Power Systems

Monitoring the virtualization environment

IBM

Note

Before using this information and the product it supports, read the information in "Notices" on page 19.

Contents

Monitoring the virtualization environment by using the Performance and Capacity Monitor function

The Performance and Capacity Monitor function collects allocation and usage data for virtualized server resources. When the Hardware Management Console is at version 8.6.0, or later, you can also export data metrics that are collected for the specified time. It displays data in the form of graphs and tables, which are viewable from the Performance and Capacity Monitor home page. The Performance and Capacity Monitor function is available in the Hardware Management Console (HMC) Version 8, Release 8.1.0, or later.

The Performance and Capacity Monitor function gathers and displays capacity reporting data and performance monitoring data. You can monitor processor, memory, virtual storage, and virtual network resource usage. This data can help you better understand how managed systems and logical partitions are using resources, and whether resources are under-used or over-used. It can also help you identify and fix performance bottlenecks. By using the Performance and Capacity Monitor, you can manage current capacity and plan for future requirements.

What's new in Monitoring the virtualization environment

Read about new or significantly changed information in Monitoring the virtualization environment since the previous update of this topic collection.

October 2019

- The following topics were updated with information about the support for the persistent memory:

  - "Current Resource Utilization graphs" on page 4
  - "The Resource Utilization table" on page 7
  - "Memory breakdown table" on page 10

August 2018

The following updates have been made to the content:

- Added information about PCM status and adapter statistics in the "Troubleshooting the Performance and Capacity Monitor" on page 14 topic.
- Removed or updated obsolete information in various topics.

Getting started

Learn how to use the Performance and Capacity Monitor.

To use the Performance and Capacity Monitor, refer to the following topics.

Enabling data collection

Server resource utilization monitoring starts after you enable data collection and continues until you disable it. Server utilization data is stored on the Hardware Management Console (HMC).

About this task

The number of servers that can be monitored is determined by the HMC. You can view the number of managed servers that can be monitored by accessing the Performance and Capacity Monitor preferences REST API at the following uniform resource identifier:

```
https://your_hmc_ip_address:12443/rest/api/pcm/preferences
```

To enable data collection for one or more servers, complete the following steps:

Procedure

1. In the navigation pane, click the **HMC Management** icon   .
   a) Click **Console Settings**. The **Console Settings** page is displayed.
   b) In the **Performance Settings** area, click **Change Performance Monitor Settings**.

      Note: Alternatively, if you try to launch the Performance and Capacity Monitor function for a system on which data collection is disabled, a message is displayed in the Current Resource Utilization area of the Settings for Performance Monitoring page. To enable data collection for the required server, set **Collection** to **On**.
2. Specify the number of days for which you want to store performance data by typing in a number in the range 1 - 366. Otherwise, click the up or down arrows next to **Number of days to store performance data** under **Performance Data Storage**.

   Note: By default, the HMC is set to store data for 180 days. The maximum number of days for which it can store data is 366.
3. Click the toggle switch in the **Collection** column, next to the name of the server, for which you want to collect data. Otherwise, click **All On** to enable data collection for all of the servers that the HMC manages.

   Note: If you request to monitor a number of managed servers that exceed the maximum number of managed servers that can be monitored by the HMC, the HMC displays an error.
4. Click **OK** to apply the changes and close the window.

   The **HMC Management** topic pane is displayed in the main window. You can now review the collected data by accessing the Performance and Capacity Monitor home page.

Accessing the Performance and Capacity Monitor home page

After you enable data collection for a server, the Performance and Capacity Monitor function plots the data in graphs and summarizes the information in tables. You can view the graphs and tables from the Performance and Capacity Monitor home page, which is accessible from the Hardware Management Console (HMC).

About this task
To access the Performance and Capacity Monitor home page, complete the following steps:

Procedure

In the navigation pane, click the **Resources** icon   .
 a) Click **All Systems**. The All Systems page is displayed.

b) Select the server for which you want to view the performance data.

c) Click **Actions**.

d) Select **View Performance Dashboard**.

The Performance and Capacity Monitor home page is displayed with the information for that system.

The Performance and Capacity Monitor home page

The Performance and Capacity Monitor home page contains charts and graphs that represent the data that is collected from the server.

The home page is divided into the following sections:

- The **Current Resource Utilization** graphs appear at the upper section of the Performance and Capacity Monitor home page. These graphs indicate current processor usage and memory assignment as a portion of available capacity. The Virtual I/O network traffic and storage bandwidth graphs indicate their current usage against their historical maximum bandwidth consumption that was recorded on that HMC after the performance monitoring function was enabled. You can change the chart auto-update interval. To view a larger version of a graph, click the icon that resembles a magnifying glass with a plus sign. To view help information for a graph, click the question mark icon.

- The **Views** topic pane appears on the right side of the home page and includes a list of server resources for which you can view performance data. The views include **Server Overview**, **Processor Utilization Trend**, **Memory Utilization Trend**, **Network Utilization Trend**, **Storage Utilization Trend**, and **SR-IOV Port Counters**.

- The details section occupies the remaining space on the Performance and Capacity Monitor home page. The details section displays the graphs and charts that are associated with the view that you selected from the **Views** topic pane.

Changing Performance and Capacity Monitor home page settings

You can change the time interval settings for the graphs on the Performance and Capacity Monitor home page.

Changing the automatic update frequency of Current Resource Utilization graphs

The **Current Resource Utilization** graphs default to an auto-update value of 1 minute; however, you can specify a longer time interval, if required.

