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# Web Services Resource Lifetime 1.2
# (WS-ResourceLifetime)

## Public Draft 02, 7 October 2005

**Abstract:**

   The relationship between Web services and stateful resources is defined in [WS-Resource].

   This specification defines message exchanges to standardize the means by which a WS-Resource may be destroyed, and resource properties [WS-ResourceProperties] that may be used to inspect and monitor the lifetime of a WS-Resource. This specification defines two means of destroying a WS-Resource: immediate destruction and time-based, scheduled destruction.

**Status:**

   This document is published by this TC as a committee draft. Committee members should send comments on this specification to the wsrf@lists.oasis-open.org list. Others may submit comments to the TC via the web form found on the TC's web page at http://www.oasis-open.org/committees/wsrf. Click the button for "Send A Comment" at the top of the page. Submitted comments (for this work as well as other works of that TC) are publicly archived and can be viewed at http://lists.oasis-open.org/archives/wsrf-comment/.

   For information on whether any patents have been disclosed that may be essential to implementing this specification, and any offers of patent licensing terms, please refer to the Intellectual Property Rights section of the WSRF TC web page (http://www.oasis-open.org/committees/wsrf/).

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| Deleted: The definition of a WS-Resource, which is expressed in terms of a stateful resource and its relationship with a Web service, is defined in the WS-Resource specification [] |
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# Table of Contents

# 1 Introduction

In this document, we consider a distributed computing environment consisting of WS-Resources. The definition of WS-Resource, in terms of its relationship with a Web service, is detailed in the WS-Resource specification [WS-Resource].

The lifetime of a WS-Resource is defined as the period between its instantiation and its destruction. The WS-ResourceLifetime specification standardizes the means by which a WS-Resource can be destroyed. The specification also defines the means by which the lifetime of a WS-Resource can be monitored. However, this specification does not prescribe (nor proscribe) the means by which a WS-Resource is created.

Normally, a service requestor's interest in a WS-Resource is for some period of time - rarely is it indefinite. In many scenarios, it is appropriate for clients of a WS-Resource to cause its immediate destruction. The immediate destruction of a WS-Resource may be accomplished using the message exchanges defined in this specification.

In addition, this specification defines the means by which a resource may be destroyed after a period of time. In a distributed computing environment, a client may become disconnected from the service provider's endpoint and therefore may be unable to, or unwilling to, cause the immediate destruction of the WS-Resource. This specification defines the means by which any client of a WS-Resource may establish and extend the scheduled termination time of a WS-Resource. If that time expires, the WS-Resource may *self-destruct* without the need for an explicit destroy request message from a client. Periodically extending the termination time of a WS-Resource can serve to extend its lifetime. WS-ResourceLifetime defines a standard message exchange by which a service requestor can establish and renew a scheduled termination time for the WS-Resource, and defines the circumstances under which a service requestor can determine that this termination time has elapsed.

A service requestor may want to determine the current time and the termination time of a WS-Resource. WS-ResourceLifetime defines resource properties, as defined in [WS-ResourceProperties], for accessing this information.

WS-ResourceLifetime is inspired by a portion of the Global Grid Forum's "Open Grid Services Infrastructure (OGSI) Version 1.0" specification [OGSI].

## 1.1 Goals and Requirements

The goal of WS-ResourceLifetime is to standardize the terminology, concepts, message exchanges, WSDL and XML needed to monitor the lifetime of, and destroy, WS-Resources as defined in [WS-Resource].

### 1.1.1 Requirements

This specification intends to meet the following requirements:

- Define the standard message exchange by which a requestor can request the immediate destruction of a WS-Resource.
- Define the means by which a service requestor can set an initial termination time for the scheduled termination of a WS-Resource.

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| 105 | • Define the means by which a service requestor can update the termination time |
| 106 | associated with a WS-Resource that is scheduled for termination. |
| 107 | • Define the means by which a service requestor can determine the current termination |
| 108 | time as known by a WS-Resource. |
| 109 | This specification MUST NOT require entities in the system to share synchronized clocks. |

### 1.1.2 Non-Goals

| 110 | |

| 111 | The following topics are outside the scope of this specification: |
| 112 | • It is not an objective of this specification to define the message exchanges representing |
| 113 | the function of a WS-Resource factory. Factory requirements are too varied to allow a |
| 114 | general-purpose factory message exchange to be usefully defined. |

### 1.2 Terminology

| 115 | |

| 116 | The keywords "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", |
| 117 | "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be |
| 118 | interpreted as described in RFC 2119. |
| 119 | When describing abstract data models, this specification uses the notational convention used by |
| 120 | the [XML Infoset]. Specifically, abstract property names always appear in square brackets (e.g., |
| 121 | [some property]). |
| 122 | |
| 123 | This specification uses a notational convention, refered to as "Pseudo-schemas" in a fashion |
| 124 | similar to the WSDL 2.0 Part 1 specification. A Pseudo-schema uses a BNF-style convention to |
| 125 | describe attributes and elements: |
| 126 | • `?' denotes optionality (i.e. zero or one occurrences), |
| 127 | • `*' denotes zero or more occurrences, |
| 128 | • `+' one or more occurrences, |
| 129 | • `[' and `]' are used to form groups, |
| 130 | • `/' represents choice. |
| 131 | • Attributes are conventionally assigned a value which corresponds to their type, as |
| 132 | defined in the normative schema. |

```
133   <!-- sample pseudo-schema -->
134   <element
135       required_attribute_of_type_QName="xs:QName"
136       optional_attribute_of_type_string="xs:string"? >
137    <required_element />
138    <optional_element />?
139    <one_or_more_of_these_elements />+
140    [ <choice_1 /> | <choice_2 /> ]*
141   </element>
```

| 142 | |
| 143 | Where there is disagreement between the separate xml schema and wsd lfiles describing the |
| 144 | messages defined by this specification and  the normative descriptive text (excluding any pseudo- |

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145    schema) in this document, the normative descriptive text will take precedence over the separate
146    files. The separate files take precedence over any pseudo-schema and over any schema and
147    wsdl included in the appendices.

