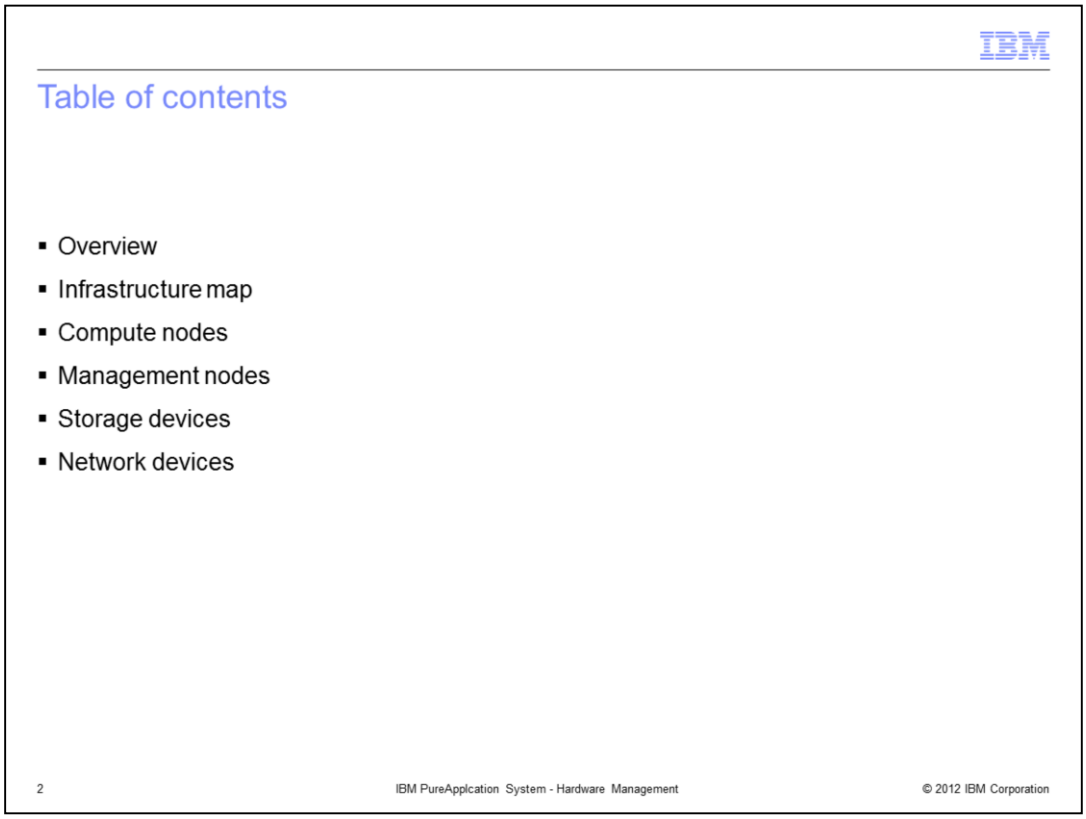
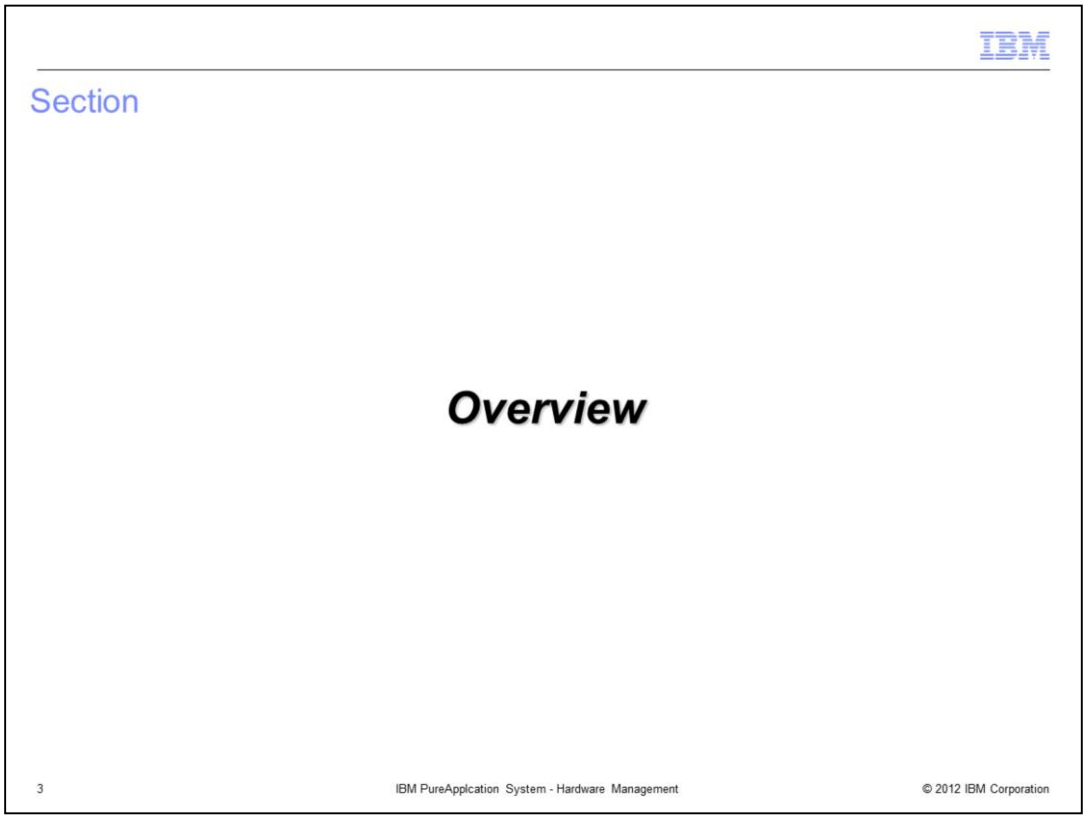
IBM PureApplication System

Hardware management

This presentation will cover the hardware management functions in IBM PureApplication System.



This presentation covers the infrastructure map, compute nodes, management nodes, storage devices and network devices in PureApplication System.



The first section of this presentation is a brief overview of the managed hardware components.

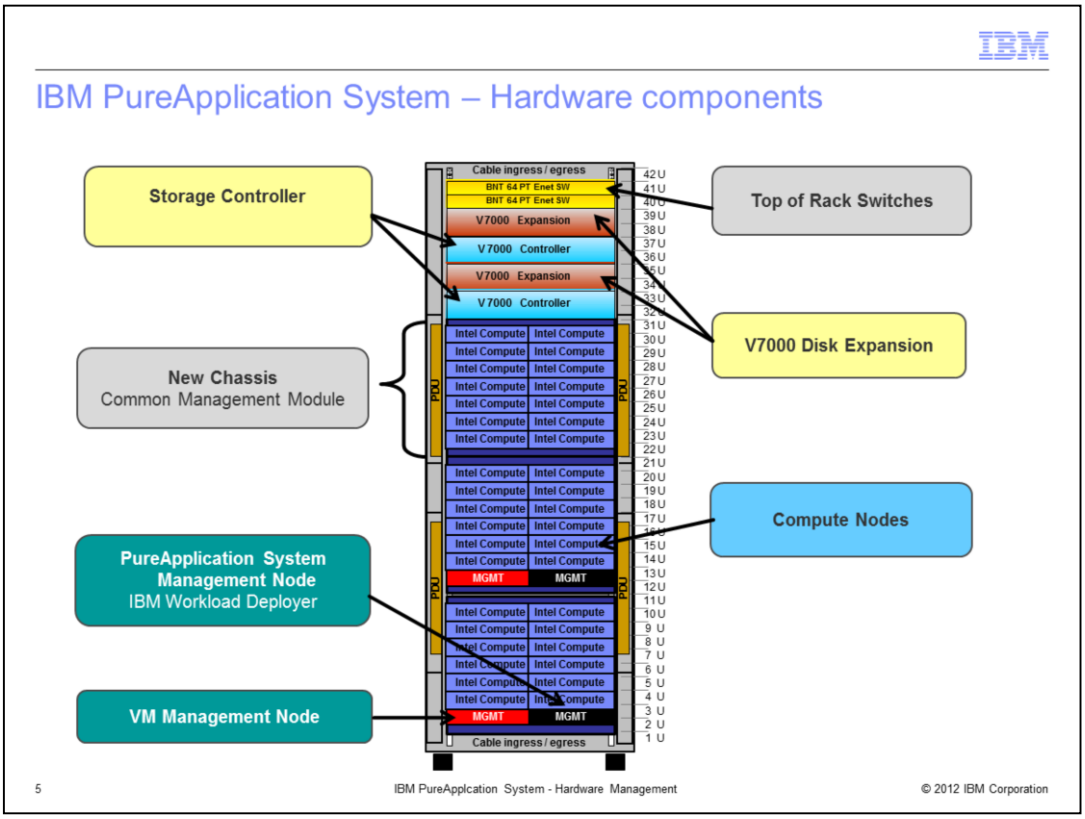
Overview

- Hardware related information, operations and configurations
  - Infrastructure map
  - Compute nodes
  - Management nodes
  - Storage devices
  - Network devices
- Requires Hardware Permission (Read or Full)
- Compute and management node panels allow some operations
- Infrastructure map, storage devices, and network device panels only display information

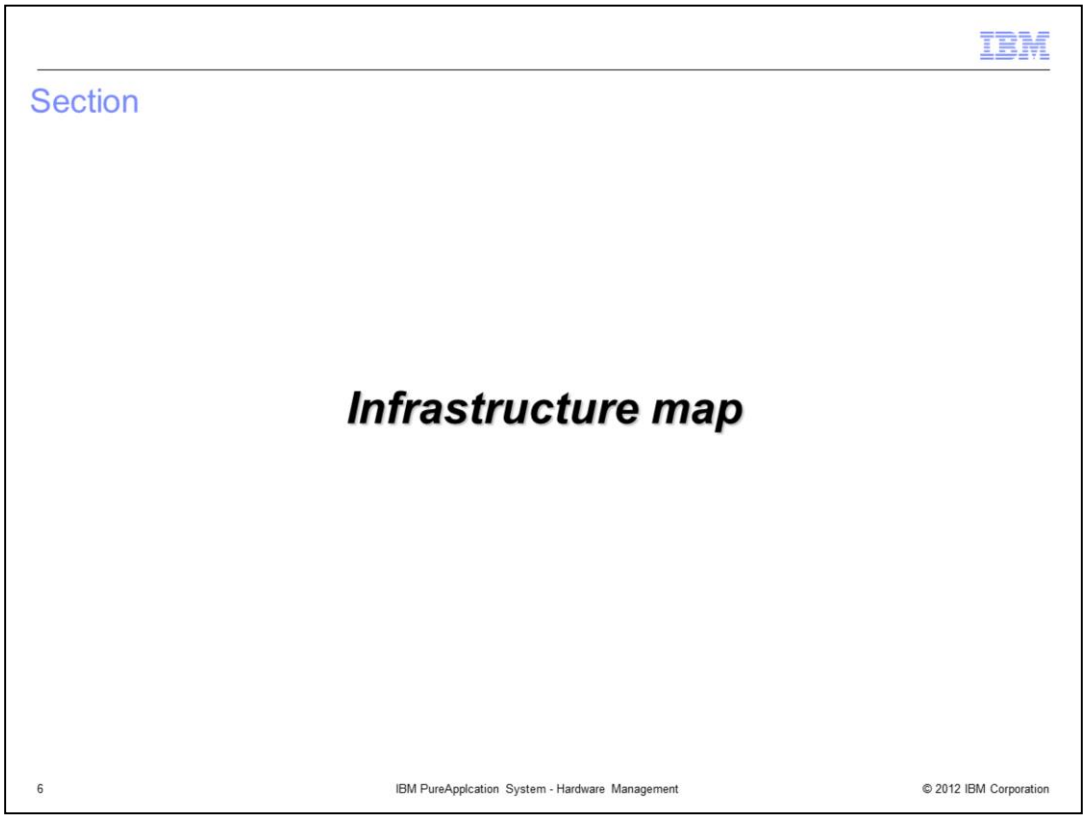
The five mentioned hardware components are accessed from the administrative console by navigating to the system console, and then selecting the Hardware tab. Here you will see the options for the infrastructure map, compute nodes, management nodes, storage devices, and network devices.

The permission required to see these options is Hardware Permission. Hardware Read Permission allows you to view these resources, and Hardware Full Permission allows you to update these resources. Note however that even with Hardware Full Permission, there are a very limited number of operations that you are allowed to access.

For the infrastructure map, storage devices, and network devices, there are no operations available to the user outside of viewing information. For compute nodes and management nodes, there are some update capabilities available to the user, and they are discussed later in this presentation.



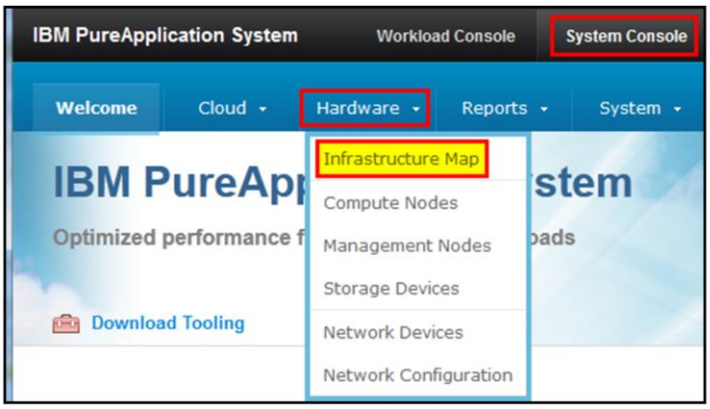
Seen here is a high-level visual overview of the hardware components of the PureApplication System. There are the storage and storage expansion controllers, top of rack switches, management nodes, compute nodes, and three chassis. All components have redundancy for high availability. This presentation will review the panels available to you to manage each of these hardware components. Additionally it will discuss the infrastructure map that is available to view the status of all these components.



This section covers the infrastructure map.

