

Oracle® Enterprise Manager Ops Center

Understanding Operating System Performance and Capacity

12c Release 2 (12.2.1.0.0)

E41231-03

January 2015

This guide provides an overview of the OS Analytics feature of Oracle Enterprise Manager Ops Center.

Introduction to Operating System Performance and Capacity

Optimizing your operating system (OS) environment can improve system performance and capacity by helping you to quickly identify areas of concern. The monitoring feature in Oracle Enterprise Manager Ops Center provides extensive information about your monitored operating systems and zones. You can use the information to evaluate performance, identify potential issues, and perform tuning.

The OS monitoring and analytics features give you quick and easy access to historical and real-time performance, process, and status details. Analytics is available for Oracle Solaris, Linux, and for the different types of OS virtualization that Oracle Enterprise Manager Ops Center supports, including Oracle Solaris Zones, Oracle VM Server for SPARC and Oracle VM Server for x86 guests.

The following are some details gathered on the performance and capacity of a specific operating system or zone:

- Real time network details
- Real time I/O details
- Real time and historical process details
- Real time and historical memory details

A number of charts provide a visual representation of performance and usage. Depending on the OS, the Summary tab contains charts for the consumers of system resources. The Charts tab lets you choose the type of chart, define the X-axis and Y-axis, and determine what you want to plot. All timed charts are all in GMT.

This document shows how you can use the Analytics feature to view the memory utilization, SMF status, and zone capacity on an Oracle Solaris 11 operating system.

See [Related Articles and Resources](#) for links to related information and articles.

What You Will Need

You need the following to view Analytics metrics for this example:

- At least one agent-managed operating system. To view OS Analytics on an Oracle Solaris 11 operation system, the Enterprise Controller and Proxy Controller must be installed on an Oracle Solaris 11 OS.

- At least one Oracle Solaris non-global zone to view zone analytics.
- An Asset Administration role assigned to a group containing the operating systems.

Understanding Operating System Performance and Capacity

Analytics is available for Oracle Solaris, Linux, Oracle Solaris Zones, Oracle VM Server for SPARC and Oracle VM Server for x86 guests. This example shows the following:

- **Where to Find Analytics:** Where to locate analytics information in the user interface.
- **Operating System Performance and Capacity:** View a history of the top consumers. From the top consumers, you can quickly assess the memory utilization of an operating system and drill down to the process level for detailed information and view a load metric.
- **Oracle Solaris SMF Services:** View the SMF status of an Oracle Solaris 11 operating system and quickly identify a critical issue.
- **Virtualization Performance and Capacity:** Monitor performance and capacity information for your Oracle Solaris zones. Drill down to the process level for detailed information.

Where to Find Analytics

Analytics is available for Oracle Solaris, Linux, and Oracle Solaris Zones. Select an operating system from the Assets. The level of detail depends on the type of OS and whether the OS is agent-managed or not. Because an Agent Controller is required to capture the level of system activity and individual process activity, the greatest level of detail is available for agent-managed operating systems.

1. Select an operating system from the **Assets** section in the Navigation pane.



2. Click the **Analytics** tab in the center pane.
 - When you select an OS without zone capabilities, a single layer of subtabs is available.



- When you select an OS with a global zone, two layers of sub-tabs are available. The first layer under Analytics is OS Analytics and Zone Analytics. Each of these tabs has a set of tabs.



