

OGSA[™] WSRF Basic Profile 1.0

Status of This Memo

This memo provides a recommendation to the Grid community on how to write normative OGSA services. The intention of this profile is to describe precisely the requirements placed on implementations of such services to ensure interoperability. Distribution is unlimited.

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Abstract

The growing number of Web services specifications makes it important to understand and define the interaction and use of these specifications to ensure interoperability. Within the context of basic Web services, it has proved useful to define normative profiles that provide guidance on issues of interoperability. One such profile is the WS-I Basic Profile 1.1 [**WS-I BP 1.1**]. Guided by the principle of interoperation through conformance specification and operating in the wider technical domain of distributed system management and grid computing, we define here the OGSA WSRF Basic Profile 1.0, the first of a set of normative profiles addressing issues relating to distributed resource management and grid computing.

The OGSA WSRF Basic Profile 1.0 described in this document is an *OGSA Recommended Profile as Proposed Recommendation* as defined in the OGSA Profile Definition [**OGSA Profile Definition**]. The OGSA WSRF Basic Profile 1.0 describes uses of widely accepted specifications that have been found to enable interoperability. The specifications considered in this profile are specifically those associated with the addressing, modeling, and management of state: WS-Addressing [**WS-Addressing**], WS-ResourceProperties [**WS-ResourceProperties**], WS-ResourceLifetime [**WS-ResourceLifetime**], WS-BaseNotification [**WS-BaseNotification**], and WS-BaseFaults [**WS-BaseFaults**].

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1 Introduction

This document defines the OGSA WSRF Basic Profile 1.0 (hereafter, "the Profile"), consisting of a set of de facto, institutional or evolving institutional Web services specifications, along with clarifications, refinements, interpretations and amplifications of those specifications that promote interoperability among implementations of those specifications.

Section 1 introduces the Profile, and explains its relationships to other profiles.

Section 2, "Profile Conformance," explains what it means to be conformant to the Profile.

Each subsequent section addresses a component of the Profile, and consists of two parts: an overview detailing the component specifications and their extensibility points, followed by subsections that address individual parts of the component specifications. Note that there is no relationship between the section numbers in this document and those in the referenced specifications.

1.1 Profile Overview

The Profile is intended for use when implementing services that are concerned with distributed resource management, grid computing, or other purposes that involve the modeling and management of stateful entities. These services frequently can benefit from the use of interfaces and behaviors defined in the WS-Addressing, WS-Resource Framework, and WS-Notification families of specifications. A service implementation that uses those specifications in a manner conformant with the Profile may be said to be an "implementation of the OGSA WSRF Basic Profile 1.0" or, informally, to be an "OGSA service." (See section 2.3, "OGSA Branding", of the OGSA Roadmap document [**OGSA Roadmap**].)

The primary issues addressed in the profile are as follows:

- *Addressing.* The Profile mandates the use of WS-Addressing endpoint references and places some constraints on their structure, thus enabling interoperable addressing.
- *Resource Properties.* The Profile mandates that a resource support certain resource properties, thus facilitating introspection, and also mandates support for certain operations that are optional in the WS-ResourceProperties specification. Both sets of requirements facilitate interoperability by allowing a client to make more assumptions about a service's interfaces.
- *Resource Lifetime.* The Profile mandates the use of the ImmediateResourceTermination and ScheduledResourceTermination portTypes and their associated operations and properties for immediate and scheduled termination of resources.
- *Base Notification.* The Profile mandates the use of the NotificationProducer portType and its associated operations and properties to provide notification using a publish/subscribe pattern.
- *Base Faults.* The Profile mandates the use of the fault structure specified in WS-BaseFaults and, where applicable, extends the fault structure.

This is not a complete list; see the sections that follow for details.

1.2 Relationships to Other Profiles

This Profile extends the WS-I Basic Profile 1.1 [**WS-I BP 1.1**]. As mentioned in section 1.1 of the WS-I Basic Profile 1.1, there are several profiled bindings which should be used in combination with a profile. It is expected that combined claims of conformance with binding-specific profiles will be the norm.

All requirements of WS-I BP 1.1 except for section 5 "Service Publication and Discovery" pertain to this Profile. There may be additional profiles in the future that will include discovery functions.

This Profile mandates composition with an OGSA Basic Security profile as described in section 8.

1.3 Notational Conventions

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 RFC2119 [RFC2119].

