

## Course Exercises

# IBM Cloud Application Performance Management 8.1.4 Fundamentals

Course code TM674 ERC 1.0



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# About these exercises

Five systems are used with the exercises in this course:

1. **APM:** This system hosts the Cloud APM environment, which includes the Management Information Node (MIN) and a Monitoring Agent for Linux Operating System. The user ID and password are as follows:
  - User ID: `root`
  - Password: `object00`
2. **LIN1:** This system hosts a WebSphere Application Server. It is used to install a Monitoring Agent for WebSphere Application Server, a Monitoring Agent for HTTP, and a Monitoring Agent for Linux Operating System. The user ID and password are as follows:
  - User ID: `root`
  - Password: `object00`
3. **LIN2:** This system hosts an IBM Tivoli Common Reporting environment. It is used to demonstrate the integration of IBM Tivoli Common Reporting with Cloud APM. The user ID and password are as follows:
  - User ID: `root`
  - Password: `object00`
4. **LIN3:** This system hosts a Netcool/OMNibus 8.1 environment. It is used to demonstrate the integration of Netcool/OMNibus with Cloud APM. The user ID and password are as follows:
  - User ID: `netcool`
  - Password: `object00`
5. **ITM:** This system hosts an IBM Tivoli Monitoring 6.3 environment, which includes the Monitoring Server, Portal Server, Portal Client, and an IBM Tivoli Monitoring Operating System agent. It has no Cloud APM components. It is used to demonstrate the integration of Cloud APM with IBM Tivoli Monitoring. The user ID and password are as follows:
  - User ID: `Administrator`
  - Password: `object00`



---

# **Unit 1 Introduction to IBM Cloud Application Performance Management exercises**

In these exercises, you start and verify the lab environment. You also learn how to access the DayTrader application and make a simple stock trade.

## **Exercise 1 Start the virtual images**

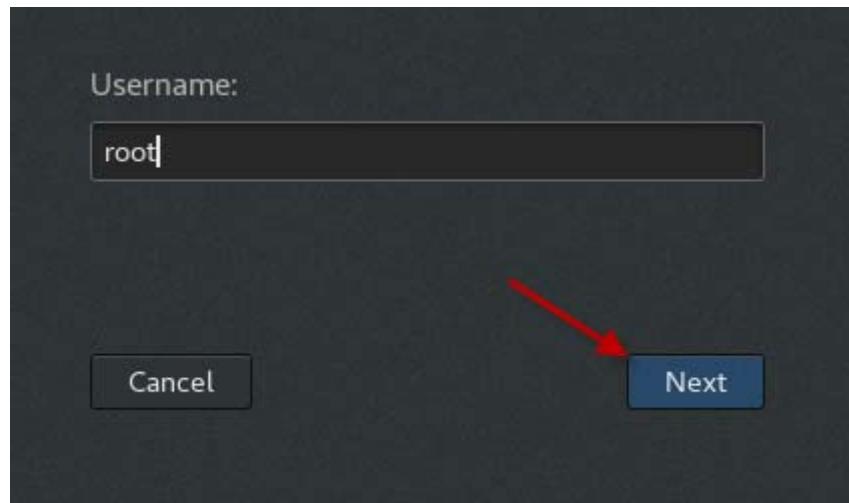
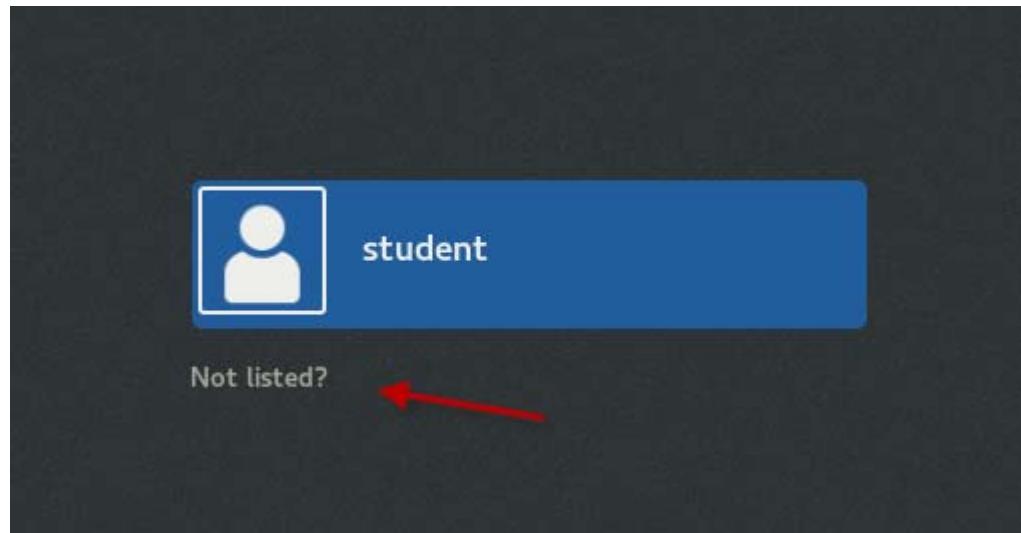


**Note:** The actual procedures for starting the virtual images might be different, depending on the hosting environment. Your instructor can provide site-specific procedures.

Complete the following steps:

1. Start the **APM VM**. Each hosting environment can have a different method for starting systems. Follow the local environment instructions.

2. At the login prompt, click **Not Listed**, enter the user name `root`, and click **Next**.

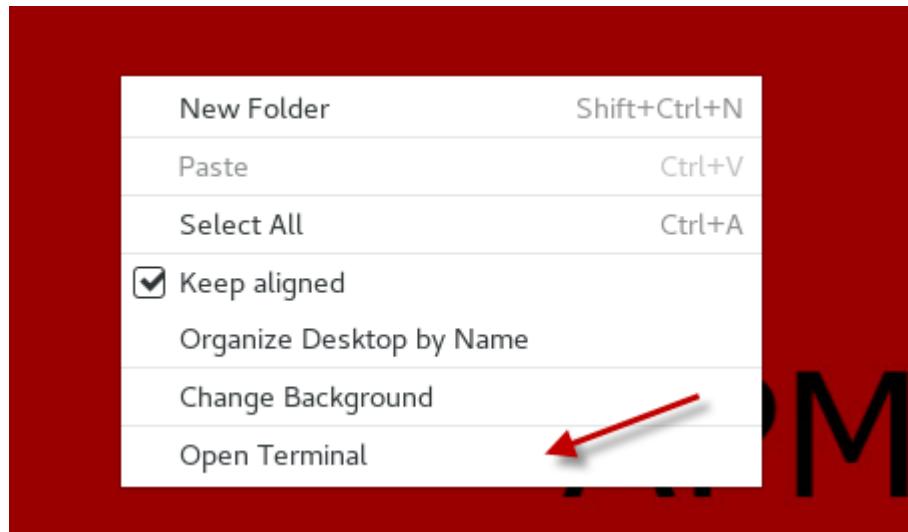


3. Enter the password `object00` and press Enter.
4. Start the **LIN1** VM. Follow the local environment instructions.
5. At the login prompt, click **Not Listed**, enter the user name `root`, and click **Next**.
6. At the password prompt, enter `object00` and press Enter.

## Exercise 2 Verify network connectivity

When the images are started and logged in, ping each system from its neighbors. This action verifies that the host names are correct in each system hosts file, and that the systems can be accessed in the network.

1. On the VM named APM, right-click the desktop and select **Open Terminal** to open a terminal window.



2. From the open terminal window, enter this command to verify the network connectivity from APM to LIN1:

```
ping lin1 -c 3
```

A successful ping has 0% packet loss.

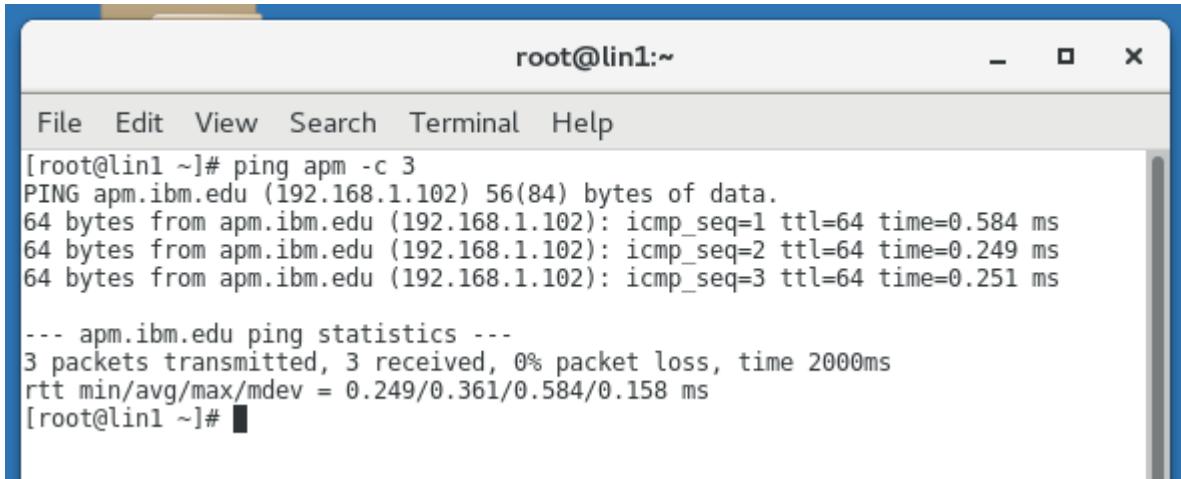
```
root@apm:~  
File Edit View Search Terminal Help  
[root@apm ~]# ping lin1 -c 3  
PING lin1.ibm.edu (192.168.1.104) 56(84) bytes of data.  
64 bytes from lin1.ibm.edu (192.168.1.104): icmp_seq=1 ttl=64 time=0.302 ms  
64 bytes from lin1.ibm.edu (192.168.1.104): icmp_seq=2 ttl=64 time=0.223 ms  
64 bytes from lin1.ibm.edu (192.168.1.104): icmp_seq=3 ttl=64 time=0.248 ms  
--- lin1.ibm.edu ping statistics ---  
3 packets transmitted, 3 received, 0% packet loss, time 2000ms  
rtt min/avg/max/mdev = 0.223/0.257/0.302/0.037 ms  
[root@apm ~]#
```

3. On the VM named **LIN1**, right-click the desktop and select **Open Terminal** to open a terminal window.

4. Issue this command to ping APM:

```
ping apm -c 3
```

Examine the responses for successful pings.



The screenshot shows a terminal window titled "root@lin1:~". The window has a standard Linux terminal interface with a menu bar (File, Edit, View, Search, Terminal, Help) and a scroll bar on the right. The terminal session shows the command "ping apm -c 3" being run, followed by its output. The output includes three successful ICMP echo replies from the host "apm.ibm.edu" with sequence numbers 1, 2, and 3, each with a TTL of 64 and a time of approximately 0.25 ms. It also shows the ping statistics summary: 3 packets transmitted, 3 received, 0% packet loss, and a round-trip time (rtt) of 0.249 ms to 0.584 ms.

```
[root@lin1 ~]# ping apm -c 3
PING apm.ibm.edu (192.168.1.102) 56(84) bytes of data.
64 bytes from apm.ibm.edu (192.168.1.102): icmp_seq=1 ttl=64 time=0.584 ms
64 bytes from apm.ibm.edu (192.168.1.102): icmp_seq=2 ttl=64 time=0.249 ms
64 bytes from apm.ibm.edu (192.168.1.102): icmp_seq=3 ttl=64 time=0.251 ms

--- apm.ibm.edu ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2000ms
rtt min/avg/max/mdev = 0.249/0.361/0.584/0.158 ms
[root@lin1 ~]#
```



**Important:** If any of the images fail to start, or if any of the pings are not successful, notify your instructor.

# Exercise 3 Make a stock trade on DayTrader

In this course, you implement monitoring on two applications and the components that make up these applications. DayTrader is the first application and is introduced in this unit. Keystone is the second application and is introduced in a later unit.

DayTrader is a stock trading application that is used to buy, sell, and manage stocks. It is a composite application that contains an HTTP server, WebSphere Application Server, and DB2 database. In this course, all parts of the DayTrader application run on the LIN1 server. In a real-world environment, each component might run on its own server and in a cluster. Regardless, the deployment process that you learn in this course applies.

Throughout this course, you implement both transactional and component monitoring of the DayTrader application and its resources.

Transactional monitoring monitors the requests (transactions) that are going through this application from the user's browser to the HTTP server to WebSphere to DB2. Transactional monitoring is good at early identification of performance and availability problems of an application. Front-end transaction monitoring is good at representing the user's experience of an application. Tracking of transactions, from the front to the back of an application, is good at locating where (which server or component) a problem is occurring.

You also implement component monitoring of each of the major components of this application, including the HTTP server, WebSphere, and DB2. This type of monitoring is good at identifying and analyzing problems within a specific component.

In this exercise, you access the application, make a few simulated stock trades, and validate that the application is functional.

1. On the VM named **LIN1**, double-click the Firefox icon on the desktop.



2. Navigate to the URL:

<http://lin1.ibm.edu/daytrader/app>

3. Click **Log in**.

DayTrader

Username      Password

uid:0      •••

Log in

Register With DayTrader

DayTrader

4. Click **Portfolio**.

Welcome to DayTrader

lin1.ibm.edu/daytrader/app

DayTrader Home

[Home](#) [Account](#) [Portfolio](#) [Quotes/Trade](#)

Welcome uid:0,

User Statistics

<a href="#">account ID:</a>	0
<a href="#">account created:</a>	Wed Sep 13 15:06:21 EDT 2017
<a href="#">total logins:</a>	5
<a href="#">session created:</a>	Mon Oct 02 14:35:28 EDT 2017

Market S 2017-

<a href="#">DayTrader Stock Index (TSIA)</a>	10
<a href="#">Trading Volume</a>	
<a href="#">Symbol</a>	s:12

5. Scroll down and observe that seven stocks are purchased.

6. Click Quotes/Trade.

The screenshot shows a web browser window with the URL `app?action=portfolio`. The main content area displays a table titled "Number of Holdings" with columns for quantity, purchase price, current price, purchase basis, market value, gain/(loss), and trade. A red arrow points to the "Quotes/Trade" menu item in the top navigation bar.

Quantity	Purchase Price	Current Price	Purchase Basis	Market Value	Gain/(Loss)	Trade
68.0	191.00	178.04	12988.00	12106.72	-881.28	<a href="#">Sell</a>

7. Click Buy on the right side beside the symbol for S0 Incorporated.

The screenshot shows the "Quotes/Trade" page with a table of stock holdings. The first row for "S0 Incorporated" has a "buy" button highlighted with a red arrow. The table includes columns for current price, gain/(loss), and trade.

Current Price	Gain/(Loss)	Trade
\$ 64.23	-34.78 ( -41.00% )	<a href="#">Buy</a> 100
\$ 3.38	0.38 ( +13.00% )	<a href="#">Buy</a> 100
\$ 183.31	9.31 ( +5.00% )	<a href="#">Buy</a> 100

8. Observe the message that indicates that the order was submitted for processing.

9. Click Portfolio.

10. Scroll down and observe the addition to your portfolio.

11. Click **Sell** beside your new stock purchase.

Ned Sep 13 15:06:22 EDT 2017	s:8810	194.0	143.00	222.08	27742.00	43083.52	15341.52↑	<a href="#">sell</a>
2017-10-02 4:40:01.318	s:0	100.0	64.23	52.67	6423.00	5267.00	-1156.00↓	<a href="#">sell</a>
				<b>Total</b>	\$ 86101.00	\$ 87035.99	\$ 934.99↑ (+1.00%)↑	



12. Observe the message that indicates that the order was submitted for processing.

13. Click **Portfolio**.

14. Scroll down and observe that the portfolio returned to its original state of having seven stocks.

Every action that you took sent a request to the HTTP server on LIN1. The HTTP server sent the request to the DayTrader application within WebSphere, which acts on each request. WebSphere generates the basic HTML code that is returned back to the HTTP server and then to the browser. WebSphere also gathers user account and stock data from, or puts it to, the DayTrader database in DB2. Through this process, your activity accessed all parts and components of the DayTrader application.



**Note:** Later in the course you automate these steps to create multiple transactions that Application Performance Management monitors.

---

# **Unit 2 Cloud APM server installation exercises**

The exercises guide you through the installation of the Cloud APM server and several operating system monitoring agents.

## **Exercise 1 Install the Cloud APM server**

The installation procedure involves expanding the installation files on the system, and running the installation script.

You must run as the `root` user to install the server.

When you start the installation, a prerequisite checker reviews your Red Hat Enterprise Linux system to ensure that it meets the software, memory, and disk requirements. Any missing prerequisites are shown in a message. An absolute prerequisite, such as an out-of-date library or insufficient disk space, stops the installation. You must address the missing prerequisite before you can start the installation again. A soft prerequisite, such as low available memory, does not stop the installation, but is displayed in a message.

1. Open a Linux terminal window on the VM named **APM**, right-click the desktop, and click **Open in Terminal**. Change to directory `/downloads/APM814`.

```
cd /downloads/APM814
```

2. List the files of the directory.

```
ls
```

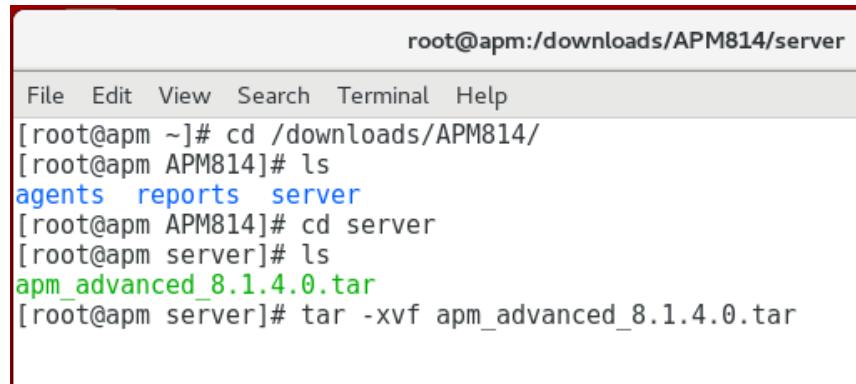
3. Change to the directory that is called `server` and list the contents of the directory by using the `ls` command.

```
cd server
```

```
ls
```

4. Extract the file that contains the Performance Management software by running the `tar` command:

```
tar -xvf aptm_advanced_monitoring_8.1.4.0.tar
```



The screenshot shows a terminal window with a red border. The title bar says "root@apm:/downloads/APM814/server". The menu bar includes "File", "Edit", "View", "Search", "Terminal", and "Help". The terminal session shows the following commands and output:  
[root@apm ~]# cd /downloads/APM814/  
[root@apm APM814]# ls  
agents reports server  
[root@apm APM814]# cd server  
[root@apm server]# ls  
aptm\_advanced\_8.1.4.0.tar  
[root@apm server]# tar -xvf aptm\_advanced\_8.1.4.0.tar

5. Install the Cloud APM server by entering the following command:

```
./install.sh
```



**Hint:** If you miss a parameter or select an incorrect option, stop the installation process (Ctrl+C) and start again.

6. Accept the default of **2** to the question about upgrading from an existing installation of IBM Cloud Application Performance Management server.
7. Review the offering that is displayed and enter **1** (yes) to continue with the installation.
8. Enter **2** to accept the default `/opt/ibm`

9. Enter **1** to accept the agreement and continue.

```
packages/AgentFrameworks/zlinux/misc/.apm_config/keyfiles/keyfile.rdb
packages/AgentFrameworks/zlinux/misc/.apm_config/keyfiles/keyfile.sth
packages/AgentFrameworks/zlinux/misc/.apm_config/omnibus.environment
offerings/ipm_apm_advanced 8.1.4.0.offering
[root@apm server]# ./install.sh

Do you want to upgrade from an existing installation of the IBM Cloud Application Performance Management server [ 1-yes or 2-no; "no" is default ]?

This script will install IBM Cloud Application Performance Management, Advanced Private (8.1.4.0).

Do you want to continue [ 1-yes or 2-no; "yes" is default ]?1

Do you want to change the default installation directory ( /opt/ibm ) [ 1-yes or 2-no; "no" is default ]?

Do you accept the license agreement(s) found in the /downloads/APM814/server/licenses/ipm_apm_advanced directory [ 1-accept or 2-decline ]?1
```

10. After you are prompted to change the default password for the administrator account, enter **1** (yes) and provide the password of **object00**.
11. After you are asked whether you want to configure your agent installation images to connect to the server, enter **1** (yes) to configure the images now.
12. Provide the path to the directory on the server where the agent images and Hybrid Gateway are stored, in this case, **/downloads/APM814/agents/**.

13. Accept the default location for the preconfigured agent installation images of `/opt/ibm/ccm/depot` and press Enter.

License agreement was accepted, installation will proceed...

Do you want to change the default password for the administrator account [ 1-yes or 2-no; "no" is default ]?1

Enter the password:

Confirm the password:

The password was accepted and will be used for the administrator account.

Agent installation images must be configured to connect to this server. If you have downloaded the agent images to the same system as the server, you can configure the agent images now.

Do you want to configure the compressed (\*.zip or \*.tar) agent installation files now [ 1-yes or 2-no; "yes" is default ]?1

Enter the path to the directory where you downloaded the agent, Hybrid Gateway, and/or data collector installation images (e.g. /opt/agents):/downloads/APM814/agents/

Enter the path to the directory where configured agent installation images can be stored or accept the default [/opt/ibm/ccm/depot]:

14. Accept the default server IP address for the agents to use by pressing Enter.

15. After you are prompted to enter the host name and IP address of the server that you use to log in to the Cloud APM console, accept the default values.

Enter the IP address/hostname that will be used by agents to communicate with the server.

Enter the IP address/hostname or accept the default [192.168.1.102]:

Enter the hostname and IP address of the server that will be used in a web browser to log in to the IBM Cloud Application Performance Management console. Accept the default values or provide your own.

Default values:

Fully qualified domain name: `apm.ibm.edu`

Short hostname: `apm`

IP address: `192.168.1.102`

Do you want to use these values [ 1-yes or 2-no; "yes" is default ]?1

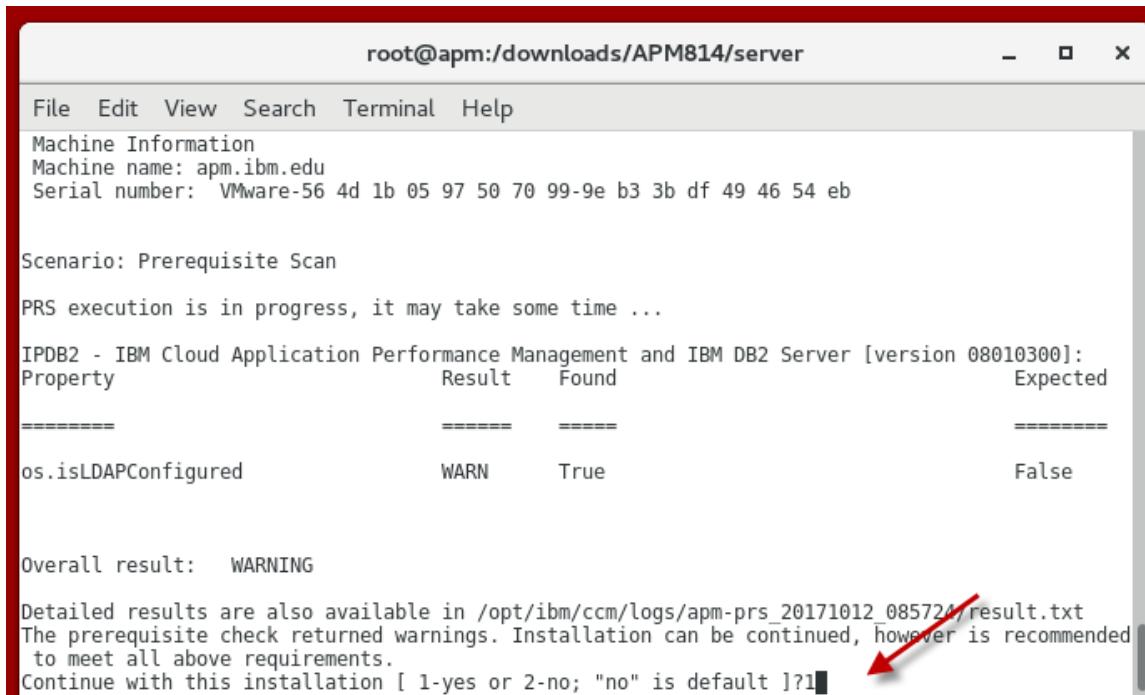
16. After you are prompted to install the database or connect to an existing DB2 database, enter **1** to install the default database.

Do you want to install the DB2 database or connect to an existing DB2? [ 1-install database or 2-connect to existing database; "1-install database" is default ]?1

Running Prerequisite Scanner. This may take a few minutes depending on the number of checked components and machine's performance.

Setting Prerequisite Scanner output directory to user defined directory: /opt/ibm/ccm/logs/apm-prs\_20171002\_152411

17. The prerequisite scanner provides some warnings, which in this case can be ignored. Enter **1** to continue with the installation.



```
root@apm:/downloads/APM814/server
File Edit View Search Terminal Help
Machine Information
Machine name: apm.ibm.edu
Serial number: VMware-56 4d 1b 05 97 50 70 99-9e b3 3b df 49 46 54 eb

Scenario: Prerequisite Scan

PRS execution is in progress, it may take some time ...

IPDB2 - IBM Cloud Application Performance Management and IBM DB2 Server [version 08010300]:
Property          Result    Found      Expected
=====
os.isLDAPConfigured    WARN     True       False

Overall result: WARNING

Detailed results are also available in /opt/ibm/ccm/logs/apm-prs_20171012_085724/result.txt
The prerequisite check returned warnings. Installation can be continued, however is recommended
to meet all above requirements.
Continue with this installation [ 1-yes or 2-no; "no" is default ]?1
```

The installer installs the server components and support files. No further user input is required. The installer configures the components, which can take up to 1 hour to complete.

root@apm:/downloads/APM814/server

File Edit View Search Terminal Help

No further user input is required. The installation and configuration of components is now starting and may take up to one hour to complete. The installation log is available at "/opt/ibm/ccm/logs/apm-server-install\_20171002\_152411.log".

Installing DB2. Please wait...

Installing the IBM Cloud Application Performance Management server. Please wait...  
BDB5105 Verification of /var/lib/rpm/Packages succeeded.  
BDB5105 Verification of /var/lib/rpm/Packages succeeded.  
BDB5105 Verification of /var/lib/rpm/Packages succeeded.  
BDB5105 Verification of /var/lib/rpm/Packages succeeded.

Starting components of the IBM Cloud Application Performance Management server...

.....

.....

.....

Configuring components of the IBM Cloud Application Performance Management server...

All components are configured successfully.  
Configuring agent installation images...  
Pre-configured agent installation images are available in the following directory: /opt/ibm/ccm/depot.  
The configuration of agent installation images can also be done manually.  
To do this manual configuration, first create configuration packages by using the following script: /opt/ibm/ccm/make\_configuration\_packages.sh. Then, use the output packages from the first script and run the following one: /opt/ibm/ccm/configure\_agent\_images.sh.  
Finalizing the installation...  
The server size has been configured as 'small' based on the number of CPUs and amount of memory . To reconfigure the server size, run script /opt/ibm/ccm/server\_size.sh with the desired size as a parameter. Valid sizes are: small, medium, large.  
Please review the documentation at [http://ibm.biz/mon\\_doc](http://ibm.biz/mon_doc) for more information.  
To begin using the product, copy the configured agent images to the systems running the applications you want to monitor and install the agents. Log in to the IBM Cloud Application Performance Management console using <https://apm.ibm.edu:9443> and review the topics on the "Getting Started" page.

[root@apm server]# █

## Validate the installation

The way to validate that the installation was successful is to attempt to log in to the Cloud APM console.

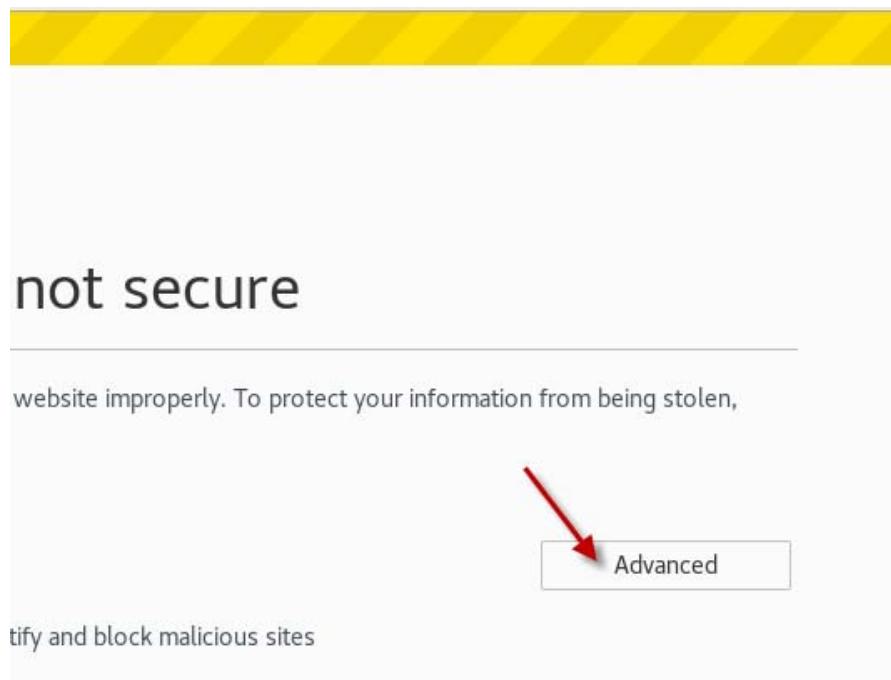
18. On the **APM** VM, open a Firefox browser by selecting the shortcut on the desktop.



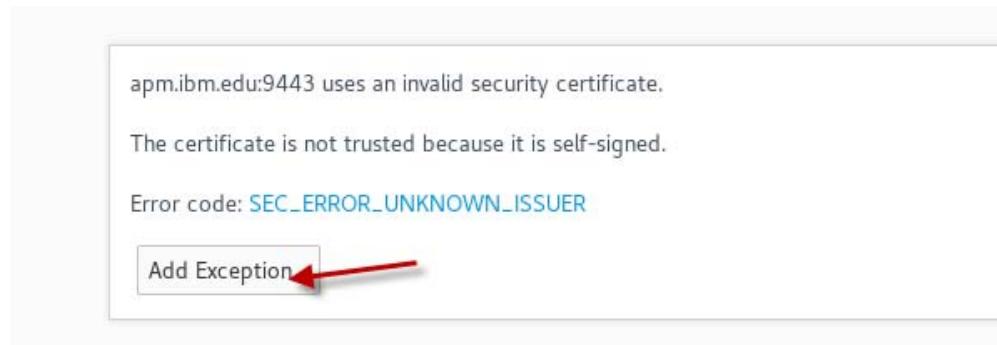
19. Open this web page:

<https://apm.ibm.edu:9443>

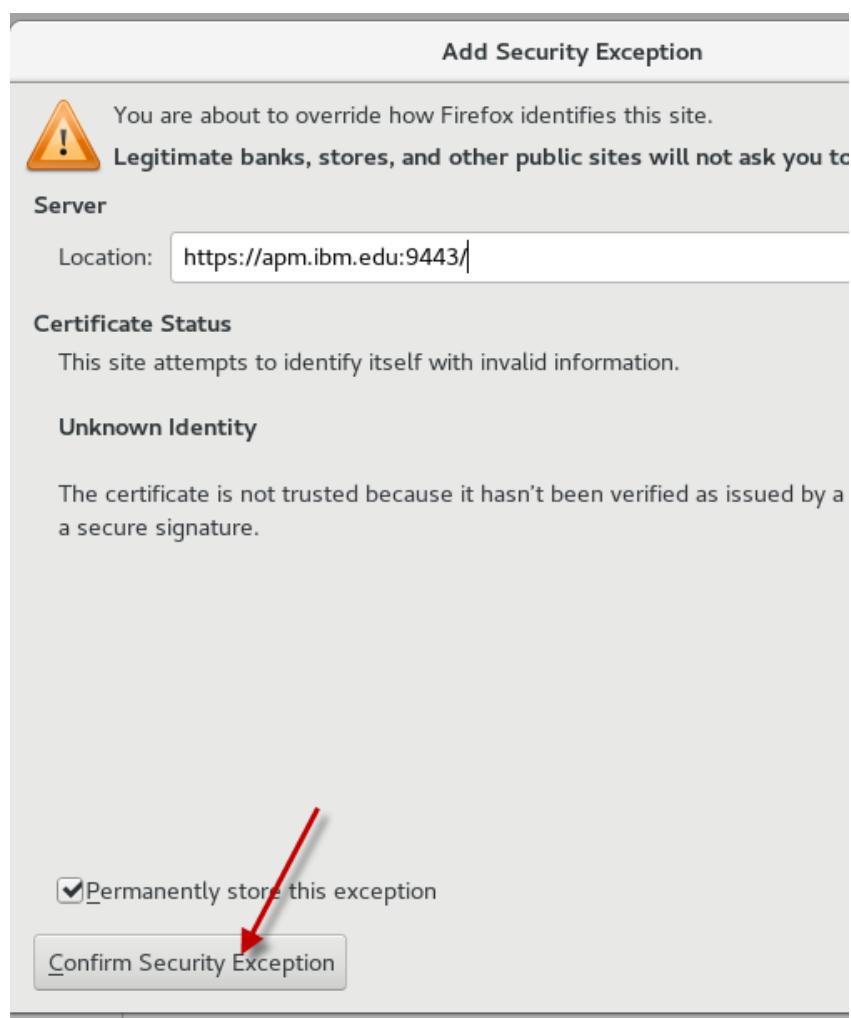
20. Click **Advanced**.



21. Click **Add Exception**.



22. Click **Confirm Security Exception**.

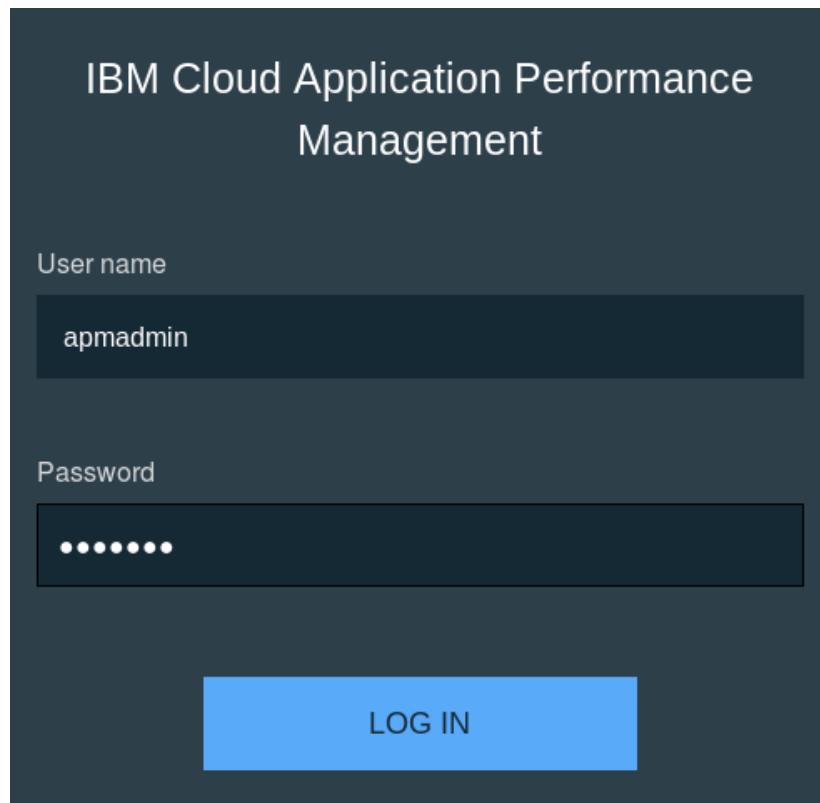


23. Click **Advanced** again.

24. Click **Add Exception** again.

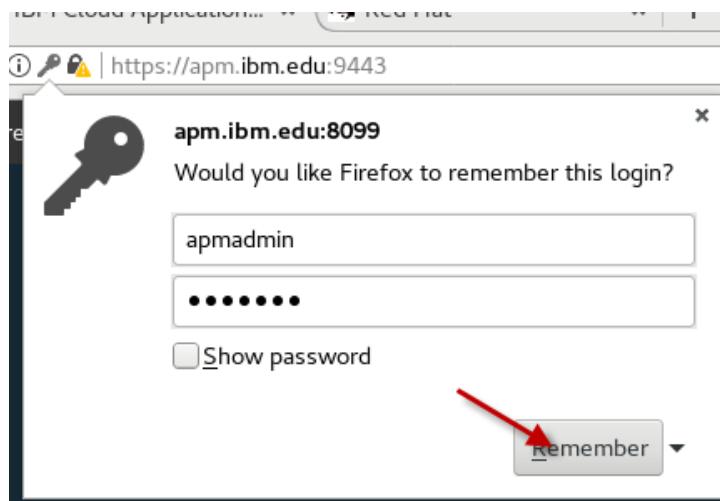
25. Click **Confirm Security Exception** again.

26. Sign in with the user ID of `apmadmin` and a password of `object00` and click **Log In**.

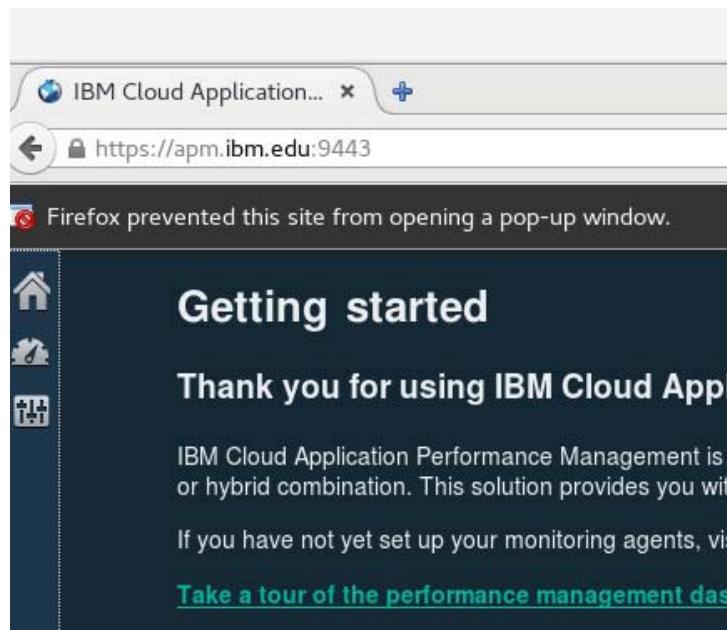


**Hint:** Create a bookmark of this URL for later use.

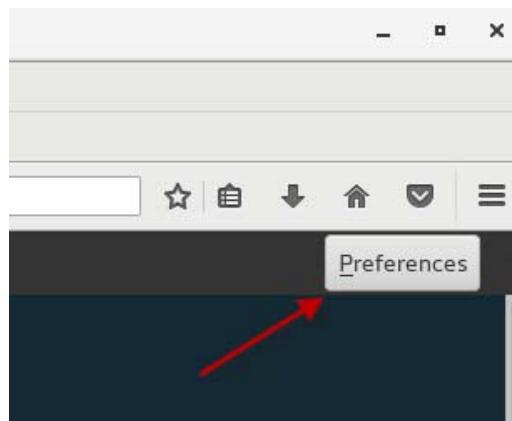
27. Click **Remember**.



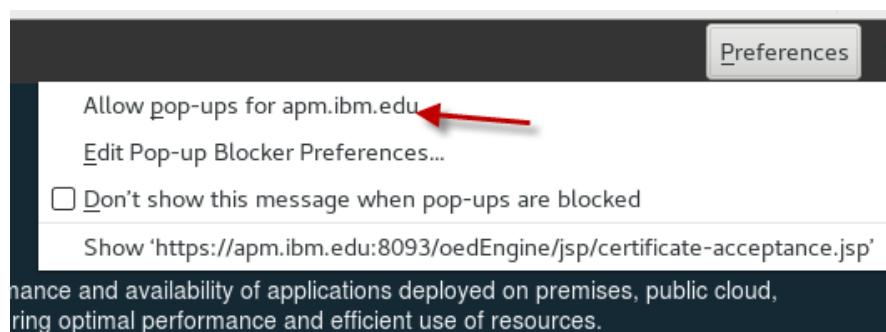
The APM console opens.



28. Click **Preferences**.



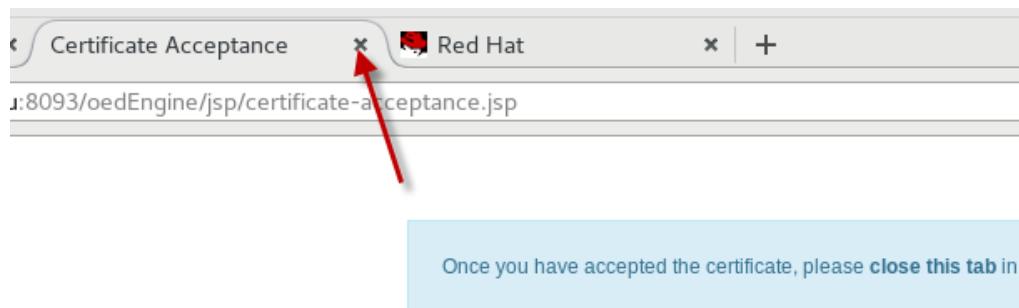
29. Click **Allow pop-ups for apm.ibm.edu**.



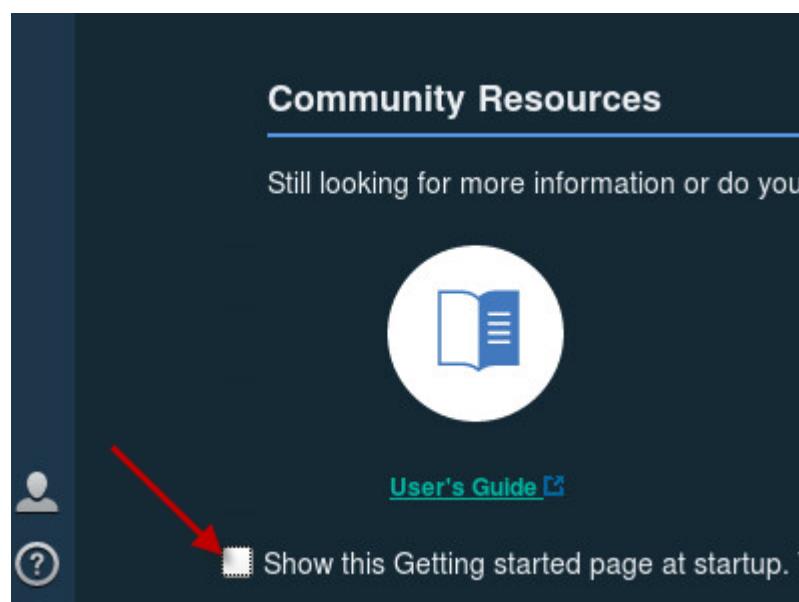
30. Click **Advanced** again.

31. Click **Add Exception** again.

32. Click **Confirm Security Exception** again.
33. Close the newly opened tab in your browser.



34. Since you are opening this window for the first time, review the Getting Started page. You learn many of these tasks during this course.
35. Scroll down and clear the check box as shown.



You validated that the Cloud APM console is functional, and accepted certificate exceptions to allow communications to the Cloud APM server. Because no agents are installed, no data can be displayed.



---

# **Unit 3 Installing, configuring, and managing Cloud APM agents exercises**

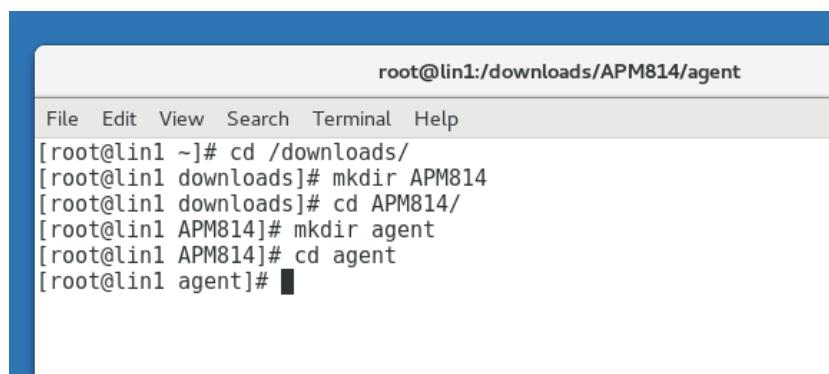
In these exercises, you install several operating system monitoring agents. You manage those operating system agents. You access data from the operating system agents. Finally, you configure and access log file data from the operating system agents.

## **Exercise 1 Install agents on Linux**

Installation of agents on one platform is similar to others. This exercise guides you through installing the Monitoring Agent for Linux OS.

### **Install the Monitoring Agent for Linux OS**

1. On the VM named **LIN1**, right-click the desktop and select **Open Terminal** to open a terminal window.
2. Change to the **/downloads** folder and create a subfolder that is called **APM814**. Change to the **/downloads/APM814** folder, create a folder that is called **agent**, and change to the **/downloads/APM814/agent** folder.



The screenshot shows a terminal window with a blue header bar. The title bar displays "root@lin1:/downloads/APM814/agent". The menu bar includes "File", "Edit", "View", "Search", "Terminal", and "Help". The main terminal area contains the following command history:

```
root@lin1 ~]# cd /downloads/
[root@lin1 downloads]# mkdir APM814
[root@lin1 downloads]# cd APM814/
[root@lin1 APM814]# mkdir agent
[root@lin1 APM814]# cd agent
[root@lin1 agent]# █
```

3. Open a secure FTP command to **apm.ibm.edu**:  
sftp apm.ibm.edu

4. Enter **yes** to confirm the authenticity of the host, and supply the password: **object00**

```
[root@lin1 agent]# sftp apm.ibm.edu
The authenticity of host 'apm.ibm.edu (192.168.1.102)' can't be established.
ECDSA key fingerprint is SHA256:0gJBdj+OZ0OyqFNKWPtfInOHIOpPIrfPVSOF5u1w1E.
ECDSA key fingerprint is MD5:9d:09:1f:12:5a:3c:d1:fb:cf:a3:44:0b:ba:54:86:a6.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'apm.ibm.edu,192.168.1.102' (ECDSA) to the list of known hosts.
root@apm.ibm.edu's password:
Connected to apm.ibm.edu.
sftp> 
```

5. Change to the directory where the configured agent images are stored: **/opt/ibm/ccm/depot/**  
List the files that are there.

```
sftp> cd /opt/ibm/ccm/depot
sftp> ls
apm_advanced_agents_win_8.1.4.0.zip      apm_advanced_agents_xlinux_8.1.4.tar
apm_datacollectors_linux_8.1.4.0.tgz      apm_hybrid_gateway_8.1.4.0.tar
sftp>
```

6. Transfer the two Linux files in the depot on the APM server to the LIN1 server:

**mget \*lin\***

```
sftp> ls
apm_advanced_agents_win_8.1.4.0.zip          apm_advanced_agents_xlinux_8.1.4.tar
apm_datacollectors_linux_8.1.4.0.tgz          apm_hybrid_gateway_8.1.4.0.tar
sftp> mget *lin*
Fetching /opt/ibm/ccm/depot/apm_advanced_agents_xlinux_8.1.4.tar to apm_advanced_agents_xlinux_8.1.4.tar
/opt/ibm/ccm/depot/apm_advanced_agents_xlinux 100% 1421MB 19.1MB/s 01:14
Fetching /opt/ibm/ccm/depot/apm_datacollectors_linux_8.1.4.0.tgz to apm_datacollectors_linux_8.1.4.0.tgz
/opt/ibm/ccm/depot/apm_datacollectors_linux_8 100% 31MB 37.9MB/s 00:00
sftp> 
```

**Note:** One of these files (**apm\_advanced\_agents\_xlinux\_8.1.4.tar**) is used in this exercise, and the other file (**apm\_datacollectors\_linux\_8.1.4.0.tgz**) is used in a later exercise.

7. Close the secure transfer command with the command **exit** and list the contents of the current directory.

```
Fetching /opt/ibm/ccm/depot/apm_datacollectors_linux_8.1.4.0.tgz to apm_datacollectors_linux_8.1.4.0.tgz
/opt/ibm/ccm/depot/apm_datacollectors_linux_8 100% 31MB 37.9MB/s 00:00
sftp> exit
[root@lin1 agent]# ls
apm_advanced_agents_xlinux_8.1.4.tar  apm_datacollectors_linux_8.1.4.0.tgz
[root@lin1 agent]# 
```

8. Extract the file `apm_advanced_agents_xlinux_8.1.4.tar`.

```
tar -xvf apm_advanced_agents_xlinux_8.1.4.tar
```

9. Change to the directory `/downloads/APM814/agent/APMADV_Agent_Install_8.1.4.0`.

```
APMADV_Agent_Install_8.1.4.0/licenses/Chinese_TW.txt
APMADV_Agent_Install_8.1.4.0/licenses/Japanese.txt
APMADV_Agent_Install_8.1.4.0/licenses/Indonesian.txt
APMADV_Agent_Install_8.1.4.0/licenses/Portuguese.txt
APMADV_Agent_Install_8.1.4.0/licenses/Greek.txt
APMADV_Agent_Install_8.1.4.0/licenses/German.txt
APMADV_Agent_Install_8.1.4.0/licenses/Czech.txt
APMADV_Agent_Install_8.1.4.0/licenses/notices
APMADV_Agent_Install_8.1.4.0/licenses/non_ibm_license.txt
[root@lin1 agent]# cd APMADV_Agent_Install_8.1.4.0/
[root@lin1 APMADV_Agent_Install_8.1.4.0]#
```

10. Run the command `./installAPMAgents.sh`.

```
root@lin1:/downloads/APM814/agent/APMADV_Agent_Install_8.1.4... - x
File Edit View Search Terminal Help
APMADV_Agent_Install_8.1.4.0/licenses/non_ibm_license.txt
[root@lin1 agent]# cd APMADV_Agent_Install_8.1.4.0/
[root@lin1 APMADV_Agent_Install_8.1.4.0]# ./installAPMAgents.sh

The following products are available for installation:

1) Monitoring Agent for Cisco UCS
2) Monitoring Agent for DataPower
3) Monitoring Agent for DB2
4) Monitoring Agent for HTTP Server
5) Monitoring Agent for IBM Integration Bus
6) Monitoring Agent for JBoss
7) Monitoring Agent for Linux KVM
8) Monitoring Agent for MongoDB
9) Monitoring Agent for WebSphere MQ
10) Monitoring Agent for MySQL
11) Monitoring Agent for NetApp Storage
12) Monitoring Agent for Nodejs
13) Monitoring Agent for OpenStack
14) Monitoring Agent for Oracle Database
15) Monitoring Agent for Linux OS
16) Monitoring Agent for PHP
17) Monitoring Agent for PostgreSQL
18) Response Time Monitoring Agent
19) Monitoring Agent for Ruby
20) Monitoring Agent for SAP Applications
21) Monitoring Agent for Siebel
22) Monitoring Agent for Synthetic Playback
23) Monitoring Agent for Tomcat
24) Monitoring Agent for VMware VI
25) Monitoring Agent for WebSphere Applications
26) Monitoring Agent for WebLogic
27) Monitoring Agent for WebSphere Infrastructure Manager
28) all of the above

Type the numbers that correspond to the products that you want to install. Type "q" to quit selection.
If you enter more than one number, separate the numbers by a space or comma.

Type your selections here (For example: 1,2):
```

11. Select **15** to install the Monitoring Agent for Linux OS.

12. Press Enter to confirm your selection.

13. Press Enter to confirm the agent home of `/opt/ibm/apm/agent`.

14. Select **1** to accept the license agreement.

```
23) Monitoring Agent for Tomcat
24) Monitoring Agent for VMware VI
25) Monitoring Agent for WebSphere Applications
26) Monitoring Agent for WebLogic
27) Monitoring Agent for WebSphere Infrastructure Manager
28) all of the above

Type the numbers that correspond to the products that you want to install. Type
"q" to quit selection.
If you enter more than one number, separate the numbers by a space or comma.

Type your selections here (For example: 1,2): 15

The following agents will be installed:
    Monitoring Agent for Linux OS

Are your selections correct [ 1-Yes, 2-No; default is 1 ]?
Please specify the agent home (default: /opt/ibm/apm/agent):
The agent will be installed in /opt/ibm/apm/agent
Do you accept the license agreement(s) found in the directory /downloads/APM814/
agent/APMADV_Agent_Install_8.1.4.0/licenses?

Please enter [ 1-to accept the agreement, 2-to decline the agreement ] : 1

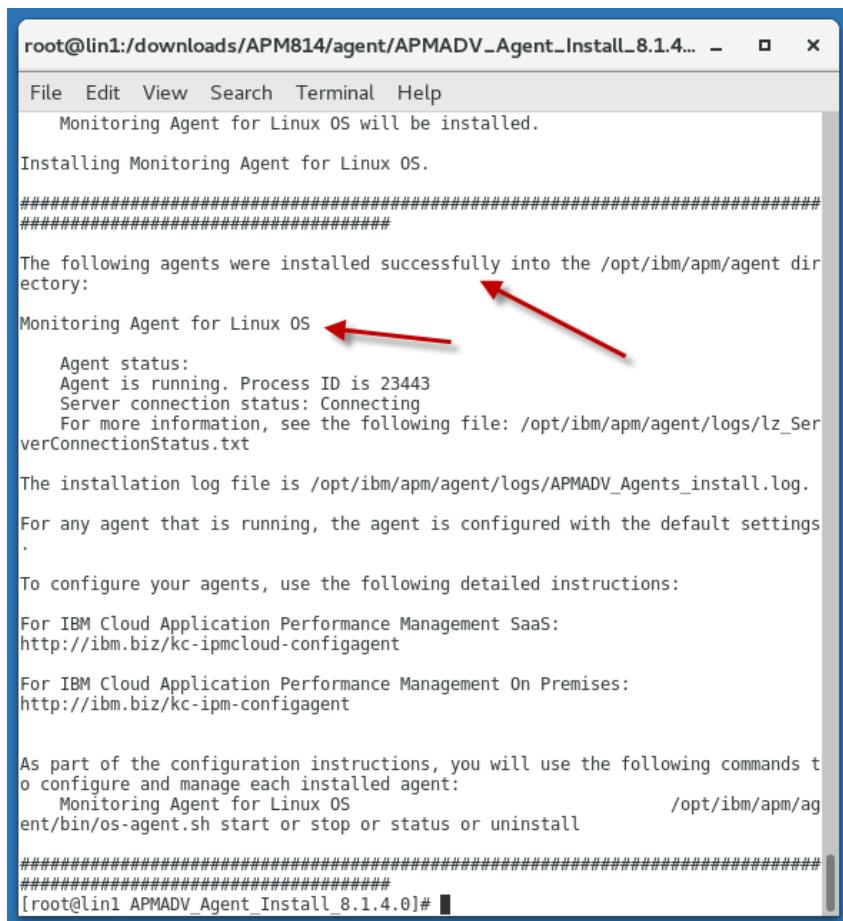
User has accepted the license agreement(s).

    Monitoring Agent for Linux OS will be installed.

Installing Monitoring Agent for Linux OS.
```

The agent installation takes approximately 5 minutes.

15. Look for a message that indicates that the installation of the agent was successful.



```
root@lin1:/downloads/APM814/agent/APMADV_Agent_Install_8.1.4... - □ ×
File Edit View Search Terminal Help
Monitoring Agent for Linux OS will be installed.

Installing Monitoring Agent for Linux OS.

#####
#####
The following agents were installed successfully into the /opt/ibm/apm/agent directory:
Monitoring Agent for Linux OS ←
Agent status:
Agent is running. Process ID is 23443
Server connection status: Connecting
For more information, see the following file: /opt/ibm/apm/agent/logs/lz_ServerConnectionStatus.txt

The installation log file is /opt/ibm/apm/agent/logs/APMADV_Agents_install.log.
For any agent that is running, the agent is configured with the default settings.

To configure your agents, use the following detailed instructions:
For IBM Cloud Application Performance Management SaaS:
http://ibm.biz/kc-ipmcloud-configagent

For IBM Cloud Application Performance Management On Premises:
http://ibm.biz/kc-ipm-configagent

As part of the configuration instructions, you will use the following commands to configure and manage each installed agent:
Monitoring Agent for Linux OS          /opt/ibm/apm/agent/bin/os-agent.sh start or stop or status or uninstall
#####
[root@lin1 APMADV Agent_Install_8.1.4.0]#
```

It takes several minutes for the agent that you installed to show in the Performance Management console.

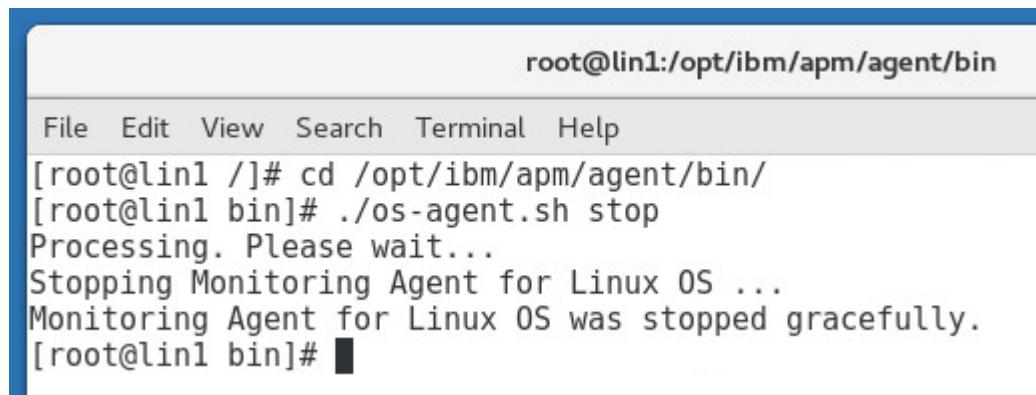
16. Using these same steps, log in to the VM LIN2 with the user ID of `root` and a password of `object00` and install the Monitoring Agent for Linux OS on LIN2.

## Exercise 2 Manage operating system agents

In this short exercise, you issue commands that manage agents, and verify the results of the commands that you issue.

1. On the LIN1 VM, run these commands to stop the Monitoring Agent for Linux OS:

```
cd /opt/ibm/apm/agent/bin  
.os-agent.sh stop
```

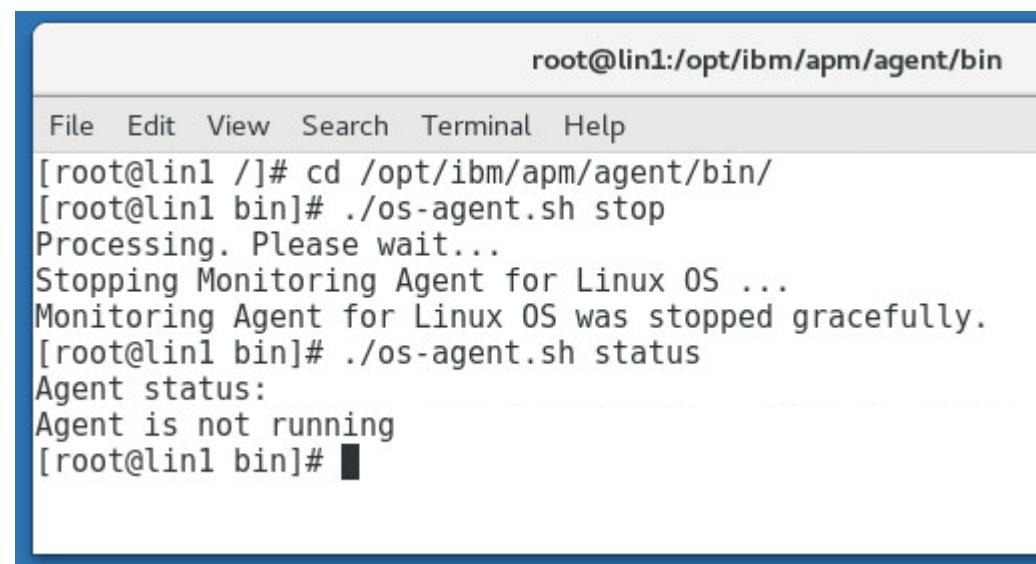


A terminal window titled "root@lin1:/opt/ibm/apm/agent/bin". The window has a menu bar with File, Edit, View, Search, Terminal, and Help. The terminal session shows the command to stop the agent:

```
[root@lin1 /]# cd /opt/ibm/apm/agent/bin/  
[root@lin1 bin]# ./os-agent.sh stop  
Processing. Please wait...  
Stopping Monitoring Agent for Linux OS ...  
Monitoring Agent for Linux OS was stopped gracefully.  
[root@lin1 bin]#
```

2. Check the status of the Monitoring Agent for Linux OS with this command:

```
./os-agent.sh status
```



A terminal window titled "root@lin1:/opt/ibm/apm/agent/bin". The window has a menu bar with File, Edit, View, Search, Terminal, and Help. The terminal session shows the command to check the agent status:

```
[root@lin1 /]# cd /opt/ibm/apm/agent/bin/  
[root@lin1 bin]# ./os-agent.sh stop  
Processing. Please wait...  
Stopping Monitoring Agent for Linux OS ...  
Monitoring Agent for Linux OS was stopped gracefully.  
[root@lin1 bin]# ./os-agent.sh status  
Agent status:  
Agent is not running  
[root@lin1 bin]#
```

3. Restart the Monitoring Agent for Linux OS with this command:

```
./os-agent.sh start
```

```
root@lin1:/opt/ibm/apm/agent/bin
File Edit View Search Terminal Help
Processing. Please wait...
Stopping Monitoring Agent for Linux OS ...
Monitoring Agent for Linux OS was stopped gracefully.
[root@lin1 bin]# ./os-agent.sh status
Agent status:
Agent is not running
[root@lin1 bin]# ./os-agent.sh start
Processing. Please wait...
Starting the Monitoring Agent for Linux OS...
Monitoring Agent for Linux OS started
[root@lin1 bin]# █
```

4. Check the status of the Monitoring Agent for Linux OS with this command:

```
./os-agent.sh status
```

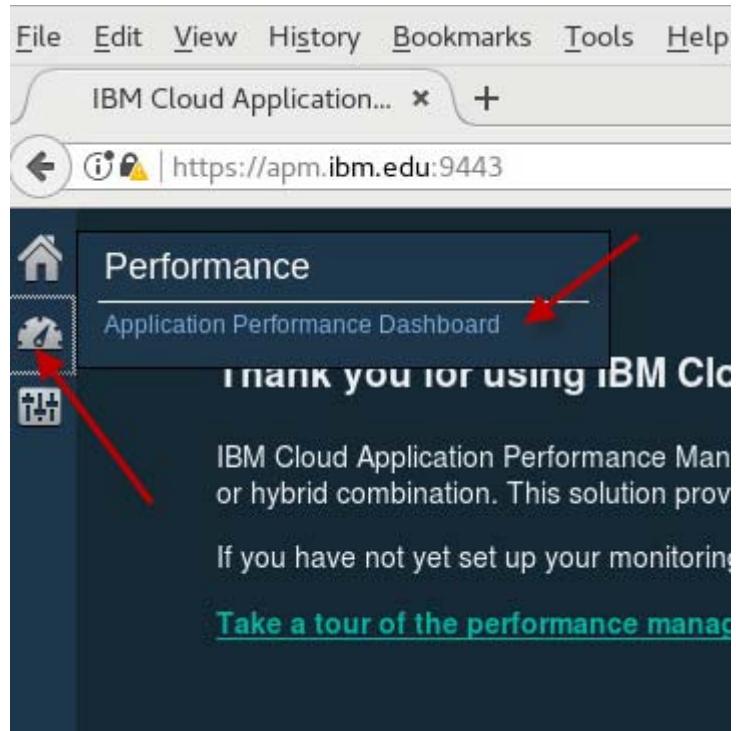
```
root@lin1:/opt/ibm/apm/agent/bin
File Edit View Search Terminal Help
[root@lin1 bin]# ./os-agent.sh start
Processing. Please wait...
Starting the Monitoring Agent for Linux OS...
Monitoring Agent for Linux OS started
[root@lin1 bin]# ./os-agent.sh status
Agent status:
Agent is running. Process ID is 85247
Server connection status: Connecting
For more information, see the following file: /opt/ibm/apm/agent/connectionStatus.txt
[root@lin1 bin]# █
```

Some agents have multiple instances. These agents require you to provide the instance name that you want to manage. You learn about multiple instance agents later in the course.

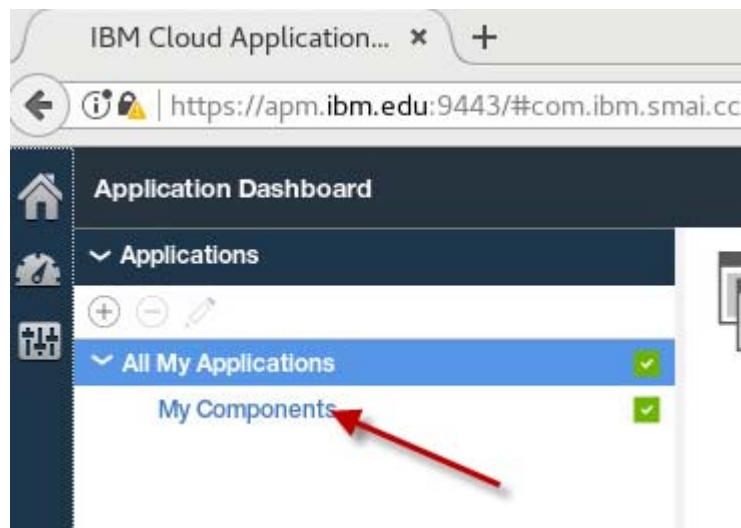
# Exercise 3 Access the data for an agent

In this exercise, you examine data that is collected by a Monitoring Agent for Linux OS.

1. In the Firefox browser on APM, select **Performance > Application Performance Dashboard**.



2. Click the **My Components** application:

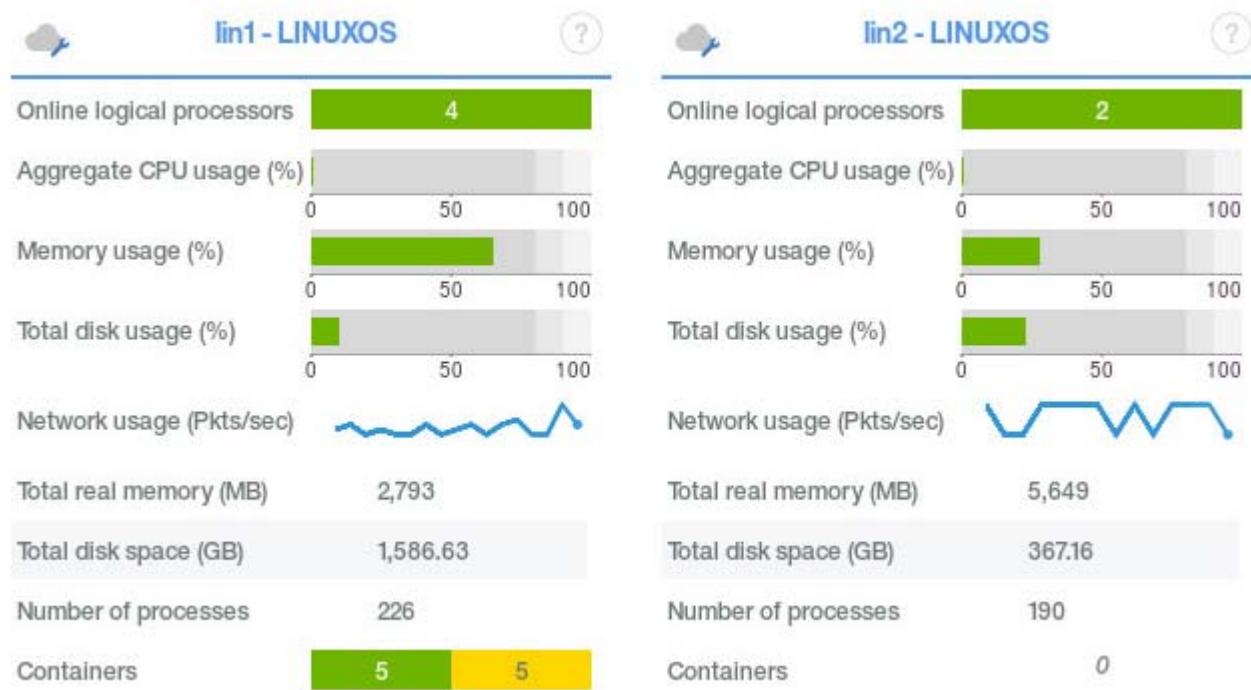


3. Click the **Linux OS** bar to explore the data that the Monitoring Agent for Linux OS collects for both systems where you installed agents. Observe the number 2 that indicates the number of monitoring agents for Linux OS that are connected to the Cloud APM server.



**Note:** If no agents or only one agent shows up, wait 5 minutes for them to appear.

4. Notice that two agents are connected, LIN1 and LIN2. Review the data in the status overview widget for the agent for LIN1.



5. Click the Linux OS Status widget for LIN1 and explore the data that is presented.  
6. Answer the following questions about the data that is collected by the Monitoring Agent for Linux OS that is running on LIN1.



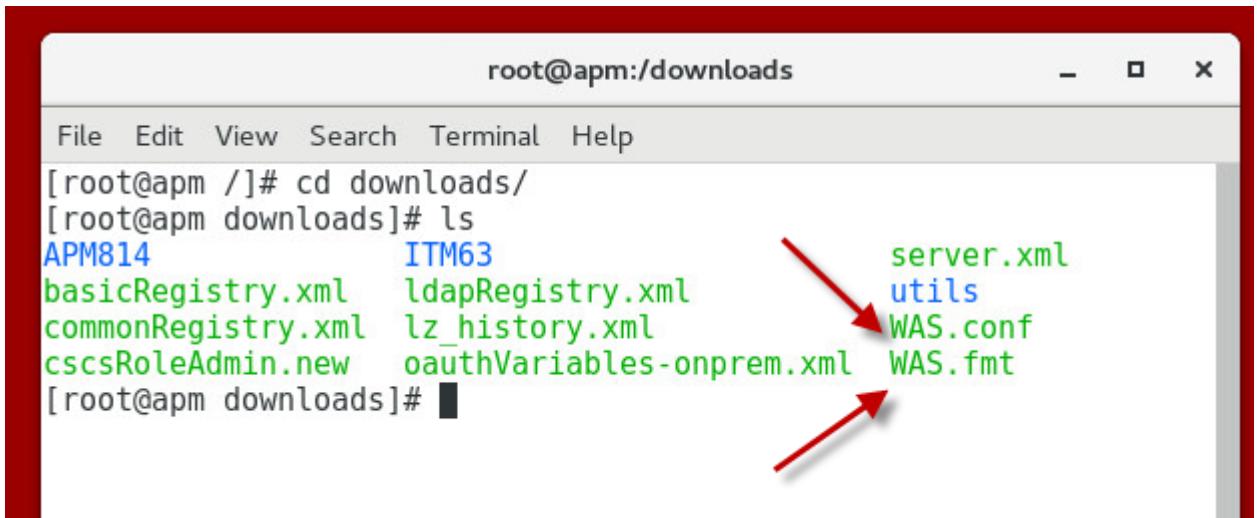
**Hint:** You can click the widgets to see the detailed data.

- What is the percentage of idle CPU?\_\_\_\_\_
- What is the percentage of SWAP memory in use?\_\_\_\_\_
- What is the peak paging rate for the operating system over the last 4 hours?\_\_\_\_\_
- What is the percentage of disk used on the / file system?\_\_\_\_\_
- What is the size of the / file system?\_\_\_\_\_
- What is the current number of processes that are running?\_\_\_\_\_
- What is the process that is using the most CPU?\_\_\_\_\_
- What is the IP address of the host where the agent is running?\_\_\_\_\_
- What is the peak aggregate network interface I/O rate over the last 4 hours?\_\_\_\_\_
- How many docker containers are running?\_\_\_\_\_
- What is the name of the docker container that is using the most memory?\_\_\_\_\_

# Exercise 4 Configure the log file agent

This exercise guides you through the steps to configure the Log File agent that is part of the Operating System agent. You load a configuration and format file, distribute the configuration to a specific server, and view the results.

1. On the APM VM, open a terminal window and change to the `/downloads` folder. List the contents of the folder and observe the two files that are named `WAS(fmt)` and `WAS.conf`.

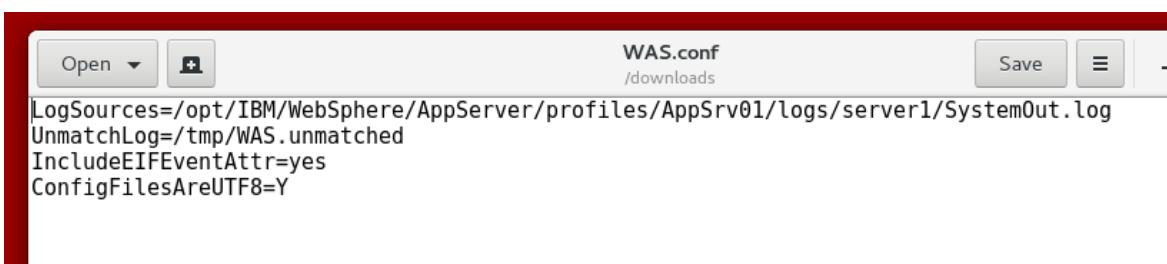


```
root@apm:/downloads
File Edit View Search Terminal Help
[root@apm /]# cd downloads/
[root@apm downloads]# ls
APM814          ITM63
basicRegistry.xml  ldapRegistry.xml
commonRegistry.xml lz_history.xml
cscsRoleAdmin.new oauthVariables-onprem.xml
[root@apm downloads]#
```

The terminal window shows a directory listing in the `downloads` folder. The files listed are `APM814`, `ITM63`, `basicRegistry.xml`, `ldapRegistry.xml`, `commonRegistry.xml`, `lz_history.xml`, `cscsRoleAdmin.new`, and `oauthVariables-onprem.xml`. Two files, `WAS.conf` and `WAS.fmt`, are highlighted with red arrows pointing to them from the right side of the screen.

2. Use gedit to review the contents of the `WAS.fmt` file and the `WAS.conf` file.

The configuration file points to the log location.



WAS.conf  
/downloads

```
LogSources=/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/logs/server1/System0ut.log
UnmatchLog=/tmp/WAS.unmatched
IncludeEIFEventAttr=yes
ConfigFilesAreUTF8=Y
```

The format file describes what to do with the log. In this case, you retrieve all records.

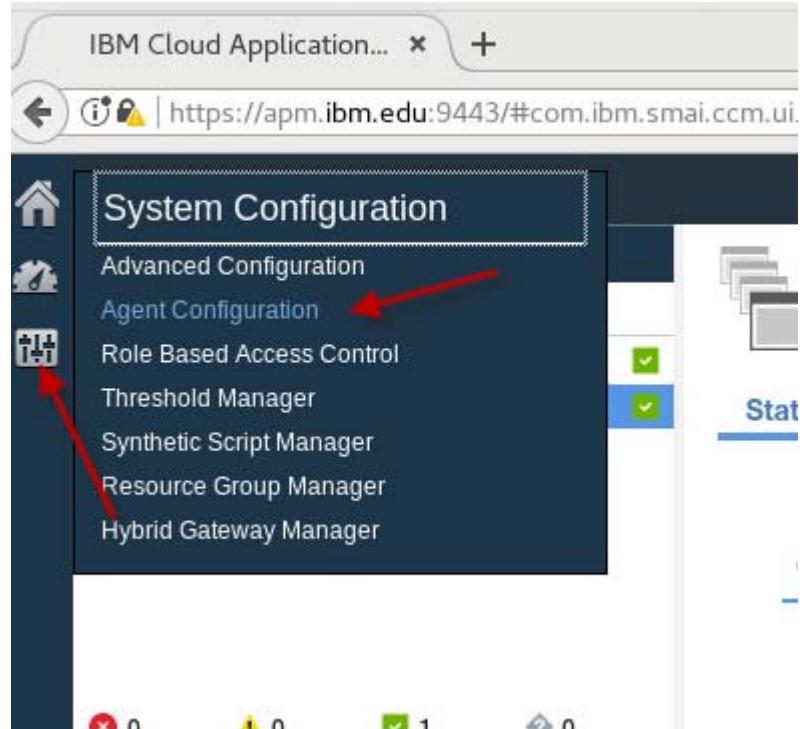


WAS.fmt  
/downloads

```
REGEX ALLLINE
(.*)
msg $1
END
```

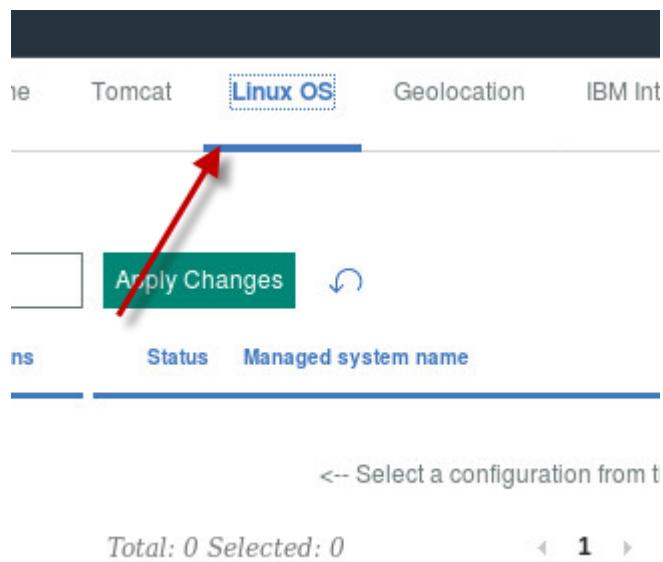
To enable the OS agents to monitor log files, you must upload the configuration file and the format file and specify to which OS agent the configuration applies. The OS agent downloads the **.conf** and **.fmt** files, and the agent monitors the log files that you specify in the configuration.

3. Click **System Configuration > Agent Configuration**.

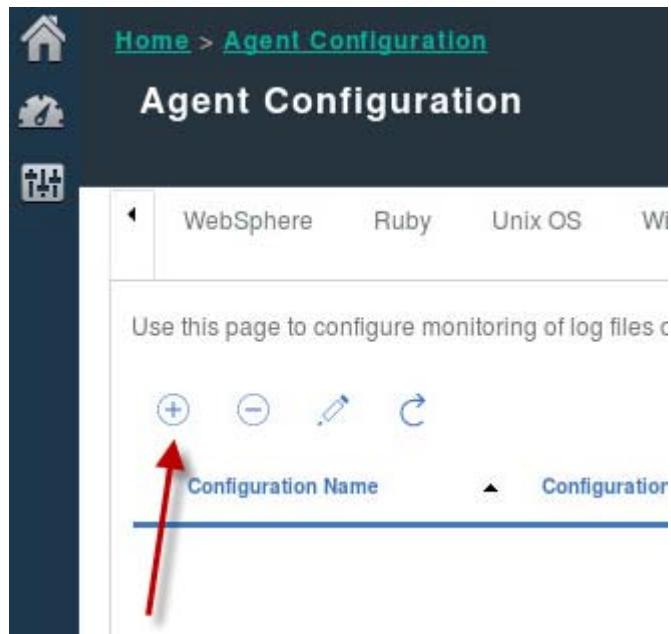


The Agent Configuration page includes tabbed pages for the OS agents. Each page shows the configuration details that you include to monitor log files for the specific OS agent.

4. Click the **Linux OS** tab.



5. To create a configuration, click the (+) icon to open the New Log File Configuration window.

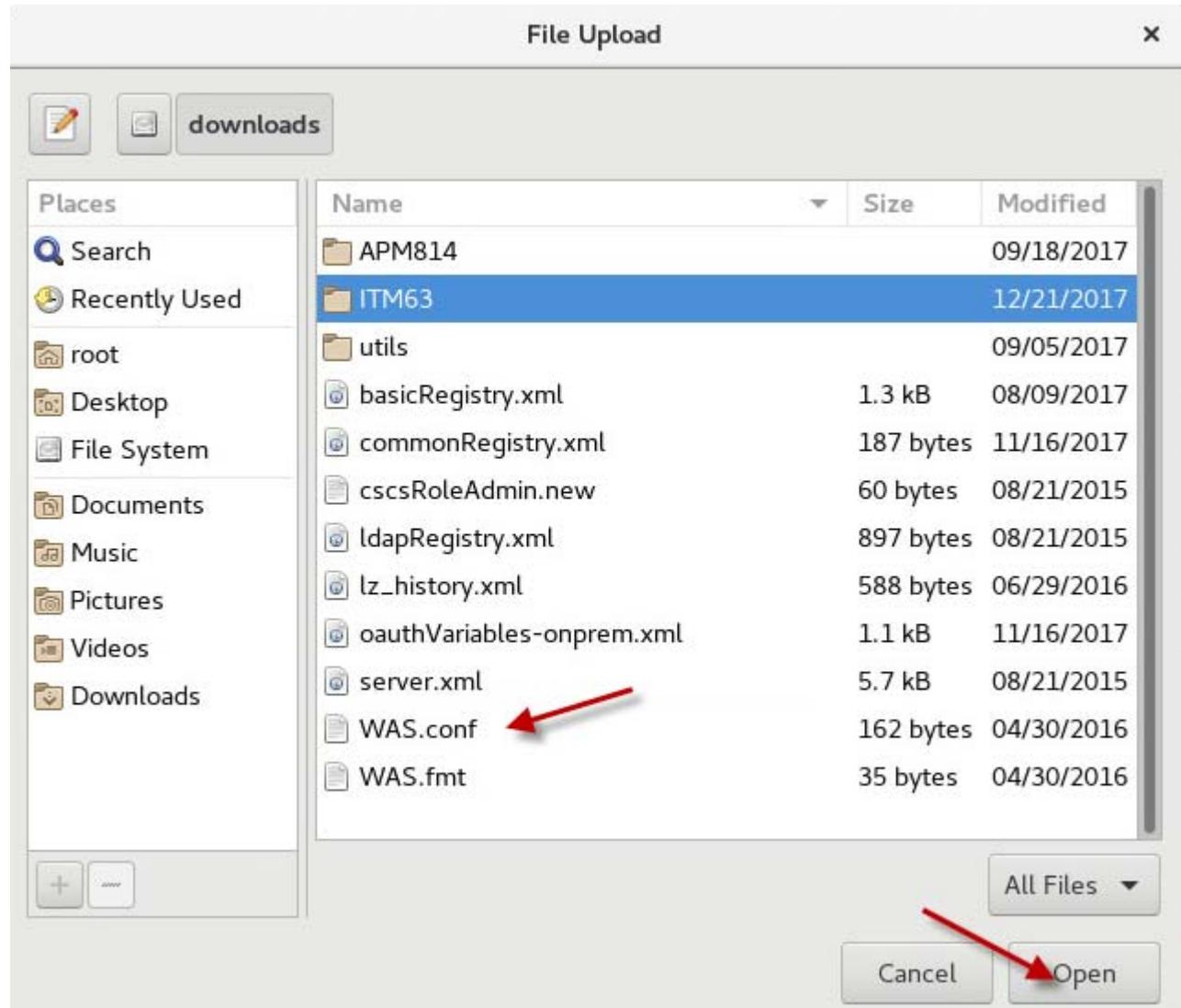


6. Enter the name `WAS` for the configuration and a description of the configuration.

## New Log File Configuration

Configuration Name *	<input type="text" value="WAS"/>
Configuration Description	This log file is from the WebSphere Application Server
Select Conf File	Select a .conf file to complete this required field
Select FMT File	Select a .fmt file to complete this required field

7. Click **Select Conf File**, navigate to the `/downloads` folder, and select the `WAS.conf` file. Click **Open**.



8. Click **View** beside the `WAS.conf` file that you uploaded.

The screenshot shows a user interface for managing log files. At the top, there's a question mark icon. Below it, a section labeled 'WAS' contains the text 'This log file is from the WebSphere Application Server'. Underneath, there are two rows. The first row has a text input field containing 'WAS.conf' and a green 'View' button to its right. A red arrow points to this 'View' button. The second row has a text input field containing 'Select a .fmt file to complete this required field' and a green 'View' button to its right.

9. Observe that this file is the same file that you reviewed earlier. Click **Close**.

10. Repeat the process to upload the `WAS.fmt` file and confirm the contents.

11. Click **Done** after uploading both files.

---

## New Log File Configuration

Configuration Name \*

WAS

Configuration Description

This log file is from the WebSphere Application Server

Select Conf File

WAS.conf

View

Select FMT File

WAS.fmt

View

Done

Cancel

12. Click **Close**.

13. On the Linux OS agent tab, select the **WAS** configuration that you uploaded.

Agent Configuration

Configuration Name	Configuration Description	Configuration File
WAS	This file is for the WebSphere Application Server	WAS.conf

**Important:** The **.conf** and **.fmt** files that are distributed to the agents are renamed to the configuration name that you define.

The Linux OS agent tab shows the configuration that you created and the agents where you deploy them.

14. To deploy the configuration, in the Log Configuration Distributions List table, select the **LIN1** and the **LIN2** OS agents and click **Apply Changes**.

Status	Managed system name
<input checked="" type="checkbox"/>	lin2:LZ
<input checked="" type="checkbox"/>	lin1:LZ

Total: 2 Selected: 2

Apply Changes

15. Click **Close**.

Observe that the Distribution count changed from 0 to 2.

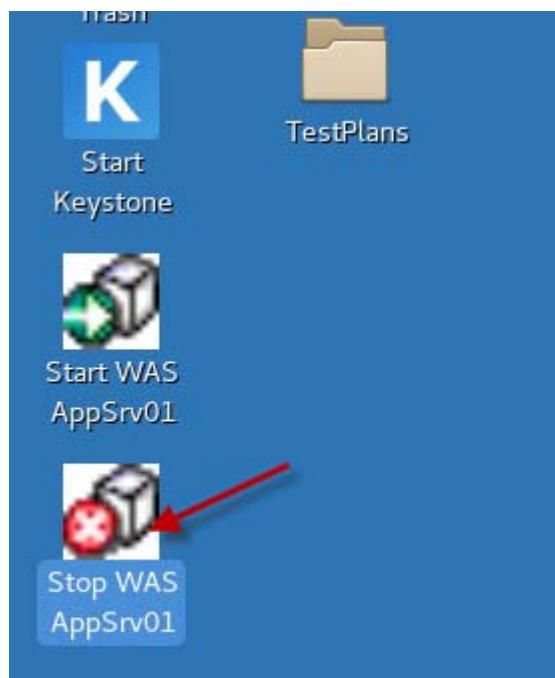
The screenshot shows a list of configuration files. At the top, there are tabs for 'Sphere MQ', 'JBoss', 'Response Time', 'Tomcat', and 'Linux OS'. Below the tabs is a search bar labeled 'Filter' and a green button labeled 'Apply Changes'. The main area displays a table with columns: 'Configuration File Name', 'Distributions', 'Status', and 'Managed sys'. A single row is visible for 'WAS.conf' with a value of '2' in the 'Distributions' column. A red arrow points to this value. At the bottom right, it says 'Total: 0 Selected: 0'.

16. Wait 10 minutes for the definition to be distributed.

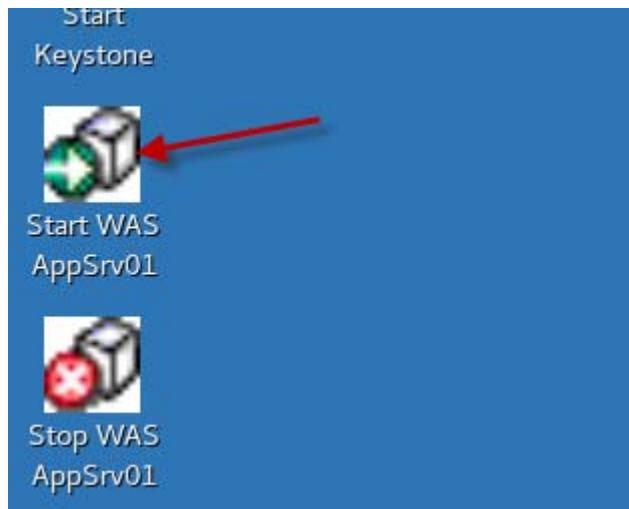


**Hint:** You can examine the folder `/opt/ibm/apm/agent/localconfig/lz/log_discovery` for the configuration and format files, which can show up in less than 10 minutes.

17. On LIN1 VM, to create some log traffic, stop the WebSphere Application Server by double-clicking the **Stop WAS AppSrv01** shortcut on the desktop.



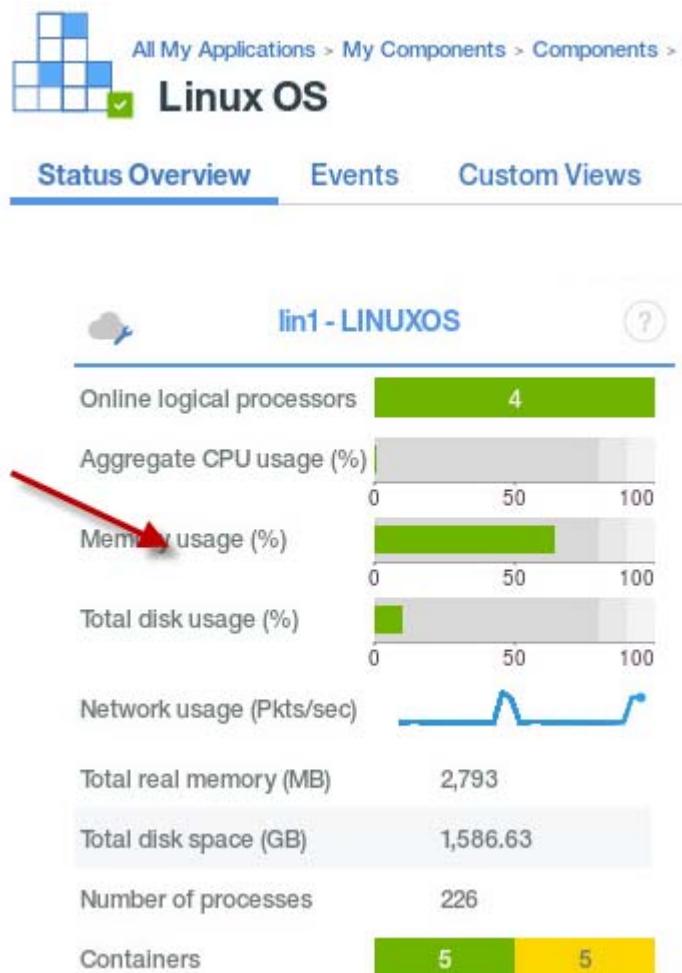
18. Restart the WebSphere Application Server by double-clicking the **Start WAS AppSrv01** shortcut on the desktop.



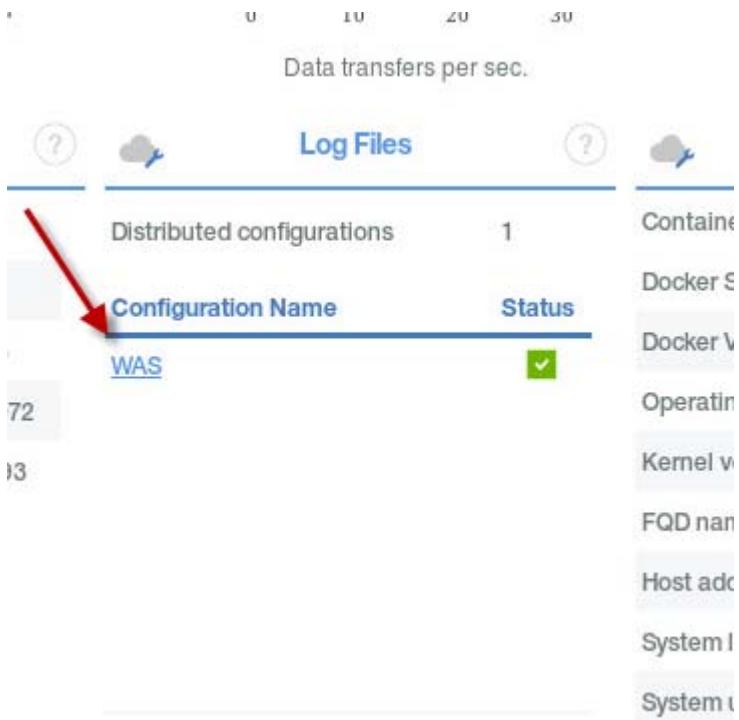
19. On the APM VM, click **Application Performance Dashboard > My Components > Linux OS**.

A screenshot of the Application Performance Dashboard interface. On the left, there is a navigation sidebar with icons for Home, Applications, Groups, Components, and Users. The 'Components' section is expanded, showing 'Linux OS' selected. The main dashboard area shows a 'Performance' header with a red arrow pointing to it. Below the header, there are sections for 'All My Applications' and 'My Components', with a red arrow pointing to 'My Components'. To the right, there is a detailed 'Status Overview' for a node named 'lin1 - LINUX'. This overview includes several performance metrics with corresponding green progress bars: 'Online logical processors', 'Aggregate CPU usage (%)', 'Memory usage (%)', 'Total disk usage (%)', 'Network usage (Pkts/sec)', 'Total real memory (MB)', 'Total disk space (GB)', 'Number of processes', and 'Containers'.

20. Select the LIN1 summary widget.



21. Scroll down, and observe the Log Files widget.



22. Click the Configuration Name **WAS** log file.

23. Click the hyperlink below the File Name header.

The screenshot shows a 'Monitored Logs' section with a table. The table has three columns: 'Configuration', 'Description', and 'File Name'. One row is visible, showing 'WAS', 'This file is for the WebSphere...', and a truncated file name. A red arrow points to the 'File Name' column header.

Configuration	Description	File Name
WAS	This file is for the WebSphere...	/opt/IBM/WebSphere/App...

24. Review the Log File Events.

The screenshot shows a web-based log monitoring application. At the top, there's a navigation bar with tabs like Overview, Monitored Logs, and Events In Monitored Log. Below the navigation is a header section with a cloud icon and the text "Configuration". Under this, there's a table with four columns: Configuration, File Name, File Type, and File Status. One row is visible, showing "WAS" under Configuration, "/opt/IBM/WebSphe..." under File Name, "REGULAR\_F..." under File Type, and "OK" under File Status. Below this is another header with a cloud icon and the text "Timestamp". Underneath is a table with two columns: Timestamp and Message. There are eight rows of log entries, each starting with the timestamp "10:42 Dec 28". The "Message" column contains log messages, with the fourth message being highlighted by a black rectangular box. The text in the box is: "[12/28/17 10:42:35:596 EST] 00000001 WsServer [12/28/17 10:42:35:596 EST] 00000001 [12/28/17 10:42:35:596 EST] 00000001 open for e-business [12/28/17 10:42:32:114 EST] 00000005c WASNan [12/28/17 10:42:32:115 EST] 00000005c Abstract [12/28/17 10:42:32:119 EST] 00000005c WASNan [12/28/17 10:42:32:120 EST] 00000005c WASNan".

Configuration	File Name	File Type	File Status
WAS	/opt/IBM/WebSphe...	REGULAR_F...	OK

Timestamp	Message
10:42 Dec 28	[12/28/17 10:42:35:596 EST] 00000001 WsServer
10:42 Dec 28	[12/28/17 10:42:35:596 EST] 00000001 [12/28/17 10:42:35:596 EST] 00000001
10:42 Dec 28	[12/28/17 10:42:35:596 EST] 00000001 open for e-business
10:42 Dec 28	[12/28/17 10:42:32:114 EST] 00000005c WASNan
10:42 Dec 28	[12/28/17 10:42:32:115 EST] 00000005c Abstract
10:42 Dec 28	[12/28/17 10:42:32:119 EST] 00000005c WASNan
10:42 Dec 28	[12/28/17 10:42:32:120 EST] 00000005c WASNan

---

# **Unit 4 Administration exercises**

In these exercises, you learn how to manage the Cloud APM server. You create applications that are composed of the data from the monitoring agents. You create several custom views. You also explore the Attribute details of various agents and save customized charts with other users.

Additionally, you create new users and assign capabilities to those users. Optionally, you set up the Cloud APM server to connect to LDAP.

## **Exercise 1 Manage the Cloud APM server**

The Cloud APM server is normally started automatically after it is installed. You can manage the Cloud APM server by using the `apm` command.

1. From the APM VM, open a terminal window.
2. From the terminal window, run this command:

```
apm help
```

Examine the various commands that can be run against the service names.

```
root@apm:~ - □ ×
File Edit View Search Terminal Help
[root@apm ~]# apt help

Usage: apt [-f|--force] command service_name

-f or --force option only applies to the stop, stop_all, restart, and
restart_all commands.

The apt commands are:

status      | ss   Show if service is running or stopped
start       | st   Start an apt service by name
start_all   | sta  Start all apt services
stop        | sp   Stop an apt service by name
stop_all    | spa  Stop all apt services
restart     | rt   Restart a running apt service by name
restart_all | rta  Restart all apt services

service_name is one of: db2 ksy kafka spark txagent mongodb scr oidc
server1 min aptui oslc dqe uviews biagent soagent

[root@apm ~]# █
```

3. To examine whether services are started or not, run this command:

```
apm status
```

```
[root@apm ~]# apm status
Service db2 is started (PID 112297).
Service ksy is started (PID 94038).
Service kafka is started (PID 71445).
Service spark is started (PID 89268).
Service txagent is started (PID 9478).
Service mongodb is started (PID 97804).
Service scr is started (PID 98172).
Service oidc is started (PID 98583).
Service server1 is started (PID 98981).
Service min is started (PID 100264).
Service apmui is started (PID 111752).
Service oslc is started (PID 38546).
Service dqe is started (PID 122239).
Service uviews is started (PID 15545).
Service biagent is started (PID 125769).
Service soagent is started (PID 1174).
[root@apm ~]#
```

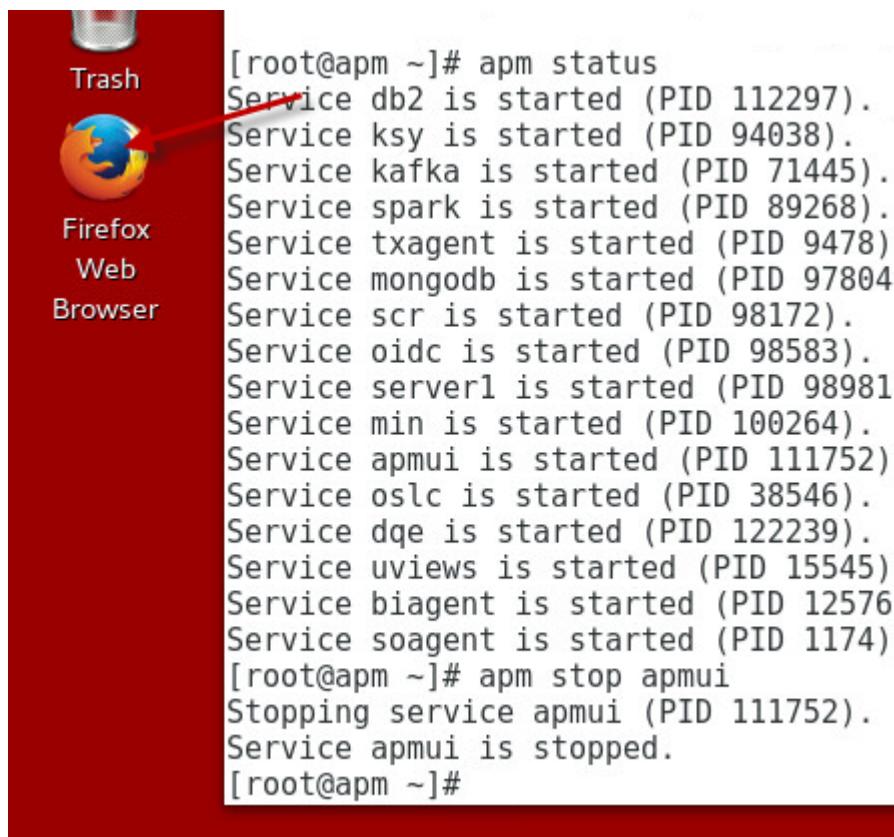
The Cloud APM console connects to the apmui service. If this service is started, you can log in to the console.

