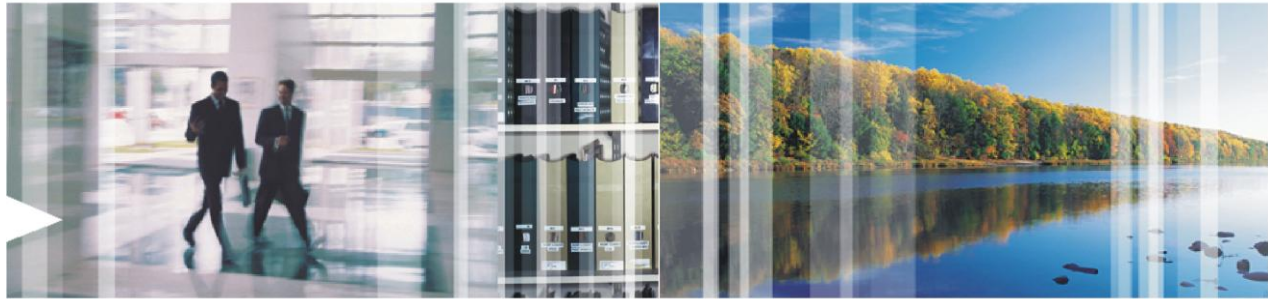




BMC® Performance Manager Express for Hardware by Sentry Software™ User Guide



Supporting

BMC® Performance Manager Express for Hardware version 2.3.00
by Sentry Software™

January 18, 2007



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 - operating system type, version, and service pack or other maintenance level such as PUT or PTF
 - system hardware configuration
 - serial numbers
 - related software (database, application, and communication) including type, version, and service pack or maintenance level
- sequence of events leading to the problem
- commands and options that you used
- messages received (and the time and date that you received them)
 - product error messages
 - messages from the operating system, such as **file system full**
 - messages from related software

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Overview

The **BMC® Portal**, also referred to as the Portal - is composed of a database, an application server, and a web server, and provides the access point for its utilities and modules. You access BMC® Portal from a browser on your desktop computer.

The **BMC® Performance Manager Portal** extends the features in the BMC Portal, enabling you to leverage both agent-less technologies and the PATROL Agent to monitor the availability and performance of your business infrastructure.

BMC® Performance Manager Express for Hardware by Sentry Software™ is an **agent-less Performance Manager** that enables you to ensure the availability of your heterogeneous hardware systems, while providing a centralized view of your enterprise within the BMC® Portal environment. It allows administrators to monitor the hardware of different server brands: IBM®, HP®, DELL®, Sun Microsystems®, NEC®, and Fujitsu-Siemens® amongst many others.

Getting started

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1 - How does it work?

BMC® Performance Manager Express for Hardware enables BMC® Performance Manager Portal to monitor computer hardware (disk status, temperatures, etc.). It gathers hardware information from different sources (vendor-specific agents, standard management technologies, SNMP, WBEM, etc.) and displays this information within the Portal framework.

In order to function properly, BMC® Performance Manager Express for Hardware needs certain hardware information sources to be available. Depending on the platform, it will rely on vendor-specific agents and/or on standard management technology such as WBEM or SNMP. On startup, BPM Express for Hardware automatically detects which hardware information source is available and then uses this source to monitor the hardware of the computer.

The picture below represents how BMC Performance Manager Express for Hardware monitors the hardware of a Fujitsu-Siemens® computer. This example shows the basic mechanism of BPM Express for Hardware.

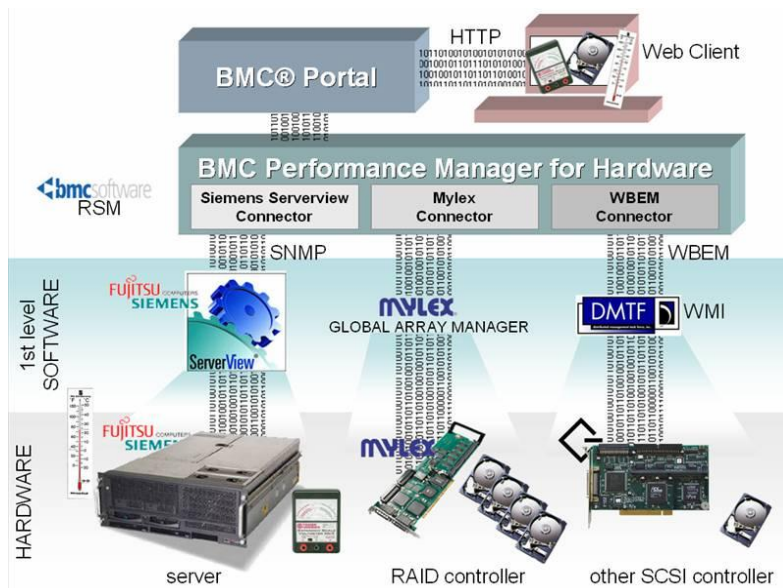


Figure 1: How it works

- The Siemens® Serverview® agent shows the temperatures, the fans, the power supplies and the voltages of the Siemens computer through SNMP
- The Mylex® GAM Server shows the status of the physical and logical disks of the Mylex® RAID Controller through SNMP
- The Windows WMI provider shows the status of the physical disks attached to the standard SCSI controller through WBEM
- BMC Performance Manager Express for Hardware detects and automatically connects to all three information sources (Siemens Serverview, Mylex GAM Server and Windows WMI provider).
- BMC Performance Manager Express for Hardware gathers the useful hardware information from these sources and displays it within the Portal framework

Note: This is just an example of the basic mechanism of BPM Express for Hardware and is applicable to IBM, NEC, HP and other computers as well.

2 - Integrating BMC Performance Manager Express for Hardware

BMC Performance Manager Express for Hardware is a Performance Manager (PM) for the Portal. This is an agent-less version, i.e. – it does not require the PATROL agent to be installed on each managed element as the monitoring is done remotely on the Portal environment.

Once BPM Express for Hardware is integrated within the Portal framework, the hardware information and status of the monitored servers should be available via the web browser used to access the Portal.

Please refer to the *BMC Performance Manager Express for Hardware - [Installation Guide](#)* for further details on the installation procedure.

3 - Understanding BPM Express for Hardware within the Portal

In order to make optimum use of BMC Performance Manager Express for Hardware, it is important to understand its relationship with the Portal. Let's take a quick look at the basic outline of BPM Express for Hardware within the Portal.

The **BMC® Portal** as you know, is composed of a database, an application server, and a web server, and provides the access point for its utilities and modules. The **BMC® Performance Manager Portal** extends the features in the Portal, enabling you to leverage both agent-less technologies and the PATROL agent to monitor the availability and performance of your business infrastructure.

BPM Express for Hardware is a **Performance Manager** based on the **agent-less technology**, and, being fully integrated with the Portal, it uses the same web-based interface and Portal features common to all modules.

BPM Express for Hardware is leveraged by the BMC Performance Manager Portal module that uses Remote Service Monitors (RSMs) to collect metrics about your infrastructure. An RSM is a computer on which you have installed the RSM program. Depending on the size of your environment, you can implement one or many RSMs.

To know what to monitor on the specified infrastructure elements, the RSM uses Performance Managers—and therefore for hardware monitoring, it banks on the BPM Express for Hardware. All Performance Managers, and the application classes that they contain, are installed on the Portal, and saved in the Portal database when you select them from an installation CD or when you import them via the Portal user interface. Performance Managers that are installed on the Portal are available to all users on the Portal who have the appropriate user permissions.

Figure 2 below shows the interaction between BPM Express for Hardware and BMC® Portal.

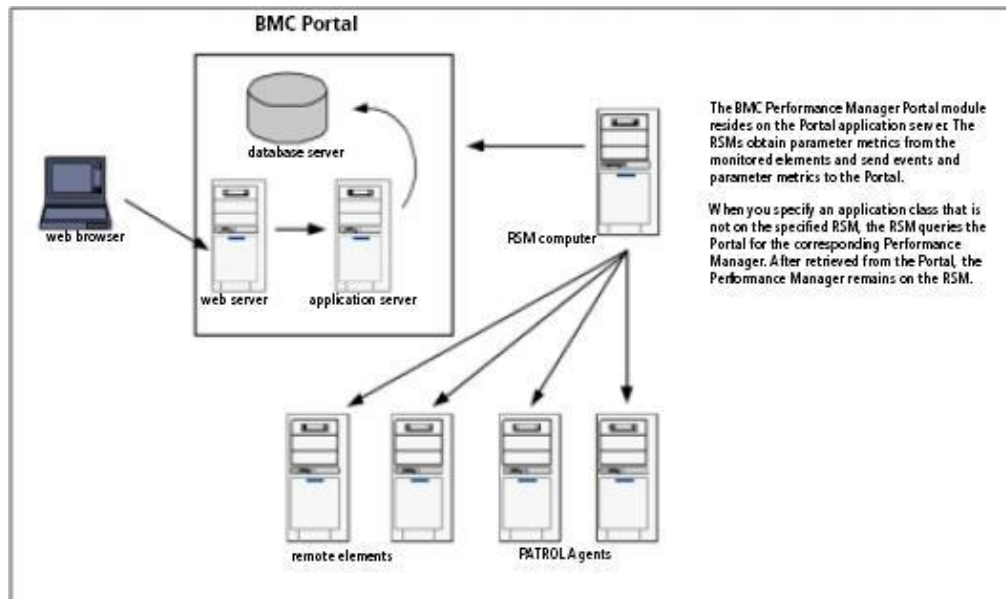


Figure 2: BMC Portal

The above given data and diagram show you how remote monitoring of your hardware is possible on the Portal. Installation of BPM Express for Hardware on just one computer is sufficient for monitoring a heterogeneous infrastructure, as long as the vendor-specific hardware agents are installed on every managed element. We take a deeper look at this in the following topic: The need for vendor-specific hardware monitoring software

4 - The need for vendor-specific hardware monitoring software

Quite often, the standard operating system layer is not a sufficient hardware information source and most computers require an additional vendor-specific agent for BPM Express for Hardware to work properly.