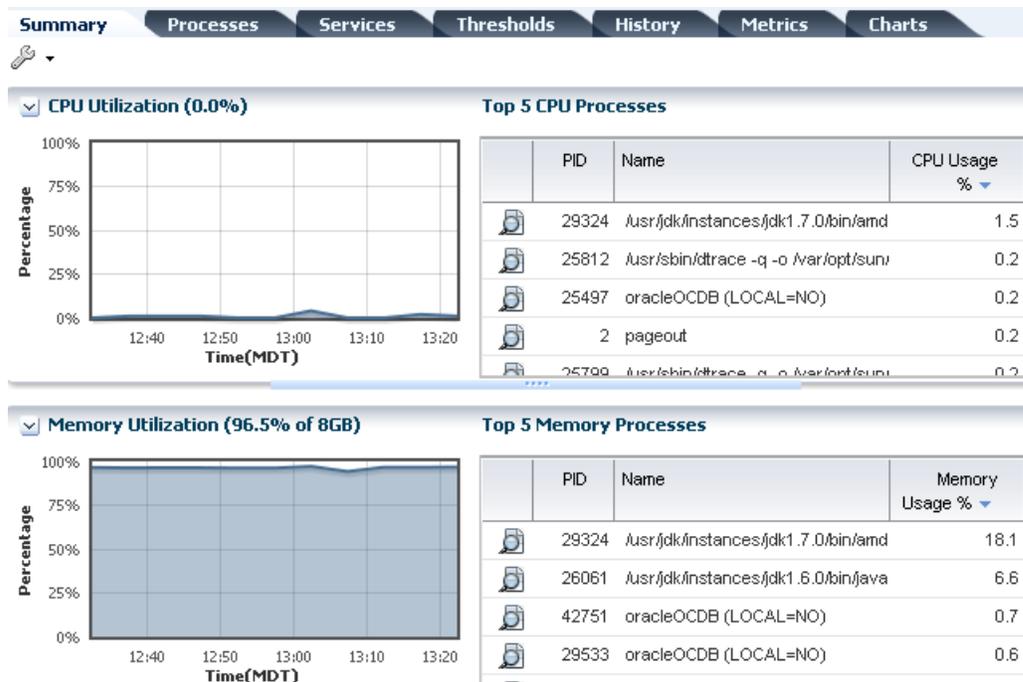
Operating System Performance and Capacity

You can quickly see the top consumers are for a specific operating system, drill down for more detailed information, or view the trend.

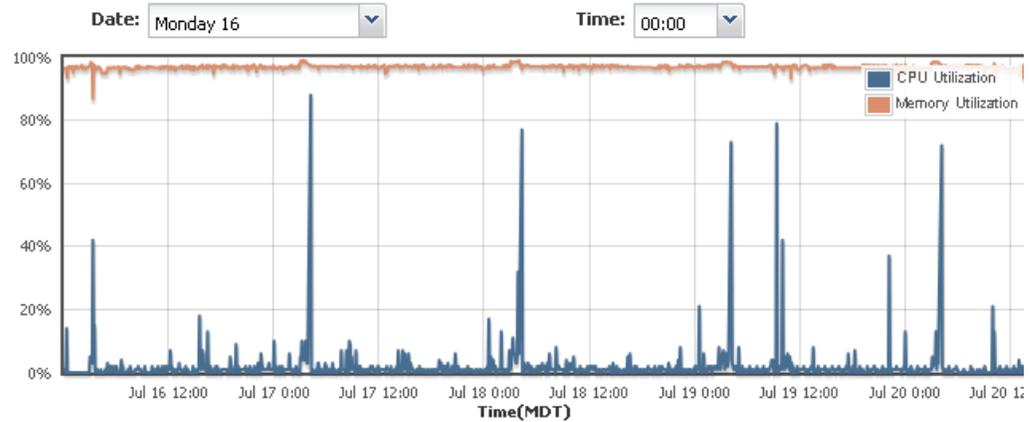
Top Consumers for CPU, Memory, Network, and I/O utilization appear on the Summary page. Each performance metric is charted to show the status at a glance. The table to the right of each graph lists the top five processes that are consuming resources. You can click the View icon next to a process to drill down to the process level and view specific areas of concern. This example shows extremely high memory utilization on a selected OS and where you can get more information.

