Oracle® Enterprise Manager Ops Center

Feature Reference Appendix Guide

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Oracle Enterprise Manager Ops Center Feature Reference Appendix Guide, 12*c* Release 2 (12.2.2.0.0)

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Preface

The *Oracle® Enterprise Manager Ops Center Feature Reference Appendix Guide* contains parameters and variables for customizing the Oracle Enterprise Manager Ops Center software.

Audience

This document is intended for users who want to modify how the product software works.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

Access to Oracle Support

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

Related Documents

For more information, see the Oracle Enterprise Manager Ops Center Documentation Library at http://docs.oracle.com/cd/E40871_01/index.htm.

Oracle Enterprise Manager Ops Center provides online Help. Click Help at the top-right corner of any page in the user interface to display the online help window.

For the latest releases of Oracle documentation, check the Oracle Technology Network at: http://www.oracle.com/technetwork/documentation/index.html#em

Conventions

The following text conventions are used in this document:

Convention	Meaning
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.

Convention	Meaning
`monospace`	Monospace type indicates commands within a paragraph, code in examples, text that appears on the screen, or text that you enter.

1

Introduction

Oracle Enterprise Manager Ops Center is Oracle's comprehensive solution for managing the physical and virtual assets in your data center: operating system, firmware, and BIOS configuration, bare metal and virtual machine provisioning, hardware monitoring, automatic My Oracle Support service request generation, and performance and energy management.

After the assets in the data center have been discovered and brought under the management of the software, as described in *Oracle Enterprise Manager Ops Center Feature Reference Guide*, you can modify features.

Use this document as a reference for making the following types of changes:

- Library Incidents contains procedure for resolving incidents for storage libraries and software libraries.

- Asset Attributes contains variables for setting group rules.

- Expression Query Language contains language for creating new monitoring rules.

- API for Oracle Enterprise Manager Ops Center contains variables for connecting the software to third-party software.

A

Library Incidents

Oracle Enterprise Manager Ops Center relies on the `library.xml` file to manage and maintain the libraries that are backed by NFS shares. This file can be affected by operations that result in an incident being reported.

UUID is not recognized

Incident: library.xml file was deleted. Please try to recover with uuid *<identifier>*

Cause: The `library.xml` file contains the original UUID for the library. Because the library was deleted and created again, the library has a new UUID.

Action: Update the `library.xml` file with the new UUID.

1. Edit the `library.xml` file.

```xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<LibraryData>
    <IsReadOnly>false</IsReadOnly>
    <UserFriendlyName>Local Storage Library (xvmsrv-005)</UserFriendlyName>
    <Description>Default virtual image local library</Description>
    <CreationTime>1382430667160</CreationTime>
    <ModificationTime>1382430667160</ModificationTime>
    <SemanticTags/>
    <UUID>d46372fa-1f39-4152-b082-7e501fda459d</UUID>
</LibraryData>
```

2. Change the UUID to the UUID displayed in the incident.

3. Save and close the file.

4. Run the OCDoctor utility to verify the `library.xml` file is in the correct state:

   `/var/opt/sun/xvm/OCDoctor/toolbox/library-check.sh`

5. If the OCDoctor output indicates a problem with the library, use the following command to associate the new UUID with the library's location:

   `/var/opt/sun/xvm/OCDoctor/toolbox/library-check.sh -f <path/to/library>`

Image information is missing

Incident: library.xml is missing some images. Number of images in the xml is *n*. Number of images in the directory is *x*.

Cause: Image files have been moved into the NFS share location but Oracle Enterprise Manager Ops Center does not manage them.

Action: Do the following

1. Run the OCDoctor utility to verify that images are missing:

   `/var/opt/sun/xvm/OCDoctor/toolbox/library-check.sh`
2. Verify there is no current jobs that modify the library, such as actions that create a guest or add storage.

3. Use the OCDoctor utility to restore the library's images:

   `/var/opt/sun/xvm/OCDoctor/toolbox/library-check.sh -f <path/to/library>`
4. Save and close the file.

5. Run the OCDoctor utility to verify the `library.xml` file is in the correct state:

   `/var/opt/sun/xvm/OCDoctor/toolbox/library-check.sh`

File is not readable

Incident: library.xml is corrupted.

Cause: Oracle Enterprise Manager Ops Center cannot open the file.

Action: Create a new library.xml file:

1. Open a file with the name `library.xml`.

2. Enter the following contents, using the format in the example:

   – isReadOnly = false

   – Description is empty. You can add or change using the Edit Attributes action.

   – CreationTime is the current time in EPOC time

   – ModificationTime is the current time in EPOC time

   – SemanticTags is empty.

   – UUID is the UUID displayed in the Incident Details message.

