

# IBM Infrastructure Suite for z/VM and Linux: Introduction

## *IBM Tivoli OMEGAMON XE on z/VM and Linux*

August/September 2015

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# Introduction

IBM Infrastructure Suite for z/VM and Linux consists of five products for monitoring and managing your z/VM and Linux on System z environments. These products include:

- IBM Wave for z/VM
- IBM Operations Manager for z/VM
- IBM Backup and Restore Manager for z/VM
- IBM Tivoli Storage Manager Extended Edition
- IBM Tivoli OMEGAMON XE on z/VM and Linux

In this guide, you will focus on OMEGAMON XE on z/VM and Linux. You will explore the product delivered Tivoli Enterprise Portal workspaces and the new IBM Dashboard Application Services Hub dashboards. Each presents z/VM and Linux metrics collected by the Linux and z/VM agents.

## Lab Environment

The labs for IBM Infrastructure Suite for z/VM and Linux are hosted on TIVLP3, a z196 machine running z/VM 6.3. In this lab, you will use a web browser or java web start application to access the Tivoli Enterprise Portal and the Dashboard Application Services Hub. All supporting infrastructure for OMEGAMON XE for z/VM and Linux is running on Linux on System z.

## Credentials

You will need the following credentials for this lab. Both interfaces will use the same userid and password:

**Tivoli Enterprise Portal (TEP) URL:** <http://192.84.47.55:15200/tep.jnlp>  
or  
<http://192.84.47.55:15200/cnp.html>

**Dashboard Application Service Hub URL:** <https://192.84.47.76:16311/ibm/console/logon.jsp>

**Userid:** DemoUser

**Password:** cmszdemo

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# IBM OMEGAMON for z/VM and Linux

OMEGAMON® XE on z/VM® and Linux provides a wide range of information about the z/VM and Linux on System z operating systems. In this lab exercise, you will use OMEGAMON XE on z/VM and Linux to:

- Observe the performance of the z/VM hypervisor hosting the virtual machines running on the TIVLP3 z/VM system, and
- Observe the performance of the Linux on System z instances provisioned on the z/VM hypervisor.

## Scenario 1: Explore the Tivoli Enterprise Portal

In this first exercise, you will navigate through the workspaces delivered with OMEGAMON XE on z/VM and Linux while investigating the data collected from TIVLP3 and the Linux guests available on this system.

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**Note:** TIVLP3 is being used for labs and for demos in the Expo. You may see changes in the number of managed systems that OMEGAMON is monitoring due to the activity on the system.

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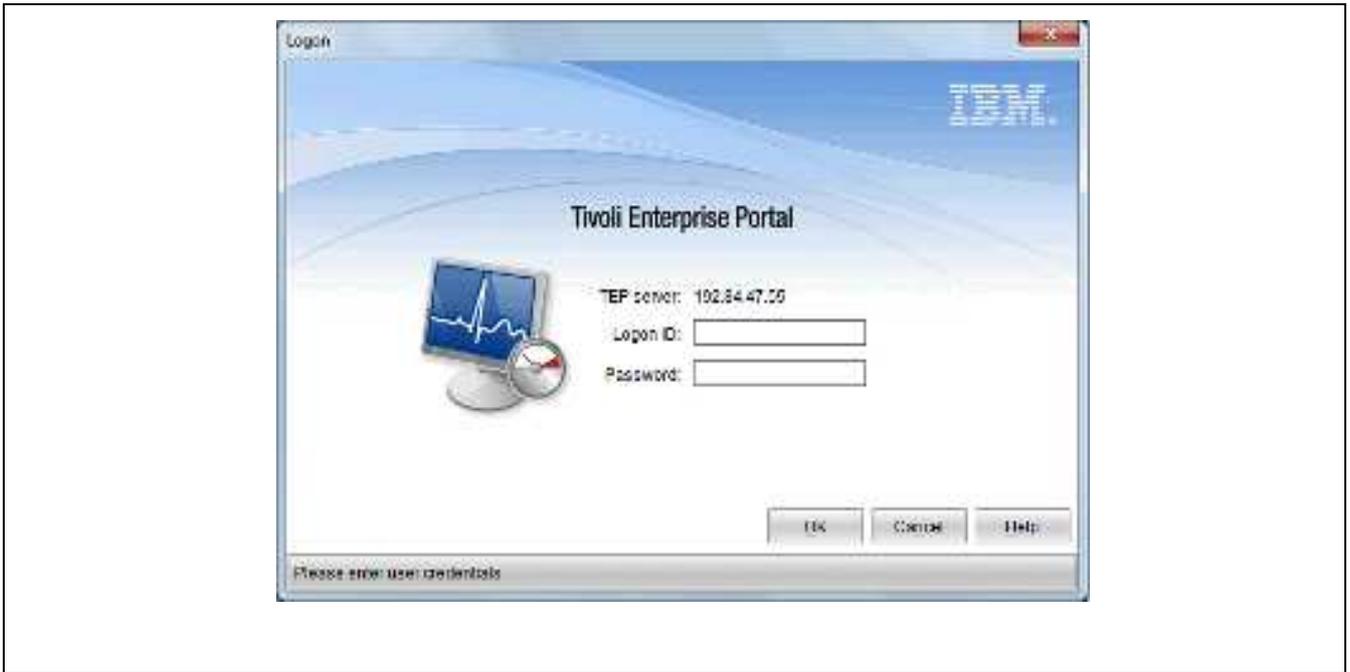
1. Logon to the Tivoli Enterprise Portal (TEP) to begin your exploration.

a. Launch the TEP from the java web start client or the web interface by pointing your browser to one of the following:

<http://192.84.47.55:15200/tep.jnlp>

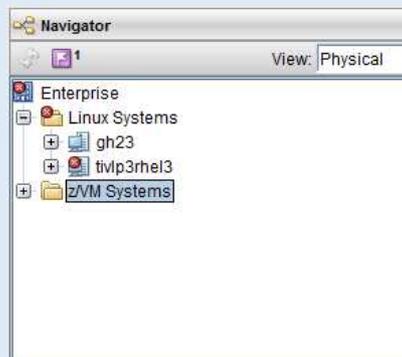
<http://192.84.47.55:15200/cnp.html>

b. Logon to the TEP using the Logon ID *DemoUser* and Password *cmszdemo*.

