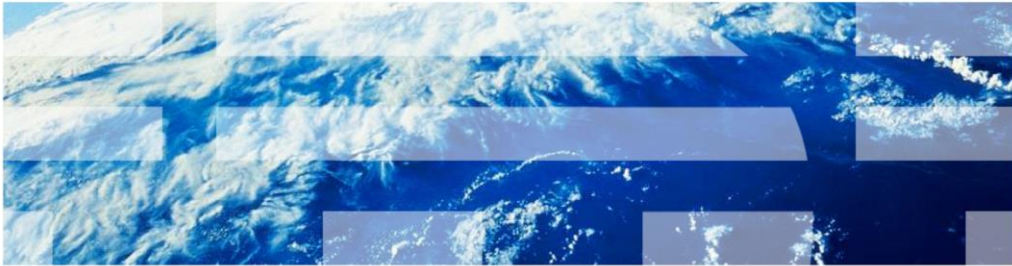


IBM PureApplication System

Troubleshooting



This presentation will discuss IBM PureApplication™ System troubleshooting.

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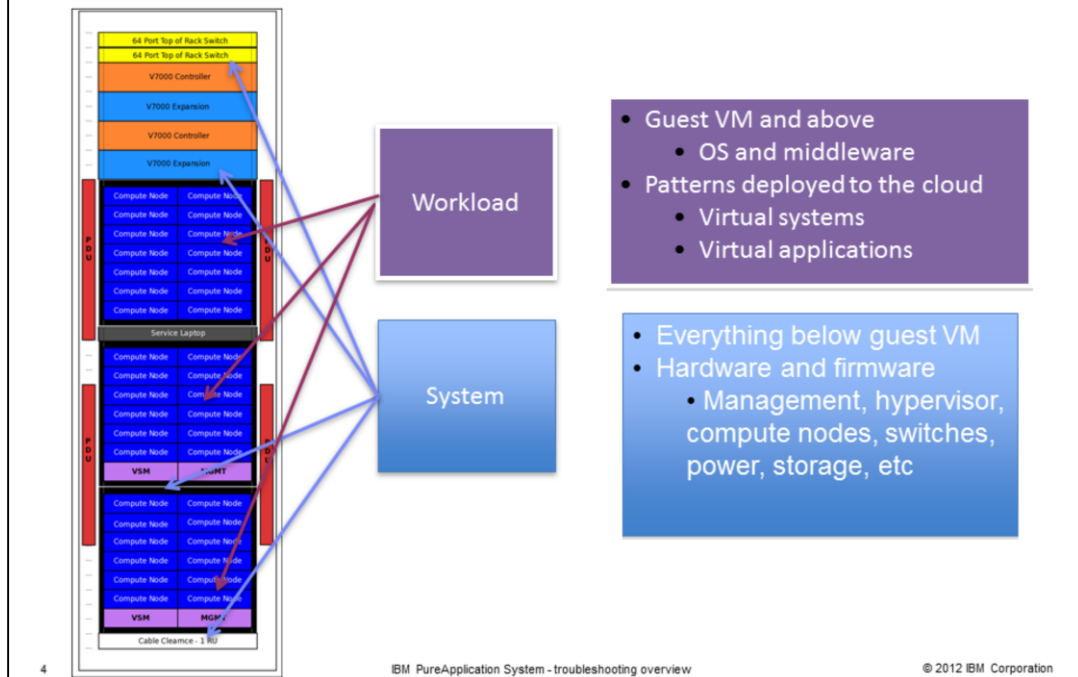
- Overview
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- Hardware infrastructure map
- Summary

Looking at the agenda, you will first see an overview of the ways that troubleshooting is broken down in PureApplication System. Then you will look at the various options in the troubleshooting menu option including the system logs and trace settings options. You will then see where the system events and problems are collected for you and end with a look at the hardware infrastructure map.

Overview

This section will discuss an overview of the IBM PureApplication System troubleshooting.

IBM PureApplication System - Troubleshooting breakdown



When looking at troubleshooting the IBM PureApplication System, problems can be broken down into two areas: Workload and System. Depending on where the problem is, will determine your troubleshooting steps. The workload area includes all the virtual machines (VMs) that are deployed for you to run your software. When you deploy a virtual system or virtual application pattern, one or more VMs are provisioned for you in the PureApplication System that will run the software you have specified in the workload defined. Once deployed and provisioned with that software, you will have logs specific to your workload to help you troubleshoot any problems. Before the workload is successfully deployed though, there are lots of things that need to happen at the “system” level. The system area includes everything below the provisioned VM that is deployed for you and includes interactions that happen in the management nodes, the compute nodes, and the switches, for example.

Overview of PureApplication System serviceability areas

- **System**
 - Logs
 - Events
 - Problems
 - Hardware infrastructure map
 - IBM customer engineer account access
- **Workloads**
 - Log service
 - Monitoring service
 - Troubleshooting service
 - Emergency fix service

There are many PureApplication System facilities to assist with troubleshooting. There are many logs created from the various PureApplication System hardware, software and deployed workloads. There are also events and problems that are surfaced by the underlying system hardware and software to the system administrator through the system console. Finally, there are hardware infrastructure maps that show the status of the hardware graphically. These are the areas you will focus on in this presentation. This presentation will talk about the system level troubleshooting. The workload area is covered in other presentations.

Where to find system related troubleshooting info

The screenshot displays the IBM PureApplication System console interface. The top navigation bar includes 'Welcome', 'Cloud', 'Hardware', 'Reports', and 'System'. The 'System' menu is expanded, showing options like Auditing, Settings, Users, User Groups, Security, Customer Network Configuration, Job Queue, Events, Troubleshooting, Problems, and Product Licenses. The 'Events', 'Troubleshooting', and 'Problems' options are highlighted with yellow boxes. In the top right corner, there are two notification icons: a yellow triangle with an exclamation point (57) and a red circle with an 'X' (509). Callout boxes explain these icons: 'Recent errors and notifications – shown as Events (Warning)' points to the yellow triangle, and 'Recent errors and notifications – shown as Events (Fatal, Critical, Major, Minor)' points to the red circle. A blue box at the bottom right states 'Hardware administration permissions required'. The bottom of the slide shows the page number '6', the title 'IBM PureApplication System - troubleshooting overview', and the copyright '© 2012 IBM Corporation'.

