IBM

IBM Systems

IBM PowerExecutive
Installation and User's Guide

Version 2.10

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> **Note**
>
> Before using this information and the product it supports, read the information in "Notices & Trademarks" on page 43.

August 2007

This edition applies to version 2.10 of IBM PowerExecutive and to all subsequent releases and modifications until otherwise indicated in new editions.

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About this user's guide

This user's guide provides instructions for using IBM® PowerExecutive™ software to manage the power and thermal needs of BladeCenter® systems and rack-mounted servers in the data center. PowerExecutive is part of a larger power-management implementation that includes hardware and firmware components. PowerExecutive 2.10 is an extension to IBM Director 5.20 software. A stand-alone version of PowerExecutive, which runs on top of the Embedded Director console, is also available.

Who should read this user's guide

This user's guide is for system administrators and operators using PowerExecutive from IBM Director Console to manage the power and thermal needs of BladeCenter systems and rack-mounted servers in the data center.

Conventions and terminology

These notices are designed to highlight key information:

Note: These notices provide important tips, guidance or advice.

Important: These notices provide information or advice that might help you avoid inconvenient or difficult situations.

Attention: These notices indicate possible damage to programs, devices or data. An attention notice appears before the instruction or situation in which damage can occur.

Related information

This topic provides links to additional information related to PowerExecutive.

PowerExecutive resources on the World Wide Web

The following Web pages provide resources for understanding, using and troubleshooting PowerExecutive and other systems-management tools.

PowerExecutive Web site
> www.ibm.com/servers/eserver/xseries/systems_management/ ibm_director/extensions/powerexec.html

> Obtain an overview of PowerExecutive and links to download the product, release notes and user's guide.

IBM Systems: Technical support page
> www-304.ibm.com/jct01004c/systems/support/

> Locate support for IBM hardware and systems-management software.

IBM Systems Management Software: Download/Electronic Support page
> www.ibm.com/servers/eserver/xseries/systems_management/ ibm_director/

Download IBM systems-management software, including PowerExecutive. Check this Web page regularly for new PowerExecutive releases and updates.

IBM System x® Systems Management page
www.ibm.com/systems/x/

Obtain an overview of IBM systems management.

IBM ServerProven® page
www-03.ibm.com/servers/eserver/serverproven/compat/us/

Obtain information about IBM System x, IBM eServer and IBM BladeCenter.

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Accessibility

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use information technology products successfully.

Features

PowerExecutive meets the accessibility standards for Section 508 of the US Rehabilitation Act.

These are the major accessibility features in PowerExecutive:
- You can use screen-reader software and a digital speech synthesizer to hear what is displayed on the screen.
- You can operate all features using the keyboard instead of the mouse.
- You can choose from a variety of high-contrast color schemes and large font sizes in the IBM Director Console.

PowerExecutive supports all accessibility features provided by IBM Director.

Keyboard navigation

This product uses standard Microsoft® Windows® and Java™ navigation keys.

Chapter 1. Getting started

Before getting started, you should become familiar with general and conceptual information about PowerExecutive.

PowerExecutive overview

PowerExecutive is an IBM Director extension that provides the PowerExecutive task in an IBM Director environment.

The PowerExecutive task displays the PowerExecutive Console in IBM Director Console. PowerExecutive enables you to monitor and collect power-consumption data from IBM BladeCenter chassis and rack-mounted servers, manage trend data, and export data.

Additionally, the information in PowerExecutive is affected by certain events. For more information, see "Events that affect PowerExecutive" on page 33.

PowerExecutive task overview

Use PowerExecutive to monitor and collect power consumption data from supported BladeCenter systems and rack-mounted servers, manage trend data, and export data from PowerExecutive.

Tip: For more information about the PowerExecutive task, see "PowerExecutive task" on page 4.

Icon	
Supported IBM Director objects	BladeCenter Chassis and rack-mounted server Director-managed objects
Supported operating systems	• Linux® • Microsoft Windows For detailed operating-system support information, see the *IBM PowerExecutive Installation and User's Guide*.
Availability	Extension to the IBM Director product. You can download the extension from the IBM Director Web site at http://www.ibm.com/systems/management/director/index.html.
Required hardware or hardware limitations	For installation, none. For monitoring, this task only supports specific BladeCenter systems and rack-mounted servers. For details, see the *IBM PowerExecutive Installation and User's Guide*.
Required software	BladeCenter Management extension to IBM Director 5.20 must be installed.
Required protocols	None
Required device drivers	None
Mass configuration support	None
Scheduler support	None

Files associated with this task	None
Events associated with this task	None, but the information displayed by PowerExecutive is affected by some events. For more information, see the *IBM PowerExecutive Installation and User's Guide*.

PowerExecutive terminology

PowerExecutive uses terminology that is specific to power management in IBM Director Console.

The hardware in a PowerExecutive environment is referred to in the following ways:

- A *management server* is a server on which both IBM Director Server and PowerExecutive Server are installed.
- A *management console* is a system on which both IBM Director Console and PowerExecutive Console are installed.
- A *BladeCenter system* consists of a chassis and a number of modules. The chassis is the physical enclosure that houses the modules. The modules are the individual components, such as blade servers and blowers, that are inserted into bays in the chassis.
- A *rack-mounted server* is a stand-alone system with a Baseboard Management Controller (BMC).
- A *managed system* is either a BladeCenter system or a rack-mounted server in an IBM Director environment.
- A *module*, as already described under *BladeCenter system*, is a BladeCenter component that is inserted in a bay in a BladeCenter chassis. The management module and blade server are two types of modules you can insert in a BladeCenter chassis:
  - A *management module* is the BladeCenter component that handles system-management functions. It configures the BladeCenter chassis and switch modules, communicates with the blade servers and all I/O modules, multiplexes the keyboard/video/mouse (KVM), and monitors critical information about the chassis and blade servers.
  - A *blade server* is a complete compute node with some combination of processors, memory, and network interfaces, with supporting hardware and firmware. The blade server may occupy one or more slots in a BladeCenter chassis.

  In addition to a management module and blade server, a BladeCenter chassis can also contain the following modules:
  - Power modules
  - I/O modules
  - Blower modules
  - Media trays
  - Midplanes

PowerExecutive components

This topic provides information about the PowerExecutive components.

PowerExecutive comprises the following three components:
- PowerExecutive Server
- PowerExecutive Console
- PowerExecutive Database

PowerExecutive Server

PowerExecutive Server maintains the PowerExecutive environment and manages all PowerExecutive operations.

PowerExecutive Server communicates out-of-band with each managed system to collect power information. In the case of a BladeCenter chassis, it communicates with the management module in the chassis. In the case of a rack-mounted server, it communicates with the BMC.

PowerExecutive Server also communicates with Director Server to provide event filtering and event actions that support IBM Director event action plans, and communicates with Director Console to display status and allow the user to perform operations. You must install PowerExecutive Server on the management server. When you install PowerExecutive Server, PowerExecutive Console is installed automatically.

Power data is collected only while the PowerExecutive Server is running. When you install PowerExecutive, the server starts running. It runs whenever the IBM Director Service is running. It collects data on the BladeCenter chassis and rack-mounted servers every minute, or as configured on the Manage Trend Data window in the graphical user interface (GUI).

PowerExecutive Console

PowerExecutive Console provides the GUI to PowerExecutive in IBM Director Console.

PowerExecutive Console displays rack-mounted servers and BladeCenter chassis at the same level in the navigation tree. Rack-mounted servers are represented by leaf nodes (lowest point in the tree), while BladeCenter chassis have sub-nodes representing the power domains and modules within the chassis.

Install PowerExecutive Console on all management consoles from which a system administrator remotely accesses the management server and performs PowerExecutive tasks.

PowerExecutive Database

The PowerExecutive Database stores information collected by PowerExecutive Server.

PowerExecutive saves configuration information and historical power and temperature data for managed systems in a Derby database. The PowerExecutive Database is created in the Data subdirectory of the IBM Director installation directory.

When you uninstall IBM Director Server, it does not remove the PowerExecutive Database unless you request that customizations be deleted during the uninstallation of IBM Director Server.

The size of the PowerExecutive Database directly correlates to the short-term data-collection interval, the long-term data-collection interval, and the number of days that short-term and long-term trend data is kept. All of these values are configurable. You can control them and the size of the PowerExecutive Database by using the Manage Trend Data window. For information about doing so, see "Managing collection of trend data" on page 30.

PowerExecutive task

You use the PowerExecutive task to launch the PowerExecutive GUI. You can use the PowerExecutive task to view and monitor power consumption on various rack-mounted servers and BladeCenter chassis in the IBM Director environment.

When you install the PowerExecutive extension in your IBM Director environment, the PowerExecutive task is added to IBM Director Console.

You can start the PowerExecutive task by dragging and dropping the task icon onto the following targets:
- If the target is a blade server, the display consists of the BladeCenter chassis containing the blade with the targeted blade preselected.
- If the target is a BladeCenter chassis, the display consists of the chassis with the chassis itself preselected.
- If the target is a rack-mounted server, the display consists of the server with the server itself preselected.
- If the target is a group of rack-mounted servers or BladeCenter chassis, or both, the display consists of all chassis or rack-mounted servers in the group with the first chassis or server in the group preselected.

If there is no target (you start the PowerExecutive task by double-clicking rather than dragging and dropping it onto a target), then the display consists of all power-managed BladeCenter chassis and rack-mounted servers known to Director.

You can perform the following tasks for rack-mounted servers, BladeCenter chassis and components:
- Monitor power consumption data
- Collect power consumption data
- Manage trend data
- Export data
- Set power cap

More information about these tasks is provided in Chapter 3, "Using PowerExecutive," on page 19.

Start PowerExecutive for all managed systems

When you start PowerExecutive with no target, the PowerExecutive window opens and displays a tree of all power-managed systems on IBM Director Server. The advantage of starting PowerExecutive in this manner is that you can manage all managed systems from one window.

Start PowerExecutive for some managed systems

When you start PowerExecutive for only a managed system or a group of managed systems, the PowerExecutive window opens and displays a tree of only the selected objects.