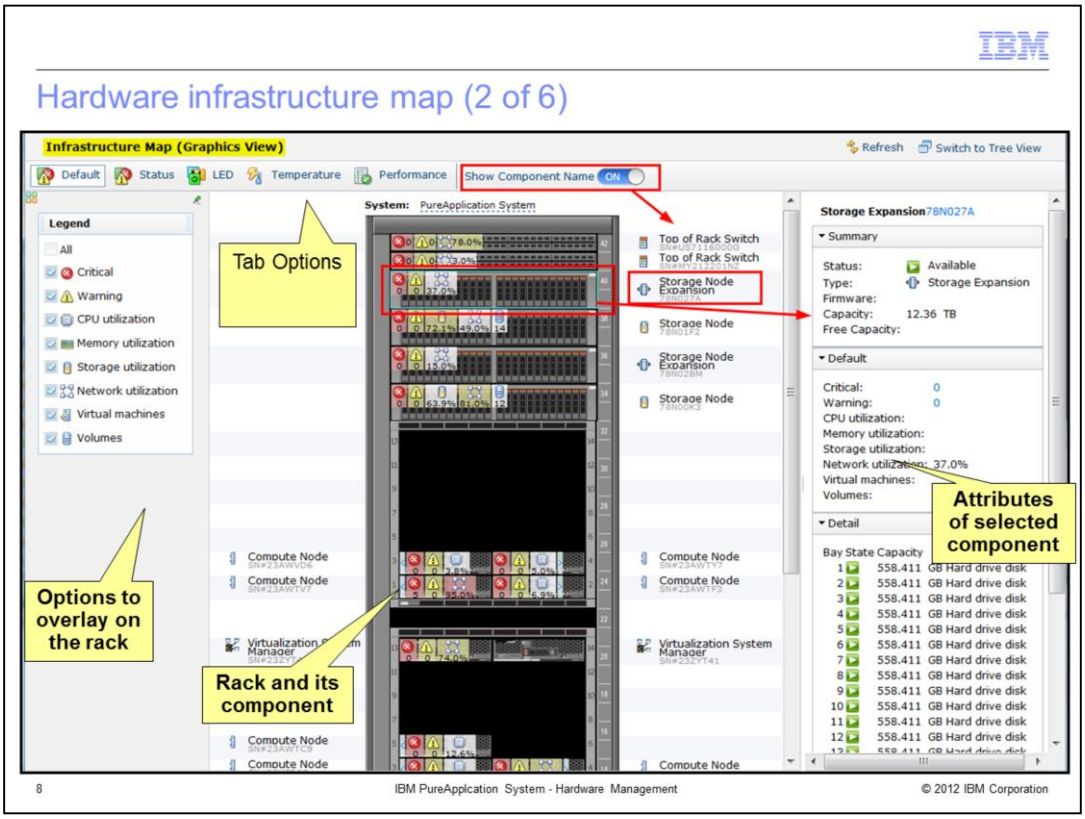
Hardware infrastructure map (1 of 6)

- Hardware infrastructure map graphically shows the entire rack and its components with overlays of important information that helps in some troubleshooting and performance issues
- Navigate to **System Console ➔ Hardware ➔ Infrastructure Map**
- Graphics view and tree view available



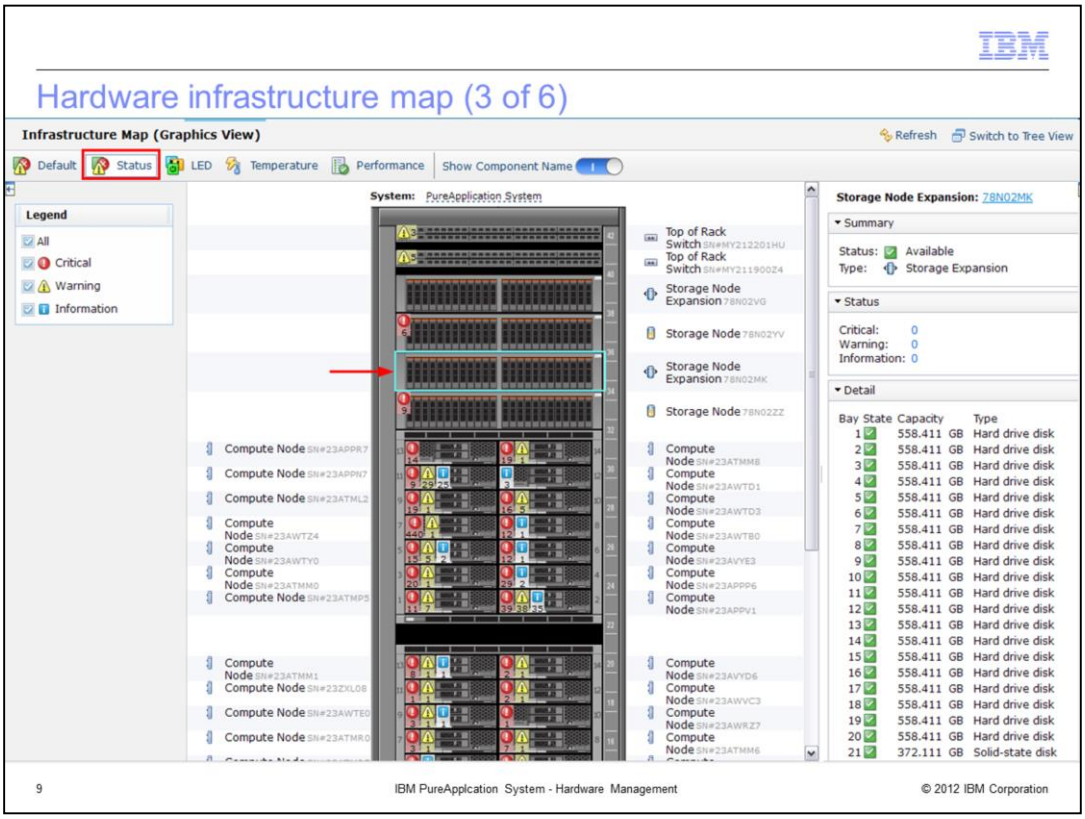
The hardware infrastructure map provides a graphical view of the entire rack and its components, providing critical information about the state of the rack. There are two views available, a graphics view and a tree view.

To view the hardware infrastructure map, navigate to the hardware menu in the system console, and select infrastructure map.

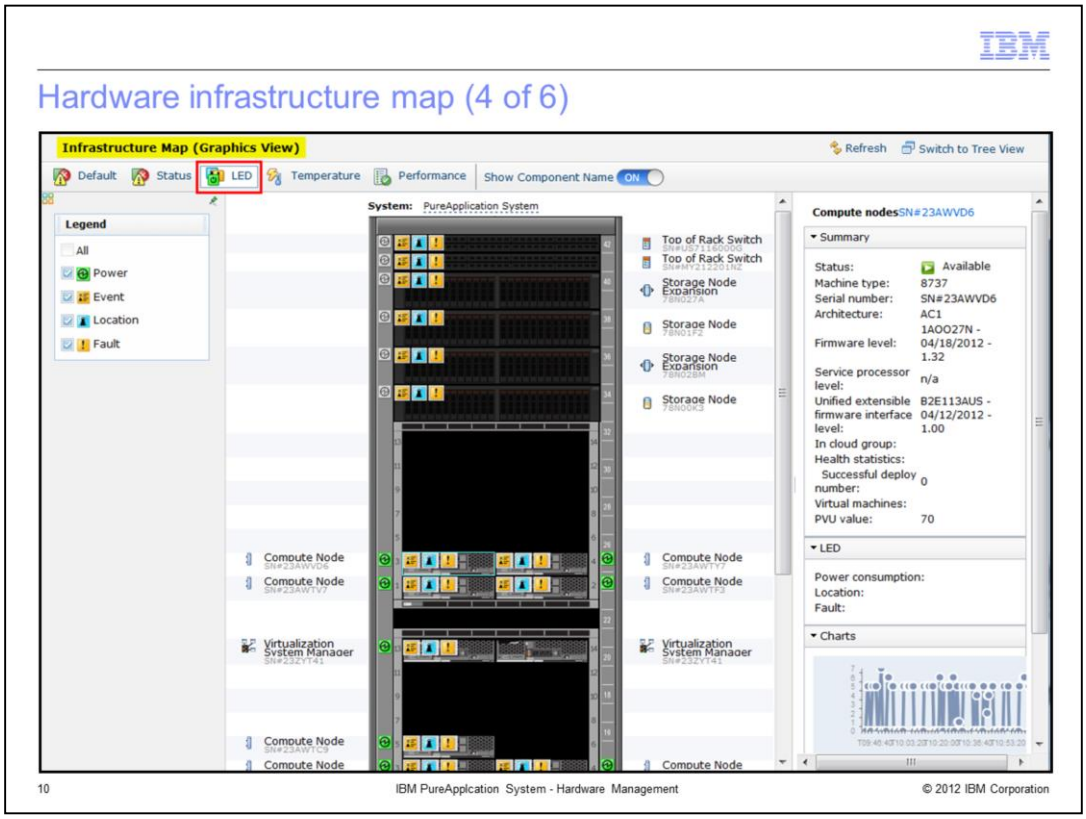


The graphical view of the infrastructure map is shown here. It has three sections to it. In the middle is the rack itself, with various system information about all of the compute nodes and other components. On the left is the legend, which provides different options for the system information that is overlaid in the middle section. On the right is the detailed system information for the selected component.

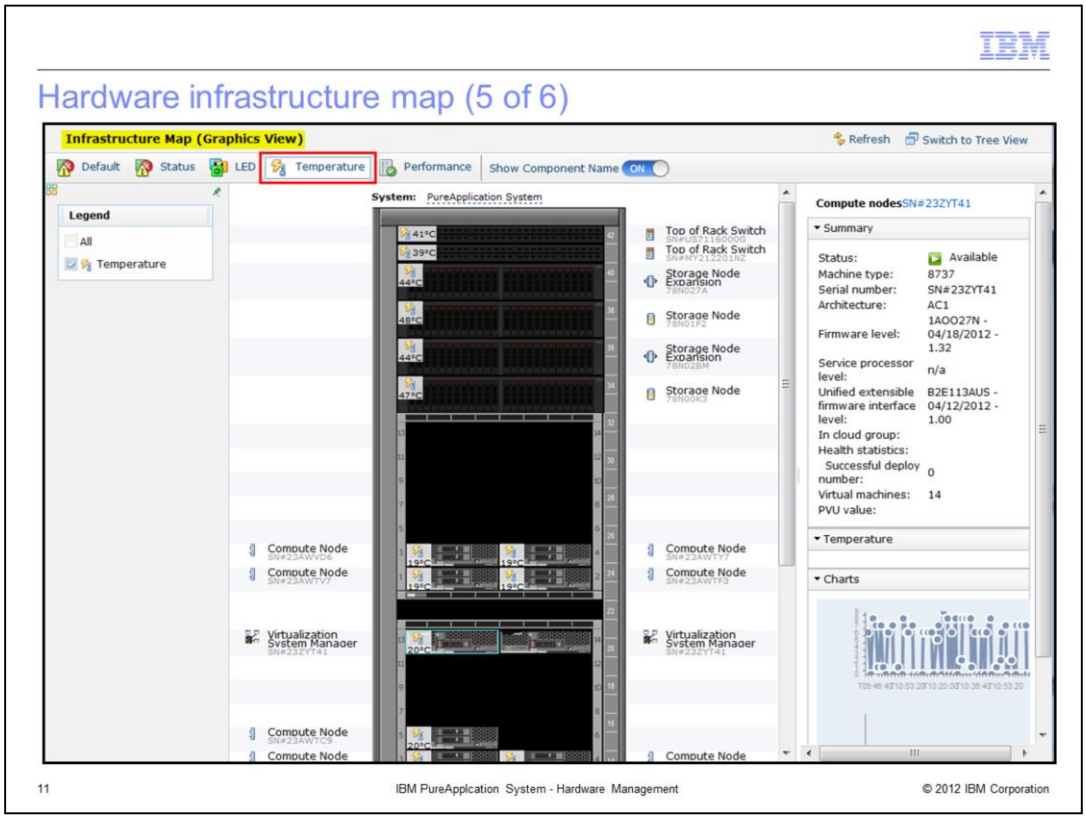
On top of the screen are multiple tab options which, when selected, provide customized legends. This view shows the default tab option. When you are in one of these tabs, you can always de-select any of the legend options, but you cannot add new options. Additionally on the same row as the five tab options, there is a show component name button, that can be toggled to either show or remove all the component names on the display.



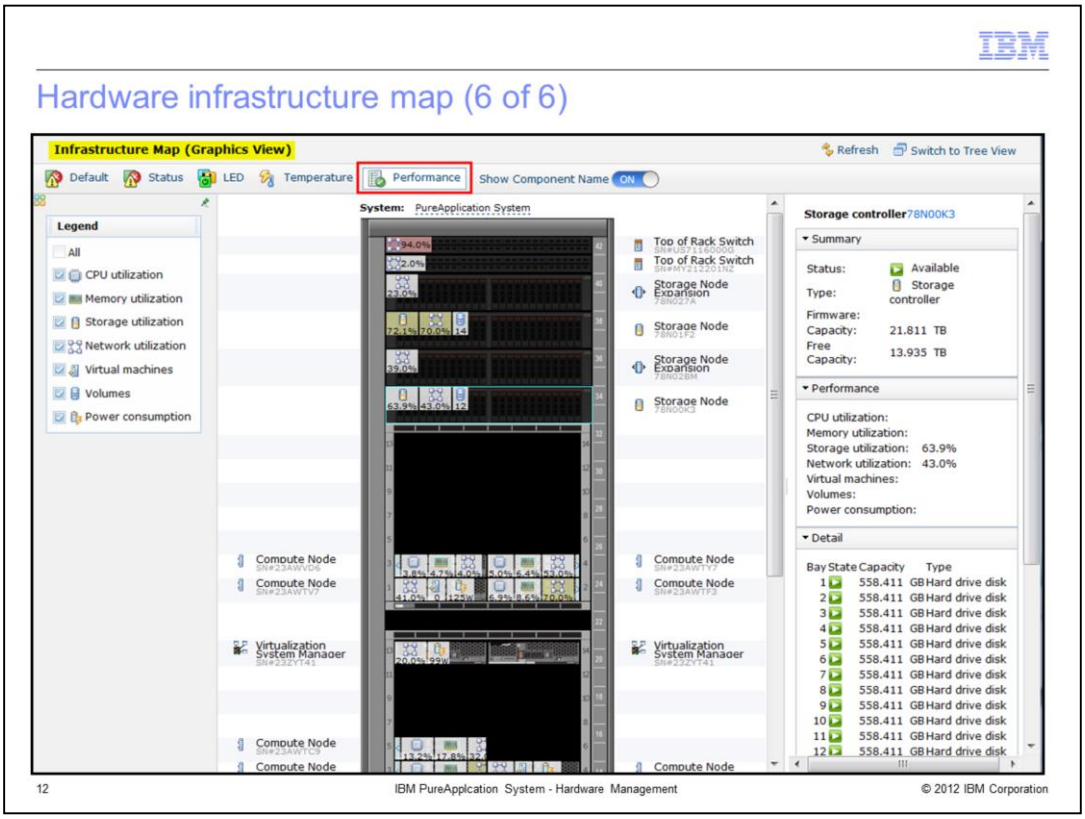
This view shows the status tab option. A storage node expansion controller is selected in the map itself, and the details of that controller are displayed on the right.



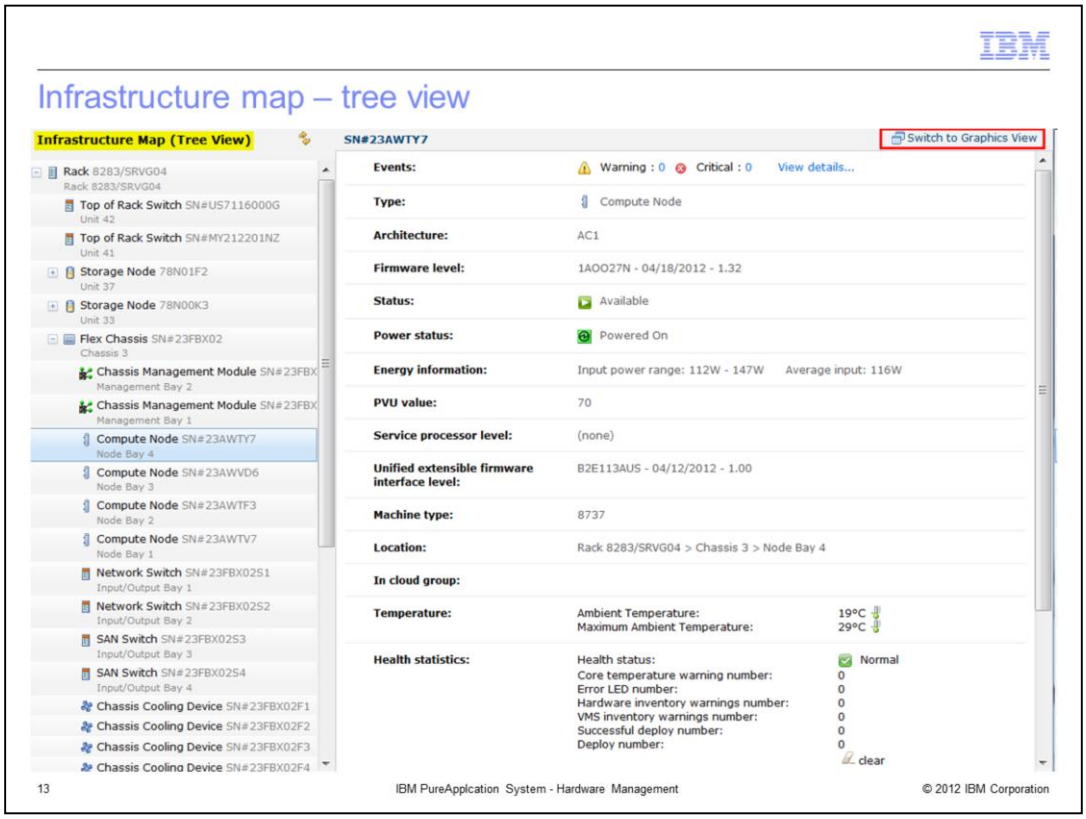
This view shows the LED tab option. A compute node is selected and the details are displayed on the right.