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<LibraryData>
    <IsReadOnly>false</IsReadOnly>
    <UserFriendlyName>Local Storage Library (xvmsrv-005)</UserFriendlyName>
    <Description>Default virtual image local library</Description>
    <CreationTime>1382430667160</CreationTime>
    <ModificationTime>1382430667160</ModificationTime>
    <SemanticTags/>
    <UUID>d46372fa-1f39-4152-b082-7e501fda459d</UUID>
</LibraryData>
```

B

Asset Attributes

Oracle Enterprise Manager Ops Center records the attributes of the assets it manages. You can use these attributes to administer groups. You can use the time zone values to adjust the reporting of assets.

Monitoring Attributes

The attributes that are used for asset monitoring vary across asset types. The list of attributes for each asset is available in a set of Javadocs within the SDK package. This package is located in the following directory:

- Linux OS: *Installation directory*`/xvmoc_full_bundle/Linux_i686/Product/components/packages/sun-xvmoc-sdk-12.0.0.noarch.rpm`

- Oracle Solaris OS for SPARC: *Installation directory*`/xvmoc_full_bundle/SunOS_sparc/Product/components/packages/SUNWxvmoc-sdk.pkg`

- Oracle Solaris OS for x86: *Installation directory*`/xvmoc_full_bundle/SunOS_i386/Product/components/packages/SUNWxvmoc-sdk.pkg`

This package installs the Javadocs in the `/opt/sun/xvm/sdk/xvm_oc/doc/javadoc/` directory. Open the Javadoc file for an asset type to view the attributes for that asset type.

Grouping Attributes

Table B–1 lists the attributes that you can use in group rules.

Table B–1   Group Asset Attributes

Attribute	Supported Values
Appliance IP Address	Any IP address
Appliance Name	Any string
Architecture	na
Asset Provisioning Supported	na

Table B–1   (Cont.) Group Asset Attributes

Attribute	Supported Values
Asset Type	GlobalZone
	NonGlobalZone
	LDomHost
	LDomGuest
	OperatingSystem
	Server Network
	ServerContainer
	MSeriesChassis
	VirtualPool
	SolarisCluster
	SolarisClusterNode
	SolarisClusterZoneClusterGroup
Auto Boot	on
	off
Capability Entry	na
Control Component Info Description	na
Control Component Info Version	na
Control Component Server Hostname	na
Control Web Console URI	na
CPU Architecture	POWER_PC
	SPARC
	SPARC-SUN4V
	X86
CPU Core Count	Any number
CPU Info Thread Count	Any number
CPU Mode	compatible
	auto
CPU Model	Any string
CPU Speed	Any number
CPU Type	Any string
Debug User SSH Access	TRUE
	FALSE
Description	Any string
Diag Level	max
	none
	min
DNS Configured	TRUE
	FALSE
DNS Domain Name	Any string

Table B–1   (Cont.) Group Asset Attributes

Attribute	Supported Values
Domain Degredation Policy	fru
	system
	xsb
Ethernet Port Fabric Tag	
Ethernet Port Info IP Address	Any IP address
Ethernet Port Infos Management	TRUE
	FALSE
Fabric Type	
Firmware Info Type	Any string
Firmware Description	Any string
FirmwareInfo Compliant	TRUE
	FALSE
FirmwareInfo Provider	Any string
Firmware Version	Any string
Hard Disk Size (Bytes)	Any number
Host ID	Any string
Hostname	Any string
HTTP Enabled	na
IbP Key	na
In Ucast Packets	na
Interface Info Enabled	TRUE
	FALSE
Interface Info Fabric Tag	
Interface Info Subnet Mask	Any number
Interface Infos Mac Address	Any number
Interface IP Address	Any IP address
IP Address	Any IP address
IPSLicense	Any string
IPS Readme	Any string
Keep Alive Trap Time Seconds	na
LDAP Profile Name	Any string
LDAP Proxy DN	Any string
LDAP Server	Any string
Local DNS Address	na

Table B–1   (Cont.) Group Asset Attributes

Attribute	Supported Values
Locale	C
	POSIX
	en_CA
	en_CA.ISO8859-1
	en_CA.UTF-8
	en_US
	en_US.ISO8859-1
	en_US.ISO8859-15
	en_US.ISO8859-15@euro
	es
	es_MX
	es_MX.ISO8859-1