1. Select an operating system from the **Assets** section in the Navigation pane.
2. Click the **Analytics** tab.

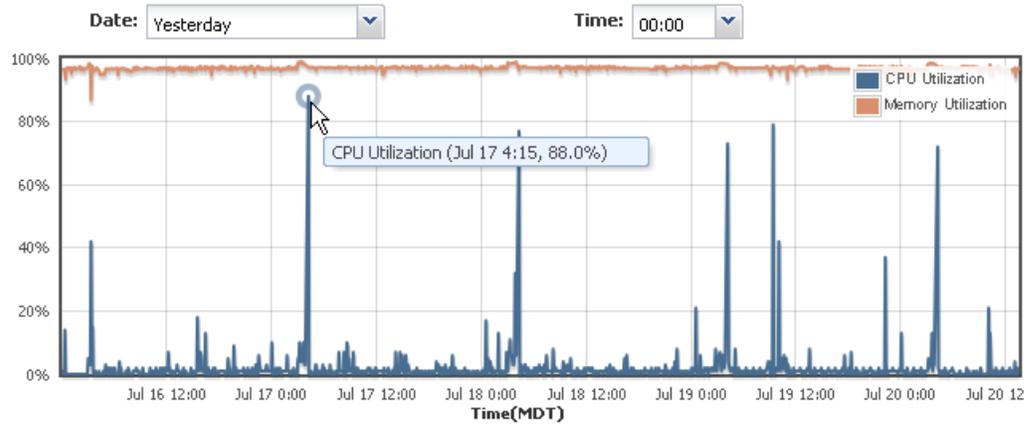
The left side of the page has four graphs, one for each type of performance metric. The right side of the page has the corresponding list of top consumers. In this example, Memory Utilization is at 96.5%.



3. Click the **History** tab to see the trend. Select the date from the drop-down list to show a running history. The history shows that the memory is consistently at close to 100% and CPU utilization has high spikes on a consistent basis.



4. Hover over the line on the graph to display the timestamp and percentage. In this screen capture, the CPU Utilization on July 17 at 4:15 was 88.0%.



5. Click the **Processes** tab to see all processes, the state, and usage. Click a table heading to sort the table in ascending or descending order. In this example, the sort is by Memory Usage. Highlight a process, then click the View icon to drill down for process details.

Summary Processes Services Thresholds History Metrics Charts							
Processes (130)							
PID	Name	User	State	CPU Usage %	Memory Usage %	Physical Memory Size (MB)	Virtual Memory Size (MB)
29324	/usr/jdk/instanc	root	SLEEPING	1%	16%	1278.9	1477.7
26061	/usr/jdk/instanc	root	SLEEPING	0%	7%	530.6	721.0

6. The Process Details page includes a Summary, Process Details, Thread Information, Handles, Process Environment, and Memory Information. Expand the area you want to view, in this case Memory Information. You can sort columns. Click **Kill Process** to force the process to quit. You can also perform this action on the main Process page, as described in Step 7.

Process Details

Summary

Process Name: /usr/jdk/instances
/jdk1.7.0
/bin/amd64/java Process ID: 29324 Target
CPU %: - Zone Name
User Name: root Memory %: 15
Group Name: sys

Process Details

Thread Information (360)

Handles

Process Environment

Memory Information (1504)

Physical Memory : 1258.6 MB Anonymous Memory : 607.7 MB
Virtual Memory : 1456.7 MB Dirty Pages : -

Virtual Address	Virtual Mapping Size (KB)	Resident Physical Memory (KB)	Anonymous Memory (KB)	Dirty Pages (KB)	Locked	Permissions	Mapping Name
FFFFFD7F3AC0	137216	137216	48208		-	rw---	[anon]
FFFFFD7F4C6C	133120	133120	20456		-	rw---	[anon]
FFFFFD7F22CC	131072	131072	114404		-	rw---	[anon]

- After you review the process, you can stop the process or close the window and review another high consumer process. To stop the process or force the process to quit, select a process and click the **Kill Process** icon. A pop-up box prompts for confirmation and a check box offers the option to force the process to quit. Click **Kill Process** to confirm.

OS Analytics Zones Analytics

Summary Processes Services Thresholds

Processes (71)

Search

PID	Name	User	State	CPU	Memory	Physical
2081	/usr/jd					5
1053	/opt/or					0
1051	/usr/ja					8
1491	/usr/sk					3
1493	/usr/sk					2

Kill Process

Are you sure that you want to kill the selected process: [18846]?