You will find system related troubleshooting information in the system console. You must have hardware administration permissions to see the menu options highlighted on the slide. You can get to the list of events from the **System > Events** menu item in the system console. Another option is to get there from the “View event” hyperlink under the “Problem determination and monitoring” scenario found on the Welcome page. Over on the top-right of the console, you are also given two links that take you directly to a list of filtered events that have occurred in the last 24 hours, by default. The time interval can be changed under the **System -> Settings -> Time Interval** option to “All” or “Last Hour.” The first one, the yellow triangle with the exclamation point, takes you to a list of “Warning” level events. This includes both errors and notifications. The red circle with the “X” takes you to a list of all events that are marked as “Fatal,” “Critical,” “Major” or “Minor.” You also see each of those options shows the number of events in each of those categories. Again, by default, these are just those events that have occurred in the last 24 hours.

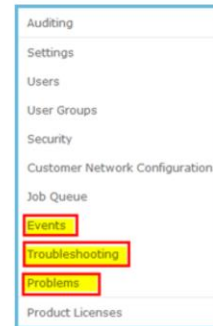
The **System > Troubleshooting** menu option in the system console is where you can collect system logs for IBM service and set trace levels when required. You can also get to the troubleshooting options from the ‘View Troubleshooting’ hyperlink under the ‘Problem determination and monitoring’ scenario found on the Welcome page. You will see this in more detail later in this presentation.

Finally, you see there is a **System > Problems** option under the system console. Here you can see a list of all the problems that exist in the system.

System console – user tasks and its user interface



- Access to troubleshooting options is through the panel on the right
 - **Events** – single view for events sent by different components
 - **Troubleshooting** – System logs, vendor information, LEDs and other information
 - **Problems** – list of problems in the system for issues where you might open a PMR

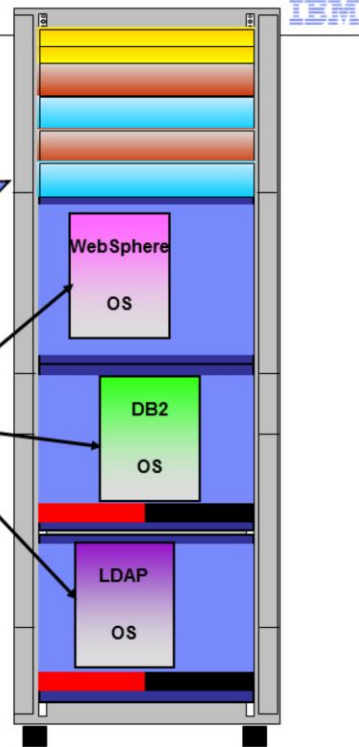


Here you see the troubleshooting options found in the **System** menu from the user task perspective. The **Events** option gives you a single view for all events sent by all the components in PureApplication System. The **Troubleshooting** option lets you collect system logs and look at the vendor information and the LED status for all the components in PureApplication System. The **Problems** option shows a list of all the problems that exist in the system and you might consider opening a PMR for. You will look at each of these in more detail on later slides.

Troubleshooting - logs

PureApplication System creates several log files to determine problems in software and hardware components

- **System logs** – accessed by way of system console
 - Logs from underlying hardware and firmware
 - Logs for system components
 - Logs for management nodes
 - Excludes logs from within virtual machines
- **Workload logs** – accessed via workload console
 - All logs within a VM
 - Agent logs from different agents in the VM
 - OS level logs from VM
 - Middleware logs from within VM – WebSphere® Application Server, DB2®, scripts, and so on
 - Related to the actual issues of the middleware runtime components
 - Logs from configuration scripts



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IBM PureApplication System - troubleshooting overview

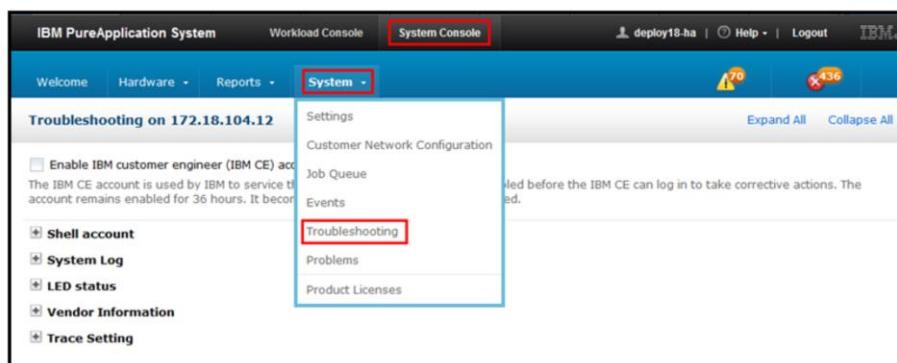
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There are two levels of logs that are provided by PureApplication System. The first one, system logs, is accessed from the system console. They include logs from the underlying hardware and firmware including logs from the management nodes. System logs do NOT include the logs from the virtual machines that are provisioned. The logs from the virtual machines that are provisioned are instead accessed from the workload console. The workload logs include all the logs within the virtual machine, including the OS level logs and the middleware logs. It also includes agent logs from different agents involved in deploying the middleware to the virtual machine. This presentation will focus on just the system logs.

Troubleshooting user interface

The next section will look at the options found under the **Troubleshooting** menu item.

Troubleshooting user interface



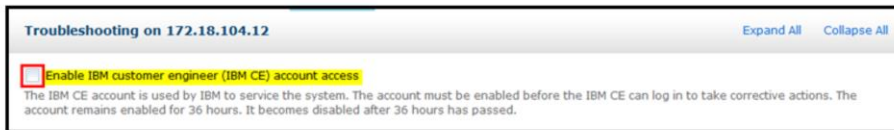
- **Shell account** used to access the system for troubleshooting by the IBM customer engineer
- **System Logs** contain the logs from the underlying hardware components and System software
- **Trace Settings** can be specified here, as requested by IBM Support team
- **LED status** – provides status on components
- **Vendor Information** – gives serial number of each component

This shows the options that you will look at on the next few slides. This includes the enable check box for IBM customer engineer access, shell account creation, system logs collection, hardware LED status monitor, vendor information and trace settings.