4. Stop the service with this command:

```
apm stop apmui
```

```
Service uviews is started (PID 15545).
Service biagent is started (PID 125769).
Service soagent is started (PID 1174).
[root@apm ~]# apm stop apmui
Stopping service apmui (PID 111752).
Service apmui is stopped.
[root@apm ~]#
```

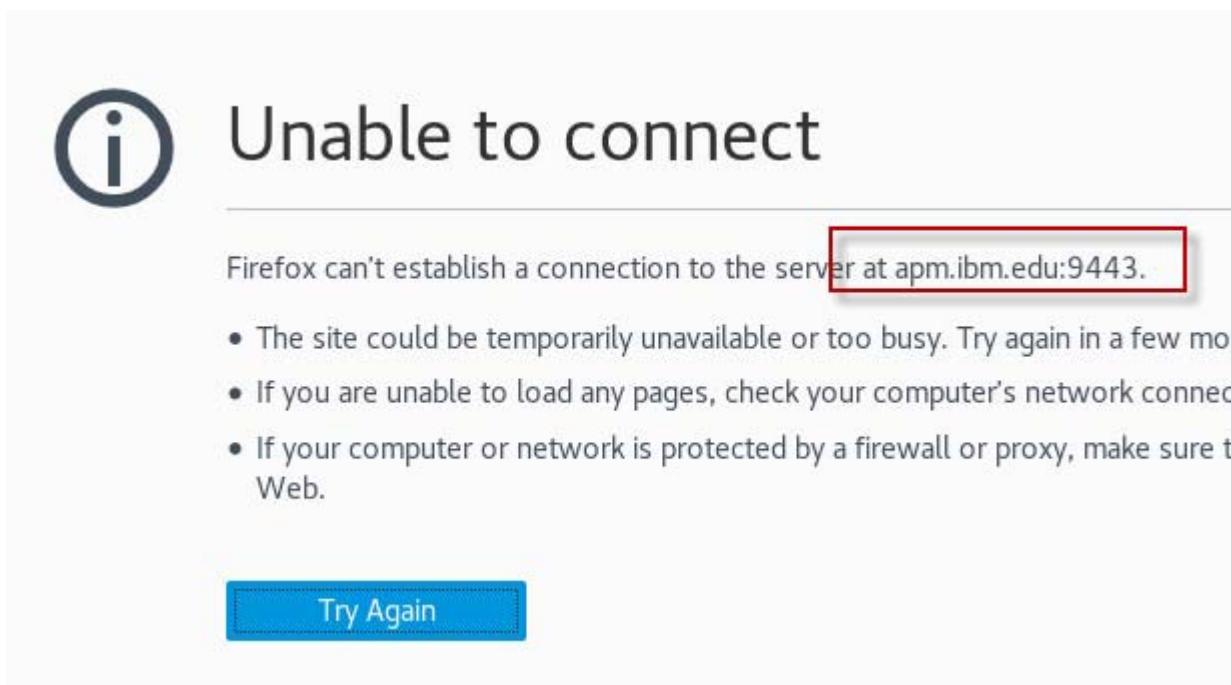
5. When the apmui service is stopped, open a Firefox browser.



6. Open the browser to this URL:

<https://apm.ibm.edu:9443>

- Because the **apmui** service is stopped, you see this message and cannot connect to the server. Leave this window open.



- From the Terminal window, start the **apmui** service. Wait for the command to complete.

```
apm start apmui
```

```
[root@apm ~]# apm start apmui
Starting service apmui
.
.
.
Service apmui is started (PID 78918).
[root@apm ~]#
```

9. From the Firefox window where you were unable to connect before, click **Try Again**.

# Unable to connect

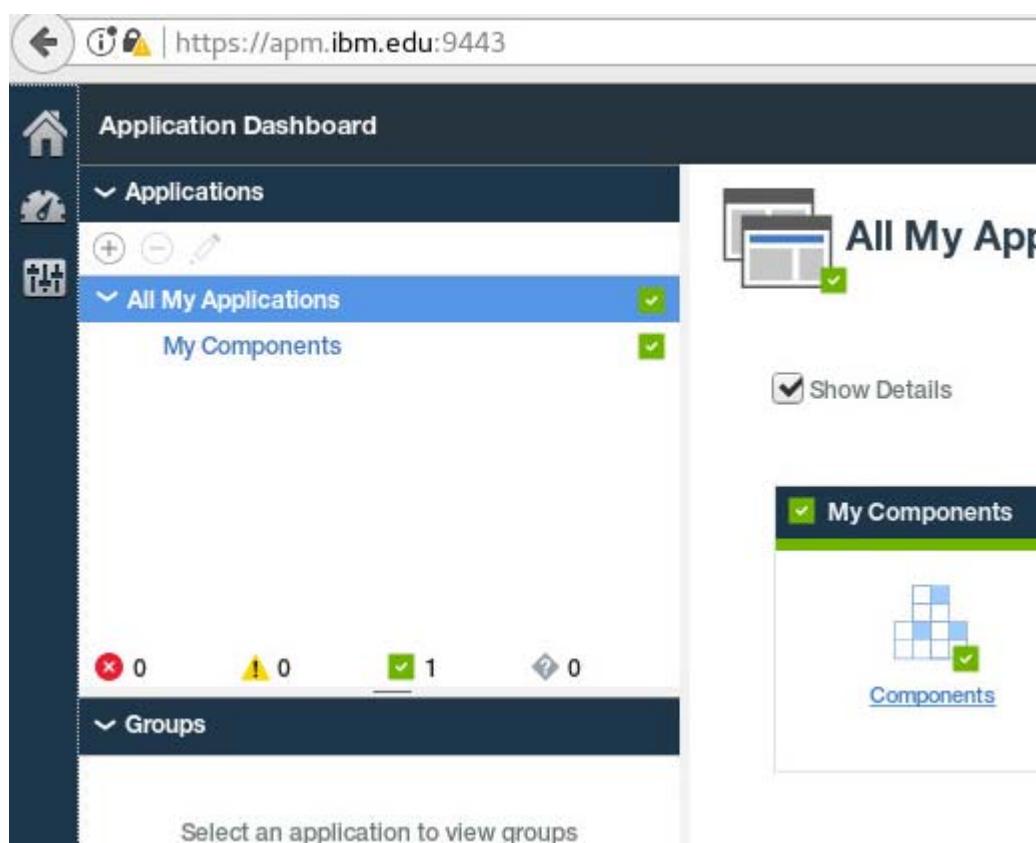
Firefox can't establish a connection to the server at `apm.ibm.edu:9443`.

- The site could be temporarily unavailable or too busy. Try again in a few minutes.
- If you are unable to load any pages, check your computer's network connection.
- If your computer or network is protected by a firewall or proxy, make sure it is configured correctly for the Web.

**Try Again**



10. Observe that this time the login is successful.

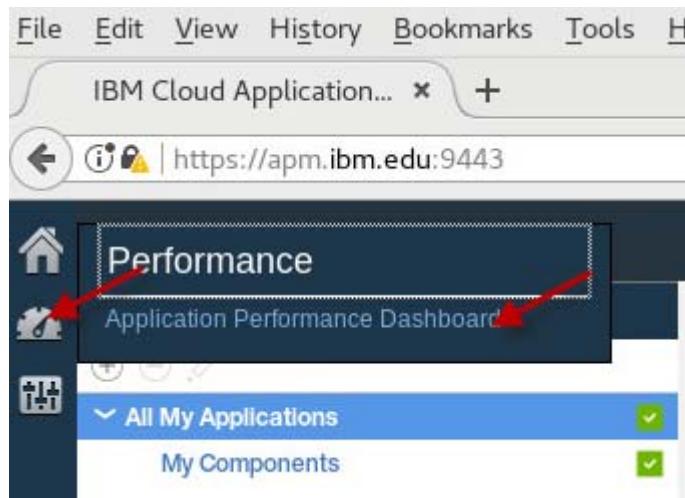


The screenshot shows the Application Dashboard interface. At the top, there is a header bar with a back arrow, a refresh icon, and the URL `https://apm.ibm.edu:9443`. Below the header is a dark sidebar with icons for Home, Applications, Groups, and Help. The main content area has a title "Application Dashboard". Under "Applications", a section titled "All My Applications" is expanded, showing a list with a blue checkmark next to it. To the right of this list is a summary with counts: 0 errors, 0 warnings, 1 checked component, and 0 unknown components. Below this summary is a "Groups" section. On the far right, there is a sidebar titled "All My Apps" with a "Show Details" checkbox. A small inset window titled "My Components" shows a grid icon and a "Components" link.

## Exercise 2 Create your first application

Before you can open the Application Performance Dashboards for viewing key performance indicators from your managed systems, you organize your managed resources into applications. Use the tools in the Navigator Applications toolbar to add or edit applications and their supporting software resources, or to remove an application. When you add an application, you can create a new application and apply the managed resources that are available, or you can select one from any discovered applications. In this exercise, you add a Monitoring Agent for Linux OS to an application.

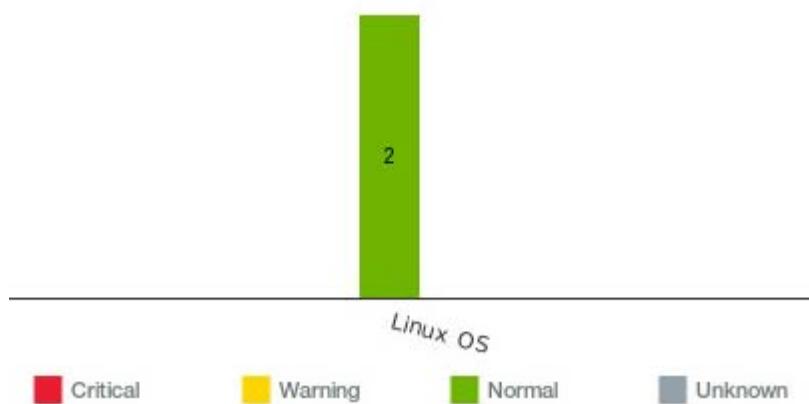
1. On the APM VM, click **Performance > Application Performance Dashboard**.



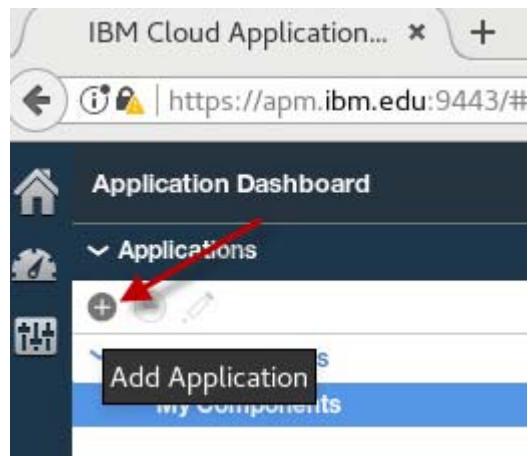
2. Observe that only the product-provided **My Components** appears under All My Applications and that currently you have no applications that are defined.

The screenshot shows the 'IBM Cloud Application...' dashboard. In the left sidebar, under 'Applications', 'All My Applications' is selected, showing 'My Components'. On the right, there's a summary bar with counts: 0 Critical, 0 Warning, 1 Normal, and 0 Unknown. A callout box highlights 'My Components' with a checkmark and a green icon. Below it, a link to 'Components' is shown.

3. Click **My Components** to see the agents that are connected to the Cloud APM server from the prior exercises.



- To add an application, click the plus sign (+).



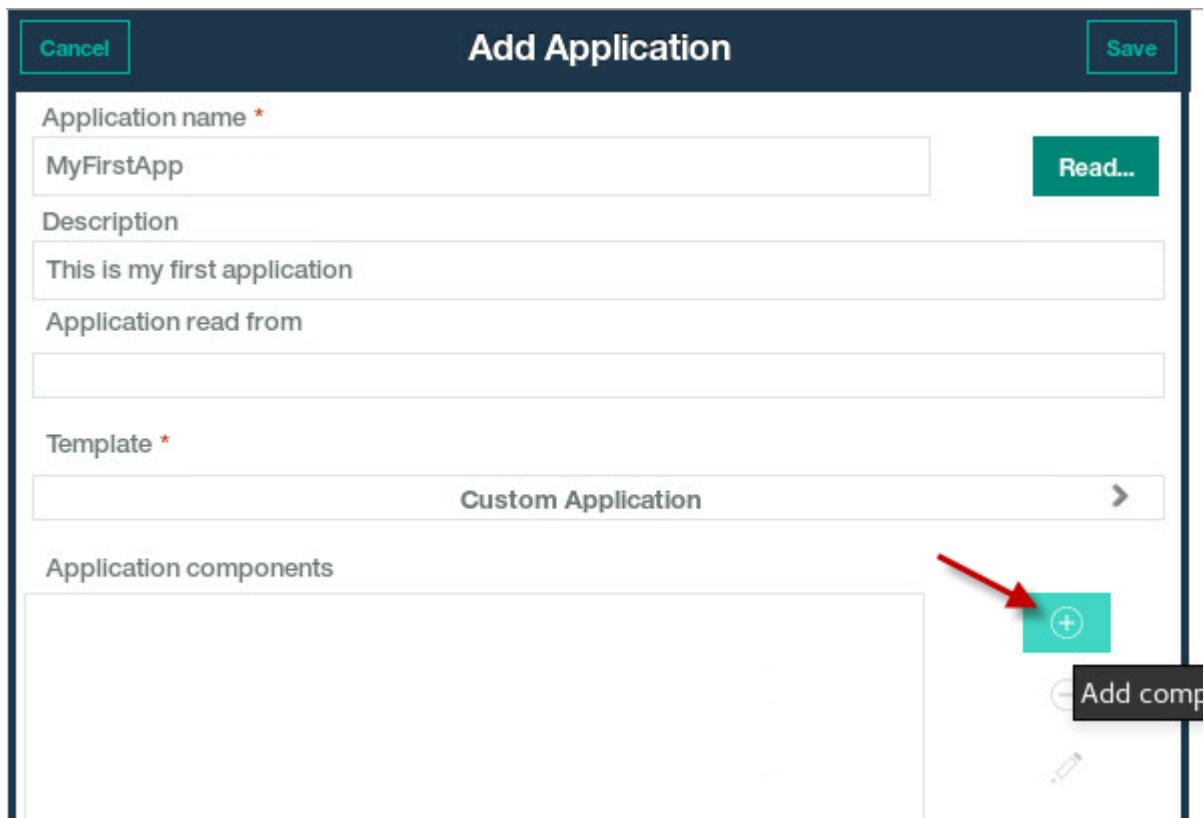
The Add Application window opens.

A screenshot of the "Add Application" dialog box. The title bar says "Add Application" with "Cancel" and "Save" buttons. The form fields are:

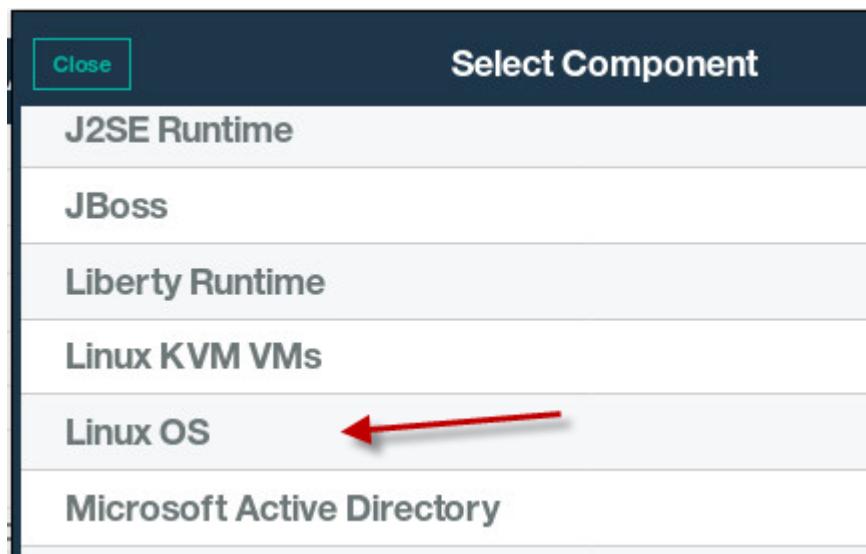
- Application name \***: A text input field with placeholder "Enter a unique name" and a "Read..." button.
- Description**: A text input field.
- Application read from**: A text input field.
- Template \***: A dropdown menu set to "Custom Application" with a right-pointing arrow.
- Application components**: A large text input area with three small icons on the right: a plus sign (+), a minus sign (-), and a pencil.

- Enter an application name of: **MyFirstApp**  
Enter a description of: **This is my first application**

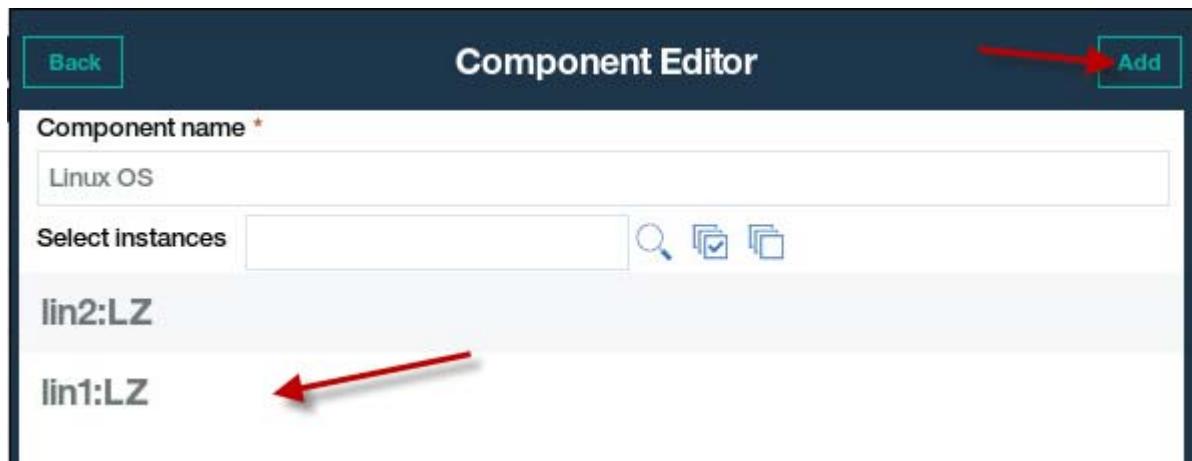
6. Click the plus sign (+) to add an application component:



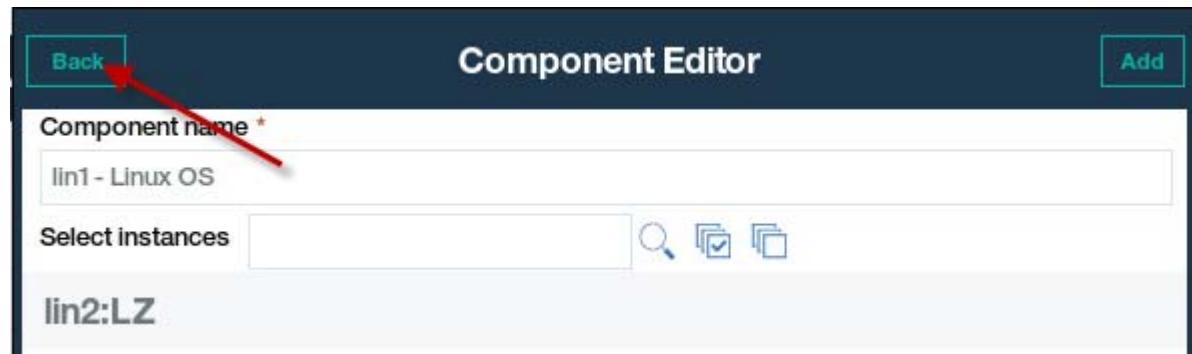
7. Scroll down and click **Linux OS**.



8. Click the **lin1:LZ** instance, and click **Add**.

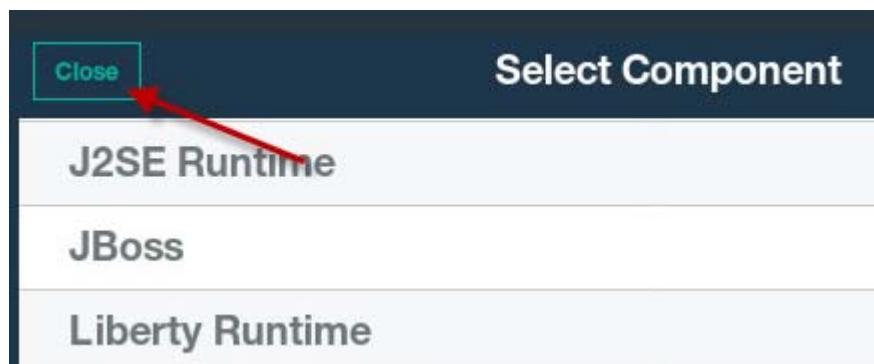


9. Click **Back**.



**Note:** You add more agents later in the course. The only agent currently in the application is the Monitoring Agent for Linux OS installed on LIN1.

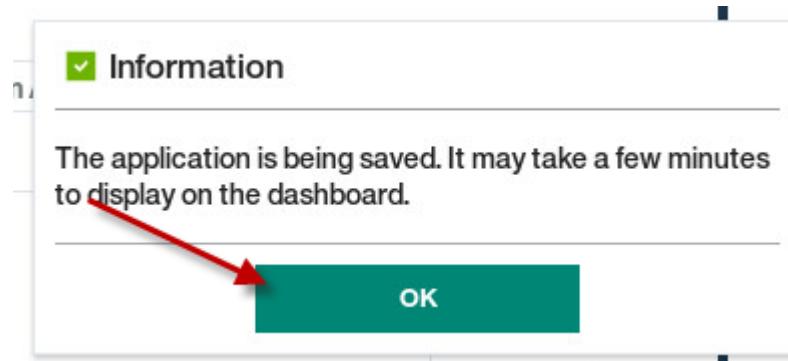
10. Click **Close**.



11. Click **Save** after you confirm that the application matches the screen capture.

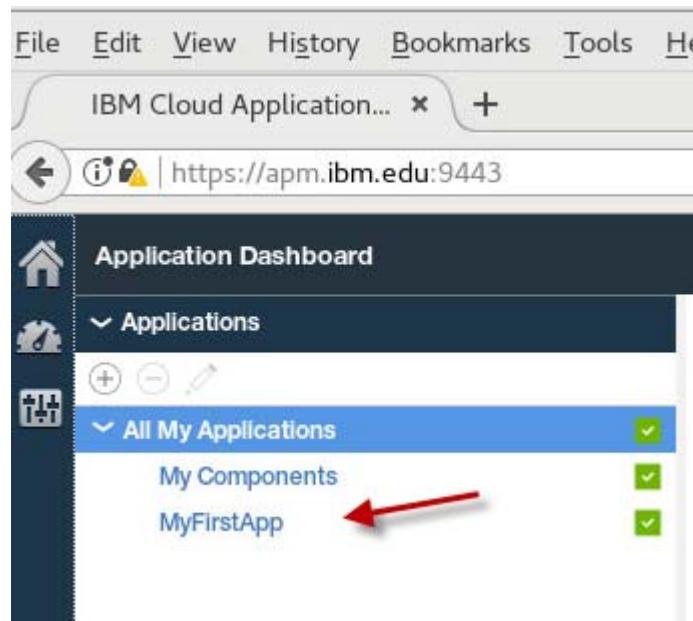
The screenshot shows the 'Add Application' dialog box. It has a 'Cancel' button on the left and a 'Save' button on the right, which is highlighted with a red arrow. The form contains fields for 'Application name' (MyFirstApp), 'Description' (This is my first application), 'Application read from' (empty), 'Template' (Custom Application), and 'Application components' (lin1 - Linux OS(1) with lin1:LZ). There are also '+' and '-' buttons for managing components.

12. Click **OK**.



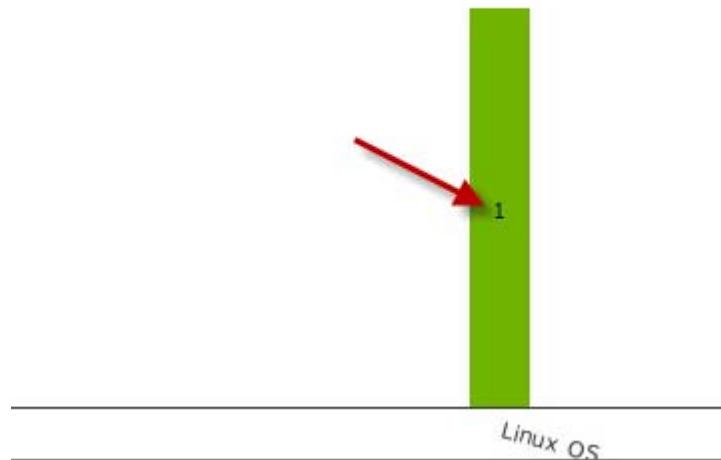
13. Press **F5** to refresh the dashboard. Repeat until the application appears.

14. Click the **MyFirstApp** application:

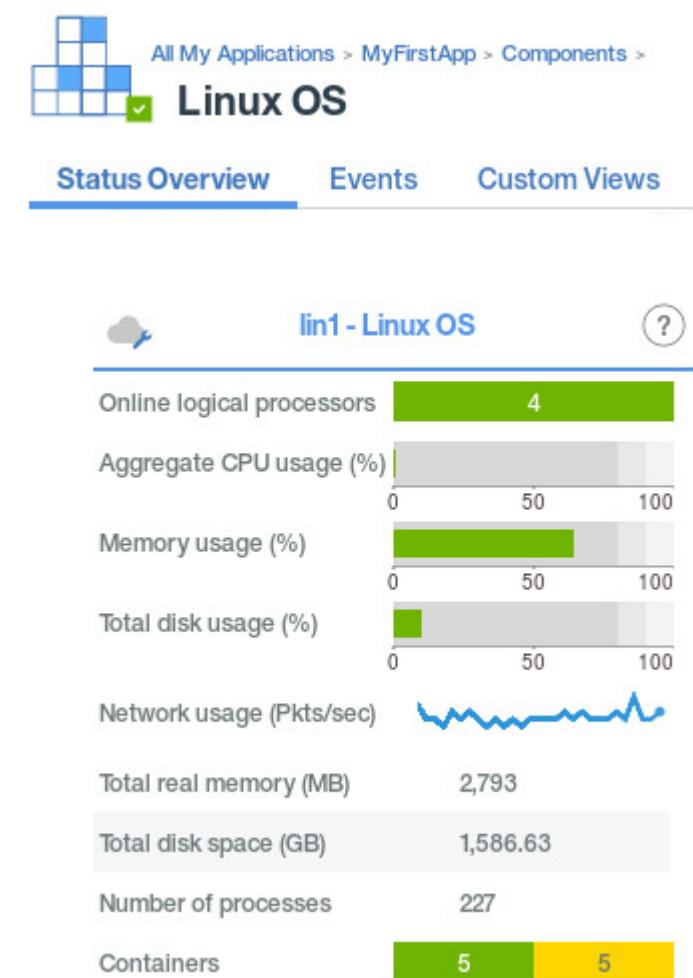


15. Observe the number 1 in the bar, which indicates that one agent is represented. Observe the color of the bar, which indicates the status of the agent. Click the **Linux OS** bar to explore the data that is collected by the Monitoring Agent for Linux OS.

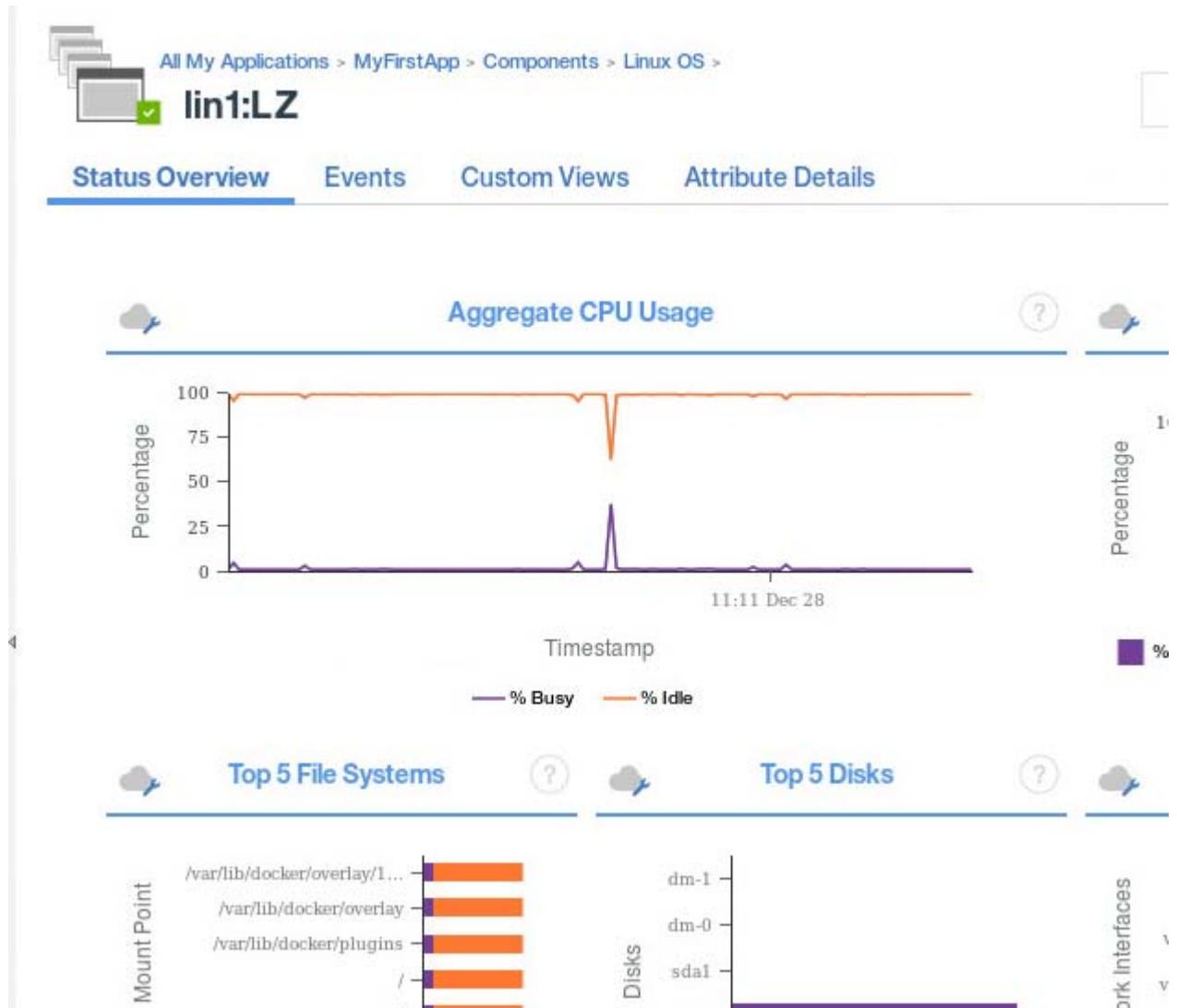
#### Custom Views



16. Review the data in the status overview widget for this agent.



17. Click the Linux OS Status widget and explore the data that is presented.



# Exercise 3 Create your second and third applications

Your second application contains the monitoring agent that you installed on the LIN2 VM. Your third application contains both of the monitoring agents that are installed on the LIN1 and LIN2 VMs.

1. To add an application, click the plus sign (+) on the Application Dashboard.
2. Enter an application name of: **MySecondApp**  
Enter a description of: **This is my second application**

The screenshot shows the 'Add Application' dialog box. At the top right is a 'Cancel' button and a large 'Add Application' title. On the left is a vertical sidebar with a dark blue header containing the word 'Add'. The main area has several input fields:

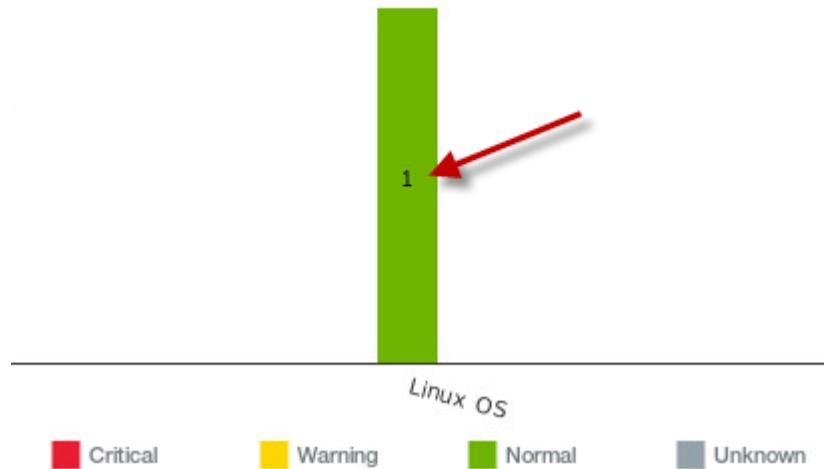
- 'Application name \*': A text input field containing 'MySecondApp'.
- 'Description': A text input field containing 'This is my second application'.
- 'Application read from': An empty text input field.
- 'Template \*': A dropdown menu showing 'Custom Application'.
- 'Application components': An empty text input field.

3. Using what you learned in [Unit 4, Exercise 2](#) on page 4-7, add the Monitoring Agent for Linux OS installed on LIN2 to an application called **MySecondApp**.

4. Verify that you have three applications that are defined under All My Applications.

The screenshot shows the Application Dashboard interface. At the top, there is a header with a back arrow, a lock icon, and the URL <https://apm.ibm.edu:9443>. Below the header, the title "Application Dashboard" is displayed. On the left, there is a sidebar with icons for Home, Applications, and a plus sign. Under "Applications", the section "All My Applications" is expanded, showing three items: "My Components", "MyFirstApp", and "MySecondApp". Each item has a green checkmark icon to its right.

5. Verify that the MySecondApp application looks similar to this screen capture.

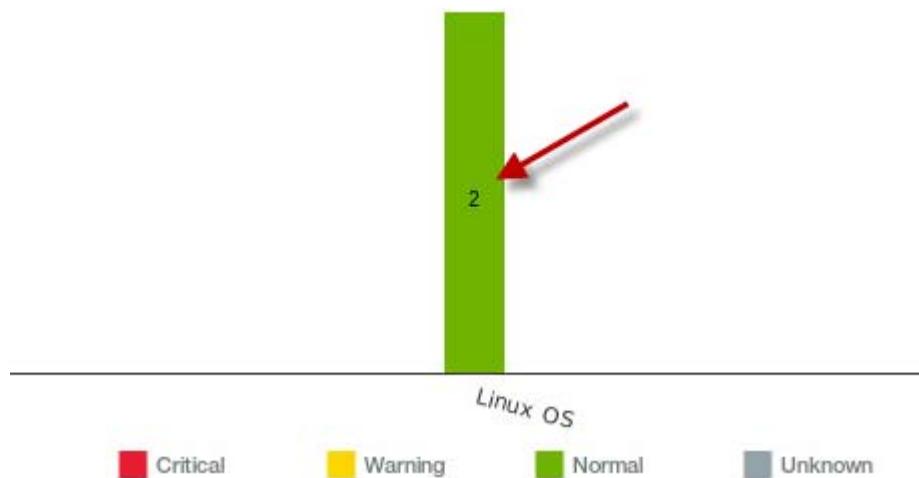


6. You now use what you learned in [Unit 4, Exercise 2](#) on page 4-7. Add the Monitoring Agent for Linux OS that is installed on LIN1 and the Monitoring Agent for Linux OS that is installed on LIN2 to a new application called **MyThirdApp**.

7. Verify that you have four applications that are defined under All My Applications.

The screenshot shows the Application Dashboard interface. On the left, there's a sidebar with icons for Home, Applications, and Infrastructure. Under 'Applications', a dropdown menu is open, showing 'All My Applications' which is selected. Below it, four applications are listed: 'My Components', 'MyFirstApp', 'MySecondApp', and 'MyThirdApp', each with a green checkmark icon. To the right, there's a preview window titled 'All My Applications' showing a grid of three application icons. A checkbox labeled 'Show Details' is checked. At the bottom right, there's a button labeled 'My Components' with a green checkmark icon.

8. Verify that the completed application **MyThirdApp** looks similar to this screen capture.



# Exercise 4 Create an instance-based custom view

By using the custom view feature, you control how the data that is collected from the agents is displayed to the user.

1. In the Cloud APM console on the APM VM, select the **MyThirdApp** application.

The screenshot shows the Application Dashboard interface. On the left, there's a sidebar with icons for Home, Applications, and Components. The main area is titled "Application Dashboard" and has a section titled "Applications". Under "Applications", there's a list of items: "All My Applications" (with a twistie icon), "My Components", "MyFirstApp", "MySecondApp", and "MyThirdApp". Each item has a green checkmark icon to its right. A blue horizontal bar highlights the "MyThirdApp" row. A red arrow points to this bar.

2. Under **Groups**, expand **Components** by clicking the twistie (>).

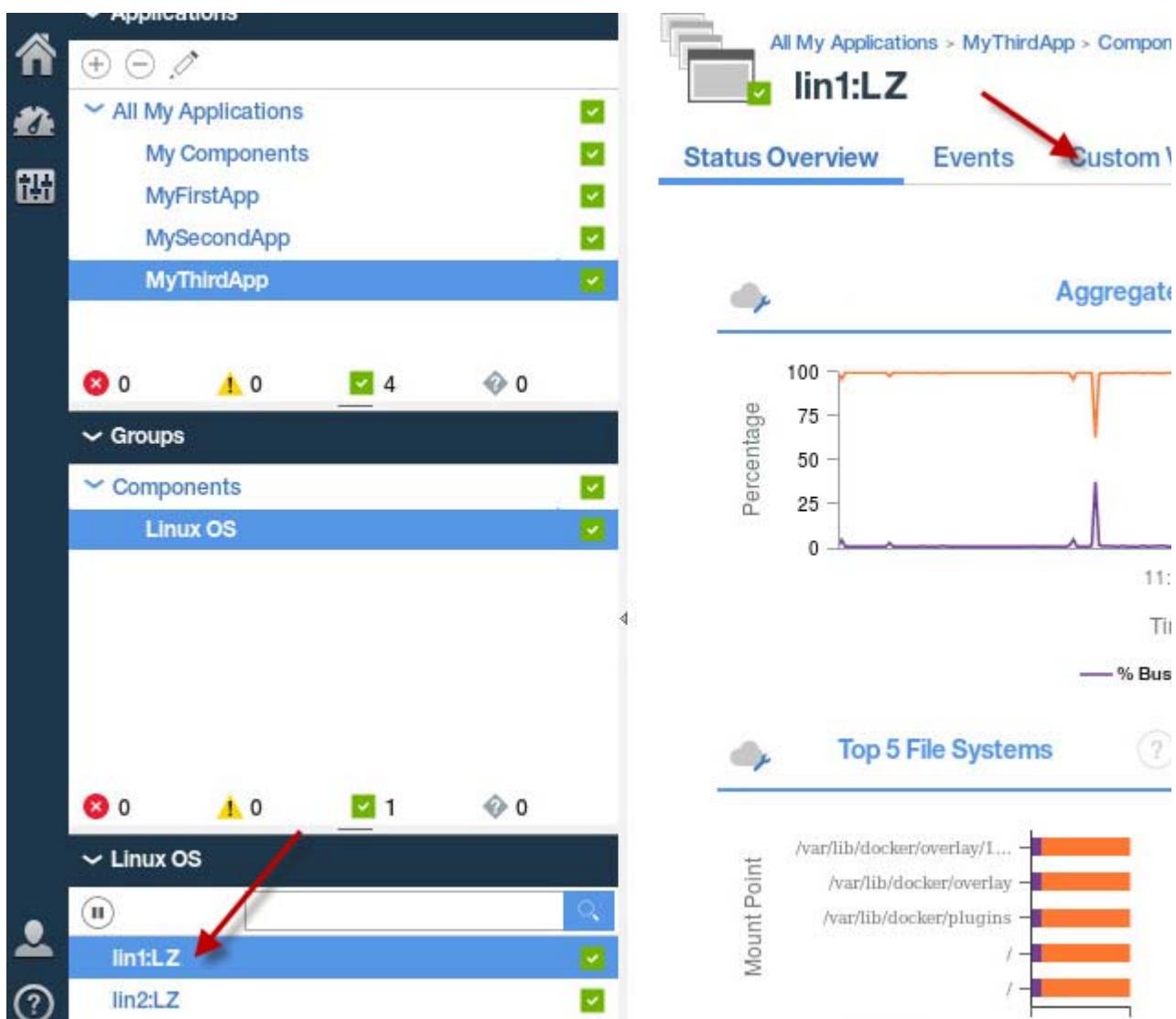
The screenshot shows the Application Dashboard interface again. The "Groups" section is expanded, showing "Components" with a twistie icon. Below the twistie, there are four status indicators: a red circle with a white minus sign and "0", a yellow triangle with a white exclamation mark and "0", a green square with a white checkmark and "4", and a blue diamond with a white question mark and "0". A red arrow points to the twistie icon next to "Components".

3. Select **Linux OS**, and look at the list under Instances.

The image consists of two vertically stacked screenshots of a software interface, likely a monitoring or configuration tool. Both screenshots show a header with four status indicators: red (0), yellow (0), green (4), and blue (0).  
  
The top screenshot shows a 'Groups' section with a single item. Below it is a 'Components' section, which is expanded to show a list of components. One component, 'Linux OS', is highlighted with a blue background and has a red arrow pointing to its name.  
  
The bottom screenshot shows a 'Linux OS' section, also with a blue background. It contains a search bar and a list of two instances: 'lin1:LZ' and 'lin2:LZ'. The instance 'lin1:LZ' is highlighted with a blue background and has a red arrow pointing to its name.

4. Click the **lin1:LZ** under the Linux OS instance list and then the **lin2:LZ** instance. Observe how the data that is presented changes.

5. Select the lin1:LZ instance and then click **Custom Views**.



6. In some instances, a Cloud APM console login prompt appears in the main panel. If prompted, log in to the Cloud APM console again and accept any security certificates.

7. A template for your custom Page is presented. Select the **1X2 Template**.

All My Applications > MyThirdApp > Components > Linux OS >  
**lin1:LZ**

Status Overview   Events   **Custom Views**   Attribute Details

Select a Template for your Custom Page

1X2 Template   1X1 Template   2X1 Template   2X2 Template

**Important:** This step fails if APM does not have a connection to the internet.

8. A 1X2 custom view template is displayed. Enter a Page Name of: **LinuxOSInstanceView**

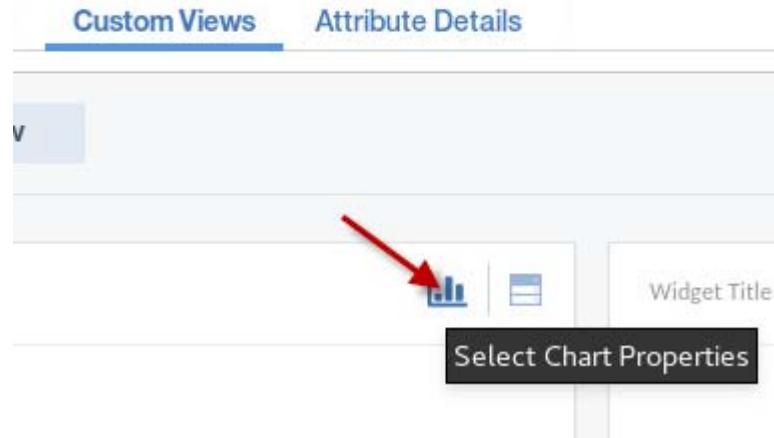
All My Applications > MyThirdApp > Components > Linux OS  
**lin1:LZ**

Status Overview   Events   **Custom Views**   At

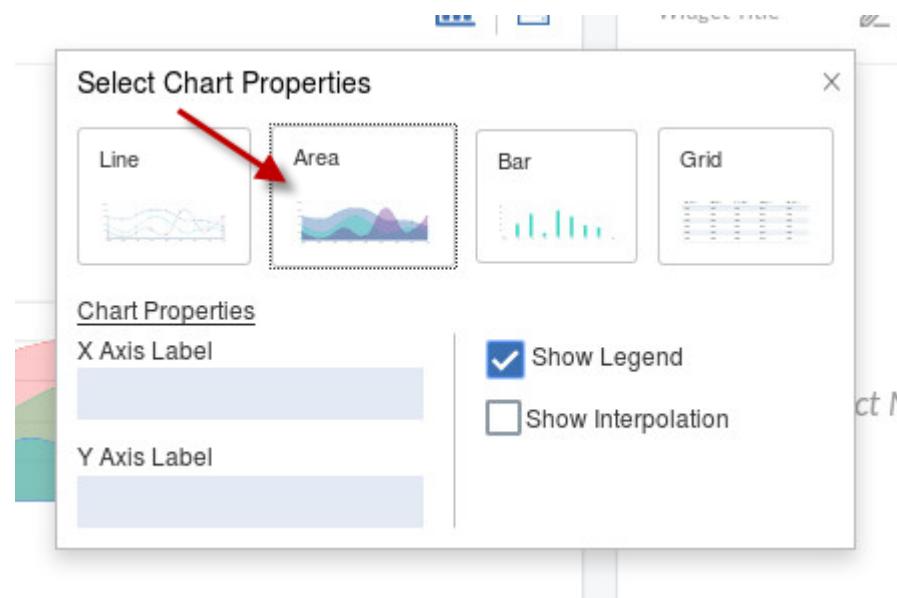
**LinuxOSInstanceView**

9. Click the **Select Chart Properties** icon on the widget on the left side.

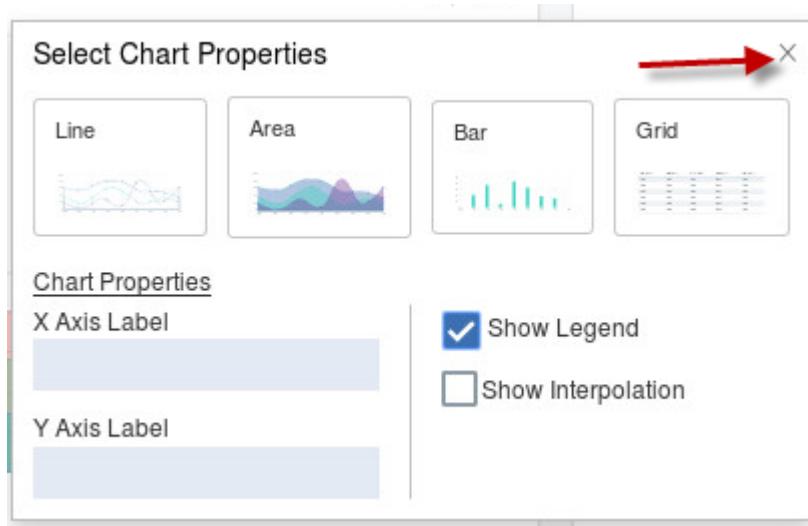
birdApp > Components > Linux OS >



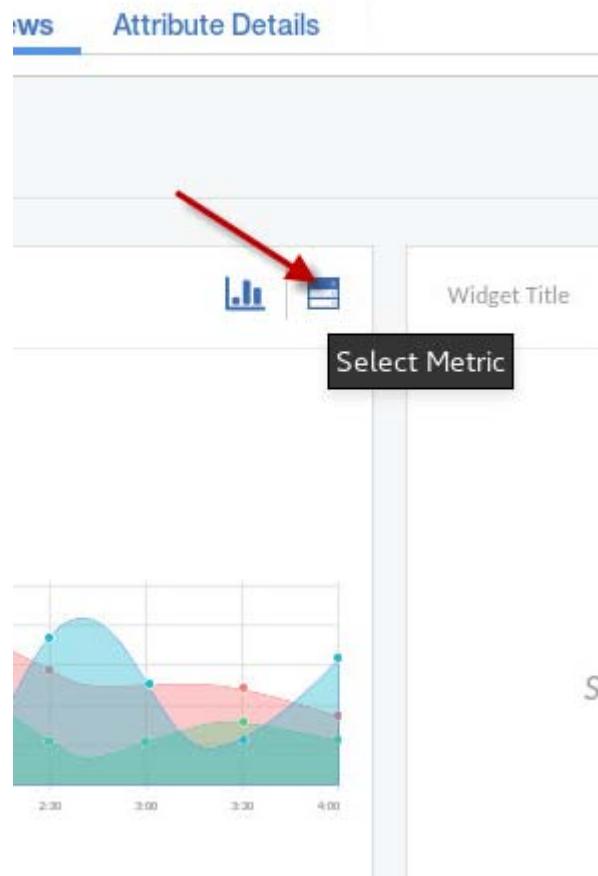
10. Select **Area**.



11. Select **Close**.



12. Click **Select Metric**.



13. Select the entries from this table:

Resource Type	Linux OS
Metric Type	KLZ_CPU
Metric	BusyCPU (Percent)
Resource Instance	*

14. Verify that the Metric settings match this screen capture, and click **Save**.

Select Metric

Resource Type	Metric Type	Metric	Resource Instance	Actions
▼ Linux OS	▼ KLZ_CPU	Busy CPU (Perce	*	▼  

Set Condition for Metric Group

WHERE CPU ID = \*

+ Add Another Metric



15. Click **Close**.

16. Update the widget on the right with these values.

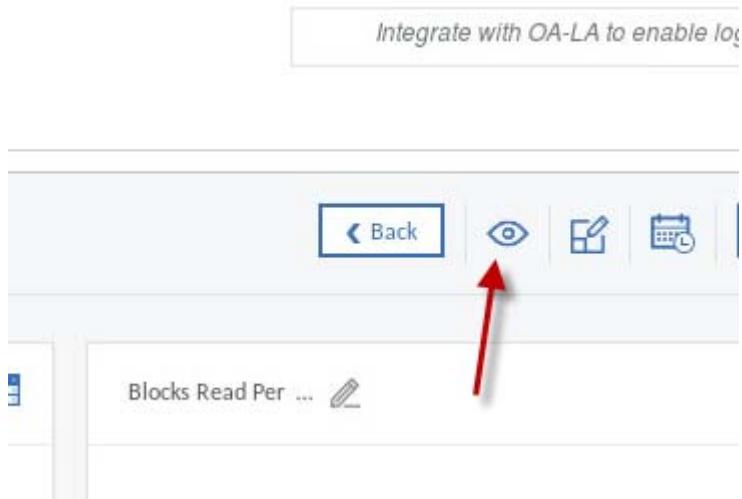
Chart Property	Line
Resource Type	Linux OS
Metric Type	KLZ_Disk_IO
Metric	Blocks Read Per Second
Resource Instance	*

17. Confirm that your Custom Page looks similar to this screen capture, and click **Save**.

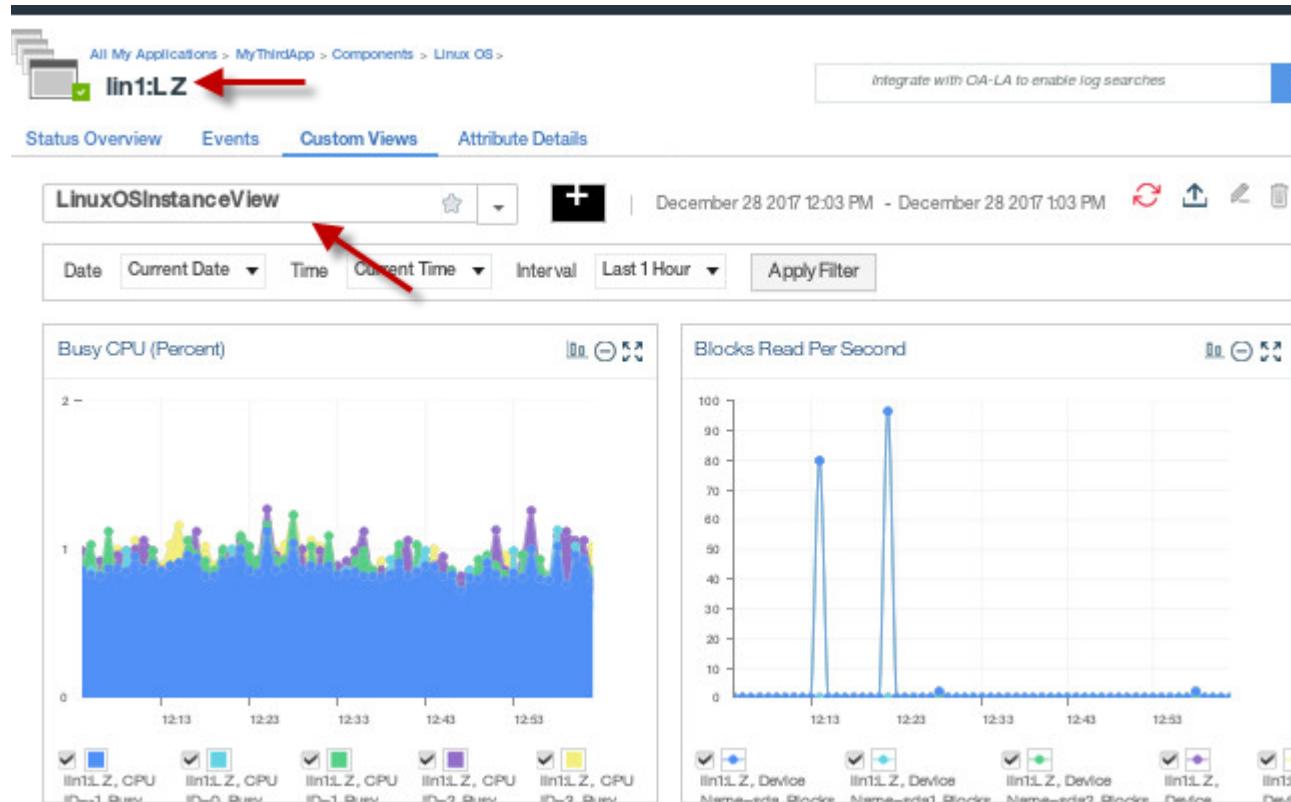


18. Click **OK**.

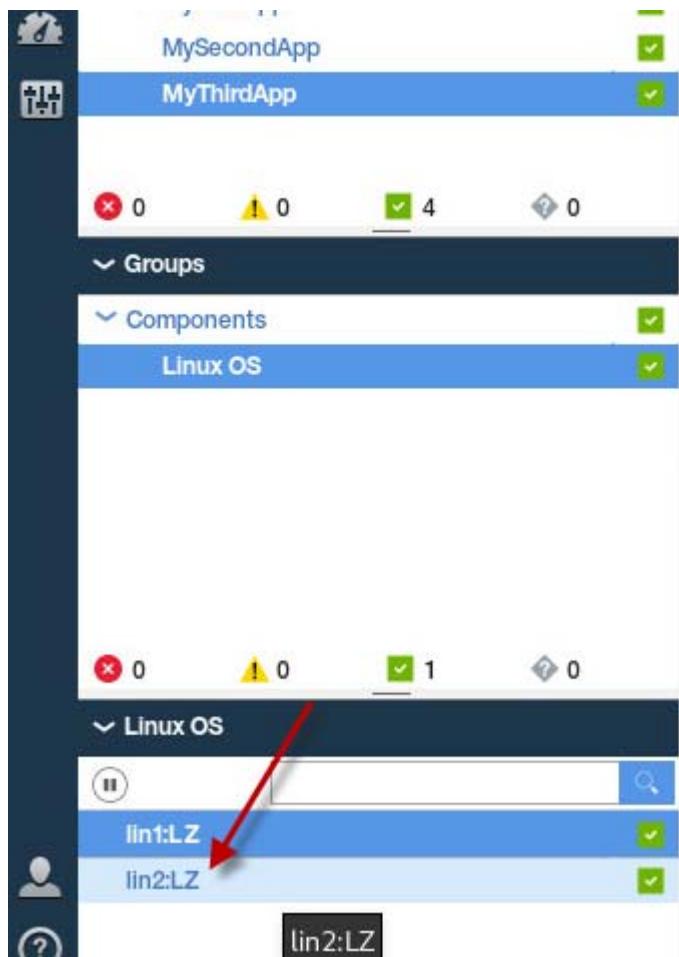
19. Click **View Dashboard**.



20. Observe the new custom view. Notice that the data that is collected and presented is for the Monitoring Agent for Linux OS that is running on **lin1:LZ**.

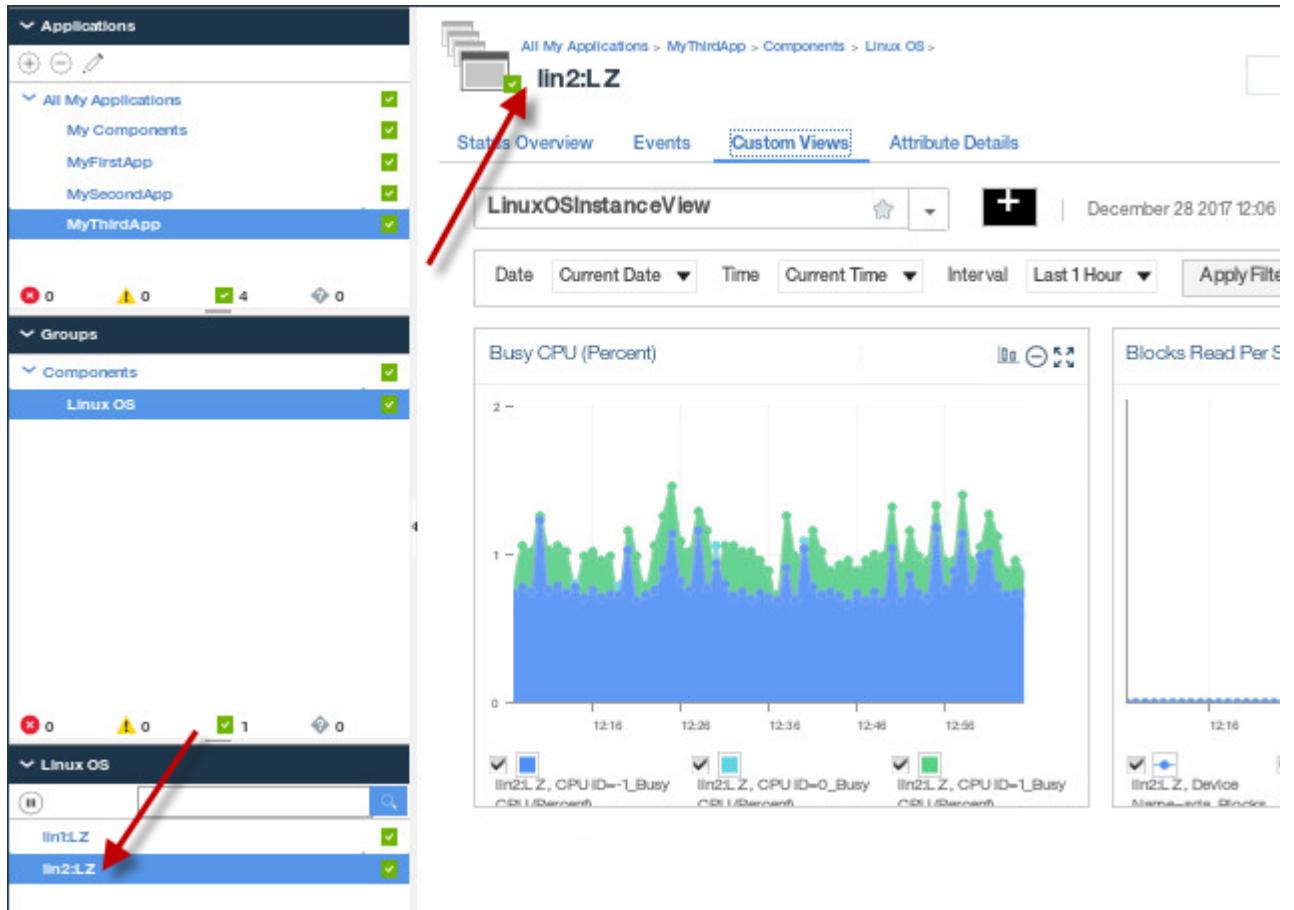


21. Select the **lin2:LZ** link under the Instances.

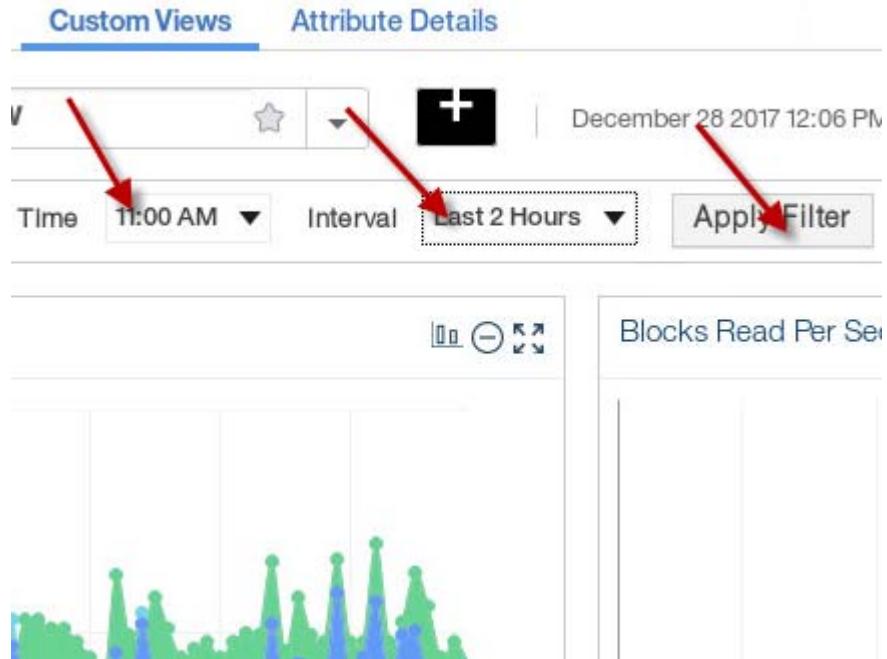


22. Select **Custom Views**.

23. Observe the new custom view. Notice that the data that is collected and presented is for the Monitoring Agent for Linux OS that is running on **lin2:LZ**.

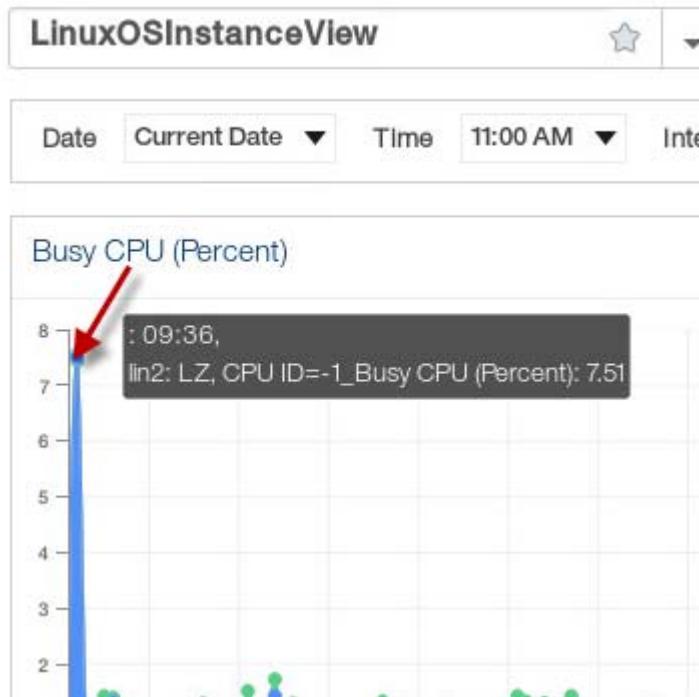


24. Adjust the filter from Current time to 2 hours ago, and the Interval to **2 hours**. Click **Apply Filter**.

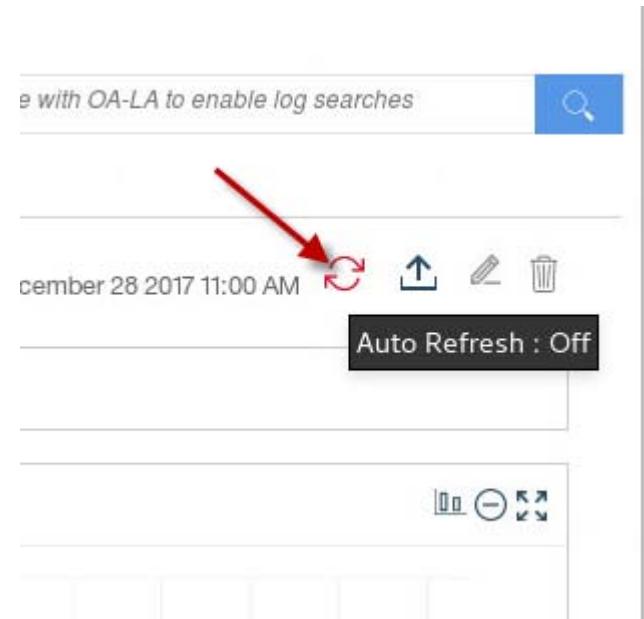


**Note:** The time when you run this exercise affects your current time. It might not be 11:00 AM.

25. Hover the mouse over a dot and observe the details that are presented.



26. Turn **Auto Refresh** on by selecting the icon that is indicated in the screen capture. Observe the color change from red to blue.



**Note:** You have created a custom view that is based on the instance selected.

# Exercise 5 Create an application-specific custom view

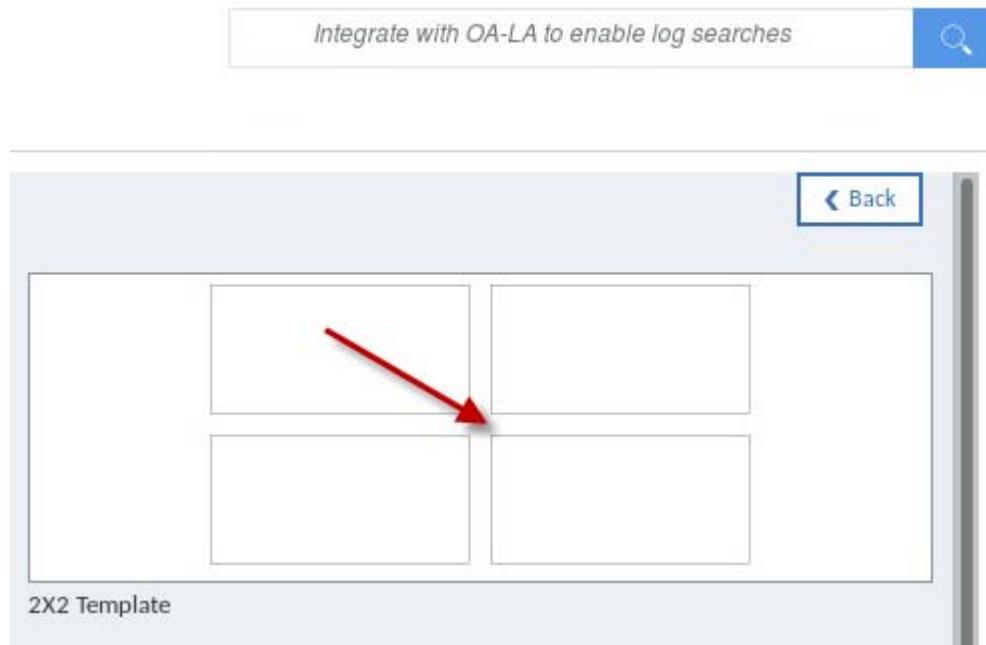
You can also create custom views at the application level. When created on a specific application, the custom views are visible only on that application and not on any other application. This exercise guides you through creating a custom view with multiple instances that are presented on a single chart.

1. Select the **MyThirdApp** application.

The screenshot shows the Application Dashboard interface. On the left, there's a sidebar with icons for Home, Applications, Groups, and Components. The 'Applications' section is expanded, showing a list of applications: All My Applications (My Components, MyFirstApp, MySecondApp, MyThirdApp), Groups, and Components. A red arrow points to the 'MyThirdApp' entry in the application list, which is highlighted with a blue background. To the right, the main content area displays the 'Status Overview' for 'MyThirdApp'. It includes a summary card with four status indicators: 0 errors (red), 0 warnings (yellow), 4 checks (green), and 0 events (grey). Below this, there are tabs for 'Status Overview' (which is selected) and 'Events', and a section titled 'Current Components Status' showing a value of 100.

2. Select **Custom Views**.

3. Select **2X2 Template**.



4. Update the widget on the upper left with these values. Save the settings.

Chart Property	Area
Resource Type	Linux OS
Metric Type	KLZ_CPU
Metric	Busy CPU (Percent)
Resource Instance	lin1:LZ

5. Verify that the Metric settings match the values in this screen capture. Save the settings.

The screenshot shows a "Select Metric" dialog box. The table has the following data:

Resource Type	Metric Type	Metric	Resource Instance	Actions
Linux OS	KLZ_CPU	Busy CPU (Percent)	lin1:LZ	

At the bottom of the dialog box, there is a link "+ Add Another Metric".

6. Update the widget on the upper right with these values. Save the settings.

Chart Property	<b>Area</b>
Resource Type	<b>Linux OS</b>
Metric Type	<b>KLZ_CPU</b>
Metric	<b>Busy CPU (Percent)</b>
Resource Instance	<b>lin2:LZ</b>

7. Verify that the Metric settings match the values in this screen capture. Save the settings.

Select Metric			
Resource Type	Metric Type	Metric	Resource Instance
Linux OS	KLZ_CPU	Busy CPU (Percent)	lin2:LZ

+ Add Another Metric

8. Scroll down, and update the widget on the lower left with these values. Save the settings.

Chart Property	<b>Line</b>
Resource Type	<b>Linux OS</b>
Metric Type	<b>KLZ_Disk_IO</b>
Metric	<b>Blocks Read Per Second</b>
Resource Instance	<b>lin1:LZ</b>

9. Verify that the Metric settings match the values in this screen capture. Save the settings.

Select Metric			
Resource Type	Metric Type	Metric	Resource Instance
▼ Linux OS ▾	KLZ_Disk_IO	Blocks Read Per	lin1:LZ

10. Update the widget on the lower right with these values. Save the settings.

Chart Property	Line
Resource Type	Linux OS
Metric Type	KLZ_Disk_IO
Metric	Blocks Read Per Second
Resource Instance	lin2:LZ

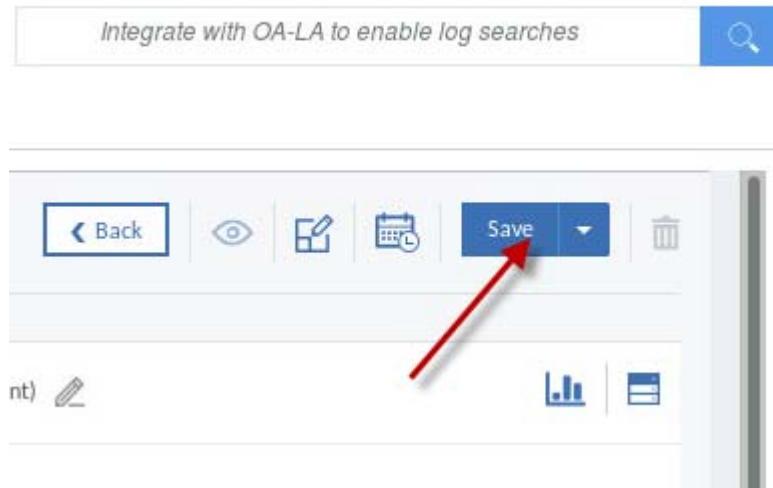
11. Verify that the Metric settings match the values in this screen capture. Save the settings.

The screenshot shows a 'Select Metric' interface with four dropdown menus. The first menu is 'Resource Type' set to 'Linux OS'. The second is 'Metric Type' set to 'KLZ\_Disk\_IO'. The third is 'Metric' set to 'Blocks Read Per Second'. The fourth is 'Resource Instance' set to 'lin2:LZ'.

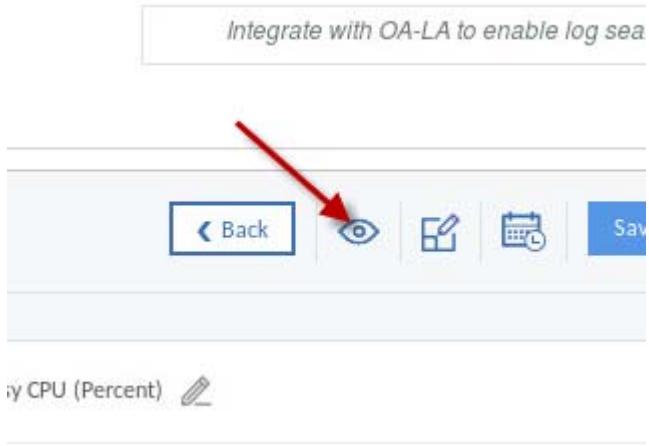
12. Scroll up, and enter **MyThirdAppCPUDiskIO** for the page name.

The screenshot shows an application dashboard with a navigation bar 'All My Applications > MyThirdApp'. Below it are three tabs: 'Status Overview', 'Events', and 'Custom Views', with 'Custom Views' being the active tab. In the main area, there is a search bar containing the text 'MyThirdAppCPUDiskIO' with a red arrow pointing to it. Below the search bar, there is a list item 'Busy CPU (Perce ...)' with an edit icon.

13. Click **Save** to save the custom page. Click **OK**.



14. Click **View Dashboard**.



15. Examine your new custom view. Observe that you are pulling data from two different systems and two different metric types.

16. Click **MyFirstApp**.

The screenshot shows the 'IBM Cloud Application...' dashboard. In the 'Applications' section, there is a list of applications: 'All My Applications', 'My Components', 'MyFirstApp' (with a red arrow pointing to it), 'MySecondApp', and 'MyThirdApp'. Each application has a green checkmark next to it. To the right of the list, there is a 'Stat' section.

17. Click **Custom Views**. Observe that you cannot access the Custom View that you created for MyThirdApp on this application.

18. Return to MyThirdApp. Click **Custom Views**.

19. Click **Add**.

The screenshot shows the 'MyThirdApp' custom view configuration page. At the top, there is a breadcrumb navigation: 'All My Applications > MyThirdApp'. Below the breadcrumb, there are tabs: 'Status Overview', 'Events', and 'Custom Views' (which is highlighted). In the main area, there is a search bar containing 'MyThirdAppCPUUDiskIO' and a '+' button. Below the search bar, there are filters for 'Date', 'Time', 'Interval', and 'Last 1 Hour'. At the bottom, there is a chart titled 'Busy CPU (Percent)'.

20. Create a 1 X 2 custom view with the following settings.

21. Update the widget on the left with these values.

Chart Property	<b>Area</b>
Resource Type	<b>Linux OS</b>
Metric Type	<b>KLZ_CPU</b>
Metric	<b>Busy CPU (Percent)</b>
Resource Instance	*

22. Update the widget on the right with these values.

Chart Property	<b>Line</b>
Resource Type	<b>Linux OS</b>
Metric Type	<b>KLZ_Disk_IO</b>
Metric	<b>Blocks Read Per Second</b>
Resource Instance	*

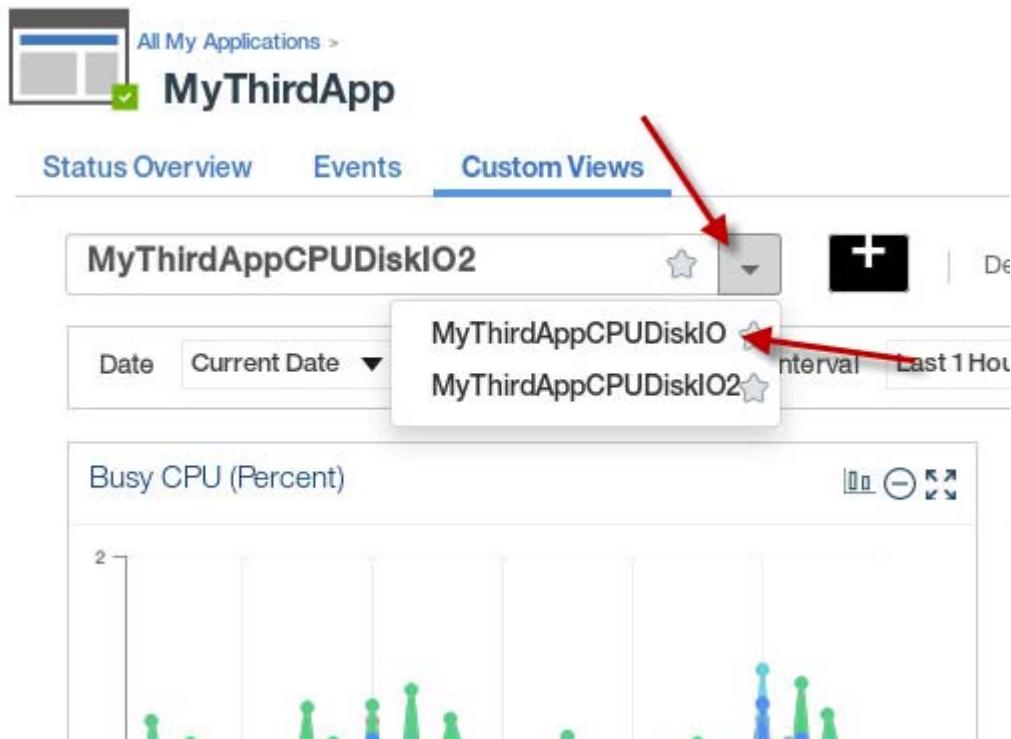
23. Update the page name to the value: **MyThirdAppCPUDiskIO2**

24. Save the custom page.

25. Verify that the page looks similar to this screen capture.



26. Observe how this custom view consolidates the same information that MyThirdAppCPUDiskIO did but uses two widgets.
27. Using the drop-down menu, switch back to **MyThirdAppCPUDiskIO**.



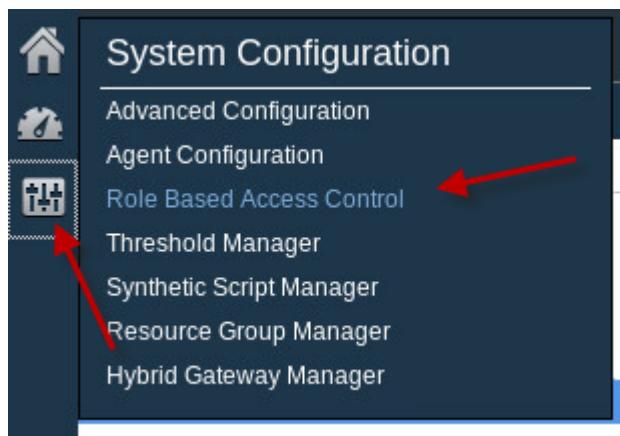
# Exercise 6 Manage user permissions in the Cloud APM console

Security in Cloud APM is based on roles. A role is a group of permissions that control the actions you can perform in Cloud APM. You can create customized roles in Cloud APM. You can assign users and user groups to existing default roles or to customized roles. You can assign permissions to customized roles, or you can assign more permissions to existing default roles. You can assign users and user groups to multiple roles. Permissions are cumulative. That is, user or user groups are assigned all the permissions for all their roles.

Cloud APM uses the WebSphere Application Server Liberty profile basic registry as the default method for user authentication. Alternatively, you can use an LDAP registry for user authentication.

This exercise guides you through updating the WebSphere Application Server Liberty profile basic registry to add users and groups, and assign roles and permissions to various users.

1. On the Firefox Browser on the APM virtual machine, click **System Configuration > Role Based Access Control**.



2. Click the **Roles** tab, and observe the four default roles. Review the descriptions.

The screenshot shows the 'Role Based Access Control' interface. At the top, there are three tabs: 'Roles' (which is selected and highlighted in blue), 'User Groups', and 'Individual Users'. Below the tabs, the word 'Role' is centered above a list of four options, each preceded by a radio button:

- Monitoring Administrator
- Monitoring User
- Role Administrator
- System Administrator

3. Click the **User Groups** tab, and observe that no user groups are defined.

The screenshot shows the 'Role Based Access Control' interface again, but this time the 'User Groups' tab is selected (highlighted in blue). A red arrow points to the 'User Groups' tab. Another red arrow points to the word 'User Groups' located below the tabs, indicating that no user groups have been defined.

- Click the **Individual Users** tab, and observe a single user, **apmadmin**.

The screenshot shows the 'Role Based Access Control' interface. At the top, there is a breadcrumb navigation: Home > Role Based Access Control. Below the title 'Role Based Access Control' and its subtitle 'Manage user access using roles.', there is a horizontal navigation bar with three tabs: 'Roles', 'User Groups', and 'Individual Users'. The 'Individual Users' tab is highlighted with a blue border and has a red arrow pointing to it from the right. Below the tabs, there is a section titled 'User' with a list of users. One user, 'apmadmin', is listed with a small circular icon next to it. A red arrow points to the 'apmadmin' entry.

- Open a terminal window on the APM virtual machine.
- Change to the `/opt/ibm/wlp/usr/shared/config` folder and list the contents.

```
root@apm:/opt/ibm/wlp/usr/shared/config
File Edit View Search Terminal Help
[root@apm ~]# cd /opt/ibm/wlp/usr/shared/config/
[root@apm config]# ls
basicRegistry.xml      oauthVariables-onprem.xml
clientSecrets.xml     oauthVariables-saas.xml
commonRegistry.xml    serverVariables.xml
isam                  synthetics.properties
ldapRegistry.xml
[root@apm config]#
```

To create users and groups, you must add them to the `basicRegistry.xml` file and restart the Liberty server component.

- Make a backup of the `basicRegistry.xml` file and name the backup: `basicRegistry.xml.orig`
- Display the contents of the file `basicRegistry.xml` in the gedit editor.

Notice that one user ID is defined, for **apmadmin**, and that the password is encrypted.

```

Open   
basicRegistry.xml
/opt/ibm/wlp/usr/shared/config
<server>
    <basicRegistry id="basic" realm="customRealm">
        <user id="apmadmin" name="apmadmin" password="{aes}A0tG1YVB0vW0RWMI/wwOojM+QT0RRW9zG69GBgrANTqk"/>
    </basicRegistry>
</server>

```

- In another terminal window, display the contents of the provided **basicRegistry.xml** file in the **/downloads** directory by using the gedit editor.

```

root@apm:/downloads
File Edit View Search Terminal Help
[root@apm ~]# cd /downloads/
[root@apm downloads]# gedit basicRegistry.xml

```

- Observe the seven users and five groups that are defined, and that the users are added to appropriate groups. Observe that the password string is different from the password string in [Step 8](#) on page 4-42.

```

<server>
    <basicRegistry id="basic" realm="customRealm">
        <user id="apmadmin" name="apmadmin" password="{aes}ACNxd7s221DSr+BLjUVmWFUTSDgJ5HVd08+J9Sy8Pl7b"/>
        <user id="apmadmin1" name="apmadmin1" password="{aes}ACNxd7s221DSr+BLjUVmWFUTSDgJ5HVdQ8+J9Sy8Pl7b"/>
        <user id="apmadmin2" name="apmadmin2" password="{aes}ACNxd7s221DSr+BLjUVmWFUTSDgJ5HVdQ8+J9Sy8Pl7b"/>
        <user id="apmuser1" name="apmuser1" password="{aes}ACNxd7s221DSr+BLjUVmWFUTSDgJ5HVdQ8+J9Sy8Pl7b"/>
        <user id="apmuser2" name="apmuser2" password="{aes}ACNxd7s221DSr+BLjUVmWFUTSDgJ5HVdQ8+J9Sy8Pl7b"/>
        <user id="apmuser3" name="apmuser3" password="{aes}ACNxd7s221DSr+BLjUVmWFUTSDgJ5HVdQ8+J9Sy8Pl7b"/>
        <user id="apmuser4" name="apmuser4" password="{aes}ACNxd7s221DSr+BLjUVmWFUTSDgJ5HVdQ8+J9Sy8Pl7b"/>
        <group name="admins">
            <member name="apmadmin" />
        </group>
        <group name="admins1">
            <member name="apmadmin1" />
            <member name="apmadmin" />
        </group>
        <group name="admins2">
            <member name="apmadmin2" />
            <member name="apmadmin" />
        </group>
        <group name="users12">
            <member name="apmuser1" />
            <member name="apmuser2" />
        </group>
        <group name="users34">
            <member name="apmuser3" />
            <member name="apmuser4" />
        </group>
    </basicRegistry>
</server>

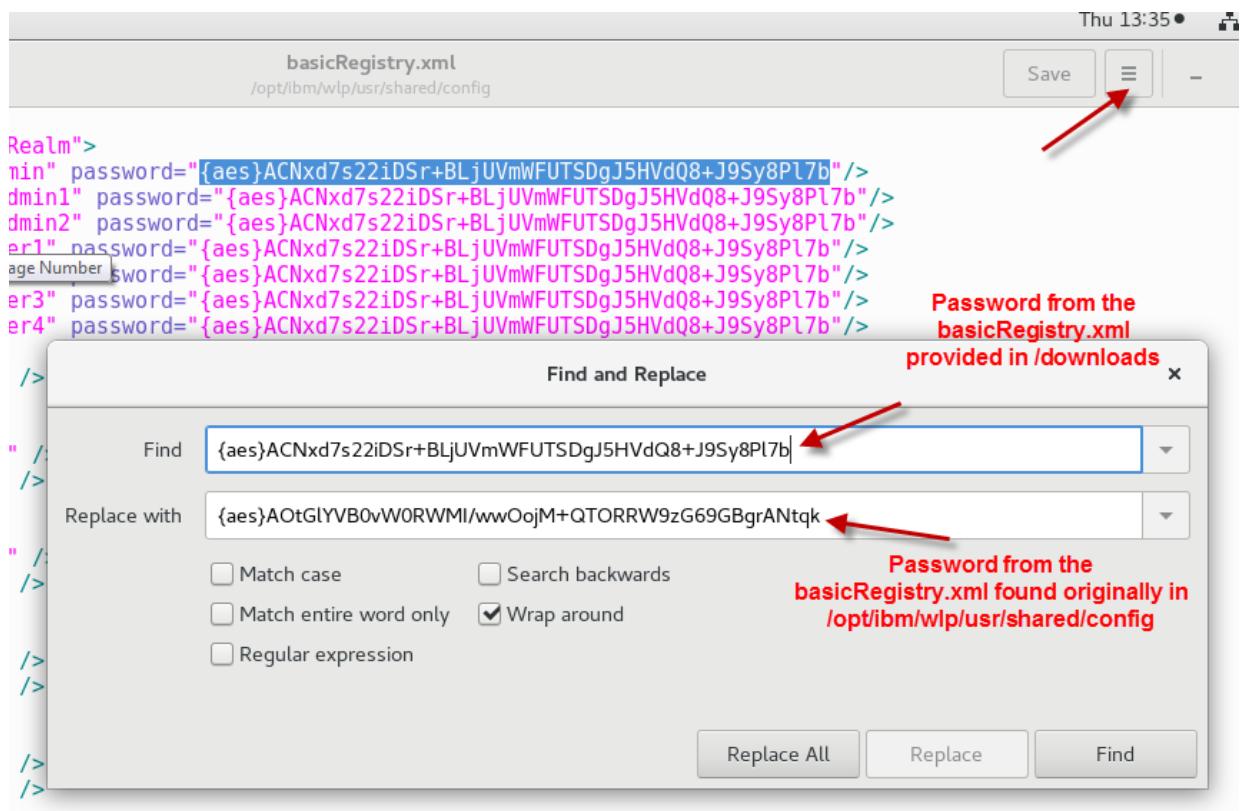
```

- From the **basicRegistry.html** file in **/opt/ibm/wlp/usr/shared/config** folder, copy the password string into your clipboard (everything in between the double quotation marks).
- Close the gedit editor.

13. Copy the `basicRegistry.xml` file from the `/downloads` folder to the `/opt/ibm/wlp/usr/shared/config` folder.

```
root@apm:/opt/ibm/wlp/usr/shared/config
File Edit View Search Terminal Help
[root@apm ~]# cd /opt/ibm/wlp/usr/shared/config/
[root@apm config]# gedit basicRegistry.xml
[root@apm config]# cp basicRegistry.xml basicRegistry.xml.orig
[root@apm config]# cp /downloads/basicRegistry.xml .
cp: overwrite './basicRegistry.xml'? y
[root@apm config]#
```

14. Edit the new `basicRegistry.xml` file and update all the passwords to be the password string from your clipboard. Save the file.



15. From a terminal window, run the `apm status` command to list the status of all the components of the Cloud APM server.

```
apm status
```

```
[root@apm config]# apm status
Service db2 is started (PID 112297).
Service ksy is started (PID 94038).
Service kafka is started (PID 71445).
Service spark is started (PID 89268).
Service txagent is started (PID 9478).
Service mongodb is started (PID 97804).
Service scr is started (PID 98172).
Service oidc is started (PID 98583).
Service server1 is started (PID 26270).
Service min is started (PID 100264).
Service apmui is started (PID 78918).
Service oslc is started (PID 38546).
Service dqe is started (PID 122239).
Service uviews is started (PID 15545).
Service biagent is started (PID 125769).
Service soagent is started (PID 1174).
[root@apm config]#
```



**Note:** This display validates that all services are up and operational before restarting server1.

16. Stop the Liberty server (server1). This command takes approximately 2 minutes.

```
apm stop server1
```

```
Service soagent is started (PID 1174).
[root@apm config]# apm stop server1
Stopping service server1 (PID 26270).
Service server1 is stopped.
[root@apm config]#
```

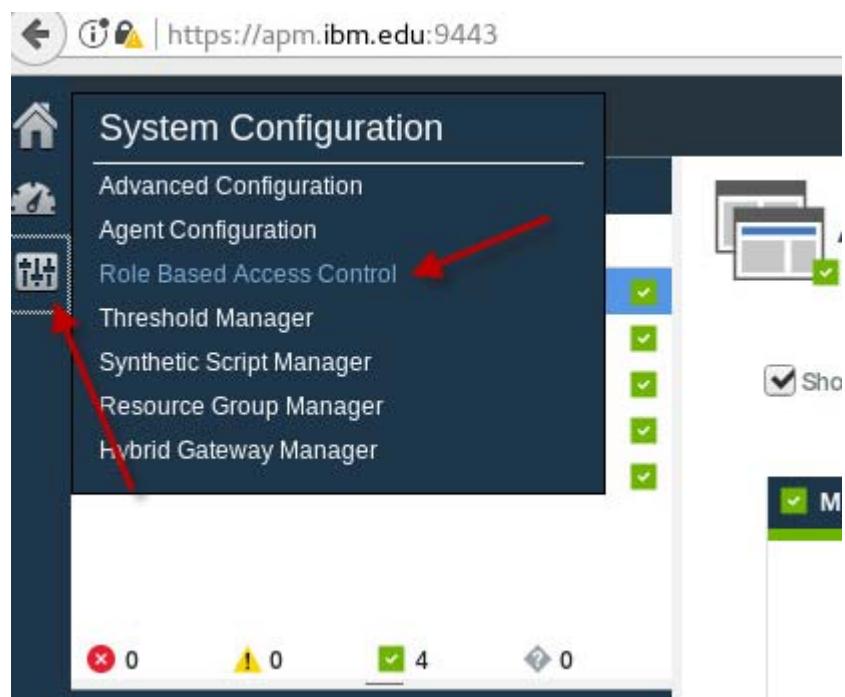
17. Restart the Liberty server. This command takes approximately 4 minutes.

```
apm start server1
```

```
Stopping service server1 (PID 26270).  
Service server1 is stopped  
[root@apm config]# apm start server1  
Starting service server1  
.....  
Service server1 is started (PID 81186).  
[root@apm config]#
```

18. Close the Firefox browser.

19. Return to the Cloud APM console and log in. Click **System Configuration > Role Based Access Control**.



20. Observe the contents of the **User Groups** tab and the **Individual Users** tab and see how they match up with the contents of the updated `basicRegistry.xml` file.

The screenshot shows the 'Role Based Access Control' page. At the top, there are three icons: a house, a gear, and a person. Below them is the title 'Role Based Access Control' and the subtitle 'Manage user access using roles.' On the left, there is a sidebar with 'Roles' and 'User Groups' tabs, where 'User Groups' is highlighted with a red arrow pointing to it. To the right, under 'User Groups', there is a list of five entries: 'admins', 'admins1', 'admins2', 'users12', and 'users34'. The 'admins1' entry is highlighted with a light gray background.

User Group
admins
admins1
admins2
users12
users34

## Impact of roles on user IDs

The remaining steps for this exercise guide you through accessing the Cloud APM console with different user IDs and seeing the impact on what your user ID can see and do. You update the roles from the `apmadmin` user ID on the APM VM. You test various user IDs on the LIN1 VM.

21. Log in to the Cloud APM console with the `apmadmin1` user ID on the LIN1 VM:

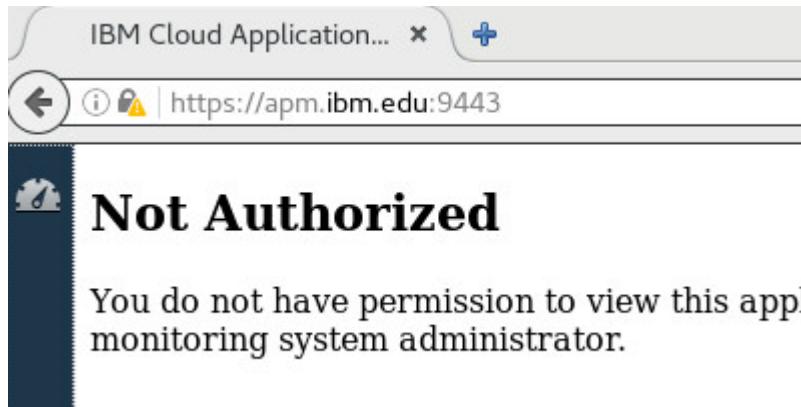
- On the LIN1 VM, open the Firefox browser to this URL:

`https://apm.ibm.edu:9443`

Accept the certificates as you did the first time you logged in from the APM VM per the instructions on [Step 20](#) on page 2-7 to [Step 22](#) on page 2-8.

- Instead of using the `apmadmin` login, use `apmadmin1` to log in, with a password of `object00`.

This screen capture shows the expected result:



This Not Authorized message opens because even though `apmadmin1` is a valid user, the user does not have any permissions or roles in the Cloud APM server.

22. On the APM VM, in Firefox return to the Cloud APM console. Click **System Configuration > Role Based Access Control**, and select **Individual Users**.

23. Select **apmadmin1**, and click the Edit icon (the pencil icon in the upper right):

The screenshot shows the 'Role Based Access Control' interface. At the top, there are three navigation icons: a house, a gear, and a person. To the right of these is the breadcrumb trail: Home > Role Based Access Control. Below the trail is the title 'Role Based Access Control' and the subtitle 'Manage user access using roles.' On the left, there are three tabs: 'Roles', 'User Groups', and 'Individual Users'. The 'Individual Users' tab is selected, indicated by a blue underline and a blue horizontal bar above the list. The list is titled 'User' and contains the following items:

- apmadmin
- apmadmin1
- apmadmin2
- apmuser1
- apmuser2
- apmuser3
- apmuser4

24. Observe that **apmadmin1** currently has no roles. Select the roles **Monitoring Administrator** and **Role Administrator**.

[Home](#) > [Role Based Access Control](#) > [Individual User Editor](#)

## Individual User Editor

Use the Individual User Editor to quickly edit the roles a user belongs to.

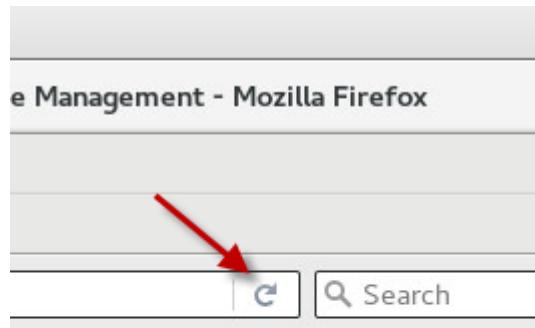
apmadmin1 (apmadmin1): admins1

### Roles

Role	Description
<input checked="" type="checkbox"/> Monitoring Administrator	Users whose primary job function is systems. Performs tasks such as adding groups of resources, and dis
<input type="checkbox"/> Monitoring User	Users whose primary job function is systems that are monitored by Perf
<input checked="" type="checkbox"/> Role Administrator	Users whose primary job function is Management. This role has all perm
<input type="checkbox"/> System Administrator	Users whose primary job function is Management system. Performs tasks such as configuring the Hybrid Gateway.

25. Scroll down and click **Save**. Click **Close**.

26. Return to the Firefox browser on the LIN1 VM. Click the Refresh icon in the browser.

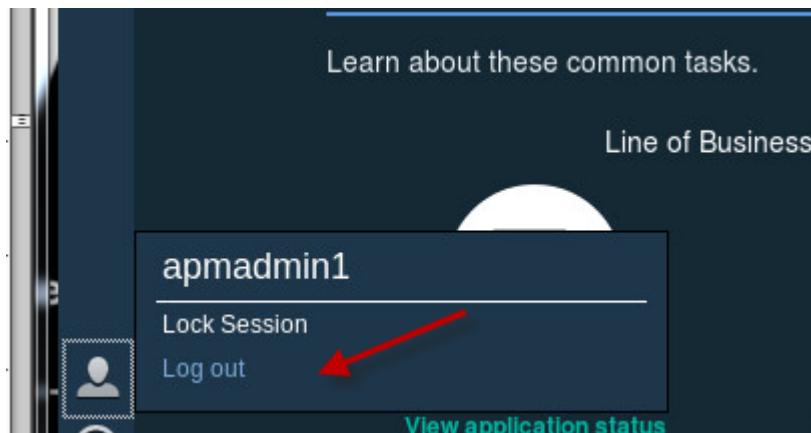


application, please send the URL

27. Confirm that the `apmadmin1` user ID has the rights to be a Monitoring Administrator and a Role Administrator.

The screenshot shows a Firefox browser window with the title "IBM Cloud Application..." and the URL "https://apm.ibm.edu:9443". A blue banner at the top says "Firefox prevented this site from opening a pop-up window". The main content area has a dark blue header with the text "System Configuration". Below the header is a list of management modules: Advanced Configuration, Agent Configuration, Role Based Access Control, Threshold Manager, Synthetic Script Manager, Resource Group Manager, and Hybrid Gateway Manager. A red arrow points to the "Role Based Access Control" link. To the left of the menu items, there is a sidebar with icons for Home, Agent, and Threshold Manager.