148

## 1.3 Namespaces

149

150    The following namespaces are used in this document:

| Prefix | Namespace |
|--------|-----------|
| s11 | http://schemas.xmlsoap.org/soap/envelope/ |
| wsa | http://www.w3.org/2005/08/addressing |
| wsrf-rp | http://docs.oasis-open.org/wsrf/rp-2 |
| wsrf-rpw | http://docs.oasis-open.org/wsrf/rpw-2 |
| wsrf-bf | http://docs.oasis-open.org/wsrf/bf-2 |
| wsrf-bfw | http://docs.oasis-open.org/wsrf/bfw-2 |
| wsrf-rl | http://docs.oasis-open.org/wsrf/rl-2 |
| wsrf-rlw | http://docs.oasis-open.org/wsrf/rlw-2 |
| wstop | http://docs.oasis-open.org/wsn/t-1 |
| xsd | http://www.w3.org/2001/XMLSchema |
| xsi | http://www.w3.org/2001/XMLSchema-instance |

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**Deleted:** http://docs.oasis-open.org/wsn/2004/06/wsn-WS-Topics-1.2-draft-01.xsd

151

## 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 Terminology and Concepts

161 This section specifies the notations, namespaces, and terminology used in this specification.

162

163 For definitions of the terms WS-Resource and WS-Resource Reference please refer to the WS-
164 Resource [WS-Resource] specification.

165

166 For definitions of the terms Resource Property, Resource Properties Document, Resource
167 Property Element and Resource Property Value, please refer to the WS-Resource Properties
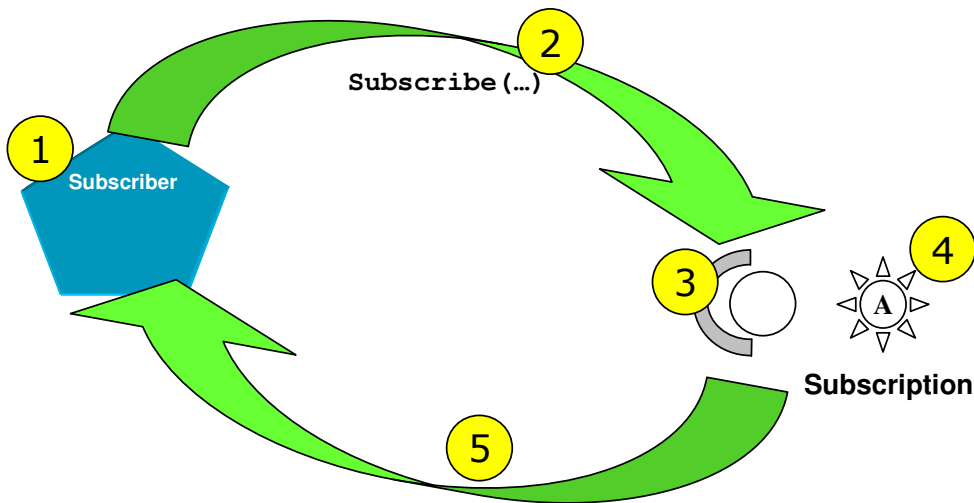168 [WS-ResourceProperties] specification.

169 .

| **Deleted:** , |
| **Deleted:** and WS-Resource Access Pattern, |
| **Deleted:** WS-RAP |

# 3 Example

Consider the case of a subscription entity within a notification system such as WS-BaseNotification [WS-BaseNotification]. This situation is depicted in the following figure:



*Figure 1 - Example WS-Resource Creation*

A service requestor (1), playing the role of a subscriber, sends a subscribe message (2) to a NotificationProducer (3) because it wishes to receive notifications related to a particular situation such as a failure of a component. A subscription WS-Resource (4) is created as a result of the subscribe message, and a WS-Resource Reference (5) [WS-Resource] is returned to the requestor. As part of the application-specific understanding of the subscribe message exchange, both the requestor and provider understand that part of the semantics of processing a subscribe message is the creation (usually for a limited period of time) of a subscription WS-Resource. The subscribe request message contains the initial scheduled termination time of the subscription WS-Resource.

The reference that is returned as a result of the subscribe message is a WS-Resource Reference as described in [WS-Resource]. It contains a reference that refers to the newly-created subscription state represented by the WS-Resource. The endpoint reference (as enumerated by the WS-Addressing embodiment) also contains the address of the Web service component of the WS-Resource that implements the message exchanges defined by WS-BaseNotification's SubscriptionManager interface.

Subsequent to the creation of the subscription WS-Resource, the application-specific behavior of delivering notifications continues. Occasionally, the subscriber may examine the subscription WS-Resource using standard WS-ResourceLifetime resource properties to inquire about the remaining time before the subscription WS-Resource may be destroyed. If the subscriber wishes

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193 to extend the lifetime of the subscription WS-Resource beyond its scheduled termination time, it
194 sends a specific WS-ResourceLifetime message to the subscription WS-Resource referenced by
195 its WS-Resource Reference, prior to the expiration of its current scheduled termination time. The
196 response to this message contains the (potentially unchanged) termination time associated with
197 the subscription WS-Resource.

198 When the subscriber no longer wishes to receive notifications, it may cause the immediate
199 destruction of the subscription WS-Resource by sending another WS-ResourceLifetime message
200 to the WS-Resource through use of its WS-Resource Reference. As another option, it may simply
201 allow the termination time of the subscription WS-Resource to expire, at which time the
202 subscription WS-Resource may be destroyed.

# 4 Immediate Destruction

A WS-Resource MAY support a message exchange pattern that allows a service requestor to request its immediate destruction.

The format of the destroy request message is:

```
…
   <wsrf-rl:Destroy/>
…
```

The wsa:Action MUST contain the URI: "http://docs.oasis-open.org/wsrf/rlw-2 /ImmediateResourceTermination/DestroyRequest".

If the WS-Resource accepts the DestroyRequest message, upon receipt of this message the WS-Resource MUST either return the following DestroyResponse message to acknowledge successful destruction, or return a fault message indicating failure.

```
…
   <wsrf-rl:DestroyResponse />
…
```

The receipt of the DestroyResponse message serves as a confirmation of the destruction of the WS-Resource. Once it has sent a DestroyResponse message, any further message exchanges directed at the subject WS-Resource MUST respond with a fault. In the absence of any other fault conditions that may take precedence this MUST be the "ResourceUnknownFault" fault message enumerated in the WS-Resource [WS-Resource] specification.

If the WS-Resource does not respond to the Destroy request with the DestroyResponse message then it MUST send a fault. This specification defines the following faults associated with failure to process the Destroy request message, in addition to those faults defined for all WS-Resources in [WS-Resource]

- ResourceNotDestroyedFault
  - The WS-Resource could not be destroyed for some reason.