Optionally force the process to quit

Kill Process Cancel

Operating System Metrics

With Metrics, you can view monitoring details on the components of an operating system, such as load, file system, networks, kernel memory, and users.

1. Click the **Metrics** tab.
2. Click a component to view the available elements. In this example, click **Load** to see an overview of all load metrics.

The screenshot shows the Oracle Solaris Metrics tab with the 'Load' component expanded. The table below displays the metrics for the 'Load' component.

Name	Threshold Status	Critical Value	Warning Value	Current Value
Used Memory %	Set	-	100	97.17879
Free Memory %	N/A	-	-	2.821201

3. Expand the component and click an element to view the details and a chart. In this example, the Load component is expanded and the elements Used Memory Percentage and Free Memory Percentage are shown.

The screenshot shows the Oracle Solaris Component Navigation pane with the 'Load' component expanded. The table below displays the metrics for the 'Load' component.

Name	Threshold Status	Critical Value	Warning Value	Current Value
Used Memory %	Set	-	100	97.17879
Free Memory %	N/A	-	-	2.821201

Oracle Solaris SMF Services

Service Management Facility (SMF) is a feature of the Oracle Solaris operating system. Beginning with Oracle Solaris 10, SMF services provide a set of capabilities to other software, local services, remote services, and system entities that include ISV applications. A milestone is a special type of service that defines the level of readiness for a system or for a group of services.

Each SMF service has the potential to have several instances. An instance is a specific configuration of a service. For example, a web server is an SMF service, while a web server daemon configured to listen on a specific port is an instance. Each instance of the web server service might have different configuration requirements. The service has system-wide configuration requirements, but each instance can override specific requirements, as needed. Multiple instances of a single service are managed as children of the service.

To work properly, many services depend on a list of local services. For example, the Sendmail service depends on the Naming service, which depends on Networking services. If an underlying service fails, you must correct it before dependent services are affected or to restore dependent services.

SMF services have the following states:

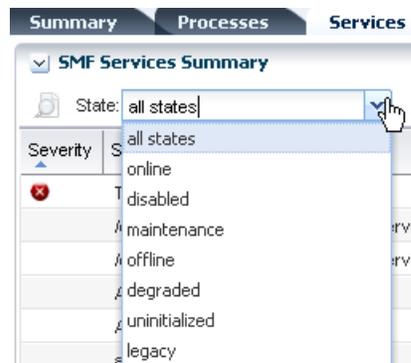
- **Online:** The service instance is enabled and has successfully started.
- **Disabled:** The service instance is not enabled and is not running.
- **Maintenance:** The service instance has encountered an error that must be resolved by the administrator.
- **Offline:** The service instance is enabled, but the service is not yet running or available to run.

- Degraded: The service instance is enabled, but is running at a limited capacity.
- Uninitialized: This is the initial state for all services before their configuration is read.
- Legacy: The service is not managed by SMF, but you can view the service. This state is only used by legacy services.

Oracle Enterprise Manager Ops Center enables you to view the state of SMF services for a particular operating system. You can view all states, or filter for a particular state. You can view the service details and the associated Fault Managed Resource Identifier (FMRI).

This example shows that there is a critical issue with an SMF service and how to drill down to identify the problem.

1. Expand **Assets** in the Navigation pane, then select an operating system.
2. Click the **Analytics** tab in the center pane, then click the **Services** subtab.
3. The default view is all states. Click the drop-down to filter for a specific state.



4. In this example, there is a critical issue with the Timezone Reload service. The critical issue appears in the first row of the table.

Severity	Service Name	State	Enabled	State Time	Fault Management Resource Identifier (FMRI)
Critical	Timezone Reload	maintenance	true	Thu Jul 12 16:55:28 2012	svc:/system/timezone:default
None	/dev/chassis namespace supj	online	true	Thu Jul 12 16:54:36 2012	svc:/system/devchassis:cleanstart

5. Double-click a service name to view details. In this case, the Timezone Reload service is in maintenance mode and a critical alert is associated with the service.