28. On the LIN1 VM, log out of the user **apmadmin1**.



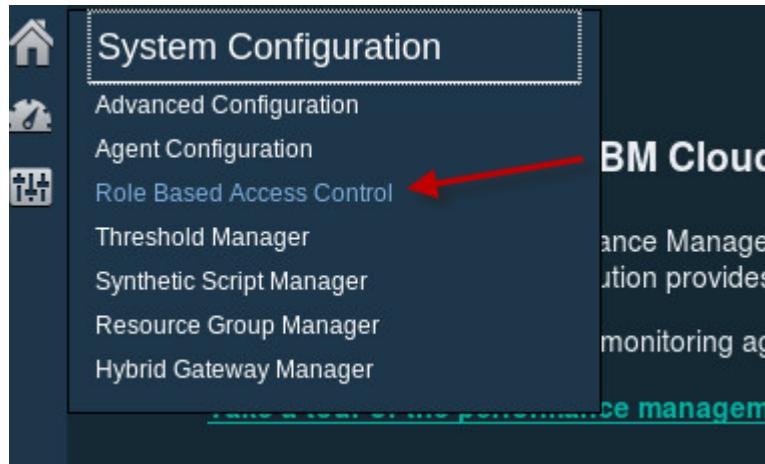
29. On the APM VM in Firefox, return to the Cloud APM console. Click **System Configuration > Role Based Access Control**, and select **User Groups**.
30. Select the **admins2** group, and select the Edit icon. This group has two users, **apmadmin** and **apmadmin2**, although you cannot see them in the User Group Editor.
31. Give this group access to all roles, and click **Save**. Click **Close**.

## Roles

Role	Description
<input checked="" type="checkbox"/> Monitoring Administrator	Users whose systems. Per adding group:
<input checked="" type="checkbox"/> Monitoring User	Users whose systems that
<input checked="" type="checkbox"/> Role Administrator	Users whose Management.
<input checked="" type="checkbox"/> System Administrator	Users whose Management configuring th

32. Log in with the **apmadmin2** user ID on the LIN1 VM:
- On the LIN1 VM, open the Firefox browser to this URL:  
<https://apm.ibm.edu:9443>
  - Instead of using the **apmadmin1** login, use **apmadmin2** to log in, with a password of **object00**.
- The user ID **apmadmin2** has all the same rights as the **apmadmin** user ID.

33. Confirm that the `apmadmin2` user ID has the rights to be a Monitoring Administrator and a Role Administrator.



34. Log out of the `apmadmin2` user ID.

35. From the APM VM Firefox browser, assign the user ID `apmuser1` only the Monitoring User role.

## Roles

Role	
<input type="checkbox"/> Monitoring Administrator	
<input checked="" type="checkbox"/> Monitoring User	
<input type="checkbox"/> Role Administrator	
<input type="checkbox"/> System Administrator	

36. Click **Save**. Click **Close**.

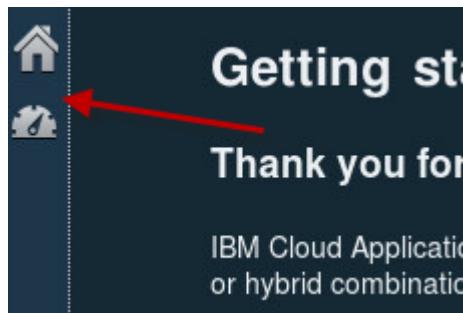
37. Log in with the `apmuser1` user ID on the LIN1 VM:

- a. On the LIN1 VM, open the Firefox browser to the URL

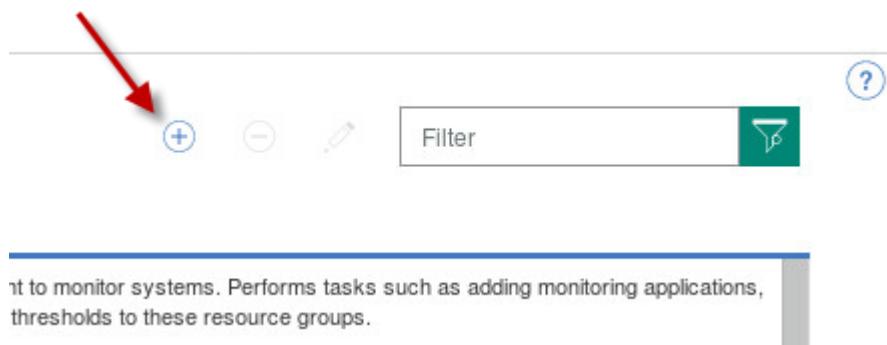
`https://apm.ibm.edu:9443`

- b. Instead of using the `apmadmin2` login, use `apmuser1` to log in, with a password of `object00`.

From the **apmuser1** login, observe that two icons are missing, which you saw in prior examples. The System Configuration and Reporting icons are removed. This user does not have the role to run reports or update the advanced settings.



38. Log out of the **apmuser1** user ID.
39. On the APM VM in Firefox, return to the Cloud APM console. Click **System Configuration > Role Based Access Control**, and click **Roles**.
40. Click the plus (+) sign to create a new role.



41. Enter **Operating System User** for the role name. For the role description, enter **Users whose primary job function is to monitor Operating Systems**. Click the **users34** user group.



**Note:** The users34 user group has two members, **apmuser3** and **apmuser4**.

The screenshot shows the 'Role Editor' interface. At the top, the navigation path is 'Home > Role Based Access Control > Role Editor'. The main title is 'Role Editor' with the subtitle 'Use the Role Editor to assign users, user groups, and permissions to roles.' Below this, there is a 'Role Name\*' input field containing 'Operating System User', with a red arrow pointing to it. To the right of the input field is a vertical toolbar with buttons for 'Assign Users to Role' and 'Assign Permissions to Role'. On the left, there is a sidebar with the same two buttons. In the center, there are two tabs: 'User Groups' (which is selected) and 'Individual Users'. Below the tabs, there is a 'Filter for user groups.' input field. Under the 'User Groups' tab, there is a list of groups: 'users12' (unchecked), 'users34' (checked, highlighted in blue with a red arrow pointing to it), and 'admins2' (unchecked). To the right of the 'User Groups' list, there is a section titled 'Select the users and user groups you want to assign to this role'.

42. Click **Assign Permissions to Role**, and click the **Resource Permission** tab.  
43. Check the View check box to the right of **Application Performance Dashboard**.

44. Expand **Applications**, and check the view check box to the right of **MyFirstApp**. Scroll down and click **Save**.

The screenshot shows the 'Resource Permissions' tab selected in the top navigation bar. Under the 'Permissions' section, there is a list of applications: Application Performance Dashboard, Applications, MyFirstApp, MySecondApp, MyThirdApp, and Diagnostics Dashboard. To the right of each application name is a checkbox labeled 'View'. Red arrows point to the 'View' checkboxes for both 'MyFirstApp' and 'MySecondApp', indicating they are checked.

Application	View
Application Performance Dashboard	<input checked="" type="checkbox"/>
Applications	<input type="checkbox"/>
MyFirstApp	<input checked="" type="checkbox"/>
MySecondApp	<input checked="" type="checkbox"/>
MyThirdApp	<input type="checkbox"/>
Diagnostics Dashboard	<input type="checkbox"/>

45. Log in with the `apmuser3` user ID on the LIN1 VM:

- a. On the LIN1 VM, from a Firefox browser go to this URL:

<https://apm.ibm.edu:9443>

- b. Instead of using the `apmuser1` login, use `apmuser3` to log in, with a password of `object00`.

46. Observe that you can now see the **MyFirstApp** application, but not the **MySecondApp** or the **MyThirdApp** application.

The screenshot shows the 'Application Dashboard' with a dark header bar. Below it, under the 'Applications' section, there is a list titled 'All My Applications'. It contains two items: 'My Components' and 'MyFirstApp', each with a green checkmark to its right. A red arrow points to the 'MyFirstApp' entry.

- My Components
- MyFirstApp

47. Explore the My components folder. Observe that you cannot see the Monitoring Agent for Linux OS installed on LIN2.

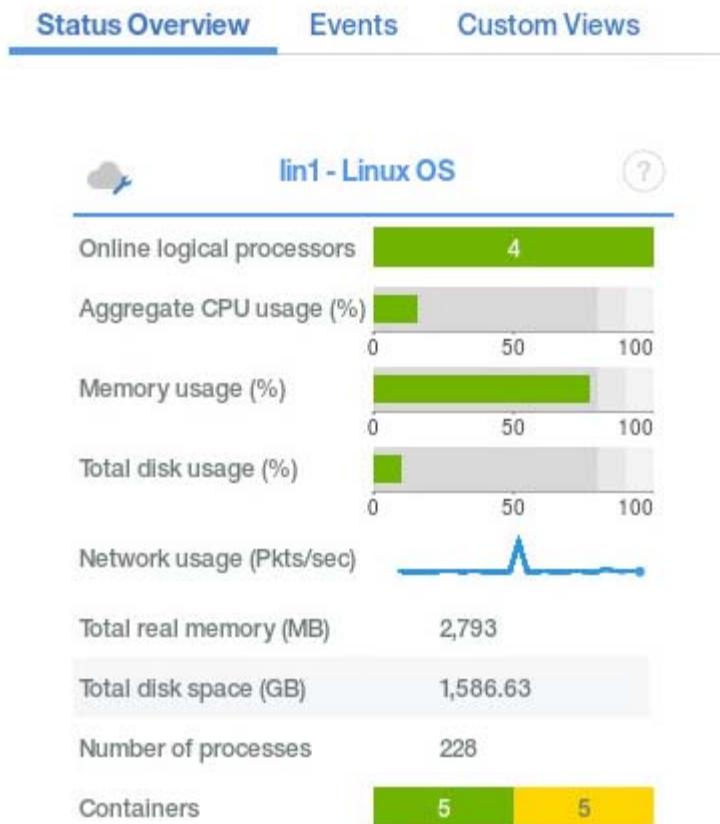
48. Log out of the `apmuser3` user ID,

# Exercise 7 Attribute details

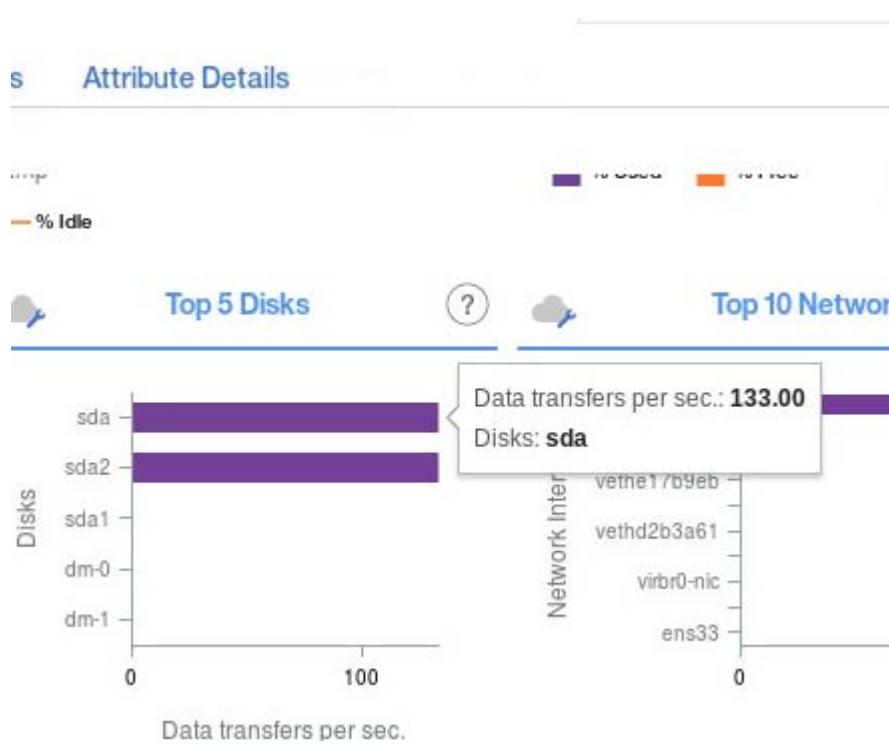
When the data that you are investigating is not found in the widget of an agent, but the agent is collecting the data, you can view the data from the **Attribute Details** tab. This exercise guides you through the process of displaying data that an agent collects that is not displayed in a widget.

For this scenario, assume that you are trying to justify a new, faster, disk drive for the LIN1 server. You were requested to get the metrics for the average service time from the Linux OS agent data set KLZIOEXT, attribute name AVGSVCTM, which is read from `/proc/diskstats` (2.6 kernel) or `/proc/partitions` (2.4 kernel).

1. On the APM VM, log in to the Cloud APM console, unless you are already logged in with a user ID of `apmadmin` and a password of `object00`.
2. Locate the summary widget for the Monitoring Agent for Linux OS that is running on the LIN1 server. Click the summary widget.

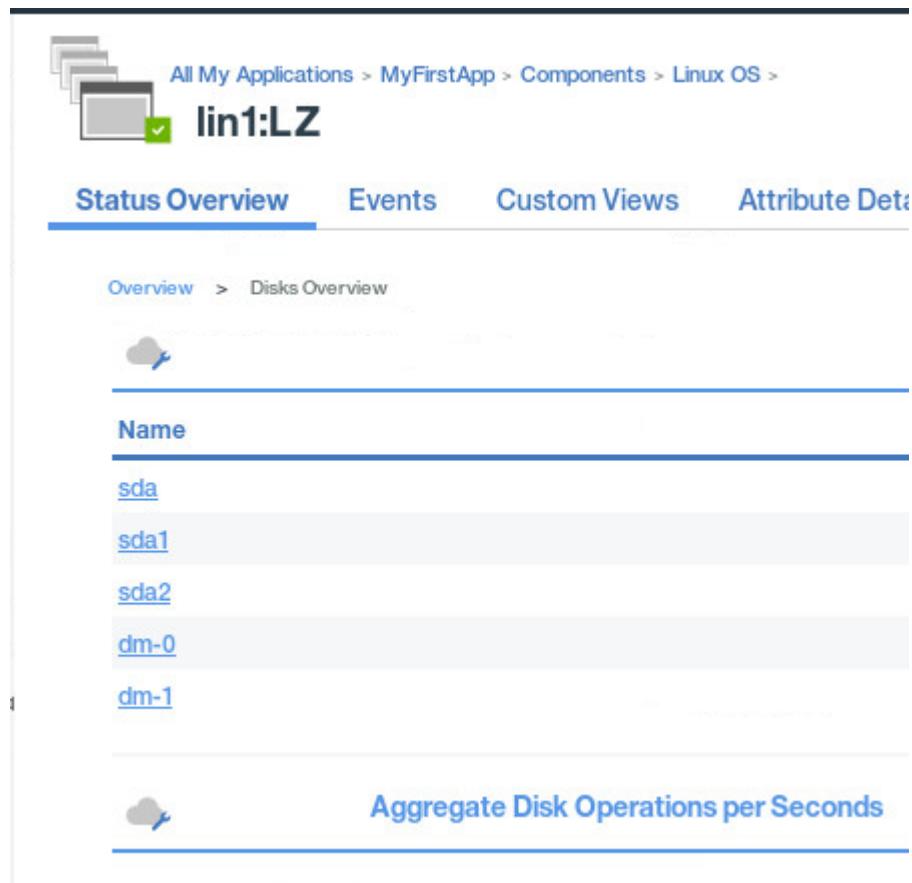


3. Hover the mouse over the **sda** disk in the Top 5 Disks widget.



Look at the data presented. The data shows the data transfers per second at the current time, but it does not display the metric that you require to justify your new disk.

4. Click the Top 5 Disks widget.



Data is provided on blocks read, blocks written, and disk usage per second, but the key metric that you need is not shown. To find this metric, you use the **Attribute Details** tab.

5. Click **Attribute Details**.

The screenshot shows a web-based monitoring application. At the top, there's a navigation bar with icons for servers and a path: All My Applications > MyFirstApp > Components > Linux OS > lin1:LZ. Below the path, there are tabs: Status Overview (which is underlined in blue), Events, Custom Views, and Attribute Details. A red arrow points to the Attribute Details tab. Underneath the tabs, there's a breadcrumb navigation: Overview > Disks Overview. On the left, there's a small icon of a cloud with a lightning bolt. The main content area is titled 'Name' and lists several disk entries: sda, sda1, sda2, dm-0, and dm-1.

6. Enter the title: **Average Service time (ms)**

Select the type **Historical**. Select **Line Chart**. Select the data set **KLZ\_IO\_Ext** and the attribute **Average Service time (ms)**.

Status Overview    Events    Custom Views    **Attribute Details**

Enter title:

Choose a type:  Real time  Historical

Choose a chart or table:  

\* Choose the metrics:



Data Set		Attributes
<input type="radio"/>	KLZ_Docker_Network	<input type="checkbox"/> Average Request
<input type="radio"/>	KLZ_Docker_Processes	<input checked="" type="checkbox"/> Average Service
<input type="radio"/>	KLZ_Docker_Stat	<input type="checkbox"/> Device Name
<input type="radio"/>	KLZ_Docker_Version	<input type="checkbox"/> System Name
<input checked="" type="radio"/>	<b>KLZ_IO_Ext</b>	<input type="checkbox"/> Time Stamp
<input type="radio"/>	Klz_LFAProfiles	<input type="checkbox"/> WRITETIME
<input type="radio"/>		

7. Click Preview Results.



The chart shows the results for the past 4 hours.

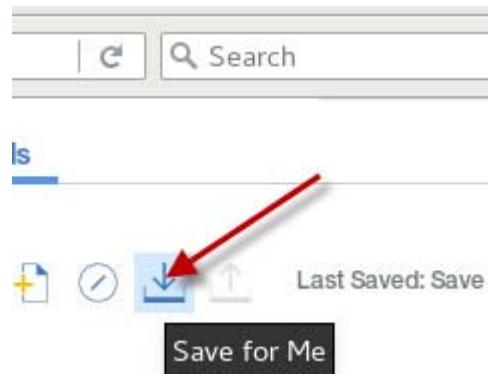


8. Change the time to the last 2 hours by selecting **Last 4 hours** in the upper right, and selecting **2 hours**.



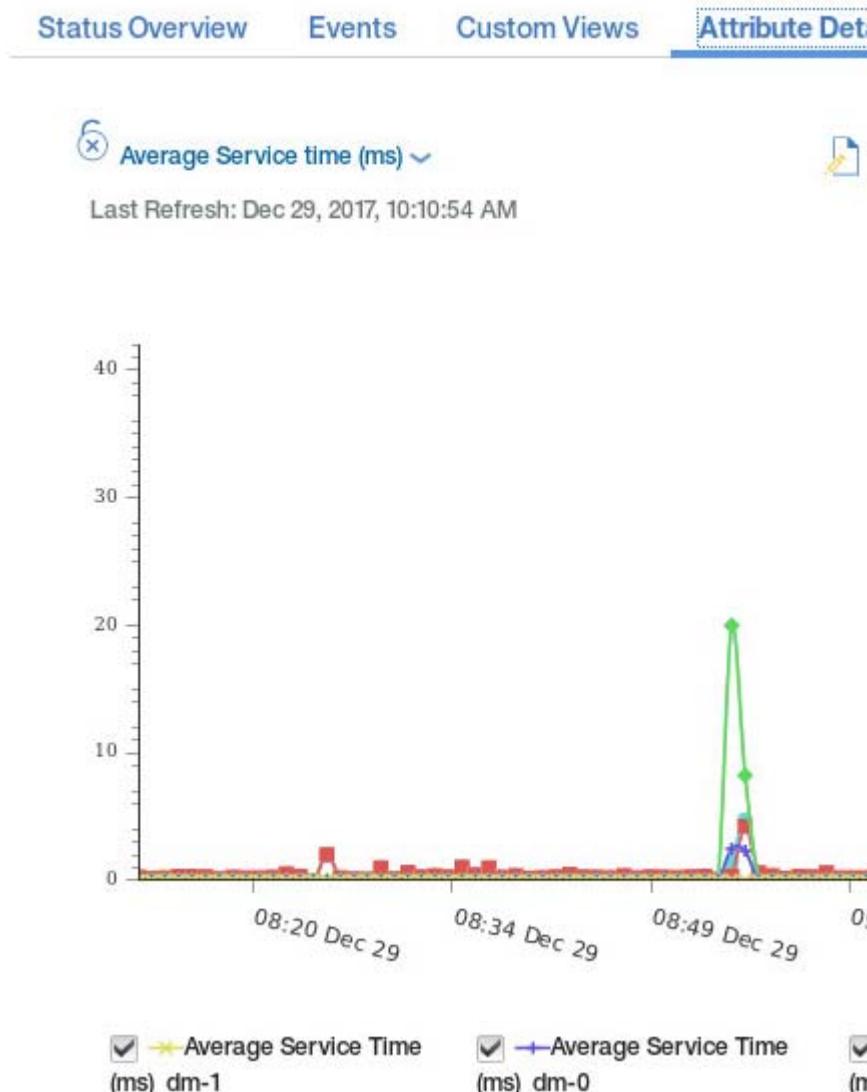
You can save this chart.

9. Click the **Save for Me** icon.



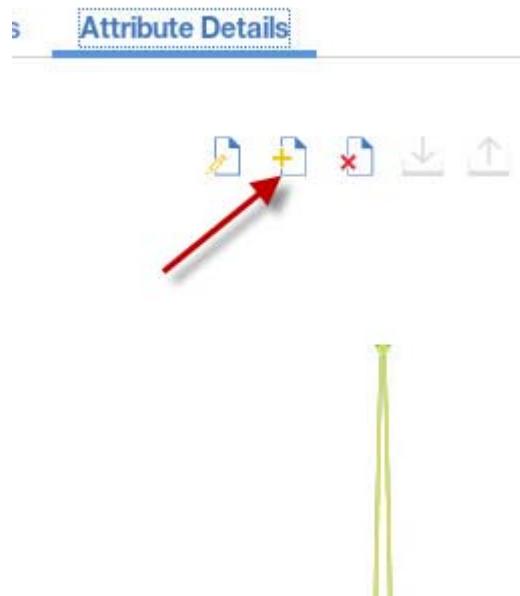
10. Click the **Status Overview** tab.

11. Click the **Attribute Details** tab. Observe that the chart is presented without going through the steps that were required before.



You can also share charts with other users.

12. Click New.



13. Enter a title of: **Average Service time (ms)**

Click **Historical** and **Line Chart**. Click the data set **KLZ\_IO\_Ext** and the attribute **Average Service time (ms)**.

14. Click **Preview Results**.

15. Click **Save to Share**.

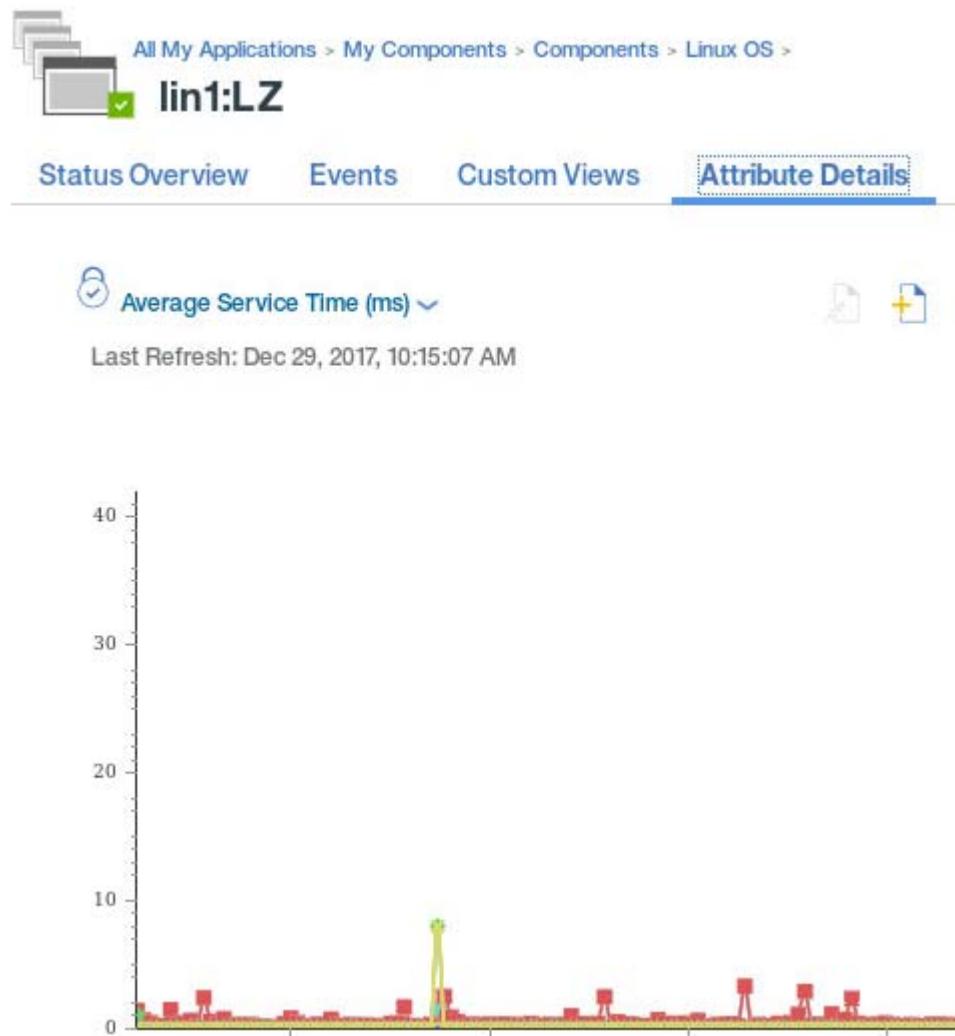


16. On LIN1 VM, open the Firefox browser to this URL:

<https://apm.ibm.edu:9443>

17. Use **apmuser3** to log in, with a password of **object00**.

18. Navigate to the **Attribute Details** tab of the Monitoring Agent for Linux OS on the LIN1 server, and observe the shared chart.



# Exercise 8 Configure LDAP to work with Cloud APM (optional)

As you learned in [Exercise 6, “Manage user permissions in the Cloud APM console,”](#) on page 4-40, security in Cloud APM is based on roles.

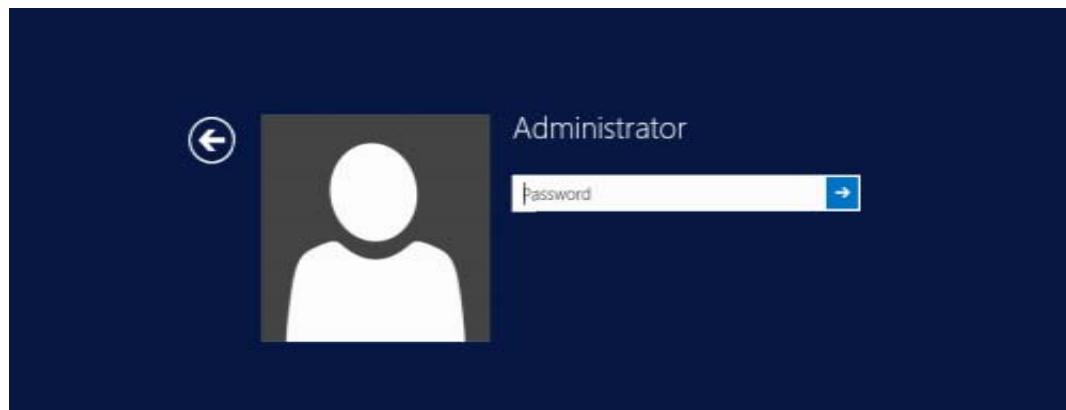
You used a WebSphere Application Server Liberty profile basic registry as the method for user authentication. Alternatively, you can use a Lightweight Directory Access Protocol (LDAP) registry for user authentication. This exercise guides you through enabling the Cloud APM server to use LDAP for security.



**Attention:** If you attempt this optional exercise, you *must* complete it to move on to the remaining exercises in the course. Ask your instructor how much time is left before you attempt it. It takes approximately 45 minutes to complete.

## Starting the ITM VM

1. Start the ITM VM. This system hosts an IBM Tivoli Monitoring environment. Follow the local environment instructions.
2. At the password prompt, enter `object00` and press Enter.

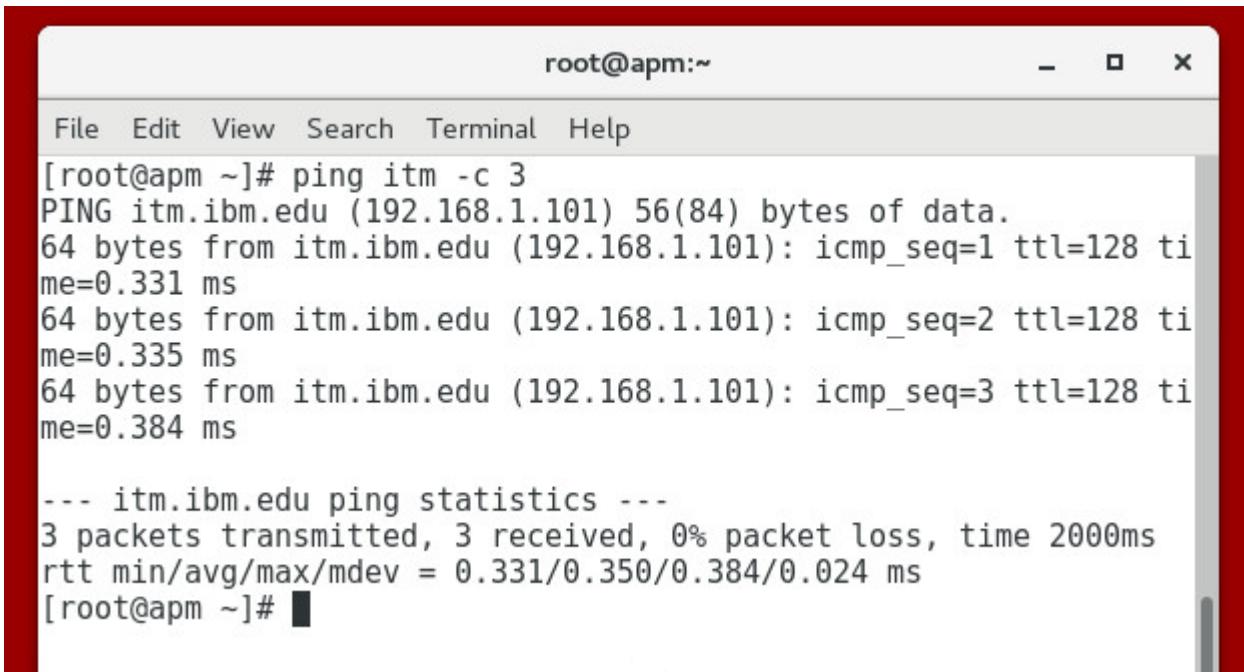


## Update the `IdapRegistry.xml` file

3. Log in to the APM console, if you are not already logged in, with a user ID of `apmadmin` and a password of `object00`.
4. Open a terminal window on the APM VM.

IBM Tivoli Directory Services is providing LDAP services on the ITM VM.

5. Confirm that you can ping the ITM VM.



```
root@apm:~#
File Edit View Search Terminal Help
[root@apm ~]# ping itm -c 3
PING itm.ibm.edu (192.168.1.101) 56(84) bytes of data.
64 bytes from itm.ibm.edu (192.168.1.101): icmp_seq=1 ttl=128 time=0.331 ms
64 bytes from itm.ibm.edu (192.168.1.101): icmp_seq=2 ttl=128 time=0.335 ms
64 bytes from itm.ibm.edu (192.168.1.101): icmp_seq=3 ttl=128 time=0.384 ms

--- itm.ibm.edu ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2000ms
rtt min/avg/max/mdev = 0.331/0.350/0.384/0.024 ms
[root@apm ~]#
```

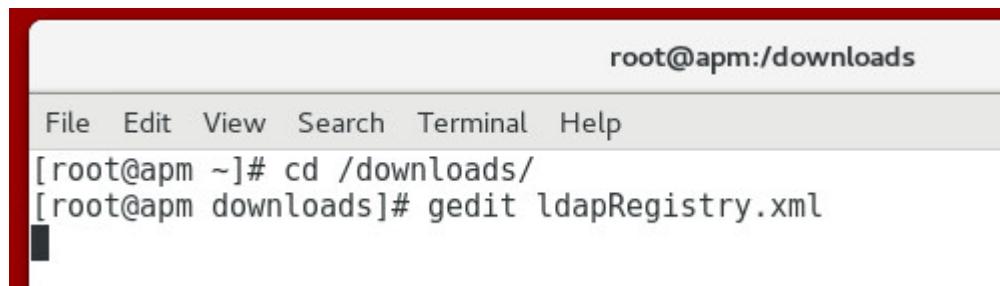
6. Change to the `/opt/ibm/wlp/usr/shared/config` folder.
7. Display the contents of the file `ldapRegistry.xml` by using the gedit editor.



```
<Open > <Save> ldapRegistry.xml /opt/ibm/wlp/usr/shared/config <Save> <Close>
<server>
    <ldapRegistry id="IBMDirectoryServerLDAP" realm="SampleLdapIDSRealm"
        host="127.0.0.1" port="389" ignoreCase="true"
        baseDN="o=ibm,c=us"
        ldapType="IBM Tivoli Directory Server"
        searchTimeout="1m"
        connectTimeout="2m"
        reuseConnection="true"
        bindDN="cn=root" bindPassword="{aes}APDE9uYbf4iaFeuqr4ku9isTn/NmZr97dKr4+h45j0Dm">
        <idsFilters>
            userFilter="(&uid=%v)(objectclass=inetOrgPerson)"
            groupFilter="(&cn=%v)((objectclass=groupOfNames)(objectclass=groupOfUniqueNames)(objectclass=groupOfURLs))"
            userIdMap="*:uid"
            groupIdMap="*:cn"
            groupMemberIdMap="ibm-allGroups:member;ibm-allGroups:uniqueMember;groupOfNames:member;groupOfUniqueNames:uniqueMember" />
            <contextPool enabled="false" initialSize="1" maxSize="0" timeout="0ms" waitTime="3000ms" preferredSize="3"/>
    </ldapRegistry>
</server>
```

8. Observe that defaults are provided for several key items, but they do not match your environment:
  - LDAP host IP address
  - realm name
  - baseDN name
  - bindDN name

9. In another terminal window, display the contents of the provided `ldapRegistry.xml` file in the `/downloads` directory by using the gedit editor.



```
root@apm:/downloads
File Edit View Search Terminal Help
[root@apm ~]# cd /downloads/
[root@apm downloads]# gedit ldapRegistry.xml
```

10. Observe that there these fields are set to match your LDAP, which runs on the ITM VM.

- LDAP host IP address
- realm name
- baseDN name
- bindDN name

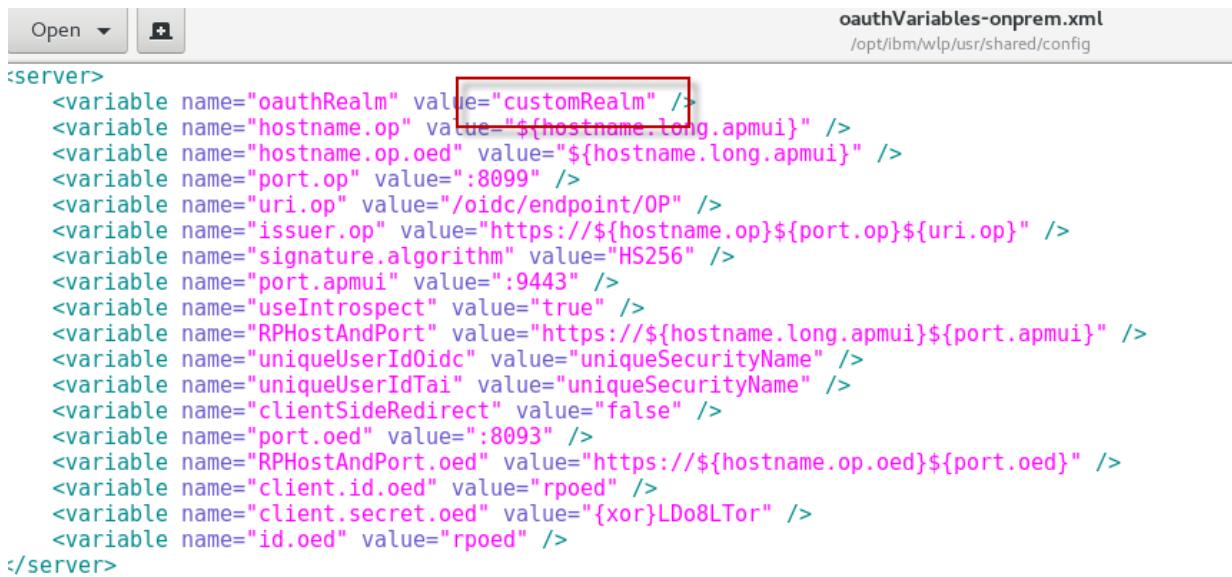
```
<server>
  <ldapRegistry id="IBMDirectoryServerLDAP" realm="APMRealm"
    host="192.168.1.101" port="389" ignoreCase="true"
    baseDN="cn=APMRealm,ou=admins,o=ibm,c=edu"
    ldapType="IBM iSeries Directory Server"
    searchTimeout="1m"
    connectTimeout="2m"
    reuseConnection="true"
    bindDN="cn=root" bindPassword="{xor}MD010jwrb28=>
  <idsFilters
    userFilter="(&(uid=%v)(objectclass/inetOrgPerson))"
    groupFilter="(&(cn=%v)(|(objectclass/groupOfNames)(objectclass/groupOfUniqueNames)(objectclass/groupOfURLs)))"
    userIdMap="*:uid"
    groupIdMap="*:cn"
    groupMemberIdMap="ibm-allGroups:member;ibm-allGroups:uniqueMember;groupOfNames:member;groupOfUniqueNames:uniqueMember" />
  <contextPool enabled="false" initialSize="1" maxSize="0" timeout="0ms" waitTime="3000ms" preferredSize="3"/>
</ldapRegistry>
</server>
```

11. Close the gedit editor.

12. Make a backup of the `ldapRegistry.xml` file in the `/opt/ibm/wlp/usr/shared/config` folder, and copy the `ldapRegistry.xml` file from the `/downloads` folder to the `/opt/ibm/wlp/usr/shared/config` folder.

```
[root@apm ~]# cd /opt/ibm/wlp/usr/shared/config
[root@apm config]# gedit ldapRegistry.xml
[root@apm config]# cp ldapRegistry.xml ldapRegistry.xml.orig
[root@apm config]# cp /downloads/ldapRegistry.xml .
cp: overwrite './ldapRegistry.xml'? y
[root@apm config]#
```

13. Display the contents of the file `oauthVariables-onprem.xml` by using the gedit editor.



```

Open + oauthVariables-onprem.xml
/opt/ibm/wlp/usr/shared/config

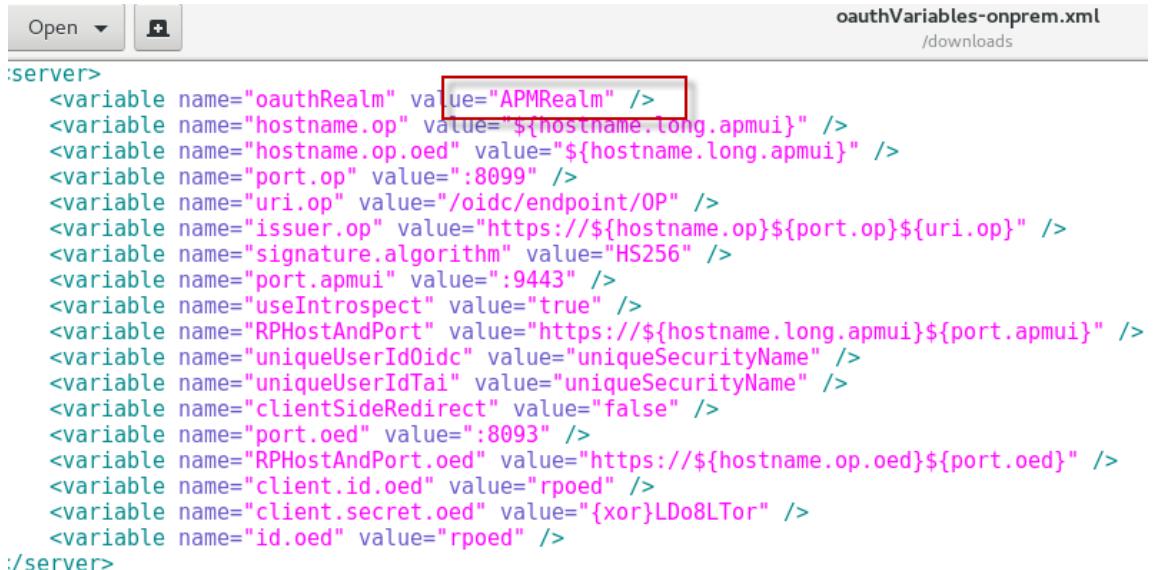
<server>
  <variable name="oauthRealm" value="customRealm" />
  <variable name="hostname.op" value="${hostname.long.apmui}" />
  <variable name="hostname.op.oed" value="${hostname.long.apmui}" />
  <variable name="port.op" value=:8099 />
  <variable name="uri.op" value="/oidc/endpoint/OP" />
  <variable name="issuer.op" value="https://${hostname.op}${port.op}${uri.op}" />
  <variable name="signature.algorithm" value="HS256" />
  <variable name="port.apmui" value=:9443 />
  <variable name="useIntrospect" value="true" />
  <variable name="RPHostAndPort" value="https://${hostname.long.apmui}${port.apmui}" />
  <variable name="uniqueUserId0idc" value="uniqueSecurityName" />
  <variable name="uniqueUserIdTai" value="uniqueSecurityName" />
  <variable name="clientSideRedirect" value="false" />
  <variable name="port.oed" value=:8093 />
  <variable name="RPHostAndPort.oed" value="https://${hostname.op.oed}${port.oed}" />
  <variable name="client.id.oed" value="rpoed" />
  <variable name="client.secret.oed" value="{xor}LDo8LTor" />
  <variable name="id.oed" value="rpoed" />
</server>

```

Observe that the value for “oauthRealm” is “customRealm”, which does not match the value in your LDAP of APMRealm.

14. Display the contents of the provided `oauthVariables-onprem.xml` file in the `/downloads` directory by using the gedit editor.

Observe that the realm value in the first stanza is set to match the realm name in your LDAP, which runs on the ITM VM.



```

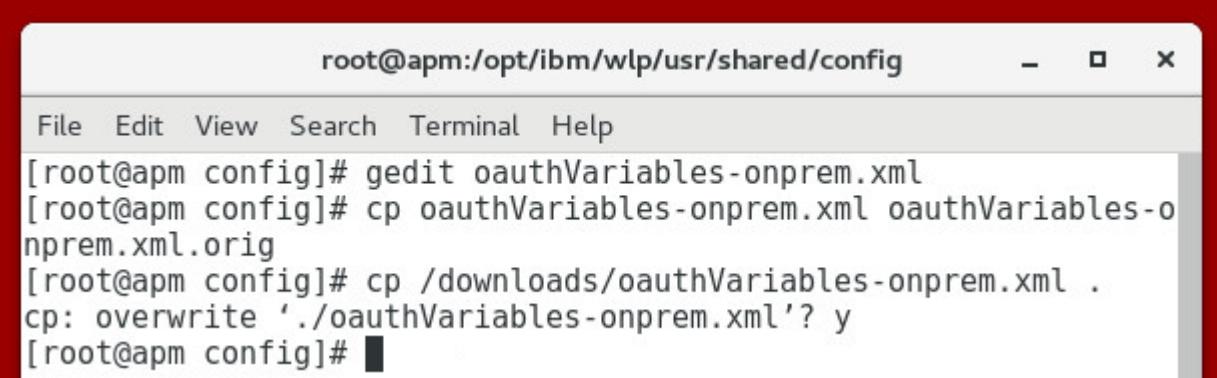
Open + oauthVariables-onprem.xml
/downloads

<server>
  <variable name="oauthRealm" value="APMRealm" />
  <variable name="hostname.op" value="${hostname.long.apmui}" />
  <variable name="hostname.op.oed" value="${hostname.long.apmui}" />
  <variable name="port.op" value=:8099 />
  <variable name="uri.op" value="/oidc/endpoint/OP" />
  <variable name="issuer.op" value="https://${hostname.op}${port.op}${uri.op}" />
  <variable name="signature.algorithm" value="HS256" />
  <variable name="port.apmui" value=:9443 />
  <variable name="useIntrospect" value="true" />
  <variable name="RPHostAndPort" value="https://${hostname.long.apmui}${port.apmui}" />
  <variable name="uniqueUserId0idc" value="uniqueSecurityName" />
  <variable name="uniqueUserIdTai" value="uniqueSecurityName" />
  <variable name="clientSideRedirect" value="false" />
  <variable name="port.oed" value=:8093 />
  <variable name="RPHostAndPort.oed" value="https://${hostname.op.oed}${port.oed}" />
  <variable name="client.id.oed" value="rpoed" />
  <variable name="client.secret.oed" value="{xor}LDo8LTor" />
  <variable name="id.oed" value="rpoed" />
</server>

```

15. Close the gedit editor.

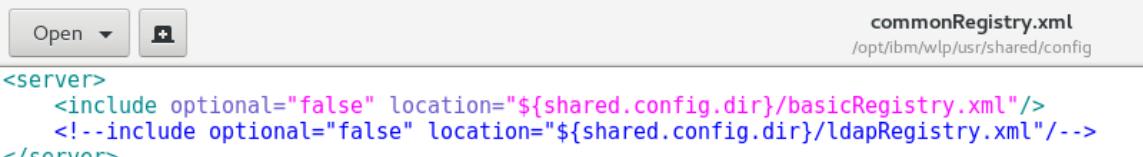
16. Make a backup of the `oauthVariables-onprem.xml` file in the `/opt/ibm/wlp/usr/shared/config` folder, and copy the `oauthVariables-onprem.xml` file from the `/downloads` folder to the `/opt/ibm/wlp/usr/shared/config` folder.



```
root@apm:/opt/ibm/wlp/usr/shared/config
File Edit View Search Terminal Help
[root@apm config]# gedit oauthVariables-onprem.xml
[root@apm config]# cp oauthVariables-onprem.xml oauthVariables-onprem.xml.orig
[root@apm config]# cp /downloads/oauthVariables-onprem.xml .
cp: overwrite './oauthVariables-onprem.xml'? y
[root@apm config]#
```

## Update the commonRegistry.xml file

17. Display the contents of the file `/opt/ibm/wlp/usr/shared/config/commonRegistry.xml` by using the gedit editor.



```
commonRegistry.xml
/opt/ibm/wlp/usr/shared/config
Open ▾ + commonRegistry.xml
<server>
  <include optional="false" location="${shared.config.dir}/basicRegistry.xml"/>
  <!--include optional="false" location="${shared.config.dir}/ldapRegistry.xml"-->
</server>
```

Observe the two statements. These statements show the default security settings of the Cloud APM server, which is using the `basicRegistry.xml` file for authentication and group definitions. The `<!--` string on the second statement around the `ldapRegistry.xml` file is a comment.

18. Display the contents of the provided `commonRegistry.xml` file in the `/downloads` directory by using the gedit editor.

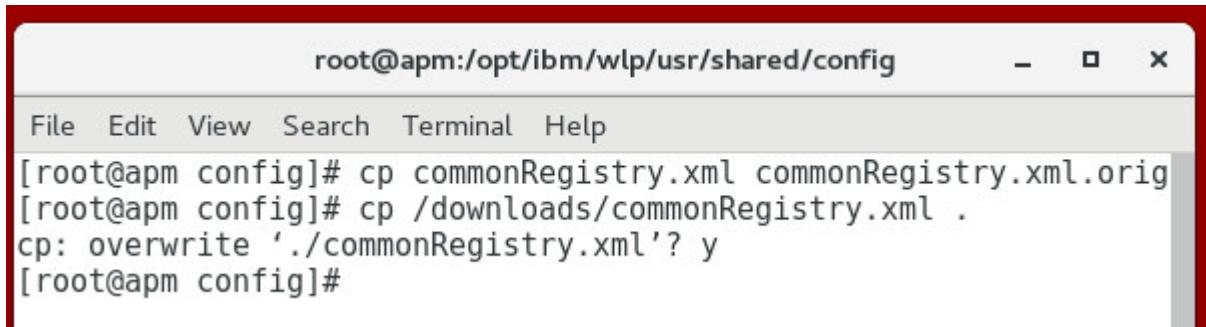
Observe that the values are set to use LDAP authentication instead of the basic registry.



```
commonRegistry.xml
/downloads
Open ▾ + commonRegistry.xml
<server>
  <!--include optional="false" location="${shared.config.dir}/basicRegistry.xml"-->
  <include optional="false" location="${shared.config.dir}/ldapRegistry.xml"/>
</server>
```

19. Close the gedit editor.

20. Make a backup of the `commonRegistry.xml` file in the `/opt/ibm/wlp/usr/shared/config` folder, and copy the `commonRegistry.xml` file from the `/downloads` folder to the `/opt/ibm/wlp/usr/shared/config` folder.



```
root@apm:/opt/ibm/wlp/usr/shared/config - □ ×
File Edit View Search Terminal Help
[root@apm config]# cp commonRegistry.xml commonRegistry.xml.orig
[root@apm config]# cp /downloads/commonRegistry.xml .
cp: overwrite './commonRegistry.xml'? y
[root@apm config]#
```

## Change the default apmadmin user

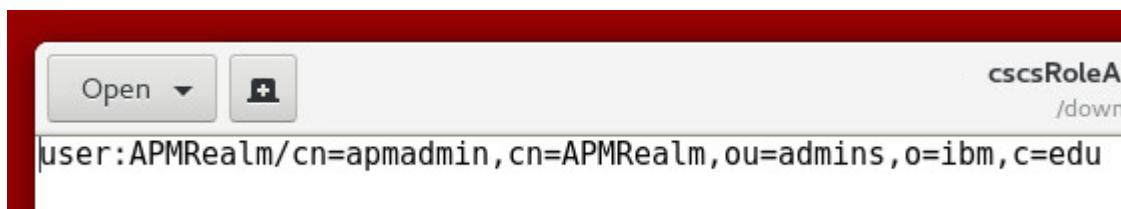
The default user for Cloud APM is **apmadmin**, and the default realm is **customRealm**. By default, **apmadmin** has the Role Administrator role. This default user is defined in the `basicRegistry.xml` file in the `/opt/ibm/wlp/usr/shared/config/` folder. You must change the default user for one of the following reasons because you are changing user authentication from basic registry to LDAP.

21. Change to the `/opt/ibm/wlp/usr/servers/server1/cscs/conf` directory.
22. Display the contents of the file `cscsRoleAdmin.conf` by using the `gedit` command.



Observe that the user ID and the realm do not match the baseDN entry from step [Step 10](#) on page 4-69.

23. Create a backup of the `cscsRoleAdmin.conf` file in this directory called: `cscsRoleAdmin.conf.orig`
24. Display the contents of the provided `cscsRoleAdmin.new` file in the `/downloads` directory by using the gedit editor.



Observe how the realm and common name (cn) entries match the settings [Step 10](#) on page 4-69.

25. Copy the `cscsRoleAdmin.new` file from the `/downloads` folder to the `/opt/ibm/wlp/usr/servers/server1/cscs/conf` folder.

```
[root@apm config]# cd /opt/ibm/wlp/usr/servers/server1/cscs/conf
[root@apm conf]# gedit cscsRoleAdmin.conf
[root@apm conf]# cp cscsRoleAdmin.conf cscsRoleAdmin.conf.orig
[root@apm conf]# cp /downloads/cscsRoleAdmin.new .
[root@apm conf]#
```

 **Note:** Do not replace the `cscsRoleAdmin.conf` file. You made a backup of the `cscsRoleAdmin.conf` file in case you need to reset the Cloud APM server to use the `basicRegistry.xml` file. After the Cloud APM server is recycled, the `cscsRoleAdmin.new` file replaces the `cscsRoleAdmin.conf` file.

26. From a terminal window, use the `apm status` command to list the status of all the components of the Cloud APM server.

```
apm status
```

```
root@apm:~#
File Edit View Search Terminal Help
[root@apm ~]# apm status
Service db2 is started (PID 112297).
Service ksy is started (PID 94038).
Service kafka is started (PID 71445).
Service spark is started (PID 89268).
Service txagent is started (PID 9478).
Service mongodb is started (PID 97804).
Service scr is started (PID 98172).
Service oidc is started (PID 98583).
Service server1 is started (PID 98981).
Service min is started (PID 100264).
Service apmui is started (PID 111752).
Service oslc is started (PID 38546).
Service dqe is started (PID 122239).
Service uviews is started (PID 15545).
Service biagent is started (PID 125769).
Service soagent is started (PID 1174).
[root@apm ~]#
```

27. Restart all of the Cloud APM server services.

```
apm restart_all
```

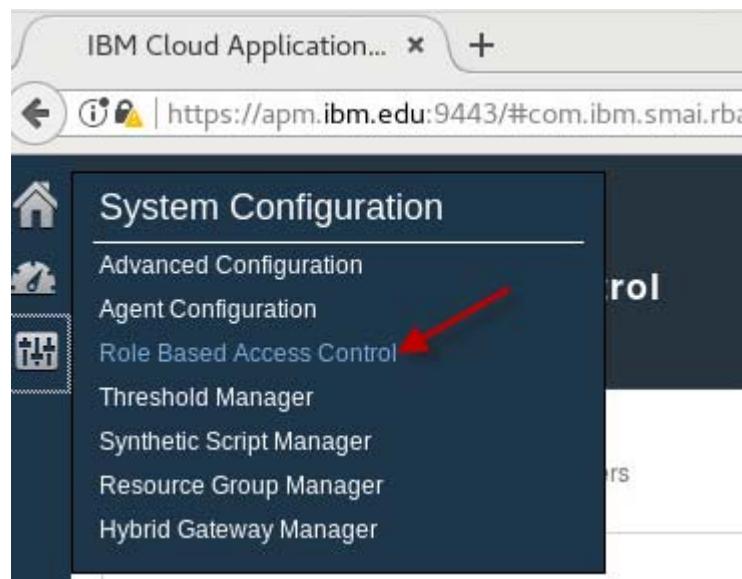


**Important:** The restart of the Cloud APM server takes 15 minutes.

28. Close the Firefox browser, if necessary.

29. Log in to the Cloud APM console with a user ID of `apmadmin` and a password of `object00`.

30. Click **System Configuration > Role Based Access Control**.



31. Observe the contents of the **User Groups** tab and see that you added two groups that are not in the `basicRegistry.xml` file, but are defined in LDAP.

The screenshot shows the 'Role Based Access Control' interface with the 'User Groups' tab selected. The page title is 'Role Based Access Control' with the subtitle 'Manage user access using roles.' Below the tabs are two red arrows pointing to the 'apmadmins' and 'users56' entries in the list of user groups.

User Group
admins
admins1
admins2
apmadmins
users12
users34
users56

32. Observe the contents of the **Individual Users** tab and see that you added two user IDs that are not in the `basicRegistry.xml` file, but are defined in LDAP.

User
apmadmin
apmadmin1
apmadmin2
apmuser1
apmuser2
apmuser3
apmuser4
apmuser5
apmuser6

## Impact on user IDs

The movement of access definitions from remaining steps for this exercise guide you through accessing the Cloud APM console with different user IDs. You also see the impact on what your user ID can access. You update the roles from the `apmadmin` user ID on the APM VM. You test various user IDs on the LIN1 VM.

33. Log in with the `apmadmin1` user ID on the LIN1 VM with these steps:
- On the LIN1 VM, open the Firefox browser to this URL:  
`https://apm.ibm.edu:9443`
  - Instead of using the `apmadmin` login, use `apmadmin1` to log in, with a password of `object00`.

The following screen capture shows the expected result:

The screenshot shows a browser window titled "IBM Cloud Application..." with the URL "https://apm.ibm.edu:9443". The main content area displays a large bold heading "Not Authorized" and the message "You do not have permission to view this app monitoring system administrator." To the left of the main content, there is a vertical sidebar with a gear icon.

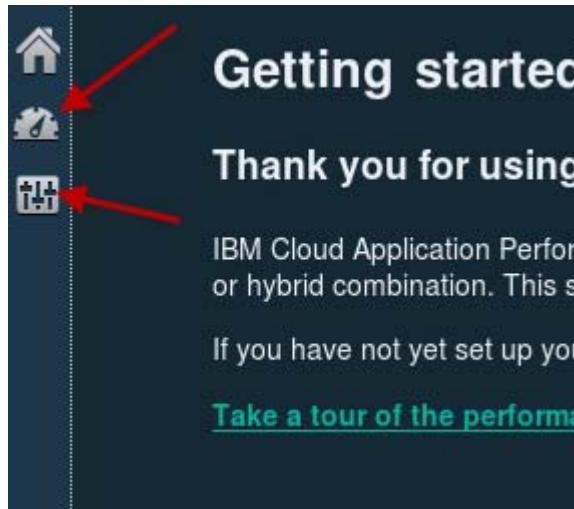
**Note:** You receive this result because even though **apmadmin1** is a valid user and was working earlier, the user does not have any permissions or roles in the Cloud APM server. The realm was changed to APMRealm when you changed to using LDAP.

34. On the APM VM in Firefox, return to the Cloud APM console. Click **System Configuration > Role Based Access Control**, and click **Individual Users**.

35. Click **apmadmin1**, and click the Edit icon.

The screenshot shows the "Role Based Access Control" interface. The title bar says "Role Based Access Control" and "Manage user access using roles.". Below the title, there are three tabs: "Roles", "User Groups", and "Individual Users", with "Individual Users" being the active tab. Under the "User" section, there is a list of users with radio buttons next to them. The user "apmadmin1" has a red arrow pointing to its radio button, which is selected (indicated by a blue background). Other users listed are "apmadmin2", "apmuser1", and "apmuser2".

36. Observe that **apmadmin1** currently has no roles. Select the roles **Monitoring Administrator** and **Role Administrator**. Scroll down and click **Save**. Click **Close**.
37. Return to the Firefox browser on the LIN1 VM. Click the Refresh icon in the browser.
38. Confirm that the **apmadmin1** user ID has the rights to be a Monitoring Administrator and a Role Administrator.



**Optional:** You can use the same steps to reapply user authority for **apmadmin2**, **apmuser1**, and **apmuser3**. These user IDs are not used for future exercises.

# Unit 5 Monitoring events exercises

In these exercises, you learn the relationship between thresholds and events. You create thresholds that test for simple and multiple conditions. You create thresholds that run commands to solve the issue that is detected. You adjust resource groups and learn the impact of these adjustments on thresholds and events.

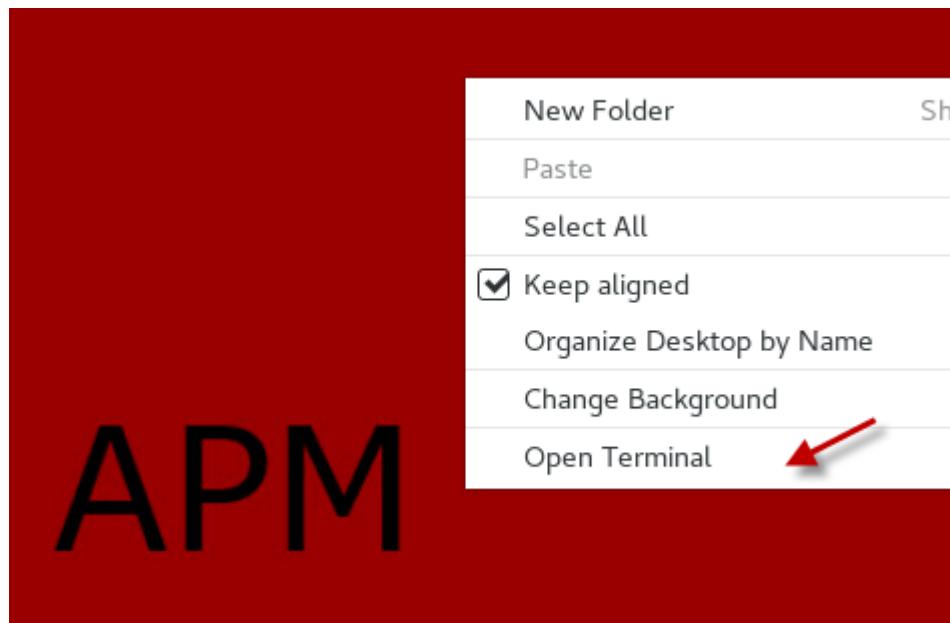
These exercises use the only agent that is installed so far, the Monitoring Agent for Linux OS. The concepts that you learn apply to all agents, and data collectors.

## Exercise 1 Install an operating system agent

In this exercise, you install a Monitoring Agent for Linux OS so that when you start the exercise on resource groups, you have another managed system for the Monitoring Agent for Linux OS. You already installed this agent on the LIN1 and LIN2 servers.

Installation of agents on one operating system is similar to the next. This exercise guides you through installing the Monitoring Agent for Linux OS.

1. On virtual machine APM, open a Gnome terminal window by right-clicking the desktop and selecting **Open Terminal**.



2. Create a folder called: /downloads/APM814/configuredagents

```
root@apm:/downloads/APM814
File Edit View Search Terminal Help
[root@apm ~]# cd /downloads/APM814/
[root@apm APM814]# mkdir configuredagents
[root@apm APM814]#
```

3. Change to the /opt/ibm/ccm/depot/ folder.

```
root@apm:/opt/ibm/ccm/depot
File Edit View Search Terminal Help
[root@apm ~]# cd /opt/ibm/ccm/depot/
[root@apm depot]#
```

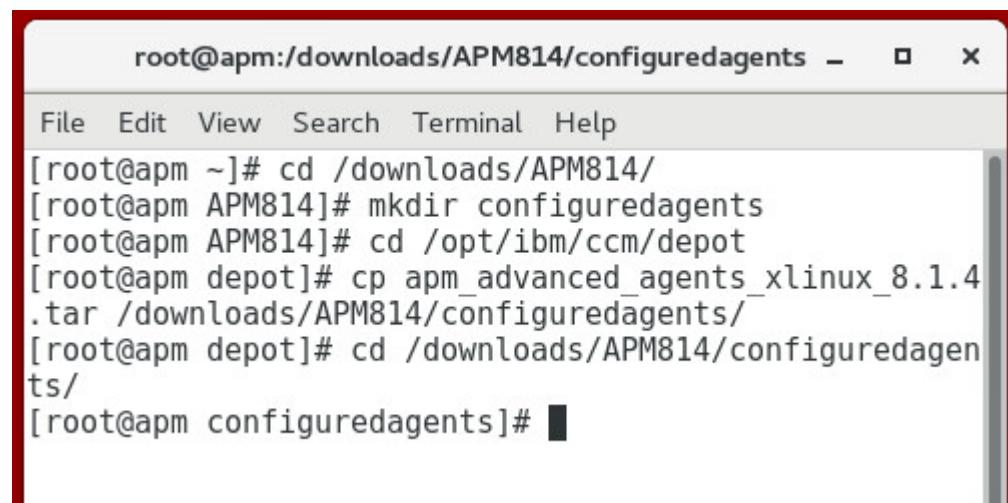
4. Copy the preconfigured Linux agent file that is called

`apm_advanced_agents_xlinux_8.1.4.tar` to the `/downloads/APM814/configuredagents` directory.

```
cp apm_advanced_agents_xlinux_8.1.4.tar /downloads/APM814/configuredagents
```

```
root@apm:/opt/ibm/ccm/depot
File Edit View Search Terminal Help
[root@apm ~]# cd /downloads/APM814/
[root@apm APM814]# mkdir configuredagents
[root@apm APM814]# cd /opt/ibm/ccm/depot
[root@apm depot]# cp apm_advanced_agents_xlinux_8.1.4.
.tar /downloads/APM814/configuredagents/
[root@apm depot]#
```

5. Change to the `/downloads/APM814/configuredagents/` folder.



```
root@apm:/downloads/APM814/configuredagents - □ ×
File Edit View Search Terminal Help
[root@apm ~]# cd /downloads/APM814/
[root@apm APM814]# mkdir configuredagents
[root@apm APM814]# cd /opt/ibm/ccm/depot
[root@apm depot]# cp apt_advanced_agents_xlinux_8.1.4.tar /downloads/APM814/configuredagents/
[root@apm depot]# cd /downloads/APM814/configuredagents/
[root@apm configuredagents]#
```

6. Extract the file `apt_advanced_agents_xlinux_8.1.4.tar`.

```
tar -xvf apt_advanced_agents_xlinux_8.1.4.tar
```

7. Change to the directory

```
/downloads/APM814/configuredagents/APMADV_Agent_Install_8.1.4.0.
```

8. Run the command: `./installAPMAgents.sh`

9. Select **15** to install the Monitoring Agent for Linux OS.

10. Press Enter to confirm your selection.

11. Press Enter to confirm the agent home of `/opt/ibm/apm/agent`.

12. Select **1** to accept the license agreement.

The agent installation takes approximately 5 minutes. It takes several minutes for the agent you installed to show in the Performance Management console. Do not wait for it. Proceed to the next exercise.

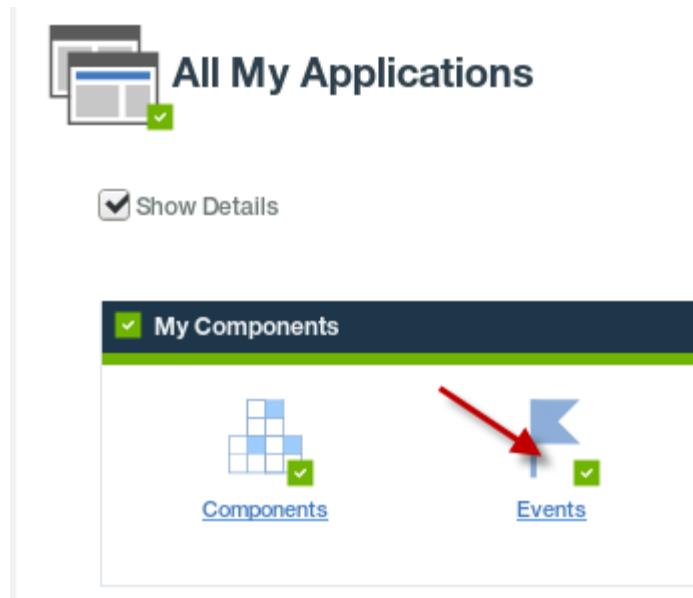


**Note:** You just installed a Cloud APM monitoring agent on the same server that has an IBM Tivoli Monitoring agent. This capability is referred to as agent coexistence.

## Exercise 2 Stop all product-provided thresholds from running

Sometimes, thresholds indicate that systems have issues but everything is running as expected. In these cases, you can stop a threshold from sending events to the Cloud APM server.

1. Open the Cloud APM console unless you are already logged in from the APM server by using Firefox to open the web page:  
<https://apm.ibm.edu:9443>
2. Open the Application Dashboard, and you might observe a red indicator on one of your applications.
3. Click the **Events** icon under My Components.



4. You might have no events yet, but if you have any, they would appear here.

All My Applications >

## My Components

Status Overview    **Events**    Custom Views

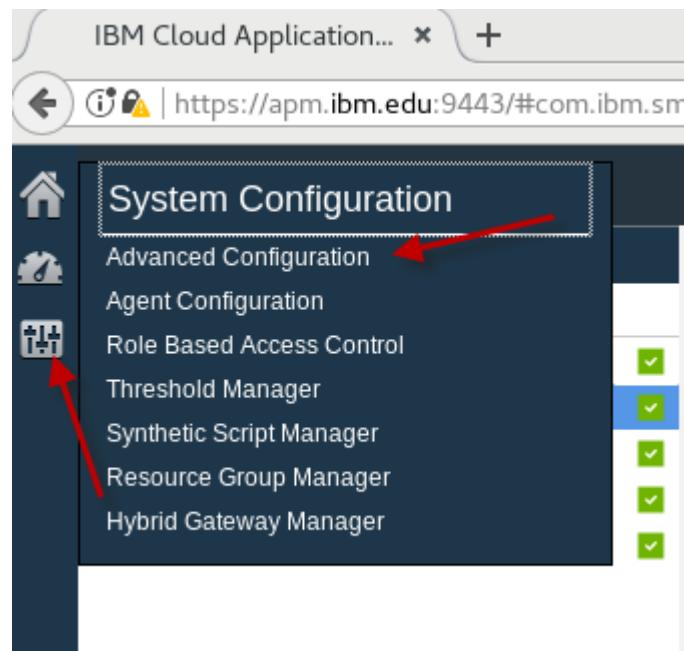
Total Events: 0    Critical Events: 0    Warning Events: 0    Normal E

Threshold Name	Status
----------------	--------

Since you did not create any thresholds yet, any event is the result of a product-provided threshold. You disable the threshold by continuing the steps in this exercise.

5. Open **Advanced Configuration**:

- Click the **System Configuration** icon.
- Click **Advanced Configuration**.



6. Disable all thresholds:
  - a. Click **Threshold Enablement**.
  - b. Click **Select Option**.

The screenshot shows the 'Advanced Configuration' page with the 'Configuration Categories' sidebar on the left and the 'Parameters' section on the right.

**Configuration Categories:**

- UI Integration
- Event Manager
- MongoDB Configuration
- Agent Central Configuration
- Data Mart
- Kafka Configuration
- Tracking Analytics Service
- Agent Subscription Facility
- Thresholds Enablement** (highlighted with a red arrow)

**Parameters:**

Configuration for enablement of predefined best practice thresholds.

Choose action to define policy for predefined best practice thresholds ?

A dropdown menu is open, showing three options:

- Select option
- Enable All
- Disable All** (highlighted with a red arrow)

7. Click **Disable All**.

The screenshot shows the 'Parameters' section of the configuration page.

**Parameters:**

Configuration for enablement of predefined best practice thresholds.

Choose action to define policy for predefined best practice thresholds ?

A dropdown menu is open, showing three options:

- Disable All
- Enable All
- Disable All** (highlighted with a red arrow)

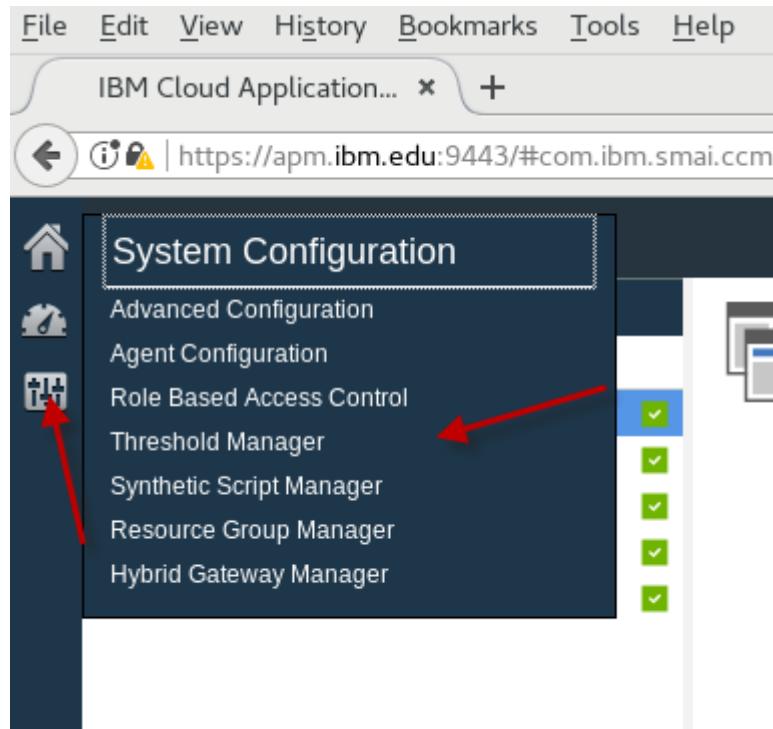
8. Click **Save**.

9. Click **Close**.

# Exercise 3 Change a threshold

This exercise guides you through the steps to update an existing threshold to change the condition.

1. Click **System Configuration > Threshold Manager** to open the Threshold Manager.



2. Select **Linux OS** from the **Data Source Type** list.

The screenshot shows a web browser window titled "IBM Cloud Application..." with the URL "https://apm.ibm.edu:9443/#com.ibm.smai.smcc". The page is titled "Threshold Manager" and contains instructions: "Use thresholds to monitor for issues on your monitored system. To set a threshold, select a data source type from the list and then enter a value in the list, type inside the Filter text box." Below this, there is a dropdown menu titled "Data Source Type" with the following options: "Linux OS", "Bluemix Integration", "Linux OS" (which is highlighted in blue), "Synthetic Transaction", and "Transaction Tracking". A red arrow points to the second "Linux OS" option in the list.

3. Click **Linux\_Disk\_Space\_Low** and click **Edit**.

The screenshot shows the 'Threshold Manager' page. At the top, there are icons for Home, Threshold Manager, and Settings. The main title is 'Threshold Manager' with a subtitle: 'Use thresholds to monitor for issues on your monitored system. To add a new threshold, select a data source type from the list on the left, then click the + button. To edit an existing threshold, select it from the list, type inside the Filter text box, or click the edit icon.' Below this is a table with a header 'Name'. The table contains the following rows:

Name
Linux_BP_ProcHighCpu_Critical
Linux_BP_SpaceUsedPct_Critical
Linux_BP_SwapSpaceUsedPct_Warn
Linux_CPU_Utilization_High
Linux_CPU_Utilization_High_Warn
<b>Linux_Disk_Space_Low</b> (highlighted with a blue selection bar and a red arrow)
Linux_Fragmented_File_System



**Hint:** Use the Filter field to help locate thresholds.

4. Change the Interval from **5** minutes to **30** seconds.

Name *	<input type="text" value="Linux_Disk_Space_Low"/>
Description	<input type="text" value="Disk free space is between 10% and 20%."/>
Severity	<input type="text" value="Warning"/>
Forward EIF event	<input type="text" value="Yes"/> EIF Slot Customization
Interval (HHMMSS)	<input type="text" value="00"/> <input type="text" value="0"/> <input type="text" value="30"/>
Required consecutive samples	<input type="text" value="1"/>
<input type="button" value="Filter"/> 	



5. Change the Description from **Disk free space is between 10% and 20%** to **Disk free space is less than 99%**.

Name *	<input type="text" value="Linux_Disk_Space_Low"/>
Description	<input type="text" value="Disk free space is less than 99%."/>
Severity	<input type="text" value="Warning"/>
Forward EIF event	<input type="text" value="Yes"/> EIF Slot Customization

6. Scroll down and change the first condition for the attribute **Disk\_Free\_Percent** from **less than or equal to 20** to **less than 99**.
  - a. Click **Disk\_Free\_Percent** and click **Edit**.

Conditions *	Attribute	Comparison
	<input checked="" type="radio"/> Disk_Free_Percent	less than or equal to 20
	<input type="radio"/> Disk_Free_Percent	greater than 10
	<input type="radio"/> FS_Type	not equal to nfs
	<input type="radio"/> FS_Type	not equal to iso9660

- b. Change the **Value** field from **20** to **99**.

Add Condition

Count	Attribute	Time Delta
<input type="checkbox"/>	<input type="radio"/> Disk_Free_Percent	<input type="checkbox"/>
<input type="checkbox"/>	<input type="radio"/> Operator	<input type="checkbox"/>
<input type="checkbox"/>	<input type="radio"/> Less than or Equal	<input type="checkbox"/>
<b>Value *</b>	<input type="radio"/> 99	

OK Cancel

- c. Click **OK**.

7. Delete the second Disk\_Free\_Percent condition.
  - a. Click the second **Disk\_Free\_Percent** and click **Delete**.

Condition	Comparison
Disk_Free_Percent	less than or equal to 99
Disk_Free_Percent	greater than 10
FS_Type	not equal to nfs
FS_Type	not equal to iso9660

**Note:** This artificially high value is just an example to exercise the tool and force a threshold to create an event.

8. Select **Linux OS** under the Group Assignment.

Group assignment

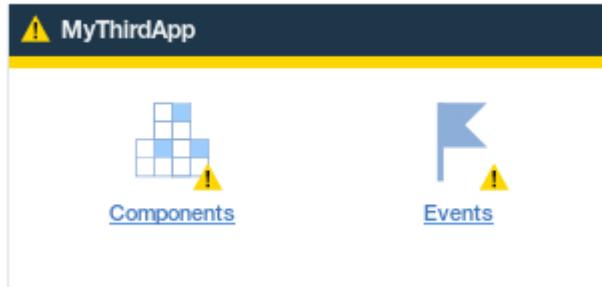
Available groups

Linux OS

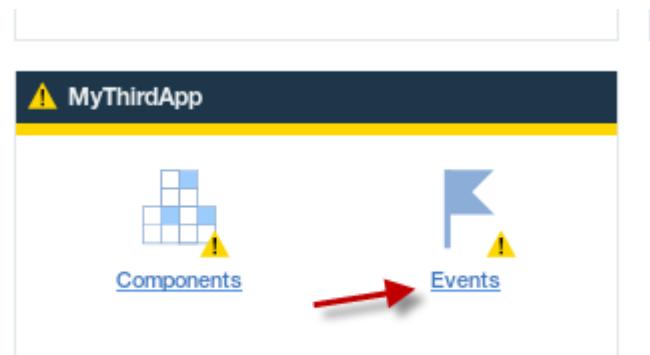
9. Scroll down. Click **Save**.

10. Click **Close**.

11. Because it can take 5 minutes for this update to be shown, go to the next exercise and validate this event when it is displayed later. When the event starts, the **MyThirdApp** application has a warning status.



12. Click **Events**.



The events widget shows the warning events.

All My Applications >  
**MyThirdApp**

Status Overview    **Events** ⚠ 19    Custom Views

■ Critical    ■ Warning

100

Total Events: 19    Critical Events: 0    Warning Events: 19    Normal Events: 0

Threshold Name	Status	Severity
Linux_Disk_Space_Low	Open	⚠ Warning

13. Scroll down and click the event that corresponds with the root (/) file system for lin1:LZ.

Open	⚠ Warning	/var/lib/docker...	lin1:LZ
Open	⚠ Warning	/var/lib/docker...	lin1:LZ
Open	⚠ Warning	/	lin1:LZ
Open	⚠ Warning	/var/lib/docker...	lin1:LZ
Open	⚠ Warning	/run/user/42	lin2:LZ

14. Review the data in the event.

Linux_Disk_Space_Low	Open	⚠ Warning	/var/lib/docker
Linux_Disk_Space_Low	Open	⚠ Warning	/var/lib/docker
Linux_Disk_Space_Low	Open	⚠ Warning	/
<b>Node</b>			
Threshold ID	Linux_Disk_Space_Low		
Global Timestamp	Dec 8, 2017, 5:11:21 PM		
Type	Sampled		
Description	Disk free space is less than 99%.		
Formula	( Disk Free Percent <= 99 AND File System Type != nfs		

15. Click the **lin1:LZ** link beside the Node entry.

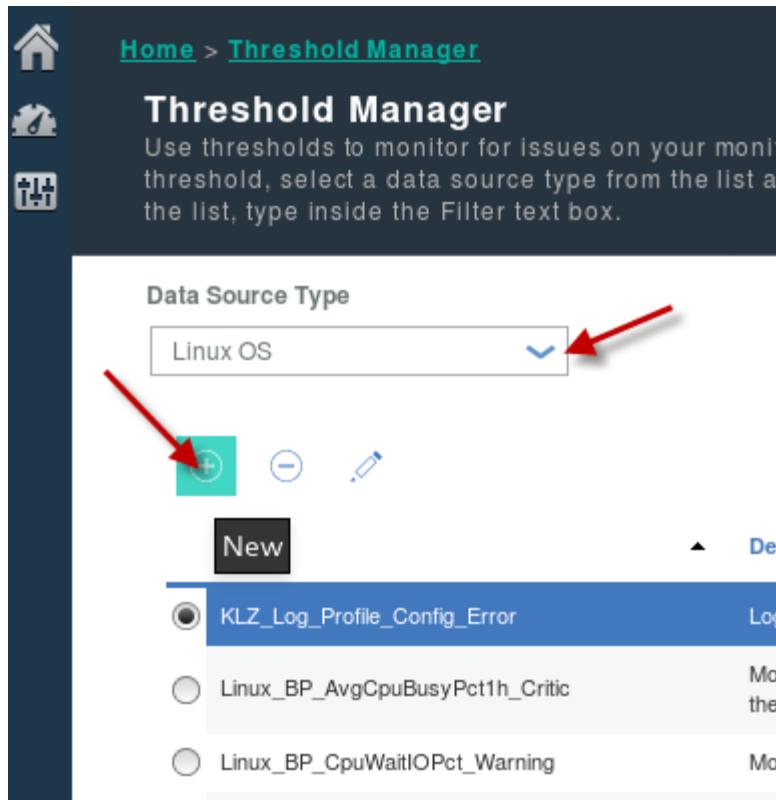
Open	⚠ Warning	/var/lib/docker/overlay/.
Open	⚠ Warning	/var/lib/docker/overlay/.
<b>lin1:LZ</b>		
Linux_Disk_Space_Low		
Dec 8, 2017, 5:11:21 PM		
Sampled		
Disk free space is less than 99%.		
( Disk Free Percent <= 99 AND File System Type != nfs AND File Sy		
Open	⚠ Warning	/
Open	⚠ Warning	/var/lib/docker/overlay

Observe how you were launched to the status of the node that reported the threshold event.

# Exercise 4 Create a threshold and event

One of the useful formulas is the Missing formula. It detects when a selected value is not present in the selected attribute for the data set. For example, you can detect whether a critical process is no longer active on a server. In this example, you monitor the Firefox process on the LIN1 server. In reality, this process is not a critical process, but it serves as an easy example.

1. Click **System Configuration > Threshold Manager** to open the Threshold Manager.
2. Select **Linux OS** from the **Data Source Type** list, and click **New**.



3. Name this threshold: **Linux\_Missing\_Process**
  - a. Provide a description.
  - b. Select **Critical** for the severity.
  - c. Set the **Interval** field to **30 seconds**.
  - d. Set the **Data set** parameter to **Linux Process**.

- e. Change the display item to **Process\_Command\_Name**.

[Home](#) > [Threshold Manager](#) > [Threshold Editor](#)

### Threshold Editor

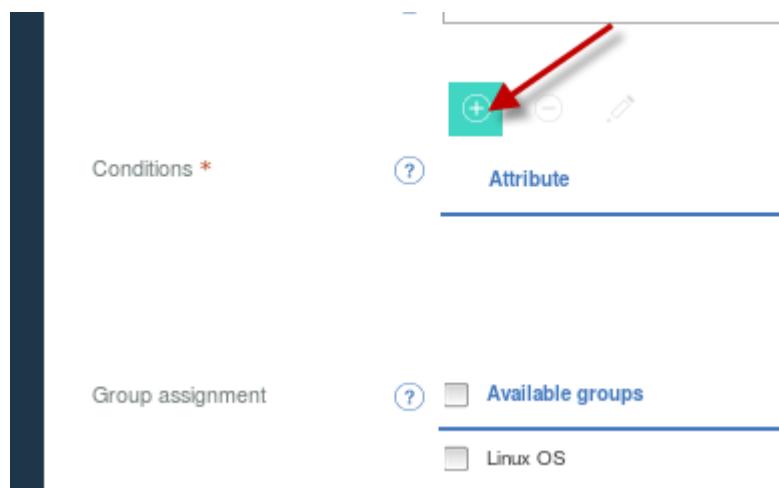
A threshold can test for one or more conditions in a given data set. Click Add to d  
conditions in Boolean OR (|) comparisons. After completing the first condition, se

Name *	<input type="text" value="Linux_Missing_Process"/>
Description	<input type="text" value="Search for a Process"/>
Severity	<input type="text" value="Critical"/>
Forward EIF event	<input type="text" value="Yes"/> EIF Slot Customization
Interval (HHMMSS)	<input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="30"/>
Required consecutive samples	<input type="text" value="1"/>
Data set	<input type="text" value="Process"/>
	<input type="radio"/> KLZ Docker Processes <input type="radio"/> KLZ Process <input type="radio"/> KLZ Process User Info <input checked="" type="radio"/> Linux Process <input type="radio"/> Linux Process User Info

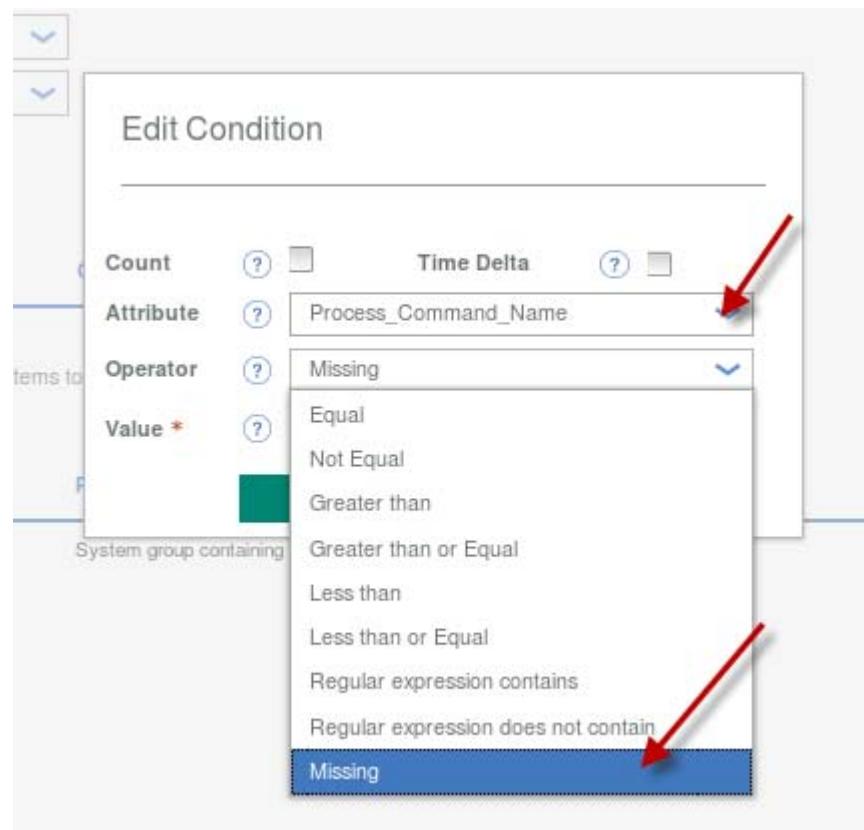


**Hint:** Use the Filter tool to find the Linux\_Process data set.

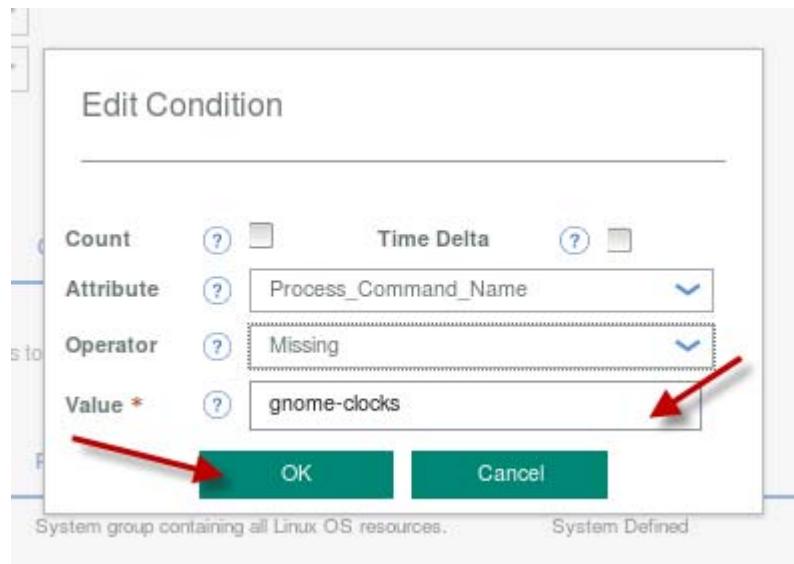
4. Click the New icon (the plus sign, +) to the right of **Conditions**.



5. Select **Process\_Command\_Name** for the attribute and **Missing** for the operator.



6. For the **Value** field, enter the name of the process: `gnome-clocks`  
Click **OK**.

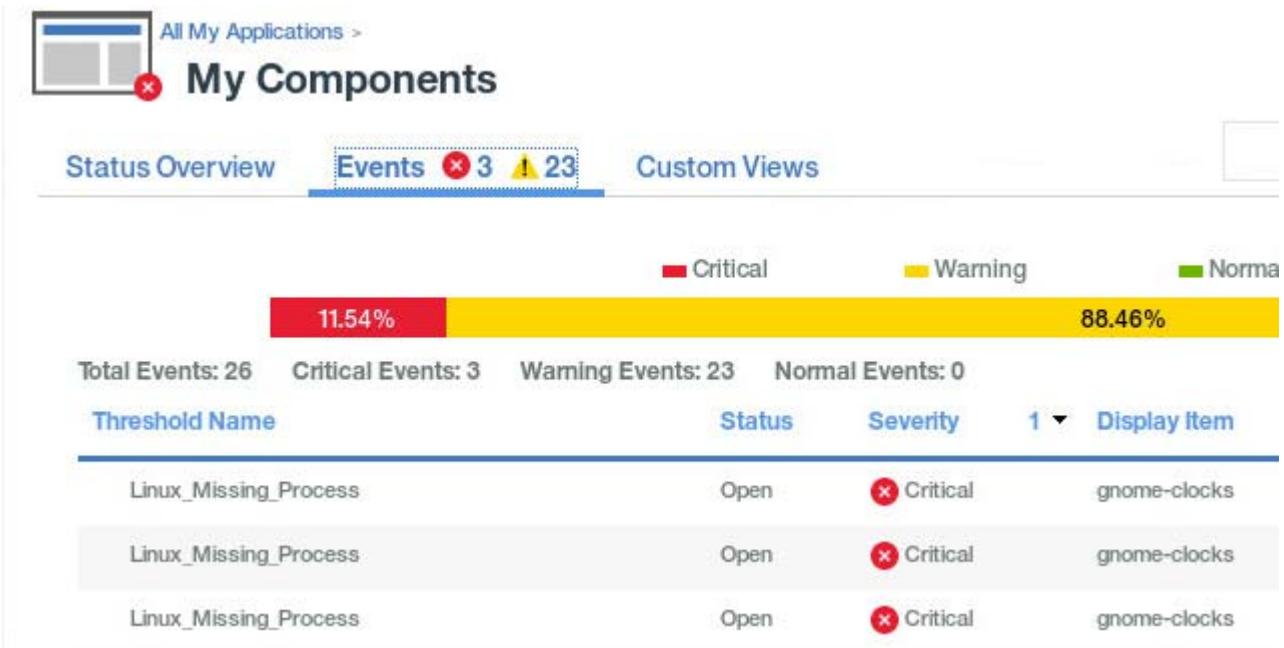


7. Select **Linux OS** for group assignment. Click **Save**.

The screenshot shows the 'Group assignment' section. Under 'Available groups', 'Linux OS' is selected. A red arrow points to this selection. At the bottom right, there is a 'Save' button, which also has a red arrow pointing to it.

8. Click **Close**.

9. Because it can take 5 minutes for this update to show, go to the next exercise and validate this event when it is displayed later. When the event starts, all of the applications have a critical status, and the event shows in the **Event Status** list.



# Exercise 5 Run a command from a threshold

Cloud APM supports running a script or a command to address issues that it detects. This exercise guides you through using this powerful capability.

By now, you see the event from [Unit 5, Exercise 3](#) on page 5-7.

1. Adjust the threshold for **Linux\_Disk\_Space\_Low** back to the product provided value of 20. This update closes the event.



**Hint:** Use the **Edit** icon to update the threshold.

The screenshot shows the Cloud APM Threshold Manager interface. At the top, there's a breadcrumb navigation: Home > Threshold Manager. Below that is the title 'Threshold Manager' and a brief description: 'Use thresholds to monitor for issues on your monitored systems. From the list and click New. To edit or delete a threshold, click the Edit icon next to its name.' In the center, there's a search bar with 'Linux OS' and a dropdown arrow. Below the search bar are two small icons: a plus sign (+) and a minus sign (-). To the right of these icons is a green 'Edit' button with a pencil icon, which has a red arrow pointing to it. Underneath these controls is a table with columns for Name, Description, and Type. The table contains the following rows:

Name	Description	Type
Linux_BP_SpaceUsedPct_Critical	More than 90% usage	Monitored system
Linux_BP_SwapSpaceUsedPct_Warn	More than 90%	Monitored system
Linux_CPU_Utilization_High	The utilization is at 90%	Monitored system
Linux_CPU_Utilization_High_Warn	The utilization is at 90%	Monitored system
<b>Linux_Disk_Space_Low</b>	Disk space usage is low	Monitored system
Linux_Fragmented_File_System	The fragmentation level is high	Monitored system
Linux_Mem_Utilization_High_Crit	The memory utilization is at 90%	Monitored system
Linux_Mem_Utilization_High_Warn	The memory utilization is at 90%	Monitored system

2. Edit the threshold for **Linux\_Missing\_Process**, and add the command to export the display and to start the utility **gnome-clocks** into the **Execute command** field. Click the check box beside **For every consecutive true interval**.

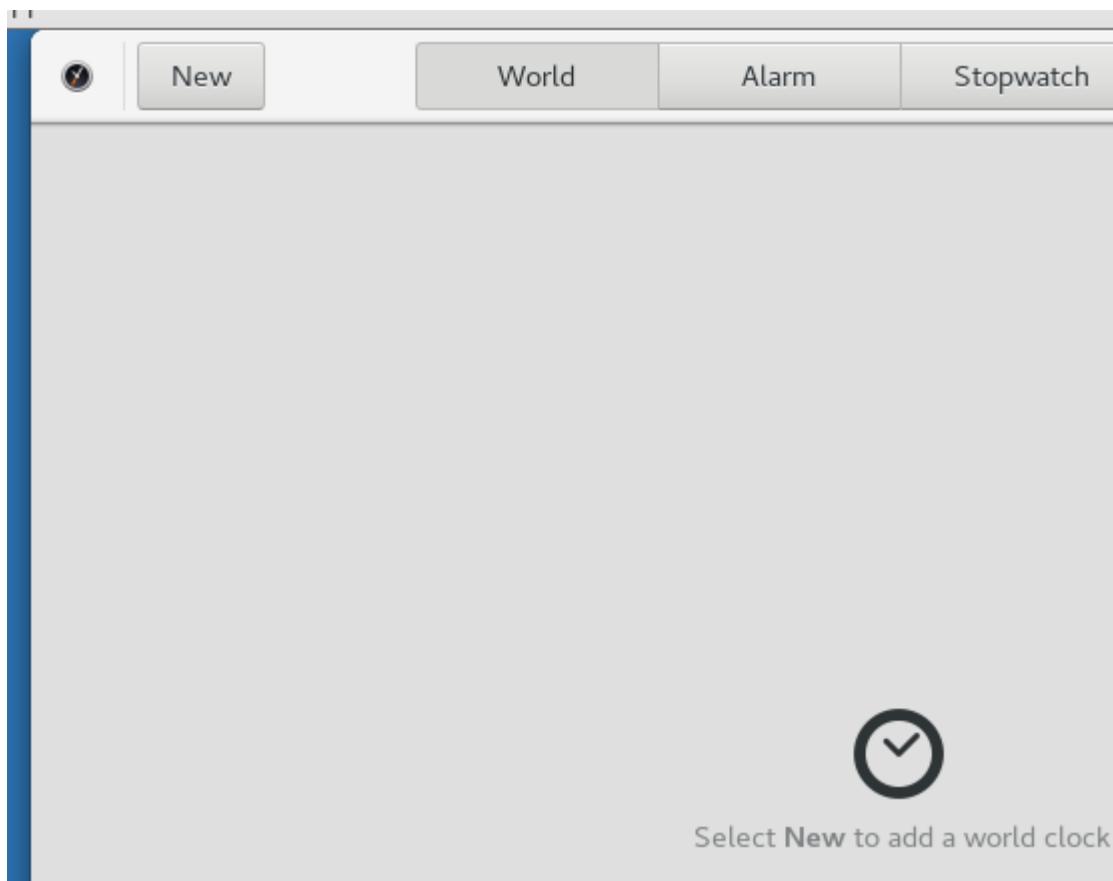
```
export DISPLAY=:0.0;gnome-clocks;
```



**Note:** If you are having difficulty in getting this step to work, run the command string from a terminal window.

3. Click **Save**. Click **Close**.
4. Wait 10 minutes for the threshold update to be distributed, and the threshold to automatically close as a result of the automation, or proceed to the next exercise.

5. Change to the LIN1 server, and watch for the **gnome-clocks** application to open automatically.



6. Return to the Cloud APM console and watch for the event **Linux\_Missing\_Process** to close and the applications to return to a normal status for all monitoring agents for Linux OS.
7. Minimize the **gnome-clocks** application.
8. After you validate that the command is successfully restarting the **gnome-clocks** application, remove the command from the threshold, and minimize the gnome-clocks on the APM, LIN1, and LIN2 systems.

# Exercise 6 Create a threshold with multiple conditions

On some occasions, a single test on a threshold is not enough to detect an issue. Fortunately, the Threshold Manager supports multiple conditions. This exercise creates a threshold with several conditions.

1. Create the file `/tmp/ABC` on both the APM and LIN1 servers.

```
touch /tmp/ABC
```

2. From the APM VM, in the Threshold Manager, create a new threshold with a name of:

**Linux\_File\_Exists**

- a. Use the **Linux OS** data source type.
- b. Set the severity to **Warning**.
- c. Have it check the interval every 30 seconds.
- d. Use the data set **Linux File Information**.
- e. Set the **Display item** field to **Fully\_Qualified\_File\_Name**.
- f. Use the attribute of **Fully\_Qualified\_File\_Name**.

- g. Use the **Equal** Condition, with a value of: /tmp/ABC

The screenshot shows the configuration interface for creating a new threshold. Key fields and their values are:

- Name:** Linux\_File\_Exists
- Severity:** Warning
- Data set:** Linux File Information (selected)
- Display Item:** Fully\_Qualified\_File\_Name
- Logical operator:** And (&)
- Conditions:** Fully\_Qualified\_File\_Name
- Comparison:** equal to /tmp/ABC

3. Set the Group Assignment to be **Linux OS**. Click **Save**. Click **Close**. Look for the events in the My Components application.

Threshold Name	Status	Severity	Display Item	Source
Linux_File_Exists	Open	Warning	/tmp/ABC	lnt1:LZ
Linux_File_Exists	Open	Warning	/tmp/ABC	apm:LZ

4. When the threshold evaluates true and creates two events, delete the ABC file on the /tmp folder on both the APM VM and the LIN1 VM. Observe the situations close.

```
root@apm:~  
File Edit View Search Terminal Help  
[root@apm ~]# touch /tmp/ABC  
[root@apm ~]# rm /tmp/ABC  
rm: remove regular empty file '/tmp/ABC'? y  
[root@apm ~]# █
```



**Note:** The events should close within a minute, rather than the normal 5-minute delay. The threshold evaluates every 30 seconds, and no change was made to the threshold to be distributed. Exit and return to the Events tab to force the event tab to refresh.

5. Create another threshold that is called **Linux\_File\_Exists\_2**. Use identical values to **Linux\_File\_Exists**. See [Step 2](#) on page 5-24.
6. Modify **Linux\_File\_Exists\_2** to add a condition to check for the **System\_Name** to be **lin1:LZ**.
  - a. In the **Conditions** section, click the New icon and edit the condition that is shown.
  - b. Click **OK**.
  - c. Select the **System\_Name** attribute.
  - d. Select **Equal** in the **Operator** list.

- e. Provide a value of: **lin1:LZ**

Add Condition

Count	<input type="checkbox"/>	Time Delta	<input type="checkbox"/>
Attribute	System_Name		
Operator	Equal		
Value *	lin1:LZ		
<b>OK</b>		<b>Cancel</b>	

- f. Click **OK**.