One of these faults, or a specialization thereof, SHOULD be sent upon failure although other fault messages MAY be returned instead.

The wsa:Action MUST contain the URI: "http://docs.oasis-open.org/wsrf/rlw-2/ImmediateResourceTermination/DestroyResponse".

## 4.1 Example SOAP Encoding of the Destroy Message Exchange

The following is a non-normative example of a DestroyRequest message using SOAP 1.1 [SOAP 1.1]:

```
<s11:Envelope . . .>
  <s11:Header>
   . . .
     <wsa:Action>
```

**Deleted:** The Destroy message MUST follow the resource access pattern, as defined in [WS-RAP].

**Deleted:** 1

**Deleted:** (1) destroy the resource component of the WS-Resource and

**Deleted:** (2)

**Deleted:** Note that the destruction of the resource component of the WS-Resource effectively destroys the WS-Resource.

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**Deleted:** age, the Web service MUST send a fault.

**Deleted:** This specification defines the following faults associated with failure to process the DestroyRequest message¶
ResourceUnknownFault¶
The WS-Resource identified in the message is not known to the Web service.

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```
243        http://docs.oasis-open.org/wsrf/rlw-
244  2/ImmediateResourceTermination/DestroyRequest
245      </wsa:Action>
246      . . .
247   </s11:Header>
248   <s11:Body>
249     <wsrf-rl:Destroy/>
250   </s11:Body>
251 </s11:Envelope>
```

The following is an example DestroyResponse message using SOAP 1.1 [SOAP 1.1]:

```
253 <s11:Envelope . . .>
254   <s11:Header>
255        . . .
256     <wsa:Action>
257        http://docs.oasis-open.org/wsrf/rlw-
258  2/ImmediateResourceTermination/DestroyResponse
259      </wsa:Action>
260        . . .
261    </s11:Header>
262   <s11:Body>
263     <wsrf-rl:DestroyResponse />
264   </s11:Body>
265 </s11:Envelope>
```

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# 5 Scheduled Destruction

A time-based approach MAY be used for managing the destruction of a WS-Resource. In this case, the WS-Resource has an associated termination time that defines the time after which the WS-Resource is expected to be destroyed and thus before which the WS-Resource can reasonably be expected to be available. As defined in the following subsections, a WS-Resource's termination time may be inspected through the TerminationTime resource property, and may be changed using the SetTerminationTime request message.

Typical use of scheduled destruction is to allow a service requestor to keep a WS-Resource active by adjusting the WS-Resource's termination time to some appropriate point in time using the SetTerminationTime request message.

Note that termination time is not required to monotonically increase, nor is a service required to accept a requested termination time. An implementation MAY refuse a request to adjust termination time for various reasons, including, for example, to enforce a policy that allows termination time to only change monotonically.

If a WS-Resource wishes to provide support for scheduled WS-Resource destruction, it MUST support all of the message exchanges and resource properties specified in this section.

## 5.1 Regarding Time

This specification assumes that services and clients use the UTC global time standard, expressed as type dateTime from XML Schema. Note that xsd:dateTime includes an optional designation of a time zone. The use of the time zone designation is RECOMMENDED. In the absence of the time zone designation, the xsd:dateTime value MUST be interpreted as universal time (UTC).

The approach allows operations and resource properties to refer unambiguously to absolute times. However, assuming the UTC time standard to represent time does *not* imply any particular level of clock synchronization between clients and services. No specific accuracy of synchronization is specified or expected by this specification, as this is a service-quality issue.

The scheduled destruction operations and resource properties have been designed to allow for tolerance of lack of clock synchronization between clients and services. The CurrentTime resource property may be used by a client to determine the clock skew between the client and the service, within a margin of error determined by the round-trip latency of the message exchange to retrieve that value. This clock skew and margin of error can then be factored into subsequent decisions of when to send subsequent requests to change the termination time, and what termination times to request. The skew can also be monitored and adjusted with each SetTerminationTime message exchange, based on the CurrentTime that is returned from this request. This approach can also be used, to a limited extent, to accommodate clocks that "jump" either forward or backward in time.

## 5.2 Querying Current Time

In order to assist the service requestor in inspecting and setting a WS-Resource's termination time without requiring a specific accuracy of clock synchronization between the service requestor and the service provider, the WS-Resource must provide information about its local time. If the SetTerminationTime request is supported, the resource properties document MUST include a

**Deleted:** MUST

307 resource property element that provides the current time as it is known by the WS-Resource. The
308 form of this resource property element is:

309

310 …
311 `<wsrf-rl:CurrentTime>xsd:dateTime</wsrf-rl:CurrentTime>`
312 …

313 The resource properties definition of the WS-Resource MUST contain exactly one element of
314 QName wsrf-rl:CurrentTime. The constraints on this element are as follows:

315 /wsrf-rl:CurrentTime

316    A WS-Resource MUST NOT allow the CurrentTime resource property to be modified by a
317    SetResourceProperties request message as defined in [WS-ResourceProperties].

318    If the element does not include the time zone designation, the value of the element MUST be
319    interpreted as universal time (UTC).

## 5.3 Determining Current Termination Time

321 If the SetTerminationTime request is supported, the WS-Resource MUST provide a resource
322 property element that indicates the current termination time of the WS-Resource. The form of this
323 resource property element is:

324 …
325   `<wsrf-rl:TerminationTime xsi:nil="xsd:boolean"?>xsd:dateTime</wsrf-`
326 `rl:TerminationTime>`
327 …

328 The resource properties definition of the WS-Resource MUST contain exactly one element of
329 QName wsrf-rl:TerminationTime. The constraints on this element are as follows:

330 /wsrf-rl:TerminationTime

331    The time, relative to the time source used by the WS-Resource, after which the WS-
332    Resource MAY be destroyed.

333    If the value of this resource property element contains the xsi:nil attribute with value "true"
334    then the lifetime of the WS-Resource is considered to be *indefinite*; that is, there is no
335    scheduled destruction time.

336    A WS-Resource MUST NOT allow the TerminationTime resource property to be modified
337    by a SetResourceProperties request message as defined in [WS-ResourceProperties].

338    If the element does not include the time zone designation, the value of the element MUST
339    be interpreted as universal time (UTC).

## 5.4 Requesting Change to Termination Time

341 The SetTerminationTimeRequest message MUST be implemented by a WS-Resource supporting
342 scheduled destruction in order to allow a requestor to change its scheduled termination time.
343 There are two forms of the SetTerminationTime message described by the 'choice' in the
344 following pseudo-schema:

345   `<wsrf-rl:SetTerminationTime>`
346     `[<wsrf-rl:RequestedTerminationTime xsi:nil="xsd:boolean"?>`
347       `xsd:dateTime`
348     `</wsrf-rl:RequestedTerminationTime>]`
349        `/`

**Deleted:** In order to allow the service requestor to determine the current termination time of a WS-Resource

**Deleted:** , the WS-Resource MUST provide a resource property element that indicates the current termination time of the WS-Resource.