To change the duration of time between updates, complete the following steps:

1. In the upper-right corner of the **Current Resource Utilization** section, click the menu next to **Auto-update in**.

2. Select one of the following preset values: **1 minute**, **5 minutes**, **10 minutes**, or **15 minutes**.

   The data in the graphs refreshes according to the time interval you chose.

Changing the time interval of the data that is displayed in the details pane

The home page defaults to a 4-hour time interval for the data in the details section. However, you can specify a longer time interval. You can also specify custom dates and times. The minimum time interval is 4 hours, and the maximum time interval is one year from the current date and time.

The details section refreshes and displays the updated content that is based on the time interval you choose. After the window refreshes, the latest entry for the data ends with the current time. The Performance and Capacity Monitor displays the data in this interval, every time you refresh the view, unless you change the interval again.

To change the time interval, complete the following steps:

1. Click the menu in the upper-right corner of the details section.

2. Select one of the following preset values: **Last 4 Hours**, **Last Day**, **Last Week**, **Last Month**, or **Last Year**. Otherwise, select **Custom**.

If you selected **Custom**, a window is displayed. Continue to the next step.

3. Specify the date and time information in the **Start Date** and **End Date** fields, or click the calendar icon to choose the start date from the calendar.

4. Click **OK** to apply your changes.

Note: If you change the time interval of one view, then the interval change applies only to that view. For example, if you change the time interval for the **Server Overview** page to **Last Week**, the time interval for the Processor Trend view remains at **Last 4 Hours**.

Current Resource Utilization graphs

The upper section of the Performance and Capacity Monitor home page includes the **Current Resource Utilization** information. These graphs depict how the system's processor usage, memory assignment, virtual I/O network, and storage traffic compare against the available capacities or against their maximum historic highs. If the overall server usage is consistently high, activate more processors, move workloads to other servers, or buy more servers, processors, or memory.

The **Current Resource Utilization** information includes the following graphs: **Processor Usage/Peak**, **Memory Assignment**, **Network Traffic**, and **Storage Traffic**.

Processor Usage/Peak

The **Processor Usage/Peak** graph shows the average processor usage that is measured in processor cores and is represented by the blue horizontal bar. The black vertical bar indicates the maximum number of processors that the system used during the most recent monitoring period. The gray shading indicates the percentage of total active physical processors used. Light gray indicates that zero to 50% of the available processors were used. Medium gray indicates that 51% - 90% of the available processors were used. Dark gray indicates that 91% - 100% of the available processors were used. This graph indicates how the current and recent peak utilization compares against the total number of processors available on the server.

Click the **Click to Enlarge** button in the **Processor Usage/Peak** area. The table displays information about the Installed, Activated, Allocated, Available, Utilized, Peak, and Minimum usage data of processor usage.

Memory Assignment

The **Memory Assignment** graph shows the average memory assignment that is measured in MB or GB and is represented by the blue horizontal bar. The black vertical bar indicates the maximum amount of memory that the system used. The gray shading indicates the percentage of total active memory used. Light gray indicates that 0% - 50% of active memory was used. Medium gray indicates that 51% - 90% of active memory was used. Dark gray indicates that 91% - 100% of active memory was used. This graph indicates how the current and recent peak utilization compares against the total amount of memory available on the server.

Click the **Click to Enlarge** button in the **Memory Assignment** area. The table displays information about the Installed, Activated, Allocated, Available, Utilized, Peak, and Minimum memory assignment. You can also view information about the Assigned Virtual Persistent Memory. The persistent memory is available only when the Hardware Management Console (HMC) is at Version 9.1.940, or later, and when the firmware is at level FW940, or later. The persistent memory is a virtualization feature in which persistent memory volumes are created by using the existing DRAM (Dynamic Random Access Memory), where data persistence is maintained across applications, and the operating systems even when the logical partition has been restarted.

Network Traffic

The **Network Traffic** graph shows the average amount of traffic (measured in KB/s or GB/s and is represented by the blue horizontal bar) that flows through the network adapters that are assigned to the Virtual I/O Server. The gray shading indicates the maximum amount of traffic that was measured in the time that elapsed since the console was started. The black vertical bar indicates the maximum amount of

network bandwidth that the system used. This graph indicates how the average network traffic compares against the maximum amount of network bandwidth that the system used.

Click the **Click to Enlarge** button in the **Network Traffic** area. The table displays information about traffic utilization that is measured per second (measured in KB/s or GB/s), the maximum amount of network bandwidth that the system used, the number of Virtual I/O Servers, and the number of Physical Adapters.

Storage Traffic

The **Storage Traffic** graph shows the average amount of traffic (measured in KB/s or GB/s and is represented by the blue horizontal bar) that is processed through the storage adapters and assigned to the Virtual I/O Server. The gray shading indicates the maximum amount of traffic that was measured in the time that elapsed since the console was started. The black vertical bar indicates the maximum amount of storage I/O bandwidth that the system used. This graph indicates how the average storage traffic compares against the maximum amount of storage I/O bandwidth that the system used.

Click the **Click to Enlarge** button in the **Storage Traffic** area. The table displays information about storage utilization that is measured per second (measured in KB/s or GB/s), maximum amount of storage I/O bandwidth that the system used, the number of Virtual I/O Servers, and the number of Physical Adapters.