The left pane in PowerExecutive contains only the selected managed systems, only those chassis that contain the blade servers that have also been selected, and only the managed systems in a selected group. When you select a blade server, PowerExecutive determines the containing chassis and displays the entire tree structure for that chassis, not just the blade server that you selected.

The advantage of starting PowerExecutive in this manner is that you see only the subset of managed systems that you are interested in. The disadvantage is that you can manage only those managed systems that were selected when you started PowerExecutive. If you need to manage other managed systems at a later time, you must start another PowerExecutive task for those additional managed systems.

PowerExecutive Console window

After you start the PowerExecutive task, the PowerExecutive Console opens and provides a GUI for managing selected rack-mounted servers and BladeCentersystems on the management server.

The PowerExecutive Console window contains a menu bar, a tool bar and a graphical representation of the managed systems that were selected. It also includes power consumption data on various rack servers, BladeCenter chassis, and power domains and modules in these chassis. The PowerExecutive window displays only those managed systems for which it was started, which might not be all managed systems on the management server.

You can force the window to refresh in different ways, as explained in "Refreshing the PowerExecutive Console" on page 9.

The PowerExecutive Console contains these major areas:
- Navigation pane
- Current Data pane
- Trend Data pane

Navigation pane

Use the Navigation pane to select the managed system for which the PowerExecutive Console displays information.

The left side of the PowerExecutive Console contains the Navigation pane, which displays the systems currently targeted by PowerExecutive in a tree structure. Each node in the structure represents a managed system that is managed by PowerExecutive. There is always a root node with three child nodes:
- The root node is labeled *All Systems* if you launch the Console by double-clicking the PowerExecutive task, or *Selected Systems* if you launch the Console by targeting a specific group or system.
- One child node labeled *Power-Managed Systems (ac)* represents the group consisting of all currently targeted rack-mounted servers or BladeCenter chassis that draw ac power and support power metering.

- One child node labeled *Power-Managed Systems (dc)* represents the group consisting of all currently targeted rack-mounted servers or BladeCenter chassis that draw dc power and support power metering.
- The other child node labeled *Other Systems* represents the group consisting of all currently targeted rack-mounted servers that don't support power metering.

Attention: If the node labeled *Other Systems* is selected in the navigation tree, the Current Data and Trend Data panes display a message that no information is available for that system.

When you expand an individual BladeCenter chassis within the Navigation pane, the tree structure shows folders that identify the power domains in the BladeCenter chassis. Under each power domain folder are various components within that power domain, such as the following objects:
- Power modules
- Blade servers
- I/O modules
- Management modules
- Blower modules
- Media trays
- Midplanes

When you select one of these components, PowerExecutive updates the Current Data pane and the Trend Data pane to display information about the one that you selected.

Current Data pane

Use the Current Data pane to view information about a selected managed system.

The upper right side of the window contains the Current Data pane, which uses a table to display information about the managed system that is currently selected in the tree structure.

The rows and columns in the table change with the object that is selected:
- If you select a group of managed systems in the Navigation pane, the Current Data pane displays rows about the managed systems in that group and columns with information about those managed systems.
- If you select a rack-mounted server in the Navigation pane, the Current Data pane displays information about that server.
- If you select a BladeCenter chassis in the Navigation pane, the Current Data pane displays rows about the power domains in the chassis and columns with information about those power domains.
- If you select a power domain in the Navigation pane, the Current Data pane displays rows about the BladeCenter components in that power domain and columns with information about those components.
- If you select a module within a power domain in the Navigation pane, the Current Data pane displays information about that module.

For information about the columns and fields in the tables of the Current Data pane, see "Monitoring power-consumption data" on page 19.

PowerExecutive updates the information in the Current Data pane when new information becomes available, which is generally once per data collection interval.

The default is every minute, but this data-collection interval can be customized. For more information, see "Managing collection of trend data" on page 30.

You can use PowerExecutive to export the information in the Current Data pane. For more information, see "Exporting current data" on page 32.

Trend Data pane

Use the Trend Data pane to view information about historical power consumption for a selected managed system.

The lower right side of the window contains the Trend Data pane, which provides a graphical or tabular view of power data over time about the managed system that is currently selected in the tree structure. The display is controlled by the *View | Show Trend Data as Chart* and *View | Show Trend Data as Table* menu items or the *Show Trend Data as Chart* and *Show Trend Data as Table* tool bar buttons).

The time range for the displayed trend data is indicated by the interval list box. You can select one of the predefined data ranges or create a custom trend data interval. For more information, see "Creating a custom time interval for the Trend Data pane" on page 31.

The predefined data ranges are as follows:
• Last hour
• Last 12 hours
• Last 24 hours
• Last 48 hours
• Last week
• Last 2 weeks
• Last month
• Last 6 months
• Last year

The Trend Data chart consists of two sub-charts, which are always displayed. The upper chart displays power data and the lower chart displays temperature and CPU throttling data. The two sub-charts share the same time axis. A legend identifying the various chart elements appears above the upper sub-chart. The check boxes in the legend control the display of individual chart elements to be enabled or disabled.

The upper chart displays average power (ac and dc) over time, along with the Pcap (current power cap), Pcap_max (maximum power cap), and Pcap_min (minimum power cap). Optionally, upper and lower percentiles for average power (dc) can be set, with the range between the upper and lower percentile displayed in light blue. An upper percentile of 90%, for example, sets the upper end of the range to the smallest power value such that at least 90% of the hits in the power histogram are below that value. A lower percentile of 10% sets the lower end of the range to the largest power value such that at least 90% of the hits in the power histogram are above that value. The default upper percentile is 100%, corresponding to the **maximum power**. The default lower percentile is 0%, corresponding to the **minimum power**.

The values are displayed in the Trend Data chart in a different color, as shown in Table 1 on page 8. For the Trend Data table, this information is put into cells of the table.

Table 1. Colors and meanings that are used in Trend Data chart

Chart check boxes	Displayed in Trend Data chart as	Description
Average (ac)	Green line	The average ac power.
Average (dc)	Blue line	The average dc power.
Pcap (dc)	Dotted black line	The current power cap.
Pcap_max/ Pcap_min	Solid black line	The maximum and minimum power caps.
Upper and lower percentile (dc)	Shaded light-blue region	The range of dc power.
Exhaust temperature	Red line	The exhaust (outlet) temperature.
Ambient temperature	Blue line	The ambient (inlet) temperature.
Effective CPU speed (%)	Shaded light-green region	The effective CPU speed over time.
Events	Red squares, green triangles and yellow diamonds	Shows the PowerExecutive events that have occurred. Each event has a severity. For more information, see "Internal events" on page 34

The current values for the **nameplate power**, **Pcap_max hot-plug**, and **Aux power** fields are displayed in text in the upper chart. These are relatively static values and, therefore, not trended over time, to reduce clutter.

The lower chart displays the ambient and (if available) exhaust temperatures. The left axis displays the scale for temperature. The lower chart also displays the effective CPU speed over time, with a value of 100% corresponding to the nominal speed of the CPUs in the system. Values less than 100% indicate that the CPUs have been throttled. The upper right corner of the chart displays the nominal CPU speed. The right axis displays the scale for CPU speeds. The scales for temperature and CPU speed are independent of one another.

The following events are displayed in both the upper and lower charts:
- The upper chart displays changes in the **Pcap_max**, **Pcap**, or **Pcap_min** field values on the corresponding trend line.
- The upper chart displays power-related events on the average power-in-use trend line.
- The lower chart displays temperature-related events on the ambient temperature trend line (the exhaust temperature is not always available).
- The lower chart displays CPU throttle-related events on the effective CPU speed line.
- The bottom axis of the upper chart displays any other events.

The Trend Data table corresponds to the node that is selected in the navigation tree. The range for the Trend Data table is controlled by the same drop-down list as for the Trend Data chart. The entire range that is specified in the list box is available. The table has the following columns.

Table 2. Descriptions of Trend Data table columns

Column title	Description
Time	The time at which the current data was collected.
Average Watts (ac)	For a rack server, the watts currently being consumed as reported by the power meter, or "..." if power data is not available. For a BladeCenter chassis, the sum of the Average Watts (ac) of all power domains in the chassis, or "..." if power data is not available.
Average Watts (dc)	The dc power that is being consumed as reported by the power meter, or "..." if power data is not available.
Pcap (dc)	The current power cap.
Upper Percentile (dc)	The upper range of the power-in-use.
Lower Percentile (dc)	The lower range of the power-in-use.
Pcap_max (dc)	The maximum possible power cap.
Pcap_min (dc)	The minimum possible power cap.
°C Exhaust	The current exhaust (outlet) temperature.
°C Ambient	The current ambient (inlet) temperature.
Effective CPU Speed (%)	The average CPU speed as a percentage of the nominal CPU speed.
Events	The description of an event.

The *Time* column is always displayed. Check boxes are used to control which elements display in both the Trend Data chart and table. Each column is controlled by a single check box, with the exception of the *Events* column, which is displayed if any of the *Events* check boxes (Critical, Warning, or Harmless) is selected.

Customizing the PowerExecutive Console

You can customize the contents of the PowerExecutive Console.

You can control the display of these panes on the PowerExecutive Console:
- Navigation pane
- Current Data pane
- Trend Data pane

To show or hide one of these panes, use the View menu to check or uncheck the name of each pane.

When the Trend Data pane is displayed, you can control its display as follows:
- Show the trend data as a chart
- Show the trend data as a table

To control these aspects of the Trend Data pane, use the View menu to check or uncheck each aspect you wish to control.

Refreshing the PowerExecutive Console

You can use the Refresh function to request an update of the information that is shown in the PowerExecutive Console.

PowerExecutive obtains its information from persistent storage in IBM Director Server and then caches the information on the console for subsequent display. See "Monitoring power-consumption data" on page 19 for the types of information that is displayed by PowerExecutive.

By default, the Console view is refreshed automatically once per short-term data-collection interval. The default is every minute, but you can change this data collection interval. To configure the short-term data collection interval, see "Managing collection of trend data" on page 30.

However, with the Refresh function, you can force a refresh request rather than waiting for the data collection interval or an event to occur.

To refresh the PowerExecutive Console, click the **Refresh** icon in the toolbar. If the management server contains several managed systems that are being displayed, the refresh operation can take several minutes. Alternatively, you can use the **View → Refresh** menu option.