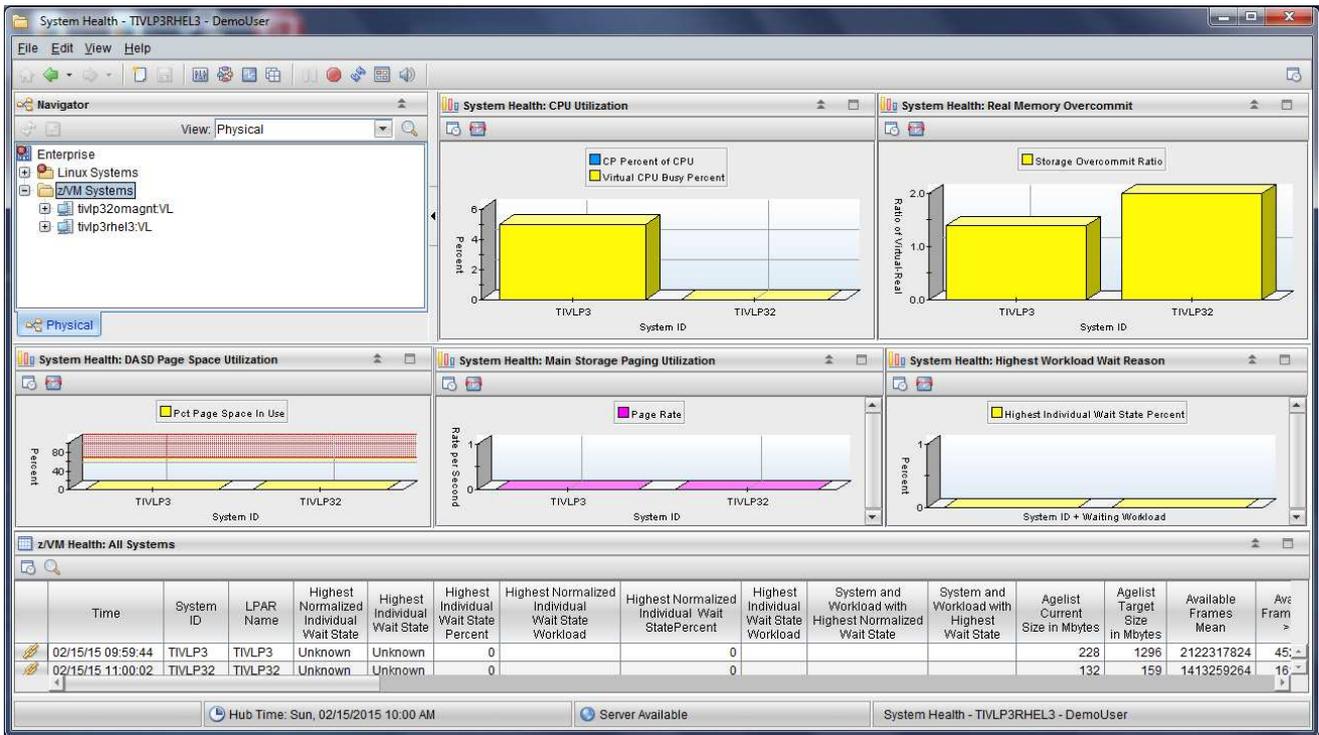


When the logon completes successfully, the Tivoli Enterprise Portal Enterprise workspace views are displayed, along with the navigator view on the left. The discovered Linux and z/VM systems are displayed in the navigator.

2. In the navigator on the left, click on **z/VM Systems**.

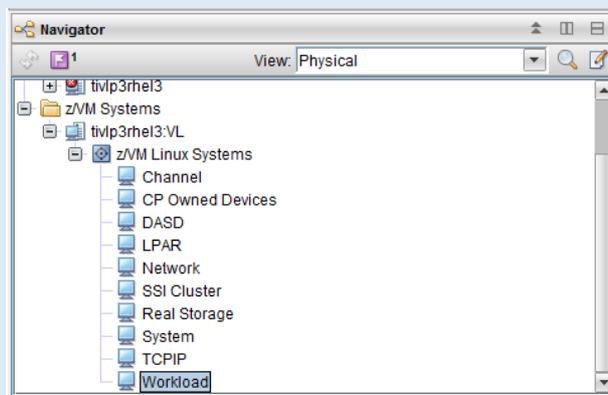


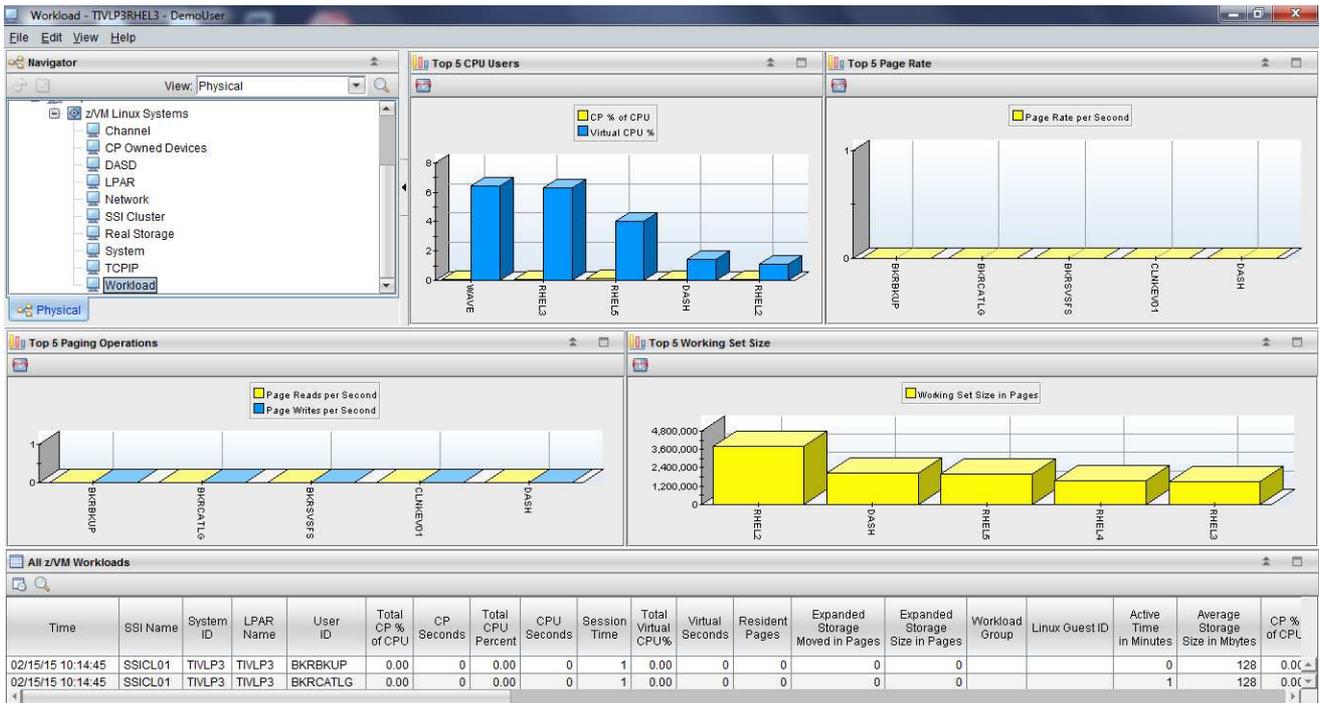
The overall **z/VM System Health** Workspace is display. This workspace shows views of the overall z/VM system performance, such as *CPU Utilization* and *Real Memory Overcommit*.



In this workspace, you see that two z/VM systems, TIVLP3 and TIVLP32, are reporting data into this IBM Tivoli Monitoring infrastructure.

- Expand **z/VM Systems** by clicking the '+'. Continue to expand the navigation tree until you find **Workload** branch for TIVLP3 (*tivlp3rhel3:VL -> z/VM and Linux Systems -> Workload*). Click on **Workload** to display the workspace.