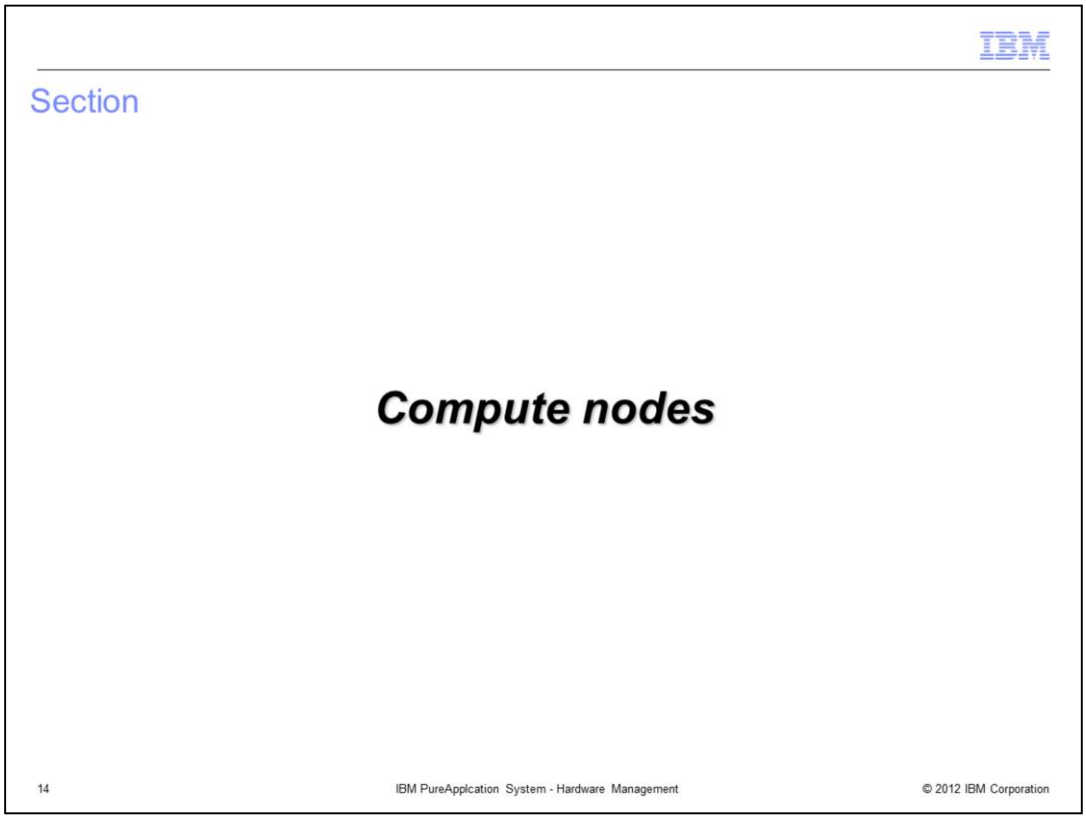
This view shows the temperature tab option. Temperatures for every compute node and other components are displayed here.



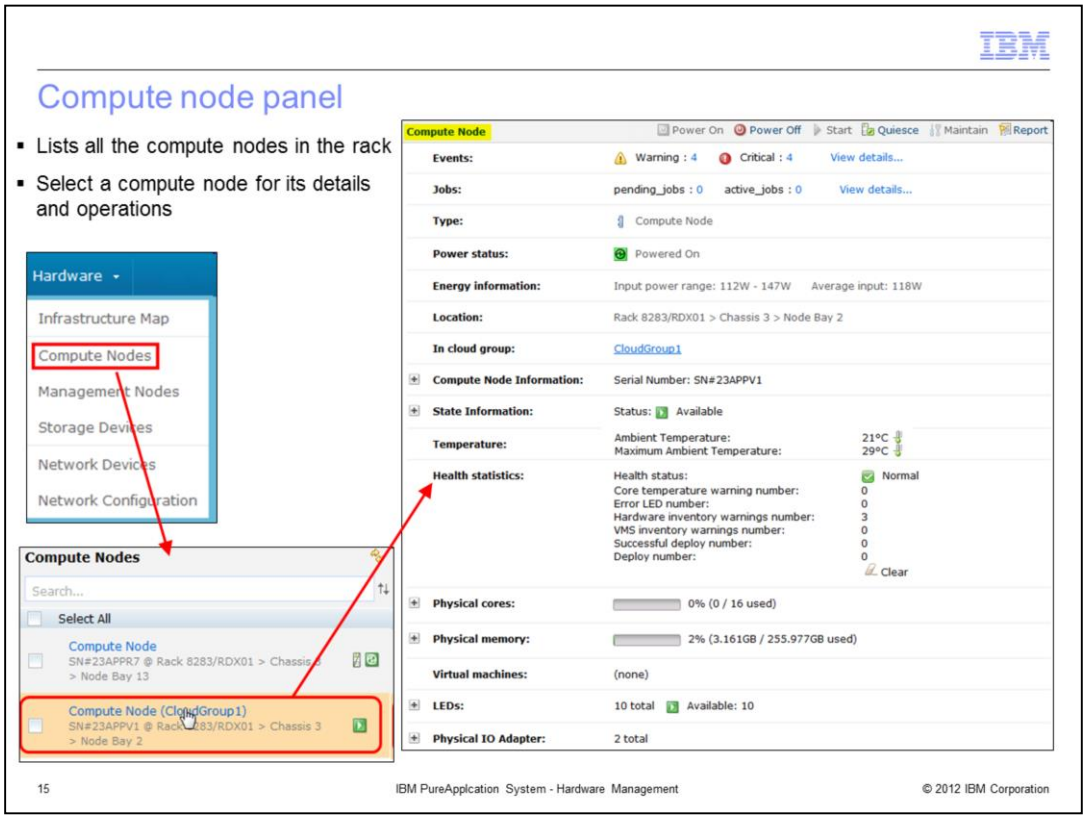
This view shows the performance tab option. Performance details are displayed on the right when one of the top of rack switches, storage controllers, or compute nodes is selected by the user.



In the top right corner is a link to toggle between the graphical view and the tree view. This presents a screen that provides every component available in the expandable sections in the left side of the screen. When a specific component is selected, its details are displayed on the right.



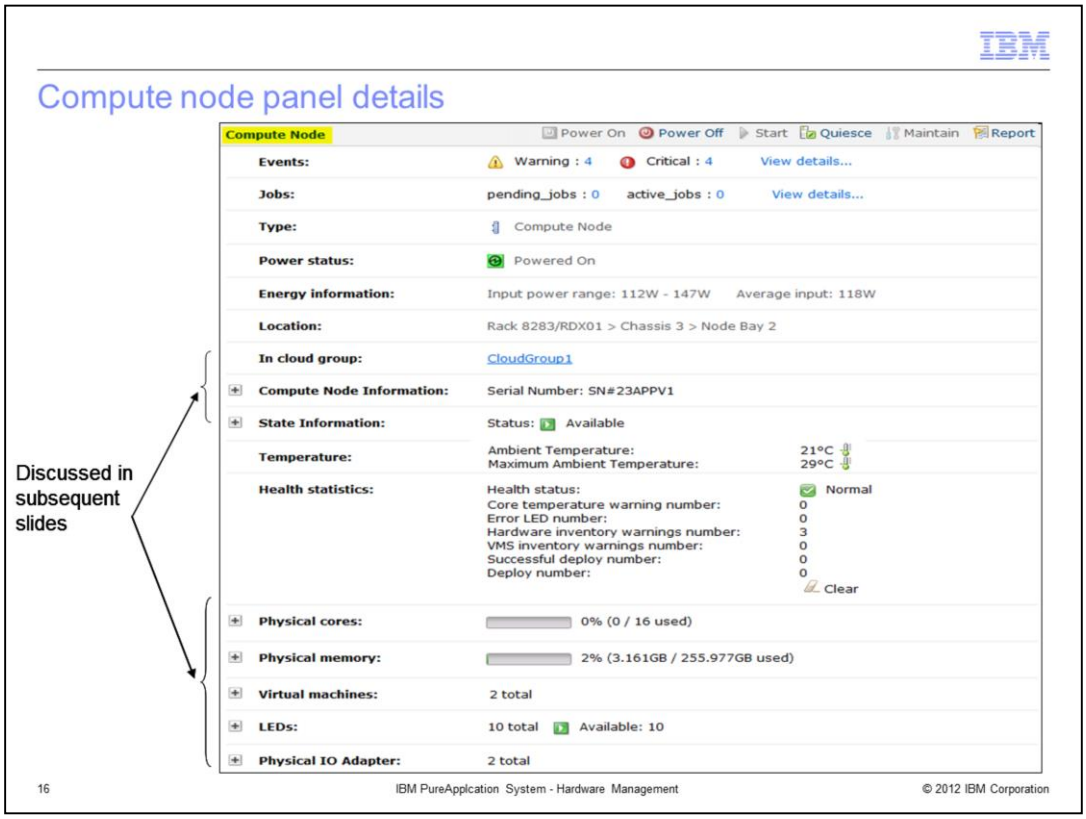
This section covers the compute nodes.



The compute nodes are the processors that have the physical CPU and memory required to run the virtual machines that are deployed to a cloud group. Recall that cloud groups consist of one or more compute nodes, and that a cloud group configuration is done as part of the cloud Configuration process.

To view the compute nodes, navigate to the hardware menu in the system console, and select compute nodes. This will present a list of all the compute nodes in the system. The list itself provides the serial number of the compute node along with its location in the form of the rack name, chassis number and node bay number.

When you click a compute node in the list, you will see the details panel for the compute node, shown here on the right. The details are discussed in the next set of slides.



Here you again see the compute node detail screen, and the fields are discussed here.

The Events field shows the number of warning and critical events for this compute node, with links that take you to the events screen to provide further details about the events.

The Jobs field shows the number of pending and active jobs that are associated with this compute nodes, with links to take you to the job queue screen to provide further details about the jobs.

The Type field identifies this as a compute node.

The Power status field indicates if the node is powered on or off.

The Energy Information field provides you with power consumption statistics.

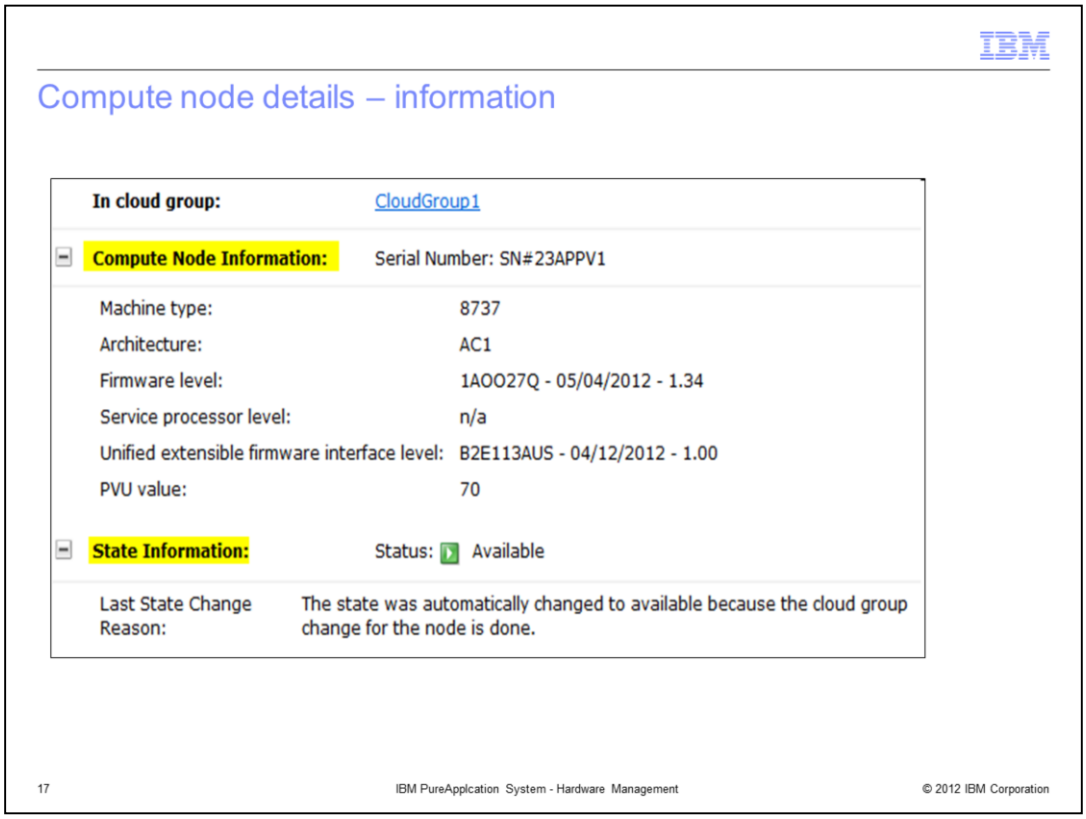
The Location field tells you where the device is located within the rack.

The In cloud group field tells you which cloud group is associated with this compute node. A link is provided to take you to the detail screen for the cloud group.

The next two Information sections are discussed in subsequent slides.

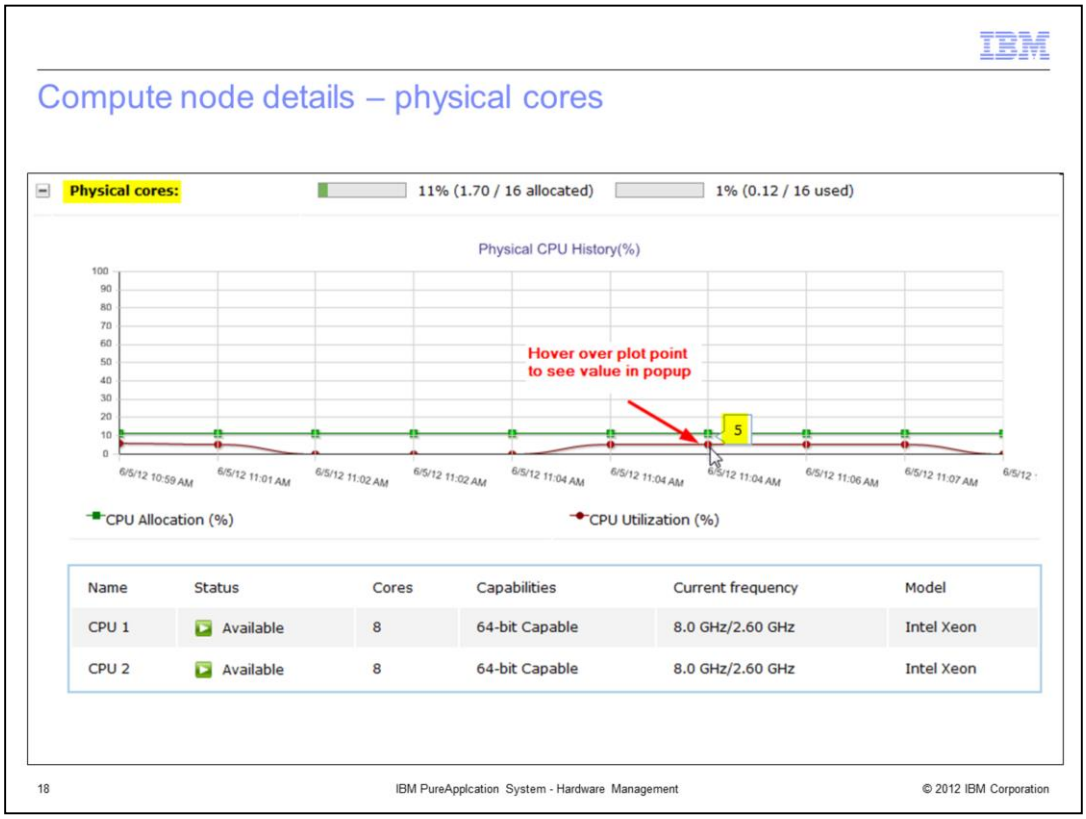
Below that are the Temperature and Health statistics fields.