```
350      [<wsrf-rl:RequestedLifetimeDuration>
351         xsd:duration
352      </wsrf-rl:RequestedLifetimeDuration>]
353    </wsrf-rl:SetTerminationTime>
```

354 The wsa:Action MUST contain the following URI: "http://docs.oasis-open.org/wsrf/rlw-
355 2/ScheduledResourceTermination/SetTerminationTimeRequest".

356 Further constraints on the processing of the SetTerminationTimeRequest message are as
357 follows:

358 /wsrf-rl:SetTerminationTime/wsrf-rl:RequestedTerminationTime

359     This is the new WS-Resource termination time that is being requested by the client. This
360     value is interpreted relative to the time source known to the WS-Resource. If the element
361     does not include the time zone designation, the value of the element MUST be interpreted
362     as universal time (UTC).

363     If the value is "in the past" relative to the current time as known by the WS-Resource, then
364     the WS-Resource MAY be destroyed immediately. This facility provides the ability to support
365     an asynchronous form of immediate destruction.

366     If the value is xsi:nil, then the intent of the service requestor is to specify there is no
367     scheduled termination time for the WS-Resource. In such situations it is RECOMMENDED
368     that the WS-Resource support the immediate WS-Resource destruction operations
369     described in Section 4.

370 /wsrf-rl:SetTerminationTime/wsrf-rl:RequestedLifetimeDuration

371     The new TerminationTime requested by the client is to be calculated by adding the duration
372     of time specified in the message to the CurrentTime known to the WS-Resource.

373     If a zero or negative duration is specified then the WS-Resource MAY be destroyed
374     immediately. This facility provides the ability to support an asynchronous form of immediate
375     destruction.

376

377 A WS-Resource that receives this message MAY reject the request to change the WS-
378 Resource's termination time for any reason (e.g. policy). In this case, a fault message MUST be
379 returned to the service requestor.

380 If a WS-Resource accepts the request to set the WS-Resource's termination time, it MUST
381 update the TerminationTime resource property of the WS-Resource to the value specified in the
382 message or to a value "in the future" relative to the requested time. If the SetTerminationTime
383 request message is accepted, the WS-Resource MUST respond with the following message:

```
384    <wsrf-rl:SetTerminationTimeResponse>
385      <wsrf-rl:NewTerminationTime xsi:nil="xsd:boolean"?>
386         xsd:dateTime
387      </wsrf-rl:NewTerminationTime>
388      <wsrf-rl:CurrentTime>
389         xsd:dateTime
390      </wsrf-rl:CurrentTime>
391    <wsrf-rl:SetTerminationTimeResponse>
```

392 Further constraints on the SetTerminationTimeResponse message are as follows:

393 /wsrf-rl:SetTerminationTimeResponse/wsrf-rl:NewTerminationTime

394     This value MAY be "in the future" relative to the xsd:dateTime requested by the service
395     requestor in the SetTerminationTime request message.

**Deleted:** The SetTerminationTime message MUST follow the WS-Resource Access Pattern, as defined in [WS-RAP].

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| 396 | This value reflects the new date and time at which the WS-Resource is scheduled to be |
| 397 | destroyed. If the value is xsi:nil, it implies that the resource will not be destroyed for an |
| 398 | indefinite period of time. In such situations, it is RECOMMENDED that the WS-Resource |
| 399 | support the immediate WS-Resource destruction operations outlined in Section 4. |
| 400 | This value MUST also be reflected through the value of the TerminationTime resource |
| 401 | property. |
| 402 | /wsrf-rl:SetTerminationTimeResponse/wsrf-rl:CurrentTime |
| 403 | This value MUST be the time, as it is known by the WS-Resource, at which the WS- |
| 404 | Resource processed this SetTerminationTimeRequest. |

405 If the WS-Resource does not respond to the SetTerminationTime request with the
406 SetTerminationTimeResponse message then it MUST send a fault. This specification defines the
407 following faults associated with failure to process the SetTerminationTimeResponse request
408 message, in addition to those faults defined for all WS-Resources in [WS-Resource]

409 • UnableToSetTerminationTimeFault

410   o The request for termination time could not be changed for some reason.

411 • TerminationTimeChangeRejectedFault

412   o In the case where a WS-Resource is willing to update its TerminationTime, but only
413     with a value "in the past" relative to the requested termination time, then the WS-
414     Resource MAY include a "hint" in the TerminationTimeRejectedFault message
415     indicating the time to which it is willing to extend its TerminationTime.

416

417 One of these faults, or a specialization thereof, SHOULD be sent upon failure although other fault
418 messages MAY be returned instead.

419 The wsa:Action MUST contain the following URI: "http://docs.oasis-open.org/wsrf/rlw-
420 2/ScheduledResourceTermination/SetTerminationTimeResponse".

421

## 5.5 Example SOAP Encoding of the SetTerminationTime Message Exchange

424 The following is a non-normative example of a SetTerminationTime request message using
425 SOAP 1.1 [SOAP 1.1]:

```
426 <s11:Envelope . . .>
427   <s11:Header>
428     . . .
429     <wsa:Action>
430       http://docs.oasis-open.org/wsrf/rlw-
431 2/ScheduledResourceTermination/SetTerminationTimeRequest
432     </wsa:Action>
433     . . .
434   </s11:Header>
435   <s11:Body>
436     <wsrf-rl:SetTerminationTime>
437       <wsrf-rl:RequestedTerminationTime>
438         2001-12-31T12:00:00Z
```

**Deleted:** Instead of the SetTerminationTimeResponse message, the Web service MUST send a fault.¶
This specification defines the following faults associated with failure to process the SetTerminationTimeRequest message¶
ResourceUnknownFault¶
The WS-Resource identified in the message (which follows the WS-Resource Access Pattern) is not known to the Web service. This fault is enumerated in the WS-Resource [WS-RAP] specification.

**Deleted:** 1

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```
439        </wsrf-rl:RequestedTerminationTime>
440      </wsrf-rl:SetTerminationTime>
441    </s11:Body>
442  </s11:Envelope>
```