Normative statements of requirements in the Profile are presented in the manner detailed in the WS-I Basic Profile 1.1 Conformance Requirements section.

Both requirement statements and extensibility statements can be considered namespace-qualified.

This specification uses a number of namespace prefixes throughout; their associated URIs are listed below. Note that the choice of any namespace prefix is arbitrary and not semantically significant.

Table 1 Namespaces used by OGSA WSRF Basic Profile 1.0

Prefix	Namespace
ogsa-bp	http://schemas.ggf.org/ogsa/2006/05/wsrf-bp
soap	http://schemas.xmlsoap.org/soap/envelope
wsdl	http://schemas.xmlsoap.org/wsdl
xsd	http://www.w3.org/2001/XMLSchema
xsi	http://www.w3.org/2001/XMLSchema-instance
wsa	http://www.w3.org/2005/08/addressing
ws-i	http://ws-i.org/schemas/conformanceClaim
wsrf-rp	http://docs.oasis-open.org/wsrf/rp-2
wsrf-rpw	http://docs.oasis-open.org/wsrf/rpw-2
wsrf-rl	http://docs.oasis-open.org/wsrf/rl-2
wsrf-rlw	http://docs.oasis-open.org/wsrf/rlw-2
wsrf-bf	http://docs.oasis-open.org/wsrf/bf-2
wsnt	http://docs.oasis-open.org/wsn/b-2
wsntw	http://docs.oasis-open.org/wsn/bw-2

This Profile uses a number of special terms to refer to referenced specifications.

- **WS-Addressing** – Web Services Addressing 1.0 - Core [**WS-Addressing**]
- **WS-ResourceProperties** – Web Services Resource Properties 1.2 [**WS-ResourceProperties**]
- **WS-ResourceLifetime** – Web Services Resource Lifetime 1.2 [**WS-ResourceLifetime**]
- **WS-BaseNotification** – Web Services Base Notification 1.3 [**WS-BaseNotification**]
- **WS-BaseFaults** – Web Services Base Faults 1.2 [**WS-BaseFaults**]
- **SchemaCentricCanonicalization** – Schema Centric XML Canonicalization Version 1.0 [**SchemaCentric-XML-C14N**]

1.4 Profile Identification and Versioning

Profile identification and versioning uses the style described in WS-I Basic Profile 1.1 and abides by the normative descriptions contained therein. The name of this Profile is "OGSA WSRF Basic Profile" and version number is "1.0."

2 Profile Conformance

Conformance to the Profile is defined normatively in WS-I Basic Profile 1.1. This Profile abides by those definitions.

2.1 Conformance Targets

Since the Profile is an extension of the WS-I Basic Profile 1.1 it may place further restrictions on conformance targets defined in WS-I Basic Profile 1.1. Further, this specification defines an additional conformance target called ENDPOINTREFERENCE.

The following conformance targets are used in the Profile:

- **ENDPOINTREFERENCE** – the serialization of the `wsa:EndpointReference` element and its content
- **ENVELOPE** – the serialization of the `soap:Envelope` element and its content (from WS-I Basic Profile 1.1)
- **DESCRIPTION** – descriptions of types, messages, interfaces and their concrete protocol and data format bindings, and the network access points associated with Web services (e.g., WSDL descriptions) (from WS-I Basic Profile 1.1)
- **INSTANCE** – software that implements a `wsdl:port` (from WS-I Basic Profile 1.1, without "bindingTemplate" from the namespace `urn:uddi-org:api_v2`)
- **CONSUMER** – software that invokes an INSTANCE (from WS-I Basic Profile 1.1)
- **SENDER** – software that generates a particular message according to the protocol(s) associated with that message (from WS-I Basic Profile 1.1)
- **RECEIVER** – software that consumes a message according to the protocol(s) associated with that message (e.g., SOAP processors) (from WS-I Basic Profile 1.1)

2.2 Claiming Conformance

Claims of conformance to the Profile and the attachments mechanisms are the same as normatively described in WS-I Basic Profile 1.1.

The conformance claim URI for this Profile is <http://www.ggf.org/ogsa/2006/05/wsrf-bp>.