In most cases, server vendors provide the required hardware monitoring agent for their server models. Depending on the platform, a single agent will monitor the temperatures, fans, voltages, power supplies and the RAID systems or a separate agent for the environment monitoring and for the disk monitoring.

For example, the IBM Director Agent monitors and provides information about temperatures, fans, voltages, power supplies and ServeRAID disks for IBM xSeries and Netfinity servers. On the other hand, the Siemens Serverview Agent will only monitor sensors on the motherboard of the server (temperatures, voltages, fans and power supplies), while the Mylex GAM Server monitors the Mylex RAID controller of the server. Please refer to the [Installation Guide](#) for further details on the installation procedure of the vendor-specific agents supported by BPM Express for Hardware.

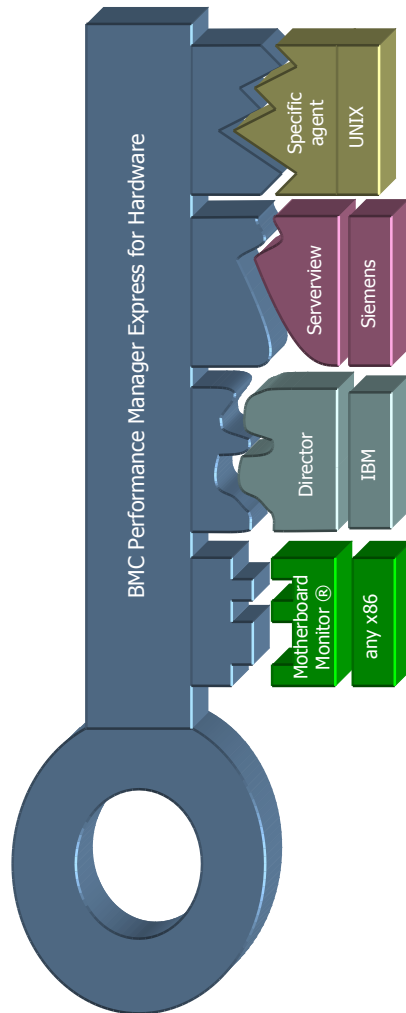


Figure 3: BPM Express for Hardware & Hardware Agents

5 - Using BPM Express for Hardware to monitor hardware

Once BMC Performance Manager Express for Hardware is installed on the Portal and having ensured that the pre-requisites have been met, the hardware information sources are available, the hardware information of the monitored computers, called “elements” in Portal terminology, are displayed in your web browser of the Portal environment.

Operators and administrators just have to look at view under “Infrastructure” on the Portal site, to see the hardware health of their monitored servers in the same way they see the operating system or database health. Under each server icon, a tree represents all the monitored hardware for this server.

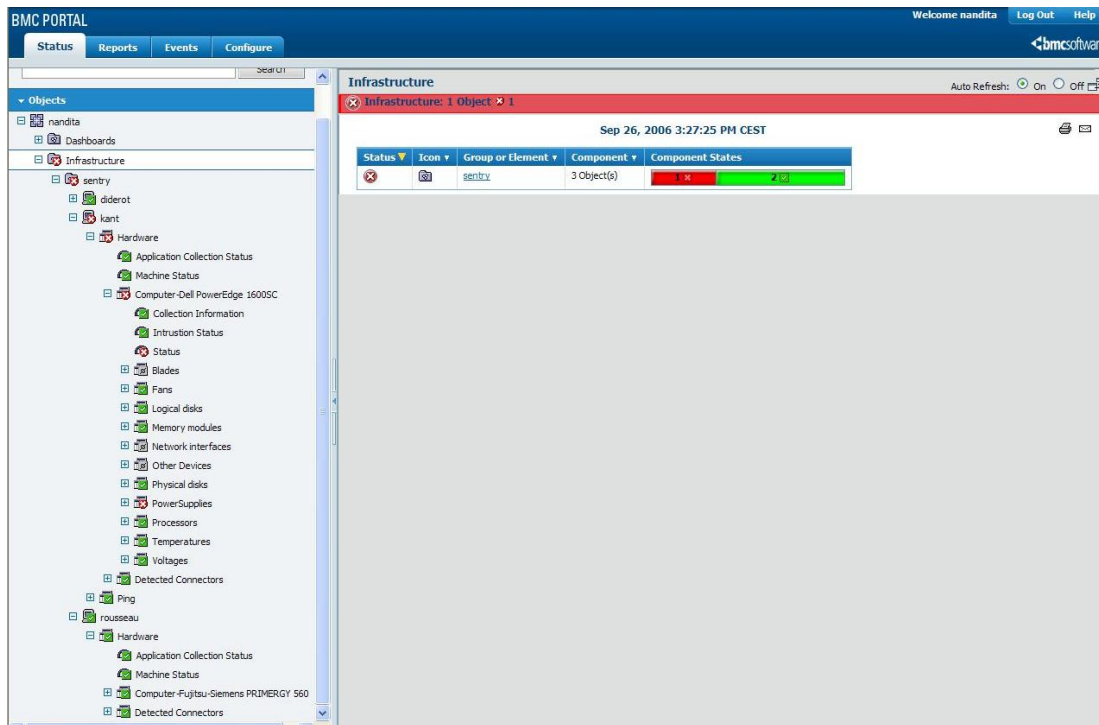


Figure 4: Infrastructure General View

6 - What sort of hardware does BPM Express for Hardware monitor?

For each supported hardware information source (such as vendor-specific agents or standard technologies), BPM Express for Hardware will monitor:

- status of the disks (RAID and non-RAID disks)
- speed and/or status of the fans
- temperatures
- voltage levels
- status of the power supplies
- processors
- memory modules
- network interfaces

Currently BPM Express for Hardware supports the following hardware information sources:

| Supported Platform | Required Hardware Agent |
|---|--|
| Dell PowerEdge computers | Dell OpenManage Server Administrator |
| Fujitsu-Siemens PRIMERGY | Fujitsu-Siemens Serverview Agent |
| Fujitsu-Siemens Blade systems | Management Blade |
| HP (Compaq) ProLiant computers | HP Insight Management Agents |
| HP Integrity and Itanium-based SuperDome computers running Microsoft Windows or Linux | HP Insight Management Agents |
| HP AlphaServer computers | The Insight Management Agents |
| HP Netserver computers | The HP TopTools Agent |
| HP Integrity, HP 9000, HP 3000 and PA-RISC-based SuperDome computers running HP-UX | None. Hardware Sentry uses internal HP-UX system commands for in-band and out-of-band monitoring (using the MP or GSP) |
| IBM xSeries and Netfinity computers | IBM Director Agent |
| IBM BladeCenter systems | Management Module |
| IBM RS/6000, pSeries and eServer p5 (AIX) computers | No agent needed |
| NEC Express5800 computers | NEC ESMPRO Agent |
| StorageTek LSeries Tape Libraries | LSeries SNMP agent |
| Sun SPARC-based computers | No agent needed |
| Sun AMD Opteron-based computers (Linux/Solaris) | IPMItool and lsiutil |
| Any unbranded PC | Motherboard Monitor® |

As Sentry Software is continuously working on the support of new hardware information, sources and new platforms that can be monitored with BPM Express for Hardware for the Portal will continue to grow.

Please check our web site (www.sentrysoftware.net) to find the latest updates. Add-ons for BPM Express for Hardware can be obtained for free and do not need an update of the Performance Manager itself.

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1 - Architecture

As described earlier BPM Express for Hardware is composed of a common hardware monitoring engine: BPM-Express-Hardware-2.3.00.par containing the following files:

- SEN_HW_WBEMUnix_2300-2.3.00_Build_174.jar
- SEN_HW_SNMP_2300-2.3.00_Build_174.jar
- SEN_HW_Protocol_2300-2.3.00_Build_174.jar
- SEN_HW_hdf_2300.jar
- SEN_HW_Hardware_2300-2.3.00_Build_174.jar

1.1 - Detection

Upon startup, BPM Express for Hardware tests each connector in order to detect which hardware information sources are available (vendor-specific hardware agents, standards instrumentation layers, etc.). This is called the "detection process".

1.2 - Discovery

Once BPM Express for Hardware knows which hardware information sources are available and can be connected to, it tries to discover the hardware environment by querying these selected hardware information sources, as described in the corresponding *.hdf files. This is called the "discovery process".

1.3 - Collection

Finally, when the detection and discovery processes are complete, BPM Express for Hardware starts collecting data about the discovered hardware environment (status, temperatures, voltages, etc.) by querying the detected hardware information sources as described in the corresponding *.hdf files. This is called the "collection process".