Troubleshooting – IBM customer engineer access

The first options you will look at are the ones that enable the IBM customer engineer access.

IBM customer engineer access to service panels



- Special service panels are available for IBM customer engineer to get access to deep system level information for troubleshooting, to perform maintenance and upgrade the system
 - Special service panels can only be accessed by IBM customer engineer on-site
 - No remote access to service panels
 - IBM customer engineer needs to use the service laptop to connect to the internal network of the system
- IBM customer engineer uses special user ID for access
 - This user ID is hidden and not displayed in the user panel
 - IBM customer engineer gets password from IBM Support which allows him to log into the service panels
 - Password is tied to a specific rack
- Hardware administrator **MUST** enable access for IBM customer engineer
 - Automatically disabled after 36 hours

There are special service panels that are available in PureApplication System to an IBM customer engineer that comes on-site for various reasons. The customer engineer, or CE, might be called on-site to do some deep system level troubleshooting of a problem, to perform maintenance or to upgrade the system. The CE needs to use the service laptop to connect to the PureApplication System internal network. Note that there is no remote access to these service panels. He has a special ID that he uses for access but you must give him permission to use it. You do this with the “Enable IBM customer engineer (IBM CE) account access” check box. Once enabled, the CE gets a password for this special ID from IBM support. The access is automatically disabled after 36 hours. You need the **Hardware administration** role with permission to **Manage hardware resources (Full permission)** to enable this access.

Enable IBM customer engineer access to service panels (1 of 2)

Troubleshooting on 172.18.104.12 Expand All Collapse All

Enable IBM customer engineer (IBM CE) account access

The IBM CE account is used by IBM to service the system. The account must be enabled before the IBM CE can log in to take corrective actions. The account remains enabled for 36 hours. It becomes disabled after 36 hours has passed.

Secret key:
Send this key to IBM Service Center and get a time-limited password.

```
PeGE0jv4uya6UB/6mF6TrV+9DaDQ6no6Qoz3b6
f3EmegHsVFLa+69a3X1Ny2Kn9uXc5Lk1BtkDM7
JlUoJgh+2m4UK0Hz40OmXh3jFYuEM
/dEyesF6M6LmFaqDSgyFaqAepKj0qrnnQx2M1SDg
B50cE1
/I32EAX5rq13HpG6YckKaaGH4B19zqou2gn8Hty
/gQkiGjvtTlaAZVJmFunFXNrdfOrE6v3mb8We2S
t0yepNADK7N12jQ750ZX
//1sEA1L7se458VE1FSAAXzuU+W7RCdHoINQ3dLa
vTWexvPe4Z09w//1SITAGAsL8VU1d3b9
/FtE888Rwa1Hg==
```

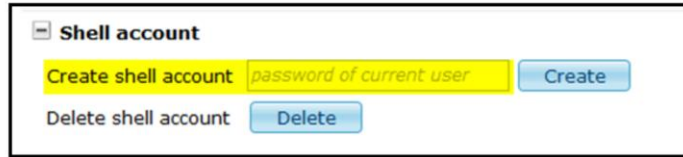
- Special service panels are available for IBMers to get access to deep system level information for troubleshooting, to perform maintenance and upgrade the system
 - Special service panels can only be accessed by IBMers on-site

When the enable check box is checked, a 'Secret key' section is shown as seen on the slide. By clicking the "Generate" box at the bottom, a secret key is generated for you. In order to get a time-limited password for the IBM CE, you need to send this key to the IBM Service Center.

Troubleshooting – shell account

Next you will see how to gain access to a shell account on the appliance where some additional commands are available to you.

Enable shell account to PureApplication System



- Option to create a secure shell account to access the system for additional troubleshooting.
- Hardware administrator with full permissions is required

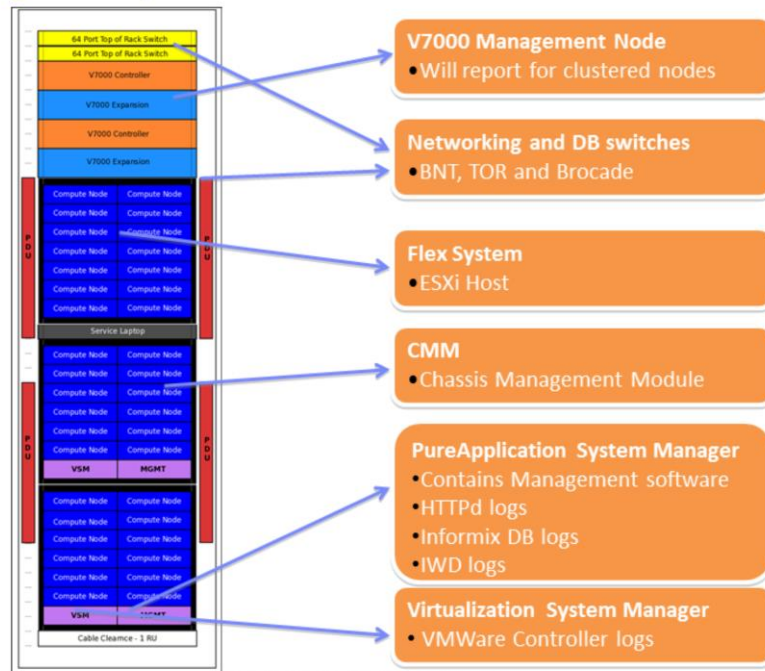
```
Welcome to the IBM PureApplication System Customer Administration Interface
PureApplication>help
checkha
gatherlogs
help
ibmceadd
ibmcedel
passwd
poweroff
reboot
version
```

Here you see the option to create a shell account. You must be a hardware administrator with full permissions in order to do this. Shown on the bottom of the slide are the shell commands available to you from the shell. You can delete the shell account when it is no longer required.

Troubleshooting – system logs

Now you will see what types of logs are collected in the system logs and how to collect them.