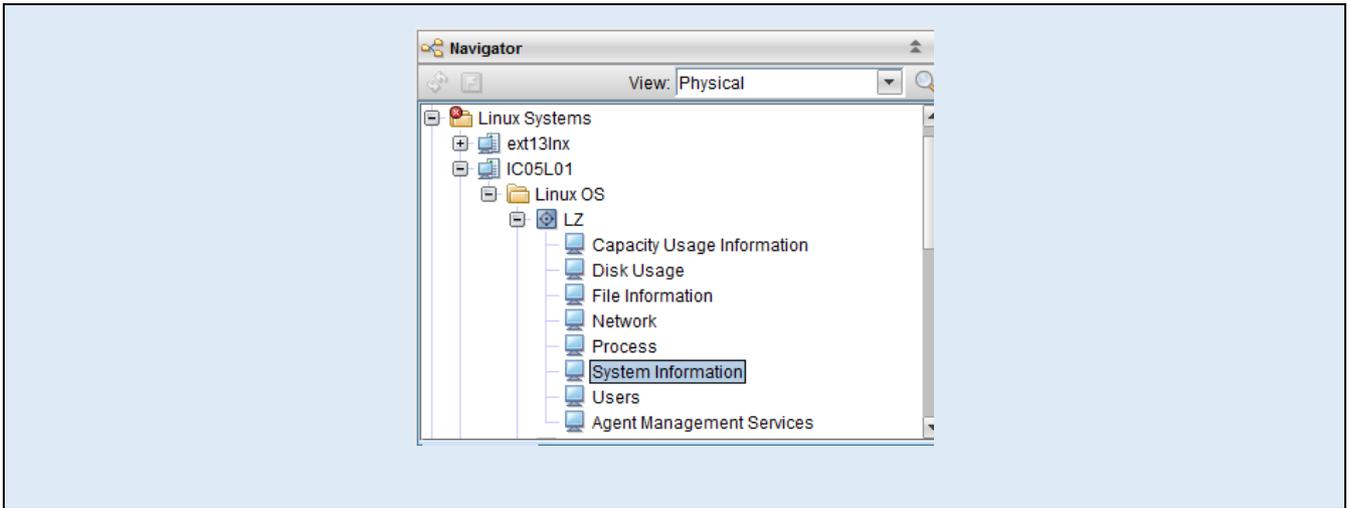




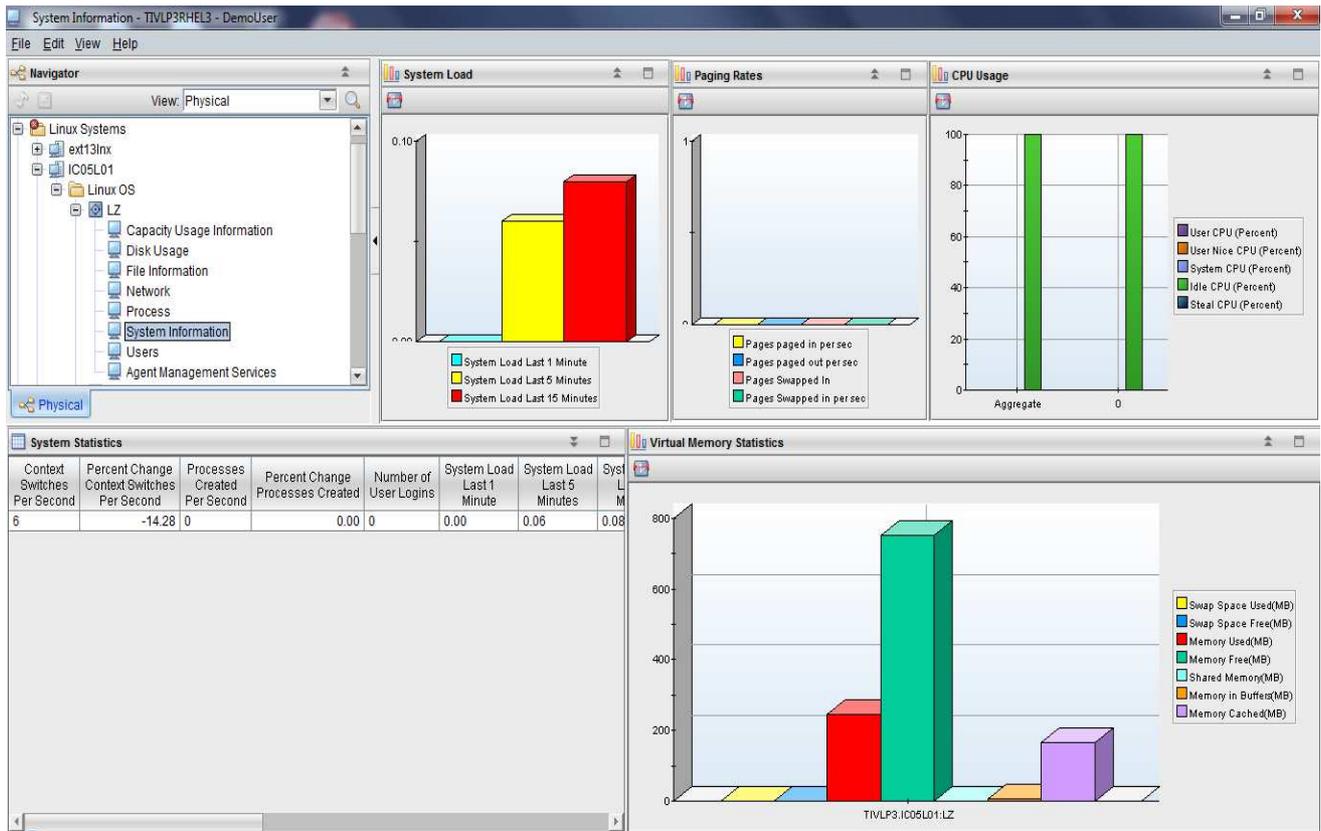
This workspace consists of 4 views showing the top five users with respect to different metrics of the TIVLP3 z/VM system.

The view at the bottom of the workspace lists all the z/VM workloads running in the system. The table can be easily sorted in descending or ascending order by clicking on the column heading of the desired attribute. Since this is a view of utilization at the hypervisor level, it is important to know which virtual machines are running critical applications and require attention.

