HP Resource Partitioning Manager
User Guide

Part Number 304102-001
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About This Guide

This guide is designed to be used as step-by-step instructions for installation and as a reference for operation, troubleshooting, and future upgrades for the HP Resource Partitioning Manager.

Audience Assumptions

This guide is intended for IT administrators who are familiar with partitions and the management of server resources.

Where to Go for Additional Help

In addition to this guide, the following information sources are available.

HP Technical Support

In North America, call the HP Technical Support Phone Center at 1-800-652-6672. Telephone support is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored.

Outside North America, call the nearest HP Technical Support Phone Center. Telephone numbers for worldwide Technical Support Centers are listed at

www.compaq.com/support/contact_compaq/worldphones.pdf

Be sure to have the following information available before you call HP:

- Technical support registration number (if applicable)
- Software version number
- Server model name(s) and numbers(s)
- Applicable error messages
- Third-party hardware or software
- Operating system type and revision level
- Detailed, specific questions

HP Website

The HP website has information on this product, as well as the latest drivers and flash ROM images. You can access the HP website by logging on to the Internet at

www.hp.com/products/wmp

HP Authorized Reseller

For the name of your nearest HP authorized reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.

Elsewhere, refer to the HP website for locations and telephone numbers.

1

Introduction

HP Resource Partitioning Manager (RPM) is a software solution that controls and dynamically allocates system resources to enable application consolidation and performance optimization on Windows 2000 server platforms, bringing maximum utilization, lower total cost of ownership, and improved availability to IT environments. This guide provides you with information on how to use RPM to create Resource Partitions, limit each partition to specific resource quantities and establish rules that allow for the dynamic reallocation of processors and memory. The guide also explains new features for Version 2.0, such as system overview charts, event logging, data trending, process metering, and reporting.

What Is a Resource Partition?

A Resource Partition is a defined set of processor and memory resources assigned to a Windows 2000 job object. RPM creates and manages Resource Partitions whose boundaries can be dynamically reallocated based on the resource needs of the objects.

What Is a Job Object?

A job object is a feature of Windows 2000 that allows a user to group processes together. These job objects can be thought of as containers that hold user-defined applications, services, and other processes.

Some applications can create job objects outside of Resource Partitioning Manager. This document refers to this type of job object as a “non-RPM” job object. To ensure that the allocation of all system resources is monitored, RPM has the ability to “capture” these non-RPM job objects in a Resource Partition using the **Capture** function under the **Partition** option on the RPM menu bar.

For more information about capturing non-RPM job objects, refer to “Capturing a Non-RPM Job Object” in Chapter 3, “Using Resource Partitions.”

System Requirements

The following list outlines the necessary requirements for using RPM:

- A Microsoft Windows 2000 Server or Windows Advanced Server, Limited Edition operating system
- 800 x 600 resolution or higher on the server running the RPM GUI
- A network containing one or more ProLiant servers
- An administrative user account on each target system

Restrictions and Recommendations

Running Microsoft SQL Server from within a Resource Partition is not recommended.

Running RPM remotely on a system using Microsoft Terminal Server is not recommended.

If the RPM GUI is shut down, the partitions that have already been created will remain.

Some products, such as Microsoft Exchange Server, Internet Information Server (IIS), and Terminal Server, do not support multiple instances to be run under a single operating system (OS) instance. Use of RPM will not overcome these product-specific limitations. For example, you may run Microsoft Exchange Server from within a Resource Partition on the same computer that is running IIS from within another Resource Partition, but you may **not** simultaneously run two copies of Microsoft Exchange Server from within two Resource Partitions on the same OS instance.

NOTE: Refer to the troubleshooting section of this guide for more information about running multiple instances of the same application.

Installation Instructions

Use the following instructions to install RPM on the ProLiant server:

1. Insert the Workload Management Pack CD.
2. On most systems, the RPM installer automatically runs. If autorun is enabled, skip to step 4. Otherwise, proceed to step 3.
3. Use Windows Explorer to locate the SETUP.EXE file on the Workload Management Pack CD and double-click to launch the file.
4. The RPM installation program begins. Follow the program instructions to install the software successfully.
5. When prompted, enter the license key number from the back of the package.

After installation is complete, a shortcut to Resource Partitioning Manager is added to the desktop.

NOTE: A system reboot is **not** required following the installation of RPM.

Upgrade Instructions

Use the following instructions to upgrade from an earlier version of RPM:

1. Shut down any active Resource Partitions. Refer to the "Deactivating a Resource Partition" section in Chapter 3, "Using Resource Partitions."
2. Follow steps 1 through 5 in the "Installation Instructions" section above.

The upgrade process shuts down the RPM service if it is active, then overwrites it with the new version of the software. After installation is complete, a shortcut to RPM 2.0 is added to the desktop.

NOTE: Partitions created in an older version of RPM remain intact after an upgrade.

NOTE: A system reboot is **not** required following an upgrade of RPM.

2

Main User Interface Screen

When Resource Partitioning Manager (RPM) is launched, the user interface is displayed. The user interface serves as the control point for all RPM functions. However, because RPM controls resources using the RPM service, the user interface does not need to be active at all times. The user interface window can be closed at any time without affecting the configurations, rules, or execution of any Resource Partition.

When you have finished creating and activating Resource Partitions, you can keep RPM visible, minimize RPM, or close the user interface window completely and move on to other activities while RPM manages your resources in the background.

The main screen of the user interface, shown in the following figure, is used to create, edit, activate, deactivate, or delete Resource Partitions. The graphics displayed on the main screen can be used to view existing Resource Partitions, as well as processor and memory details for the server.

The main screen consists of four elements: a menu bar, a toolbar, Resource Partition panels, and processor and memory graphs.

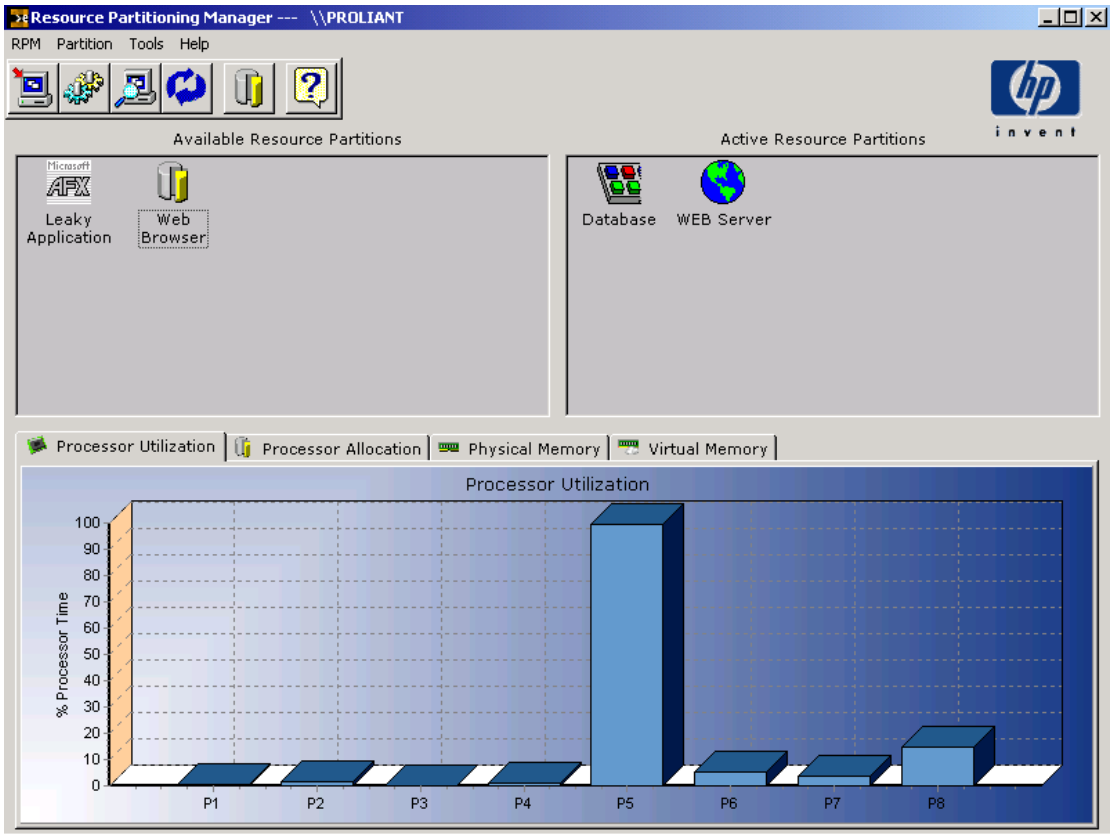

Figure 2-1: RPM main user interface

Resource Partitioning Manager Menu Bar

The RPM menu bar contains the following menu items:

- **RPM**—Basic commands for using RPM
- **Partition**—Options for creating and managing partitions
- **Tools**—Additional tools for event logging, trending, metering, and reporting
- **Help**—Help on RPM topics

The items on the menu bar are described in detail in the following chapters.

Resource Partitioning Manager Toolbar

The following table describes the icons and functions of the RPM toolbar found at the top of the main screen.

Table 2-1: Toolbar Buttons

Icon	Function	Description
	Select Computer	Opens a dialog box for accessing other systems in the network.
	Service Properties	Allows management of the RPM service. The **General** tab can be used for maintenance of the RPM service, which can be started, stopped, or updated. The **Logon** tab can be used to assign a logon user account to the RPM service to enable access to resources such as files and folders protected by Windows 2000. When a Resource Partition is active, you can view this icon and menu item, but you cannot modify it.
	System Overview	Provides a graphical overview of a server, its processors, its memory, its physical disks, and its networks.
	Refresh Views	Provides the user with the ability to refresh the data in RPM.
	Create Resource Partition	Launches the Create Resource Partition process.
	Help	Offers context-sensitive help about the current page and opens the help viewer for further searching of the help contents.

Resource Partition Panels

The main window of the user interface includes the **Available Resource Partitions** panel and the **Active Resource Partitions** panel. The **Available Resource Partitions** panel contains inactive Resource Partitions that have been previously defined.

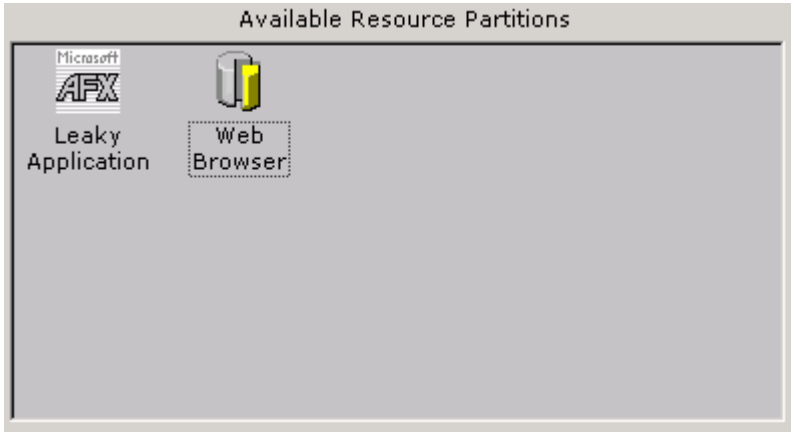

Figure 2-2: Available Resource Partitions

The **Active Resource Partitions** panel contains all Resource Partitions currently active on the server.

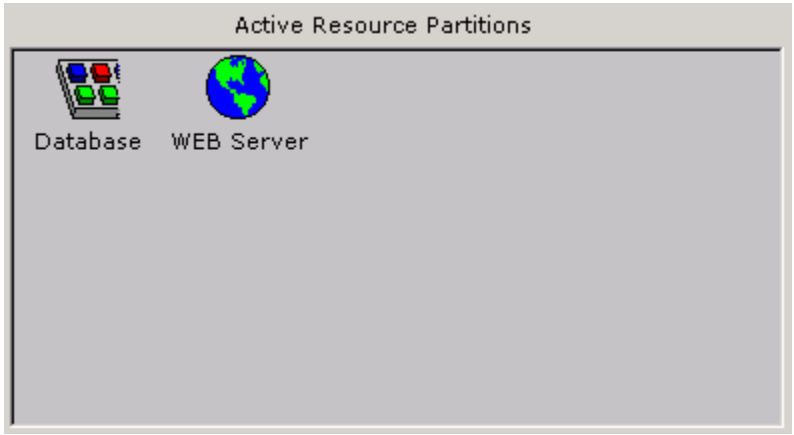

Figure 2-3: Active Resource Partitions

Processor and Memory Tabs

The bottom section of the main window displays processor and memory utilization and allocation graphs.

The **Processor Utilization** tab displays the current processor utilization for all system activity.

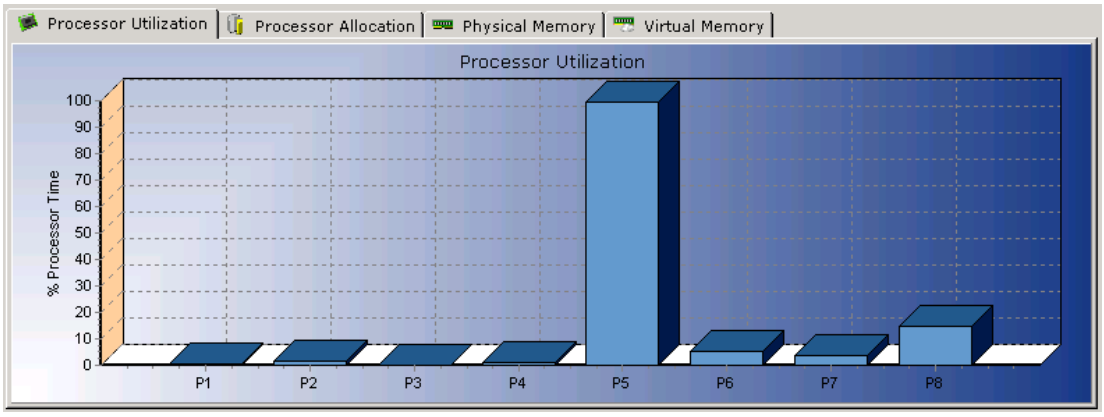

Figure 2-4: Processor Utilization

The **Processor Allocation** tab displays which processors are assigned to which partitions.

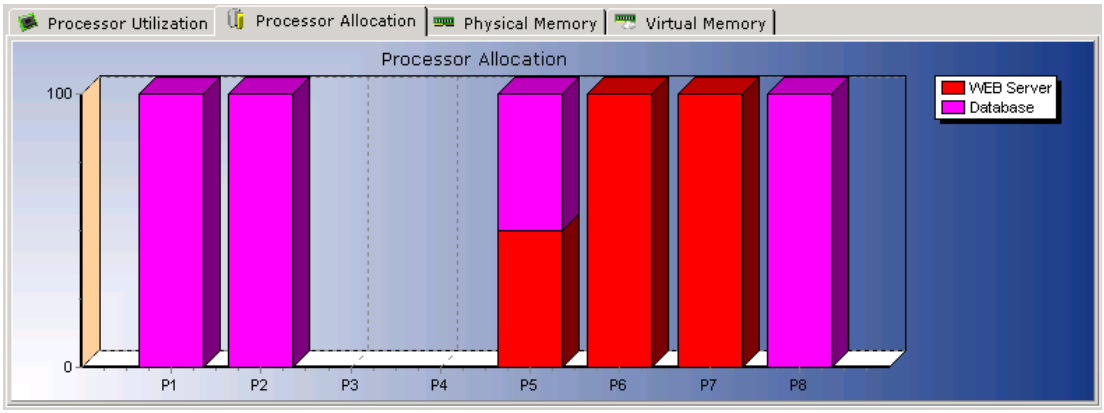

Figure 2-5: Processor Allocation

The **Physical Memory** tab displays the current amount of physical memory in use by each active Resource Partition.

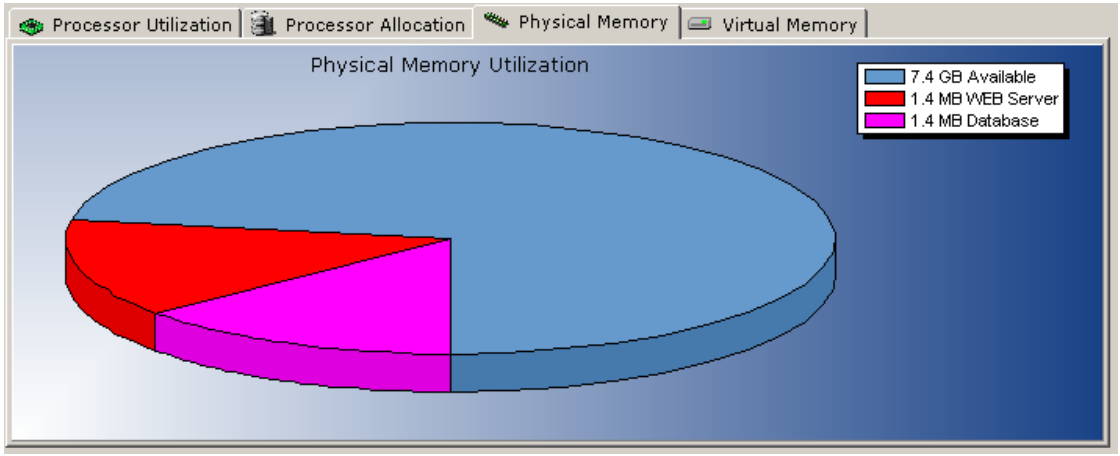

Figure 2-6: Physical Memory

The **Virtual Memory** tab displays the amount of virtual memory in use for each active Resource Partition.

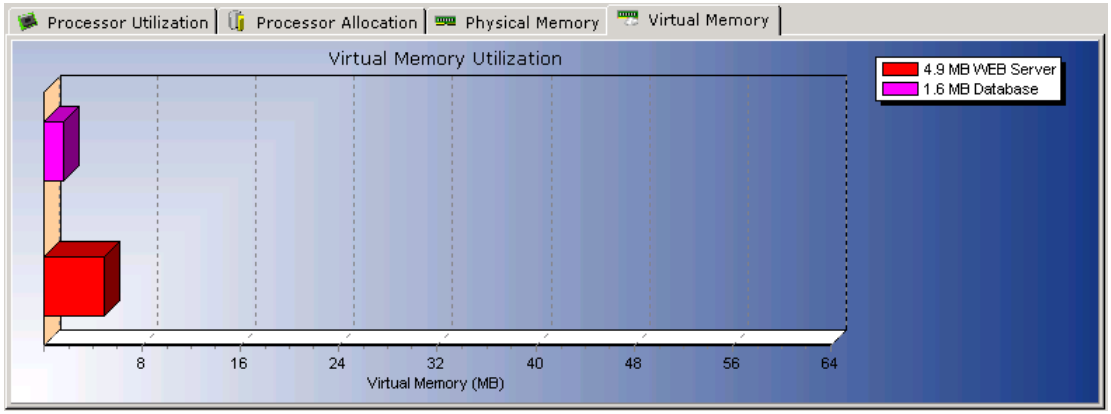

Figure 2-7: Virtual Memory

3

Using Resource Partitions

The core purpose of Resource Partitioning Manager is to contain processes within defined Resource Partitions and to have those processes obey the configured boundaries of their associated partitions. These boundaries are defined during the process of creating a Resource Partition.

Creating a Resource Partition

This section explains how to create a Resource Partition on a local system. For instructions on creating a Resource Partition on a remote system, refer to the "Using Resource Partitioning Manager on a Target Machine" section of this guide.

To create a Resource Partition on a local system:

1. Set the Resource Partition Properties by defining the processor and memory resources available to the partition.
2. Identify the Resource Partition Processes to be contained within the Resource Partition.
3. Create Resource Partition Rules to dynamically modify the processor and memory resources available to the partition based on resource utilization.

Each of these steps is described in detail in the following sections.

Resource Partition Properties

The first step in creating a Resource Partition is to set the basic properties for the partition. Click the **Create Resource Partition** icon on the toolbar or select **Partition, Create** from the main menu to launch the Resource Partition creation wizard. The **Resource Partition Properties** screen is displayed (refer to Figure 3-1).

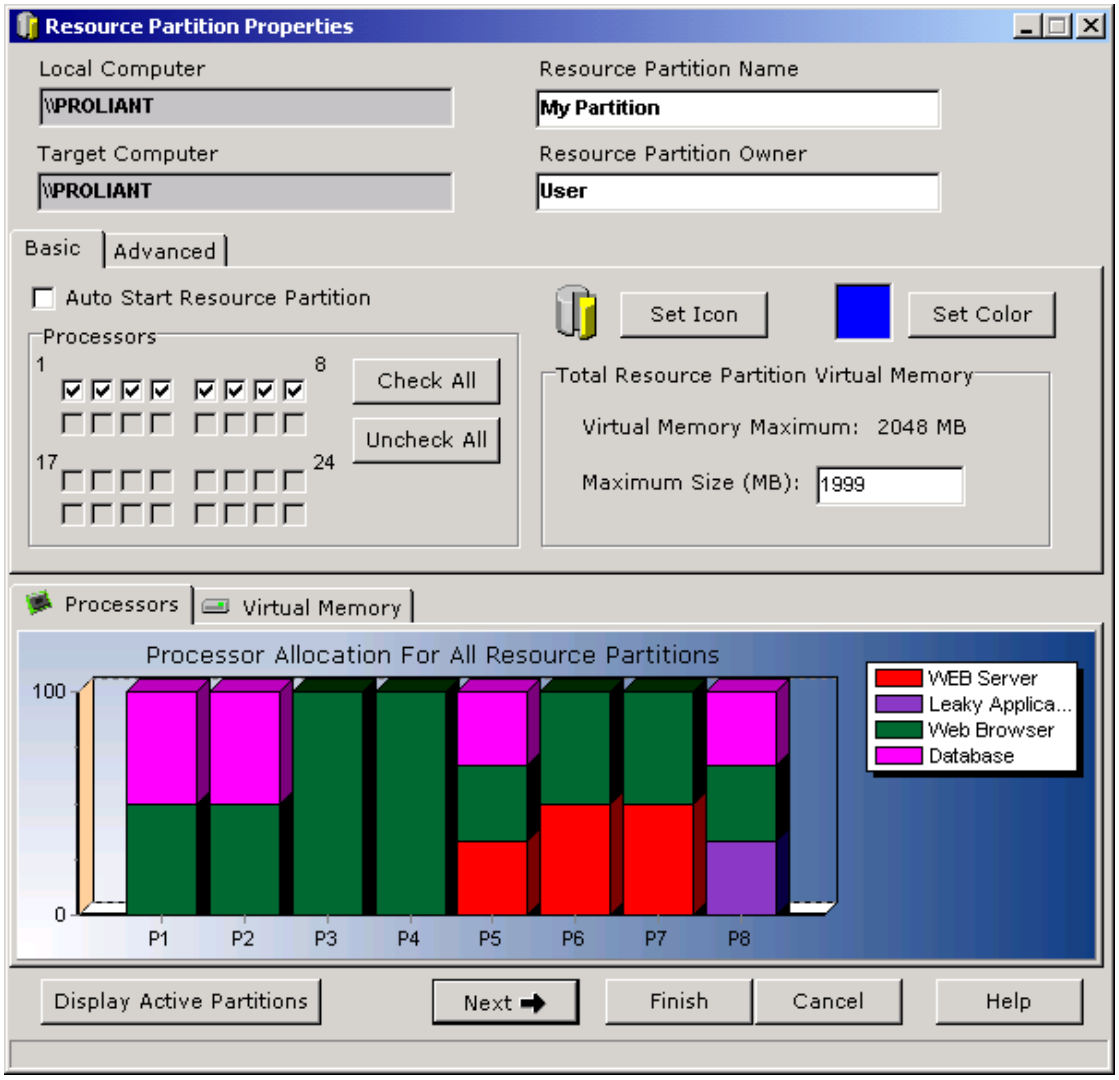

Figure 3-1: Resource Partition Properties (Basic tab view)

The **Resource Partition Properties** screen allows you to name a partition, assign an owner to the partition, define the basic processor and memory resources available to the partition, and assign other partition attributes to the target system.

To create a Resource Partition:

1. Enter a name for the partition in the **Resource Partition Name** field.

NOTE: The **Next** and **Finish** buttons will be disabled until you have named the Resource Partition.