The following is an example SetTerminationTimeResponse message using SOAP 1.1 [SOAP
1.1]:

```
445  <s11:Envelope . . . >
446    <s11:Header>
447      . . .
448      <wsa:Action>
449          http://docs.oasis-open.org/wsrf/rlw-
450  2/ScheduledResourceTermination/SetTerminationTimeResponse
451      </wsa:Action>
452      . . .
453    </s11:Header>
454    <s11:Body>
455      <wsrf-rl:SetTerminationTimeResponse>
456        <wsrf-rl:NewTerminationTime>
457            2001-12-31T12:00:00Z
458        </wsrf-rl:NewTerminationTime>
459        <wsrf-rl:CurrentTime>
460            2001-12-31T11:00:00Z
461        </wsrf-rl:CurrentTime>
462      </wsrf-rl:SetTerminationTimeResponse>
463    </s11:Body>
464  </s11:Envelope>
```

<div style="float:right;border:1px solid red;">Deleted: 1</div>

## 5.6 Termination Time Expiration

If the service requestor fails to successfully update the termination time of a WS-Resource before
the termination time expires, the WS-Resource MAY be destroyed and therefore no longer be
accessible. Termination time has expired when the termination time of the WS-Resource (as
reflected by the value of the WS-Resource's TerminationTime resource property element) is "in
the past" relative to the current time as expressed in the value of the WS-Resource's CurrentTime
resource property element.

The specific mechanisms employed to destroy the WS-Resource after termination time has
expired is implementation dependent. An implementation MAY delay destruction of the WS-
Resource at its own discretion. The requestor MUST NOT depend on the destruction of the WS-
Resource occurring at termination time expiration but SHOULD assume that the WS-Resource is
no longer accessible after termination time has expired.

# 6 Notification of Resource Destruction

A WS-Resource MAY choose to support the pattern of notifying interested parties when it is destroyed. If a WS-Resource chooses to support this pattern and if the WS-Resource uses WS-BaseNotification [WS-BaseNotification] to implement this pattern, then it MUST follow the approach described in this section. An implementation MAY choose to not support this pattern, or it MAY choose to do so using some means other than WS-BaseNotification; in such circumstances, the implementation MAY ignore the approach described in this section.

If the WS-Resource is also a NotificationProducer, according to the WS-BaseNotification specification [WS-BaseNotification], then it SHOULD provide a topic [WS-Topics] to allow requestors to subscribe for notification of its destruction. The notification applies to both immediate and scheduled destruction. The form of the topic is:

```
<wstop:TopicNamespace name="ResourceLifetime"
    targetNamespace=
     "http://docs.oasis-open.org/wsrf/rl-2"
… >
   <wstop:Topic name="ResourceTermination" …>
      <wstop:MessagePattern>
         <wsrf-rp:QueryExpression
           dialect="http://www.w3.org/TR/1999/REC-xpath-19991116" >
             boolean(/*/TerminationNotification)
         </wsrf-rp:QueryExpression>
      </wstop:MessagePattern>
   </wstop:Topic>
</wstop:TopicNamespace>
```

The value of /wstop:Topic/@MessageTypes is implementation-dependent; this specification does not define the exact content of the notification messages produced on this topic. However, the notification message associated with this topic MUST contain the following element:

```
<wsrf-rl:TerminationNotification>
  <wsrf-rl:TerminationTime xsi:nil="xsd:boolean"?>xsd:dateTime</wsrf-
rl:TerminationTime>
  <wsrf-rl:TerminationReason>xsd:any</wsrf-rl:TerminationReason>?
</wsrf-rl:TerminationNotification>
```

This constraint is specified in the /wstop:Topic/wstop:MessagePattern element. The TerminationNotification element is further constrained as follows:

/wsrf-rl:TerminationTime

> This element contains the date and time when the WS-Resource was destroyed.

/wsrf-rl:TerminationReason

> This OPTIONAL element contains an explanation of the situation surrounding the destruction of the WS-Resource. This element is specific to the type of the WS-Resource that was destroyed.

A requestor would send a subscribe request message, following the WS-BaseNotification specification, specifying the "ResourceTermination" topic and referencing a chosen WS-Resource using a WS-Resource Reference [WS-Resource].

**Deleted:** s

**Deleted:** 1

**Deleted:** ¶

**Deleted:** ¶

**Deleted:** s

**Deleted:** WS-RAP

# 7 Security Considerations

This specification defines the message exchanges used to request the destruction of a WS-Resource, or to obtain information about the termination time of the WS-Resource. In this context, there are two categories of security aspects that need to be considered: (a) securing the message exchanges and (b) securing the operations that perform the WS-Resource destruction.

## 7.1 Securing the Message Exchanges

When messages are exchanged between a requestor and a WS-Resource in order to access or act upon one or more resource properties, it is RECOMMENDED that the communication between the services be secured using the mechanisms described in WS-Security.

## 7.2 Securing Resource Destruction

Given that WS-ResourceLifetime defines a mechanism to destroy WS-Resources, security policies should be established to ensure that only authorized requestors can destroy a WS-Resource. Authorization policies should be defined so that the implications of destroying a WS-Resource either through immediate requests or by setting termination time, are considered. The two approaches for destruction may be considered equivalent for authorization reasons. In other words, an authorization policy that describes the ability to perform a Destroy operation on a WS-Resource, conforming to the ImmediateResourceTermination portType, may also need to be applied when the SetTerminationTime operation is performed on the same resource.

It should be noted that this specification does not allow modifications to the CurrentTime and TerminationTime resource properties through the SetResourceProperty request message of WS-ResourceProperties.  Therefore, there should be no authorization enforcement performed when these resource properties are accessed using the Set request message; however, it should be left to the runtime to enforce the requirement as specified. Given a requestor can subscribe for notification of the destruction of the resource using "ResourceLifetime" topic, the security considerations specified in WS-BaseNotification specification are applicable to this topic.