The Server Overview section

The **Server Overview** section contains graphs that summarize data from virtualized server resources. This information indicates how physical processor and memory resources are allocated among the partitions on your server. Additionally, the information indicates whether partitions are using more or less than their entitled capacity for these resources. By default, the Performance and Capacity Monitor displays the data in the Details section of the home page.

The **Server Overview** section includes two general graphs: **Capacity Distribution by Processor** and **Capacity Distribution by Memory**. These graphs indicate general information about the capacity distribution for processors and memory.

The **Top Resource Consumers** graph displays information about partitions, Virtual I/O Servers, or processor pools. The **Resource Utilization** table shows detailed information about individual partitions, such as the number of processor cores and the amount of memory.

By default, the graphs and table show data that was collected for the previous 4 hours. For more information on displaying data for a longer amount of time, see "Changing Performance and Capacity Monitor home page settings" on page 3.

Note: When the firmware is at level 7.8, or later, and VIOS version is at 2.2.3, or later, you can view all the performance metrics. For more information about the limitations of the performance monitor metrics based on the firmware level and VIOS version, see HMC Integrated Performance Monitor Metrics based on Firmware and VIOS level.

The Capacity Distribution by Processor graph

The **Capacity Distribution by Processor** graph shows the percentage and number of partitions whose processor usage is high, medium, or low relative to the partitions' entitled processor capacity. The Performance and Capacity Monitor designates processor utilization as high if the percentage is 91% or greater, medium if the percentage is in the range 50% - 90%, and low if the percentage is 50% or lower.

No additional configurations are available for this graph. However, you can view a more detailed version. For more information, see "Accessing and reviewing the Detailed Spread graphs" on page 6.

The Capacity Distribution by Memory graph

The **Capacity Distribution by Memory** graph displays the percentage and number of partitions whose memory is high, medium, and low capacity relative to the partitions' entitled memory capacity. The Performance and Capacity Monitor designates memory usage as high, if the percentage is 91% or greater, as medium, if the percentage is in the range of 50% - 90%, and low if the percentage is 50% or lower.

No additional configurations are available for this graph. However, you can view a more detailed version. For more information, see for more information.

Accessing and reviewing the Detailed Spread graphs

The **Detailed Spread** graphs provide details about the partition metrics that are shown in the **Capacity Distribution by Processor** and by Memory graphs. The graphs show dots that represent individual partitions whose current processor usage (vertical axis) is plotted against entitlement (horizontal axis). The diagonal lines have slopes of 0.5, 0.9, and 1.0, which represent usage, relative to entitlement of 50%, 90%, and 100%. If a partition is positioned above the 1.0 line, the partition is using more than 100% of its entitled capacity. You can hover your mouse pointer over a marker on the graph to view the name of the associated partition.

About this task
To access and review the Detailed Spread graphs, complete the following steps:

Procedure

1. On the Performance and Capacity Monitor home page, in the Server Overview section click **Show Detailed Spread**.
   The **All Partitions Spread** window is displayed.
2. Click **More Graphs** to switch between the **Processor Usage vs Entitlement** and the **Memory Usage vs Assigned** views.

The Top Resource Consumers graph

The **Top Resource Consumers** graph displays up to 10 partitions or Virtual I/O Servers that are using the highest number of units of the resource you chose.

Each vertical line represents a single partition, Virtual I/O Server, or processor pool. The top of each vertical line corresponds to the maximum number of resource units that are used, and the bottom of each line represents the minimum number of resource units.

The horizontal lines that bisect the vertical lines represent the average utilization of the resource.

The Resource ID appears along the bottom of the graph directly below the vertical line of the partition, Virtual I/O Server, or processor pool that the line represents. You can hover your mouse pointer over this area of the graph to view numeric values for minimum, maximum, and average utilization.

Changing the Top Resource Consumers graph
The **Top Resource Consumers** graph defaults to show up to 10 partitions that are using the most processors. However, you can change the graph to show the 10 partitions that are using the most memory, network, or storage resources. You can also choose to view the 10 highest processor pools.

About this task
To change the Top Resource Consumers graph to another graph, complete the following steps:

Procedure

1. On the Performance and Capacity Monitor home page, click **More Graphs**.
2. Select one of the following options:

   - **Partitions**
   - **Virtual I/O Servers**
   - **Processor Pools**

   If you chose **Partitions** or **Virtual I/O Servers**, continue with the next step. If you chose **Processor Pools**, there are no additional selections; the graph refreshes and shows the top 10 partitions that are using the processor pools.

3. Select one of the following resources:

- **Processor**
- **Memory**
- **Network**
- **Storage**

The graph refreshes and shows the top 10 partitions or Virtual I/O Servers that are using the resource that you chose.

Note: If you have fewer than 10 partitions or Virtual I/O Servers, the graph shows all of them.

The Resource Utilization table

The **Resource Utilization** table shows the amount of server resources, such as processor or memory, that is used by each partition. You can sort and filter the table. You can click the partition names in the Resource Utilization table to view the configuration information about the partition.

The **Resource Utilization** table also shows information about the Assigned Virtual Persistent Memory. The persistent memory is available only when the Hardware Management Console (HMC) is at Version 9.1.940, or later, and when the firmware is at level FW940, or later.

Sorting the Resource Utilization table

You can sort the **Resource Utilization** table by clicking the up or down chevron next to the name of the column that you want to sort. You might choose to sort the columns so that you can view the entries ranking from the lowest to the highest, or from the highest to the lowest.

