active endpoints

ActiveVOS Engine Monitoring with OASIS WSDM/MUWS

Technical Note

ActiveVOS...
driving mass adoption of services-based applications.

2009

Content

Introduction

Active Endpoints has adopted the OASIS WSDM standard for MUWS (Management Using Web Services) to support administration and monitoring at the engine level.

The OASIS WSDM MUWS specification defines how the management of an arbitrary resource can be made accessible via Web services. The latest version of this standard is version 1.1, released in August of 2006 and builds upon WSA (addressing) as well as a number of specifications that fall under the WS-Resource Framework (WSRF) family. These include WSRP (resource properties), WSN (notification), WSRMD (metadata), and WSTS (topic spaces).

Key WSDM Definitions

Resource –a logical or physical component of some subject domain, for example, an application server, a printer or a CRM application.

Capability –a group of properties, operations, events and metadata associated with identifiable semantics and information and exhibiting a specific behavior. For example, operations that return the high-level runtime state of a resource are part of the Operational Status capability.

Manageable resource – a resource capable of supporting one or more standard manageability capabilities defined by WSDM.

Manageability Endpoint - A Web service endpoint providing access to some manageable resource

WSDM Resource - the actual composition of a resource and a manageability endpoint, from which the resource can be accessed and managed.

Manageability Consumer discovers the Web service endpoint and exchanges messages with the endpoint in order to request information, subscribe to events, or, control the manageable resource associated with the endpoint.

Service Group - a collection of Manageability Endpoints representing a related set of resources. For example, a parent resource maintains a service group of its child resources. Clients may drill into the resource hierarchy by querying the service group membership of the parent.

MUWS Namespaces

Addressing: wsa=http://www.w3.org/2005/08/addressing

WSRF Base: wsrf-r=http://docs.oasis-open.org/wsrf/r-2

Resource Properties: wsrf-rp=http://docs.oasis-open.org/wsrf/rp-2

Resource Lifecycle: wsrf-rl=http://docs.oasis-open.org/wsrf/rl-2

Service Groups: wsrf-sg=http://docs.oasis-open.org/wsrf/sg-2

Metadata: wsx=http://schemas.xmlsoap.org/ws/2004/09/mex

Notification: wsn=http://docs.oasis-open.org/wsn/b-2

Topic Spaces: wst=http://docs.oasis-open.org/wsn/t-1

MUWS Part 1: muws1=http://docs.oasis-open.org/wsdm/muws1-2.xsd

MUWS Part 2: muws2=http://docs.oasis-open.org/wsdm/muws2-2.xsd

ActiveVOS Resources
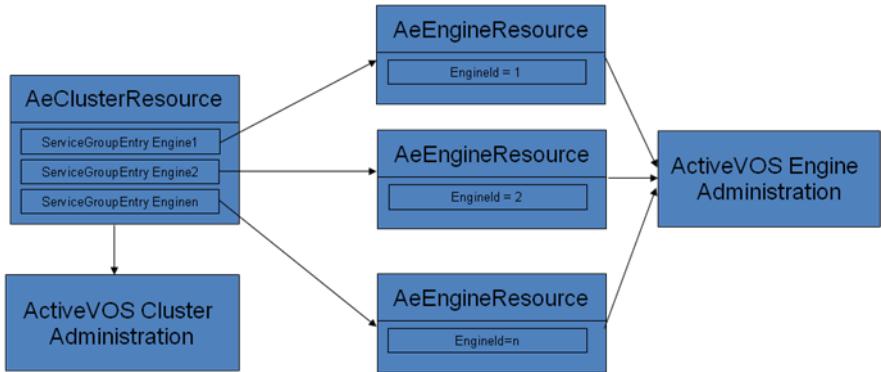
The set of endpoint references for clustered engines can be obtained by querying the service group of its cluster resource

To support deployment behind a load balancer, any resource endpoint may be accessed from any node within it's cluster.