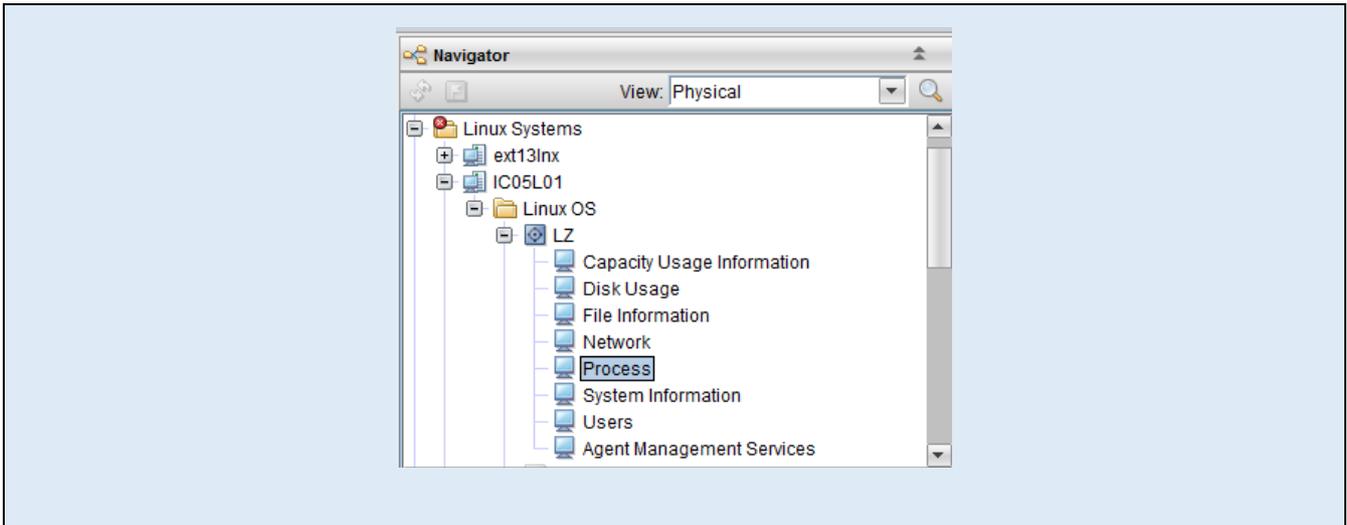
- The TEP also reports Linux agent data. In the navigator view on the left side of the screen, find the **IC15BASE** Linux guest or, if you recently completed the IBM Wave lab, look for your **IC0xL02** guest. The golden image used to create these Linux guests contains the ITM Linux OS agent and will report into the lab's IBM Tivoli Monitoring environment when the guest is started.
- Expand the tree for the Linux system you chose. Click on the **System Information** branch to display a new workspace:



Paging and CPU load views are displayed as part of the **System Information** workspace.



6. Clicking on **Processes** in the navigator displays views of utilization by each process.

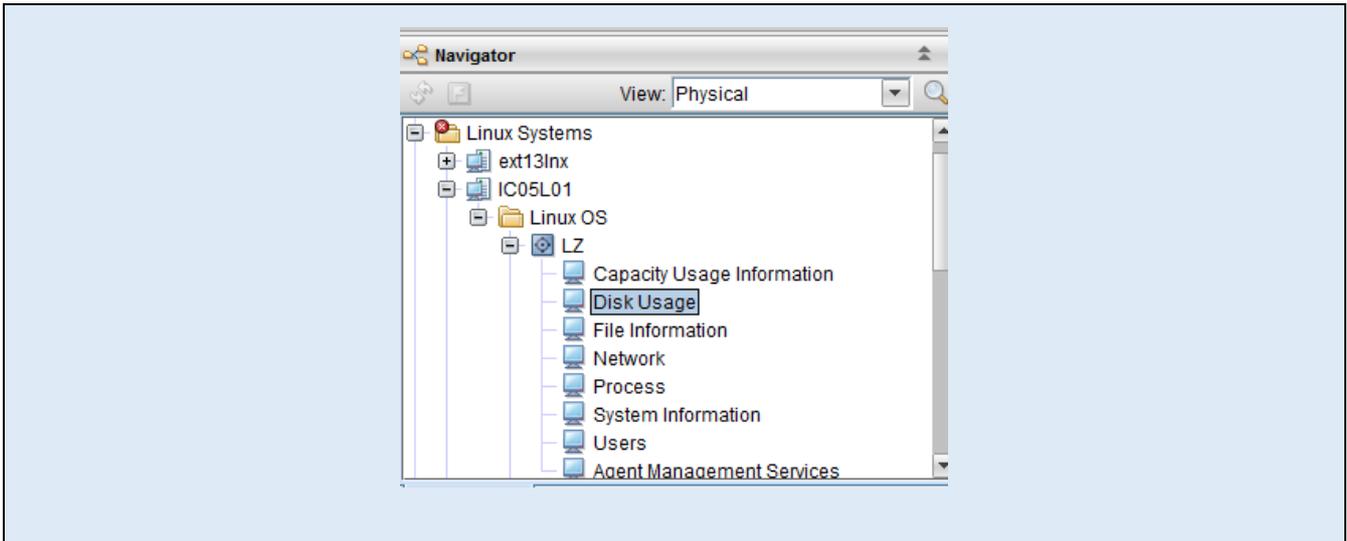


In the *Process Information Details* table, notice the link icon next to the process name. If you click on this link icon in any table, a new workspace is opened. To return to the original workspace, use the arrow keys on the toolbar.

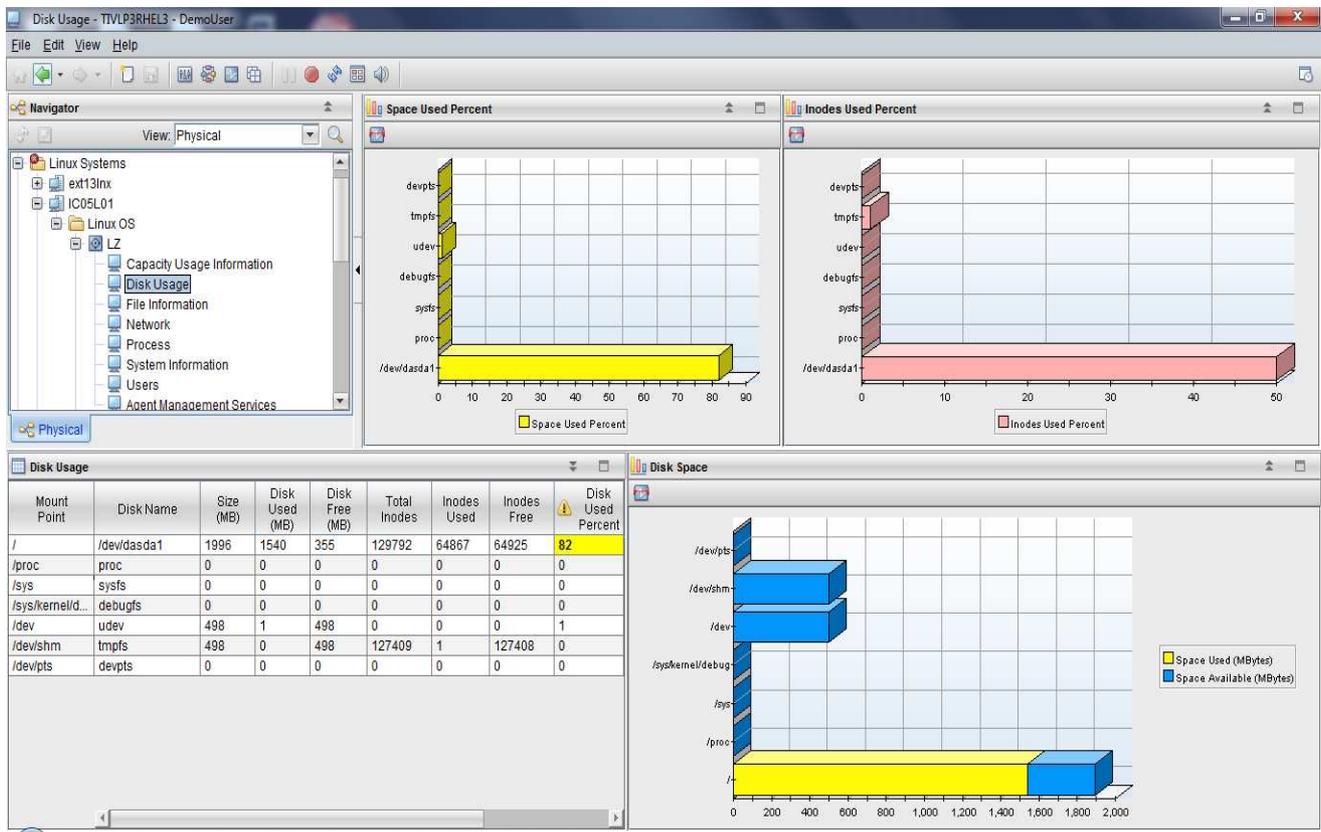
The screenshot shows the Process Information Details table and two CPU usage graphs. The table lists various processes and their CPU usage. The graphs show Process System CPU (Percent) and Process User CPU (Percent) usage for various processes.