	es_MX.UTF-8
	fr
	fr_CA
	fr_CA.ISO8859-1
	fr_CA.UTF-8
	iso_8859_1
Location	na
Locator Light On	TRUE
	FALSE
MAC Address	na
Machine Hardware Class	InfiniBand
	Ethernet
	FibreChannel
	EthernetGateway
	InfiniBandGateway
	Unknown
	TOR
	NEM
Maintenance Mode	na
Managed State	HIDDEN
	MANAGED
	MANAGED_OR_PROVISIONED
	PROVISIONING
	UNMANAGED
	UNMANAGED_OR_ PROVISIONED
Management IP	na
Manufactured Service Tag	na
Manufacturer	Any string

Table B–1   (Cont.) Group Asset Attributes

Attribute	Supported Values
MBean Interface Name	Any string
Member Info Secure Mode	on
	off
Member Info Set Type	DOMAIN
	NEM
	SERVER
Memor Size	Any number
Memor Type	Any string
Model	Any string
Monitored	TRUE
	FALSE
Monitoring Policy	na
MTU	na
Multi Path Enabled	TRUE
	FALSE
Name	
Name Service Domain Name	Any string
Network CIDR	Any string
NFS Map ID Domain	Any string
NIS Name Server By IP Address	Any IP address
NIS Name Server By Name	Any string
Notifications Enabled	TRUE
	FALSE
Operator Panel Switch Status	Any string
Ops Center Version	na
OSRunning	TRUE
	FALSE
Out Ucast Pkts	na
PDU Modules	na
Platform	na
Port Info Address	Any string
Port Info Connected Peer	Any string

Table B–1   (Cont.) Group Asset Attributes

Attribute	Supported Values
Port Connector Type	BOARD_INTERNAL
	CHASSIS_BLADE
	CHASSIS_FABRIC
	CXP
	QSFP
	SFP
	SFP_PLUS
	UNKNOWN
Port Description	Any string
Port Fabric Tag	ETHERNET
	FIBRE_CHANNEL
	INFINIBAND
	UNKNOWN
Port Info In Discards	Any number
Port Info In Errors	Any number
PortInfos.inNUcastPkts	Any number
Port Info In Octets	Any number
Port Info Last Tick	Any number
Port Info Link Type	Any string
Port Info Local IP Address	Any string
Port Info Management	TRUE
	FALSE
Port Info MTU	Any number
Port Info Node Address	na
Port Info Oper Status	Any string
Port Info Out Discards	Any number
Port Info Out Errors	Any number
Port Info Out NU CastPackets	Any number
Port Info Out Octets	Any number
Port Info Peer Address	Any number
Port Info Port Type	HOST
	ROUTER
	SWITCH
	TARGET
Port Info Remote DNS Address	Any string
Port Info Remote IP Address	Any string
Port Info Speed	Any string

Table B–1   (Cont.) Group Asset Attributes

Attribute	Supported Values
Port Info Type	ETHERNET
	FIBRE_CHANNEL
	INFINIBAND
	POWER
	SERIAL
	VLAN
	UNKNOWN
Port Infos In Unknown Proto	na
Port Infos NUcast Packets	na
PoweredOn	TRUE
	FALSE
Product Defined Instance ID	na
Product Name	na
Product URN	na
Product Vendor	na
Product Version	na
Public UUID	na
Rack ID	na
Rack Info Asset Domain Type	na
Rack Info Asset Gear Type	na
Rack Info Asset ON	na
Rack Info Asset Status	na
Rack Info Asset User Friendly Name	na
Rack Info Assets	na
Rack Info Assets Model	na
Rack Info Assets Occupancy	na
Rack Info Position X	na
Rack Info Position Y	na
Rack Info Position Z	na
Rack Info Assets User Friendly Name	na
Rack Info Configuration	na
Rack Info Number of Slots	na
Rack Info Type	na
Rcv Error Rate	Any string
RcvThroughput	Any string
Repeat Trap Number	na
Repeat Trap Time Seconds	na
Revision	na

Table B–1   (Cont.) Group Asset Attributes

Attribute	Supported Values
RoutingMode	DYN_OFF
	DYN_ON
	DYN_AUTO
Satellite	Any string
Semantic Tag Key	na
Semantic Tag Key & Value	na
Sensor Notification Enabled	TRUE
	FALSE
Serial Console URL	Any string
Serial Number	na
Service Tag Agent Version	Any string
Service Tag AssetLabel	Any string
Service Tag CPU Manufacturer	Any string
Service Tag Customer Asset Tag	Any string
Service Tag Host	Any string
Service Tag Instance URN	Any string
Service Tag IP Address	Any IP address
Service Tag Platform Architecture	Any string
Service Tag Port	Any number
Service Tag Product Hierarchy	Any string
Service Tag Release	Any string