3 Addressing

This section of the Profile incorporates the following specification by reference, and defines extensibility points within it:

- Web Services Addressing 1.0 - Core [**WS-Addressing**]
Extensibility points:
 - **E0301 – WS-Addressing Extensibility** – WS-Addressing allows extensibility elements for the wsa:EndpointReference element.
 - **E0302 – WS-Addressing Metadata Extensibility** – WS-Addressing allows extensibility elements for metadata as children of the wsa:Metadata element.
 - **E0303 – WS-Addressing Reference Parameters Extensibility** – WS-Addressing allows extensibility elements for Reference Parameters as children of the wsa:ReferenceParameters element.

3.1 Endpoint Reference

The following specification (or sections thereof) is referred to in this section of the Profile:

- Web Services Addressing, Section 2 [**WS-Addressing**]

WS-Addressing defines the endpoint reference structure for referencing services and WS-Resources. The Profile mandates the use of that structure, and places the following constraints on its use:

3.1.1 Endpoint Reference Structure

R0311 *An ENDPOINTREFERENCE MUST conform to the structure specified in Web Services Addressing section 2, "Endpoint References."*

4 Resource Property

This section of the Profile incorporates the following specification by reference, and defines extensibility points within it:

- Web Services Resource Properties 1.2 [**WS-ResourceProperties**]
Extensibility points:
 - **E0401 – Resource Property Document Extensibility** – Any resource property document MAY include standard XML extensibility through the use of xsd:any.
 - **E0402 – Resource Property Element Extensibility** – Any resource property element MAY include standard XML extensibility through the use of xsd:any.
 - **E0403 – QueryExpression Extensibility** – The Query Expression supported by the QueryResourceProperties message exchange is defined as open content (xsd:any).

4.1 Resource Property Definition

WS-ResourceProperties does not define any resource property elements. In contrast, the Profile requires the resource property elements listed below for introspection purposes. The Profile mandates the use of these resource property elements, and places the following constraints on their use.

4.1.1 *ResourcePropertyNames Resource Property Element Description*

Each instance of a WS-Resource is required to provide the ability to retrieve, through the `GetResourceProperty` or `GetMultipleResourceProperties` message exchange pattern, a list of all resource property element QNames that it contains. (See Appendix C.)

R0411 A DESCRIPTION MUST contain in the Resource Property Document schema, as referred to by the `wsrf-rp:ResourceProperties` attribute on the portType, a Resource Property Element `ogsa-bp:ResourcePropertyNames` as defined in the schema <http://schemas.ggf.org/ogsa/2006/05/wsrf-bp> (see Appendix D).

R0412 A RECEIVER MUST respond to a `wsrf-rp:GetResourceProperty` request where the child of the `wsrf-rp:GetResourceProperty` is the QName `ogsa-bp:ResourcePropertyNames` with the complete list of the `xsd:QNames` of all Resource Property Elements contained in the Resource Property Document at the time of receipt of the message.

R0413 A RECEIVER MUST respond to a `wsrf-rp:GetMultipleResourceProperties` request where the child of the `wsrf-rp:GetMultipleResourceProperties` contains the QName `ogsa-bp:ResourcePropertyNames` with the complete list of the `xsd:QNames` of all Resource Property Elements contained in the Resource Property Document at the time of receipt of the message.

4.1.2 *FinalWSResourceInterface Resource Property Element Description*

Each instance of a WS-Resource is recommended to provide the ability to retrieve, through the `GetResourceProperty` or `GetMultipleResourceProperties` message exchange pattern, the final portType interface QName. (See Appendix C.)

R0414 A DESCRIPTION MUST contain in the Resource Property Document schema, as referred to by the `wsrf-rp:ResourceProperties` attribute on the portType, a Resource Property Element `ogsa-bp:FinalWSResourceInterface` as defined in the schema <http://schemas.ggf.org/ogsa/2006/05/wsrf-bp> (see Appendix D).

R0415 A RECEIVER SHOULD respond to a `wsrf-rp:GetResourceProperty` request where the child of the `wsrf-rp:GetResourceProperty` is the QName `ogsa-bp:FinalWSResourceInterface` with the `xsd:QName` of the `wsdl:portType` associated with the endpoint to which the message was addressed.

R0416 A RECEIVER SHOULD respond to a `wsrf-rp:GetMultipleResourceProperties` request where the child of the `wsrf-rp:GetMultipleResourceProperties` contains the QName `ogsa-bp:FinalWSResourceInterface` with the `xsd:QName` of the `wsdl:portType` associated with the endpoint to which the message was addressed.