The remaining five expandable sections are discussed in subsequent slides.



The compute node information section of the detail screen provides the serial number. When expanded, it also provides the machine type, architecture, firmware level, service processor level, unified extensible firmware interface level, and PVU value.

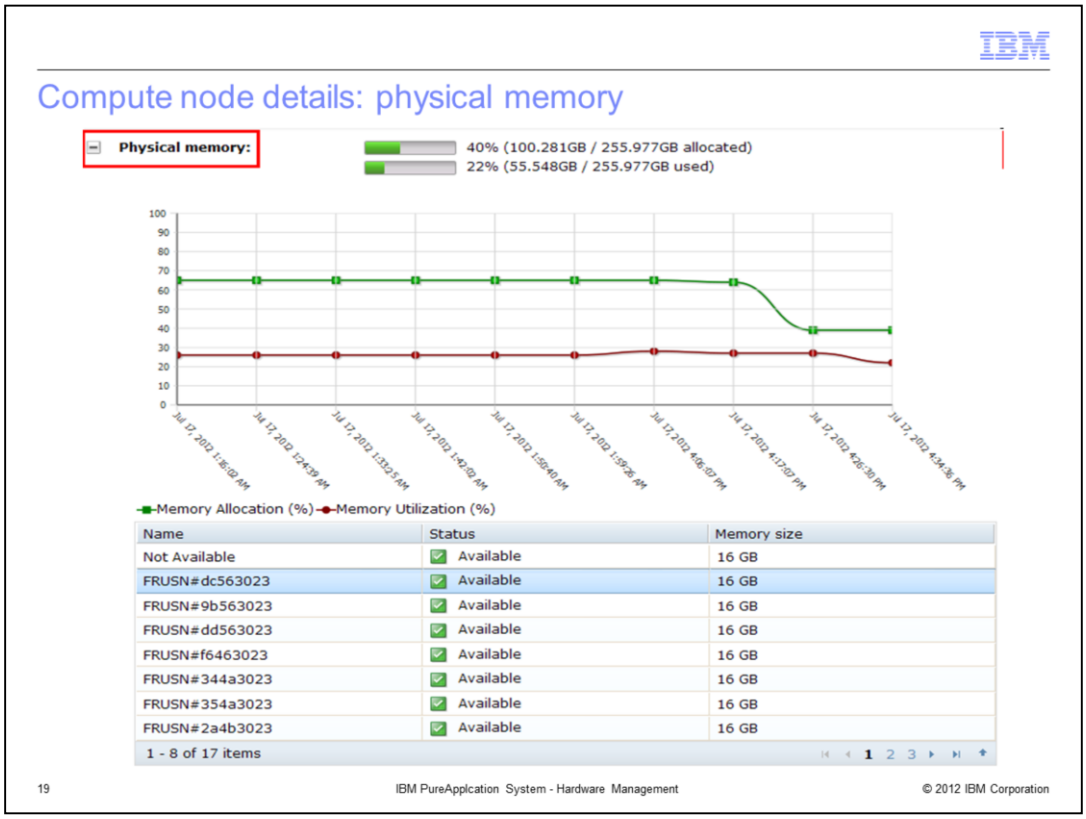
The state Information section provides the state of the compute node. Some example states are available and quiesced. When expanded, it also provides the reason for the last state change.



The physical cores section of the compute node screen provides information about the core usage on this compute node.

When expanded, a graph of the CPU allocation and usage is presented, The graph shows the physical allocation of CPUs to virtual machines on this compute node, and the utilization history. The scale of this graph can vary from minimally 1-minute intervals to larger intervals, depending on when changes in allocation and usage occur. You can hover your cursor over any of the plot points to see the actual values.

At the bottom of the expanded screen is information about the individual CPUs in the compute node, including name, status, number of cores, addressing capabilities, current frequency, and model.



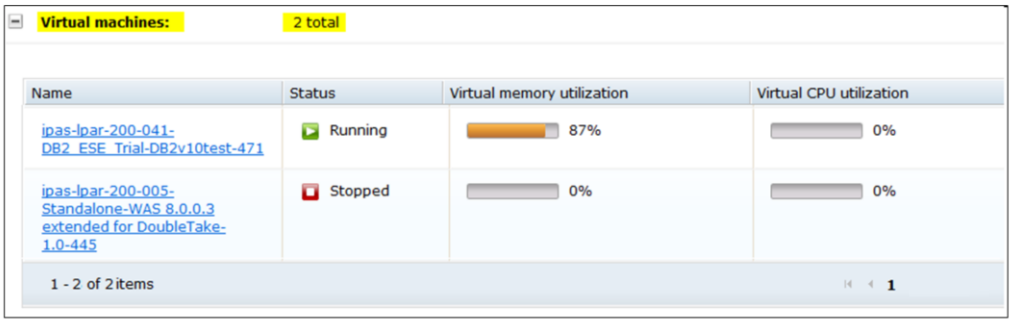
The physical memory section of the compute node screen provides information about the physical memory allocation and usage on this compute node.

When expanded, a graph of the memory allocation and usage is presented. The scale of this graph is the same as on the physical cores graph seen on the previous slide. You can hover your cursor over any of the plot points to see the actual values.

At the bottom of the expanded screen is a list of memory modules in the compute node, with their name, status and size.

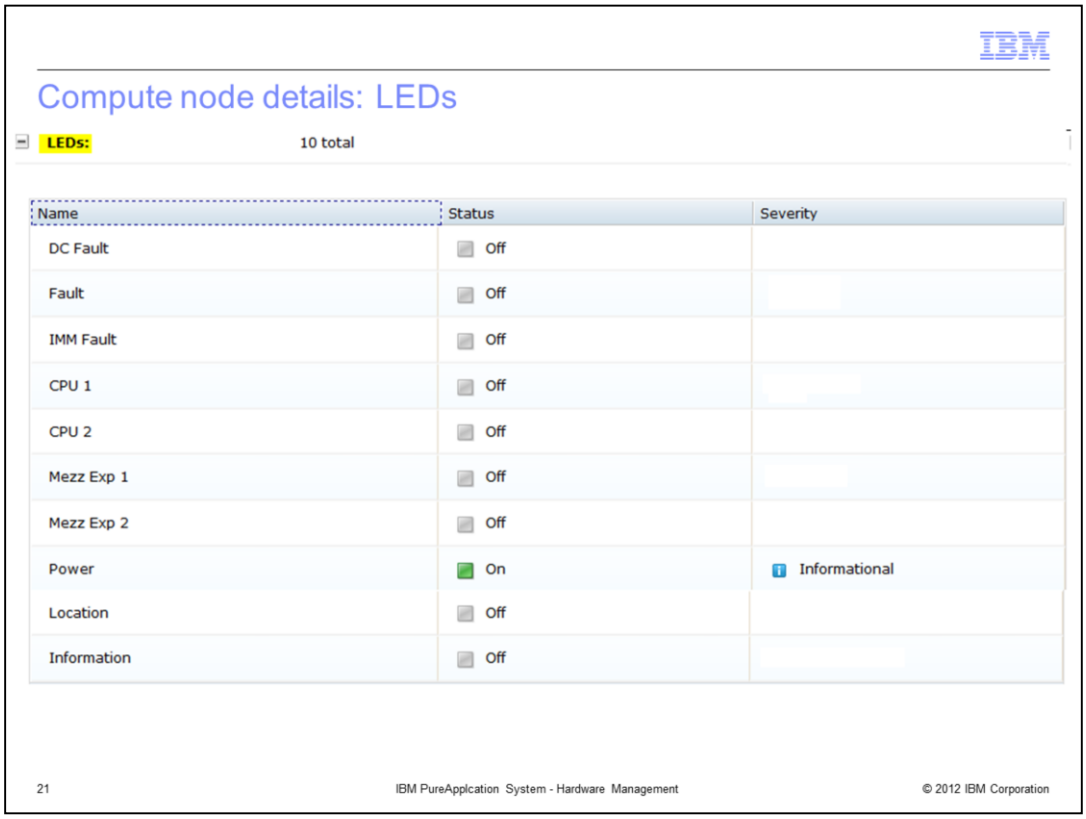
Compute node details: virtual machines

- Lists information about all virtual machines running on this compute node

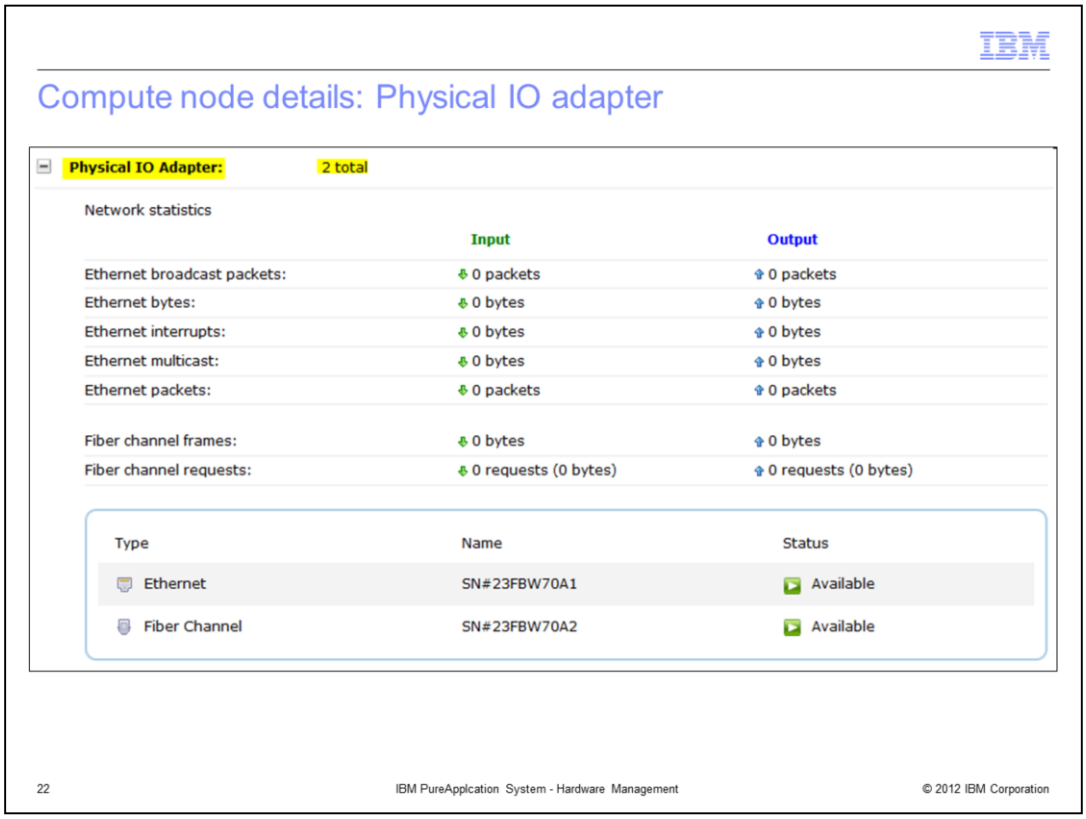


The virtual machines section of the compute node details screen shows you the total number of virtual machines running on that compute node. When expanded, more details about the virtual machines are provided, including virtual machine name, status, virtual memory utilization, and virtual CPU utilization.

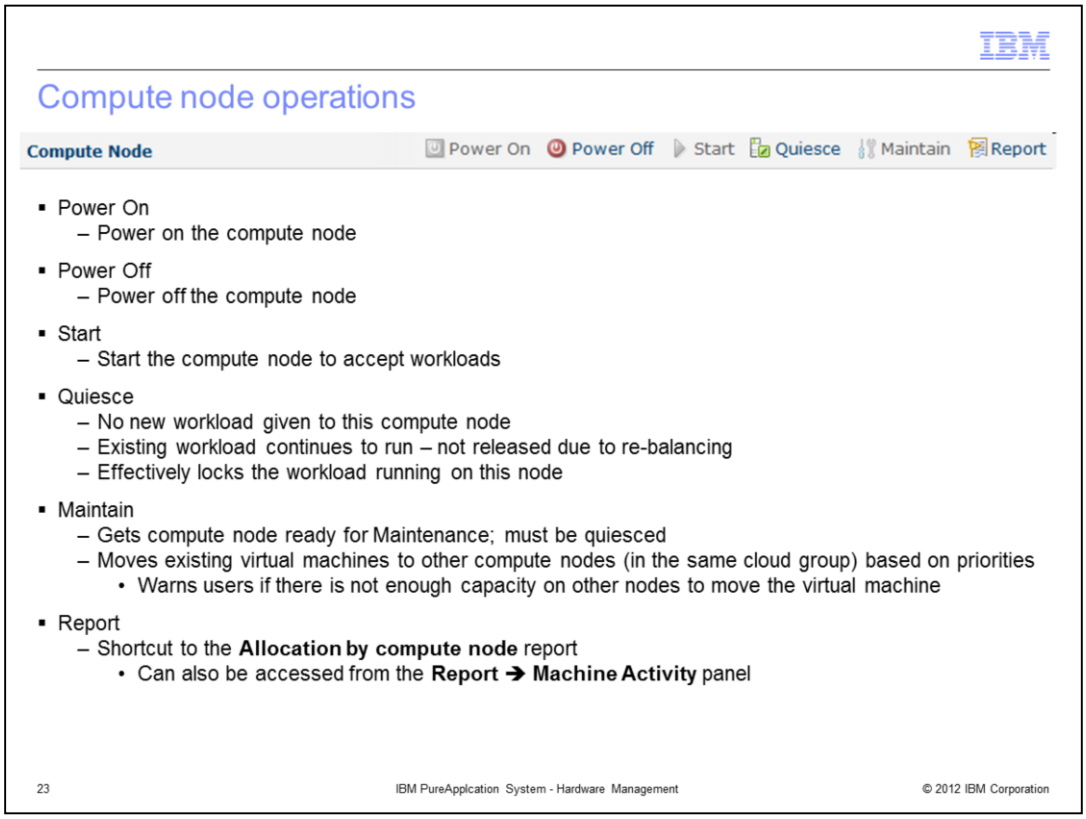
Links are provided in the name column to take you directly to the virtual machine detail screen.



The LEDs section of the compute node details panel displays the number of LEDs available. When expanded, more details are provided, the LED name, status of the LED, if the LED is illuminated, and the severity of that specific LED indicator. In this example, only the power LED is illuminated for this compute node, which show a severity of informational.



In the last section of the compute node details screen, you see the physical IO adapter section that shows the number of adapters. When expanded, you see network statistics for the ethernet broadcast packets, ethernet bytes, ethernet interrupts, ethernet multicast, ethernet packets, fiber channel frames and fiber channel requests. Below that you see a summarized list of the types of connections supported. In this example, you see that ethernet and fiber Channel are supported, along with their connection name and status.



The compute node detail screen has function icons at the top of the screen called power on, power off, start, quiesce, maintain, and report. For compute nodes, these are the only operations a user with full hardware permissions can undertake.

The power on icon allows you to turn the compute node on, but the node will not yet start accepting workload.