Service Tag Serial Number	Any string
Service Tag Sub-Status	Any string
Service Tag Type	NATIVE
	NATIVE_NOT_FOUND
	MANUFACTURED
SNMP Enabled	na
Solaris Non-global zone Exclusive	na
Solaris Non-Global Zone.	na
Static Route Info Set	na

Table B–1   (Cont.) Group Asset Attributes

Attribute	Supported Values
Status	FAULTED
	NON_RECOVERABLE
	MAINTENANCE
	DECONFIGURED
	DEGRADED
	CRITICAL
	WARNING
	INFO
	OK
	UNINITIALIZED
	UNKNOWN
	UNCONFIGURED
	NEEDS_POWERON
Subnet Manager	TRUE
	FALSE
Subnet Manager Address	Any string
Subnet Mask	Any string
System Identifier	na
System Name	na
System Version	na
Time Zone	See Time Zone Values list below
Total Rcv Errors	Any string
Total Rcv Octets	Any string
Total Xmit Errors	Any string
Total Xmit Octets	Any string
User Friendly Description	Any string
User Friendly Name	Any string
Version	na
Virtualization Type	ldom
	xen
	zone
VLan ID	Any string
Web Console URI	Any string
Web Console URL	Any string
Xmit Error Rate	Any string
Xmit Throughput	Any string
XSB Assignment Status	Assigned
	Available
	Unavailable

Table B–1   (Cont.) Group Asset Attributes

Attribute	Supported Values
XSB Connection Status	y
	n
XSB Diag Status	Failed
	Passed
	Testing
	Unknown
	Unmount
XSB Domain ID	00
	01
	02
	03
	04
	05
	06
	07
	08
	09
	10
	11
	12
	13
	14
	SP
XSB Dynamic Reconf Status	Any string
XSB ID	Any string
XSB Fault Status	Degraded
	Faulted
	Normal
XSB Info Set	na
XSB Power Status	y
	n
XSB PSB ID	Any string
XSB Incorporation Status	y
	n
XVMServerVersion	Any string

C

Expression Query Language

Use the expression query language to build query object constraints and create customized expression monitoring rules. See the Monitoring Rules and Policies chapter in the *Oracle Enterprise Manager Feature Reference Guide* for more information about monitoring rules. See *Oracle® Enterprise Manager Ops Center Tuning Monitoring Rules and Policies* for examples of how to tune the default rules that are provided with the software and how to add new rules.

The expression query language is mainly used to define monitoring rules and to check if an asset attribute verifies a given condition. The query language is closely modeled on the `WHERE` clause of `SQL SELECT` statements.

This section contains the following information:

- Monitoring Attributes and Classes
- Lexical Elements
- Grammar
- Semantics
- Informal Examples

Monitoring Attributes and Classes

Asset monitoring attributes vary by asset type. The asset types and corresponding attributes are available in the API Javadocs that are part of the SDK package. The package installs the Javadocs in the `/opt/sun/xvm/sdk/xvm_oc/doc/javadoc/` directory. Open the Javadoc file to view all attributes and classes.

Classes

The classes corresponding to the asset types are located in the `com.sun.hss.type` package and subpackages. The following are a few of the classes representing the asset types that you can use to create expression monitoring rules and some attributes available for monitoring:

- `com.sun.hss.type.os.OperatingSystem`
- `com.sun.hss.type.server.Server`
- `com.sun.hss.type.servercontainer.ServerContainer`
- `com.sun.hss.type.virtserver.VirtServer`
- `com.sun.hss.type.virtserver.VirtServerContainer`

For each class, you can deduce the attributes that the software can monitor by looking for the *getter* methods defined by the class. Those are the methods whose names start with *get* or *is* and which take no parameters. The name of the attribute corresponding to a method is built by removing the *get* or *is* prefix from the method name. For example, the `OperatingSystem` class defines a method named `getCpuUsage`, as follows:

```
@Description(value="CPU Usage information")

CpuUsage getCpuUsage()
```

The name of corresponding attribute name is `CpuUsage`.

AttributeType

The return type of the method describes the attribute type. To find the subfields of the attributes that the software can monitor, navigate to the definition of the corresponding class. The name of the subfields are also deduced from the *getter* methods defined on the attribute type class. Given the name of a *getter* method, you can deduce the subfield name by removing the *get* or *is* prefix and by setting the next letter to lowercase. Following the previous example, when you navigate to the javadoc of the *CpuUsage* class, you will find the following *getter* method:

```
@ValueInfo(metricType="gauge",

    thresholdRising=true,

    units="%",

    minValue="0",

    maxValue="100")

public float getUsagePercentage()
```

This means the subfield is named *usagePercentage*. The complete attribute / subfield name that you can use in a monitoring rule is `CpuUsage.usagePercentage`.

Lexical Elements

The following are some lexical elements:

- Attribute names are case sensitive.

- Keywords, such as `and`, `like`, and `between`, are not case sensitive.

- Use double quotes to access an attribute whose name, ignoring case, is the same as one of these keywords: `not`, `instanceof`, `like`, `true`, or `false`. For example, `"not"`. You can use double quotes to include non-identifier characters in the name of an attribute. For example, "attribute-name-with-hyphens". To include the double quote character in the attribute name, write it twice. `"foo""bar""baz"` represents the attribute called `foo"bar"baz`.

- String constants are written with single quotes, for example `'this'`. A single quote within a string constant must be doubled, for example `'can''t'`.

- Integer constants are written as a sequence of decimal digits, optionally preceded by a plus or minus sign. An integer constant must be a valid input to `Long.valueOf(String)`.

- Floating-point constants are written using the Java syntax. A floating-point constant must be a valid input to `Double.valueOf(String)`.

- A boolean constant is either true or false, ignoring case.

■ Spaces cannot appear inside identifiers (unless written with double quotes), keywords, or multi-character tokens, such as <=. Spaces can appear anywhere else, but are not required except to separate tokens. For example, you can write the query *a < b* and *5 =c* as a<b and 5=c, but you cannot remove any other spaces.

Grammar

query
andquery [OR query]

andquery
predicate [AND andquery]

predicate
(query) |

NOT predicate |

INSTANCEOF stringvalue |

LIKE objectnamepattern |

value predrhs

predrhs
compare value |

[NOT] BETWEEN value AND value |

[NOT] IN (value commavalues) |

[NOT] LIKE stringvalue

commavalues
[, value commavalues]

compare
= | < | > | <= | >= | <> | !=

value
factor [plusorminus value]

plusorminus
+ | -

factor
term [timesordivide factor]

timesordivide
* | /

term
attr | literal | (value)

attr

name [# name]

name:

identifier [.name]

identifier

Java-identifier | double-quoted-identifier

literal

booleanlit | longlit | doublelit | stringlit

booleanlit

FALSE | TRUE

stringvalue

stringlit

objectnamepattern

stringlit

Semantics

Table C–1 describes the grammar semantics and defines a function *q* that maps a string to a Java object, such as a `QueryExp` or a `ValueExp`.

Table C–1   Semantics

String *s*	*q(s)*
query1 **OR** *query2*	Query.or(*q(query1)*, *q(query2)*)
query1 **AND** *query2*	Query.and(*q(query1)*, *q(query2)*)
(*queryOrValue*)	*q(queryOrValue)*
NOT query	Query.not(*q(query)*)
INSTANCEOF stringLiteral	Query.isInstanceOf(*Query.value(q(stringLiteral))*)
LIKE stringLiteral	new ObjectName(*q(stringLiteral)*)
value1 = value2	Query.eq(*q(value1)*, *q(value2)*)
value1 < value2	Query.lt(*q(value1)*, *q(value2)*)
value1 > value2	Query.gt(*q(value1)*, *q(value2)*)
value1 <= value2	Query.leq(*q(value1)*, *q(value2)*)
value1 >= value2	Query.geq(*q(value1)*, *q(value2)*)
value1 <> value2	Query.not(Query.eq(*q(value1)*, *q(value2)*))
value1 != value2	Query.not(Query.eq(*q(value1)*, *q(value2)*))
value1 **BETWEEN** *value2* AND *value3*	Query.between(*q(value1)*, *q(value2)*, *q(value3)*)
value1 **IN** (*value2, value3*)	Query.in(*q(value1)*, new ValueExp[] { *q(value2)*, *q(value3)*})
value1 **NOT IN** (*value2, value3*)	Query.not(Query.in(*q(value1)*, *new ValueExp*[] { *q(value2)*, *q(value3)*}))
value **LIKE** *stringLiteral*	Query.match(*q(value)*, translateWildcards(*q(stringLiteral)*))

Table C–1   (Cont.) Semantics

String *s*	*q(s)*
value **NOT LIKE** *stringLiteral*	Query.not(Query.match(*q(value),* translateWildcards(*q(stringLiteral)))*)
value1 + value2	Query.plus(*q(value1), q(value2)*)
value1 - value2	Query.minus(*q(value1), q(value2)*)
*value1 * value2*	Query.times(*q(value1), q(value2)*)
value1 / value2	Query.div(*q(value1), q(value2)*)
name	Query.attr(*q(name)*)
name1#name2	Query.attr(*q(name1), q(name2)*)
FALSE	Query.value(false)
TRUE	Query.value(true)
decimalLiteral	Query.value(Long.valueOf(*decimalLiteral)*)
floatingPointLiteral	Query.value(Double.valueOf(*floatingPointLiteral)*)

The `translateWildcards` function translates from the SQL notation for wildcards, using `%` and `_`, to the API notation using `*` and `?`. If the `LIKE` string already contains a `*` or `?`, these characters have their literal meanings, and are quoted in the call to `Query.match`.

Informal Examples

The formal specification of the language is described in Lexical Elements. The attributes are located in the javadocs.

This section provides some informal examples.

```
Message = 'OK'
```
Message = 'OK' is verified if the `Message` attribute is the string `'OK'`.

```
Message like 'OK: %'
```
`Message` attribute whose value is a string beginning with `"OK: "`. The wildcard characters are the same as in SQL. In the query language, percent character means any sequence of characters and the underscore character means any single character.

```
FreeSpacePercent < 10
```
The`FreeSpacePercent` attribute whose value is a number less than 10.

```
FreeSpacePercent < 10 and WarningSent = false
```
Uses the same attribute as the previous example, but includes a boolean attribute `WarningSent` whose value is false.

```
SpaceUsed > TotalSpace * (2.0 / 3.0)
```
`SpaceUsed` and `TotalSpace` attributes where the first is more than two-thirds the second.

```
not (FreeSpacePercent between 10 and 90)
```
`FreeSpacePercent` attribute whose value is not between 10 and 90, inclusive.