During the refresh operation, the status line of the PowerExecutive Console displays the word Refreshing to indicate that the operation is active. After the refresh operation is complete, the status line displays the word Ready.

Invoking PowerExecutive functions

The functions of PowerExecutive are invoked primarily through the toolbar, the menu bar or pop-up menus in the PowerExecutive Console.

You can use the menu bar to manage power (set a policy), suspend and resume data collection, manage trend data, export power information, derate power for individual managed systems, customize the contents of the PowerExecutive Console, access the PowerExecutive help system, and close the PowerExecutive Console. Menu bar operations are explained in Chapter 3, "Using PowerExecutive," on page 19.

The PowerExecutive toolbar contains the functions that are described in Table 3.

Table 3. Toolbar icons and their actions

Icon	Action
■ -or- ▷	Enables or disables collection of trend data for the rack server or BladeCenter chassis that is selected in the navigation tree. This icon is only available when the object that is selected in the navigation tree is a rack server or BladeCenter chassis.
	Opens a dialog with which you can manage the trend data in the PowerExecutive database.
	Opens a dialog with which you can manage power for rack or blade servers with power-meter support.
	Opens a dialog with which you can specify a derating factor for non-blade modules or blades with no power-meter support. This factor is applied to the label power to estimate the power-in-use.
	Opens a dialog that allows you to display the amount of power used for a given system or group of systems over a specified period of time and calculates the corresponding cost of that power.
	Displays trend data in graphical format. This toolbar icon is available only when the trend data is displayed in tabular format.

Table 3. Toolbar icons and their actions (continued)

Icon	Action
	Displays trend data in tabular format. This toolbar icon is available only when the trend data is displayed in graphical format.
	Refreshes the current Trend Data chart or table.

Chapter 2. Installing PowerExecutive

To install PowerExecutive, review important planning, requirements, and preparation considerations.

PowerExecutive stand-alone version

A stand-alone version of PowerExecutive is available starting with version 2.00. The stand-alone version is similar to the extension version, except where PowerExecutive extension runs on top of the standard Director console, the stand-alone version runs on top of the Embedded Director console.

Tip: See IBM Director: Documentation and Resources (http://www-03.ibm.com/ systems/management/director/resources/) for information about launching the Director console.

The Embedded Director Console is a streamlined version of the standard Director Console, supporting only the PowerExecutive extension and related tasks.

Once installed, the PowerExecutive stand-alone version functions exactly the same as PowerExecutive extension.

Requirements

This topic provides information about PowerExecutive product requirements.

In addition to the requirements that are applicable to IBM Director 5.20, PowerExecutive has further restrictions regarding the hardware and software with which it can be used. For information about IBM Director 5.20 requirements, see the *IBM Director Installation and Configuration Guide*.

Hardware requirements

There are minimum hardware requirements the system must be meet before you can install or use PowerExecutive.

Management servers and management consoles

PowerExecutive can be installed on any management server or management console that supports IBM Director 5.20.

Managed systems

PowerExecutive can monitor power consumption for selected high-end and high-volume rack servers, BladeCenter chassis and blade servers.

PowerExecutive can monitor these servers:

Table 4. PowerExecutive managed system support

Server	Machine Type	Power Monitoring	Power Cap
x3550	7978	Yes	Yes
x3650	7979	Yes	Yes
x3755	8877	Yes	No
x3655	7985	Yes	No

Table 4. PowerExecutive managed system support (continued)

Server	Machine Type	Power Monitoring	Power Cap
x460	8872	Yes	No
x366	8863	Yes	No
HS20	8843	Yes	Yes
HS21	7995	Yes	Yes
HS21	8853	Yes	Yes
HC10	7996	Yes	No
LS20	8850	Yes	Yes
LS21	7971	Yes	No
LS41	7972	Yes	Yes

PowerExecutive can monitor these BladeCenter chassis:
- BladeCenter E machine type 8677 (AC and DC powered)
- BladeCenter T machine type 8720 (DC powered)
- BladeCenter T machine type 8730 (AC powered)
- BladeCenter H machine type 7989 (AC powered)
- BladeCenter H machine type 8852 (AC powered)
- BladeCenter HT machine type 8740 (DC powered)
- BladeCenter HT machine type 8750 (AC powered)

Supported operating systems

PowerExecutive is supported for use with IBM Director 5.20 management servers and management consoles that are running 32-bit operating systems.

PowerExecutive supports a subset of the operating systems supported by IBM Director. Specifically, these operating systems are supported for Power Executive:
- Windows Server 2003 Enterprise Edition
- Windows Server 2003 Enterprise Edition x64
- Red Hat Enterprise Linux AS, version 4.0, for Intel® x86-64
- Red Hat Enterprise Linux ES, version 4.0, for Intel x86-64
- Red Hat Enterprise Linux AS, version 4.0, for Intel x86
- Red Hat Enterprise Linux ES, version 4.0, for Intel x86
- SUSE LINUX Enterprise Server 9 for x86-64
- SUSE LINUX Enterprise Server 9 for x86

Preparing to install PowerExecutive

Use this section to ensure that your environment is set up properly for the installation and use of PowerExecutive.

Prerequisites

Ensure that your system meets all prerequisites before you install and use PowerExecutive.

You must have the following prerequisites installed before you can install PowerExecutive:

- IBM Director 5.20 is installed
- BladeCenter Management extension of IBM Director is installed

Downloading PowerExecutive

Ensure that your environment is set up properly for the installation and use of PowerExecutive.

Complete the following steps to download PowerExecutive from the IBM Web site:
1. Go to the overview page for PowerExecutive at www-03.ibm.com/systems/ management/director/extensions/powerexec.html.
2. On the bottom of the overview page, click **Download IBM PowerExecutive**.
3. On the PowerExecutive (plug-in tool for IBM Director) - Systems Management page, click the file link for the PowerExecutive executable file that you want to download.

   Table 5 lists the executable files that you can download.

Table 5. PowerExecutive files that can be downloaded

Operating system	PowerExecutive component	File to download
Windows	Server or console	PowerExecutive 2.10.exe
Linux	Server	PowerExecutive-server-2.10-2.noarch.rpm
Linux	Console	PowerExecutive-console-2.10-2.noarch.rpm
Windows (*PowerExecutive stand-alone version*)	Server	PowerExecutiveSA 2.10.exe
Linux (*PowerExecutive stand-alone version*)	Server	PowerExecutiveSA-2.10-1.noarch.rpm

   Tip:

   You can also download the *IBM PowerExecutive 2.10 Readme* and the *IBM PowerExecutive Installation and User's Guide* from this page.
4. Copy the downloaded file to a local drive on each management server and management console on which you want to install PowerExecutive. Be sure that you copy the correct file based on the operating system that the management server or management console is using.

Installing PowerExecutive on systems running Windows

Use this section for installing PowerExecutive on systems that are running Windows.

If you are installing PowerExecutive on systems that are running Linux, see "Installing PowerExecutive on systems running Linux" on page 17.

Complete the following steps to install PowerExecutive on a system that is running Windows:
1. If IBM Director Server or IBM Director Console, or both, are running, close them.

2. From the system on which you want to install PowerExecutive, run the executable file that you downloaded.

   Important: The operating-system account that is used to install PowerExecutive must have at least local Administrator authority.

   The PowerExecutive Setup program starts. After several seconds, the Welcome window opens.
3. Click **Next**. The License Agreement window opens.
4. Read the license agreement, click **I accept the terms in the license agreement**, and click **Next**. The Director Server Control Notification window opens.
5. Read the notification and click **Next**. The Ready to Install the Program window opens.
6. Click **Install**.

   When you are installing PowerExecutive Console or PowerExecutive Server when IBM Director Server is not running, the Installing IBM PowerExecutive window opens. The progress of the installation is displayed.

   If this is an upgrade, and the existing PowerExecutive database is from a prior release, then a warning prompt occurs that indicates that the previous version of PowerExecutive will no longer be able to access the database once version 2.10 has been started.
7. Click **Finish**.

Complete the following steps to install the stand-alone version of PowerExecutive on a system that is running Windows:
1. The stand-alone version cannot be installed on a system that has the IBM Director Console or Server already installed. Ensure that neither the IBM Director Console nor Server are installed on this system.
2. From the system on which you want to install PowerExecutive, run the executable file that you downloaded.

   The operating-system account that is used to install PowerExecutive must have at least local Administrator authority.

   The PowerExecutive Setup program starts. After several seconds, the Welcome window opens.
3. Click **Next**. The License Agreement window opens.
4. Read the license agreement, click **I accept the terms in the license agreement**, and click **Next**. The Destination Folder window opens.
5. You can install to the folder specified or click **Change** to change to a different destination folder. Once you decide which destination folder you want to use, click **Next**. The IBM PowerExecutive 2.10 SA service account information window opens.
6. The IBM PowerExecutive 2.10 SA service account is used to log onto the server when IBM Embedded Director starts up. The IBM PowerExecutive 2.10 SA service account window contains the following fields:

   Local computer name or domain
   > Type the account with either local or domain Administrator privileges.

   User name
   > Type the user ID for the account with either local or domain Administrator privileges.

Password

Type the password with either local or domain Administrator privileges.

Confirm password

Retype the password with either local or domain Administrator privileges.

Click **Next**. The Ready to Install the Program window opens.

7. Click **Install**.

When you are installing PowerExecutive Console or PowerExecutive Server when IBM Director Server is not running, the Installing IBM PowerExecutive window opens. The progress of the installation is displayed.

If this is an upgrade, and the existing PowerExecutive database is from a prior release, then a warning prompt occurs that indicates that the previous version of PowerExecutive will no longer be able to access the database once version 2.10 has been started.

Restriction: This statement is not applicable to the stand-alone version of PowerExecutive. You should not use the stand-alone version as an upgrade.

8. Click **Finish**.

Installing PowerExecutive on systems running Linux

This section provides instructions for installing PowerExecutive on systems that are running Linux.

If you are installing PowerExecutive on systems that are running Windows, see "Installing PowerExecutive on systems running Windows" on page 15.