2. If desired, enter text in the **Resource Partition Owner** field to assign an owner to the partition. This field can be used to associate the partition with a specific organizational entity or to provide additional information about the partition.
3. Select or unselect individual processors in the **Processors** area of the **Basic** tab to allocate processor resources to the Resource Partition.
   - — Selected boxes represent processors to be used by the current Resource Partition.
   - — White boxes represent other available processors.
   - — Gray boxes represent processors that are not physically present.

   When creating a new partition, RPM selects all available processors by default.
4. Select **Auto Start Resource Partition** to automatically activate the Resource Partition after subsequent server restarts.

NOTE: For information about how associated processes can be started when the Resource Partition is activated, refer to the "Adding an Active Process Using the Capture Method" section in this chapter.

To set the amount of total virtual memory available to a partition, enter the desired maximum value (in megabytes) in the **Maximum Size (MB)** field. A partition must be allocated a minimum of 16 MB of virtual memory, with the maximum possible value determined by the machine configuration (and displayed in the **Virtual Memory Maximum** field).

Processors Tab

The **Processors** tab graphs the number of Resource Partitions that are allocated to each processor. The allocation bars are color-coded by Resource Partition.

NOTE: A single processor can be assigned to multiple Resource Partitions; however, this may impact performance.

The **Display Active Partitions** button controls the display of the processor allocation chart. If you click the **Display Active Partitions** button, the chart shows only objects that are currently active, and the text on the button changes to **Display All Partitions.** If you click the **Display All Partitions** button, all objects (both active and inactive) are displayed.

Virtual Memory Tab

The **Virtual Memory** tab graphs the maximum virtual memory for each Resource Partition. The allocation bars are color-coded by Resource Partition.

The **Display Active Partitions** button controls the display of the processor allocation chart. If you click the **Display Active Partitions** button, the chart shows only objects that are currently active, and the text on the button changes to **Display All Partitions.** If you click the **Display All Partitions** button, all objects (both active and inactive) are displayed.

Advanced Features

To modify advanced features, click the **Advanced** tab, as shown in the following figure.

CAUTION: You must fully understand the implications of each of the settings on the **Advanced** tab before using them. Users unfamiliar with the significance of **Advanced** tab settings within the Windows 2000 operating system should avoid their use.

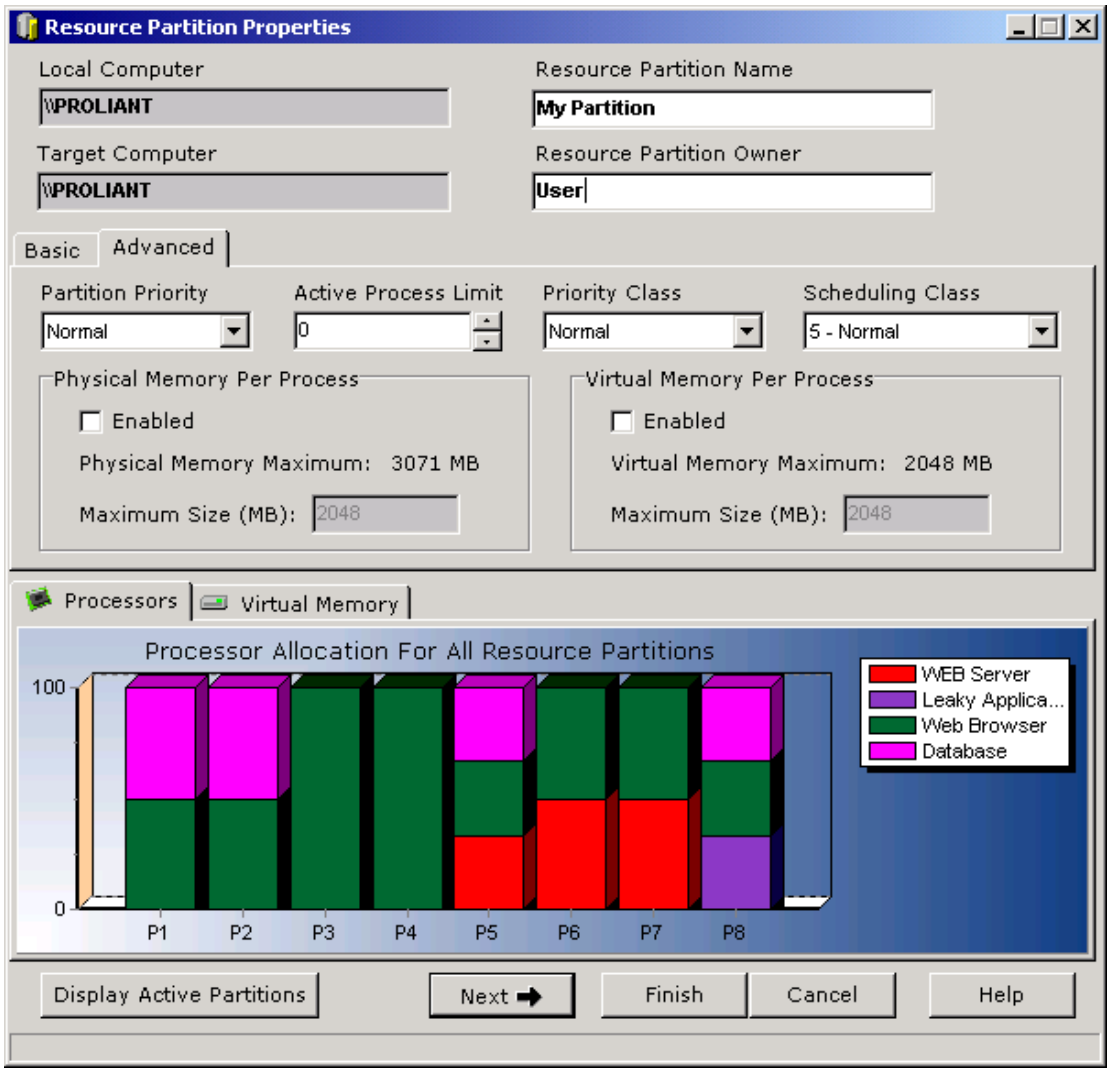

Figure 3-2: Resource Partition Properties (Advanced tab view)

- The **Partition Priority** field supports three levels of prioritization that can be assigned to a partition to guarantee that a lower priority partition does not use all system resources when higher priority partitions (tasks) are initiated. The default value is **Normal.**

- The **Active Process Limit** field sets the maximum number of processes that can be activated within a given Resource Partition. Windows 2000 will not start processes beyond this limit. Processes are activated in the same order as they were entered. The default value is zero. Leaving the **Active Process Limit** field at zero indicates that unlimited processes can be activated within a given Resource Partition.
- The **Priority Class** field sets the Windows 2000 priority class for all threads within each process in the Resource Partition. The default value is **Normal.**
- The **Scheduling Class** field sets the length of time allocated for all threads within each process in the Resource Partition. The default value is **5-Normal.**
- The **Physical Memory Per Process** section sets the maximum amount of physical memory available to any individual process contained within the Resource Partition. The entered amount cannot exceed the total physical memory shown.

NOTE: For both the **Physical** and **Virtual Memory Per Process** settings, the allocation is the same for each process in the Resource Partition. You cannot set a different limit for individual processes.

- The **Virtual Memory Per Process** section is the amount of virtual memory available to any individual process within the Resource Partition. The entered amount cannot exceed the total virtual memory shown.

NOTE: By default, each user process on the 32-bit version of Windows 2000 can have up to a 4-GB private address space, where 2 GB are allocated to the private address and the remaining 2 GB are used by the operating system. Microsoft Windows 2000 Advanced Server and Windows 2000 Datacenter Server support a boot-time option that allows 3-GB user address spaces. RPM automatically recognizes that the system is running in this configuration and adjusts the value for **Virtual Memory Maximum** accordingly.

After you finish reviewing the settings for Resource Partition Properties, click **Next.** The **Resource Partition Processes** screen is displayed (refer to Figure 3-3).

Resource Partition Processes

The following figure shows the **Resource Partition Processes** screen, which is the starting point for adding any process to a Resource Partition.

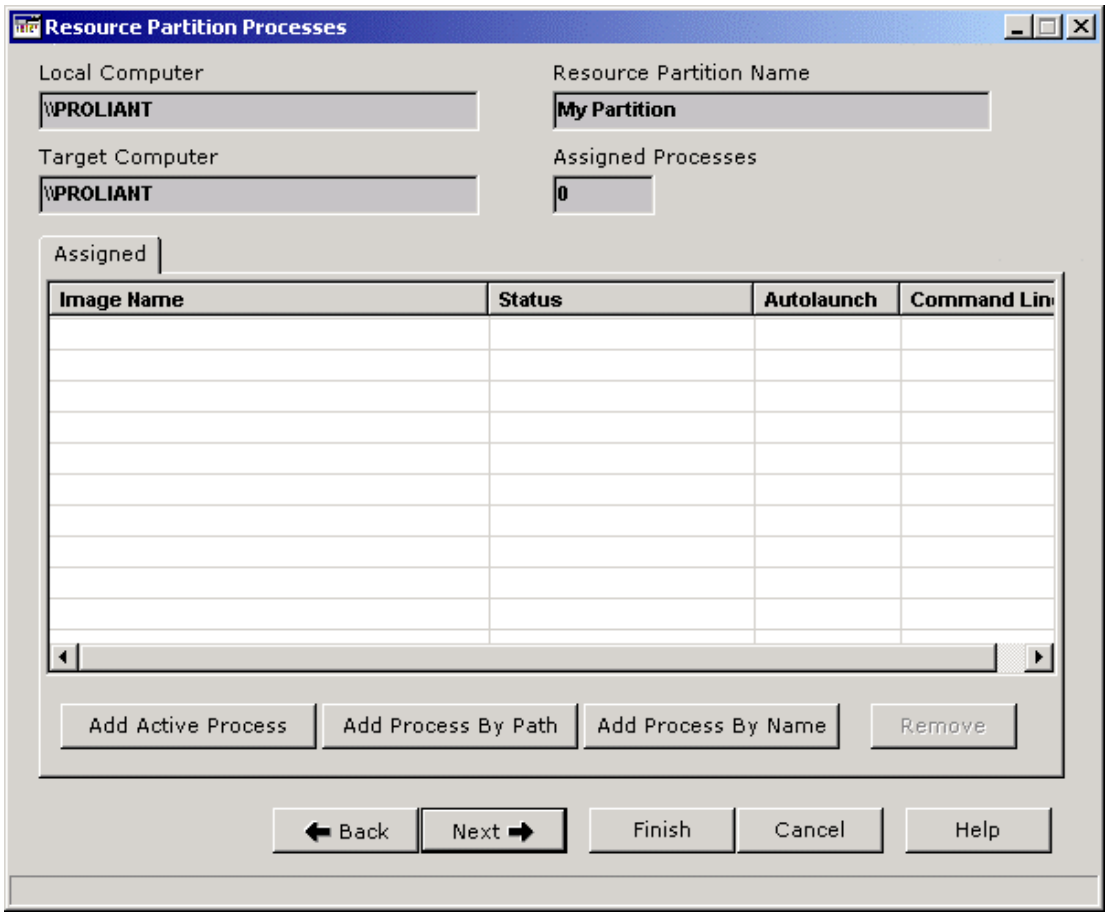

Figure 3-3: Resource Partition Processes

There are three methods for adding a process into a Resource Partition:

- **Add Active Process**—Captures the process information from a running process by selecting it from a Task Manager-style list.
- **Add Process By Path**—Indicates the exact file path (on your hard drive, for example) of an executable representing the process.
- **Add Process By Name**—Indicates the image name that the process will run under when executed. The image name of a process can be viewed under Task Manager when that process is active.

The following sections explain each method in more detail.

Adding an Active Process Using the Capture Method

The capture method provides a simple way to add a running process to the Resource Partition.

From the **Resource Partition Processes** screen (refer to Figure 3-3), click the **Add Active Process** button. The **Add Active Process** screen is displayed.

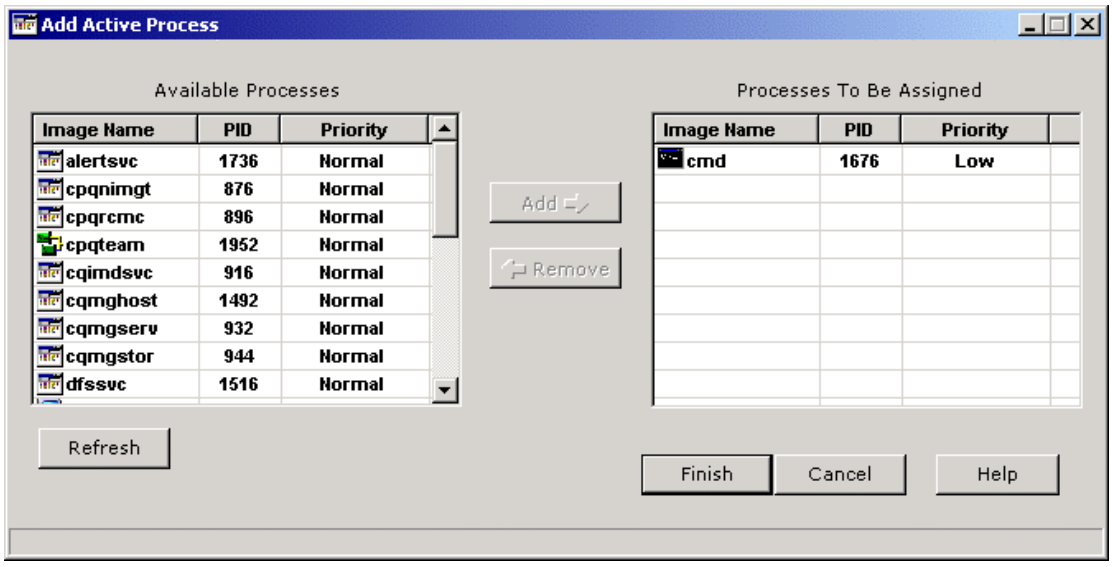

Figure 3-4: Add Active Process

This screen displays two list boxes. The left list box shows all processes running on the system, with the exception of certain system and kernel processes that are excluded to avoid potential conflict issues.

To capture a process within the Resource Partition, double-click the target image name in the left list box to move it to the **Processes To Be Assigned** list on the right, or highlight the target image name and click **Add.**

CAUTION: Adding a running process to a Resource Partition will result in that process being terminated if the partition is later deactivated.

Adding a Process Using the Executable Path Method

With the executable path method, a new process can be added to the Resource Partition by pointing to the location of the executable file that is associated with the process.

From the **Resource Partition Processes** screen, click **Add Process By Path.** When the **Add Process By Path** screen is displayed, enter the path directly or click the **Browse** button to browse to the target executable file.

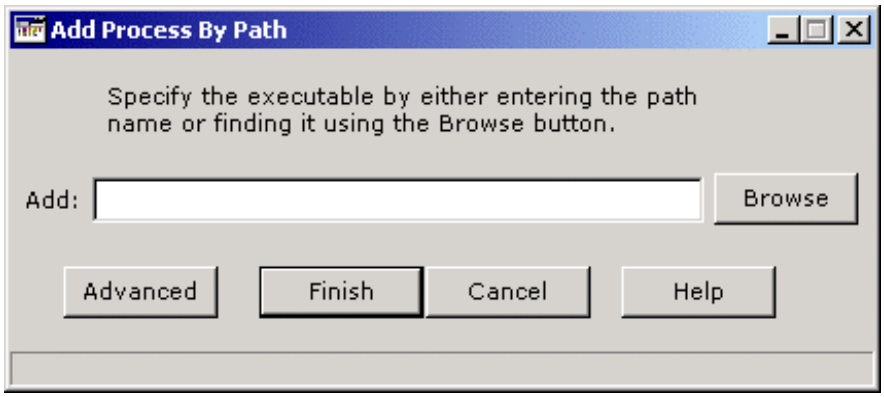

Figure 3-5: Add Process By Path

For processes specified using the executable path method, two additional options are available under the **Advanced** button, as shown in the following figure.

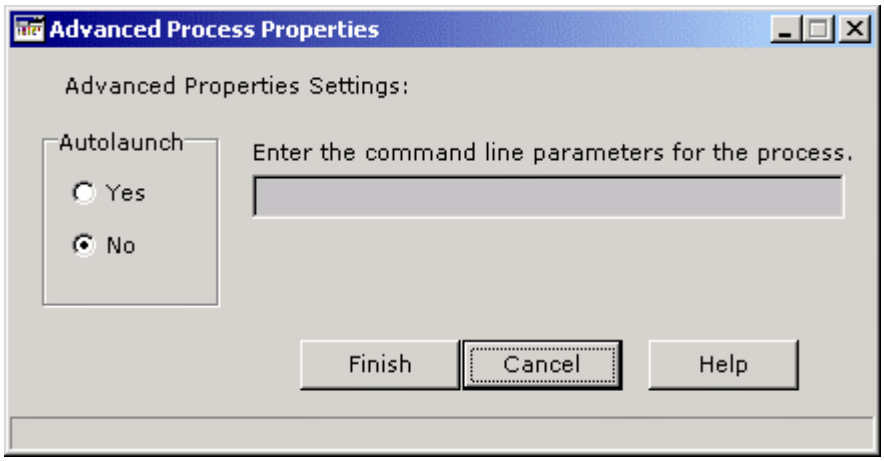

Figure 3-6: Advanced Process Properties

- **Autolaunch**—The default is set to **No.** If **Autolaunch** is set to **Yes,** RPM attempts to launch this process whenever the associated Resource Partition is activated.

CAUTION: Using the **Autolaunch** feature, RPM can be configured to launch a process or processes whenever the Resource Partition is activated, rather than waiting for the process to become active. This setting can be beneficial in certain situations, such as when using RPM to launch a process on a remote system over a network (refer to "Using Resource Partitioning Manager on a Target Machine" in this guide.) However, using the **Autolaunch** feature can cause unexpected behavior changes in certain applications, as well as require a change in the methods already used to launch applications on the system. For these reasons, HP recommends that **Autolaunch** be set to **No** for general system use. Also, RPM cannot launch system services and some other processes due to requirements of the Windows 2000 operating system. To manage these services with RPM, assign them to a Resource Partition by means of the capture method.

- **Command line parameters**—Enter the command line parameters for processes that are launched automatically.

After you specify the path name, click **Finish** to save the changes. The newly added process will appear in the **Assigned** processes list on the **Resource Partition Processes** screen.

NOTE: RPM can be used to specify processes for executables accessed over a network. However, these executables must be accessible by means of a previously configured network share drive.

Adding a Process Using the Image Name Method

With the image name method, a new process is specified by the image name it runs under (as displayed in Task Manager). This method is useful where multiple instances of a specific application may be running on the same system and may not be identifiable by the executable path. This method allows the user to indicate an image name for a specific instance of an application.

To begin this method, click **Add Process By Name** on the **Resource Partition Processes** screen.

When the **Add Process By Name** dialog box is displayed, enter the exact image name that the process runs under and click **Finish,** as shown in the following figure.

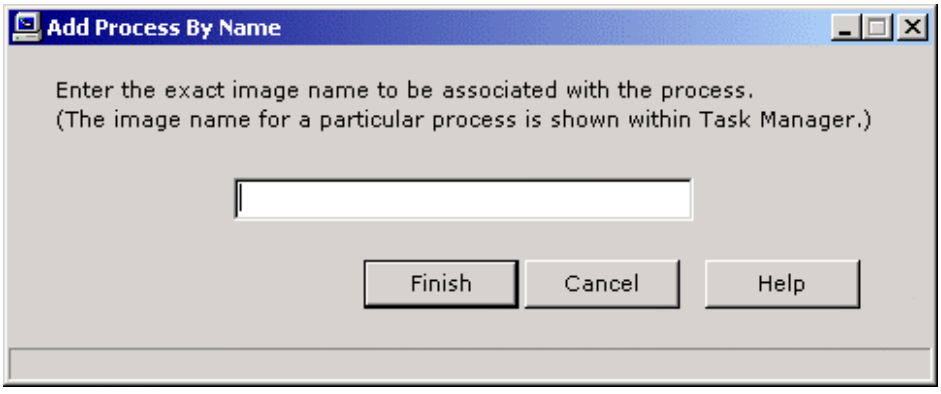

Figure 3-7: Add Process By Name

Processes Screen

After creating the partitions, you can view the processes assigned to each partition through the **Resource Partition Processes** screen. Two different process views are available: **Assigned** and **Active.** Available Resource Partitions contain assigned processes. Active Resource Partitions show both assigned and active processes.

Assigned Tab

To view a list of processes that have been assigned to a Resource Partition, click the **Assigned** tab. The following figure shows an example of this view, which is the default view for the **Resource Partition Processes** screen.

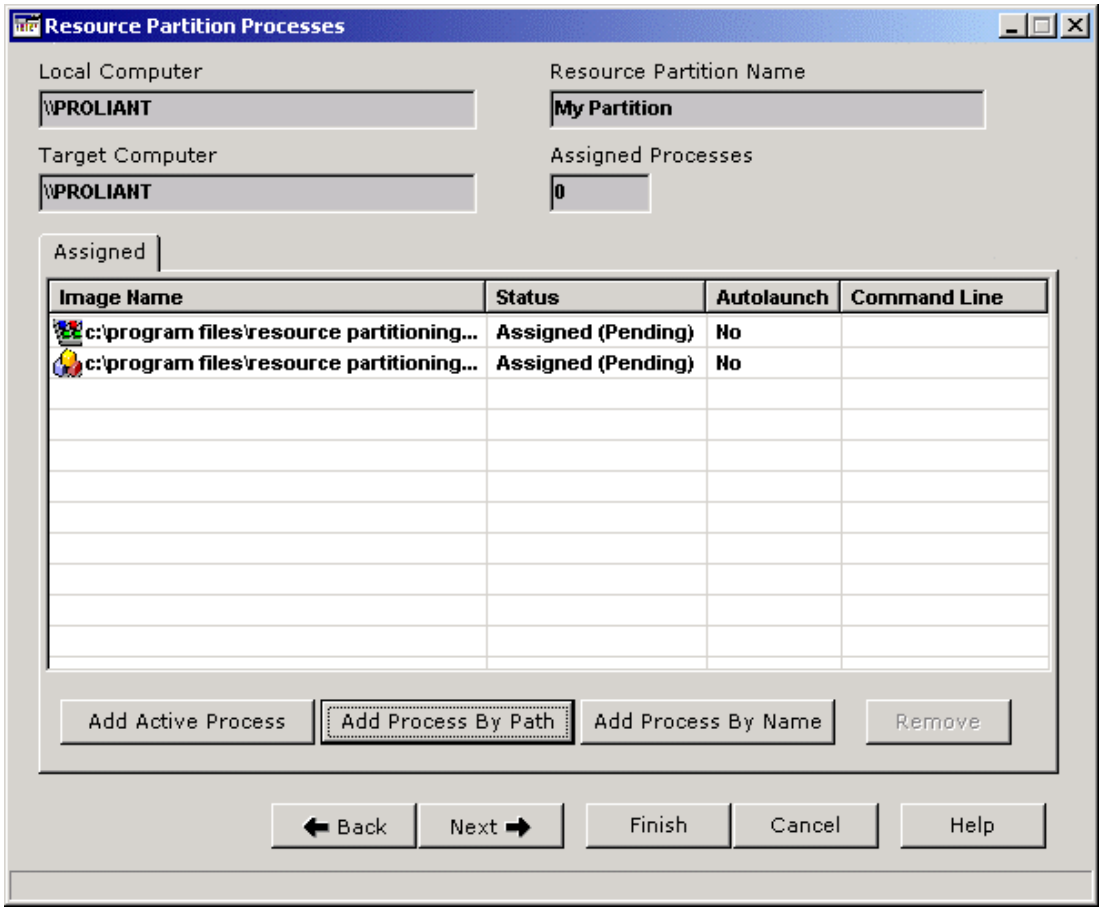

Figure 3-8: Resource Partition Processes (Assigned tab view)

The following information is provided about each assigned process:

- **Image Name**—The image name of the process (also shown in Task Manager).
- **Status**—The current assignment status of this process.
  - — If the status is **Assigned,** the process is currently assigned to this partition.
  - — If the status is **Assigned (Pending),** the process has been selected for assignment to this partition but is pending until the **Finish** button is clicked.
  - — If the status is **Removed (Pending),** the process has been selected for removal from this partition but is pending until the **Finish** button is clicked.
- **Autolaunch**—Processes that are specified using the executable path method can be configured to automatically launch.
  - — If **Autolaunch** is set to **Yes,** RPM attempts to launch this process when the Resource Partition is started.
  - — If **Autolaunch** is set to **No,** starting the partition does not launch the process. Instead, the process is "pulled into" the partition whenever the process and the partition are both active.
  - — If **Autolaunch** is set to **N/A,** the process cannot be configured to automatically launch.
- **Command Line**—Shows any command line parameters configured for this partition.