```
FreeSpacePercent not between 10 and 90
```
Another way of writing the previous query.

```
Status in ('STOPPED', 'STARTING', 'STARTED')
```
Status attribute whose value is one of those three strings.

Example C–1   Root Disk and CPU Usage

Example C–1 is an expression that will raise an alert when the root disk is above 80% and the CPU usage is above 10.

```
FileSystemUsages.name="/".usedSpacePercentage >= 80) AND (CpuUsage.usagePercentage
>= 10
```

Example C–2   Root Disk and System Load

Example C–2 is an expression that will raise an alert when the root disk is above 80% and the system load is above 15.

```
FileSystemUsages.name="/".usedSpacePercentage >= 70) AND
(SystemLoad.average1Minute >= 15
```

D

API for Oracle Enterprise Manager Ops Center

Oracle Enterprise Manager Ops Center APIs allow external systems management solutions to integrate with Oracle Enterprise Manager Ops Center. The APIs are available remotely using TCP/IP through one of two secure protocols: JMXRemoting over TLS and WS-Management over https.

The Oracle Enterprise Manager Ops Center Software Developer's Kit (SDK), which is shipped with the Oracle Enterprise Manager Ops Center software, includes some examples that show how to use the public APIs.

To use the examples included in the package:

1. Locate the `SUNWxvmoc-sdk.pkg` package in the `dvd/<platform>/Product/components/packages/` directory on the DVD/Install Media.

2. Install the `SUNWxvmoc-sdk.pkg` package.

3. Locate the example you want. Table D–1 lists the examples in the package.

4. Compile the example.

5. Execute the example, using the appropriate shell script.

Table D–1   Examples Included in the SUNWxvmoc-sdk.pkg Package.

Example	Description	Code
Basic client example using JMX	This example demonstrates the JMX Messaging Protocol (JMXMP) connector with Java/JMX technology. This example does not require any external JARs except Java and JDMK. This example performs the following functions: ■ Configures the connection. ■ Performs security settings. ■ Opens the connection (locally or remotely). ■ Uses the connection with JMX basic requests. ■ Closes the connection.	BasicClient.java
Domain model client example using WS-MAN	This example demonstrates direct access to the read-only copy of the domain model. This example performs the following functions: ■ Configures the connection. ■ Performs security settings. ■ Opens the connection (locally or remotely). ■ Queries the domain model for all the server objects and displays the value of their model attributes. ■ Queries the domain model for all the OperatingSystems objects and displays the value of their description attributes. ■ Queries the domain model for all the ZoneController objects and displays the value of their ZoneControllerType attributes. ■ Queries the domain model for all the ISOImage objects and displays the value of their DiskImagePath attributes. ■ Queries the domain model for all the VirtServerImage objects and displays the value of their DomainFilePath attributes. ■ Closes the connection.	DomainModelClient.java
Basic client example using WS-MAN	This example performs the same functions as the basic client with JMX example. However, this example uses the WS-MAN connector with Java/JMX technology.	SimpleClient.java
Server services access example using WS-MAN	This example demonstrates the server public services. This example performs the following functions: ■ Configures the connection. ■ Performs the security settings. ■ Opens the connection (locally or remotely) ■ Creates a proxy for each xVM server service to verify everything is working. ■ Displays the attribute values. ■ Lists the service tags. ■ Lists the nodes and their names. ■ Lists the xVM servers and displays some information on each one including the list of guests. ■ Closes the connection.	ServerClient.java ServerClientServices.java

Table D–1   (Cont.) Examples Included in the SUNWxvmoc-sdk.pkg Package.

Example	Description	Code
Services access using WS-MAN	This example demonstrates specific Oracle Enterprise Manager Ops Center public services. This example performs the following functions: ■ Configures the connection. ■ Performs security settings. ■ Opens the connection (locally or remotely). ■ Creates a proxy for each specific service to verify everything is working. ■ Closes the connection.	OpsCenterClient.java OpsCenterClientServices.java
Discovery and agent provisioning example using WS-MAN	This example demonstrates some Oracle Enterprise Manager Ops Center public services. This example performs the following functions: ■ Configures the connection. ■ Performs security settings. ■ Opens the connection (locally or remotely) with the satellite. ■ Uses the discovery service to discover one machine. ■ Registers the server asset for this machine. ■ Provisions the agent on this machine. ■ Unprovisions the agent on this machine. ■ Deletes both the server and operating system asset created for this machine. ■ Closes the connection.	OCProvisionClient.java Utils.java
Server example using WS-MAN	This example demonstrates some Oracle Enterprise Manager Ops Center public services. This example performs the following functions: ■ Configures the connection. ■ Performs some security settings. ■ Opens the connection (locally or remotely) with the satellite. ■ Unattaches the xVM server if it is already attached. ■ Deletes the asset associated with the xVM server. ■ Uses the discovery service to discover one xVM server. ■ Attaches the xVM server to the Oracle Enterprise Manager Ops Center. ■ Closes the connection.	OCXVMServer.java Utils.java

List of Public APIs

Table D–2 provides a brief description of the public APIs. For a complete list of packages, its classes, interfaces, and methods, refer to the Javadoc that is included in the SDK.

Table D–2   List of Public APIs