- g. Confirm that your conditions look like this screen capture. Select **Linux OS** for the Group Assignment.

Required consecutive samples  Filter

Data set  Linux Disk Usage Trends  
 Linux File Comparison  
 Linux File Information  
 Linux File Pattern  
 Linux Group  
 Linux Host Availability

Display item Fully\_Qualified\_File\_Name

Logical operator And (&)

Conditions \*

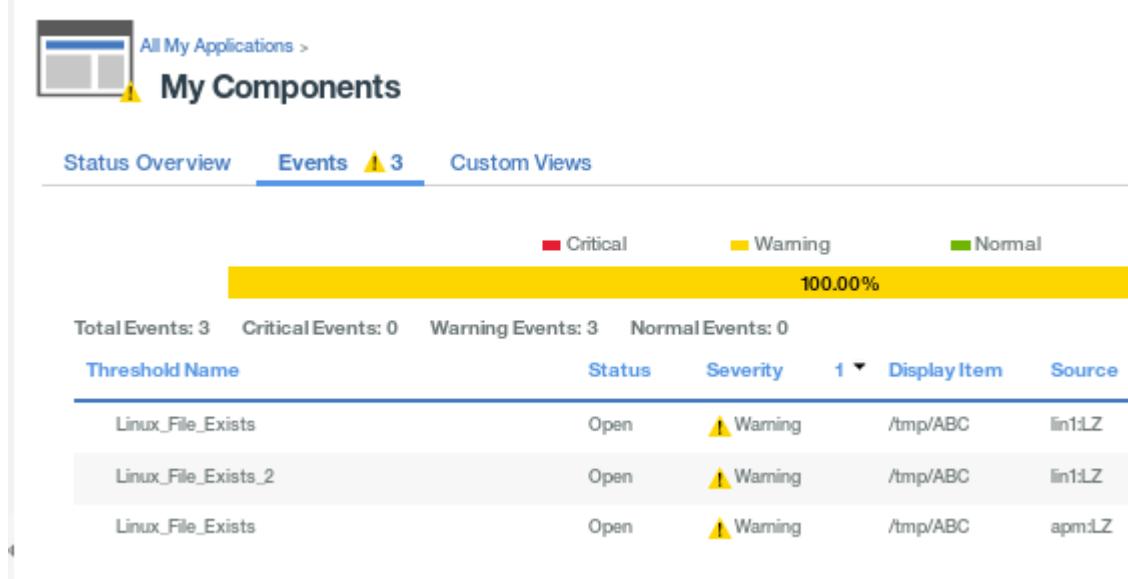
Attribute	Comparison
Fully_Qualified_File_Name	equal to /tmp/ABC
System_Name	equal to lin1:LZ

Group assignment Available groups  
 Linux OS

- h. Click **Save**.
  - i. Click **Close**.
7. Create the file `/tmp/ABC` on both the APM and LIN1 servers.

```
touch /tmp/ABC
```

Within ten minutes, you have three events from these two thresholds.



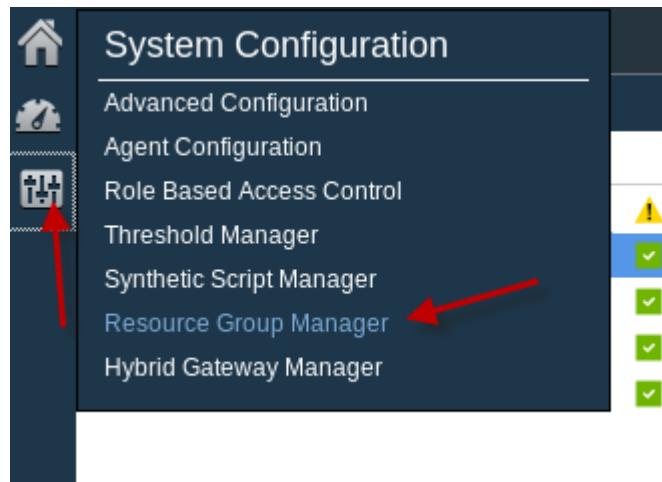
**Note:** Because you have new condition checking for the system name, the Linux\_File\_Exists\_2 threshold is not true on the APM system.

# Exercise 7 Resource Group Management

Resource groups are named collections that can be assigned to event thresholds. You can mix different types of monitoring resources in a group; thresholds are distributed to resources of the same type.

## Work with the Resource group manager

1. Open the performance management console, unless you are already logged in from the APM server, by using Firefox to open the web page:  
<https://apm.ibm.edu:9443>
2. Click **System Configuration > Resource Group Manager** to open the Resource Group Manager.



You start with a resource group name for each agent type that is connected to the Cloud APM server.

[Home > Resource Group Manager](#)

## Resource Group Manager

Use the Resource Group Manager to organize your monitored system resources. Resources are grouped by resource type. You can add or remove resources from a group; thresholds are distributed to members of the same resource group. You can also edit resource properties and filter the list, type inside the Filter text box.

The screenshot shows a table with two columns: 'Resource group name' and 'Resource group description'. There are five rows, each representing a resource group. The first row is 'BluemixIntegration', the second is 'Linux OS' which is selected (indicated by a blue background and a dashed border), the third is 'Linux OS Profiles', the fourth is 'Synthetic Events Agent', and the fifth is 'Transaction Tracking'. Each row has a small circular icon to its left, and a blue pencil icon at the top right of the table header.

Resource group name	Resource group description
BluemixIntegration	This system group contains resources associated with BluemixIntegration, but members can be added to an application and distributed across the Performance Management system.
Linux OS	System group containing all Linux resources.
Linux OS Profiles	System group containing all Linux profiles.
Synthetic Events Agent	System group containing all Synthetic Events Agent resources.
Transaction Tracking	System group containing all Transaction Tracking resources.

3. Click the Linux OS resource group and then the **Edit** icon so that you can review the settings for the Linux OS resource group.

The screenshot shows a list of resource groups. The 'Linux OS' group is selected, highlighted with a blue border. A red arrow points to the 'Edit' icon at the top of the screen. Another red arrow points to the selected 'Linux OS' row. The 'Resource group description' section is visible on the right.

Resource group	Description
BluemixIntegration	This system group contains resources from the BluemixIntegration, but members have not been added to an application and do not have access to the Performance Management.
<b>Linux OS</b>	<b>System group containing all Linux operating system resources.</b>
Linux OS Profiles	System group containing all Linux OS profiles.
Synthetic Events Agent	System group containing all Synthetic Events Agent resources.
Transaction Tracking	System group containing all Transaction Tracking resources.

4. Observe the group name, group description, and the resource assignment. Scroll down to observe all of the resources. Observe all the thresholds.
5. Locate the thresholds, **Linux\_File\_Exists**, and **Linux\_File\_Exists\_2** and remove them from the Linux OS group by clearing the check box indicated:

The screenshot shows the 'Threshold assignment' section. The 'Linux\_Disk\_Space\_Low' threshold is selected, indicated by a blue background and a checked checkbox. Two red arrows point to the checkboxes for 'Linux\_File\_Exists' and 'Linux\_File\_Exists\_2', which are currently checked. A legend at the bottom indicates that a blue square means 'Linux Fragmented File System' and an empty square means 'Show only selected thresholds'.

Threshold assignment

Threshold name

Linux\_Disk\_Space\_Low

Linux\_File\_Exists

Linux\_File\_Exists\_2

Linux Fragmented File System

Show only selected thresholds



**Hint:** Use the **Filter** field to search on **Linux\_File**.

The screenshot shows a user interface for managing resources. At the top, there are two tabs: "Linux OS" and "On Premises". Below the tabs is a search/filter bar with the text "Linux\_File" and a magnifying glass icon. Two red arrows point to this bar from the left and right. Underneath the bar is a table with two columns: "Type" and "Origin". The first row shows "Linux OS" under Type and "Custom" under Origin. The second row shows "Linux OS" under Type and "Custom" under Origin. The second row is highlighted with a light gray background.

Type	Origin
Linux OS	Custom
Linux OS	Custom

6. Click **Save**.

7. Click **Close**.

Because the thresholds were removed from the Resource List, the **Linux\_File\_Exists** and **Linux\_File\_Exists2** events close within 5 minutes.

## Create a resource group

8. Open the **Resource Group Manager**.

9. Click the New icon.

The screenshot shows the 'Resource Group Manager' page. At the top, there is a breadcrumb navigation: Home > Resource Group Manager. Below the title 'Resource Group Manager', there is a brief description: 'Use the Resource Group Manager to organize resources into groups; thresholds are distributed to members of the group. To filter the list, type inside the Filter text box.' A red arrow points to the '+ New' button, which is located above a table. The table has columns for 'Name', 'Type', 'Description', and 'Status'. It lists four items: 'Bluemix Integration' (selected), 'Linux OS', 'Synthetic Events Agent', and 'Transaction Tracking'. The 'Bluemix Integration' row is highlighted with a blue background.

Name	Type	Description	Status
Bluemix Integration	Threshold	Bluemix integration thresholds	Normal
Linux OS	System	Linux OS thresholds	Normal
Synthetic Events Agent	System	Synthetic events agent thresholds	Normal
Transaction Tracking	System	Transaction tracking thresholds	Normal

10. Enter a Group name of: **Linux\_WAS\_Servers**

11. Enter a Group description of: **This resource group is for Linux servers that have WebSphere Application Servers and the software that supports the application servers.**

12. Select only the Monitoring Agent for Linux OS that is running on the LIN1 and LIN2 servers.

- lin1:LZ
- lin2:LZ

Group name *	<input type="text"/> Linux_WAS_Servers
Group description	<input type="text"/> This resource group is for Linux servers that have <del>Web</del> supports the application servers.

Resource assignment	Available resource	Host name
<input type="checkbox"/>	KBI-GEN-HOSTNAME:BI	apm.ibm.edu
<input type="checkbox"/>	KTE-GEN-HOSTNAME:TE	apm.ibm.edu
<input checked="" type="checkbox"/>	lin1:LZ	lin1
<input checked="" type="checkbox"/>	lin2:LZ	lin2.ibm.edu
<input type="checkbox"/>	Show only selected resources	

13. Select all the thresholds in the **Threshold Assignment** list that pertain to Linux OS.

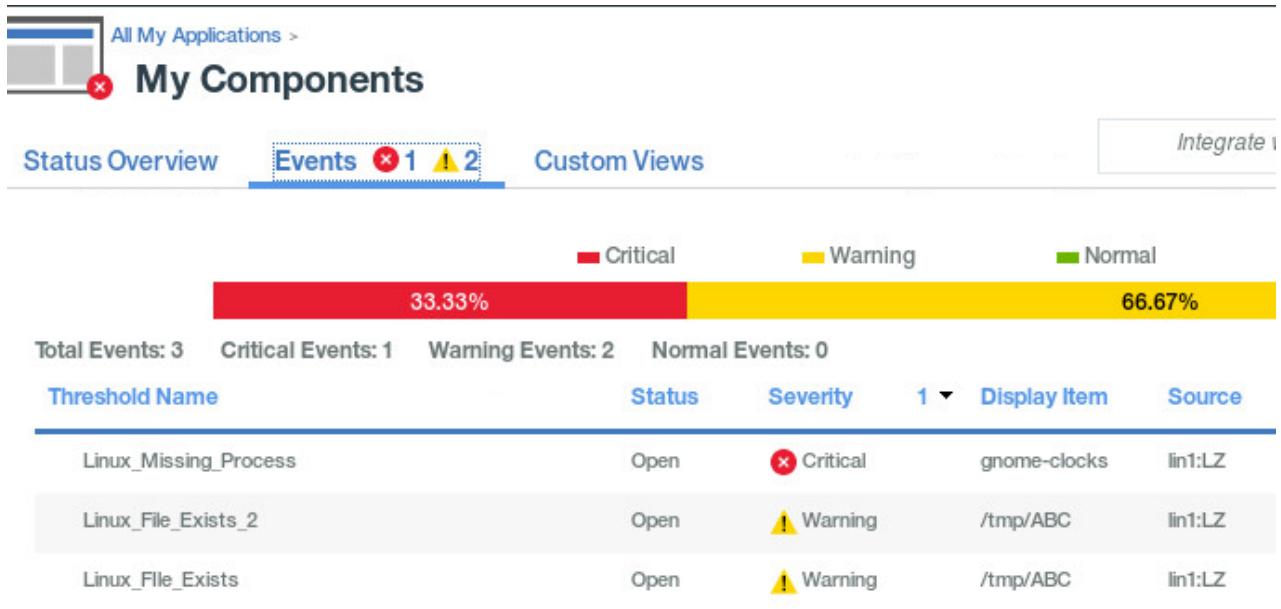


**Hint:** Select the **Type** column to sort by type of thresholds.

Threshold assignment	Threshold name	Description	Type	Origin
<input checked="" type="checkbox"/>	KLZ_Log_Profile_Error	Log file configuration error.	Linux OS	Predefined
<input checked="" type="checkbox"/>	Linux_BP_AvgCpuBusyPctTh_Critic	Monitors total percent CPU (system + user) busy for the sum of all the CPU's on the system	Linux OS	Predefined
<input checked="" type="checkbox"/>	Linux_BP_CpuWaitIOPct_Warning	Monitors CPU I/O Waits	Linux OS	Predefined
<input type="checkbox"/> Show only selected thresholds				
<input type="button" value="Save"/> <input type="button" value="Cancel"/>				

14. Click **Save**.

15. On the LIN1 VM, close the gnome-clocks application.
16. Wait a few minutes and open the **Events** option for My Components.



The **Linux\_File\_Exists** and **Linux\_File\_Exists2** events are included in this resource list, and the Monitoring Agent for Linux OS on the LIN1 server is included in the resource list. Therefore, the events return, but only on LIN1, not on the APM server.

Also, observe that the event from the **Linux\_Missing\_Process** was redistributed and is true provided you closed gnome-clocks.

17. After these events are validated, do these steps on the LIN1 VM to clear the events out from the Cloud APM Console.

- a. From a terminal window, remove the file `/tmp/ABC` by using the command:

```
rm /tmp/ABC
```

- b. From a terminal window, start the gnome-clocks application and minimize it.

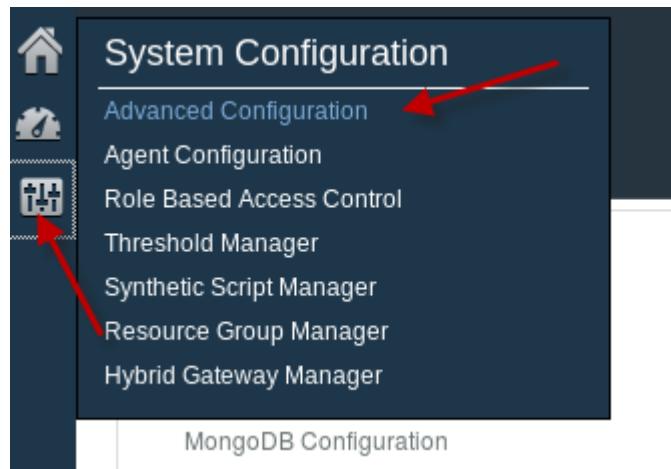
```
gnome-clocks &
```

# Exercise 8 Event notification

Events that are produced can be sent to email IDs. This exercise uses the Linux-provided postfix process as the mail server on the APM VM to avoid installing and introducing another product to this course.

## Update the Advanced Configuration Event Manager

1. From the Cloud APM console, click the System Configuration icon, which looks like three levers. Click **Advanced Configuration**.



- From Advanced Configuration, click **Event Manager**.

The screenshot shows the 'Advanced Configuration' interface. At the top, there's a navigation bar with icons for Home, Advanced Configuration, and other settings. Below the navigation bar, the title 'Advanced Configuration' is displayed. On the left, there's a sidebar with three icons. The main content area is titled 'Configuration Categories' and lists several items: UI Integration, Event Manager, MongoDB Configuration, Agent Central Configuration, Data Mart, Kafka Configuration, Tracking Analytics Service, Agent Subscription Facility, and Thresholds Enablement. The 'Event Manager' item is highlighted with a blue background and has a red arrow pointing to it.

- Change the parameters as follows:

- a. Change **Target Email Addresses** to: `root@apm.ibm.edu`

- b. Change the Sending Email Account to: `root`

- c. Change the **Sending Email Account Password** to: `object00`

- d. Change SMTP Server Address to: `apm.ibm.edu`

The SMTP server is a Postfix mail server on the APM VM. In a production environment, this address is your mail server.

The screenshot shows the 'Event Manager' configuration page. It has several input fields with red arrows pointing to them:

- 'Target Email Addresses': The value is `root@apm.ibm.edu`.
- 'Sending Email Account': The value is `root`.
- 'Sending Email Account Password': The value is `*****`.
- 'SMTP Server Address': The value is `apm.ibm.edu`.

- e. Click **Save** to save the configuration.
4. From the save configuration window, click **Close**.
5. Wait 5 minutes for the configuration update to take effect.

## Examine mail for root on the APM VM

6. On the APM VM, open a terminal window. Enter the `mailx` command.

`mailx`

```
root@apm ~]# mailx
leirloom Mail version 12.5 7/5/10. Type ? for help.
/var/spool/mail/root": 134 messages 132 unread
  1 Anacron      Fri Dec 29 03:32 18/611 "Anacron job 'cron.daily' on apm.j
  2 root@apm.ibm.edu Fri Dec 29 13:10 95/4214 "Linux_Mem_Utilization_High_Warn c
U  3 root@apm.ibm.edu Fri Dec 29 13:10 58/2418 "Linux_Mem_Utilization_High_Warn c
U  4 root@apm.ibm.edu Fri Dec 29 13:10 57/2267 "Agent_KTE-GEN-HOSTNAME:TE has res
U  5 root@apm.ibm.edu Fri Dec 29 13:10 54/2160 "APM_Agent_Offline on lin1:LZ (Clc
U  6 root@apm.ibm.edu Fri Dec 29 13:10 54/2188 "APM_Agent_Offline on LZ:lin1_WAS
U  7 root@apm.ibm.edu Fri Dec 29 13:10 54/2261 "APM_Agent_Offline on KTE-GEN-HOS
U  8 root@apm.ibm.edu Fri Dec 29 13:10 57/2267 "Agent_KBI-GEN-HOSTNAME:BI has res
U  9 root@apm.ibm.edu Fri Dec 29 13:10 54/2262 "APM_Agent_Offline on KBI-GEN-HOS
U 10 root@apm.ibm.edu Fri Dec 29 13:10 57/2267 "Agent_SyntheticsEvents:S0 has res
U 11 root@apm.ibm.edu Fri Dec 29 13:10 54/2262 "APM_Agent_Offline on SyntheticsEv
U 12 root@apm.ibm.edu Fri Dec 29 13:10 95/4306 "KLZ_Log_Profile_Config_Error on L
U 13 root@apm.ibm.edu Fri Dec 29 13:10 95/4214 "Linux_Mem_Utilization_High_Warn c
U 14 root@apm.ibm.edu Fri Dec 29 13:10 58/2419 "Linux_Mem_Utilization_High_Warn c
U 15 root@apm.ibm.edu Fri Dec 29 13:10 57/2269 "Agent_KTE-GEN-HOSTNAME:TE has res
U 16 root@apm.ibm.edu Fri Dec 29 13:10 54/2261 "APM_Agent_Offline on KTE-GEN-HOS
U 17 root@apm.ibm.edu Fri Dec 29 13:10 54/2162 "APM_Agent_Offline on lin1:LZ (Clc
U 18 root@apm.ibm.edu Fri Dec 29 13:10 54/2188 "APM_Agent_Offline on LZ:lin1_WAS
U 19 root@apm.ibm.edu Fri Dec 29 13:10 57/2268 "Agent_KBI-GEN-HOSTNAME:BI has res
U 20 root@apm.ibm.edu Fri Dec 29 13:10 54/2263 "APM_Agent_Offline on KBI-GEN-HOS
U 21 root@apm.ibm.edu Fri Dec 29 13:10 57/2268 "Agent_SyntheticsEvents:S0 has res
U 22 root@apm.ibm.edu Fri Dec 29 13:10 54/2262 "APM_Agent_Offline on SyntheticsEv
U 23 root@apm.ibm.edu Fri Dec 29 13:10 60/2391 "KLZ_Log_Profile_Config_Error on
U 24 root@apm.ibm.edu Fri Dec 29 13:10 58/2292 "Linux_Mem_Utilization_High_Warn c
U 25 root@apm.ibm.edu Fri Dec 29 13:10 79/3656 "Linux_Disk_Space_Low on lin1:LZ (
U 26 root@apm.ibm.edu Fri Dec 29 13:10 79/3293 "Linux_Disk_Space_Low on lin1:LZ (
U 27 root@apm.ibm.edu Fri Dec 29 13:10 79/3290 "Linux_Disk_Space_Low on lin1:LZ (
U 28 root@apm.ibm.edu Fri Dec 29 13:10 79/3353 "Linux_Disk_Space_Low on lin1:LZ (
U 29 root@apm.ibm.edu Fri Dec 29 13:10 79/3259 "Linux_Disk_Space_Low on lin1:LZ (
U 30 root@apm.ibm.edu Fri Dec 29 13:10 79/3307 "Linux_Disk_Space_Low on lin1:LZ (
U 31 root@apm.ibm.edu Fri Dec 29 13:10 79/3442 "Linux_Disk_Space_Low on lin1:LZ (
```

Examine the column that displays the subjects in quotation marks.

7. Each number represents a separate email. At the ampersand prompt, enter a number to view the contents of one of the emails that match a threshold name you recognize.

U 27 root@apm.ibm.edu	Fri Dec 29 13:10	79/3290	"Linux_Disk_Space_Low on lin1:LZ (Notification)"
U 28 root@apm.ibm.edu	Fri Dec 29 13:10	79/3353	"Linux_Disk_Space_Low on lin1:LZ (Notification)"
U 29 root@apm.ibm.edu	Fri Dec 29 13:10	79/3259	"Linux_Disk_Space_Low on lin1:LZ (Notification)"
U 30 root@apm.ibm.edu	Fri Dec 29 13:10	79/3307	"Linux_Disk_Space_Low on lin1:LZ (Notification)"
U 31 root@apm.ibm.edu	Fri Dec 29 13:10	79/3442	"Linux_Disk_Space_Low on lin1:LZ (Notification)"
& 31			

8. Examine the email for information from the Event Manager. The configuration of the Event Manager produced the From, To, Subject, and the email text. The following example is the first half of the email.

**Message 31:**

```
From root@apm.ibm.edu  Fri Dec 29 13:10:31 2017
Return-Path: <root@apm.ibm.edu>
X-Original-To: root@apm.ibm.edu
Delivered-To: root@apm.ibm.edu
From: root@apm.ibm.edu
To: root@apm.ibm.edu
Subject: Linux_Disk_Space_Low on lin1:LZ (Notification)
Content-Type: text/plain; charset=us-ascii
Date: Fri, 29 Dec 2017 13:10:31 -0500 (EST)
Status: R0
```

The text below lists the information received from the agent that triggered the event. The Description and Severity values specify the name of the attribute/value pairs present in the threshold event, in this case:

```
Server IP  : 192.168.122.1 (192.168.1.102)
Agent IP   : 192.168.1.104
Agent       : lin1:LZ
Severity    : warning
Description: Linux_Disk_Space_Low[Disk_Free_Percent <= 99]
              ITM_KLZ_Disk
              ManagedSystemGroups='*LINUX_SYSTEM'
              TenantID=5ABE-3FCF-4F36-230D-1C4E-0731-F9DD-7E33
              adapter_host=lin1.ibm.edu
              apm_hostname=192.168.1.102
              appl_label=A:P:S
              date=12/29/2017
              disk_free=160213
              disk_free_percent=89
              disk_name=/dev/sda2
```

--More--

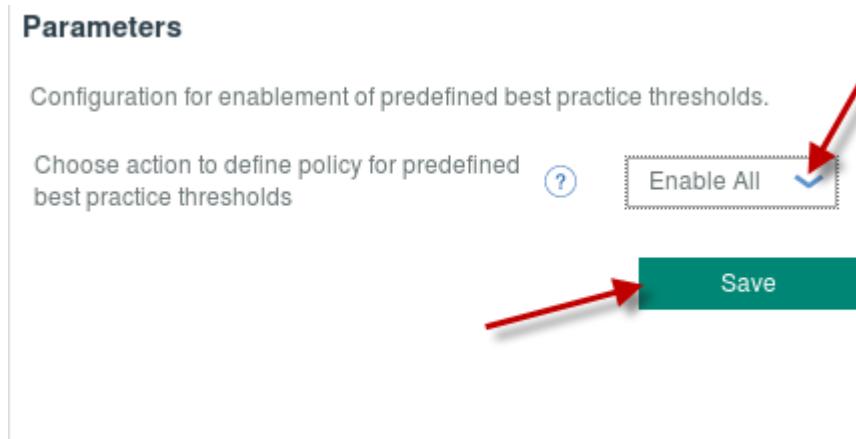
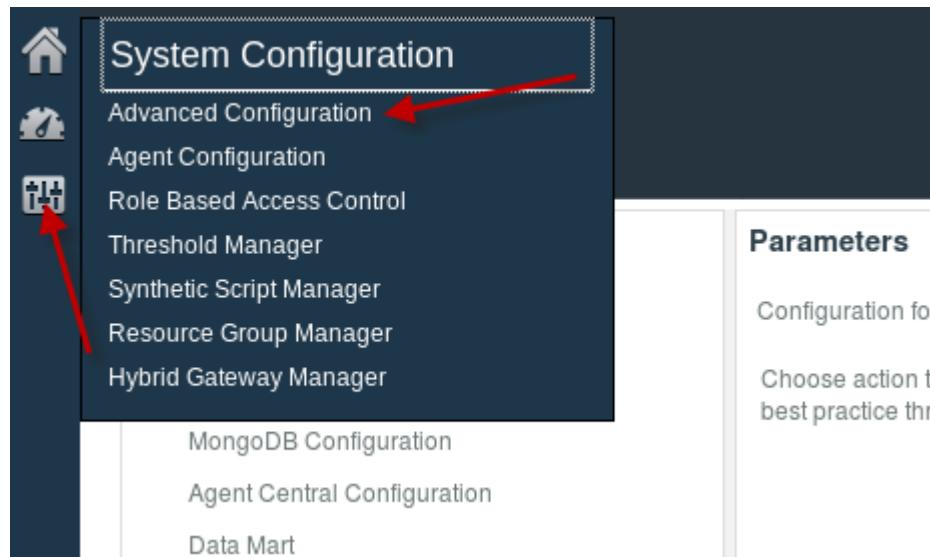
9. If the email exceeds the length of the screen, type the letter **d** to scroll to the next screen.

At the ampersand prompt, type the letter **q** to exit the mail application.

## Enable product-provided thresholds

In this section, you enable the product-provided thresholds that you disabled in [Exercise 2, “Stop all product-provided thresholds from running”](#)

10. On APM, return to the **Cloud APM** console and re-enable the product-provided thresholds by selecting **System Configuration > Advanced Configuration > Thresholds Enablement > Enable All > Save > Close**.



---

# **Unit 6 Monitoring the user experience of applications exercises**

In the exercises for this unit, you deploy front-end transactional monitoring with the Response Time and HTTP Server agents.

## **Exercise 1 Install the Monitoring Agent for HTTP Server on Linux**

This exercise guides you through installing the Monitoring Agent for HTTP Server on the LIN1 VM.

1. On VM LIN1, in a terminal window confirm that the HTTP server is running:

```
ps -ef |grep httpd
```

```
[root@lin1 bin]# ps -ef |grep httpd
root      7780  65198  0 07:48 pts/0      00:00:00 grep --color=auto httpd
nobody    21951  92447  0 Jan05 ?          00:02:06 /opt/IBM/HTTPServer/bin/httpd -d /opt/IBM/HTTPServer -k start
root      92447     1  0 Jan05 ?          00:00:16 /opt/IBM/HTTPServer/bin/httpd -d /opt/IBM/HTTPServer -k start
nobody    92454  92447  0 Jan05 ?          00:00:00 /opt/IBM/HTTPServer/bin/httpd -d /opt/IBM/HTTPServer -k start
nobody    92461  92447  0 Jan05 ?          00:00:20 /opt/IBM/HTTPServer/bin/httpd -d /opt/IBM/HTTPServer -k start
nobody    92462  92447  0 Jan05 ?          00:02:00 /opt/IBM/HTTPServer/bin/httpd -d /opt/IBM/HTTPServer -k start
[root@lin1 bin]#
```

If it is not running, start it now with the following command:

```
/opt/IBM/HTTPServer/bin/apachectl start
```

2. In the terminal window, change to the following directory:

```
/downloads/APM814/agent/APMADV_Agent_Install_8.1.4.0
```

3. Run the command: `./installAPMAgents.sh`

```
File Edit View Search Terminal Help
[root@lin1 APMADV_Agent_Install_8.1.4.0]# ./installAPMAgents.sh
```

The following products are available for installation:

- 1) Monitoring Agent for Cisco UCS
- 2) Monitoring Agent for DataPower
- 3) Monitoring Agent for DB2
- 4) Monitoring Agent for HTTP Server
- 5) Monitoring Agent for IBM Integration Bus
- 6) Monitoring Agent for JBoss
- 7) Monitoring Agent for Linux KVM
- 8) Monitoring Agent for MongoDB
- 9) Monitoring Agent for WebSphere MQ
- 10) Monitoring Agent for MySQL
- 11) Monitoring Agent for NetApp Storage
- 12) Monitoring Agent for Nodejs
- 13) Monitoring Agent for OpenStack
- 14) Monitoring Agent for Oracle Database
- 15) Monitoring Agent for Linux OS
- 16) Monitoring Agent for PHP
- 17) Monitoring Agent for PostgreSQL
- 18) Response Time Monitoring Agent
- 19) Monitoring Agent for Ruby
- 20) Monitoring Agent for SAP Applications
- 21) Monitoring Agent for Siebel
- 22) Monitoring Agent for Synthetic Playback
- 23) Monitoring Agent for Tomcat
- 24) Monitoring Agent for VMware VI
- 25) Monitoring Agent for WebSphere Applications
- 26) Monitoring Agent for WebLogic
- 27) Monitoring Agent for WebSphere Infrastructure Manager
- 28) all of the above

Type the numbers that correspond to the products that you want to install. Type "q" to quit selection.

If you enter more than one number, separate the numbers by a space or comma.

Type your selections here (For example: 1,2): █

4. Select **4** to install the **Monitoring Agent for HTTP Server**.
5. Press Enter to confirm your selection.
6. Press Enter to confirm the agent home of `/opt/ibm/apm/agent`.

7. Select **1** to accept the license agreement.

Type the numbers that correspond to the products that you want to install. Type "q" to quit selection.

If you enter more than one number, separate the numbers by a space or comma.

Type your selections here (For example: 1,2): 4

The following agents will be installed:

Monitoring Agent for HTTP Server

Are your selections correct [ 1-Yes, 2-No; default is 1 ]?

Please specify the agent home (default: /opt/ibm/apm/agent):

The agent will be installed in /opt/ibm/apm/agent

Do you accept the license agreement(s) found in the directory /downloads/APMADV\_Agent\_I  
nstall\_8.1.4.0/licenses?

Please enter [ 1-to accept the agreement, 2-to decline the agreement ] : 1

User has accepted the license agreement(s).

Monitoring Agent for HTTP Server will be installed.

Installing Monitoring Agent for HTTP Server.

The agent installation takes approximately 5 minutes.

```
#####
#####
```

The following agents were installed successfully into the /opt/ibm/apm/agent directory:

Monitoring Agent for HTTP Server

Agent status:

Agent is running. Process ID is 28413

Server connection status: Connected

For more information, see the following file: /opt/ibm/apm/agent/logs/hu\_ServerConnectionStatus.txt

The installation log file is /opt/ibm/apm/agent/logs/APMAgents\_install.log.

For any agent that is running, the agent is configured with the default settings.

To configure your agents, use the following detailed instructions:

For IBM Cloud Application Performance Management SaaS:

<http://ibm.biz/kc-ipmcloud-configagent>

For IBM Cloud Application Performance Management On Premises:

<http://ibm.biz/kc-ipm-configagent>

As part of the configuration instructions, you will use the following commands to configure and manage each installed agent:

Monitoring Agent for HTTP Server /opt/ibm/apm/agent/bin  
/http\_server-agent.sh start or stop or status or uninstall

```
#####
#####
```

```
[root@lin1 APMADV Agent Install 8.1.4.01# ]
```

The HTTP Server agent is installed, started, and connected to the APM server.

## Install the HTTP Server Response Time plug-in

To fully use the integration between the HTTP Server and the Response Time agent, install the HTTP Server Response Time plug-in to your HTTP server. With HTTP Server Response Time plug-in, application performance data can be collected from the user's browser if JavaScript is enabled.

8. Change directory to /opt/ibm/apm/agent/tmp/khu and list the contents of the directory.

9. Display the contents of the file **khu.opt.IBM.HTTPServer.conf.httpd.conf** by using the **cat** command.

```
[root@lin1 APADV_Agent_Install_8.1.4.0]# cd /opt/ibm/apm/agent/tmp/khu/
[root@lin1 khu]# ls
discovery  khu_cps.properties  khu.opt.IBM.HTTPServer.conf.httpd.conf
[root@lin1 khu]# cat khu.opt.IBM.HTTPServer.conf.httpd.conf
#
# Settings for Monitoring Agent for HTTP Server module.
#
#LoadModule alias_module modules/mod_alias.so

LoadModule khu_module "/opt/ibm/apm/agent/lx8266/hu/lib/khuapache24dc_64.so"

<IfModule mod_khu.c>
    KhuShmemPerm 660
    KhuShmemPath "/opt/IBM/HTTPServer/conf/httpd.conf"
    KhuCpsPath "/opt/ibm/apm/agent/tmp/khu/khu_cps.properties"
</IfModule>

Alias /khu "/opt/ibm/apm/agent/lx8266/hu/etc"
<Directory "/opt/ibm/apm/agent/lx8266/hu/etc">
    #Order deny,allow
    #Allow from all
    Require all granted
</Directory>

LoadModule wrt_module /opt/ibm/apm/agent/lx8266/hu/lib/mod_wrt_ap24_64.so
WrtOriginID HU:lin1_httpd:HUS
[root@lin1 khu]#
```

This IBM HTTP Server configuration file must include the **khu.opt.IBM.HTTPServer.conf.httpd.conf** file to collect data for the Monitoring Agent for HTTP.

10. Change to the **/opt/IBM/HTTPServer/conf** directory.

```
cd /opt/IBM/HTTPServer/conf
```

11. Make a backup copy of the file **httpd.conf**.

```
cp httpd.conf httpd.conf.orig
```

12. Edit the file **httpd.conf** with the **gedit** editor.

```
[root@lin1 khu]# cd /opt/IBM/HTTPServer/conf
[root@lin1 conf]# cp httpd.conf httpd.conf.orig
[root@lin1 conf]# gedit httpd.conf
```

13. Scroll to the bottom of the file and add the line:

```
Include "/opt/ibm/apm/agent/tmp/khu/khu.opt.IBM.HTTPServer.conf.httpd.conf"

# GlobalLog logs/cookie-debug.log "%h %l %u %t \"%r\" %>s %b %{User-Agent}i %D %{RH}e %
{WAS}e %{Age}o %{Cache-Control}i exp=%{Expires}o %{Cache-Control}o SC=\"%{Set-Cookie}o
\" C=\"%{Cookie}i\" %{Location}o"

LoadModule was_ap24_module /opt/IBM/WebSphere/Plugins/bin/64bits/mod_was_ap24_http.so
WebSpherePluginConfig /opt/IBM/WebSphere/Plugins/config/webserver1/plugin-cfg.xml
```

**Include "/opt/ibm/apm/agent/tmp/khu/khu.opt.IBM.HTTPServer.conf.httpd.conf"**

Plain Text ▾ Tab Width: 8 ▾ Ln 877, Col 76 ▾

INS



**Hint:** This setting is case-sensitive. Confirm that the quotation marks are placed as shown.

14. Save the change and close gedit.

15. Change to the directory **/opt/IBM/HTTPServer/bin**.

16. Recycle the IBM HTTP Server to pick up the configuration changes.

```
./apachectl stop
```

```
./apachectl start
```

```
[root@lin1 conf]# gedit httpd.conf
[root@lin1 conf]# gedit httpd.conf
[root@lin1 conf]# cd /opt/IBM/HTTPServer/bin
[root@lin1 bin]# ./apachectl stop
[Sun Oct 01 06:34:05.120761 2017] [:notice] [pid 15048:tid 140276285990720] mod_wrt: sh
ared memory initialized. pid: 15048
[Sun Oct 01 06:34:05.133162 2017] [:notice] [pid 15048:tid 140276285990720] KHU DC - Se
rver stopped.
[root@lin1 bin]# ./apachectl start
[Sun Oct 01 06:34:15.594341 2017] [:notice] [pid 15142:tid 140417513506624] mod_wrt: sh
ared memory initialized. pid: 15142
[root@lin1 bin]#
```



**Hint:** These error messages can be ignored.

## Exercise 2 Install the Response Time Monitoring Agent on Linux

This exercise guides you through installing the Response Time Agent on the LIN1 Linux based VM.

1. On VM LIN1, in a terminal window, change to the following directory:

/downloads/APM814/agent/APMADV\_Agent\_Install\_8.1.4.0.

2. Run the command `./installAPMAgents.sh`.

The APM agents installer opens with a list of agents to install.

3. Select **18** to install the **Response Time Monitoring Agent**.

4. Press Enter to confirm your selection.

5. Press Enter to confirm the agent home of `/opt/ibm/apm/agent`.

6. Select **1** to accept the license agreement.

Type your selections here (For example: 1,2): 18

The following agents will be installed:

Response Time Monitoring Agent

Are your selections correct [ 1-Yes, 2-No; default is 1 ]?

Please specify the agent home (default: /opt/ibm/apm/agent):

The agent will be installed in /opt/ibm/apm/agent

Do you accept the license agreement(s) found in the directory /downloads/APMADV\_Agent\_Install\_8.1.4.0/licenses?

Please enter [ 1-to accept the agreement, 2-to decline the agreement ] : 1

The agent installation takes approximately 5 minutes.

These messages indicate a successful installation:

The following agents were installed successfully into the /opt/ibm/apm/agent directory:  
Response Time Monitoring Agent

Agent status:

Agent is running. Process ID is 28949  
Server connection status: Connected

For more information, see the following file: /opt/ibm/apm/agent/logs/t5\_ServerConnectionStatus.txt

The installation log file is /opt/ibm/apm/agent/logs/APMAgents\_install.log.

For any agent that is running, the agent is configured with the default settings.

To configure your agents, use the following detailed instructions:

For IBM Cloud Application Performance Management SaaS:  
<http://ibm.biz/kc-ipmcloud-configagent>

For IBM Cloud Application Performance Management On Premises:  
<http://ibm.biz/kc-ipm-configagent>

As part of the configuration instructions, you will use the following commands to configure and manage each installed agent:

Response Time Monitoring Agent /opt/ibm/apm/agent/bin  
/rt-agent.sh start or stop or status or uninstall

```
#####
#root@lin1 APMADV Agent Install 8.1.4.01#
```



**Important:** If you install the Response Time agent without or before the HTTP Server agent, more configuration is necessary.

# Exercise 3 Introduction to DayTrader and driving HTTP transactions

In this exercise, you set up automation to continuously use the Day Trader application. This process creates activity within the application that can be monitored by the various Cloud APM agents you deploy in this course.

In the next exercise in this unit, you view the front-end monitoring data that is gathered by the Response Time and HTTP Server agents. In exercises in later units, you see the back-end monitoring data that is gathered by other agents, such as the WebSphere, DB2, and transaction tracking agents.

1. On LIN1, open a Firefox browser by double-clicking the Firefox icon on the desktop.



2. Open the following URL:

<http://lin1/daytrader/app>



**Hint:** You can also select the DayTrader Login link from the bookmark list.

A screenshot of a web browser window. The address bar shows the URL "lin1.ibm.edu/daytrader/app". The title bar says "DayTrader Login". The main content area displays the "Log in" form with fields for "Username" (uid:0) and "Password" (three dots). Below the form, a message says "First time user? Please Register" with a link "Register With DayTrader". The browser has a red bar at the bottom with the text "DayTrader Login" and "DayTrader".

DayTrader Login

DayTrader Login | DayTrader

Log in

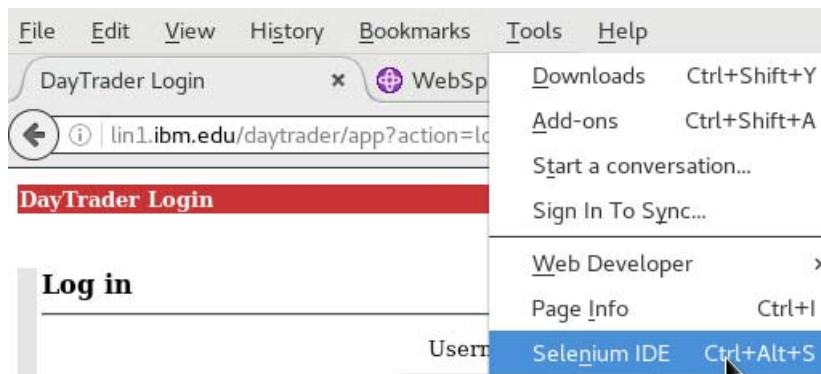
Username: uid:0      Password: •••

First time user? Please Register

[Register With DayTrader](#)

DayTrader Login | DayTrader

- From Firefox, select **Tools > Selenium IDE** to start the plug-in.

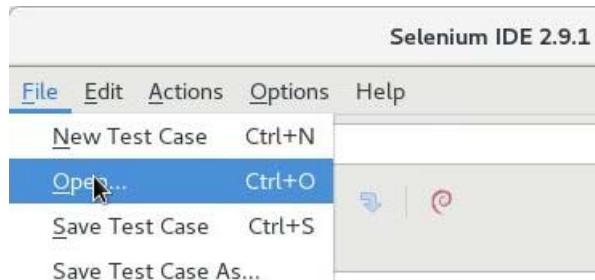


**Hint:** Reposition the Selenium IDE and Firefox browser windows so that you can see both at the same time.

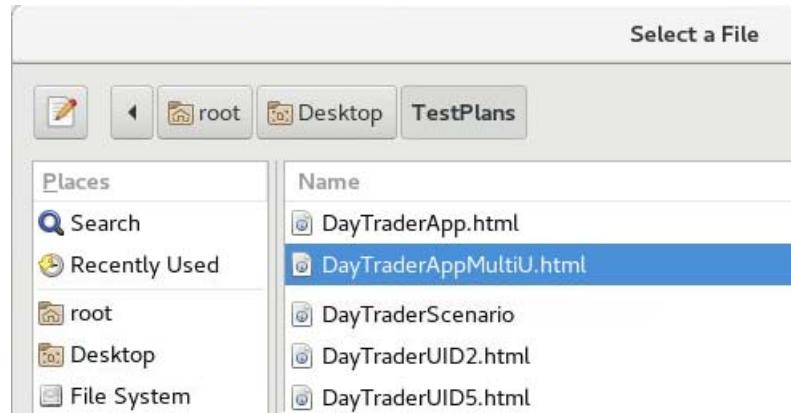
The Selenium IDE plug-in for Firefox can be used to create and run scripts that do actions within an application from the Firefox browser. In this exercise, you set up automation that runs a Selenium script every 5 minutes, which completes the actions in the DayTrader application that you did in the previous section. In this manner, you ensure continuous activity to be monitored.

**Important:** In the Synthetic Transaction unit, you learn how to create Selenium IDE scripts and deploy them with APM to create synthetic transaction monitoring, another type of front-end transaction monitoring.

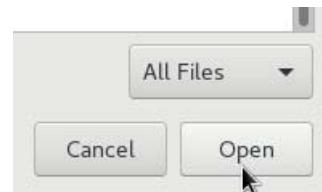
- In Selenium IDE, click **File > Open**.



5. Locate and click the `DayTraderAppMultiU.html` script that is located in `/root/Desktop/TestPlans`.



6. Click **Open**.

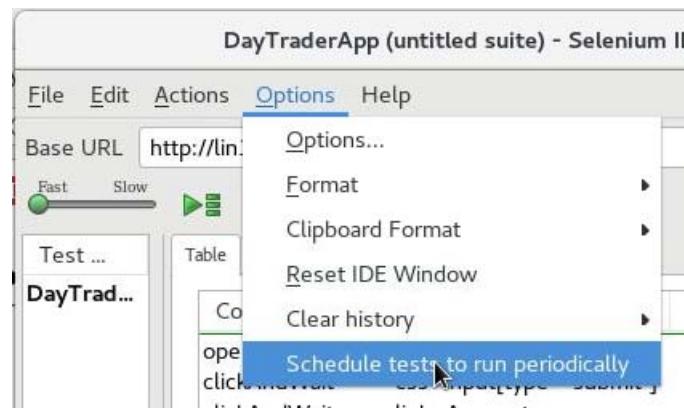


The `DayTraderAppMultiU.html` script opens in Selenium IDE.

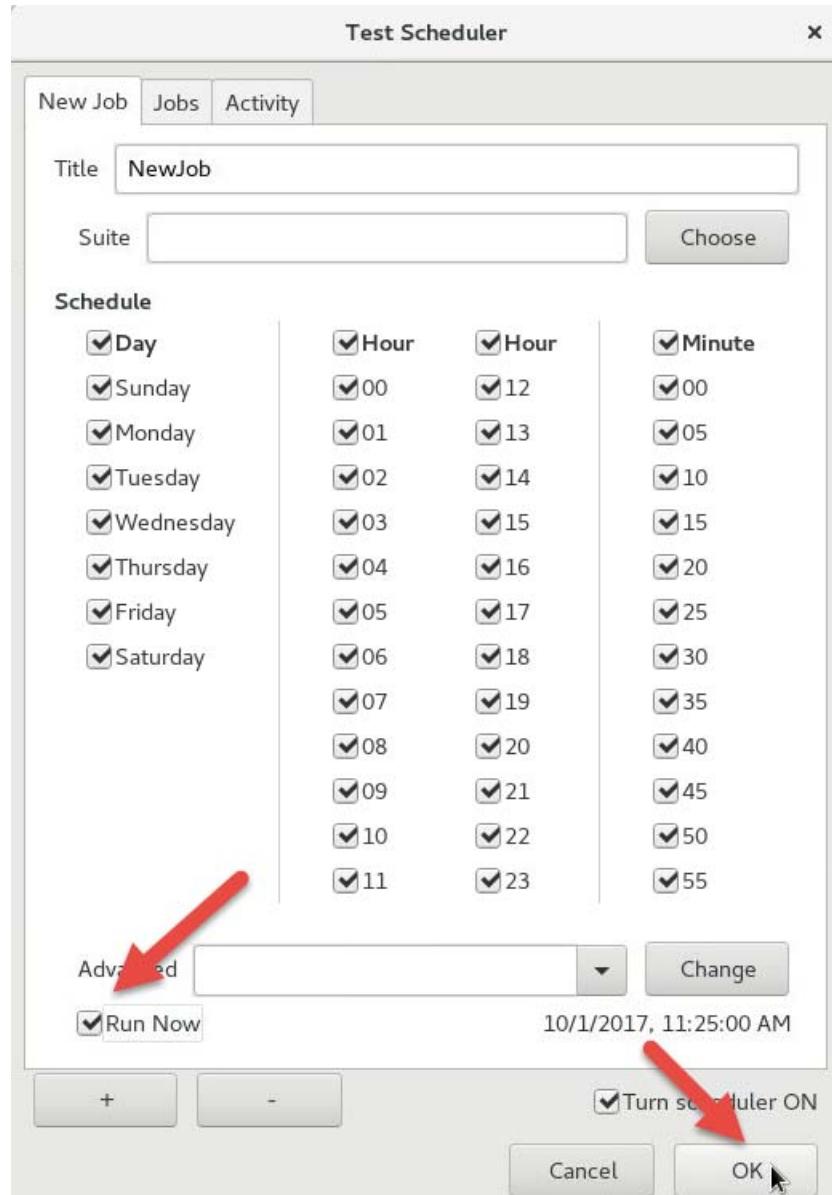
Command	Target	Value
open	/daytrader/app	
clickAndWait	css=input[type="submit"]	
open	/daytrader/app?action=...	
open	/daytrader/app?action=...	
clickAndWait	name=action	

This script logs in to the DayTrader application as three different users and completes various actions similar to those actions you completed in the first part of this exercise. It also attempts to access URLs (`/daytrader/bad`) that do not exist to create errors in the monitored data.

7. Click Options > Schedule tests to run periodically.



8. Accept the default timings (every day, every hour, every 5 minutes) and click **Run Now**. Click **OK**.



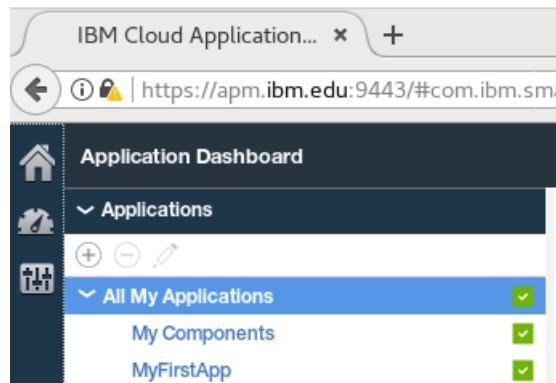
9. Observe the DayTrader web page refresh. This refresh repeats every 5 minutes until you stop the Selenium tool from running.

These steps create multiple transactions for the Response Time agent to collect and activities within all components of the DayTrader application, as you see in future exercises.

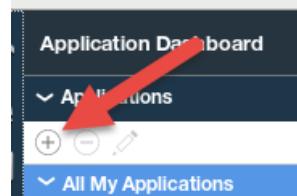
# Exercise 4 Add Response Time and HTTP Server components to an application

In this exercise, you add the Response Time and HTTP Server components to the DayTrader (WAS) application in the Cloud APM console.

1. On the APM VM, log in to the Cloud APM console if you are not already logged in with a user ID of `apmadmin` and a password of `object00`.
2. Click **Performance > Application Performance Dashboard**.



3. To add an application, click the plus sign (+) on the Application Dashboard.



The Add Application window opens.

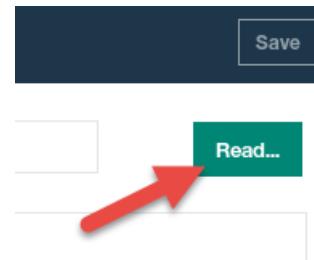
The screenshot shows the 'Add Application' dialog box. At the top right are 'Cancel' and 'Save' buttons. The main area contains fields for 'Application name \*' (with placeholder 'Enter a unique name'), 'Description' (empty), 'Application read from' (empty), 'Template \*' (set to 'Custom Application'), and a section for 'Application components' which is currently empty. To the right of the component list are three icons: a plus sign (+), a minus sign (-), and a pencil.

4. Enter **DayTrader (WAS)** as the application name.

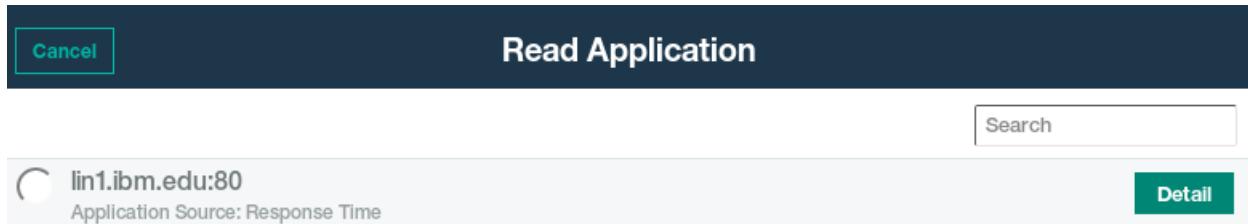
The screenshot shows the 'Add Application' dialog box with the 'Application name \*' field populated with 'DayTrader (WAS)'. The 'Save' button is at the top right.

Read is used to add servers and components that are detected by the Response Time agent to your application.

5. Click **Read**.



The Read Application window opens.

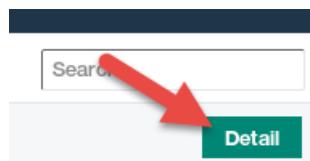


The Response Time agent detects HTTP traffic that is going to the lin1.ibm.edu server through port 80 and is monitoring that traffic.

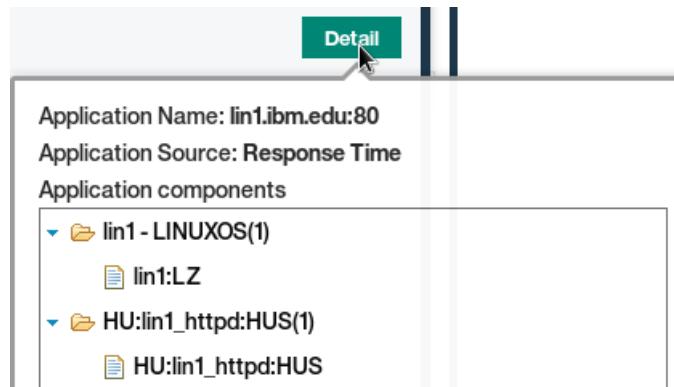


**Important:** It can take up to 5 minutes for lin1.ibm.edu:80 to be displayed. To refresh the window, click Cancel to close the window and Read to reopen it.

6. Click **Detail** to the right of **lin1.ibm.edu:80**:



7. Observe the discovered components, the Monitoring Agent for HTTP Server and the Monitoring Agent for Linux OS.

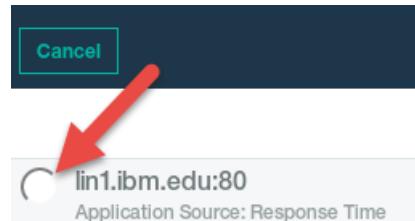


The Response Time agent also discovers a Linux OS and HTTP Server agent on LIN1.



**Important:** If the Linux OS and HTTP Server agents are not shown, you can either wait until the Response Time agent discovers them or continue with the exercise and add them manually at [Step 9](#).

8. Select **lin1.ibm.edu:80** to add all transactions that are going to LIN1 port 80 and the two discovered agents to your application.



You are returned to the Add Application window.

The screenshot shows the 'Add Application' dialog box. At the top right is the title 'Add Application'. On the left is a 'Cancel' button. The main area contains several input fields and dropdown menus:

- Application name \***: DayTrader (WAS)
- Application read from**: lin1.ibm.edu:80
- Description**: (empty)
- Application read from**: Response Time
- Template \***: Custom Application
- Application components**:
  - lin1 - LINUXOS(1)
    - lin1:LZ
  - HU:lin1\_httpd:HUS(1)
    - HU:lin1\_httpd:HUS

That HTTP traffic to an application was read from LIN1 is displayed below the application name. This name indicates that the Response Time agent gathers HTTP transaction data that is headed to port 80 of LIN1 and displays it as part of this application name. Furthermore, the two discovered components, LINUX OS and HTTP Server agents, are added to this application.

9. If the LIN1 Linux OS and HTTP Server agents do not show in Application Components, click the **Add components** button and add them manually now.

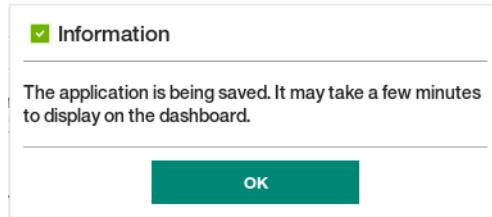
You are finished with the DayTrader (WAS) application for now.



**Important:** In later units, you add the WebSphere and DB2 agents to the DayTrader application.

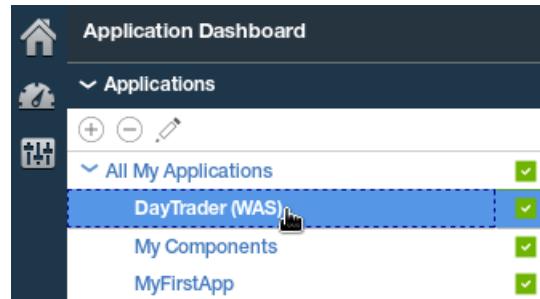
10. Click **Save**.

11. Click **OK**.



You are returned to the Application Dashboard.

12. Click F5 to refresh the window and display the application.

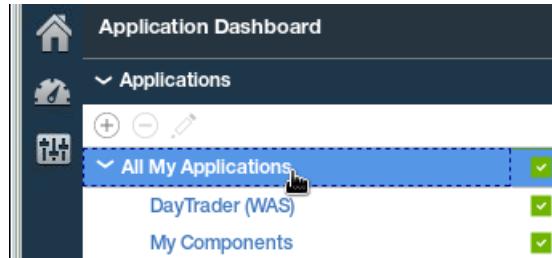


The DayTrader (WAS) application appears in the Applications list.

# Exercise 5 Navigate and understand Response Time data

In this exercise, you navigate the Response Time data and confirm the health of the DayTrader application.

1. In the Cloud APM console, click **All My Applications** in the **Applications** list.



A summary of all monitored applications is shown, displaying the status of each application.

A screenshot of the 'All My Applications' page. At the top, there is a header with the title 'All My Applications' and a 'Show Details' checkbox. Below this are two main monitoring panels. The left panel is for 'DayTrader (WAS)' and the right panel is for 'My Components'. Each panel has three categories: 'Components' (with a green checkmark), 'Transactions' (with a green checkmark), and 'Events' (with a green checkmark). At the bottom right of the page, there is a 'Filter by Status' section with a red '0' count next to it.

Three categories of monitoring help to define the application status and to lead towards known issues:

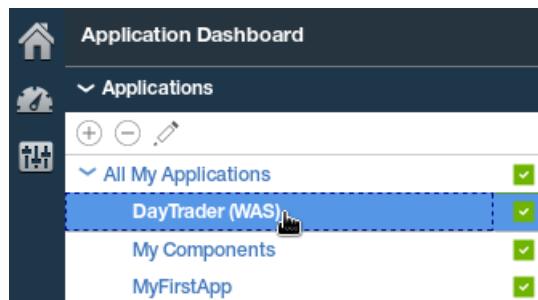
- Components are agents that are monitoring application resources, such as operating systems, databases, and application servers.
- Transactions are front-end HTTP requests monitored by the Response Time agent. Monitoring the performance and availability of requests to an application shows the overall health of the application and the user's experience of that application.
- Events are alerts that are triggered by an application event, such as the violation of a threshold.

Click any one of these three to open a more detailed page on it.



**Important:** The status of your DayTrader application might differ from what is shown in this guide.

2. Click the **DayTrader (WAS)** application in the Applications pane.



The Status Overview page is shown with the Request and Response Time widget above and the Aggregation Transaction Topology widget below.

All My Applications >  
**DayTrader (WAS)**

Status Overview    Events    Custom Views

Last 4 hours

Requests and Response Time

Aggregate Transaction Topology

Actions

Status: ✓ ⚠ ✖

**Important:** It can take up to 5 minutes for the Aggregate Transaction Topology to be displayed.



**Hint:** You can drag the bar above the topology to display more of the Request and Response Time widget.

Transaction topologies are discussed in a later unit.

3. Click the arrow on the right to move from the Aggregate Transaction Topology widget to the Current Component Status widget.



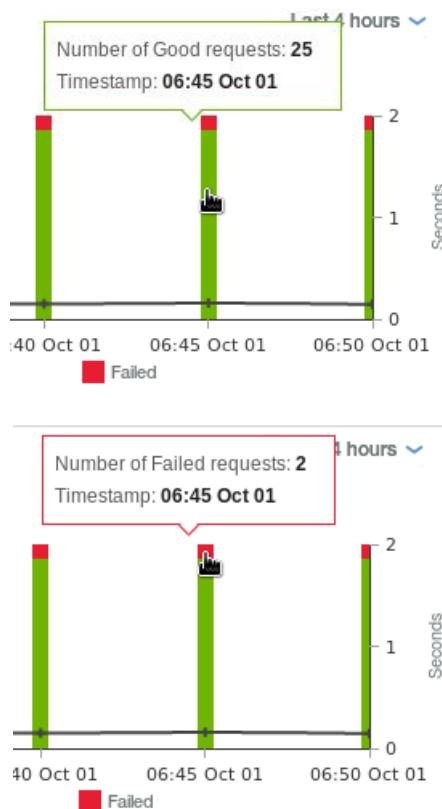
The DayTrader (WAS) data looks similar to this screen capture:



4. Answer these questions about the data:

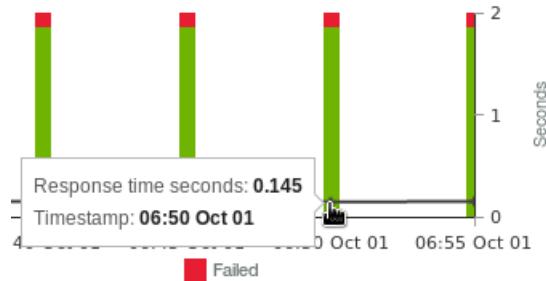
- What is the highest number of requests received by the DayTrader application in the last 4 hours? \_\_\_\_\_
- What is the peak request rate per minute in the last hour on the HTTP server in the hour? \_\_\_\_\_

5. Look at the bar chart in the Requests and Response Time widget to compare the number of good (green), slow (yellow), and failed (red) transactions for the selected application over the last hour.
6. Place your cursor over a bar, and a window shows you the count of good, slow, or failed transactions that bar segment represents.

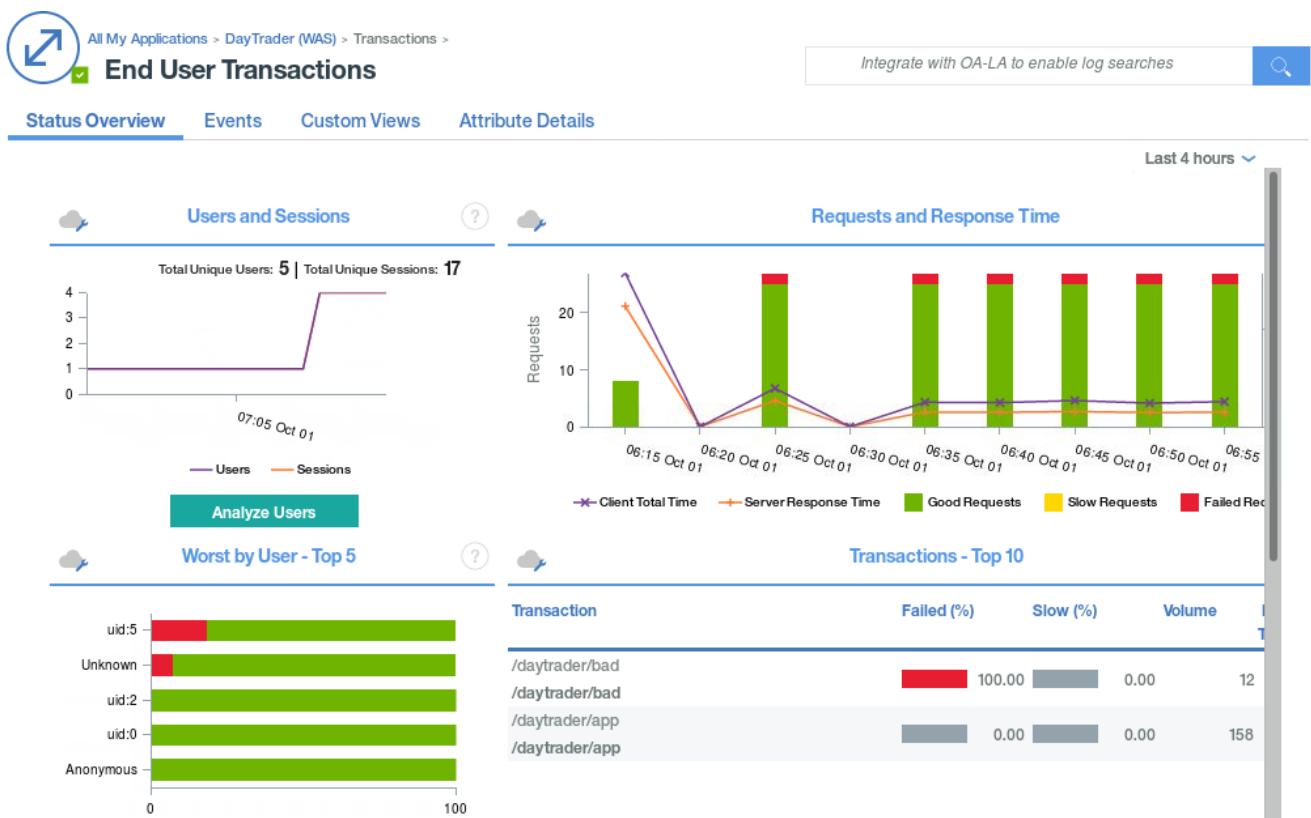


Also, look at the line to see the average response time for all transactions over time. Use these lines together with the bar chart to identify any trends.

- Place your cursor at the peak of any line to see the average response time of those transactions during that interval.



- Click the **Requests and Response Time** widget to investigate the transactions in more detail.
- The End User Transactions page opens.



The Requests and Response Time widget at the upper right now breaks the response timeline into server and client time. The light brown Server Response timeline shows the average response time for transactions from the server side. The blue line shows the client experience of the user. This line represents the client-side response time, including JavaScript transactions. As before, use these lines together with the bar chart to identify any trends.

9. Click and hold the mouse button on a specific interval to display the client and server response time during that interval.



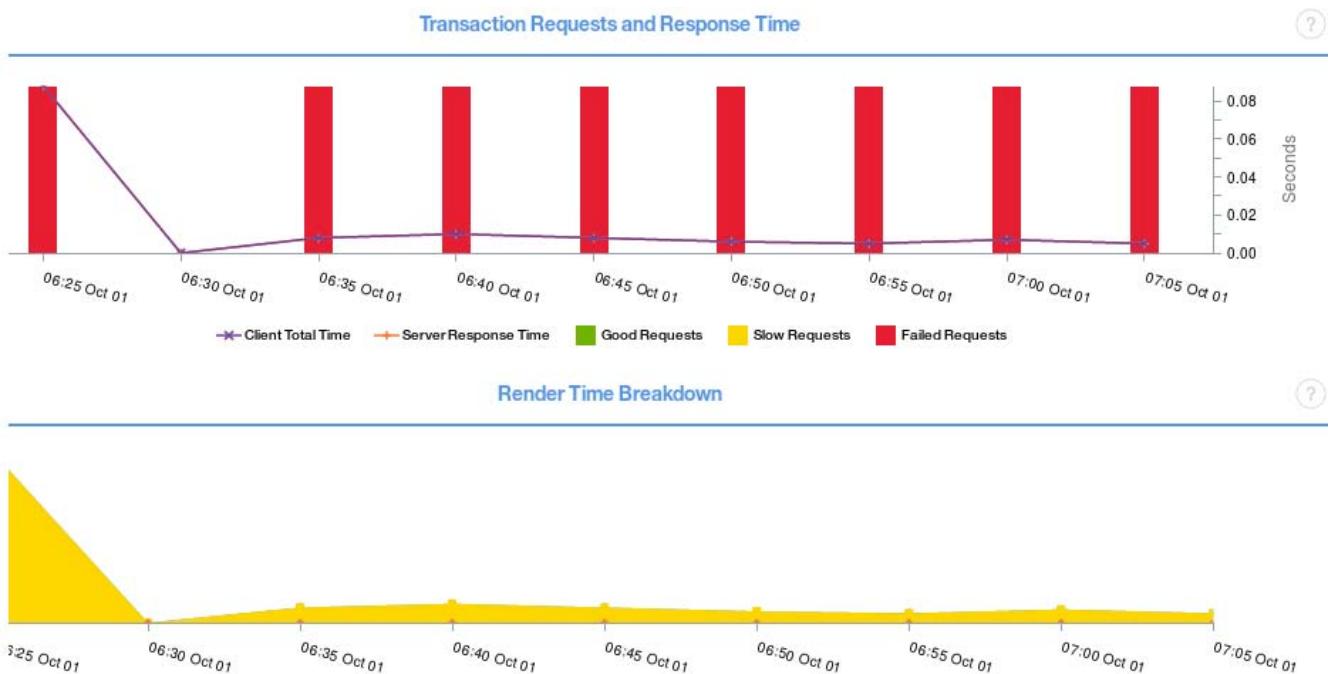
10. Look at the transactions in the **Transactions – Top 10** table.

Transaction	Failed (%)	Slow (%)	Volume	Response Time...
/daytrader/bad	100.00	0.00	12	0.020
/daytrader/bad	0.00	0.00	158	0.363
/daytrader/app				
/daytrader/app				

These transactions are the ones that create a poor user experience and are therefore of the highest priority.

11. Locate the `/daytrader/bad` transaction and notice that it is identified as failed.
12. Click the `/daytrader/bad` transaction to open the Transaction Details page.

The Transaction Detail page opens.



All widgets on this page display data about this one transaction. The Transaction Requests and Response Time widget shows that someone is submitting this bad URL every interval.

13. Look at the chart in the Render Time Breakdown widget to see which parts within the web page take the longest time to load from a user perspective. Timing points are described by the W3C Navigation Timing specification.
14. Scroll down and look at the Runs On table and check the status of the web server. A Satisfaction score of less than 0.5 indicates that the server offers a poor user experience because of too many slow or failed requests. A Satisfaction score of 0.5 – 0.84 means that the server's performance is degraded but is not yet critical. A Satisfaction score of 0.85 and above indicates that the server is performing well.
15. Look at the Subtransactions table to see how interactions within a page, such as Ajax requests, are performing (if your transaction has any).
16. Scroll down to the **Transactions Instances** widget.

Transaction Instances

Status	Response Time (s)	Source	User Name	User Agent
✖	0.010	192.168.1.104	<Unknown>	Mozilla/5.0 (X11; Linux x86_64; rv:52.0) Gecko/20100101 Firefox/52.0
✖	0.010	192.168.1.104	<Unknown>	Mozilla/5.0 (X11; Linux x86_64; rv:52.0) Gecko/20100101 Firefox/52.0
✖	0.016	192.168.1.104	<Unknown>	Mozilla/5.0 (X11; Linux x86_64; rv:52.0) Gecko/20100101 Firefox/52.0
✖	0.021	192.168.1.104	<Unknown>	Mozilla/5.0 (X11; Linux x86_64; rv:52.0) Gecko/20100101 Firefox/52.0
✖	0.155	192.168.1.104	<Unknown>	Mozilla/5.0 (X11; Linux x86_64; rv:52.0) Gecko/20100101 Firefox/52.0

This table shows all instances of this failed transaction, the response time, the IP address of the user, the user name (if logged in), and information on the client application and host.

17. Click any transaction in the table to open the Transaction Topology page.

The screenshot shows a table with one row. The first column is 'Status' with value 'Failed'. The second column is 'Response Time (sec)' with value '0.010 <Unknown>'. Below the table is a diagram titled 'Transaction Instance Topology' showing a flow from a computer monitor icon to an 'HTTP' server icon. Both icons have red 'X' marks above them. A black arrow points from the monitor to the server, with the value '0.010' written next to it.

The table at the top identifies the specific transaction instance that you are investigating. The topology view shows where the transaction flowed and possibly at which component it failed. In this instance, the transaction is probably failing at the HTTP server. Because you did not implement transaction monitoring in the back-end components (WebSphere and DB2) of the DayTrader application, you cannot determine whether this conclusion is true.



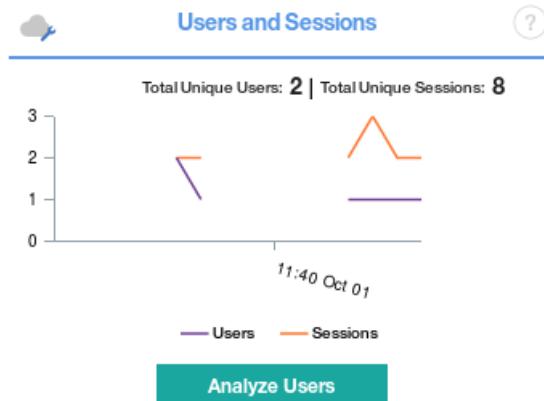
**Important:** Transaction topologies are discussed in detail after you implement monitoring of the WebSphere and DB2 components.

18. Click **Overview** to return to the End User Transaction Status Overview page.

Overview > Transaction Details > Transaction Topology



19. Look at the **Users and Sessions** widget.

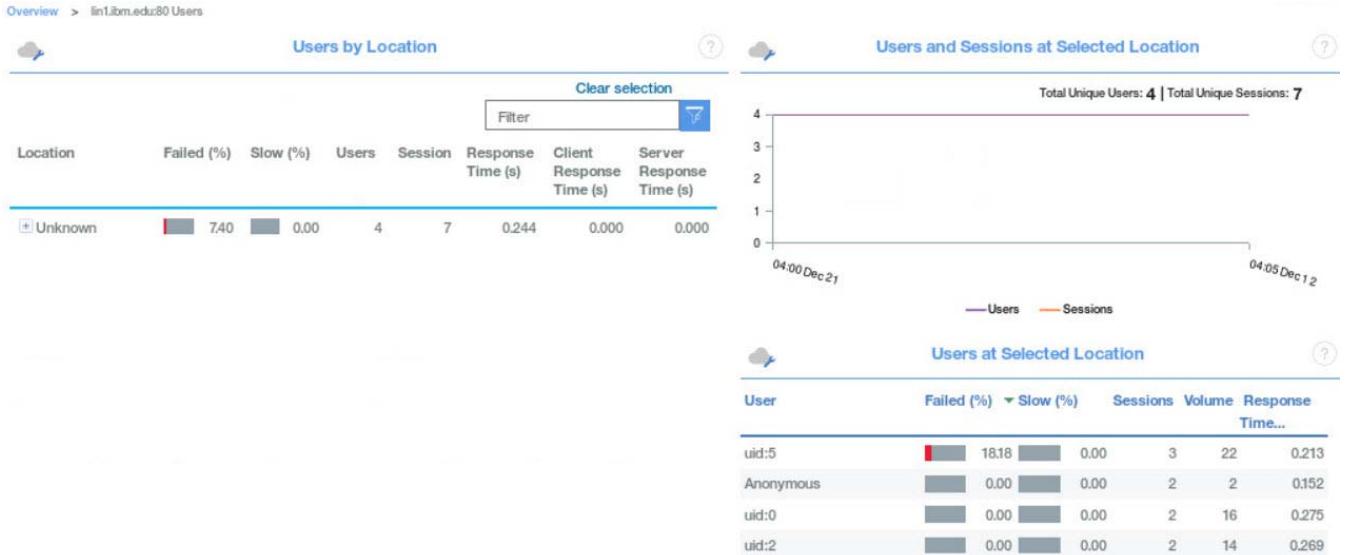


The Users and Sessions widget gives an overview of how many users and sessions are active.

20. Click **Analyze Users**.



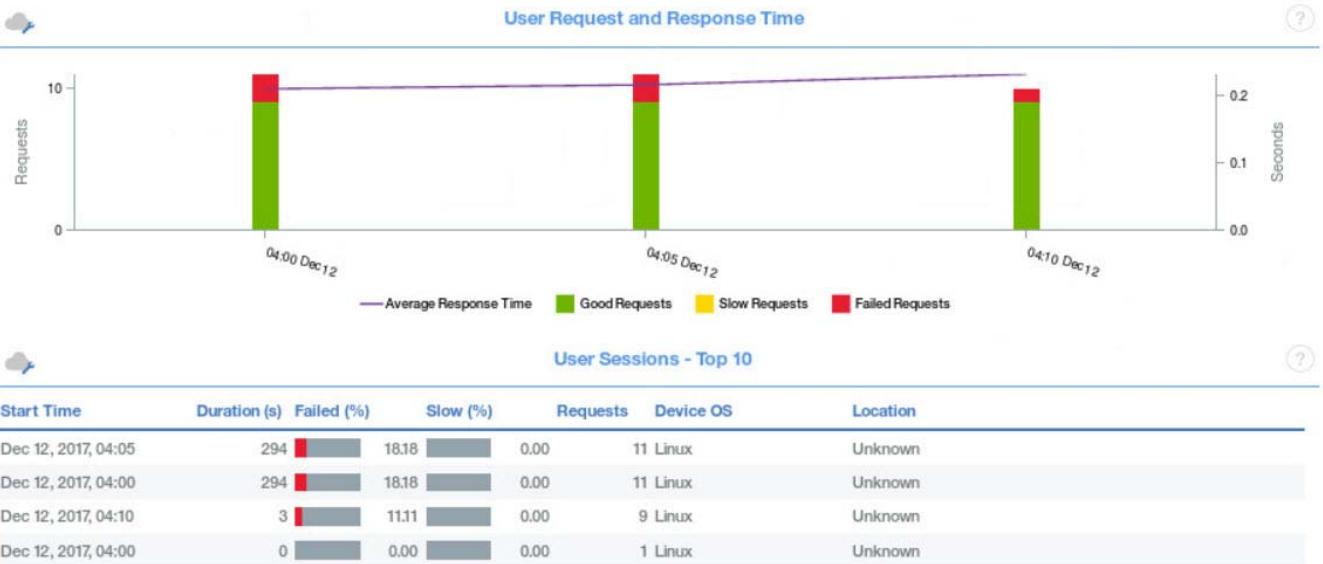
The Users by Location page opens.



Summary performance data for each location is listed in the Users by Location widget. Expand the locations and select users in this widget, and the data in the other two widgets changes. The Users and Sessions at Selected Location widget shows the number of users and sessions over time for that location. The Users at a Selected Location widget lists the performance data of each user's experience.

21. Click User **uid:5** in the Users at Selected Location widget for performance and availability data for this specific user.

Overview > lin1.ibm.edu:80 Users > User:



This page shows the availability and response time of transactions for the uid:5 user. The top widget shows the request and response time data for this specific user. The bottom widget shows summary performance data for each session of this user.

22. Click the top session for details on that session.

Overview > lin1.ibm.edu:80 Users > User: > Session Details

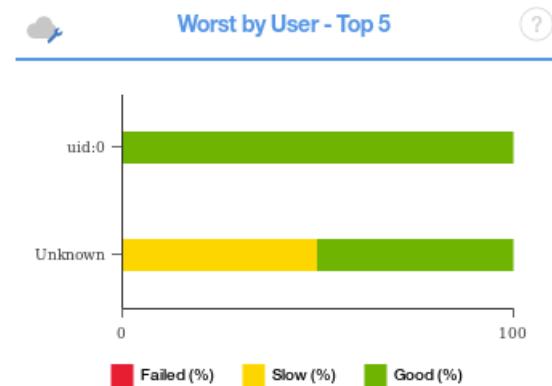


This page shows the availability of requests over time that are made during this session. It also shows summary performance and availability data for each session instance.

23. Click the **Overview** link below Status Overview to return to the Overview page.



24. Look at the Worst by User – Top 5 widget.



The Worst by User – Top 5 widget shows the top five worst users.

25. Click the Worst by User – Top 5 widget.

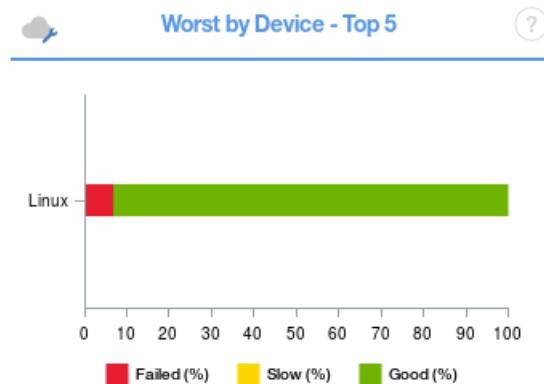


This page shows the availability and response time of transactions by all users. Notice that this page has the same page layout that you saw for the uid:5 user in [Step 33](#). You can click a specific session for more details just as you did for a specific session in [Step 34](#).

26. Click the **Overview** link below Status Overview to return to the Overview page.

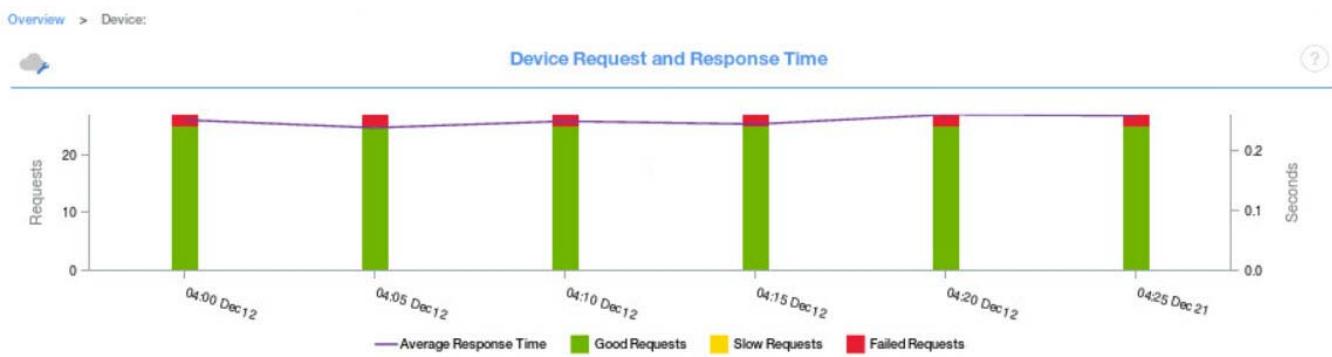


27. Look at the Worst by Device – Top 5 widget.



The Worst by Device – Top 5 widget identifies the top five devices with the worst response times or failures. Devices are identified by their OS, such as Windows, Linux, Android, and iPhone.

28. Click the Worst by User – Top 5 widget.



Device Sessions - Top 10						
Start Time	Duration (s)	Failed (%)	Slow (%)	Requests	User	Location
Dec 12, 2017, 04:25	3	18.18	0.00	11	Anonymous	Unknown
Dec 12, 2017, 04:10	294	16.66	0.00	12	Anonymous	Unknown
Dec 12, 2017, 04:15	294	16.66	0.00	12	Anonymous	Unknown

This page shows the availability and response time of transactions by sending device. Notice that this page has the same page layout that you saw for the uid:5 user in [Step 33](#), but is about device. You can click a specific device session for more details just as you did for a specific session in [Step 34](#).

---

# **Unit 7 Monitoring applications with synthetic transactions**

In these exercises, you create a synthetic transaction for playback and monitoring. By completing these tasks, you enable periodic monitoring of the website that the script accesses.

## **Objectives**

After completing all exercises, you can create and monitor synthetic transactions.

## **Exercise 1 Install the Synthetic Playback agent**

This exercise guides you through installing the Synthetic Playback agent on the LIN1 Linux based VM.

1. On VM LIN1, in a terminal window change to the following directory:

```
/downloads/APM814/agent/APMADV_Agent_Install_8.1.4.0
```

- Run the command: `./installAPMAgents.sh`

```
[root@lin1 APMADV_Agent_Install_8.1.4.0]# ./installAPMAgents.sh
```

The following products are available for installation:

- 1) Monitoring Agent for Cisco UCS
- 2) Monitoring Agent for DataPower
- 3) Monitoring Agent for DB2
- 4) Monitoring Agent for HTTP Server
- 5) Monitoring Agent for IBM Integration Bus
- 6) Monitoring Agent for JBoss
- 7) Monitoring Agent for Linux KVM
- 8) Monitoring Agent for MongoDB
- 9) Monitoring Agent for WebSphere MQ
- 10) Monitoring Agent for MySQL
- 11) Monitoring Agent for NetApp Storage
- 12) Monitoring Agent for Nodejs
- 13) Monitoring Agent for OpenStack
- 14) Monitoring Agent for Oracle Database
- 15) Monitoring Agent for Linux OS
- 16) Monitoring Agent for PHP
- 17) Monitoring Agent for PostgreSQL
- 18) Response Time Monitoring Agent
- 19) Monitoring Agent for Ruby
- 20) Monitoring Agent for SAP Applications
- 21) Monitoring Agent for Siebel
- 22) Monitoring Agent for Synthetic Playback
- 23) Monitoring Agent for Tomcat
- 24) Monitoring Agent for VMware VI
- 25) Monitoring Agent for WebSphere Applications
- 26) Monitoring Agent for WebLogic
- 27) Monitoring Agent for WebSphere Infrastructure Manager
- 28) all of the above

Type the numbers that correspond to the products that you want to install. Type "q" to quit selection.

If you enter more than one number, separate the numbers by a space or comma.

Type your selections here (For example: 1,2): █

- Select **22** to install the **Monitoring Agent for Synthetic Playback**.
- Press Enter to confirm your selection.
- Press Enter to confirm the agent home of `/opt/ibm/apm/agent`.

6. Select **1** to accept the license agreement.

```
Type your selections here (For example: 1,2): 22
```

```
The following agents will be installed:
```

```
    Monitoring Agent for Synthetic Playback
```

```
Are your selections correct [ 1-Yes, 2-No; default is 1 ]?
```

```
Please specify the agent home (default: /opt/ibm/apm/agent):
```

```
The agent will be installed in /opt/ibm/apm/agent
```

```
Do you accept the license agreement(s) found in the directory /downloads/APMADV_Agent_Install_8.1.4.0/licenses?
```

```
Please enter [ 1-to accept the agreement, 2-to decline the agreement ] : 1
```

```
User has accepted the license agreement(s).
```

```
    Monitoring Agent for Synthetic Playback will be installed.
```

```
Installing Monitoring Agent for Synthetic Playback.
```

The agent installation takes approximately 5 minutes.

These messages indicate a successful installation:

```
#####
# The following agents were installed successfully into the /opt/ibm/apm/agent directory:
#
# Monitoring Agent for Synthetic Playback
#
# Agent status:
# Agent is not running
#
# The installation log file is /opt/ibm/apm/agent/logs/APMAgents_install.log.
#
# For any agent that is not running, you must configure the agent before it can be started.
#
# To configure your agents, use the following detailed instructions:
#
# For IBM Cloud Application Performance Management SaaS:
# http://ibm.biz/kc-ipmcloud-configagent
#
# For IBM Cloud Application Performance Management On Premises:
# http://ibm.biz/kc-ipm-configagent
#
# As part of the configuration instructions, you will use the following commands to configure and manage each installed agent:
# Monitoring Agent for Synthetic Playback          /opt/ibm/apm/agent
# /bin/synthetic_playback-agent.sh config or start or stop or status or uninstall
#
#####
[root@lin1 APMAADV Agent Install 8.1.4.0]#
```

7. Change to the `/opt/ibm/apm/agent/bin` directory.
8. Confirm that the agent is not running by using this command:  
`./synthetic_playback-agent.sh status`
9. Run the following command to start the agent configuration:  
`./synthetic_playback-agent.sh config`

```
[root@lin1 APMAADV_Agent_Install_8.1.4.0]# cd /opt/ibm/apm/agent/bin
[root@lin1 bin]# ./synthetic_playback-agent.sh status
Agent status:
Agent is not running
[root@lin1 bin]# ./synthetic_playback-agent.sh config
```

10. Press Enter to edit the agent.
11. Enter **Austin** as the data center name for the playback point of presence.
12. Press Enter to accept the default Java trace level parameter.

13. Press Enter to not set a class path for external jars.

```
Configuring Monitoring Agent for Synthetic Playback
```

```
Edit 'Monitoring Agent for Synthetic Playback' settings? [ 1=Yes, 2=No ] (default is: 1):
```

```
Agent configuration :
```

```
Agent level configuration variables.
```

```
The data center name for user to select as playback point of presence.
```

```
The data center name for user to select as playback point of presence. (default is: ) : Austin
```

```
Java :
```

```
Java parameters
```

```
This parameter allows you to specify the trace level used by the Java providers.
```

```
Java trace level [ 1=Off, 2=Error, 3=Warning, 4=Information, 5=Minimum Debug, 6=Medium Debug, 7=Maximum Debug, 8=All ] (default is: 2):
```

```
Java API :
```

```
Java API Client Configuration
```

```
A class path that lists jars required by Java API data provider that are not included with the agent. This class path is appended to the class path generated by the agent.
```

```
Class path for external jars (default is: ):
```

```
Configuration completed successfully.
```

```
[root@lin1 bin]#
```

The Synthetic Playback agent is configured.

14. Start the agent with the following command:

```
./synthetic_playback-agent.sh start
```

# Exercise 2 Create a Selenium IDE script

This exercise guides you through creating a Selenium IDE script that sends request to the DayTrader application. In the next exercise, you create a Synthetic Transaction in APM and deploy it to your Synthetic Playback agent.

1. On LIN1, if Selenium IDE is open, close it now.



**Important:** Closing Selenium stops any automatic script playback that is configured in previous exercises.

2. In Firefox, open the DayTrader application with the following URL:

`http://lin1/daytrader/app`

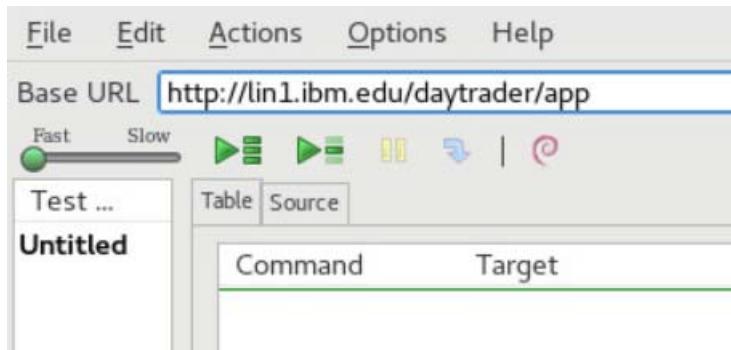
3. Start Selenium IDE by selecting **Tools > Selenium IDE** in Firefox.

The Selenium IDE window opens and starts recording all user actions on the displayed web page.

4. For ease of use, place the browser and Selenium IDE windows next to each other so that you can see the full content of both windows. Resize each application window as needed.

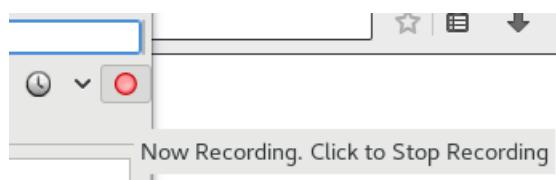
5. Enter the following URL in the Base URL field:

`http://lin1.ibm.edu/daytrader/app`



This URL is captured in the script, but no commands are yet recorded.

6. Roll your cursor over the **Record** button. If it says **Click to Record**, click it to start recording a script. If it says it is now recording, do nothing.



7. Return to the browser and complete the following actions in DayTrader.
  - a. Click **Log in**.
  - b. Click **Account**.
  - c. Click **Portfolio**.
  - d. Click **sell** on any holding in the Portfolio table.

Number of Holdings: 8			
use	market value	gain/(loss)	trade
00	1150.00	141.00↑	<b>sell</b>
00	392.67	23.67↑	<b>sell</b>



- e. Click **Quotes/Trade**.
- f. Click **buy** on any symbol in the Quotes table.

gain/(loss)	trade
-96.50↓ (-89.00%)↓	<b>buy</b> 100
0.38↑	<b>buy</b>



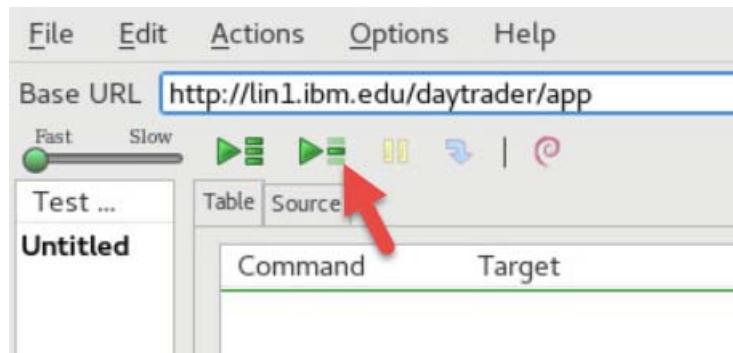
- g. Click **Logoff**.
- For every user action on a web page, Selenium-IDE records a command and adds it to a script.
- h. Confirm that Selenium IDE added a command for each link.

Table	Source																		
<table border="1"> <thead> <tr> <th>Command</th> <th>Target</th> </tr> </thead> <tbody> <tr> <td>open</td> <td>/daytrader/app?action=logout</td> </tr> <tr> <td>clickAndWait</td> <td>css=input[type="submit"]</td> </tr> <tr> <td>clickAndWait</td> <td>link=Account</td> </tr> <tr> <td>clickAndWait</td> <td>link=Portfolio</td> </tr> <tr> <td>clickAndWait</td> <td>link=sell</td> </tr> <tr> <td>clickAndWait</td> <td>link=Quotes/Trade</td> </tr> <tr> <td>clickAndWait</td> <td>name=action</td> </tr> <tr> <td>clickAndWait</td> <td>link=Logoff</td> </tr> </tbody> </table>		Command	Target	open	/daytrader/app?action=logout	clickAndWait	css=input[type="submit"]	clickAndWait	link=Account	clickAndWait	link=Portfolio	clickAndWait	link=sell	clickAndWait	link=Quotes/Trade	clickAndWait	name=action	clickAndWait	link=Logoff
Command	Target																		
open	/daytrader/app?action=logout																		
clickAndWait	css=input[type="submit"]																		
clickAndWait	link=Account																		
clickAndWait	link=Portfolio																		
clickAndWait	link=sell																		
clickAndWait	link=Quotes/Trade																		
clickAndWait	name=action																		
clickAndWait	link=Logoff																		

8. Click the **Record** button again to stop the recording.

9. Test your script.

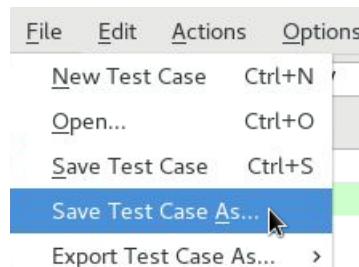
- In the Selenium IDE window, click the **Play current test case** button to test the playback of the script that you recorded.



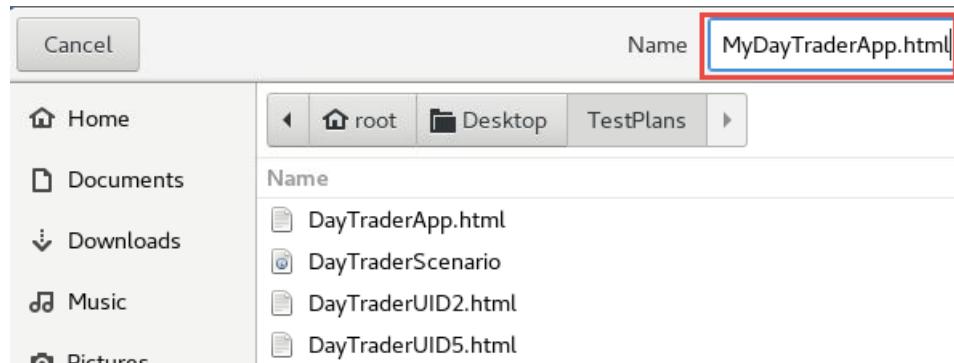
- Watch your browser and confirm that the script loads each page.

10. Save the script in HTML format.

- Click **File > Save Test Case As...**.



- Save the file in `/root/Desktop/TestPlans` with the name `MyDayTraderApp.html`.



11. Close Selenium IDE.

# Exercise 3 Configure a synthetic transaction

In this exercise, you create a synthetic transaction in the Cloud APM console to play back and monitor a Selenium IDE script. This exercise is completed from LIN1 because the Selenium script is on LIN1.

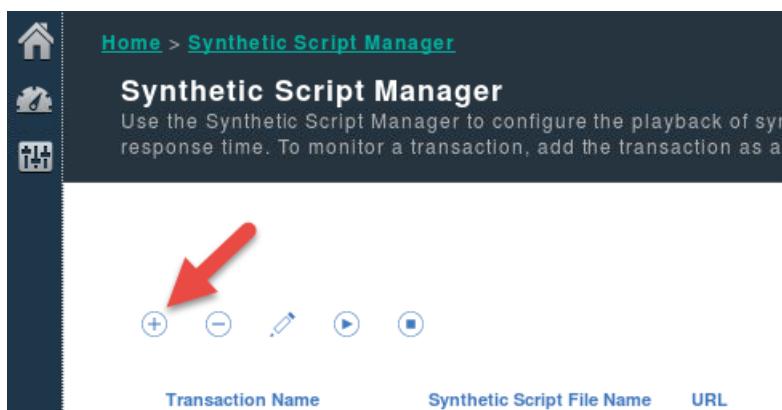
- From LIN1, open the Cloud APM console with this URL:

<https://apm.ibm.edu:9443>

- Log in as user **apmadmin** and password **object00**.
- Hover over the sliders icon to open the **System Configuration** menu and then select **Synthetic Script Manager**.



- Click the plus (+) sign to create a new transaction.

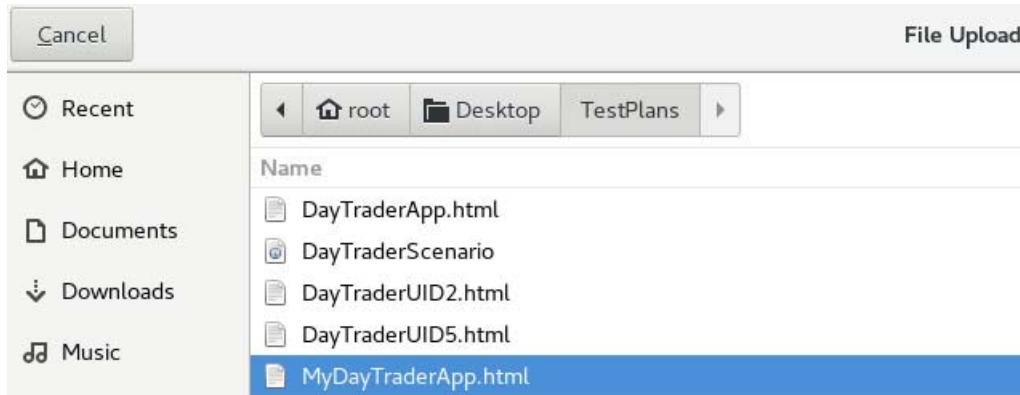


- On the **Upload a Script** tab of the Synthetic Script Editor, enter the following parameters:
  - Transaction Name: **MyDayTraderApp**
  - Description: **Runs the MyDayTraderApp.html script, which completes actions on the DayTrader application**

c. Click **Upload Script**.



d. Locate and select your `MyDayTraderApp.html` script.



e. Click **Open**.

The Upload a Script tab is completed.

A screenshot of the 'Upload a Script' tab configuration. It includes fields for 'Transaction Name' (set to 'MyDayTraderApp'), 'Description' (a note about running the script), and 'Synthetic Script File' (set to 'MyDayTraderApp.html'). The 'Upload Script' button is highlighted with a cursor.

<b>* Transaction Name</b>	<input type="text" value="MyDayTraderApp"/>
<b>Description</b>	Runs the <code>MyDayTraderApp.html</code> script which completes actions on the <code>DayTrader</code> application.
<b>* Synthetic Script File</b>	<input checked="" type="radio"/> Upload script file <b>Upload Script</b> MyDayTraderApp.html ( 1.2 KB ) <input type="radio"/> Enter the URL of web page to test

6. See how to change the thresholds for a script.

- a. Click **Advanced Settings**.

Upload a Script   Schedule a Script   **Advanced Settings**

---

Set threshold for subtransaction      Configure variable substitutions for different locations

Double-click the Response Time Threshold cell to edit the value, use blank to indicate no threshold.