You can select which columns are displayed in the **Resource Utilization** table. To change which columns are displayed, click the arrow in the header row of the table.

Filtering the Resource Utilization table

You can search for specific entries such as the partition name within the table. The search shows all table rows that contain text in any cell that matches the filter text.

The Processor Utilization view

The **Processor Utilization** view includes historical data and trends that reflect the usage of virtualized or shared processors over time. A graph shows the processor utilization on the physical server. Another aggregated graph shows the usage per resource, which includes the system firmware, Virtual I/O Servers, and client partitions. The table lists more detailed information about averages and trends.

You can access this view by clicking **Processor Utilization Trend** in the **Views** window.

The **Processor Utilization** view includes a trend graph. You can change the graph options to show processor utilization for the server and aggregated levels.

The **Resource Utilization** table shows detailed information for individual partitions and pools, such as the number of entitled and used units.

By default, the graphs and tables show data that was collected for the previous 4 hours. For more information about displaying data for a longer amount of time, see "Changing Performance and Capacity Monitor home page settings" on page 3.

Processor trend graphs

The Performance and Capacity Monitor home page includes trend graphs that show processor utilization data that is plotted against a default time interval of 4 hours.

By default, the trend graph shows server level data; however, you can change the view to display aggregated level data. To switch from one view to another view, click **More Graphs** and choose **Server Level Utilization** or **Aggregated Level Utilization**.

Processor trend graph: Server Level Utilization view

The **Server Level Utilization** view indicates the number of processors that the server is using at the times indicated along the horizontal axis. The lower shaded area represents the total number of activated physical processors on the server, and the upper shaded area indicates how many more processors are available for activation. The line shows how the total processor usage on the physical server varies over the selected time period, in comparison with the available processor capacity.

Processor trend graph: Aggregated Level Utilization view

The **Aggregated Level Utilization** view shows the total number of processors that the server is using. You can compare whether the processors are being used by the system firmware, Virtual I/O Servers, or client partitions by viewing the shading for each processor.

Processor breakdown tables

The processor breakdown tables list information that is based on partitions or pools over the selected time period. The following breakdown tables are available: **Breakdown by Partitions** and **Breakdown by Pools**.

The processor Breakdown by Partitions table

The **Breakdown by Partitions** table shows processor utilization data for logical partitions. Each row indicates whether a partition is using dedicated or shared processor resources. If the partition is using shared processor resources, the **Pool** column indicates the shared processor pool from which the resources are drawn.

In addition, you can view the number of processors or processor pools that the partition is entitled to use, is using, and the maximum number the partition used. The **Usage Trend** column shows the overall usage trend for the logical partition for the time interval you selected.

The table lists the total number of partitions for your system. The **Donated Units** column indicates whether the partition is donating unused processor resources to its shared processor pool. The **Dispatch Wait Time** column indicates the mount of time for which partitions are waiting for processor resources to be available.

The processor Breakdown by Pools table

The **Breakdown by Pools** table shows processor utilization within individual processor pools. You can view the total processor entitlement of all partitions that use resources from the pool and the number of processors the pool borrowed. You can also view the number of processors the pool is using and the maximum number of processors the pool used.

The **Usage Trend** column shows a high-level trend view for an individual pool.

Sorting the processor breakdown tables

You can sort the table by clicking the up or down chevron next to the name of the column that you want to sort. You might choose to sort the columns so that you can view the entries, ranking from the lowest to the highest, or vice versa.

You can select which columns are displayed in the **Processor Breakdown** tables. To change which columns are displayed, click the arrow in the header row of the table.

Filtering the processor breakdown tables

You can search for specific entries such as the partition name within the table. The search shows all table rows that contain text in any cell that matches the filter text.

The Memory Utilization view

The **Memory Utilization** view includes historical data and trends that reflect the amount of dedicated memory that is allocated, or shared among logical partitions, over time. The graph shows memory usage that is divided by the total, allocated, and assigned usage. The table lists more detailed information about averages and trends.

You can access this view by clicking **Memory Utilization Trend** in the **Views** window.

The **Memory Utilization** view includes a trend graph. You can change the graph options to show server level, aggregated level, or Active Memory Sharing (AMS) level memory utilization.

The **Resource Utilization** table shows detailed information for individual partitions. The information includes the amount of memory that the firmware is using and the amount of memory in the shared memory pool that partitions are entitled to use.

By default, the graphs and table show data that was collected over the last 4 hours. To display data for a longer amount of time, refer to "Changing Performance and Capacity Monitor home page settings" on page 3.

Memory trend graphs

The Performance and Capacity Monitor home page includes trend graphs that show memory utilization data that is plotted against a default time interval of 4 hours.

By default, the trend graph shows server level data; however, you can change the view to display aggregated or Active Memory Sharing (AMS) level data. To switch from one view to another view, click **More Graphs** and choose **Server Level Utilization**, **Aggregated Level Utilization**, or **AMS Level Utilization**.

Memory trend graph: Server Level Utilization view

The **Server Level Utilization** view shows the memory usage for the server. Shaded areas indicate the amount of memory that is assigned to the server, the amount of memory that is allocated for use by the server, and the total memory available for use. You can compare the shaded areas to determine whether you maximized the memory allocation for your server.

Memory trend graph: Aggregated Level Utilization view

The **Aggregated Level Utilization** view shows the collective memory usage for the partitions on that server. Shaded areas indicate the amount of memory that is allocated to the system firmware, the amount of memory that is used by all Virtual I/O Servers, and the amount of memory available for all partitions. You can compare the trend lines to determine whether you allocated more memory or less memory for the partitions on your server.

