Digital UNIX

Performance Manager

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Product Version:	POLYCENTER Performance Manager Version 2.1
Operating System and Version:	Digital UNIX Version 4.0 or higher

POLYCENTER Performance Manager is a real-time performance manager that allows you to detect and correct performance problems.

Digital Equipment Corporation
Maynard, Massachusetts

Contents

4 Archives

5 Commands

6 Troubleshooting

Index

Figures

Tables

Preface

POLYCENTER™ Performance Manager is a real-time performance manager that allows you to detect and correct performance problems. POLYCENTER Performance Manager comprises three primary pieces: `pmgr` (Performance Manager Graphical User Interface), `pmgrd` (Performance Manager daemon), and `pmgr_actd` (the activity daemon). An additional daemon, `clstrmond`, is used in monitoring TruClusters.™

Performance Manager runs locally and can display data from every node in your Digital UNIX™ network that runs the Performance Manager daemon, SNMP daemon, or cluster daemon. Tables and graphs show you hundreds of different system values, including:

- CPU performance
- Memory usage
- Disk transfers
- File-system capacity
- Network efficiency
- Buffer cache hit rates
- Cluster specific metrics

In addition to monitoring, Performance Manager provides these features:

- Metric data can be archived to a file, showing resource usage trends and historical analysis.
- Performance analysis and system management commands (yours and those supplied with Performance Manager) can be run on multiple nodes at once using the graphical user interface (GUI).
- You can add your own administration tasks to the extensible GUI.

Documentation Note

Digital recommends using the HTML version of this user's guide. See the Performance Manager release notes to locate the HTML version of this user's guide in your kit. If you do not have a World Wide Web browser available to view the user's guide, see the release notes for instructions on how to obtain one from the Netscape™ Corporation.

Related Documentation

The printed version of the Digital UNIX documentation set is color coded to help specific audiences quickly find the books that meet their needs. (You can order the printed documentation from Digital.) This color coding is reinforced with the use of an icon on the spines of books. The following list describes this convention:

Audience	Icon	Color Code
General users	G	Blue
System and network administrators	S	Red
Programmers	P	Purple
Device driver writers	D	Orange
Reference page users	R	Green

Some books in the documentation set help meet the needs of several audiences. For example, the information in some system books is also used by programmers. Keep this in mind when searching for information on specific topics.

The *Documentation Overview, Glossary, and Master Index* provides information on all of the books in the Digital UNIX documentation set.

Conventions

The following conventions are used in this document:

`%` `$`	A percent sign represents the C shell system prompt. A dollar sign represents the system prompt for the Bourne and Korn shells.
`#`	A number sign represents the superuser prompt.
`% cat`	Boldface type in interactive examples indicates typed user input.
file	Italic (slanted) type indicates variable values, placeholders, and function argument names.
`cat`(1)	A cross-reference to a reference page includes the appropriate section number in parentheses. For example, `cat`(1) indicates that you can find information on the `cat` command in Section 1 of the reference pages.

Ctrl/*x*	This symbol indicates that you hold down the first named key while pressing the key or mouse button that follows the slash. In examples, this key combination is enclosed in a box (for example, Ctrl/C).

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Getting Started 1

This chapter tells how to start and exit Performance Manager, defines some Performance Manager terms, and explains the GUI's main window.

1.1 Starting Performance Manager

To start Performance Manager, log in to a node where Performance Manager has been installed. If the `rehash` command has not been issued since Performance Manager was installed, issue that command:

```
% rehash
```

Before starting Performance Manager, be sure the DISPLAY environment variable (see Section 1.2) on the system where Performance Manager will be started is set to the X Window System workstation or PC where you want Performance Manager displayed.

There are extra things to consider if you display Performance Manager on a PC (see Section 1.3).

To start Performance Manager, issue the `/usr/bin/pmgr` command at the prompt (see the `pmgr`(8) reference page for details):

```
# pmgr
```

When Performance Manager starts, it opens its identity window on the workstation defined by the DISPLAY environment variable. Click on the identity window to close it and display the main window.

1.2 Setting the DISPLAY Environment Variable

The DISPLAY environment variable on the system where Performance Manager will be started must be set to the X Window System workstation or PC where you want Performance Manager displayed.

Note that your workstation should be a Digital UNIX node with the Common Desktop Environment (CDE) window server. Nodes running other operating systems and other window servers might work, but you are expected to use Digital UNIX.

Also be sure your workstation permits Performance Manager to be displayed if you are running Performance Manager remotely.

1.2.1 Setting DISPLAY in a C Shell

To set the DISPLAY environment variable in a C shell (`csh`), issue the following command, where *`workstation`* is the name of your workstation:

```
% setenv DISPLAY workstation:0.0
```

1.2.2 Setting DISPLAY in a Bourne or Korn Shell

To set the DISPLAY environment variable in a Bourne shell (`sh`) or korn shell (`ksh`), issue the following commands, where *`workstation`* is the name of your workstation:

```
$ DISPLAY=workstation:0.0
$ export DISPLAY
```

1.3 Displaying Performance Manager on a PC

Performance Manager can be displayed on most PCs. Either start Performance Manager on the PC through a PC X server program (such as eXcursion™), or start Performance Manager on a server node whose DISPLAY environment variable is set to the PC (see Section 1.2). Either TCP/IP or DECnet™ will work, but consider the following when displaying Performance Manager on a PC:

- The PC and the Digital UNIX server node must know about each other. The PC's network name and address must be in the server node's `/etc/hosts` file or DUS database (TCP/IP) or NCP/NCL database (DECnet). The server node's network name must be in the PC's TCP/IP file or NCP/NCL database (DECnet).
- When starting Performance Manager on a PC using an X server program (such as eXcursion), there can be error messages that the X server program cannot report, such as your user name not being authorized to run Performance Manager, LMF license check failure, and so forth. To check for such errors, start Performance Manager on the server node after setting DISPLAY to the PC.
- Depending on how your PC's resources are configured, it is possible to overload an X server program by displaying too many applications, especially large ones such as Performance Manager (as compared to small ones such as `dxclock`, `dxterm`, and `dxcalendar`). Overloading an X server program can cause odd nonintuitive errors. If you see such errors, try closing a few applications and retrying Performance Manager.

1.4 Exiting Performance Manager

To exit Performance Manager, from the File menu, choose Exit. Your current session will not be saved when exiting. To save the session, choose Save Session from the main window's File menu.