No Variables defined in this script

Transaction Name	Response Time Threshold (Seconds)
+ MyDayTraderApp	10

In Set Threshold for subtransactions, you set the threshold for the full script or any subtransaction. If the script or subtransaction takes longer than this threshold, the script status changes to Slow and generate a Warning event. The default threshold for all scripts is 10 seconds.

- b. Double-click the **10** under Response Time Threshold to see that you can edit it.

Transaction Name	Response Time Threshold (Seconds)
+ MyDayTraderApp	10

- c. Click the plus (+) in front of MyDayTraderApp to display the subtransactions.
- d. Double-click the Response Time Threshold cell for any subtransaction to see that you can set it.

Transaction Name	Response Time Threshold (Seconds)
+ MyDayTraderApp	10
open	



**Note:** By default, script subtransactions do not have a response time threshold.

7. Click the **Schedule a Script** tab and set the following Playback schedule and location.
- a. Playback Mode: **Simultaneous**
- b. Interval: 5 minutes

c. Location: Austin

## MyDayTraderApp

Upload a Script    **Schedule a Script**    Advanced Settings

---

\* Playback Mode  Simultaneous  Staggered

\* Interval  5 Minutes

\* Location   Austin



**Important:** It can take up to 10 minutes for the Austin location to be displayed.

8. Click **Save Transaction** to finish creating the transaction.

9. Click **OK** to close the confirmation window.

You are returned to the Synthetic Script Manager.

10. Confirm that the transaction started.

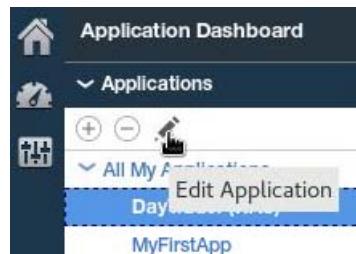


Transaction Name	Synthetic Script File Name	URL	Description	Locations	
MyDayTraderApp	MyDayTraderApp.html		Runs the MyDayTraderApp.html	Austin	
Status	Playback Mode	Interval	Measurements Per Month	Modified Date	Modified By
Started	simultaneous	5	8,928	Oct 26,2017, 12:18	apmadmin

# Exercise 4 Add the Synthetic Playback transaction to the DayTrader application

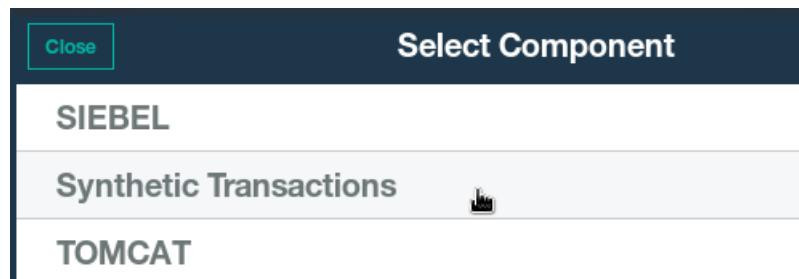
In this exercise, you edit the DayTrader (WAS) application to add the new MyDayTraderApp synthetic transaction.

1. In Firefox on LIN1, return to the **Application Performance Dashboard**.
2. Click the **DayTrader (WAS)** application and click the **Edit Application** icon.

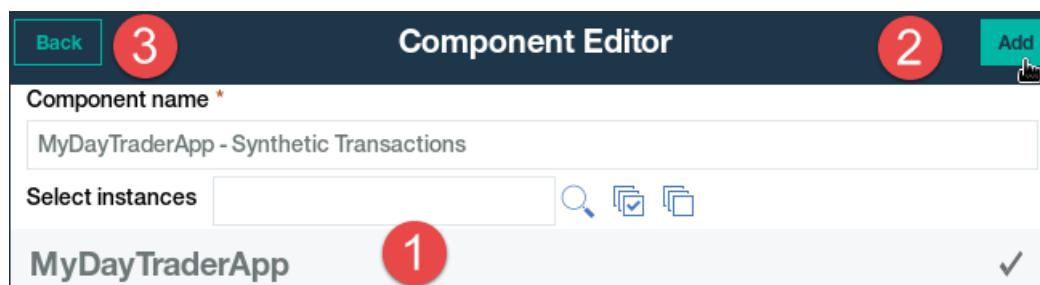


The Edit Application window opens.

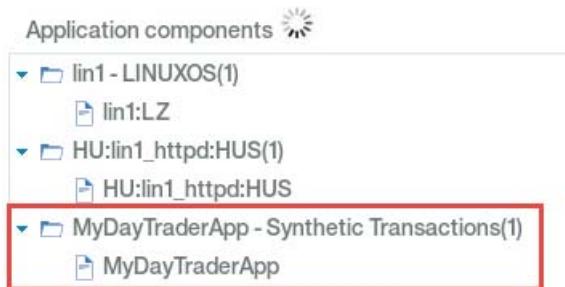
3. In the Application components window, click the plus (+) sign to **add a component**.
4. Scroll down to **Synthetic Transactions** in the **Select Component** dialog box and click it.



5. In the Component Editor window, select the **MyDayTraderApp** synthetic transaction.
6. Click **Add** to associate the synthetic transaction with the application.
7. Click **Back** to return to the Select Component window.



8. Click **Close** to exit the Select Component window.
9. Confirm that the **MyDayTraderApp** synthetic transaction was added.



10. Click **Save** to save your changes to the DayTrader (WAS) application.
11. Click **OK** to complete the operation.

You are returned to the Application Dashboard.

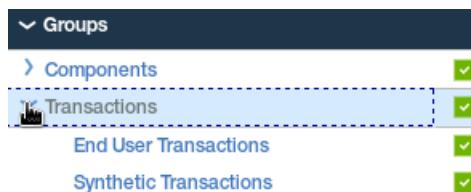
# Exercise 5 View synthetic transactions data

In this exercise, you navigate the synthetic transactions monitoring data.



**Important:** It can take 10 – 15 minutes for sufficient data to be gathered. Consider taking a break now.

1. Click the **DayTrader (WAS)** application in the **All My Applications** list.
2. Expand the **Transactions** node in the **Groups** pane.



Your front-end transactional data now includes synthetic transaction data and the End User Transactions that are monitored by the Response Time and HTTP Server agents.

3. Click **Synthetic Transactions**.

The Synthetic Transactions page opens.

The screenshot shows the 'Synthetic Transactions' page. At the top, there is a breadcrumb trail: 'All My Applications > DayTrader (WAS) > Transactions > Synthetic Transactions'. Below the breadcrumb, there are three tabs: 'Status Overview' (which is selected), 'Events', and 'Custom Views'. The main area is divided into two sections: 'Transaction List' and 'Location List'.

**Transaction List:**

Transaction	Latest Status	Last Run At	Response Time Threshold	Latest Response Time (Seconds)	Average Response Time (Seconds)	Unavailable (%)	Slow (%)
MyDayTraderApp	<span style="color: green;">✓</span>	Oct 26, 2017, 12:34	10.0	2.39	2.58	<div style="width: 25%; background-color: #ccc;"></div>	0.00

Total 1

**Location List:**

Location	Latest Status	Last Run At	Latest Response Time (Seconds)	Average Response Time (Seconds)	Unavailable (%)	Slow (%)
Austin	<span style="color: green;">✓</span>	Oct 26, 2017, 12:34	2.39	2.58	<div style="width: 25%; background-color: #ccc;"></div>	0.00

From this page, you can investigate the performance of specific synthetic transactions or points of presence.

4. Click the **DayTrader (WAS)** application again in the **All My Applications** list.



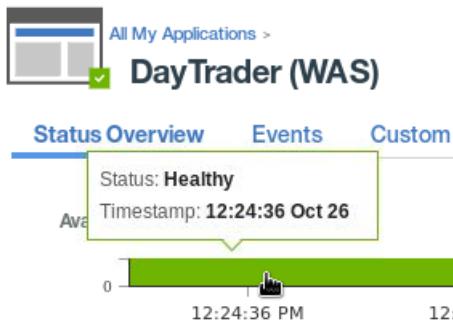
**Hint:** If you cannot see all of the Requests and Response Time table, drag down the divider bar between it and the topology view.

The Availability Over Time widget shows the Synthetic Playback agent data.

*Green* indicates that all transactions are completing in less time than their threshold value.

*Yellow* indicates transactions that are taking longer than the threshold value. *Red* indicates that some transactions are failing.

5. Roll your cursor over the bar chart and see the average times for all transactions in that aggregation period.



6. Click the **Availability Over Time** widget.

The Synthetic Transactions page opens again.

The screenshot shows the Synthetic Transactions page with the following sections:

**Transaction List**

Transaction	Latest Status	Last Run At	Response Time Threshold (Seconds)	Latest Response Time (Seconds)	Average Response Time (Seconds)	Unavailable (%)	Slow (%)
MyDayTraderApp	<span style="color: green;">✓</span>	Oct 26,2017, 12:34	10.0	2.39	2.58	<div style="width: 25%; background-color: #ccc;"></div>	0.00

Total 1

**Location List**

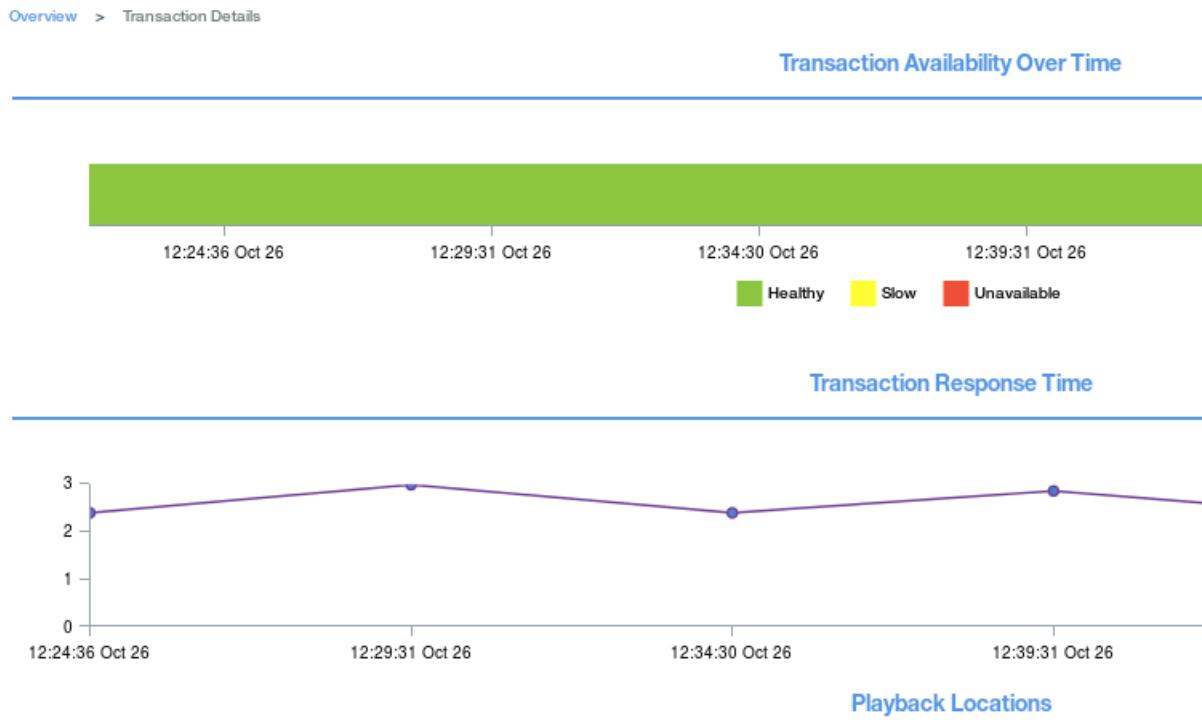
Location	Latest Status	Last Run At	Latest Response Time (Seconds)	Average Response Time (Seconds)	Unavailable (%)	Slow (%)
Austin	<span style="color: green;">✓</span>	Oct 26,2017, 12:34	2.39	2.58	<div style="width: 25%; background-color: #ccc;"></div>	0.00

Examine the performance data for the transactions within Transactions List to determine whether any are having performance problems. When the same script is run from multiple locations, compare performance by location in the Location List. When multiple scripts are run from the same location, compare their performance in the Transaction List.

Examine the locations where scripts are playing from and their performance data to see whether any one location is having performance problems. If you deploy from multiple locations, you can see whether any specific location is causing the problems.

7. Click the **MyDayTraderApp** transaction to open the Synthetic Transaction window for more detail.

The Synthetic Transaction page opens.



This page shows performance and availability data of this specific script over time.

This sample transaction has no subtransactions. For transactions with subtransactions, more detail is available in the **Subtransactions** widget at the bottom of this dashboard.

8. In the Playback Locations widget, click the **Austin** location to access a list of **Transaction Instances** for your location.

Transaction Instances		
Timestamp	Status	Response Time (Seconds)
Oct 26, 2017, 12:49	✓	2.23
Oct 26, 2017, 12:44	✓	2.31
Oct 26, 2017, 12:39	✓	2.85
Oct 26, 2017, 12:34	✓	2.39
Oct 26, 2017, 12:29	✓	2.98
<b>Total 6</b>		

Notice that the time stamps for the instances are 5 minutes apart. This result is because you set the playback schedule for the script to every 5 minutes.



**Hint:** If more than 10 minutes did not elapse, return later to see multiple instances. If more than 10 minutes elapsed and you do not see multiple instances, confirm that you configured your synthetic transaction to play back every 5 minutes.

9. Click a **Transaction Instance** in the window.

The Transaction Instance Details page opens.

Overview > Transaction Details > Transaction Instance Details

Transaction Instances			?
Timestamp	Status	Total Time (Se.. Location	
Oct 26,2017, 12:49	✓	2.23 Austin	
Oct 26,2017, 12:44	✓	2.31 Austin	
Oct 26,2017, 12:39	✓	2.85 Austin	
Oct 26,2017, 12:34	✓	2.39 Austin	
Oct 26,2017, 12:29	✓	2.98 Austin	
Oct 26,2017, 12:24	✓	2.39 Austin	

Time Stamp	Subtransaction Name	Error Ty

Transaction Name	Response Time (Seconds)	Status
MyDayTraderApp	2.23	✓

The Transaction Instances widget shows the same data list as the previous window with the instance you selected highlighted. The data that is displayed in the other two widgets is based on this selection. You can select a different instance at any time in the Transactions Instances widget to see the details of other instances.

10. In the Transaction Break Down widget, click any plus (+) sign to expand the **Transaction Break Down**.

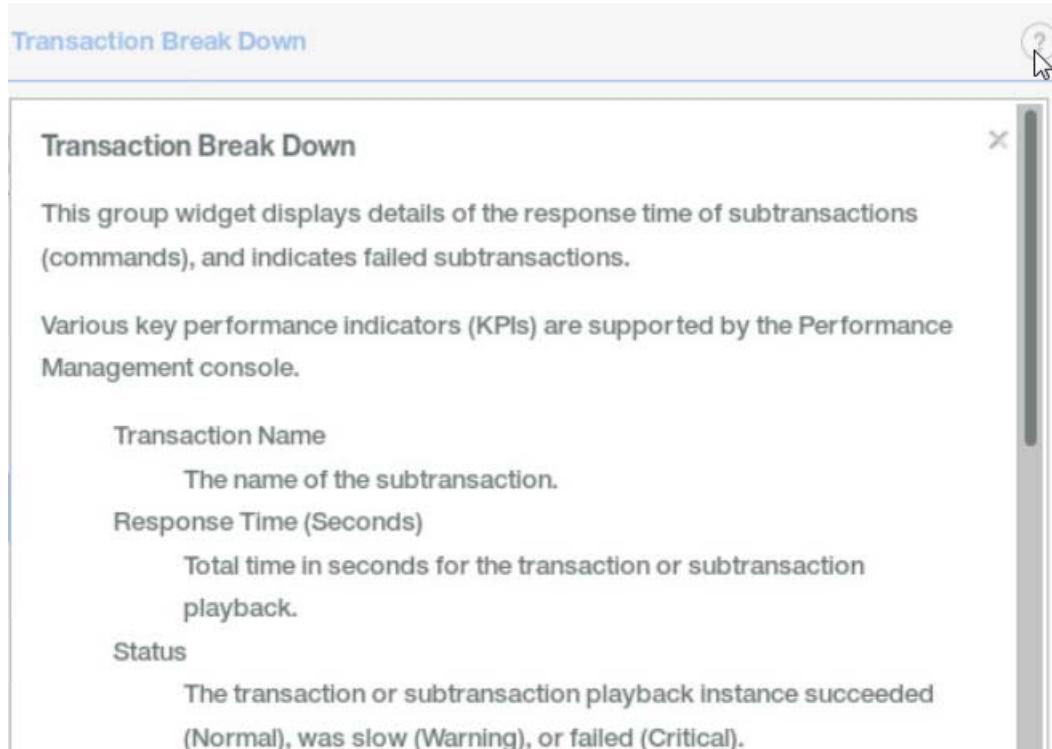
Transaction Break Do						
Transaction Name	Response Time (Seconds)	Status	Http Status	Size (kb)	Blocks (ms)	
MyDayTraderApp	2.23	✓				
http://lin1.ibm.edu/daytrader/app?action=logout	0.35	✓				
GET:http://lin1.ibm.edu/daytrader/app?action=logout	0.009	200 OK	4.03	0		
GET:http://lin1.ibm.edu/daytrader/style.css	0.007	200 OK	1.38	0		
GET:http://lin1.ibm.edu/daytrader/wrt_perf_timing.js	0.001	200 OK	4.49	0		
http://lin1.ibm.edu/daytrader/app	0.31	✓				

11. Expand the **Transaction Name** column so that you can see the full name of each action that the script takes.

Transaction Break Down						
Transaction Name	Response Time (Seconds)	Status	Http Status	Size (kb)		
MyDayTraderApp	2.23	✓				
http://lin1.ibm.edu/daytrader/app?action=logout	0.35	✓				
GET:http://lin1.ibm.edu/daytrader/app?action=logout	0.009	200 OK	4.03	0		
GET:http://lin1.ibm.edu/daytrader/style.css	0.007	200 OK	1.38	0		
GET:http://lin1.ibm.edu/daytrader/wrt_perf_timing.js	0.001	200 OK	4.49	0		
http://lin1.ibm.edu/daytrader/app	0.31	✓				

12. Scroll through the **Transaction Break Down** and click transaction events that have high response times or other indications of poor performance. Review the available metrics in the column header row.

13. Click the question mark (?) icon and scroll through the help window for more details of the available metrics.



This step completes this exercise.



---

# **Unit 8 Monitoring application resources**

The exercises first guide you through the installation of the WebSphere and DB2 monitoring agents on the Linux system.

Then, you use the workspaces of those monitoring agents to review some of the resources that can be monitored with Cloud APM, Private. You see how resource monitoring helps you identify and address potential issues with your infrastructure, application components, and workloads.

## **Exercise 1 Drive HTTP transactions with Firefox**

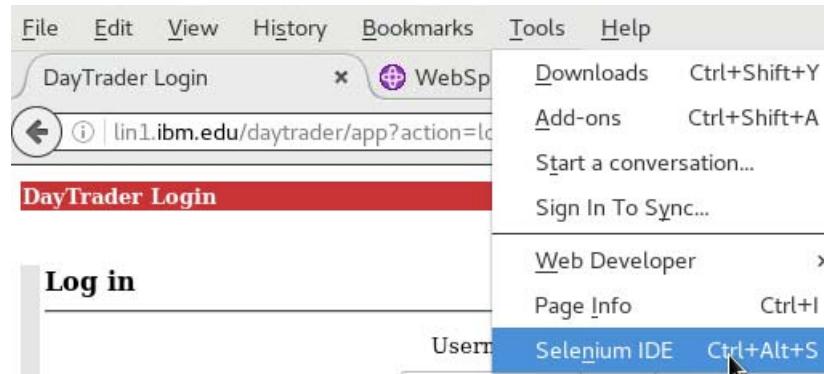
In this exercise, you again set up automation to continuously use the Day Trader application as you did in Unit 6, this time by using the `/daytrader/scenario`. This automation creates activity within the application that can be monitored by using the various Cloud APM agents that you deploy in this course.

1. On LIN1, open a Firefox browser by double-clicking the **Firefox** icon on the desktop.



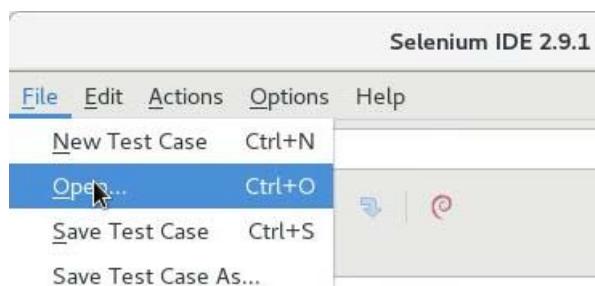
2. Open the **DayTraderScenario**.

- a. From Firefox, select **Tools > Selenium IDE** to start the plug-in.

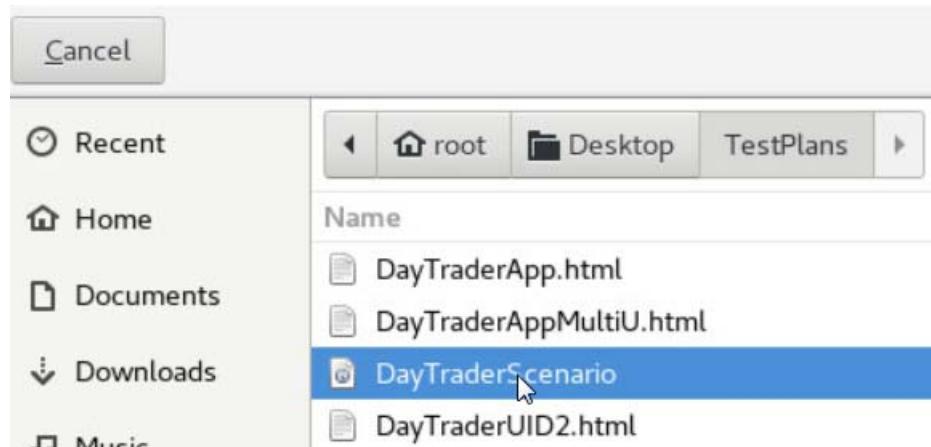


**Hint:** Reposition the Selenium IDE and Firefox browser windows so that you can see both at the same time.

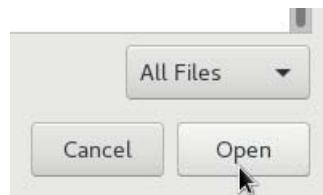
- b. In Selenium IDE, click **File > Open**.



- c. Locate and click the **DayTraderScenario** script that is located in **/root/Desktop/TestPlans**.



- d. Click **Open**.



The DayTraderScenario script opens in Selenium IDE.

Command	Target	Value
open		/daytrader/scenario
refresh		
refresh		

- e. Click **Options > Schedule tests to run periodically**.

- File
- Edit
- Actions
- Options
- Help

Base URL http://lin1.ib...

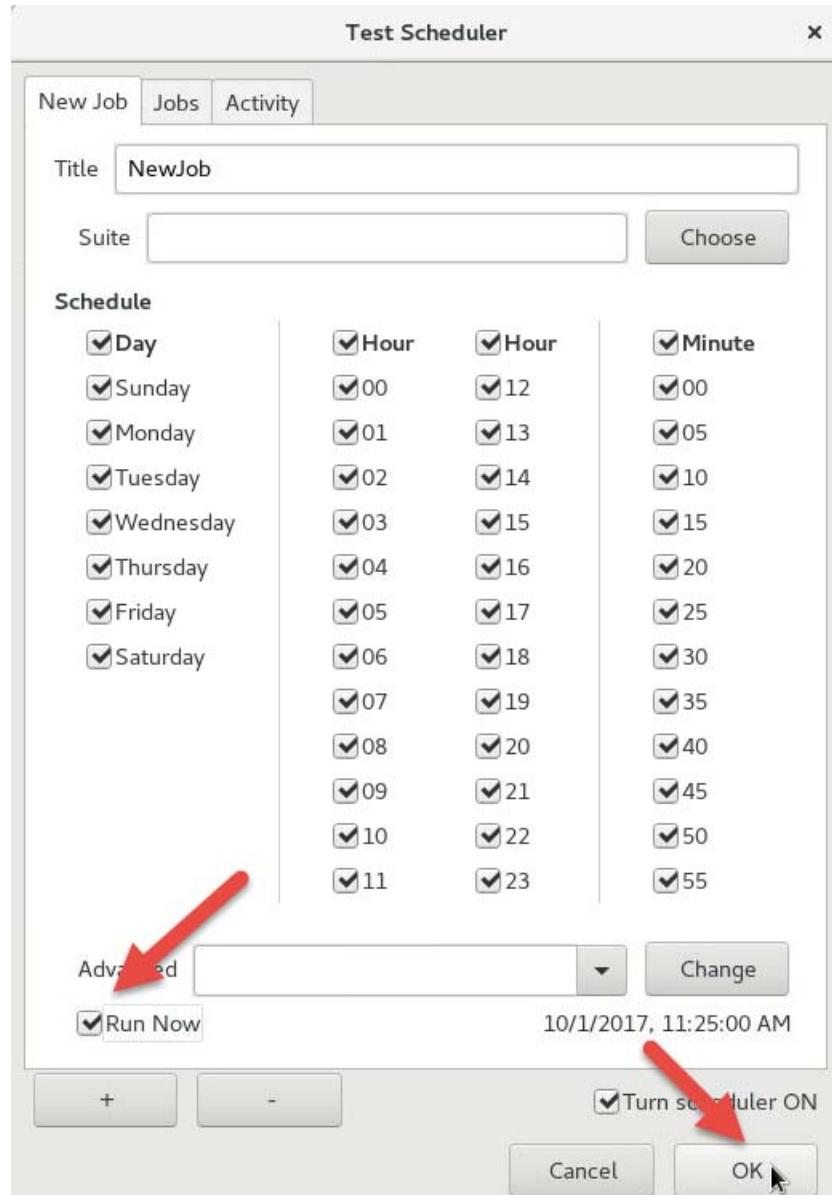
Fast Slow ➤ ➤ | ↻

Test Case

DayTraderScenario

- Options...
- Format >
- Clipboard Format >
- Reset IDE Window
- Clear history >
- Schedule tests to run periodically

- f. Accept the default timings (every day, every hour, every 5 minutes) and click **Run Now**.  
Click **OK**.



3. Observe the DayTrader web page refresh. This refresh repeats every 5 minutes until you stop the Selenium tool from running.

This automation creates monitoring data for the exercises in this unit.

# Exercise 2 Install and configure the Monitoring Agent for WebSphere Applications

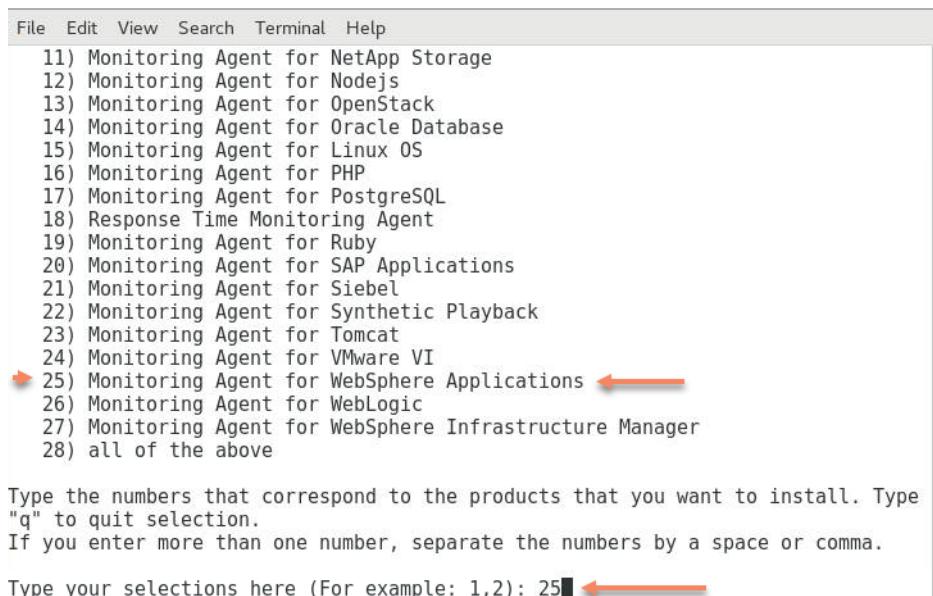
This exercise guides you through installing the Monitoring Agent for WebSphere Applications on the LIN1 Linux-based VM.

1. On VM LIN1, in a terminal window change to the following directory:

```
/downloads/APM814/agent/APMADV_Agent_Install_8.1.4.0
```

2. Run the command: `./installAPMAgents.sh`

3. Select **25** to install the **Monitoring Agent for WebSphere Applications**.



4. Press Enter to confirm your selection.

5. Press Enter to confirm the agent home of `/opt/ibm/apm/agent`.

6. Enter **1** and press **Enter** to accept the license agreement.

The agent installation takes approximately 5 minutes, and successfully concluded installations are confirmed by seeing a message in the terminal.

```

root@lin1:/software/Agents/APMADV_Agent_Install_8.1.4.0 - □ ×
File Edit View Search Terminal Help

The following agents were installed successfully into the /opt/ibm/apm/agent directory:
Monitoring Agent for WebSphere Applications ←

Agent status:
Agent is running. Process ID is 1165
Server connection status: Connected
For more information, see the following file: /opt/ibm/apm/agent/logs/yn_Primary_ServerConnectionStatus.txt

The installation log file is /opt/ibm/apm/agent/logs/APMADV_Agents_install.log.

```

The Monitoring Agent for WebSphere Applications needs some manual configuration to collect the necessary data.

- In the terminal window, change directory to

`/opt/ibm/apm/agent/yndchome/7.3.0.14.0/bin/` and run the `./simpleconfig.sh` command.

```
[root@lin1 APMADV_Agent_Install_8.1.4.0]# cd /opt/ibm/apm/agent/yndchome/7.3.0.14.0/bin/
[root@lin1 bin]# ./simpleconfig.sh
```

The script carries out a series of commands with no user input.

- When asked to select a WebSphere instance, enter **1** and press Enter.

```
List of WebSphere Application Server home directories discovered:
Enter a number or enter the full path to a home directory
  1. /opt/IBM/WebSphere/AppServer
Enter a number:
1
```

- Review the on-screen message that indicates that the configuration was completed successfully.

```
Enter a number or enter the full path to a home directory
  1. /opt/IBM/WebSphere/AppServer
Enter a number:
1
Looking for servers under profile AppSrv01
Discovering profile. Please wait...
Configuring. Please wait...

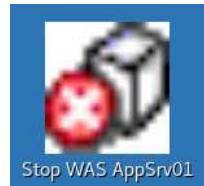
Please ensure the account that was used to run the application server has the read and write privileges to DCHome/runtime directories.
Configuration completed successfully.
Please restart the WebSphere servers under the selected profile to exploit the full power of Monitoring Agent for WebSphere Applications Data Collector.
[root@lin1 bin]#
```



**Note:** The `simpleconfig.sh` script enables all the features of the WebSphere Applications monitoring agent that is required for resource monitoring. More configuration steps are carried out in [Unit 10, “Deep-dive diagnosis”](#) to enable the deep-dive features that are required for that set of exercises.

- Restart WebSphere.

- Double-click the **Stop WAS AppSrv01** icon.



- b. Double-click the **Start WAS AppSrv01** icon.



# Exercise 3 Install and configure the Monitoring Agent for DB2

This exercise guides you through installing the Monitoring Agent for DB2 on the LIN1 Linux-based VM.

1. Open a terminal window and change to the following directory:

```
/downloads/APM814/agent/APMADV_Agent_Install_8.1.4.0
```

2. Run the command: `./installAPMAgents.sh`

3. Type **3** to install the Monitoring Agent for DB2 and press Enter.

```
1) Monitoring Agent for Cisco UCS
2) Monitoring Agent for DataPower
3) Monitoring Agent for DB2
4) Monitoring Agent for HTTP Server
5) Monitoring Agent for IBM Integration Bus
6) Monitoring Agent for JBoss
7) Monitoring Agent for Linux KVM
8) Monitoring Agent for MongoDB
9) Monitoring Agent for WebSphere MQ
10) Monitoring Agent for MySQL
11) Monitoring Agent for NetApp Storage
12) Monitoring Agent for Nodejs
13) Monitoring Agent for OpenStack
14) Monitoring Agent for Oracle Database
15) Monitoring Agent for Linux OS
16) Monitoring Agent for PHP
17) Monitoring Agent for PostgreSQL
18) Response Time Monitoring Agent
19) Monitoring Agent for Ruby
20) Monitoring Agent for SAP Applications
21) Monitoring Agent for Siebel
22) Monitoring Agent for Synthetic Playback
23) Monitoring Agent for Tomcat
24) Monitoring Agent for VMware VI
25) Monitoring Agent for WebSphere Applications
26) Monitoring Agent for WebLogic
27) Monitoring Agent for WebSphere Infrastructure Manager
28) all of the above
```

Type the numbers that correspond to the products that you want to install. Type "q" to quit selection.

If you enter more than one number, separate the numbers by a space or comma.

Type your selections here (For example: 1,2): 3

4. Press Enter to confirm your selection.

5. Press Enter to confirm the agent home of `/opt/ibm/apm/agent`.

6. Enter 1 and press Enter to accept the license agreement.

```
Do you accept the license agreement(s) found in the directory /software/Agents/APMADV_Agent_Install_8.1.4.0/licenses?  
Please enter [ 1-to accept the agreement, 2-to decline the agreement ] : 1  
User has accepted the license agreement(s).  
Monitoring Agent for DB2 will be installed.  
Installing Monitoring Agent for DB2.
```

The agent installation takes approximately 5 minutes, and successfully concluded installations are confirmed with a message in the terminal.

The Monitoring Agent for DB2 needs some manual configuration to collect the necessary data. The user that runs the Monitoring Agent for DB2 must have sufficient authority with DB2. Because you installed the Monitoring Agent for DB2 agent as `root`, the agent runs under `root`.

7. Change to the `/opt/ibm/apm/agent` directory and run this command:

```
chmod 777 logs/
```

8. In a new terminal window, change to the following directory:

```
cd /opt/ibm/apm/agent/config
```

9. Run the following command to make the script executable:

```
chmod +x Kud*
```

- a. Run the following command to confirm that the script is executable:

```
ls -l Kud*
```

```
[root@lin1 APMADV_Agent_Install_8.1.4.0]# cd /opt/ibm/apm/agent/config/  
[root@lin1 config]# chmod +x Kud*  
[root@lin1 config]# ls -l Kud*  
-rwxr-xr-x 1 root root 6252 Dec 21 05:16 KudGrantUserPermissions.sh
```

- b. Run the following command to switch to the db2inst1 user:

```
su - db2inst1
```



**Important:** If you receive “Permission denied” errors, close the db2inst1 window and from `root` run:

```
chmod 777 /dev/null  
su - db2inst1
```

- c. Change to the following directory:

```
cd /opt/ibm/apm/agent/config
```

- d. Run the following script to grant required permissions:

```
./KudGrantUserPermissions.sh db2inst1 root
```

```
[db2inst1@lin1 config]$ ./KudGrantUserPermissions.sh db2inst1 root
Initialising DB2 environment...
Sourcing db2profile...
Granting permissions started
This may take few minutes. Please wait...
Granting permissions completed successfully....
Check with ../logs/UD_permissions_logs_20180306150226.log file for any errors.
[db2inst1@lin1 config]$
```

- e. Check the UD\_permissions\_logs log for any errors.

The DB2 agent can be configured interactively by using the `config` command, or silently by using the `DB2_silent_config.txt` file. However, before running the silent install, specified updates are made to the `DB2_silent_config.txt` file, updates that you make in the next steps.

10. Set the DB2 agent configuration properties in the silent installation file.

- Change to the `/opt/ibm/apm/agent/samples` directory, and list the contents.
- Make a backup copy of the sample configuration file, `DB2_silent_config.txt`.  
`cp DB2_silent_config.txt DB2_silent_config.orig`
- Open the file `DB2_silent_config.txt` by using gedit.  
`gedit DB2_silent_config.txt`
- Update two entries to the DB2 PARAMETERS as in the screen capture:

```
KUD_DB2_SQL_PATH=/opt/ibm/apm/agent/config/kudcussql.properties
KUD_DIAGLOG_PATH=/home/db2inst1/sqllib/db2dump
```

```
#####
# DB2 PARAMETERS #####
# The absolute path and file name for DB2 customized SQL definition file
KUD_DB2_SQL_PATH=/opt/ibm/apm/agent/config/kudcussql.properties
# The directory of the DB2 diagnostics log file. It includes path only
KUD_DIAGLOG_PATH=/home/db2inst1/sqllib/db2dump
```

 **Note:** The statements are already in the `DB2_silent_config.txt` file. You need to update them providing the values as indicated.

- Save the `DB2_silent_config.txt` file and close gedit.

The DB2 agent is a multi-instance agent, which means that a single agent can monitor multiple instances of its domain, databases. Multi-instance agents must be configured to monitor each instance, and each monitor instance must be started separately.

11. In a terminal window, run the following commands to configure the DB2 agent to monitor the db2inst1 database that uses the silent configuration file:

```
cd /opt/ibm/apm/agent/bin/  
  
. /db2-agent.sh config db2inst1  
/opt/ibm/apm/agent/samples/DB2_silent_config.txt  
  
[root@lin1 bin]# . /db2-agent.sh config db2inst1 /opt/ibm/apm/agent/samples/DB2_silent_config.txt  
Configuring Monitoring Agent for DB2  
Configuration completed successfully.  
Automatic start at system initialization has been configured.  
Automatic stop at system shutdown has been configured.  
[root@lin1 bin]# █
```



**Hint:** The instance name is **db2inst1** and the final character is the digit one (1) and not the lowercase letter L (l).

12. Start the Monitoring Agent for DB2:

```
./db2-agent.sh start db2inst1
```

13. Confirm that the DB2 monitoring agent started.

```
[root@lin1 bin]# ./db2-agent.sh start db2inst1  
Sourcing db2profile for user db2inst1  
Processing. Please wait...  
Starting the Monitoring Agent for DB2...  
Monitoring Agent for DB2 started  
[root@lin1 bin]# █
```

# Exercise 4 Monitor WebSphere resources

WebSphere Application Server is just one of the application servers whose resources can be monitored with Cloud APM. This exercise reviews dashboards for:

- EJB containers
- Thread pools

1. In Firefox on APM, open the Cloud APM console.

`https://apm.ibm.edu:9443`

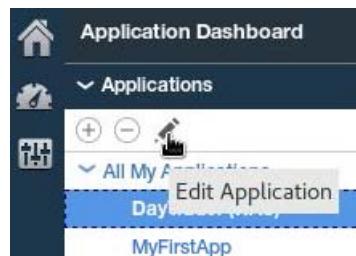
2. Log in with the credentials `apmadmin / object00`.

3. Add the LIN1 WebSphere and DB2 agent to the DayTrader application.



**Note:** It can take up to 10 minutes for the DB2 instance that is shown in [Step f](#) on page 8-13 to appear in the Application Editor.

- a. Open to the **Application Performance Dashboard**.
- b. Click the **DayTrader (WAS)** application and click the **Edit Application** icon.



The Edit Application window opens.

- c. In the Application components dialog box, click the plus (+) sign to add a component.
- d. Scroll down to **DB2** in the **Select Component** dialog box and click it.

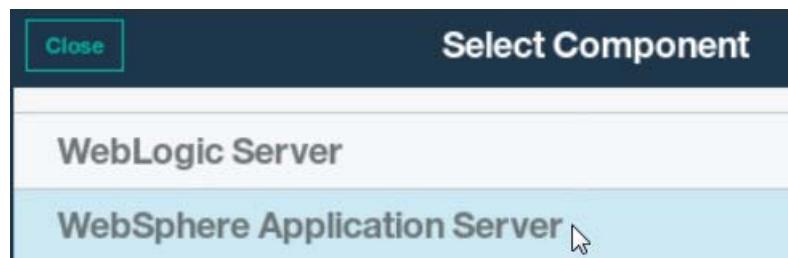


- e. In the Component Editor window, select the **db2inst1:lin1:UD** instance.

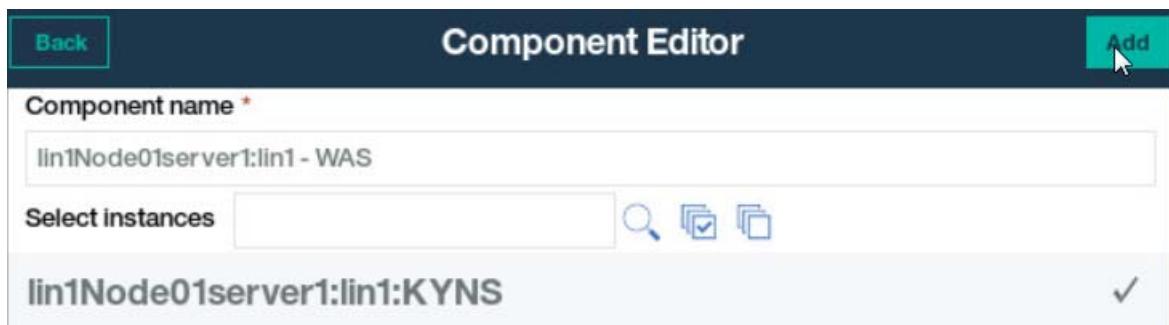
- f. Click **Add** to associate the instance with the application.



- g. Click **Back** to return to the Select Component window.  
h. Scroll down to **WebSphere Application Server** in the **Select Component** dialog box and click it.



- i. In the Component Editor window, select the **lin1Node01server1:lin1:KYNS** instance.  
j. Click **Add** to associate the instance with the application.



- k. Click **Back** to return to the Select Component window.  
l. Click **Close** to exit the Select Component window.

- m. Confirm that the **DB2** and **WebSphere** instances were added.

The screenshot shows the 'Application components' tree. The 'lin1Node01server1:lin1 - WAS(1)' node is highlighted with a red box. Inside this box are the sub-nodes 'lin1Node01server1:lin1:KYNS' and 'db2inst1:lin1 - DB2(1)'. Below 'db2inst1:lin1 - DB2(1)' is another node 'db2inst1:lin1:UD'. Other nodes in the tree include 'lin1\_htpd - HTTP Server(1)', 'lin1 - Linux OS(1)', and 'MyDayTraderApp - Synthetic Transactions(1)'.

4. Click **Save** to save your changes to the DayTrader (WAS) application.
5. Click **OK** to complete the operation.

You are returned to the Application Dashboard.

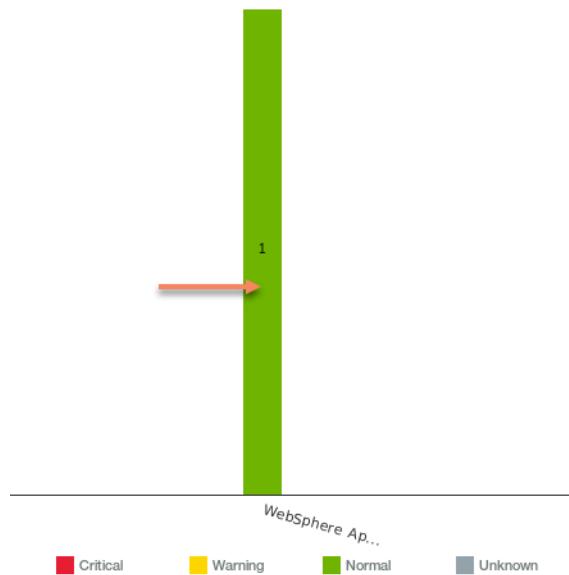


**Important:** It can take up to 5 minutes for the components to be added to the DayTrader dashboard.

6. Select the **DayTrader (WAS)** application in the Applications list.
7. Click the arrow at the upper right to move from the aggregate topology to the individual application component status indicators.

The screenshot shows the Application Dashboard for the 'DayTrader (WAS)' application. At the top, there is a status bar with 'Last Updated: Oct 18, 2017, 11:23:02 AM', 'Actions', and a help icon. Below this is a search bar with 'Integrate with OA-LA to enable log searches' and a magnifying glass icon. The main area displays the application's status with a 'Last 4 hours' summary. A prominent orange arrow points to a green gear icon, which is circled in red. Below the summary are several small status icons and a domain selection bar.

8. Click the bar for the WebSphere Application monitoring agent.



9. Click the widget to access the top-level dashboard of resource widgets.





**Note:** This unit covers resource monitoring only. The advanced monitoring features that are highlighted in yellow are covered in [Unit 10, “Deep-dive diagnosis”](#).

Requests with Slowest Response Time

L	Request Name	Average Response Time (ms)	Error Rate (%)
n.ibm.websphere.samples.daytrader....	getClosedOrders	103	0.00%
://lin1.ibm.edu/daytrader/app	/daytrader/app	40	0.00%
n.ibm.websphere.samples.daytrader....	onMessage	5	0.00%

In-flight Request Summary

Flight requests	Average resident time (ms)
0	0

View Requests

JVM GC (history)

Kbytes Used and Max Heap KB

0 500,000

09:42 Oct 18 11:22 Oct 18

— Kbytes used in heap — Max heap kbytes

WebSphere Applications

Application Name	Average Response Time	Throughput
app	0	0
iasyncrsp	0	0
transferSecured	0	0
managementEJB	0	0

View Heap Dump View Memory Analysis

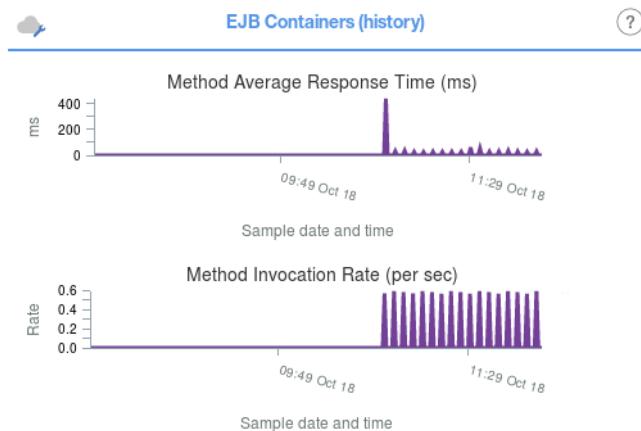


**Hint:** An important reason for monitoring **EJB containers** is that they manage the enterprise beans that contain the business logic of a Java Platform, Enterprise Edition application.

An EJB container performs several functions for objects:

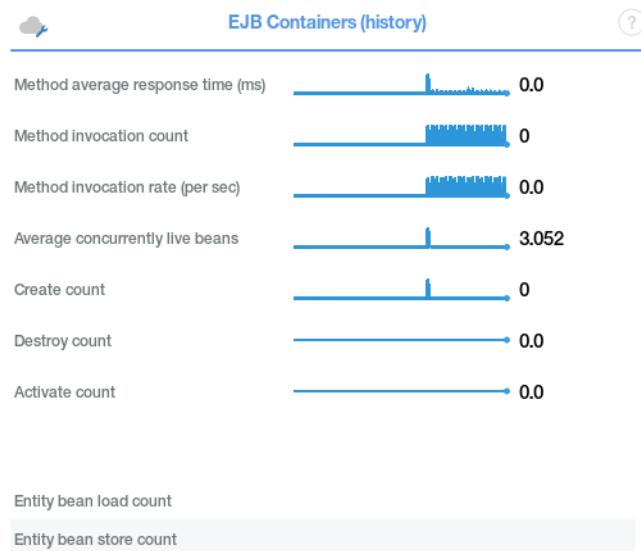
- Registers an object
- Provides a remote interface for the object
- Creates and destroys object instances
- Checks object security
- Manages the active state of the object
- Coordinates distributed transactions

10. Review the graphs on the **EJB Containers** widget.



11. Click the widget to access EJB container details dashboard.

12. Pay particular attention to a widget with the same name, **EJB Containers (history)**, and note the greater level of detail provided.



13. Review the KPIs on the instance overview widget.



14. Hover over a column header to see the full text of the KPI.
15. In the Enterprise JavaBeans table, click the ? icon to view added detail for the KPIs in this table.

Method Aver...	Create Count	Activate Co...	Passivate C...	Entity Bean...	Entity Bean...	Destroy Count	Average Con...	Online help
1.0	0.0	0					0.0	
1.0	0.0	0					1.0	

Container Transactions

Committed Local...	Rolled Back Glo...	Rolled Back Loc...	Timeouts Global...	Timeouts Local ...	Duration Global...	Duration Local ...
0			0	0	0.0	0.0

**Hint:** An important reason for monitoring **Garbage Collection** and **Java Heap size** is the impact that they can have on performance.

16. Just below the **Status Overview** tab, click the **Overview** link to return to the main WebSphere resource dashboard.



**Hint:** **Thread pools** and their corresponding threads control all execution of the application. You can think of thread pools as queuing mechanisms to throttle how many concurrent requests you are going to be running at any one time in your application.

The more threads that you have, the more requests you can be servicing at one time. However, the more threads that you have, the more they are competing for shared resources such as CPUs and the slower the overall response time can become as these shared resources are contended or exhausted.

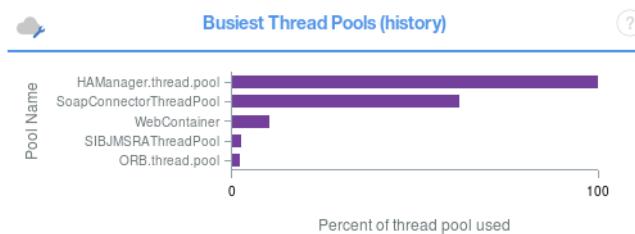
If you are not reaching a target CPU percentage usage, you can increase the three pool sizes, but this increase probably requires more memory and should be sized properly. If you have any bottlenecks other than the CPUs, then CPU usage stops increasing.

The most commonly used (and tuned) thread pools within the application server are:

- **WebContainers**
  - Used when requests come in over HTTP
- **ORB (not applicable in this environment)**
  - Used when remote requests come in over RMI/IOP for an enterprise bean from an EJB application client, remote EJB interface, or another application server
- **Messaging thread pools (not applicable in this environment)**

The following pages show some of the tread pool metrics that can be monitored with Cloud APM, Private.

17. Scroll down and click the **Busiest Thread Pools (history)** widget to access the resource dashboard for thread pools.



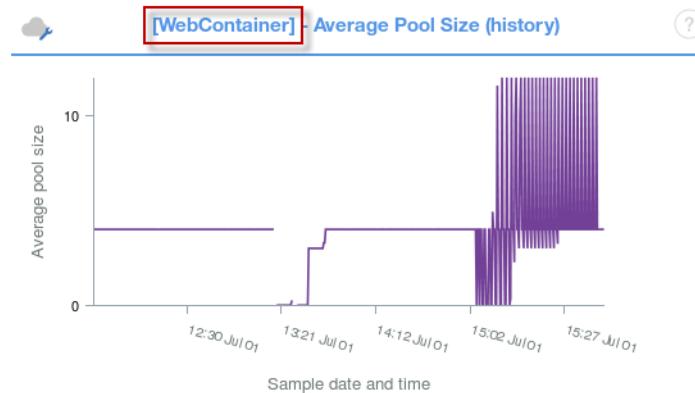
18. Click the header of the **Average Pool Size** column until the highest values are at the top.

Thread Pool Name	Maximum Pool Size	Average Active Threads	Average Pool Size
WebContainer	50	1.0	6.999
SoapConnectorThreadPool	5	0.009	3.0
HAManager.thread.pool	2	0.0	2.0
ORB.thread.pool	50	0.0	1.0
SIBJMSRAThreadPool	41	0.0	1.0
AirlinesThreadPool	5	0.0	0.0
Default	20	0.0	0.0

19. Select the first item in the sorted **Thread Pool Name** list.

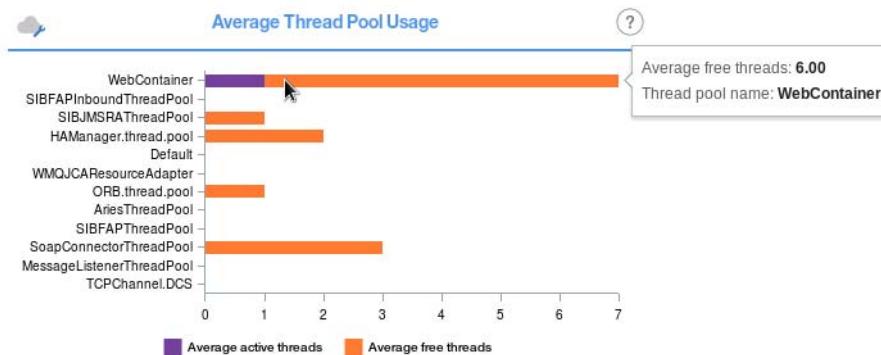
Thread Pool Name	Maximum Pool Size	Average Active Threads	Average Pool Size
WebContainer	50	1.0	6.999
SoapConnectorThreadPool	5	0.009	3.0
HAManager.thread.pool	2	0.0	2.0
ORB.thread.pool	50	0.0	1.0

Notice that the added prefix to the header of the **Average Pool Size** widget matches the thread that you selected in the previous step.

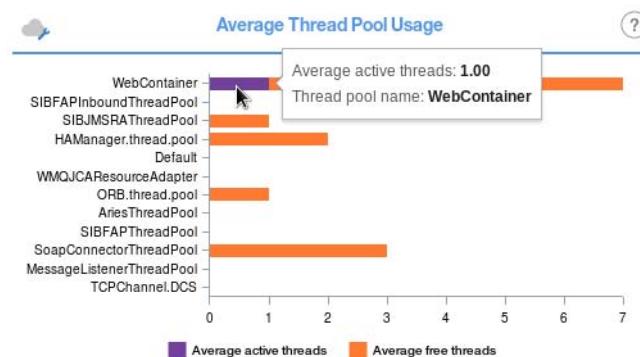


**Note:** Not all dashboard headers are given the prefix, including **Average Thread Pool Usage**.

20. Move the mouse pointer over the orange section of the **WebContainer** bar in the **Average Thread Pool Usage** bar chart. Examine the flyover to see the **average free threads** for the selected pool for the current interval.



21. Move the mouse pointer over the purple section of the **WebContainer** bar in the **Average Thread Pool Usage** bar chart. Examine the flyover to see the **average active threads** for the selected pool for the current interval.



22. Just below the **Status Overview** tab, click the **Overview** link to return to the main WebSphere resource dashboard.

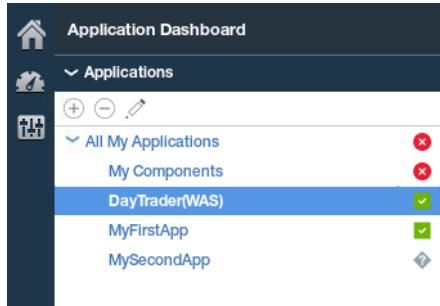


# Exercise 5 Monitor DB2 resources

DB2 is just one of the resources that can be monitored with Cloud APM, Private. This exercise reviews the Database Status table, focusing on two key metrics:

- Package Cache %
- Buffer Pool Hit Ratio %

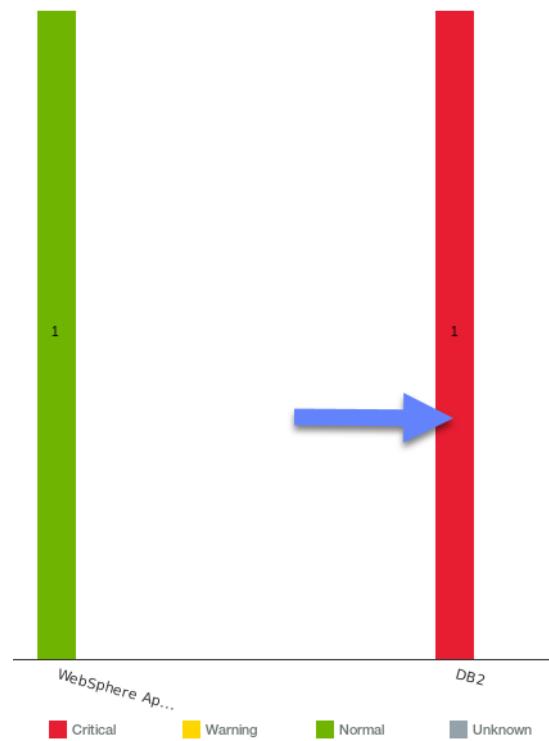
1. In the Cloud APM console on APM, select the **DayTrader (WAS)** application.



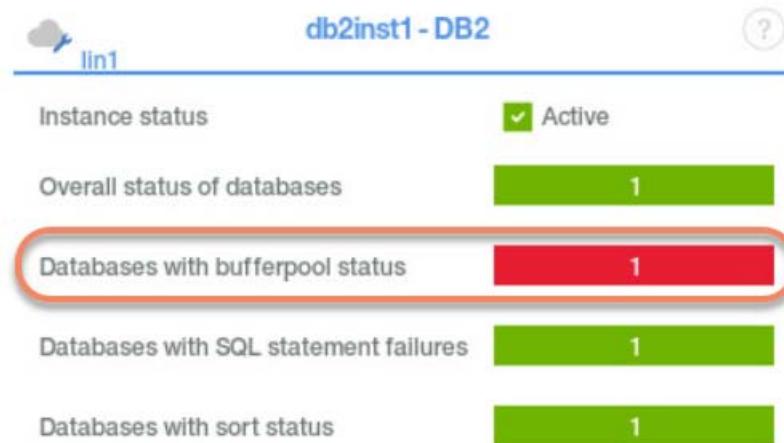
2. Click the arrow at the upper right to move from the aggregate topology to the individual application component status indicators.

The screenshot shows the detailed status view for the 'DayTrader(WAS)' application. At the top, it says 'Last Updated: Oct 18, 2017, 11:23:02 AM' and has 'Actions' and '?' buttons. Below is a search bar with 'Integrate with OA-LA to enable log searches' and a magnifying glass icon. A time filter 'Last 4 hours' is shown with a dropdown arrow. A prominent orange arrow points to a circular button with a right-pointing arrow icon, which is circled in red. Below the button is a horizontal toolbar with icons for green, yellow, red, grey, and a domain selector. At the bottom is a large icon of a cloud with a gear inside.

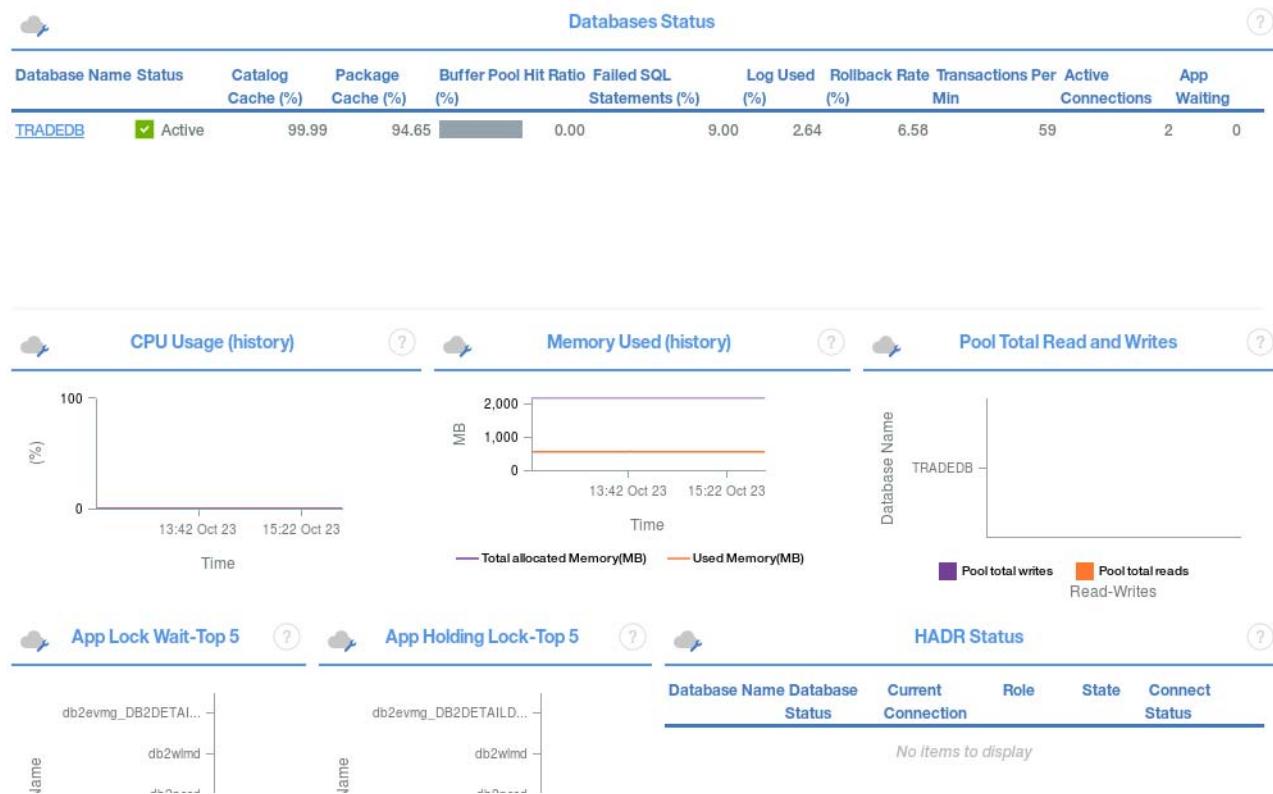
3. Click the bar for the DB2 monitoring agent.



4. Review the KPIs on the instance overview widget.



5. Click the widget to access the top-level dashboard of resource widgets.



6. Focus on the **Database Status** table near the top of the dashboard.

The screenshot shows the Database Status table with a red arrow pointing to the Package Cache (%) value of 98.19. Another red arrow points to the Failed SQL Statements (%) value of 0.00.

Database Name	Status	Catalog Cache (%)	Package Cache (%)	Buffer Pool Hit Ratio (%)	Failed SQL Statements (%)	Log Used (%)	F
TRADEDB	Active	98.65	98.19	0.00	13.29	100.00	E

Among the essential metrics included in this table are:

### Package Cache (%)

The package cache is a memory area where DB2 stores static and dynamic queries, access plans, and information about the execution of those queries. The package cache percentage represents the ratio of package sections that were found in the cache. If the hit ratio is high (more than 0.8), the package cache generally is being used effectively.

When a package cache is too small, dynamic SQL must be more frequently recompiled and performance suffers while applications are waiting for that compilation to happen. Alternatively, if a package cache is too large, memory allocation is less efficient.

## Buffer Pool Hit Ratio (%)

Monitoring buffer pool activity in your database can help you identify opportunities to improve database performance. The database server reads and updates all data from a buffer pool. Data is copied from disk to a buffer pool as it is required for applications.

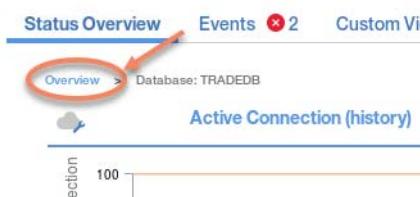
If the server needs to read a page of data that is already in the buffer pool, then accessing that page is much faster than if the page had to be read from disk. It is desirable to encounter as many pages as possible in the buffer pool. Therefore, avoiding disk I/O is an important factor in database performance. Proper configuration of the buffer pools is one of the most important considerations for performance tuning.

A healthy and high-performing database should have a **Buffer Pool Hit Ratio %** in the 90s.

Several other important metrics are included in this table:

- Catalog Cache (%)
- Failed SQL Statements (%)
- Log Used (%)
- Rollback Rate (%)
- Transactions per Minute
- Active Connections
- Applications Waiting

7. Just below the **Status Overview** tab, click the **Overview** link to return to the main DB2 resource dashboard.



# Exercise 6 Install the Nodes.js data collector

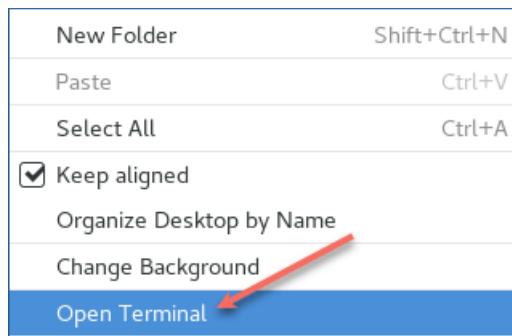
In this lab session, you install the data collector for Node.js.

Node.js is a software platform that employs JavaScript for server-side solutions, and these solutions are often used for receiving and responding to HTTP requests. The Node.js data collector can be used to measure and collect data about the performance of Node.js applications. For example, throughput and response times for HTTP requests, and other measurements that relate to resource usage, are monitored and stored for display and analysis.

The Node.js agent is a single instance agent. It registers subnodes for each monitored Node.js application.

This exercise guides you through installing the LWDC for Node.js on the LIN1 Linux-based VM.

1. On the LIN1 VM, right-click the desktop and click **Open Terminal**.



2. Run the following command to access the data collector package:

```
cd /downloads/APM814/agent/
```

3. Run the following command to unpack the installation package:

```
tar -xvf apm_datacollectors_linux_8.1.4.0.tgz
```

```
[root@lin1 ~]# cd /downloads/APM814/agent/
[root@lin1 agent]# tar -xvf apm_datacollectors_linux_8.1.4.0.tgz
j2se_datacollector_linux_8.1.4.0.tgz
liberty_datacollector_8.1.4.0.tgz
nodejs_datacollector_8.1.4.0.tgz
python_datacollector_8.1.4.0.tgz
ruby_datacollector_8.1.4.0.tgz
[root@lin1 agent]#
```

4. Run the following command to copy the Node.js data collector package to the home directory of your Keystone application:

```
cp nodejs_datacollector_8.1.4.0.tgz /opt/node_app/keystone-demo-master/
```

```
[root@lin1 Agents]# cp nodejs_datacollector_8.1.4.0.tgz /opt/node_app/keystone-d
emo-master/
```

- Run the following command to access the home directory of your Node.js application package:

```
cd /opt/node_app/keystone-demo-master/
```

```
[root@lin1 Agents]# cd /opt/node_app/keystone-demo-master/  
[root@lin1 keystone-demo-master]#
```

- Run the following command to unpack the Node.js data collector installer:

```
tar -xvf nodejs_datacollector_8.1.4.0.tgz
```

```
[root@lin1 keystone-demo-master]# tar -xvf nodejs_datacollector_8.1.4.0.tgz  
nodejs_dc/  
nodejs_dc/README.md  
nodejs_dc/ibmapm.tgz  
[root@lin1 keystone-demo-master]#
```

- Run the following command to install the data collector:

```
npm install nodejs_dc/ibmapm.tgz
```

```
[root@lin1 keystone-demo-master]# npm install nodejs_dc/ibmapm.tgz  
npm http GET https://registry.npmjs.org/appmetrics  
npm http GET https://registry.npmjs.org/properties  
npm http GET https://registry.npmjs.org/uuid  
npm http GET https://registry.npmjs.org/log4js  
npm http GET https://registry.npmjs.org/https-proxy-agent  
npm http GET https://registry.npmjs.org/agent-base  
npm http GET https://registry.npmjs.org/debug  
npm http GET https://registry.npmjs.org/extend  
npm http GET https://registry.npmjs.org/request
```



**Important:** This step requires access to the internet.

# Exercise 7 Configure the Node.js data collector

1. If you are not there already, change to the following directory in a terminal window:

```
cd /opt/node_app/keystone-demo-master/
```

The **keystone.js** file is the main application file for the Keystone application and needs to be edited to add the Node.js data collector.

2. Open the **keystone.js** file for editing.

```
gedit keystone.js
```

3. Enter the highlighted text at the location indicated, and then click **Save**.



```
// Load .env for development environments
require('dotenv')().load();
require('ibmapm'); ←
var keystone = require('keystone');

/**|
 * Application Initialisation
 */

keystone.init({
```

## Exercise 8 Generate Node.js traffic

In this exercise, you start the Keystone.js application, and a script to generate Node.js traffic.

1. On the LIN1 VM, in a terminal window change to the directory where the Node.js start script is located.

```
cd /opt/node/app/
```

2. Type the command to start the Keystone application. Press Enter.

./start.sh

3. Ignore the **c++** error message and wait until the application initializes.

4. Open a separate terminal window, and type the command to navigate to the folder that contains the traffic generation script. Press Enter.

```
cd /opt/node/app/httpSender/
```

5. Type the command to start the script. Press Enter.

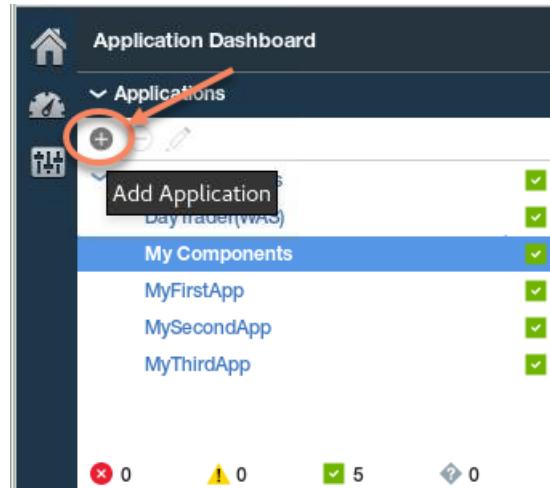
```
./sendUrlWithCookies.py
```

- #### **6. Review the flow of traffic.**

```
from 1511387263957 to 1511387283957
[2017-11-22 16:48:03.965] [INFO] knj_sender_log - tool/sender.data_sender response statusCode: 200
GET /gallery 200 577ms - 9.22kb
GET /contact 200 549ms - 10kb
GET /keystone/signin 200 255ms - 1.99kb
GET /keystone/po
[2017-11-22 16:4
09 1511387285647 File Edit View Search Terminal Help
[2017-11-22 16:4
from 1511387285647 delete?id=5a15f023f8bf4631233a3b2d
Thread-1 Sending Get request with url:http://127.0.0.1:3001/keystone/api/post
[2017-11-22 16:4
se statusCode: 200 delete?id=5a15f02bf8bf4631233a3b2e
Thread-1 Sending Get request with url:http://127.0.0.1:3001/keystone/api/post
[2017-11-22 16:4
GET /keystone/ga delete?id=5a15f032f8bf4631233a3b2f
Thread-1 Sending Get request with url:http://127.0.0.1:3001/keystone/api/post
[2017-11-22 16:4
GET /keystone/en delete?id=5a15f03af8bf4631233a3b2g
Thread-1 Sending Get request with url:http://127.0.0.1:3001/keystone/api/post
[2017-11-22 16:4
GET /keystone/us delete?id=5a15f03af8bf4631233a3b30
Thread-1 Sending Get request with url:http://127.0.0.1:3001/keystone/api/post
[2017-11-22 16:4
Step 1/11 delete?id=5a15f041f8bf4631233a3b31
```

# Exercise 9 Create the Keystone application in the Performance Management console

1. Move to the **Performance Management console** on the APM image.
2. Click the plus (+) sign in the **Applications** widget.



3. Type **Keystone** in the Application name field.

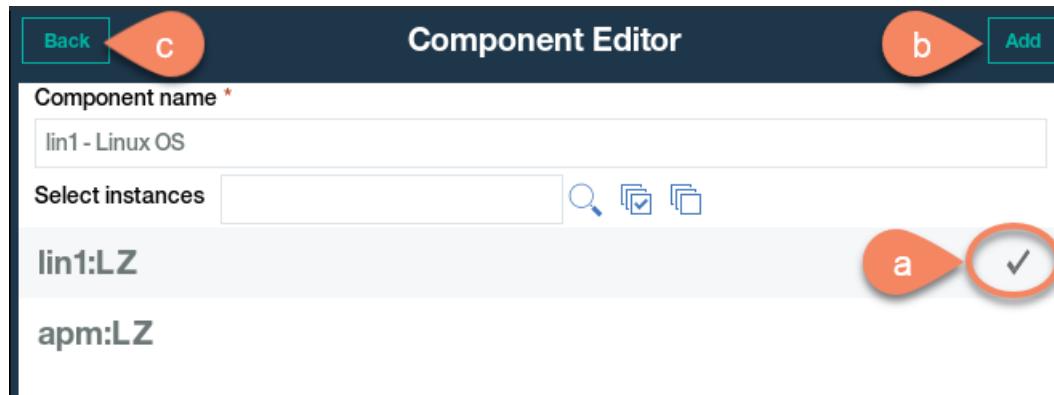
A screenshot of the 'Add Application' dialog box. It has fields for 'Name' (containing 'Keystone' and circled in red), 'Description' (empty), and 'Application read from' (empty). There are 'Save' and 'Read...' buttons at the top right. The 'Name' field is highlighted with a red circle.

4. Click the plus (+) sign to add a component.



5. Locate and select **Linux OS** in the list of available components.

6. Add the **LIN1** instance to the application.



- Click the instance.
  - Click **Add**.
  - Click **Back** to complete the operation.
7. Select **Node.js Runtime** in the list of available components.



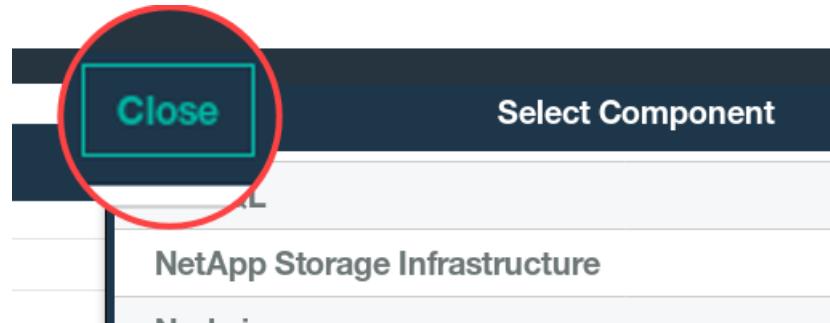
8. Add the single instance to the application.



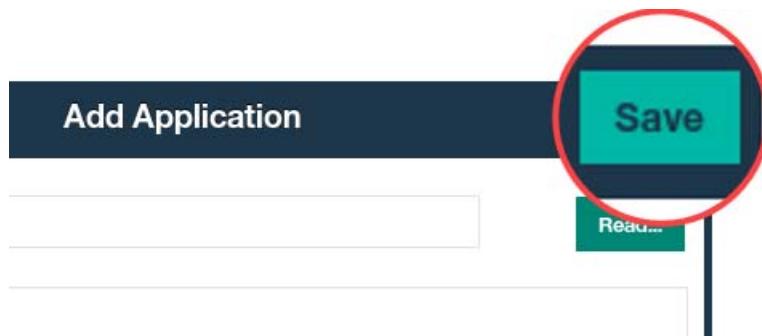
**Important:** It can take up to 10 minutes for the LIN1 Keystone instance to be displayed.

- Click the instance.
- Click **Add**.
- Click **Back** to complete the operation.

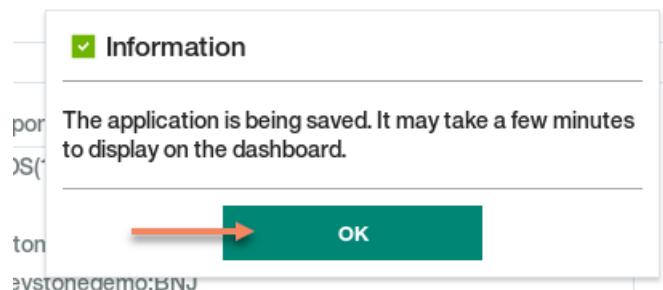
9. Click **Close**.



10. Click **Save**.

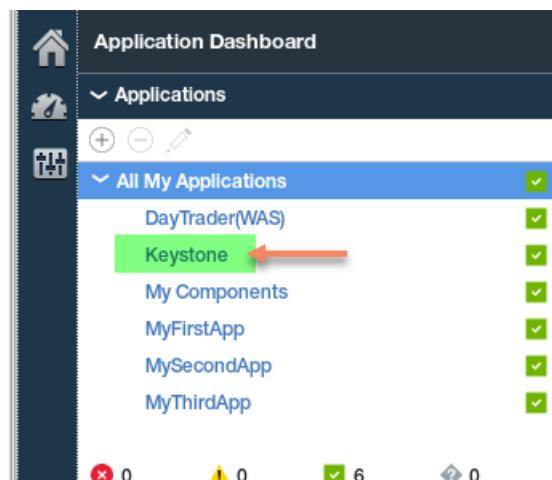


11. Click **OK** to complete the operation.



You are returned to the Application Dashboard, and the **Keystone** application is displayed.

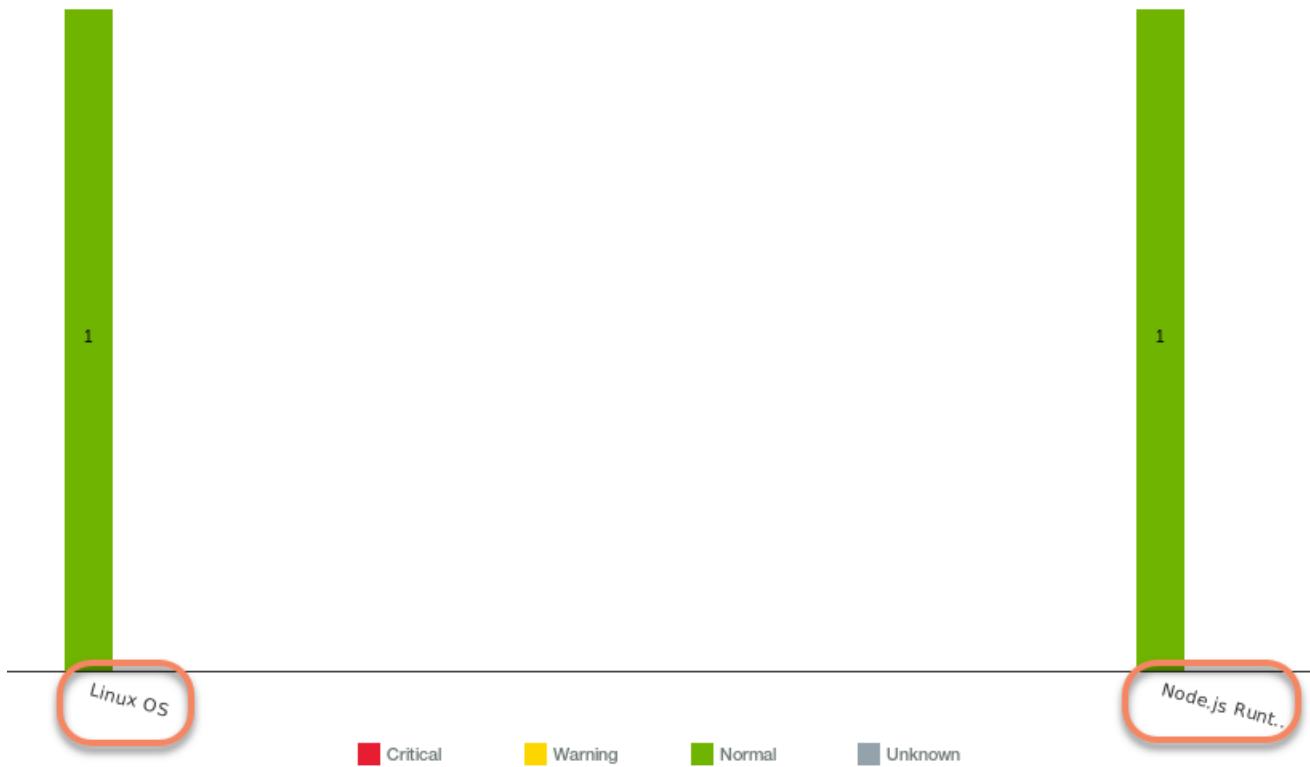
12. Confirm the creation of your application.



13. Verify that your Node.js agent is listed in the **Groups** widget.

The screenshot shows the Application Dashboard interface. In the top navigation bar, there is a house icon, a gear icon, and a search bar. Below the navigation bar, there is a sidebar with a house icon, a gear icon, and a plus sign icon. The main content area has a dark header with the text "Application Dashboard". Underneath the header, there is a section titled "Applications" with a dropdown arrow. Below this, there is a table with columns for "All My Applications" and "Groups". The "All My Applications" table contains rows for "DayTrader(WAS)" and "Keystone". The "Groups" table contains a single row for "Components" with two items: "Linux OS" and "Node.js Runtime". A red arrow points from the "Keystone" row in the applications table down to the "Components" table. Another red box highlights the "Components" table.

14. Verify that your components are listed in the **Current Components Status** widget.





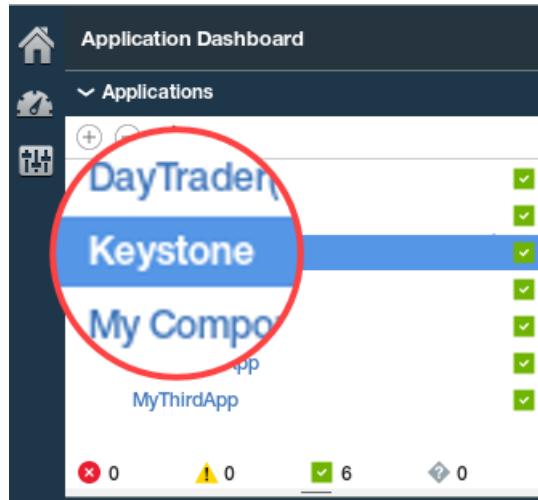
**Note:** The status of your agents might be different.

# Exercise 10 Monitor Node.js resources

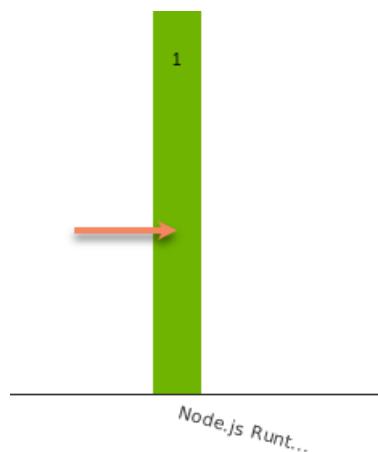
Node.js is just one of the application frameworks whose resources can be monitored with Cloud APM, Private. This exercise reviews dashboards for:

- Request diagnosis
- Garbage collection

1. Click the **Keystone** application to return to the **Status Overview** dashboard.



2. Click the **Node.js** bar in the **Current Components Status** widget.

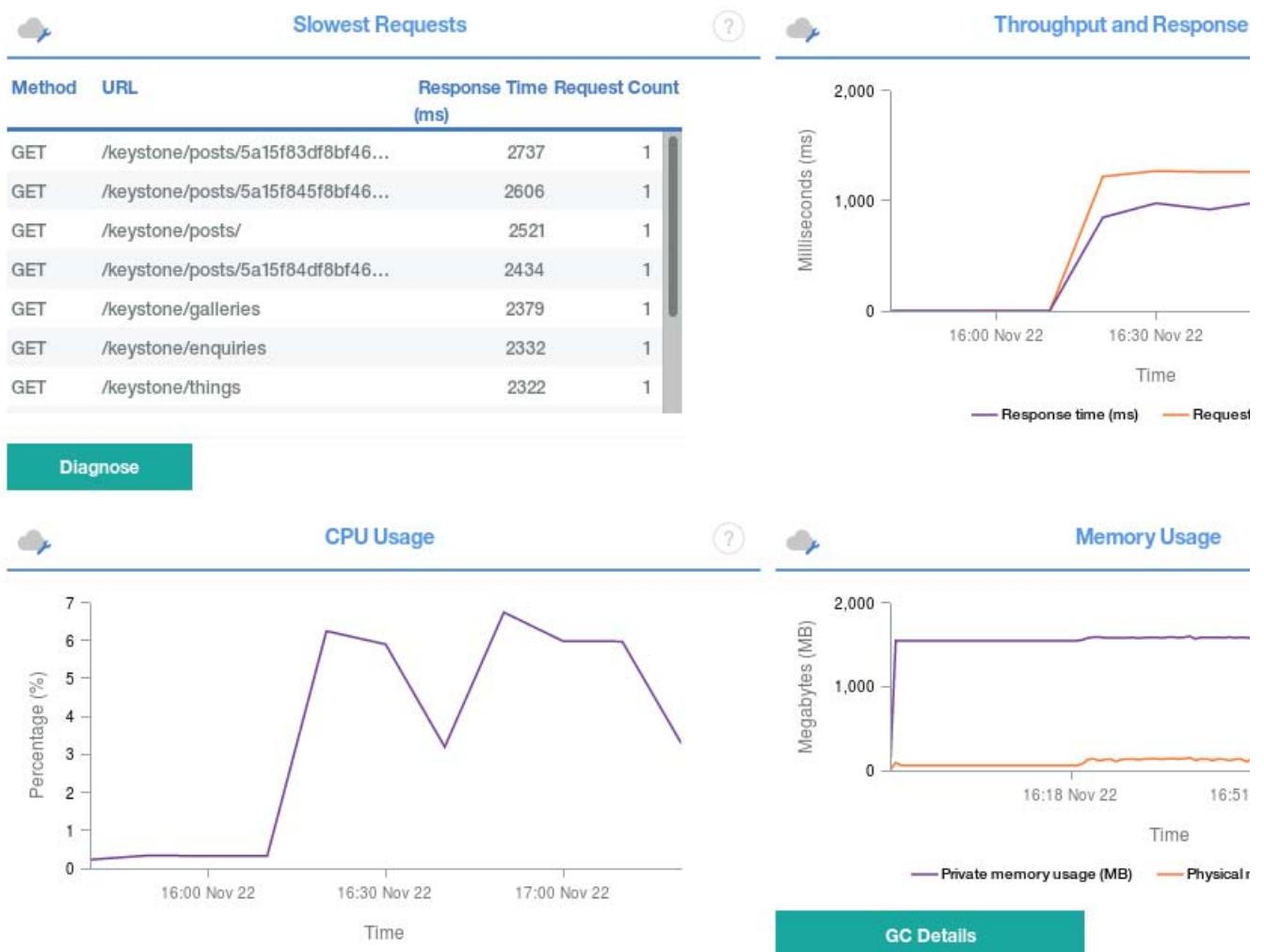


- Click the Node.js instance widget.

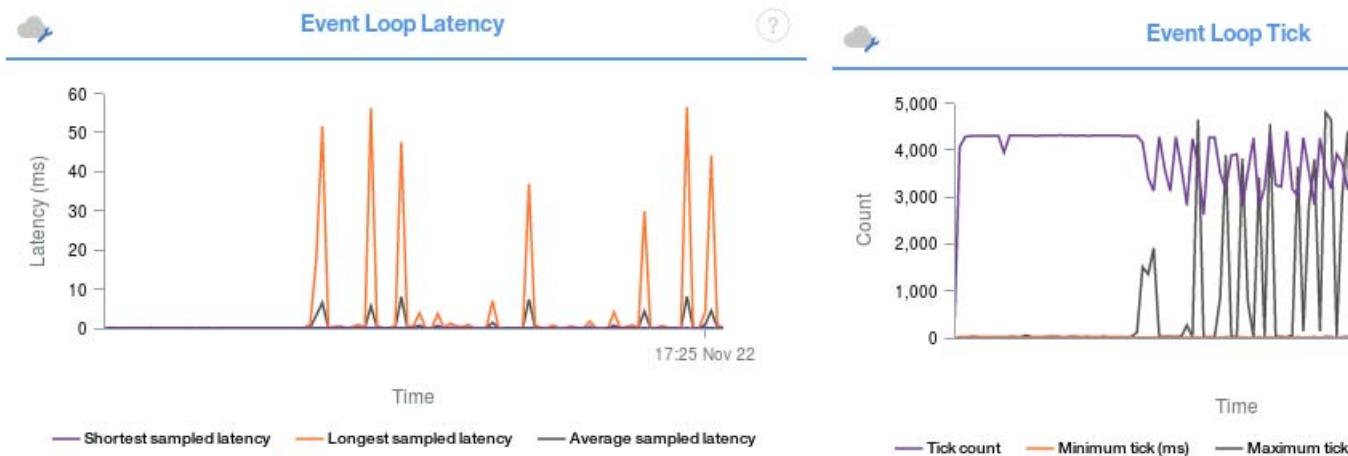
The screenshot shows a summary of the 'keystone-demo' application. Key metrics displayed include:

- Application name: keystone-demo
- Port: 3001
- Request rate (RPM): 10.98
- Average response time (ms): 203 (highlighted with a red arrow)
- Slowest response time (ms): 593
- Up time: 0d 1h 37m 22s
- CPU usage (%): 0.333%
- Memory usage (MB): 1,583
- Application type: single

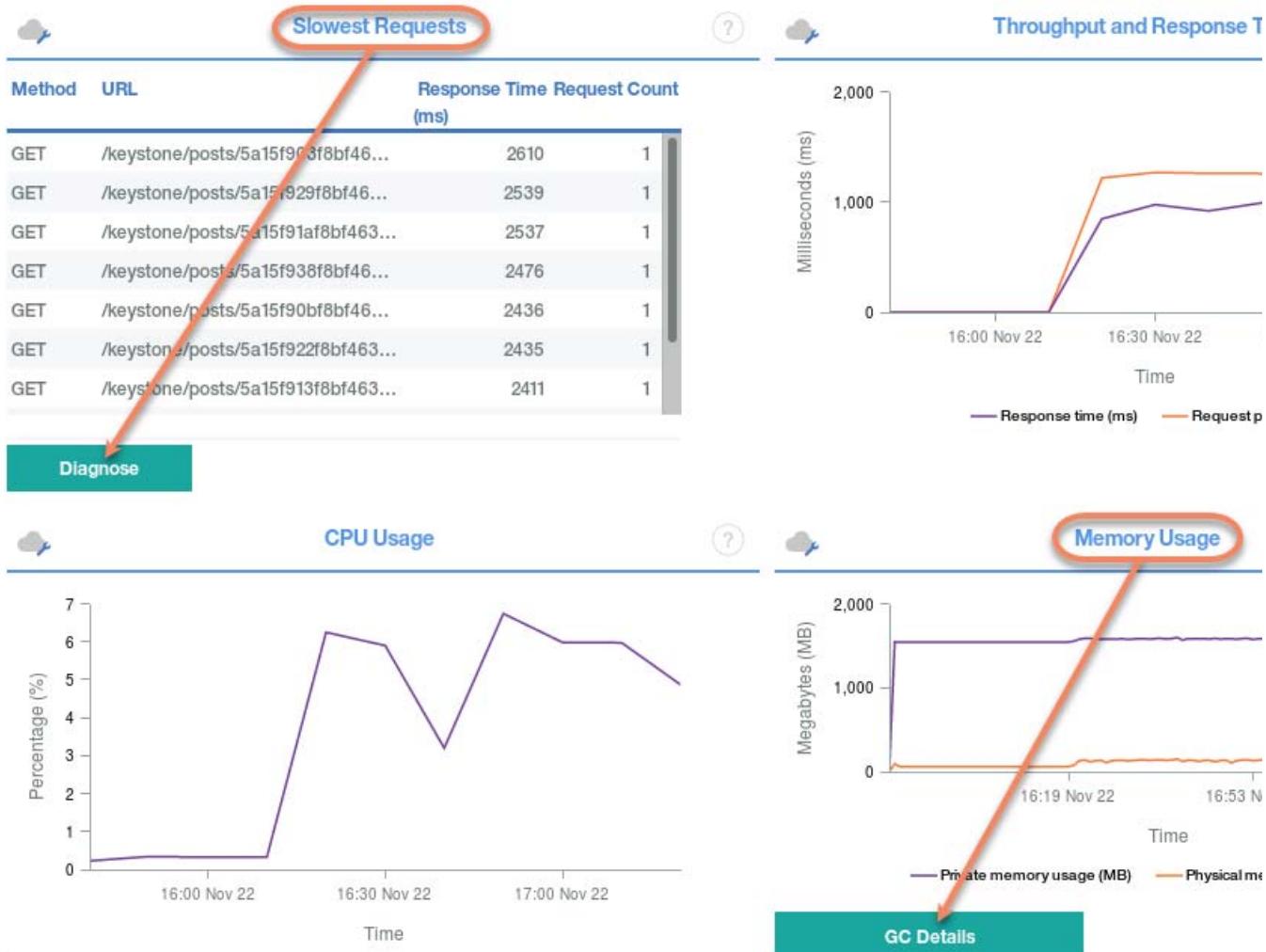
- Review the top set of widgets on the **Status Overview** dashboard.



- Review the remaining widgets on bottom portion of the **Status Overview** dashboard.



Currently, these two widgets support further drill-down.



You next drill down to the diagnostic dashboards to diagnose Node.js requests.

6. Click **Diagnose** to access request performance details.

Method	URL	Response Time (ms)	Request Count
GET	/keystone/posts/5a15f903f8bf46...	2610	1
GET	/keystone/posts/5a15f929f8bf46...	2539	1
GET	/keystone/posts/5a15f91af8bf463...	2537	1
GET	/keystone/posts/5a15f938f8bf46...	2476	1
GET	/keystone/posts/5a15f90bf8bf46...	2436	1
GET	/keystone/posts/5a15f922f8bf463...	2435	1
GET	/keystone/posts/5a15f913f8bf463...	2411	1

**Diagnose**

7. Click **View instance data** for a request.

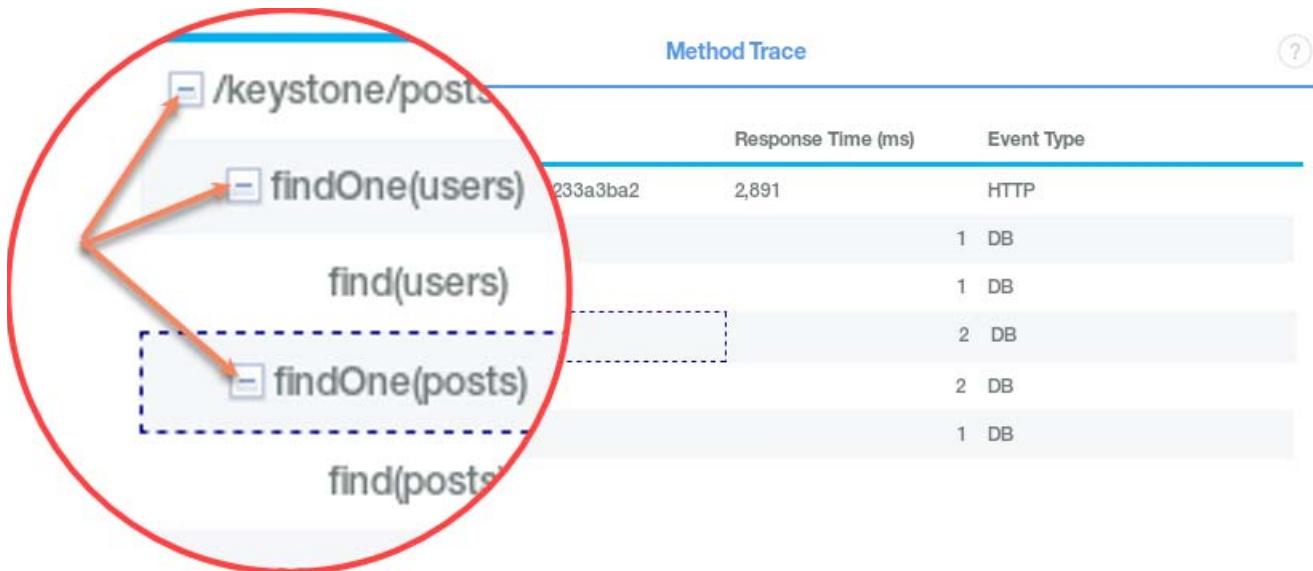
Request Summary						
Time	Time	Request Type	Request Count	Sampled Requests Count	Average Response Time (ms)	Max Response Time (ms)
2017-11-22 17:05:23	2017-11-22 17:35:16	HTTP	1	1	2,891	2,891
		HTTP	1	1	2,872	2,872
		HTTP	1	1	2,758	2,758
		HTTP	1	1	2,737	2,737

Action

8. Click **View request sequence**.

Request Instances - /keystone/posts/5a15f8fbf8bf4631233a3ba2			
Request Type	Response Time (ms)	Timestamp	Action
HTTP	2,891	2017-11-22 05:23:56 PM	View request sequence

9. Expand any + signs in the **Method Trace**.



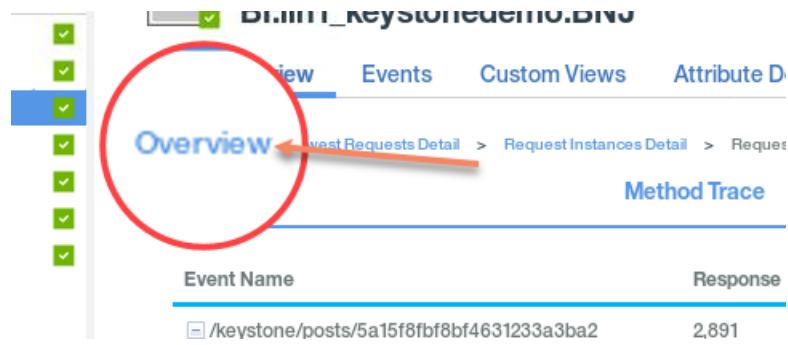
10. Click individual **Events** and note any details in the **Request Context** and **Request Stack Trace** widgets.

Method Trace		Request Context		
Event Name	Response Time (ms)	Event Type	Name	
/keystone/posts/5a15f8fbf8bf4631233a3ba2	2,891	HTTP	query	{\"_id\": \"\"}
└ findOne(users)		1 DB		
└ find(users)		1 DB		
└ findOne(posts)		2 DB		
└ find(posts)		2 DB		
└ count(postcomments)		1 DB		
└ find(postcomments)		1 DB		

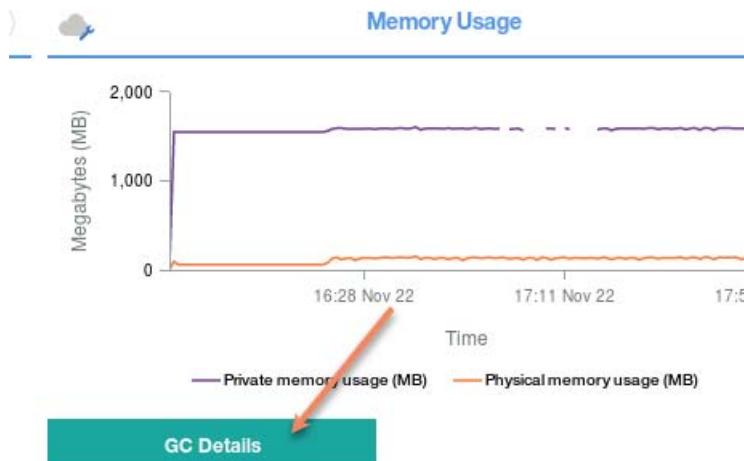
Request Stack Trace	
Fully Qualified Method Name	
<module>.root(147:...de_modules/mongodb/lib/mongodb/collection/query.js)	
Cursor.nextObject(733:...ongoose/node_modules/mongodb/lib/mongodb/cursor.js)	
<module>.commandHandler(713:...ongoose/node_modules/mongodb/lib/mongodb/cursor.js)	
<module>.root(1806:...es/mongoose/node_modules/mongodb/lib/mongodb/db.js)	
Server.Base._callHandler(442:...ode_modules/mongodb/lib/mongodb/connection/base.js)	

11. Click the highlighted **Overview** link to return to the top-level dashboard for this application.

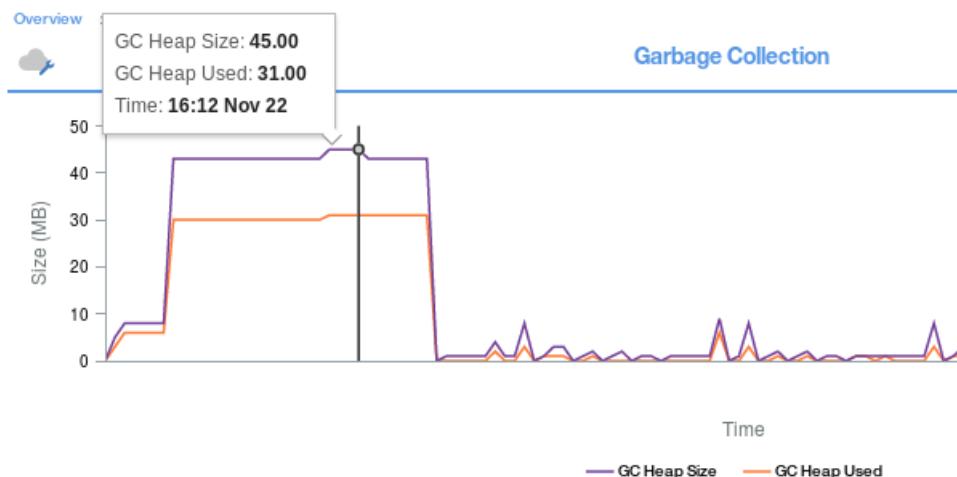


Next, drill down to the dashboard to analyze garbage collection.