2 - The Connectors

Each connector is an “.hdf” file that is dedicated to one hardware information source. The purpose of each “.hdf” file is to describe how BPM Express for Hardware can connect to the hardware information source available on a platform and which information is available through this source. For example, MS_HW_Director41NT.hdf will describe how to get information from the IBM Director 4.1 Agent and then monitor an IBM xSeries server.

An “.hdf” file can tell the BPM Express for Hardware engine to do the following actions:

- Query a SNMP agent (get, get next, and tables)
- Execute a WBEM query (using WMI for Windows and the Pegasus implementation of WBEM for Linux)
- Execute an OS command (using TELNET and SSH)

Each “.hdf” file uses a mix of these possible actions with some computing capabilities to make BPM Express for Hardware gather useful data in a given hardware information source.

Note: The “.hdf” files are packed as “SEN_HW_hdf_2200.jar”. The “.hdf” files released by Sentry Software are encrypted and therefore cannot be updated or modified by the end-user.

3 - The Detection Process

On startup, BPM Express for Hardware:

1. Gets the list of available connectors "*.hdf" files from SEN_HW_hdf_2300.jar
2. It tests for detection criteria (OS type, Windows, processes, SNMP request, etc.) for each ".hdf" file found.
3. Then it marks the ".hdf" files as "detected" once all its detection criteria is successfully met. There may be several connectors detected at one time (typically: one connector for the temperatures, voltages, etc., one for the RAID disk controller and one for the non-RAID disk controller).
4. After which it launches the discovery process.

Note: Only one ".hdf" file can describe the computer model and manufacturer, as only one icon for the computer will be created. The BPM Express for Hardware engine will ensure that only one ".hdf" describing the computer model will be marked as "detected".

4 - The Discovery Process

The discovery process is launched just after the end of the detection process. It takes the following actions:

- Processes the "Enclosure.Discovery" section of the detected connectors (".hdf") that describe the computer model and create the main BPM Express for Hardware and computer icon (class: MS_HW_ENCLOSURE). Most of other icons (fans, temperatures, etc.) will be created under this computer icon.
- Launches the disk controller discovery that processes the "DiskController.Discovery" section of each detected ".hdf" file.
- Launches the other discoveries (fans, temperatures, voltages, power supplies, logical disks, physical disks and other devices) that will process the corresponding sections of each detected ".hdf" file and create the corresponding icons.

5 - The Collection Process

Once the discovery process is complete, the collection process starts. Every five minutes, BPM Express for Hardware spawns several paramlets that are responsible for the collection of information about a given device type.

For example, SEN_HW_FAN_CLASS paramlet will gather fan information from the different detected hardware information sources, as described in the corresponding ".hdf" Fan.Collect section.

These paramlets are "attached" to the main BPM Express for Hardware icon (SEN_HW_MAIN class) and not to the corresponding classes and instances.

When a device has been marked as "missing" by the discovery process (i.e. had been discovered and is no longer discovered), the collection process no longer queries the hardware information source and simply sets the status of the object to alarm.

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1 - Monitoring Fans, Temperatures, Power-Supplies and Voltages

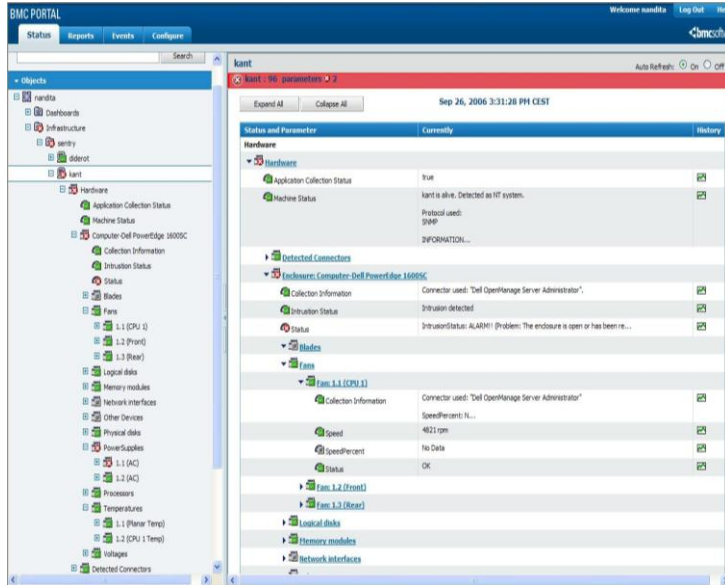


Figure 5: Monitoring View

BPM Express for Hardware automatically detects the information sources available on the monitored computer and displays the hardware information provided by those sources.

If a hardware information source provides data about temperatures, fans, voltages or power-supplies, an icon is automatically created for each sensor found in the system, as well as for one or more parameters.

- In the left pane, click on an element and see all its monitored hardware in detail in the right panel
- By clicking on any hardware component in the left pane, you will see details about it in the right pane.

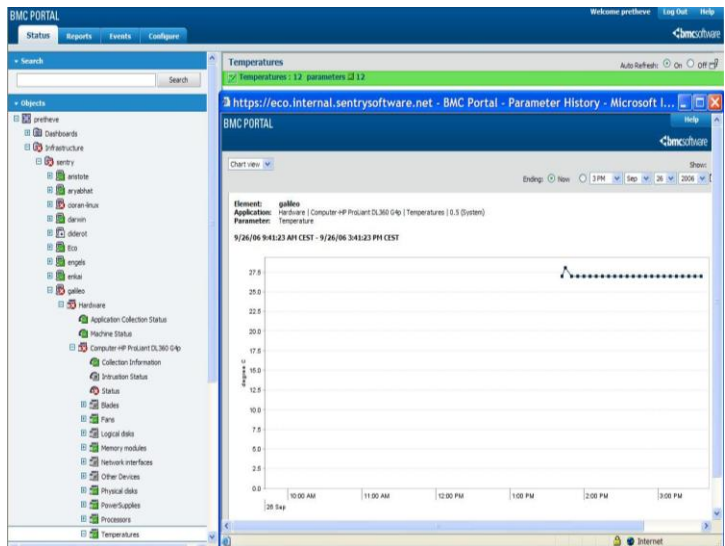


Figure 6: Chart View

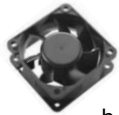
For each monitored element, graphs & text reports are built by polling the parameter instances every five minutes. To view these graphs or text reports from the Status tab:

- Click the **parameter** > click the corresponding **History icon** that appears in the right pane.
- For parameters with numeric values or Boolean values such as : temperature, voltage, speed, speedpercent and usedcapacity, you can see the results either in **Chart view** (graph) or **Table view**
- For parameters with text values the report displayed is in a table view.

Depending on the type of platform and sensors, and whenever possible, alert thresholds are automatically set by BPM Express for Hardware. When the parameter value breaches these thresholds, it is *Status* - a text parameter that displays the overall status for every instance, that triggers alerts, and a notification is sent out according to the options configured in the Portal.

Note 1: If a device appears to be missing, the *Status* parameter will trigger an alert.

Note 2: *Status* is a text parameter that describes the overall status of the corresponding device or sensor. It is the *Status* parameter that raises alerts when any of the other parameters for the device breach their thresholds. Alert conditions for *Status* describe in symbolic terms what occurs in the *Status* parameter when thresholds are breached: one exclamation mark triggers a warning; two exclamation marks raise an alarm. Example: If BPM Express for Hardware detects that manufacturer-specified thresholds for the device have been breached, the *Status* parameter will report for example: "WARNING! This network adapter has degraded" or, "ALARM! This network adapter is not detected anymore" or as the case may be. The history graph shows the exact details of the problem, its consequences and recommended actions.



1.1 - Fans

To avoid temperatures that are too high, system manufacturers install fans on critical devices (processors, power supplies, etc.). Monitoring fans is important because they ensure a proper temperature for the system to work efficiently.

Depending on the available information, the *Speed* and/or *SpeedPercent* and/or *Status* parameters will be displayed for each detected fan device:

- The *Speed* parameter represents the speed of the corresponding fan in rotations/minute. An alert is triggered if the fan speed is too low for proper functioning.
- The *SpeedPercent* parameter represents the speed of the corresponding fan in percentage of its maximal speed.
- The *Status* parameter represents the overall status of the fan. An alert is triggered if any of the parameters breach their respective thresholds. It is only *Status* that will trigger and display the alerts. When all is fine, *Status* shows "OK", and when there is problem, it shows "WARNING!" or "ALARM!!" with a detailed description of the issue, its consequences and recommended actions. The alert conditions for *Status* are: "!"=WARNING; "!!"=ALARM

Example: "OK", or, "ALARM!! This fan is not detected anymore".

1.2 - Temperatures



As with any electronic device, chips and other components of a computer stop working when the temperature rises too high (many unrecoverable errors, crashes and even hardware damage). Temperatures may rise too high when the device is abnormally overloaded, when a fan is not working properly or when the ambient temperature is too hot. Monitoring the temperatures of critical devices of your system allows you to take action before a crash occurs.