System logs – components collected



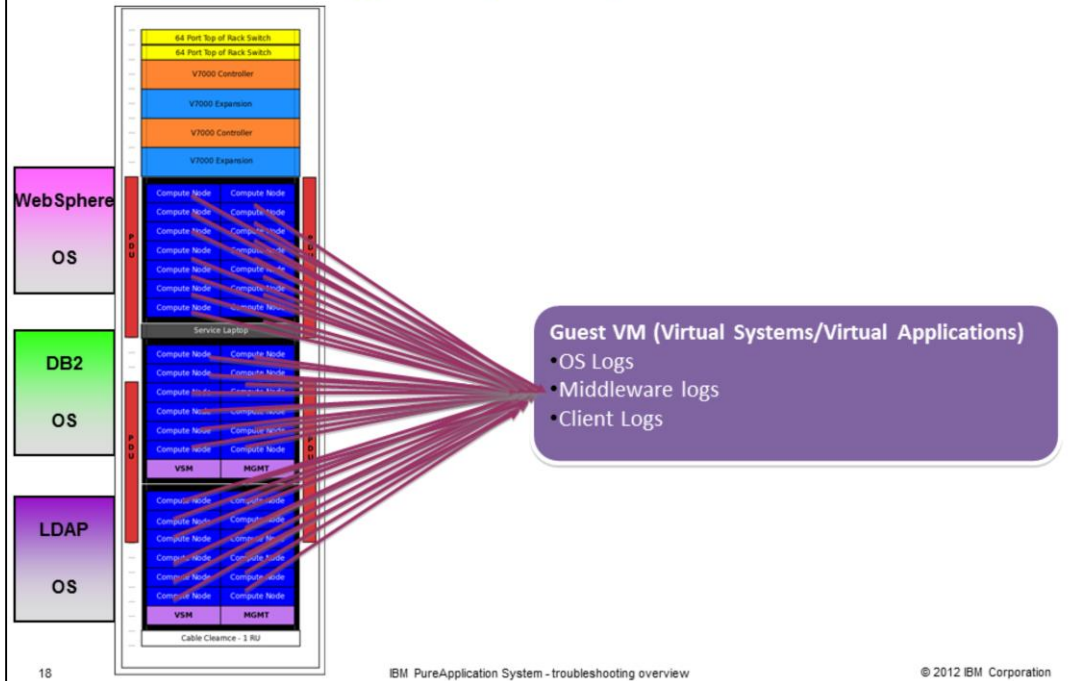
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IBM PureApplication System - troubleshooting overview

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The system logs include logs from all the various components that make up the PureApplication System. The system logs include logs collected from the V7000 management nodes, the networking switches, the compute nodes, the chassis management modules, the PureApplication System Manager and the Virtualization System Manager.

What is NOT being logged in system logs



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IBM PureApplication System - troubleshooting overview

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What is NOT included in the system logs is anything on the virtual machines that are deployed to host the software that is installed as part of the virtual systems or virtual applications. This means that anything having to do with WebSphere, DB2, LDAP or even the RedHat operating system is not included here.

System logs – Overview

- Captures all logs from management software, firmware and hardware in PureApplication System
 - Continuous collection of logs and on-demand log collection
 - Support compression and retrieval from either of two active PureApplication System Management nodes
- Client requested logs from system (GUI or CLI)
 - Results in a single archive file for user
 - No built in viewer of logs
 - Options:
 - **Management** - Only PureApplication System software logs on the PureApplication System management node
 - **Deploy** - Latest version of workload console actions logs
 - **System** - Management, deploy plus syslogs from remote systems, FRM syslogs
 - **Dumps** - JVM dumps from PureApplication System management node
 - **Complete** - system plus historical deploy logs
 - **IP-###.###.###.###** - Collects specific on-demand items from a hardware component specified by IP address. Includes dumps and configuration

The system logs include logs from all the management software, firmware and hardware included in PureApplication System. The logs are continually collected with on-demand collection from the system console. You will see the interface for the on-demand collection on the next slide. The options for on-demand collection include **Management** logs, **Deploy** logs, **System** logs, **Dumps**, **Complete** and **IP** where you must specify an IP address of a particular hardware component. Each of these options are explained on the slide.

System logs – Collect logs

System > Troubleshooting > System Log

The screenshot illustrates the steps to collect system logs in the IBM PureApplication System. It shows the navigation path, the 'Collect Log' button, the 'Request System Logs' dialog where a collection set name is selected, and the 'Trace Setting' dialog. A 'Download' button is highlighted in the 'Actions' column of a table. A separate window shows the 'Index of /downloads/systemlogs' directory listing a compressed .tgz file.

| Name | Last modified | Size | Description |
|--|-------------------|------|-------------|
| Parent Directory | | | - |
| 081696d2-d6f8-40ec-b4fe-7bb167453132.tgz | 11-Nov-2011 10:39 | 171M | |

Here you see the screen where you do log collection. In order to collect the logs, you click the **Collect log** button under the **System Log** twisty as shown by the number one on the slide. You are then given the option of what logs you want to collect as seen by number two on the slide. Number three shows the options that you are given to collect which includes the options described on the previous slide. Number four shows the “Download” hyperlink that you use to download the logs when they are available. Number five shows an example of a downloaded log file. Notice that it is a compressed .tgz file.

System logs – Collection details

- Continuous log collection
 - Uses conventional syslog functionality, communicating over UDP
 - Asynchronously gathered
 - Logs rotate on daily/weekly/monthly basis to regulate disk usage
 - Reaper threads delete expired log resources and those gathered through the CLI
- On demand log collection
 - PureApplication System logs collected when user request to extract logs

As mentioned previously, the logs are continuously gathered and as such they are rotated to regulate disk usage. To actually look at them, you need to use the on demand log collection as seen on the previous slides.

Troubleshooting – LED status

On the next slide you will take a look at what is shown in the **LED status** section under the **Troubleshooting** menu item.