Package	Description
com.oracle.sysman.services.bios	Provides BIOS configuration services.
com.oracle.sysman.services.bootenvironment	Provides parameters for ABE related operations.
com.oracle.sysman.services.cloudmgmt	Provides virtual datacenter (vDC) administration and vDC management services.
com.oracle.sysman.services.common	Provides common constants and utility classes.
com.oracle.sysman.services.discovery	Provides services to perform discovery and manage discovery profiles.
com.oracle.sysman.services.dmmaintenance	Provides the service for Domain Model maintenance
com.oracle.sysman.services.exadatacell	Provides the service interface for exadata cell management.
com.oracle.sysman.services.network	Provides network domain services.
com.oracle.sysman.services.ocdoctor	Provides services for OCDoctor functionality in Ops Center.
com.oracle.sysman.services.ops	Provides Oracle pre-engineered system management services.
com.oracle.sysman.services.osanalytics	Provides services for operating systems and virtual server container analytics.
com.oracle.sysman.services.ovm	Provides services to perform operations on OVM deployments through the OVM manager.
com.oracle.sysman.services.rack	Provides rack management services.
com.oracle.sysman.services.reset	Provides the reset service interface to handle resetting and refreshing the service processor.
com.sun.xvm.services.agentprov	Provides service for managing the provisioning of agents. This package provides services for the installation, configuration, and removal of agent software to remote operating systems.
com.sun.xvm.services.agentupgrade	Provides the service interface for agent upgrades.
com.sun.xvm.services.alarm	Provides services for alarm management.
com.sun.xvm.services.authorization	Provides the operations for authorization management.
com.sun.xvm.services.bootenvironment	Provides the interface for boot environment service.
com.sun.xvm.services.cachemanager	Provides the service interface for managing the cached view of the domain model.
com.sun.xvm.services.cluster	Provides the service interface for cluster management. This service is responsible for viewing and managing Solaris cluster instances and their nodes.
com.sun.xvm.services.common	Provides the service interfaces that are common to different public API services.
com.sun.xvm.services.componentmgmt	Provides the service interface for hardware components management.
com.sun.xvm.services.datamodel	Provides the service for accessing low-level data models.
com.sun.xvm.services.deleteasset	Provides the service interface to delete assets such as servers, operating systems, service tags, and chassis. The virtualization assets such as hosts, guests, virtual image libraries, and networks can be removed by calling the appropriate methods on their respective services.
com.sun.xvm.services.discovery	Provides services to discover assets. The interface for discovery service provides capability to initiate a discovery operation for a set of IP addresses.

Table D–2   (Cont.) List of Public APIs

Package	Description
com.sun.xvm.services.event	Provides the interface for event service. The interface for event service allows the client to subscribe to notifications emitted from the domain model.
com.sun.xvm.services.fabricmgmt	Provides service interfaces for fabric management.
com.sun.xvm.services.fwdeployment	Provides services for firmware deployment management. This package manages deployments of firmware updates to servers and chassis.
com.sun.xvm.services.gear	Provides service tag and general gear management interfaces.
com.sun.xvm.services.grouping	Provides asset group management services.
com.sun.xvm.services.guest	Provides service interfaces for guest management.
com.sun.xvm.services.guest.provision	Provides service interfaces for guest provisioning.
com.sun.xvm.services.jobmanager	Provides job management services for performing job actions, controlling job status, and retrieving information on job actions and job history.
com.sun.xvm.services.migration	Provides the service interface for migration service. This package provides the service for live, warm and cold migration of guest domains.
com.sun.xvm.services.mos	Provides the My Oracle Support services.
com.sun.xvm.services.network	Provides the network management services. This package provides services for managing networks for guests.
com.sun.xvm.services.notification	Provides notifications management services.
com.sun.xvm.services.oemgc	Provides the service interface for Oracle Enterprise Manager Cloud Control repository integration.
com.sun.xvm.services.operation	Provides services for operation profile functionality.
com.sun.xvm.services.opscenter	Provides the service interface for XMV Update Job Manager.
com.sun.xvm.services.osconfig	Provides classes for OS Configuration profiles management.
com.sun.xvm.services.osdeployment	Provides services and types to manage deployment of operating systems to servers. This package provides services to access aggregated and detailed information on installed operating systems, monitor OS activity, and provision OS. This package is available only in Enterprise Controllers.
com.sun.xvm.services.osmonitoring	Provides the parameters for OS monitoring profile value object creation.
com.sun.xvm.services.pam	Provides access to services based on the pluggable authentication modules
com.sun.xvm.services.pis	Provides the product and asset information service and types interfaces, used to classify assets according to their product name and hierarchy.
com.sun.xvm.services.productupdate	Provides the service interface to download update catalog files and bundles.
com.sun.xvm.services.profile	Provides the profile services to create, delete, and update profiles.
com.sun.xvm.services.provisioning	Provides services for managing server provisioning.