1.5 Performance Manager Terms

Performance Manager uses terms you might be unfamiliar with or have different meanings for:

- **Node**. A computer system that is uniquely addressable on a network. A node can have more than one CPU.
- **Cluster**. A collection of nodes that appears to be a single-server system, allowing for greater application availability and scalability than would be possible with a single system.
- **Group**. A collection of nodes that are frequently managed together.
- **Metric**. A particular item of information about a node. For example, the average run queue length over the past 5 seconds, the number of bytes transferred to or from a disk, or the number of characters sent to a terminal. Performance Manager has over 400 metrics, divided among several categories (CPU, Disk, Network, and so on).
- **Threshold**. A limit you can set on a metric. If that limit is crossed, an action you previously specified is taken. For example, you could set a threshold of 90% capacity on some or all of your disks, with the action being to run a command that moves some files off that disk.
- **Archive**. A file containing data gathered by Performance Manager. Instead of watching data displayed in real time, you can capture data in an archive or condense and graph the data. See Chapter 4 for more information on archives.
- **Metrics server**. A UNIX daemon process that services requests for system information. Performance Manager includes support for several metric servers.
- **Session**. A set of choices you make using Performance Manager. A session comprises selected nodes, metrics, display types, and threshold settings. You can save as many sessions as you want, but you can only run one session at a time. See Section 3.1 for more information on sessions.

1.6 Main Window Overview

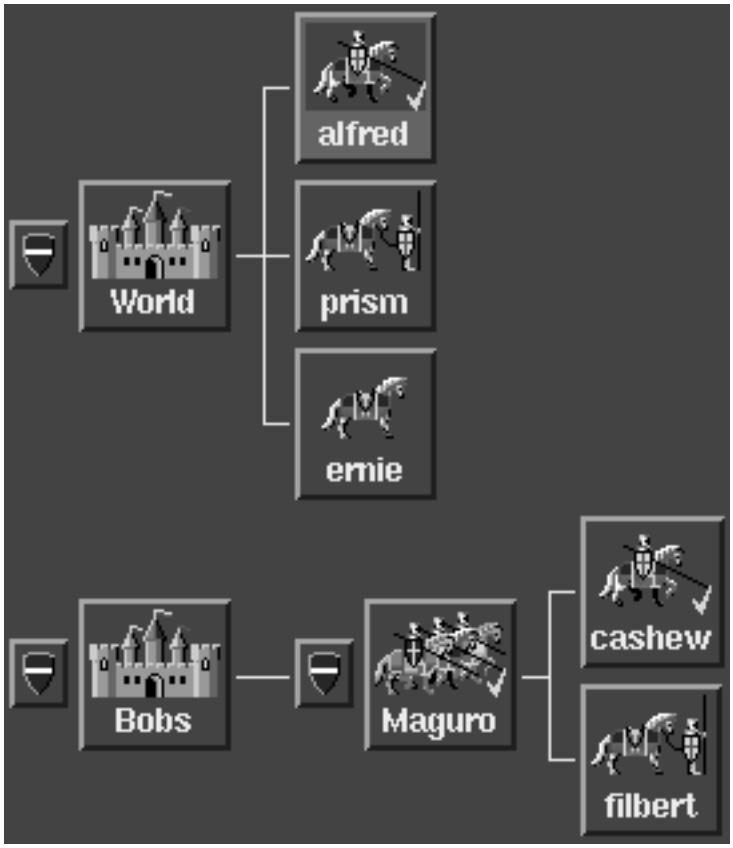
This section explains the buttons and icons used in Performance Manager's main window.

When Performance Manager is started, there is no work area. Clicking on a node, cluster, or group in Performance Manager's initial main window causes the work area to appear.

1.6.1 Nodes Area Icons

The nodes area, on the left side of the main window, shows the nodes available for monitoring. By default, the local node is displayed and belongs to the group "World." Figure 1-1 shows an example of a nodes area and the icons in it. To manage the nodes area, go to the main window's Tasks menu and choose Node Management (see Chapter 2).

Figure 1-1: Nodes Area



1.6.1.1 Node Icons

A node is a computer system that is uniquely addressable on a network. A node can have more than one CPU. Single horses represent individual nodes in various states. Three horses indicate a cluster. In Figure 1-1, the nodes are named alfred, prism, ernie, cashew, and filbert.

A node icon changes to reflect one of the following three node states:

Appearance	Node State
No knight	Node is down or invalid.
Knight standing	Node is up.
Knight on horse	Node is up, metrics have been selected for monitoring.

A check mark indicates that metrics have been selected for monitoring. In addition, when a node is selected, the background color of the node icon will change.

1.6.1.2 Cluster Icons

A cluster is a collection of nodes that appears to be a single-server system, allowing for greater application availability and scalability than would be possible with a single system. A set of three horses represents a cluster. In Figure 1-1, the cluster is named Maguro.

A cluster icon changes to reflect one of the following three cluster states:

Appearance	Cluster State
No knights	All nodes in the cluster are down or invalid.
Knights standing	Nodes in the cluster are up.
Knights on horses	Nodes are up, metrics have been selected for monitoring.

A check mark indicates that metrics have been selected for monitoring. In addition, when a cluster is selected, the background color of the cluster icon will change.

1.6.1.3 Group Icons

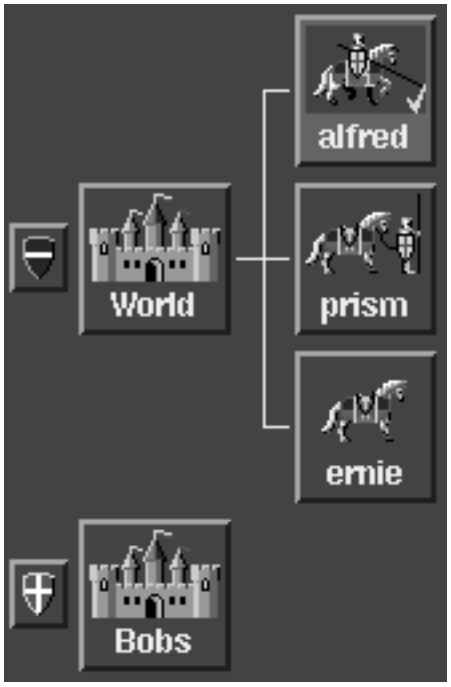
A group is a collection of nodes and/or clusters that are frequently managed together. Castles represent these collections. In Figure 1-1, the groups are named World and Bobs.

If the group icon shows a check mark, metrics have been selected for monitoring for every cluster and node in the group. In addition, when a group is selected, the background color will change.

1.6.1.4 Shield Icons

A shield appears next to each castle (group) and set of three horses (cluster). A shield displaying a minus sign (-) shows that all nodes in the group or cluster are exposed (see Figure 1-2). A shield displaying the plus sign (+) shows that all nodes are hidden. Clicking on that shield would expose all the nodes and clusters inside. The shield next to the group Bobs indicates that nodes are hidden.

Figure 1-2: Shields



1.6.2 Buttons

Buttons that appear in the main window are described in this section.

Figure 1-3: Metric-Category Buttons

Each category of metrics has its own button, and the buttons can be in one of three states, as shown in Figure 1-3: CPU is selected, System is not selected, and Process is not selected but metrics in the category are. (For more information about metric categories, see Section 3.2.)

Figure 1-4: Display Button

Click on the Display button (see Figure 1-4) to select displays for a session.

Figure 1-5: Start Session Button

Click on the Start Session button (see Figure 1-5) to start the currently loaded session. The displays and thresholds you have selected become active as soon as you click on this button. This button is active only when a session is not running. (For more information about sessions, see Section 3.1.)