Active Tab

The **Active** tab displays those processes that are running within the Resource Partition when it is active, including those processes that are called from the assigned process. The following figure shows an example of this view.

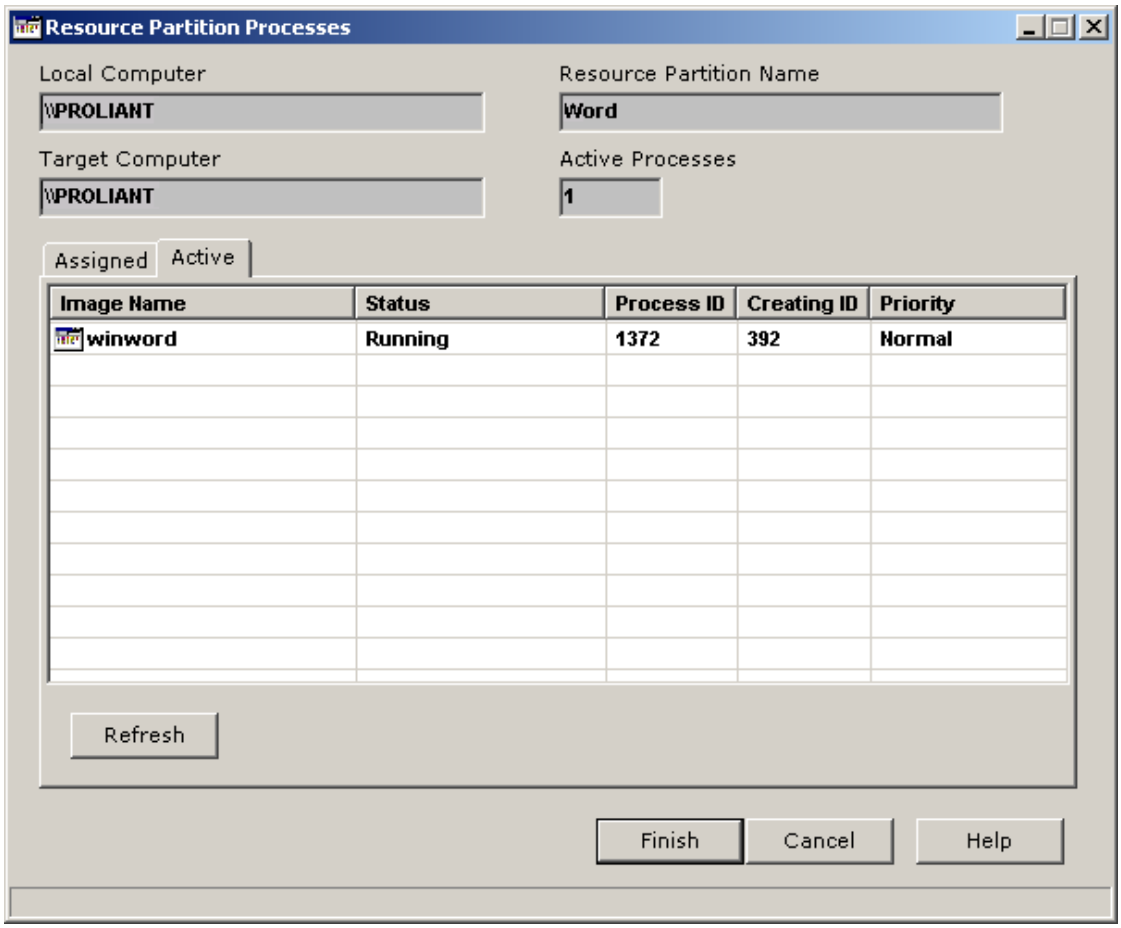

Figure 3-9: Resource Partition Processes (Active tab view)

The following information is provided about each process:

- **Image Name**—The image name of the process (also shown in Task Manager)
- **Status**—The current status of this process (in the **Active** tab, this is usually **Running**)
- **Process ID**—The process identifier for the process
- **Creating ID**—The creation identifier for the process
- **Priority**—The priority class setting for the process

Click the **Refresh** button to update the information in the process list.

Additional Notes on Processes

To add more processes, repeat the steps for the desired method. Processes will be shown on the **Assigned** tab of the **Resource Partition Processes** screen as they are added to the Resource Partition.

To remove a process from a partition, select the process image name in the list view under the **Assigned** tab and click **Remove.** You can remove processes from both available and active Resource Partitions.

After all desired processes are assigned to the partition, click **Next** to set the rules for the newly created Resource Partition, or click **Finish** to save the Resource Partition and return to the main screen.

Resource Partition Rules

After a process has been assigned to a Resource Partition, rules can be associated with that Resource Partition, enabling RPM to dynamically reallocate processors and memory.

The **Resource Partition Rules** screen enables you to modify these four types of rules:

- Processor
- Memory
- Time
- Event

Processor and memory rules dynamically adjust the resource allocations of a partition from the initial settings defined on the **Resource Partitions Properties** screen, in order to optimize system performance. When a Resource Partition is activated for the first time, the initially allocated processors and memory are used. Thereafter, the rules take precedence over the initial settings.

Each type of rule is described in more detail in the following sections.

Processors Tab

The following two processor rules are available, as shown in Figure 3-10. These rules are independent of each other and can be in effect at the same time. Processors are added and removed one at a time.

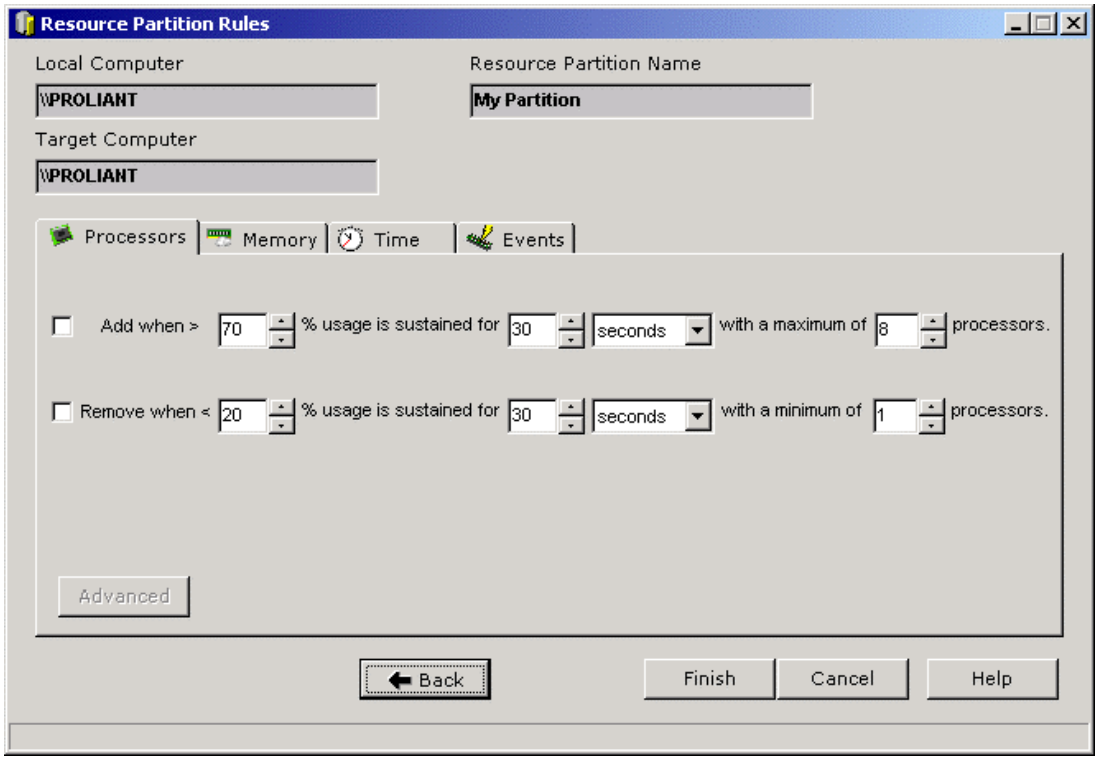

Figure 3-10: Resource Partition Rules (Processor tab view)

- **Add when**—When this rule is enabled, available processors are dynamically allocated to the Resource Partition as the preset rule conditions occur. The rule remains active as long as the Resource Partition is active or until the maximum number of processors is reached.
- **Remove when**—When this rule is enabled, processors are dynamically removed from the Resource Partition as the preset rule conditions occur. The rule remains active as long as the Resource Partition is active or until the minimum number of processors is reached.

To enable or disable a processor rule, select the check box at the left of the rule.

For the most efficient use of resources, enable both rules for the partition. This ensures that processors added to the Resource Partition during periods of high processor usage will then be released back to the system when utilization decreases.

In some cases, it may be advantageous to control the order in which processors are added or removed by the rules. RPM provides this control through the **Advanced Processor Rules Settings** screen shown in the following figure.

To reach this screen, click **Advanced** on the **Processor Rules** screen.

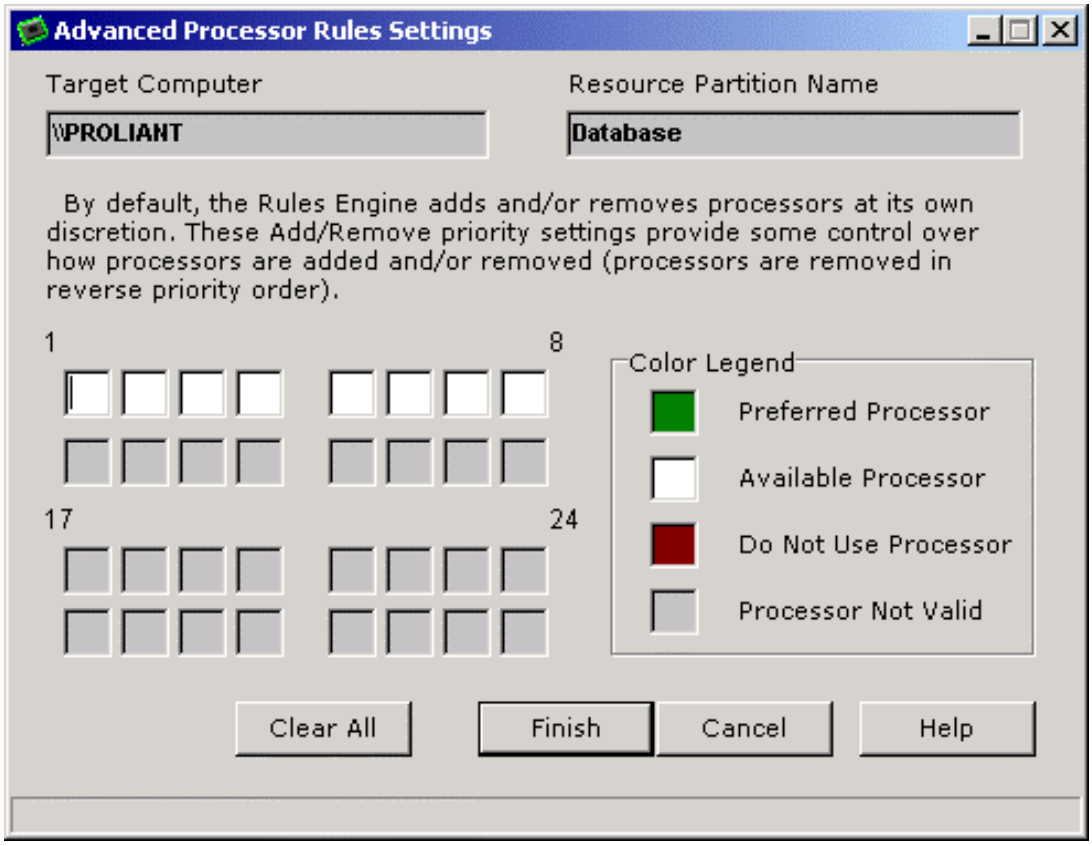

Figure 3-11: Advanced Processor Rules Settings

Clicking a processor box cycles through the processor prioritization classifications, as indicated by the color legend. A processor already allocated to the Resource Partition cannot be set to **Do Not Use,** nor can a processor set to **Do Not Use** be allocated to the partition from the **Resource Partition Properties** screen.

The rules engine reviews the priority settings of each processor before adding or removing a processor to or from the Resource Partition.

- If an **Add Processor** rule is triggered, the Rules Engine scans for a **Preferred Processor** not currently allocated to the Resource Partition and assigns it to the partition. If no **Preferred Processors** are found, the Rules Engine scans for **Available Processors** not currently allocated. Processors marked **Do Not Use** are never added.
- If a **Remove Processor** rule is triggered, processors are removed in reverse order.

Memory Tab

The following two memory rules are available, as shown in Figure 3-12.

NOTE: Memory is added and removed in 16-MB increments.

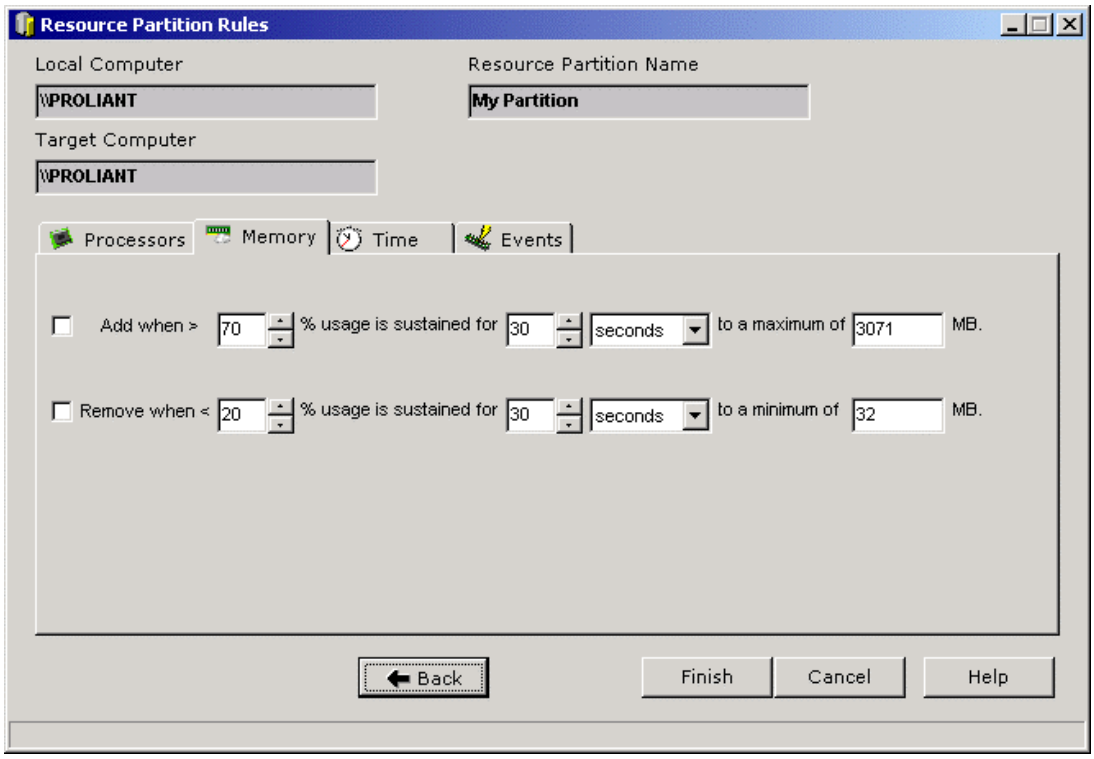

Figure 3-12: Resource Partition Rules (Memory tab view)

- **Add when**—When this rule is enabled, a set amount of memory is dynamically allocated to the Resource Partition as the preset rule conditions occur. The rule remains active as long as the Resource Partition is active or until the maximum amount of memory is reached.
- **Remove when**—When this rule is enabled, a set amount of memory is dynamically removed from the Resource Partition as the preset rule conditions occur. The rule remains active as long as the Resource Partition is active or until the minimum amount of memory is reached.

To enable or disable a memory rule, select the check box at the left of the rule.

For the most efficient use of resources, enable both rules for the partition. This ensures that memory added to the Resource Partition during periods of high memory usage are released back to the system when utilization decreases.

Time Tab

The following time rules are available, as shown in Figure 3-13.

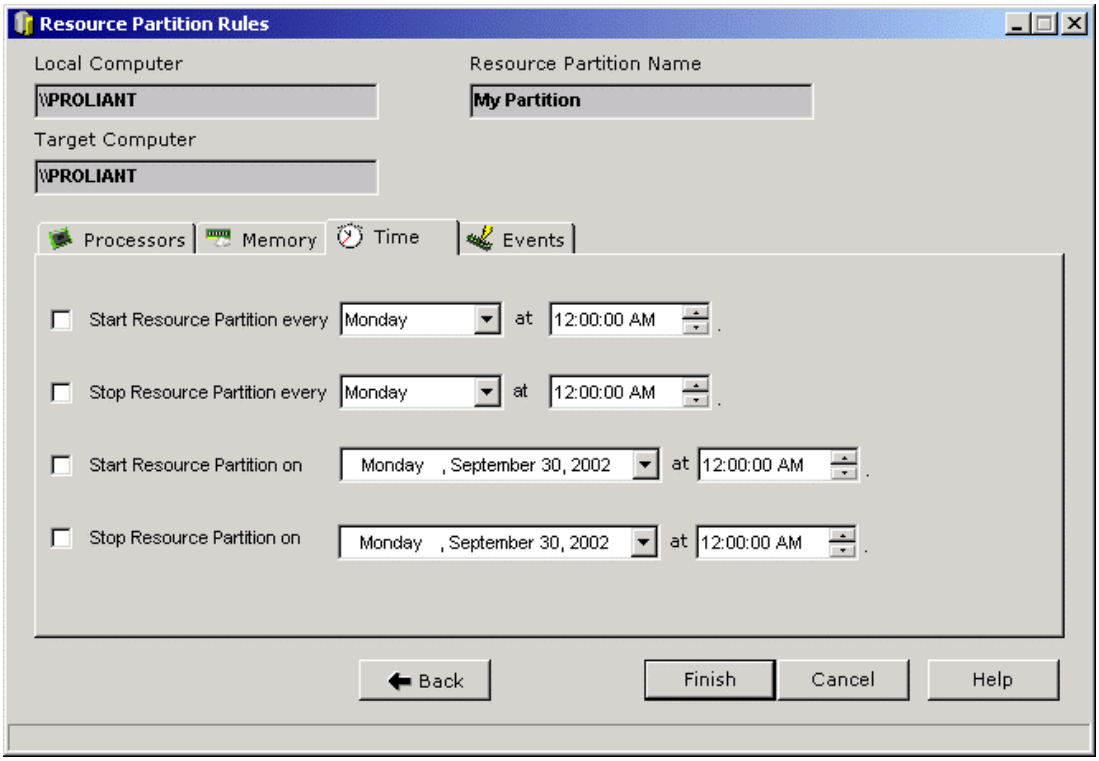

Figure 3-13: Resource Partition Rules (Time tab view)

- **Start Resource Partition every**—When this rule is enabled, the Resource Partition is scheduled to start at regular intervals.
- **Stop Resource Partition every**—When this rule is enabled, the Resource Partition is scheduled to stop at regular intervals.
- **Start Resource Partition on**—When this rule is enabled, the Resource Partition is scheduled to start at a particular time.
- **Stop Resource Partition on**—When this rule is enabled, the Resource Partition is scheduled to stop at a particular time.

To enable or disable a time rule, select the check box at the left of the rule.

Events Tab

The following event rules are available, as shown in Figure 3-14.

NOTE: Percent usage is specified in one-percent increments.

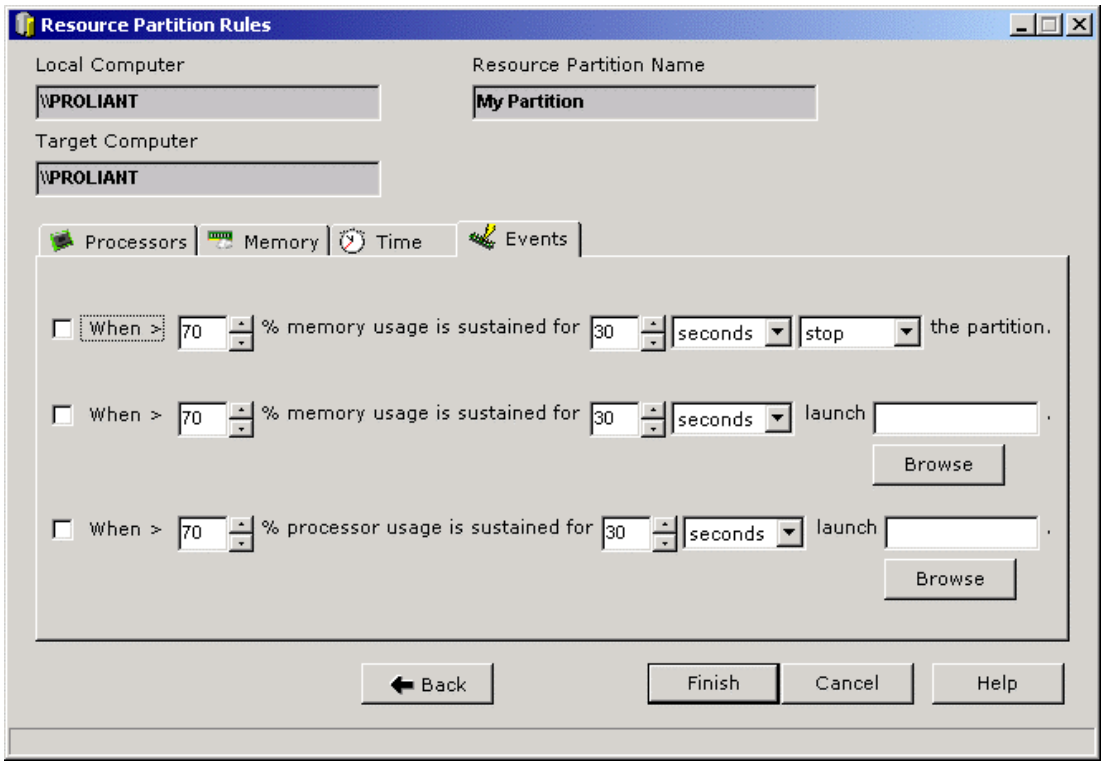

Figure 3-14: Resource Partition Rules (Events tab view)

- **Partition stop/restart rule**—When this rule is enabled, if memory usage exceeds a set percentage for a set period of time, the partition stops or restarts. This rule is useful for stopping non-essential applications that are "leaking" memory.
- **Launch on memory utilization level rule**—When this rule is enabled, if memory usage exceeds a set percentage for a set period of time, RPM launches a user-specified process or command file. For instance, you might set RPM to launch a program to clean up the memory or to run a batch file to page you when the set memory usage is exceeded.
- **Launch on processor utilization level rule**—When this rule is enabled, if processor utilization exceeds a set percentage for a set period of time, RPM launches the user-specified process or command file. For instance, you might set the rule to remove low priority applications when the set processor usage is exceeded.

NOTE: If you want the application that is launched by these rules to be captured and to run in a partition, you must add the application to the processes page for the partition.

To enable or disable an event rule, select the check box at the left of the rule.

Applying Rules

Click **Finish** to apply the rules, or click **Cancel** to proceed without applying the rules.

RPM returns to the main screen with the newly created Resource Partition displayed in the **Available Resource Partitions** screen, as shown in the following figure.

