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Web Services Resource Lifetime 1.2 (WS-ResourceLifetime)

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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:
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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.
- Define the means by which a service requestor can update the termination time associated with a WS-Resource that is scheduled for termination.

105   • Define the means by which a service requestor can determine the current termination
106   time as known by a WS-Resource.

107 This specification MUST NOT require entities in the system to share synchronized clocks.

1.1.2 Non-Goals

109 The following topics are outside the scope of this specification:

110   • It is not an objective of this specification to define the message exchanges representing
111   the function of a WS-Resource factory. Factory requirements are too varied to allow a
112   general-purpose factory message exchange to be usefully defined.

1.2 Terminology

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

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

120

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

124   • `?′ denotes optionality (i.e. zero or one occurrences),
125   • `*′ denotes zero or more occurrences,
126   • `+′ one or more occurrences,
127   • `[′ and  `]′ are used to form groups,
128   • `|′ represents choice.
129   • Attributes are conventionally assigned a value which corresponds to their type, as
130   defined in the normative schema.

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

140

141 Where there is disagreement between the separate xml schema and wsd lfiles describing the
142 messages defined by this specification and the normative descriptive text (excluding any pseudo-
143 schema) in this document, the normative descriptive text will take precedence over the separate
144 files. The separate files take precedence over any pseudo-schema and over any schema and
145 wsdl included in the appendices.

146

147 ## 1.3 Namespaces

148 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

149

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

158 2 Terminology and Concepts

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

160

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

163

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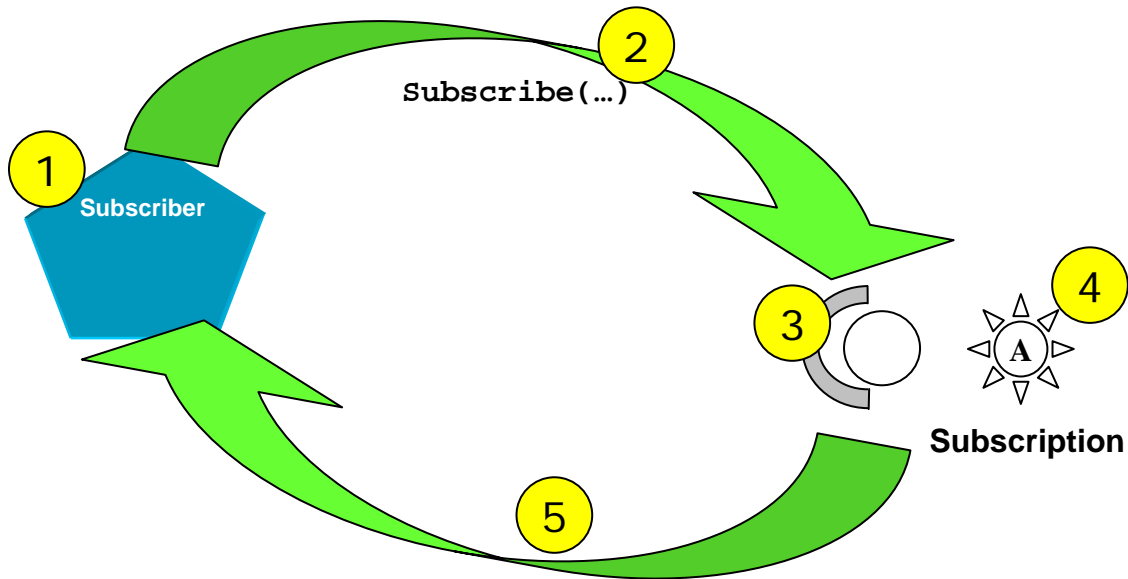166 [WS-ResourceProperties] specification.

167 .