Figure 1-6: Stop Session Button

Click on the Stop Session button (see Figure 1-6) to stop the current session. All metric displays are closed and thresholds are cleared, but archives continue to collect data as specified. This button is active only when a session is running.

Figure 1-7: Guide Button

Click on the Guide button for help with defining a session. (Not yet implemented.)

1.7 Modifying the Main Window

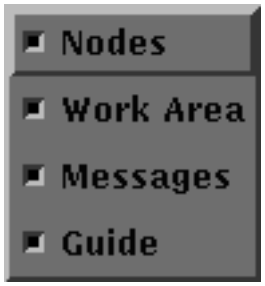
The foreground and background color of all Performance Manager windows can be changed by starting Performance Manager with different colors; for example:

```
# pmgr  -fg black -bg  salmon
```

You can also modfy the font and background and foreground colors used in the interface by editing the X resouce file, `/usr/lib/X11/app-defaults/PM`.

Each area of the main window can be hidden or exposed by using the View menu (see Figure 1-8).

Figure 1-8: View Menu



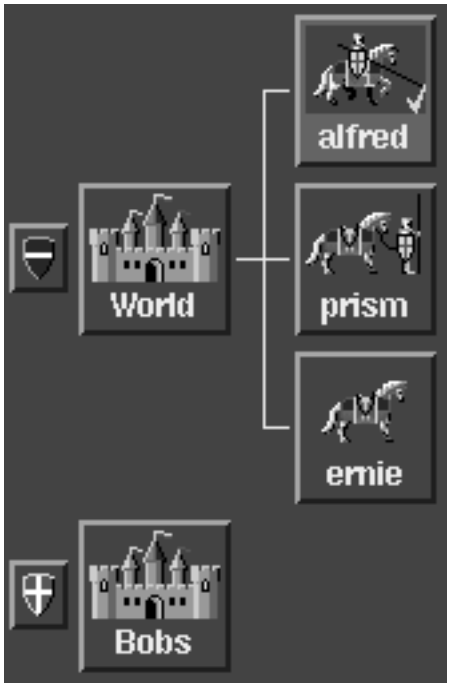
Node Management 2

Node management involves adding nodes or clusters to or deleting nodes or clusters from the main window's nodes area, moving nodes or clusters among groups, and creating and deleting groups.

2.1 Adding Nodes

Adding a node makes an icon for it to appear in the main window's nodes area (see Figure 2-1), which allows you to display its metrics and run scripts on it.

Figure 2-1: Nodes Area



To add a node, follow these steps:

1. From the main window's Tasks menu, choose Node Management, which opens the Node Management dialog box.
2. Select Create from the option menu in the upper-left corner.
3. Click in the Group field and type the name of the group (new or existing) the node is to be added to, or choose the group from the drop-down list.
4. Click in the Node field and type the name of the node to be added.
5. Click on Apply.

2.2 Moving Nodes

You can move a node from one group to another in the main window's nodes area:

1. From the main window's Tasks menu, choose Node Management, which opens the Node Management dialog box.
2. Select Move Node from the option menu in the upper-left corner.
3. Click in the Group field and type the name of the group the node is to be moved from, or choose the group from the drop-down list.
4. Click in the Node field and type the name of the node to be moved, or choose the node from the drop-down list.
5. Click in the Move to Group field and type the name of the group the node is to be moved to, or choose the group from the drop-down list.
6. Click on Apply.

2.3 Deleting Nodes

Deleting a node removes it from the main window's nodes area. Once it is deleted, you will no longer be able to display the node metrics or run scripts on the node. To delete a node:

1. From the main window's Tasks menu, choose Node Management, which opens the Node Management dialog box.
2. Select Delete from the option menu in the upper-left corner.
3. Click in the Group field and type the name of the group the node is to be deleted from, or choose the group from the drop-down list.
4. Click in the Node field and type the name of the node to be deleted, or choose the node from the drop-down list.
5. Click on Apply.

2.4 Adding Clusters

Add clusters so you can monitor their nodes in the main window's nodes area. To add a cluster:

1. From the main window's Tasks menu, choose Node Management, which opens the Node Management dialog box.
2. Select Create from the option menu in the upper-left corner.
3. Click in the Group field and type the name of the group (new or existing) the cluster is to be added to, or choose the group from the drop-down list.
4. Click in the Node field and type the name of the cluster to be added.
5. Set the Node Is a Cluster Alias check box to the *on* position.
6. Click in the Any Cluster Member field and type the name of one node in the cluster; the other nodes will be automatically added to the cluster.
7. Click on Apply.

2.5 Moving Clusters

You can move a cluster from one group to another in the main window's nodes area. To move a cluster:

1. From the main window's Tasks menu, choose Node Management, which opens the Node Management dialog box.
2. Select Move Node from the option menu in the upper-left corner.
3. Click in the Group field and type the name of the group the cluster is to be moved from, or choose the group from the drop-down list.
4. Click in the Node field and type the name of the cluster to be moved, or choose the cluster from the drop-down list.
5. Click in the Move to Group field and type the name of the group the cluster is to be moved to, or choose the group from the drop-down list.
6. Click on Apply.

2.6 Deleting Clusters

Deleting a cluster removes it from the nodes area and deletes all nodes in the group. Once it is deleted, you will no longer be able to display metrics or run scripts on any node in the cluster. To delete a cluster:

1. From the main window's Tasks menu, choose Node Management, which opens the Node Management dialog box.

2. Select Delete from the option menu in the upper-left corner.
3. Click in the Group field and type the name of the group the cluster is to be deleted from, or choose the group from the drop-down list.
4. Click in the Node field and type the name of the cluster to be deleted, or choose the cluster from the drop-down list.
5. Click on Apply.

2.7 Creating Groups

Create groups to organize your nodes in the main window's nodes area:

1. From the main window's Tasks menu, choose Node Management, which opens the Node Management dialog box.
2. Select Create from the option menu in the upper-left corner.
3. Click in the Group field and type the name of the group to be added.
4. Click on Apply.

2.8 Deleting Groups

Deleting a group removes it from the main window's nodes area, and all nodes and clusters in that group will also be removed. To delete a group:

1. From the main window's Tasks menu, choose Node Management, which opens the Node Management dialog box.
2. Select Delete from the option menu in the upper-left corner.
3. Click in the Group field and type the name of the group to be deleted, or choose the group from the drop-down list.
4. Click on Apply.

Monitoring 3

Monitoring nodes means looking at performance data in real time. This section explains sessions, metric categories, the types of displays you can choose, and how to float displays.

3.1 Sessions

Everything you do in Performance Manager occurs within a *session*. A session is to Performance Manager as a file is to an editor. You can change sessions, save sessions, or recall previous sessions.

When defining a session, you select which nodes to monitor and which metrics to watch. Starting the session puts everything in motion: the displays you specified will open.

When you are through, stop the session. Sessions can be saved and recalled later, which eliminates the need to respecify your choices. You can also modify saved sessions.