## 8 References

### 8.1 Normative

**[WS-Addressing]**

http://www.w3.org/TR/ws-addr-core/

**[WS-BaseNotification]**

http://docs.oasis-open.org/wsn/wsn-WS-BaseNotification-1.3-pr-02.pdf

**[WS-BaseFaults]**

http://docs.oasis-open.org/wsrf/wsrf_ws_base_faults-1.2-spec-pr-02.pdf

**[WS-Resource]**

http://docs.oasis-open.org/wsrf/wsrf-ws_resource-1.2-spec-pr-02.pdf

**[WS-ResourceProperties]**

http://docs.oasis-open.org/wsrf/wsrf_ws_resource_properties-1.2-spec-pr-02.pdf

**[WS-Topics]**

http://docs.oasis-open.org/wsn/wsn-WS-Topics-1.3-pr-01.pdf

**[XML]**

http://www.w3.org/TR/REC-xml

**[XML-Infoset]**

http://www.w3.org/TR/xml-infoset/

### 8.2 Non-Normative

**[OGSI]**

GGF GFD.15 "Open Grid Services Infrastructure (OGSI) Version 1.0". Available at http://forge.gridforum.org/projects/ogsi-wg

**[SOAP 1.1]**

http://www.w3.org/TR/2000/NOTE-SOAP-20000508/

**[WS-Security]**

http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-soap-message-security-1.0.pdf

**[WS-I Basic Profile 1.1]**

http://www.ws-i.org/Profiles/BasicProfile-1.1.html

# Appendix A. Acknowledgments

Special thanks to the Global Grid Forum's Open Grid Services Infrastructure working group, which defined the OGSI v1.0 [OGSI] specification which was a large inspiration for the ideas expressed in this specification.

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), David Martin (IBM), Samuel Meder (ArgonneNational 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), Matsunori Satomi (Hitachi), Igor Sedukhin (Computer Associates), Hitoshi Sekine (Ricoh Company, Ltd.), Frank Siebenlist (ArgonneNational Laboratory), Alex Sim (Lawrence Berkeley National Laboratory), David Snelling (Fujitsu), Latha Srinivasan (Hewlett-Packard), Jem Treadwell (Hewlett-Packard), Steve Tuecke (ArgonneNational 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).

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Karl Czajkowski (Globus / USC/ISI), Donald F Ferguson (IBM), Ian Foster (Globus / Argonne), Jeffrey Frey (IBM), Frank Leymann (IBM), Nataraj Nagaratnam (IBM), Martin Nally (IBM), Tony Storey (IBM), Sanjiva Weerawarana (IBM)

# 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/rl-2.xsd

**Deleted:** 1

```xml
                  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:wsrf-rl="http://docs.oasis-open.org/wsrf/rl-2"
                  xmlns:wsrf-bf="http://docs.oasis-open.org/wsrf/bf-2"
                  elementFormDefault="qualified" attributeFormDefault="unqualified"
                  targetNamespace="http://docs.oasis-open.org/wsrf/rl-2">

     <xsd:import namespace="http://docs.oasis-open.org/wsrf/bf-2"
     schemaLocation="http://docs.oasis-open.org/wsrf/bf-2.xsd" />
     <!--
          =============== Resource Property Related  ====================
     -->
     <!--
          ==== Resource Properties for ScheduledResourceTermination ====
     -->

     <xsd:element name="CurrentTime" >
          <xsd:complexType>
                  <xsd:simpleContent>
                          <xsd:extension base="xsd:dateTime" >
                                  <xsd:anyAttribute namespace="##other"
processContents="lax"/>
                          </xsd:extension>
                  </xsd:simpleContent>
          </xsd:complexType>
     </xsd:element>

     <xsd:element name="TerminationTime" nillable="true">
     <xsd:complexType>
                  <xsd:simpleContent>
                          <xsd:extension base="xsd:dateTime" >
                                  <xsd:anyAttribute namespace="##other"
processContents="lax"/>
                          </xsd:extension>
                  </xsd:simpleContent>
          </xsd:complexType>
     </xsd:element>


     <!-- ==== Resource Properties for ScheduledResourceTermination ==== -
->
     <xsd:element name="ScheduledResourceTerminationRP">
          <xsd:complexType>
                  <xsd:sequence>
                          <xsd:element maxOccurs="1" minOccurs="1"
ref="wsrf-rl:CurrentTime" />
                          <xsd:element maxOccurs="1" minOccurs="1"
ref="wsrf-rl:TerminationTime" />
                  </xsd:sequence>
          </xsd:complexType>
     </xsd:element>

     <!-- ====== Message Types for ImmediateResourceTermination  ======= -
->
     <xsd:element name="Destroy">
          <xsd:complexType />
```

```
720        </xsd:element>
721

722     <xsd:element name="DestroyResponse">
723            <xsd:complexType />
724     </xsd:element>
725

726     <xsd:complexType name="ResourceNotDestroyedFaultType">
727            <xsd:complexContent>
728                    <xsd:extension base="wsrf-bf:BaseFaultType" />
729            </xsd:complexContent>
730     </xsd:complexType>
731     <xsd:element name="ResourceNotDestroyedFault" type="wsrf-
732  rl:ResourceNotDestroyedFaultType" />
733     <!-- ====== Message Types for ScheduledResourceTermination  ======= -
734  ->
735     <xsd:element name="SetTerminationTime">
736            <xsd:complexType>
737                    <xsd:choice>
738                            <xsd:element name="RequestedTerminationTime"
739  nillable="true" type="xsd:dateTime" />
740                            <xsd:element name="RequestedLifetimeDuration"
741  type="xsd:duration" />
742                    </xsd:choice>
743            </xsd:complexType>
744     </xsd:element>
745

746     <xsd:element name="SetTerminationTimeResponse">
747            <xsd:complexType>
748                    <xsd:sequence>
749                            <xsd:element name="NewTerminationTime"
750  nillable="true" type="xsd:dateTime" />
751                            <xsd:element name="CurrentTime"
752  type="xsd:dateTime" />
753                    </xsd:sequence>
754            </xsd:complexType>
755     </xsd:element>
756     <xsd:complexType name="UnableToSetTerminationTimeFaultType">
757            <xsd:complexContent>
758                    <xsd:extension base="wsrf-bf:BaseFaultType" />
759            </xsd:complexContent>
760     </xsd:complexType>
761

762     <xsd:element name="UnableToSetTerminationTimeFault" type="wsrf-
763  rl:UnableToSetTerminationTimeFaultType" />
764     <xsd:complexType name="TerminationTimeChangeRejectedFaultType">
765            <xsd:complexContent>
766                    <xsd:extension base="wsrf-bf:BaseFaultType" />
767            </xsd:complexContent>
768     </xsd:complexType>
769     <xsd:element name="TerminationTimeChangeRejectedFault" type="wsrf-
770  rl:TerminationTimeChangeRejectedFaultType" />
771

772

773     <!--
774         ============= Notification Message Related  ==================
775     -->
776     <xsd:element name="TerminationNotification">
```

```
777              <xsd:complexType>
778                  <xsd:sequence>
779                      <xsd:element name="TerminationTime"
780     type="xsd:dateTime" minOccurs="1" maxOccurs="1" nillable="true" />
781                      <xsd:element name="TerminationReason"
782     type="xsd:anyType" minOccurs="0" maxOccurs="1" />
783                  </xsd:sequence>
784
785          </xsd:complexType>
786      </xsd:element>
787
788
789     </xsd:schema>
```