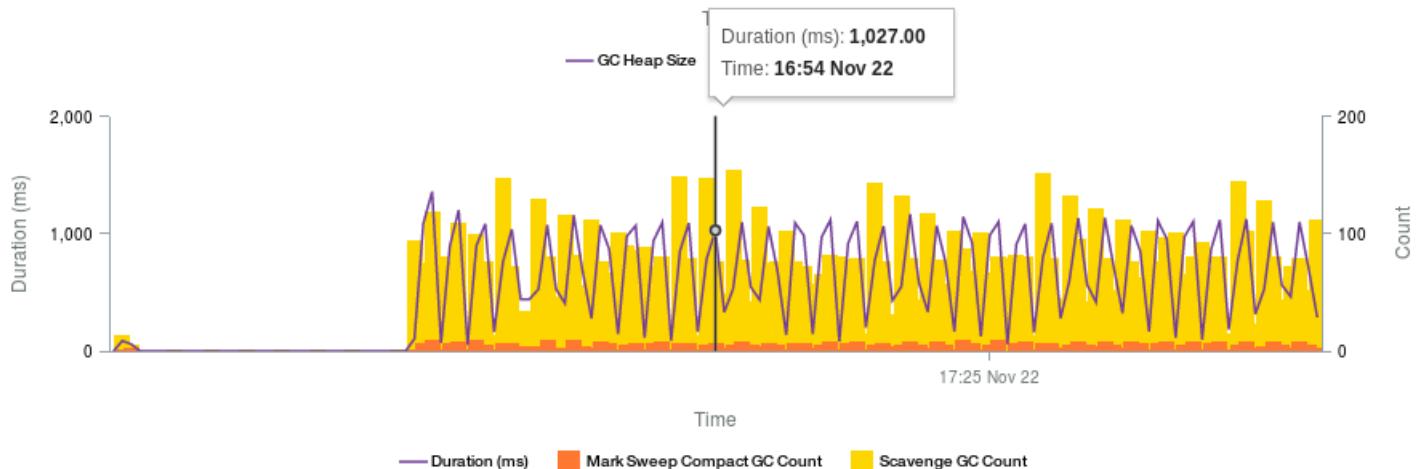
12. Click **GC Details** below the **Memory Usage** widget.



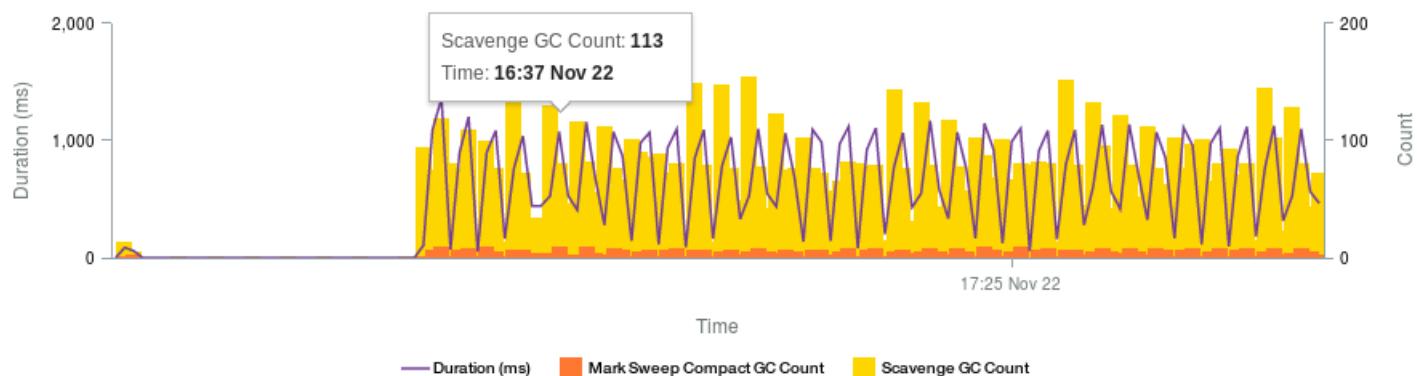
13. Hold down the left mouse button when hovering over the upper graph in the **Garbage Collection** widget to view details of **Heap Size** and **Heap Used** for a point in time.



14. Hold down the left mouse button when hovering over lower graph in the **Garbage Collection** widget to view details of **Garbage Collection Duration** for a point in time.



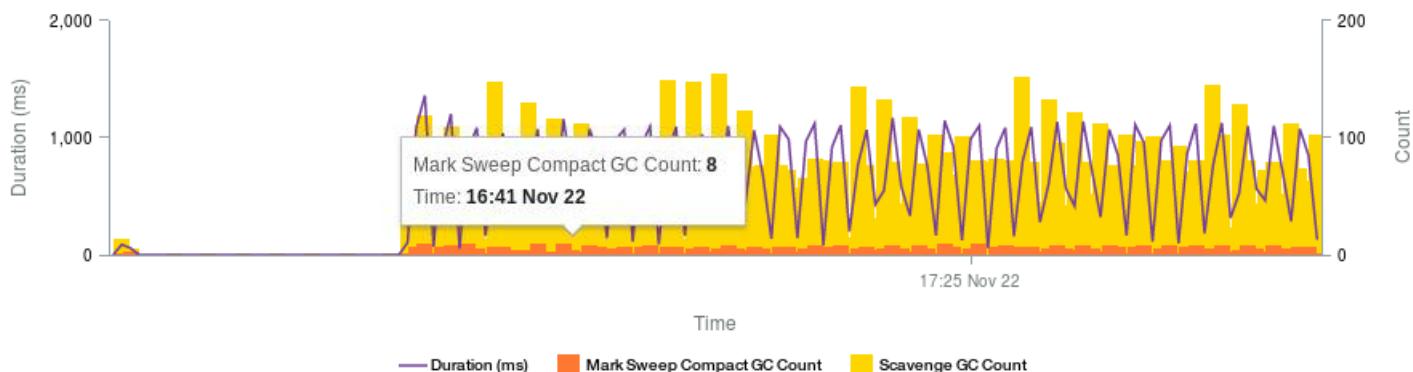
15. Hover over a **yellow** section of the graph (*without depressing a mouse button*) to view **Scavenge Garbage Collection** details for a point in time.



**Scavenge garbage collection** occurs regularly and removes dead objects. Although scavenge collection is quick, some objects survive; those objects are eventually promoted to old space, where garbage gets collected in a separate cycle when full.

**Mark-sweep garbage collection** is of the tracing variety, which is based on reachability. Mark-sweep relocates reachable objects and reclaims objects that are left behind. Objects that are unreachable can safely be considered dead.

16. Hover over an **orange** section of the graph (*without depressing a mouse button*) to view **Mark Sweep Compact Garbage Collection** details for a point in time.



---

# **Unit 9 Transaction tracking**

This unit covers transaction tracking exercises. You learn to access the information that transaction tracking collects, and how to interpret this data. In addition, you learn how to turn transaction tracking off.

Transactional monitoring monitors the health of an application by monitoring the availability and performance of the application transactions. A transaction is a request for a service to an application. A request can be a user request to the application, often called a front-end transaction. A request can be an application-to-application request, often referred to as a middle or back-end transaction.

By monitoring front, middle, and back-end transactions, transaction tracking can quickly identify where a performance or availability problem is occurring. An application might be running on many servers, which are composed of hundreds of software components, and handling thousands or millions of interactions. In such an application, transaction tracking can identify on which server, which component, and which transaction the problem is occurring. If that information is not sufficient to resolve the problem, you can immediately link to relevant deep-dive agents, often the same agents that are monitoring the problem transaction, to investigate possible problems within that component.

Transactional monitoring answers questions like:

- Which applications have slow or failing transactions?
- Which transactions are slow or failing?
- What is the user's experience of your application?
- Where in the transaction path does a problem occur?
- What is the availability or performance of your application over time?
- What is the transaction load, current or over time, for your application?

## **Objectives**

After completing all the exercises, you can analyze transaction topologies for WebSphere Application Server.

# Exercise 1 Drive HTTP transactions with Firefox

In this exercise, you confirm that Selenium IDE is still running the Scenario script on LIN1 to create monitoring data for this lab.



**Hint:** See [Unit 8, Exercise 1](#) on page 8-1 for detailed steps.

1. If the Firefox browser is not open, open it now.
2. If Selenium IDE is not open, open it now.
3. If the `DayTraderScenario.html` script is not open, in Selenium IDE, open it now.

Command	Target	Value
open		/daytrader/scenario
refresh		
refresh		

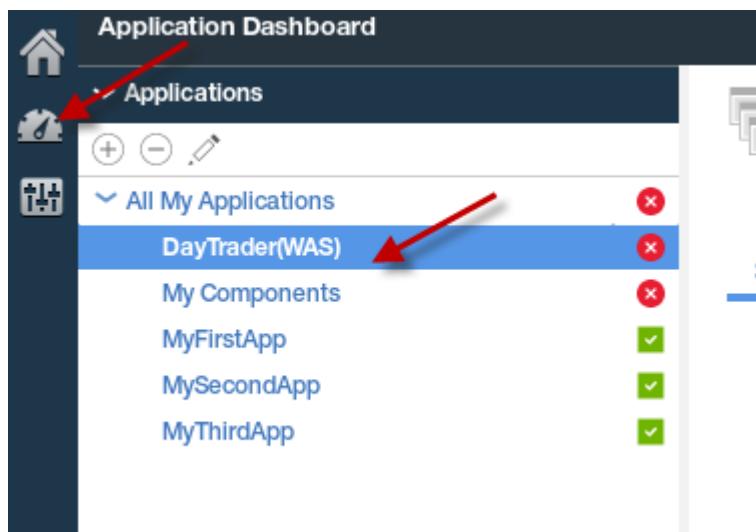
4. Click **Options > Schedule tests to run periodically**.
5. Accept the default timings (every day, every hour, every 5 minutes) and click **Run Now**. Click **OK**.
6. Observe the DayTrader web page refresh. This refresh repeats every 5 minutes until you stop the Selenium tool from running.

This automation creates monitoring data for the exercises in this unit.

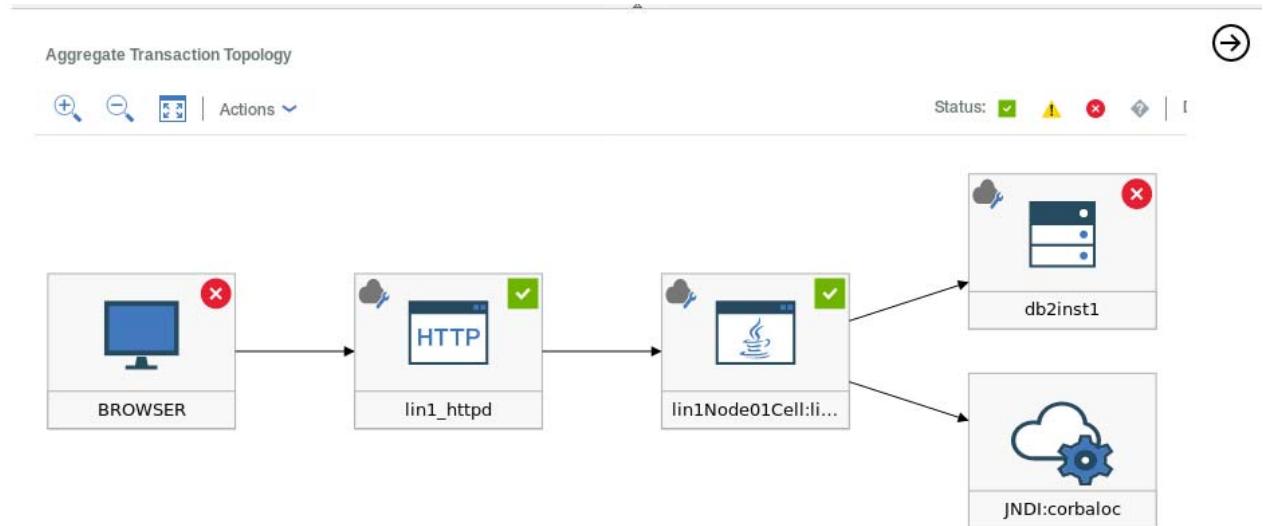
# Exercise 2 Explore aggregate topologies

In this exercise, you explore aggregate topologies.

1. On APM, return to the Cloud APM console and select **Performance > Application Performance Dashboard > DayTrader (WAS)** in the application list.

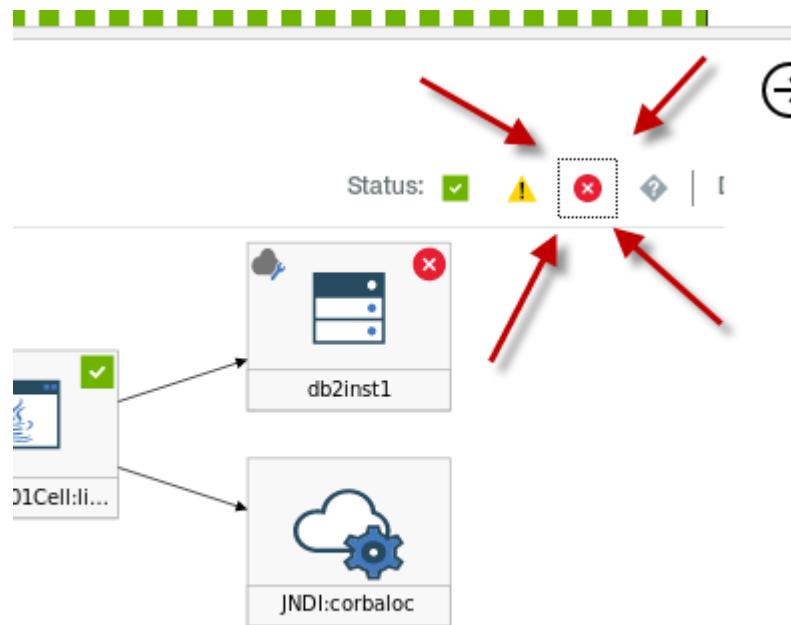


2. Review this sample **Aggregate Transaction Topology**, including the icons at the upper right.

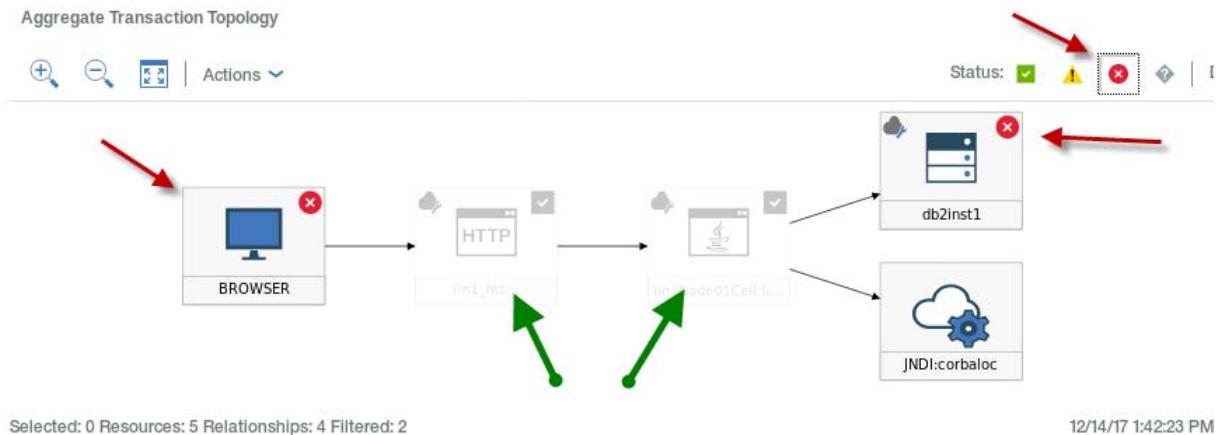


**Note:** Your topology might look different.

- Click the Critical icon as shown.



- Note the changes in the **Aggregate Transaction Topology** when the critical icon is selected.



- The **lin1 HTTP** node previously had a normal status, which was indicated with a white check mark in a green box (see the screen capture in [Step 2](#) on page 9-3). The node is now disabled **for display purposes only**.
- The **lin1Node01Cell** previously had a normal status, which is indicated with a white check mark in a green box, and is now disabled for display purposes only.
- The **BROWSER** and **db2inst1** nodes were in a critical state and so are still displayed normally.
- The **JNDI:corbaloc** nodes are unmonitored. Because they have no assigned status, those nodes are unaffected by the filter.

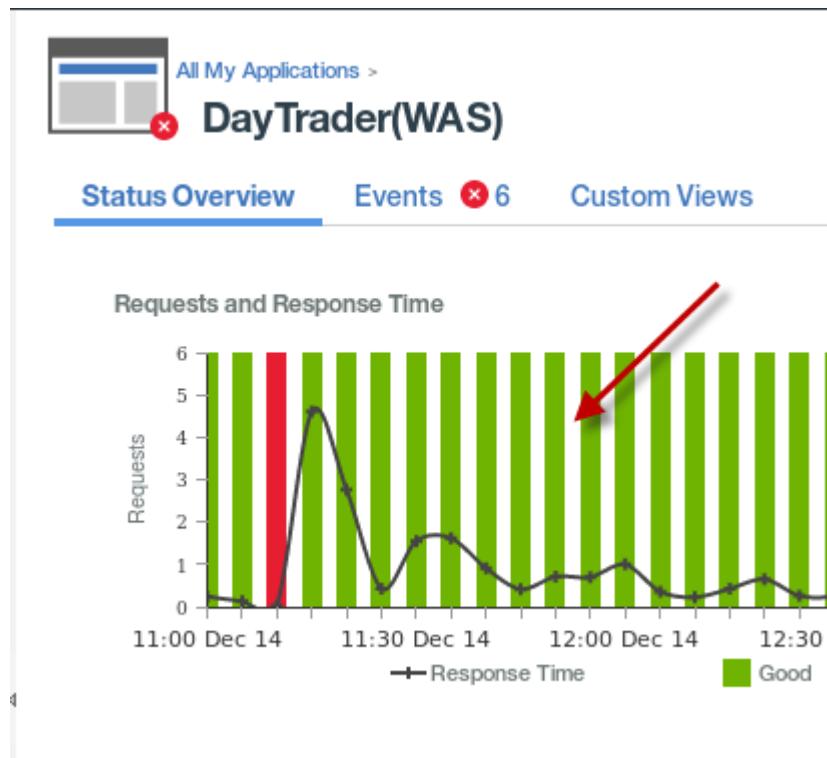
5. Click the **Critical** node again to turn off the filter, returning the topology to the state shown at [Step 2](#) on page 9-3.

# Exercise 3 Explore transaction instance topologies

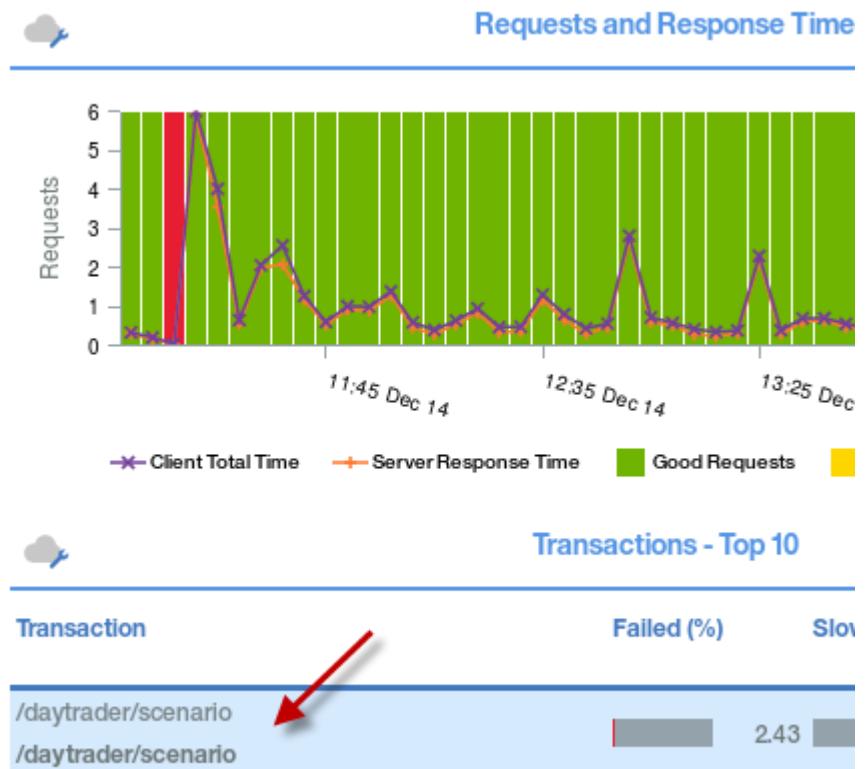
1. Return to the top-level Status Overview dashboard for the DayTrader(WAS) application.

The screenshot shows the Application Dashboard interface. On the left, there's a sidebar with icons for Home, Applications, Groups, and Help. The main area has a title bar 'Application Dashboard'. Below it, under 'Applications', there's a section titled 'All My Applications' with a dropdown arrow. This section lists several applications: 'DayTrader(WAS)' (highlighted with a blue background and a red arrow pointing to it), 'My Components', 'MyFirstApp', 'MySecondApp', and 'MyThirdApp'. Each application has a status icon (red 'X' for DayTrader(WAS), green checkmark for others) and a count of errors (2 for DayTrader(WAS), 0 for others). At the bottom of this list, there are summary counts: 2 errors, 0 warnings, 3 successes, and 0 unknowns. Below this is another section titled 'Groups'.

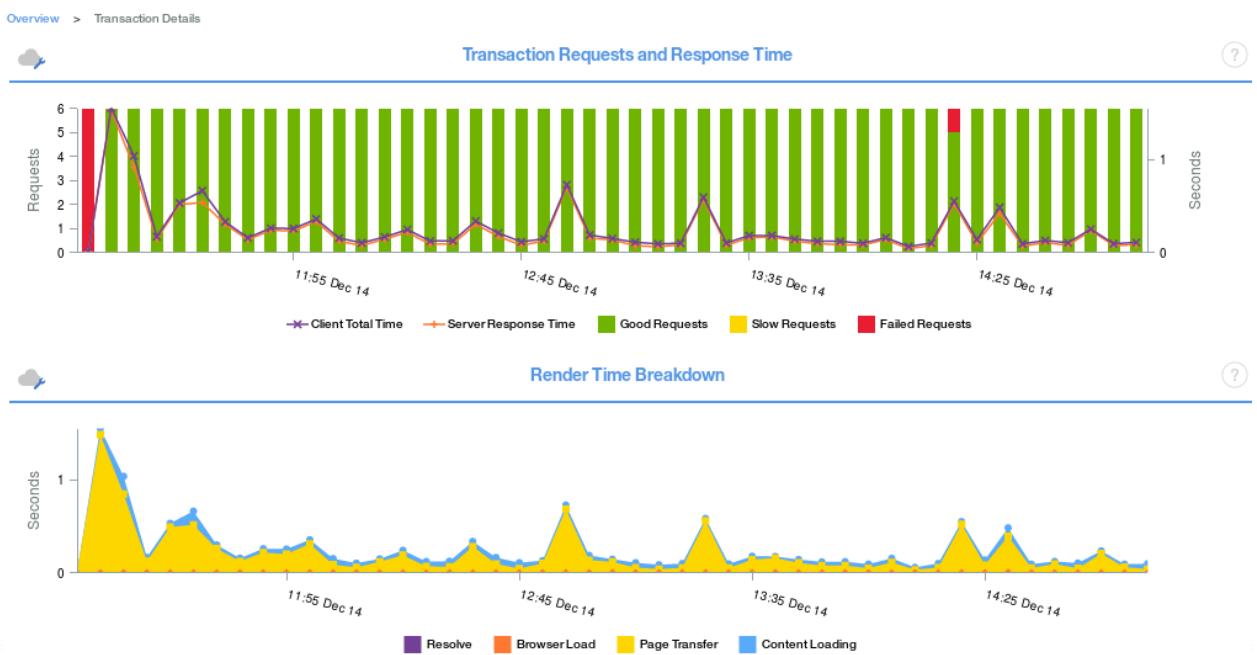
2. Click anywhere on the Requests and Response Time widget.



- Locate and click the **/daytrader/scenario** transaction in the **Transactions Top 10** list.



- Review the two graphs at the top of the **/daytrader/scenario** dashboard.



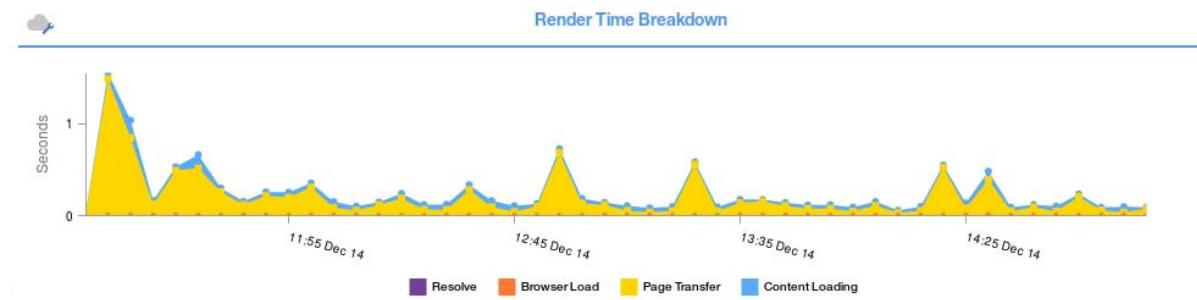
The **Transaction Requests and Response Time** graph is similar to the graph at [Step 2](#) on page 9-7.

- Notice the added detail in the second-level **Requests and Response Time** chart, with a response time breakdown for **Client Total Time** and **Server Response Time**.

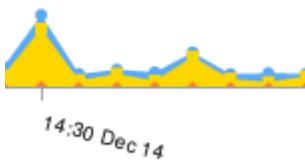


**Note:** The **Client Total Time** in this second-level graph corresponds to the **Response timeline** in the top-level graph.

- Review the four elements of the **Response Time Breakdown** graph.



- Click the question mark icon of the **Render Time Breakdown** widget for details of how to interpret the data.



- Scroll down in the Help window to the definitions for the four render time elements.

A screenshot of a help window. At the top, the title "Render Time Breakdown group widget" is displayed with a red arrow pointing to it. The main content area contains a paragraph about the widget's purpose and a restriction note. A vertical scroll bar is visible on the right side of the window. The restriction note states:

**Restriction:** For the Response Time Monitoring agent to collect data from the browser, JavaScript monitoring code must be injected into the pages you want to monitor. If JavaScript monitoring has not been enabled in your environment, this widget will show partial data only if the IBM HTTP Server Response Time module is installed. If neither JavaScript monitoring nor IBM HTTP Server monitoring with IBM HTTP Server Response Time module are enabled, this widget will not display any information.

The following table describes the information displayed in the key performance

- Click the X to close the help window.

10. Scroll down and review the lower portion of the **End User Transactions** dashboard.

Runs on			Subtransactions - /daytrader/scenario						
Web Servers	Failed (%)	Slow (%)	Transaction	Type	Failed (%)	Slow (%)	Volume	Respo...	
192.168.1.104:80	0.35	0.00	lin1.ibm.edu:80/daytrader/style.css style.css	Resource...	0.00	0.00	73	0.007	

Transaction Instances					
Timestamp	Status	Response Time (s)	Source	User Name	User Agent
Dec 14, 2017, 14:20	✗	2.872	192.168.1.104	Anonymous	Mozilla/5.0 (X11; Linux x86_64; rv:52.0) Gecko/20100101 Firefox/52.0
Dec 14, 2017, 13:25	✓	0.965	192.168.1.104	Anonymous	Mozilla/5.0 (X11; Linux x86_64; rv:52.0) Gecko/20100101 Firefox/52.0
Dec 14, 2017, 12:55	✓	0.977	192.168.1.104	Anonymous	Mozilla/5.0 (X11; Linux x86_64; rv:52.0) Gecko/20100101 Firefox/52.0
Dec 14, 2017, 11:35	✓	1.356	192.168.1.104	Anonymous	Mozilla/5.0 (X11; Linux x86_64; rv:52.0) Gecko/20100101 Firefox/52.0

 **Note:** The lack of subtransactions in this case is normal.

11. Scroll down in the same dashboard to the **Transaction Instances** widget.

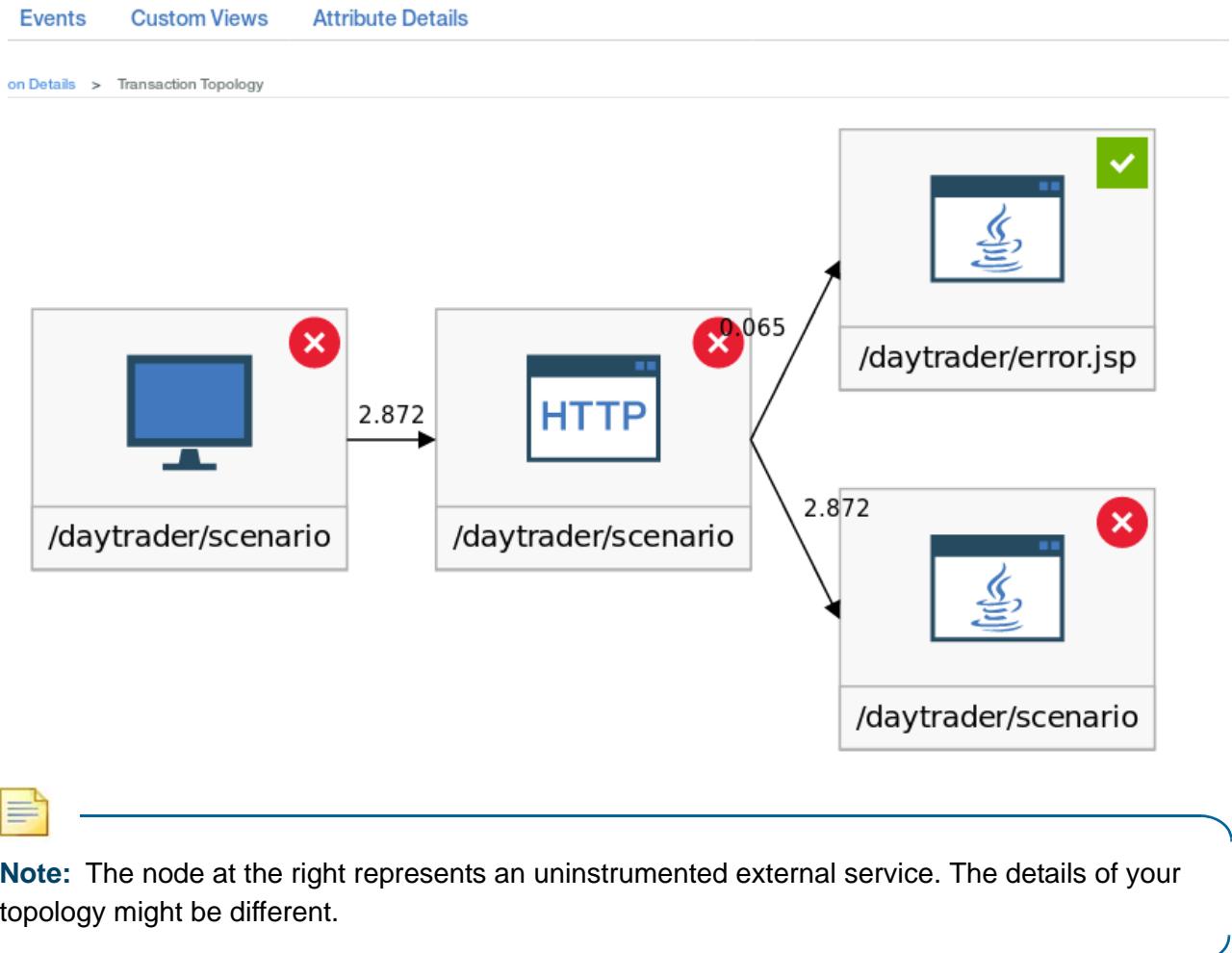
Transaction Instances					
Timestamp	Status	Response Time (s)	Source	User Name	User Agent
Dec 14, 2017, 14:20	✗	2.872	192.168.1.104	Anonymous	Mozilla/5.0 (X11; Linux x86_64; rv:52.0) Gecko/20100101 Firefox/52.0
Dec 14, 2017, 14:30	✓	0.920	192.168.1.104	Anonymous	Mozilla/5.0 (X11; Linux x86_64; rv:52.0) Gecko/20100101 Firefox/52.0
Dec 14, 2017, 13:25	✓	0.965	192.168.1.104	Anonymous	Mozilla/5.0 (X11; Linux x86_64; rv:52.0) Gecko/20100101 Firefox/52.0
Dec 14, 2017, 12:55	✓	0.977	192.168.1.104	Anonymous	Mozilla/5.0 (X11; Linux x86_64; rv:52.0) Gecko/20100101 Firefox/52.0

12. Click the **Response Time** column header to bring the longest response time to the top. You might have to click the header multiple times.

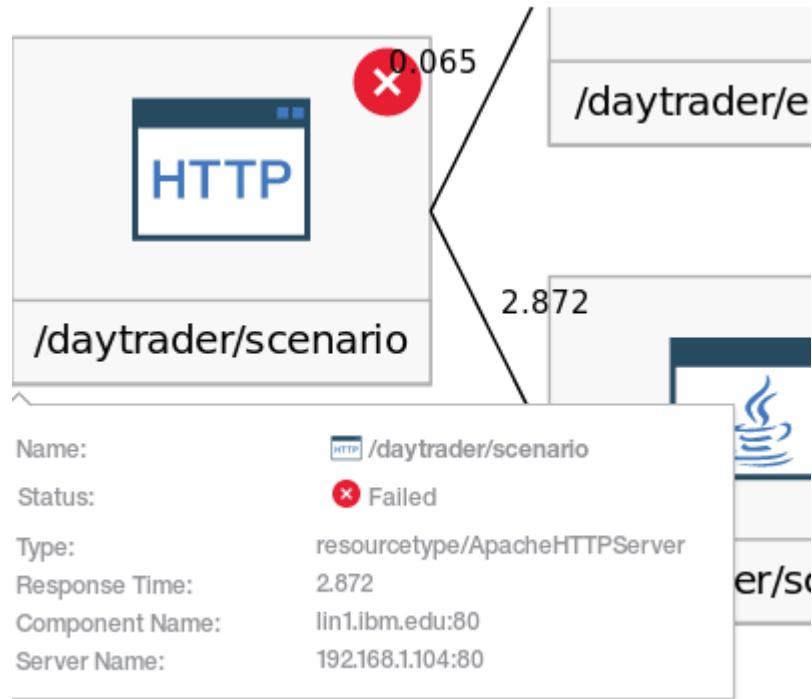
Transaction Instances			
Status	Response Time...	Source	User Name
✗	2.872	192.168.1.104	Anonymous
✓	2.182	192.168.1.104	Anonymous
✓	1.356	192.168.1.104	Anonymous
✓	0.977	192.168.1.104	Anonymous
✓	0.965	192.168.1.104	Anonymous
✓	0.920	192.168.1.104	Anonymous
✓	0.890	192.168.1.104	Anonymous
✓	0.762	192.168.1.104	Anonymous
✓	0.687	192.168.1.104	Anonymous

13. Click the top transaction in the list.

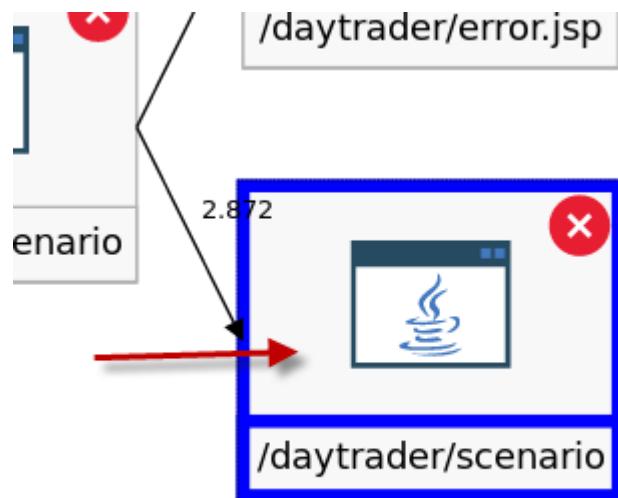
14. Review the topology.



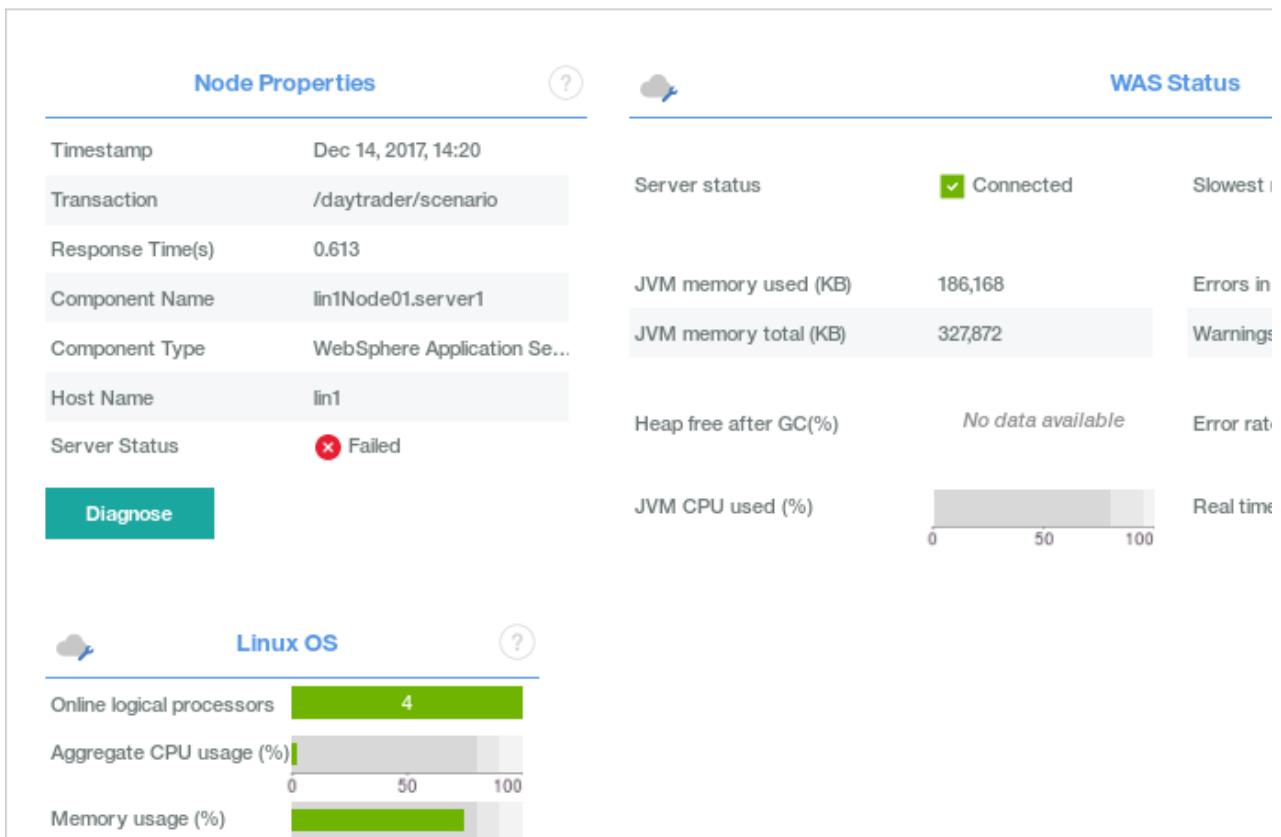
15. Hover over each of the icons to view specific details for each of the components of the transaction (browser, node, and others).



16. Click the **/daytrader/scenario** node.



17. Observe that the Node, WebSphere Application Server, and Monitoring Agent for Linux OS summary widgets are all displayed.



18. Consider drilling down into the **WAS Status** and **Linux OS** nodes for further investigation.

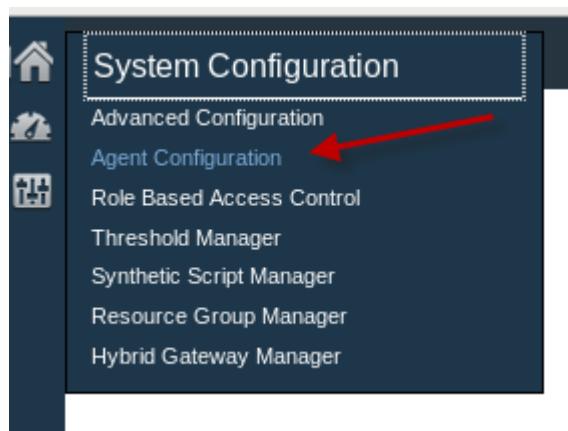
# Exercise 4 Configure transaction monitoring components

The following agents participate in transactional monitoring:

- DataPower
- HTTP Server
- IBM Integration Bus
- JBoss
- Liberty data collector
- Microsoft .NET
- Node.js data collector
- Response time
- SAP NetWeaver Java Stack
- Tomcat
- Weblogic
- WebSphere Applications
- WebSphere MQ

For each of these Cloud APM agents, transaction tracking is enabled by default. You disable or enable transaction tracking from the Cloud APM console.

1. Select **Systems Configuration > Agent Configuration**.



The Agent Configuration page opens.

The screenshot shows the 'Agent Configuration' page for 'WebSphere'. At the top, there's a breadcrumb navigation: Home > Agent Configuration. Below it is a title 'Agent Configuration'. A horizontal menu bar includes 'WebSphere', 'Ruby', 'Windows OS', 'Unix OS', 'JBoss', 'WebSphere MQ', and 'WebLogic'. A main content area is titled 'Use this page to configure data collection for WebSphere Application Servers.' It features a 'Actions' dropdown and a table with three columns: 'Managed System Name', 'IP Address', and 'Server name'. One row is listed: 'lin1Node01server1:lin1:KYNS' with IP '192.168.1.104' and Server name 'server1'. Below the table, a message says 'Total: 1 Selected: 0'.

2. Review the settings for Current Transaction Tracking (for this agent, it is enabled by default).

The screenshot shows the 'Current Transaction Tracking' configuration section. It includes a 'Filter' button and a 'Yes' button, which is highlighted with a red arrow pointing to it. The 'Yes' button is located below the 'Current Transaction Tracking' label.

10

3. Select the check box beside the Monitoring Agent for WebSphere Applications.

Home > Agent Configuration

## Agent Configuration

WebSphere Ruby Windows OS Unix C

Use this page to configure data collection for WebSphere Application Servers.

Actions

Managed System Name

lin1Node01server1:lin1:KYNS

Total: 1 Selected: 1

4. Select Actions > Disable Transactions Tracking.

Home > Agent Configuration

## Agent Configuration

WebSphere Ruby Windows OS Unix OS JBoss WebS

Use this page to configure data collection for WebSphere Application Servers.

Actions

- Enable Transaction Tracking
- Enable Diagnostic Mode
- Enable Diagnostic Mode and Method Trace
- Disable Transaction Tracking**
- Disable Method Trace
- Disable Diagnostic Mode and Method Trace

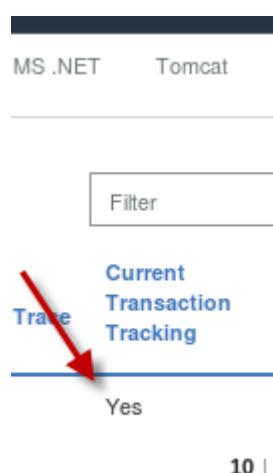
IP Address

192.168.1.104

5. Review the updated setting for Transaction Tracking.



6. Re-enable Transaction Tracking and review the setting to make sure that it is enabled for the next unit.





---

# **Unit 10 Deep-dive diagnosis**

In addition to resource monitoring, Cloud Application Performance Management Advanced supports deep-dive diagnosis.

As of this writing, code-level monitoring is available for agents that monitor these products:

- J2SE
- JBoss
- Liberty – DC
- MS .NET
- Node.js
- Node.js – DC
- Python
- Ruby
- Ruby – DC
- SAP NetWeaver
- WebLogic
- WebSphere

This unit illustrates code-level monitoring that uses the example of the WebSphere monitoring agent.

## **Objectives**

After completing all the exercises, you can do the following tasks:

- Configure the `gdc_custom.properties` file configuration to increase the level of data that is collected for deep-dive diagnosis
- Turn on diagnostic features in the Cloud APM UI
- Analyze request instances, method, and stack traces for WebSphere Application Server
- Perform memory analysis

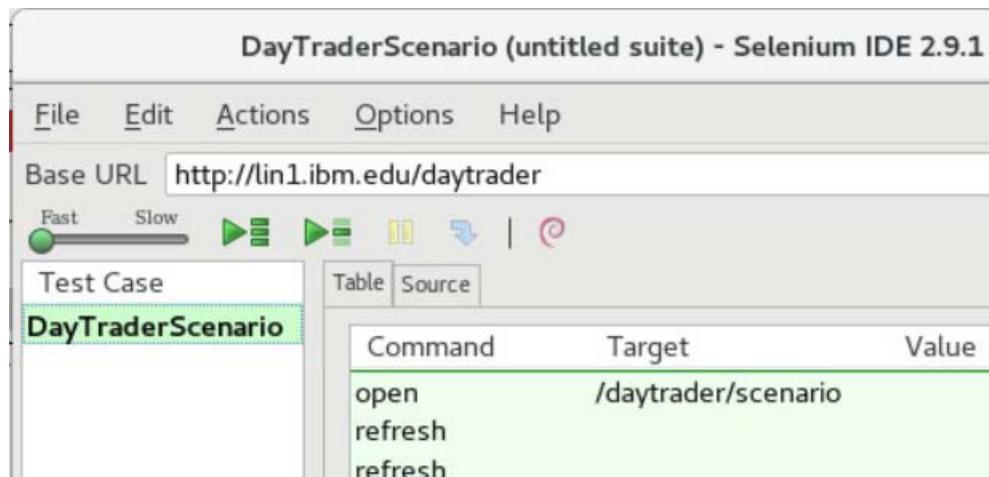
# Exercise 1 Drive HTTP transactions with Firefox

In this exercise, you confirm that Selenium IDE is still running the Scenario script on LIN1 to create monitoring data for this lab.



**Hint:** See [Unit 8, Exercise 1](#) on page 8-1 for detailed steps.

1. If the Firefox browser is not open, open it now.
2. If Selenium IDE is not open, open it now.
3. If the `DayTraderScenario.html` script is not open in the Selenium IDE, open it now.



4. Click **Options > Schedule tests to run periodically.**
5. Accept the default timings (every day, every hour, every 5 minutes) and click **Run Now**. Click **OK**.
6. Observe the DayTrader web page refresh. This refresh repeats every 5 minutes until you stop the Selenium tool from running.

This automation creates monitoring data for the exercises in this unit.

## Exercise 2 Modify the `gdc_custom.properties` file

You now modify the `gdc_custom.properties` file to increase the amount of data that is collected and displayed in the **Performance Management console**.



**Important:** Why turn off **Sampling**, as you do in [Step 3](#) through [Step 8](#), below? Because **Sampling**, in this context, means that only a portion of data is retained for display in the console.

You change three parameters:

- To collect diagnostic data for every request, set the property to false.

```
dc.sampling.enable=false
```

- To collect method data for every request for which diagnostic data is collected, set the property to false.

```
dc.sampling.methsampler.enabled=false
```

- To enable method data collection at server startup, set the property to true.

```
dfe.enable.methoddata=true
```



**Note:** The instructions are based on using **gedit**. Feel free to use another Linux-based text editor and adapt the instructions.

1. On the VM named **LIN1**, right-click the desktop and select **Open Terminal** to open a terminal window.
2. Type this command (on one line) and press Enter.

```
gedit
```

```
/opt/ibm/apm/agent/yndchome/7.3.0.14.0/runtime/was90.lin1Node01Cell.lin1Node01.  
AppSrv01.server1/custom/gdc/gdc_custom.properties
```

```
[root@lin1 APMADV_Agent_Install_8.1.4.0]# gedit /opt/ibm/apm/agent/yndchome/7.3.  
0.14.0/runtime/was90.lin1Node01Cell.lin1Node01.AppSrv01.server1/custom/gdc/gdc_c  
ustom.properties
```

3. Type Ctrl-F and begin typing the string `dc.sampling.enable` in the search field at the upper right.



4. Remove the leading # character and then change **true** to **false**.

```
#####
| dc.sampling.enable=false
#####
#
```

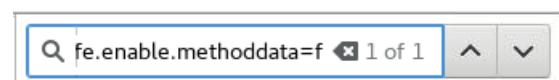
5. Type Ctrl-F and begin typing the string `dc.sampling.methsampler.enabled` in the search field at the upper right.



6. Remove the leading # character and then change **true** to **false**.

```
#####
| dc.sampling.methsampler.enabled=false
#####
#
```

7. Type Ctrl-F and begin typing the string `dfe.enable.methoddata=false` in the search field at the upper right.



8. Remove the leading # character and then change **false** to **true**.

```
#####
| dfe.enable.methoddata=true
#####
#
```

9. Click **Save**.



10. Double-click the **Stop WAS AppSrv01** icon to stop WebSphere.

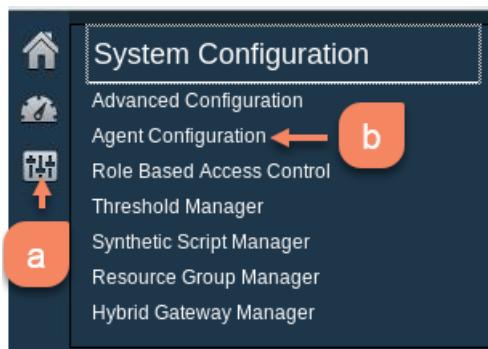


11. Double-click the **Start WAS AppSrv01** icon to restart WebSphere.



# Exercise 3 Turn on diagnostic features in the Cloud APM console

1. On the APM VM, return to the Cloud APM console.
2. Select:
  - a. System Configuration icon
  - b. Agent Configuration item



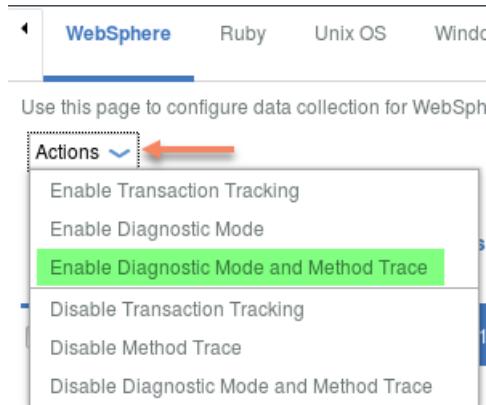
3. Check your server instance to select it.

The screenshot shows the 'Agent Configuration' page for 'WebSphere'. The table lists a single managed system: 'lin1Node01server1:lin1:KYNS' with IP '192.168.1.104', server name 'server1', and node name 'lin1Node01'. A red arrow points to the checkbox in the 'Selected' column for this row, indicating it is selected.

4. At the right of the row, note any diagnostic features that were not enabled from the previous steps that you carried out.

Current Diagnostic Mode	Current Method Trace	Current Transaction Tracking	DC Enabled
Yes	No	Yes	Yes

5. Select the **Actions** menu and then select the feature to be enabled, in this example **Enable Diagnostic Mode and Method Trace**.

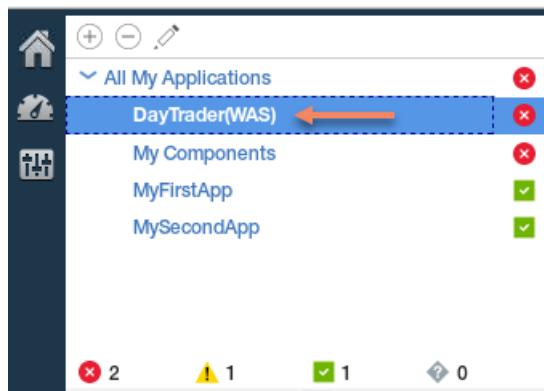


6. Press F5 to refresh the console and confirm that the enablement action was successful.

Current Diagnostic Mode	Current Method Trace	Current Transaction Tracking	DC Enabled
Yes	Yes	Yes	Yes

# Exercise 4 Access code-level data for WebSphere

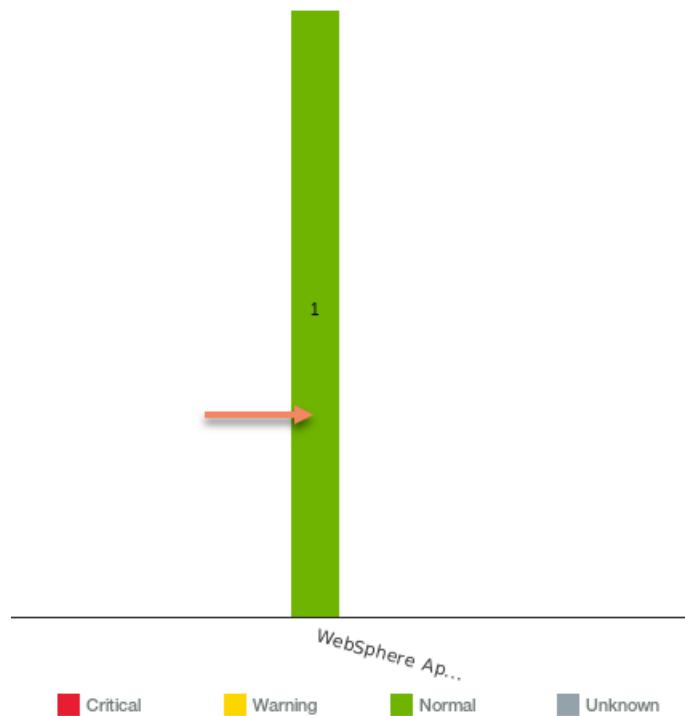
1. Return to **Cloud APM console** and select the **DayTrader(WAS)** application.



2. Click the highlighted arrow to access the **Components Overview**.



3. Click the **WebSphere** bar.



4. Click Instance widget for **WebSphere**.



5. Click **Diagnose**.

Requests with Slowest Response Time		
URL	Request Name	Average Response Time (ms)
http://lin1.ibm.edu:9080/daytrader/config	/daytrader/config	
<b>Diagnose</b>		

6. Click the **View instance data** link to the right of a **/daytrader/app** row.

Request Summary											
and time	2017-11-20 04:12:30 PM	nd time	2017-11-20 04:12:30 PM	Average Respo...	Minimum Respo...	Maximum Respo...	Sampled Reque...	Request Count	CPU Time (ms)	Request Type	Action
	62		30	94		2		2	51	Servlet	<a href="#">View instance data</a>

7. Click **View request sequence** for one of the requests in the table.

Request Instances - /daytrader/app						
Request ID	Response Time (ms)	CPU Time (ms)	Request Type	Thread ID	Method Entries	Action
I6745...	120	83	Servlet	517	Yes	<a href="#">View request sequence</a>
I6746...	90	85	Servlet	517	Yes	<a href="#">View request sequence</a>

8. Review the request sequence:
  - a. Click all plus signs to expand the request.

**Request Sequence - 42949674506**

Order ID	Depth	Event Name	Start Date And Time	Respo
	1	/daytrader/app	2018-01-15 02:19:28 PM	
	2	doPost	2018-01-15 02:19:28 PM	
	3	performTask	2018-01-15 02:19:28 PM	
	4	doLogin	2018-01-15 02:19:28 PM	
	5	doHome	2018-01-15 02:19:28 PM	
	6	requestDispatch	2018-01-15 02:19:28 PM	
	7	/daytrader/app	2018-01-15 02:19:28 PM	
	8	_jspService	2018-01-15 02:19:28 PM	

- b. Click through the request events.
- c. Note any events that have an associated **Stack Trace**, **Request Context**, and **Method Summary**.

7	/daytrader/app	2018-01-15 02:24:28 PM	
8	_jspService	2018-01-15 02:24:28 PM	

Request Context - /daytrader/app



Request Stack Trace - /day

Value

Fully Qualified Method Name

DayTrader3-EE6#web.war./daytrader/app

No items to display

- If none of the events has a **Stack Trace** or **Request Context**, click the **Request Instance Dashboard** link to return to the previous dashboard and select a new request.

The screenshot shows the 'Request Instance Dashboard' interface. At the top, there are tabs: 'Status Overview' (which is selected), 'Events', 'Custom Views', and 'Attribute Details'. Below the tabs, a breadcrumb navigation shows: 'Overview > Diagnostic Dashboard > Request Instance Dashboard > Request Sequence Dashboard'. The main area is titled 'Request Sequence - 55834'. It displays a table with columns: 'Order ID', 'Depth', 'Event Name', and 'Start Date And Time'. A single row is visible, showing Order ID 1, Depth 1, Event Name /dev/tuxedo/testapp, and Start Date And Time 2017-11-20 04:45:06.5.

- Repeat [Step 7](#) and [Step 8](#) for the new request.

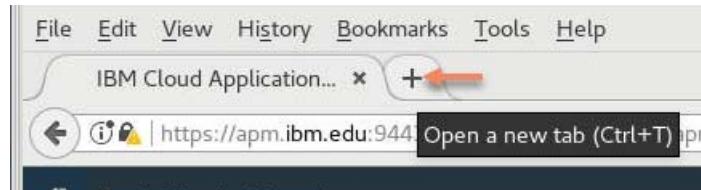


**Note:** Depending on the type of traffic on your system and how data collection is configured, you might not see a Stack Trace or Request Context for your transactions.

# Exercise 5 Generate more traffic

You can generate more transactions by stopping and restarting all applications in the WebSphere administrator console.

1. Click the plus (+) sign to open a new tab in your browser.



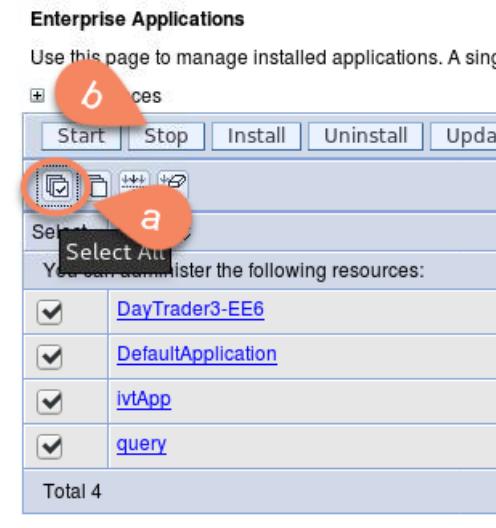
2. Enter `lin1.ibm.edu:9060/ibm/console` in the address bar of your browser and press Enter.
3. Enter the user ID `wasadmin` and click **Log in**.



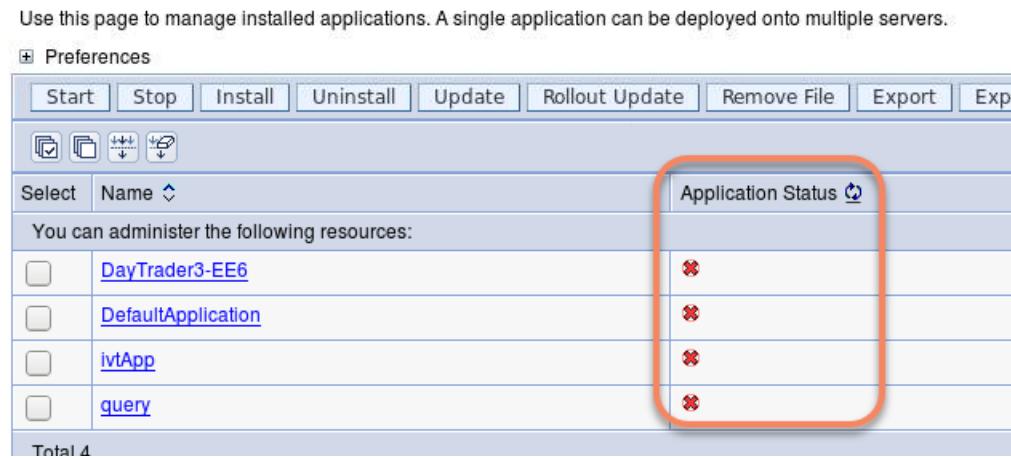
4. Navigate to **Applications > Application Types > WebSphere enterprise applications**.



5. Stop all applications:
  - a. Click the icon to select all applications.
  - b. Click **Stop**.

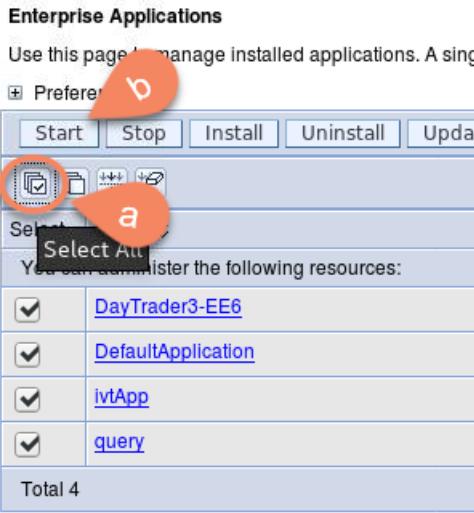


6. Confirm that the applications were stopped successfully.

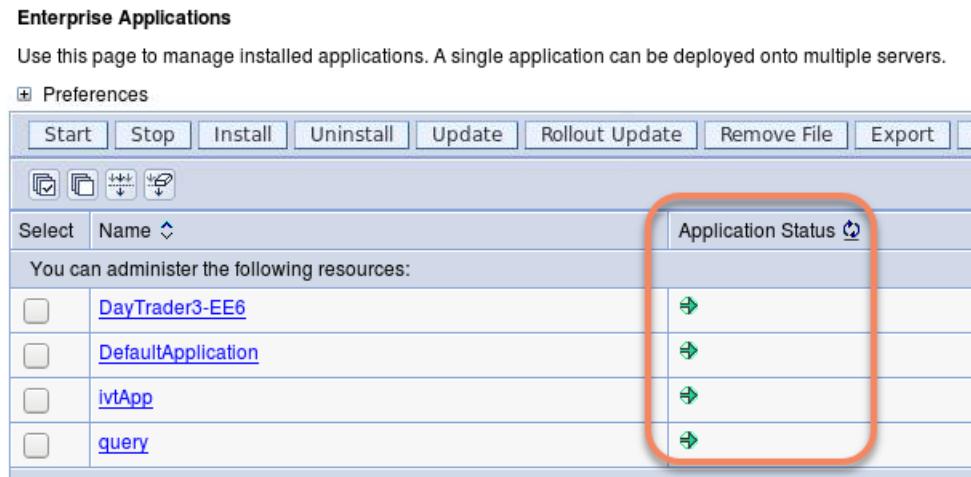


7. Restart all applications:

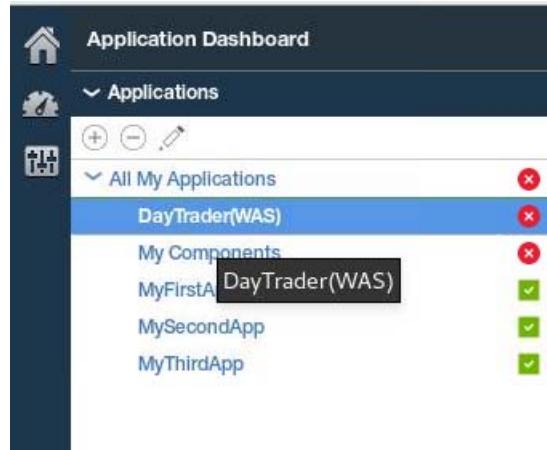
- Click the icon to select all applications.
- Click **Start**.



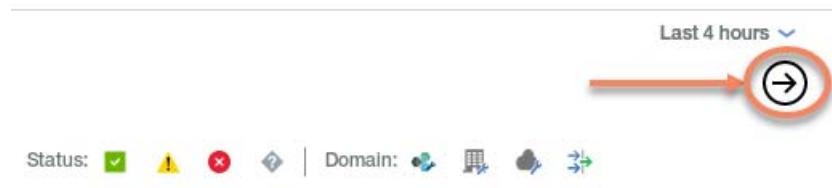
8. Confirm that the applications were started successfully.



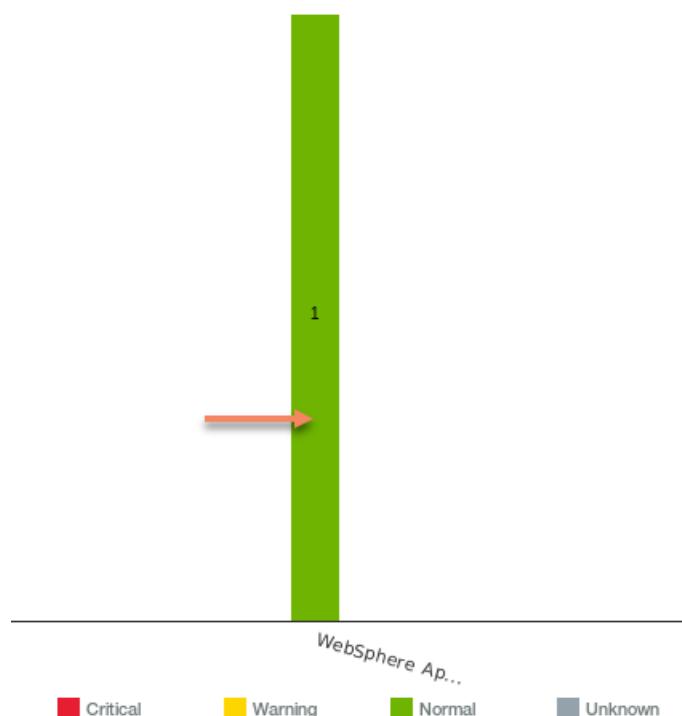
9. Return to the **Performance Management** console and select **DayTrader(WAS)** in the application list.



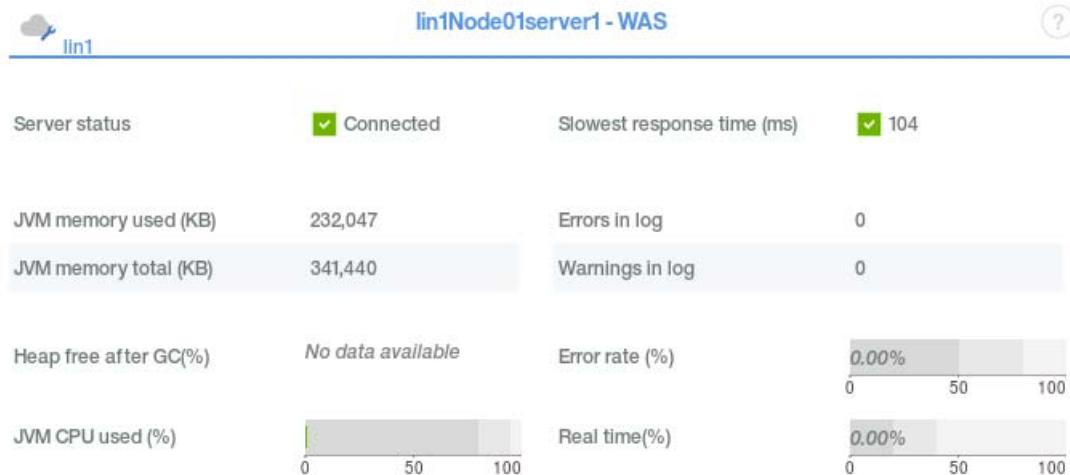
10. Click the highlighted arrow to access the **Components Overview**.



11. Click the **WebSphere** bar.



12. Click **Instance** widget for **WebSphere**.



13. Review the list of **Requests with Slowest Response time**, noting especially requests that contain the string `/ibm/console/`.



### Requests with Slowest Response Time

URL	Request Name	Average Response Time (ms)	Error Rate
http://lin1.ibm.edu:9060/lbm/console/col...	/ibm/console/collectionButton.do	15,970	
http://lin1.ibm.edu:9060/lbm/console/se...	/ibm/console/secure/javascriptToSessio...	4	
http://lin1.ibm.edu:9060/lbm/console/AP...	/ibm/console/AppManagementStatus	3	

**Diagnose** 

14. Click **Diagnose** at the lower left of the **Requests with Slowest Response time** widget.

15. Click **View Instance data** at the right of the worst performing transaction in the **Request Summary** widget.

Request Summary								
Last End Time	2017-11-20 02:13:35 PM							
Last End Time	2017-11-20 02:22:19 PM							
Average Response Time	Minimum Response Time	Maximum Response Time	Sampled Requests	Request Count	CPU Time (ms)	Request Type	Action	
actionBu...	10908	5847	15969	2	2	8019 Servlet		<a href="#">View instance data</a>
gatorCm...	320	320	320	1	1	319 Servlet		<a href="#">View instance data</a>
ire/javas...	8	4	13	2	2	8 Servlet		<a href="#">View instance data</a>

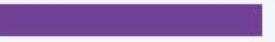
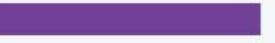
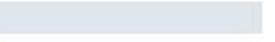
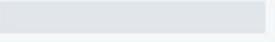
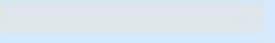
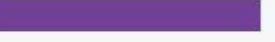


**Note:** The details of your list of transactions might be different.

16. Click **View request sequence** at the right of the worst performing transaction in the **Request Instances** widget.

Request Instances - /ibm/console/collectionButton.do						
	Request ID	Response Time (ms)	CPU Time (ms)	Request Type	Thread ID	Method Entries
ectio...	60129542212	15969	10783	Servlet	5236	Yes
ectio...	30064771328	5847	5254	Servlet	383	Yes

17. Click any plus (+) signs to expand the request.

Request Sequence - 60129542212					
Order ID	Depth	Event Name	Start Date And Time	Response Time (ms)	
1	1	/ibm/console/collectionButton.do	2017-11-20 02:22:02 PM		
2	2	doPost	2017-11-20 02:22:02 PM		
3	3	process	2017-11-20 02:22:02 PM		
etc.	4	process	2017-11-20 02:22:02 PM		
	5	processActionPerform	2017-11-20 02:22:02 PM		
	6	execute	2017-11-20 02:22:02 PM		
	7	lookup	2017-11-20 02:22:02 PM		
	8	processForwardConfig	2017-11-20 02:22:03 PM		

18. Click through the request events, and note any events that have an associated **Request Context**, **Stack Trace**, **Method Summary**, or a combination of the three.

Depth	Event Name	Start Date And Time	Response Time (ms)	Event Type	CPU Tim (ms)
1	1 /ibm/console /collectionButton.do	2017-11-20 02:22:02 PM	15969	Servlet	10
2	2 doPost	2017-11-20 02:22:02 PM	15968	Method	10
3	3 process	2017-11-20 02:22:02 PM	15968	Method	10
4	4 process	2017-11-20 02:22:02 PM	15966	Method	10
5	5 processActionPerform	2017-11-20 02:22:02 PM	98	Method	
6	6 execute	2017-11-20 02:22:02 PM	98	Method	
7	7 lookup	2017-11-20 02:22:02 PM	70	JNDI	
8	5 processForwardConfig	2017-11-20 02:22:03 PM	15867	Method	10

**Request Context - /ibm/console/collectionButton.do**

Value
isclite#isclite.war./ibm/console/collecti...
/ibm/console/collectionButton.do
Servlet

**Request Stack Trace - /ibm/console/collectionButton.do**

Fully Qualified Method Name
com.ibm.ws.webcontainer.servlet.ServletWrapper.handleRequest(934:Servlet...
com.ibm.ws.webcontainer.servlet.ServletWrapper.handleRequest(477:Servlet...
com.ibm.ws.webcontainer.servlet.ServletWrapperImpl.handleRequest(178:Serv...
com.ibm.ws.webcontainer.filter.WebAppFilterChain.invokeTarget(143:WebAppFi...

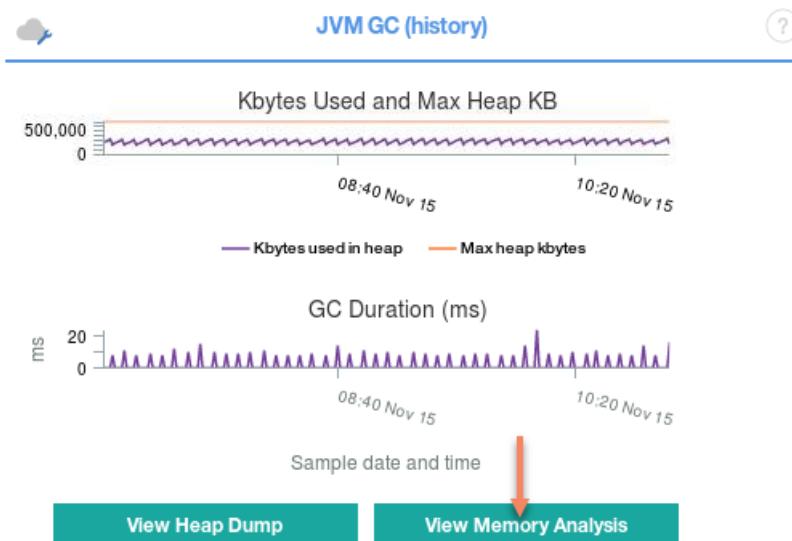
# Exercise 6 Perform memory analysis

For the Memory Analysis dashboard to contain data, you must enable memory allocation collection for the data collector during configuration.



**Note:** This diagnostic feature requires IBM Health Center 3.0.8 or later. If the IBM Health Center version is not eligible, upgrade the JRE that is used by the application server to a version that contains IBM Health Center 3.0.8 or later.

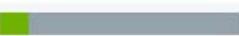
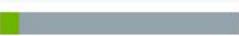
1. On the main **WebSphere** agent dashboard, scroll down to the **JVM GC (history)** widget and click **View Memory Analysis**.



2. Review the three widgets on this dashboard:

- Samples by object
  - By default, a maximum of 1000 objects can be displayed in this widget, and they are sorted by the Percentage of Total Size column in descending order.
- Top 100 Instance Count by Request Site
  - This widget displays the object allocation information for each request site, sorted by the number of allocated objects in descending order by default. *Only the top 100 request sites with the most allocated objects can be displayed.*
- Allocation Site
  - Populated only **after** you select a row in the **Samples by object** widget.
  - This widget displays the allocation sites for the selected object and the percentage of heap size that is allocated for each site. By default, a maximum of five allocation sites can be listed for the selected object, and they are sorted in descending order.

3. Click the top row in the **Samples by Object** widget.

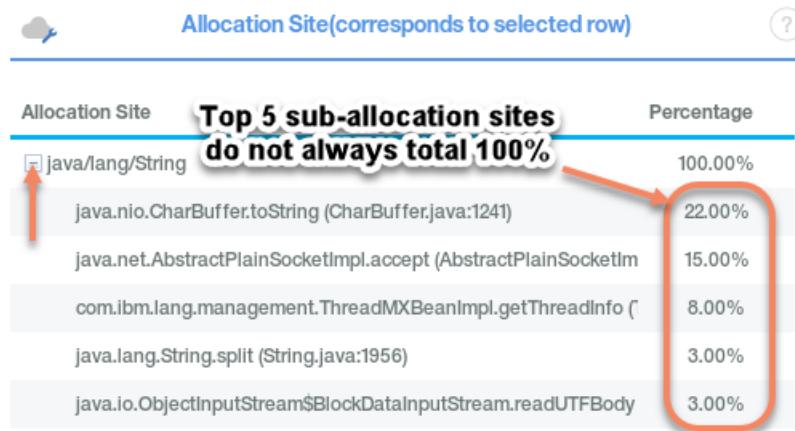
Samples By Object				
Count	Percentage of Total Size	Total Size(KB)	Allocated Object	
9223		44%	295136	java.util.ArrayList
2532		12%	60768	java.l
1666		8%	53312	java.util.concurrent.locks.AbstractQueuedSynchroni

4. Click any plus signs to expand the list of allocation sites.

Allocation Site (corresponds to selected row)		
Allocation Site	Percentage	
 java.util.ArrayList\$ListItr	100.00%	
com.ibm.java.diagnostics.common.datamodel.impl.data.TwoDim	100.00%	

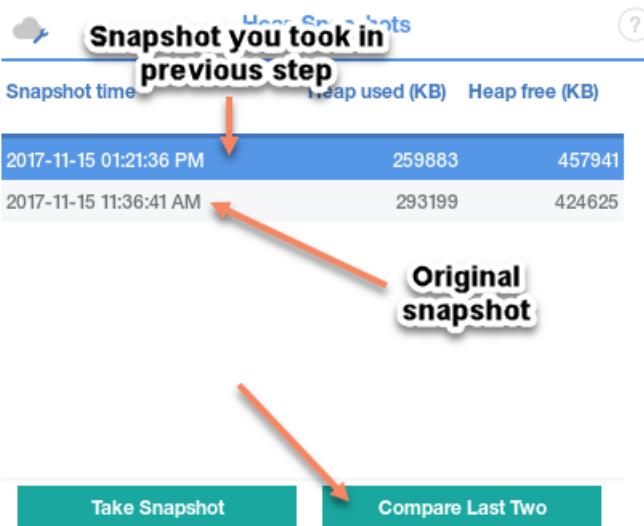
5. Return to the **Samples by Object** widget and click another row. The following step uses the **java.lang.String** row as an example.

6. Click the plus sign in the **Allocation Site** dialog box to view data for up to five suballocation sites.



**Important:** The populated list in the **Allocation Sites** widget does not always total 100%, but does represent the top five sites by percentage. *As of the present release, the number of sites that are displayed cannot be increased.* The interval at which memory allocation information is collected can be modified; the default is 15 minutes. See product documentation for details.

7. Click **Compare Last Two** to compare the initial snapshot with the one you just took.



8. Scroll down to the **Heap Dump** widget at the bottom of the dashboard.

---

# **Unit 11 Integrating Cloud APM with other products exercises**

By using agents and advanced configuration, you integrate Cloud Application Performance Management with other products. Advanced configuration is also used for more settings.

In these exercises, you integrate Cloud APM with IBM Tivoli Monitoring, IBM Netcool/OMNibus, and IBM Dashboard Application Services. You also configure email notification and examine other advanced configuration options.

## **Exercise 1 Integrate with IBM Tivoli Monitoring: Hybrid Gateway**

Customers need to manage both IBM Tivoli Monitoring 6.3 agents and Cloud APM agents. In an environment that includes both IBM Tivoli Monitoring 6.3 and Cloud APM products, you can install the Cloud APM Hybrid Gateway to provide a consolidated view of managed systems from both domains.

This exercise uses the ITM, APM, LIN1, and LIN3 VMs.

## Start the ITM VM

1. If the ITM VM is not already started, start it. This system hosts an IBM Tivoli Monitoring environment. Follow the local environment instructions.
2. Click the icon that is labeled **Administrator**. At the password prompt, enter `object00` and press Enter.

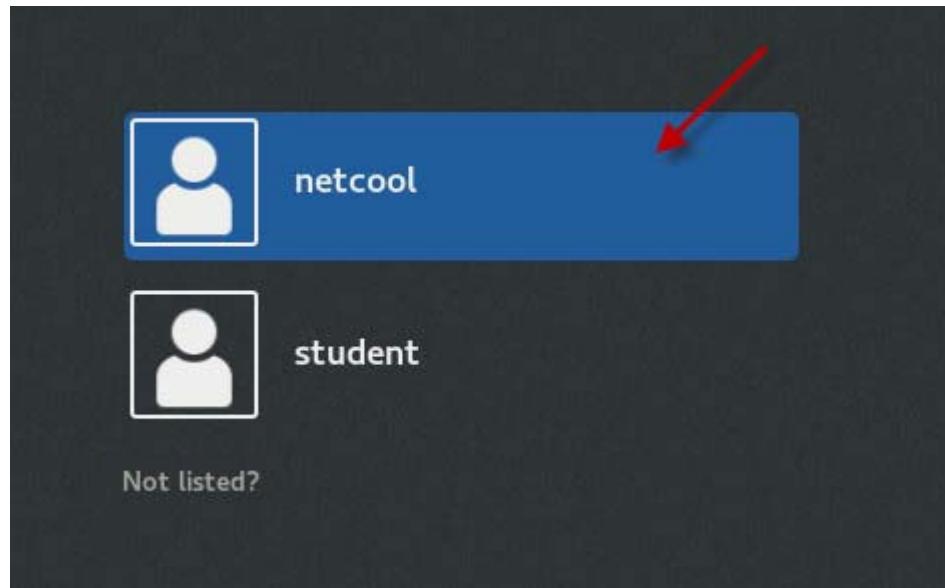


## Start the LIN3 VM

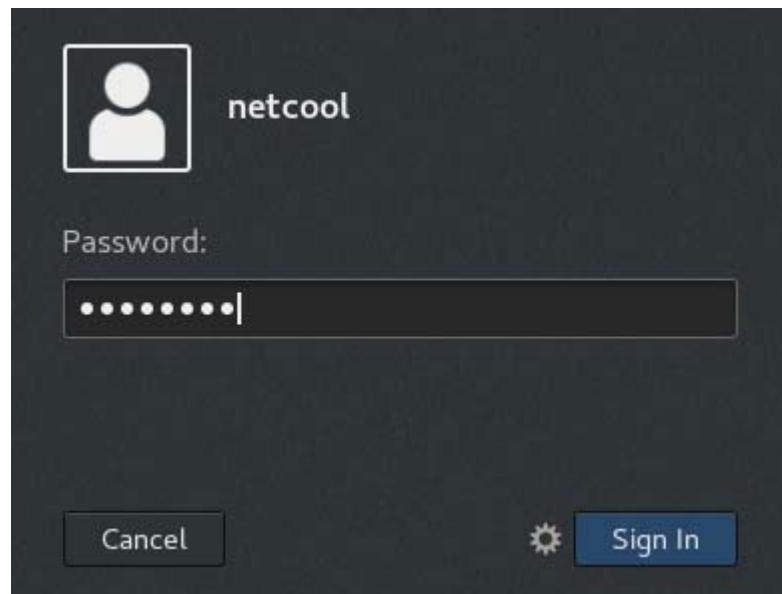
The APM VM is where Cloud APM 8.1.4 is already started and running. The LIN3 VM has a Netcool/OMNIbus 8.1 environment. When all of the images start and you log in to them, ping each one from its neighbors to validate network connections.

3. Start the LIN3 VM. Follow the local environment instructions.

4. Click **netcool**, which is the user ID (not `root` or `Administrator`).

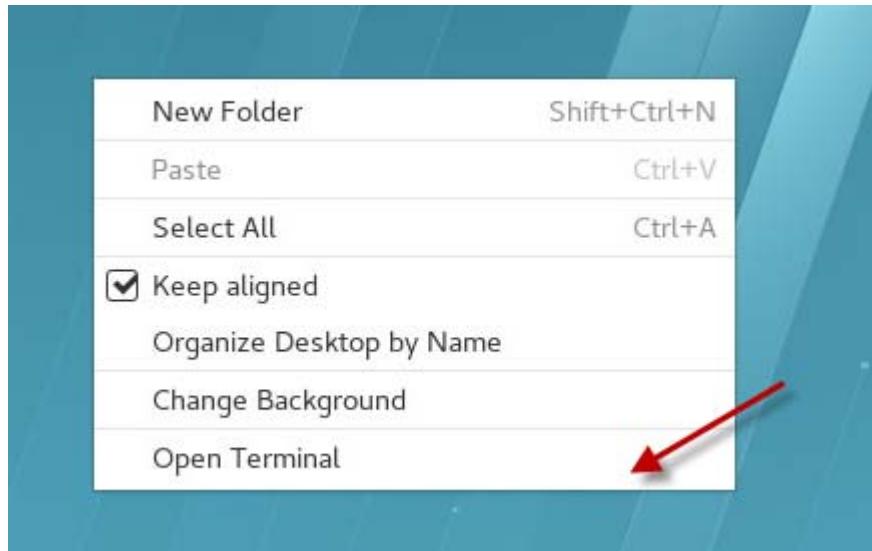


5. Enter `object00` for the password and select **Sign In**.



OMNIbus starts automatically.

6. On the LIN3 VM, right-click anywhere on the desktop. From the drop-down window, click **Open Terminal**.



7. Ping the APM VM with this command:

```
ping apm -c 3
```

```
netcool@lin3:~  
File Edit View Search Terminal Help  
[netcool@lin3 ~]$ ping apm -c 3  
PING apm.ibm.edu (192.168.1.102) 56(84) bytes of data.  
64 bytes from apm.ibm.edu (192.168.1.102): icmp_seq=1 ttl=64 time=0.756 ms  
64 bytes from apm.ibm.edu (192.168.1.102): icmp_seq=2 ttl=64 time=0.413 ms  
64 bytes from apm.ibm.edu (192.168.1.102): icmp_seq=3 ttl=64 time=0.297 ms  
--- apm.ibm.edu ping statistics ---  
3 packets transmitted, 3 received, 0% packet loss, time 2001ms  
rtt min/avg/max/mdev = 0.297/0.488/0.756/0.196 ms  
[netcool@lin3 ~]$
```

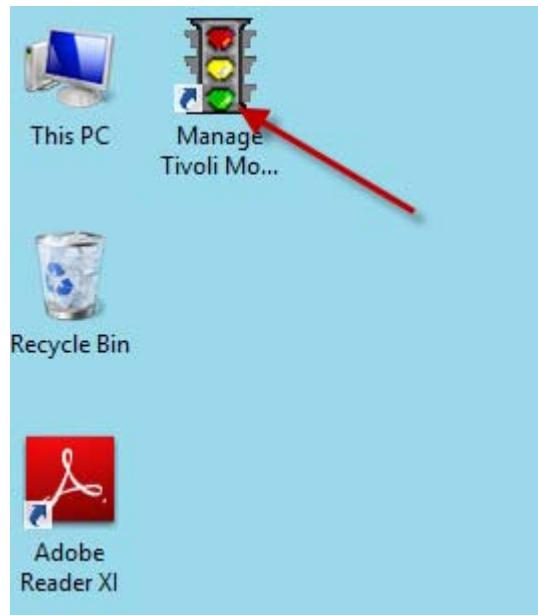
A successful ping displays 0% packet loss.

8. If an image fails to start or if any of the pings are not successful, notify your instructor.
9. Ping the ITM VM with this command:

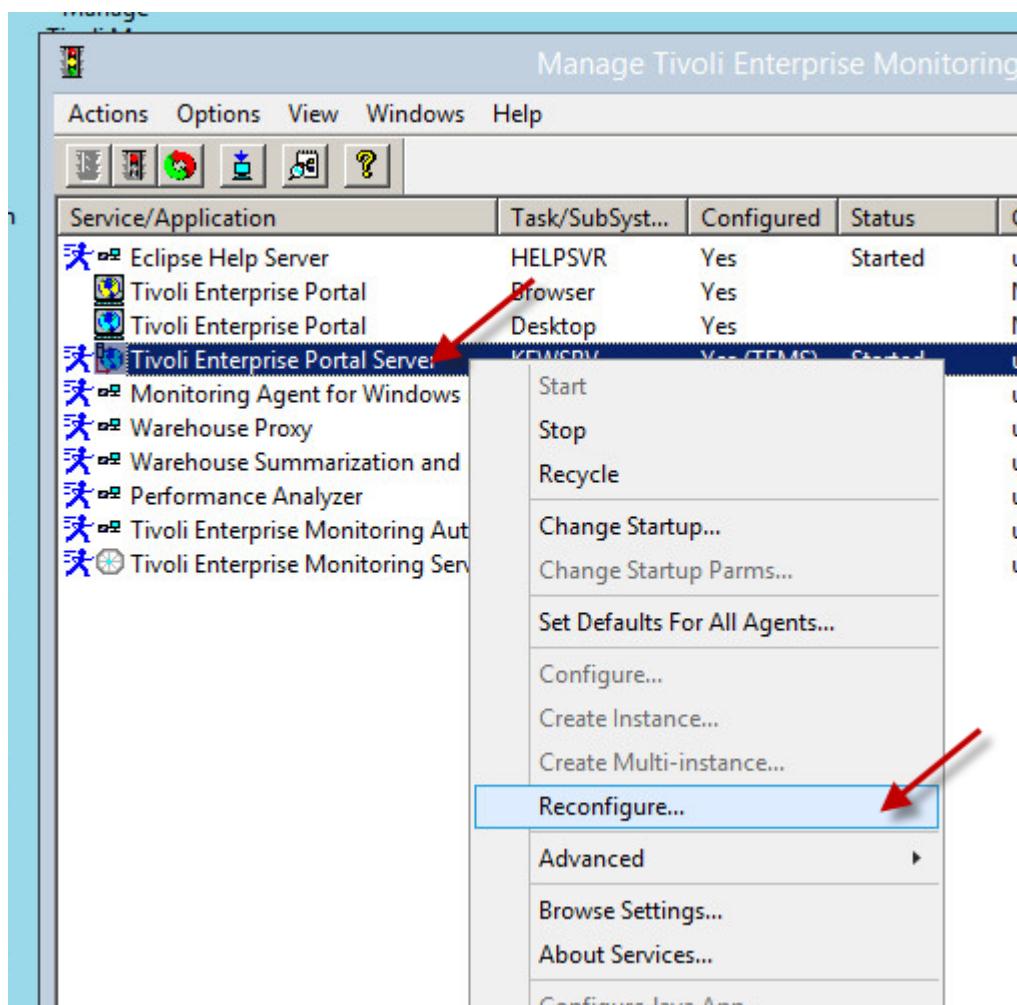
```
ping itm -c 3
```

A successful ping displays 0% packet loss.

10. On the ITM VM, click the **Manage Tivoli Monitoring Services** icon on the desktop.



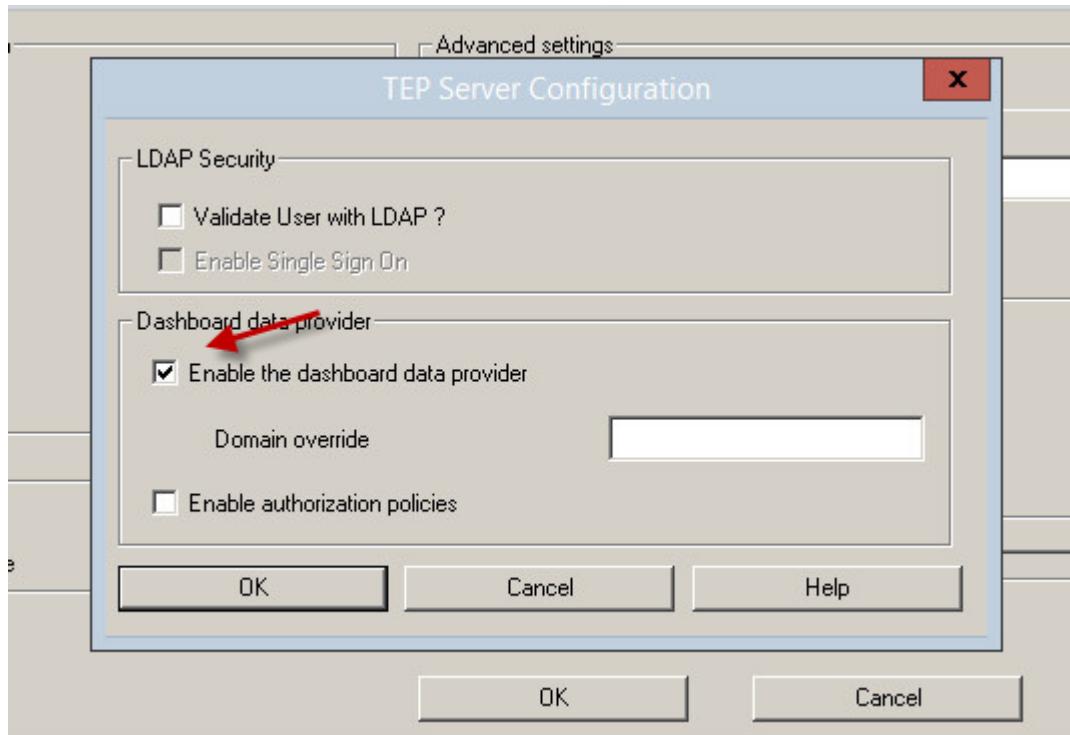
11. Highlight the Tivoli Enterprise Portal Server service. Right-click and select **Reconfigure**.



12. Click **Yes** to the prompt in the Start Configuration window about stopping the service.

13. On the Tivoli Enterprise Portal Server Configuration window, click **OK**.

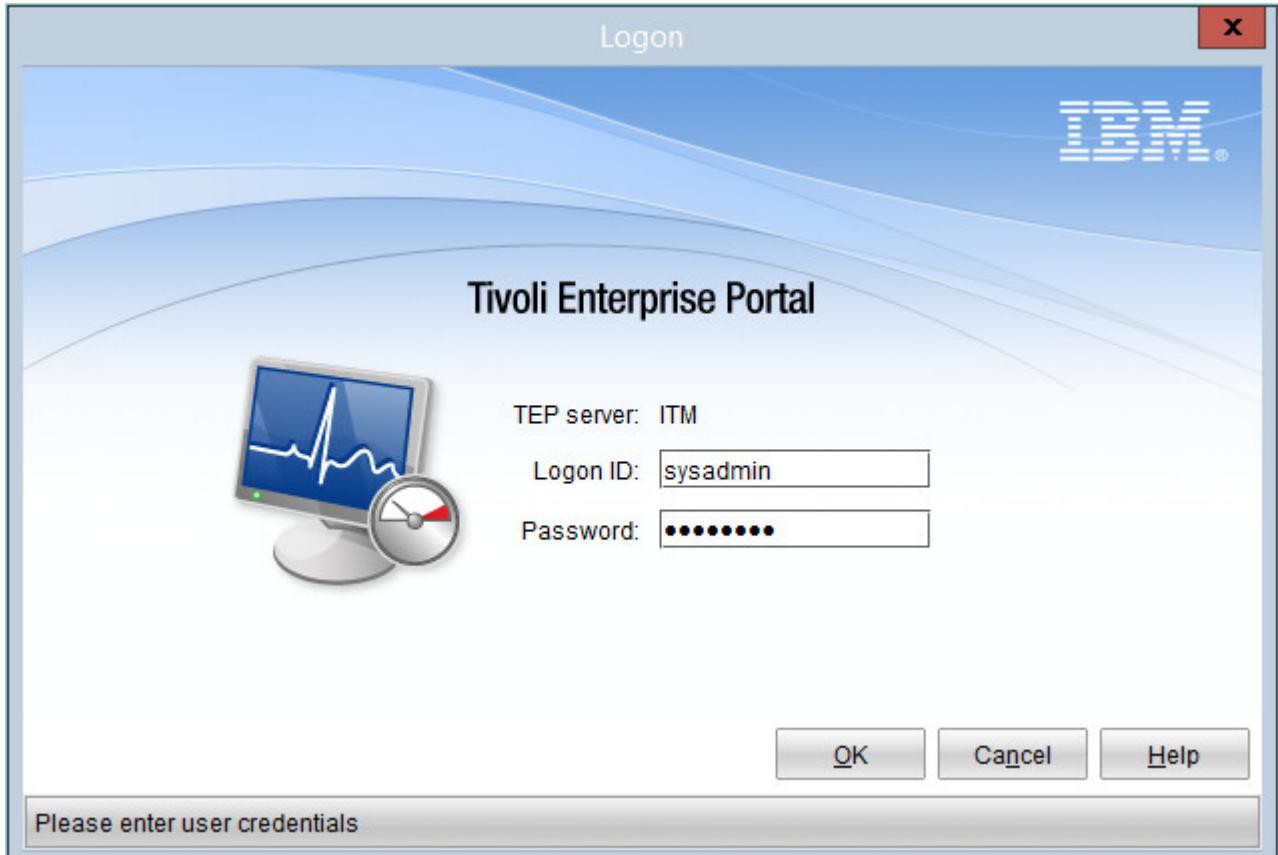
14. On the next TEP Server Configuration window, ensure that the check box is selected for **Enable the dashboard data provider**. After confirming this setting, click **Cancel** on this window and **Cancel** on the next window that opens.



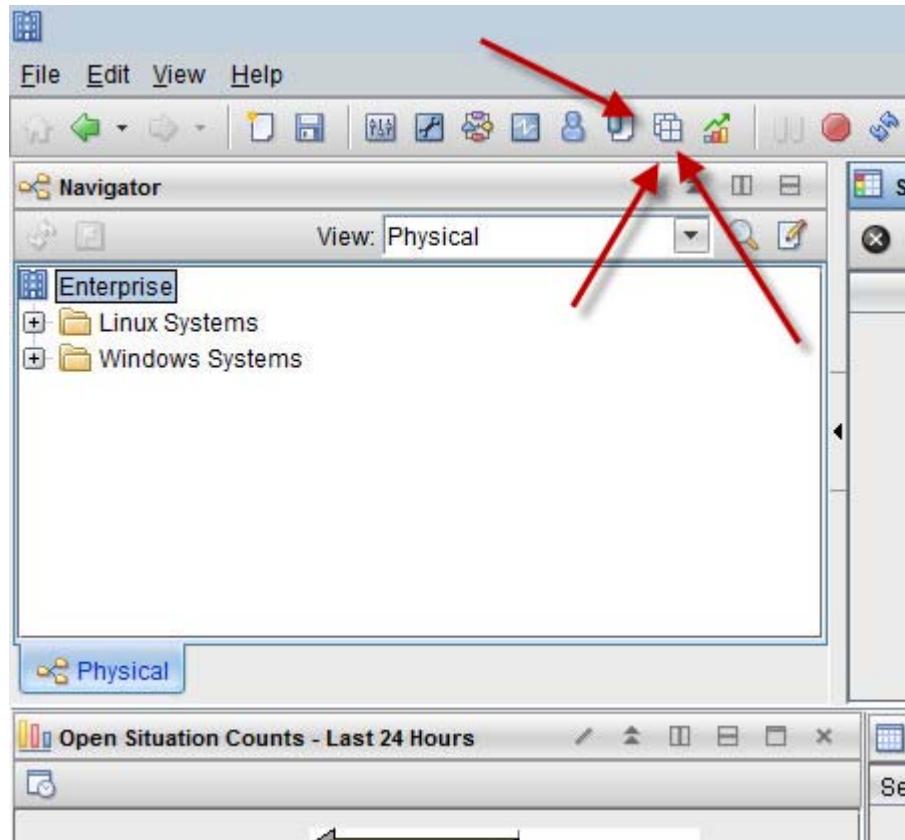
15. Close the Manage Tivoli Enterprise Monitoring Services application by clicking the X in the upper-right corner.
16. From the desktop of the ITM VM, double-click the **Tivoli Enterprise Portal** icon.