4.1.3 *WSResourceInterfaces Resource Property Element Description*

Each instance of a WS-Resource is recommended to provide the ability to retrieve, through the `GetResourceProperty` or `GetMultipleResourceProperties` message exchange pattern, a list of all known portTypes that were composed together to make a new portType for the `wsdl:Service/port`. Each portType must be referenced by a QName, where the namespace of the QName is that of the parent `wsdl:definition` (See Appendix C.)

R0417 A DESCRIPTION MUST contain in the Resource Property Document schema, as referred to by the *wsrf-rp:ResourceProperties* attribute on the portType, a Resource Property Element *ogsa-bp:WSResourceInterfaces* defined in the schema <http://schemas.ggf.org/ogsa/2006/05/wsrf-bp> (see Appendix D).

R0418 A RECEIVER SHOULD respond to a *wsrf-rp:GetResourceProperty* request where the child of the *wsrf-rp:GetResourceProperty* is the QName *ogsa-bp:WSResourceInterfaces* with the complete list of the *xsd:QNames* of all the *wsdl:portTypes* that were composed into the endpoint to which the message was addressed.

R0419 A RECEIVER SHOULD respond to a *wsrf-rp:GetMultipleResourceProperties* request where the child of the *wsrf-rp:GetMultipleResourceProperties* contains the QName *ogsa-bp:WSResourceInterfaces* with the complete list of the *xsd:QNames* of all the *wsdl:portTypes* that were composed into the endpoint to which the message was addressed.

4.1.4 ResourceEndpointReference Resource Property Element Description

Each instance of a WS-Resource is recommended to provide the ability to retrieve, through the *GetResourceProperty* or *GetMultipleResourceProperties* message exchange pattern, the *wsa:EndpointReference(s)* for itself. (See Appendix C.)

R0420 A DESCRIPTION MUST contain in the Resource Property Document schema, as referred to by the *wsrf-rp:ResourceProperties* attribute on the portType, a Resource Property Element *ogsa-bp:ResourceEndpointReference* as defined in the schema <http://schemas.ggf.org/ogsa/2006/05/wsrf-bp> (see Appendix D).

R0421 A RECEIVER SHOULD respond to a *wsrf-rp:GetResourceProperty* request where the child of the *wsrf-rp:GetResourceProperty* is the QName *ogsa-bp:ResourceEndpointReference* with the *wsa:EndpointReference(s)* of the endpoint to which the message was addressed.

R0422 A RECEIVER SHOULD respond to a *wsrf-rp:GetMultipleResourceProperties* request where the child of the *wsrf-rp:GetMultipleResourceProperties* contains the QName *ogsa-bp:ResourceEndpointReference* with the *wsa:EndpointReference(s)* of the endpoint to which the message was addressed.

4.2 Get Multiple Resource Properties

WS-ResourceProperties defines a portType for retrieval of multiple resource properties. The Profile mandates the use of this portType, and places the following constraints on its use.

4.2.1 wsrf-rpw:GetMultipleResourceProperties Message Exchange

WS-ResourceProperties only requires that an instance of a WS-Resource implement the *GetResourceProperty* message exchange pattern. The Profile also requires support for *GetMultipleResourceProperties* message exchange pattern.

R0423 A DESCRIPTION MUST include the *wsrf-rpw:GetMultipleResourceProperties* *wsdl:operation* as defined in **WS-ResourceProperties** section 5.3.

R0424 *An INSTANCE MUST support the `wsrf-rpw:GetMultipleResourceProperties` message exchange to allow for the retrieval of multiple resource properties.*

4.3 Query Resource Properties

WS-ResourceProperties defines a portType for query and retrieval of resource properties. The Profile recommends the use of this portType, and places the following constraints on its use.

4.3.1 `wsrf-rpw:QueryResourceProperties` Message Exchange

WS-ResourceProperties only requires that an instance of a WS-Resource implement the `GetResourceProperty` message exchange pattern. The Profile also recommends support for the `QueryResourceProperties` message exchange pattern. Existing implementations of XPath 1.0 are prevalent and as such, the Profile requires support for the XPath 1.0 dialect. Further, without consistent serialization a client's ability to process the response will be hindered. The Profile recommends the use of SchemaCentricCanonicalization for serialization of the response.