The cluster resource supports all of the engine properties and operations that are applicable cluster-wide

Supported WSRF Capabilities

- Resource Properties
  - Generic operations to get and set resource properties
- Resource Lifecycle
  - Immediate and Scheduled resource termination
- Metadata Exchange
  - Fetches the metadata document (.rmd) associated with a resource port type
- Service Groups
  - Query membership and add resources to the group
- Notification Producer
  - Supports subscriptions and event publishing
- Notification Consumer
  - Defines the Notify operation used to receive notification events

Supported WSDM Capabilities

- **Identity**
  - GUID property for a resource instance
  - Mandatory for all WSDM resources
- **Manageability Characteristics**
  - lists capability URIs supported by the resource
- **Operational Status**
  - Property indicating status of resource as Available, Unavailable, Partially Available, or Unknown
  - Derived from the engine state for ActiveVOS resources.
  - Cluster resources reflect the aggregate state of their member engines.
- **Advertisement**
  - Publishes a Management Event when resources are created or destroyed
- **Configuration**
  - Engine admin methods that update the engine configuration map into this capability.
  - Custom Functions, URN Mappings, and Installed Licenses are multi-valued configuration properties of complex type
- **Metrics**

o Engine admin methods that report counts, timestamps and durations for processes, services, and catalog resources would map into properties under this capability.

ActiveVOS Specific Capabilities

These operations are characteristic of ActiveVOS and do not map into a property or standard capability

- **ActiveVOS Admin**
  - Stop – stops the engine resource, without destroying it
  - Start – starts a stopped resource
  - DeployBpr
  - DeleteCompletedProcesses
  - DeleteInactivePlans
  - DeleteDeploymentLogs

Addressing ActiveVOS Resources

- WSDM uses WS-Addressing 1.0 (2005/08) to route requests to the intended resource instance
- All resource requests must include the following headers
  - wsa:To
  - wsa:Action
  - ns:MyRefParam[@wsa:IsReferenceParameter="true"]
- Endpoint equality is determined by the Service Name and Reference Parameters
- The host, port, and context from the URL are not considered so the same resource can be accessed using any valid DNS address or just the service name for a local invoke

Examples

Querying Service Groups

- The Service Group capability defines one property (wssg:Entry) and one operation (Add)
- A resource consumer can get the set of group members by making a wsrf:GetResourceProperty request for the wssg:Entry property.

Request:

```
<soap:Envelope xmlns:soap="http://www.w3.org/2003/05/soap-envelope"
xmlns:wsa="http://www.w3.org/2005/08/addressing">
    <soap:Header xmlns:wsa="http://www.w3.org/2005/08/addressing">
       <wsa:To>http://localhost:8080/active-
bpel/services/AeClusterResource</wsa:To>
       <wsa:Action>http://docs.oasis-open.org/wsrf/rpw-
2/GetResourceProperty/GetResourcePropertyRequest</wsa:Action>
       <wsa:MessageID>uuid:fae86813-2b65-3ad2-41ea-
e517bd28f648</wsa:MessageID>
   </soap:Header>
   <soap:Body>
       <wsrf-rp:GetResourceProperty
           xmlns:wsrf-rp="http://docs.oasis-open.org/wsrf/rp-2"
xmlns:wsrf-sg="http://docs.oasis-open.org/wsrf/sg-2">wsrf-
sg:Entry</wsrf-rp:GetResourceProperty>
   </soap:Body>
</soap:Envelope>
```

From the response, a resource consumer may then use the wssg:MemberServiceEPR endpoint reference to address the engine resource

The transport URL for the member address is updated from the request context, similar to how we update the service address when generating wsdl for services

Response:

```
<wsrf-rp:GetResourcePropertyResponse xmlns:wsrf-
rp="http://docs.oasis-open.org/wsrf/rp-2">
        <wsrf-sg:Entry xmlns:wsrf-sg="http://docs.oasis-
open.org/wsrf/sg-2">
            <wsrf-sg:ServiceGroupEntryEPR>
                <wsa:Address
xmlns:wsa="http://www.w3.org/2005/08/addressing">http://…/AeClusterR
esource</wsa:Address>
            </wsrf-sg:ServiceGroupEntryEPR>
            <wsrf-sg:MemberServiceEPR>
                <wsa:Address
xmlns:wsa="http://www.w3.org/2005/08/addressing">http://…/AeEngineRe
source</wsa:Address>
                <wsa:ReferenceParameters
xmlns:wsa="http://www.w3.org/2005/08/addressing">
                    <abe:EngineId
xmlns:abe="http://rt.activee.com/wsdm/muws/engine">1</abe:EngineId>
                </wsa:ReferenceParameters>
            </wsrf-sg:MemberServiceEPR>
            <wsrf-sg:Content/>
        </wsrf-sg:Entry>
```

```
</wsrf-rp:GetResourcePropertyResponse>
```

Subscribing for WSDM Events

The Notification Producer capability defines a Subscribe operation that sets up a subscription for a Notification Consumer

The Notification Consumer capability defines one operation, Notify, which is invoked by producers, to deliver its notifications