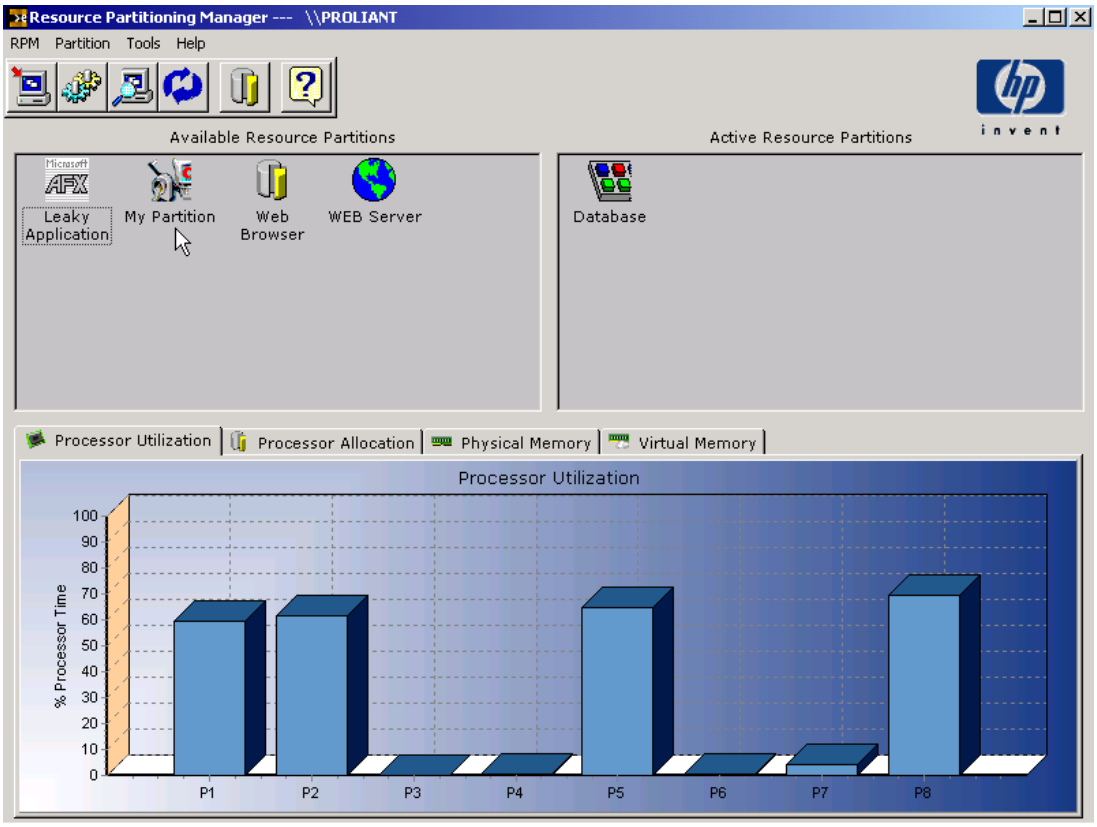

Figure 3-15: Main Screen with an available Resource Partition

Capturing a Non-RPM Job Object

Some applications can create job objects outside of Resource Partitioning Manager. To ensure that the allocation of all system resources is monitored, RPM has the ability to capture these non-RPM job objects in a Resource Partition.

To capture a non-RPM job object:

1. Select **Partition** on the menu bar.
2. Select **Capture.** The **Capture Non-RPM Job Object** screen is displayed.

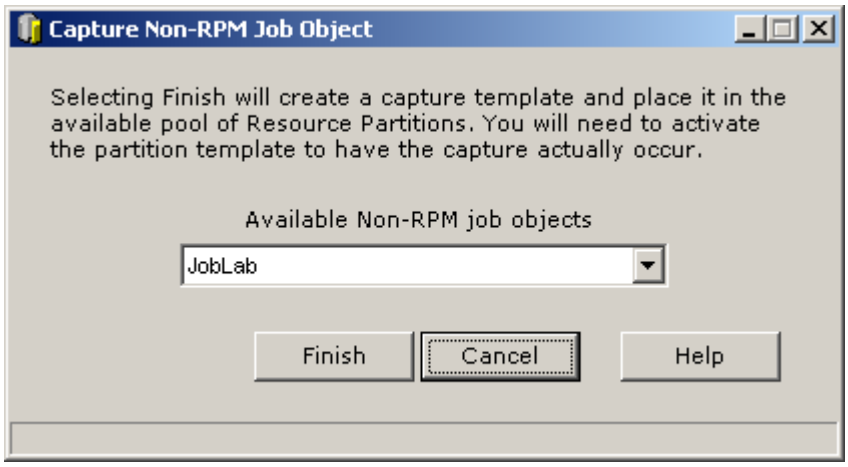

Figure 3-16: Capturing a non-RPM job object

3. Select a non-RPM job object from the drop-down menu.
4. Select **Finish.** RPM creates a new Resource Partition for the job object you selected. The new partition appears in the **Available Resource Partitions** panel of the main RPM window.

NOTE: You can modify the properties and rules for a non-RPM partition, but you cannot add or remove processes.

5. To activate the new partition, drag it from the **Available Resource Partitions** panel to the **Active Resource Partitions** panel.

   To deactivate the partition, drag it from the **Active Resource Partitions** panel to the **Available Resource Partitions** panel.

NOTE: Unlike regular Resource Partitions, moving a partition created from a non-RPM job object from the **Active Resource Partitions** panel to the **Available Resource Partitions** panel does not terminate the processes in the partition.

Managing Resource Partitions

In addition to creating Resource Partitions, RPM enables you to activate partitions, activate processes inside partitions, change the configuration of available and active partitions, and use the RPM service on remote machines or in clustered environments.

Activating a Resource Partition

To activate one of the available Resource Partitions, drag its icon into the **Active Resource Partitions** screen or right-click the **Partition** icon and click **Start** (refer to the following figure).

NOTE: Associated processes may or may not be activated when a Resource Partition is activated. For more information, refer to the following section, “Activating Processes Inside Resource Partitions.”

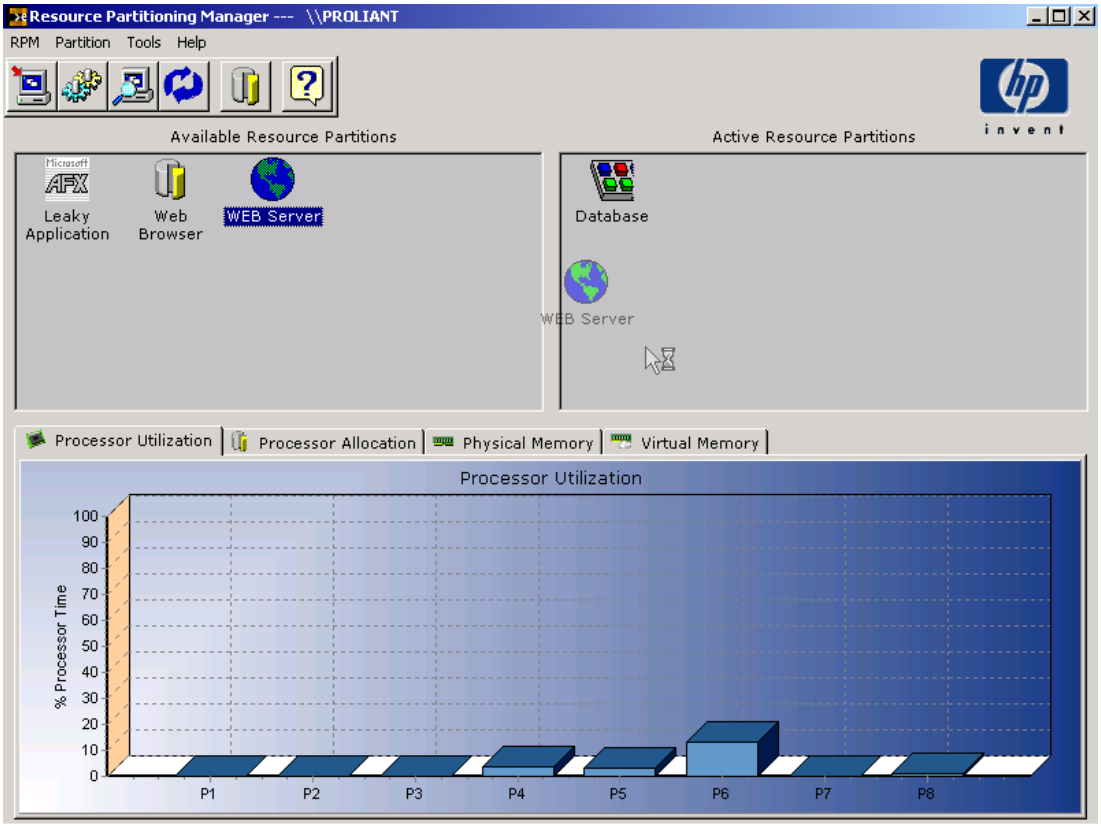

Figure 3-17: Activating a new Resource Partition

Deactivating a Resource Partition

To deactivate a Resource Partition, drag the icon back to the **Available Resource Partitions** screen or right-click the partition icon and click **Stop.** Deactivating the partition produces an error message as shown in Figure 3-18.

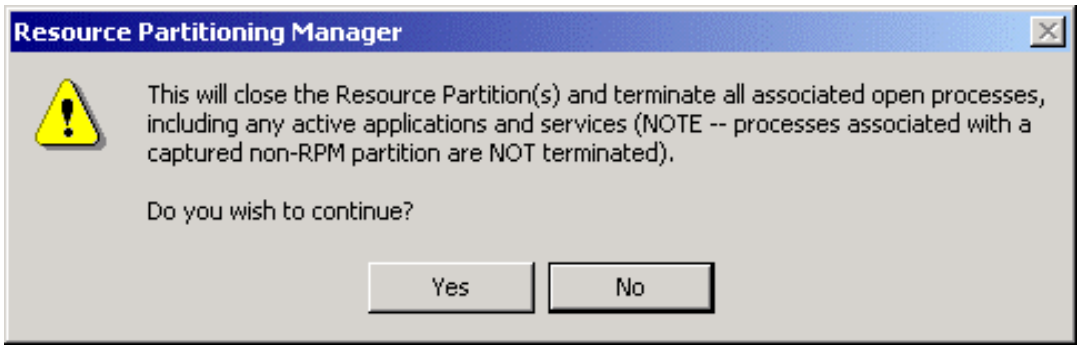

Figure 3-18: Deactivation warning

CAUTION: Deactivating a Resource Partition forcefully terminates all applications. This action initiates an abnormal application shutdown and could lead to a loss of data.

Activating Processes Inside Resource Partitions

RPM is primarily designed to provide process management capabilities (using Resource Partitions) without requiring changes to typical application startup procedures. Thus, the preferred method for managing a process is as follows:

1. A Resource Partition is configured to include a process by specifying the image name directly or by capturing it while the process is active (refer to the "Resource Partition Processes" section of this chapter).
2. The Resource Partition is activated, either automatically using the **Autostart Resource Partition** check box or manually by means of the RPM GUI.
3. RPM waits for the process to become active. When the process is activated, RPM automatically pulls the process into the boundaries of the Resource Partition.

No overhead is consumed by an active Resource Partition that is waiting for a process to become active.

Using the **Autolaunch** feature (available when adding a process using the executable path method), RPM can be configured to launch a process or processes whenever the Resource Partition is activated, rather than waiting for the process to become active.

However, using the **Autolaunch** feature may require changes in the methods already used to launch applications on the system, or can cause unexpected behavior changes in certain applications. For these reasons, HP recommends that **Autolaunch** be set to **No** for most situations.

Changing the Configuration of an Available Resource Partition

To change the configuration of an available Resource Partition, right-click the **Resource Partition** icon in the **Available Resource Partitions** screen. A list of configuration options is displayed, as shown in the following figure.

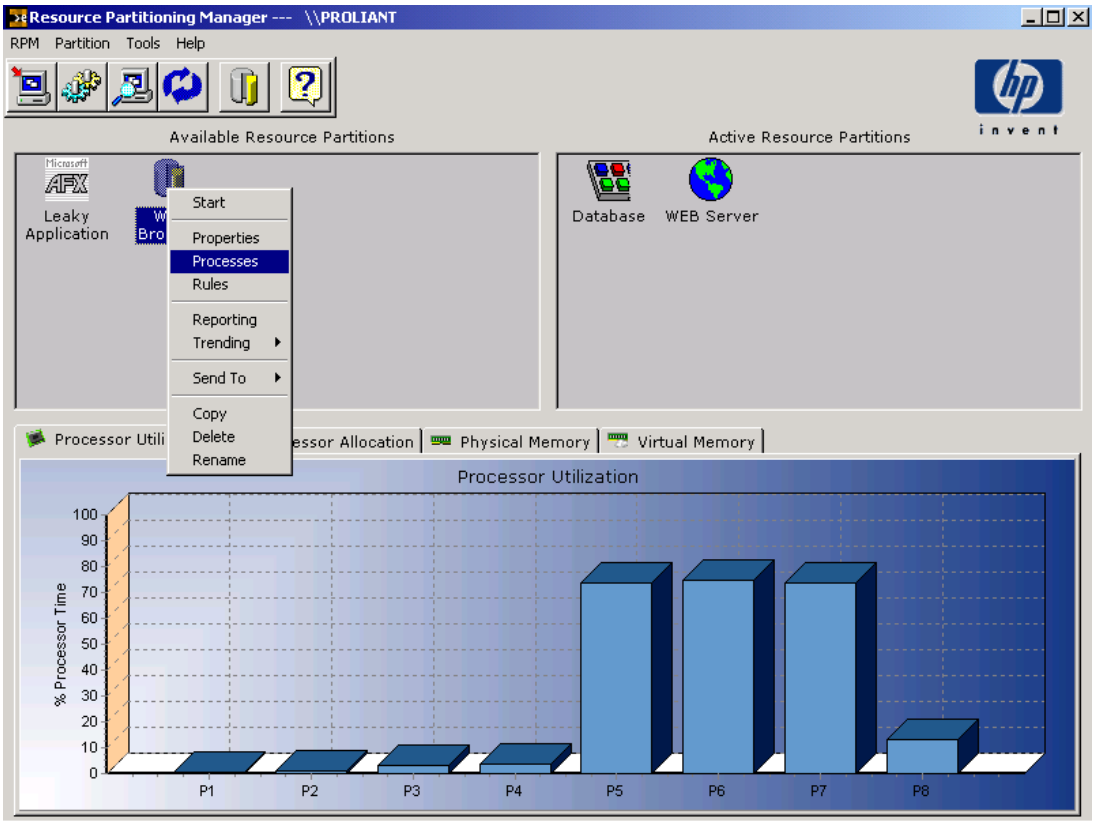

Figure 3-19: Changing the configuration of an available Resource Partition

The following options are available:

- **Start**—Activates the selected Resource Partition.
- **Properties**—Displays the **Resource Partition Properties** screen and enables editing of properties of the Resource Partition.
- **Processes**—Displays the **Resource Partition Processes** screen and enables editing of the process list. When viewing the process list in editing mode, right-click a process to remove it or double-click the process name to edit the advanced properties.
- **Rules**—Displays the **Resource Partition Rules** screen and enables editing of the rules.
- **Reporting**—Displays the **Reporting Preferences** screen and enables creation of reports.
- **Trending**—Displays options to enable or view trending data.
- **Send to**—Enables you to export partitions to a file or to a target machine.

- **Copy**—Creates a new Resource Partition with the same properties, processes, and rules as the selected Resource Partition.
- **Delete**—Deletes the selected Resource Partition.
- **Rename**—Renames the selected Resource Partition.

Changing the Configuration of an Active Resource Partition

To change the configuration of an active Resource Partition, right-click the **Resource Partition** icon in the **Active Resource Partitions** screen, as shown in the following figure.

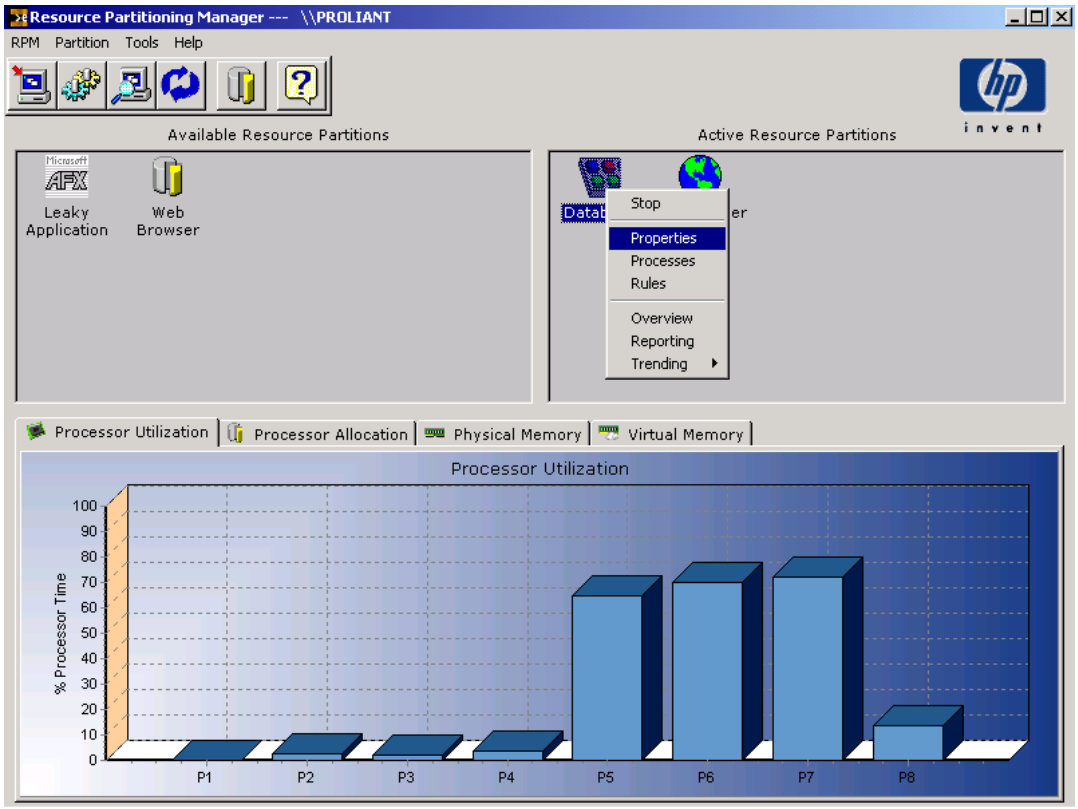

Figure 3-20: Changing the Configuration of an active Resource Partition

The following configuration options are available:

- **Stop**—Deactivates the selected Resource Partition.
- **Properties**—Displays the **Resource Partition Properties** screen and enables editing of general Resource Partition properties.
- **Processes**—Displays the **Resource Partition Processes** screen and enables editing of the process list.
- **Rules**—Displays the **Resource Partition Rules** screen and enables editing of the rules.

- **Overview**—Displays the **Resource Partition Overview** screen, which shows processor, memory, and I/O information for the selected Resource Partition.
- **Reporting**—Displays the **Reporting Preferences** screen and enables creation of reports.
- **Trending**—Displays options to enable or view trending data.

IMPORTANT: You cannot **Copy, Delete,** or **Rename** a Resource Partition while it is in the **Active Resource Partitions** screen.

Using Resource Partitioning Manager on a Target Machine

RPM provides a method for managing resources on other systems on the network that are running RPM.

NOTE: RPM can provide data for any remote Microsoft Windows 2000 Server system to which the user has administrator level access.

1. Click the **Select Target Computer** icon, as shown in the following figure, or select **RPM, Select Computer** from the menu bar.

Figure 3-21: Selecting a computer

The **Select Target Machine** dialog box opens, as shown in the following figure.

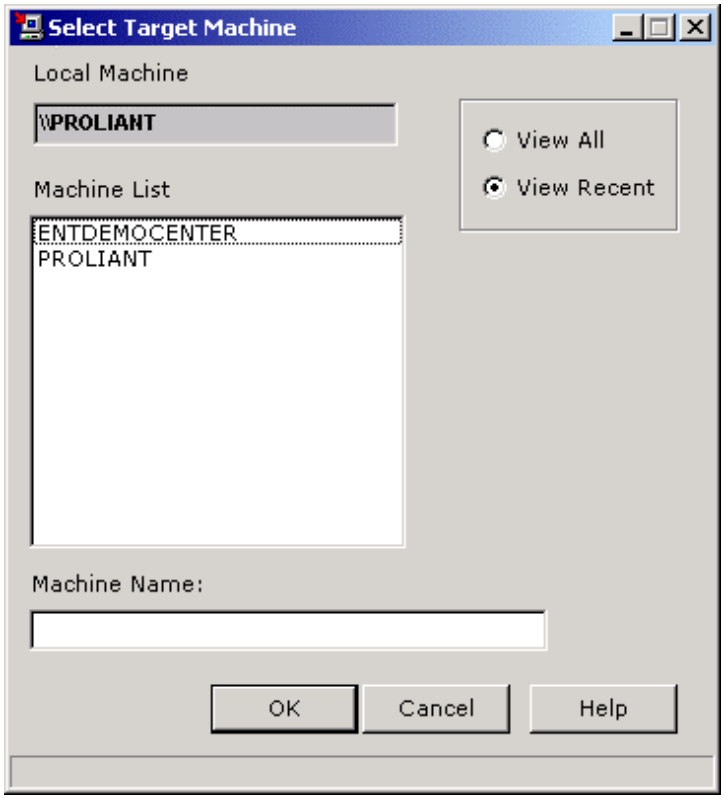

Figure 3-22: Selecting a target machine

2. Enter a computer name in the **Machine Name** field, or select a machine from the **Machine List** pane:
   - To view a list of all available systems in your workgroup or domain, select **View All** or specify the path.
   - To view recently accessed systems, select **View Recent.**
3. Click **OK** to access the target machine.
4. After accessing the target machine, follow the instructions in the "Creating a Resource Partition" section of this chapter. The partition on the target can be operated or maintained in the same manner as a partition on a local machine.

IMPORTANT: If a single server is managed simultaneously by two RPM GUIs—one local and one remote—GUI synchronization issues may result. For example, if the GUI is left running on the server, and an administrator uses a GUI remotely to delete a Resource Partition, that change will not be automatically reflected on the RPM GUI running on the server. To update the information in RPM, click **Refresh** on the main toolbar.

Clustering Support for Resource Partitioning Manager

RPM can be successfully used in a clustered environment without interfering with normal cluster operations.

NOTE: Refer to “Using the RPM Scripting Interface” in Chapter 5, “Additional Tools,” for information about scripting.

RPM provides “landing zones” for applications in a clustered environment. A landing zone is a Resource Partition that has been predefined for an application on the application standby cluster node.

Clustering support for RPM can best be understood in the example of a two-node cluster, where both nodes are used to provide services to clients, as shown in the following figure.

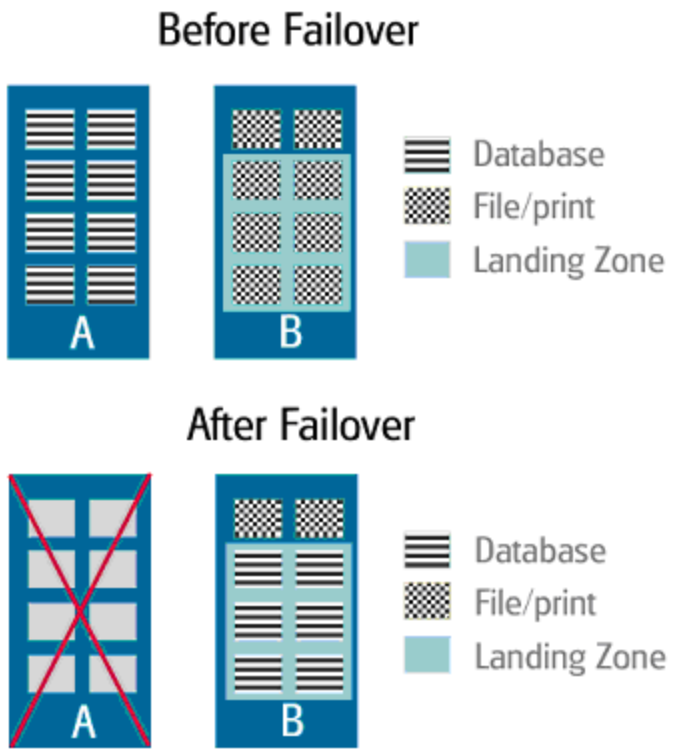

Figure 3-23: Two-node cluster

Server A has eight processors and is running a critical database application, while Server B is a file and print server with eight processors. Without the capabilities of RPM, the administrator of this cluster has two options to handle the allocation of resources for these applications in the event of a cluster node failure and the subsequent migration of the failed node’s applications to the surviving server:

1. Let the Database and File and Print applications compete for resources (undesirable because the final allocation of resources may end up favoring the less important application).