R0425 *A DESCRIPTION SHOULD include the `wsrf-rpw:QueryResourceProperties` `wsdl:operation` as defined in **WS-ResourceProperties** section 5.4.*

R0426 *An INSTANCE SHOULD support the `wsrf-rpw:QueryResourceProperties` message exchange to allow for the query and retrieval of multiple resource properties.*

R0427 *An INSTANCE MUST support the `QueryExpression Dialect URI` <http://www.w3.org/TR/1999/REC-xpath-19991116> on the `wsrf-rpw:QueryResourceProperties` message exchange.*

R0428 *An INSTANCE, when presented with a resource property retrieval for the QName `wsrf-rp:QueryExpressionDialect` response, MUST (at least) include the URI <http://www.w3.org/TR/1999/REC-xpath-19991116>.*

R0429 *A MESSAGE response for `wsrf-rpw:QueryResourceProperties` with the `Dialect URI` <http://www.w3.org/TR/1999/REC-xpath-19991116> SHOULD conform to the structure/serialization as defined in SchemaCentricCanonicalization.*

Note: Without standardized serialization of the XPath evaluation, it is unlikely a client will be able to process the `QueryResourceProperties` response successfully. The client will be left to deal with the vagaries of the XPath implementation with respect to such things as namespaces (or just their prefixes), comments, processing instructions, boolean values, defaults and a host of other information items. This is not a new problem; serialization of an XPath evaluation is a 'classical' problem introduced by XPath 1.0's lack of normative serialization specification. To address this shortcoming several specifications defining canonicalization/serialization algorithms have been developed: Canonical XML [XML-C14N], Exclusive XML Canonicalization [XML-Exc-C14N] and SchemaCentricCanonicalization. The first two specifications have well known issues that make them unsuitable for serialization (except in the most limited of use cases). SchemaCentricCanonicalization addresses these issues. For a complete discussion of the limitations of Canonical XML and Exclusive XML Canonicalization see SchemaCentricCanonicalization section 1.1.

4.4 Resource Property Change Notification

WS-ResourceProperties recommends support for resource property element change notifications for WS-Resources that support the `wsntw:NotificationProducer` [WS-BaseNotification] portType. OGSA services fundamentally rely on the ability to understand changes in other OGSA services.

The Profile recommends the use of the `wsrf-rp:ResourcePropertyValueChangeNotification` element and places the following constraints on its use.

4.4.1 Use of `wsntw:NotificationProducer`

The Profile recommends the use of the `NotificationProducer` portType and its associated operations and properties to support the resource property value change notification pattern for insertions, updates and deletions.

R0430 A DESCRIPTION SHOULD include the `wsntw:NotificationProducer` `wsdl:portType` as defined in **WS-BaseNotification** section 4.

R0431 An INSTANCE SHOULD support `wsnt:Subscribe` message exchange to allow for creation of `wsrf-rpw:ResourcePropertyValueChangeNotification`.

5 Resource Lifetime

This section of the Profile incorporate the following specifications by reference, and defines extensibility points within it:

- Web Services Resource Lifetime 1.2 [**WS-ResourceLifetime**] Extensibility points:
 - **E0501 – Termination Reason** – The termination reason in the `TerminationNotification` message type allows for open content (`xsd:any`).

5.1 Immediate Resource Termination

`WS-ResourceLifetime` defines a portType for immediate termination of a `WS-Resource`. The Profile mandates the use of this portType for explicit destruction of resources created as a result of a message exchange, and places the following constraints on its use:

5.1.1 `wsrf-rlw:Destroy` Message Exchange

`WS-ResourceLifetime` does not require that an instance of a `WS-Resource` implement any of the message exchanges that it defines. In contrast, the Profile mandates immediate destruction capability for `WS-Resource` instances that are created as a result of a message exchange.

R0511 A DESCRIPTION SHOULD include the `wsrf-rlw:Destroy` `wsdl:operation` as defined in `WS-ResourceLifetime` section 4 to allow for the immediate destruction of a `WS-Resource`.

R0512 An INSTANCE that is created as a result of a message exchange MUST support the `wsrf-rlw:Destroy` message exchange to allow for the immediate destruction of a `WS-Resource`.