com.sun.xvm.services.proxyprov	Provides services for the installation of proxy software on a set of systems.
com.sun.xvm.services.proxyservice	Provides service for managing the provisioning of Proxy Controllers.

Table D–2   (Cont.) List of Public APIs

Package	Description
com.sun.xvm.services.report	Provides services and types for retrieving reports on utilization trend.
com.sun.xvm.services.reportsmanager	Provides services interfaces for the report manager.
com.sun.xvm.services.storagemgmt	Provides service interfaces for storage server management.
com.sun.xvm.services.svrmgmt	Provides service interfaces for server management.
com.sun.xvm.services.switchmgmt	Provides the physical and virtual switch management service interface.
com.sun.xvm.services.topology	Provides the topology service and types interfaces to get topology information of the managed resources. This package provides a tree-based navigation view of the Ops Center assets.
com.sun.xvm.services.user	Provides the services to manage user preferences.
com.sun.xvm.services.virtimagelib	Provides the services for virtual images library and virtual image management.
com.sun.xvm.services.virtpool	Provides the service for managing the life cycle of virtual pools sharing the same libraries or networks, and have the same processor architecture, integrating virtual pools with storage, networks, and virtualization hosts.
com.sun.xvm.services.virtservercontainer	Provides the service interface for managing virtualized server containers.
com.sun.xvm.services.win	Provides filters supported for Windows services.
com.sun.xvm.services.winpm	Provides service interfaces for Windows compliance reports and Windows software updates deployment.
com.sun.xvm.services.wme	Provides the service interface for Windows management extension administration.
com.sun.xvm.services.xvmserver	Provides the XVM server management service for managing the system level aspects of the XVM server.

Public API Access

- Public API Access Through JMX Clients

- Public API Access Through WS-Management

JMX

Java Management Extensions (JMX) technology provides the tools for building distributed, modular, and dynamic solutions for managing and monitoring devices, applications, and networks. The JMX API defines the notion of MBeans, or manageable objects, which expose attributes and operations in a way that allows remote management applications to access them. An important new feature of the JMX API in the Java Platform, Standard Edition 7 (Java SE 7) is its ability to create MXBeans, a substantial improvement over Standard MBeans. For more information on JMX, see the Java Management Extensions (JMX) Technology website at http://www.oracle.com/technetwork/java/javase/tech/javamanagement-140525.html.

WS-Management

Web Services for Management (WS-MAN) is a specification for managing servers, devices, and applications using web services standards, providing a common way for systems to access and exchange management information across the entire IT infrastructure. It is commonly used in the Windows management stacks, and is supported by Microsoft management tools, including the `winrm` command-line interface and COM objects that can be used from Visual Basic or from C#.

Public API Access Through JMX Clients

The simplest and preferred way of interacting with the public APIs is using a Java client. This Java client communicates with the public APIs using a secure remote JMX client. By using a remote JMX client, it is possible to directly interact with the Service MXBeans in Java using the strongly-typed Java MXBeans interface class library. The JMX MXBean interfaces are documented in the javadoc that is included in the SDK. The following remote JMX management protocols are supported: JMXMP and WS-MAN.

Public API Access Through WS-Management

The public API MXBeans are exposed over WS-Management through JSR-262. This specification defines a way to use Web Services to access JMX instrumentation remotely. Clients are not required to be Java applications. This permits a generic WS-Management client to interact with the public APIs. The WS-Management mappings for each service tier API is documented in the Javadoc that is included in the SDK.

Virtualization Management Stack

The virtualization management stack is a three-tier management paradigm. The stack consists of presentation tier, service tier, and an underlying domain model.

Presentation Tier

The presentation tier provides the user interface, displays the information provided by the service tier, and takes actions through the service tier.

Service Tier

The service tier contains all the core management logic. This tier exposes the management functionality through a set of public APIs that are used by the presentation tier and external systems management solutions. These public APIs are the ideal integration points for third-party software to control or to monitor the Enterprise Manager Ops Center software.

The service tier exposes its management APIs as a series of Java Management Extensions (JMX) MXBean interfaces. These interfaces are made accessible as public APIs through several remote protocols, including JMXRemoting (JSR 160) and WS-Management (JSR 262).

The services are identified by MXBean ObjectName, and these are of the form:

```
com.sun.xvm.services:type=<service name>
```

The main entry point to the public APIs is the MXBean interface defined in com.sun.xvm.services.

Domain Model

The domain model provides the representation of underlying managed resources and associations between them. The domain model exposes a normalized data model of these managed resources as a collection of JMX MXBeans. Each managed resource has one MXBean and each association between these resources as one MXBean.

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