2. Configure each application to use only the portion of the available resources on each server (undesirable because idle resources are not being utilized in the normal, non-failed-over state to ensure resource availability for the failed-over condition).

RPM provides another option for handling this failover situation. Assume that you want to give resource priority to the database application in the previous example scenario. Using RPM, create the home partition on Server A for the database application by defining six of the eight processors as **Preferred Processors** and the other two processors as **Available Processors** in the advanced section of the **Processor Rules** screen. Also, define a Resource Partition for the LanManServer process (services.exe) that limits it to the two processors designated as available to the database application.

Services.exe controls the publishing of file shares and print spools to clients. From the cluster point of view, file sharing will behave as if it is a separate application. In actuality, it is part of the server service that runs on every Windows NT and Windows 2000 machine.

IMPORTANT: If you create a partition for services.exe, **never** deactivate this partition.

On Server B, create a landing zone partition for the database application, again allocating six preferred and two available processors. Define two processors as **Preferred Processors** and the remaining six processors as **Available Processors.** Also, create a partition for services.exe.

By setting up the home and landing zone partitions in this manner, you have ensured that in a normal operation state (no node failures), each application has all the processors of its home machine available to it. If the file and print server node fails, the database on the surviving node has at least six of eight processors available to it. File and print access will be slower on this node, but because you elected to give the database a higher priority in using resources, this reduction should be acceptable.

An additional level of resource usage prioritization can be achieved by using the **Partition Priority** setting under the **Advanced** tab of the **Properties** screen (refer to Figure 3-2). For example, in the preceding clustered scenario, you could create a Resource Partition on Server B for the base file/print function, giving it a **Normal** partition priority and access to all processors. Next, create a landing zone partition for the database application configured with a minimum number of initial processors and a **High** partition priority. Set the **Processor** rule to add processors whenever utilization gets above 70%. If a failover occurs, the database application restarts on Server B, taking processors from the file/print partition as needed since the database partition priority is higher than the file/print partition priority.

NOTE: For additional information on clustering using RPM, visit the HP website at

www.hp.com/products/wmp

4

System and Resource Partition Overviews

The **System** and **Resource Partition Overview** screens provide two different ways to view and evaluate real-time performance on an RPM-managed server.

- The **System Overview** charts provide a real-time, system-wide view of current system performance in the areas of processor, memory, disk, and network utilization. This information can be useful when configuring RPM Resource Partitions for maximum performance and optimization.
- The **Resource Partition Overview** charts provide a real-time view of resource utilization at the Resource Partition level. Processor, memory, and combined disk and network I/O charts reflect how the applications and processes contained in a Resource Partition are utilizing the resources available to them.

Using the System Overview

To use the **System Overview,** select **RPM, System Overview** from the menu bar, or click the **System Overview** icon on the toolbar.

Refer to the following sections for explanations of each tab and its contents.

System Performance Overview

The **System Overview** opens with the **Overview** tab, as shown in Figure 4-1. The **Overview** tab provides selected performance information for:

- Processors—**Processor Utilization** provides a measurement of how busy the processor is executing requests.
- Memory—**Physical Memory Utilization** is the percentage of memory currently being used by the system.
- Physical disk—**Current Disk Utilization** provides the percentage of time the disk is servicing read and/or write requests.
- Overall subsystem balance—**Current Subsystem Utilization** gives an overall view of subsystem utilization.

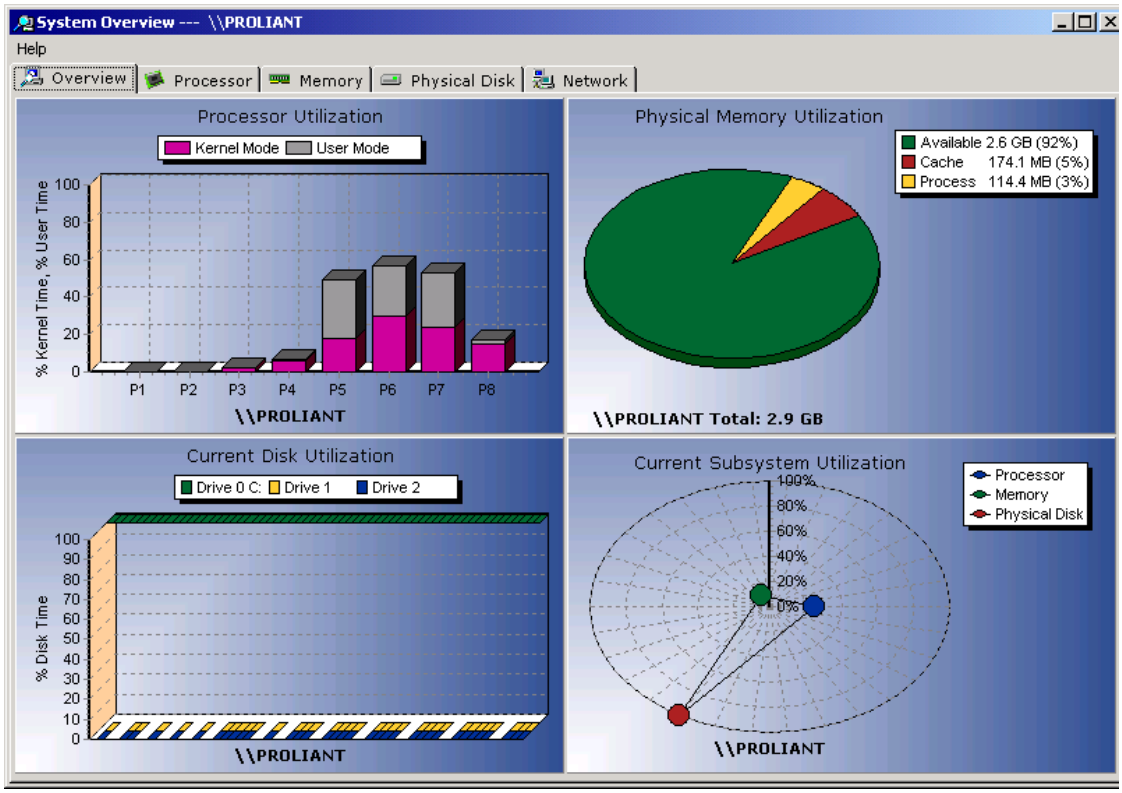

Figure 4-1: Overview tab

Processor Details

The **Processor** tab displays information about all processors recognized by Microsoft Windows 2000 operating systems. The following sections provide detailed information about each processor chart.

NOTE: Processor numbering is consistent with Windows 2000 Server processor numbering.

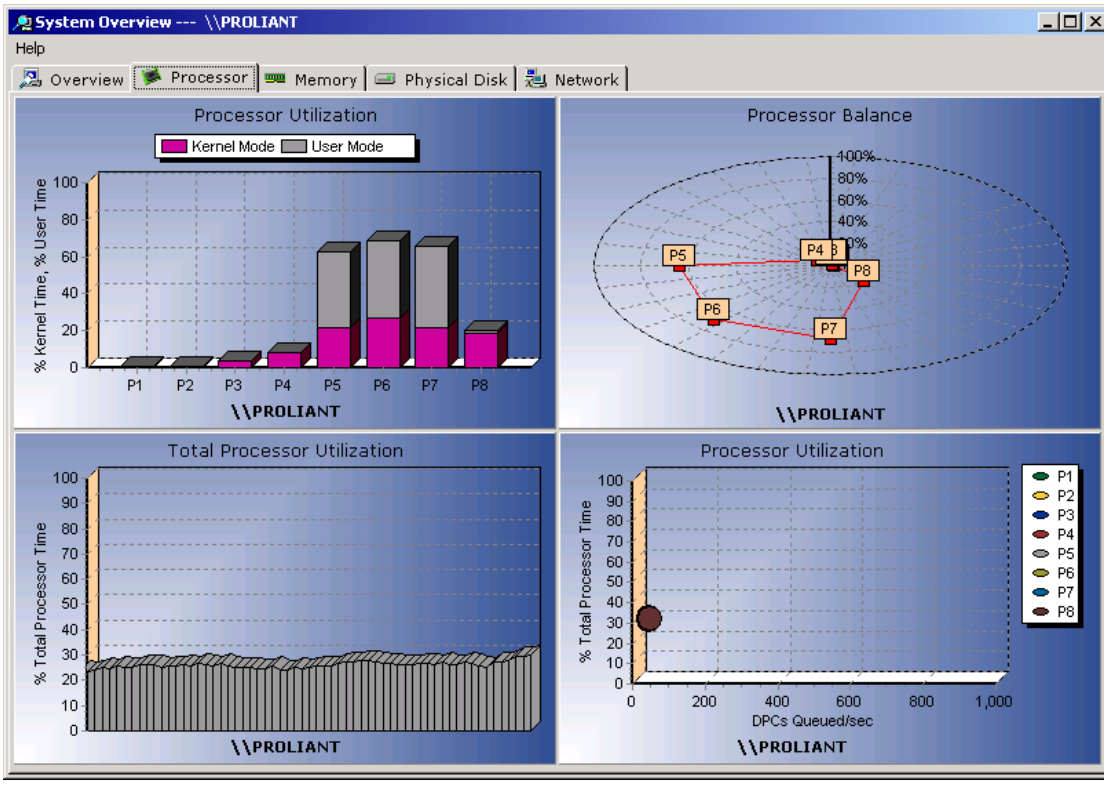

Figure 4-2: Processor tab

Processor Utilization (User Mode and Kernel Mode)

Processor utilization provides a measurement of how busy the processor is executing requests. Each request takes up a portion of the work capability of the processor.

As more and more requests are made to the processor, the processor can become overburdened with requests, resulting in high processor utilization and slower response times. When the processor does not have requests to complete, an Idle process is executed. A high processor utilization percentile means that the processor is always busy responding to requests, so that the Idle process is never executed.

The overall processor utilization totals are divided into User Mode and Kernel Mode.

- **Kernel Mode**—The Windows 2000 service layer, the Executive routines, and the Windows 2000 kernel execute in Kernel Mode. Device drivers for most devices other than graphics adapters and printers also execute in Kernel Mode.
- **User Mode**—All application code and subsystem code execute in User Mode. The graphics engine, graphics device drivers, printer device drivers, and the window manager also execute in User Mode.

This information helps you to discern between the application workload and the system processes workload.

Processor Balance

The **Processor Balance** screen displays processor utilization data per processor. The location of the processor icon around the ring indicates the percentage of utilization for that processor.

Total Processor Utilization

The **Total Processor Utilization** screen displays an overall average of all processor utilization rates. This information gives a good indication of overall processor loading over a period of time.

Total Processor Time versus DPCs Queued per Second

This screen is a current measurement of the outstanding DPCs (deferred procedure calls). When a hardware device interrupts the processor, the Interrupt Handler may elect to execute the majority of its work in a DPC. DPCs run at lower priority than interrupts, and therefore permit interrupts to occur while DPCs are being executed.

Memory Details

The **Memory** tab displays information about all memory installed in the system and recognized by Windows 2000 Server operating systems. The following sections provide detailed information about each memory chart.

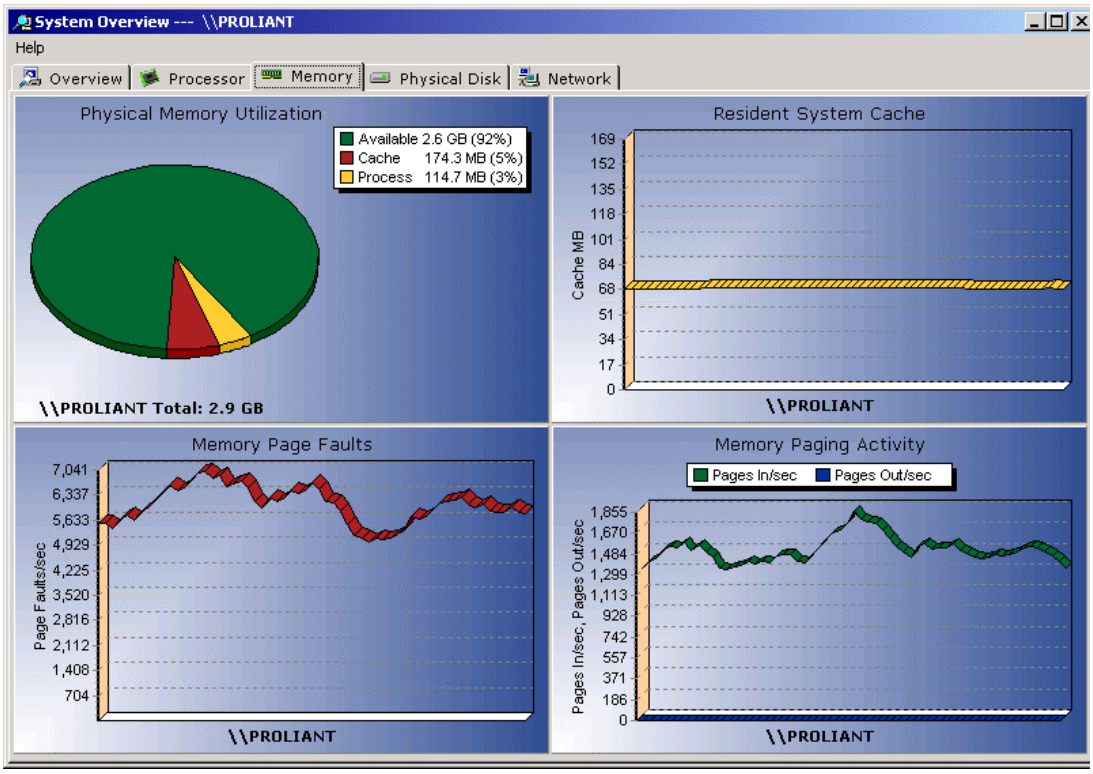

Figure 4-3: Memory tab

Physical Memory Utilization

The Physical Memory Utilization displays the percentage of memory currently being used by the system. The percentage of memory in use is the ratio of available memory to total physical memory.

- **Available Bytes** is the amount of memory that is available for use by applications. This screen displays the size of the virtual memory currently on the Zeroed, Free, and Standby lists. Zeroed and Free memory is ready for use for application work.
- **Cache Bytes** is the amount of memory currently assigned for disk buffering. It is the sum of the System Cache Resident Bytes, System Driver Resident Bytes, System Code Resident Bytes, and Pool Paged Resident Bytes counters.
- **Process Bytes** is the amount of memory used by processors.

As more and more memory is being used by the system, less memory is available for other applications or to buffer disk requests. A low amount of available memory can impact system performance.

Resident System Cache

The **Resident System Cache** screen displays the number of bytes allocated for the file system cache resident in the physical memory. This value includes only current physical pages and does not include any virtual memory pages not currently resident in the physical memory.

The system cache is a temporary location for data that is otherwise resident in disk storage. Since accessing data in cache is significantly faster than accessing disk data, it is an advantage to have sufficient cache storage.

Memory Page Faults

The **Memory Page Faults** screen displays the overall rate at which faulted pages are handled by the processor.

Numerous page faults can be an indication that more memory is needed to sustain optimum performance.

Memory Paging Activity

The **Memory Paging Activity** screen displays pages input/pages output per second.

- **Pages In/sec** is the number of pages read from the disk to resolve hard page faults. Pages input per second is a primary indicator of faults that cause system-wide delays. It includes pages retrieved to satisfy faults in the file system cache (usually requested by applications) and in non-cached mapped memory files.
- **Pages Out/sec** is the number of pages written to disk to free up space in physical memory. Pages are written back to the disk only if they are changed in physical memory, so they are likely to hold data, not code.

Windows 2000 Server writes pages to disk to free up space when physical memory is in short supply. A high rate of paging (pages in or pages out) may indicate a memory shortage.

Physical Disk Details

The **Physical Disk** tab displays information about all physical disks attached to the system and recognized by Windows 2000 Server operating systems. The following sections provide detailed information about each physical disk chart.

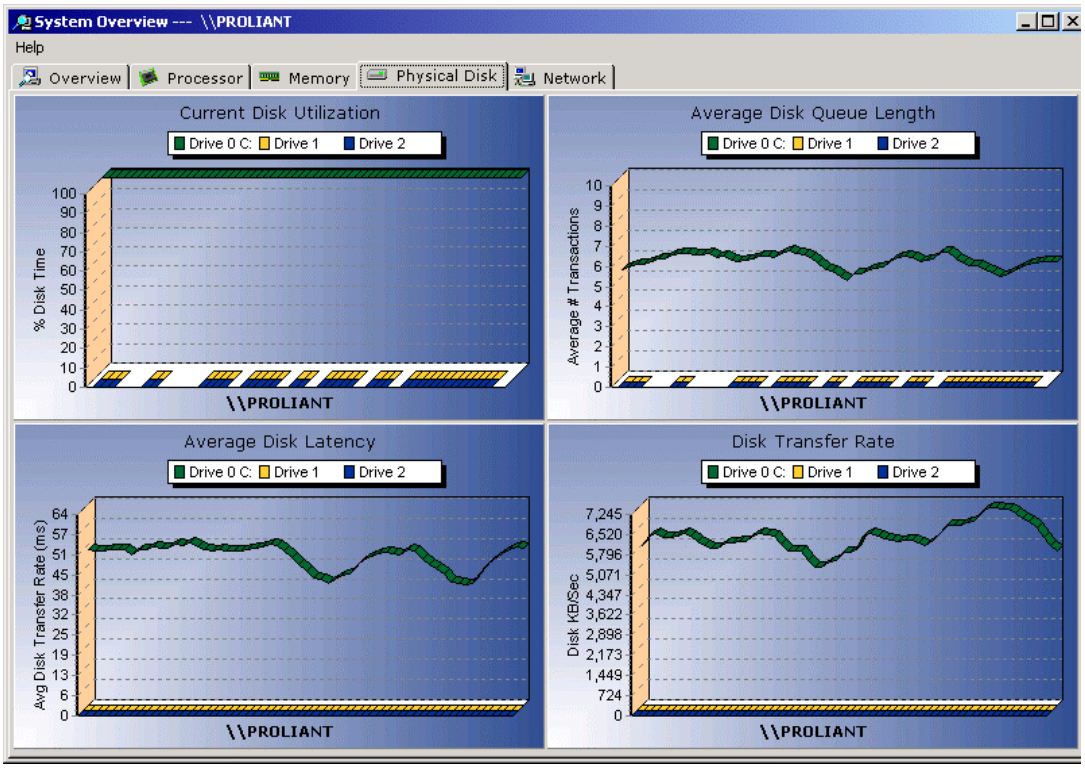

Figure 4-4: Physical Disk screen

Current Disk Utilization

The **Current Disk Utilization** screen displays the percentage of time the disk is servicing read and/or write requests. This chart indicates how busy the disk is.

Low processor utilization and high disk utilization could indicate a disk performance limitation.

Average Disk Queue Length

The **Average Disk Queue Length** screen displays the length of outstanding read/write requests queued for the disk. This screen measures the length of time the controller takes to complete outstanding requests.

A performance limitation may occur if the disk controller is not able to keep up with the number of requests being received.

Average Disk Latency

The **Average Disk Latency** screen displays the time in milliseconds of the average disk transfer.

When a request is received, a timer starts. When the request is completed, the timer stops, providing a measure of the time for disk transfer.

This chart can indicate how well the disk is responding to transfers.

Disk Transfer Rate

The **Disk Transfer Rate** screen displays the rate at which bytes are transferred to or from the disk during write/read operations.

This chart measures data transfer rates over a period of time. Data transfer rates indicate how much work the controller is performing.

Network Details

The **Network** tab displays information about all network interfaces attached to the system and recognized by Windows 2000 Server operating systems. The following sections provide detailed information about each network chart.

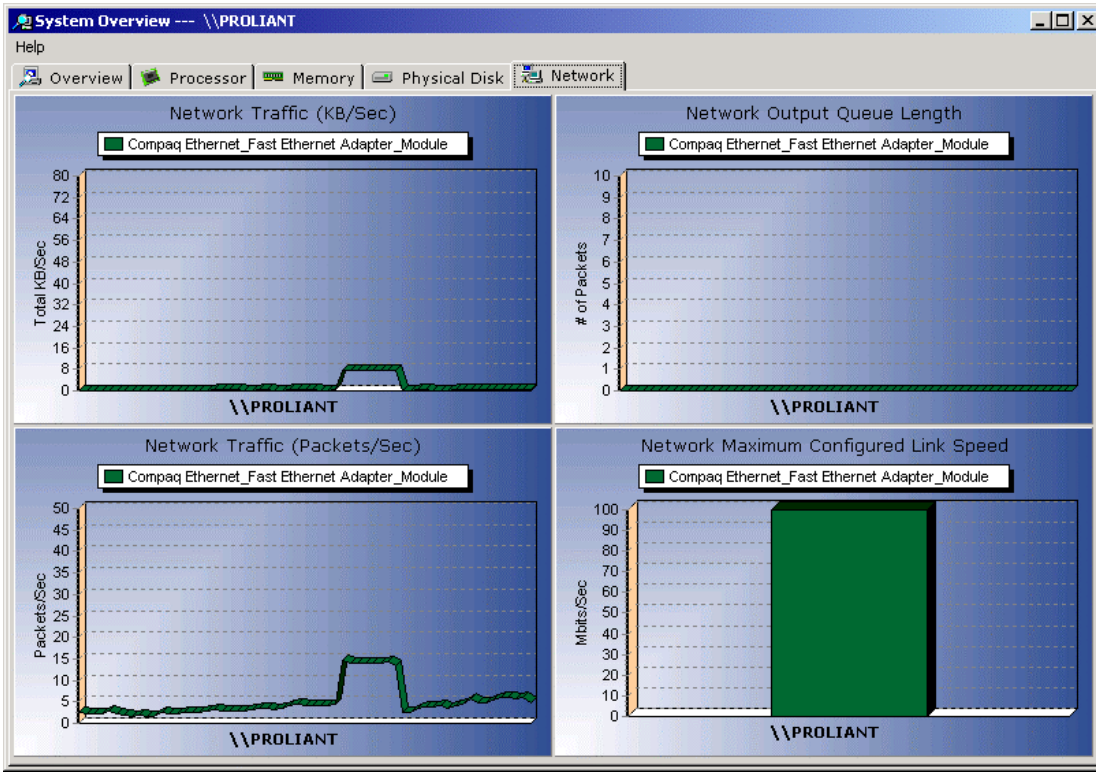

Figure 4-5: Network tab

Network Traffic (KB/Sec)

The **Network Traffic (KB/Sec)** screen displays the rate at which data bytes are sent over the network. Over a period of time, this screen indicates how many bytes have been transferred.

A consistently high rate of network traffic could indicate performance limitations.

Network Output Queue Length

The **Network Output Queue Length** screen displays the number of packets in the output queue. This chart indicates the number of outstanding packets.

An elevated queue length over an extended period of time could indicate a network performance problem.

Network Traffic (Packets/Sec)

The **Network Traffic (Packets/Sec)** screen displays the rate at which packets are sent over the interface.

A consistently high rate of packets per second could indicate performance limitations.

Network Maximum Configured Link Speed

The **Network Maximum Configured Link Speed** screen displays the currently configured maximum rate of the network interface.

This data can be used to verify proper configuration of installed NICs (network interface cards).

NOTE: This graph indicates system potential and can be expected to remain static.

Using the Resource Partition Overview

The **Resource Partition Overview** charts provide a real-time view of resource utilization at the Resource Partition level. Processor, memory, and disk and network I/O charts reflect how the applications and processes contained in a Resource Partition are utilizing the resources available to them.