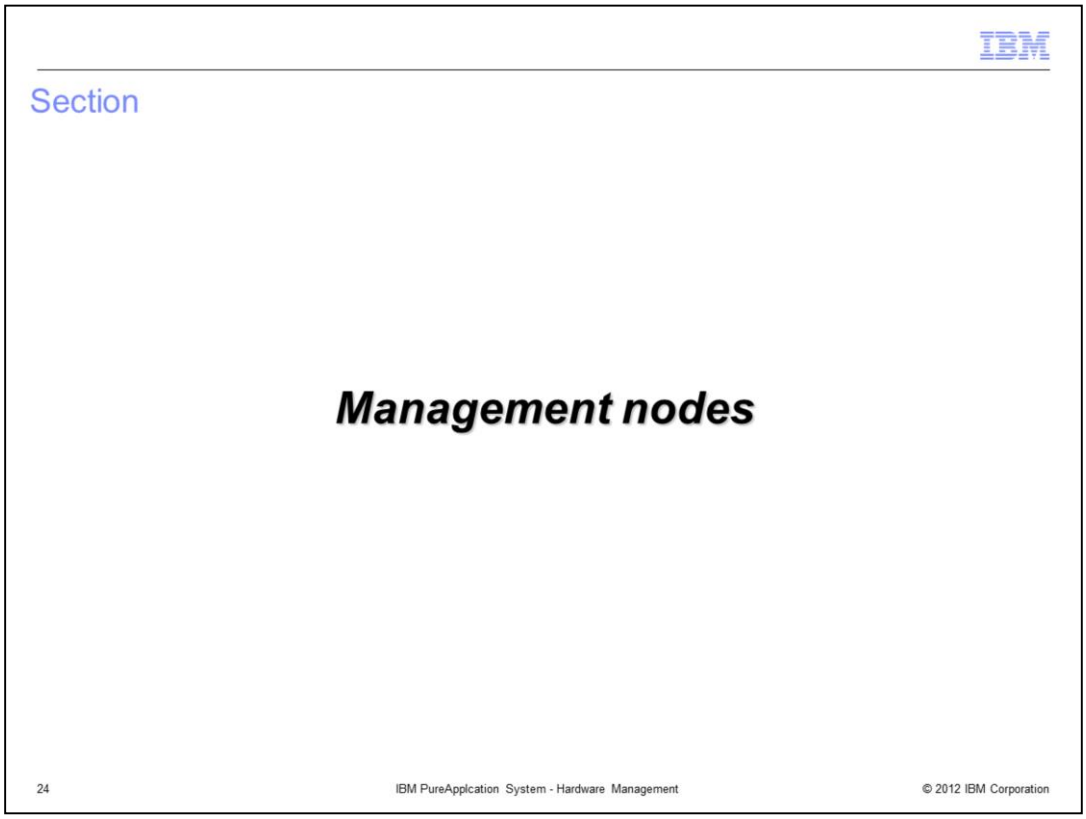
The power off icon allows you to turn off the compute node.

The start icon is available only when the compute node is powered on. The start icon will allow the compute node to accept new workloads and be included in the re-balancing process. It will also take a compute node out of quiesce mode.

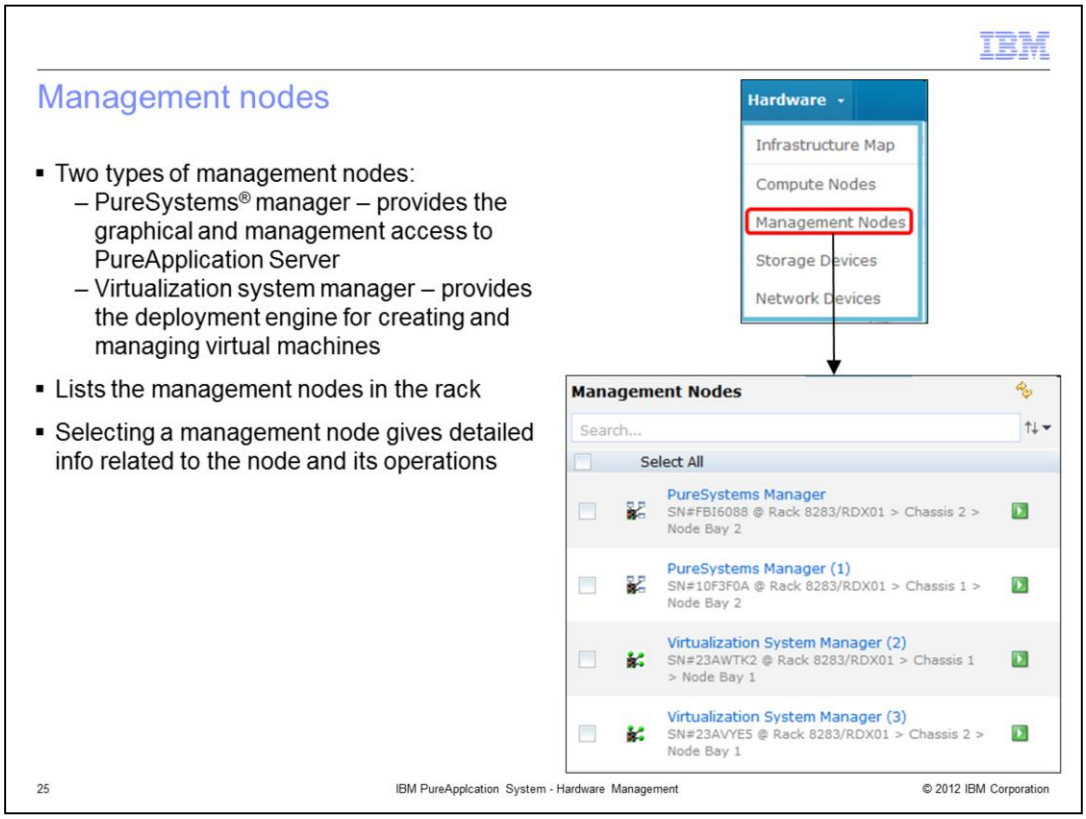
The quiesce icon indicates that this compute node can continue running existing workloads, but is not to accept any new work loads nor to release any workloads due to re-balancing. An important use case for quiesce is when you are satisfied with the performance of a set of applications on this node and do not want to change the throughput characteristics by adding or releasing any work loads.

The maintain icon allows you to ready the compute node for maintenance, causing PureApplication Server to move existing virtual machines to other compute nodes in the same cloud group, assuming there is capacity to do so. You are warned if there is not enough capacity on other nodes to move the virtual machines. The compute node must be quiesced before it can be put into maintenance mode.

The report icon is a shortcut to the allocation by compute node report, which is also available by navigating to the machine activity option under reports. Further details about what is available in reports is in the reporting presentation.



This section covers the management nodes.

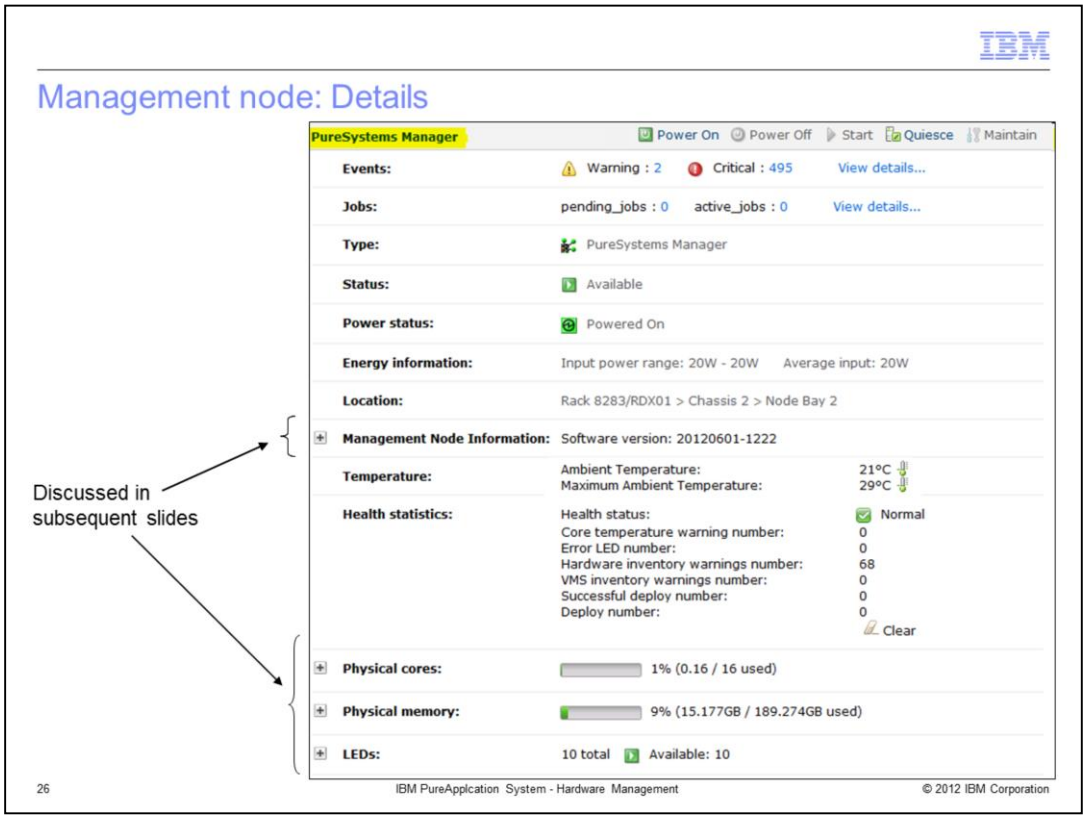


Management nodes are specialized nodes very similar to compute nodes. They control the overall system and provide the administration interfaces.

There are two types of management nodes, the PureSystems manager and the virtualization system manager, each having a redundant backup in case one fails. The PureSystems manager provides the graphical and management access to PureApplication Server. The virtualization system manager provides the deployment engine for creating and managing virtual machines within the cloud groups.

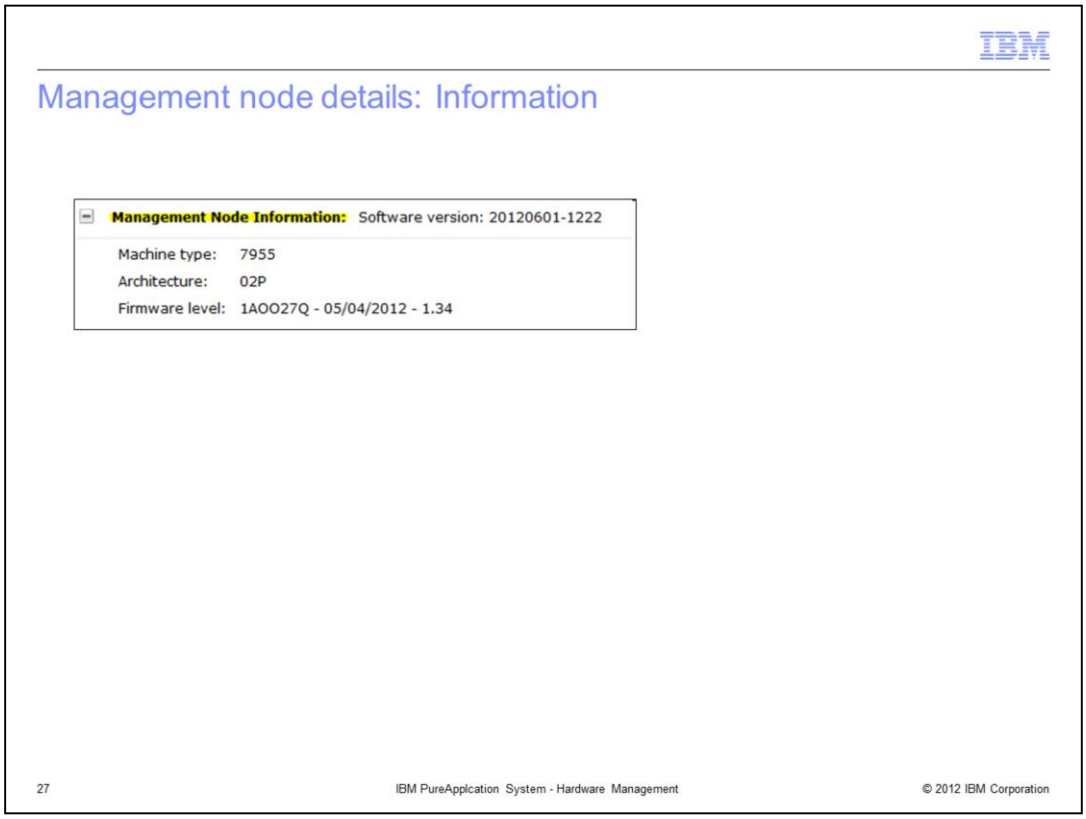
To view the management nodes, navigate to the hardware menu in the system console, and select management nodes. This will present a list of the four management nodes in the system. The list itself provides the serial number of the management node along with its location.

When you click a management node in the list, you will see the details panel for the management node, which is shown in the next slide. The details are very similar to those of a compute node, and therefore only differences from compute nodes are discussed.

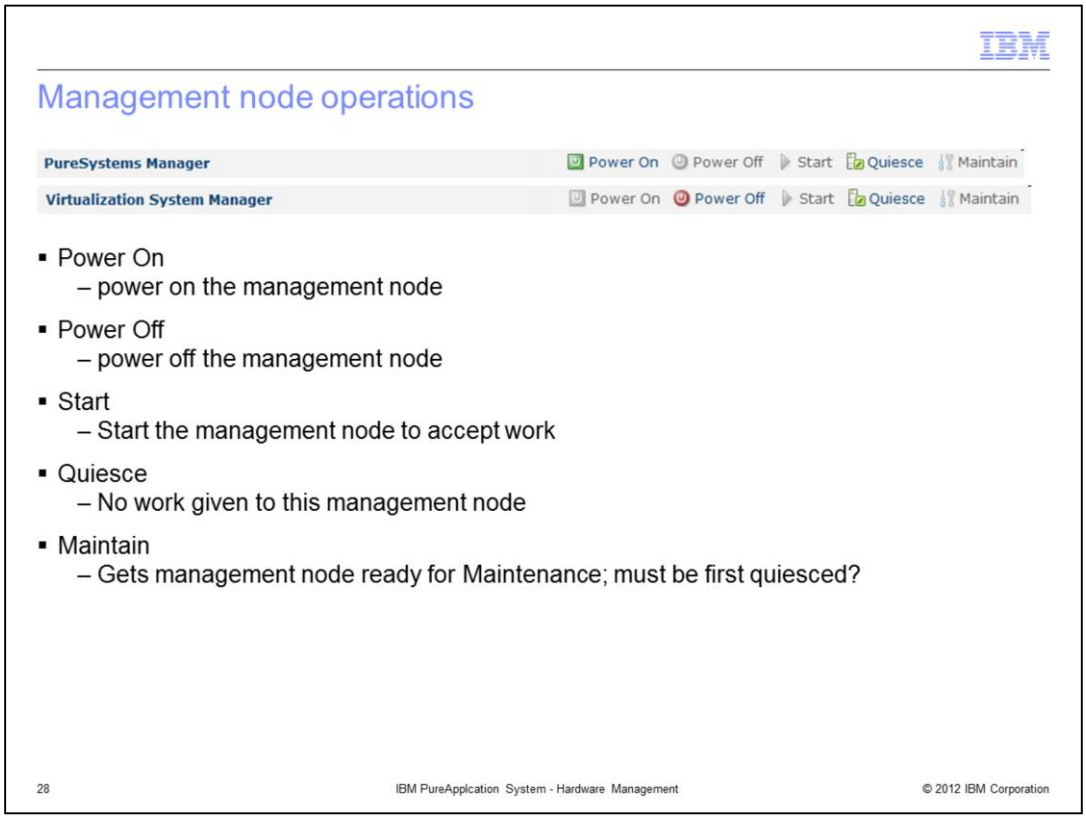


This slide shows a management node detail screen for a PureSystems manager. A detail screen for a virtualization system manager looks exactly the same, except that the type field is labeled virtualization system manager instead of PureSystems manager.

