
CS 696

Introduction to Grid Computing:
Lecture #16: PyGridWare (part 2)

Mary Thomas

San Diego State

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PyWSRF v1.3.1

- PyWSRF developers are correcting and updating codebase:
 - on-line tutorial:
 - <http://dsd.lbl.gov/gtg/projects/pyGridWare/doc/pyGridWare-tutorial-v1.3.1/>
 - pdf tutorial (text is cut off)
 - <http://dsd.lbl.gov/gtg/projects/pyGridWare/doc/pyGridWare-tutorial-v1.3.1.pdf>
 - Codebase snapshot
 - <http://dsd.lbl.gov/gtg/projects/download/pyGridWare-1.3.1.dev-r1349.tar.gz>

Resource Properties (cont.)

Working Client.py: GetResourceProperty

```
def GetResourceProperty(iport):
    for i in range(10):
        iport.add(CLIENT.AddInputMessage(i))
        iport.subtract(CLIENT.SubtractInputMessage(10))
        msg = iport.GetResourceProperty(\
            CLIENT.GetResourcePropertyRequest(\
                ("http://www.globus.org/namespaces/examples/core/MathService_instance_rp", "Value"),
            ))
        print "MSG: ", msg
        print "PROPERTIES: ", msg.Any
        print "PROPERTY: ", msg.Any[0]
        print "CORRECT: ", msg.Any[0] == sum(range(10)) - 10
```

```
def main(*argv, **kw):
    locator = CLIENT.MathServiceLocator()
    port = locator.getMathPort(**kw)
    msg = port.createResource(CLIENT.CreateInputMessage())
    iport = locator.getMathPort(endPointReference=msg.EndpointReference, \
        **kw)
    if len(argv) > 0:
        method = eval(argv[0])
        method(iport)
    reactor.stop()
```

GetResourceProperty: XML Request

```
2007/04/12 11:45 -0700 [ChunkedHTTPChannel,3,127.0.0.1] --->PROCESS REQUEST
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:ZSI="http://www.zolera.com/schemas/ZSI/"><SOAP-ENV:Header
  xmlns:ns2="http://www.globus.org/namespaces/examples/core/MathService_instance_rp"
  xmlns:ns1="http://schemas.xmlsoap.org/ws/2004/03/addressing">
<ns1:MessageID>uuid:1176403540.11</ns1:MessageID>
<ns1:Action>
  http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceProperties/GetResourceProperty
</ns1:Action>
<ns1:To>http://127.0.0.1:9080/wsrf/services/MathService</ns1:To>
<ns1:From>
  <ns1:Address>http://schemas.xmlsoap.org/ws/2004/03/addressing/role/anonymous</ns1:Address>
</ns1:From>
<ns2:MathServiceRPKey id="o2338b70">1000</ns2:MathServiceRPKey>
</SOAP-ENV:Header>
<SOAP-ENV:Body xmlns:ns1="http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceProperties-1.2-draft-
01.xsd">
<ns1:GetResourceProperty
  xmlns:ns2="http://www.globus.org/namespaces/examples/core/MathService_instance_rp">
  ns2:Value
</ns1:GetResourceProperty>
</SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

GetResourceProperty: XML Response

```
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:ZSI="http://www.zolera.com/schemas/ZSI/">
  <SOAP-ENV:Header
    xmlns:ns1="http://schemas.xmlsoap.org/ws/2004/03/addressing">
    <ns1:Action>
      http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceProperties/GetResourcePropertyResponse
    </ns1:Action>
    <ns1:MessageID>uuid:1176403540.19</ns1:MessageID>
    <ns1:RelatesTo>uuid:1176403540.11</ns1:RelatesTo>
    <ns1:To>http://schemas.xmlsoap.org/ws/2004/03/addressing/role/anonymous</ns1:To>
    <ns1:From> <ns1:Address>http://127.0.0.1:9080/wsrf/services/MathService</ns1:Address>
    </ns1:From>
  </SOAP-ENV:Header>
  <SOAP-ENV:Body
    xmlns:ns1="http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceProperties-1.2-draft-01.xsd">
    <ns1:GetResourcePropertyResponse
      xmlns:ns2="http://www.globus.org/namespaces/examples/core/MathService_instance_rp">
      <ns2:Value>100</ns2:Value>
    </ns1:GetResourcePropertyResponse>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