To install PowerExecutive on a Linux system:

- On systems where you are installing PowerExecutive Server, enter the following command at the command prompt:

  `rpm -iv PowerExecutive-server-2.10-2.noarch.rpm`

- On systems where you are installing PowerExecutive Console, enter the following command at the command prompt:

  `rpm -iv PowerExecutive-console-2.10-2.noarch.rpm`

- On systems where you are installing PowerExecutive stand-alone, enter the following command at the command prompt:

  `rpm -iv PowerExecutiveSA-2.10-1.noarch.rpm`

If you are installing PowerExecutive Server and IBM Director Server is running, then this installation stops the IBM Director service before the PowerExecutive installation begins. After the PowerExecutive installation is completed, the IBM Director service is restarted.

Restriction: This statement is not applicable to the stand-alone version of PowerExecutive. To use the stand-alone version, IBM Director should not be installed on the machine.

Uninstalling PowerExecutive on systems running Windows

Use these instructions for uninstalling PowerExecutive on systems that are running Windows.

If you are uninstalling PowerExecutive on systems that are running Linux, see "Uninstalling PowerExecutive on systems running Linux."

Complete the following steps to uninstall PowerExecutive on systems that are running Windows:

1. Click **Start → Settings → Control Panel**. The Control Panel window opens.
2. Double-click **Add/Remove Programs**. The Add/Remove Programs window opens.
3. Click the currently installed program IBM PowerExecutive; then click **Change/Remove**.

   Attention: If you are uninstalling the stand-alone version of PowerExecutive, you click **Change**.
4. Follow any further instructions on the window.

Uninstalling PowerExecutive on systems running Linux

Use these instructions for uninstalling PowerExecutive on systems that are running Linux.

If you are uninstalling PowerExecutive from systems that are running Windows, see "Uninstalling PowerExecutive on systems running Windows."

To uninstall PowerExecutive from a Linux system:

- On systems where you are uninstalling PowerExecutive Server, enter the following command at the command prompt:

  `rpm -ev PowerExecutive-server`
- On systems where you are uninstalling PowerExecutive Console, enter the following command at the command prompt:

  `rpm -ev PowerExecutive-console`
- On systems where you are uninstalling PowerExecutive stand-alone, enter the following command at the command prompt:

  `rpm -ev PowerExecutiveSA`

Chapter 3. Using PowerExecutive

You can use PowerExecutive, extension or stand-alone, to monitor and collect power consumption data, manage trend data, set power capping targets and export data.

Connecting to BladeCenter chassis and rack-mounted servers from IBM Director

Follow these steps to connect to BladeCenter chassis and rack-mounted servers from IBM Director.

Connecting to BladeCenter chassis from IBM Director

1. Go to the IBM Director Console and select menu items: Console → New → Managed Objects → BladeCenter Chassis.
2. In the **Add BladeCenter Chassis** dialog, specify the `Chassis Name`, `IP Address`, `User ID`, and `Password`. The `IP address` must be that of the management module in the chassis.
3. Click **OK**.

Connecting to rack-mounted servers from IBM Director

1. Go to the IBM Director Console and select menu items: Console → New → Managed Objects → Physical Platforms.
2. In the **Add Physical Platforms** dialog, specify the `Name` and `Network Address`. The `Network Address` must be the IP address of the BMC in the rack-mounted server.
3. Click **OK**.

Monitoring power-consumption data

Use PowerExecutive to display details and summaries about both power-managed systems and unmanaged systems.

Each node in the navigation tree of PowerExecutive represents an object that is being managed. There is one top-level node with two children:

- *Power-Managed Systems* consist of all currently targeted rack-mounted servers or BladeCenter chassis that support power metering.
- *Other Systems* consist of all currently targeted rack-mounted servers that don't support power metering.

  Restriction: All BladeCenter chassis are considered to be power-managed, so chassis cannot appear in this group.

You can display the following details and summaries about power-managed systems:

- For a group of BladeCenter chassis or rack-mounted servers, you can display details and summary information.
- For an individual BladeCenter chassis, you can display details and summary information.

- For an individual rack-mounted server, you can display details.
- For an individual power domain in a BladeCenter chassis, you can display details and summary information.
- For an individual module in a power domain, you can display details.

Remember: Keep in mind the following assumptions when viewing power-consumption data:

1. If data is expected and is in fact available, the data appears in the cell in question.
2. If data is not expected or applicable, the cell is left blank, to avoid clutter.
3. If data is expected but has yet to arrive (for example, the console is waiting for a response from the server), the cell contains **...**.
4. If data is expected but an error condition prevents its retrieval, the cell contains the word `Error`.
5. If data for one or more rack servers or BladeCenter chassis in a group of systems is not available, PowerExecutive cannot calculate the correct power consumption for that group. As a result, a total power value for that group is not displayed.

Understanding differences between PowerExecutive and management module power displays

Power data for the BladeCenter Management Module or Advanced Management Module may differ slightly from the data displayed by PowerExecutive.

The Web page for a BladeCenter Management Module or Advanced Management Module displays power data for the power domains and the individual components in the corresponding chassis. This data may differ slightly from that displayed by PowerExecutive for the following reasons:

- Older versions of management module firmware may display only static nameplate power values for blades while PowerExecutive displays dynamic power values obtained from the built-in power meter.
- The management module firmware may report non-zero power values for empty slots. For example, an empty I/O module slot may have a non-zero power value. This value represents power that the management module is reserving for that slot to guarantee that it can be powered on (if a module is plugged in).

  PowerExecutive, on the other hand, reports the actual power consumed, not the amount reserved. As a result, the actual amount will always be zero for an empty slot.
- The management module and IBM Director display a multi-wide blade as a single entity. This differs from PowerExecutive. PowerExecutive displays a blade on a per-slot basis. Each slot occupied by a blade is reported in PowerExecutive.

Displaying details and summary information about a group of BladeCenter chassis

You can display the details and summary information that PowerExecutive provides about a group of BladeCenter chassis.

Complete the following steps to display details and summary information about a group of BladeCenter chassis:

1. From IBM Director Console, drag the PowerExecutive task onto a group of chassis.
2. In the Navigation pane of the PowerExecutive Console, look at the information in the Current® Data pane.

Each row in the table corresponds to one BladeCenter chassis in the group. All power numbers in the table represent alternating current (ac) power.

The last row of the table summarizes information about the chassis in the group.

Table 6 describes the information that is displayed for each chassis in the group.

Table 6. Detail and summary information about a group of BladeCenter chassis

Column title	Description
Name	The name of the BladeCenter chassis.
Data Collection	The status of data collection. Values are Enabled, Disabled and Offline. The offline status is used when data collection is enabled, but the management module is not responsive. The offline status reflects only whether the management module is responsive to PowerExecutive. It is not an indicator of system health.
Average Watts (ac)	The sum of the power in use by all power domains in the BladeCenter chassis. This value is measured in watts.
°C Ambient	The current ambient (inlet) temperature of the chassis. This value is measured in Celsius degrees.
°C Exhaust	The current temperature of the air exiting the box. This value is measured in Celsius degrees and is available only for BC-2 chassis. The column remains blank if data is not available.
BTUs/hr	An estimate, based on the power in use, of the thermal load in British thermal units (BTU) placed on the surrounding environment by this chassis. The following formula is used to determine the estimate that is displayed: `1 watt = 3.412 BTUs/hour`
Acoustic Mode	Indicates whether acoustic mode is in use for the BladeCenter chassis. Values are Enabled or Disabled. This column defaults to a position right of the BTUs/hr column. For information about acoustic mode, see the documentation that comes with the management module that is in the affected chassis.
Time	The time at which the current data was collected.
Summary Row	Totals for the following columns: • Watts in Use • Nameplate Watts • BTU/hr

Displaying details and summary information about an individual BladeCenter chassis

You can display the details and summary information that PowerExecutive provides about an individual BladeCenter chassis.

Complete the following steps to display details and summary information about an individual BladeCenter chassis:

1. From IBM Director Console, drag the PowerExecutive task onto a chassis.
2. In the Navigation pane of the PowerExecutive Console, look at the information in the Current Data pane.

Each row in the table corresponds to one power domain in the chassis. All power numbers in the table represent ac power.

The last row of the table summarizes information about the power objects in the BladeCenter chassis as a whole.

Table 7 describes the information that is displayed for each row in the table.

Table 7. Detail and summary information about an individual chassis

Column title	Description
Name	The name of the power domain to which the row in question corresponds, for example `Power Domain 1`.
Average Watts (ac)	The sum of the Average Watts (ac) of all modules in the power domain, or `--` if power data is not available.
°C Ambient	The current ambient (inlet) temperature of the chassis. This value is measured in Celsius degrees.
°C Exhaust	The current exhaust (outlet) temperature of the chassis. This value is measured in Celsius degrees and is available only for BC-2 chassis. The column remains blank if data is not available.
Redundancy Status	The redundancy in the power domain. The following values are available: • Redundant Power Available • Non-Redundant Power Available • No Power Available For information about power-management policy settings, including redundancy in the power domain, see the documentation that comes with the MM that is in the affected BladeCenter chassis.
Oversubscription Policy	The oversubscription policy that the BladeCenter chassis is using. Values are one of the following: • Redundant without Performance Impact • Redundant with Performance Impact • Non-Redundant These correspond, respectively, to the following: • No Over-Subscription (NOS) • Recoverable Over-Subscription (ROS) • Non-Recoverable Over-Subscription (NROS) For information about oversubscription policies, see the documentation that comes with the MM that is in the affected BladeCenter chassis.
Time	The time at which the current data was collected.

Displaying details and summary information about individual power domains

You can display the details and summary information that PowerExecutive provides about an individual power domain within a BladeCenter chassis.

Complete the following steps to display details and summary information about an individual power domain:

1. From IBM Director Console, drag the PowerExecutive task onto the BladeCenter chassis that contains the power domain.
2. In the Navigation pane of the PowerExecutive Console, expand the tree structure until you see the power domain.
3. Click the name of the power domain and look at the information in the Current Data pane.

Each row in the table corresponds to one bay, which is generally one module, within the power domain. The power numbers for modules in the table represent dc power.

The last row of the table summarizes information about the power domain as a whole. The power numbers in the summary row represent ac power.

Table 8 describes the information that is displayed for each row in the table.