5.2 Scheduled Resource Termination

`WS-ResourceLifetime` defines a portType for scheduled termination of a `WS-Resource`. The Profile mandates the use of this portType to provide time-based destruction of resources created as a result of a message exchange, and places the following constraints on its use:

5.2.1 `wsrf-rlw:SetTerminationTime` Message Exchange

`WS-ResourceLifetime` does not require that an instance of a `WS-Resource` implement any of the message exchanges that it defines. In contrast, the Profile mandates time-based destruction capability for `WS-Resource` instances that are created as a result of a message exchange.

R0513 A DESCRIPTION SHOULD contain in the Resource Property Document schema, as referred to by the `wsrf-rp:ResourceProperties` attribute on

the portType, a Resource Property Element `wsrf-rl:CurrentTime` as defined in the schema <http://docs.oasis-open.org/wsrf/rl-2>.

R0514 A DESCRIPTION SHOULD include the `wsrf-rlw:SetTerminationTime` `wsdl:operation` as defined in WS-ResourceLifetime section 5 to allow for the scheduled destruction of a WS-Resource.

R0515 An INSTANCE that is created as a result of a message exchange MUST support the `wsrf-rlw:SetTerminationTime` message exchange to allow for the scheduled destruction of a WS-Resource.

6 Base Notification

This section of the Profile incorporates the following specification by reference, and defines extensibility points within it:

- Web Services Base Notification 1.3 [**WS-BaseNotification**] Extensibility points:
 - **E0601 – Subscribe Topic Expression** – The topic expression in the `wsnt:Subscribe` is open content (`xsd:any`).

6.1 Notification Producer

The Profile mandates the use of this portType for client-controlled notifications of events from resources, and places the following constraints on its use:

6.1.1 `wsntw:Subscribe` Message Exchange

The `wsntw:Subscribe` message exchange allows for notification messages to be sent over protocols other than Web services-based protocols. This flexibility impedes the interoperability of services that conform to the Profile. The Profile allows the use of this message exchange but places the following constraints on it:

R0611 A CONSUMER MUST NOT include the `wsnt:SubscriptionPolicy/wsnt:UseRaw` element in the `wsntw:Subscribe` request.

R0612 An INSTANCE MUST support the `TopicExpression Dialect` URI <http://docs.oasis-open.org/wsn/t-1/TopicExpression/Simple> for `wsnt:Subscribe/wsnt:Filter/wsnt:TopicExpression@Dialect` in the `wsntw:Subscribe` message exchange.

R0613 An INSTANCE, when presented with a resource property retrieval for the QName `wsnt:TopicExpressionDialect` MUST include in the response (at a minimum) the URI <http://docs.oasis-open.org/wsn/t-1/TopicExpression/Simple>.

R0614 An INSTANCE that accepts the `wsnt:Filter/wsnt:ProducerProperties` element in the `wsntw:Subscribe` message exchange MUST support the `Dialect` from the namespace <http://www.w3.org/TR/1999/REC-xpath-19991116> as the content for the `wsnt:Filter/wsnt:ProducerProperties` element.

R0615 An INSTANCE that accepts the `wsnt:Filter/wsnt:MessageContent` element in the `wsntw:Subscribe` message exchange MUST support the `Dialect` from the namespace <http://www.w3.org/TR/1999/REC-xpath-19991116> as the content for the `wsnt:Filter/wsnt:MessageContent` element.

6.1.2 Notification Message Exchange

Although WS-BaseNotification allows the use of raw notification, the Profile mandates the Notify message by R0611 and disallows raw notification. Therefore:

R0616 *An INSTANCE MUST send the wsntw:Notify message to the NotificationConsumer in order to deliver one or more NotificationMessage(s).*

7 Base Faults

This section of the Profile incorporates the following specification by reference, and defines extensibility points within it:

- Web Services Base Faults 1.2 [**WS-BaseFaults**] Extensibility points:
 - **E0701 – Base Fault Type** – The Base Fault Type includes open content (xsd:any) as the first child element in sequence.

7.1 Base Faults

WS-BaseFaults defines the fault structure that WS-Resources use for faults that are generated by the WS-Resource. The Profile mandates the use of that structure, and places the following constraints on its use:

7.1.1 BaseFault Structure

R0711 *A MESSAGE for a fault from a WS-Resource MUST conform to the structure specified in Web Services Base Faults Section 2, "Base Fault Type."*

8 Security

The Profile does not address security requirements directly; Grid infrastructure and environmental security requirements must be profiled in separate documents. The Profile mandates the composition with an OGSA Basic Security profile that exposes an OGSA Basic Security conformance claim along with the OGSA Security conformance claim. For instance, an OGSA anonymous channel would expose two claims, one for OGSA Basic Security conformance and one for the anonymous channel conformance.