LED status

Allows you to look whether a component is on or off

Filter

Hyperlinks for component details

Download to .csv file

Go to specific page

| Name | Status | Source | Updated On |
|-------|--------|---|-------------------------|
| Power | On | Compute Node SN#23ATMM8 | Jun 3, 2012 7:37:18 PM |
| Power | On | Compute Node SN#23AWTE0 | Jul 31, 2012 2:12:00 AM |
| Power | On | Virtualization System Manager SN#23AYE5 | Aug 7, 2012 7:54:12 PM |
| Power | On | Compute Node SN#23ATML2 | Aug 9, 2012 1:59:42 PM |
| Power | On | Compute Node SN#23ATMP5 | Jun 26, 2012 1:04:39 PM |

| Name | Status | Source | Updated On |
|-------|--------|---|--------------------------|
| CPU 1 | Off | Compute Node SN#23ATMN3 | Aug 29, 2012 1:14:22 AM |
| CPU 1 | Off | Compute Node SN#23APPV1 | Aug 29, 2012 1:07:43 AM |
| CPU 1 | Off | Compute Node SN#23AWTK1 | Aug 29, 2012 1:14:14 AM |
| CPU 1 | Off | Compute Node SN#23AWWC3 | Aug 23, 2012 12:21:54 PM |
| CPU 1 | Off | Compute Node SN#23APPN7 | Aug 28, 2012 10:56:48 PM |

The LED status section under troubleshooting allows you to monitor the LED status for hardware in the system. This information is also provided as part of the hardware infrastructure map which you will see shortly. Note the hyperlink under 'Source' which takes you directly to the compute node where the hardware exists. You can also filter by status, download the information to a .csv file and go to a specific page.

Troubleshooting – Vendor information

On the next slide you will take a look at what is shown in the **vendor information** section under the **Troubleshooting** menu item.

Vendor information

Allows you to see the part serial number and other details

The screenshot shows the IBM PureApplication System interface. The main content area displays the 'Vendor Information' section, which includes a table of hardware details. The table has columns for Name, Serial Number, Vendor, Type, and Model. The 'Vendor' column is set to 'All' and the 'Serial Number' column is highlighted. A callout labeled 'Filters' points to the 'Vendor' and 'Serial Number' filter options. Another callout labeled 'Download to .csv file' points to a download icon in the top right corner of the table. A third callout labeled 'Go to specific page' points to a page navigation control at the bottom of the table. The interface also shows a navigation bar with 'Welcome', 'Hardware', 'Reports', and 'System' tabs, and a status bar with 'Troubleshooting on 172.18.104.12' and 'Expand All' / 'Collapse All' buttons.

| Name | Serial Number | Vendor | Type | Model |
|------------------------|------------------------|----------|-------------|-------------|
| 11S49Y7406YXXX6WN0HGT7 | 11S49Y7406YXXX6WN0HGT7 | IBM-207x | Disk Drives | ST9600204SS |
| 11S49Y7406YXXX6WN0M9ZP | 11S49Y7406YXXX6WN0M9ZP | IBM-207x | Disk Drives | ST9600204SS |
| 11S49Y7406YXXX6WN0MHP7 | 11S49Y7406YXXX6WN0MHP7 | IBM-207x | Disk Drives | ST9600204SS |
| 11S49Y7406YXXX6WN0MM27 | 11S49Y7406YXXX6WN0MM27 | IBM-207x | Disk Drives | |
| 11S49Y7406YXXX6WN0MV25 | 11S49Y7406YXXX6WN0MV25 | IBM-207x | Disk Drives | |
| 11S49Y7406YXXX6WN0N3WA | 11S49Y7406YXXX6WN0N3WA | IBM-207x | Disk Drives | |
| 11S49Y7406YXXX6WN0N62T | 11S49Y7406YXXX6WN0N62T | IBM-207x | Disk Drives | ST9600204 |
| 11S49Y7406YXXX6WN0NRWM | 11S49Y7406YXXX6WN0NRWM | IBM-207x | Disk Drives | ST9600204S |
| 11S49Y7406YXXX6WN0P4FK | 11S49Y7406YXXX6WN0P4FK | IBM-207x | Disk Drives | ST9600204S |
| 11S49Y7406YXXX6WN0P848 | 11S49Y7406YXXX6WN0P848 | IBM-207x | Disk Drives | ST9600204SS |

Here you see the vendor information for the hardware in the PureApplication System. As you can see, the vendor information shows you the serial numbers of the hardware along with type and model. You can filter this list by vendor or serial number and again, you can download the information to a .csv file and go to a specific page.

Troubleshooting – Trace settings

The next section will look at the **trace settings** options found under the **Troubleshooting** menu item.

Trace settings

- Ability to add more details in the logs through different trace settings
- Support will request the appropriate trace setting and the component to be traced
- Can add new trace string if not in the list
 - This allows tracing of components that might not have been included in the list when shipped
- Trace level from no tracing to Finest

The screenshot shows the 'Trace Setting' section of the IBM PureApplication System troubleshooting overview. The page title is 'Troubleshooting on 172.18.0.12'. Below the title, there are several expandable sections: 'Shell account', 'System Log', 'LED status', and 'Vendor Information'. The 'Trace Setting' section is expanded and highlighted with a red box. It contains a table with the following columns: Component Name, Trace Level, and a delete icon (X). The 'Configure trace level' dropdown menu is open, showing options: OFF, SEVERE, WARNING, INFO, FINE, FINER, FINEST, and ALL. The 'FINEST' option is selected and highlighted in yellow. Below the table, there is a red-bordered button labeled 'Add trace setting' with a plus icon.

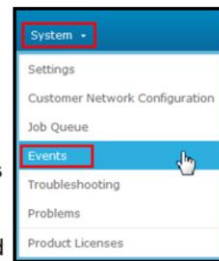
| Component Name | Trace Level | Delete (X) |
|-------------------------|-------------|------------|
| security | FINEST | X |
| com.ibm.purescale.users | OFF | X |
| user_groups_roles | SEVERE | X |
| users_roles | WARNING | X |
| user_groups | INFO | X |
| users | FINE | X |
| Authorize | FINER | X |
| user_groups_users | FINEST | X |
| rest | ALL | X |
| ibmce | FINEST | X |
| ldap_configs | FINEST | X |
| tokens | FINEST | X |
| audit | ALL | X |

Here you can set the trace levels of the various components. Support will request the level required which can be from 'OFF' to 'FINEST'. You also have the ability to add a new trace string if needed for a component not already in the list.