Request:

```
<soap:Envelope xmlns:soap="http://www.w3.org/2003/05/soap-envelope"
xmlns:wsa="http://www.w3.org/2005/08/addressing">
    <soap:Header xmlns:wsa="http://www.w3.org/2005/08/addressing">
        <wsa:To>http://…/AeEngineResource</wsa:To>
        <wsa:Action>http://docs.oasis-open.org/wsn/bw-
2/NotificationProducer/SubscribeRequest</wsa:Action>
        <wsa:MessageID>uuid:7bdd5ab5-b859-524a-903d-
e648a7571c77</wsa:MessageID>
        <abe:EngineId wsa:IsReferenceParameter="true"
xmlns:abe="http://rt.activee.com/wsdm/muws/engine">1</abe:EngineId>
 </soap:Header>
    <soap:Body>
        <wsnt:Subscribe xmlns:wsnt="http://docs.oasis-
open.org/wsn/b-2">
            <wsnt:ConsumerReference>

<wsa:Address>http://…/DurableSubscriberService</wsa:Address>
                <ns2:ReferenceParameters
xmlns:ns2="http://www.w3.org/2005/08/addressing">
                    <abx:conversationId
xmlns:abx="http://...">1:/process/partnerLinks/partnerLink[@name='no
tifyPLT']</abx:conversationId>
                </ns2:ReferenceParameters>
            </wsnt:ConsumerReference>
            <wsnt:Filter>
                <wsnt:TopicExpression
                    Dialect="http://docs.oasis-open.org/wsn/t-
1/TopicExpression/Concrete"
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Al
ertService</wsnt:TopicExpression>
            </wsnt:Filter>
        </wsnt:Subscribe>
    </soap:Body>
</soap:Envelope>
```

Notification Event Message delivered to the Consumer's Notify callback
```
<wsnt:NotificationMessage xmlns:wsnt="http://docs.oasis-
open.org/wsn/b-2">
            <wsnt:SubscriptionReference>
                <ns1:Address
xmlns:ns1="http://www.w3.org/2005/08/addressing">http://localhost:80
80/active-bpel/services/SubscriptionManager</ns1:Address>
                <ns2:ReferenceParameters
xmlns:ns2="http://www.w3.org/2005/08/addressing">
                    <abx:conversationId
xmlns:abx="http://www.activebpel.org/bpel/extension">2:/process/part
nerLinks/partnerLink[@name='resourcePLT']</abx:conversationId>
                </ns2:ReferenceParameters>
            </wsnt:SubscriptionReference>
            <wsnt:Topic Dialect="http://docs.oasis-
open.org/wsn/t-
1/TopicExpression/Concrete">pfx0:AlertService</wsnt:Topic>
            <wsnt:ProducerReference>
```

```
                    <ns3:Address
xmlns:ns3="http://www.w3.org/2005/08/addressing">http://localhost:80
80/active-bpel/services/AeEngineResource</ns3:Address>
                    <ns4:ReferenceParameters
xmlns:ns4="http://www.w3.org/2005/08/addressing">
                        <abe:EngineId
xmlns:abe="http://rt.activee.com/wsdm/muws/engine">1</abe:EngineId>
                    </ns4:ReferenceParameters>
                </wsnt:ProducerReference>
                <wsnt:Message>
                    <wsrf-rp:ResourcePropertyValueChangeNotification
xmlns:wsrf-rp="http://docs.oasis-open.org/wsrf/rp-2">
                        <wsrf-rp:OldValues>
                            <abe:AlertService
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">OldAle
rtService</abe:AlertService>
                        </wsrf-rp:OldValues>
                        <wsrf-rp:NewValues>
                            <abe:AlertService
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">NewAle
rtService</abe:AlertService>
                        </wsrf-rp:NewValues>
                    </wsrf-
rp:ResourcePropertyValueChangeNotification>
                </wsnt:Message>
            </wsnt:NotificationMessage>
```