# Appendix C. WSDL 1.1

790

791 The WSDL 1.1 for the Web service methods described in this specification is compliant
792 with WS-I Basic Profile 1.1 [WS-I Basic Profile 1.1] and is included here for convenience.
793 The authoritative version of this WSDL is available at:

794 http://docs.oasis-open.org/wsrf/rlw-2.wsdl

```
795  <?xml version="1.0" encoding="UTF-8"?>
796  <!--
797
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834
```

```
-->
<wsdl:definitions name="WS-ResourceLifetime"
targetNamespace="http://docs.oasis-open.org/wsrf/rlw-2"
xmlns="http://schemas.xmlsoap.org/wsdl/"
xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
xmlns:wsrf-bf="http://docs.oasis-open.org/wsrf/bf-2"
xmlns:wsrf-rl="http://docs.oasis-open.org/wsrf/rl-2"
xmlns:wsrf-rlw="http://docs.oasis-open.org/wsrf/rlw-2"
xmlns:wsrf-rp="http://docs.oasis-open.org/wsrf/rp-2"
xmlns:wsrf-rw="http://docs.oasis-open.org/wsrf/rw-2"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/">

   <wsdl:import namespace="http://docs.oasis-open.org/wsrf/rw-2"
       location="http://docs.oasis-open.org/wsrf/rw-2.wsdl"/>
   <wsdl:types>
         <xsd:schema attributeFormDefault="unqualified"
elementFormDefault="qualified"
xmlns="http://www.w3.org/2001/XMLSchema">
                <xsd:import namespace="http://docs.oasis-
open.org/wsrf/rl-2"
                       schemaLocation="http://docs.oasis-
open.org/wsrf/rl-2.xsd" />
         </xsd:schema>
   </wsdl:types>

   <wsdl:message name="SetTerminationTimeRequest">
         <wsdl:part element="wsrf-rl:SetTerminationTime"
name="SetTerminationTimeRequest" />
   </wsdl:message>
   <wsdl:message name="DestroyResponse">
         <wsdl:part element="wsrf-rl:DestroyResponse"
name="DestroyResponse" />
   </wsdl:message>
   <wsdl:message name="SetTerminationTimeResponse">
         <wsdl:part element="wsrf-rl:SetTerminationTimeResponse"
name="SetTerminationTimeResponse" />
   </wsdl:message>

   <wsdl:message name="DestroyRequest">
         <wsdl:part element="wsrf-rl:Destroy" name="DestroyRequest" />
   </wsdl:message>
   <wsdl:message name="ResourceNotDestroyedFault">
         <wsdl:part element="wsrf-rl:ResourceNotDestroyedFault"
name="ResourceNotDestroyedFault" />
   </wsdl:message>

   <wsdl:message name="UnableToSetTerminationTimeFault">
         <wsdl:part element="wsrf-rl:UnableToSetTerminationTimeFault"
name="UnableToSetTerminationTimeFault" />
   </wsdl:message>
```

```
892      <wsdl:message name="TerminationTimeChangeRejectedFault">
893          <wsdl:part element="wsrf-
894  rl:TerminationTimeChangeRejectedFault"
895  name="TerminationTimeChangeRejectedFault" />
896      </wsdl:message>
897      <wsdl:portType name="ImmediateResourceTermination">
898          <wsdl:operation name="Destroy">
899              <wsdl:input name="DestroyRequest" message="wsrf-
900  rlw:DestroyRequest" />
901
902              <wsdl:output name="DestroyResponse" message="wsrf-
903  rlw:DestroyResponse" />
904              <wsdl:fault message="wsrf-
905  rlw:ResourceNotDestroyedFault" name="ResourceNotDestroyedFault" />
906              <wsdl:fault name="ResourceUnknownFault" message="wsrf-
907  rw:ResourceUnknownFault" />
908                  <wsdl:fault name="ResourceUnavailableFault"
909  message="wsrf-rw:ResourceUnavailableFault"/>
910          </wsdl:operation>
911      </wsdl:portType>
912      <wsdl:portType name="ScheduledResourceTermination"
913                     wsrf-rp:ResourceProperties="wsrf-
914  rl:ScheduledResourceTerminationRP">
915          <wsdl:operation name="SetTerminationTime">
916              <wsdl:input name="SetTerminationTimeRequest"
917  message="wsrf-rlw:SetTerminationTimeRequest" />
918              <wsdl:output name="SetTerminationTimeResponse"
919  message="wsrf-rlw:SetTerminationTimeResponse" />
920
921              <wsdl:fault message="wsrf-
922  rlw:UnableToSetTerminationTimeFault"
923  name="UnableToSetTerminationTimeFault" />
924              <wsdl:fault name="ResourceUnknownFault" message="wsrf-
925  rw:ResourceUnknownFault" />
926                  <wsdl:fault name="ResourceUnavailableFault"
927  message="wsrf-rw:ResourceUnavailableFault"/>
928              <wsdl:fault message="wsrf-
929  rlw:TerminationTimeChangeRejectedFault"
930  name="TerminationTimeChangeRejectedFault" />
931          </wsdl:operation>
932      </wsdl:portType>
933  </wsdl:definitions>
```