Table 8. Detail information about modules in a power domain

Column title	Description
Name	If the slot is populated, the name of the module in the slot to which the row in question corresponds, for example, IBM 8832L1X KPZH797. If information is not available, the value is --.
Type	The slot type as reported by VPD.
Bay	The number of the bays that this module occupies.
Power Meter	The version of the power meter in the blade, or None for legacy blades or non-blade modules.
Metering Level	The metering level of the power meter (if it is present). It can be one of the following values: • Disabled • Monitoring only • Capping • -- (if no value is available)
Power Savings Supported by Platform	The power savings status for the module. It can be one of the following values: • Yes • No This reflects only BIOS enablement of power savings (for example, DBS on Intel or PowerNow on AMD). The operating system might not enable power savings even if the BIOS has enabled it.
Average Watts (dc)	For a power meter-enabled blade server, the power currently being consumed as reported by the power meter, or -- if power data is not available. For all other blade servers and modules, the same as the Nameplate Watts (dc) value, possibly derated by a factor specified by the user.
Pcap (dc)	The current power cap.
Effective CPU Speed (%)	The effective CPU speed as a percentage.
Time	The time at which the current data was collected.

Displaying details about individual modules

You can display the details that PowerExecutive provides about individual modules.

Complete the following steps to display details about an individual module:

1. From IBM Director Console, drag the PowerExecutive task onto the chassis object that contains the module.
2. In the Navigation pane of the PowerExecutive Console window, expand the tree structure until you see the module.
3. Click the name of the module and look at the information in the Current Data pane.

Each row in the table corresponds to one module in the chassis.

You can display information about the following module types:

- Power-managed blade server modules
- Legacy (non-power-metered) blade server modules
- Other non-blade-server modules

Table 9 describes the information that is displayed for an individual power-managed blade server module.

Table 9. Detail information about a power-managed blade server module

Field name	Description
Name	The name of the module. No value is displayed when the bay is not populated.
Type	The type of module. The following values are available: • Power Module **Tip:** The power consumption listed for the power module represents the amount of power lost in the power module. • Blade Server • I/O Module • Management Module • Blower Module • Media Tray • Midplane
Bay	The number of the bay that this module occupies.
Power Meter	Displays the version number of the power meter.
Metering Level	The metering level for the module. It can be one of the following values: • Monitoring Only • Capping • None
Power Savings Supported by Platform	The power savings status for the module. It can be one of the following values: • Yes • No This reflects only BIOS enablement of power savings (for example, DBS on Intel or PowerNow on AMD). The operating system might not enable power savings even if the BIOS has enabled it.
Nameplate Watts (dc)	The nameplate power as reported by VPD.

Field name	Description
Average Watts (dc)	The power in use of the module.
Pcap (dc)	The current power cap.
Pcap Max (dc)	The maximum possible power cap for this module.
Pcap Min (dc)	The minimum possible power cap for this module.
Effective CPU Speed (%)	The effective CPU speed as a percentage.
Last Policy	The last policy for this module.

Table 10 describes the information that is displayed for an individual power-managed blade server module. The power numbers in the table represent dc power.

Table 10. Detail information about a legacy (non-power-metered) blade server module

Field name	Description
Time	The time at which the current data was collected.
Name	The name of the module. No value is displayed when the bay is not populated.
Type	The type of module.
Bay	The number of the bay that this module occupies.
Power Meter	Displays the version number of the power meter. However, displays None for non-power-metered blade servers.
Derate Nameplate Watts to (%)	User-specified derating factor that you apply to the label power for the module in question to estimate the power in use. The maximum (and default) is 100%, meaning that no derating is performed. The minimum is 0%, meaning that the label power is to be derated entirely, giving an estimate of zero power in use.
Nameplate Watts (dc)	The nameplate power as reported by VPD.
Average Watts (dc)	The power in use of the module.
Current CPU Throttle Values (%)	(Blade server only) A comma-separated list of the current throttle values of each processor in the blade server. A value of 100% indicates that a processor is running at maximum performance (full throttle). For information about throttle levels, see the documentation that comes with the BladeCenter management module that is in the affected chassis.
Preset Blade Throttle Value (W)	(Blade server only) The preset throttle level of the BladeCenter chassis that contains this module. For information about throttle levels, see the documentation that comes with the BladeCenter MM that is in the affected chassis.

Table 11 describes the information that is displayed for an individual power-managed blade server module. The power numbers in the table represent dc power.

Table 11. Detail information about other non-blade server modules

Field name	Description
Time	The time at which the current data was collected.

Table 11. Detail information about other non-blade server modules (continued)

Field name	Description
Name	The name of the module. No value is displayed when the bay is not populated.
Type	The type of module. The following values are available: • Power Module **Tip:** The power consumption listed for the power module represents the amount of power lost in the power module. • I/O Module • Management Module • Blower Module • Media Tray • Midplane
Bay	The number of the bay that this module occupies.
Power Meter	Displays the version number of the power meter. However, displays None for all non-blade server modules.
Derate Nameplate Watts to (%)	User-specified derating factor that you apply to the label power for the module in question to estimate the power in use. The maximum (and default) is 100%, meaning that no derating is performed. The minimum is 0%, meaning that the label power is to be derated entirely, giving an estimate of zero power in use.
Nameplate Watts (dc)	The nameplate power as reported by VPD.
Average Watts (dc)	The power in use of the module.

Displaying details about power-managed rack-mounted servers

You can display the details that PowerExecutive provides about power-managed rack-mounted servers.

Complete the following steps to display details about a power-managed rack-mounted server:

1. From IBM Director Console, drag the PowerExecutive task onto the managed system representing the server.
2. In the Navigation pane of the PowerExecutive window, expand the tree structure until you see the server.
3. Click the name of the server, and look at the information in the Current Data pane.

Each row in the table corresponds to one data item describing the rack-mounted server.

Table 12. Detail information about a power managed rack-mounted server

Field name	Description
Time	The time at which the current data was collected.
Name	The name of the rack-mounted server.
Power Meter	The version of the power meter if the rack-mounted server is power-managed, otherwise the value is None.

Field name	Description
Metering Level	The metering level of the power meter (if it is present). It can be one of the following values: • Disabled • Monitoring only • Capping • -- (if no value is available)
Power Savings Supported by Platform	The power savings status for the server. It can be one of the following values: • Yes • No This reflects only BIOS enablement of power savings (for example, DBS on Intel or PowerNow on AMD). The operating system might not enable power savings even if the BIOS has enabled it.
Nameplate Watts (ac)	The maximum AC draw of the server, as reported by Power Engineering.
Average Watts (ac)	The AC power currently being consumed as reported by the power meter, or -- if power data is not available.
Average Watts (dc)	The DC power currently being consumed as reported by the power meter, or -- if power data is not available
Pcap (dc)	The current power cap.
Pcap_max (dc)	The maximum possible power cap for this rack-mounted server.
Pcap_min (dc)	The minimum possible power cap for this rack-mounted server.
°C Ambient	The current ambient (inlet) temperature of the rack-mounted server.
°C Exhaust	The current exhaust (outlet) temperature of the rack-mounted server. This value is measured in Celsius degrees and is an estimate based on the current ambient temperature and fan RPM of the rack-mounted server. It is not a direct measurement.
Effective CPU Speed (%)	The effective CPU speed as a percentage.
Last policy	The last policy of this rack-mounted server.

Displaying details about unmanaged rack-mounted servers

You can display the details that PowerExecutive provides about unmanaged rack-mounted servers.

Complete the following steps to display details about an unmanaged rack-mounted server:

1. From IBM Director Console, drag the PowerExecutive task onto the object that contains the server.
2. In the Navigation pane of the PowerExecutive window, click **Other Systems** to expand the tree structure until you see the server.
3. Click the name of the server and look at the information in the Current Data pane.

Each row in the table corresponds to an unmanaged rack-mounted server.

Table 13. Detail information about an unmanaged rack-mounted server

Field name	Description
Name	The name of the rack-mounted server
Power Meter	The version of the power meter if the rack-mounted server is power-managed, otherwise the value is None.
Metering Level	Disabled for a power-managed rack server, else N/A.
Upgradeable	Yes if the server could become power-managed with a firmware upgrade; No if not

Setting the power cap value

You can set the power cap value for rack or blade servers.

The power cap (Pcap) value, specified in watts, is the value to which a given rack or blade server will be capped by the PowerExecutive firmware (when the firmware supports capping). The power cap value is persistent across power cycles for both rack and blade servers.

Note: If a blade is removed from a chassis, then the power cap setting is lost.

Average power consumption on a blade may or may not reach or exceed the minimum power capping threshold. The minimum power capping threshold represents a value that can be guaranteed under all operating conditions. PowerExecutive will not actively limit, or cap, the power consumption for a blade when the average power consumption is below the minimum power capping threshold (Pcap_min). No power capping will occur when the average power consumption is below the minimum power capping threshold. It is common for a blade to consume less power than the minimum power capping threshold. Total power consumption on a blade is related to certain conditions that can include hardware configuration of the blade and applications executing on the blade.

Complete these steps to set the power cap value:
1. From IBM Director Console, start PowerExecutive.
2. From the PowerExecutive window, click **Edit → Manage Power** or click the **Manage Power** icon on the Tool bar. The PowerExecutive Create or edit power policy window opens.
3. From the PowerExecutive Create or edit power policy window, specify the new policy in one of three ways: **Percentage of power limit range**, **Power limit range**, or **Compute power limit based on historical data**.
   a. **Percentage of power limit range:** Choose this option to specify a cap in terms of a percentage between the Pcap_min and Pcap_max value ranges.Specifying a cap in this way is particularly useful when there is a group of unlike systems where a specific Pcap value is not appropriate, but where a capping percentage makes sense. The percentage can be set using either the slider or the text box. A percentage of 0% means that the Pcap value is set to the minimum valid value (for example, Pcap_min), in which case the system throttle value is set to the maximum extent possible. A percentage of 100% means that the Pcap value is set to the maximum valid value (for example, Pcap_max), in which case throttling never occurs. A

percentage between 0% and 100% means that the Pcap value is set to a value corresponding to a distance between the Pcap_min and Pcap_max value ranges.