Memory trend graph: AMS Level Utilization view

The **AMS Level Utilization** view shows the amount of memory that is used by Active Memory Sharing (AMS). The shaded area indicates the amount of memory that is used by the system firmware at the times that are displayed along the horizontal axis. You can review this information periodically to determine whether your system benefits from using memory from Active Memory Sharing. If you are not using Active Memory Sharing, this information is not available.

Memory breakdown table

The memory **Breakdown by Partitions** table lists information that is based on partitions over the selected time period. The memory breakdown table is displayed at the bottom of the main window.

The Memory Breakdown by Partitions table

The **Breakdown by Partitions** table shows memory utilization data for logical partitions. Each row indicates whether the partition is configured for dedicated or shared access to memory resources. In addition, you can view the size of the memory available, the amount of memory that is assigned, and the maximum amount of memory that is assigned to the memory pool for that partition. The **Assigned Trend** column shows the overall usage trend for the assigned memory over the time interval you selected. The **Breakdown by Partitions** table also lists the total number of partitions for that system.

The **Breakdown by Partitions** table also shows information about the Assigned Virtual Persistent Memory. The persistent memory is available only when the Hardware Management Console (HMC) is at Version 9.1.940, or later, and when the firmware is at level FW940, or later.

Sorting the memory breakdown table

You can sort the table by clicking the up or down chevron next to the name of the column that you want to sort. You might choose to sort the columns so that you can view the entries, ranking from the lowest to the highest, or vice versa.

You can select which columns are displayed in the **Memory Breakdown** table. To change which columns are displayed, click the arrow in the header row of the table.

Filtering the memory breakdown table

You can search for specific entries such as the partition name within the table. The search shows all table rows that contain text in any cell that matches the filter text.

The Network Utilization view

The **Network Utilization** view includes historical data and trends that show how logical partitions use physical network resources, or virtual local area network resources, over time. This view contains a graph that shows the network traffic per Virtual I/O Server. The table lists more detailed information about the averages and trends.

You can access this view by clicking **Network Utilization Trend** in the **Views** window.

The **Network Utilization** view includes a trend graph.

The **Resource Utilization** table shows detailed information for individual partitions and network bridges, such as the amount of traffic that is processed by the physical resources.

By default, the graphs and tables show data that was collected for the previous 4 hours. To display data for a longer amount of time, refer to "Changing Performance and Capacity Monitor home page settings" on page 3.

Network trend graphs

The Performance and Capacity Monitor home page includes a trend graph that shows network utilization data that is plotted against a default time interval of 4 hours.

By default, the trend graph shows network bridge level data; however, you can change the view to display Single root I/O virtualization (SR-IOV) adapters traffic data. To switch from one view to another view, click **More Graphs** and choose **Network Bridges Traffic** or **SR-IOV Adapters Traffic**.

Network trend graph: Network Bridges Traffic trend view

The **Network Bridges Traffic** view shows the traffic that is flowing over network bridges at the times indicated along the horizontal axis. The shaded areas indicate the amount of internal virtual traffic (measured in GB per second) that is tagged by a Virtual I/O Server and is processed by shared Ethernet adapters. The dotted line indicates the amount of physical traffic that is routed to a physical NIC for sharing outside of the virtual network. You can compare the shaded areas to determine how much virtual traffic is sent to one Virtual I/O Server versus another. Similarly, you can view the dotted line to compare the amount of physical traffic versus the amount of virtual traffic.

Network breakdown tables

The network breakdown tables list information about network traffic for the selected time period. The following breakdown tables are available: **Breakdown by Partitions** and **Breakdown by Network Bridges**.

The network Breakdown by Partitions table

The **Breakdown by Partitions** table shows network traffic data for logical partitions. Each row indicates the ID of the network bridge with which that partition is associated. The rows also indicate the number of Virtual I/O Servers that are associated with the partition, and the amount of virtual and physical traffic that is processed through the partition. The **Traffic Trend** column shows the overall network traffic for the logical partition for the time interval you selected.

Click a network bridge ID to display network traffic information, such as the number of packets that were sent and received and the speeds at which packets were sent or received, for the bridge.

The network Breakdown by Network Bridges table

The **Breakdown by Network Bridges** table shows the network traffic for network bridges. Each row indicates the name of the network bridge, the number of partitions that are sending traffic across that bridge, the name of the Virtual I/O Server that hosts the network bridge, and the amount of virtual and physical traffic that is processed through the bridge. The **Traffic Trend** column shows the overall network traffic on the network bridge for the time interval you selected.

Click a network bridge ID to display network traffic information, such as the number of packets that were sent and received and the speeds at which packets were sent or received, for the bridge.

Click one of the numbers in the **Partitions Using** column to view the names of the partitions that are using that network bridge.

Sorting the network breakdown tables

You can sort the table by clicking the up or down chevron next to the name of the column that you want to sort. You might choose to sort the columns so that you can view the entries, ranking from the lowest to the highest, or vice versa.

You can select which columns are displayed in the **network breakdown** table. To change which columns are displayed, click the arrow in the header row of the table.

Filtering the network breakdown tables

You can search for specific entries such as the partition name within the table. The search shows all table rows that contain text in any cell that matches the filter text.