# Appendix D. Revision History

934

935 *[This appendix is optional, but helpful. It should be removed for specifications that are at OASIS*
936 *Standard level.]*

| Rev | Date | By Whom | What |
|-----|------|---------|------|
| wd-01 | 2004-05-21 | Latha Srinivasan | Initial version created from submission by contributing companies. Minor modifications made to reflect OASIS formatting and the following issues: WSRF2, WSRF3, WSRF14, WSRF33. |
| wd-02 | 2004-06-01 | Latha Srinivasan | Modification to Acknowledgments section to reflect TC list as per WS-RP draft spec. v 1.2 |
| Wd-03 | 2004-06-08 | Latha Srinivasan | Fixed namespaces to reflect 2004/06; replaced rogue verdana fonts with Arial; updated Acknowledgments section; added ElementFormDefault and attributeFormDefault to schema and XSD files; updated references to point to pdf versions of files; Fixed reference for WS-BaseNotification and replaced references to "lifecycle" with lifetime |
| wd-04 | 2004-11-04 | Latha Srinivasan | Addressed issues WSRF6, WSRF30, WSRF43,WSRF49, WSRF53 and WSRF56 in addition to changes suggested by Ian Robinson in email dated Nov 6, 2004 |
| wd-05 | 2004-12-22 | Latha Srinivasan | Addressed issues 84 and 85 to keep the doc in sync with the WSDL and XSD files of rev. 05. Also updated namespaces for WSRF-BF and WSRF-RP. |
| wd-05a | 2005-02-15 | Tim Banks & Latha Srinivasan | Reflects resolutions for Issues 19, 62, 63, 81, 84, 85, 86, 93 and 96 |
| wd-06.a | 2005-04-18 | Tim Banks | Resolution of issue 99 (and corrections to examples), 92 |
| wd-07 | 2005-05-11 | Latha Srinivasan | Resolution of issues 91,101 and 103 and change of namespaces and document identifiers |
| wd-08 | 2005-05-17 | Tim Banks | Resolution of issues 100,109,113 |

| Rev | Date | By Whom | What |
|-----|------|---------|------|
| wd-09 | 2005-05-18 | Latha Srinivasan | Resolution of issue #:114 and updated Acknowledgements section per Ian's mail |
| cd-01 | 2005-05-19 | Latha Srinivasan | First Committee draft |
| wd-10 | 2005-09-15 | Tim Banks | Resolution of issues 127 141, 152, 147, 150. |

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

```xml
-->
<wsdl:definitions name="WS-ResourceLifetime"
targetNamespace="http://docs.oasis-open.org/wsrf/rlw-l"
xmlns="http://schemas.xmlsoap.org/wsdl/"
xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
xmlns:wsrf-bf="http://docs.oasis-open.org/wsrf/bf-1"
xmlns:wsrf-rl="http://docs.oasis-open.org/wsrf/rl-1"
```

```
xmlns:wsrf-rlw="http://docs.oasis-open.org/wsrf/rlw-1"
xmlns:wsrf-rp="http://docs.oasis-open.org/wsrf/rp-1"
xmlns:wsrf-rw="http://docs.oasis-open.org/wsrf/rw-1"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/">

        <wsdl:import namespace="http://docs.oasis-open.org/wsrf/rw-1"
    location="http://docs.oasis-open.org/wsrf/rw-1" />
        <wsdl:types>
                <xsd:schema attributeFormDefault="unqualified"
elementFormDefault="qualified" xmlns="http://www.w3.org/2001/XMLSchema">
                        <xsd:import namespace="http://docs.oasis-open.org/wsrf/rl-1"
                                schemaLocation="http://docs.oasis-open.org/wsrf/rl-1"
/>
                </xsd:schema>
        </wsdl:types>

        <wsdl:message name="SetTerminationTimeRequest">
                <wsdl:part element="wsrf-rl:SetTerminationTime"
name="SetTerminationTimeRequest" />
        </wsdl:message>
        <wsdl:message name="DestroyResponse">
                <wsdl:part element="wsrf-rl:DestroyResponse"
name="DestroyResponse" />
        </wsdl:message>
        <wsdl:message name="SetTerminationTimeResponse">
                <wsdl:part element="wsrf-rl:SetTerminationTimeResponse"
name="SetTerminationTimeResponse" />
        </wsdl:message>

        <wsdl:message name="DestroyRequest">
                <wsdl:part element="wsrf-rl:Destroy" name="DestroyRequest" />
        </wsdl:message>
        <wsdl:message name="ResourceNotDestroyedFault">
                <wsdl:part element="wsrf-rl:ResourceNotDestroyedFault"
name="ResourceNotDestroyedFault" />
        </wsdl:message>

        <wsdl:message name="UnableToSetTerminationTimeFault">
                <wsdl:part element="wsrf-rl:UnableToSetTerminationTimeFault"
name="UnableToSetTerminationTimeFault" />
        </wsdl:message>
        <wsdl:message name="TerminationTimeChangeRejectedFault">
                <wsdl:part element="wsrf-rl:TerminationTimeChangeRejectedFault"
name="TerminationTimeChangeRejectedFault" />
        </wsdl:message>
        <wsdl:portType name="ImmediateResourceTermination">
                <wsdl:operation name="Destroy">
                        <wsdl:input name="DestroyRequest" message="wsrf-
rlw:DestroyRequest" />
```

```
                        <wsdl:output name="DestroyResponse" message="wsrf-
rlw:DestroyResponse" />
                        <wsdl:fault message="wsrf-rlw:ResourceNotDestroyedFault"
name="ResourceNotDestroyedFault" />
                        <wsdl:fault name="ResourceUnknownFault" message="wsrf-
rw:ResourceUnknownFault" />
                </wsdl:operation>
        </wsdl:portType>
        <wsdl:portType name="ScheduledResourceTermination"
                                wsrf-rp:ResourceProperties="wsrf-
rl:ScheduledResourceTerminationRP">
                <wsdl:operation name="SetTerminationTime">
                        <wsdl:input name="SetTerminationTimeRequest"
message="wsrf-rlw:SetTerminationTimeRequest" />
                        <wsdl:output name="SetTerminationTimeResponse"
message="wsrf-rlw:SetTerminationTimeResponse" />

                        <wsdl:fault message="wsrf-
rlw:UnableToSetTerminationTimeFault" name="UnableToSetTerminationTimeFault"
/>
                        <wsdl:fault name="ResourceUnknownFault" message="wsrf-
rw:ResourceUnknownFault" />
                        <wsdl:fault message="wsrf-
rlw:TerminationTimeChangeRejectedFault"
name="TerminationTimeChangeRejectedFault" />
                </wsdl:operation>
        </wsdl:portType>
</wsdl:definitions>
```