The screens for both types of management nodes look very similar to the compute node screens. The only differences are that the sections for “in cloud group”, virtual machines, and physical IO Adapters are not required for management nodes. The next slide will describe the management node information section. The physical cores, physical memory and LEDs sections are not described here as they are the same as for compute nodes.

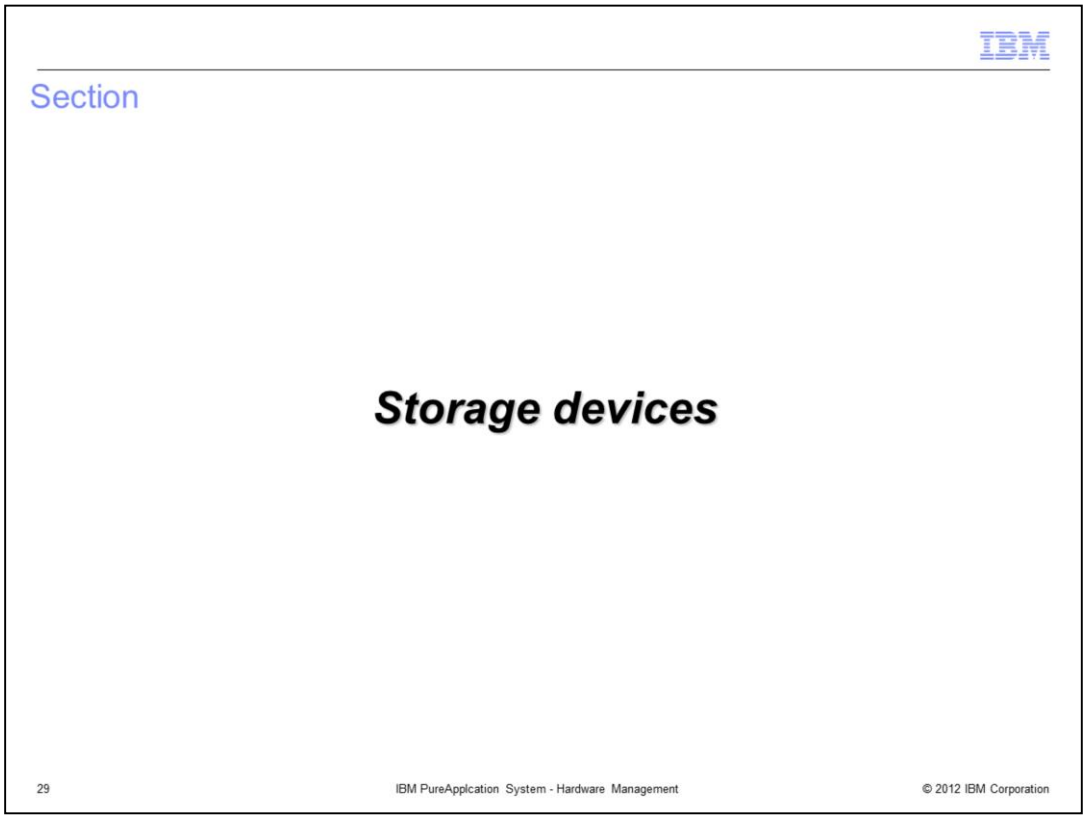


The management node Information section is common to both the PureSystems manager and virtualization system manager screens. It shows you the machine type, the architecture, and firmware level of the device.

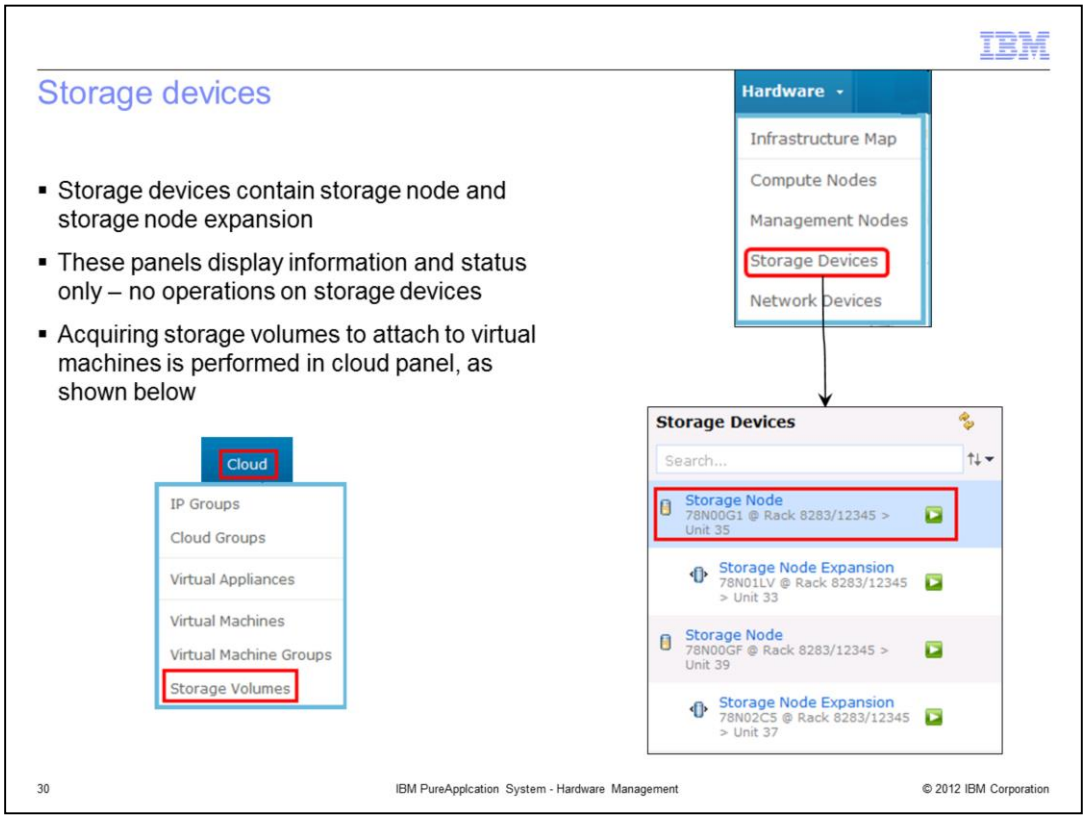


The management node detail screen has the same function icons at the top of the screen as for compute nodes, except for the report icon which is not available. As with compute nodes, these are the only actions a user with full hardware permissions can undertake.

All the icons here are the same as for compute nodes, but note the following difference. Since a management node has a backup, as long as the backup is not powered off, these functions will have no effect on the overall running of PureApplication System.

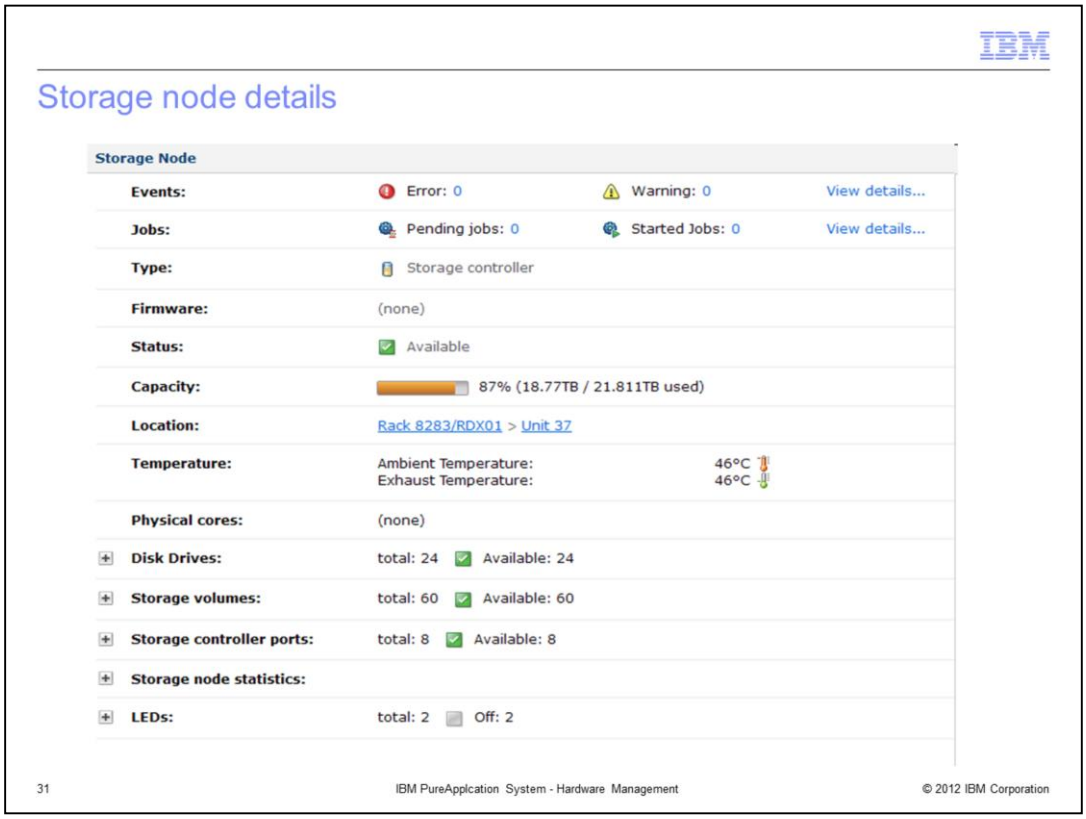


This section covers the storage devices.



To view the storage devices, navigate to the hardware menu in the system console, and select storage devices. This panel will list the two storage node controllers and the two associated storage node expansion controllers. For each node, a serial number and a rack location is provided. Further details are provided by selecting any of the nodes. Note that no operations are available to you from these panels.

As a brief background, a cloud administrator must allocate storage volumes to a cloud group. They are used to provide the space for raw disk add-ons, database storage, application storage, and so on. These storage volumes are created on the storage devices seen on this screen.

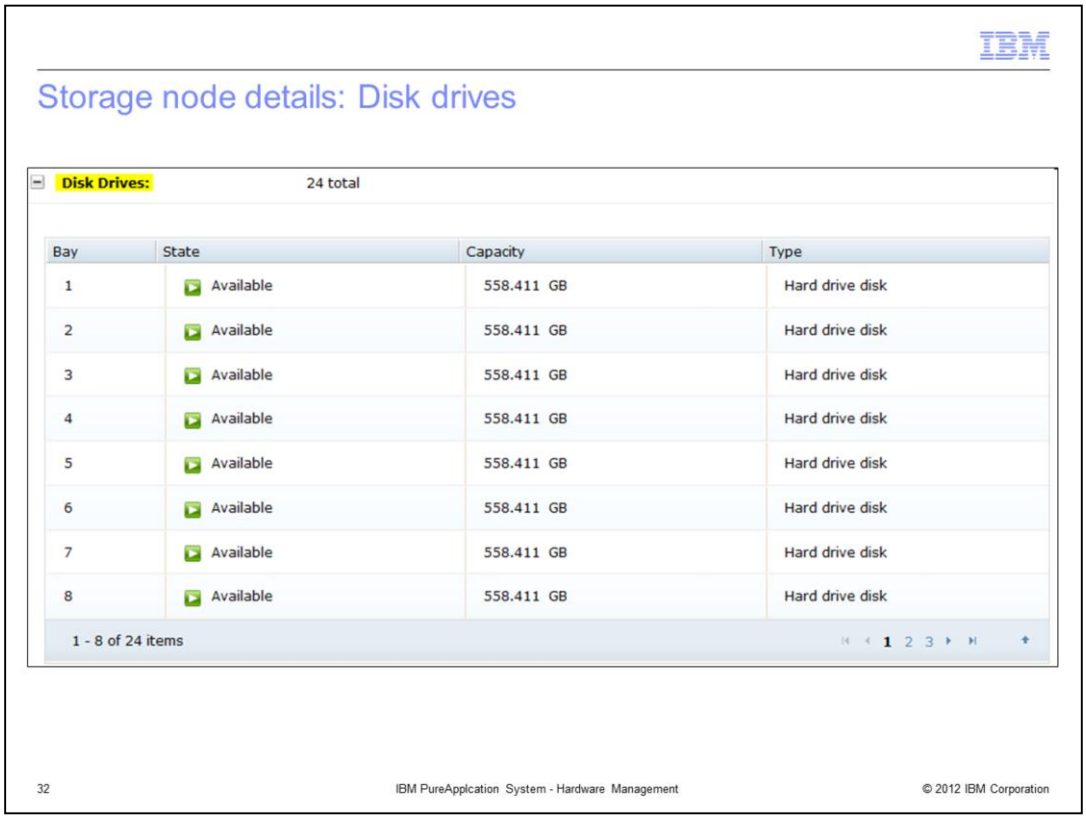


When a storage node is selected on the previous view, this detailed screen is presented.

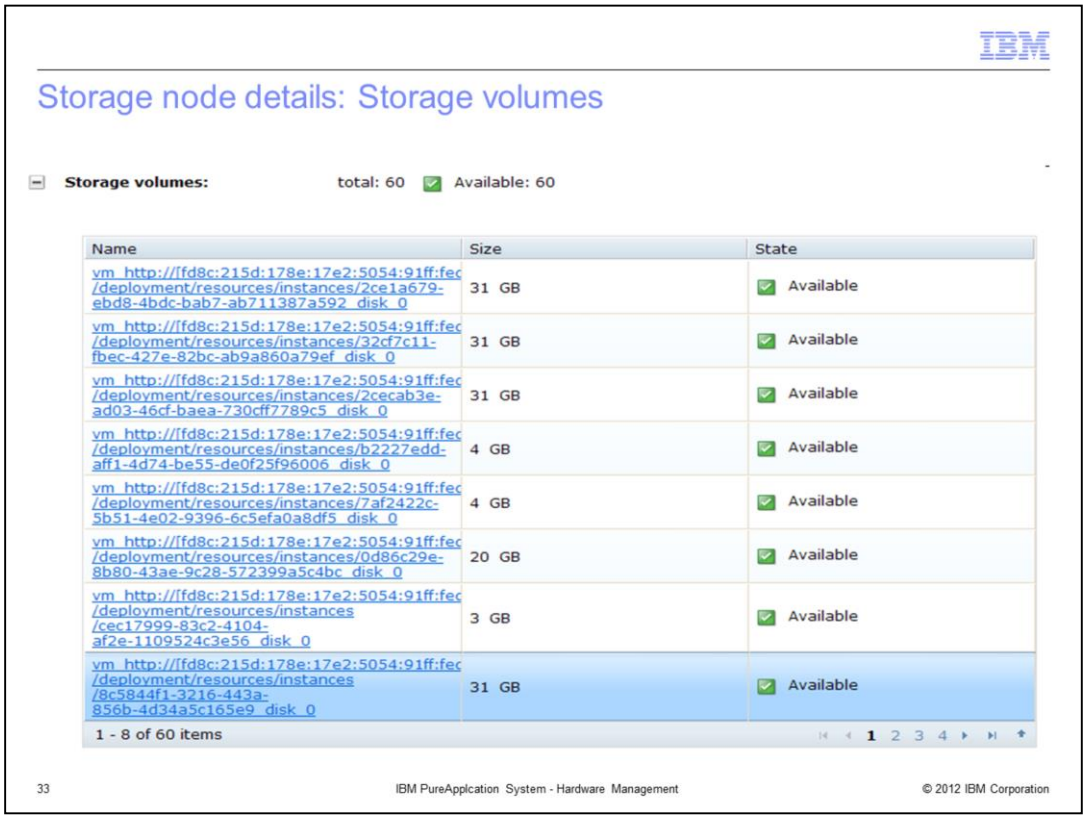
The Events field provides a summary of error and warning events associated with this storage node. There is also a view details link to take you to the event detail screen to view the events.