Depending on the available information, the *Temperature* and/or *Status* parameters will be displayed for each detected temperature sensor:

- The *Temperature* parameter represents the current temperature reading in Celsius degrees (°C).
- The *Status* parameter represents the overall status of the temperature. An alert is triggered if the temperature rises to high, or i.e. if any of the other parameters breach their respective thresholds. It is only *Status* that will trigger and display the alerts. When all is fine, *Status* shows "OK", and when there is problem, it shows "WARNING!" or "ALARM!!" with a detailed description of the issue, its consequences and recommended actions. The alert conditions for *Status* are: "!"=WARNING; "!!"=ALARM

Example: "OK", or, "ALARM!! The temperature is critically high"

1.3 - Power Supplies



The power supply is the component that transforms the AC Line into electric power needed by the computer. Therefore the power supply is a highly critical device of a computer that should never fail. Due to this, many vendors build servers with redundant power supplies. Monitoring power supplies allows the operators to be alerted when a power supply fails, or even in some cases when a power supply is overloaded.

Depending on the available information, the *UsedCapacity* and/ or *Status* parameters will be displayed for each power supply or power unit device:

- The *UsedCapacity* parameter represents the current power usage as a percentage. The *Status* parameter triggers an alert when the power supply's maximum power output is reached.
- The *Status* parameter represents the overall status of the power supply. An alert is triggered if power output goes out of range, or i.e. if the parameter for breaches its thresholds. It is only *Status* that will trigger and display the alerts. When all is fine, *Status* shows "OK", and when there is problem, it shows "WARNING!" or "ALARM!!" with a detailed description of the issue, its consequences and recommended actions. The alert conditions for *Status* are: "!="WARNING; "!="ALARM

Example: "WARNING! Problem: This power supply is in degraded state, or about to fail" or "ALARM!! The power consumed by the system is out of the supported range"

1.4 - Voltages

Power supplies convert the AC line power into voltages and currents needed by the motherboard of the computer. The stability of the motherboard (and therefore that of the overall computer) strongly depends on this power converter. Voltages that are too low or too high may lead to unpredictable system crashes. Monitoring the value of the different voltages needed by the motherboard will help in detecting unstable system instability.



Depending on the available information, the *Voltage* and/or *Status* parameters are displayed for each voltage sensor on the motherboard:

- The *Voltage* parameter represents the voltage output in milliVolts (mV). An alert is triggered by the *Status* parameter if the voltage goes out of the proper range.
- The *Status* parameter represents the overall status of the voltage. It triggers an alert if the voltage output is too low for proper functioning or if it goes out of the proper range. It is only *Status* that will trigger and display the alerts. When all is fine, *Status* shows "OK", and when there is problem, it shows "WARNING!" or "ALARM!!" with a detailed description of the issue, its consequences and recommended actions. The alert conditions for *Status* are: "!="WARNING; "!="ALARM

Example: "OK" or "ALARM!! This voltage sensor is no longer detected"

2 - Monitoring Storage

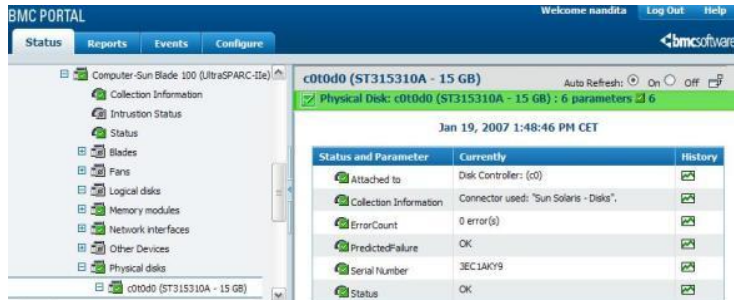


Figure 7: Monitoring Storage: Physical Disk

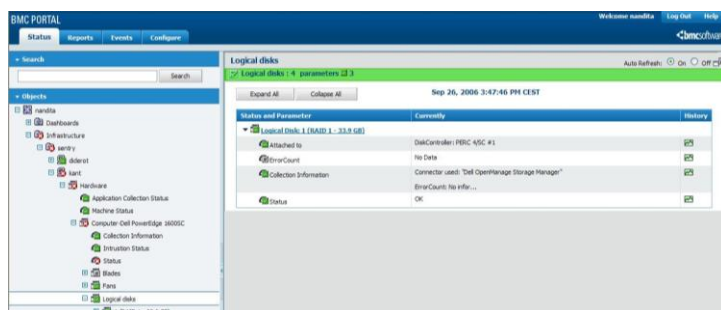


Figure 8: Monitoring Storage: Logical Disk

BMC Performance Manager Express for Hardware automatically detects information sources available on the monitored computer and displays the hardware information provided by these sources.

An icon will be created for each storage-related device: physical disks and logical disks.

Each icon is labeled with a description of the device: ID, size, vendor, role, etc.

By clicking on the physical /logical disk in the left pane, you can see its details in the right pane.

Each of these disks display which disk controller they are attached to, along with the other monitored parameters.

Note 1: If a device appears to be missing, the *Status* parameter will trigger an alert if necessary.

Note 2: *Status* is a text parameter that describes the overall status of the corresponding device or sensor. It is the *Status* parameter that raises alerts when any of the other parameters for the device breach their thresholds. Alert conditions for *Status* describe in symbolic terms what occurs in the *Status* parameter when thresholds are breached: one exclamation mark triggers a warning; two exclamation marks raise an alarm. Example: If BPM Express for Hardware detects that manufacturer-specified thresholds have been breached, the *Status* parameter will report, for example: "WARNING! This disk is about to fail" or, "ALARM!! This logical disk is no longer detected" or as may be the case. The history graph shows the exact details of the problem, its consequences and recommended actions.

2.1 - Physical Disks



Physical disks must be monitored to avoid loss of data, unavailability and performance degradation. When available, the S.M.A.R.T. technology will be used to predict a disk failure before it occurs. Depending on the available information, the *PredictedFailure*, *ErrorCount* and *Status* parameters will be displayed for each discovered physical disk:

- The *PredictedFailure* parameter uses the S.M.A.R.T. technology to predict physical disk failures. An alert will be triggered by the *Status* parameter if it is predicted that the Physical Disk will soon break down.

- The *ErrorCount* parameter is incremented each time an error occurs on this physical disk. An alert is raised by the Status parameter from the first detected error. The Status parameter represents the overall status of the physical disk and triggers an alert is triggered if the physical disk is not available for proper operation or if any of the other parameters breach their thresholds.
- The *Status* parameter represents the overall status of the physical disk. It triggers an alert if the physical disk missing or not fully operational or if any of the other parameters have breached their thresholds. It is only Status that will trigger and display the alerts. When all is fine, Status shows "OK", and when there is problem, it shows "WARNING!" or "ALARM!!" with a detailed description of the issue, its consequences and recommended actions. The alert conditions for Status are: "!="=WARNING; "!="=ALARM. Example: "OK" or "ALARM!! This physical disk is no longer detected."
- The *Attached to* parameter states which disk controller the physical disk is attached to.

Note: The *Status* parameter reports an "ALARM!!" if the *ErrorCount* parameter is greater than zero (that is: the disk encountered some errors). Since the counter is reset every 24th hour, the corresponding alert on the Status parameter will automatically be cleared after 24 hours. This mechanism enables BPM Express for Hardware/Portal to report pure event-driven alerts with no need for manual acknowledgement from the operators.

2.2 - Logical Disks

RAID or advanced disk controllers expose several physical disks as a single logical disk to the operating system. The status of a logical disk typically corresponds to the status of a RAID array (on-line, degraded, rebuilding, etc.). For each logical disk discovered, the *Status* parameter is displayed:

- The *ErrorCount* parameter represents number of errors encountered by the LOGICAL disk since the last counter reset. The error count is automatically reset every 24th hour (by default; this setting is configurable).
- The *Status* parameter represents the overall status of the logical disk. It triggers an alert if the logical disk missing or if any of the other parameters have breached their thresholds. It is only Status that will trigger and display the alerts. When all is fine, Status shows "OK", and when there is problem, it shows "WARNING!" or "ALARM!!" with a detailed description of the issue, its consequences and recommended actions. The alert conditions for Status are: "!="=WARNING; "!="=ALARM. Example: "OK" or "ALARM!! This logical disk is no longer detected."
- The *Attached To* parameter states which disk controller the logical disk is attached to.

Note 1: For non-RAID disk controllers (as most of IDE controllers, for example), no logical disk will be displayed.

Note 2: The Status parameter reports an "ALARM!!" if the ErrorCount parameter is greater than zero (that is: the disk encountered some errors). Since the counter is reset every 24th hour, the corresponding alert on the Status parameter will automatically be cleared after 24 hours. This mechanism enables BPM Express for Hardware/Portal to report pure event-driven alerts with no need for manual acknowledgement from the operators.

2.3 - Disk Controller

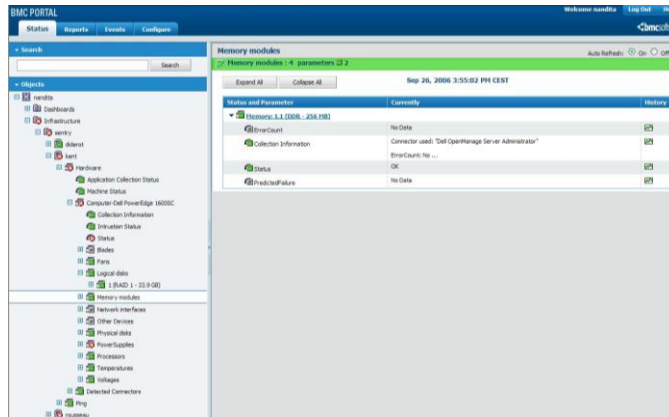
A disk controller is a card inside a computer that connects one or several physical disk drives to this computer. Some intelligent disk controllers (such as RAID controllers) manage several physical disks as a single logical disk which is the only disk exposed to the operating system. Monitoring both physical and logical disks is essential to ensure that storage is available.