Process Command Name	Process ID	Process Parent ID	Process State	Process System CPU (Percent)	Process User CPU (Percent)	Cumulative Process System CPU (Percent)	Cumulative Process User CPU (Percent)	Kernel Priority	Nice Value	Total Size (Pages)	Resident Set Size (Pages)	Shared Memory (Pages)	Text Resident Set (Pages)	Shared Lib Resident Set (Pages)	Data Resident Set (Pages)
init	1	0	Sleeping	0.00	0.00	0.00	0.00	20	0	623	223	188	10	0	81
kthreadd	2	0	Sleeping	0.00	0.00	0.00	0.00	20	0	0	0	0	0	0	0
ksftirqd/0	3	2	Sleeping	0.00	0.00	0.00	0.00	20	0	0	0	0	0	0	0
kworker/0:0	4	2	Sleeping	0.00	0.00	0.00	0.00	20	0	0	0	0	0	0	0
kworker/u:0	5	2	Sleeping	0.00	0.00	0.00	0.00	20	0	0	0	0	0	0	0
migration/0	6	2	Sleeping	0.00	0.00	0.00	0.00	-100	0	0	0	0	0	0	0
cpuset	7	2	Sleeping	0.00	0.00	0.00	0.00	0	-20	0	0	0	0	0	0
khelper	8	2	Sleeping	0.00	0.00	0.00	0.00	0	-20	0	0	0	0	0	0
netns	9	2	Sleeping	0.00	0.00	0.00	0.00	0	-20	0	0	0	0	0	0
sync_supers	10	2	Sleeping	0.00	0.00	0.00	0.00	20	0	0	0	0	0	0	0
bdi-default	11	2	Sleeping	0.00	0.00	0.00	0.00	20	0	0	0	0	0	0	0
kintegrityd	12	2	Sleeping	0.00	0.00	0.00	0.00	0	-20	0	0	0	0	0	0
kblockd	13	2	Sleeping	0.00	0.00	0.00	0.00	0	-20	0	0	0	0	0	0
md	14	2	Sleeping	0.00	0.00	0.00	0.00	0	-20	0	0	0	0	0	0
cio	15	2	Sleeping	0.00	0.00	0.00	0.00	0	-20	0	0	0	0	0	0

7. Click on **Disk Usage** to find out how much disk space is available:



Notice the warning indicated in the *Disk Usage* table. This example shows that the *Disk Used Percent* threshold has been exceeded due to high utilization.



**Note:** A situation is a test for a specific condition, such as Disk Space Usage % exceeding a certain threshold or the existence of a process running on a machine. A set of predefined situations is delivered as part of the product.

8. OMEGAMON XE also provides an Enterprise view of all the situations currently outstanding for the known agents. Click on **Enterprise** in the navigator to see this workspace.

The screenshot shows the Enterprise Status - tivlp3rhel3 - DemoUser workspace. The interface is divided into three main sections:

- Navigator:** Shows a tree view of the system hierarchy, with 'Enterprise' selected.
- Situation Event Console:** Displays a table of events with columns for Severity, Status, Owner, Name, Display Item, Source, and Impact. The table shows several critical events, including 'Linux\_AMS\_Alert\_Critical' and 'Linux\_System\_Thashing'.
- My Acknowledged Events:** Displays a table of events assigned to the current user, with columns for Status, Name, Display Item, Origin Node, Global Timestamp, Local Timestamp, and Nc.
- Open Situation Counts - Last 24 Hours:** A bar chart showing the number of times a situation has been opened in the last 24 hours. The chart shows counts for various situations, including 'MS\_Offline', 'Linux\_System\_Thashing', 'Linux\_Process\_stopped', 'Linux\_Low\_percent\_space', and 'Linux\_AMS\_Alert\_Critical'.

This workspace consists of three views. The *Situation Event Console* lists situations whose status has changed. Clicking the link indicator in the first column opens the event details workspace. The *My Acknowledged Events* table view displays the events assigned to the current user. Finally, the Open Situation Counts bar chart graphically displays the number of times a situation has been opened in the last 24 hours.

## Summary

OMEGAMON XE for z/VM and Linux collects data both at the z/VM system level and at the individual Linux guest level and presents this information in a set of predefined workspaces. In this exercise, you used the Tivoli Enterprise Portal to explore some of these metrics while learning how data is organized and presented within the portal.

## Scenario 2: Explore IBM Dashboard Application Services Hub

In the previous exercise, the Tivoli Enterprise Portal was used to investigate the health of the z/VM and Linux environment. In OMEGAMON XE for z/VM and Linux 4.3.0, support for IBM Dashboard Application Services Hub, or DASH, was introduced. In this scenario, you will explore the dashboards delivered by OMEGAMON XE for z/VM and Linux.

1. On your Desktop, open a web browser to the DASH application:

<https://192.84.47.76:16311/ibm/console/logon.jsp>



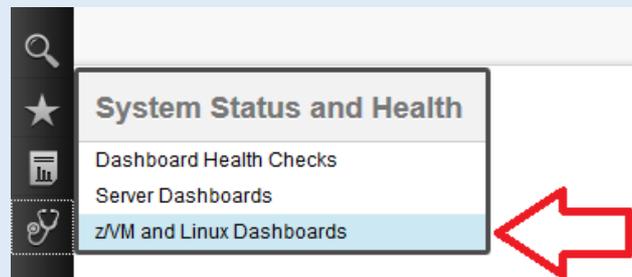
Logon with the user ID, *DemoUser*, and password, *cmszdemo* .

When the logon completes successfully, the “Learn. Explore. Connect.” dashboard is displayed.