8.1.1 OGSA Basic Security Profile Conformance Claim

One of the primary aspects of the OGSA security architecture is the ability for a service requester to discover the security capabilities of the service. In order to accomplish this, the Profile introduces a requirement for exposure of a well known conformance claim for all OGSA Basic Security profiles. The Profile places the following constraints on the conformance claim:

R0811 *A DESCRIPTION MUST have attached to the wsdl:portType a wsi:claim with the URI "http://www.ggf.org/ogsa/2006/05/bsp".*

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<http://www.ggf.org/documents/final.htm>
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Appendix A. Referenced Specifications

The following specifications' requirements are incorporated into the Profile by reference, except where superseded by the Profile:

- Web Services Addressing 1.0 – Core (WS-Addressing) [**WS-Addressing**]
- Web Services Base Faults 1.2 (WS-BaseFaults) [**WS-BaseFaults**]
- Web Services Base Notification 1.3 (WS-BaseNotification) [**WS-BaseNotification**]
- Web Services Resource Lifetime 1.2 (WS-ResourceLifetime) [**WS-ResourceLifetime**]
- Web Services Resource Properties 1.2 (WS-ResourceProperties) [**WS-ResourceProperties**]
- Basic Profile 1.1 [**WS-I BP 1.1**]
- Schema Centric XML Canonicalization Version 1.0 [**SchemaCentric-XML-C14N**]

Appendix B. Extensibility Points

This section identifies extensibility points for the Profile's component specifications. These mechanisms are out of the scope of the Profile; their use may affect interoperability, and may require private agreement between the parties to a Web service.

In Web Services Addressing [**WS-Addressing**]:

- **E0301 – WS-Addressing Extensibility** – WS-Addressing allows extensibility elements for the `wsa:EndpointReference`.
- **E0302 – WS-Addressing Metadata Extensibility** – WS-Addressing allows extensibility elements for metadata as children of the `wsa:Metadata` element.
- **E0303 – WS-Addressing Reference Parameters Extensibility** – WS-Addressing allows extensibility elements for Reference Parameters as children of the `wsa:ReferenceParameters` element.

In Web Services Resource Properties 1.2 [**WS-ResourceProperties**]:

- **E0401 – Resource Property Document Extensibility** – Any resource property document MAY include standard XML extensibility through the use of `xsd:any`.
- **E0402 – Resource Property Element Extensibility** – Any resource property document MAY include standard XML extensibility through the use of `xsd:any`.
- **E0403 – QueryExpression Extensibility** – The Query Expression supported by the `QueryResourceProperties` message exchange is defined as open content (`xsd:any`).

In Web Services Resource Lifetime 1.2 [**WS-ResourceLifetime**]

- **E0501 – Termination Reason** – The termination reason in the `TerminationNotification` message type allows for open content (`xsd:any`).

In Web Services Base Notification 1.3 [**WS-BaseNotification**]

- **E0601 – Subscribe Topic Expression** – The topic expression in the `wsnt:Subscribe` is open content (`xsd:any`).

In Web Services Base Faults 1.2 [**WS-BaseFaults**]

- **E0701 – Base Fault Type** – The Base Fault Type includes open content (`xsd:any`) as the first child element in sequence.

Appendix C. OGSA Resource Properties – Normative

C.1. ResourcePropertyNames Resource Property Element Definition

The general form of a ResourcePropertyNames resource property element is:

```
<ogsa-bp:ResourcePropertyNames>
  list of xsd:QNames
</ogsa-bp:ResourcePropertyNames>
```

Furthermore, this reference MUST reflect the minOccurs and maxOccurs properties as follows:

```
<xsd:element ref="ogsa-bp:ResourcePropertyNames"
  minOccurs="1" maxOccurs="1" />
```

This resource property element is further constrained as follows:

/ogsa-bp:ResourcePropertyNames

Contains a complete list of xsd:QNames of all Resource Property Elements defined in the Resource Property Document.