3.1.1 Creating a Session

To create a session that opens displays, follow these steps:

1. From the main window's File menu, choose New Session.
2. Select a node, group, or cluster in the main window's nodes area. The work area will display to the right.
3. Click on the Display button, if not already selected.
4. Select a metric category from the horizontally scrolling list at the top of the work area.
5. Under Metrics, set a metric check box.
6. Use the metric's related option menu to choose a display type.
7. Select an interval.
8. Repeat the previous steps (except step 1) for every node, cluster, or group you want to monitor.
9. Click on the Start Session button.

3.1.2 Saving a Session

To save a session, from the main window's File menu, choose Save Session.

3.1.3 Recalling a Session

To recall a previous session, from the main window's File menu, choose Open Session.

3.2 Metrics

Performance Manager can gather data on several hundred metrics. For a description of a particular metric, use context-sensitive help. From the main window's Help menu, choose On Item, then click on a metric. A Help box will appear.

3.2.1 Showing Hidden Metric Categories

Select one of the metric categories at the top of the work area to display metrics that you can select for monitoring. To display additional categories not in the list:

1. From the main window's Tasks menu, choose Category Management, which opens the Category Management dialog box.
2. Select a category in the Hidden Categories list box.
3. Click on the lower Move To button. The selected category now appears in the Visible Categories list box.
4. Click on OK.

While working in the Category Management dialog box, you can cancel any moves by clicking on the Reset button. The lists of visible and hidden categories will be reset to how they were when you opened the dialog box.

3.2.2 Hiding Metric Categories

If the list of metric categories shows categories that you are not using, you can choose to temporarily remove categories from the list. To remove categories from the list:

1. From the main window's Tasks menu, choose Category Management, which opens the Category Management dialog box.
2. Select a category in the Visible Categories list box.

3. Click on the upper Move To button. The selected category now appears in the Hidden Categories list box.
4. Click on OK.

3.3 Displays

Each performance metric can be displayed in several display types including table, plot, pie, area, bar, and stack bar. Display types are chosen from the option menu to the right of each metric in the main window. Examples of some of the display types are shown in the following figures.

Figure 3-1: Area

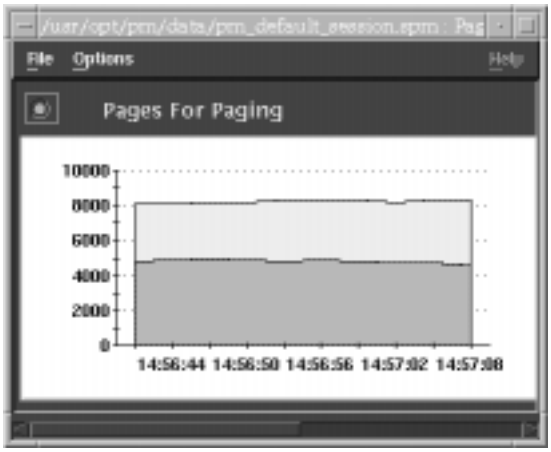


Figure 3-2: Bar

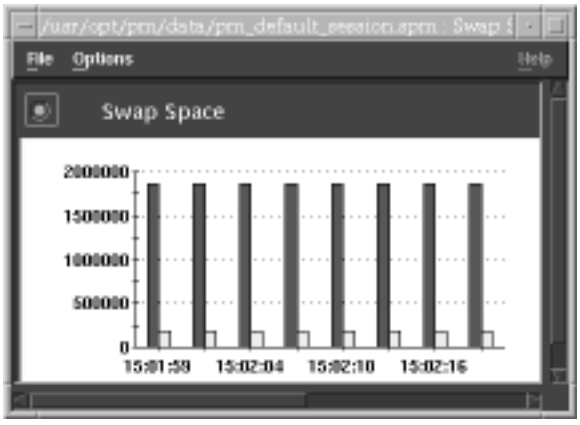


Figure 3-3: Pie

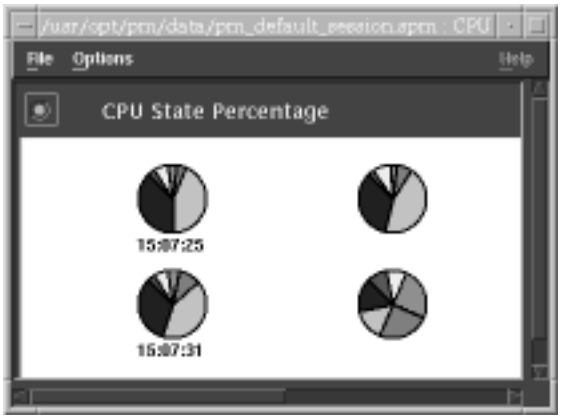


Figure 3-4: Plot

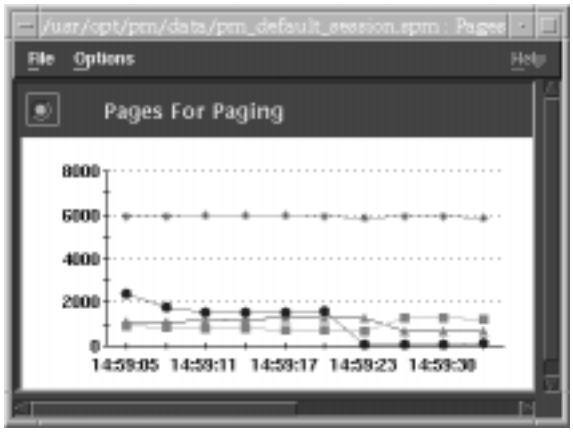


Figure 3-5: Stack Bar

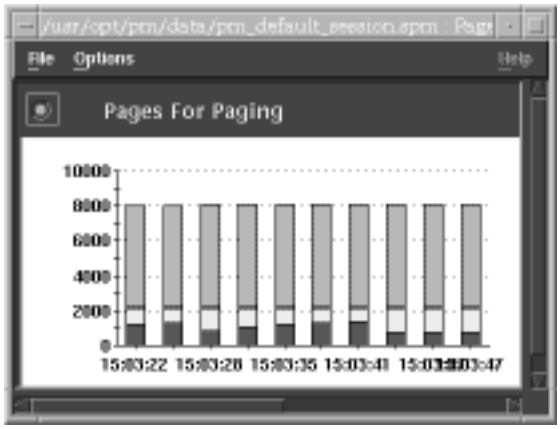
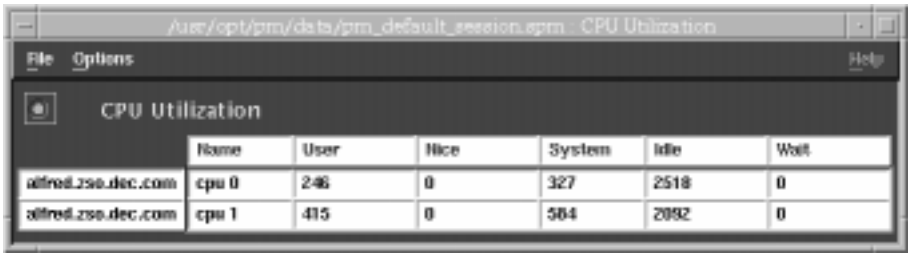


Figure 3-6: Table



3.3.1 Floating Displays

When a new session is opened, all displays are shown in the session window; however, individual displays can be "floated out" in their own separate windows.