The Jobs field provides a summary of Pending and Started jobs associated with this storage controller. There is also a view details link to take you to the jobs detail screen to view the jobs.

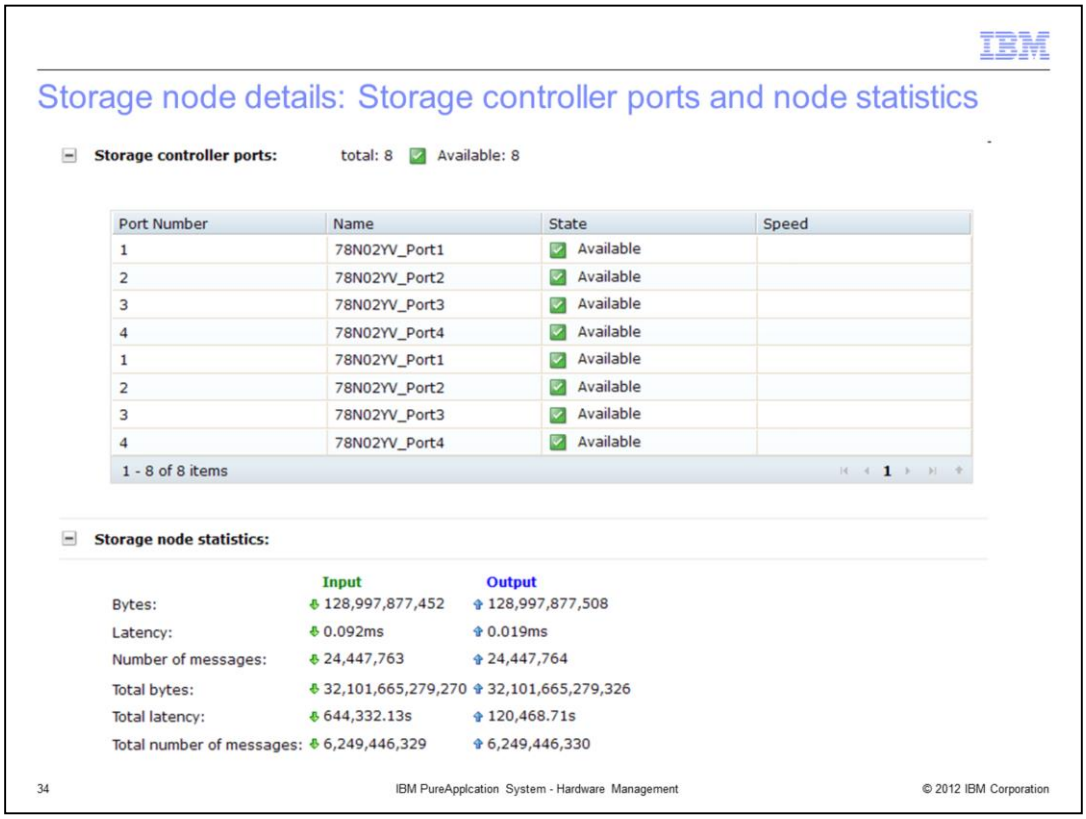
The Type field always is “storage controller.” A Firmware field is provided. There is a status field indicating the status of the controller. The Capacity field indicates the total and percentage of storage used on the controller. Location and Temperature fields are also provided. The remaining expandable sections are discussed in the next set of slides.



The disk drive section shows all the physical hard drives on this storage node, as they came from the manufacturer. The state and capacity are provided for each hard drive.

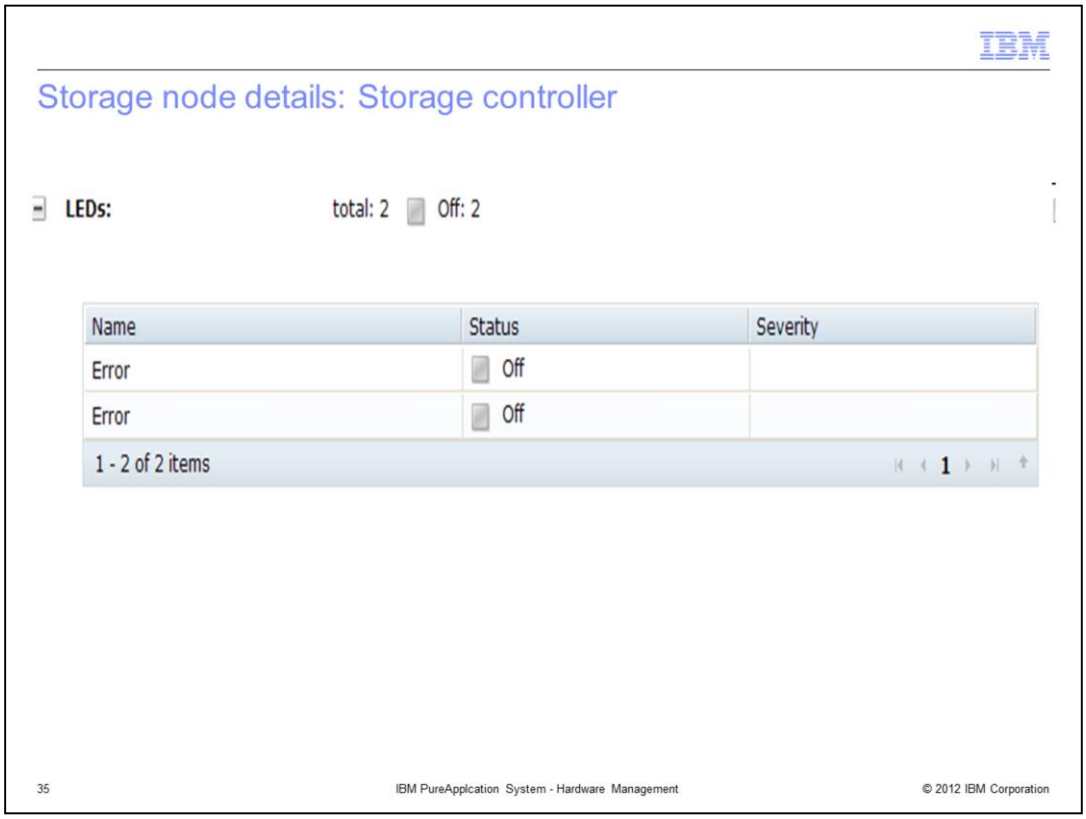


The storage volumes section provides a list of all the storage volumes on the controller, along with their size and state. A link is provided for each volume to take you to the detail screen for that volume.

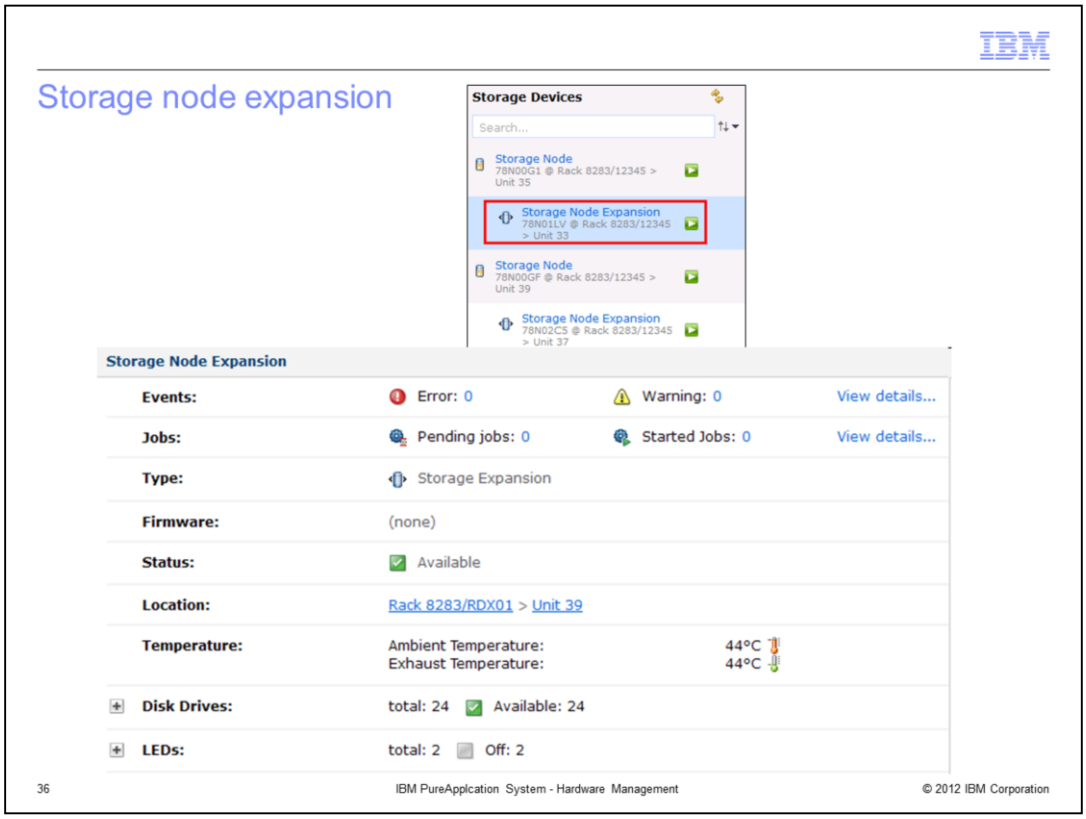


The storage controller ports section lists all the controller ports on the rack, with their names and state.

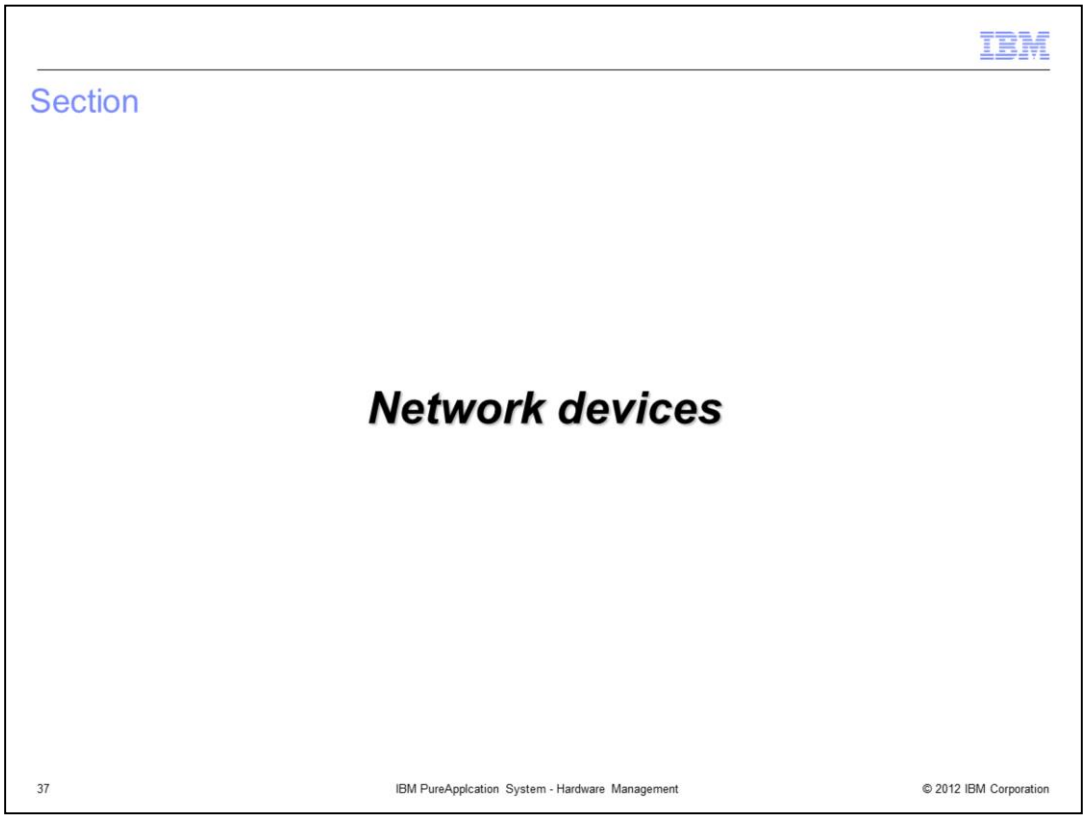
The storage node statistics section provides details about the node usage from the input and output perspectives.



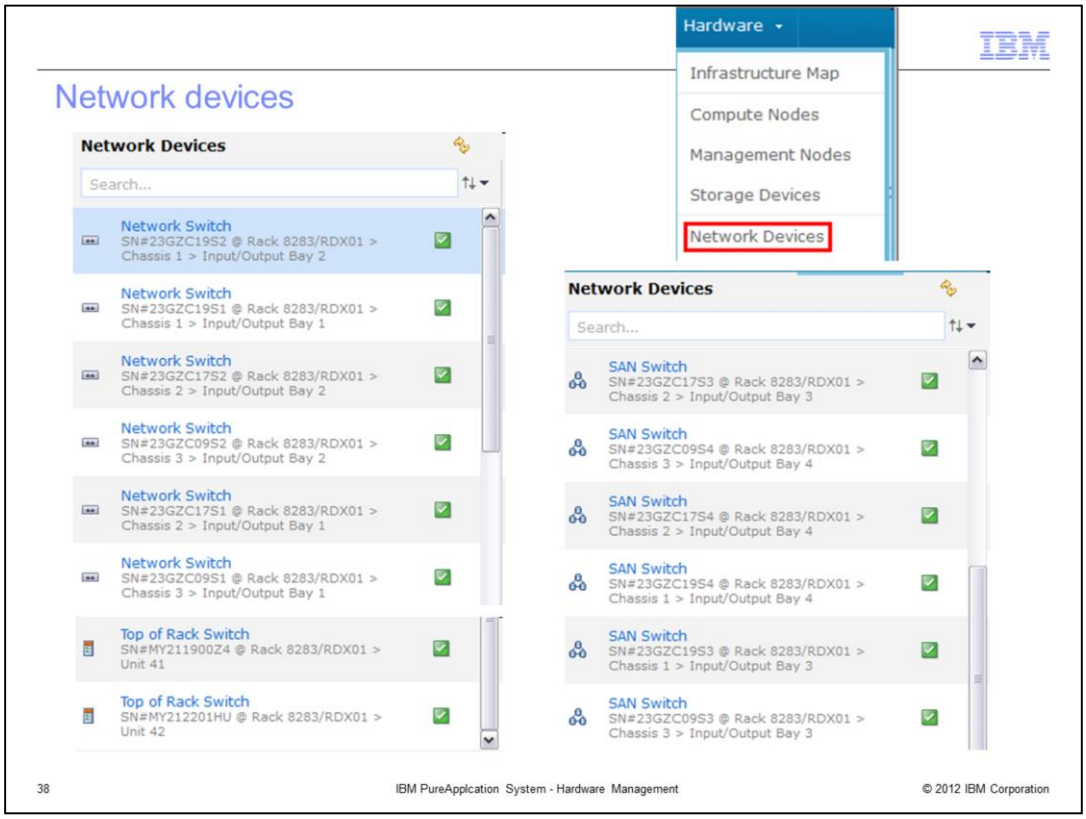
The LED section provides information about the controller LEDs and their status and severity.



The storage node expansion detailed screen is very similar to the storage node screen, except that many of the fields are not required.



This section covers the network devices.