C.2. FinalWSResourceInterface Resource Property Element Definition

The general form of a FinalWSResourceInterface resource property element is:

```
<ogsa-bp:FinalWSResourceInterface>
  xsd:QName
</ogsa-bp:FinalWSResourceInterface>
```

Furthermore, this reference MUST reflect the minOccurs and maxOccurs properties as follows:

```
<xsd:element ref="ogsa-bp:FinalWSResourceInterface"
  minOccurs="0" maxOccurs="1" />
```

This resource property element is further constrained as follows:

/ogsa-bp:FinalWSResourceInterface

Optional element, if present, contains the xsd:QName of the most derived portType interface of the service.

C.3. WS ResourceInterfaces Resource Property Element Definition

The general form of a WSResourceInterfaces resource property element is:

```
<ogsa-bp:WSResourceInterfaces>
  list of xsd:QNames
</ogsa-bp:WSResourceInterfaces>
```

Furthermore, this reference MUST reflect the minOccurs and maxOccurs properties as follows:

```
<xsd:element ref="ogsa-bp:WSResourceInterfaces"
  minOccurs="0" maxOccurs="1" />
```

This resource property element is further constrained as follows:

/ogsa-bp:WSResourceInterfaces

Optional element, if present, contains a complete list of xsd:QNames of all portType interfaces aggregated into the service.

C.4. Resource Endpoint Reference Resource Property Element Definition

The general form of an `ogsa-bp:ResourceEndpointReference` resource property element is:

```
<ogsa-bp:ResourceEndpointReference>
  wsa:EndpointReferenceType
</ogsa-bp:ResourceEndpointReference>
```

Furthermore, this reference **MUST** reflect the `minOccurs` and `maxOccurs` properties as follows:

```
<xsd:element ref="ogsa-bp:ResourceEndpointReference"
  minOccurs="0" maxOccurs="unbounded" />
```

This resource property element is further constrained as follows:

`/ogsa-bp:ResourceEndpointReference`

Optional elements, if present, contain `wsa:EndpointReference(s)` by which a service is addressable.

Appendix D. OGSA WSRF Basic Profile Schema

This section contains the normative XML Schema definitions described in this document. The definitions in this section **MUST** be considered normative.

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

```
<xsd:schema
  xmlns="http://www.w3.org/2001/XMLSchema"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:wsa="http://www.w3.org/2005/08/addressing"
  xmlns:ogsa-bp="http://schemas.ggf.org/ogsa/2006/05/wsrf-bp"
  elementFormDefault="qualified"
  attributeFormDefault="unqualified"
  targetNamespace="http://schemas.ggf.org/ogsa/2006/05/wsrf-bp" >

  <xsd:import
    namespace="http://www.w3.org/2005/08/addressing"
    schemaLocation="http://www.w3.org/2005/08/addressing/ws-addr.xsd"
  />

  <xsd:simpleType name="QNameListType">
    <xsd:list itemType="xsd:QName"/>
  </xsd:simpleType>

  <xsd:element name="ResourcePropertyNames"
    type="ogsa-bp:QNameListType" />

  <xsd:element name="FinalWSResourceInterface"
    type="xsd:QName" />

  <xsd:element name="WSResourceInterfaces"
    type="ogsa-bp:QNameListType" />

  <xsd:element name="ResourceEndpointReference"
    type="wsa:EndpointReferenceType" />

</xsd:schema>
```

Appendix E. Referenced Specification Status and Adoption Level Classification

The classification of this Profile's referenced specifications at the time of writing are in Table 2.

Table 2 Status of specifications referenced by OGSA WSRF Basic Profile 1.0

OGSA Referenced Specifications: OGSA WSRF Basic Profile 1.0													
May 1, 2006	Status							Adoption					Note
	De Facto	Institutional	Evolving Institutional	Draft Institutional	Consortium	Evolving Consortium	Draft	Ubiquitous	Adopted	Community	Interoperable	Implemented	
Specification/Profile Name													
Specifications													
WS-Addressing 1.0		<	X								<	X	IBM, Apache implementing
WS-ResourceProperties 1.2		X									<	X	OASIS Standard
WS-ResourceLifetime 1.2		X									<	X	OASIS Standard
WS-BaseFaults 1.2		X									<	X	OASIS Standard
WS-BaseNotification 1.3		<	X									<	X At public review
SchemaCentricCanonicalization			X									X	Committee Specification
Profiles													
WS-I Basic Profile 1.1		X											Final Material

Legend:

X	Specification or profile is currently at this status or adoption level
<	Specification or profile is approaching this status or adoption level
	Status or adoption level is not applicable