To float a display:

1. Set the radio button next to the metric title to the *on* position.
2. From the session window's File menu, choose Current Display, then choose Float.

The display now appears in its own window.

You must save a session after floating displays if you want the displays to appear in their own windows when the session is reopened.

3.3.2 Consolidating Displays

Floating displays can be closed so that they reappear in the session window. To consolidate a floating display into the session:

1. From the display window's File menu, choose No Float.
2. The display now appears in the session window.

3.4 Other Monitoring Methods

The following sections provide information on methods for monitoring without using the Performance Manager GUI.

3.4.1 Accessing Metrics Servers Through SNMP Requests Over Private Ports

The metrics servers provided by Performance Manager are SNMP agents. You can access them using most SNMP manager applications and utility programs.

Each Performance Manager metrics server listens on a UDP port. You can determine the UDP port numbers by examining the `/etc/services` file.

The following example shows a typical `/etc/services` file:

```
pmgr-snmp      1161/udp  # PMGR 2.1 private SNMP request port
clstrmond-snmp 1165/udp  # PMGR 2.1 TruCluster agent private SNMP port
```

In this example, SNMP requests issued to port 1161 will be processed by the `pmgrd` command while requests issued to port 1165 will be handled by the `clstrmond` command.

3.4.2 Accessing Metrics Servers from the Command Line

The following UNIX commands are provided for command-line access to the metrics servers:

- `getone`
- `getnext`
- `getmany`
- `getbulk`
- `gettab`

When you issue these commands, the SNMP requests are, by default, sent to the well-known SNMP port (UDP 161). To specify a different port, use the environment variable `PMGR_SNMP_PORT`.

The following example shows how to query the `pmgrd` using the `getmany` command:

```
% getmany alfred public pm
pmCmSysProcessorType.0 = alpha(2)
pmCmSysOperatingSystem.0 = digital-unix(2)
pmCmSysOSMajorVersion.0 = 3
pmCmSysOSMinorVersion.0 = 2
pmCmSysPageSize.0 = 8192
pmCmSysNumCpusOnline.0 = 2
pmCmSysPhysMem.0 = 262136
pmCmSysPhysMemUsed.0 = 56328
pmCmSysUpTime.0 = 88677120
pmCmSysDate.0 = 7.204.1.17.17.58.57.0.-.8.0
pmCmSysNumUsers.0 = 14
pmCmSysProcesses.0 = 81
   .
   .
   .
pmAoVmSwapInUse.0 = 57160
pmAoVmSwapDefault.0 = /dev/re3c
pmAoVmSiIndex.1 = 1
pmAoVmSiPartition.1 = /dev/re3c
pmAoVmSiPagesAllocated.1 = 256896
pmAoVmSiPagesInUse.1 = 7145
pmAoVmSiPagesFree.1 = 249751
pmAoBcReadHits.0 = 21761200
pmAoBcReadMisses.0 = 78356
pmAoIfEthIndex.1 = 1
pmAoIfEthName.1 = tu0
pmAoIfEthCollisions.1 = 13064347
End of MIB.
```

3.4.3 Accessing Metrics Servers Using SNMP Network Management Systems

You can use SNMP manager software if it allows you to specify the UDP port to which SNMP requests are sent. The POLYCENTER NetView system is an SNMP manager. For detailed information on how to use NetView with Performance Manager, see the document in `/usr/opt/pm/nms/README.nms`.

Archives 4

Archives are files of data that are stored for later use. The data that you see when Performance Manager is monitoring can be saved in an archive file, then played back.

Thus, archives allow you to capture all data on one or more nodes without having to monitor them. Should performance problems develop later, you can retrieve the archive and examine the data to see when the problem began.

4.1 Archive Recording

This feature is not fully implemented yet. However, this version of Performance Manager includes two simple archiver scripts that archive the metrics that Performance Manager monitors:

```
singleton_archiver
tabular_archiver
```

Both archiver scripts are located in the following directory:

```
/var/opt/PM/SMscripts
```

Both scripts can be executed from the command line. The `tabular_archiver` script can also be executed from the `pmgr` GUI by selecting System Management from the main window's Execute menu, then selecting the Tabular Archiver item.

Both archiver scripts archive metrics from the `snmpd`, `pmgrd`, `advfsd`, and `clstrmond` daemons. The archiver assumes the ports for the daemons are: 161, 1161, 1163, and 1165 respectively. If your daemons run on different ports, modify the scripts accordingly.

4.2 Archive Playing

The data gathered from the the `singleton_archiver` and `tabular_archiver` scripts can be charted using the Microsoft(R) Excel macro, `archiver.xls`, which is also included in the following directory:

```
/var/opt/pm/SMscripts
```

This Excel macro will chart the data from either of the archiver scripts. When given a `singleton_archiver` output file, it will allow you to choose the

object that you want to plot and chart the data for all nodes. When given `tabular_archiver` output, it will plot all instances of a chosen object against time.

The format of the archived files is explained in the script itself and in the `/var/opt/pm/SMscripts/archiver.readme` file. Use this information to create your own plotting interface using the graphing tool of your choice.

Commands 5

A command is any executable program, such as a shell script or binary file. Performance Manager can execute commands on remote nodes or the local GUI node.

Performance Manager comes with several performance analysis (see Section 5.1), system management (see Section 5.2), and cluster analysis (see Section 5.3) scripts and you can execute these as they are or modify them to suit your needs (see Section 5.7). Performance Manager scripts can be found below the `/var/opt/pm` directory. You can also execute your own commands from Performance Manager by adding them to the Execute menu (see Section 5.5) and you can organize your commands in categories (see Section 5.8).

5.1 Performance Analysis Commands

Performance analysis commands are executed on the local node, but collect data from other nodes. Performance Manager's performance analysis commands are scripts that analyze nodes in four areas: CPU, memory, network, and disk I/O.

5.1.1 CPU Scripts

CPU Analysis

This script determines how efficiently a computer's CPU is being used. High idle time during a heavy load indicates an I/O bottleneck. High system time under a heavy load indicates excessive overhead. If inefficiency is discovered, other scripts can reveal the cause; try the Virtual Memory, Swapping, and Device I/O scripts.

Load Average

This script determines a computer's load average for the last minute, last 5 minutes, and last 15 minutes. The load average is the number of jobs in the run queue. An acceptable load average is 3 to 7 jobs for a large system, 1 to 2 jobs for a workstation. This script also reports if a computer is consumed by a small number of user processes, and lists the top CPU-using processes.

5.1.2 Memory Scripts

Buffer Cache

This script determines if a computer's buffer cache is too large or too small. A too-small cache causes excessive I/O. A too-large cache causes excessive paging and swapping.

Excessive Paging

This script determines if there is excessive paging on a computer by checking the number of free pages, paged out pages, and page faults. Excessive paging can be caused by a new process trying to allocate pages, or by active virtual memory being too large relative to active real memory.

Excessive Swapping

This script displays virtual memory and swap space usage and reports excessive usage.