¹⁶⁸ 3 Example

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

171 *Figure 1 - Example WS-Resource Creation*

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

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

187 Subsequent to the creation of the subscription WS-Resource, the application-specific behavior of
188 delivering notifications continues. Occasionally, the subscriber may examine the subscription WS-
189 Resource using standard WS-ResourceLifetime resource properties to inquire about the
190 remaining time before the subscription WS-Resource may be destroyed. If the subscriber wishes
191 to extend the lifetime of the subscription WS-Resource beyond its scheduled termination time, it
192 sends a specific WS-ResourceLifetime message to the subscription WS-Resource referenced by

193 its WS-Resource Reference, prior to the expiration of its current scheduled termination time. The
194 response to this message contains the (potentially unchanged) termination time associated with
195 the subscription WS-Resource.

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

201 4 Immediate Destruction

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

204 The format of the destroy request message is:

```
205  …
206     <wsrf-rl:Destroy/>
207  …
```

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

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

```
213  …
214     <wsrf-rl:DestroyResponse />
215  …
```

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

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

225

226 •   ResourceNotDestroyedFault

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

228

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

231 The wsa:Action MUST contain the URI: "http://docs.oasis-open.org/wsrf/rlw-
232 2/ImmediateResourceTermination/DestroyResponse".

233

234 4.1 Example SOAP Encoding of the Destroy Message Exchange

235 The following is a non-normative example of a DestroyRequest message using SOAP 1.1 [SOAP
236 1.1]:

```
237  <s11:Envelope . . .>
238    <s11:Header>
239     . . .
240      <wsa:Action>
241         http://docs.oasis-open.org/wsrf/rlw-
242  2/ImmediateResourceTermination/DestroyRequest
243      </wsa:Action>
```

```
244        . . .
245      </s11:Header>
246      <s11:Body>
247        <wsrf-rl:Destroy/>
248      </s11:Body>
249    </s11:Envelope>
```

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

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

5 Scheduled Destruction

264

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

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

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

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

5.1 Regarding Time

280

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

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

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

5.2 Querying Current Time

300

301 In order to assist the service requestor in inspecting and setting a WS-Resource's termination
302 time without requiring a specific accuracy of clock synchronization between the service requestor
303 and the service provider, the WS-Resource must provide information about its local time. If the
304 SetTerminationTime request is supported, the resource properties document MUST include a
305 resource property element that provides the current time as it is known by the WS-Resource. The
306 form of this resource property element is:

307

```
308   …
309   <wsrf-rl:CurrentTime>xsd:dateTime</wsrf-rl:CurrentTime>
310   …
```

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

313 /wsrf-rl:CurrentTime

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

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

5.3 Determining Current Termination Time

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

```
322   …
323     <wsrf-rl:TerminationTime xsi:nil="xsd:boolean"?>xsd:dateTime</wsrf-
324   rl:TerminationTime>
325   …
```

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

328 /wsrf-rl:TerminationTime

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

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

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

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

5.4 Requesting Change to Termination Time

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

```
343     <wsrf-rl:SetTerminationTime>
344       [<wsrf-rl:RequestedTerminationTime xsi:nil="xsd:boolean"?>
345         xsd:dateTime
346       </wsrf-rl:RequestedTerminationTime>]
347           |
348       [<wsrf-rl:RequestedLifetimeDuration>
349         xsd:duration
350       </wsrf-rl:RequestedLifetimeDuration>]
351     </wsrf-rl:SetTerminationTime>
```

352 The wsa:Action MUST contain the following URI: "http://docs.oasis-open.org/wsrf/rlw-
353 2/ScheduledResourceTermination/SetTerminationTimeRequest".

354 Further constraints on the processing of the SetTerminationTimeRequest message are as
355 follows:

356 /wsrf-rl:SetTerminationTime/wsrf-rl:RequestedTerminationTime

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

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

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

368 /wsrf-rl:SetTerminationTime/wsrf-rl:RequestedLifetimeDuration

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

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

374

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

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

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

390 Further constraints on the SetTerminationTimeResponse message are as follows:

391 /wsrf-rl:SetTerminationTimeResponse/wsrf-rl:NewTerminationTime

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

394 This value reflects the new date and time at which the WS-Resource is scheduled to be
395 destroyed. If the value is xsi:nil, it implies that the resource will not be destroyed for an
396 indefinite period of time. In such situations, it is RECOMMENDED that the WS-Resource
397 support the immediate WS-Resource destruction operations outlined in Section 4.