# Learn. Explore. Connect.

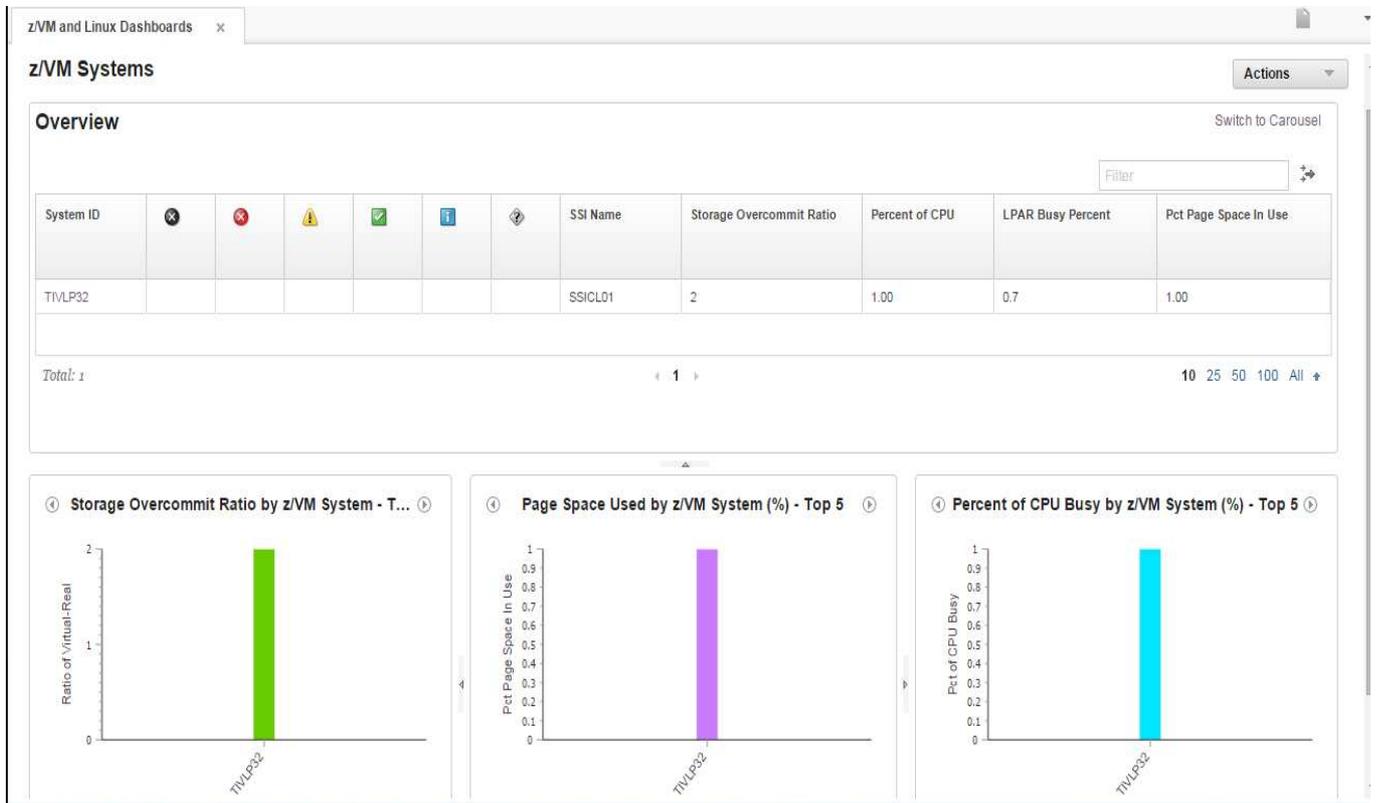


2. In the menu along the left edge of the dashboard, click on the stethoscope icon. Select: **z/VM and Linux Dashboards**.



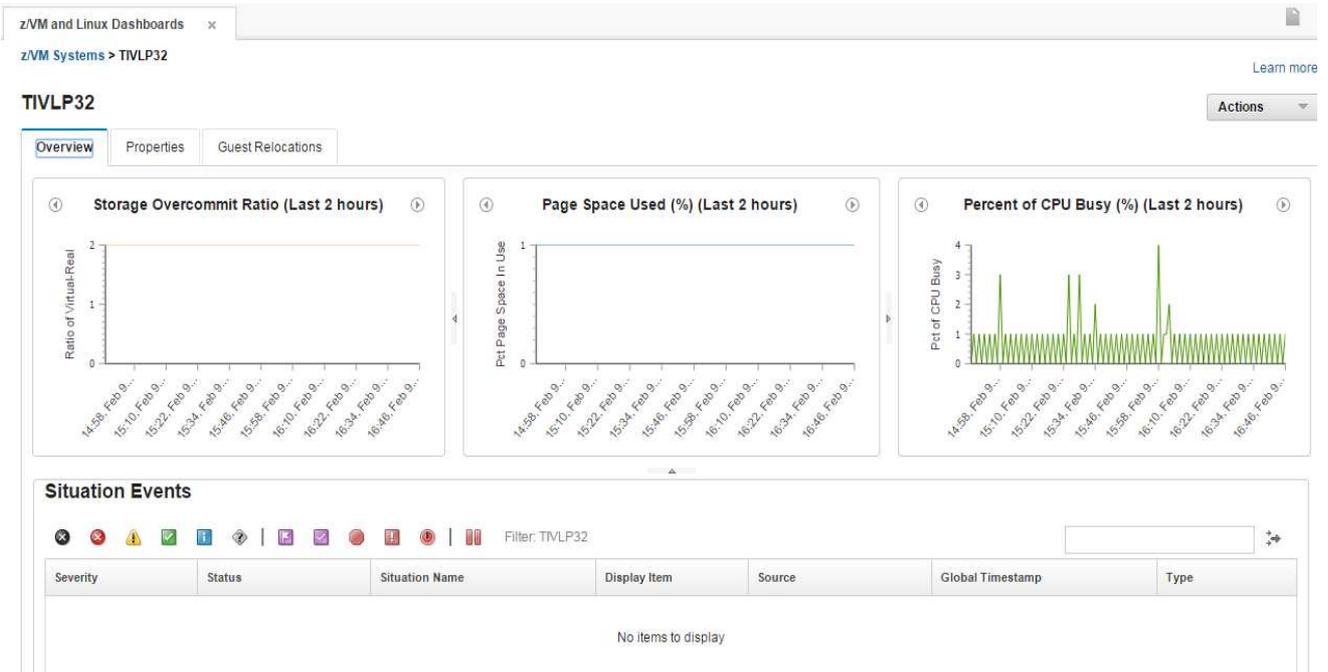
**Note:** The selection labeled **Server Dashboards** in the menu is for the Linux OS dashboards, which you will see later in this exercise. The **Dashboard Health Checks** option is not currently supported for z/VM.

After selecting **z/VM and Linux Dashboards**, the landing page for **z/VM Systems** appears. The **Overview** section shows any outstanding events for the monitored z/VM systems. Also, an at-a-glance view of the overall health of each system is shown. The example below shows a single z/VM image with system ID TIVLP32. If more systems are available, they will also appear as rows in the table and bars in the charts.



**Hint:** By clicking on: *Switch to Carousel* in the upper right corner of the dashboard, the view changes to show a carousel. Click on *Switch to Scorecard* to toggle back to the default view. The carousel provides the same content as the scorecard, but in a less cluttered view. The carousel can show overall status of a larger number of systems without forcing the user to scroll through a tabular list.