Memory Shortage

This script determines if a computer has a memory shortage. If there is much swapping during paging, and runnable processes are swapped out while the free list increases, lack of memory is causing desperation swapping (also called "thrashing").

Virtual Memory

This script determines if a computer has virtual memory problems. This script displays swap configurations and the number of free pages, and compares the amounts of physical and virtual memory.

5.1.3 Network Scripts

Gateway Errors

This script determines if a computer has excessive gateway errors by looking at the number of bad checksum fields for IP, ICMP, TCP, and UDP. Gateway errors should be fewer than one hundredth of a percent of the total number of packets received.

Network Errors

This script determines if a network node (a computer in a network) has exceeded the acceptable number of network output errors and collisions. This script examines the length of the send queue for all connections, and displays the number of output errors, input errors, and collisions, as well as the number of in and out packets.

Packet Retransmissions

This script determines if a node has excessive network packet retransmissions by looking at the number of retransmissions and bad XIDs. (Bad XIDs are acks that return an XID different from the one sent.) Packet retransmissions should be fewer than 1% of the total number of client Network File System (NFS) calls. Retransmissions increase when you are working with network hardware or all your computers boot at the same time.

5.1.4 Disk I/O Scripts

Excessive Transactions

This script displays the transactions per second (tps) and total transactions on each device and reports excessive activity.

File System Analysis

This script determines if there are sufficient inode and file table entries to support the number of system processes. If inode and open file usage are more than 80%, increase the system parameter to make the usage less than 80%.

5.2 System Management Commands

System management commands perform tasks on the node they are executing on. When a system management command is executed:

1. If the command does not exist on a remote node, the command is copied from the node running the GUI to the remote node.
2. The activity daemon `pmgr_actd` executes the command on the remote node. If `pmgr_actd` is not running on a remote node, the command cannot execute. (See Section 6.1.2 for information about `pmgr_actd`.)
3. Any output is sent back to the node running the GUI for display in an output window.

File Modification

This script determines if files have been modified or accessed.

Clean File Systems

This script cleans full file systems of core files and other user-specified unneeded files.

Growth of Files

This script determines if files are growing faster than a certain rate.

Maintain Files

This script allows you to perform the following file management tasks:

- Move files to new file systems
- Copy files to new file systems or tapes
- Make symbolic links
- Delete files
- Change files' permissions
- Change files' user and group ownerships
- Undelete AdvFS files

Tabular Archiver

This script allows you to capture all metric data on one or more nodes without having to monitor them. The archived data can be replayed using Microsoft Excel or any other graphing tool you create an interface for. For more information, see the `tabular_archiver`(1) reference page.

5.3 Cluster Analysis Scripts

Cluster Load Average

This script determines if a cluster is working under an extreme load (3 jobs in the run queue by default) using metrics retrieved from the `pmgrd` for the last 5 seconds, last 30 seconds, and the last 60 seconds. It also reports if the cluster is consumed by a small number of user processes and lists the top processes.

Cluster Node Status

This script lists the node members of a cluster maintained by the Connection Manager. When the `-s` switch is specified, it will list the state of each node in the cluster and notify the user when a node is down or not working properly.

DLM Deadlocks

This script checks to see if the Distributed Lock Manager (DLM) locks and deadlocks exceed thresholds that are acceptable for a cluster system. It also compares the number of locks received with the number of locks sent to see if they are within a specified percentage of each other.

DLM Locks

This script checks to see if the Distributed Lock Manager (DLM) lock requests and messages are within a certain specified percentage of each other. The lock metrics received are compared to the number of lock metrics sent to see if the result exceeds a specified percentage.

DLM Resources

This script checks to see if the Distributed Lock Manager (DLM) resources and locks exceed thresholds that are acceptable for a cluster system. Threshold checks that are made include: too many processes currently attached to the DLM, too many locks currently allocated, and too many resources currently allocated.

DRD Blocking Server Client

This script checks to see if the Distributed Raw Disk (DRD) block shipping server and client operations exceed thresholds that are acceptable for a cluster system. These operations include number of opens, closes, reads, writes, and ioctls.

DRD Memory Channel

This script checks to see if the following Distributed Raw Disk (DRD) block shipping client memory channel operations exceed thresholds that are acceptable for a cluster system. These operations include number of reads, writes, and waits over the MC as well as number of unaligned reads and writes.

5.4 Executing Commands

To execute a command on one or more nodes, follow these steps:

1. From the main window's Execute menu, choose a command. (You can modify these commands or add your own; from the main window's Commands menu, choose Configure.)
2. An Execute dialog box opens that displays an area to specify flag values, argument values, and nodes on which to execute. Execute dialog boxes vary according to the flags and arguments of each command. Specify the values and nodes, then click on the OK or Apply button to execute the command.

5.5 Adding Commands to the Execute Menu

To add a command to the main window's Execute menu, follow these steps:

1. From the main window's Commands menu, choose Configure, which opens the Configure dialog box.
2. From the Category option menu, choose a command category, or choose New to create a new one. Choosing New (even if it is already visible, you must click on the word "New") opens the New Category dialog box.
3. Click in the Category Type field and type the name of the category type or choose one from the drop-down list. The category you enter is the category the new command will belong to, be default.
4. From the Operation option menu, choose New Command.
5. Click in the Command field and type a command name. Use no more than 50 characters consisting of letters, numbers, spaces, commas, underscores (_), and percent signs (%).
6. Click in the Executable field and type the full path of the command's executable file; for example, `/usr/staff/muse/virus2`. Use no more than 50 characters consisting of letters, numbers, commas, periods, slashes (/), underscores (_), and percent signs (%).
7. If you choose Yes for Display Output, a window will display the command's output when the command is executed. One window opens for each selected node.

8. If you choose Execute Script on Nodes Selected in Main Window, then the nodes that are selected in the main window when the script is executed will be the nodes that appear as defaults in the Execute dialog box's Execute Script on Node field.

   If you choose Use Selected Nodes as Default Arguments, then the nodes that are selected in the main window when the script is executed will be the default nodes in the Execute dialog box for any flags and arguments that are of type Node. In this case, the default node to execute the script on is the node running the GUI.

   In either case, however, you can specify any nodes you want at execution time.

9. If the command takes flags, click on the Flag button to open the Flag dialog box (see Section 5.5.1).
10. If the command takes arguments, click on the Argument button to open the Argument dialog box (see Section 5.5.3).
11. Click on the Apply button.

5.5.1 Specifying Flags

Use the Flag dialog box to specify any flags taken by the command. (Flags—also called switches and options—are usually specified on a command line.) To specify a flag:

1. In the Configure window, click on the Flag button to open the Flag dialog box.
2. Click in the Flag field and type the actual flag that the command expects, such as `-k`.
3. Set the Optional check box to the *on* position if the flag is optional. Set this check box to the *off* position if the flag is required.
4. Provide a brief description of the flag in the Description field. This description appears in the Execute dialog box as a prompt each time the command is executed (see Section 5.5.1.1).
5. Set the Parameter button check box to the *on* position if this flag takes a parameter. Then:
   a. Choose a type.
   b. Optionally specify a default value.
   c. Set the Blank Separator check box to the *on* position if the command expects a space between the flag and its parameter (for example: `-k LPS40`). Set this check box to the *off* position if the command expects no space (for example: `-kLPS40`).