Service Details

Name: Timezone Reload
FMRI: svc:/system/timezone:default
State: maintenance **Next State:** none
Severity:  **Enabled:** true
State Time: Thu Jul 12 16:55:28 2012 **Restarter:** [svc:/system/svc/restarter:default](#)

Dependencies: (2)

FMRI ▲	State	Grouping/Restart On
svc:/system/filesystem/root:default	online	require_all/none
svc:/system/manifest-import:default	online	optional_all/none

Dependents: (2)

FMRI ▲	State
svc:/milestone/self-assembly-complete:default	online
svc:/milestone/single-user:default	online

Log File: [/var/svc/log/system-timezone:default.log](#)
Reason: Start method exited with \$SMF_EXIT_ERR_FATAL.
Impact: This service is not running.

The top section of the service details includes the name, FMRI, state, severity, when the date and time when the state was reached, the next state, whether the service is enabled, and a link to the restarter. Two tables appear below the details. The first, titled Dependencies, shows the number of dependencies, the FMRI, state, and Grouping or restart location. The second table, titled Dependents, shows the number of services depending on the service, the FMRI, and the state. The bottom of the page includes a link to the log file, the reason for the issue, and the impact.

- To drill down and view the service details about a dependency or dependent service, and to access log files, click the link in the FMRI column.

Service Details

Name: Timezone Reload
FMRI: svc:/system/timezone:default
State: maintenance
Severity:  **Enabled:** true
State Time: Thu Jul 12 16:55:28 2012

Dependencies: (2)

FMRI ▲
[svc:/system/filesystem/root:default](#)
[svc:/system/manifest-import:default](#)

Dependents: (2)

FMRI ▲
[svc:/milestone/self-assembly-complete:default](#)
[svc:/milestone/single-user:default](#)

Log File: [/var/svc/log/system-timezone:default.log](#)
Reason: Start method exited with \$SMF_EXIT_ERR_FATAL.
Impact: This service is not running.

ORACLE

Oracle Enterprise Manager Ops Center - Service Details

Service Details - Dependency of svc:/system/timezone:default

Name: root file system mount
FMRI: svc:/system/filesystem/root:default
State: online **Next State:** none
Severity:  **Enabled:** true
State Time: Thu Jul 12 16:54:22 2013 **Restarter:** [svc:/system/svc/restarter:default](#)

Dependencies: (2)

FMRI ▲	State	Grouping/Restart On
svc:/network/socket-config:default	online	require_all/none
svc:/system/device/mpxio-upgrade:default	disabled	optional_all/none

Dependents: (10)

FMRI ▲	State
svc:/network/dns/client:default	online
svc:/network/service:default	online
svc:/network/socket-filter.kssl	disabled
svc:/system/auditset:default	online

- To view the contents of a log file, click the link. In this example, the file content of the log file indicates that the issue is caused by a missing file or directory and cannot link from `/usr/share/lib/zoneinfo/GMT-7` to `/etc/localtime`.

File Content

File Name: `/var/svc/log/system-timezone:default.log`

```
[ Jul 12 16:55:18 Rereading configuration. ]
[ Jul 12 16:55:28 Executing start method ("/lib/svc/method/svc-timezone start"). ]
/usr/sbin/zic: Can't link from /usr/share/lib/zoneinfo/GMT-7 to /etc/localtime: No such file or directory
[ Jul 12 16:55:28 Method "start" exited with status 95. ]
```

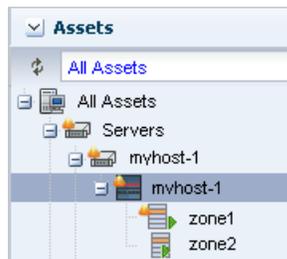
The logs enable you to quickly identify the impact to other services and to identify and correct the issue.