3. Click on **TIVLP32** under the System ID column to drill-down into additional detail.



Three tabs appear on the top of the system detail dashboard: *Overview*, *Properties*, and *Guest Relocation*. The **Overview** dashboard provides line charts of key z/VM performance indicators: *Storage Overcommit Ratio*, *Page Space Used %*, and *Percent Busy*. Note that the data is for the previous two hours of samples.

You may also see any outstanding events in the *Situation Events* table. This table is similar to the *Event Console* view in the TEP **Enterprise** workspace.

4. Click on the **Properties** tab to see details of the selected system (TIVLP32) and notice the information presented in this view. This is a subset of the information found in the TEP under **z/VM Systems** -> *tivlp32omagnt:VL* -> **z/VM Linux Systems** in the **System** branch and the top-level **z/VM Systems** workspace.

## TIVLP32

Overview

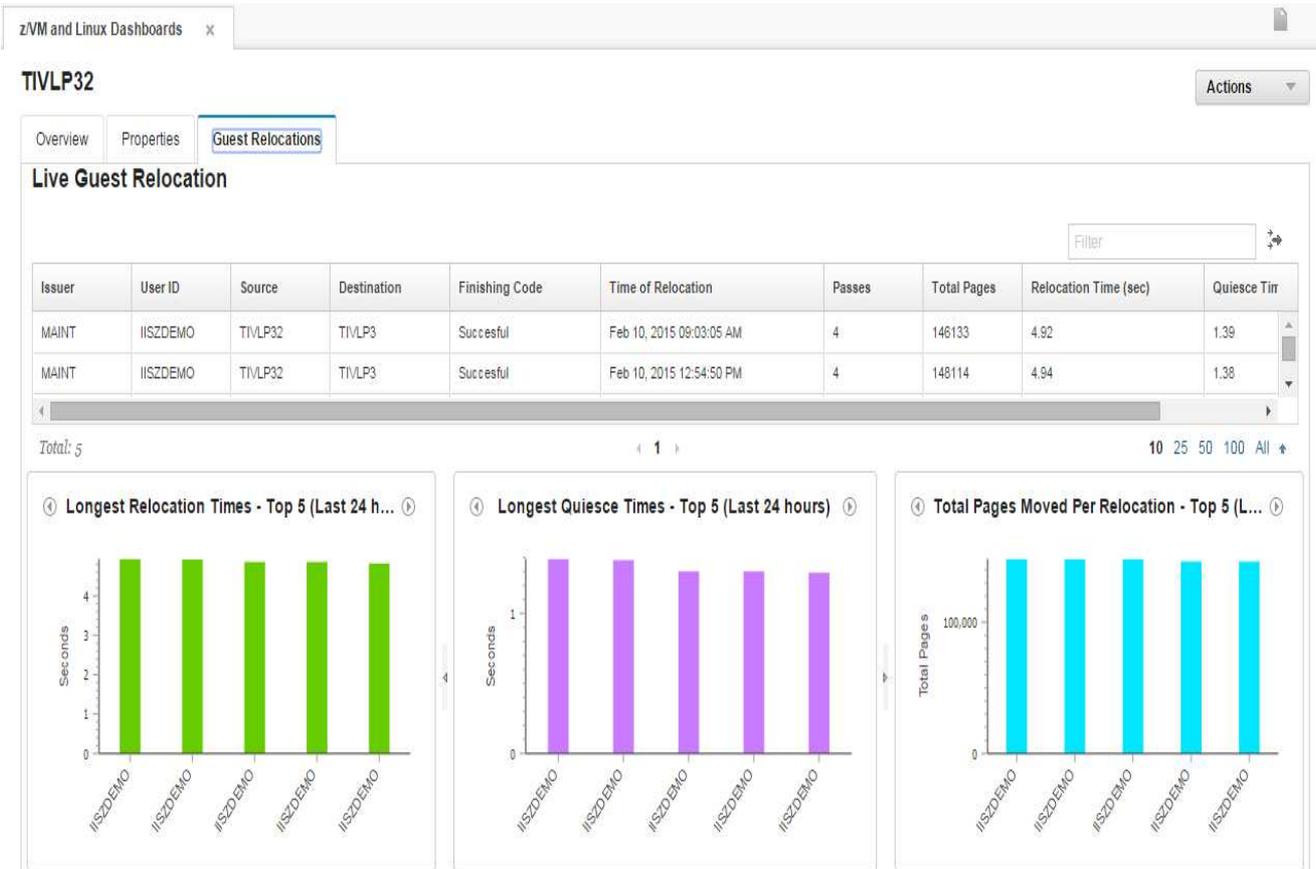
Properties

Guest Relocations

Property Name	Property Value
SSI Name	SSICL01
System ID	TIVLP32
Page Index	3
Main Storage Available in Mbytes	8192
Main Storage Offline in Kbytes	0
SYSGEN Storage Size in Mbytes	8192
Shared Segment Storage in Mbytes	602
Number of Dynamic Frames	8118272
Locked Dynamic Paging Area Storage in Kbytes	5
Trace Table Storage in Kbytes	1300
Pageable Dynamic Paging Area Storage in Mbytes	7908
Standby Real Storage Size in Mbytes	0
Reserved Real Storage in Mbytes	0
XSTORE Size in Mbytes	0
VDISK Maximum Storage Blocks	3808000

5. Click on the **Guest Relocations** tab.

The Guest Relocations tab shows data on running Linux on System z guests that are moved from one system to another via the Live Guest Relocation (LGR) feature. Relocations are initiated by system administrators. There may be no relocations during the interval, and therefore no data available to display.



A representation of resource relationships appears at the bottom of all the system information dashboards. The resource relationships icons show a hierarchy of the defined system resources. The count of active virtual machines, or guests, in the selected z/VM system is provided.

### Resource Relationships



- Click on the *z/VM Guest(s)* count to link to the *z/VM Guests* dashboard. The *z/VM Guests* dashboard shows key performance indicators for all the virtual machines that are currently active on the selected *z/VM* system.

**Overview**

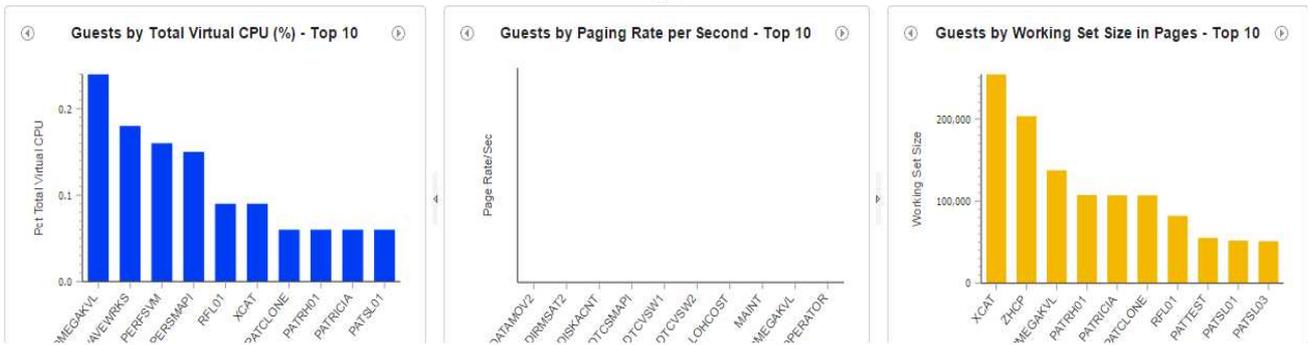
HIBER

User ID	Total Virtual CPU %	Page Rate per Second	Working Set Size in Pages	Virtual IO per Second
TCPIP	0.01	0	3224	0
VMSERV	0	0	274	0
VMSERVS	0	0	9825	0.8
VMSERVU	0	0	778	0

Total: 43

◀ 1 2 3 4 5 ▶

10 25 50 100 All +



Three key performance indicators are shown for the guests: *Total Virtual CPU Utilization %*, *Paging Rate per Second*, and *Working Set Size in Pages*.