System events and problems

In the next section, you will briefly look at the events and problems that are surfaced.

System events (1 of 2)



- Different subsystems send notifications to the management node as events
 - Surfaced in the system console
 - **System Console > System > Events**
 - Linked up to the appropriate PureApplication System component record
 - System collects all potentially useful SNMP traps from hardware, firmware and workload console into a single SNMP endpoint
 - Logon/logoff events from the hardware are not sent as there are too many
 - SNMP messages become PureApplication System events which are forwarded as PureApplication System SNMP traps which you can subscribe to
 - You can configure as many external SNMP destinations as you want
 - You configure the minimum severity to send to each destination
 - SNMP v1 and v2 are supported
 - MIB and OMNibus rules for the PureApplication System events can be found here:
 - **System Console > System > Settings > Event Forwarding**
- [Download MIB](#) [Download OMNibus Rules](#)
- Workload monitoring traps are also surfaced as system events
 - Optim™ Performance Monitor and IBM Tivoli® Monitor events
 - Kernel services, storehouse and security/auditing (log events of Info/Warning/Error)

PureApplication System consists of many subsystems working together. These different subsystems send notifications to the management node as events which allows there to be a single place for monitoring the PureApplication System's health. All the events are surfaced in the system console under the **System > Events** menu. The system is also collecting SNMP traps from the various hardware, firmware and the workload console which are also surfaced as events. These traps are collected into a single SNMP endpoint which you can subscribe to. SNMP v1 and v2 are supported and you can configure as many external SNMP destinations as you want. MIB and OMNibus rules can be downloaded for this purpose from the system console under the **System > Settings > Event Forwarding** menu item.

Workload monitoring traps from Optim Performance Monitor and IBM Tivoli Monitor are also surfaced as system events, along with events from kernel services, storehouse, security and auditing which are all helping to coordinate your running workloads.

System events

Welcome Hardware Reports **System**

Events

Filters

Delete selected events/download to .csv file

| Event text | Type | Severity | Category | Updated on | Actions |
|--|----------------------------------|---------------|----------------------|-------------------------|---------------------------|
| System dock updated | Network Switch SN#23GZC19S1 | Informational | Alert | Aug 26, 2012 9:42:27 PM | [X] [Heart] [Info] |
| System dock updated | Network Switch SN#23GZC19S2 | Informational | Alert | Aug 26, 2012 9:42:18 PM | [X] [Heart] [Info] |
| System dock updated | Network Switch SN#23GZC09S1 | Informational | Alert | Aug 26, 2012 9:41:52 PM | [X] [Heart] [Info] |
| Error ID = 81002 : Failure to bring up Ethernet interface | Storage Node 78N02YV | Critical | Call support | Aug 26, 2012 9:39:15 PM | [X] [Heart] [Info] [Link] |
| Hot air exiting from the rear of the chassis might be recirculated in the inlet air at the front of the chassis. | Flex Chassis SN#23GZC09 | Minor | Customer serviceable | Aug 26, 2012 9:38:40 PM | [X] [Heart] [Info] |
| System dock updated | Top of Rack Switch SN#MY212201HU | Informational | Alert | Aug 26, 2012 9:35:10 PM | [X] [Heart] [Info] |
| System dock updated | PureApplication System Cluster 1 | Informational | Alert | Aug 26, 2012 9:35:10 PM | [X] [Heart] [Info] |
| System dock updated | Network Switch SN#23GZC17S1 | Informational | Alert | Aug 26, 2012 9:35:10 PM | [X] [Heart] [Info] |
| System dock updated | Network Switch SN#23GZC09S2 | Informational | Alert | Aug 26, 2012 9:28:52 PM | [X] [Heart] [Info] |
| Hot air exiting from the rear of the chassis is not being recirculated. | Flex Chassis SN#23GZC09 | Informational | Customer serviceable | Aug 26, 2012 9:28:47 PM | [X] [Heart] [Info] |
| System dock updated | Network Switch SN#23GZC19S1 | Informational | Alert | Aug 26, 2012 9:27:25 PM | [X] [Heart] [Info] |
| System dock updated | Network Switch SN#23GZC19S2 | Informational | Alert | Aug 26, 2012 9:27:17 PM | [X] [Heart] [Info] |

2521 - 2532 of 39687 items

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This slide gives you a sampling of system events that are surfaced. Notice you can filter on “event text,” “type,” “severity,” and “category” to see a subset of the events. You also have an option to download the events to a .csv file and you can select multiple events and delete them. The actions over on the right allow you to delete individual events, add a comment or see the event details. The two events highlighted in the middle of the slide show you a critical problem that you will need to call support about and a minor problem that can be resolved by you. The event in the “Call support” category also has a link to the problem that was created for it. The other events shown are informational only. Again, remember the two icons on the top right, by default, will take you to a filtered set of events that have occurred in the last 24 hours.

Problems

Combination of SNMP special events and internal flags

The screenshot shows the IBM PureApplication System interface. A dropdown menu for 'System' is open, with 'Problems' selected. The main content area displays a table of system problems. The table has columns for 'Status', 'Created On', and 'Action'. The 'Created On' column is highlighted in yellow. The table contains several rows of error events, including 'Authorization failure' and 'Unexpected internal error'.

| Status | Created On | Action |
|--------|-------------------------|--------|
| Open | Jun 29, 2012 1:51:00 AM | [Icon] |
| Open | Jun 26, 2012 4:14:46 AM | [Icon] |
| Open | Jul 20, 2012 3:23:32 AM | [Icon] |
| Open | Jun 5, 2012 1:49:45 PM | [Icon] |
| Open | Jul 25, 2012 8:42:04 AM | [Icon] |
| Open | Jul 13, 2012 9:18:26 AM | [Icon] |
| Open | Jul 12, 2012 9:18:22 AM | [Icon] |
| Open | Jul 24, 2012 2:52:18 PM | [Icon] |

The “Problems” menu option under “System” shows you a list of problems with the system that you might think about opening a PMR for. What you are shown here are a combination of SNMP special events and internal flags that have been raised. Note you can filter on the status or look at problems for a particular machine. You are also able to sort on the various columns such as “Created On” which is highlighted on the slide.