CREATE REQUEST

===== CREATE REQUEST =====

```
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/" xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:ZSI="http://www.zolera.com/schemas/ZSI/">
<SOAP-ENV:Header xmlns:ns1="http://schemas.xmlsoap.org/ws/2004/03/addressing">
<ns1:MessageID>
uuid:1176409960.84</ns1:MessageID>
<ns1:Action>
  http://www.globus.org/namespaces/examples/core/MathService_instance_rp/ ...
  MathPortType/createResourceRequest
</ns1:Action>
<ns1:To>http://127.0.0.1:9080/wsrf/services/MathService</ns1:To>
<ns1:From>
<ns1:Address>http://schemas.xmlsoap.org/ws/2004/03/addressing/role/anonymous</ns1:Address>
</ns1:From>
</SOAP-ENV:Header>
<SOAP-ENV:Body xmlns:ns1="http://www.globus.org/namespaces/examples/core/MathService_instance_rp">
<ns1:create>
</ns1:create>
</SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

CREATE RESPONSE

```
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:ZSI="http://www.zolera.com/schemas/ZSI/">
<SOAP-ENV:Header xmlns:ns1="http://schemas.xmlsoap.org/ws/2004/03/addressing">
<ns1:Action>
  _ http://www.globus.org/namespaces/examples/core/MathService_instance_rp/MathPortType/createResourceResponse
</ns1:Action>
<ns1:MessageID>uuid:1176409960.99</ns1:MessageID>
<ns1:RelatesTo>uuid:1176409960.84</ns1:RelatesTo>
<ns1:To>http://schemas.xmlsoap.org/ws/2004/03/addressing/role/anonymous</ns1:To>
<ns1:From><ns1:Address>http://127.0.0.1:9080/wsrf/services/MathService</ns1:Address></ns1:From>
</SOAP-ENV:Header>
<SOAP-ENV:Body
  xmlns:ns1="http://www.globus.org/namespaces/examples/core/MathService_instance_rp">
<ns1:createResponse xmlns:ns2="http://schemas.xmlsoap.org/ws/2004/03/addressing">
<ns2:EndpointReference xsi:type="ns2:EndpointReferenceType">
<ns2:Address>http://127.0.0.1:9080/wsrf/services/MathService</ns2:Address>
<ns2:ReferenceProperties>
<ns1:MathServiceRPKey xsi:type="xsd:int"> 1008</ns1:MathServiceRPKey>
</ns2:ReferenceProperties>
</ns2:EndpointReference>
</ns1:createResponse>
</SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

ADD REQUEST

```
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/"
xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xmlns:ZSI="http://www.zolera.com/schemas/ZSI/">
<SOAP-ENV:Header
xmlns:ns2="http://www.globus.org/namespaces/examples/core/MathService_instance_rp"
xmlns:ns1="http://schemas.xmlsoap.org/ws/2004/03/addressing">
<ns1:MessageID>uuid:1176409960.02</ns1:MessageID>
<ns1:Action>
http://www.globus.org/namespaces/examples/core/MathService_instance_rp/MathPortType/addRequ
est</ns1:Action>
<ns1:To>http://127.0.0.1:9080/wsrf/services/MathService</ns1:To>
<ns1:From><ns1:Address>http://schemas.xmlsoap.org/ws/2004/03/addressing/role/anonymous
</ns1:Address>
</ns1:From>
<ns2:MathServiceRPKey id="o2343f80">1008</ns2:MathServiceRPKey>
</SOAP-ENV:Header>
<SOAP-ENV:Body
xmlns:ns1="http://www.globus.org/namespaces/examples/core/MathService_instance_rp">
<ns1:add>100</ns1:add>
</SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

ADD RESPONSE