Restriction: A percentage of 0% does not necessarily mean that the system will always be throttled to the maximum extent. It just means that the maximum amount of throttling is possible at this setting.

b. **Power limit range:** Choose this option for a single system, or for a group of similar systems for which the same Pcap value is appropriate. You can specify a Pcap value either by adjusting the slider or by entering the desired value directly in the text box. If you click **Apply**, a window displays in which you can specify the systems to which the Pcap value should be applied. The new value takes effect immediately. The new window also gives you the option to **Save as Task**. If you click **Save as Task**, another window displays allowing you to specify a name for the task. A task is then created in the Tasks pane of Director Console (if the task already exists, it is updated using the currently specified parameters). The task can then be run from Director Console.

c. **Compute power limit based on historical data:**Choose this option to specify a historical period to examine, using the drop-down list box, and a power-limiting goal, using the slider. A power-limiting goal of 0% corresponds to a Pcap value equal to the maximum-observed power over the period of interest. A negative percentage corresponds to a Pcap value lower than the observed maximum, and a positive percentage corresponds to a Pcap value greater than the observed maximum (allowing room for the power consumption to grow without incurring throttling).

Setting the derating power factor

You can set the derating power factor for an individual module that is not power meter enabled in a chassis. By default, the derating power factor is 100%, which means that the reported power is not derated at all.

The derating factor is the percentage of the static maximum power that is used when estimating the power in use for blade servers that are not power meter enabled and for all other modules. The derating factor does not apply to blade servers that are power meter enabled.

Complete these steps to set the derating factor:

1. From IBM Director Console, start PowerExecutive.
2. In the Navigation pane, select the module that you want to derate. You cannot derate power for a chassis or a power domain, you must select a module.
3. From the PowerExecutive window, click **Edit → Derate Power**. The PowerExecutive Derate Power Factor window opens.
4. From the PowerExecutive Derate Power Factor window, enter a number that represents the percent of the static maximum power that you want to use when estimating the power consumption of the module.
5. Click **OK**.

Collecting power consumption data

By default, power information is collected for all BladeCenter chassis or rack-mounted servers or both that are displayed in PowerExecutive.

Suspending data collection

You can suspend data collection on any chassis or server displayed in PowerExecutive.

You might decide to suspend data collection to decrease the amount of disk space required in the PowerExecutive database. Another reason might be to reduce the network load from polling for new information.

You cannot suspend Data collection for individual modules within a chassis.

Complete these steps to suspend data collection for a chassis or a server:
1. From IBM Director Console, start PowerExecutive.
2. In the Navigation pane of the Power Executive Console, select the chassis or server for which you want to suspend data collection.
3. From the PowerExecutive Console, click **Edit → Enable Data Collection** to remove the check mark next to **Enable Data Collection**.

Data collection is suspended.

Resuming data collection

You can resume data collection for a chassis or server displayed in PowerExecutive in which data collection was previously suspended.

Resuming data collection increases the amount of disk space required in the PowerExecutive database. It also increases the network load as it polls for new information.

Complete these steps to resume data collection for a chassis:
1. From IBM Director Console, start PowerExecutive.
2. In the Navigation pane of the PowerExecutive Console, select the chassis or server for which you want to resume data collection.
3. From the PowerExecutive Console, click **Edit → Enable Data Collection** to add a check mark next to Enable Data Collection.

Data collection is resumed.

Managing trend data

This section provides information about using PowerExecutive to manage trend data.

Trend data is displayed in the Trend Data pane of the PowerExecutive console. For more information, see "Trend Data pane" on page 7.

Managing collection of trend data

You can manage trend data using the Edit menu of PowerExecutive.

Historical trend data is written to the PowerExecutive database. You can control how often and how much historical trend data is written to the database and when trend data is deleted.

However, when the PowerExecutive database cannot expand, it deletes the oldest historical data from the database to free up room for new data that it is collecting.

Complete these steps to affect the trend data written to the PowerExecutive database:

1. From IBM Director Console, start PowerExecutive.
2. From the Power Executive Console, click **Edit → Manage Trend Data**. The Manage Trend Data window opens.
3. Complete the fields on the Manage Trend Data window as follows:
   - In the **Short-term data collection in minutes** field, enter the number of minutes in the short-term data-collection cycle. The default value is one minute. In addition, the value is limited by the interval in which you can poll the system.

     Once every short-term data-collection interval, PowerExecutive collects temperature and power data from the systems under its control. The data collected during these cycles is considered to be short-term data collection. Lower values in this field could have an impact on the network performance of the systems involved.
   - In the **Long-term data collection in minutes** field, enter the number of minutes in the long-term data collection cycle. The default value is ten minutes. PowerExecutive uses the long-term data collection cycle to determine which data is considered to be long-term data. Long-term data is the trend data that you can display on the Trend Data pane.

     Important: All short-term data points that fall within the **Long-term data collection in minutes** time period are coalesced into a single long-term data record.
   - In the **Number of days to keep short-term trend data** field, enter the number of days that PowerExecutive identifies data as short-term data before considering it to be long-term data. The default value is 31 days.
   - In the **Number of days to keep long-term trend data** field, enter the number of days that PowerExecutive keeps long-term data before deleting it. The default value is 365 days.
4. Click **Apply** to save the settings, recompute and then display the data at the bottom of the dialog box so you don't have to re-open the dialog to see how the new settings affect the projected size of the PowerExecutive database. Click **OK** to save the settings, and dismiss the dialog box.

Creating a custom time interval for the Trend Data pane

You can create a custom time interval for use by the Trend Data pane instead of using one of the predefined time intervals.

Complete the following steps to create a custom time interval for the Trend Data pane:

1. From IBM Director Console, start PowerExecutive.
2. From the Trend Data pane in the PowerExecutive window, click the drop-down box in the upper left corner.
3. Click **Add/Change custom interval** as the trend data interval. The PowerExecutive Custom window opens.
4. Complete the fields on the PowerExecutive Custom window in the following way:
   - In the first row of fields, enter the day and time from which the trend data should start. Define the month, day, year, hour, and minute from which to start displaying trend data.

- In the second row of fields, enter the day and time at which the trend data should stop. Define the month, day, year, hour, and minute at which to stop displaying trend data.

5. Click **OK**.

Exporting data from PowerExecutive

Use this section to get information about exporting data from PowerExecutive.

You can export the following types of data:
- Current data from the Current Data pane
- Trend data chart from the Trend Data pane
- Trend data table from the Trend Data pane

Exporting current data

Use the File menu in PowerExecutive to export current data from the Current Data pane.

PowerExecutive can save the exported current data in comma-separated value (CSV), XML or HTML format.

Complete the following steps to export the current data in the Current Data pane:

1. From IBM Director Console, start PowerExecutive.
2. From the PowerExecutive Console, click **File → Export → Current Data**. The Export Current Data window opens.
3. Select the directory where you want to export the data.
4. In the **File Name** field, type a name for the file.
5. In the **Files of Type** field, select the type of file that you want to create.
6. Click **OK**.

Exporting a Trend Data chart

To export the Trend Data chart, the chart must be displayed in the PowerExecutive Console.

PowerExecutive saves the exported Trend Data chart in JPEG format.

Complete the following steps to export the Trend Data chart:

1. From IBM Director Console, start PowerExecutive.
2. From the PowerExecutive Console, click **File → Export → Trend Data as Chart**. The Export Trend Data as Chart window opens.
3. Select the directory where you want to export the data.
4. In the **File Name** field, type a name for the file.
5. Click **OK**.

Exporting a Trend Data table

To export the Trend Data table, the table must be displayed in the PowerExecutive Console.

Power Executive can save the exported Trend Data table in CSV, XML or HTML format.

Complete the following steps to export a Trend Data table:

1. From IBM Director Console, start PowerExecutive.
2. From the PowerExecutive Console, click **File → Export → Trend Data as Table**. The Export Trend Data as Table window opens.
3. Select the directory where you want to export the data.
4. In the **File Name** field, type a name for the file.
5. In the **Files of Type** field, select the type of file that you want to create.
6. Click **OK**.

Events that affect PowerExecutive

You should understand the IBM Director events and PowerExecutive events that affect the information that is displayed in PowerExecutive. Events can be external (generated by IBM Director) or internal (generated by PowerExecutive).

Before using PowerExecutive, use the Management Processor Configuration subtask of the Server Configuration Manager task (formerly Management Processor Assistant [MPA]) to configure an alert-forwarding profile for the chassis that you plan to monitor. In the alert-forwarding profile, set the connection type to **IBM Director Comprehensive** and set the IP address to the IP address of the management server that is being used to monitor power consumption with PowerExecutive.

Important: This management server must be the only server that is configured and enabled to receive alerts from the chassis that you plan to target.

If you do not create an alert-forwarding profile for a chassis, PowerExecutive cannot receive any events for that chassis.

The IBM Director event log might not contain all events that are reported in PowerExecutive. Further, the timestamp on events is different between the IBM Director event log and the trend pane in Power Executive. The IBM Director event log records the time that the defect occurred. The PowerExecutive events reflect the time that PowerExecutive detected the event.

External events

Some events from Server Configuration Manager cause PowerExecutive to poll for new information and refresh the PowerExecutive Console as needed. Server Configuration Manager is an IBM Director task that is used to create or update server configuration profiles, which include management of service processors in System x™ and IBM Netfinity® servers.

External events are generated by the MM in a BladeCenter chassis, intercepted by IBM Director, and communicated up to PowerExecutive through the IBM Director event-subscription mechanism.

Table 14 describes the severities that can be assigned to each event.

Table 14. Event severities and their meanings

Event severity	Description
Critical	Severe events that signal that the system might not be functioning.
Warning	Serious events that could progress to critical severity.

Table 14. Event severities and their meanings (continued)

Event severity	Description
Harmless	Any event that is not severe or serious. These events are not necessarily errors.

Table 15 describes the events that can cause the information to be refreshed in the PowerExecutive Console.