Hardware infrastructure map

The next section will introduce you to the hardware infrastructure map.

Hardware infrastructure map

- Hardware infrastructure map graphically shows the entire rack and its components with overlays of important information that helps in some troubleshooting and performance issues
- Go to **System Console > Hardware > Infrastructure Map**
 - Hardware administration permissions required
- Two views available – graphical view and tree view



The hardware infrastructure map shows the entire rack and its components in a graphical way. Hardware administration permissions are required to see this option. There are overlays of important information that can help in troubleshooting problems as you will see on the next few slides.

Hardware infrastructure map – Default

The screenshot displays the IBM PureApplication System Hardware Infrastructure Map in its default Graphics View. The interface is divided into several sections:

- Legend (Left):** A list of filters to overlay on the rack, including All, Critical, Warning, CPU utilization, Memory utilization, Storage utilization, Network utilization, Virtual machines, and Volumes. A "Toggle legend" button is located above this list.
- System Overview (Center):** A graphical representation of the PureApplication System rack, showing various components like Compute Nodes and Storage Nodes. A red box highlights a specific Storage Node.
- Component Details (Right):** A detailed view of the selected Storage Node (78N02YV), showing its status (Available), type (Storage Node), firmware (3.0.2), capacity (811 TB), and free capacity (41 TB). Below this is a table of disk bay states.
- Navigation and Settings (Top):** A "Show Component Name" toggle switch is visible, along with "Refresh" and "Switch to Tree View" buttons.

Yellow callout boxes provide additional context: "Toggle legend" points to the legend list, "Options to overlay on the rack" points to the legend filters, "Rack and its component" points to the central rack view, and "Attributes of selected component" points to the detailed view of the Storage Node.

You will first look at the graphical view as shown on the slide. Notice over on the left is a legend of what you are showing on the map. You can limit what is shown by clearing the check box for that particular option. You can also toggle the legend from showing using the “toggle legend” button shown on the top left. The PureApplication system is shown just as it is set up, with all the hardware showing exactly where it is placed in the system. On the slide here, a storage node is highlighted on the slide so the attributes for that particular component are shown over on the right. There is also a hyperlink there to take you to its definition in the hardware menu. The “Show Component Name” toggle switch determines whether the component names show to the right and left of the box. This is showing the default view of PureApplication System. You see there are numbers under each of the options being shown. This gives you an idea at a quick glance what components might be having a problem.

Hardware infrastructure map – Status

The screenshot displays the IBM PureApplication System Infrastructure Map in Graphics View. The main interface shows a server rack with various components. A red box highlights a specific Storage Node (78N02YV). To the right of the rack, a detailed status panel for this node is visible, also highlighted with a red box. The panel includes a Summary section with fields for Status (Available), Type (Storage Node), Firmware (6.3.0.2), Capacity (21.811 TB), and Free Capacity (12.041 TB). Below this is a Status section showing Critical (21), Warning (3), and Information (0) events. At the bottom of the panel is a Detail table listing 18 bays, each with a state (green checkmark), capacity (558.411 GB), and type (Hard drive disk).

Legend

- All
- Critical
- Warning
- Information

System: PureApplication System

Storage Node: 78N02YV

Summary

- Status: Available
- Type: Storage Node
- Firmware: 6.3.0.2
- Capacity: 21.811 TB
- Free Capacity: 12.041 TB

Status

- Critical: 21
- Warning: 3
- Information: 0

Detail

| Bay State | Capacity | Type |
|--|------------|-----------------|
| 1 <input checked="" type="checkbox"/> | 558.411 GB | Hard drive disk |
| 2 <input checked="" type="checkbox"/> | 558.411 GB | Hard drive disk |
| 3 <input checked="" type="checkbox"/> | 558.411 GB | Hard drive disk |
| 4 <input checked="" type="checkbox"/> | 558.411 GB | Hard drive disk |
| 5 <input checked="" type="checkbox"/> | 558.411 GB | Hard drive disk |
| 6 <input checked="" type="checkbox"/> | 558.411 GB | Hard drive disk |
| 7 <input checked="" type="checkbox"/> | 558.411 GB | Hard drive disk |
| 8 <input checked="" type="checkbox"/> | 558.411 GB | Hard drive disk |
| 9 <input checked="" type="checkbox"/> | 558.411 GB | Hard drive disk |
| 10 <input checked="" type="checkbox"/> | 558.411 GB | Hard drive disk |
| 11 <input checked="" type="checkbox"/> | 558.411 GB | Hard drive disk |
| 12 <input checked="" type="checkbox"/> | 558.411 GB | Hard drive disk |
| 13 <input checked="" type="checkbox"/> | 558.411 GB | Hard drive disk |
| 14 <input checked="" type="checkbox"/> | 558.411 GB | Hard drive disk |
| 15 <input checked="" type="checkbox"/> | 558.411 GB | Hard drive disk |
| 16 <input checked="" type="checkbox"/> | 558.411 GB | Hard drive disk |
| 17 <input checked="" type="checkbox"/> | 558.411 GB | Hard drive disk |
| 18 <input checked="" type="checkbox"/> | 558.411 GB | Hard drive disk |

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Looking at the same component here, you see the status option which restricts the output to the critical, warning and informational events reported for that component.

Hardware infrastructure map – LED

The screenshot displays the 'Infrastructure Map (Graphics View)' for a 'PureApplication System'. The interface includes a legend on the left with options for All, Power, Event, Location, and Fault. The main area shows a rack of server nodes. A specific compute node, SN#23AWT80, is highlighted with a red box. To the right of the rack, a detailed view for this node is shown, including a 'Summary' section with status 'Available' and various hardware details, and an 'LED' section showing 'Location: off' and 'Fault: off'. Below the LED section is a 'Charts' area with a 'CPU Utilization (%)' graph.