```
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/" xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/" xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:ZSI="http://www.zolera.com/schemas/ZSI/">
<SOAP-ENV:Header xmlns:ns1="http://schemas.xmlsoap.org/ws/2004/03/addressing">
<ns1:Action>
http://www.globus.org/namespaces/examples/core/MathService_instance_rp/MathPortType/addResponse
</ns1:Action>
<ns1:MessageID>uuid:1176409960.09</ns1:MessageID>
<ns1:RelatesTo>uuid:1176409960.02</ns1:RelatesTo>
<ns1:To>http://schemas.xmlsoap.org/ws/2004/03/addressing/role/anonymous</ns1:To>
<ns1:From><ns1:Address>
http://127.0.0.1:9080/wsrf/services/MathService</ns1:Address>
</ns1:From>
</SOAP-ENV:Header>
<SOAP-ENV:Body
xmlns:ns1="http://www.globus.org/namespaces/examples/core/MathService_instance_rp">
<ns1:addResponse>
</ns1:addResponse>
</SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

Lifecycle Management

WS-ResourceLifetime (WSRF-RL)

WSRF-RL: Destroy

- Immediate destruction
 - simplest type of lifecycle management
 - request will destroy resource immediately
 - Do this by invoking a destroy operation in the instance service.
- WSRF portType provides destruction:
 - `<wsdl:operation name="Destroy">`
- Note:
 - factory service creates resource
 - Destruction for a resource must route through instance service.

ImmediateResourceTermination

```
<!-- ImmediateResourceTermination -->
  <wsdl:operation name="Destroy">

    <wsdl:input message="wsrlw:DestroyRequest"
      wsa:Action="http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
ResourceLifetime/Destroy"/>
    <wsdl:output message="wsrlw:DestroyResponse"
      wsa:Action="http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
ResourceLifetime/DestroyResponse"/>
    <wsdl:fault
      message="wsrlw:ResourceNotDestroyedFault"
      name="ResourceNotDestroyedFault"/>
    <wsdl:fault message="wsrlw:ResourceUnknownFault" name="ResourceUnknownFault"/>
  </wsdl:operation>
```

WSRF-RL: ScheduledResourceTermination

- Scheduled destruction specifies exactly when to destroy a *WS-Resource*.
 - perform lease-based lifecycle management
 - application must periodically renew the lease or resource will eventually be destroyed.
 - Applications can purge resources as needed
- WSRF portType provides scheduled destruction:
 - `<wsdl:operation name="SetTerminationTime">`
 - resource properties: `TerminationTime`, `CurrentTime`.
 - `TerminationTime` specifies when resource is destroyed

Generated MathLTService

```
class MathServiceWSRF(MathService):

    def GetResourceContext(ps, address):
        """get a resource context"""
        return ManagerHome.getInstance().getResourceContext(ps, address)
    GetResourceContext = staticmethod(GetResourceContext)
    ...

    def wsa_Destroy(self, ps, address, **kw): 1
        request,response = MathService.wsa_Destroy(self, ps, address) 2
        ctx = MathServiceWSRF.GetResourceContext(ps, address) 3
        ImmediateResourceTermination.Destroy(ctx) 4
        return request,response 5
```

1. Fully functional WSRF Destroy operation, immediately destroys the instance referenced by the EPR.
2. Call lower-level service binding stub to set up the response and request python objects.
3. Retrieve the ResourceContext of the service instance.
4. Request immediate destruction of the service instance.
5. Return python object representing the WS-ResourceLifetime Message DestroyResponse