Obtaining a list of Engine Resources

Request:

```
<soap:Envelope xmlns:wsa="http://www.w3.org/2005/08/addressing"
xmlns:soap="http://www.w3.org/2003/05/soap-envelope">
    <soap:Header xmlns:wsa="http://www.w3.org/2005/08/addressing">
        <wsa:To>http://localhost:8080/active-
bpel/services/AeEngineResource</wsa:To>
        <wsa:Action>http://docs.oasis-open.org/wsrf/rpw-
2/GetMultipleResourceProperties/GetMultipleResourcePropertiesRequest
</wsa:Action>
        <wsa:MessageID>uuid:ab203ce3-64ab-c449-6447-
7624bc0376e6</wsa:MessageID>
        <wsa:From>

<wsa:Address>http://www.w3.org/2005/08/addressing/role/anonymous</ws
a:Address>
        </wsa:From>
        <abe:EngineId
xmlns:abe="http://rt.activee.com/wsdm/muws/engine"
wsa:IsReferenceParameter="true">1</abe:EngineId>
    </soap:Header>
    <soap:Body>
        <wsrf-rp:GetMultipleResourceProperties xmlns:wsrf-
rp="http://docs.oasis-open.org/wsrf/rp-2">
            <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Un
matchedReceiveTimeout</wsrf-rp:ResourceProperty>
            <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Pr
ocessesRunning</wsrf-rp:ResourceProperty>
            <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:De
ployedResourceCount</wsrf-rp:ResourceProperty>
            <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Th
readPoolMin</wsrf-rp:ResourceProperty>
            <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Re
sourceCacheSize</wsrf-rp:ResourceProperty>
            <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:En
gineName</wsrf-rp:ResourceProperty>
            <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:En
gineConfig</wsrf-rp:ResourceProperty>
```

```
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Pr
ocessesFaulted</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Al
armQueueDepth</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Lo
gging</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:De
ployedProcessCount</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Al
lowedRolesEnforced</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:In
dexedPropertiesCount</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Pr
ocessesActive</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Al
lowCreateXPath</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Pr
ocessWorkCount</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:De
ploymentCacheSize</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Al
ertService</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Th
readPoolMax</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Pr
ocessesCompleted</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:De
ployedServiceCount</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Pr
ocessReleaseLag</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Pr
ocessCount</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:De
ploymentGroupId</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:De
ploymentGroup</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Re
ceiveQueueDepth</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Nu
mCPUs</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Re
sourceCatalogDiskReads</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Re
sourceReplace</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Pr
ocessUnmatchedReceivesCount</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Re
sourceCatalogTotalReads</wsrf-rp:ResourceProperty>
        <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:De
ployedPartnerCount</wsrf-rp:ResourceProperty>
```

```xml
            <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:En
gineId</wsrf-rp:ResourceProperty>
            <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Al
lowEmptyQuerySelection</wsrf-rp:ResourceProperty>
            <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Pr
ocessesSuspended</wsrf-rp:ResourceProperty>
            <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Va
lidateServiceMessages</wsrf-rp:ResourceProperty>
            <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:St
artDate</wsrf-rp:ResourceProperty>
            <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Cl
usterMembershipCount</wsrf-rp:ResourceProperty>
            <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:UR
NMapping</wsrf-rp:ResourceProperty>
            <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Li
censeHolder</wsrf-rp:ResourceProperty>
            <wsrf-rp:ResourceProperty
xmlns:abe="http://rt.activee.com/wsdm/muws/engine/properties">abe:Fu
nctionContext</wsrf-rp:ResourceProperty>
        </wsrf-rp:GetMultipleResourceProperties>
    </soap:Body>
</soap:Envelope>
```

WSDM Resources

AeClusterResource

The AeClusterResource provided by the ActiveVOS product represents a set of deployed instances of the engine. The Cluster resource acts as a Service Group for engine resources.

There is exactly one AeClusterResource per web context, no reference parameters required.

The endpoint reference used to address a cluster resource is

```
<wsa:EndpointReference
xmlns:wsa="http://www.w3.org/2005/08/addressing">
<wsa:Address>http://host:port/webcontext/AeClusterResource</wsa:Addr
ess>
</wsa:EndpointReference>
```

Consumers may obtain the endpoint references of engine instances through the Service Group property with QName = {`http://docs.oasis-open.org/wsrf/sg-2`}Entry.

AeEngineResource

The WSDM Engine Resource provided by the ActiveVOS product represents a deployed instance of the engine. An instance consists of an engine configuration and a set of deployed processes that may be hosted on a single server or deployed across a group of clustered servers.