System: PureApplication System

Refresh Switch to Tree View

Default Status LED Temperature Performance Show Component Name

Legend

- All
- Power
- Event
- Location
- Fault

Compute Node: SN#23AWT80

Summary

Status: Available

Machine type: 8737

Serial number: SN#23AWT80

Architecture: AC1

Firmware level: 1A00270 - 05/04/2012 - 1.34

Service processor n/a

level:

Unified extensible B2E113AUS - 04/12/2012 - 1.00

level:

In cloud group: CloudGroupCognos

Health statistics: normal

Successful deploy 0

number:

PVU value: 70

LED

Location: off

Fault: off

Charts

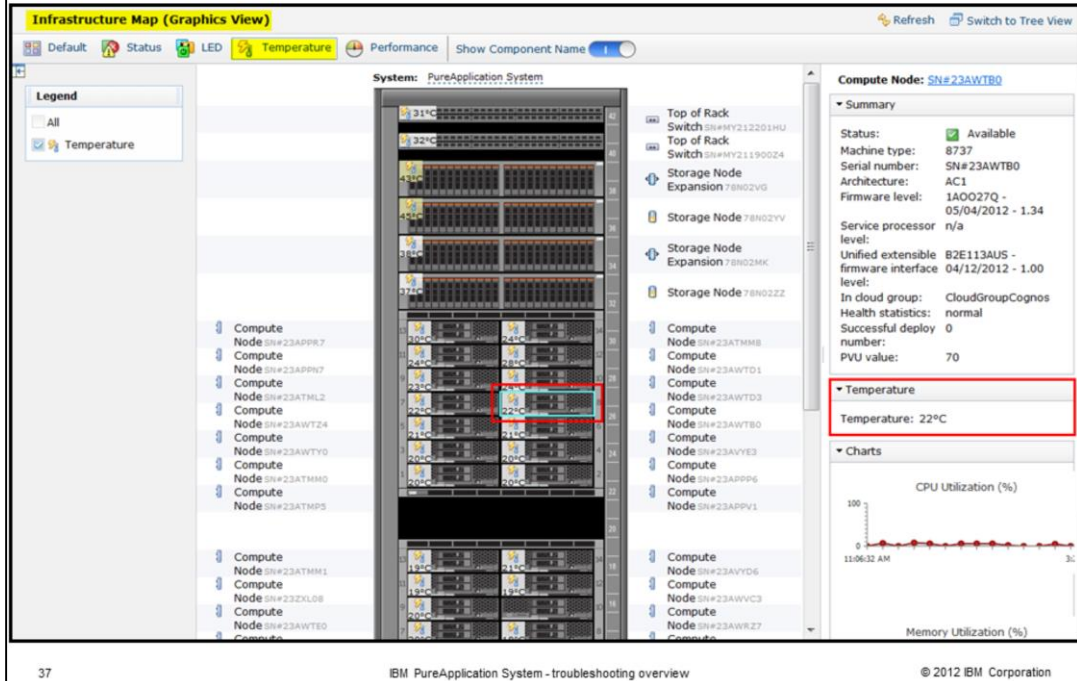
CPU Utilization (%)

11:06:32 AM

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As mentioned earlier, the LED status can also be monitored from the hardware infrastructure map. This is showing the LED status of one of the compute nodes. You can easily see that this particular node is powered on.

Hardware infrastructure map – Temperature



This slide shows the temperatures of the various components in PureApplication System. You can easily see here if something is running hot and needs to be checked out. This is showing one of the compute nodes and its temperature is currently normal.

Hardware infrastructure map – Performance

Switch to tree view

Performance

- CPU utilization: 8%
- Memory utilization: 12%
- Virtual machines: 5

Charts

CPU Utilization (%)

100
0
11:23:13 AM

Finally, you can easily check the performance of the system. This is showing the same compute node as you saw on the previous slides and you can easily see that it currently has five virtual machines hosted on it and the processor and memory utilization are low.

Now that you have briefly looked at each of the options for the hardware infrastructure map, you will quickly see the 'tree view' option on the next slide. In order to switch to the tree view, you need to click the hyperlink in the top right corner of the screen.

Hardware infrastructure map – Tree view

The screenshot displays the 'Infrastructure Map (Tree View)' for a specific compute node, SN#23AWT80. The left sidebar shows a tree of infrastructure components, with the selected node highlighted. The main panel provides detailed information for this node, including events, jobs, power status, energy information, location, and health statistics. Red boxes highlight specific areas of interest: the Events section (showing 1 error and 2 warnings), the Power status (Available), the Temperature section (Ambient: 22°C, Maximum Ambient: 33°C), and the Events link.

| Section | Value |
|--------------------------|--|
| Events | Error: 1, Warning: 2 |
| Jobs | Pending jobs: 0, Started Jobs: 0 |
| Type | Compute Node |
| Power status | Available |
| Energy information | Input power range: 122W - 162W, Average input: 126W |
| Location | Rack 8283/RDX01 > Chassis 3 > Node Bay 8 |
| In cloud group | (none) |
| Compute Node Information | Serial Number: SN#23AWT80 |
| State | State: Available |
| Temperature | Ambient Temperature: 22°C, Maximum Ambient Temperature: 33°C |
| Health statistics | Health status: Normal, Core temperature warning number: 0, Error LED number: 0, Hardware inventory warnings number: 1, VMS inventory warnings number: 0, Successful deploy number: 0, Deploy number: 0 |
| Physical cores | 35% (5.50 / 16 allocated), 0% (0 / 16 used) |
| Physical memory | 38% (95.273GB / 255.976GB allocated), 12% (28.964GB / 255.976GB used) |

This slide shows the same compute node as the last slide but from the tree view. Some of the information is highlighted here that you saw earlier such as power status, temperature and events.

Section

Summary

This section will give a brief summary of this presentation.

Summary

- IBM PureApplication System has many built-in facilities that help debug system problems in hardware and system software
 - Logs
 - Events
 - Problems
 - Hardware infrastructure map
 - IBM customer engineer account access

IBM PureApplication System has many facilities to help troubleshoot system problems which you looked at briefly in this presentation. This includes logs, events, problems and the hardware infrastructure map. You also saw an option to allow an IBM customer engineer to gain access to do some deeper system level troubleshooting of a problem.

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