6. When the Flag dialog box is first opened, there is only one flag form. Click on More to add another flag form and specify another flag. (Subsequent flag forms cannot be added until the last flag form's Flag field contains something.)

5.5.1.1 Example Flag Dialog Box and Execute Dialog Box

The information in the Flag dialog box in Figure 5-1 produces the output in the Execute dialog box in Figure 5-2 when the command is executed.

Figure 5-1: Example Flag Dialog Box

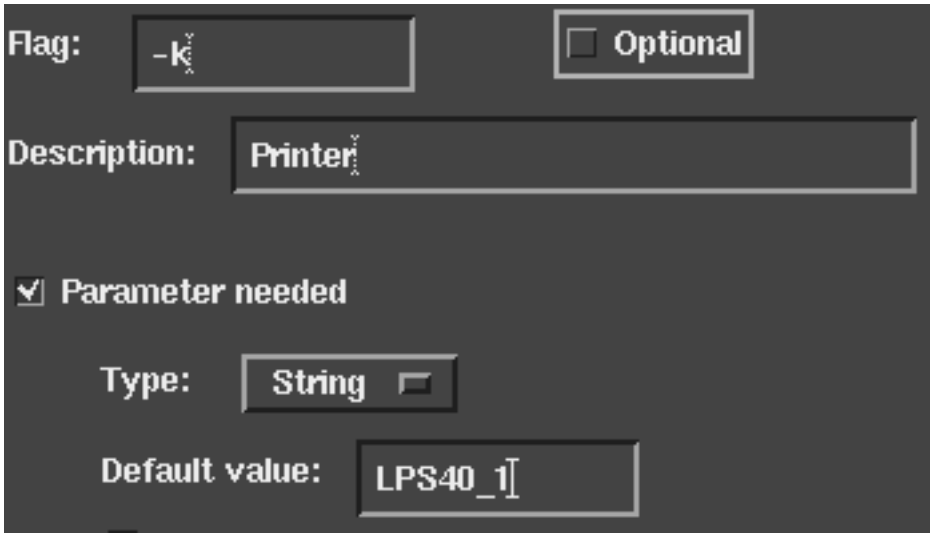
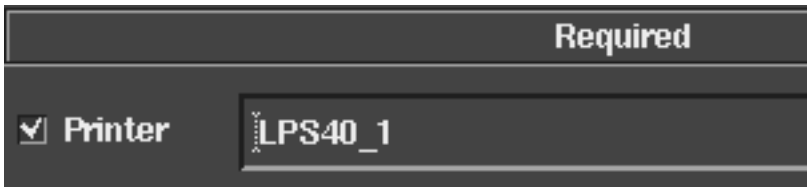


Figure 5-2: Resulting Execute Dialog Box



5.5.2 Deleting Flags

If a command changes, you might need to delete a flag. Follow these steps:

1. Click on the Configure dialog box Flag button to open the Flag dialog box.
2. Click on the round button at the upper-left corner of a flag form so it is on; this selects the flag. Note that more than one flag can be selected at once. All selected flags will be deleted when the Delete button is clicked on.
3. Click on the Delete button, which deletes all selected flags. (Currently, only the last selected flag is deleted.)

5.5.3 Specifying Arguments

Use the Argument dialog box to specify any arguments for a command. Follow these steps:

1. In the Configure dialog box, click on the Argument button to open the Argument dialog box.
2. Provide a brief description of the argument. This description appears in the Execute dialog box as a prompt each time the command is executed (see Section 5.5.1.1
3. Set the Optional check box to the *on* position if the argument is optional. Set this check box to the *off* position if the argument is required.
4. Choose a type.
5. Optionally specify a default value.
6. When the Argument dialog box is first opened, there is only one argument form. Click on the More check box to add another argument form and specify another argument. (Subsequent argument forms cannot be added until the last form's Description field contains something.)

5.6 Deleting Commands from the Execute Menu

To delete a command from the main window's Execute menu, follow these steps:

1. From the main window's Commands menu, choose Configure, which opens the Configure dialog box.
2. From the Category option menu, choose the command category containing the command to be deleted.

3. From the Command List, select the command to be deleted.
4. From the Operation option menu, choose Delete Command.
5. Click on the Apply button.

5.7 Modifying Commands

To modify a command, follow these steps:

1. From the main window's Commands menu, choose Configure, which opens the Configure dialog box.
2. From the Category option menu, choose the command category containing the command to be modified.
3. From the Command List, select the command to be modified.
4. From the Operation option menu, choose Modify Command.
5. Modify the fields as needed.
6. Click on the Apply button.

5.8 Adding Command Categories

Commands are grouped in categories. To add a new category, follow these steps:

1. From the main window's Commands menu, choose Script Category Mgmt, which opens the Script Category Mgmt dialog box.
2. Select Add Category from the option menu.
3. Click in the Enter Category field and type the name of the new category.
4. Click in the Category Type field and type the name of the category type or choose one from the drop-down list. The type chosen determines where the configuration file is saved.
5. Click on the OK button.

5.9 Deleting Command Categories

To delete a command category, follow these steps:

1. From the main window's Commands menu, choose Script Category Mgmt, which opens the Script Category Mgmt dialog box.
2. Select Delete Category from the option menu.
3. Click in the Enter Category field and type the name of the category to be deleted or choose it from the drop-down list.

4. Click on the OK button.

5.10 Moving Commands Between Categories

To move a command to a different category, follow these steps:

1. From the main window's Commands menu, choose Move, which opens the Move Command dialog box.
2. Choose a category from the From option menu. The commands in this category will be displayed in the Command List.
3. From the Command List, select a command to be moved.
4. Choose a category from the To option menu. This is the category the selected command will be moved into.
5. Click on the OK or Apply button.

Troubleshooting 6

If you have problems with Performance Manager, try the solutions in one of the following sections:

- Section 6.1, Nodes Not Responding
- Section 6.2, GUI or Daemons Will Not Start
- Section 6.3, Commands Not Running
- Section 6.4, Disks Not Visible to Performance Manager

If you want to examine the various Performance Manager log files, see Section 6.5, Log Files.

If you think you have found a bug, see Section 6.6, Reporting Bugs.

6.1 Nodes Not Responding

If a node is not responding to the Performance Manager GUI, its icon has a riderless horse:

Either the network link to that node is broken, the node has crashed, or the node doesn't exist on the network.

The installation script starts all Performance Manager daemons automatically after a successful installation and configuration, and these daemons are started automatically at boot time. Use the information in the following sections only if you need to restart a Performance Manager daemon.

6.1.1 Performance Manager Daemon (pmgrd)

The Performance Manager daemon (`pmgrd`) must run on each node managed by Performance Manager. Without `pmgrd`, a node cannot serve its `pmgrd` data metrics to the Performance Manager GUI.