The Storage Utilization view

The **Storage Utilization** view includes historical data and trends that show the amount of physical storage I/O bandwidth that each Virtual I/O Server uses and allows logical partitions to use through Small Computer System Interface (SCSI) connections, for a specific duration of time. The data also shows the

virtualized storage I/O bandwidth that the logical partitions use from logical ports that are provided by an N_Port ID Virtualization (NPIV) adapter. The table lists detailed information about averages and trends.

You can access this view by clicking **Storage Utilization Trend** in the **Views** window.

The **Storage Utilization** view includes a trend graph. You can change the graph options to show **vSCSI Adapter usage** or **NPIV traffic**.

The **Resource Utilization** table shows detailed information for individual partitions and physical adapters, such as the total traffic used.

By default, the graphs and tables show data that was collected for the previous 4 hours. For more information about displaying data for a longer amount of time, see "Changing Performance and Capacity Monitor home page settings" on page 3.

Storage trend graphs

The Performance and Capacity Monitor home page includes trend graphs that show storage utilization data that is plotted against a default time interval of 4 hours.

By default, the trend graph shows data for virtual Small Computer System Interface (SCSI) adapters; however, you can change the view to display N_Port ID Virtualization (NPIV) traffic data. To switch from one view to another, click **Graph Options** and choose **vSCSI Adapaters Usage** or **NPIV Traffic**.

Storage trend graph: vSCSI Adapters Usage view

The **vSCSI Adapters Usage** view shows the I/O bandwidth for a Virtual I/O Server (VIOS) that is using physical storage space on SCSI adapters at the times indicated along the horizontal axis. Each of the shaded areas represents one VIOS. You can compare the shaded areas with one another to determine which VIOS is using the most storage bandwidth, and you can compare individual VIOS usage against the total usage.

Storage trend graph: NPIV Traffic view

The **NPIV Traffic** view shows the I/O bandwidth for a VIOS that is using physical storage space through logical ports that are provided by an NPIV adapter at the times indicated along the horizontal axis. Each of the shaded areas represents one VIOS. You can compare the shaded areas with one another to determine which VIOS is using the most storage bandwidth, and you can compare individual VIOS usage against the total usage.

Storage breakdown table

The storage breakdown tables list information that is based on partitions or physical Fibre Channel (FC) adapters over the selected time period. The following breakdown tables are available: **Breakdown by Partitions** and **Breakdown by Pools**.

The storage Breakdown by Partitions table

The **Breakdown by Partitions** table shows the amount of traffic that is passing through the physical storage adapter that is associated with the logical partition. Each row indicates the name of the Virtual I/O Server and Virtual Host that is associated with the partition. The **Traffic Trend** column shows the overall traffic trend for the physical adapter over the time interval you selected.

The table lists the total number of partitions for that system.

The storage Breakdown by Physical FC table

The **Breakdown by Physical FC** table shows the amount of traffic that is passing through the physical storage adapter that is associated with the Physical FC. Each row indicates the name of the Virtual I/O Server and Virtual Host that is associated with the Physical FC. The **Traffic Trend** column shows the overall traffic trend for the physical adapter over the time interval you selected.

Sorting the storage breakdown tables

You can sort the table by clicking the up or down chevron next to the name of the column that you want to sort. You might choose to sort the columns so that you can view the entries, ranking from the lowest to the highest, or vice versa.

You can select which columns are displayed in the **storage breakdown** tables. To change which columns are displayed, click the arrow in the header row of the table.

Filtering the storage breakdown tables

You can search for specific entries such as the partition name within the table. The search shows all table rows that contain text in any cell that matches the filter text.

Viewing SR-IOV port counters

You can view SR-IOV port counters in the Hardware Management Console (HMC) version 8.7.0, or later. The **SR-IOV Port Counters** page displays the details of logical ports and physical ports that are configured for a selected SR-IOV adapter. You can use the **SR-IOV Port Counters** page to view port counters for a logical port or a physical port that is configured for a selected SR-IOV adapter.

About this task

To view the SR-IOV port counters, by using the Hardware Management Console (HMC), complete the following steps:

Procedure

1. In the navigation pane, click the **Resources** icon .
2. Click **All Systems**.

   The **All Systems** page is displayed.
3. Select the server for which you want to view the performance data.
4. Click **Actions**.
5. Select **View Performance Dashboard**.
6. In the **Views** topic pane, click **SR-IOV Port Counters**.

   The **SR-IOV Port Counters** page is displayed. The **SR-IOV Adapters** list displays the details of the SR-IOV adapters that are configured for the selected system.
7. From the **SR-IOV Adapters** list, select an SR-IOV adapter.

   The status, mode, owner, maximum logical ports, and the configured logical ports of the selected SR-IOV adapter are displayed.
8. Select **Physical Ports** or **Logical Ports** to view the list of physical or logical ports that are configured for the SR-IOV adapter.

   - If you want to view the list of physical ports that are configured for the SR-IOV adapter, select **Physical Ports**. The **Physical Ports** table is displayed, with the details about the physical ports such as ID, location code, type, link status, label, and sub label of the port.

     Note: If the selected SR-IOV adapter does not have any physical ports that are attached to it, the **Physical Ports** table does not display any details about the physical ports.

     To view the list of port counters, complete the following steps:

     a. From the **Physical Ports** table, select a physical port to view the list of port counters. The **Port Counters** table is displayed, with the name and value of port counters for the selected physical port.

     b. Click **Reset Statistics** to reset the port counter statistics of the selected physical port.