To use the **Resource Partition Overview:**

1. Select an active Resource Partition from the **Active Resource Partitions** pane.
2. Select **Partition** on the menu bar.
3. Select **Overview.**

Refer to the following sections for explanations of each tab and its contents.

Processor Details

The **Processor** tab displays information about the processors used by the Resource Partition. The following sections provide detailed information about each processor chart.

NOTE: Processor numbering is consistent with Windows 2000 Server processor numbering.

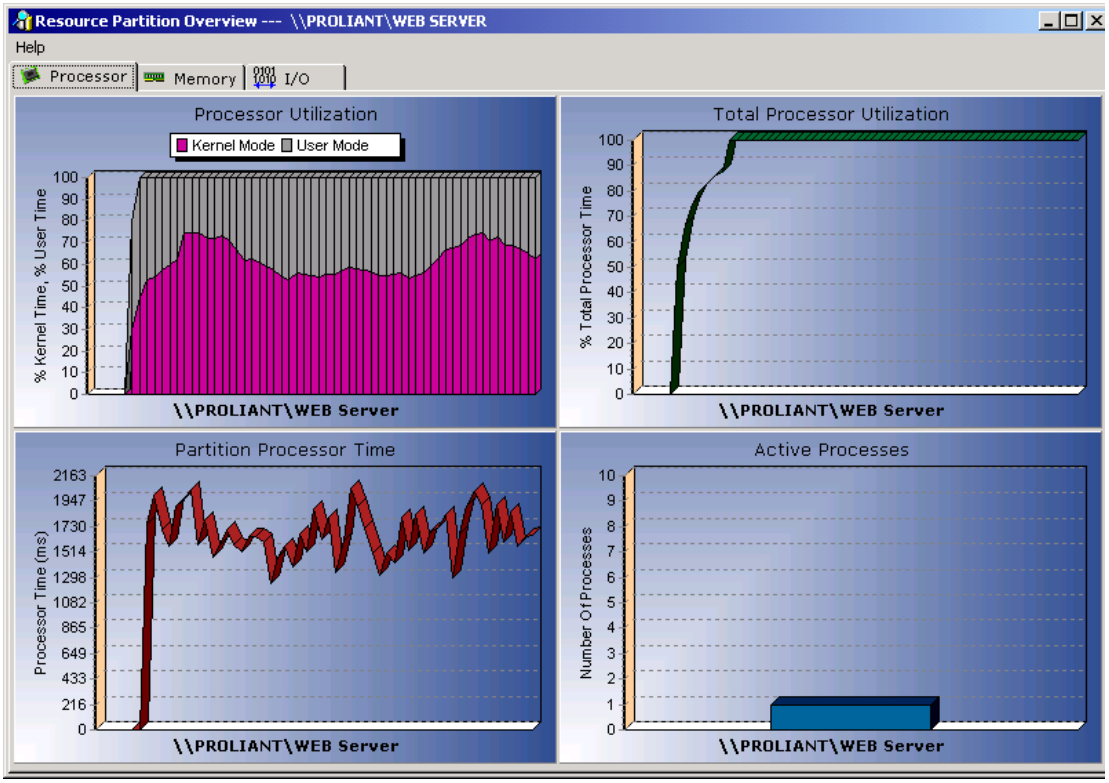

Figure 4-6: Processor screen

Processor Utilization (User Mode and Kernel Mode)

Processor utilization provides a measurement of how busy the processor is executing requests. Each request takes up a portion of the work capability of the processor.

As more and more requests are made to the processor, the processor can become overburdened with requests, resulting in high processor utilization and slower response times. When the processor does not have requests to complete, an Idle process is executed. A high processor utilization percentile means that the processor is always busy responding to requests, so that the Idle process is never executed.

The overall processor utilization totals are divided into User Mode and Kernel Mode.

- **Kernel Mode**—The Windows 2000 service layer, the Executive routines, and the Windows 2000 kernel execute in Kernel Mode. Device drivers for most devices other than graphics adapters and printers also execute in Kernel Mode.
- **User Mode**—All application code and subsystem code execute in User Mode. The graphics engine, graphics device drivers, printer device drivers, and the window manager also execute in User Mode.

This utilization information helps you to discern between the application workload and the system processes workload.

Total Processor Utilization

The **Total Processor Utilization** screen displays the percentage of total available processor time used by this Resource Partition. This information gives a good indication of overall processor loading over a period of time.

Partition Processor Time

The **Partition Processor Time** screen displays a running sampling of the raw amount of processor time utilized by the partition. This information provides a good indication of processor activity for the partition over time.

Active Processes

The **Active Processes** screen displays how many processes are currently active on the Resource Partition.

Memory Details

The **Memory** tab displays information about the memory used by the partition. The following sections provide detailed information about each memory chart.

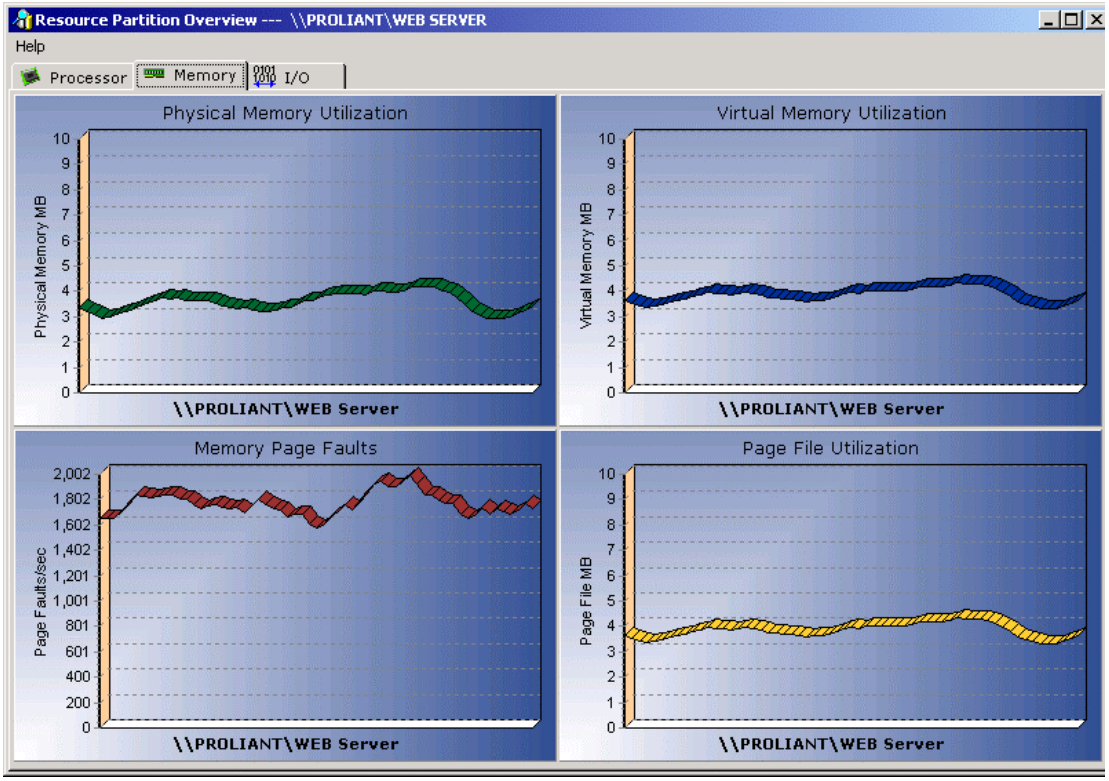

Figure 4-7: Memory screen

Physical Memory Utilization

The **Physical Memory Utilization** screen displays the percentage of memory currently being used by the Resource Partition. The percentage of memory in use is the ratio of utilized memory to total physical memory.

As more and more memory is being used by the system, less memory is available for other applications or to buffer disk requests. A high rate of utilization can impact system performance.

Virtual Memory Utilization

The **Virtual Memory Utilization** screen displays the total amount of virtual memory currently being used by all processes within the Resource Partition.

Memory Page Faults

The **Memory Page Faults** screen displays the overall rate at which faulted pages are handled by the processor.

Numerous page faults can be an indication that more memory is needed to sustain optimum performance.

Page File Utilization

The **Page File Utilization** screen displays the amount of storage this partition is utilizing in the paging files. Paging files are shared by all processes, and lack of space in paging files can prevent other processes from allocating memory.

I/O Details

The **I/O** tab provides read and write information about network, file, and device I/O operations. The following sections provide detailed information about each I/O chart.

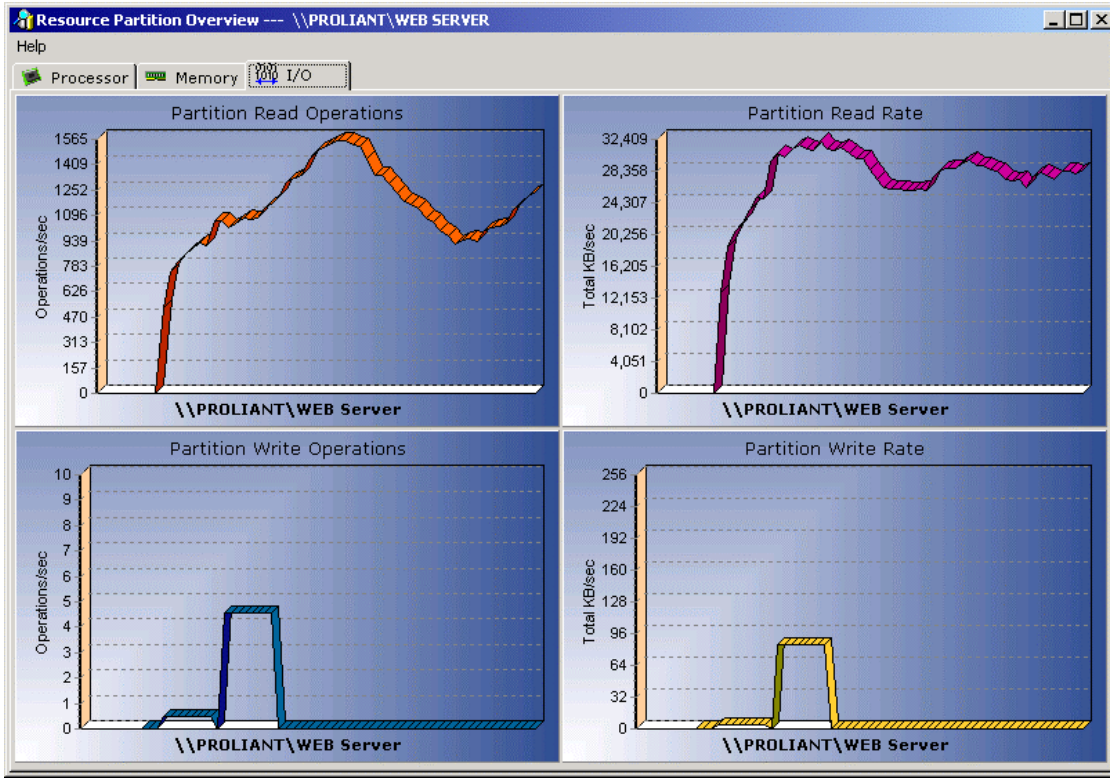

Figure 4-8: I/O screen

Partition Read Operations

The **Partition Read Operations** screen indicates the rate at which processes in this Resource Partition are issuing read I/O operations.

Partition Read Rate

The **Partition Read Rate** screen indicates the rate at which processes in this Resource Partition are reading data from I/O operations.

Partition Write Operations

The **Partition Write Operations** screen indicates the rate at which processes in this Resource Partition are issuing write I/O operations.

Partition Write Rate

The **Partition Write Rate** screen indicates the rate at which processes in this partition are writing data from I/O operations.

5

Additional Tools

A variety of additional tools provide methods for managing the RPM service, exporting and importing partition files, tracking system and Resource Partition data, accessing scripting capabilities, creating reports based on collected data, customizing charts, and setting partition defaults.

This chapter describes the following tools:

- Service Properties
- Exporting and Importing Partitions
- Event Logging
- Data Trending
- Metering
- Process Viewing
- Scripting
- Reporting
  - — System Data
  - — Partition Data
- Chart Properties
- Partition Defaults

Service Properties

Configuration and management of the RPM service are performed through the **Service Properties** dialog box. You can access **Service Properties** through the toolbar or the menu.

NOTE: RPM Service Properties cannot be modified if any partitions are active.

The **General** tab provides the following management options:

- **Start**—Starts the RPM service if it is not currently active.
- **Stop**—Stops the RPM service if it is currently active.
- **Update**—Allows manual replacement of the existing RPM service with an available update.

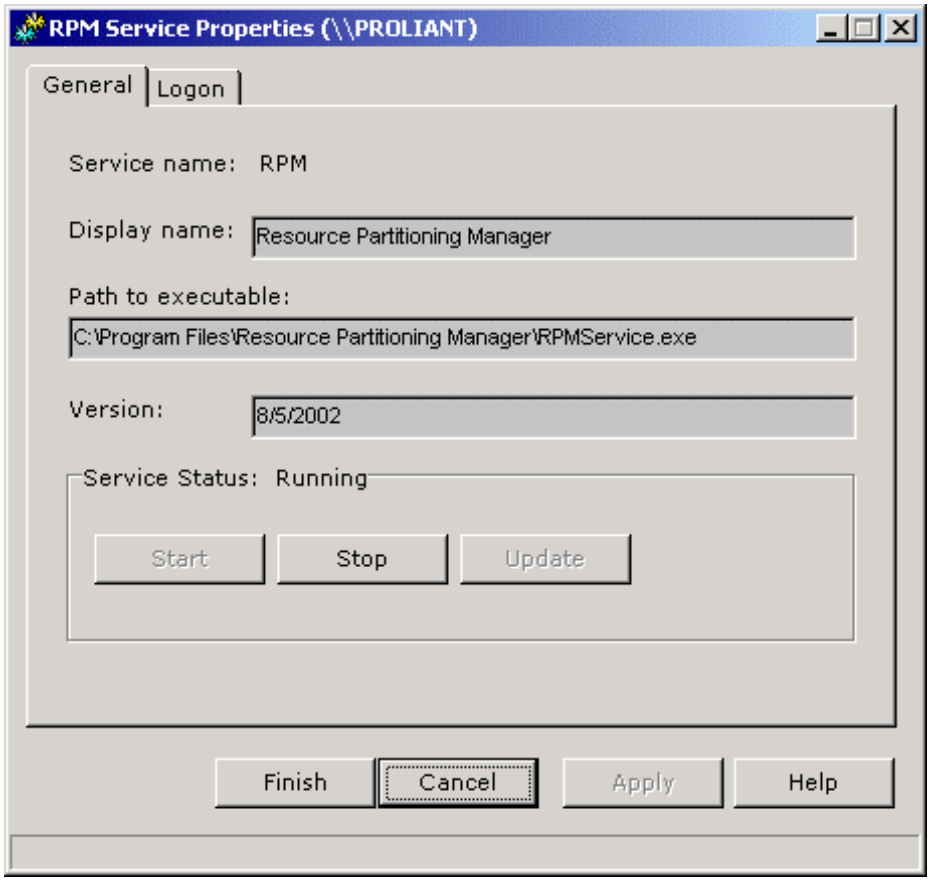

Figure 5-1: Service Properties (General tab view)

The RPM service, by default, logs on to the LocalSystem account. The **Logon** tab can be used to configure the RPM service to log on to a user account. This feature is relevant when RPM is being used to manage a process that requires access to network resources (such as files and folders) that are protected by Windows 2000.

Figure 5-2: Service Properties screen (Logon tab view)

Exporting and Importing Partitions

RPM supports exporting and importing Resource Partitions. This feature enables you to:

- Distribute standard Resource Partition definitions across multiple identical machines by exporting partition definitions directly to the target machines.
- Save Resource Partition definitions for later restoration, as in a server replacement scenario, by exporting partition definitions to saved files.

IMPORTANT: Do not export or import files between machines that have different hardware configurations. Resource Partitions definitions correlate with the hardware configuration of their host machine. For example, exporting a partition from an eight-processor server with 4 GB of memory to a two-processor workstation with 256 MB of memory does not produce consistent results and is not supported.

Exporting a Partition to a File

To export a Resource Partition to a file:

1. Select an available partition to export.

NOTE: Active partitions cannot be exported.

2. Select **Partition** on the menu bar.
3. Select **Send To.** A pop-up menu is displayed.
4. Select **File** from the pop-up menu. The following dialog box is displayed.

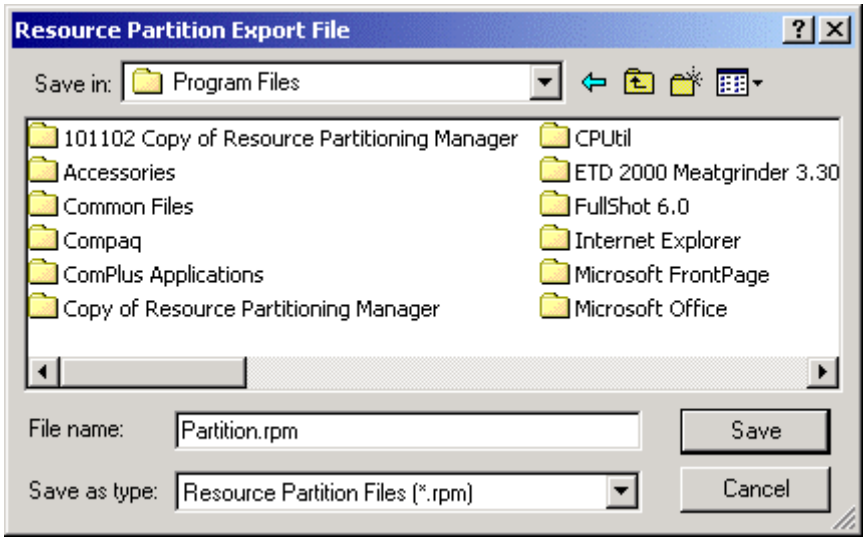

Figure 5-3: Exporting a partition to a file

5. Choose a name and location for the partition file. Partitions are saved with a .rpm extension.
6. Click **Save.**

Exporting a Partition to a Target Machine

To export a Resource Partition directly to another machine running RPM:

1. Select an available partition to export.

NOTE: Active partitions cannot be exported.

2. Select **Partition** on the menu bar.
3. Select **Send To.** A pop-up menu is displayed.
4. Select **Machine** from the pop-up menu. The following dialog box is displayed.

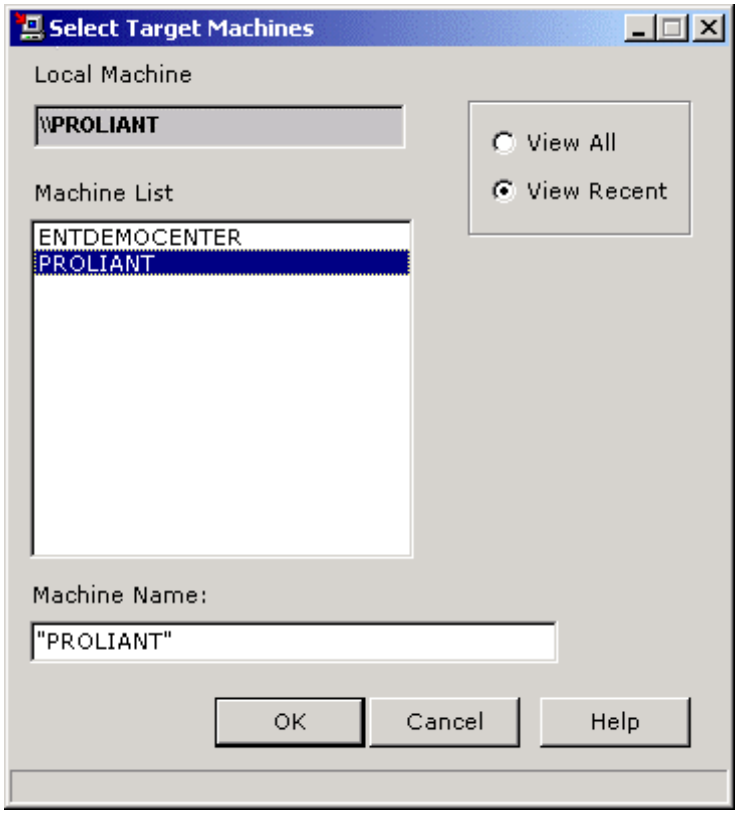

Figure 5-4: Exporting a partition to a target machine

5. Select a target machine from the existing list, or type a machine name in the **Machine Name** field.
6. Click **OK.**

Importing a Partition

To import a partition from a saved file:

1. Select **RPM** on the menu bar.
2. Select **Import Partitions.** The following screen is displayed.

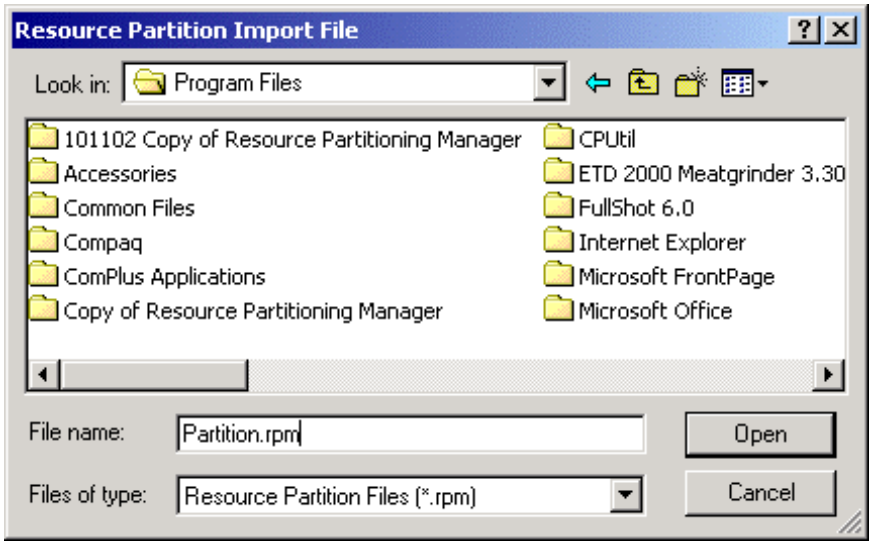

Figure 5-5: Importing a partition

3. Browse to the file you want to import.
4. Click **Open** to import the file. The imported Resource Partition now appears in the **Available Resource Partitions** panel of the main screen and can be edited like any other available partition.

Using the Event Logging Tool

Logged events and error conditions can provide valuable information for troubleshooting.

RPM allows you to select the type of events to log. By default, events are logged to the standard Windows event log, accessible through the Event Viewer. If desired, SNMP traps can also be generated using the Microsoft SNMP Event Translator.