**Hint:** Sort the *Overview* table by clicking on any column heading.



Hide the table by clicking the  just below the table view.

- Continue to drill down to the guest details by selecting the OMEGAKVL guest from the table view. Notice the three tabs, *Overview*, *Properties*, and *Linux Data* at the top of the dashboard:



Resource Relationships



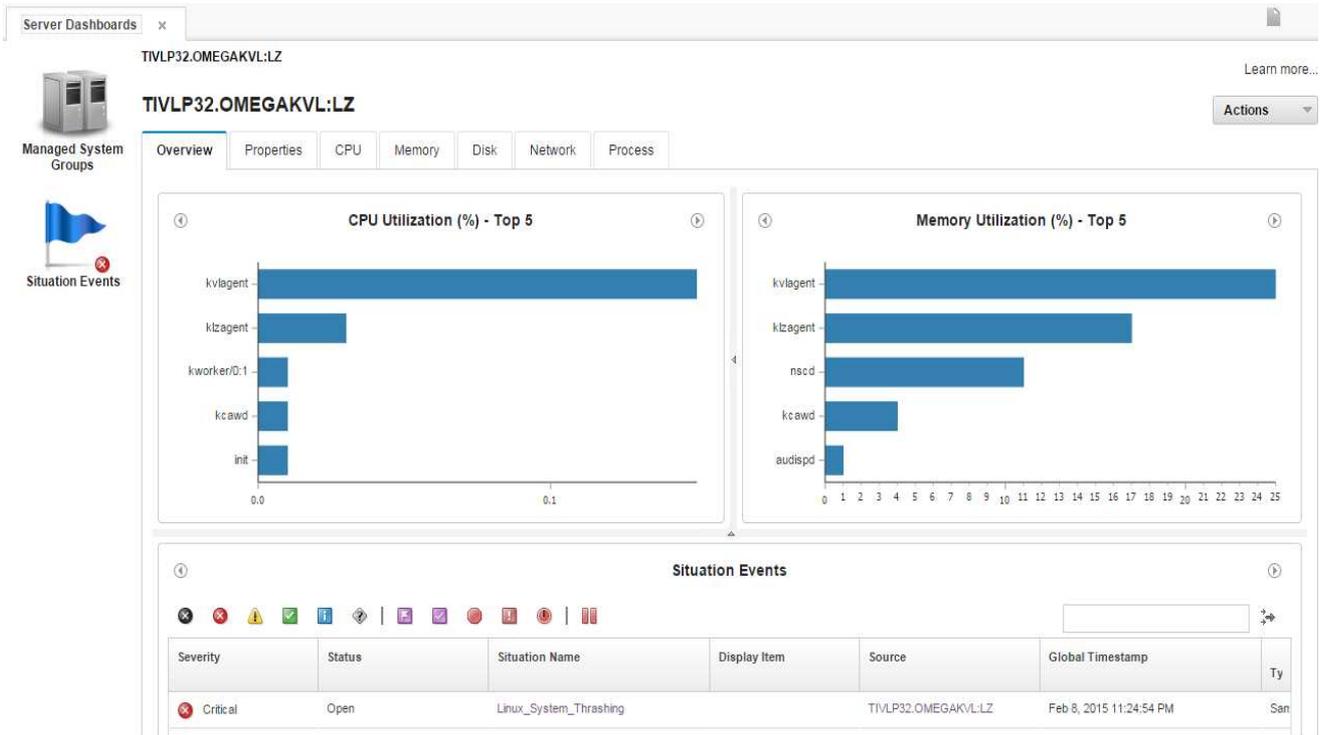
Notice the *Linux Data* tab is available for this guest.

Linux on System z guests may be configured to pass performance information to the z/VM monitor. If this is the case, a link from z/VM to Linux dashboards is available, as shown in the example below:

Resource Relationships

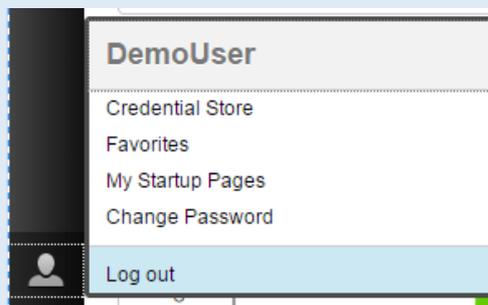


- Click on the link ([TIVLP32.OMEGAKVL:LZ](#)) to navigate to the Linux OS dashboard in the context of the OMEGAKVL virtual machine. A new tab, **Server Dashboards**, opens.



Two charts show the top 5 processes on the guest consuming the most CPU and memory. Notice situation events, filtered for the specific guest, are shown in the table view. Explore the remaining tabs on the dashboard for the OMEGAKVL guest.

- When you finish exploring the z/VM and Linux data in DASH, logoff using the icon in the lower left menu:



## Behind the Scenes

A connection from DASH to the IBM Tivoli Monitoring dashboard data provider component of the portal server (TEMS in the list below) is defined as part of the configuration of the dashboard package introduced in the latest release of OMEGAMON XE on z/VM and Linux. You must be an administrator to create this connection:

Name	Type	Description	Connection
TEMS	IBMTivoliMonitoringServices	IBM Tivoli Monitoring dashboard data provider	Remote
Tivoli Directory Integrator	TDI	TDI Generic Data Provider (1.0.21)	Local
tip	tip	Tivoli Integrated Portal Data Provider	Static

The dashboards viewed as part of this lab are examples of what is possible with DASH. You may create your own dashboards with a wide variety of widgets displaying metrics important to you. Dashboards can be created for mobile devices as well. You can combine data from different data providers on a single dashboard. Tivoli Directory Integrator is one tool for delivering data from different sources, such as databases, files, and web services. Tivoli Netcool/Imact is another powerful option. For more experience with DASH, check out the following InterConnect labs:

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[InterConnect 2015 COM-5643: Building Custom Dashboards with Tivoli Directory Integrator](#)

[InterConnect 2015 COM-3614: Advanced Dashboard Creation Using Third-Party Data-Mining Tools and Widgets](#)

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## Summary

This exercise introduces the new support for the IBM Dashboard Application Services Hub within the OMEGAMON XE on z/VM and Linux product. A subset of the metrics presented in the Tivoli Enterprise Portal scenario are displayed in a set of predefined dashboards within DASH. While this lab focuses on z/VM and Linux data, DASH provides the opportunity to create highly customized dashboards containing data from many different sources.