WSRF-LS: Destroy client.py

```
def main(**kw):  
    locator = CLIENT.MathServiceLocator() [1]  
    port = locator.getMathPort(**kw) [2]  
    msg = port.createResource(CLIENT.CreateInputMessage()) [3]  
    iport = locator.getMathPort(endpointReference=msg.EndpointReference,  
                                **kw) [4]  
  
    iport.add(CLIENT.AddInputMessage(100)) [5]  
    iport.Destroy(CLIENT.DestroyRequest()) [6]  
  
    try:  
        iport.subtract(CLIENT.SubtractInputMessage(99)) [7]  
    except ZSI.fault.Fault, ex:  
        pass  
    reactor.stop()  
    print "EXCEPTION: ", ex.__class__ [8]
```

[1] reference to a
MathPortType instance

[2] create Resource: EPR
contains instance service URI, &
Resource identifier

[3] factory creates
InputMessage instance

[4] get EPR for MathPortType
instance

[5] add 100 to property

[6] Destroy resource instance
(not server/factory)

[7] try to subtract

[8] cannot do it bcs resource is
not available

DESTROY REQUEST

```
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/" xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/" xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:ZSI="http://www.zolera.com/schemas/ZSI/">
<SOAP-ENV:Header
xmlns:ns2="http://www.globus.org/namespaces/examples/core/MathService_instance_rp"
xmlns:ns1="http://schemas.xmlsoap.org/ws/2004/03/addressing">
<ns1:MessageID>uuid:1176409960.34</ns1:MessageID>
<ns1:Action>
http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceLifetime/Destroy</ns1:Action>
<ns1:To>
http://127.0.0.1:9080/wsrf/services/MathService</ns1:To>
<ns1:From>
<ns1:Address>
http://schemas.xmlsoap.org/ws/2004/03/addressing/role/anonymous</ns1:Address>
</ns1:From>
<ns2:MathServiceRPKey id="o2343f80">1008</ns2:MathServiceRPKey>
</SOAP-ENV:Header>
<SOAP-ENV:Body xmlns:ns1="http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceLifetime-1.2-draft-01.xsd">
<ns1:Destroy></ns1:Destroy>
</SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

DESTROY RESPONSE

```
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/" xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/" xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:ZSI="http://www.zolera.com/schemas/ZSI/">
  <SOAP-ENV:Header xmlns:ns1="http://schemas.xmlsoap.org/ws/2004/03/addressing">
    <ns1:Action>
      http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceLifetime/DestroyResponse</ns1:Action>
    <ns1:MessageID>uuid:1176409961.02</ns1:MessageID>
    <ns1:RelatesTo>uuid:1176409960.09</ns1:RelatesTo>
    <ns1:To>
      http://schemas.xmlsoap.org/ws/2004/03/addressing/role/anonymous</ns1:To>
    <ns1:From>
    <ns1:Address>
      http://127.0.0.1:9080/wsrf/services/MathService</ns1:Address>
    </ns1:From>
  </SOAP-ENV:Header>
  <SOAP-ENV:Body
    xmlns:ns1="http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceLifetime-1.2-draft-01.xsd">
    <ns1:DestroyResponse>
    </ns1:DestroyResponse>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

Now try to use instance

```
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/" xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/" xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:ZSI="http://www.zolera.com/schemas/ZSI/">
<SOAP-ENV:Header
xmlns:ns2="http://www.globus.org/namespaces/examples/core/MathService_instance_rp"
xmlns:ns1="http://schemas.xmlsoap.org/ws/2004/03/addressing">
<ns1:MessageID>
uuid:1176409961.46</ns1:MessageID>
<ns1:Action>
http://www.globus.org/namespaces/examples/core/MathService_instance_rp/MathPortType/subtractRequest</ns1:Action>
<ns1:To>
http://127.0.0.1:9080/wsrf/services/MathService</ns1:To>
<ns1:From>
<ns1:Address>
http://schemas.xmlsoap.org/ws/2004/03/addressing/role/anonymous</ns1:Address>
</ns1:From>
<ns2:MathServiceRPKey id="o2343f80">1008</ns2:MathServiceRPKey>
</SOAP-ENV:Header>
<SOAP-ENV:Body
xmlns:ns1="http://www.globus.org/namespaces/examples/core/MathService_instance_rp">
<ns1:subtract>99</ns1:subtract>
</SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

Fault Response