- If you want to view the list of logical ports that are configured for the SR-IOV adapter, select **Logical Ports**. The **Logical Ports** table is displayed, with the details about the logical ports such as adapter ID, physical port ID, location code, type, partition, and connected partition for the port.

  Note: If the selected SR-IOV adapter does not have any logical ports that are attached to it, the **Logical Ports** table does not display any details about the logical ports.

  To view the list of port counters, complete the following steps:

  a. From the **Logical Ports** table, select a logical port to view the list of port counters. The **Port Counters** table is displayed, with the name and value of port counters for the selected logical port.

  b. Click **Reset Statistics** to reset the port counter statistics of the selected logical port.

Troubleshooting the Performance and Capacity Monitor

Review the common troubleshooting issues and their solutions.

How can I determine whether performance data is being collected?

The Performance and Capacity Monitor home page includes a **Data Collection** status indicator on the home page. If the status is **On**, the Performance and Capacity Monitor function is collecting data from that server. If the status is **Off**, the Performance and Capacity Monitor function is not collecting data from that server. For more information about collecting data from your system, see "Enabling data collection" on page 2.

What permission do I need to view the managed system utilization data?

You must have **List Utilization Data** access permission for the managed system to view the performance data for that server. For more information about user roles and permissions, see HMC tasks, user roles, IDs, and associated commands .

What happens if I power off the system while Performance and Capacity Monitor is still enabled?

If you power off a PCM-enabled system, Performance and Capacity Monitor does not get disabled automatically. Instead, the Performance and Capacity Monitor data collection that happens in the background is stopped. However, the status of Performance and Capacity Monitor for the PCM-enabled system is still displayed as **On** in the graphical user interface (GUI) and in Representational State Transfer (REST). When the system is powered on again, Performance and Capacity Monitor restarts data collection, as usual.

Why was data not collected for my server even though I enabled data collection?

You can enable data collection for servers that are in any state. However, the Performance and Capacity Monitor collects data in the Hardware Management Console (HMC) only when the server is in running or in the operational state. The Performance and Capacity Monitor automatically disables collection, if the server is not in running or operational state for 30 minutes or longer.

Why does the home page not display data even though I enabled data collection?

If you access the Performance and Capacity Monitor home page before the initial data is collected, the Performance and Capacity Monitor displays a status message. The status message indicates that data is not yet available and recommends that you go to the home page again later. The initial time that is required to collect the information is about 15 minutes.

Why is my physical adapter not displayed under the PCM data?

If a storage adapter is not connected to a device, that adapter does not appear under the Performance and Capacity Monitor data, as there is no utilization for that adapter.

Why are the Performance and Capacity Monitor graphs not displayed, and instead I see only the "Fetching PCM Data" message?

You must clear the browser cache and cookies, and then try again.

Why is the home page not showing data for the entire length of time I chose?

The Performance and Capacity Monitor home page can show only the amount of data that the server stored since you enabled data collection. For example, if you want to collect data for 250 days and if you immediately access the home page, you can view only the data that represents the minute or minutes that passed since you enabled data collection.

In addition, the maximum number of days for which the Performance and Capacity Monitor collects data is 366. As a result, the Performance and Capacity Monitor shows a maximum of 366 days of data only.

Why do I see gaps in the data that is displayed in the collection graphs?

If you disable the data collection and re-enable it, or if the server stopped collecting data because the server stopped running, or it is no longer operational, the Performance and Capacity Monitor shows gaps that represent the missing time intervals.

Can I see utilization data after I disable the data collection?

Yes, the Performance and Capacity Monitor maintains utilization data after data collection is disabled. You can view the historic data from the Performance and Capacity Monitor home page of your server. For more information, see "Accessing the Performance and Capacity Monitor home page" on page 2.

Why do I receive a message that indicates that network or storage resources are not available to display?

If you dedicate network and storage resources to a single partition on your server, network and storage utilization data is not available. Network and storage utilization data shows how each of the partitions on your server is using network and storage resources that are managed by Virtual I/O Servers. You can compare the data among partitions to determine whether a partition is overloaded or under-used. However, if a single partition is entitled to dedicated network and storage resources, there is no data to compare. In addition, you can also check whether you have the required Virtual I/O Server version. The Performance and Capacity Monitor requires Virtual I/O Server Version 2.2.3, or later to display the Network and Storage data.

Why do I see only a single partition or Virtual I/O Server listed in the Top Resource Consumers graph?

The **Top Resource Consumers** graph displays up to 10 partitions or Virtual I/O Servers that are using the highest number of units of the resource you chose. However, if you dedicate all of your resources to a single partition or Virtual I/O Server, no other partitions or servers can compete for the resources. As a result, only the partition or Virtual I/O Server for which you dedicated all resources is displayed in the **Top Resource Consumers** graph.

Similarly, if you have fewer than 10 partitions or Virtual I/O Servers, the **Top Resource Consumers** graph includes a vertical line for each of your partitions or Virtual I/O Servers. A maximum of 10 partitions or Virtual I/O Servers are included in the **Top Resource Consumers** graph. If fewer than 10 partitions or Virtual I/O Servers exist, all the partitions or Virtual I/O Servers are displayed.

Disabling data collection

The Performance and Capacity Monitor function captures data only for the servers for which you enabled data collection. However, you can disable data collection if you no longer need performance and capacity monitoring information for that server.

