hitachi), David Levine (IBM), Paul Lipton (Computer Associates), Mark Little (Arjuna Technologies Limited), Lily Liu (WebMethods, Inc.), Tom Maguire (IBM), Susan Malaika (IBM), Mark Mc Keown (University of Manchester), David Martin (IBM), Samuel Meder (Argonne National Laboratory), Jeff Mischkinsky (Oracle), Roger Menday (Forschungszentrum Jlich GmbH), Bryan Murray (Hewlett-Packard), Mark Peel (Novell), Alain Regnier (Ricoh Company, Ltd.), Ian Robinson (IBM), Tom Rutt (Fujitsu), Mitsunori Satomi (Hitachi), Igor Sedukhin (Computer Associates), Hitoshi Sekine (Ricoh Company, Ltd.), Frank Siebenlist (Argonne National Laboratory), Alex Sim (Lawrence Berkeley National Laboratory), David Snelling (Fujitsu), Latha Srinivasan (Hewlett-Packard), Rich Thompson (IBM), Jem Treadwell (Hewlett-Packard), Steve Tuecke (Argonne National Laboratory), William Vambenepe (Hewlett-Packard), Katy Warr (IBM), Alan Weissberger (NEC Corporation), Pete Wenzel (SeeBeyond Technology Corporation), Kirk Wilson (Computer Associates) and Umit Yalcinalp (SAP).

Appendix B. XML Schema

The XML types and elements used in this specification are included here for convenience. The authoritative version of this schema document is available at: http://docs.oasis-open.org/wsrf/r-2.xsd

```
<?xml version="1.0" encoding="UTF-8"?>
<!--

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-->
<xsd:schema
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:wsrf-r="http://docs.oasis-open.org/wsrf/r-2"
  xmlns:wsrf-bf="http://docs.oasis-open.org/wsrf/bf-2"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  elementFormDefault="qualified" attributeFormDefault="unqualified"
  targetNamespace="http://docs.oasis-open.org/wsrf/r-2"
>

  <xsd:import
     namespace=
  "http://docs.oasis-open.org/wsrf/bf-2"
     schemaLocation="http://docs.oasis-open.org/wsrf/bf-2.xsd"
  />

<!-- ====================== WS-Resource fault types ============= -->

      <xsd:complexType name="ResourceUnknownFaultType">
         <xsd:complexContent>
            <xsd:extension base="wsrf-bf:BaseFaultType"/>
         </xsd:complexContent>
      </xsd:complexType>
      <xsd:element name="ResourceUnknownFault"
                   type="wsrf-r:ResourceUnknownFaultType"/>

      <xsd:complexType name="ResourceUnavailableFaultType">
         <xsd:complexContent>
            <xsd:extension base="wsrf-bf:BaseFaultType"/>
         </xsd:complexContent>
      </xsd:complexType>
      <xsd:element name="ResourceUnavailableFault"
                   type="wsrf-r:ResourceUnavailableFaultType"/>
</xsd:schema>
```

Appendix C. WSDL 1.1

The WSDL 1.1 for the Web service methods described in this specification is compliant with [WS-I Basic Profile 1.1] and is included here for convenience. The authoritative version of this WSDL is available at: http://docs.oasis-open.org/wsrf/rw-2.wsdl

```
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<!--
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-->

<wsdl:definitions name="WS-Resource"
  xmlns="http://schemas.xmlsoap.org/wsdl/"
  xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:wsrf-r="http://docs.oasis-open.org/wsrf/r-2"
  xmlns:wsrf-rw="http://docs.oasis-open.org/wsrf/rw-2"
  targetNamespace="http://docs.oasis-open.org/wsrf/rw-2"
>

<!-- ====================== Types Definitions ====================== -->
   <wsdl:types>
     <xsd:schema
        xmlns:xsd="http://www.w3.org/2001/XMLSchema"
        targetNamespace="http://docs.oasis-open.org/wsrf/rw-2"
        elementFormDefault="qualified"
        attributeFormDefault="unqualified">

       <xsd:import
         namespace="http://docs.oasis-open.org/wsrf/r-2"
         schemaLocation="http://docs.oasis-open.org/wsrf/r-2.xsd"
       />

     </xsd:schema>
   </wsdl:types>

<!-- ================= WS-Resource faults ======================== -->
  <wsdl:message name="ResourceUnknownFault">
     <part name="ResourceUnknownFault"
           element="wsrf-r:ResourceUnknownFault" />
  </wsdl:message>

  <wsdl:message name="ResourceUnavailableFault">
     <part name="ResourceUnavailableFault"
           element="wsrf-r:ResourceUnavailableFault" />
  </wsdl:message>

</wsdl:definitions>
```

Appendix D. Revision History

Rev	Date	By Whom	What
wd-01	2004-08-27	Steve Graham	Initial version created based on 08/23 and 08/24 meeting amongst the authors.
wd-02	2004-09-02	sgg	Modifications per feedback on 09/01 telecon, and email from Anish and Igor.
wd-01.a-f	Various	sgg	Reflected various progress
wd-01g	2004-09-29	sgg	Reflected final agreements
wd-02a	2004-10-07	ir	Editorial and TC issues
Wd-02.b	2004-11-22	sgg	Resolved WSRF75 and WSRF76
Wd-02	2004-12-09	ir	Editorial
wd-03.a	2005-02-17	ir	Issues 50, 62, 77, 81, 86, 93, 96
Wd-03.b	2005-03-08	Jem Treadwell	Fixed minor typos.
Wd-03.c	2005-04-19	ir	Added reference to WS-I in 5.1.
Wd-04	2005-05-10	ir	Issues: 91, 92, 99, 101
wd-05	2005-05-16	ir	Issue WSRF 100
wd-06	2005-05-18	ir	Issues WSRF109, 113, 114, 116
pr-01	2005-06-10	ir	Change status to PR
wd-07	2005-09-06	ir	127
wd-08	2005-09-15	ir	Issues 141, 152, 148, 147
wd-09	2005-09-15	ir	TC review comments
pr-02.a	2005-11-05	ir	156 - PR-02 comments
pr-02.b	2005-11-21	ir	Editorial corrections

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