```
<SOAP-ENV:Envelope xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/" xmlns:SOAP-
ENV="http://schemas.xmlsoap.org/soap/envelope/" xmlns:ZSI="http://www.zolera.com/schemas/ZSI/"
xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance"><SOAP-ENV:Header></SOAP-ENV:Header>
<SOAP-ENV:Body><SOAP-ENV:Fault>
<faultcode>SOAP-ENV:Server</faultcode><faultstring>Processing Failure</faultstring>
<detail><ZSI:FaultDetail><ZSI:string>pyGridWare.wsrf.faults.PropertiesFaults:ResourceUnknownFault
\n&lt;pyGridWare.wsrf.faults.PropertiesFaults.&lt;class `pyGridWare.wsrf.faults
PropertiesFaults.ResourceUnknownFault`&gt; instance 24aa030 \n&lt;ns2:ResourceUnknownFault
xmlns:ns1="http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-BaseFaults-1.2-draft-01.xsd"
xmlns:ns2="http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceProperties-1.2-draft-
01.xsd"&gt;&lt;ns1:Timestamp&gt;2007-04-
12T20:55:18.003Z&lt;/ns1:Timestamp&gt;&lt;/ns2:ResourceUnknownFault&gt;&gt;</ZSI:string>
<ZSI:trace>build/bdist.macosx-10.3-fat/egg/ZSI/twisted/WSresource.py:341:render_POST\nbuild/bdist.macosx-10.3-
fat/egg/ZSI/twisted/WSresource.py:254:processRequest\n/Library/Frameworks/Python.framework/Versions/2.5/lib/py
thon2.5/site-packages/pyGridWare-1.3.1.dev_r1349-py2.5.egg/pyGridWare/utility/web/resource.py:
71:processRequest\n/Users/mthomas/working/cs696/pygridware/tutorial/lifecycle/MathLTSite/services/MathService.r
py:21:wsa_subtract\n/Users/mthomas/working/cs696/pygridware/tutorial/lifecycle/MathLTSite/generated/MathLTServ
ice/services/MathLTService/MathService.py:21:GetResourceContext\n/Users/mthomas/working/cs696/pygridware/tu
torial/lifecycle/MathLTSite/generated/MathLTService/resource/MathLTService/MathService.py:24:getResourceConte
xt\n/Library/Frameworks/Python.framework/Versions/2.5/lib/python2.5/site-packages/pyGridWare-1.3.1.dev_r1349-
py2.5.egg/pyGridWare/resource/ResourceHomeManager.py:161:get\n/Library/Frameworks/Python.framework/Versio
ns/2.5/lib/python2.5/site-packages/pyGridWare-1.3.1.dev_r1349-
py2.5.egg/pyGridWare/resource/ResourceHome.py:51:get</ZSI:trace>
</ZSI:FaultDetail></detail></SOAP-ENV:Fault>
</SOAP-ENV:Body></SOAP-ENV:Envelope>
```

WS-ResourceLifetime: WSDL

```
<!-- WS-ResourceLifetime operations -->
<!-- ScheduledResourceTermination -->
<wsdl:operation name="SetTerminationTime">

  <wsdl:input message="wsrlw:SetTerminationTimeRequest"
    wsa:Action="http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
      ResourceLifetime/SetTerminationTime"/>
  <wsdl:output message="wsrlw:SetTerminationTimeResponse"
    wsa:Action="http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
      ResourceLifetime/SetTerminationTimeResponse"/>

  <wsdl:fault
    message="wsrlw:UnableToSetTerminationTimeFault"
    name="UnableToSetTerminationTimeFault"/>
  <wsdl:fault message="wsrlw:ResourceUnknownFault"
    name="ResourceUnknownFault"/>
  <wsdl:fault message="wsrlw:TerminationTimeChangeRejectedFault"
    name="TerminationTimeChangeRejectedFault"/>