Depending on the system and the information available, the *BatteryStatus* and *ControllerStatus* parameters will be displayed.

- The *BatteryStatus* parameter triggers an alert to predict that the disk controller battery will be unable to support the controller in the event of a power failure.
- The *ControllerStatus* parameter displays the status of the disk controller.

Note: All systems may not be able to provide this information

3 - Monitoring Processors, Memory modules and Network interfaces



BMC Performance Manager Express for Hardware automatically detects the information sources available on the monitored elements and displays the hardware information provided by these sources.

If at least one hardware information source provides useful data about the most critical non-storage devices in the computer, an icon will be created for each device: processors, memory modules and network interfaces.

Clicking on the icon in the left pane, for example, clicking on memory module, will display its details in the right pane.

Figure 9: Monitoring Memory

Processors, memory modules and network interfaces icons are created under an element icon. Each icon is labeled with a description of the device: ID, size, vendor, role, etc.

Note 1: If a device appears to be missing, the *Status* parameter will trigger an alert if necessary.

Note 2: *Status* is a text parameter that describes the overall status of the corresponding device or sensor. It is the *Status* parameter that raises alerts when any of the other parameters for the device breach their thresholds. Alert conditions for *Status* describe in symbolic terms what occurs in the *Status* parameter when thresholds are breached: one exclamation mark triggers a warning; two exclamation marks raise an alarm. Example: If BPM Express for Hardware detects that manufacturer-specified thresholds for the device have been breached, the *Status* parameter will report for example: "WARNING! This network adapter has degraded" or, "ALARM! This network adapter is not detected anymore" or as may be the case. The history graph shows the exact details of the problem, its consequences and recommended actions.

Note 3: The *Status* parameter reports an ALARM if the *ErrorCount* and *CorrectedErrorCount* parameters report values greater than zero (that is: the disk encountered some errors). Since the counter is reset every 24th hour, the corresponding alert on the *Status* parameter will automatically be cleared after 24 hours. This mechanism enables BPM Express for Hardware/Portal to report pure event-driven alerts with no need for manual acknowledgement from the operators.

3.1 - Processors

Processors (also called CPU, Central Processing Unit) are obviously the most critical devices within a computer. While a processor fault may often lead to a system crash without a chance for a monitoring tool to catch the error, it can still be useful to monitor a server's processors.

In the case of a system crash due to a processor fault, the system reboots automatically. The reboot is either triggered by the operating system or by the motherboard itself. If a processor is no longer working, it is automatically disabled by the BIOS and, if there is one processor left, the operating system starts with one processor less.

BMC Performance Manager Express for Hardware monitors each processor and checks that it is present and running. If a processor is missing upon a reboot, BPM Express for Hardware will trigger an alert.

On some recent or high-end servers, processors are able to correct some operation errors by themselves (like the ECC memory). If this information is available, it is displayed in the Portal by BPM Express for Hardware. In addition, if the processor is able to predict a failure, this information will be monitored by BPM Express for Hardware and shown in the Portal view.

Depending on the information available, the *Status* and/or *CorrectedErrorCount* and/or *PredictedFailure* parameters will be displayed for each discovered processor (CPU):

- The *Status* parameter represents the overall status of the processor. An alert is triggered if the processor is not available for proper operation (missing, disabled by the BIOS due to a POST error, etc.) or if any of the other parameters breach their thresholds.
- The *PredictedFailure* parameter reports the predictive failure analysis, performed by the processor itself. This information is based on the rate of corrected errors.
- The *CorrectedErrorCount* parameter represents the number of errors that have been automatically corrected by the processor. This information can be very useful to predict a failure in the near future.

3.2 - Memory Modules

The main memory of a computer is actually as critical as the processors since almost all processor operations deal with the memory. A single memory fault will lead to severe computer crash with, potentially, data corruption. On servers, the memory modules (the devices where the memory data is actually stored) often include auto-correction features (ECC), and sometimes even better: RAID5-like memory configuration. These features and configurations allow the memory modules to report statistics on failures, to predict failures, to hot-replace a memory module upon failure, etc.

Depending on the available information and the features provided by the motherboard and the memory modules, the *ErrorCount* and/or *PredictedFailure* and/or *Status* parameters will be displayed for each discovered memory module:

- The *ErrorCount* parameter reports the number of errors that have been detected by the memory module and then corrected. A steadily growing value means that the memory module is not reliable and that it could encounter errors that it is unable to correct and that will then crash the system.
- The *PredictedFailure* parameter is reported by the memory modules which try to predict if it is going to fail by analyzing the trend of the number of detected/corrected errors (thanks to the ECC technology). If this parameter goes into alarm, you should remove the faulty memory module and replace it with a new one.
- The *Status* parameter represents the overall status of the memory module. An alert is triggered if the memory module reports a failure (in a RAID5-like configuration), if it is missing after a computer reboot or if any of the other parameters breach their thresholds.

3.3 - Network Interfaces

Network interfaces are devices that serve as a common interface for various other devices within a local area network (LAN), or as an interface to allow networked computers to connect to an outside network. It is therefore essential to make sure these devices are properly running and linked to the network. For each network interface discovered, the *Status*, *ErrorPercent* and/or *LinkStatus* parameters are displayed:

- The *Status* parameter represents the overall status of the network interface. An alert is triggered when the network interface is not responding, or any of the other parameters' thresholds are breached.
- The *LinkStatus* reports whether or not the adapter is properly linked to the network from a pure hardware cable perspective (it will not report a bad IP configuration for example). By default, the *LinkStatus* parameter raises an alert (through *Status*) only for previously connected network adapters that are no longer linked to the network.
- The *ErrorPercent* parameter represents the percentage of sent and received network packets that were in error. A high percentage of errors often means that the network link is improperly configured or that the network card is functioning poorly and thus needs to be replaced.

4 - Missing Device Detection

The missing device detection mechanism of BPM Express for Hardware alerts operators when a device that was previously detected in the system is no longer found.

This mechanism is especially useful when, for example, a non-redundant physical disk does not restart during a system reboot and therefore is no longer seen by the operating system and the monitoring software.

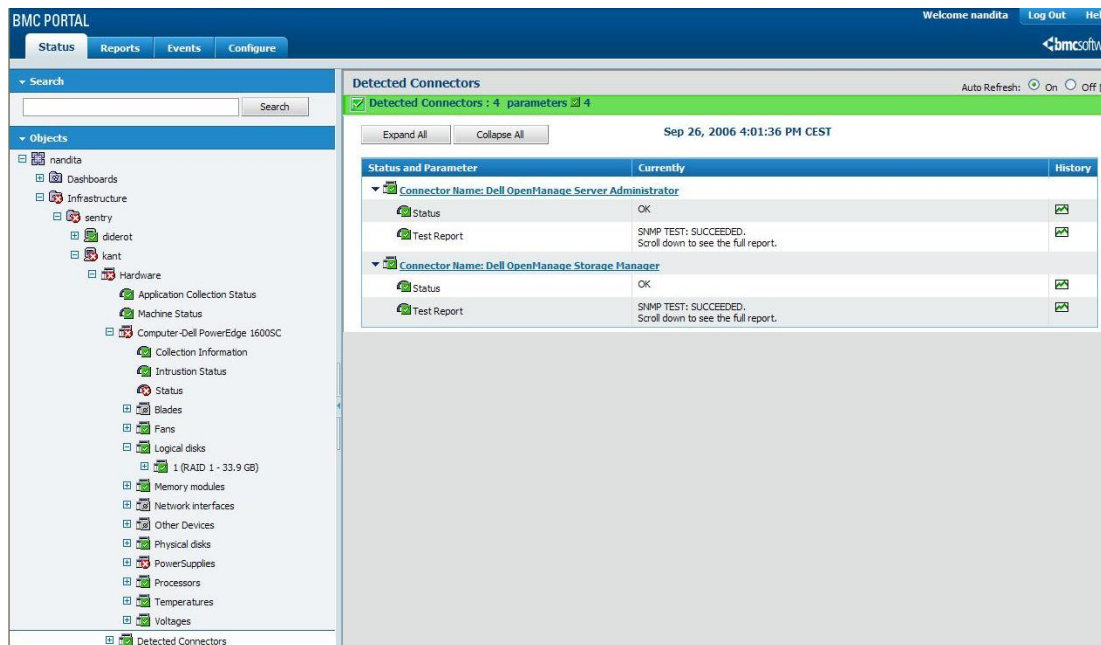
When a device is no longer discovered, its *Status* parameter goes into alarm and its label directly shows that it is missing.

5 - Connector Monitoring

When a BMC Performance Manager Express for Hardware connector has been detected as applicable to the current platform, a corresponding instance is created under **Infrastructure > Element > BMC Performance Manager Express for Hardware** and its status is monitored regularly to ensure that the underlying technology is still available.

Example: BMC Performance Manager Express for Hardware is running on a Dell server with Dell OpenManage Server Administrator.