To use the event logging tool:

1. Select **Tools** on the menu bar.
2. Select **Event Logging.**

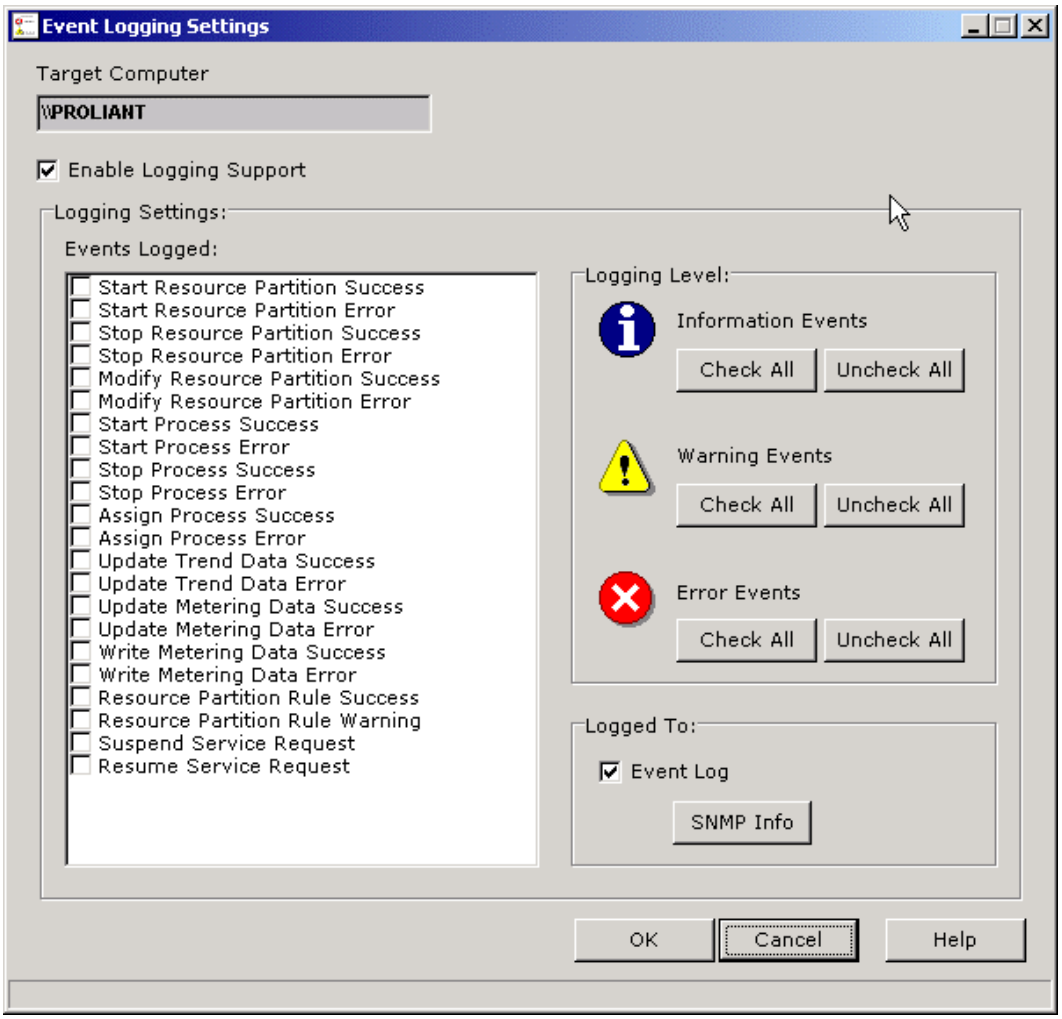

Figure 5-6: Event Logging screen

3. Select the **Enable Logging Support** checkbox.
4. Select the types of events to be logged in the **Logging Level:** section. This action places check marks next to the appropriate events in the **Events Logged:** section.

5. If desired, you can modify the events to be logged by selecting or deselecting individual events in the **Events Logged:** section.
6. Select a location to which events are to be logged in the **Logged to:** section.

NOTE: When Event Logging is enabled, events are logged to the standard Windows event log by default, as indicated by the checkbox on the Event Log selection. If you also wish to generate SNMP traps, you can do so using the Microsoft SNMP Event Translator. Click the **SNMP Info** button to view information on generating SNMP traps.

For information about how to use and configure this utility, refer to the Microsoft SNMP online documentation.

NOTE: To generate SNMP traps, the **Event Log** box must be checked.

7. Click **OK.**

Using the Data Trending Tool

Data trending provides a way to monitor the performance of specific Resource Partitions over a period of time and to generate charts and reports based on that performance data. Data trending is disabled by default and is enabled on a per-partition basis.

To enable data trending:

1. Click an available or active Resource Partition to select it for data trending.
2. Select **Partition** on the menu bar.
3. Select **Trending.**
4. Select **Enable.**

To view trended data:

1. Click a Resource Partition to select it.
2. Select **Partition** on the menu bar.
3. Select **Trending.**
4. Select **View Data.** The **Resource Partition Trend Data** screen is displayed as shown in Figure 5-7, providing information about processor utilization, total number of processors used, memory utilization, and I/O traffic over a period of time.

NOTE: Data trending graphs are not available until data have been collected. Samples are gathered every 30 minutes. To view a full graph, like those shown in Figure 5-7, be sure to allow RPM sufficient time to collect data.

NOTE: The **Data Trending** tool displays up to 21 days of data.

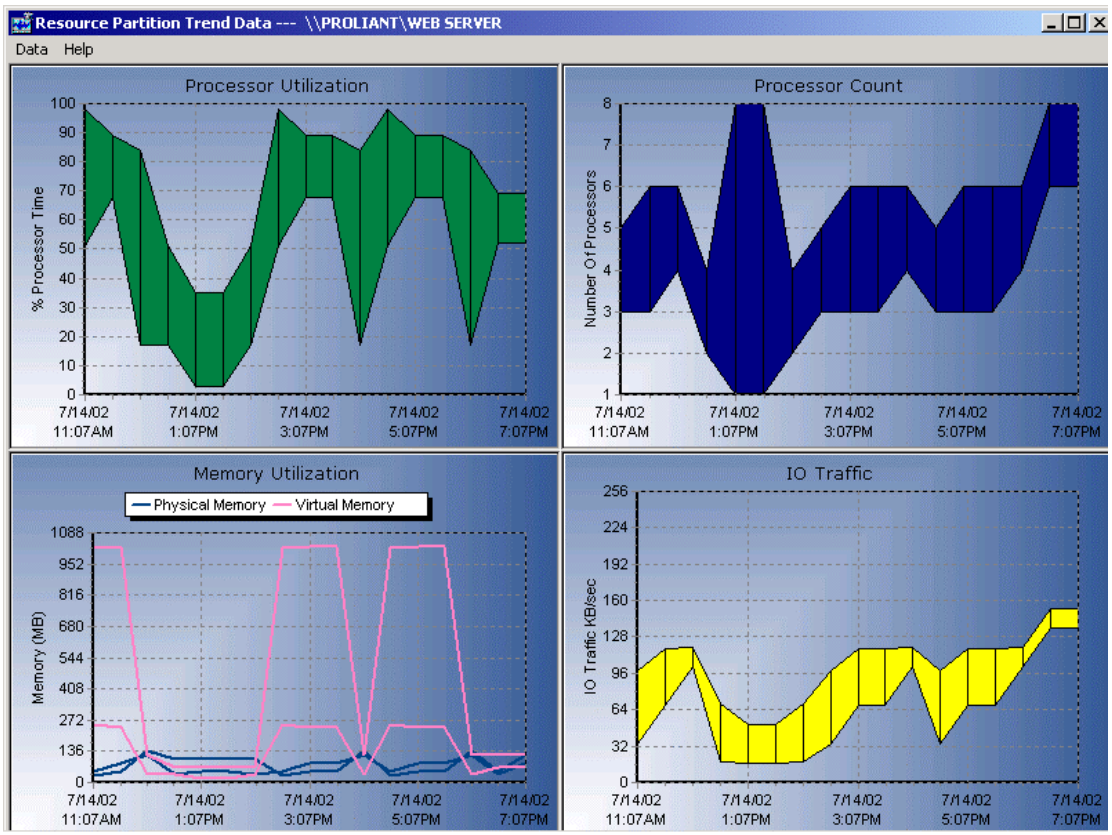

Figure 5-7: Trend Data

5. Click **Data, Refresh** to view the most current data.

Once data has been collected, the **Data** item on the **Trend Data** menu bar provides the following options:

- **Intervals**—This option displays a list of intervals of collected data, as shown in Figure 5-8. Select an interval from the list to view the data collected during that time.
- **Refresh**—This option refreshes the screen to provide the most current data.
- **Clear Interval**—This option clears the current interval.
- **Clear All Intervals**—This option clears all intervals.

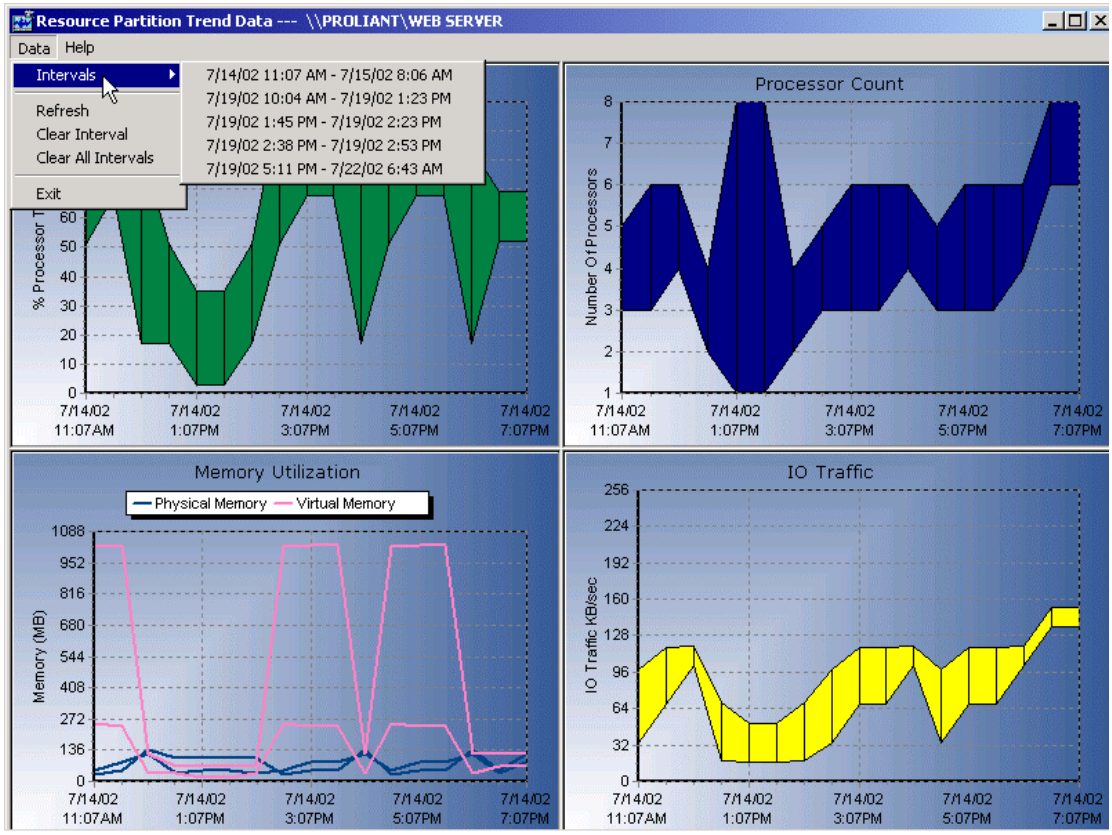

Figure 5-8: Data trending intervals

Choosing to clear an interval produces the following message:

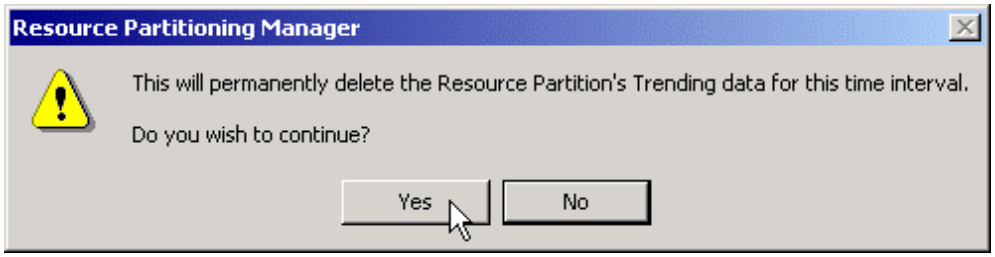

Figure 5-9: Clear interval message

Select **Yes** to clear the interval; select **No** to return to the data trending screen.

Using the Metering Tool

Metering enables you to track and log resource utilization of each Resource Partition on a server over a period of time. You can also generate charts and reports based on that performance data.

To enable metering support:

1. Select **Tools** on the menu bar.
2. Select **Metering.** A pop-up menu is displayed.
3. Select **Settings** in the pop-up menu. The following screen is displayed.

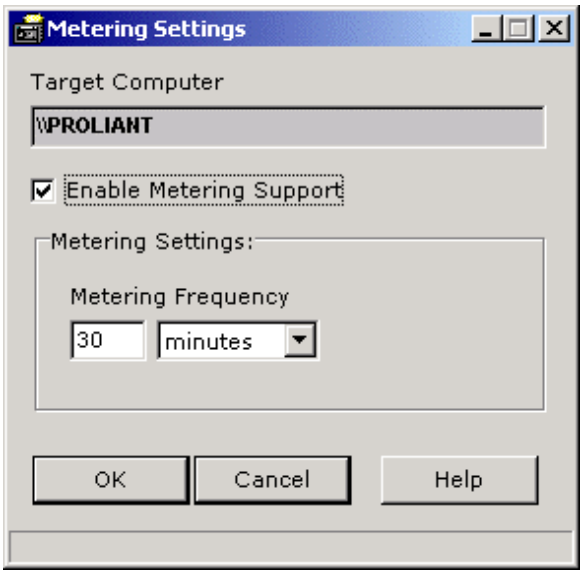

Figure 5-10: Metering Settings

4. Select the **Enable Metering Support** checkbox.
5. Set the **Metering Frequency.**
6. Click **OK.**

Once metering is enabled, RPM creates a metering (.met) file for each partition.

Metered data is stored in an RPM-specific format, but can be exported to external files for use in other programs, such as company reports or spreadsheets. Data is stored and exported on a per-partition basis. To export metering data:

1. Select **Tools** on the menu bar.
2. Select **Metering.** A pop-up menu is displayed.
3. Select **Export** in the pop-up menu. The following screen is displayed.

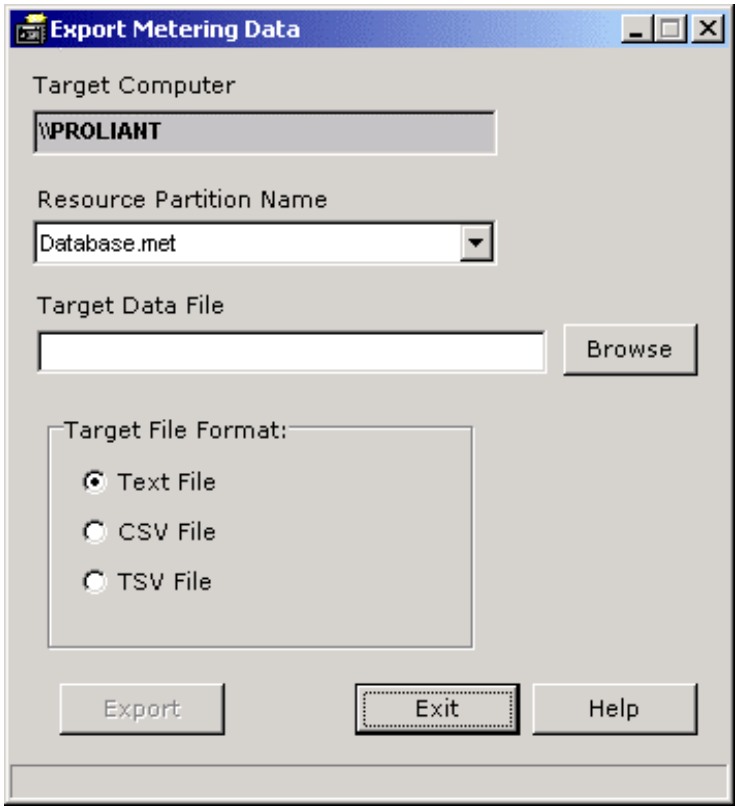

Figure 5-11: Export Metering Data

4. Select a Resource Partition to be exported from the **Resource Partition Name** drop down menu.
5. Type in or browse to the path for the **Target Data File** (the destination file for the exported data).
6. Select the **Target File Format** from the list.
7. Click **OK.**

Viewing Processes

The **View Processes** option provides detailed information on each process running on the partitioned system. The information is provided in tree format so that the assignment of applications to partitions and the relationships between processes are easily identified.

To view processes running on the system:

1. Select **Tools** on the menu bar.
2. Select **View Processes.** The following screen is displayed.

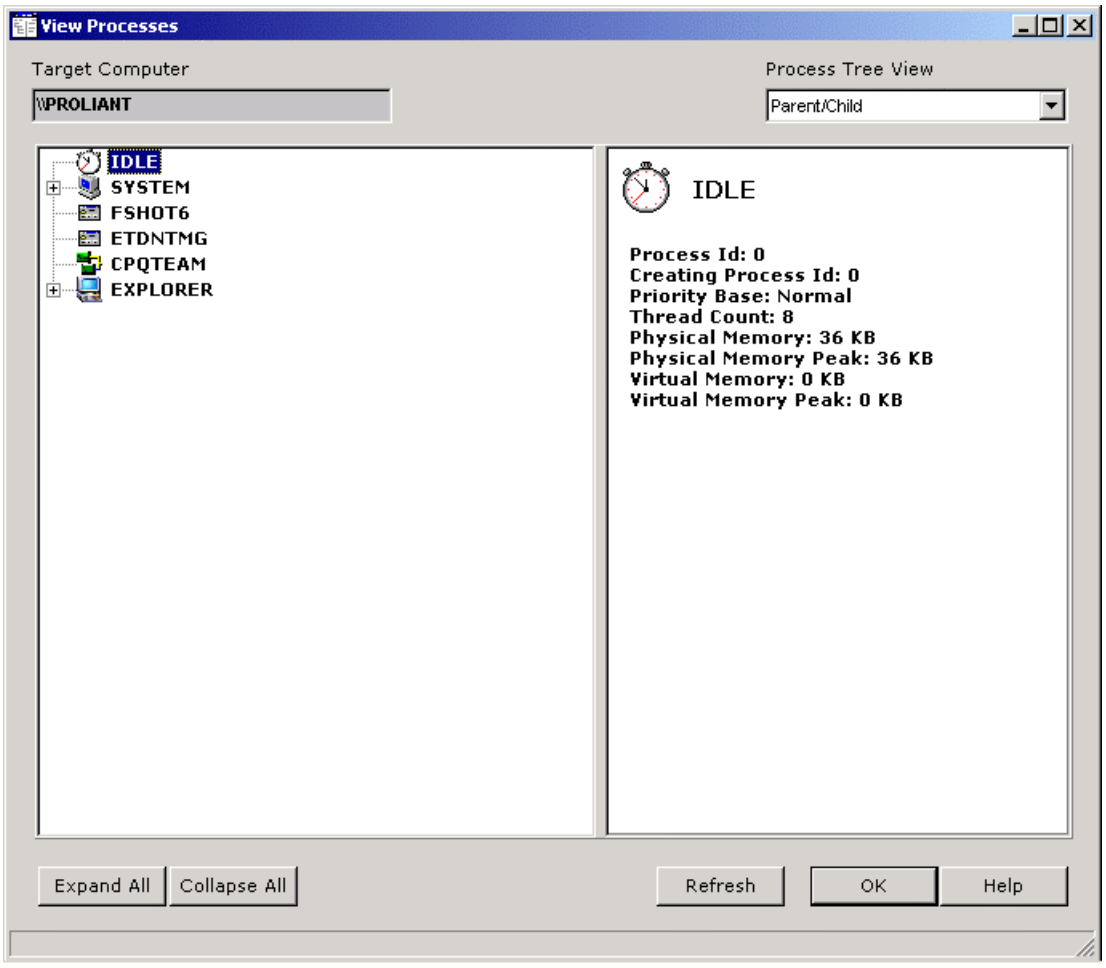

Figure 5-12: View Processes screen

3. Use the **Process Tree View** drop-down menu to select a method for organizing the process tree in the left pane of the window. You can choose to organize the tree by **Parent/Child, Process Name, Process ID, Applications,** or **Resource Partitions.**
4. To refresh the process tree view, click the **Refresh** button.

Using the RPM Scripting Interface

Many RPM capabilities are accessible through a command-line scripting interface. This interface can be used locally or remotely to control RPM activity with existing management tools and processes. Refer to Table 5-3 for additional commands that can be used when launching the RPM GUI.

Command Line Syntax

To use the scripting feature, you can create a batch file or use the command line interface. The general command line syntax for RPM is as follows:

```
rpm [-h] [-machine:machinename] [-scriptmode
–inputfile:infilename [–outputfile:outfilename]
[–console:yes/no]]
```

The command line options are shown in Table 5-1:

Table 5-1: RPM Command Line Arguments

Command	Description
`-h`	Display a help screen on the command line and scripting parameters.
`-machine:`*`machinename`*	Launch the RPM GUI with *`machinename`* as the target machine.
`-scriptmode –inputfile:`*`infilename`* `[–outputfile:`*`outfilename`*`] [–console:`*`yes/no`*`]`	Runs script *`infilename`*, with the results optionally output to *`outfilename`* and/or the console. If no parameter is specified for console, the default setting is *`yes`*.

NOTE: All arguments and information enclosed in brackets are optional. Refer to the “Script File Commands” section for a full description of the arguments that RPM accepts.

Command Line Examples

Table 5-2 provides examples of command line input.

Table 5-2: Command Line Examples

Command Line Input	Result
`rpm –machine:WEBSERVER5`	Starts the RPM user interface with WEBSERVER5 as the target machine.
`rpm –h`	Displays the help screen for command line and scripting functions.
`rpm –scriptmode –inputfile:script.txt –outputfile:outfile.txt console:no`	Runs the `script.txt` script, directing the output to the file `outfile.txt` and suppressing console output.

Script File Commands

Table 5-3 provides a summary of the available scripting commands. These commands are submitted within a script file specified by the `–inputfile` parameter of the `–scriptmode` command line parameter.

Table 5-3: Script File Commands

Command	Description
`-setmachine:`*`machinename`*	Select the target machine.
`-servicestart`	Start RPM service
`-servicestop`	Stop RPM service.
`-setpartition:`*`partitionname`*	Select the Resource Partition.
`-partitionstart`	Start the Resource Partition.
`-partitionstop`	Stop the Resource Partition.
`-setpartitionpriority:`*`priority`*	Set the Resource Partition priority. Valid values are **High, Normal,** or **Low**.
`-partitionstartall`	Start all Resource Partitions.
`-partitionstopall`	Stop all Resource Partitions.
`-addpartitionprocessors:`*`N`*	Adds *N* processors from the current Resource Partition, where *N* is an integer between one and the total number of processors in the server.
`-removepartitionprocessors:`*`N`*	Removes *N* processors from the current Resource Partition, where *N* is an integer between one and the total number of processors in the server.