</wsdl:operation>
```

Use to set a time to destroy/terminate a resource

WSRF-RL: SetTerminationTime server

```
def wsa_SetTerminationTime(self, ps, address, **kw): 1
    #http://docs.oasis-open.org/wsr/2004/06/wsr-WS-ResourceLifetime-
    1.2-draft-01.wsdl SetTerminationTimeRequest
    request,response = MathService.wsa_SetTerminationTime(self, ps,
    address) 2
    ctx = MathServiceWSRF.GetResourceContext(ps, address) 3
    ScheduledResourceTermination.SetTerminationTime(ctx,
    request._RequestedTerminationTime) 4
    response._NewTerminationTime = time.gmtime(ctx.getTerminationTime()) 5
    response._CurrentTime = time.gmtime(time.time())
    return request,response 6
```

1

WSRF-RL: SetTerminationTime client.py

```
def main(**kw):
    import time
    locator = CLIENT.MathServiceLocator() 1
    port = locator.getMathPort(**kw) 2
    msg = port.createResource(CLIENT.CreateInputMessage()) 3
    print 'Created instance.'
    iport = locator.getMathPort(endPointReference=msg.EndpointReference, **kw) 4
    request = CLIENT.SetTerminationTimeRequest()
    startTime = time.time()
    termTime = startTime + 10
    request.RequestedTerminationTime = termTime 5
    msg = iport.SetTerminationTime(request) 6
    print 'Local Time'
    print 'Start Time          ', time.strftime('%c', time.localtime(startTime))
    print 'Requested termination time ', time.strftime('%c', time.localtime(termTime))
    print 'UTC Tuples: RequestedTerminationTime ', time.gmtime(request.RequestedTerminationTime)
    print 'NewTerminationTime      ', msg.NewTerminationTime
    print 'CurrentTime              ', msg.CurrentTime
    try:
        for i in range(1,20):
            iport.add(CLIENT.AddInputMessage(1)) 7
            time.sleep(startTime + i - time.time())
            print 'Second %d' %i
    except ZSI.fault.Fault:8
        print 'resource has been destroyed: ', time.strftime('%c', time.localtime())
    else:
        print 'ERROR'
    reactor.stop()
```

output

```
% ./client_set_termination_time.py -u http://127.0.0.1:9080/wsrf/services/MathService -d 0
FtWarning: Creation of InputSource without a URI
Created instance.
Local Time
Start Time          Thu Apr 12 14:40:13 2007
Requested termination time Thu Apr 12 14:40:23 2007

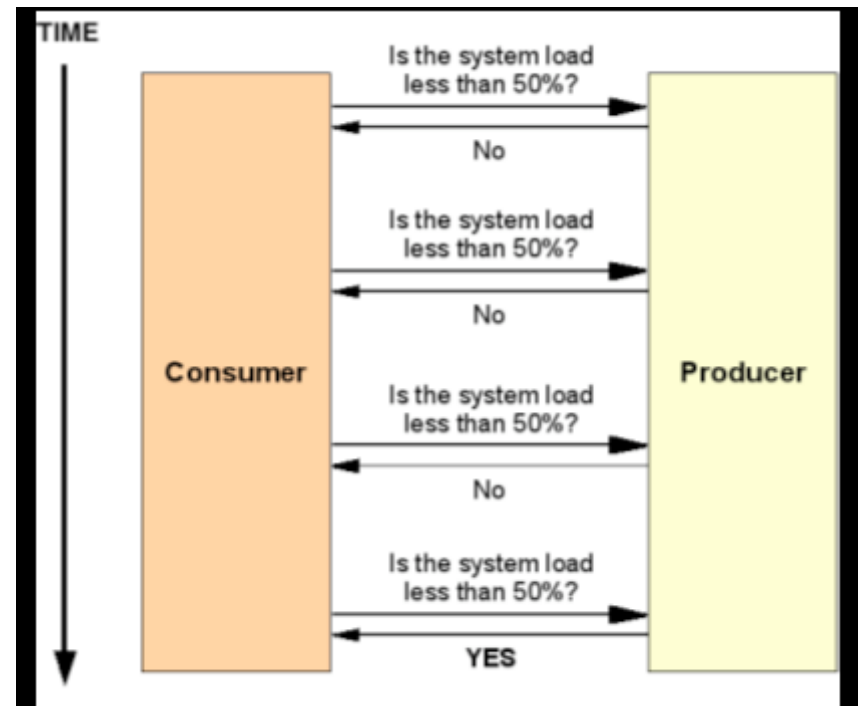
UTC Tuples
RequestedTerminationTime (2007, 4, 12, 21, 40, 23, 3, 102, 0)
NewTerminationTime      (2007, 4, 12, 21, 40, 23, 3, 0, 0)
CurrentTime              (2007, 4, 12, 21, 40, 13, 3, 0, 0)