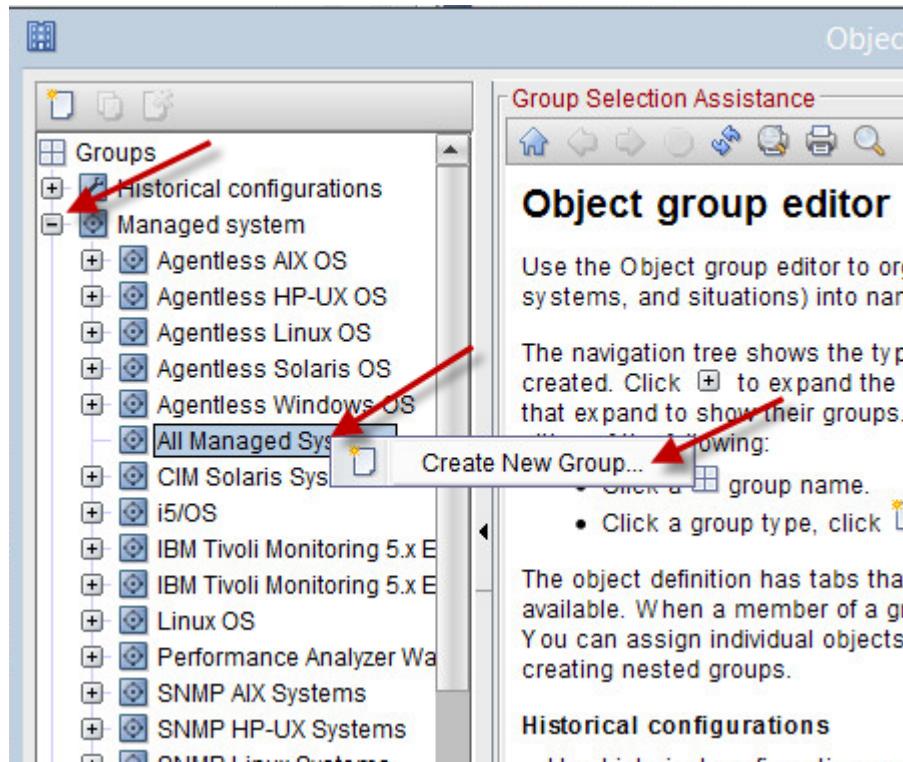
17. Log in to the Tivoli Enterprise Portal with the Logon ID **sysadmin** and password **object00**.  
Click **OK**.



18. From the Tivoli Enterprise Portal desktop, open the Object Group Editor. Click the icon that looks like a pair of two-by-two squares.

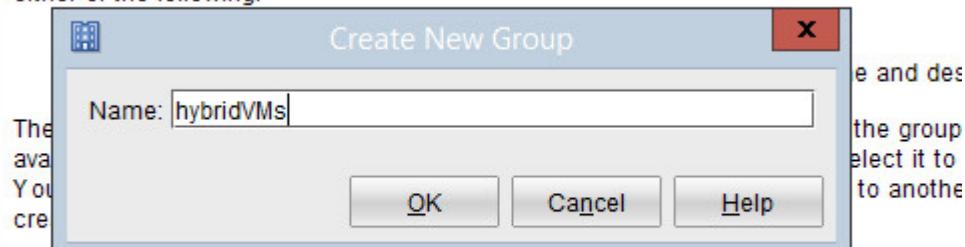


19. From the Object Group Editor, expand **Managed System** and then click **All Managed Systems** to highlight it. Right-click and select **Create New Group**.



20. In the Create New Group window, enter the name **hybridVMs** and click **OK**. The name that you enter is case-sensitive.

that expand to show their groups. To replace this user assistance with an object g either of the following:

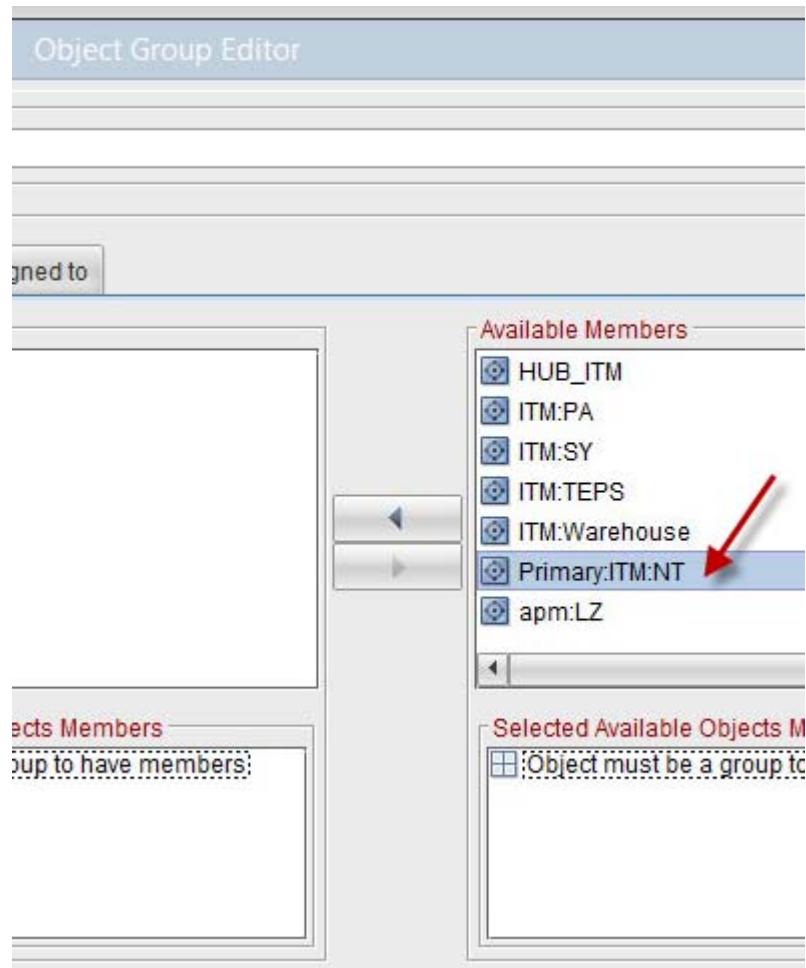


#### Historical configurations

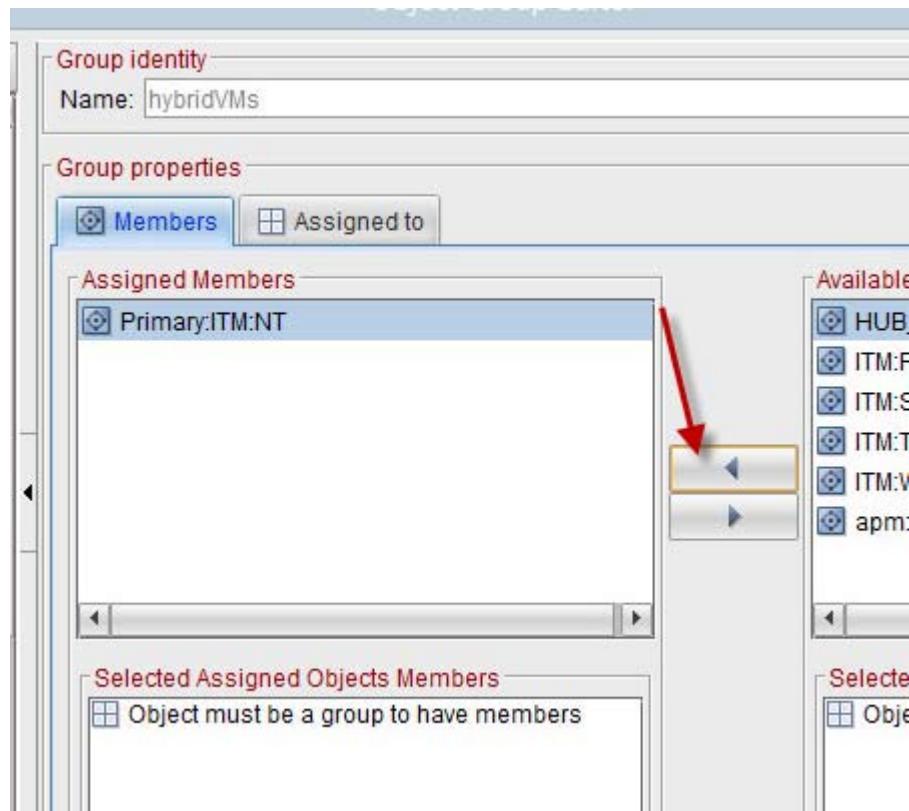
Use historical configuration groups to combine related historical collections into then control collection for the group rather than having to select collection definit

When you build a new group in your production environment, you choose multiple managed systems to be members of the new group. In this class, to keep the environment simple, you use one managed system as a member of the group. Only managed systems in this group forward data and events to IBM Cloud APM.

21. In the **Available Members** box, click **Primary:ITM:NT** to highlight it.



22. Click the left arrow to move Primary:ITM:NT to the Assigned Members pane.



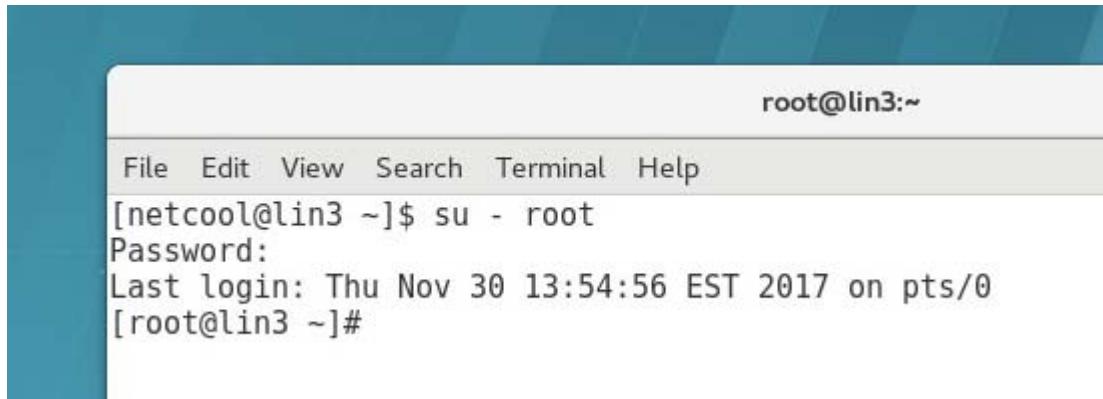
23. Near the lower-right corner of the Object Group Editor window, click **OK** to save the hybridVMs managed system name group.

## Install the hybrid gateway

The hybrid gateway must be installed in your Tivoli Monitoring environment on a system with Red Hat Enterprise Linux Server 6 Update 2 or later. It also cannot be installed where the Cloud APM server is running. In this environment, use LIN3.

24. Open a terminal window on the LIN3 VM. Issue the command to switch the user to `root`. At the prompt, reply with the password `object00`.

```
su - root
```

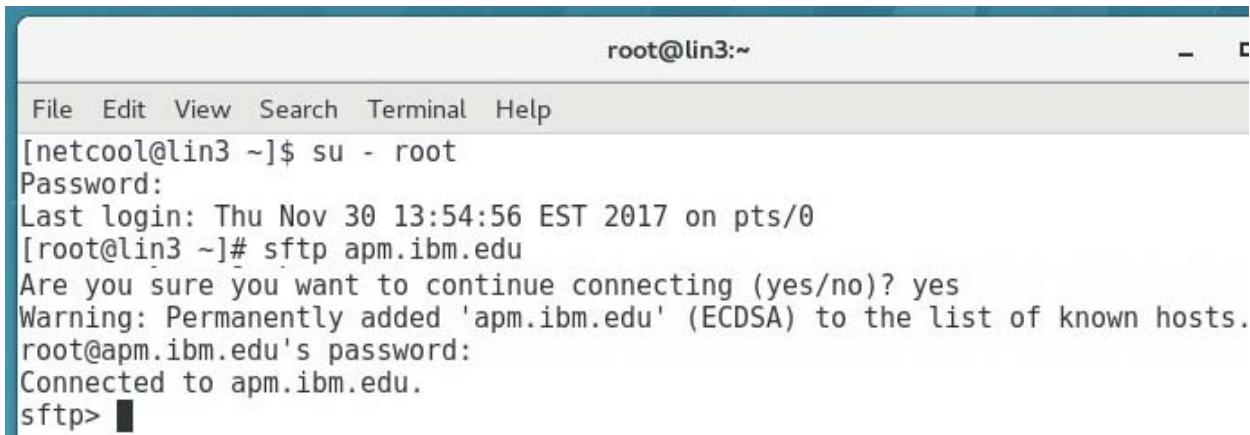


A screenshot of a terminal window titled "root@lin3:~". The window has a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". The main area shows the command [netcool@lin3 ~]\$ su - root followed by a password prompt "Password:". Below that is the message "Last login: Thu Nov 30 13:54:56 EST 2017 on pts/0". The prompt "[root@lin3 ~]#" is visible at the bottom.

25. Issue this command to begin a file transfer session with the APM VM:

```
sftp apm.ibm.edu
```

At the prompt about the authenticity of `apm.ibm.edu`, reply `yes`. At the password prompt, enter `object00`.



A screenshot of a terminal window titled "root@lin3:~". The window has a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". The main area shows the command [netcool@lin3 ~]\$ su - root followed by a password prompt "Password:". Below that is the message "Last login: Thu Nov 30 13:54:56 EST 2017 on pts/0". The command [root@lin3 ~]# sftp apm.ibm.edu is entered, followed by "Are you sure you want to continue connecting (yes/no)? yes", "Warning: Permanently added 'apm.ibm.edu' (ECDSA) to the list of known hosts.", "root@apm.ibm.edu's password:", "Connected to apm.ibm.edu.", and the prompt "sftp>".

26. Copy the hybrid gateway code from the APM VM to the LIN3 VM where the code is running.  
Issue these commands.

```
cd /opt/ibm/ccm/depot
ls -l
get apm_hybrid_gateway_8.1.4.0.tar /downloads/apm_hybrid_gateway_8.1.4.0.tar
exit
```

The `sftp` command places a copy in the LIN3 VM directory `/downloads`.

27. On the LIN3 VM, change the directory to the location of the downloaded hybrid gateway compressed file. Expand the `apm_hybrid_gateway.8.1.4.0.tar` file to create the `APM_Hybrid_Gateway_Install_8.1.4.0` folder.

```
cd /downloads  
ls -l  
tar -xvf apm_hybrid_gateway_8.1.4.0.tar  
ls -l
```

The directory `APM_Hybrid_Gateway_Install_8.1.4` is created.

28. Install the hybrid gateway.

```
cd APM_Hybrid_Gateway_Install_8.1.4.0  
ls -l  
./install.sh
```

The installation process begins.

29. Respond to proceed with the installation despite the prerequisite warning. Respond to the license agreement prompt with 1. Press Enter to accept the default hybrid gateway profile of lin3. After the installation, the hybrid gateway server is started.

```
Detailed results are also available in /opt/ibm/hybridgateway/logs/prerechecke
Some of the prerequisites checks returned warnings.
Do you want to continue? [ 1-yes or 2-no; "no" is default ]?yes
Do you accept the license agreement(s) found in the "/downloads/APM_Hybrid_Gate
[ult ]?1
User has accepted the license agreement(s).

Before continuing, log in to the Cloud APM console and select System Configuration.
Enter the profile name that was defined for this Hybrid Gateway to connect to the
Cloud APM instance. This profile will be used by the Hybrid Gateway.
Each profile should be used by only one Hybrid Gateway. The default profile name is
"Cloud APM". You can change it if required.

Preparing... #####
Updating / installing...
ibm-java-x86_64-jre-8.0-4.5 #####
Preparing... #####
Updating / installing...
smai-liberty-8.1.4.0-1.el6 #####
smai-itmcdb-itmclient-08.14.00.00-1.el6 #####
Server hybridgateway created.
Preparing... #####
Updating / installing...
smai-agentproxy-8.1.4.0-1.el6 #####
Starting server hybridgateway.
Server hybridgateway started with process ID 52442.

Hybrid Gateway installation completed. The installation log file is located at
/opt/ibm/hybridgateway/logs/install.log

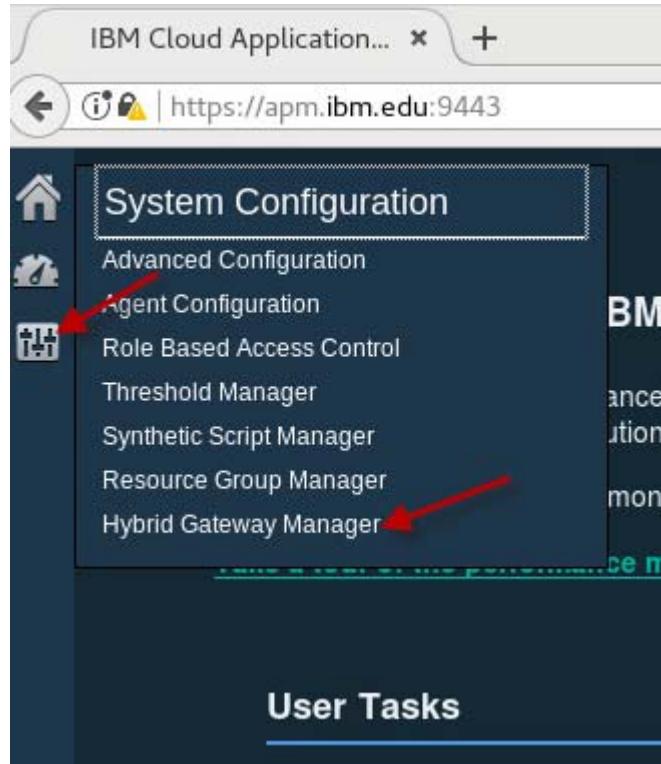
Use the following command to manage Hybrid Gateway:
/opt/ibm/hybridgateway/bin/hybridgateway.sh start|stop|status|uninstall

The Hybrid Gateway log files are located in the "/opt/ibm/wlp/usr/servers/hybridgatwey
[root@lin3 APM_Hybrid_Gateway_Install_8.1.4.0]#
```

root@lin3:/downloads/APM\_Hybrid...

## Configure the hybrid gateway

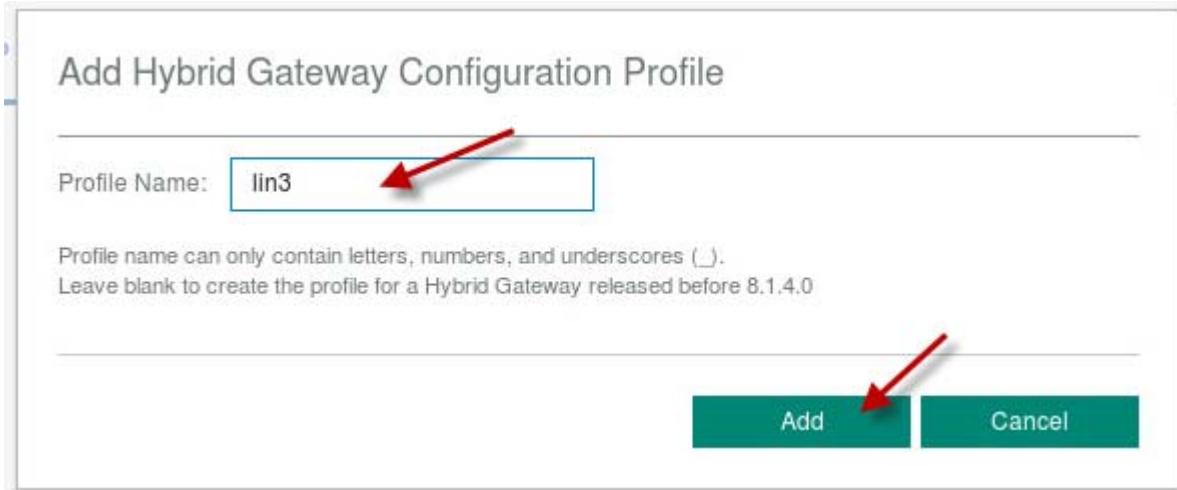
30. From the APM VM, go to the APM console. Click the **System Configuration** icon and click **Hybrid Gateway Manager**.



31. Click **Add**.

The screenshot shows the 'Hybrid Gateway Manager' page. At the top, there's a breadcrumb navigation 'Home > Hybrid Gateway Manager'. Below the breadcrumb is a section titled 'Hybrid Gateway Manager' with a sub-instruction: 'Use the Hybrid Gateway Manager to manage the co... Enterprise Monitoring environments in the Performa...'. In the center of the page is a large button with a plus sign and the word 'Add', which is highlighted with a red arrow. Below this button, there are two input fields: 'Profile Name' and 'Managed System Grou...'. There is a horizontal line separating this from the rest of the page.

32. Enter a profile name of **lin3** and click **Add**.



33. Enter the following values:

- a. Managed System Group Name must match the case-sensitive name that you created in the Tivoli Enterprise Portal Object Group Editor: **hybridVMs**
- b. **Portal Server Host Name** is the host name of the IBM Tivoli Monitoring host where the portal server is running: **itm.ibm.edu**
- c. **Portal Server Port** is the port number that is used for logging in to the IBM Tivoli Monitoring system where the portal server is running: **15200**
- d. **Portal Server Protocol** is used by IBM Tivoli Monitoring, which is installed on the ITM VM: **http**
- e. **Portal Server user name** is the logon ID to log in to the Tivoli Enterprise Portal: **sysadmin**

- f. **Portal Server User Password** is the password that you use to log in the Tivoli Enterprise Portal client: **object00**

### Edit Hybrid Gateway Configuration Profile

Profile Name *	<input type="text" value="lin3"/>
Managed System Group Name *	<input type="text" value="hybridVMs"/>
Portal Server Host Name *	<input type="text" value="itm.ibm.edu"/>
Portal Server Port *	<input type="text" value="15200"/>
Portal Server Protocol *	<input type="text" value="http"/>
Portal Server User Name *	<input type="text" value="sysadmin"/>
Portal Server User Password	<input type="password" value="*****"/>
Pass-Through Proxy Host Name	<input type="text"/>
Pass-Through Proxy Port	<input type="text" value="0"/>
Pass Through Proxy Protocol	<input type="text" value="http"/>

**OK**    **Cancel**

34. When all of the parameters are entered, click **OK**.  
35. At the confirmation prompt, the configuration is saved. Click **Close**.

36. Confirm that the Hybrid Gateway Profile is successfully created.

The screenshot shows the 'Hybrid Gateway Manager' interface. At the top, there are three icons: a house, a gear, and a plus sign. Below them, the title 'Home > Hybrid Gateway Manager' is displayed. The main heading 'Hybrid Gateway Manager' is followed by a sub-instruction: 'Use the Hybrid Gateway Manager to manage the configuration of multiple Hybrid environments in the Performance Management console'. A large blue button labeled '+ Add' is visible. The table below lists one profile:

Profile Name	Managed System Group Name
lin3	hybridVMs

**Note:** Because it can take 45 minutes for the ITM – WINDOWSOS window to be shown, go to the next exercise. Validation of the hybrid gateway is a separate later exercise.

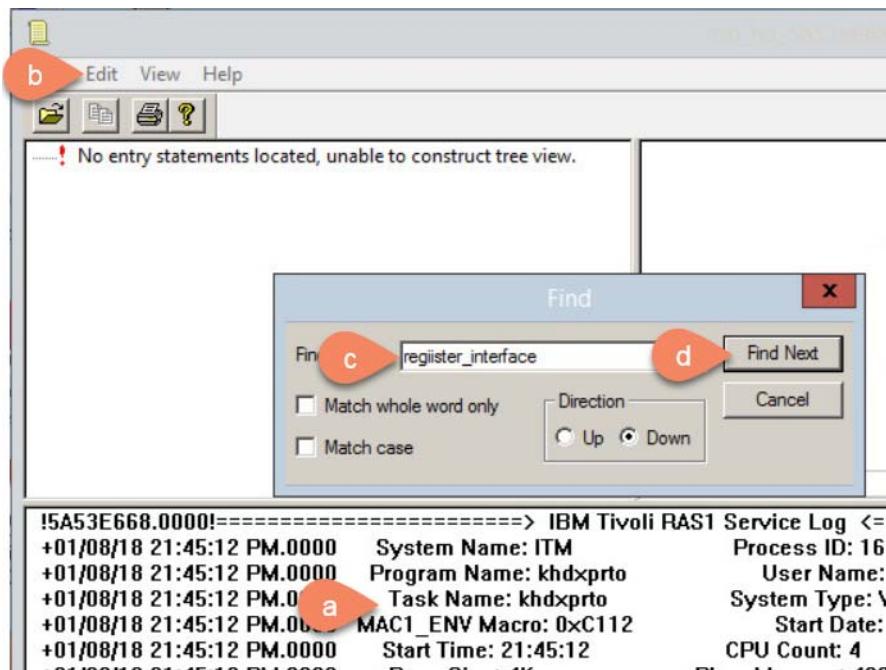
## Exercise 2 Integrate with IBM Tivoli Monitoring: Using the Tivoli Data Warehouse

Cloud APM supports selected agents that store the historical data in the Tivoli Data Warehouse. This exercise guides you through the steps.

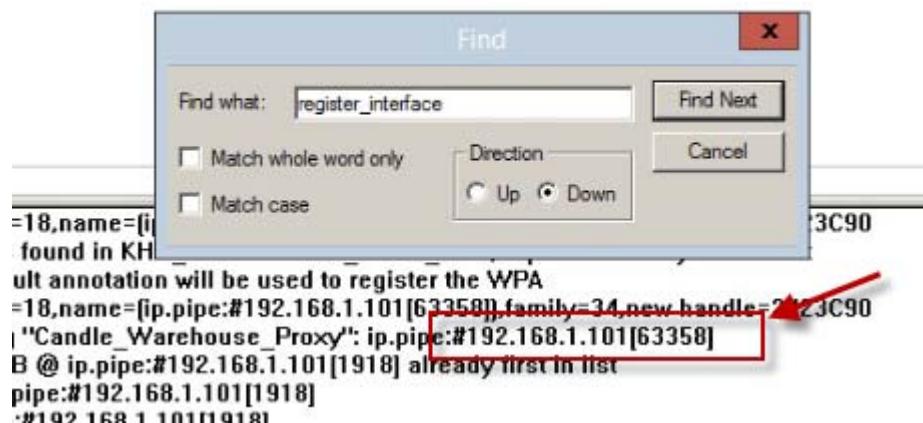
1. On the ITM VM, open the Manage Tivoli Enterprise Monitoring Services application, right-click the **Warehouse Proxy** application, and select **Advanced > View Trace Log**.
2. Select the most recent log, which is at the top of the list. Click **OK**.



3. Find the IP address and port that are used in these steps:



- a. Click in the lower pane.
- b. Click **Edit > Find**.
- c. Enter the string: **register\_interface**
- d. Click **Find Next**.
- e. Scroll to the right, and observe the IP address and the port number. The warehouse proxy is listening on this IP address and port number, which match the settings that you use in the configuration of the Cloud APM.



4. On the APM VM, open a terminal window and change to the directory:

```
/opt/ibm/wlp/usr/servers/min/dropins/CentralConfigurationServer.war/data_source/lz
```

5. Display the contents of the `linux_os_sample_history.xml` file by using the `gedit` command. Observe that the warehouse location is not specified.

```
root@apm:/opt/ibm/wlp/usr/servers/min/dropins/CentralConfigurationServer.war/data_sou... - □
File Edit View Search Terminal Help
[ root@apm ~]# cd /opt/ibm/wlp/usr/servers/min/dropins/CentralConfigurationServer.war/data_source/lz
[ root@apm lz]# gedit linux_os_sample_history.xml

Open Save
linux_os_sample_history.xml
/opt/ibm/wlp/usr/servers/min/dropins...nfigurationServer.war/data_source/lz

<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<PRIVATECONFIGURATION>
  <WAREHOUSE LOCATION="ip.pipe:#netaddress[port#]" />
  <HISTORY EXPORT="60" INTERVAL="15" RETAIN="6" TABLE="KLZ_CPU"/>
  <HISTORY EXPORT="60" INTERVAL="15" RETAIN="6" TABLE="KLZ_DISK"/>
  <HISTORY EXPORT="60" INTERVAL="15" RETAIN="6" TABLE="KLZ_VM_STATS"/>
  <HISTORY EXPORT="60" INTERVAL="15" RETAIN="6" TABLE="KLZ_NETWORK"/>
  <HISTORY EXPORT="60" INTERVAL="15" RETAIN="6" TABLE="KLZ_SYSTEM_STATISTICS"/>
  <HISTORY EXPORT="60" INTERVAL="15" RETAIN="6" TABLE="Linux_IP_Address"/>
</PRIVATECONFIGURATION>
```

6. Display the contents of the `lz_history.xml` file by using the `gedit` command. Notice that you see no settings for the warehouse location and no settings for historical data collection.

```
.wai/data_source/lz
[ root@apm lz]# gedit linux_os_sample_history.xml
[ root@apm lz]# gedit lz_history.xml

Open Save
lz_history.xml
/opt/ibm/wlp/usr/servers/min/dropins/CentralConfigurationServer.war/data_sou... - □

<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<PRIVATECONFIGURATION>
</PRIVATECONFIGURATION>
```

7. Make a backup copy of the `lz_history.xml` file.
8. Copy the `lz_history.xml` file from the `/downloads` directory to the current directory.
9. Display the contents of the `lz_history.xml` file by using the `gedit` command. Observe that this file specifies the warehouse proxy location that is determined earlier and has several settings for historical data collection.



**Note:** Outside the classroom, edit the original `lz_history.xml` file, setting your warehouse IP address and tables to export.

```
[root@apm lz]# gedit lz_history.xml
[root@apm lz]# cp lz_history.xml lz_history.xml.orig
[root@apm lz]# cp /downloads/lz_history.xml .
cp: overwrite './lz_history.xml'? y
[root@apm lz]# gedit lz_history.xml
```

The screenshot shows a terminal window with the following command history:  
[root@apm lz]# gedit lz\_history.xml  
[root@apm lz]# cp lz\_history.xml lz\_history.xml.orig  
[root@apm lz]# cp /downloads/lz\_history.xml .  
cp: overwrite './lz\_history.xml'? y  
[root@apm lz]# gedit lz\_history.xml

Below the terminal is a file editor window titled "lz\_history.xml". The file path is listed as "/opt/ibm/wlp/usr/servers/min/dropins/CentralConfigurationServer.war/data\_source/lz". The file contains the following XML configuration:  
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<PRIVATECONFIGURATION>
 <WAREHOUSE LOCATION="ip.pipe:#192.168.1.101[63358]" />
 <HISTORY EXPORT="60" INTERVAL="15" RETAIN="6" TABLE="KLZ\_CPU" />
 <HISTORY EXPORT="60" INTERVAL="15" RETAIN="6" TABLE="KLZ\_DISK" />
 <HISTORY EXPORT="60" INTERVAL="15" RETAIN="6" TABLE="KLZ\_VM\_STATS" />
 <HISTORY EXPORT="60" INTERVAL="15" RETAIN="6" TABLE="KLZ\_NETWORK" />
 <HISTORY EXPORT="60" INTERVAL="15" RETAIN="6" TABLE="KLZ\_SYSTEM\_STATISTICS" />
 <HISTORY EXPORT="60" INTERVAL="15" RETAIN="6" TABLE="Linux\_IP\_Address" />
</PRIVATECONFIGURATION>

You validate that the data is collected in the exercises in the next unit of the course.

# Exercise 3 DASH with Cloud APM data

In this exercise, you create an original page and a dashboard that contains Cloud APM information.

- From the LIN2 VM, log in to the Dashboard Application Services Hub console. Open a browser (click the icon on the desktop) and enter this URL:

<https://lin2.ibm.edu:16311/ibm/console/logon.jsp>



**Note:** This website is the home page for the Firefox browser on LIN2.

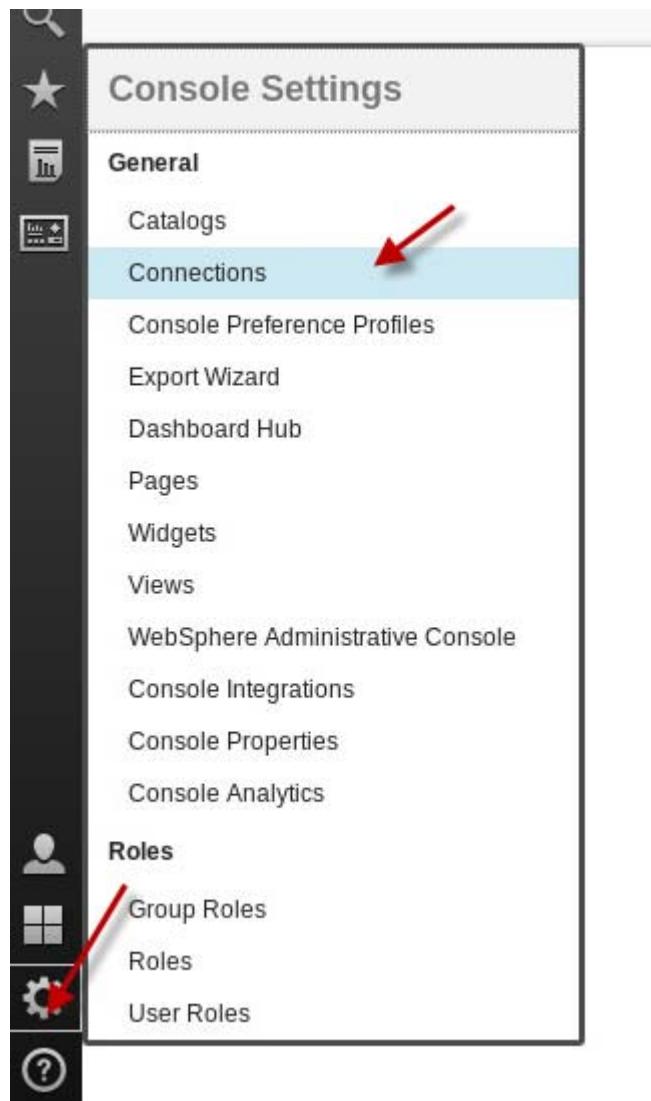
- Enter the user name `smadmin`, password `object00`, and click **Go**. If you are prompted that another user is logged in with the same user ID, select the choice to log out the other user and click **OK**.



The IBM Dashboard Application Services Hub window opens at the end of the installation of the dashboards. If you are prompted to remember the password, select to remember the password, and click **X** to close that window.

## Create the KD8 connection

3. Click the gear icon to open the Console Settings window. Under **General**, click **Connections**.



4. Click the icon to create a new remote provider:

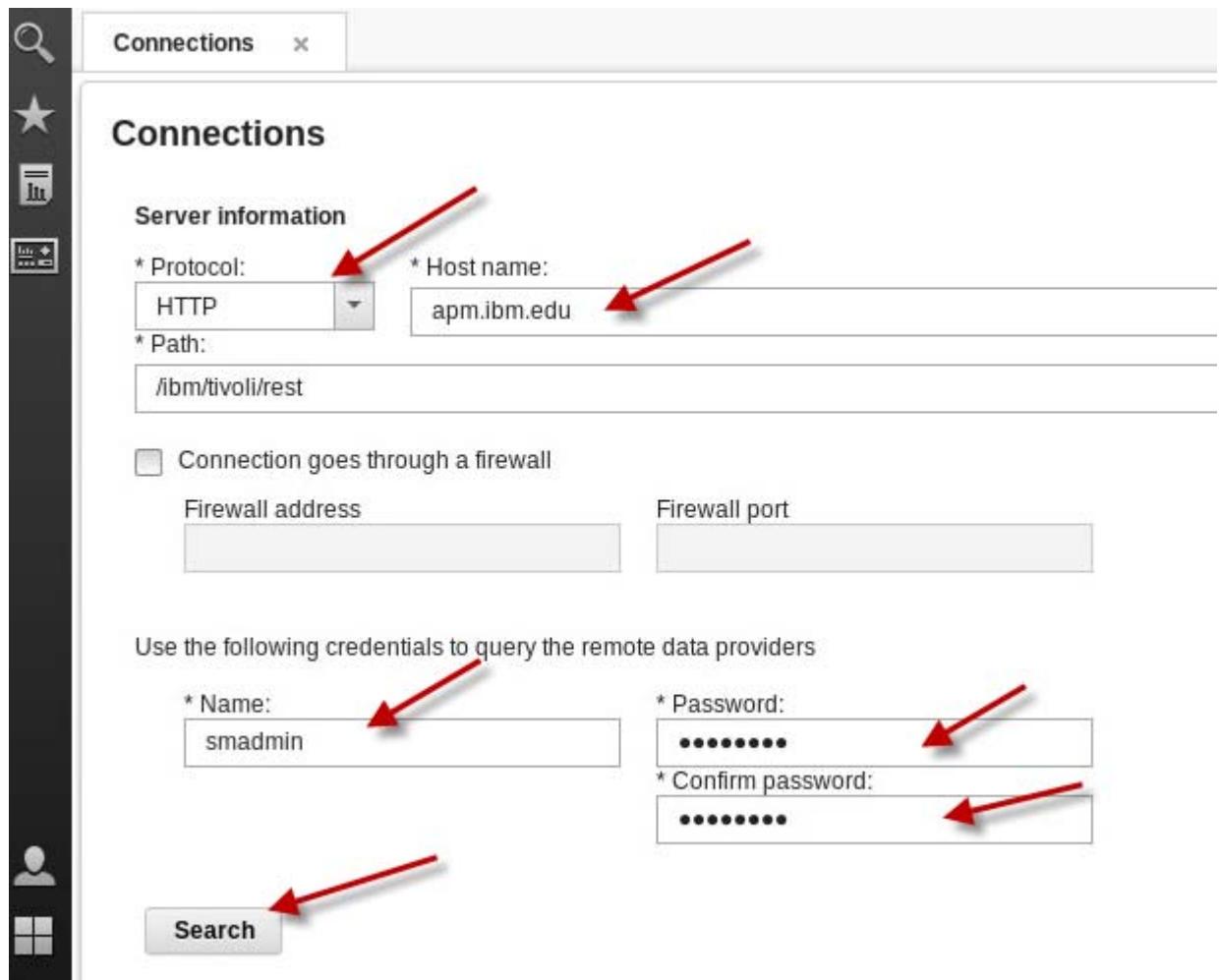
The screenshot shows the 'Connections' manager window. At the top, there's a search bar and a menu icon. Below it, a sidebar has icons for a star, a document, and a gear. The main area is titled 'Connections' and contains a message: 'The connection manager allows you to configure To create a new remote connection, click on the ' icon in the menu option. To delete a remote connection, eith'. Below this is a toolbar with four icons: a blue square with a white circle, a yellow square with a white starburst, a blue square with a white pencil, and a red square with a white X. A red arrow points to the second icon from the left. A table below lists two connections: 'Tivoli Directory Integrator' (Type: TDI) and 'tip' (Type: tip). The table has columns for 'Name' and 'Type'.

Name	Type
Tivoli Directory Integrator	TDI
tip	tip

5. Provide these values:

- ◆ Protocol: HTTP
- ◆ Host name: `apm.ibm.edu`
- ◆ Port number: 8090
- ◆ Name: `smadmin`
- ◆ Password: `object00`

6. Select **Search**.



7. Scroll down, select the **KD8** entry, and click **OK**.

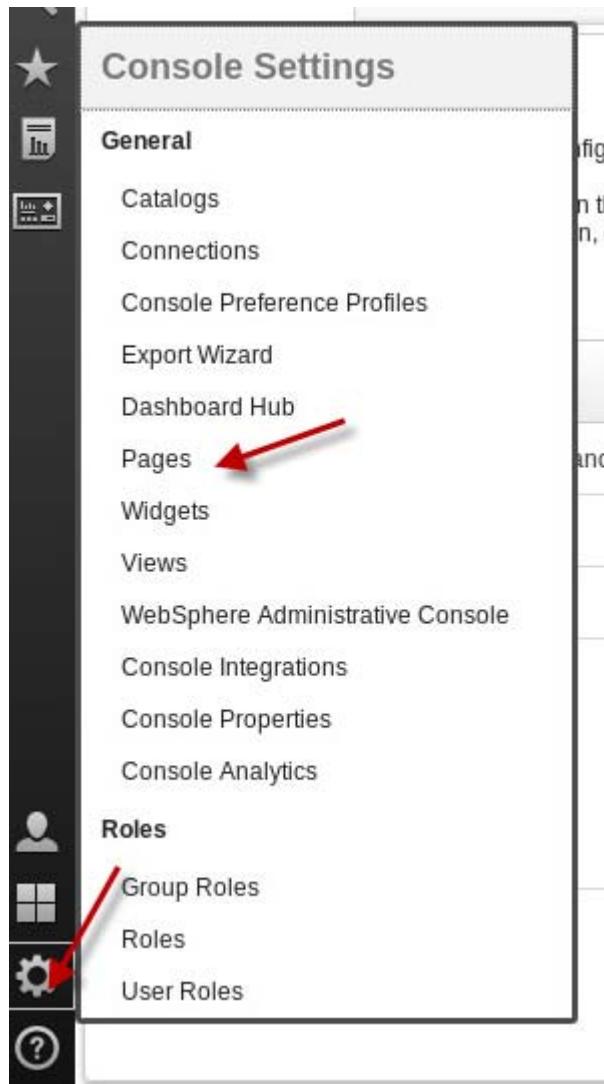
The screenshot shows the 'Connections' dialog box. On the left is a vertical toolbar with icons for search, star, list, user, dashboard, gear, and help. The main area has a title bar 'Connections' with a close button. Below it is a table with one row:

KD8	IBM Performance Management dash
-----	---------------------------------

A red arrow points to the 'KD8' entry in the table. Below the table, a message says 'Total: 1 Selected: 1'. Underneath is a section titled 'Connection information' with fields for Name, Description, Provider ID, and a checkbox for SSO Configuration. At the bottom are 'OK' and 'Cancel' buttons, with a red arrow pointing to the 'OK' button.

## Create an original page and dashboard

8. Before you create the new page, create a folder by clicking **Console Settings > Pages**.

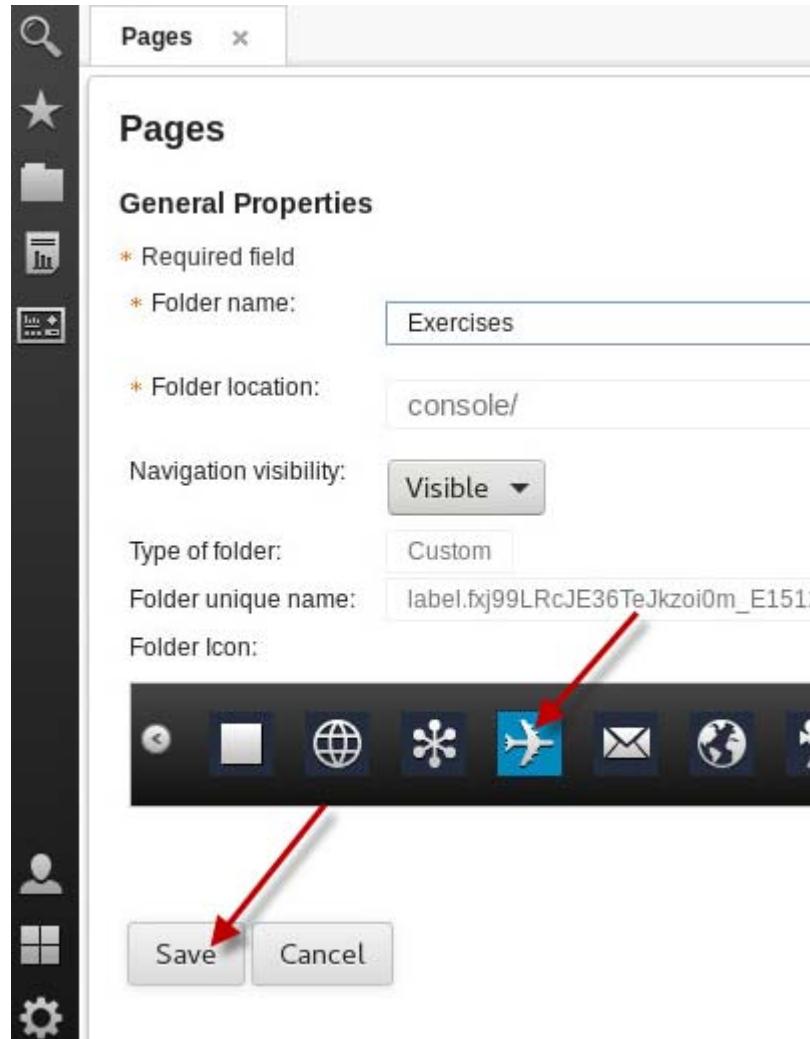


The Pages window opens.

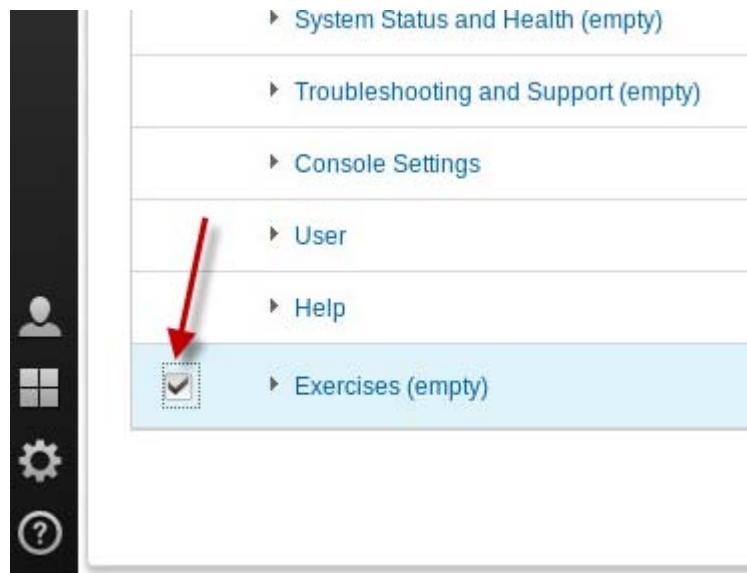
9. Click New Folder.

The screenshot shows the 'Pages' section of the DASH interface. At the top, there are 'Connections' and 'Pages' tabs. Below them, a search bar and a star icon are visible. The main area is titled 'Pages' and contains a descriptive text: 'Use this page to manage all pages and folders available in the current workspace. When you create a new page, you can select which widgets to include.' Below this text are several buttons: 'New Page...', 'New Folder...', and 'Delete'. Underneath these buttons is a table with two columns: 'Select' and 'Name'. A single row is shown with the name 'Default'. A red arrow points to the 'New Folder...' button.

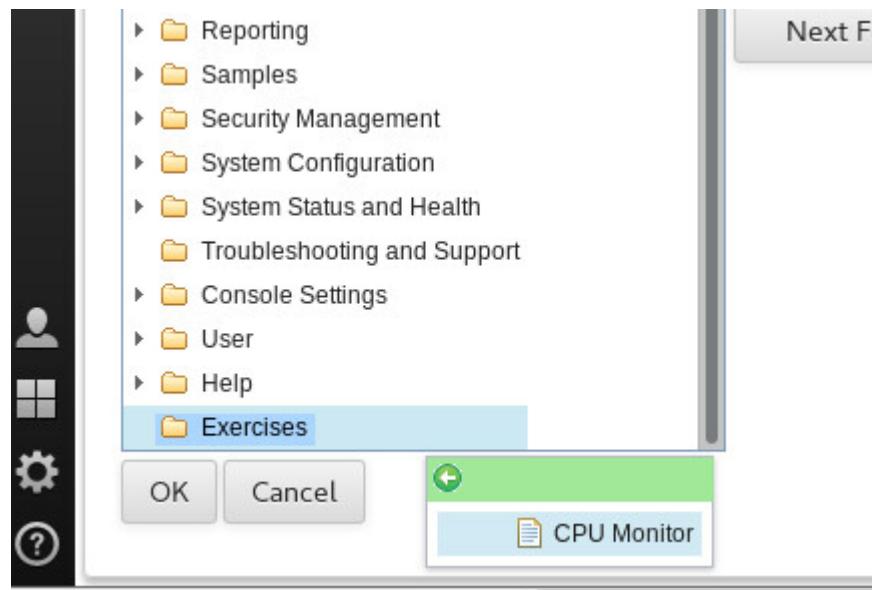
10. Name the folder **Exercises**. Choose an icon, such as the airplane. Click **Save**. You are still on the **Pages** tab.



11. Scroll down the pages to see the **Exercises** folder. Check the box for that folder.



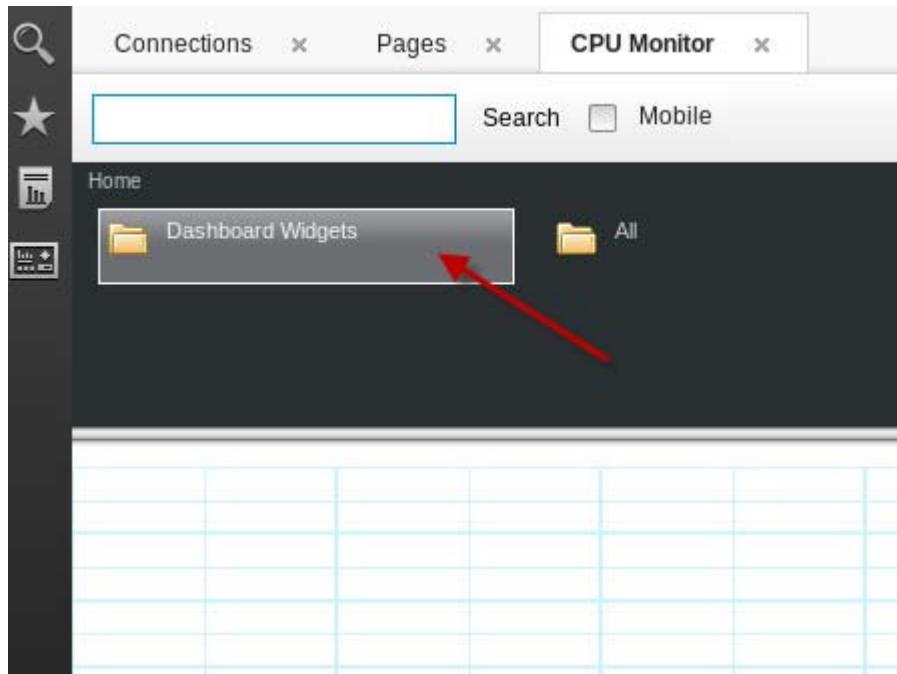
12. Click **New Page**. Name the page **CPU Monitor** and click **Location**. Drag the **CPU Monitor** page to the **Exercises** folder.



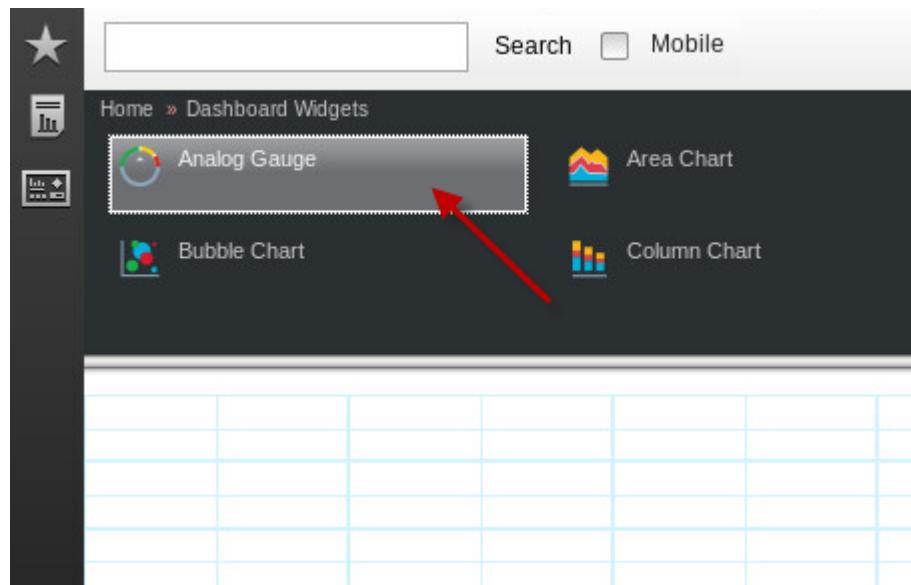
13. Click **OK** for the folder selection and **OK** again on Page Settings. Clear the informational message by clicking **OK**.

You can use two sets of widgets to build a page.

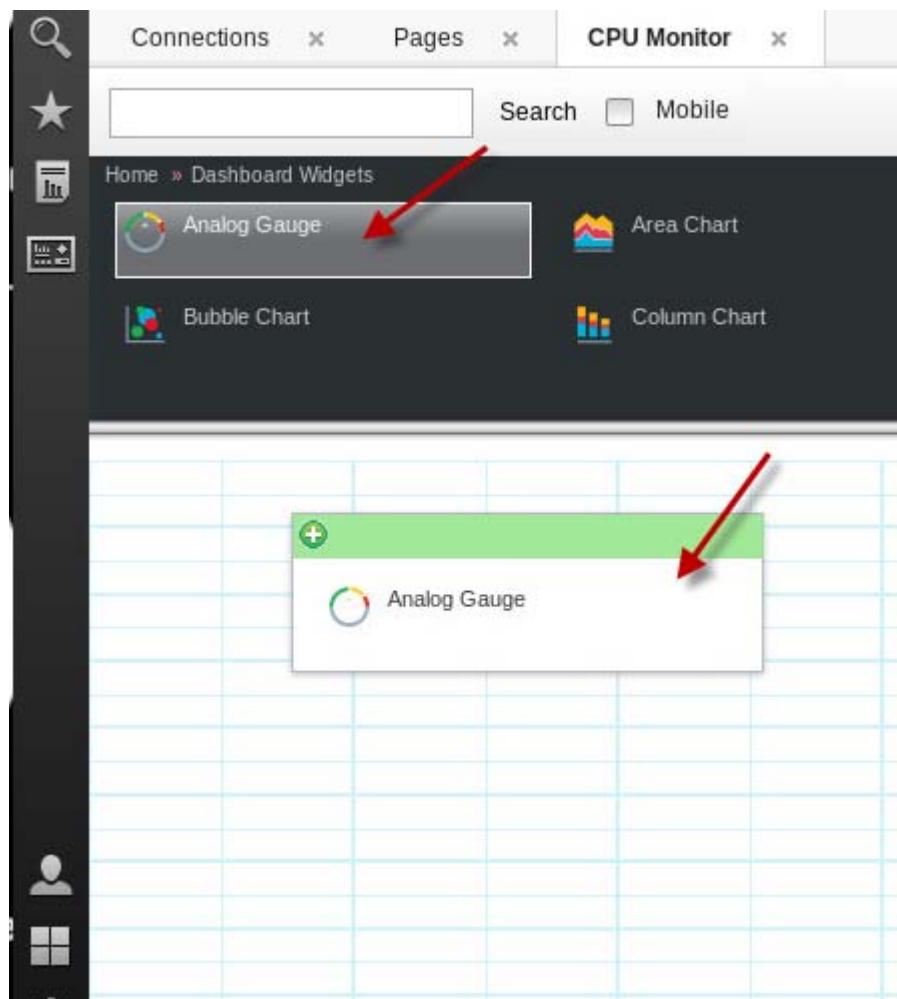
14. Click the **Dashboard Widgets** icon.



15. Begin building the dashboard with the **Analog Gauge** bar.



16. Click the **Analog Gauge** icon and drag it to the left side of the palette near the top.



17. Read about the widget by clicking the question mark in the upper-right corner. Help opens in a new browser window. Close the help browser after reading the procedures.

Analog Gauge widget - Mozilla Firef

[https://lin2.ibm.edu:16311/ibm/help/topic/com.ibm.twl.help/dash\\_c\\_twl\\_an](https://lin2.ibm.edu:16311/ibm/help/topic/com.ibm.twl.help/dash_c_twl_an)

## Analog Gauge widget

Analog Gauges are used to visually represent a numeric quantity within specified minin can be displayed as full gauges or half-moon gauges.

### Analog Gauge visualizations

Analog Gauges are displayed as full gauges by default, in edit mode an administrator c displayed as a half-moon gauge with its status ranges shown on its rim. Both visualiz

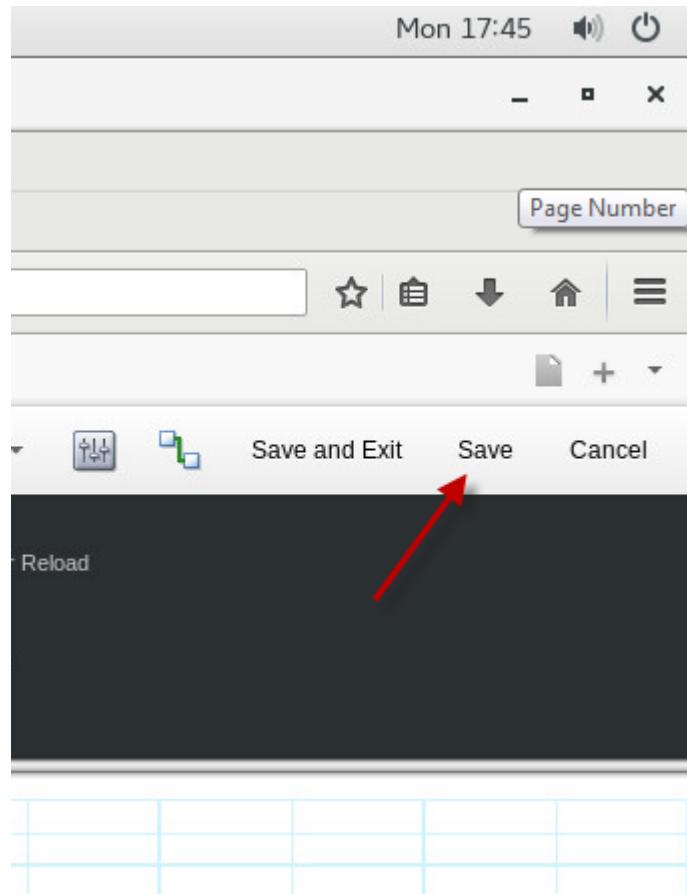
The Analog Gauge provides a number of visual cues to assist dashboard users in quick including varying the gauge color and displaying a status icon. In edit mode, an adminis visualization type. For example, a gauge that reads 0 - 100 can be configured to displa values that are in the range of 80 - 89.

**Note:** Visualizations can vary slightly depending the active console theme. The visualiz

*Table 1. Analog Gauge status visualizations. This table lists the type of different visual Analog gauges.*

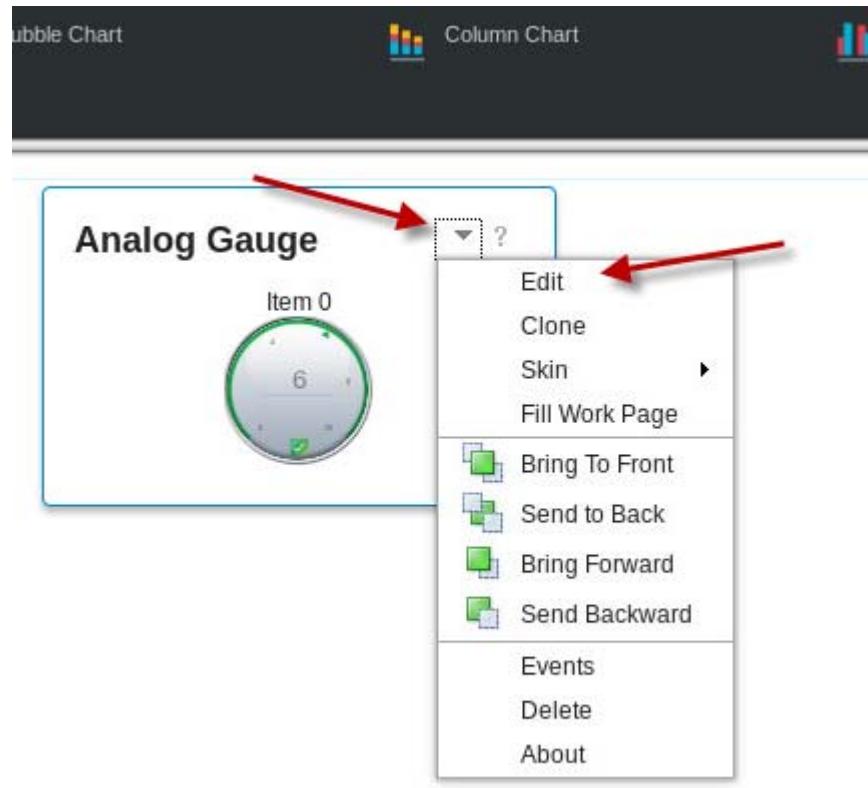
Status type	Standard Visualization	Half-M
<i>Informational</i> - This status is displayed when the displayed value is within the specified informational range for the parameter that is being monitored. While the status is not normal, it generally does not indicate that a problem exists.		
<i>Normal</i> - This status is displayed when the displayed value is within the specified normal range for the parameter that is being monitored.		

18. Save your work in progress by clicking **Save** in the toolbar.



Each type of widget has different settings and controls.

19. Edit the widget settings by clicking the Edit Options icon, and clicking **Edit**.

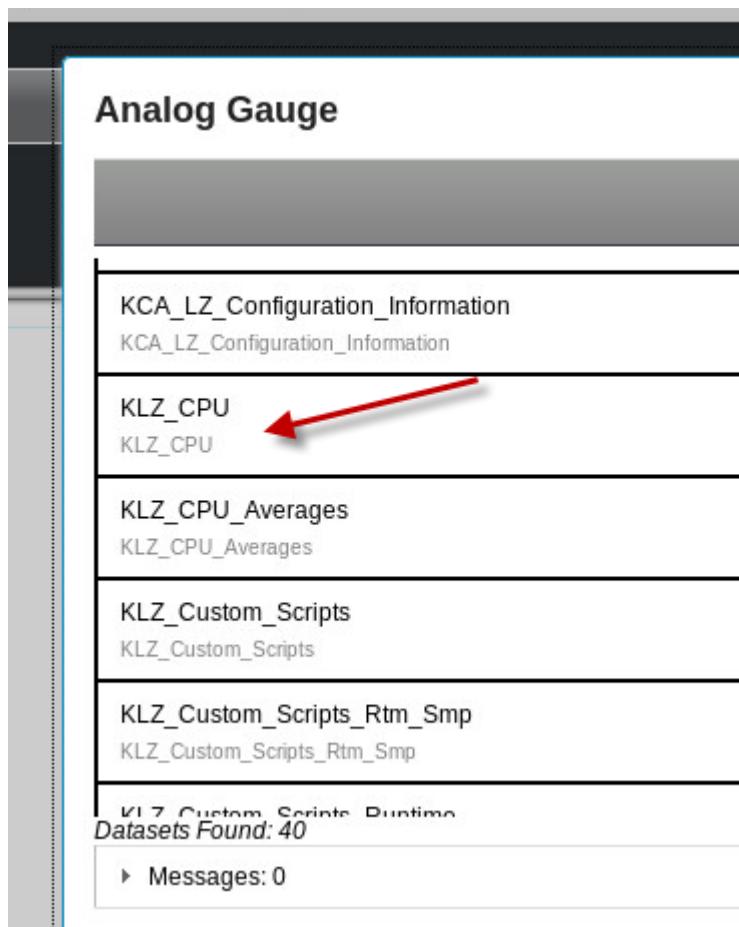


20. Select a data set or attribute group name. Enter **KLZ** in the field and click **Search**.

The screenshot shows the 'Analog Gauge' search interface. At the top, there is a search bar with the placeholder text 'Enter a term and press Search to see data sets. To see all, just click here.' A red arrow points to the search bar, which contains the text 'KLZ'. To the right of the search bar is a 'Search' button. Below the search bar, a message says 'After searching, select a dataset from the search results below'. Underneath this, it shows 'Provider: KD8 > Datasource: Linux OS Profiles' followed by two items: 'Klz\_LogfileProfileEvents' and 'Klz\_LogfileProfileEvents'. Another section follows with 'Provider: KD8 > Datasource: Linux OS' containing 'Klz\_pro\_Performance\_Object\_Status' and 'Klz\_pro\_Performance\_Object\_Status'. A third section shows 'Provider: KD8 > Datasource: Linux OS' with 'KCA\_LZ\_Agent\_Active\_Runtime\_Status' and 'KCA\_LZ\_Agent\_Active\_Runtime\_Status'. At the bottom, it displays 'Datasets Found: 40' and a link 'Messages: 0'.

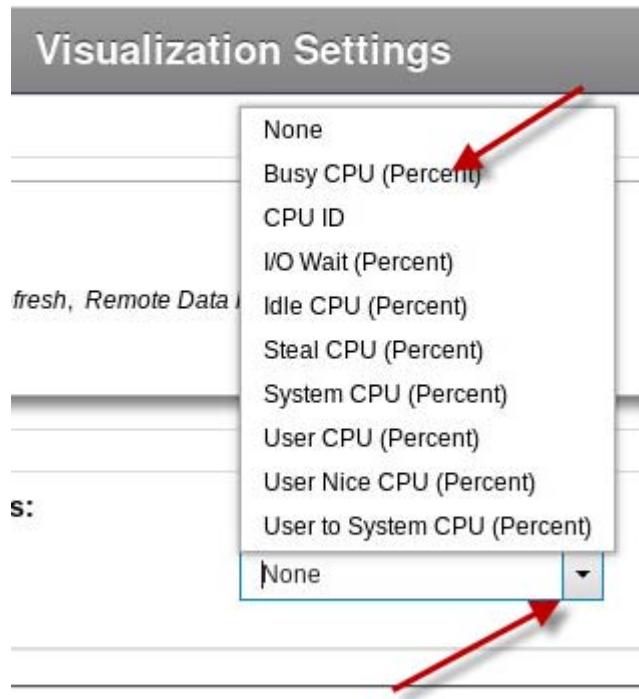
The search returns all attribute groups with *KLZ* in their name.

21. Scroll to locate the KLZ\_CPU provider. Click **KLZ\_CPU** to select it.



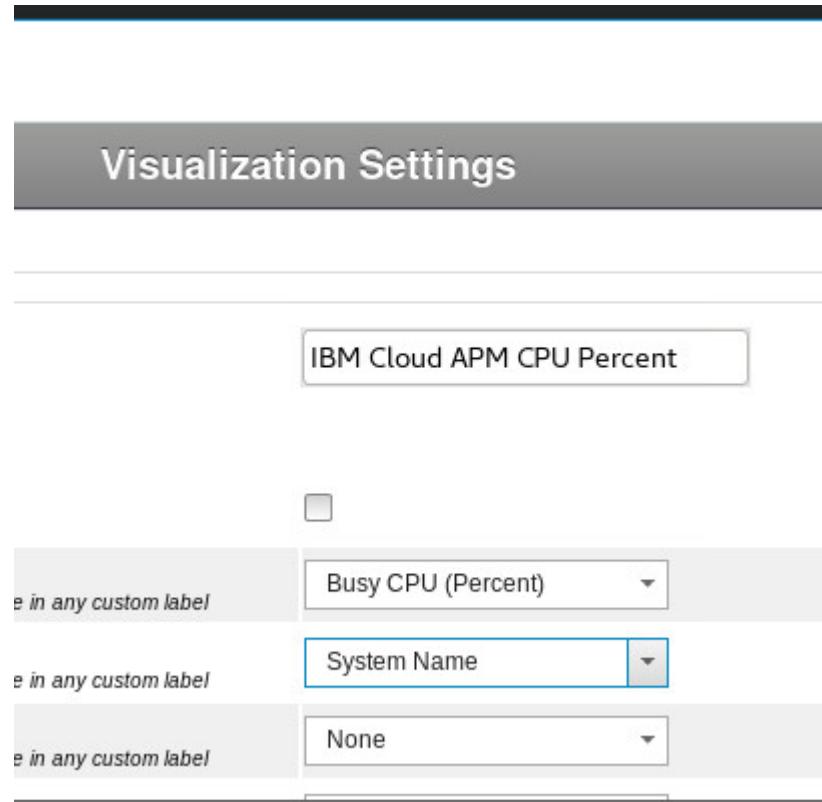
The Required Settings pane opens.

22. Click the arrow next to **None** and select **Busy CPU (Percent)**.



23. Click **Optional Settings** to expand it. Enter **IBM Cloud APM CPU Percent** in the **Title** field.

24. Select **Busy CPU (Percent)** for the **Label above Gauge** field. Set the label at leading edge as **System Name**.



25. Leave the minimum value as **0** and maximum value as **100**.

26. You can provide values that cause the gauge to change color, somewhat like situation states.

Enter the following values to set up the gauge thresholds:

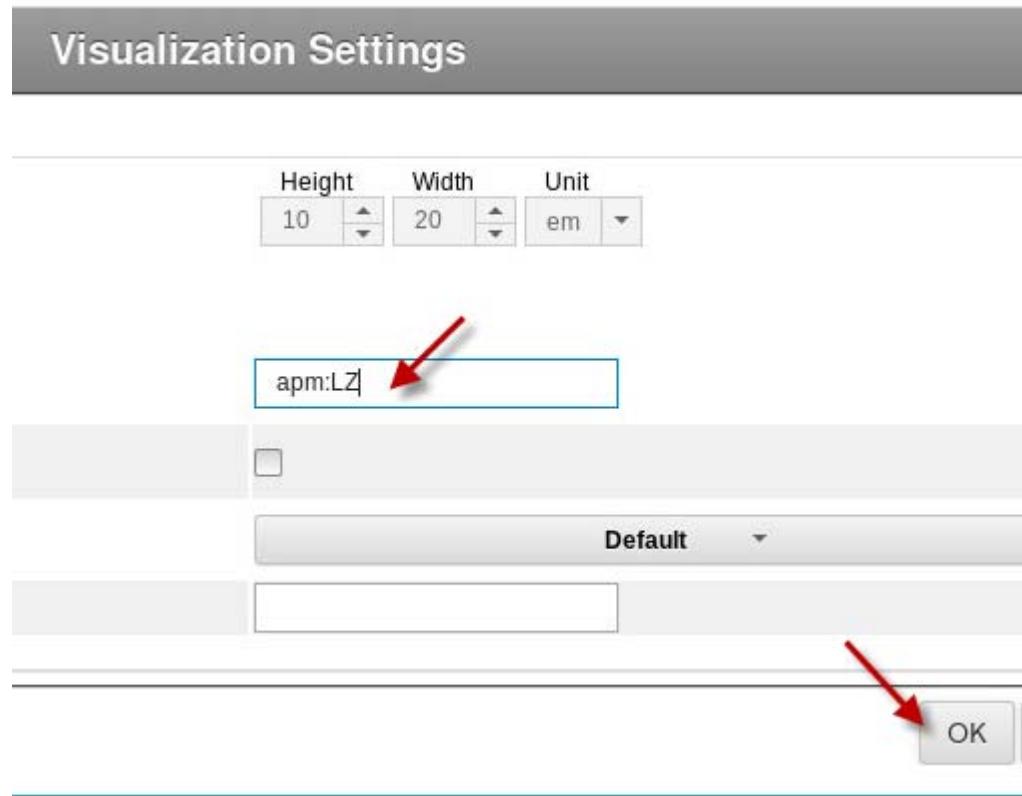
**Visualization Settings**

▶ Messages: 0

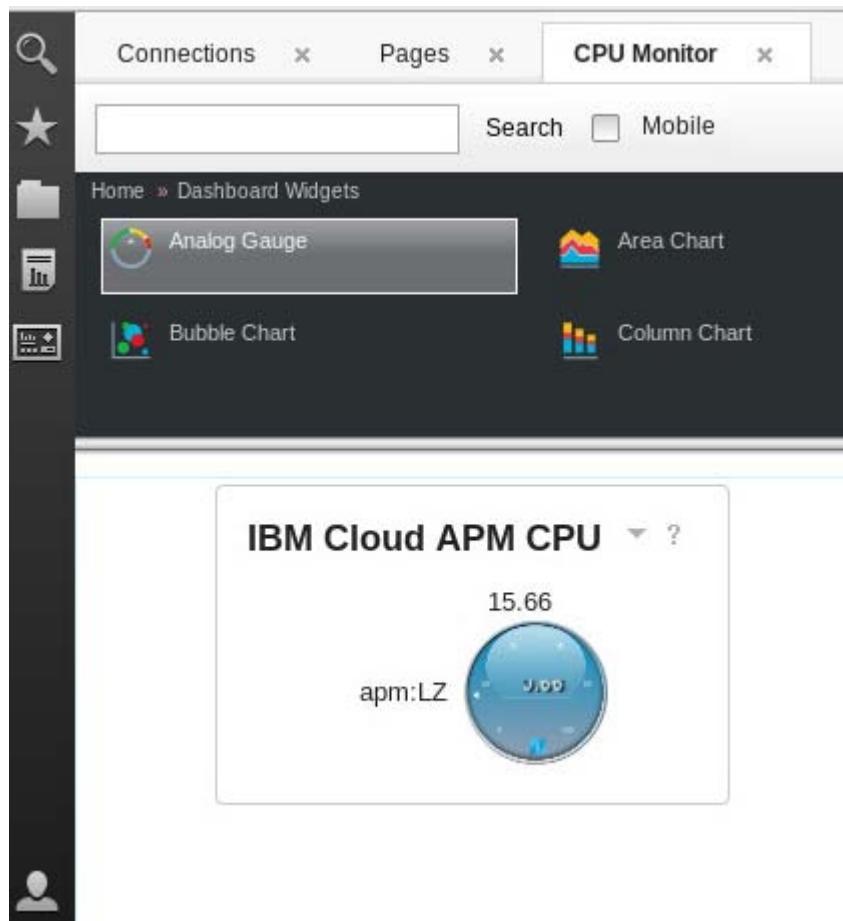
<b>Informational</b> Threshold Value indicating start (>=) of Informational Status	0	<input type="button" value="▲"/> <input type="button" value="▼"/>
<b>Normal</b> Threshold Value indicating start (>=) of Normal Status	50	<input type="button" value="▲"/> <input type="button" value="▼"/>
<b>Minor</b> Threshold Value indicating start (>=) of Minor Warning Status	60	<input type="button" value="▲"/> <input type="button" value="▼"/>
<b>Major</b> Threshold Value indicating start (>=) of Major Warning Status	75	<input type="button" value="▲"/> <input type="button" value="▼"/>
<b>Critical</b> Threshold Value indicating start (>=) of Critical Status	90	<input type="button" value="▲"/> <input type="button" value="▼"/>
<b>Fatal</b> Threshold Value indicating start (>=) of Fatal Status	99	<input type="button" value="▲"/> <input type="button" value="▼"/>

27. You can control the tick marks on the gauge. For this exercise, leave the tick mark settings unchanged.

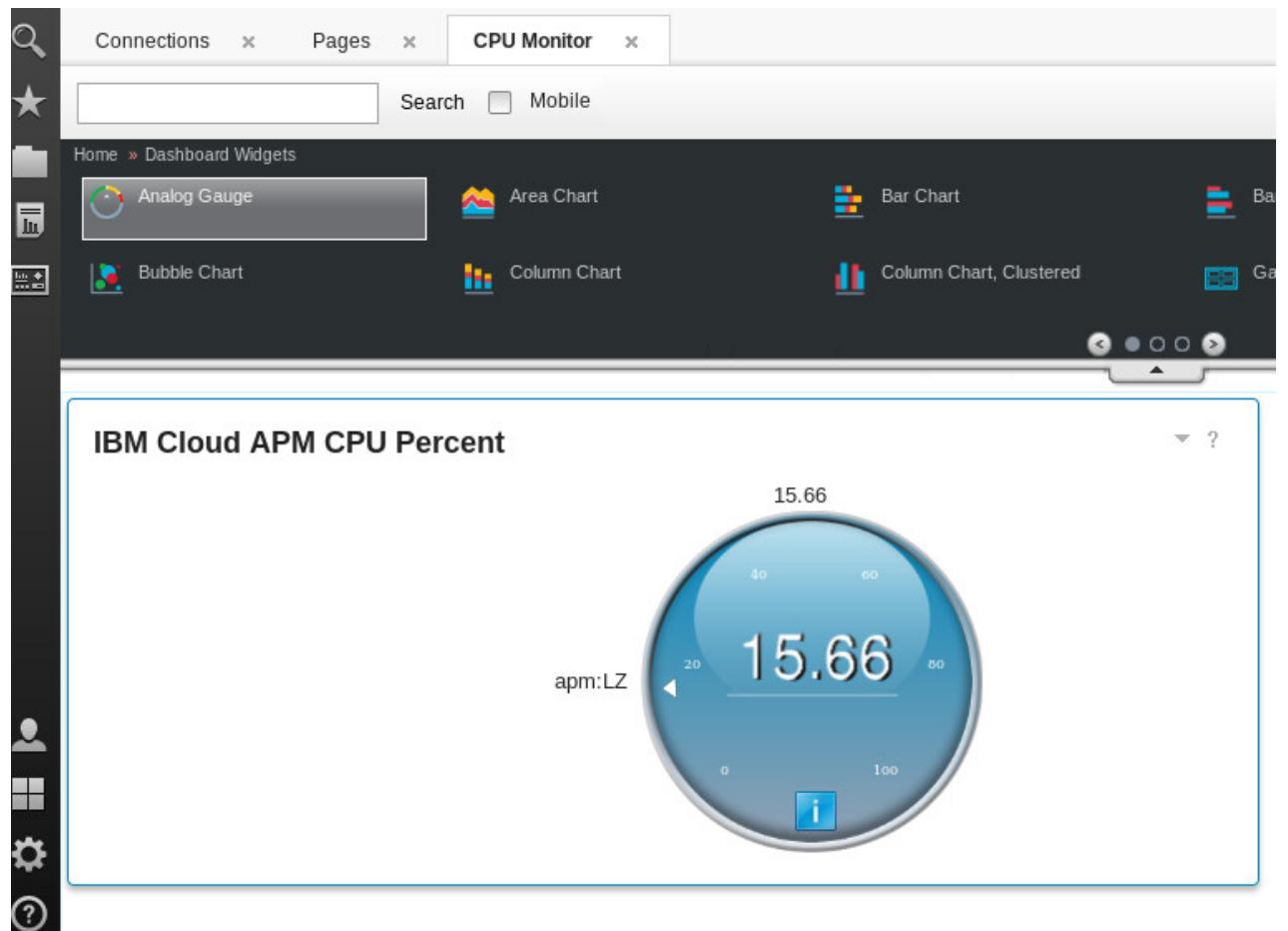
28. Enter the managed system name as `apm:LZ`. Click **OK**.



29. Confirm that your result looks similar to this screen capture.

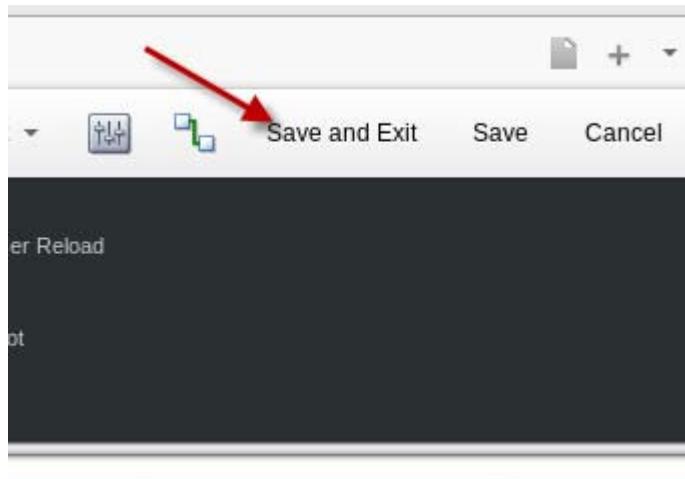


30. Size the widget as shown.

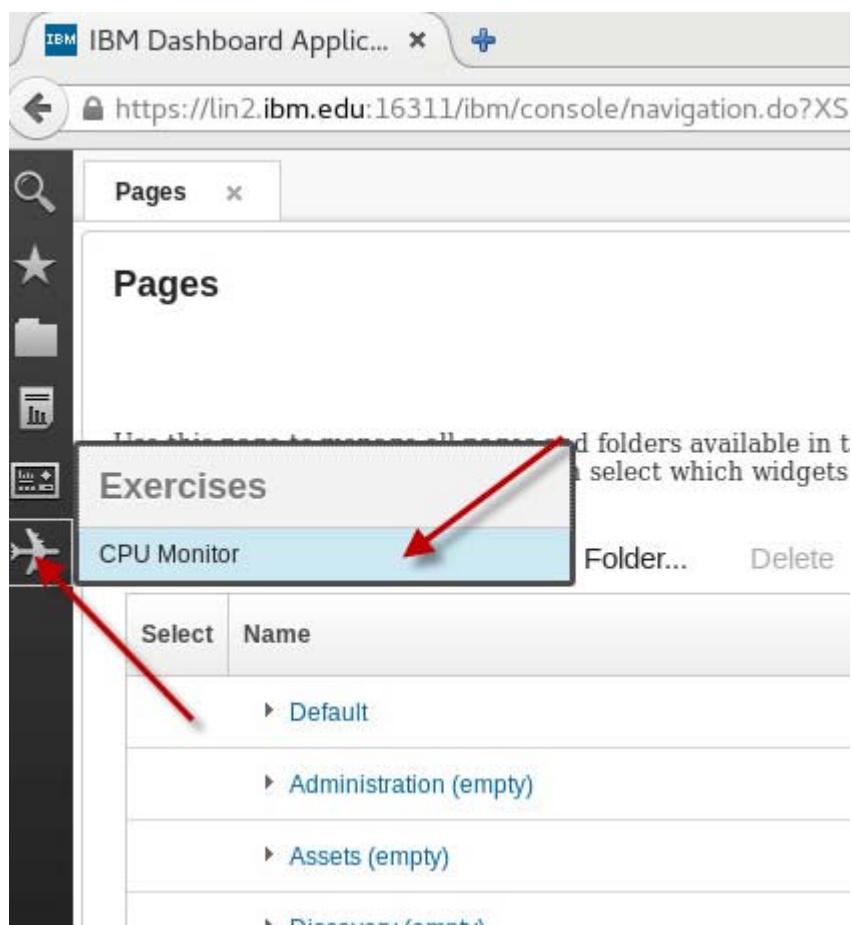


**Important:** If you close the edit window before you finish or if you want to modify any of the settings, open the Edit window as you did in [Step 19](#) on page 11-37. Click **Optional Settings**.

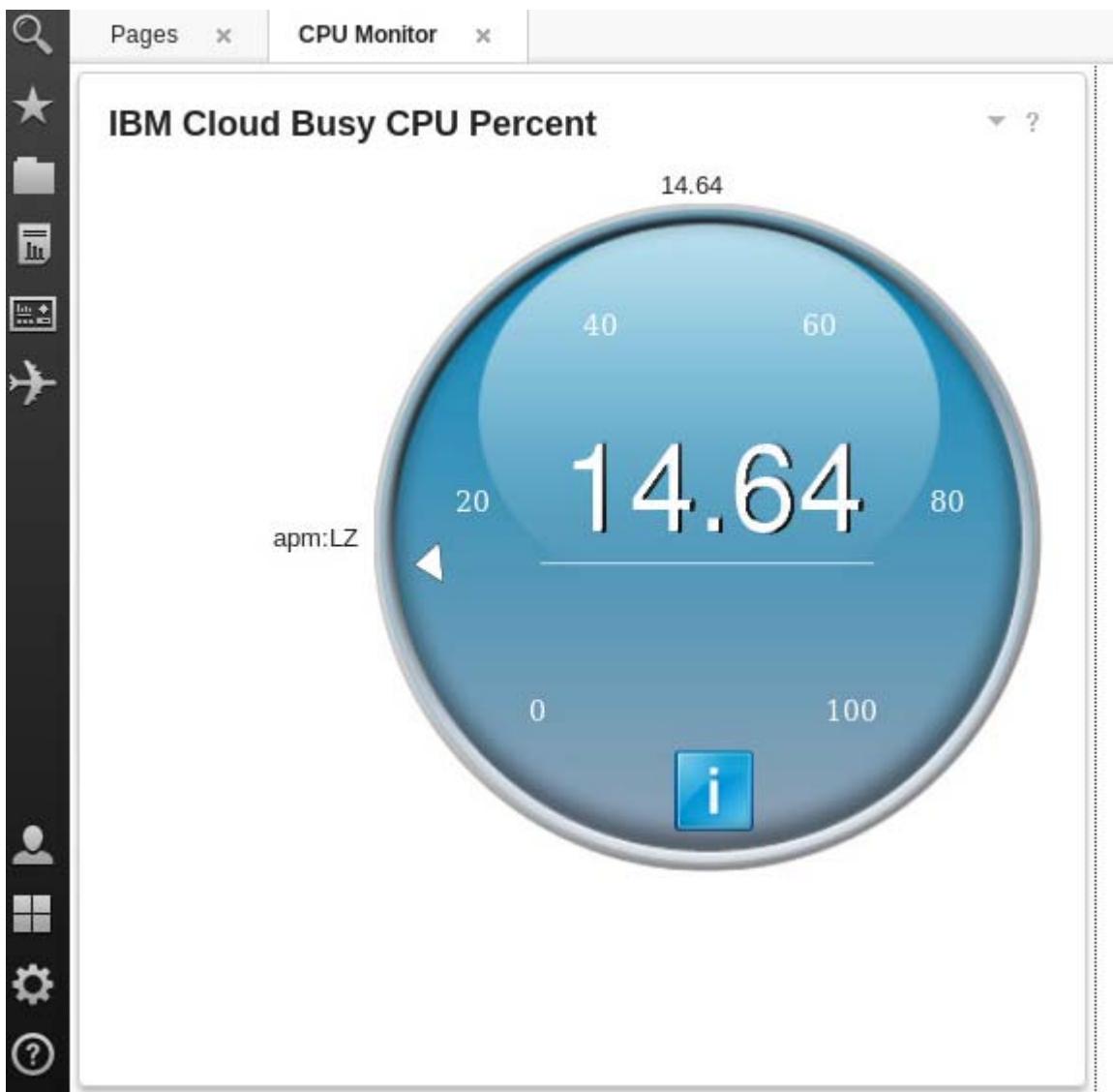
31. Test the dashboard by clicking **Save and Exit** in the menu bar. Close the page by clicking the X on the CPU Monitor tab.



32. Click the Airplane icon, and click **CPU Monitor**.



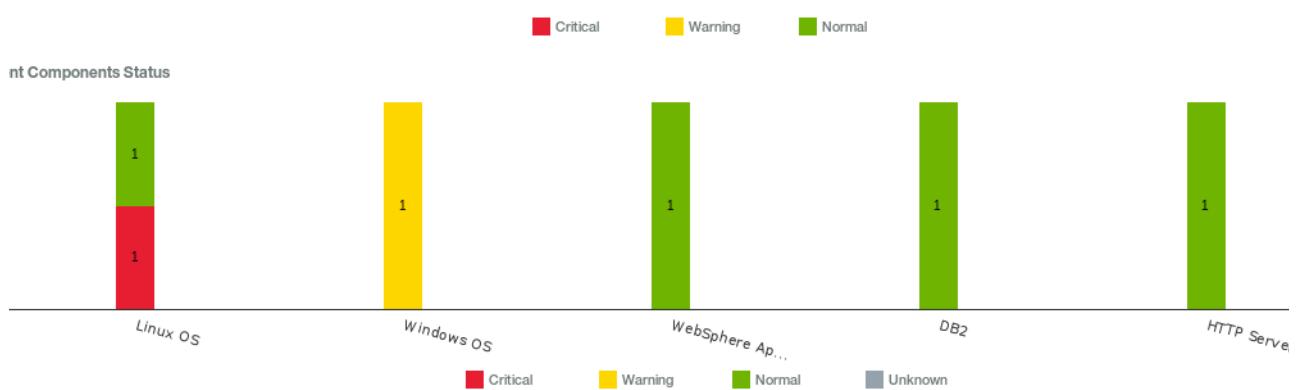
33. Verify that the result looks similar to this screen capture:



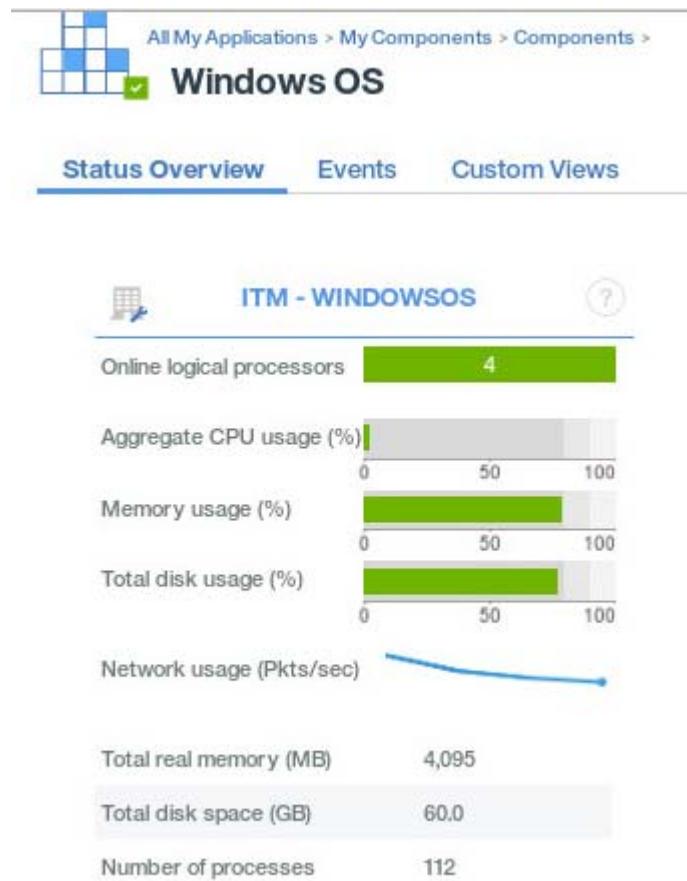
# Exercise 4 Verify the hybrid gateway

In this exercise, you validate the data that is forwarded from the hybrid gateway that you installed in [Exercise 1, “Integrate with IBM Tivoli Monitoring: Hybrid Gateway,”](#) on page 11-1. You confirm that the data from the IBM Tivoli Monitoring agent is showing up in the Cloud APM console.

1. On the APM console, click the gauge icon to open the Performance drop-down window. Click **Application Performance Dashboard**.
2. In the navigator, click **All My Applications**.
3. In the My Applications area, click **My Components** to open a window that contains a Current Components Status pane.



- In the Current Components Status pane, click the **Windows OS** bar to open a page that displays the Windows components.



The icon before ITM – WINDOWSOS looks like a building with a wrench. This icon indicates that the component is an agent that is connected through a hybrid gateway environment.

- Explore the date that this agent collected from IBM Tivoli Monitoring.

- After you validate that the agent is collecting data from IBM Tivoli Monitoring, it is time to close the hybrid gateway. On the LIN3 VM, open a terminal window and shut down the hybrid gateway by using these commands:

```
su - root  
/opt/ibm/hybridgateway/bin/hybridgateway.sh stop  
/opt/ibm/hybridgateway/bin/hybridgateway.sh status
```

The screenshot shows a terminal window with a blue header bar containing the text "root@lin3:~". Below the header is a menu bar with options: File, Edit, View, Search, Terminal, Help. The main area of the terminal contains the following command history:

```
[netcool@lin3 ~]$ su - root
Password:
Last login: Thu Nov 30 13:55:32 EST 2017 on pts/0
[root@lin3 ~]# /opt/ibm/hybridgateway/bin/hybridgateway.sh stop
Stopping server hybridgateway.
Server hybridgateway stopped.
[root@lin3 ~]# /opt/ibm/hybridgateway/bin/hybridgateway.sh status
Server hybridgateway is not running.
[root@lin3 ~]# █
```

# Exercise 5 Integrate with Netcool/OMNIbus

You can forward events from Cloud APM into your on-premises IBM Tivoli Netcool/OMNIbus event manager.

To enable integration with Netcool/OMNIbus, you must copy the event rules to the probe for Tivoli EIF and modify them. You must also update the Netcool/OMNIbus ObjectServer and the database schema, and configure the Cloud APM server to forward events.

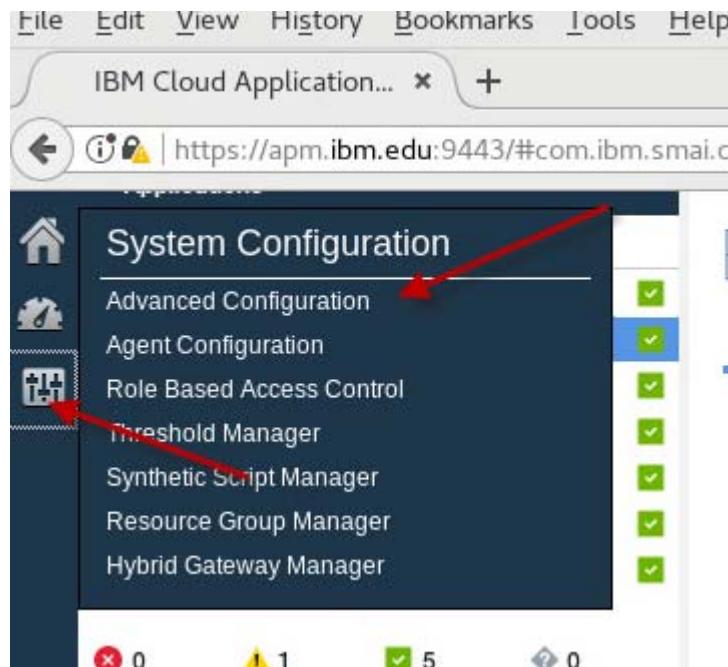
## Files that are supplied by Cloud APM and implemented with OMNIbus EIF probe

The installation of these files is completed for you on the LIN3 VM with these steps:

- Files that are on the APM VM in directory `/opt/ibm/ccm/omnibus` that begin with `itm_` are copied to the LIN3 VM in the `/downloads` directory.
- On the LIN3 VM, these files are copied from the `/downloads` to the `/opt/ibm/tivoli/netcool/omnibus/probes/linux2x86` directory.
- The INCLUDE statement is uncommented for `itm_event.rules` in the `tivoli_eif.rules` file in the probe directory, and the file is saved.
- The `itm_apm_event.rules` file is copied over the `itm_event.rules` file.
- The Netcool/OMNIbus ObjectServer database schema is updated from a terminal window opened by the `netcool` ID. The `itm_apm_db_update.sql` file is loaded twice into the database with the command: `$OMNIhome/bin/nco_sql -user root -password object00 -server RTP_AGG_P -input $OMNIHOME/probes/linux2x86/itm_apm_db_update.sql`
- The port number was changed in the `tivoli_eif.props` file from 9998 to 9011 because the former port is already in use by another product. This same matching port number is also assigned in the **Advanced Configuration > Event Manager** in Cloud APM.
- The OMNIbus EIF probe `nco_p_tivoli_eif` is restarted from the `/opt/IBM/tivoli/netcool/omnibus/probes` directory.

# Configure the Cloud APM server to send events to Netcool/OMNIbus

1. From the APM VM, go to the APM console.
2. Open the Advanced configuration menu by completing these steps:
  - a. Click the System Configuration icon, which looks like three levers.
  - b. From the System Configuration drop-down window, click **Advanced Configuration**.



3. From the Advanced Configuration Categories, click **Event Manager**.

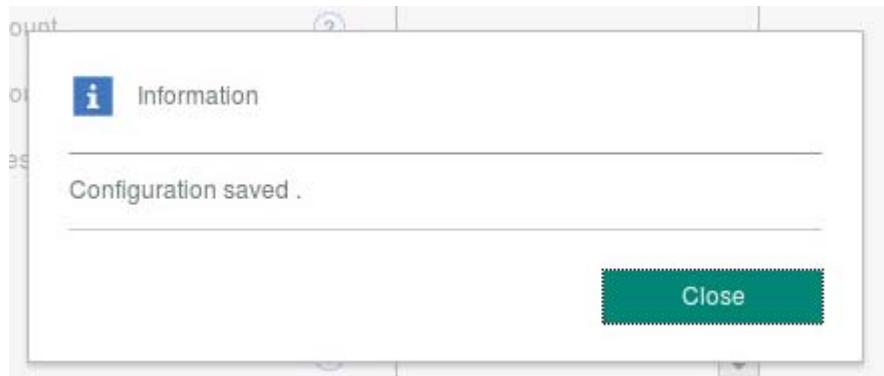
The screenshot shows the 'Advanced Configuration' interface. At the top, there are three icons: a house, a gear, and a wrench. Below them, the title 'Advanced Configuration' is displayed. Underneath the title is a section titled 'Configuration Categories'. This section lists several items: UI Integration, Event Manager, MongoDB Configuration, Agent Central Configuration, Data Mart, Kafka Configuration, Tracking Analytics Service, Agent Subscription Facility, and Thresholds Enablement. The 'Event Manager' item is highlighted with a blue background and has a red arrow pointing to it from the left.

4. Change the Event Manager parameters as follows. Most of the parameters affect the Event Notification, which is not the Netcool/OMNIbus integration. Only two parameters affect the EIF.
- **EIF Port:** Leave the default 9998 port.
  - **EIF Event Target(s):** Use the IP address of **192.168.1.106**.

The screenshot shows the 'Parameters' configuration screen for the Event Manager. The title 'Parameters' is at the top. Below it, a sub-section title says 'Configuration parameters that control the storage and forwarding of received events.' There are five parameter settings listed:

- Event Cache Time: Value 60, with up and down arrows for adjustment.
- Pure Event Close Time: Value 24, with up and down arrows for adjustment.
- Master Reset Event: Value True, with a dropdown menu.
- EIF Port: Value 9,998, with up and down arrows for adjustment.
- EIF Event Target(s): Value 192.168.1.106, shown in a text input field.

5. Scroll down and click **Save** to save the changes.
6. Click **Close** to the confirmation that the configuration is saved.



Your Netcool/OMNIbus integration is now complete.