Table 15. Events that affect the information in PowerExecutive

Severity	Category	Description
Critical	Power failure	A system power supply failed.
Critical	Chassis failed	There are no working fans in the chassis.
Critical	Power supply failed	A power supply is now functioning properly in the chassis.
Warning	Blade power off	The server is powering off.
Warning	Management Module active	A management module assumed control of the chassis.
Warning	Mismatched power supplies	The power supplies are mismatched.
Warning	Power redundancy lost	Power redundancy was lost in the chassis.
Warning	I/O module redundancy lost	The I/O module redundancy was lost in the chassis.
Warning	I/O module power off	An I/O module in the chassis was powered off.
Harmless	I/O module power on	An I/O module in the chassis was powered on.
Harmless	I/O module redundancy restored	The I/O module redundancy was restored in the chassis.
Harmless	No mismatched power supplies	No mismatched power supplies were detected in the chassis.
Harmless	Blade throttled	A blade server in the chassis is throttled in order to maintain a power consumption within certain bounds. A recovery event is also sent.
Harmless	Blade unthrottled	A blade server in the chassis is no longer throttled.
Harmless	Blade power on	The server is powering on.
Harmless	Service processor test	The service processor sent a test event.
Harmless	Power redundancy restored	Power redundancy was restored in the chassis.
Harmless	Power supply recovered	The power supply was recovered.

Internal events

PowerExecutive displays information about events that it generates in the Trend Data pane.

Internal events are generated internally by PowerExecutive itself, rather than an MM, but tracked by PowerExecutive and displayed to the user by the same mechanism as MM-generated events.

Specifically, PowerExecutive generates and displays internal event information with the following severities.

Table 16. Event severities and their meanings

Event severity	Description
Critical	Severe events that signal that the system might not be functioning.
Warning	Serious events that could progress to critical severity.
Harmless	Any event that is not severe or serious. These events are not necessarily errors.

Table 17 describes the internal events that can cause the information to be refreshed in the PowerExecutive Console.

Important: The term *server* in the descriptions below can be a placeholder for a rack-mounted server, chassis, or module type.

Table 17. Internal events that affect the information in PowerExecutive

Severity	Category	Description
Critical	Server power supply removed	A power supply was removed from the server.
Critical	BMC HW error calibration	A BMC power meter hardware calibration error has occurred on the server.
Warning	PowerExecutive stopped	PowerExecutive was stopped.
Warning	Chassis removed	The chassis was removed.
Warning	Data collected suspended	Data collection was suspended for the chassis.
Warning	Chassis offline	The chassis is offline.
Warning	Module removed	A module was removed from the chassis.
Warning	Long-term data discarded	Long-term data was discarded.
Warning	Time change detected	Time change detected; data may not be accurate.
Warning	Server power off	The rack-mounted server is powering off.
Warning	Server removed	The rack-mounted server was removed.
Warning	Server offline	The rack-mounted server is offline.
Warning	Server not power-managed	The rack-mounted server is no longer power-managed.
Warning	Server inventory not compete	Server power inventory is not complete for the server.
Warning	Firmware downgraded	The BMC firmware was downgraded for the server.
Warning	Firmware unsupported	The BMC firmware for the server is not supported.

Severity	Category	Description
Warning	Write access detected	Host Write access to power management registers on the server was detected.
Warning	Pcap min changed	The minimum power cap value for the server was updated.
Warning	Pcap max changed	The maximum power cap value for the server was updated.
Warning	Pcap less than Pcap min	The new minimum power cap value for the server exceeded the power cap value.
Warning	Power capping removed	Power capping was disabled for the server.
Warning	Power measurement removed	Power measurement was disabled for the server.
Warning	Power interval greater	The BMC polling interval for the server is greater than the app polling interval.
Warning	Power interval less	The BMC polling interval for the server is less than the app polling interval.
Warning	BMC HW error exhaust temp	A BMC exhaust temperature sensor failure has occurred on the server.
Warning	BMC HW error inlet temp	A BMC inlet temperature sensor failure has occurred on the server.
Warning	BMC reset detected	A BMC reset was detected on the server.
Warning	Database warning	The projected database size exceeded the space available on the volume.
Harmless	PowerExecutive started	PowerExecutive was started.
Harmless	Chassis added	The chassis was added.
Harmless	Data collection resumed	Data collection was resumed for the chassis
Harmless	Chassis online	The chassis is online.
Harmless	Acoustic mode enabled	Acoustic mode was enabled for the chassis.
Harmless	Acoustic mode disabled	Acoustic mode was disabled for the chassis.
Harmless	Oversubscription policy NOS	Power policy for the domain was changed to NOS (no oversubscription).
Harmless	Oversubscription policy ROS	Power policy for the domain was changed to ROS (recoverable oversubscription).
Harmless	Oversubscription policy NROS	Power policy for the domain was changed to NROS (non-recoverable oversubscription).
Harmless	Module inserted	A module was inserted into the chassis.
Harmless	Short-term data coalesced	Short-term data was coalesced.
Harmless	Server power on	The rack-mounted server is powering on.
Harmless	Server added	The rack-mounted server was added.
Harmless	Server online	The rack-mounted server is online.

Table 17. Internal events that affect the information in PowerExecutive (continued)

Severity	Category	Description
Harmless	Server power managed	The rack-mounted server is now power-managed.
Harmless	Server power save mode change	The server entered or exited a power savings mode.
Harmless	Server rebooted	The BIOS for the server reported a system reboot.
Harmless	Server inventory complete	Server Power Inventory has completed for the server.
Harmless	Server power supply added	A power supply was added to the server.
Harmless	Firmware upgraded	The BMC firmware was upgraded to the server.
Harmless	Above car threshold	Average effective clock rate for the server is more than 80% of normal.
Harmless	Pcap changed	The power cap value for the server was altered.
Harmless	Power capping added	Power capping was enabled for the server.
Harmless	Power measurement added	Power measurement was enabled for the server.
Harmless	PS label power changed	A change was detected in the Label Power for the server.
Harmless	BMC HW ERRCLR exhaust temp	A BMC exhaust temperature sensor error has been cleared on the server.
Harmless	BMC HW ERRCLR inlet temp	A BMC inlet temperature sensor has been cleared on the server.
Harmless	Database resolved	The projected database size no longer exceeds the space available on the volume.

Events that PowerExecutive generates are collected with other trend data and stored in the PowerExecutive database. These events let you know why historical data might be missing for one or more chassis.

In the Trend Data chart, these events are displayed:
- Events with a critical severity are shown as red squares.
- Events with a warning severity are shown as yellow diamonds.
- Events with a harmless severity are shown as green triangles.

You can place your mouse over each event in the Trend Data chart to obtain a description of the event that occurred.

In the Trend Data table, these events are displayed in the Event column.

Using the Watt-Hour Meter

The Watt-Hour Meter allows you to display the amount of power used for a given system or group of systems over a specified period of time and calculates the corresponding cost of that power.

The Watt-Hour Meter gives a visual indication of the number of watt-hours consumed by the target object or objects over the specified time period. This is compared to what would have been consumed had nameplate power been drawn over that entire period.

To use the Watt-Hour Meter:

1. From the menu bar, select **Edit → Watt-Hour Meter...**

   Note: You can also select the Edit Watt-Hour Meter icon in the toolbar.

Table 18. Detail information about the Watt-Hour Meter

Field name	Description
Target	The system or group of systems for which power is calculated.
Time Period	The time period for which power is calculated for the specified system or group of systems. This is the time period that is defined in the trend chart or table.
Enter price per kilowatt-hour	Specify the cost of power per kilowatt-hour. The monetary unit for the default locale is used. No monetary unit needs to be specified here. **Note:** This value is saved across PowerExecutive Console sessions.
Enter cooling rate factor	Specify how much cooling contributes to the cost of the power consumption currently being displayed. The default is 1.5. This means that every dollar (or your local currency) spent on power requires that an additional 1.5 dollars be spent on cooling to offset the heat generated by that power. To estimate the cost of power alone, this factor can be set to 0. **Note:** This value is saved across PowerExecutive Console sessions.
Cost of actual power	The estimated cost of the power actually consumed, based on the price per kilowatt-hour.
Cost of nameplate power	The estimated cost of the power that would have been consumed had nameplate power been drawn through the specified interval.

Chapter 4. Troubleshooting

IBM provides several options to troubleshoot and resolve problems with PowerExecutive.

Known limitations, problems, and workarounds

This section contains information about IBM PowerExecutive 2.10 limitations, problems and workarounds.

Limitations

- The **Min/Max** power readings shown in the user interface are representative of measurements made within the rack-mounted server. Some external AC power meters may not be able to capture or display the same peaks as are displayed using the PowerExecutive power meter due to differences such as the averaging periods of the PowerExecutive power meter, the averaging periods of the external power meter, and the filtering behavior of your power supply.
- On Windows, saving exported data to a network share that is not mapped to a drive letter is not supported. When using the **File → Export** function, you must specify a local disk or a network share that is mapped to a drive when saving the exported data.
- Demand Based Switching does not work on BladeCenter HS20 (machine type 8843).
- Power information on BladeCenter systems is refreshed at a default rate of once every 10 minutes. Power values for blades in such a system will therefore not be updated more frequently than every 10 minutes, regardless of the rate at which PowerExecutive short-term polling is set to (once a minute, by default).
- The Advanced Management Module (AMM) displays information on allocated power and the power capping range for an individual blade. The allocated maximum power is not the worst case maximum amount of power that a blade will utilize but is a typical maximum power across various configurations. This maximum allocated power is used by the AMM to budget for a given blade a typical maximum power in order to determine if a given blade will fit within the domain's power budget and be allowed to power on. The maximum power in the power capping range will be different than the allocated maximum power. The maximum power in the power capping range reflects the nameplate power for the blade.

Known problems and workarounds

- Installation of PowerExecutive on Windows Server 2003 with SP1 and Windows Server 2003 x64 Edition may fail if all Windows Installer hotfixes are not installed.
  - Workaround: To correct this problem, download and install MS KB 898715 to upgrade the installer to version 3.1 v2. You can then install PowerExecutive.
  _____
- PowerExecutive displays a popup that says `The following device is not supported by PowerExecutive: <system name>` on a system known to support PowerExecutive.
  - Workaround: The system may have an advanced management module (Service Processor [SP]), which has its own Ethernet port, and, therefore, its

own IP address. Director will talk to this SP. But, this SP does not have PowerExecutive support. Only the on-board Base Management Controller (BMC) has PowerExecutive support. The BMC is on the system board and it shares the Ethernet port with the system. For PowerExecutive to display the system, you must configure the BMC from the F1 BIOS Setup screen.