- Upon startup, BPM Express for Hardware detects Dell OpenManage Server Administrator and starts using the corresponding connector to discover the server hardware configuration and monitor the discovered devices.
- Additionally, BPM Express for Hardware creates an icon representing the Dell OpenManage Server Administrator connector.
- Every 5 minutes, its Status parameter is updated.
- If, for some reason, the Dell agent stops working, an alarm is raised on the *Status* parameter and the devices that were discovered through to this connector are taken offline.



The screenshot displays the BMC Portal interface. On the left is a navigation tree under 'Objects' showing a hierarchy from 'nandita' down to 'Detected Connectors'. The main panel is titled 'Detected Connectors' and shows a table of monitoring data. The table has columns for 'Status and Parameter', 'Currently', and 'History'. Two connectors are listed: 'Dell OpenManage Server Administrator' and 'Dell OpenManage Storage Manager'. Both show a 'Status' of 'OK' and a 'Test Report' of 'SNMP TEST: SUCCEEDED. Scroll down to see the full report.'.

| Status and Parameter | Currently | History |
|---|--|---------|
| Connector Name: Dell OpenManage Server Administrator | | |
| Status | OK | [OK] |
| Test Report | SNMP TEST: SUCCEEDED. Scroll down to see the full report. | [OK] |
| Connector Name: Dell OpenManage Storage Manager | | |
| Status | OK | [OK] |
| Test Report | SNMP TEST: SUCCEEDED. Scroll down to see the full report. | [OK] |

Figure 10: Connector Monitoring

This connector monitoring mechanism helps administrators detect hardware agent failures. It also provides a high monitoring accuracy by not confusing errors encountered by devices with errors caused by a monitoring-tool failure.

Threshold Management

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1 - Threshold Management

1.1 - How thresholds are set

BMC® Performance Manager Express for Hardware dynamically sets the thresholds on all of its parameters, depending on the platform it is running on. All the warnings and alerts that are thus automatically set to trigger via the *Status* parameter of each element differ depending on the thresholds of each host machine. This is why a recapitulative table of the alert thresholds cannot be provided; BPM Express for Hardware takes the manufacturer-set thresholds for each component and sets alert rules accordingly.

1.2 - Parameters configured to trigger alerts

It is only *Status*, the text parameter that shows the **overall status** of each monitored element that displays the alert conditions and triggers warnings and alarms.

For example, let's take the case of Network Interface, which has the following instances under it:

- *LinkStatus*: shows whether or not the card is plugged or unplugged.
Plugged = OK, Unplugged (if previously plugged) = Alarm
- *ErrorPercent*: shows the percentage of errors detected.
Unit: %10-30 = Warning; 30-100=Alarm
- *Status*: shows the overall status of the above instances.
Values: OK, Unplugged=Warning, Critical/Missing = Alarm

If, for instance, the *LinkStatus* shows that the network interface is unplugged, it will display this under the **History** icon with all the details of the same. However, only the icon for *Status* will go into **Warning**.

Similarly, if the *ErrorPercent* parameter thresholds breach Alarm levels, it is *Status* that will trigger the alarm and not *ErrorPercent*.

2 - Configuration of Alert Conditions

BPM Express for Hardware assigns the pre-set thresholds to its symbolic conditions of exclamation marks. For instance, when a manufacturer-set threshold reaches warning level – BPM Express for Hardware translates it to the symbol of one exclamation mark, and then triggers a warning symbol in the *Status* parameter; and for an alarm-level breach, it has assigned triggering of an alarm by two exclamation marks. You can see this under **Thresholds** in the **Configure** tab.

Nevertheless, it is possible to modify these pre-set thresholds via the **Configure** tab in the BMC® Portal. You must however remember that you have to deactivate the thresholds for the *Status* parameter (which will otherwise continue to consider pre-set thresholds), and instead directly assign threshold values against individual parameter instances of that class.

3 - Modifying Parameter Thresholds

Whenever possible, BPM Express for Hardware automatically sets thresholds for parameters. These thresholds are retrieved from available information and they are generally accurate. Normally, there is no need to modify these thresholds but in case BPM Express for Hardware cannot obtain them, or if you prefer a more fault-tolerant monitoring, you can modify the thresholds of each parameter through the **Configure** tab > **Edit Thresholds**.

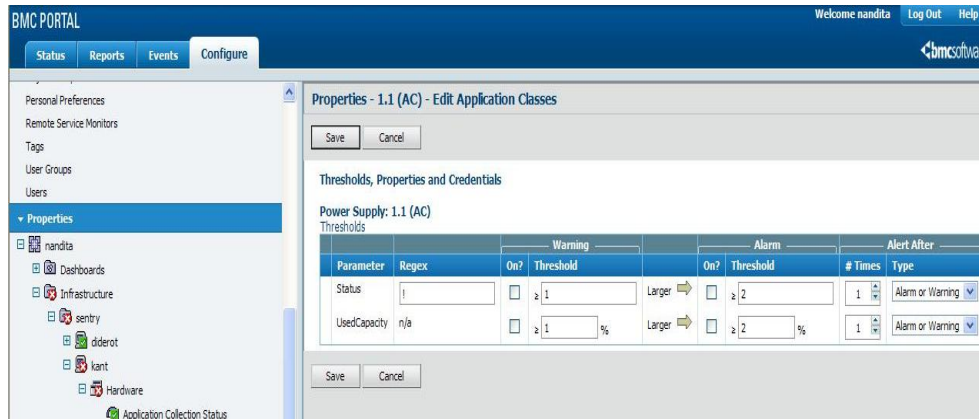


Figure 11: Deactivate alert conditions on Status

1. **Deactivate** the alert conditions in the **Status** parameter, i.e. **uncheck** the boxes for Warning and Alarm.

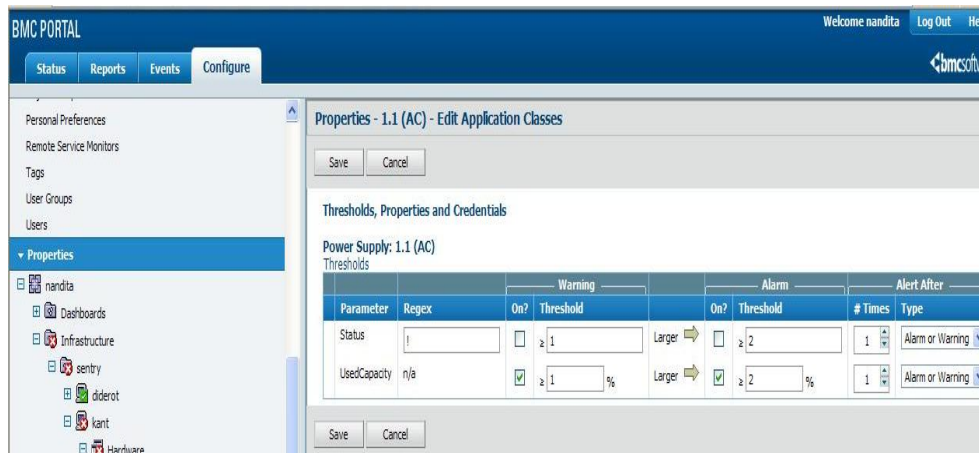


Figure 12: Modify Thresholds on Parameter

2. Go to the instance whose thresholds you want to modify, and physically **modify** the values.
3. Check the boxes to set the alert conditions.
4. Save changes.

Troubleshooting

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1 - Supported Platforms

Currently BPM Express for Hardware supports the following hardware information sources:

| Supported Platform | Required Hardware Agent |
|---|--|
| Dell PowerEdge computers | Dell OpenManage Server Administrator |
| Fujitsu-Siemens PRIMERGY | Fujitsu-Siemens Serverview Agent |
| Fujitsu-Siemens Blade systems | Management Blade |
| HP (Compaq) ProLiant computers | HP Insight Management Agents |
| HP Integrity and Itanium-based SuperDome computers running Microsoft Windows or Linux | HP Insight Management Agents |
| HP AlphaServer computers | The Insight Management Agents |
| HP Netserver computers | The HP TopTools Agent |
| HP Integrity, HP 9000, HP 3000 and PA-RISC-based SuperDome computers running HP-UX | None. Hardware Sentry uses internal HP-UX system commands for in-band and out-of-band monitoring (using the MP or GSP) |
| IBM xSeries and Netfinity computers | IBM Director Agent |
| IBM BladeCenter systems | Management Module |
| IBM RS/6000, pSeries and eServer p5 (AIX) computers | No agent needed |
| NEC Express5800 computers | NEC ESMPRO Agent |
| StorageTek LSeries Tape Libraries | LSeries SNMP agent |
| Sun SPARC-based computers | No agent needed |
| Sun AMD Opteron-based computers (Linux/Solaris) | IPMItool and Isiutil |
| Any unbranded PC | Motherboard Monitor® |

Details on each hardware agent and the parameters / components it permits BPM Express for Hardware to monitor are given in the [Reference guide](#), you can also refer to the complete documentation in the online technical library for [BPM Express for Hardware](#).