398 This value MUST also be reflected through the value of the TerminationTime resource
399 property.

400 /wsrf-rl:SetTerminationTimeResponse/wsrf-rl:CurrentTime

401   This value MUST be the time, as it is known by the WS-Resource, at which the WS-
402   Resource processed this SetTerminationTimeRequest.

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

407 •   UnableToSetTerminationTimeFault

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

409 •   TerminationTimeChangeRejectedFault

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

414

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

417 The wsa:Action MUST contain the following URI: "http://docs.oasis-open.org/wsrf/rlw-
418 2/ScheduledResourceTermination/SetTerminationTimeResponse".

419

5.5 Example SOAP Encoding of the SetTerminationTime Message Exchange

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

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

441 The following is an example SetTerminationTimeResponse message using SOAP 1.1 [SOAP
442 1.1]:

```
443 <s11:Envelope . . . >
444   <s11:Header>
445     . . .
446     <wsa:Action>
```

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

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

476

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

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

```
487 <wstop:TopicNamespace name="ResourceLifetime"
488     targetNamespace=
489       "http://docs.oasis-open.org/wsrf/rl-2"
490 … >
491     <wstop:Topic name="ResourceTermination" …>
492         <wstop:MessagePattern>
493             <wsrf-rp:QueryExpression
494               dialect="http://www.w3.org/TR/1999/REC-xpath-19991116" >
495                 boolean(/*/TerminationNotification)
496             </wsrf-rp:QueryExpression>
497         </wstop:MessagePattern>
498     </wstop:Topic>
499 </wstop:TopicNamespace>
500
```

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

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

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

511 /wsrf-rl:TerminationTime

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

513 /wsrf-rl:TerminationReason

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

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

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_base_notification-1.3-spec-pr-02.pdf

[WS-BaseFaults]

http://docs.oasis-open.org/wsrf/wsrf-ws_base_faults-1.2-spec-cs-01.pdf

[WS-Resource]

http://docs.oasis-open.org/wsrf/wsrf-ws_resource-1.2-spec-cs-01.pdf

[WS-ResourceProperties]

http://docs.oasis-open.org/wsrf/wsrf-ws_resource_properties-1.2-spec-cs-01.pdf

[WS-Topics]

http://docs.oasis-open.org/wsn/wsn-ws_topics-1.3-spec-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

579

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).

In addition, the following people made contributions to this specification:

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

```
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<!--

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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"
```

```
666    xmlns:wsrf-rl="http://docs.oasis-open.org/wsrf/rl-2"
667    xmlns:wsrf-bf="http://docs.oasis-open.org/wsrf/bf-2"
668    elementFormDefault="qualified" attributeFormDefault="unqualified"
669    targetNamespace="http://docs.oasis-open.org/wsrf/rl-2">
670
671        <xsd:import namespace="http://docs.oasis-open.org/wsrf/bf-2"
672        schemaLocation="http://docs.oasis-open.org/wsrf/bf-2.xsd" />
673        <!--
674              =============== Resource Property Related  ===================
675        -->
676        <!--
677              ==== Resource Properties for ScheduledResourceTermination ====
678        -->
679
680        <xsd:element name="CurrentTime" >
681                <xsd:complexType>
682                        <xsd:simpleContent>
683                                <xsd:extension base="xsd:dateTime" >
684                                        <xsd:anyAttribute namespace="##other"
685    processContents="lax"/>
686                                </xsd:extension>
687                        </xsd:simpleContent>
688                </xsd:complexType>
689        </xsd:element>
690
691        <xsd:element name="TerminationTime" nillable="true">
692        <xsd:complexType>
693                        <xsd:simpleContent>
694                                <xsd:extension base="xsd:dateTime" >
695                                        <xsd:anyAttribute namespace="##other"
696    processContents="lax"/>
697                                </xsd:extension>
698                        </xsd:simpleContent>
699                </xsd:complexType>
700        </xsd:element>
701
702
703        <!-- ==== Resource Properties for ScheduledResourceTermination ==== -
704    ->
705        <xsd:element name="ScheduledResourceTerminationRP">
706                <xsd:complexType>
707                        <xsd:sequence>
708                                <xsd:element maxOccurs="1" minOccurs="1"
709    ref="wsrf-rl:CurrentTime" />
710                                <xsd:element maxOccurs="1" minOccurs="1"
711    ref="wsrf-rl:TerminationTime" />
712                        </xsd:sequence>
713                </xsd:complexType>
714        </xsd:element>
715
716        <!-- ====== Message Types for ImmediateResourceTermination  ======= -
717    ->
718        <xsd:element name="Destroy">
719                <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