A specific engine instance is identified by its <abe:EngineId> parameter.

```
<wsa:EndpointReference
xmlns:wsa="http://www.w3.org/2005/08/addressing">
<wsa:Address>http://host:port/webcontext/AeEngineResource</wsa:Addre
ss>
     <wsa:ReferenceParameters>
         <abe:EngineId

      xmlns:abe="http://rt.activee.com/muws/engine">5</abe:EngineI
d>
     </wsa:ReferenceParameters>
</wsa:EndpointReference>
```

Capabilities defined by WSRF

Resource Properties

Operations	
GetResourceProperty	Returns the current value(s) of a property
GetMultipleResourceProperties	Returns the current values of specified properties
SetResourceProperties	Updates the value of specified properties
QueryResourceProperties	Returns values of properties meeting the selection criteria
GetResourcePropertyDocument	Returns all resource properties

Resource Lifetime

Operations	
Destroy	Immediate Resource Termination
SetTerminationTime	Scheduled Resource Termination

Metadata Exchange

Operations	
GetMetadata	Returns the metadata document (.rmd) associated with the resource port type

Service Group

Operations	
Add	Adds a resource to the Service Group

Properties	
wssg:Entry	To retrieve the endpoints of current members of a service group, clients should issue a GetResourceProperty request for the wssg:Entry property Each entry is represented by a ServiceGroupEntry resource instance. A resource is removed from the service group when the ServiceGroupEntry resource is destroyed.

Notification Producer

Operations	
Subscribe	Creates a subscription for a Notification Consumer. Each subscription is represented by a Subscription Manager resource instance. To unsubscribe, clients should send a wsrl:Destroy request to the Subscription Manager resource returned with the SubscribeResponse document.

Durable Subscriptions for resources are backed by a BPEL process. The process supports 3 methods, Create, Renew, and Destroy. The process is initiated by the Subscription Manager instance when a subscription is created. When a node starts, the engine will invoke the Renew method on each running process instance to resubmit the subscription request. When a subscription instance is destroyed, the process completes.

Notification Consumer

Operations	
Notify	Callback operation invoked by the Producer to deliver Notification messages to the client

Standard Capabilities defined by WSDM

Identity

URI = http://docs.oasis-open.org/wsdm/muws/capabilities/Identity

Capability exposes the ResourceId of a manageable resource. A ResourceId is a globally unique identifier that is neither mutable nor modifiable. The Identity capability must be implemented on every WSDM manageable resource.

Properties	
ResourceId	xs:anyURI

The Identity capability generates a GUID for each resource instance when it is created.

Description

URI = http://docs.oasis-open.org/wsdm/muws/capabilities/Description

Capability exposes the Caption, Description, and Version properties of the manageable resource.

Properties	
Caption	muws2:LangString
Description	muws2:LangString
Version	muws2:LangString

Use the values displayed on the ActiveVOS server console.

Manageability Characteristics

URI = http://docs.oasis-open.org/wsdm/muws/capabilities/ManageabilityCharacteristics

Capability exposes a list of ManageabilityCapability elements. Each element in the list denotes a capability supported by the manageable resource by its URI.

Properties	
ManageabilityCharacterisic [0..n]	xs:anyURI

OperationalStatus

URI = http://docs.oasis-open.org/wsdm/muws/capabilities/OperationalStatus

Capability exposes the high-level health of a manageable resource from a simple operational perspective. The OperationalStatus property of a resource may have one of the following values: Available, PartiallyAvailable, Unavailable or Unknown.

Properties	
OperationalStatus	xs:string

We map our engine states to OperationalStatus values as follows:

```
CREATED = PARTIALLY_AVAILABLE
STARTING = PARTIALLY_AVAILABLE
RUNNING = AVAILABLE
STOPPING = UNAVAILABLE
STOPPED = UNAVAILABLE
SHUTTINGDOWN = UNAVAILABLE
SHUTDOWN = UNAVAILABLE
ERROR = UNAVAILABLE
```

Each engine resource publishes a HeartbeatReport management event to `{http://docs.oasis-open.org/wsdm/muwse-2.xml}OperationalStatusCapability`

Advertisement

URI = http://docs.oasis-open.org/wsdm/muws/capabilities/Advertisement

Capability exposes a mechanism that emits a notification upon the creation or destruction of a manageable resource.

The framework publishes these notifications automatically when a resource is created or destroyed.

The AeClusterResource listens on the following topics for engine lifecycle events:

```
{http://docs.oasis-open.org/wsdm/muwse-
2.xml}ManageabilityEndpointCreation
```

```
{http://docs.oasis-open.org/wsdm/muwse-
2.xml}ManageabilityEndpointDestruction
```

```
{http://docs.oasis-open.org/wsdm/muwse-
2.xml}OperationalStatusCapability
```

State

URI = http://docs.oasis-open.org/wsdm/muws/capabilities/State

Capability exposes the current state and the last state transition of a manageable resource. The WSDM specification allows a resource to define its own state model. Support for this capability indicates that information about the state model of a manageable resource can be retrieved by a manageability consumer. For example, a resource may expose information about its current state and last state transition. Resource may emit a notification on state transition.