Virtualization Performance and Capacity

Zones Analytics gives you several different views of zone performance and capacity. Charts and top consumer tables show the capacity and the percentage used by the global zone and all associated non-global zones.

The tabs provide different views of the resources allocated to each zone and the CPU and memory utilization. The Resource Pool Utilization page provides information for both shared and dedicated CPU.

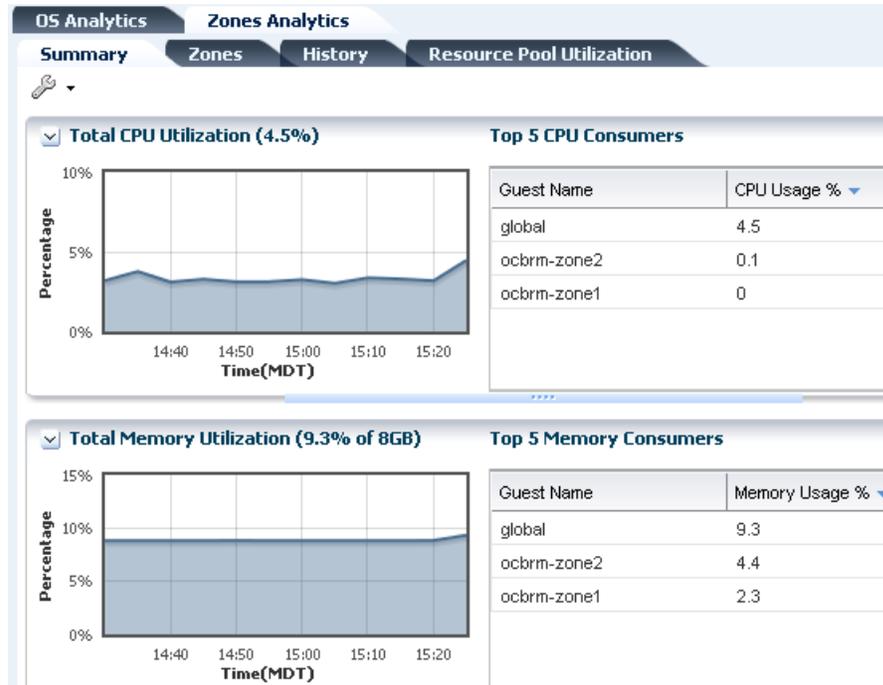
- Expand **Assets** in the Navigation pane, then select an operating system.



- Click the **Analytics** tab in the center pane, then click the **Zone Analytics** sub-tab.



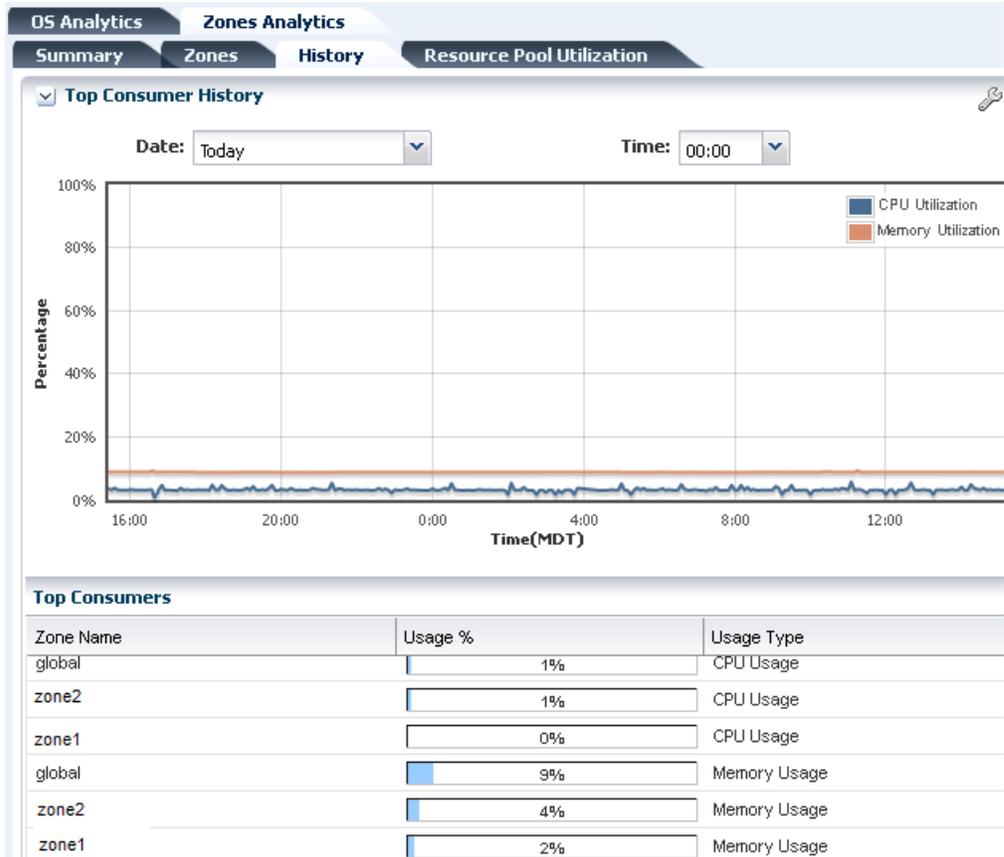
- The Zone Analytics Summary page provides a graphical representation of the top five consumers for CPU utilization and memory utilization. The corresponding table on the right lists the guest name and usage.