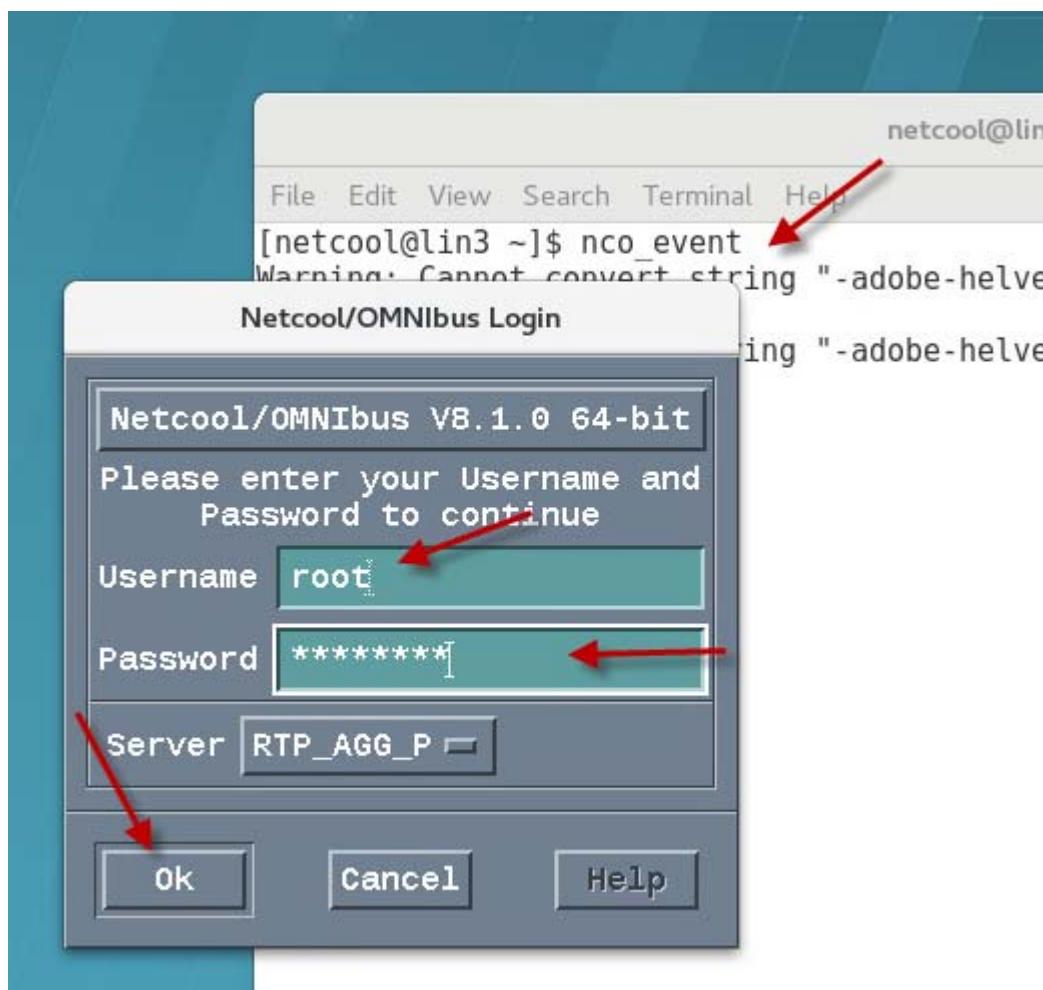
## View the events on Netcool/OMNIbus

7. From the LIN3 VM, open a terminal window.



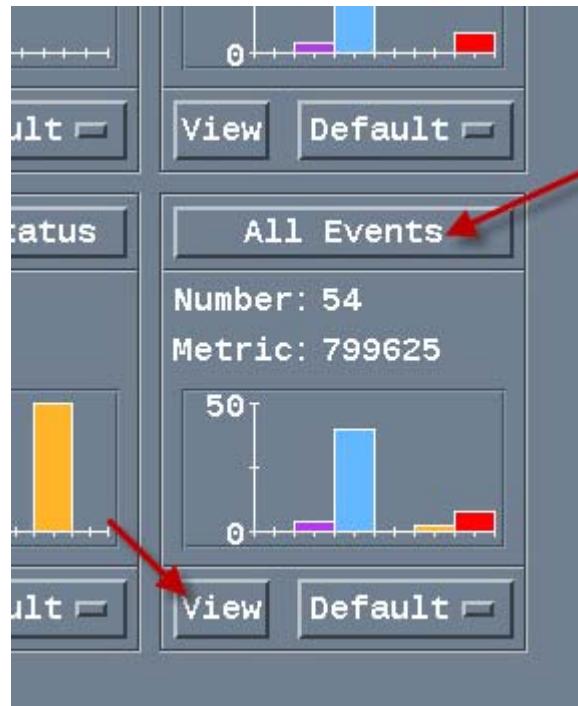
**Hint:** Make sure that you are running the terminal window as `netcool`, not `root`.

8. Run the `nco_event` command to open the OMNIbus console. Supply the user name of `root` (the default is `netcool`) and a password of `object00`. Click **OK**.



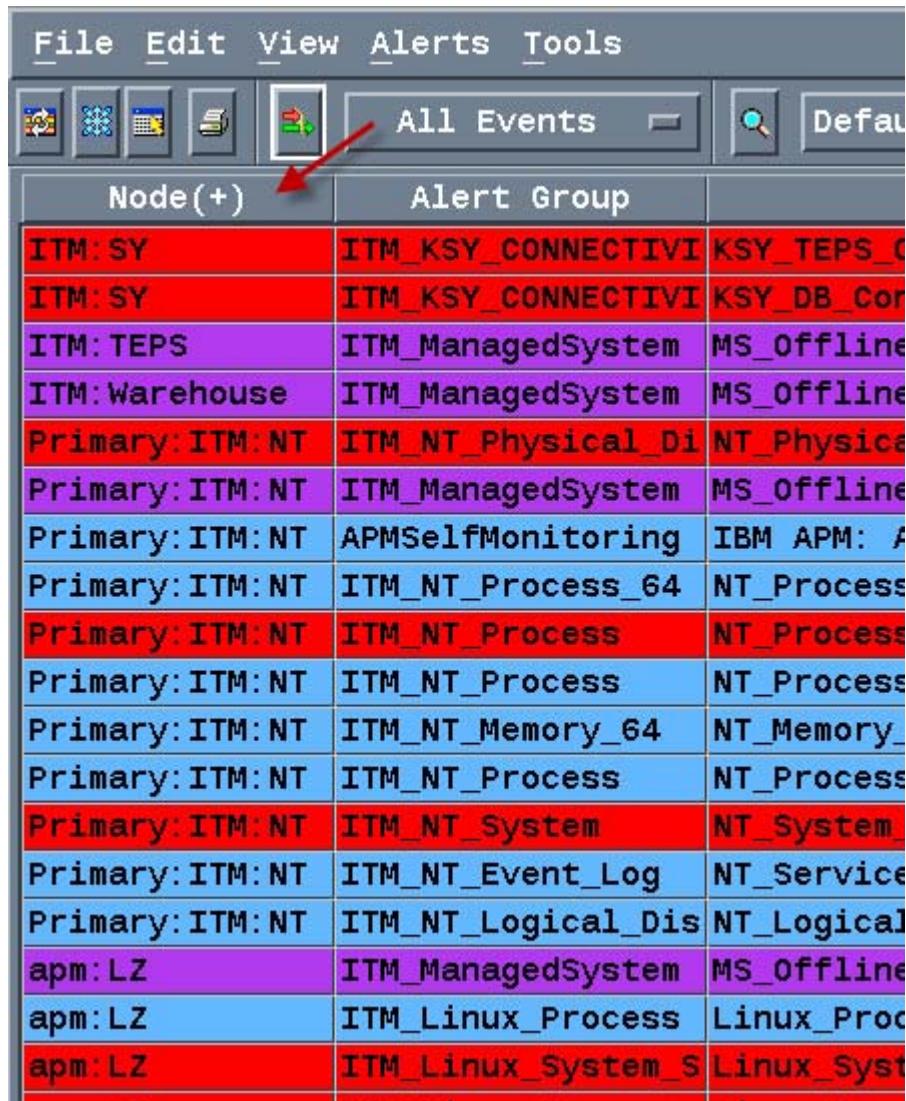
9. Maximize the screen.

10. In the lower-right corner, click **View** under All Events.



11. You can use this default view. The Last10Mins view can be useful if you have a vast number of events in your system.

12. Sort the Event Viewer by **Node**.



Node(+)	Alert Group	
ITM:SY	ITM_KSY_CONNECTIVI	KSY_TEPS_C
ITM:SY	ITM_KSY_CONNECTIVI	KSY_DB_Cor
ITM:TEPS	ITM_ManagedSystem	MS_Offline
ITM:Warehouse	ITM_ManagedSystem	MS_Offline
Primary:ITM:NT	ITM_NT_Physical_Di	NT_Physica
Primary:ITM:NT	ITM_ManagedSystem	MS_Offline
Primary:ITM:NT	APMSelfMonitoring	IBM APM: A
Primary:ITM:NT	ITM_NT_Process_64	NT_Process
Primary:ITM:NT	ITM_NT_Process	NT_Process
Primary:ITM:NT	ITM_NT_Process	NT_Process
Primary:ITM:NT	ITM_NT_Memory_64	NT_Memory_
Primary:ITM:NT	ITM_NT_Process	NT_Process
Primary:ITM:NT	ITM_NT_System	NT_System
Primary:ITM:NT	ITM_NT_Event_Log	NT_Service
Primary:ITM:NT	ITM_NT_Logical_Dis	NT_Logical
apm:LZ	ITM_ManagedSystem	MS_Offline
apm:LZ	ITM_Linux_Process	Linux_Proc
apm:LZ	ITM_Linux_System_S	Linux_Syst

13. Look for the Alert Group messages that are from APM or LIN1. These messages are from Cloud APM.

14. Log out of the Omnibus console.

# Exercise 6 Integrate with IBM Tivoli Monitoring: Agent coexistence

You can install Cloud APM agents on the same server where IBM Tivoli Monitoring agents are installed. This exercise guides you through that process.



**Important:** Before attempting this exercise, validate that [Exercise 4, “Verify the hybrid gateway,”](#) on page 11-48 was finished successfully.

You successfully installed a Linux OS agent on `apm.ibm.edu` in [Exercise 1, “Install an operating system agent,”](#) on page 5-1. When you did this installation, you installed a Cloud APM agent on a server on which an IBM Tivoli Monitoring Linux OS agent was already installed. This exercise demonstrates the same capability on a Windows server.

1. On the ITM VM, open a command prompt window.



2. Change to the `c:\downloads` folder and create a subfolder that is called `APM814`. Change to the subfolder `APM814` and create another subfolder that is called `agent`, and change to the `c:\downloads\APM814\agent` folder.

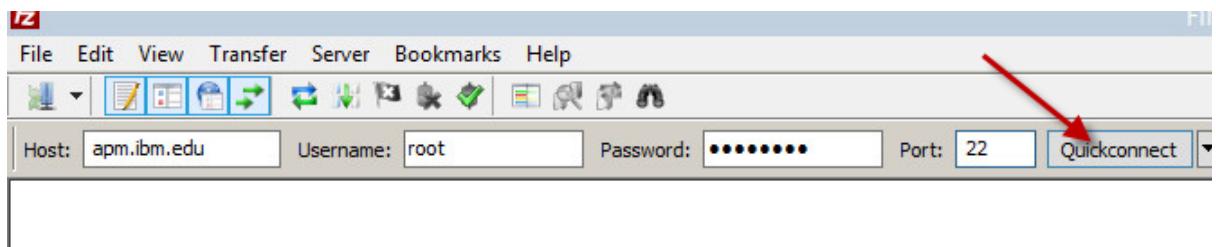
```
Administrator: Command Prompt
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved

C:\Users\Administrator>cd \downloads
C:\downloads>mkdir APM814
C:\downloads>cd APM814
C:\downloads\APM814>mkdir agent
C:\downloads\APM814>cd agent
C:\downloads\APM814\agent>
```

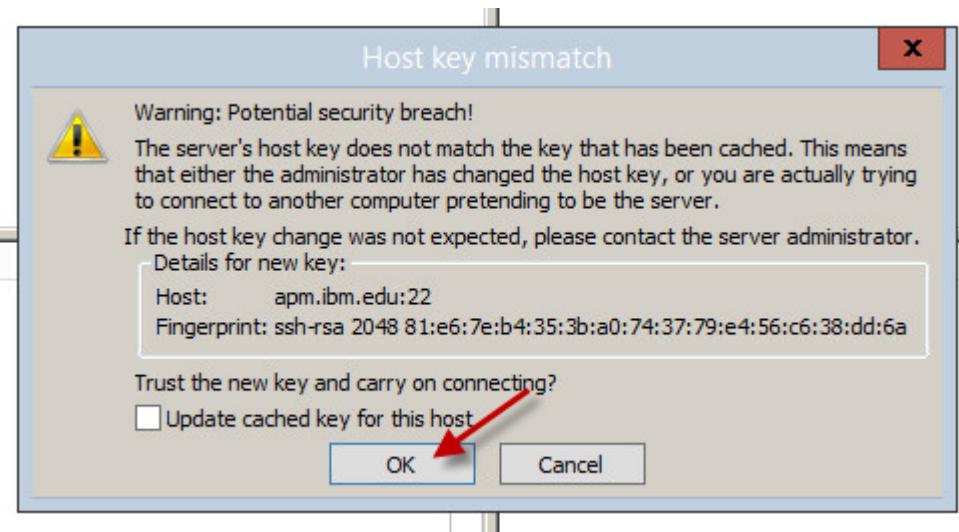
3. Double-click the **FileZilla** icon on the desktop.



4. Enter **apm.ibm.edu** in the **Host** field, **root** in the **Username** field, **object00** in the **Password** field, and **22** in the **Port** field. Click **Quickconnect**.

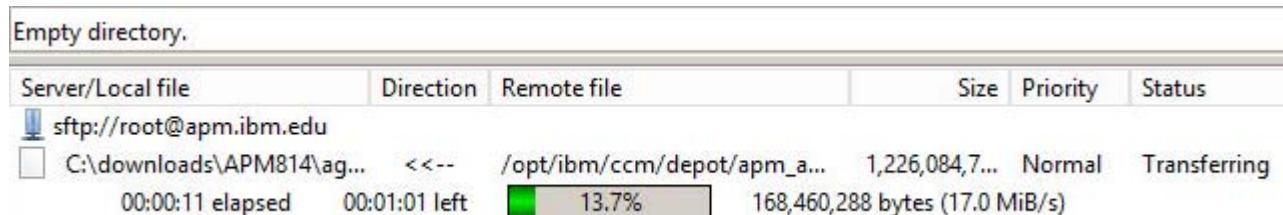


5. Click **OK** to the Host key mismatch message.

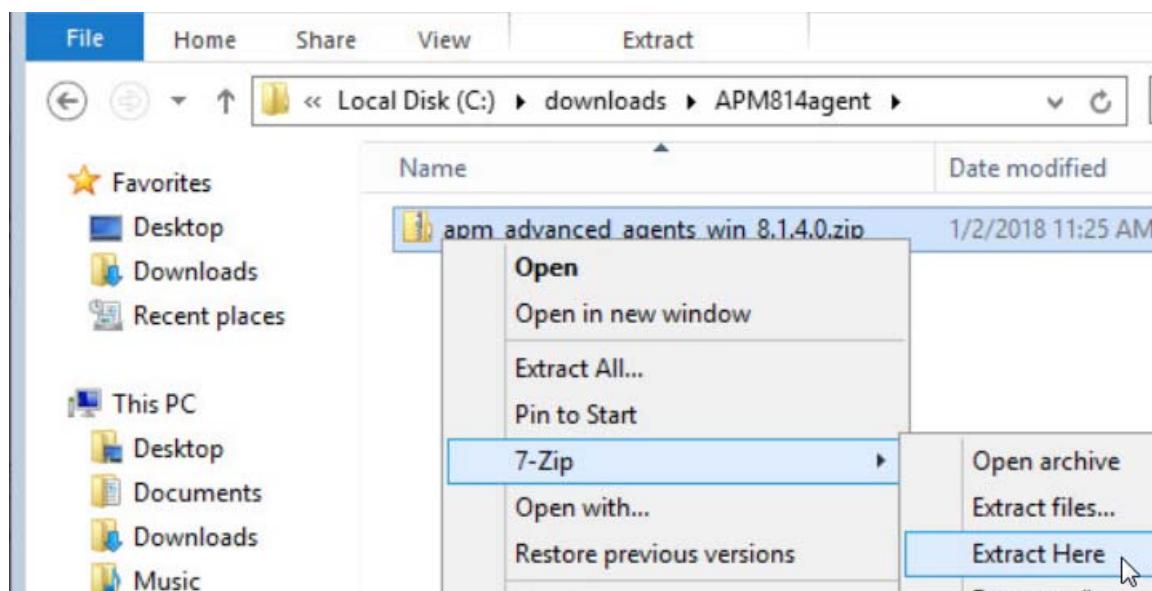


6. On the Local site window, select the **c:\downloads\APM814\agent** folder.

7. On the Remote site window, select the `/opt/ibm/ccm/depot/` folder.
8. Select the file `apm_advanced_agents_win_8.1.4.0.zip` on the right and drag it to the `c:\downloads\APM814\agent` folder on the left.



9. Close FileZilla when the transfer completes.
10. Extract the contents of the `apm_advanced_agents_win_8.1.4.0.zip` file.
  - a. Open **File Explorer** and navigate to the `C:\downloads\APM814\agent` directory.
  - b. Right-click the compressed file and select **7-zip > Extract Here**.



11. On the VM APM, verify that you no longer see status for the IBM Tivoli Monitoring Windows OS agent that was validated to be showing status earlier.

The screenshot shows the 'Status Overview' tab selected in the navigation bar. The main title is 'Windows OS'. Below it, there's a section titled 'ITM - WINDOWSOS' with a question mark icon. The page displays several metrics, each with a status message: 'Online logical processors' (The agent is offline), 'Aggregate CPU usage (%)' (The agent is offline), 'Memory usage (%)' (The agent is offline), 'Total disk usage (%)' (The agent is offline), 'Network usage (Pkts/sec)' (No data), 'Total real memory (MB)' (The agent is offline), 'Total disk space (GB)' (The agent is offline), and 'Number of processes' (The agent is offline).

12. On the ITM VM, in a command prompt, change directory to this folder:

```
c:\downloads\APM814\agent\APMADV_Agent_Install_8.1.4.0
```

13. Run the command: `installAPMAgents.bat`

The screenshot shows a 'Administrator: Command Prompt' window. The title bar says 'Administrator: Command Prompt'. The window content shows the command prompt at the C:\ prompt. The user has run the command `cd \downloads\APM814\agent\APMADV_Agent_Install_8.1.4.0` and then `installAPMAgents.bat`. The output shows the command being executed.

14. Select **18** to install the Monitoring Agent for Windows OS.

15. Press Enter to confirm your selection.
16. Press Enter to confirm the installation directory of C:\IBM\APM.
17. Select 1 to accept the license agreement.

```
Administrator: Command Prompt - installAPMA

6> Monitoring Agent for Microsoft Hyper-V Server
7> Monitoring Agent for Microsoft IIS
8> Monitoring Agent for Microsoft Cluster Server
9> Monitoring Agent for Microsoft Lync Server
10> Monitoring Agent for WebSphere MQ
11> Monitoring Agent for Active Directory
12> Monitoring Agent for Microsoft Exchange Server
13> Monitoring Agent for Microsoft SQL Server
14> Monitoring Agent for MS SharePoint Server
15> Monitoring Agent for MySQL
16> Monitoring Agent for NetApp Storage
17> Monitoring Agent for Oracle Database
18> Monitoring Agent for Windows OS
19> Monitoring Agent for PostgreSQL
20> Response Time Monitoring Agent
21> Monitoring Agent for SAP Applications
22> Monitoring Agent for Siebel
23> Monitoring Agent for Tomcat
24> Monitoring Agent for VMware UI
25> Monitoring Agent for WebSphere Applications
26> Monitoring Agent for WebLogic
27> all of the above

Type the numbers that correspond to the products that you
"q" to quit selection.
If you enter more than one number, separate the numbers by a comma.
Type your selections here <For example: 1,2>: 18 ↓

The following agents will be installed:
    Monitoring Agent for Windows OS

Are your selections correct [ 1-Yes, 2-No; default is "1"]
Specify the installation directory. [Default is C:\IBM\APM]
The agents will be installed in C:\IBM\APM.

Do you accept the license agreement(s) found in the directory
C:\agent\APMADV_Agent_Install_8.1.4.0\licenses?
Please enter [ 1-to accept the agreement, 2-to decline the agreement]
User has accepted the license agreement(s).

Monitoring Agent for Windows OS will be installed.

Installing Monitoring Agent for Windows OS...
```

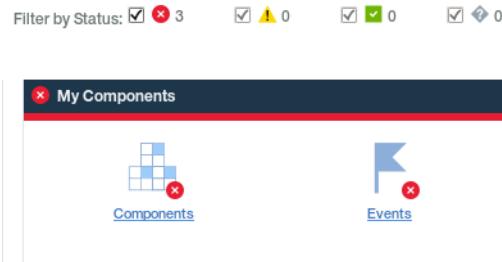


**Note:** The agent installation takes approximately 5 minutes. It takes several minutes more for the agent that you installed on Windows to connect to the Cloud APM server.

```
Administrator: Command Prompt

Overall result: PASS
Detailed results are also available in: C:\IBM\APM\InstallITM\pre_0_215531\result.txt
Installation destination path: C:\IBM\APM
Installing core framework...
Installing Monitoring Agent for Windows OS...
Agent installation completed. The agent was configured and started
configuration settings.
End running cmd /c C:\DOWNLO^1\APM814\agent\APMADU^1.0\apm\os-agent > "C:\IBM\APM\logs\install_agent_NT.log"
#####
#####
The following agents were installed successfully into the C:\IBM\
Monitoring Agent for Windows OS
Agent status:
Agent is running. Process ID is 0001220
Server connection status: Connecting
For more information, see the following file: C:\IBM\APM\TMA\
_ServerConnectionStatus.txt
#
#
The installation log file is C:\IBM\APM\logs\APMADU_Agents_instal
To configure your agents, use the following detailed instructions
For IBM Cloud Application Performance Management SaaS:
http://ibm.biz/kc-ipmccloud-configagent
For IBM Cloud Application Performance Management On Premises:
http://ibm.biz/kc-ipm-configagent
As part of the configuration instructions, you will use the following
to configure and manage each installed agent:
  Monitoring Agent for Windows OS  C:\IBM\APM\bin\os-agent.bat start
status or uninstall
#####
#####
C:\downloads\APM814\agent\APMADU_Agent_Install_8.1.4.0>
```

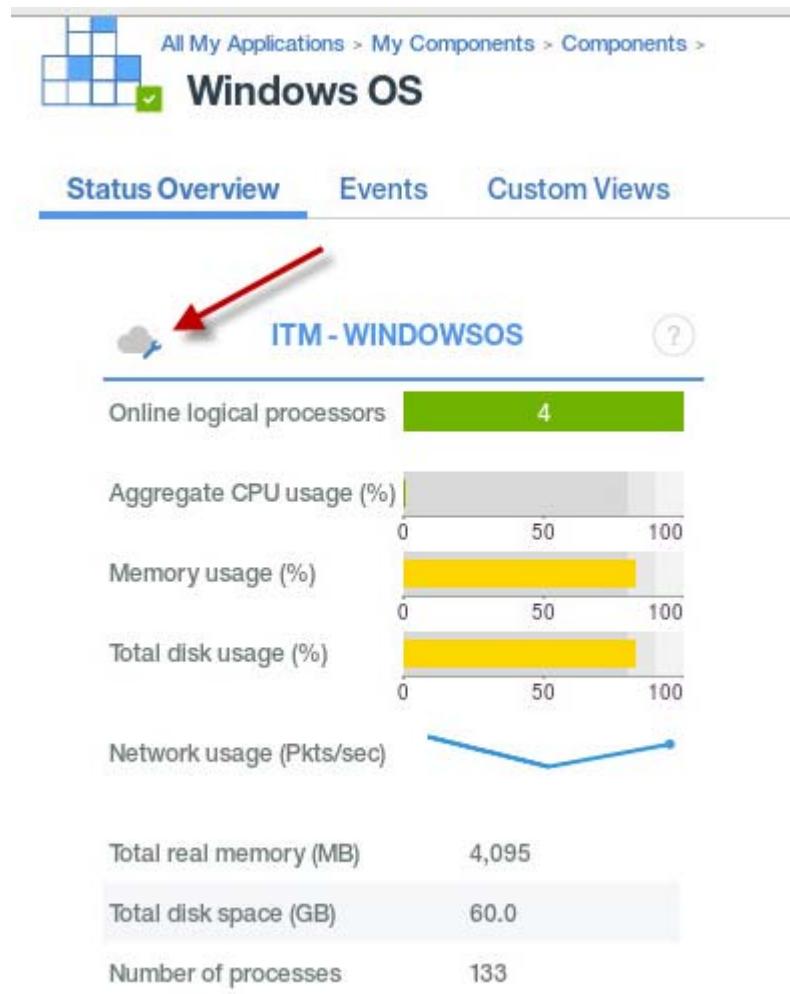
18. On the APM VM, in the Cloud APM console, click **All My Applications > My Components**.



19. In the Current Components Status pane, click the **Windows OS** bar to open a page that displays the Windows components.

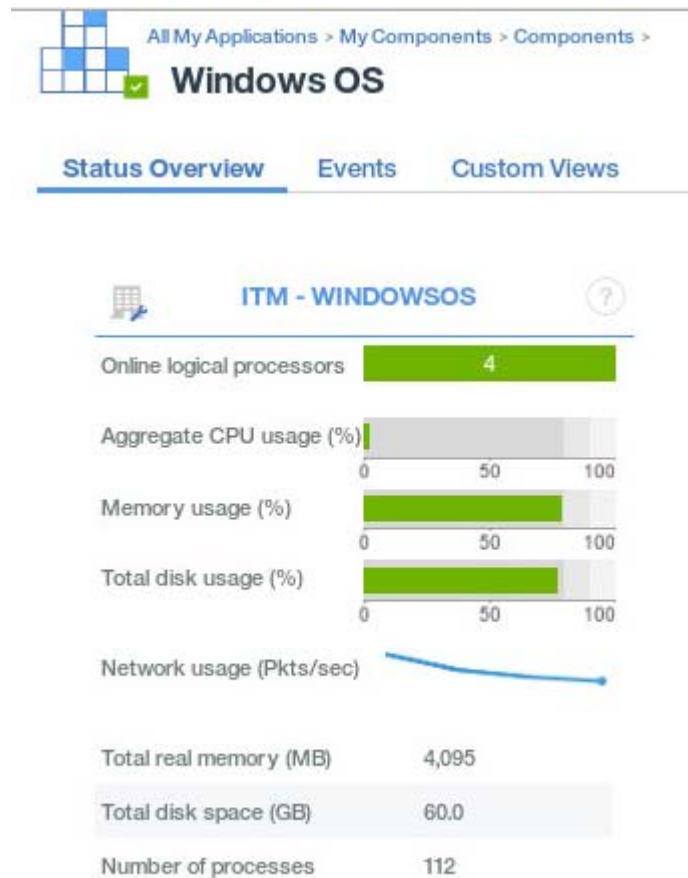


The Status Overview widget opens.



20. Observe how the icon beside ITM – WINDOWSOS looks like a cloud with a wrench. This icon indicates that the component is from a Cloud APM agent.

21. Compare the icon to the icon that was displayed when the agent was coming from the hybrid gateway component that is shown here. The icon appeared as a building and a wrench, but now it is a cloud with a wrench.



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# **Unit 12 Reporting and 7-day comparison exercises**

In Cloud APM, certain widgets that display information are compared against the same time frames from other days. This feature is known as Historical 7-day comparison.

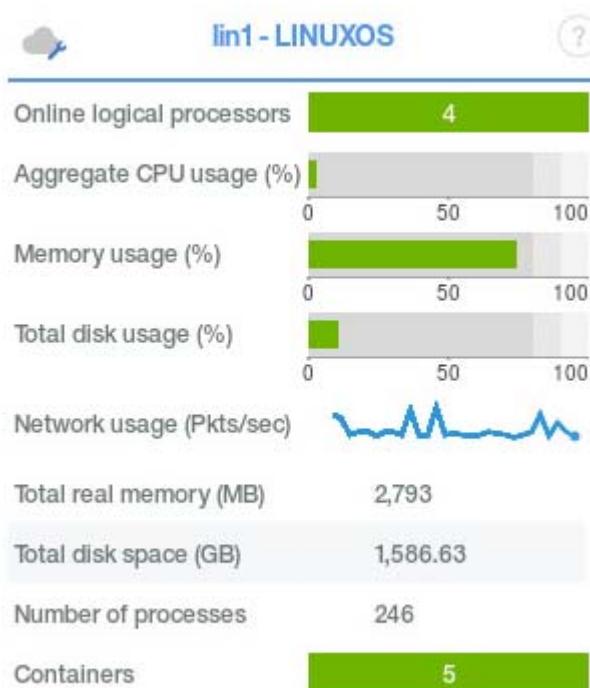
In these exercises, the objective is to learn how to use Historical 7-day comparison and how to install and access Tivoli Common Reporting reports.

## **Exercise 1 Historical 7-day comparison**

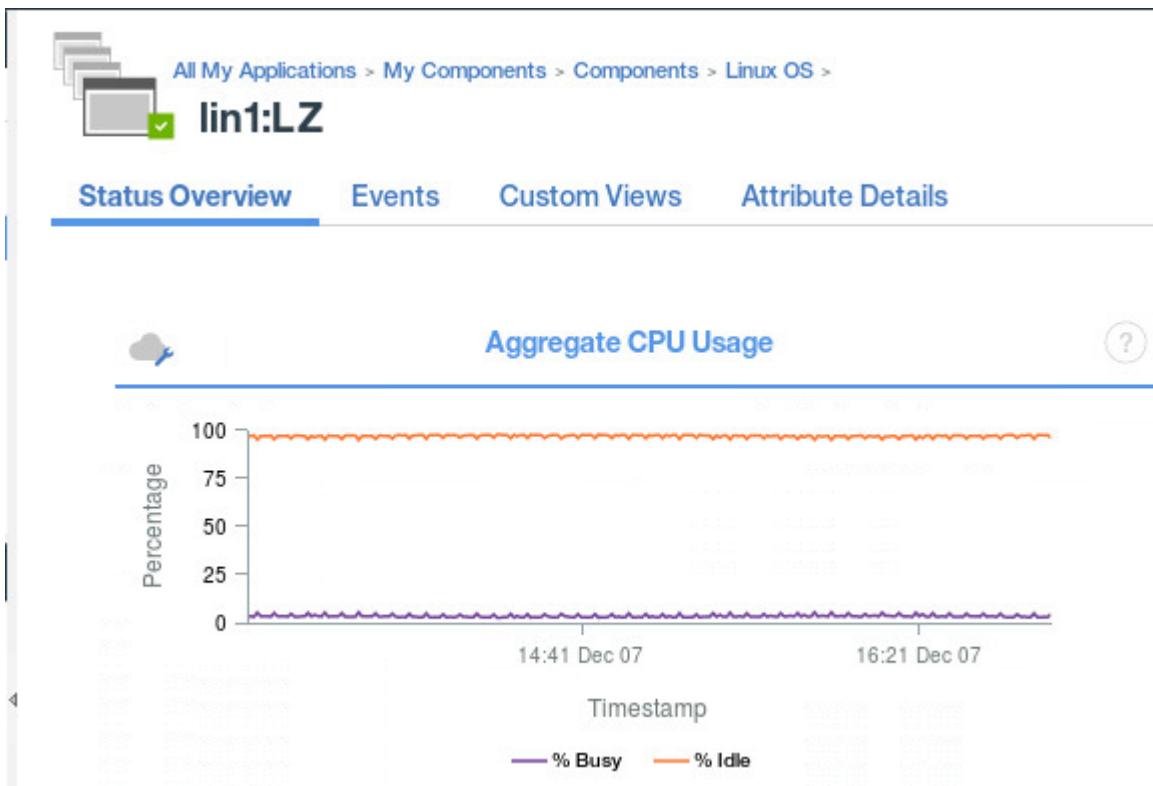
Historical 7-day comparison compares the time range that is displayed in a line chart with the metrics from a different day, up to one week ago. The **Compare to** selection is effective only for the current page. The change affects all the dashboards in the current application (or all applications).

1. From the IBM Cloud APM console, locate the Linux OS component under any of the applications that you created (for example, MyFirstApp).

2. In the Linux OS area, in the **Status Overview** tab, click anywhere inside the **lin1- LINUXOS** area.



3. Examine the Aggregate CPU Usage chart, which is a line chart. It contains a time stamp legend with a default time range.



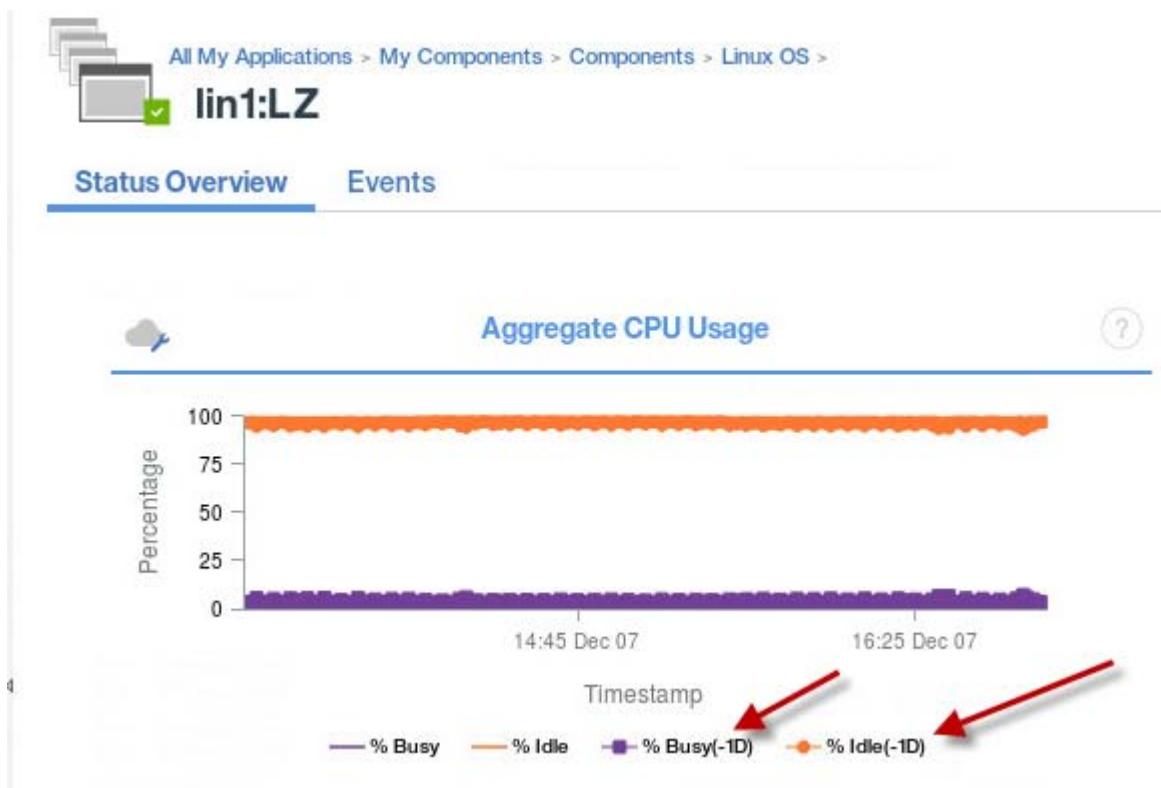
4. In the upper-right side of the window that contains all of the widgets, you see controls for the 7-day time span. Where you see **Last 4 hours**, click the down arrow.
5. Click **Compare to** in the list of options.

6. Select the date that corresponds to yesterday and then select **Apply**.

The screenshot shows a reporting interface with the following elements:

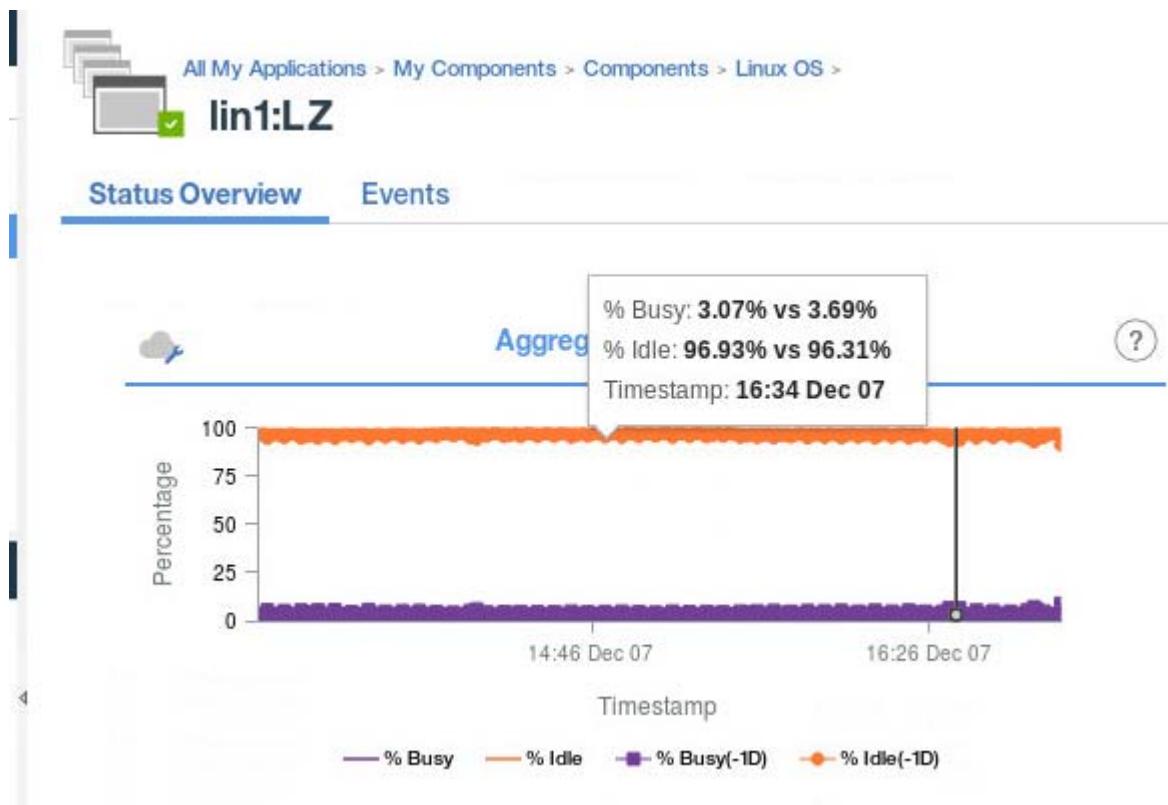
- Header:** Last Updated: Dec 7, 2017, 5:02:40 PM, Actions, Help (?)
- Search Bar:** Integrate with OA-LA to enable log searches, Search icon
- Comparison Options:** A dropdown menu titled "Last 4 hours" with the following items:
  - Last 4 hours (selected)
  - Last 12 hours
  - Last 1 day
  - Compare to > (disabled)
  - Only This Application (selected)
  - All ApplicationsA bar chart shows % Used (orange) and % Free (purple) for All Applications.
- Calendar:** A December 2017 calendar is displayed. The 7th is highlighted in blue, indicating it is selected. Red arrows point from the "Apply" button and the "Compare to" dropdown to the selected date.
- Buttons:** No comparison (disabled), Apply

7. Note the changes on the Aggregate CPU Usage widget.

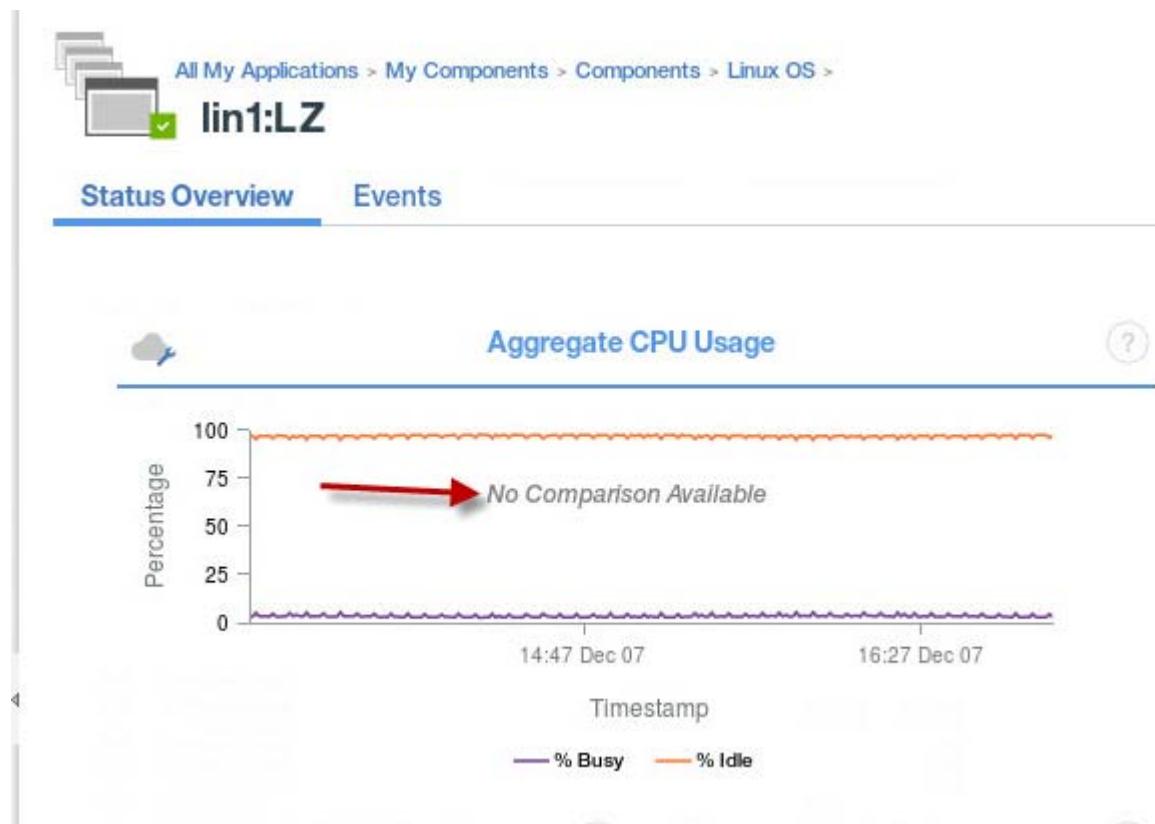


The **Timestamp** legend now has two sets of information, % Busy and % Idle information. The original set, which indicates the more current information, uses solid lines. The second set uses boxes and lines, which makes the lines look thicker and indicates by **(-1D)** that it represents going back 1 day for the same time range.

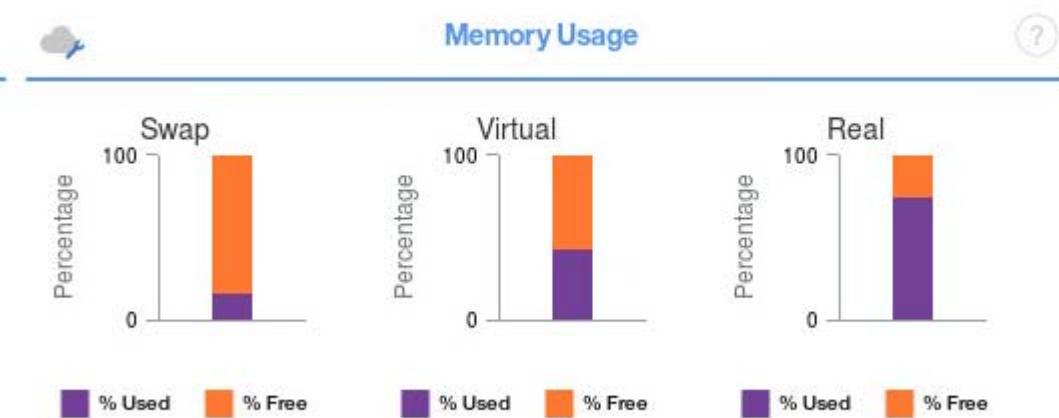
8. Select a point on the line by pressing the left mouse button and holding it down. Now the box represents the two sets of information at that point, and the two are being compared.



9. If data is not available to compare, a message indicates that no data is available. In your class, if you compare to **1 week ago** or longer, no data exists. The words *No Comparison Available* indicate the lack of data. You see this example when you compare to a few days before today.



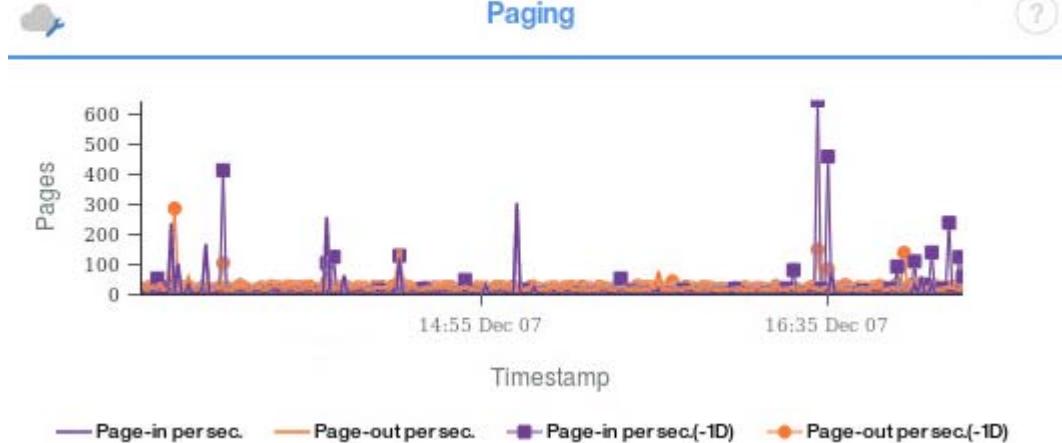
The Memory Usage widget is to the right of the Aggregate CPU Usage widget. Examine the Swap, Virtual, and Real memory usage bar charts.



10. Because Memory Usage contains bar charts, it shows the current values. To examine memory values in a time range, place the cursor anywhere inside the Memory Usage widget. Click inside the Memory Usage widget to cause more memory-related widgets to show in a new page. Look at the Paging widget.



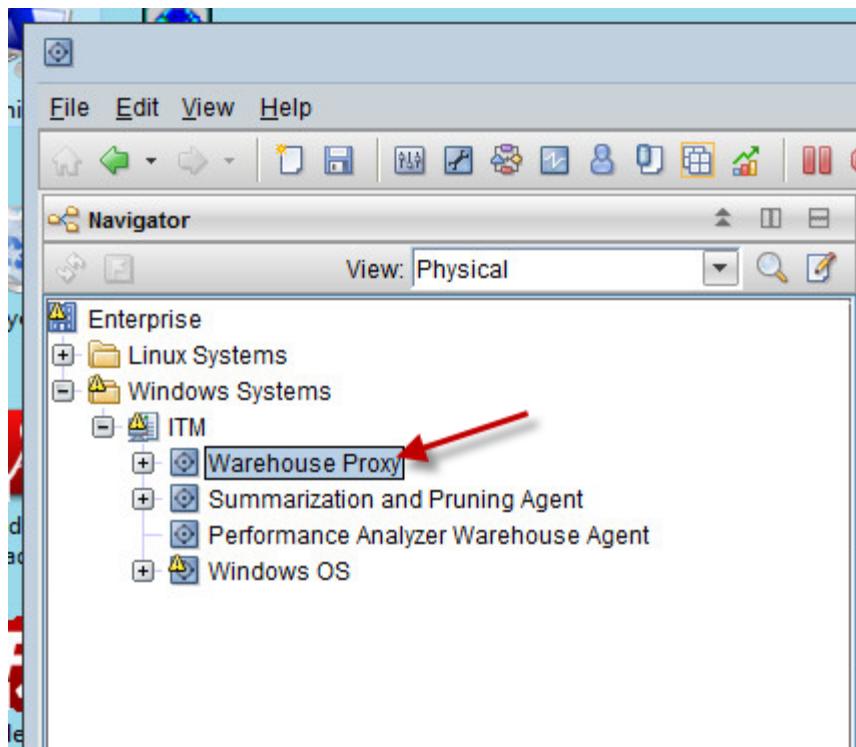
11. From the history selections, choose to compare to yesterday. Because all four widgets have time ranges of data, the historical selection applies to all four widgets. Examine the differences in the Paging widget.



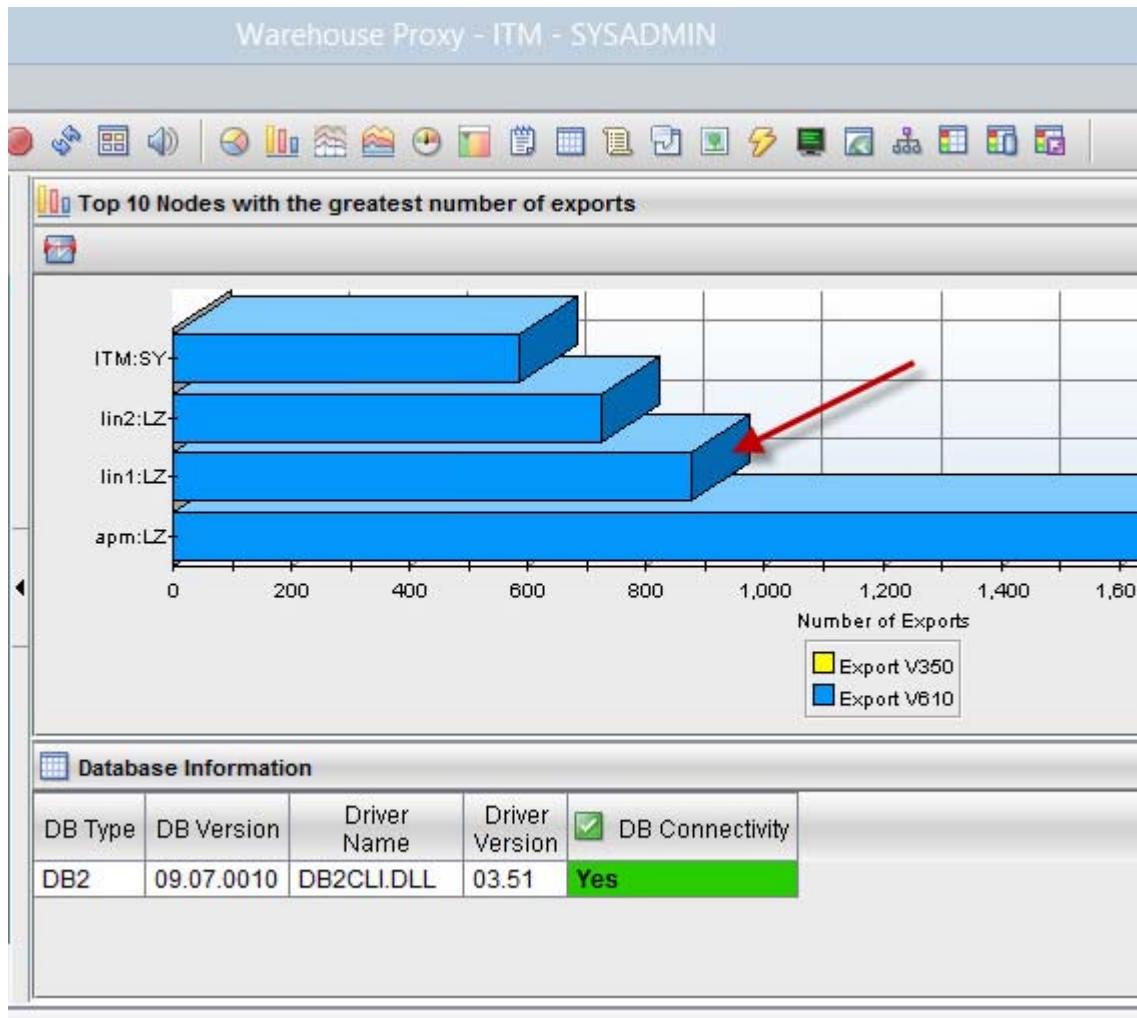
# Exercise 2 Run IBM Tivoli Monitoring reports

This exercise guides you through the steps of running IBM Tivoli Monitoring reports on a Tivoli Common Reporting server. You validate that the configurations in [Exercise 2, “Integrate with IBM Tivoli Monitoring: Using the Tivoli Data Warehouse,”](#) on page 11-20 are successful.

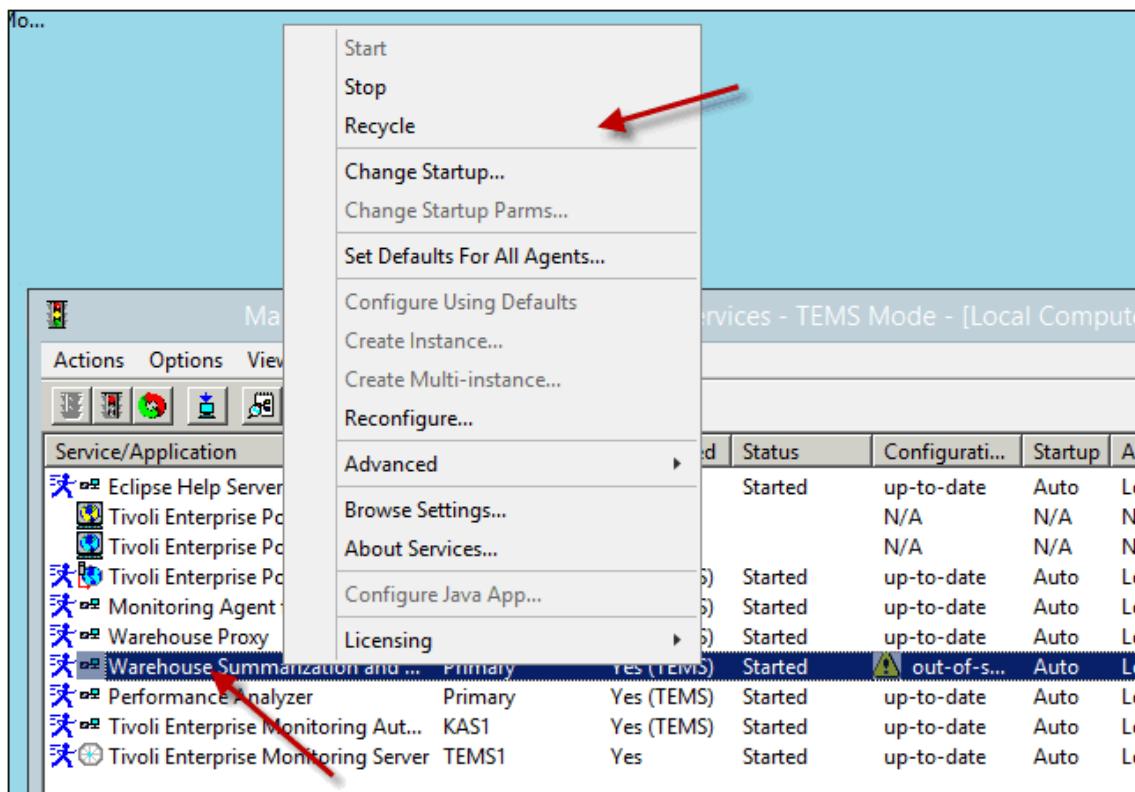
1. On the ITM VM, log in to the Tivoli Enterprise Portal.
2. Open the default workspace for the warehouse proxy agent at **Enterprise > Windows Systems > ITM > Warehouse Proxy**.



3. Review the view Top 10 Nodes with the greatest number of exports. Check to see whether lin1:LZ is present. If it is, then the configuration was successful and data is transferring from the Cloud APM agent into the IBM Tivoli Monitoring V6 successfully.

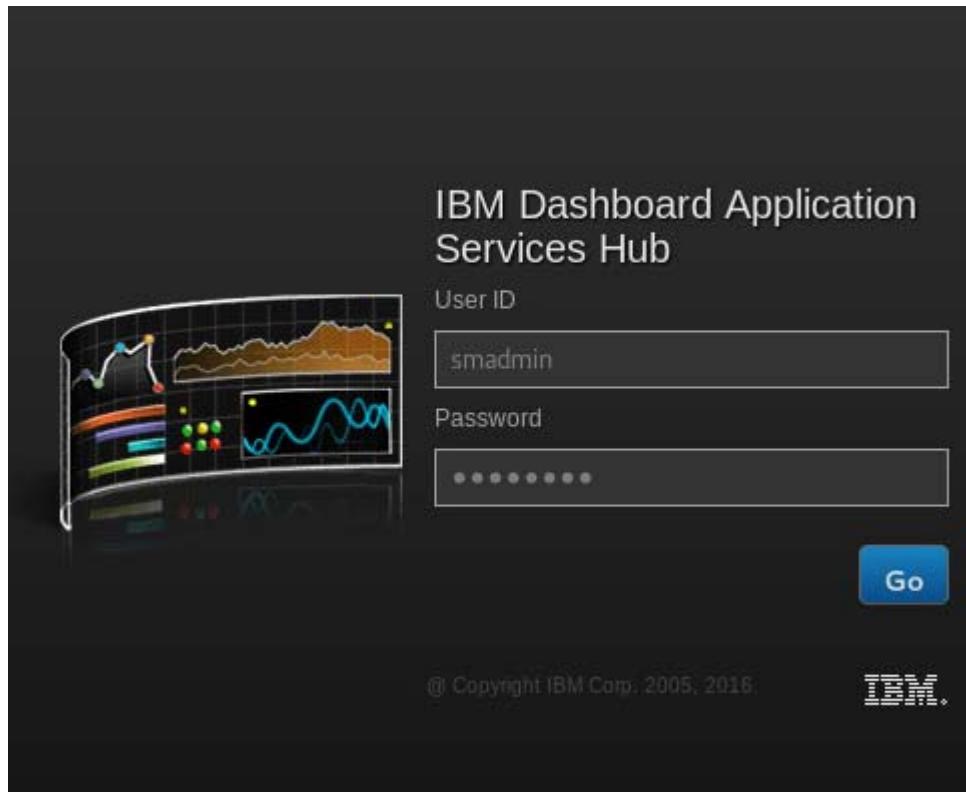


4. Open the Manage Tivoli Enterprise Monitoring Services application, right-click the **Warehouse Summarization and Pruning** agent, and select **Recycle**.

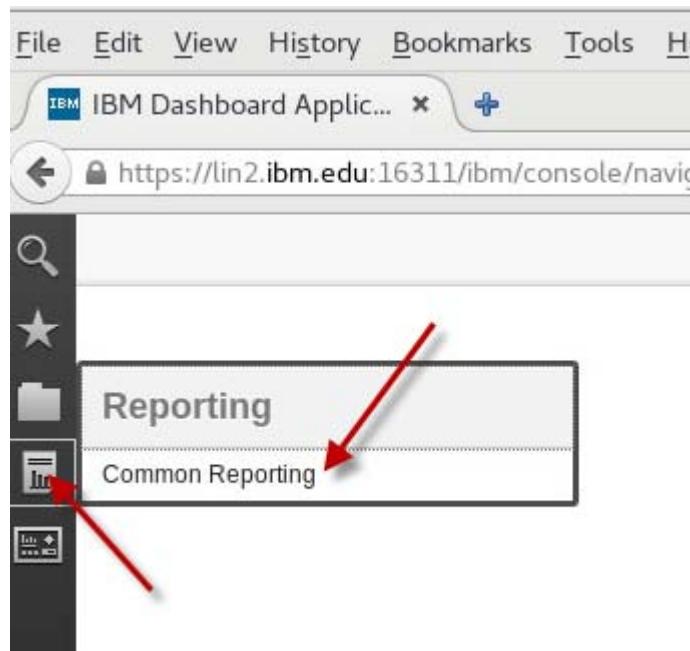


5. On the LIN2 VM, log in as `root` with a password of `object00`.
6. Open a Firefox browser by using the icon on the desktop.

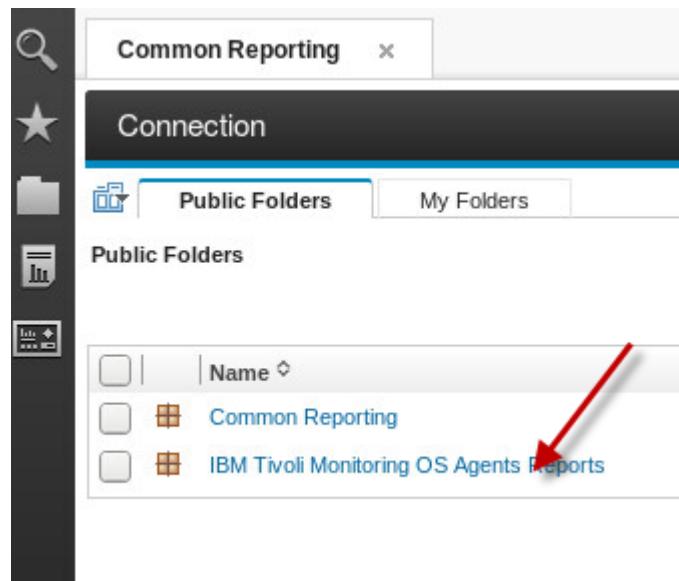
7. Log in to the Dashboard Application Services Hub as **smadmin** with a password of **object00**.



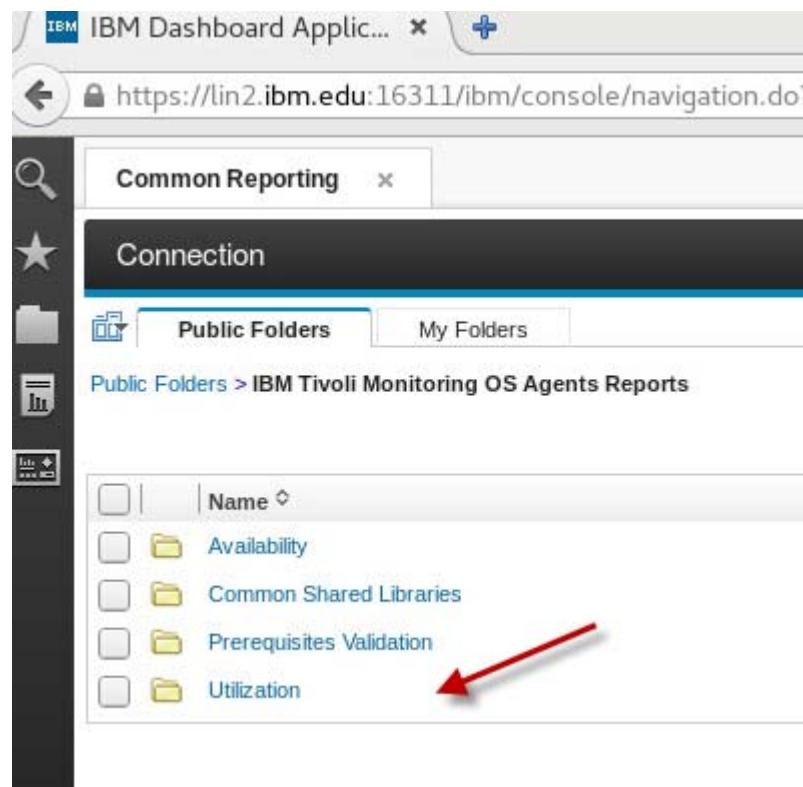
8. Select **Reporting > Common Reporting**.



9. Select **IBM Tivoli Monitoring OS Agents Reports**.



10. Select **Utilization**.



11. Select CPU Utilization for a Single Resource.

The screenshot shows the 'Common Reporting' interface. At the top, there's a 'Connection' bar with tabs for 'Public Folders' (which is selected) and 'My Folders'. Below this, the path 'Public Folders > IBM Tivoli Monitoring OS Agents Reports > Utilization' is displayed. The main area is a list of reports under 'Utilization', ordered by name. A red arrow points to the second item in the list, 'CPU Utilization for Single Resource'.

	Name
<input type="checkbox"/>	WPAR
<input type="checkbox"/>	CPU Utilization Comparison for Multiple Resources
<input type="checkbox"/>	CPU Utilization for Single Resource
<input type="checkbox"/>	Disk Utilization Comparison for Multiple Resources
<input type="checkbox"/>	Disk Utilization for Single Resource
<input type="checkbox"/>	Enterprise Daily Utilization Heat Chart
<input type="checkbox"/>	Enterprise Resources List

12. Select these report parameter settings. If a setting is not specified, accept the defaults:

- Date range for the report: **Last 7 days**
- Summarization type: **Hourly**
- OS Type: **Linux**
- Servers: **apm**

Common Reporting x

---

Date range

Select desired date range for report: \* **Last 7 days** ▾

From:  calendar icon  
 up/down arrows

Date range: **To:**

calendar icon  
 up/down arrows

---

Summarization selection

Summarization type: \* **Hourly** ▾

Include shift periods: \* **All shifts** ▾ **The system**

Include vacation periods: \* **All days** ▾ **The system**

---

Resource selection

OS type: \* **Linux** ▾

**apm** Selected

**lin1**



13. Click **Finish**.

Resource selection

OS type: \* Linux

Servers

Forecast

Forecast: \* Do not use forecast

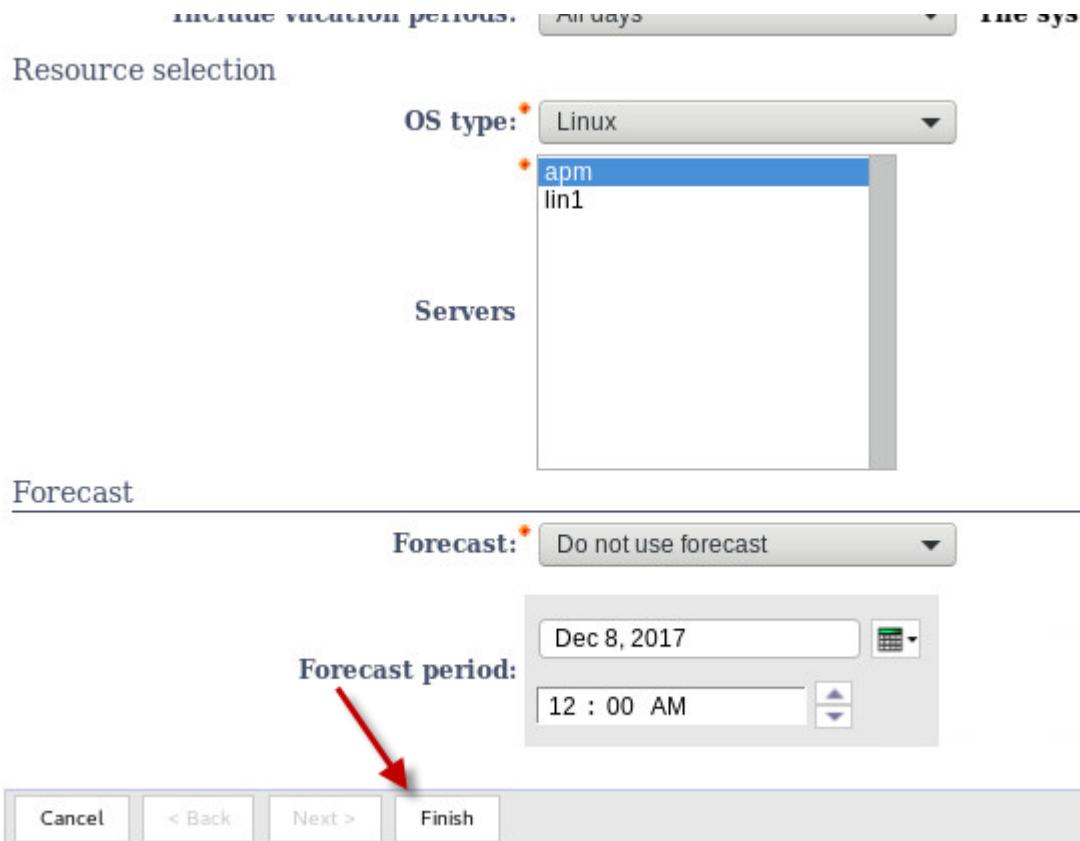
Forecast period:

Dec 8, 2017

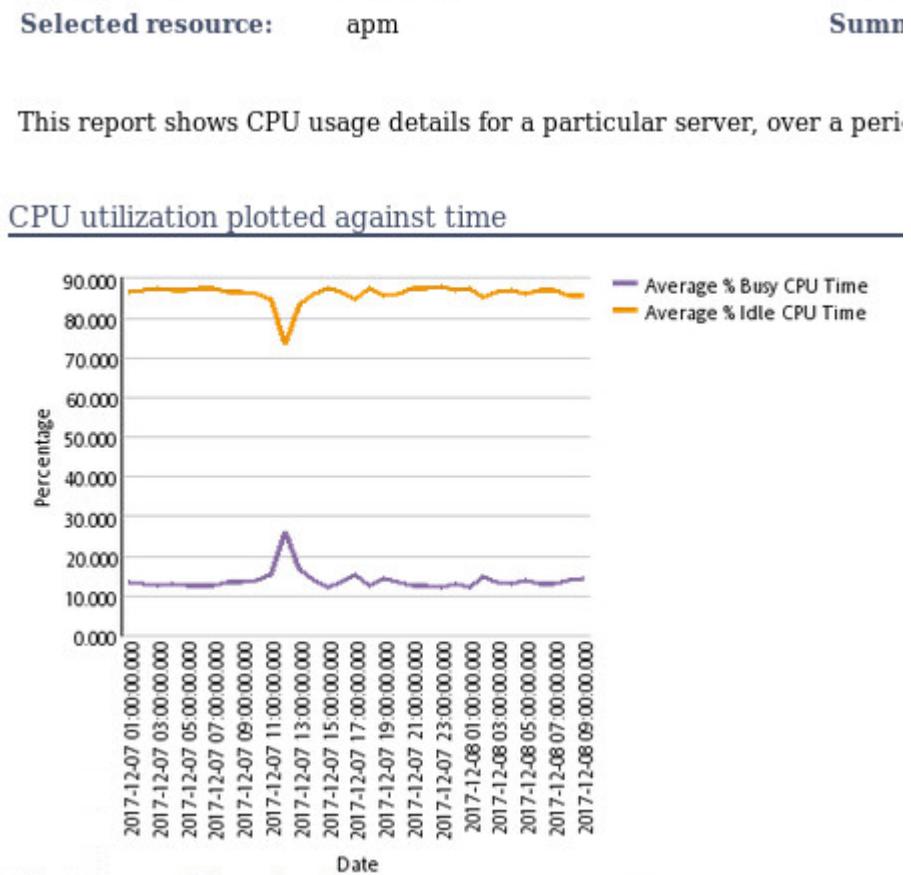
12 : 00 AM

A red arrow points from the text "Forecast period:" down to the "Finish" button in the bottom navigation bar.

Cancel < Back Next > **Finish**

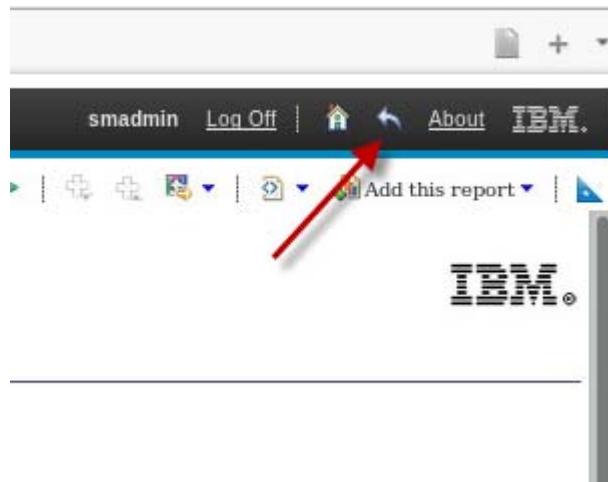


The report runs and the data looks similar to this screen capture:



**Note:** The **apm:LZ** agent resource is an IBM Tivoli Monitoring OS agent.

14. In the upper right, click **Return**.



15. Run the CPU Utilization for Single Resource report again, this time for the **lin1** Linux OS agent.

Common Reporting

---

Date range

Select desired date range for report: \* Last 7 days

From:

Dec 8, 2017

12 : 00 AM

Date range: To:

Dec 8, 2017

11 : 59 PM

---

Summarization selection

Summarization type: \* Hourly

Include shift periods: \* All shifts

Include vacation periods: \* All days

---

Resource selection

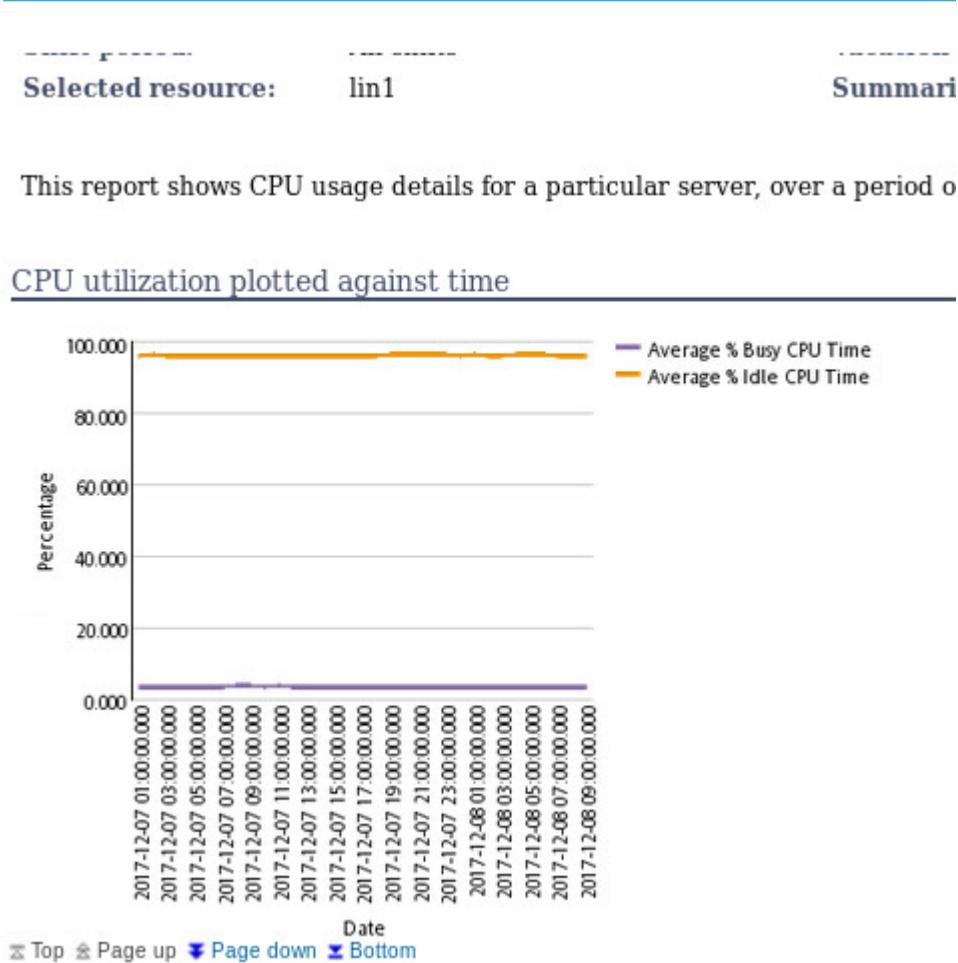
OS type: \* Linux

apm



16. Click **Finish**.

The report runs, and the data looks similar to this screen capture:



**Note:** The **lin1:LZ** agent resource is a Cloud APM OS agent.

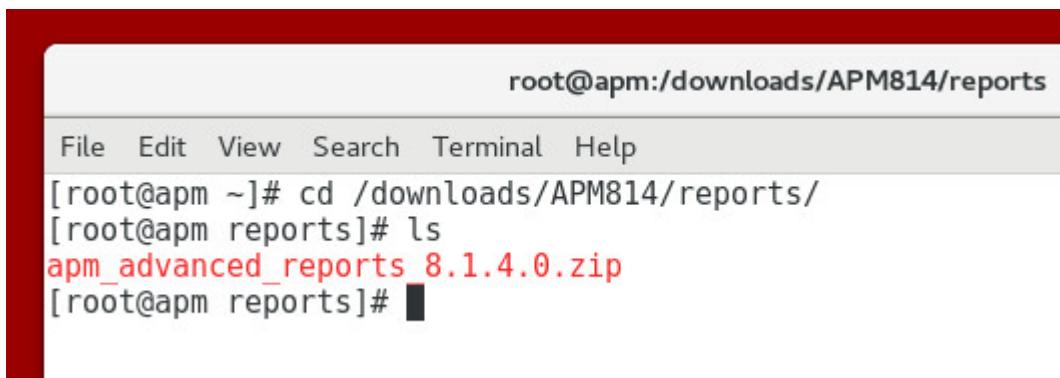
17. Explore other reports as time permits.

18. Log out of the IBM Dashboard Application Services Hub, and close Firefox.

# Exercise 3 Install Cloud APM reports

Cloud APM delivers reports that run with Cloud APM agents and use the warehouse database that is included with Cloud APM. This exercise guides you through configuring those reports and installing them. You also run the reports after they are installed.

1. On the APM VM, open a terminal window.
2. Change to this directory: `/downloads/APM814/reports`
3. List the contents of the directory.



A screenshot of a terminal window titled "root@apm:/downloads/APM814/reports". The window has a red header bar. The terminal shows the following command-line session:

```
root@apm:/downloads/APM814/reports
File Edit View Search Terminal Help
[root@apm ~]# cd /downloads/APM814/reports/
[root@apm reports]# ls
apm_advanced_reports_8.1.4.0.zip
[root@apm reports]#
```

This content is the report package that Cloud APM delivers.

4. Change to the `/opt/ibm/ccm` directory.
5. Run the `configure_reports_images.sh` command to configure the reports:  
`./configure_reports_images.sh`
6. Enter **1** to confirm that you want to begin the installation.
7. Enter the directory location where the reports installation image is located:  
`/downloads/APM814/reports`
8. Enter `object00` for the password for the Cloud APM server.
9. Accept the default value of `/opt/ibm/ccm/depot`.

10. Enter the IP address of the Cloud APM server with which the Tivoli Common Reporting server communicates for retrieving data for reports, in this case **192.168.1.102**.

```
root@apm:/opt/ibm/ccm
File Edit View Search Terminal Help
[root@apm reports]# cd /opt/ibm/ccm
[root@apm ccm]# ./configure_reports_images.sh
The log files of reports configuration are located in path: /opt/ibm/ccm/logs.

Do you want to configure the reports installation image [ 1-yes or 2-no; "yes" is default ]? 1
Enter the path you downloaded the reports installation image to: /downloads/APM814/reports/

Reports installation image found in the path "/downloads/APM814/reports".
Enter password of APM Administrator:
Provided password is correct.

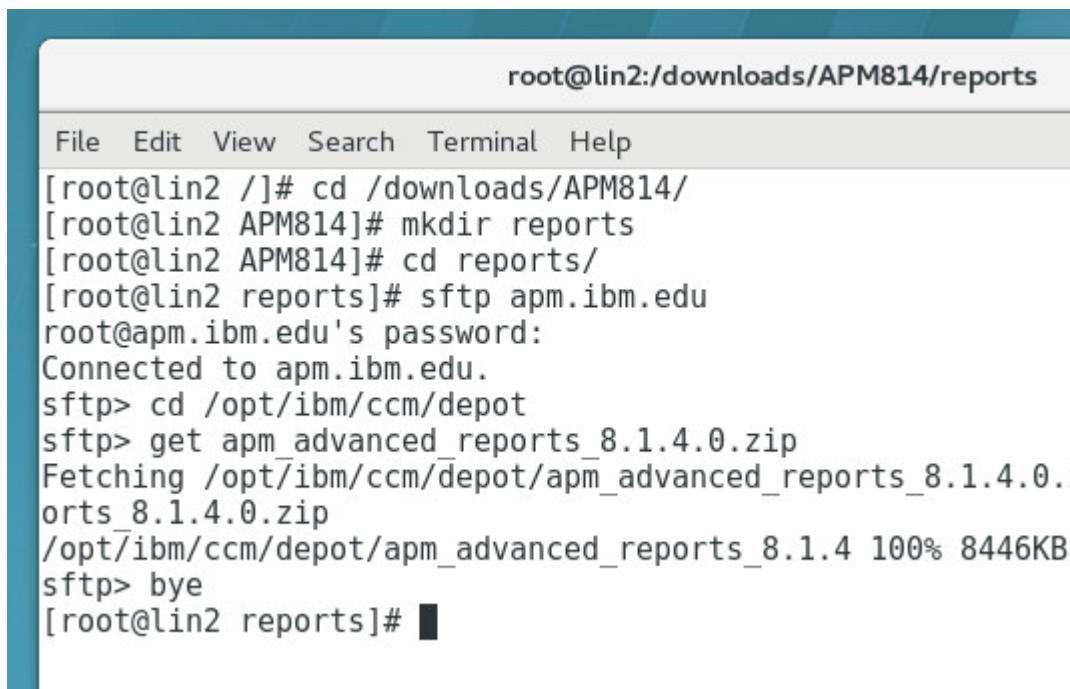
The configuration script copies the configured installation image to another directory.
Enter the directory where you want to store the reports configured package or accept the default value [/opt/ibm/ccm/depot]:
Enter the APM Server IP address/hostname or accept the default [192.168.122.1]:
192.168.1.102
The reports installation image was configured successfully. The reports packages are available in "/opt/ibm/ccm/depot":
[root@apm ccm]#
```



**Note:** If multiple NICs are active, the IP address might not be the default.

11. From the LIN2 VM, transfer the configured reports package from the APM VM to the LIN2 VM by using these commands. When prompted for a password, provide the value `object00`.

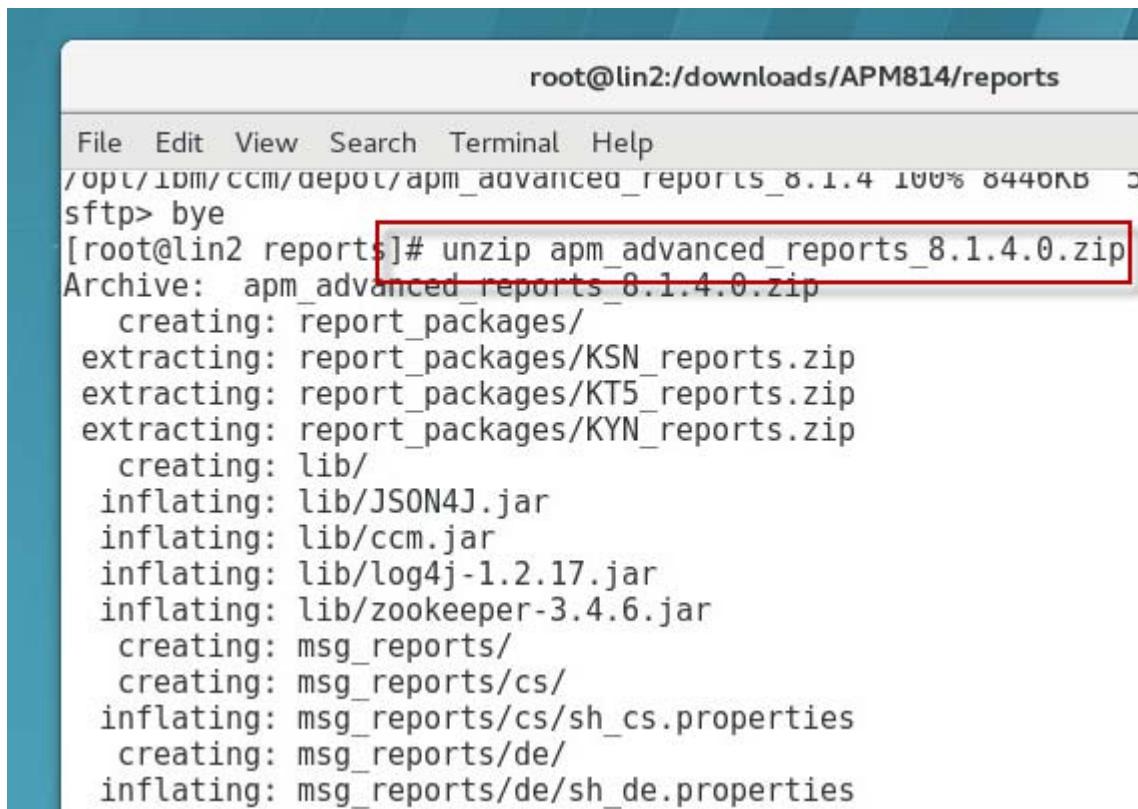
```
cd /downloads/APM814
mkdir reports
cd reports
sftp apm.ibm.edu
cd /opt/ibm/ccm/depot
get apm_advanced_reports_8.1.4.0.zip
bye
```



The screenshot shows a terminal window with a blue header bar containing the text "root@lin2:/downloads/APM814/reports". Below the header is a menu bar with "File Edit View Search Terminal Help". The main area of the terminal displays the following command history:

```
[root@lin2 /]# cd /downloads/APM814
[root@lin2 APM814]# mkdir reports
[root@lin2 APM814]# cd reports/
[root@lin2 reports]# sftp apm.ibm.edu
root@apm.ibm.edu's password:
Connected to apm.ibm.edu.
sftp> cd /opt/ibm/ccm/depot
sftp> get apm_advanced_reports_8.1.4.0.zip
Fetching /opt/ibm/ccm/depot/apm_advanced_reports_8.1.4.0.zip
100% 8446KB
sftp> bye
[root@lin2 reports]#
```

12. Extract the report package by using the `unzip` command.



The screenshot shows a terminal window with a blue header bar. The title bar reads "root@lin2:/downloads/APM814/reports". The menu bar includes "File", "Edit", "View", "Search", "Terminal", and "Help". Below the menu is a path: "/opt/IDM/ccm/depot/apm\_advanced\_reports\_8.1.4". The terminal prompt is "sftp> bye". The user then runs the command "[root@lin2 reports]# unzip apm\_advanced\_reports\_8.1.4.0.zip". The output shows the extraction of files from the zip archive, including "report\_packages/", "lib/", and various jar files like "JSON4J.jar", "ccm.jar", "log4j-1.2.17.jar", and "zookeeper-3.4.6.jar". It also creates directories for "msg\_reports/" and "msg\_reports/cs/" and extracts properties files like "sh\_cs.properties" and "sh\_de.properties".

```
root@lin2:/downloads/APM814/reports
File Edit View Search Terminal Help
/opt/IDM/ccm/depot/apm_advanced_reports_8.1.4 100% 0440KB C
sftp> bye
[root@lin2 reports]# unzip apm_advanced_reports_8.1.4.0.zip
Archive: apm_advanced_reports_8.1.4.0.zip
  creating: report_packages/
  extracting: report_packages/KSN_reports.zip
  extracting: report_packages/KT5_reports.zip
  extracting: report_packages/KYN_reports.zip
  creating: lib/
  inflating: lib/JSON4J.jar
  inflating: lib/ccm.jar
  inflating: lib/log4j-1.2.17.jar
  inflating: lib/zookeeper-3.4.6.jar
  creating: msg_reports/
  creating: msg_reports/cs/
  inflating: msg_reports/cs/sh_cs.properties
  creating: msg_reports/de/
  inflating: msg_reports/de/sh_de.properties
```

13. Install the report package by using the `./installReports.sh` command.  
14. Enter **1,2,3** to select all of the report packages.  
15. Accept the default the installation path for Jazz for Service Management.  
16. Accept the default user name (`smadmin`) for Jazz for Service Management user with administrator privileges, and provide a password of `object00`.  
17. Enter the password of the Cloud APM administrator: `object00`

18. Enter the Tivoli Common Reporting IP address: 192.168.1.105

```
[root@lin2 reports]# ./installReports.sh  
The log files of reports installation are located in path: /tmp/apm_reports_installer.
```

The following reports are available for installation:

- 1) Synthetic Transaction Reports
- 2) Response Time Monitoring Agent Reports
- 3) Monitoring Agent for WebSphere Applications Reports

Type the numbers that correspond to the products that you want to install. Type "q" to quit selection.  
If you want to enter more than one number, separate the numbers by using space or comma.

Type your selections here (For example: 1,2,3) 1,2,3  
Enter the JazzSM installation path or accept the default [/opt/IBM/JazzSM]:

JazzSM found in the path "/opt/IBM/JazzSM".

Enter the JazzSM Administrator user or accept the default [smadmin]:  
Enter the password of JazzSM Administrator:

Provided password is correct.  
Enter password of APM Administrator:  
Provided password is correct.

./installReports.sh: line 75: [: too many arguments  
Enter the TCR server IP address/hostname or accept the default []: 192.168.1.105

Creating APPMART DataSource for DATAMART database.  
Creating TDW DataSource for WAREHOUS database.

Installing report packages.

- 1) Synthetic Transaction Reports Installed successfully.
- 2) Response Time Monitoring Agent Reports Installed successfully.
- 3) Monitoring Agent for WebSphere Applications Reports Installed successfully.

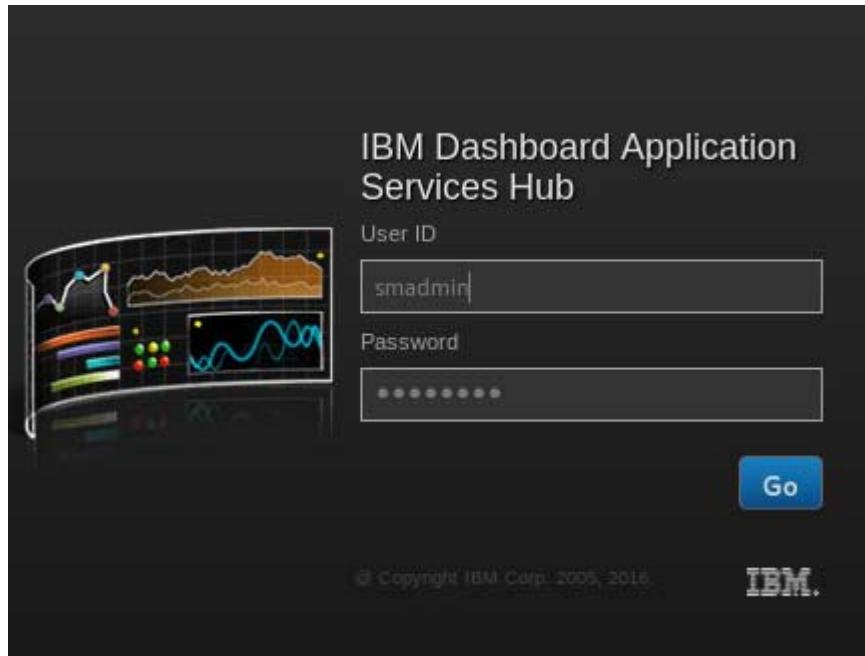
Configuring APM server for reporting feature.

Installation completed.  
[root@lin2 reports]# █

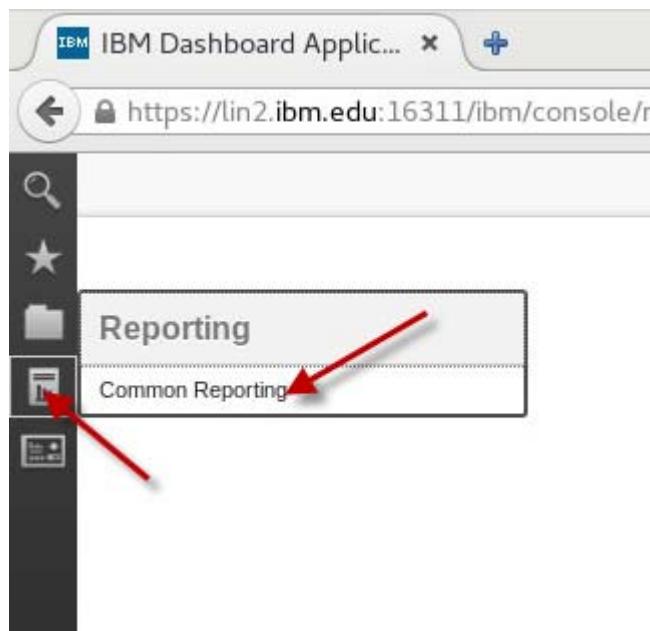


**Hint:** You can ignore the “too many arguments” message.

19. On the LIN2 VM, open a Firefox browser and log in to the Dashboard Application Services Hub as **smadmin** with a password of **object00**.



20. Click **Reporting > Common Reporting**.



21. Select IBM Monitoring 8.1.2 WebSphere Reports.

The screenshot shows the 'Common Reporting' connection in the IBM Dashboard Application. On the left, there's a sidebar with icons for search, star, folder, and report. The main area is titled 'Connection' with tabs for 'Public Folders' and 'My Folders'. Under 'Public Folders', a list of items is shown, each with a checkbox and a small icon. A red arrow points to the item 'IBM Monitoring 8.1.2 WebSphere Reports'.

Name
APM Synthetic
Application Performance
Common Reporting
<b>IBM Monitoring 8.1.2 WebSphere Reports</b>
IBM Tivoli Monitoring OS Agents Reports

22. Select DB Connection Pools.

The screenshot shows the 'IBM Monitoring 8.1.2 WebSphere Reports' folder within the 'Common Reporting' connection. The path 'Public Folders > IBM Monitoring 8.1.2 WebSphere Reports' is visible at the top. Below, a list of items is shown, each with a checkbox and a small icon. A red arrow points to the item 'DB Connection Pools'.

Name
Application Request Performance
Application Request Performance for Cluster
<b>DB Connection Pools</b>
EJB Performance
GC Usage of Application Server
JVM and GC Usage for Cluster
JVM Usage for Application Server
ThreadPools
Top applications with slowest response time across servers
WebApplication Performance

23. Provide these values for the report:

- Select desired date range for report: Last 7 Days
- Summarization Type: Hourly
- Application Server: lin1Node01server1:lin1:KYNS

**Parameter Selection for DB Connection Pools**

---

Date Range

Select desired date range for report **Last 7 days**

Start Date From: **Dec 8, 2017**

End Date To: **Dec 8, 2017**

12 : 00 AM

11 : 59 PM

---

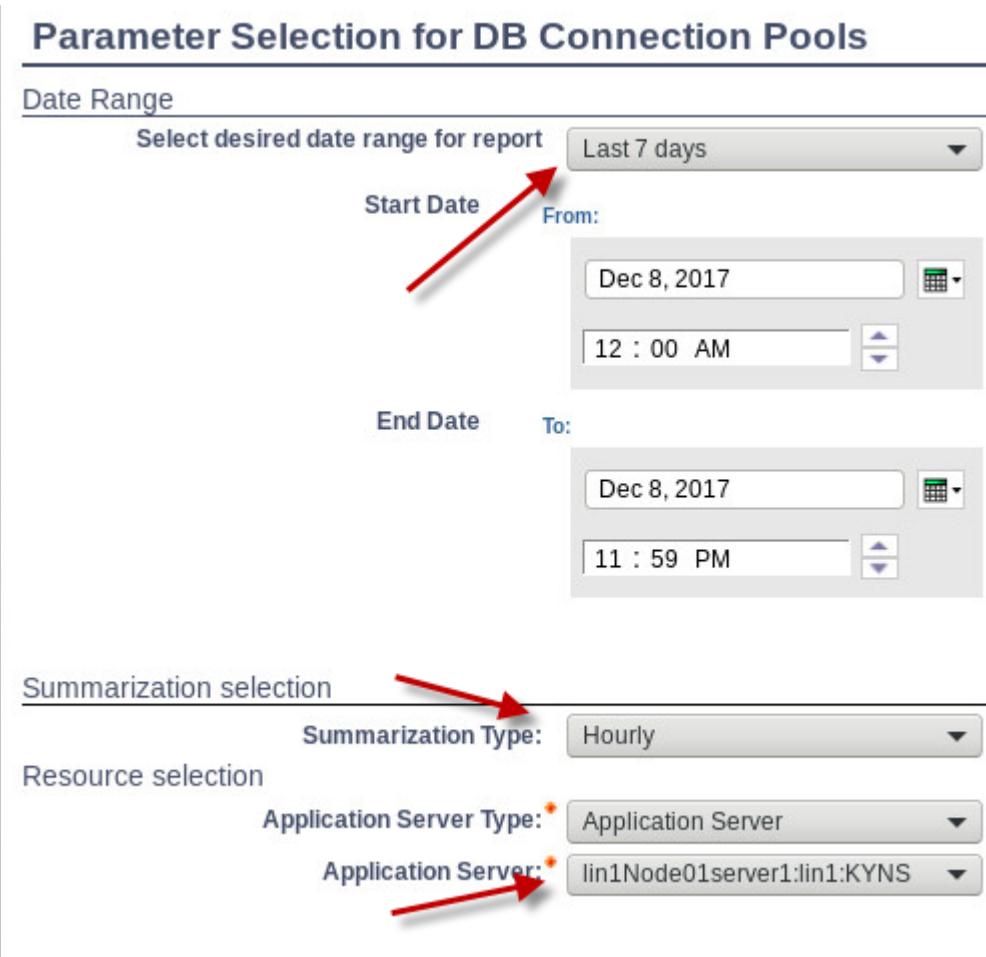
Summarization selection

Summarization Type: **Hourly**

Resource selection

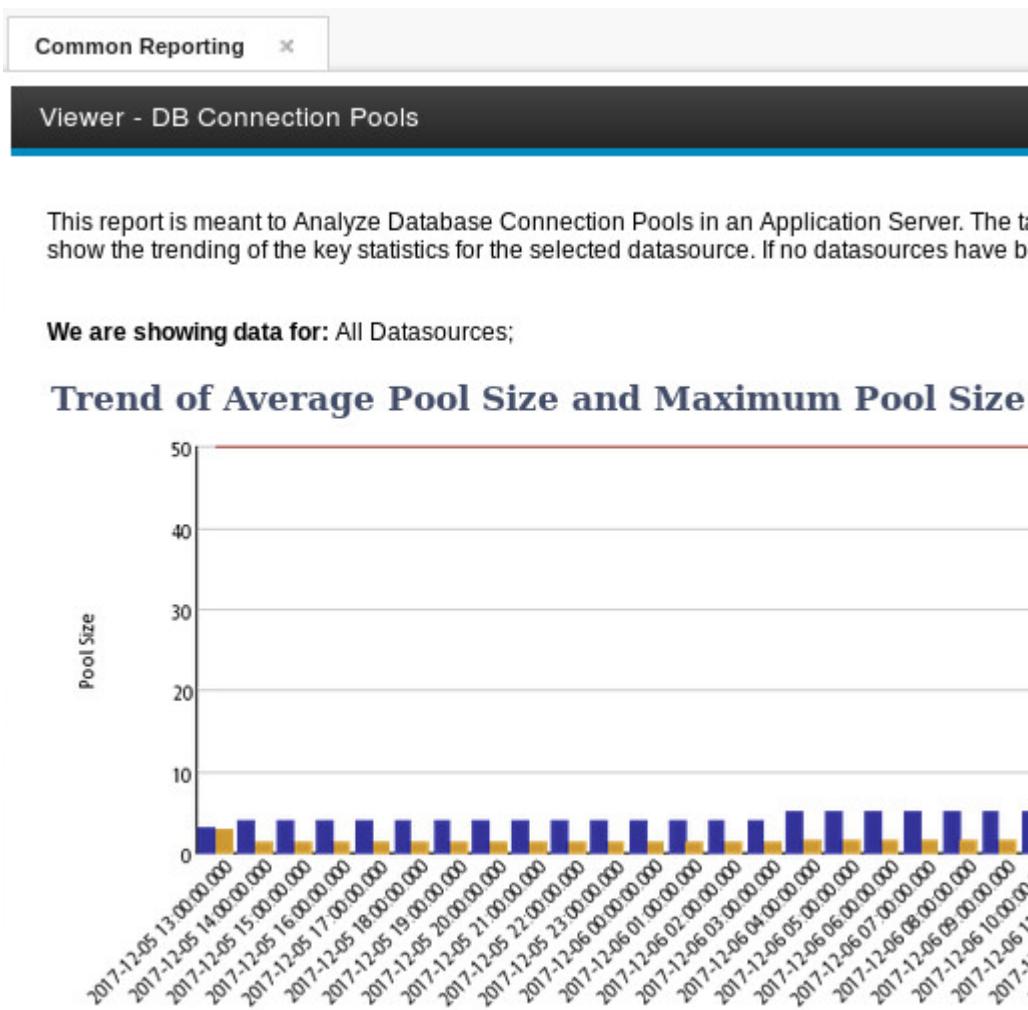
Application Server Type: **Application Server**

Application Server: **lin1Node01server1:lin1:KYNS**



24. Click **Finish**.

25. Review the report.



26. Explore the various drill-down features of this report.

27. Explore other reports as time permits.



IBM Training



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