Second 1
Second 2
Second 3
Second 4
Second 5
Second 6
Second 7
Second 8
Second 9
Second 10
Second 11
resource has been destroyed: Thu Apr 12 14:40:24 2007
```

Notifications

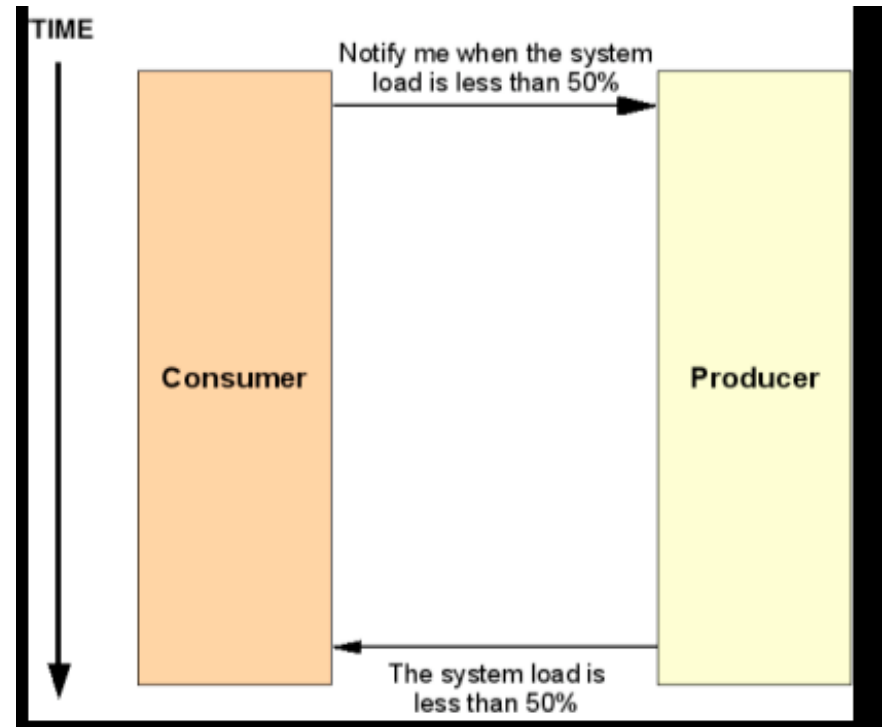
Standard Polling Pattern

- Consumer asks producer if there are any changes.
- producer replies "No",
- consumer waits a while before making another call.
- The consumer asks the producer if there are any changes.
- producer replies "No"
- consumer waits a while before making another call.
- this step can be repeated *ad nauseam* until server replies that there has been a change.



Notification Pattern

- Consumer asks producer to notify when server load drops below 50%.
- Producer keeps a list of all its registered consumers.
 - *subscription or registration* step.
- Consumer and the producer work asynchronously
- When server load drops below 50% producer *notifies* all its consumers



WS-Notifications

- Not part of WSRF but useful, like WS-Addressing
- Three specifications
 - WS-Topics
 - WS-BaseNotification
 - WS-BrokeredNotification

Operation Providers