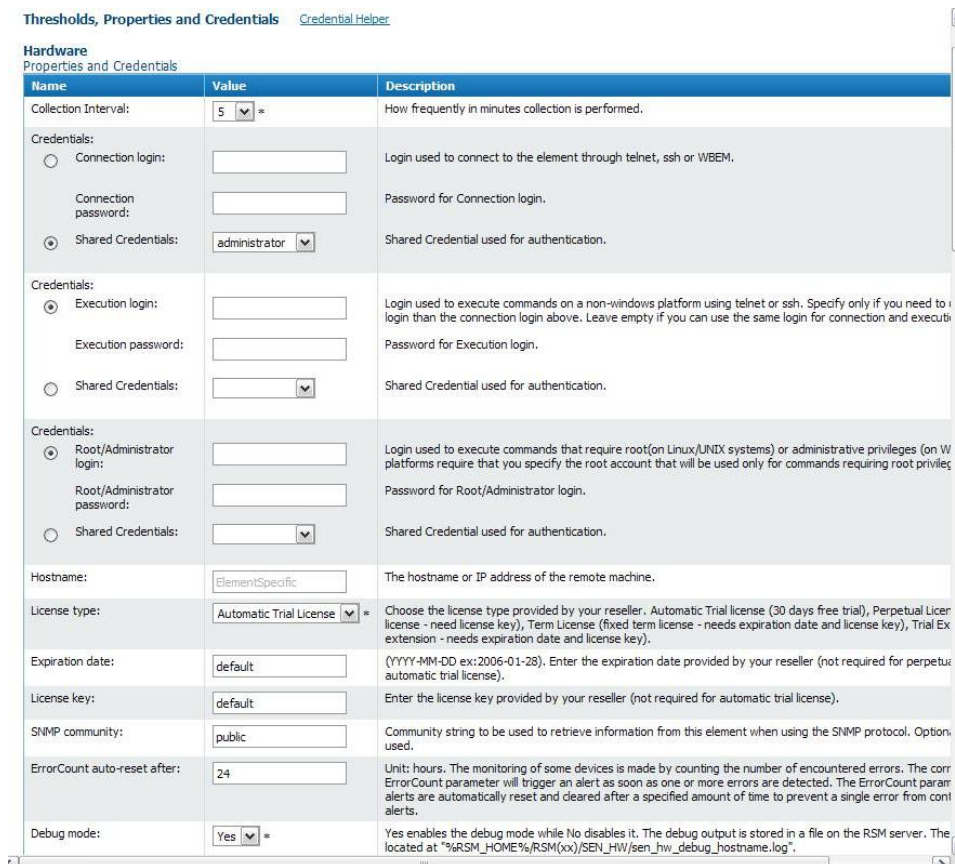
As Sentry Software is continuously working on the support of new hardware information, sources and new platforms that can be monitored with BPM Express for Hardware for the Portal will continue to grow.

Please check our web site (www.sentrysoftware.net) to find the latest updates. Add-ons for BPM Express for Hardware can be obtained for free and do not need an update of the Performance Manager itself.

2 - Enabling the Debug Mode

By default, BPM Express for Hardware sends only the most critical information, warning and error messages to *Status* parameter report. Most often, this information is accurate enough to ensure that BPM Express for Hardware is functioning properly.

If you encounter a bug and wish to report it to Sentry Software, you will be asked to enable the Debug Mode and provide the debug output to the Sentry Software support team.



| Name | Value | Description |
|--|-------------------------|--|
| Collection Interval: | 5 | How frequently in minutes collection is performed. |
| Credentials: | | |
| <input type="radio"/> Connection login: | <input type="text"/> | Login used to connect to the element through telnet, ssh or WBEM. |
| Connection password: | <input type="text"/> | Password for Connection login. |
| <input checked="" type="radio"/> Shared Credentials: | administrator | Shared Credential used for authentication. |
| Credentials: | | |
| <input checked="" type="radio"/> Execution login: | <input type="text"/> | Login used to execute commands on a non-windows platform using telnet or ssh. Specify only if you need to login than the connection login above. Leave empty if you can use the same login for connection and execution. |
| Execution password: | <input type="text"/> | Password for Execution login. |
| <input type="radio"/> Shared Credentials: | <input type="text"/> | Shared Credential used for authentication. |
| Credentials: | | |
| <input checked="" type="radio"/> Root/Administrator login: | <input type="text"/> | Login used to execute commands that require root(on Linux/UNIX systems) or administrative privileges (on Windows platforms require that you specify the root account that will be used only for commands requiring root privileges). |
| Root/Administrator password: | <input type="text"/> | Password for Root/Administrator login. |
| <input type="radio"/> Shared Credentials: | <input type="text"/> | Shared Credential used for authentication. |
| Hostname: | ElementSpecific | The hostname or IP address of the remote machine. |
| License type: | Automatic Trial License | Choose the license type provided by your reseller. Automatic Trial license (30 days free trial), Perpetual License - need license key), Term License (fixed term license - needs expiration date and license key), Trial Extension - needs expiration date and license key). |
| Expiration date: | default | (YYYY-MM-DD ex:2006-01-28). Enter the expiration date provided by your reseller (not required for perpetual automatic trial license). |
| License key: | default | Enter the license key provided by your reseller (not required for automatic trial license). |
| SNMP community: | public | Community string to be used to retrieve information from this element when using the SNMP protocol. Option used. |
| ErrorCount auto-reset after: | 24 | Unit: hours. The monitoring of some devices is made by counting the number of encountered errors. The ErrorCount parameter will trigger an alert as soon as one or more errors are detected. The ErrorCount parameters are automatically reset and cleared after a specified amount of time to prevent a single error from continuing. |
| Debug mode: | Yes | Yes enables the debug mode while No disables it. The debug output is stored in a file on the RSM server. The file is located at "%RSM_HOME%\RSM(xx)\SEN_HW\sen_hw_debug_hostname.log". |

Figure 13: Enable the Debug Mode

To enable the debug mode:

1. Configure tab > click on the element whose debug output you require.
2. Scroll down to **Application Classes** > click **Edit**.
3. Select "Yes" from the dropdown Debug Mode list > **Save**.
4. By default, BMC Performance Manager Hardware sends its debug output to: %RSM_HOME%\RSM\SEN_HW\sen_hw_debug_hostname.log. The debug file is stored on the computer where the RSM is installed.

Note: If the element was created through "Element Profile", please edit the same way.

Warning! Pay attention to the file size - the debug output of BPM Express for Hardware could be very large when running for several days.

3 - Reinitializing Certain Parameters

Due to the inner mechanism of servers, and that of BPM Express for Hardware, certain parameters have a tendency to trigger alerts far too frequently. More often than not, these alerts do not indicate a grave problem, and are annoying to administrators who have to deal with them all the time. *ErrorCount* and *CorrectedErrorCount* are two such parameters.

Reinitializing these parameters automatically reduces the triggering of such "ignorable" alerts. For this reason, BPM Express for Hardware has configured *ErrorCount* and *CorrectedErrorCount* to be re-initialized every 24hrs by default. This time-frame is customizable.

Basically, here's what happens:

When BPM Express for Hardware detects the parameter *ErrorCount* for the first time, it notes the number of errors encountered, and keeps that "1st discovered" number as a base-count. After which, each time it discovers an *Errorcount* greater than this recorded base-count (which becomes its "threshold", it triggers an alert through the *Status* parameter of that class. This, as you can tell, happens far too often. It is the same with *CorrectedErrorCount*.

Now, configured by default to "re-initialize" every 24hrs, it is programmed to take the last recorded *Errorcount/Corrected ErrorCount* as the new "base-count or threshold" for the fresh round after reset. This is the inner mechanism, the display shows that on reset the count is zero, and if it increases to one, an alarm is triggered.

Example:

- Let's say the very first discovered *ErrorCount* for SEN_HW_LOGICALDISK is 40.
- Now onwards, every time, BPM Express for Hardware "discovers" the Logicaldisk, and it meets an *Errorcount* of any value greater than 40, the *Status* parameter of that instance will trigger an alert.
- Remember it is programmed for reinitialiation every 24hrs.
- So, suppose during the last "collect" just before the reset takes place, the *Errorcount* is '48', BPM Express for Hardware will record '48' as the "base-count" for the next round after re-initialization.
- Hence after 24hrs (or the time you set: 6hrs, or 1hour etc), the basecount /threshold for *Errorcount* will be 48, and so on and so forth.

3.1 - Classes that contain "reinitializable" parameters:

ErrorCount applies to:

- SEN_HW_LOGICALDISK
- SEN_HW_MEMORY
- SEN_HW_PHYSICALDISK
 - *CorrectedErrorCount* applies to
- SEN_HW_CPU

4 - BMC Performance Manager Express for Hardware Shows Nothing

Even if BMC Performance Manager Express for Hardware is unable to detect any available hardware information source, it should create an icon labeled "BMC Performance Manager Express for Hardware" under the main computer icon.

4.1 - Checking the Application Collection Status

This parameter has Boolean values: True or False. "True" indicates that BPM Express for Hardware is functioning; "False" indicates that it is not.

You first need to check whether the "Application Collection Status" has been set to "true" which means that at least one collect has been performed. As long as this parameter is not set to "true", it means that BPM Express for Hardware has not finished (successfully or not) its collection for this server. You need to wait until "Application Collection Status" is set to "true" before investigating further.

This parameter is created by default by BMC® Portal for every application class that is added. Hence when you add BPM Express for Hardware on an element, this parameter should appear.