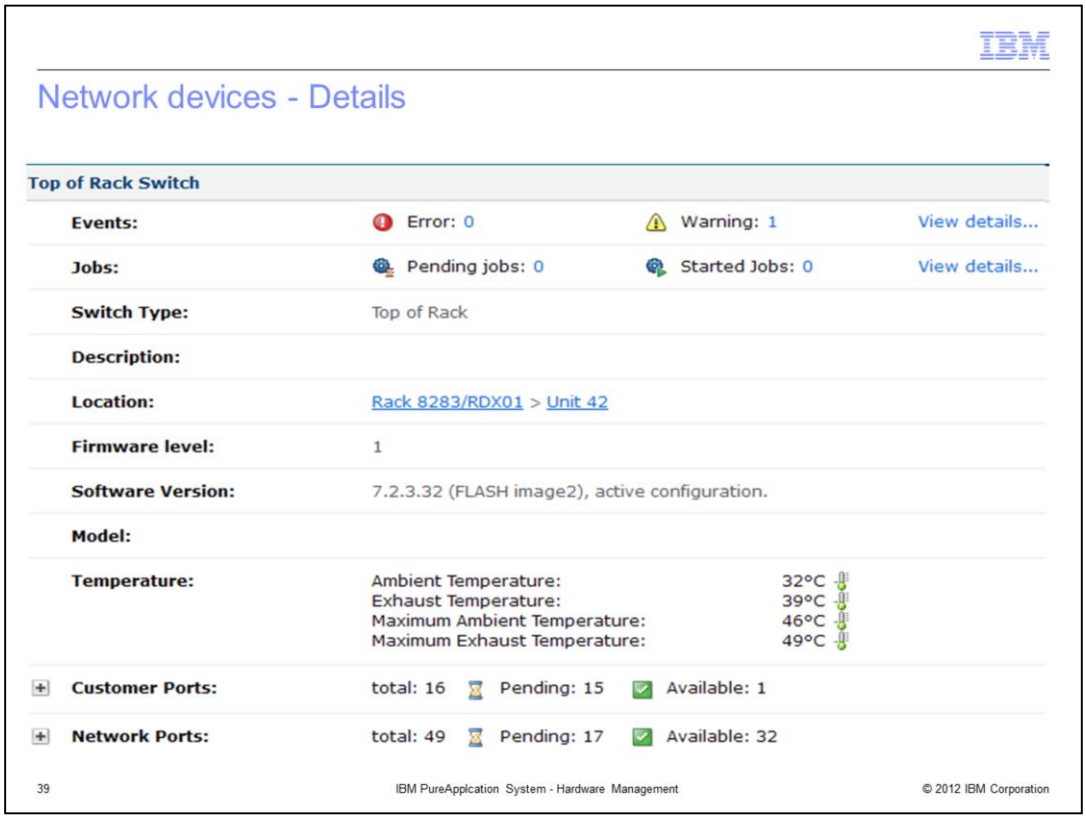
The network devices panel provides status information about each network device. To get to the network devices panel in the system console, navigate to network devices under the hardware tab. This will present a list of all the network related switches in your system. Every switch is redundant, and thus are displayed as pairs. The user has no authority to modify the settings related to the network devices; they can only view details about the networks.

The top of rack switches provide network connectivity to external and internal networks.

The SAN switches come in pairs for every chassis, and are used for the fiber channel network that connects the storage devices within the system. They are not related to the ethernet networking equipment.

The network switches also come in pairs for every chassis, and are used for the ethernet network within the system. They are not related to the fiber channel networking.

For each switch device, you will see very similar detailed information. The only differences in the detailed views of the three types of switches are that the top of rack switches have an additional temperature field, and the SAN switches do not have any customer ports. The following slides go into more detail about the information available.



When a network device is selected on the previous slide, a detailed screen is presented.

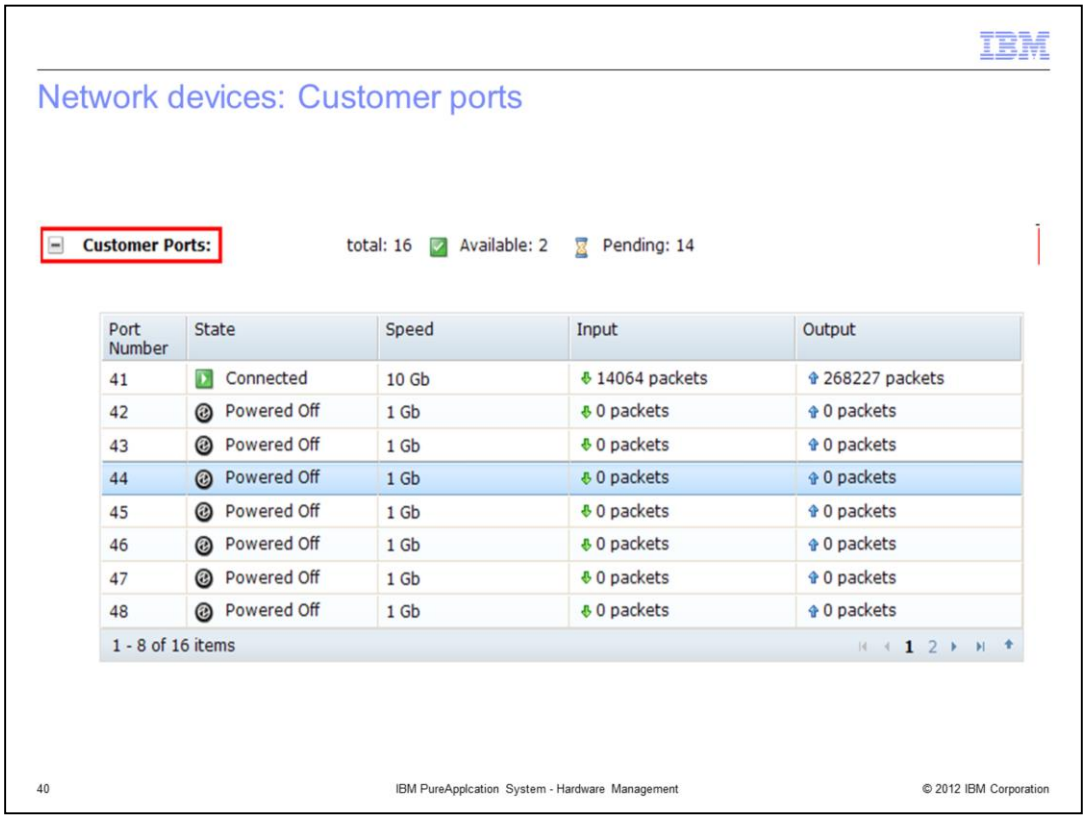
The Events field provides a summary of error and warning events associated with this network device. There is also a view details link to take you to the event detail screen to view the events.

The Jobs field provides a summary of pending and started jobs associated with this network device. There is also a view details link to take you to the jobs detail screen to view the jobs.

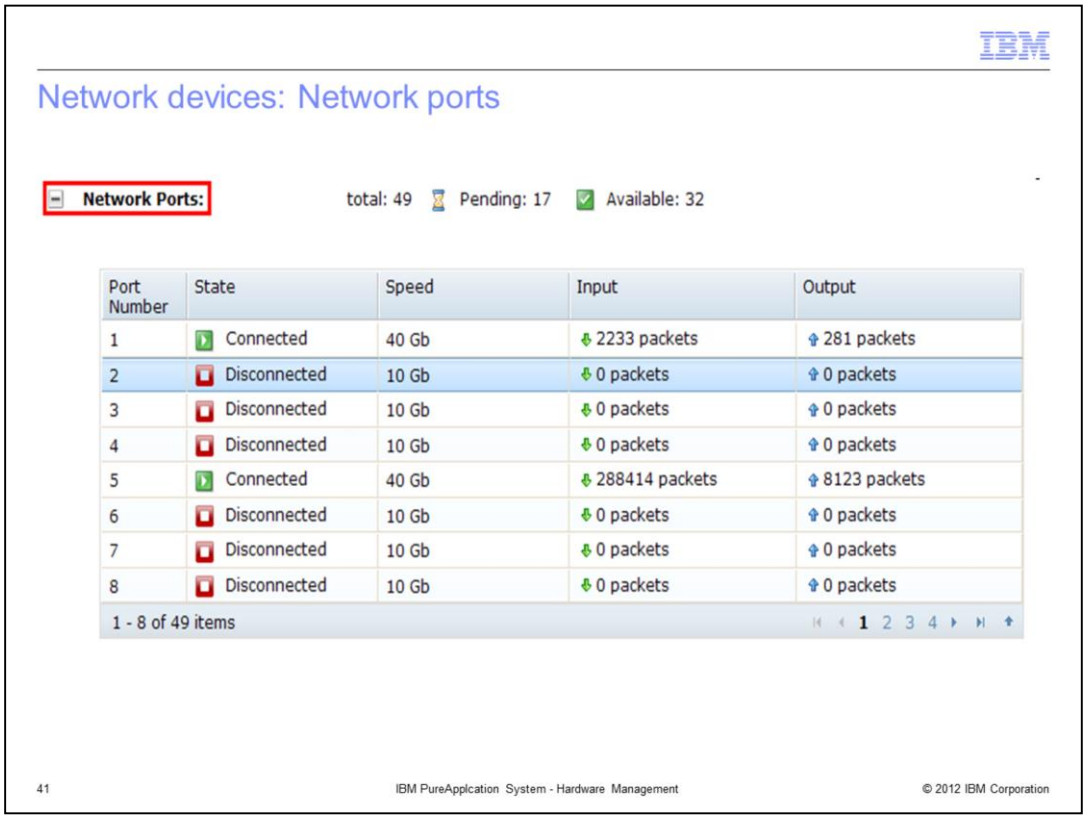
The Switch Type field is either “top of rack”, “chassis network switch”, or “chassis SAN switch”.

After the Type field is the Description, Location, Firmware level, Software version and Model fields.

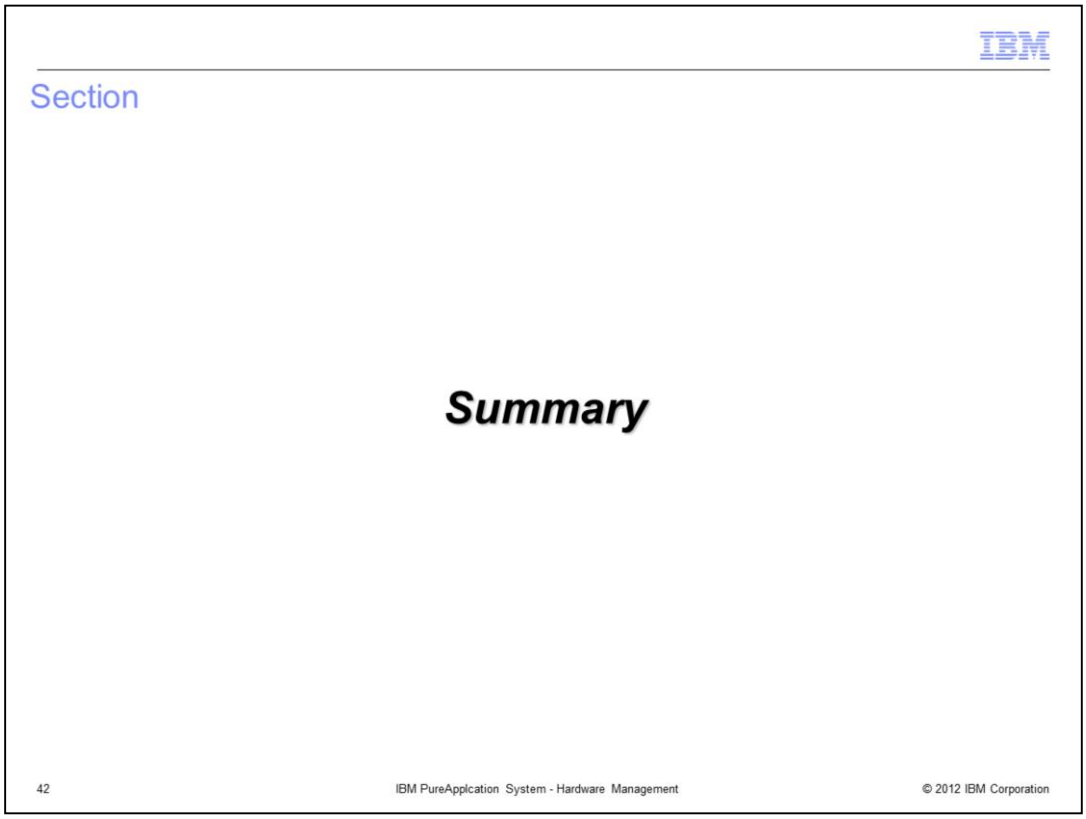
The remaining two sections are discussed in the next set of slides.



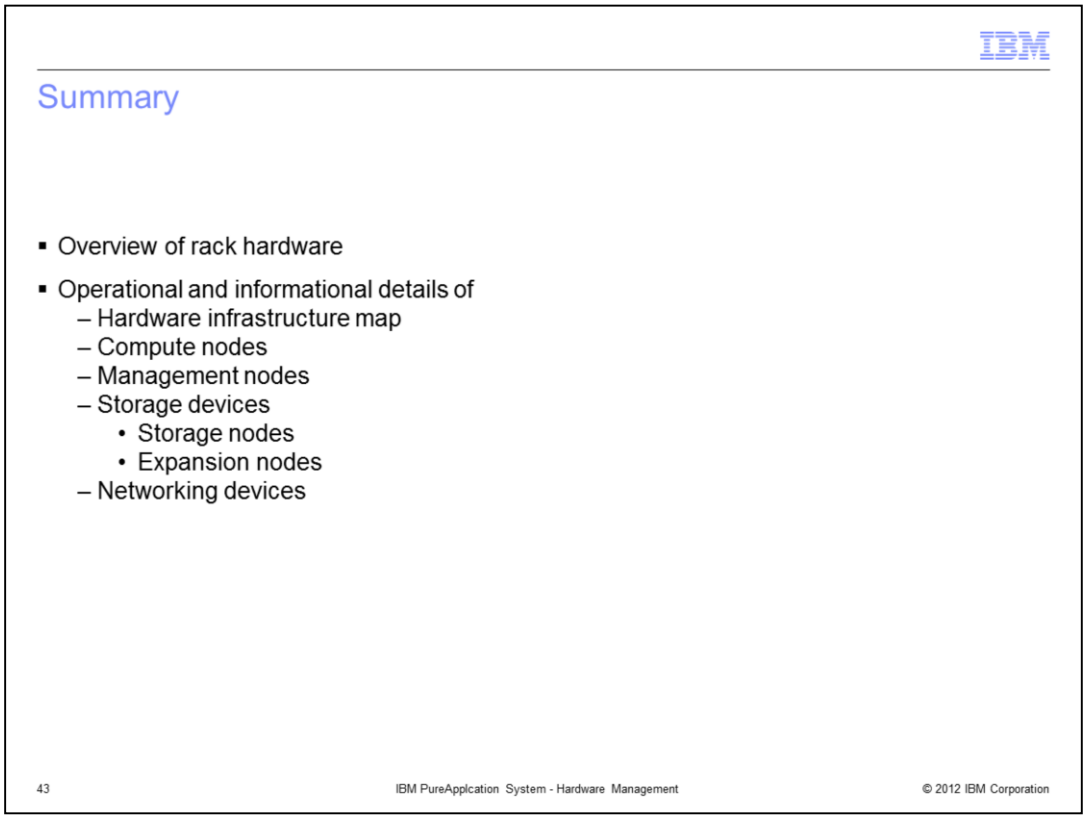
Customer ports are the ports on the top of rack switches that can be connected externally of the PureApplication System. The customer ports section provides a status summary of the ports and a list of the port numbers, the state of the port, the speed, and the number of input and output packets.



The network ports section has the same fields as the customer ports section on the previous slide.



This section contains the summary.



In summary, in this presentation you saw an overview of the rack hardware, followed by operational and informational details about the hardware infrastructure map, compute nodes, management nodes, storage nodes, storage expansion nodes, and networking devices.

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