Not currently implemented.

Metrics

URI = http://docs.oasis-open.org/wsdm/muws/capabilities/Metrics

Capability exposes metric information relevant to the performance and operation of a manageable resource. WSDM defines some metrics for a Web service resource (see MOWS spec) and allows all resources to define any suitable and relevant metrics in their metadata.

All API methods that report counts, timestamps and durations for processes, services, and catalog resources would map into properties under this capability.

Engine Properties	
StartDate	xs:dateTime
DeployedProcessCount	xs:int
DeployedServiceCount	xs:int
DeployedPartnerCount	xs:int

IndexedPropertiesCount	xs:int
DeployedResourceCount	xs:int
ResourceCatalogTotalReads	xs:int
ResourceCatalogDiskReads	xs:int
ProcessesActive	xs:int
ProcessesRunning	xs:int
ProcessesFaulted	xs:int
ProcessesSuspended	xs:int
ProcessesCompleted	xs:int
AlarmQueueDepth	xs:int
ReceiveQueueDepth	xs:int
ClusterMembershipCount	xs:int

Configuration

URI = http://docs.oasis-open.org/wsdm/muws/capabilities/Configuration

Capability exposes properties of the manageable resource that can be modified by the manageability consumer and which change the operation behavior of the resource.

All API methods that update the engine config map into this capability.

Engine Properties	
EngineName	xs:string
EngineId	xs:int
DeploymentGroup	xs:string
DeploymentGroupId	xs:int
EngineConfig	xs:string
ValidateServiceMessages	xs:Boolean

AllowEmptyQuerySelection	xs:Boolean
AllowCreateXPath	xs:Boolean
UnmatchedReceiveTimeout	xs:int
Logging	xs:string
AllowedRolesEnforced	xs:Boolean
ThreadPoolMin	xs:int
ThreadPoolMax	xs:int
ProcessCount	xs:int
ProcessReleaseLag	xs:int
ProcessUnmatchedReceivesCount	xs:int
ProcessWorkCount	xs:int
ResourceCacheSize	xs:int
ResourceReplace	xs:boolean
DeploymentCacheSize	xs:int
AlertService	xs:string
UrnMapping[0..n]	abe:UrnMapping
FunctionContext[0..n]	abe:FunctionContext
License[0..n]	abe:License

Resource emits notifications of changes.

Relationships

URI = http://docs.oasis-open.org/wsdm/muws/capabilities/Relationships

Capability exposes the relationships in which a resource participates. Facilities exposed by this capability include retrieving relationships, querying a resource for its participation in a specific type of relationship, and notifying on the creation or the deletion of a relationship in which the resource participates

Not currently implemented.

RelationshipResource

URI = http://docs.oasis-open.org/wsdm/muws/capabilities/RelationshipResource

Capability exposes the properties of a manageable resource representing a relationship. These properties may include the name, type and role in the relationship.

This has the same applicability as the Relationships capability.

WSDM Standard Capabilities not applicable to ActiveVOS

CorrelatableProperties

URI = http://docs.oasis-open.org/wsdm/muws/capabilities/CorrelatableProperties

Capability exposes a list of properties whose values are useful when determining whether two different ResourceIds from two different manageability providers actually refer to the same manageable resource.

ActiveVOS Capabilities

Engine/Cluster Resource Operations

These functions are characteristic of ActiveVOS and do not map easily into a standard capability

Operations	
DeployBpr	Deploys a bpr archive
DeleteCompletedProcesses	May be scheduled or immediate
DeleteInactivePlans	May be scheduled or immediate
DeleteDeploymentLogs	May be scheduled or immediate

About Active Endpoints

Active Endpoints (www.activevos.com) is the leading developer of visual orchestration systems. VOS empowers line of business project teams to create applications using services and industry standards, making their businesses more agile and effective. Active Endpoints' ActiveVOS promotes mass adoption of

SOA-enabled applications by focusing on accelerating project delivery time with a standards-based, easy to use system. Active Endpoints is headquartered in Waltham, MA with development facilities in Shelton, CT.

To find out how Active Endpoints can help your business, visit http://www.activevos.com, call +1 781 547 2900 and press 1 for Sales, or email us at info@activevos.com.