4. Click the **Zones** tab to view the CPU usage and memory allocation for the global zone and all associated non-global zones.

Zone Name	CPU Usage %	Memory Allocated %
global	4.5%	9.3%
zone2	0.06%	4.4%
zone1	0.01%	2.3%

5. Click the **History** tab to view a graphical representation of the percentage of CPU and memory over time that the top consumers used. You can edit the chart by selecting a date and time to graph. The lower portion of the page has a Top Consumers table that lists the zone name, Usage percentage, and whether the usage type is CPU Usage or Memory Usage.



- Click the **Resource Pool Utilization** tab to see CPU allocation and utilization across the zones when the zones are a member of a server pool. This page shows greater details on how the CPU is allocated for the global and non-global zones, and the aggregated total capacity and usage.

OS Analytics Zones Analytics

Summary Zones History Resource Pool Utilization

Shared CPU Utilization

Name ▲	Usage Cap	Usage Cap %	Usage %	Usage ms	Idle %	Elapsed Time
Resource Pool: pset_default (4)						
Total (Aggregate)	-	-	3%	15967	97%	00:00:15
global	-	-	3%	15867	97%	-
ocbrm-zone1	-	-	0%	39	100%	-
ocbrm-zone2	-	-	0%	61	100%	-

Dedicated CPU Utilization

Name ▲	Usage Cap	Usage Cap %	Usage %	Usage ms	Idle %	Elapsed Time
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What's Next?

Use the Analytics information to monitor processes and drill down to greater process details. You can use the information to tune your monitoring policies and rules and alerting thresholds to optimize the performance and capacity in your data center.

Related Articles and Resources

See the *Oracle Enterprise Manager Ops Center Feature Reference Guide* for more information on the features. The documentation is available at http://docs.oracle.com/cd/E40871_01/index.htm.

The following chapters in the *Oracle Enterprise Manager Ops Center Feature Guide* contain more information:

- See *Operating Systems* for a list of the supported analytics information for agentlessly managed operating systems.
- See *Monitoring Rules and Policies* for information about changing a monitoring threshold for a single asset.

For end-to-end examples, see the workflows and how to documentation in the *Deploy How To* library at http://docs.oracle.com/cd/E40871_01/nav/deplohowto.htm and the *Operate How To* library at http://docs.oracle.com/cd/E40871_01/nav/operatehowto.htm.

For in-depth information about Oracle Solaris 11, see the Oracle Solaris 11 documentation at http://docs.oracle.com/cd/E23824_01/index.html.

Documentation Accessibility

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