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• PowerExecutive doesn't display any systems even though the system that has PowerExecutive installed supports PowerExecutive.

  – Workaround: PowerExecutive only communicates out of band through the network to the management processor on the system. Even though you have one Ethernet cable into the system on the Ethernet 1 port, you will have two IP addresses: one for the on board BMC and one for the OS. For PowerExecutive to display the system on which it is installed, you must add the BMC address to Director as a Physical Platform.

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• PowerExecutive tasks appear in the IBM Director console, but they do not execute when clicked. This occurs when a system has IBM Director console installed, but does not have PowerExecutive Console installed.

  – Workaround: PowerExecutive Console and IBM Director console must both be installed in order to be able to complete PowerExecutive tasks through the Director console.

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• During installation, the following message is displayed:

1603: Error installing Windows Installer engine. A file which needs to be replaced may be held in use. Close all applications and try again.

  – Workaround: Click OK and continue the installation. If this does not solve the problem, one or more of the following fixes may resolve the error:

    1. Insufficient disk space

       Increase your hard disk space.

    2. Temp directory is not clean

       Clean the Temp directory.

    3. A certain file on the machine is locked

       Close all applications running in the background. Reboot your computer. Run the installation again.

    4. Use Microsoft's Windows Installer Cleanup utility to remove traces of previous installations.

       This utility does not remove files installed by the installation, which may need to be removed manually. For more information, refer to Microsoft's Knowledge Base.

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• The HS21 and HS41 blade servers have a known limitation in their power meter hardware. The maximum value that the power meter circuit can measure, called Full Scale Power (FSP), can be exceeded on fully configured servers when running high performance computing applications. Under such operating conditions, the measured power displayed by the PowerExecutive Application GUI will remain saturated at FSP and will not reflect the actual power drawn by the blade. Additionally, setting the power capping limit to a value higher than FSP may lead to a failure in capping server power, under such operating conditions. The maximum value of the power capping limit is based on nameplate power of the blade server and is higher than the FSP.

– Workaround: Do not set power capping limit above FSP. The FSP value is 388 W (246 W for blade hardware Rev 4). Throttling may occur when capping the system at FSP in this case. If throttling is not desired, do not enable power capping for this configuration.

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• On Windows, saving exported data to a network share may sometimes fail with an error stating that the file already exists even though it may have been deleted on the actual share.

– Workaround: To correct this problem, use a different filename to export data or reboot the machine to clean the network file cache information.

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• On HS20 server blades, there is a known limitation on setting power capping at or close to minimum power capping value on fully configured servers when running high performance computing applications. A failure in power capping may occur when power capping value is within 20W of the minimum power capping value.

– Workaround: Do not set power capping limit within 20W of the minimum power capping value in these configurations.

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• On Linux, attempting to upgrade from IBM Director 5.10.3 to IBM Director 5.20.x fails when PowerExecutive 2.00 or PowerExecutive 2.00.1 is installed on the system.

– Workaround: To upgrade IBM Director 5.10.3 to IBM Director 5.20.x when PowerExecutive is already installed on the system:

1. Uninstall IBM PowerExecutive using the following command:

   ```
   rpm -ev PowerExecutive-server
   ```

   Note: When you uninstall PowerExecutive, the PowerExecutive Database is preserved.

2. Install IBM Director 5.20.x. Refer to _IBM Director Installation and Configuration Guide_ for details.

3. Install PowerExecutive to the latest version.

_____

• On Linux, the Console properties (for example, price/kwh in the Watt-Hour Meter dialog) are not saved across PowerExecutive sessions when the user does not have proper authority on the operating system.

– Workaround: To save Console properties across PowerExecutive sessions, ensure that the operating-system account you use has local root authority.

Contacting customer support

If you need help, service or technical assistance, or just want more information about IBM products, you can find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your System x system, and whom to call for service, if it is necessary.

Before you call

Before you call IBM, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system is turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Hardware Maintenance Manual and Troubleshooting Guide* in the IBM System x Documentation or at the IBM Systems: Technical support sitewww.ibm.com/jct01004c/systems/support/.
- Go to the IBM Support Web site to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the publications that are provided with your system and software. The information that comes with your system also describes the diagnostic tests that you can perform. Most IBM System x machines, operating systems, and programs come with information that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the information for the operating system or program.

Using the documentation

Information about your IBM System x machine and preinstalled software, if any, is available in the documentation that is included with your system. That documentation includes printed books, online books, readme files and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to www.ibm.com/jct01004c/systems/support/ and follow the instructions. Also, you can order publications through the IBM Publications Center at www.elink.ibmlink.ibm.com/public/applications/ publications/cgibin/pbi.cgi.

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Glossary

Terms

This topic provides definitions of terms that are used in the PowerExecutive product.

This glossary defines technical terms and abbreviations used in this IBM PowerExecutive document. If you do not find the term you are looking for, view the IBM Terminology Web site at: http://www.ibm.com/ibm/terminology.

Selection of Terms: A term is a word or group of words to be defined. In this glossary, the singular form of the noun and the infinitive form of the verb are the terms most often selected to be defined. If the term may be abbreviated, the abbreviation is indicated. The abbreviation is also defined in its proper place in the glossary.

A

ac   See *alternating current*.

alternating current
    An electric current that reverses its direction at regularly recurring intervals.

B

Baseboard Management Controller
    A controller that monitors system platform management events such as fan failure and temperature or voltage increases, and logs their occurrence.

blade server
    An IBM BladeCenter server. A high-throughput server on a card that supports symmetric multiprocessors (SMP).

BladeCenter chassis
    A BladeCenter unit that acts as an enclosure. It enables the individual blade servers to share resources such as the management, switch, power and blower modules.

BMC   See *Baseboard Management Controller*.

British thermal unit
    An English unit of measure for heat.

BTU   See *British thermal unit*.

C

chassis
    The metal frame in which various electronic components are mounted.

D

dc   See *direct current*.

direct current
    An electric current that flows in a single direction and at a constant voltage.

discovery
    The process of finding resources within an enterprise, including finding the new location of monitored resources that were moved.

E

exhaust heat index
    A sensor that is derived from a number of other physical sensors in the server, which helps to detect temperature changes in the exhaust area of your server. The exhaust heat index should only be used as an indication that the exhaust temperature is increasing or decreasing at a rate shown in the PowerExecutive GUI.

event   An occurrence of significance to a task or system, such as the completion or failure of an operation. There are two types of events: alert and resolution.

event action
    The action that IBM Director takes in response to a specific event or events

event-action plan
    A user-defined plan that determines how IBM Director manages certain events. An event action plan comprises one or more event filters and one or more customized event actions.

Event Action Plan wizard
    An IBM Director Console wizard that can be used to create simple event action plans.

event filter
    A filter that specifies the event criteria for an event action plan. Events must meet

the criteria specified in the event filter in order to be processed by the event action plan to which the filter is assigned to.

extension
> See *IBM Director extension*.

external event
> An event generated by the MM in a BladeCenter chassis, intercepted by IBM Director, and communicated up to PowerExecutive through the IBM Director event-subscription mechanism.

G

group A logical set of managed objects. Groups can be dynamic, static, or task-based.

I

IBM Director Console
> A component of IBM Director software. When installed on a system, it provides a graphical user interface (GUI) for accessing IBM Director Server. IBM Director Console transfers data to and from the management server using TCP/IP.

IBM Director environment
> The complex, heterogeneous environment managed by IBM Director. It includes systems, BladeCenter chassis, software, Simple Network Management Protocol (SNMP) devices.

IBM Director extension
> A tool that extends the functionality of IBM Director. Some of the IBM Director extensions are BladeCenter Management, Capacity Manager, ServeRAID Manager, Remote Deployment Manager, and PowerExecutive.

IBM Director Server
> The main component of IBM Director software. When installed on the management server, it provides basic functions such as discovery of managed systems, persistent storage of configuration and management data, an inventory database, event listening, security and authentication, management console support, and administrative tasks.

internal event
> An event generated internally by PowerExecutive itself, rather than an MM, but tracked by PowerExecutive and

displayed to the user by the same mechanism as MM-generated events.

L

Level-0 managed system
> An IBM or non-IBM server, desktop computer, workstation, or mobile computer that can be managed by IBM Director but does not have any IBM Director software installed on it.

M

managed group
> A group of systems or objects managed by IBM Director.

managed object
> An item managed by IBM Director. In IBM Director Console, a managed object is represented by an icon that shows its type (such as chassis, cluster, system, or scalable system).

managed object ID
> A unique identifier for each managed object. It is the key value used by IBM Director database tables.

managed system
> A system that is being controlled by a given system management application, for example, a system managed by IBM Director.

management console
> A system (server, desktop computer, workstation, or mobile computer) on which IBM Director Console is installed.

management module
> The BladeCenter component that handles system-management functions. It configures the chassis and switch modules, communicates with the blade servers and all I/O modules, multiplexes the keyboard/video/mouse (KVM), and monitors critical information about the chassis and blade servers.

management server
> The server on which IBM Director Server is installed.

module
> A BladeCenter component that is inserted in a bay in a chassis and whose power consumption data can be monitored by PowerExecutive. Modules include power

modules (power supplies), blade servers, I/O modules, BladeCenter management modules, blower modules, and media trays.

O

out-of-band communication
Communication that occurs through a modem or other asynchronous connection, for example, service processor alerts sent through a modem or over a LAN. In an IBM Director environment, such communication is independent of the operating system and interprocess communication (IPC).

R

rack-mounted server
A standalone system with a Baseboard Management Controller (BMC).

S

switch module
The BladeCenter component that provides network connectivity for the BladeCenter chassis and blade servers. It also provides interconnectivity between the management module and blade servers.

system
The computer and its associated devices and programs.

T

target system
A managed system on which an IBM Director task is performed.

V

vital product data (VPD)
Information that uniquely defines the system, hardware, software, and microcode elements of a processing system.

VPD See *vital product data*.

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IBM PowerExecutive
Installation and User's Guide
Version 2.10

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