```
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796  <!--
797
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840
841  -->
```

```
842   <wsdl:definitions name="WS-ResourceLifetime"
843   targetNamespace="http://docs.oasis-open.org/wsrf/rlw-2"

844   xmlns="http://schemas.xmlsoap.org/wsdl/"
845   xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
846   xmlns:wsrf-bf="http://docs.oasis-open.org/wsrf/bf-2"
847   xmlns:wsrf-rl="http://docs.oasis-open.org/wsrf/rl-2"
848   xmlns:wsrf-rlw="http://docs.oasis-open.org/wsrf/rlw-2"
849   xmlns:wsrf-rp="http://docs.oasis-open.org/wsrf/rp-2"
850   xmlns:wsrf-rw="http://docs.oasis-open.org/wsrf/rw-2"
851   xmlns:xsd="http://www.w3.org/2001/XMLSchema"
852   xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/">
853
854      <wsdl:import namespace="http://docs.oasis-open.org/wsrf/rw-2"
855          location="http://docs.oasis-open.org/wsrf/rw-2.wsdl"/>
856      <wsdl:types>
857          <xsd:schema attributeFormDefault="unqualified"
858   elementFormDefault="qualified"
859   xmlns="http://www.w3.org/2001/XMLSchema">
860                  <xsd:import namespace="http://docs.oasis-
861   open.org/wsrf/rl-2"
862                          schemaLocation="http://docs.oasis-
863   open.org/wsrf/rl-2.xsd" />
864              </xsd:schema>
865      </wsdl:types>
866
867      <wsdl:message name="SetTerminationTimeRequest">
868          <wsdl:part element="wsrf-rl:SetTerminationTime"
869   name="SetTerminationTimeRequest" />
870      </wsdl:message>
871      <wsdl:message name="DestroyResponse">
872          <wsdl:part element="wsrf-rl:DestroyResponse"
873   name="DestroyResponse" />
874      </wsdl:message>
875      <wsdl:message name="SetTerminationTimeResponse">
876          <wsdl:part element="wsrf-rl:SetTerminationTimeResponse"
877   name="SetTerminationTimeResponse" />
878      </wsdl:message>
879
880      <wsdl:message name="DestroyRequest">
881          <wsdl:part element="wsrf-rl:Destroy" name="DestroyRequest" />
882      </wsdl:message>
883      <wsdl:message name="ResourceNotDestroyedFault">
884          <wsdl:part element="wsrf-rl:ResourceNotDestroyedFault"
885   name="ResourceNotDestroyedFault" />
886      </wsdl:message>
887
888      <wsdl:message name="UnableToSetTerminationTimeFault">
889          <wsdl:part element="wsrf-rl:UnableToSetTerminationTimeFault"
890   name="UnableToSetTerminationTimeFault" />
891      </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>
```

934   Appendix D. Revision History

[This appendix is optional, but helpful. It should be removed for specifications that are at OASIS
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
wd-09	2005-05-18	Latha Srinivasan	Resolution of issue #:114 and updated Acknowledgements section per Ian's

Rev	Date	By Whom	What
			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.
pr-02.a	2005-11-18	Latha Srinivasan	Minor updates to references per Ian's mail
cs-01	2006-01-10	Latha Srinivasan	Committee spec version

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