About this task

To disable data collection, complete the following steps:

Procedure

1. In the navigation pane, click the **HMC Management** icon .
2. Click **Console Settings**. The **Console Settings** page is displayed.
3. In the **Performance Settings** area, click **Change Performance Monitor Settings**.

   Note: Alternatively, if you try to launch the Performance and Capacity Monitor function for a system on which data collection is disabled, a message is displayed in the Current Resource Utilization area of the **Settings for Performance Monitoring** page. To enable data collection for the required server, set **Collection** to **On**.

4. Click the toggle switch in the **Collection** column next to the name of the server for which you want to disable data collection or click **All Off** to disable data collection for all of the servers in your environment.
5. Click **OK** to apply the changes and close the window.

   The **HMC Management** content is displayed in the main window.

Exporting data

The Export Data option exports the Performance and Capacity Monitor (PCM) data metrics that are collected for the specified time. You can export the Performance and Capacity Monitor data metrics that is displayed in the dashboard into a folder on your local system.

About this task

You can export data metrics by accessing the HMC.

To export data metrics for one or more servers, complete the following steps:

Procedure

1. In the navigation pane, click the **Resources** icon .

   a) Click **All Systems**. The All Systems page is displayed.

   b) Select the server for which you want to view the performance data.

   c) Click **Actions**.

   d) Select **Performance Data Collection** > **Export Data**.

   The Performance and Capacity Monitor home page is displayed with the information for that system.

2. In the upper-right corner of the Performance and Capacity Monitor section, click the **Data Collection** menu.
3. Click **Export Data**.

   The **Export Data** page is displayed.

4. The data collection can be turned on or turned off using the toggle switch in the **Data Collection** menu.
5. Select the feed by which you want to export the performance metrics.

   PCM metrics have the following rollup or aggregation frequency and retention period:

   • Tier 0 level - The aggregation frequency is 30 seconds and the retention period is 2 hours.
   • Tier 1 level - The aggregation frequency is 5 minutes and the retention period is 24 hours.
   • Tier 2 level - The aggregation frequency is 2 hours and the retention period is 7 days.
   • Tier 3 level - The aggregation frequency is 24 hours and the retention period is 180 days.

   When you select the feed as **By Source**, multiple data files that contain overall resource level data are exported for each managed system, logical partition, and Virtual I/O Server (VIOS). When you select the feed type as **By Tier**, the maximum tier level is calculated based on the time duration that is specified in start time stamp and end time stamp, and the data for corresponding level is exported.

   Note:

   If you select the feed type as **By Tier** and the export format is CSV, two files are created, one for the managed system and one for the logical partition, as compared to a single file in the JavaScript Object Notation (JSON) format.
6. Select the export format as either JavaScript Object Notation (**JSON**) or comma-separated values (**CSV**).

   The CSV file represents data of JSON file content in the CSV format.
7. Click the calendar icon to choose the **Start Date** and **End Date**.

   By default, the time stamp in the **Start Date** is set to 4 hours before the current time, and the current time is set as the time stamp in the **End Date**. You can choose to export data for this duration. Otherwise, to specify specific time interval, you must enter the time within the Performance and Capacity Monitor data retention period, which is 180 days by default. The time stamp of the last data export is displayed in gray.
8. Click **OK**. The **Confirm Download** dialog box is displayed with the name of the file that contains the exported data.
9. Click **OK** to download the exported data in a compressed format.
10. Depending on your browser setting, you can choose the destination folder in which the exported data must be saved.

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Accessibility features for IBM Power Systems servers

Accessibility features assist users who have a disability, such as restricted mobility or limited vision, to use information technology content successfully.

Overview

The IBM Power Systems servers include the following major accessibility features:

- Keyboard-only operation
- Operations that use a screen reader

The IBM Power Systems servers use the latest W3C Standard, WAI-ARIA 1.0 (www.w3.org/TR/wai-aria/), to ensure compliance with US Section 508 (www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-section-508-standards/section-508-standards) and Web Content

Accessibility Guidelines (WCAG) 2.0 (www.w3.org/TR/WCAG20/). To take advantage of accessibility features, use the latest release of your screen reader and the latest web browser that is supported by the IBM Power Systems servers.

The IBM Power Systems servers online product documentation in IBM Knowledge Center is enabled for accessibility. The accessibility features of IBM Knowledge Center are described in the Accessibility section of the IBM Knowledge Center help (www.ibm.com/support/knowledgecenter/doc/kc_help.html#accessibility).

Keyboard navigation

This product uses standard navigation keys.

Interface information

The IBM Power Systems servers user interfaces do not have content that flashes 2 - 55 times per second.

The IBM Power Systems servers web user interface relies on cascading style sheets to render content properly and to provide a usable experience. The application provides an equivalent way for low-vision users to use system display settings, including high-contrast mode. You can control font size by using the device or web browser settings.

The IBM Power Systems servers web user interface includes WAI-ARIA navigational landmarks that you can use to quickly navigate to functional areas in the application.

Vendor software

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Related accessibility information

In addition to standard IBM help desk and support websites, IBM has a TTY telephone service for use by deaf or hard of hearing customers to access sales and support services:

TTY service
800-IBM-3383 (800-426-3383)
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Programming interface information

This Monitoring the Virtualization Environment publication documents intended Programming Interfaces that allow the customer to write programs to obtain the services of IBM AIX Version 7.2, IBM AIX Version 7.1, IBM AIX Version 6.1, IBM i 7.4, and IBM Virtual I/O Server Version 3.1.1.

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