Script File Example

Script files are simple text files, with one script command per line. This example script file simulates the shutdown of a database partition, the lowering of the priority on a virus scanning partition, and the startup of a backup session:

```
-setmachine:entdata05
-setpartition:UserDataSource
-partitionstop
-setpartition:VirusScan
-setpartitionpriority:Low
-setpartition:DataBackup
-partitionstart
```

Creating Reports

RPM provides the capability to produce customized reports, including:

- System information
- Resource Partition configuration information
- Trending data
- Metering data

System Reports

To create a system level report:

1. Select **Tools, Reporting, System** on the menu bar.

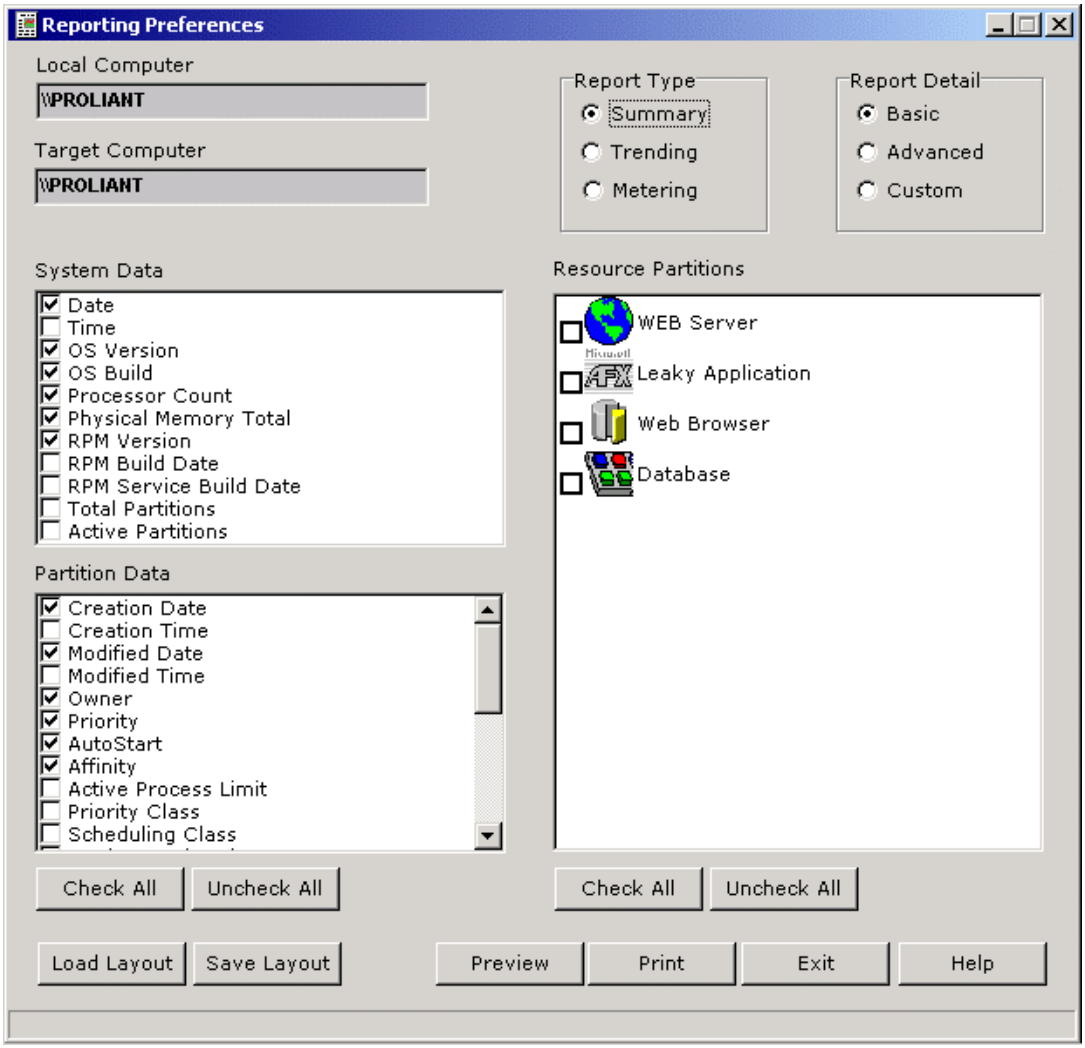

Figure 5-13: System Reporting Preferences

2. Select **Summary, Trending**, or **Metering** in the **Report Type** section to select the type of data to be reported.
3. Select **Basic, Advanced,** or **Custom** in the **Report Detail** section. The items that are selected in the **System Data** and **Partition Data** windows change based on which detail level you select. Selecting **Basic** or **Advanced** activates default settings in the **Partition Data** section. Select **Custom** to clear the **System** and **Partition Data** windows and make your own data selections.
4. Select which partitions to include in the report in the **Resource Partitions** section.
5. Click **Preview** to see a preview of the report you created.

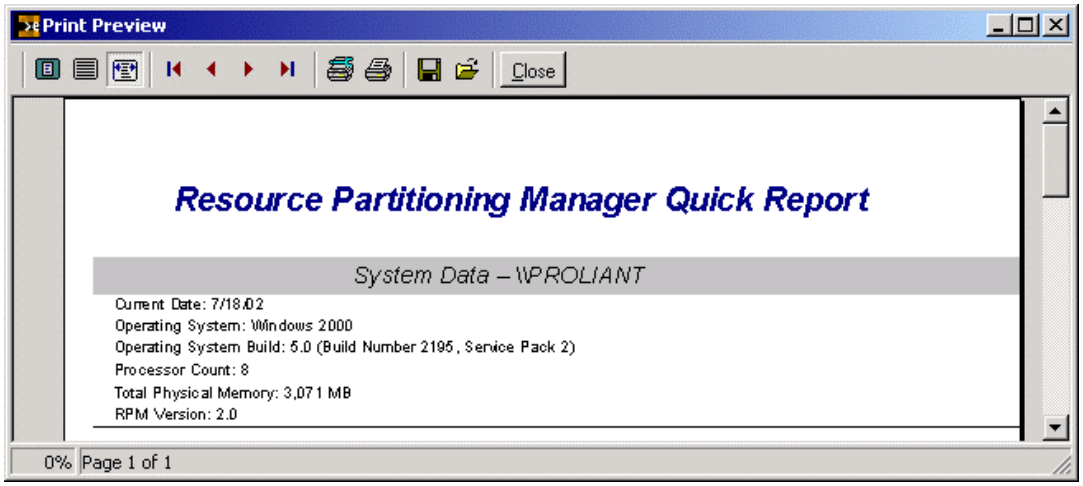

Figure 5-14: System data report preview

6. Click **Close** to close the preview window.
7. Click **Print** to print the report.
8. Click **Exit** to set your preferences and leave the **Reporting Preferences** screen.

NOTE: Customized report configurations can be saved to a file using the **Save Layout** button, and reloaded at a later time using the **Load Layout** button.

Partition Reports

Users with dedicated web servers that host customer websites or applications can now get reports from RPM that provide CPU, memory, and I/O usage data by partition. This data can be used to calculate the cost of resources used for customer billing purposes.

To create a partition level report:

1. Select **Partition, Reporting** on the menu bar, or select **Tools, Reporting, Partitions** on the menu bar. The following screen is displayed.

NOTE: The **System Data** options are grayed out when a partition report is being created.

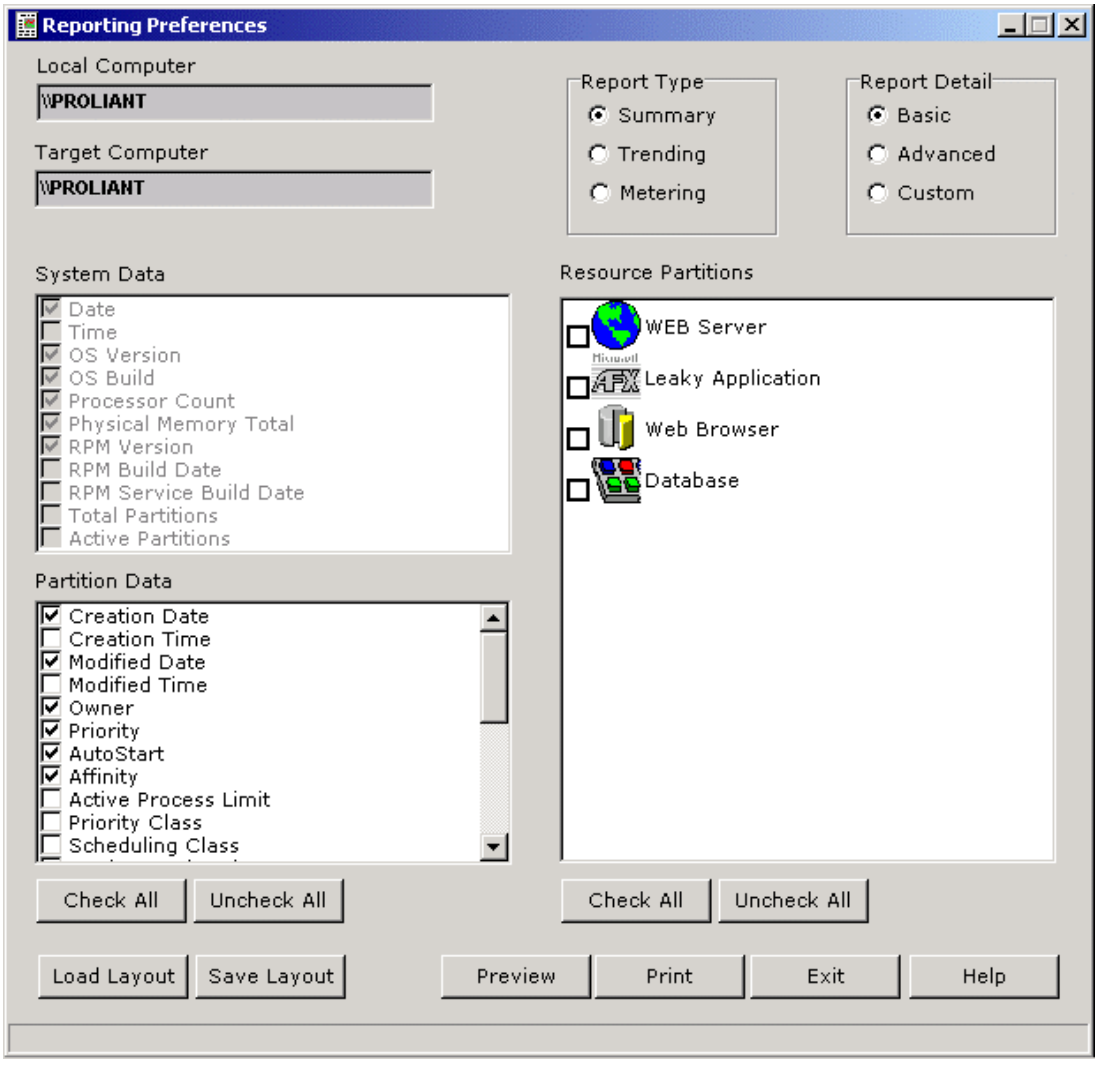

Figure 5-15: Partition Reporting Preferences

2. Select **Summary, Trending,** or **Metering** in the **Report Type** section to select the type of data to be reported.

3. Select **Basic, Advanced,** or **Custom** in the **Report Detail** section. The items that are selected in the **Partition Data** window change based on the level of detail you select. Selecting **Basic** or **Advanced** activates default settings in the **Partition Data** section. Select **Custom** to clear the **Partition Data** window and make your own partition data selections.
4. Select which partitions to include in the report in the **Resource Partitions** section.
5. Click **Preview** to see a preview of the report you created.

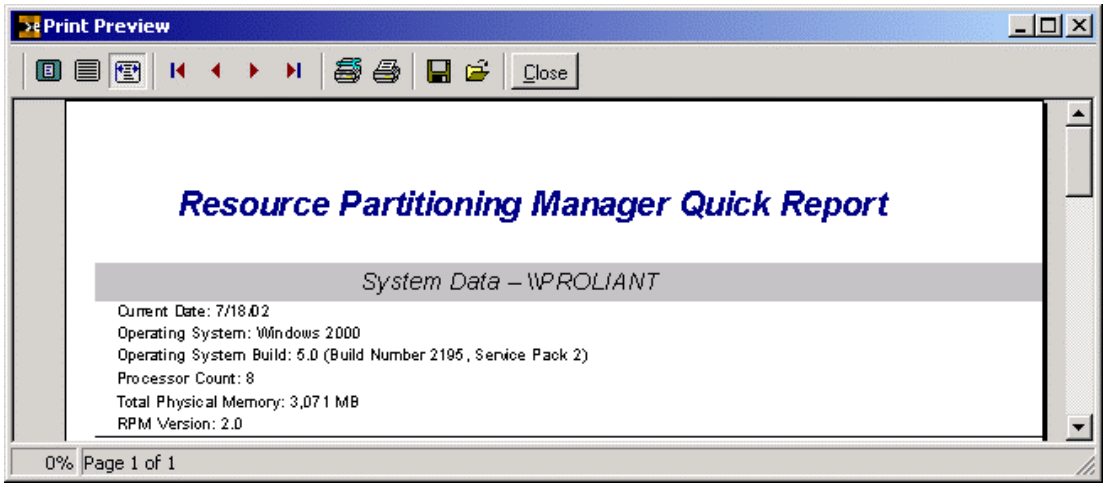

Figure 5-16: Partition data report preview

6. Click **Close** to close the preview window.
7. Click **Print** to print the report.
8. Click **Exit** to set your preferences and leave the **Reporting Preferences** screen.

NOTE: Customized report configurations can be saved to a file using the **Save Layout** button, and reloaded at a later time using the **Load Layout** button.

Setting Chart Properties

RPM enables you to customize chart colors and modify how frequently data is captured and updated.

To set customized properties for charts:

1. Select **Tools** on the menu bar.
2. Select **Options.**
3. Select the **Chart Properties** tab. The following screen is displayed.

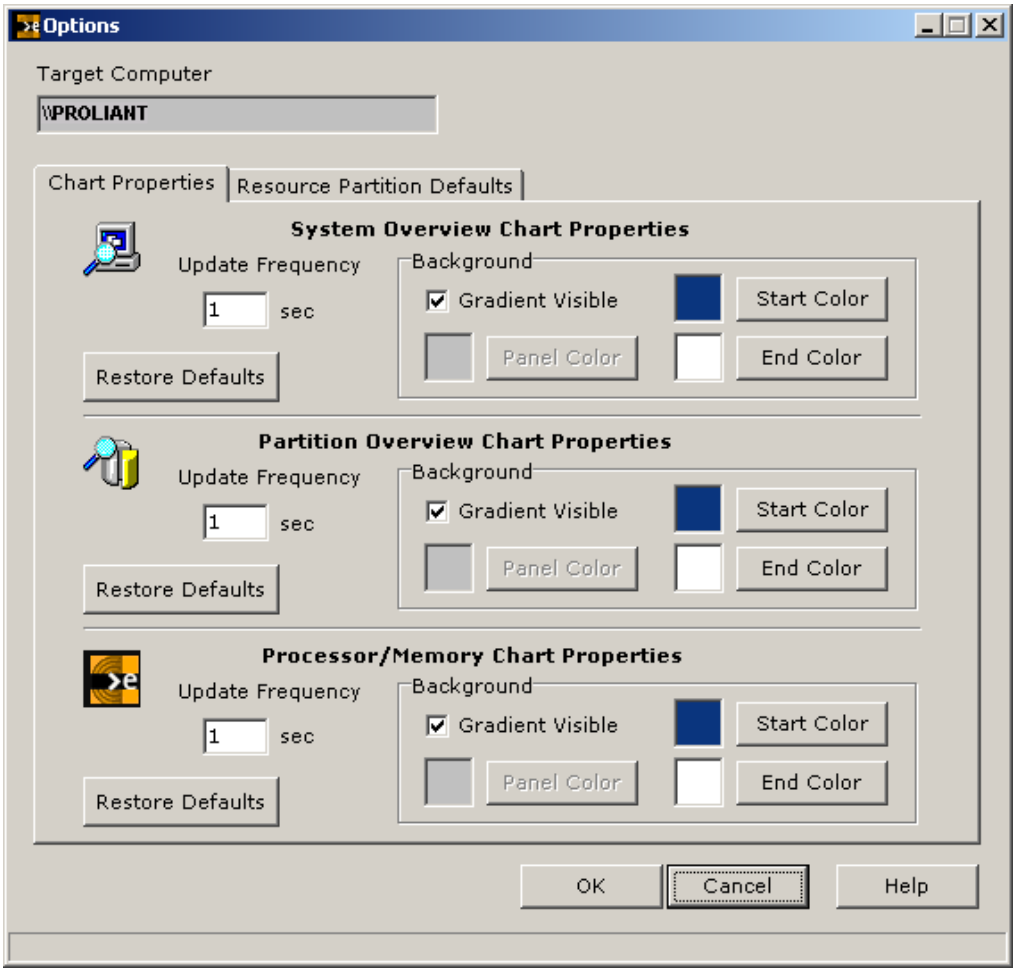

Figure 5-17: Options (Chart Properties tab)

4. Set the update frequencies and colors for each section.

NOTE: Longer update times decrease system traffic.

5. Click **OK.**

To return to the original chart properties settings, click the **Restore Defaults** button for the setting you want to restore.

Setting Partition Defaults

RPM enables you to set default properties for new Resource Partitions.

NOTE: Setting partition defaults does not affect the settings for existing Resource Partitions.

To set a default partition:

1. Select **Tools** on the menu bar.
2. Select **Options.**
3. Select the **Resource Partition Defaults** tab. The following screen is displayed.

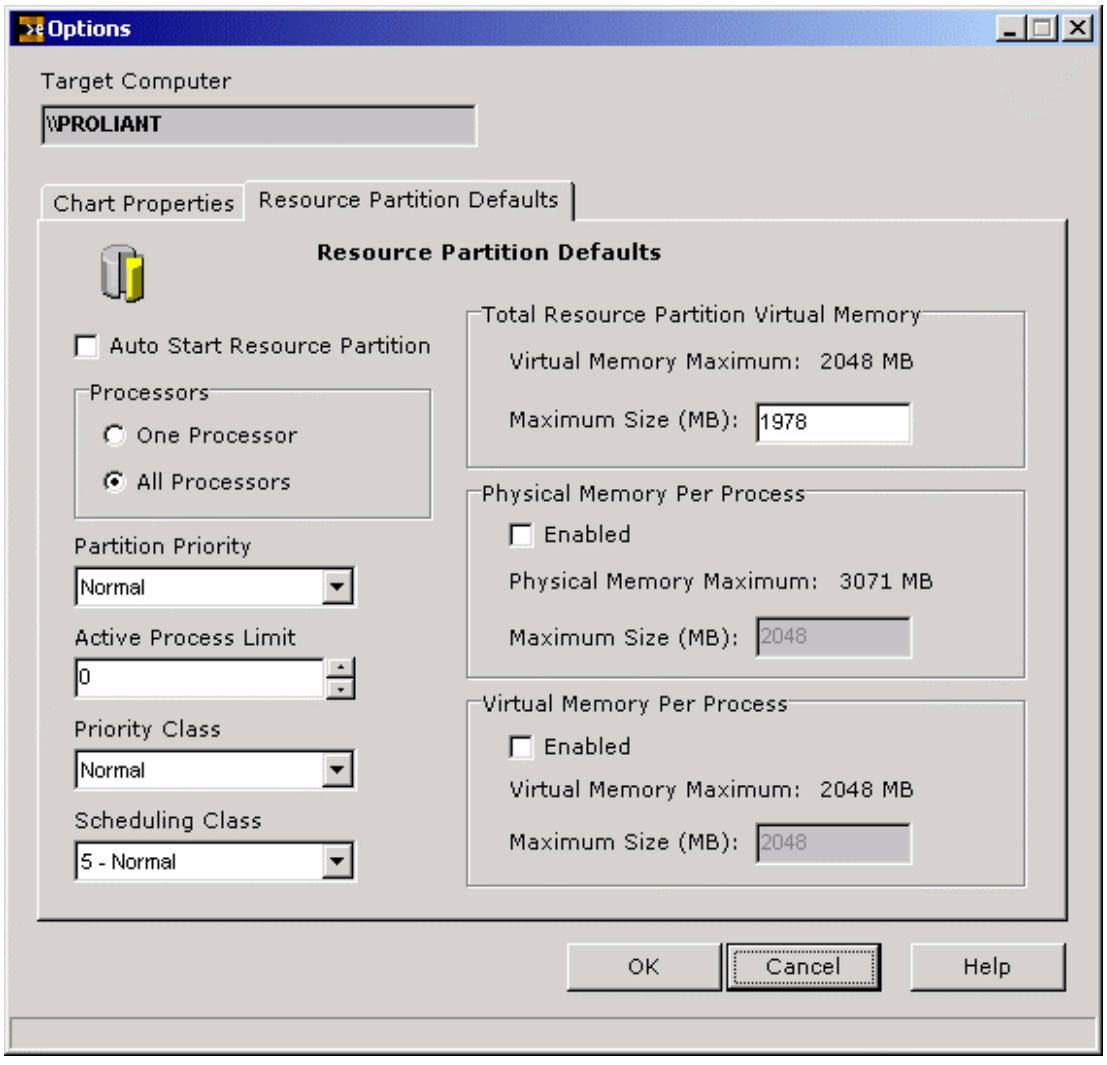

Figure 5-18: Options (Resource Partition Defaults tab)

4. Select the settings to use as defaults.
5. Click **OK.**

6

Troubleshooting

Hardware Configuration Changes

In the event of a significant change to the system configuration, particularly the addition or removal of processors or memory, Resource Partition configurations may be rendered invalid. In this case, you need to review Resource Partition configurations for any needed updates in light of the system changes. Resource Partitioning Manager (RPM) will display a warning box noting that a system configuration change has occurred, and it will attempt to highlight potential areas of concern.

GUI Synchronization

If a single server is managed simultaneously by two RPM GUIs—one local and one remote—GUI synchronization issues may result. For example, if the GUI is left running on the server, and an administrator uses a GUI remotely to delete a Resource Partition, that change will not be automatically reflected on the RPM GUI running on the server. To update the information in RPM, click **Refresh** on the main toolbar.

Terminal Services

Terminal Services is designed to emulate a mainframe client-server environment. When viewing the server screen using Terminal Services, you are actually seeing a reproduction of the server screen, as if you are the only user.

Because of this effect, running RPM by means of Terminal Services can produce some confusion. More specifically, applications launched by RPM when running by means of Terminal Services will not appear to have been started, because they will be launched outside of the client space. Thus, they will not be displayed in the Terminal Services window, although they will be displayed on the actual server console.

Running Multiple Instances of the Same Application

Although RPM supports running multiple instances of most applications, in situations where you have to capture multiple instances of the same program, care must be taken to be sure that processes are captured by the correct active Resource Partition. Table 6-1 shows three instances of an application and three active Resource Partitions, each waiting to capture an instance.

Table 6-1: Multiple Instances of the Same Application

Application	Active Resource Partition
Application Instance # 1	Active Resource Partition # 1 (waiting for application to start)
Application Instance # 2	Active Resource Partition # 2 (waiting for application to start)
Application Instance # 3	Active Resource Partition # 3 (waiting for application to start)

In situations where each Resource Partition is configured differently, start each Resource Partition manually, then manually start the application instance to be captured. Continue the sequence until all of the instances have been started (activate a Resource Partition, start an application instance, activate a Resource Partition, start an application instance, and so on).

NOTE: This scenario only applies if an instance **must** be captured by a specific Resource Partition.

Error Messages

Use error messages to assist you in troubleshooting and performing basic diagnostic functions in RPM.

Table 6-2: RPM Error Messages

Error Message	Cause
Please enter an integer between X and Y.	The *X* and *Y* in this error message are variables based on the minimum and maximum values of items such as memory on the server that is running RPM.
At least one processor must be assigned to the resource partition.	This error message occurs when no processors are assigned to a Resource Partition during the partition creation process.
Unable to load the Resource Partitioning Manager help file.	This error message occurs if RPM cannot load the help file. This situation can occur if the help file is missing or corrupted.
The properties of a process contained within an active Resource Partition cannot be modified.	This error message occurs if an attempt is made by the user to modify the properties of a process in an active Resource Partition.

continued

Table 6-2: RPM Error Messages *continued*

Error Message	Cause
Please enter a value both between 1 and 100 and greater than the Remove Memory Percent value.	This error message occurs if the user attempts to enter a number for the memory percent value for the **Add When** rule that is not between 1 and 100 percent (inclusive) or is not greater than memory percent value for the **Remove When** rule.
Please enter a value both between 1 and 100 and less than the Add Memory Percent value.	This error message occurs if the user attempts to enter a number for the memory percent value for the **Remove When** rule that is not between 1 and 100 percent (inclusive) or is not less than the memory percent value for the **Add When** rule.
Please enter a value both between 1 and 100 and greater than the Remove Processor Percent value.	This error message occurs if the user attempts to enter a number for the processor percent value for the **Add When** rule that is not between 1 and 100 percent (inclusive) or is not greater than the processor percent value for the **Remove When** rule.
Please enter a value both between 1 and 100 and less than the Add Processor Percent value.	This error message occurs when the user attempts to enter a number for the processor percent value for the **Remove When** rule that is not between 1 and 100 percent (inclusive) or is not less than the processor percent value for the **Add When** rule.
Please enter a non-zero positive integer.	This error message occurs when a number other than a non-zero positive integer is entered into a field that requires a non-zero positive integer value. Examples of this type of field are fields for seconds, minutes, or hours for the rules settings.
Invalid Configuration: At least one processor must be set as Available or Preferred.	This error message occurs when the user has entered the **Advanced Processor Rules Settings** screen and fails to set at least one processor as **Available** or **Preferred**. It prevents the user from setting all of the processors as **Do Not Use.**
Invalid Domain or Username	This error message occurs when an invalid domain or user name is entered into the **Logon** tab of the **Service Properties** screen.
Password Mismatch	This error message occurs when the password entered does not match the **Confirm password** field on the **Logon** tab of the **Service Properties** screen.

Additional Troubleshooting Information

For additional RPM troubleshooting information, refer to the troubleshooting section of the RPM website. This section contains more comprehensive information and should be consulted before contacting HP Technical Support. The troubleshooting section is located at

www.hp.com/products/wmp

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