To see if the Performance Manager daemon is running, issue the following command:

```
% ps awx | grep pmgrd
```

If the daemon is running, you should see output similar to the following:

```
329 ??       S &lt;      0:16.02 bin/pmgrd
292 ttyp1    S  +     0:00.03 grep pmgrd
```

If pmgrd is not running, it failed to start or has crashed; see the pmgrd log file, /var/opt/pm/log/pmgrd.log, for the cause.

To start pmgrd, in a root account issue the pmgrd command with the start argument:

```
% /usr/opt/pm/scripts/pmgrd  start
```

If pmgrd is not starting at boot time, ensure that the boot-time start files exist: /sbin/rc2.d/K47pmgrd and /sbin/rc3.d/S47pmgrd. If they are missing, reinstall the Performance Manager Daemons & Base subset (see the *Installation Guide*).

For more information, see the pmgrd(8) reference page.

6.1.2 Activity Daemon (pmgr_actd)

The Activity daemon, pmgr_actd, must run on each node where Performance Manager runs commands. Without pmgr_actd, a command cannot run on a node, and it cannot display its output to the Performance Manager GUI.

To see if the activity daemon is running, issue the following command:

```
% ps awx | grep pmgr_actd
```

If the daemon is running, you should see output similar to the following:

```
 1237 ttyp1    S  +     0:00.02 grep pmgr_actd
31988 ttyp6    I        0:00.42 pmgr_actd
```

If pmgr_actd is not running, it failed to start or has crashed; see the activity daemon log file, /var/opt/pm/log/pmgr_actd.log, for the cause.

To start pmgr_actd, in a root account issue the pmgr_actd command with the start argument:

```
% /usr/opt/pm/scripts/pmgr_actd  start
```

The boot-time start files are /sbin/rc2.d/K48pmgr_actd and /sbin/rc3.d/S48pmgr_actd.

Note

The activity daemon, `pmgr_actd`, will fail to run if TCI is not installed with the kit.

For more information, see the `pmgr_actd`(8) reference page.

6.2 GUI or Daemons Will Not Start

If the GUI or daemons fail to start, it could be because their log files are missing (see Section 6.2.1).

If the GUI or daemons fail to start and there is no error message, check the DISPLAY environment variable (see Section 1.2) and confirm that an `xhost` session is authorized.

If `pmgrd` fails to start automatically when a node is rebooted, but can be started manually, check that its startup files exist (see Section 6.2.2).

6.2.1 No Log File

The installation procedure creates initial copies of the log files with appropriate protections. For security reasons, the log directory (`/var/opt/pm/log`) is protected so that no new files can be created in it. If a log file is deleted, an appropriately protected empty file must be left in its place; otherwise, no new process (that writes to that particular log file) can be started.

The GUI log file is `/var/opt/pm/log/pmgr_gui.log`.

The `pmgrd` log file is `/var/opt/pm/log/pmgrd.log`.

6.2.2 No Startup Files

The installation script writes entries in system startup files that start `pmgrd` automatically each time a node is rebooted. If `pmgrd` is not starting on a node after it is booted, check the following files and be sure they have the correct entries:

- `/sbin/rc2.d/K47pmgrd`
- `/sbin/rc3.d/S47pmgrd`

If they are missing, reinstall the Performance Manager Daemons & Base subset (see the *Installation Guide*).

6.3 Commands Not Running

If commands fail to run on certain nodes:

1. Make sure the nodes are up.
2. Make sure the nodes are running `pmgr_actd` (see Section 6.1.2), which must run on nodes where commands are run. If `pmgr_actd` is not running, an error is written to `stdout` on the node running the GUI.

6.4 Disks Not Visible to Performance Manager

If your kernel configuration does not match your disk configuration, Performance Manager may not recognize the disks that are not configured in the kernel. When you add disks to your system configuration, check that your kernel is configured for the new device. If needed, run the `doconfig` command to update your kernel. See the `doconfig`(8) reference page for more information.

6.5 Log Files

The Performance Manager GUI writes messages to a log file, `/var/opt/pm/log/pmgr_gui.log`. The Performance Manager daemon (`pmgrd`) also writes messages to a log file, `/var/opt/pm/log/pmgrd.log`. These log files provide a history that is useful for troubleshooting and debugging.

The installation procedure creates initial copies of the log files with appropriate protections. For security reasons, the log directory (`/var/opt/pm/log`) is protected so that no new files can be created in it. If a log file is deleted, an appropriately protected empty file must be left in its place. Otherwise, no new process (that writes to that particular log file) can be started.

To view just the last 50 lines of a log file (the GUI log file, in this example), issue the following command:

```
% tail –50 /var/opt/pm/log/pmgr_gui.log | more
```

Here is the entry format used in all log files. Each entry has three lines, the second and third lines being indented. Each field in a line is separated by vertical bars:

```
date_time|local_host|remote_host|user
  severity|error_code|module|line_number
  error_text
```

Table 6-1 describes each field in a log file entry.

Table 6-1: Log File Field Descriptions

Field	Description
date_time	The date and time the entry was written.
local_host	The node running the process that generated the entry.
remote_host	The node that originated the request. For user interface log files, *remote_host* is always blank because there is no remote node. For daemon log files, *remote_host* is blank only if a local event caused the entry.
user	The user running the application. For user interface log files, this is the login name. For daemon log files, this is the login name of the user on the remote node, if it is available. The field is blank if the daemon is unable to determine the name of the application user. For daemon messages that are not caused by a remote request, the *user* field is `Daemon`.
severity	Possible values are `Info`, `Warn`, `Fatal`, and `Debug`.
error_code	A string that identifies an error.
module	The program module that generated the entry.
line_number	The line number in the program module where the entry originated.
error_text	A description of the message.

The following is an example log file entry.

```
Jan 24 11:47:03 1994|prism.zso.dec.com||root (muse)
  error|PMD_NOSUCHINST|pmdci_manager.c|line 2158
  The specified instance does not exist
```

6.6 Reporting Bugs

If an error occurs while installing or using Performance Manager, and you believe the error is caused by a problem with the product, take one of the following actions:

- If you have a basic or DECsupport™ Software Agreement, call your Customer Support Center. The Customer Support Center provides high-level advisory and remedial assistance.
- If you have a Self-Maintenance Software Agreement or you purchased Performance Manager within the past 90 days, you can submit a Software Performance Report.
- For documentation problems, casual questions, or suggestions, use the response form at the back of this guide.

6.6.1 Software Performance Reports

When you submit a Software Performance Report, please take the following steps:

- Reduce the problem to as small a size as possible.
- Describe as accurately as possible the circumstances and state of the node when the problem occurred. Include the description and version number of Performance Manager being used. Demonstrate the problem with specific examples.
- Report only one problem per Software Performance Report; this ensures a faster response.
- Mail the Software Performance Report package to Digital.

Many Software Performance Reports do not contain enough information to duplicate or identify the problem. Concise, complete information helps Digital give accurate and timely service to software problems.

Index

E

F

G

H

K

L

M

N

P

R

S

T

V

W

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