4.2 - Checking the Machine Status

The second step is to check the "Machine Status" parameter which reports whether BPM Express for Hardware on the RSM was able to communicate with the targeted server with the credentials provided by the user. If so, the "Machine Status" parameter is set to "<hostname> is alive. Detected as a <OS> system.". Otherwise, this parameter will report that BPM Express for Hardware cannot communicate with this host. This can be due to several reasons:

- a firewall prevents communication between the RSM and the managed server
- the WMI layer has not been installed or is disabled (Windows only)
- neither SSH nor telnet connections are allowed on the managed server (UNIX and Linux only)
- the supplied credentials are incorrect
- the SNMP community string is wrong

If the "Machine Status" is OK, you need to check which connectors are detected as valid for the targeted server, and compare them to the expected list of connectors (as described in the [Installation Guide](#)).

4.3 - Checking Connector Detection

If one or several connectors are not detected as valid for the targeted server, you should enable the debug mode of BPM Express for Hardware, and check the debug output for the reason that led BPM Express for Hardware to exclude those connectors.

Several reasons may prevent a connector from being used:

- the SNMP community string is wrong (only for SNMP-based connectors)
- the administrative/root credentials are missing or incorrect (only for connectors which need such root/administrative privileges)
- the corresponding hardware agent is not installed or running
- some instrumentation drivers required by the hardware agent are missing

5 - Unable to See Temperature, Voltage or Fan

The fact that the main BMC Performance Manager Express for Hardware icon is present but no temperature/voltage/fan information is shown may be caused by three issues:

- BMC Performance Manager Express for Hardware did not detect any hardware information source that is able to show the temperature/voltage/fan data. Typically, the vendor-specific hardware monitoring agent that comes with the server has not been properly installed.
- BMC Performance Manager Express for Hardware properly detected the vendor-specific hardware monitoring agent that comes with the server, but this agent is unable to provide any temperature/voltage/fan information. Please check that all the vendor-specific software is up-to-date (the hardware agent itself, the BIOS of the motherboard, the BIOS of other components like management processor if any, etc.)
- No temperature/voltage/fan sensor is provided with the computer (on a few Sun servers, all HP-UX systems and most of the IBM RS/6000 computers).

See details on hardware agents in the [Installation Guide](#)

5.1 - Note on HP-UX servers:

HP-UX servers do not report any environment information (temperatures, voltages, fans and power supplies). On these HP-UX servers, only the processors, network cards and internal disks will be monitored.

5.2 - Note on Sun servers

Some Sun servers do not provide any environment information (temperatures, voltages, fans and power supplies). On these Sun servers, only the processors, network cards and internal disks will be monitored. These Sun servers typically include the Ultra-2, 5, 10, 20 and 60 servers, as well as a few Sun Blade models and the 420r.

As shown in the Supported Platforms table, no mainframe-like system is supported (as of yet), including Sun E10K, F12K, F15K, F20K and F25K. You should check whether or not the system provides environment information by executing the `prtdiag -v` command on Solaris. If environment information is shown, BPM Express for Hardware should normally report.

5.3 - Note on IBM AIX servers:

Most IBM AIX servers do not provide any environment information (temperatures, voltages, fans and power supplies). On these IBM AIX servers, only the processors, network cards and internal disks will be monitored. You can check whether or not the system provides environment information by executing the `uesensor` command on AIX. If environment information is shown, BPM Express for Hardware should report it.

6 - Unable to See Disk Controller

On some computers, the vendor-specific hardware monitoring agent is only responsible for the monitoring of the baseboard: temperatures, fans, voltages and power supplies.

In this case, the disk monitoring is handled by the disk controller manufacturer. Therefore, you need to install additional software for your disk monitoring.

Please contact your server vendor to know which software must be used with your disk controller.

7 - Removed disk went undetected on Sun Solaris

This should not normally occur. However, here's a possible explanation:

On Sun Solaris servers, BPM Express for Hardware relies on the "iostat-En" command to detect disk errors. If the disk in question has never been used at all, then no error could have been registered - neither by the operating system, nor by BPM Express for Hardware.

Try having some activity on the said disk to check if the same happens and also execute also the "iostat -En" command and provide us with its output.

8 - Shows / Monitors Network Interfaces, but no other components

This is typically an "SNMP" issue. Many manufacturer-provided hardware agents use the SNMP technology (DELL OpenManage, HP Insight Management, Fujitsu-Siemens Serverview and for example). Since BPM Express for Hardware gathers hardware information from these agents, you need to enable and properly configure the SNMP layer on the managed servers if an SNMP-based agent is running on them.

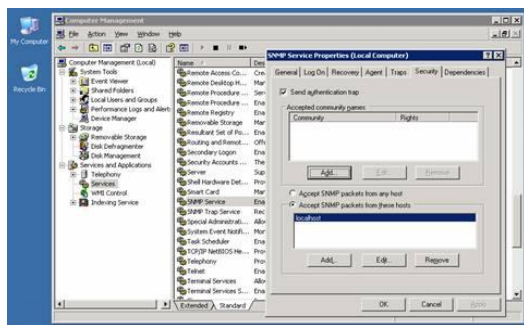
However sometimes, like in the case of HP® (Compaq®) ProLiant® servers, the network interface is detected and therefore displays in the PATROL Console /Central view whilst no other hardware component gets detected by BPM Express for Hardware – simply because it cannot communicate with the managed element. So enabling and authorizing the managed server to communicate through the SNMP protocol is essential.

8.1 - Configuring SNMP on Windows servers

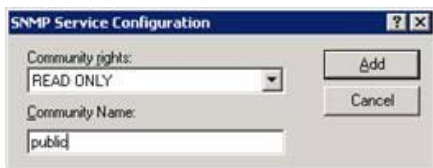
Starting with Windows Server 2003, the SNMP service is not configured to allow the "public" community by default. As a consequence, even if the SNMP service is properly installed and the hardware agent properly running, BPM Express for Hardware is not able to gather any hardware information from the SNMP agent.

Therefore, on Windows Server 2003 computers that run an SNMP-based hardware agent (DELL OpenManage, HP Insight Management or Fujitsu-Siemens Serverview), you first need to install the SNMP service (not installed by default) and then configure it to allow a community to access the SNMP agent.

1. In the Services administrative tool, right-click on **SNMP service** > **Properties**. Click on **Security**:



2. Click on the first **Add** button and enter a community name that will allow access to the SNMP agent (READ ONLY):



3. Click **OK**. The new settings are taken into account immediately.
4. Now you need to enter the community string for this server on the Portal. Log on as a user > **Configure** tab > **Elements**
5. Expand your infrastructure tree and select the element for which you need to enter the SNMP community string > click **Edit**
6. See the **Application Classes** section > **Hardware** > **Edit**

7. In this **Properties and Credentials section**, enter the correct SNMP community string so that henceforth BPM Express for Hardware will be able to communicate with this element and monitor all other components and not just the network interface.

9 - Note on IBM xSeries and Netfinity servers:

BPM Express for Hardware currently supports 3 major versions of the IBM Director Agent: 3.11, 4.10.x and 5.10.3. The recommended version is 5.10.3 except on older systems (with Windows NT4, for example) where it's possible that only the 3.11 or 4.10 versions will run properly (IBM has dropped support for Windows NT4 in the latest 5.10 version of Director).

10 - Unable to connect to WBEM

At times BPM Express for Hardware is unable to connect to WBEM. There could be two reasons for this:

- A firewall blocks the WBEM protocol.
- The user does not have sufficient connection rights.

10.1 - Firewall is blocking the WBEM protocol

In such a case, you are required to reset the port for RPC/DCOM connections. WMI uses RPC/DCOM, so enabling the DCPM across the firewall should allow it to work. When WMI connects to a remote machine it uses port 135 for the initial negotiation, and then a port is allocated for further connection. Stated below are two links that will help in setting a range of ports for the RPC/DCOM connection. Once you have set a range for RPC/DCOM communication, you can then configure the firewall to allow traffic through this range of ports.

- <http://support.microsoft.com/default.aspx?scid=kb;en-us;154596>
- http://msdn.microsoft.com/library/default.asp?url=/library/ens/dndcom/html/msdn_dcomfirewall.asp

10.2 - Insufficient connection rights

This means that the user credentials provided are insufficient to access WMI. This error occurs when the connected user is not recognized or is restricted in some fashion by the remote server (for example, the user might be locked out). The reasons may be the following:

Accounts are in different domains

Recent changes made to WMI security:

- o Blank passwords, formerly permitted, are not allowed in Windows XP and Windows Server 2003.
- o The DCOM configuration access setting might have been changed.
- o If the target computer is running Windows XP, the Force guest value under the registry key `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Lsa` might be set to force the Guest account off (value is zero).

Request your network administrator to accord sufficient rights to the user credentials.

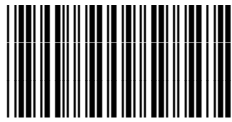
11 - Note on IPMI-based servers:

The latest servers include an IPMI-compliant instrumentation chip. In this case the hardware agent provided by the manufacturer most often needs a specific IPMI driver. Please read the documentation of the appropriate hardware agent carefully to check which IPMI driver needs to be installed. Also, please refer to the on IPMI in the [Installation guide](#).

12 - Note on unsupported servers running Windows or Linux:

On officially non-supported servers running Windows or Linux, BPM Express for Hardware will still be able to monitor the network cards and the internal, non-RAID disks.

Notes



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