

Sun Enterprise SyMON™ 2.0.1 Software User's Guide



THE NETWORK IS THE COMPUTER™

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Part No. 806-0648-10
May 1999, Revision A

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Preface

The *Sun Enterprise SyMON 2.0.1 User's Guide* provides instructions on how to use the Sun Enterprise SyMON™ system management solution. These instructions are designed for a system administrator with networking knowledge.

Note – In the Sun Enterprise SyMON software, all alarm messages are displayed in English.

Using UNIX Commands

This document may not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

See one or more of the following for this information:

- *Solaris Handbook for Sun Peripherals*
- AnswerBook™ online documentation for the Solaris™ software environment
- Other software documentation that you received with your system

Typographic Conventions

TABLE P-1 Typographic Conventions

Typeface	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. % You have mail.
AaBbCc123	What you type, when contrasted with on-screen computer output	% su Password:
<i>AaBbCc123</i>	Book titles, new words or terms, words to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type <code>rm filename</code> .

Shell Prompts

TABLE P-2 Shell Prompts

Shell	Prompt
C shell	<i>machine_name%</i>
C shell superuser	<i>machine_name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

Related Documentation

TABLE P-3 Related Documentation

Product Family	Title	Part Number
Midrange Servers	<i>Sun Enterprise SyMON 2.0.1 Supplement for Sun Enterprise Midrange Servers</i>	806-0649
Workgroup Servers	<i>Sun Enterprise SyMON 2.0.1 Supplement for Workgroup Servers</i>	806-1183
Workstations	<i>Sun Enterprise SyMON 2.0.1 Supplement for Workstations</i>	806-1184

Sun Documentation on the Web

The `docs.sun.comsm` web site enables you to access Sun technical documentation on the Web. You can browse the `docs.sun.com` archive or search for a specific book title or subject at:

`http://docs.sun.com`

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Please include the part number of your document in the subject line of your email.

Introduction

This chapter provides an overview of the Sun Enterprise SyMON™ version 2.0.1 product, its component layers, and how they interact with one another.

This chapter includes the following topics:

- Sun Enterprise SyMON Overview
- Sun Enterprise SyMON Architecture
- Sun Enterprise SyMON Concepts
- Sun Enterprise SyMON Monitoring Features

Sun Enterprise SyMON Overview

Sun Enterprise SyMON software is an open, extensible system monitoring and management solution that uses Java™ software protocol and Simple Network Management Protocol (SNMP) to provide an integrated and comprehensive enterprise-wide management of Sun products and their subsystems, components, and peripheral devices.

Sun Enterprise SyMON technology provides a solution to extend and enhance the management capability of Sun's hardware and software solutions.

TABLE 1-1 Sun Enterprise SyMON Technology

Feature	Description
System Management	Monitors and manages the system at the hardware and operating system levels. Monitored hardware includes boards, tapes, power supplies, and disks.
Operating System Management	Monitors and manages operating system parameters including load, resource usage, disk space, and network statistics.
Application and Business System Management	Provides enabling technology to monitor business applications such as trading systems, accounting systems, inventory systems, and real-time control systems.
Scalability	Provides an open, scalable, and flexible solution to configure and manage multiple management domains (consisting of many systems) spanning across an enterprise. The software can be configured and used in a centralized or distributed fashion by multiple users.

Sun Enterprise SyMON Architecture

Sun Enterprise SyMON software comprises three component layers: console, server, and agent. It is based on the manager/agent architecture, in which:

- The console is the user interface which interacts with you to initiate management tasks.
- The server (manager) executes management applications and sends requests to agents in order to perform management tasks on your behalf.
- The agents (that are executing on the managed nodes) access the management information, monitor local resources, and respond to manager requests.

The three component layers are depicted in FIGURE 1-1.

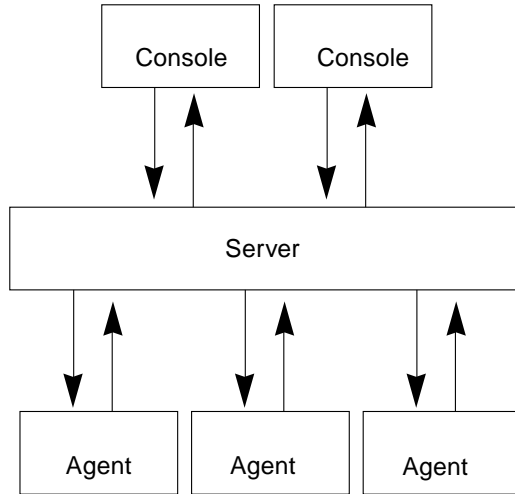


FIGURE 1-1 Sun Enterprise SyMON Component Layers

The major Sun Enterprise SyMON layers and their functionality are described below.

Console Layer

You may have multiple consoles, serving multiple users, for the same Sun Enterprise SyMON server. The consoles provide you with:

- Visual representations of the managed objects (for example, hosts and networks)
- The ability to manipulate attributes and properties associated with the managed objects (for example, create alarm thresholds)
- The ability to initiate management tasks (for example, dynamic reconfiguration)

The Sun Enterprise SyMON console layer is the interface between you and the other component layers of Sun Enterprise SyMON software.

Server Layer

The server layer accepts requests from you through the console and passes these requests to the appropriate agent. It then relays the response from the agent back to you.

For example, if you want information on the number of users accessing a host, the server layer receives this request from the console, and sends it to the agent on that host. The agent finds the answer, sends it back to the server, which passes on the information to you (through the console)

Similarly, if an error condition is created on one of the hosts, the agent on that host sends notification of this error (an event) to the server, which forwards the information to you (through the console) as an alarm.

In addition, this layer provides the console with a secure entry point to interface with the agents.

The server layer includes five components (FIGURE 1-2):

- Sun Enterprise SyMON server
- Topology manager
- Trap handler
- Configuration manager
- Event manager

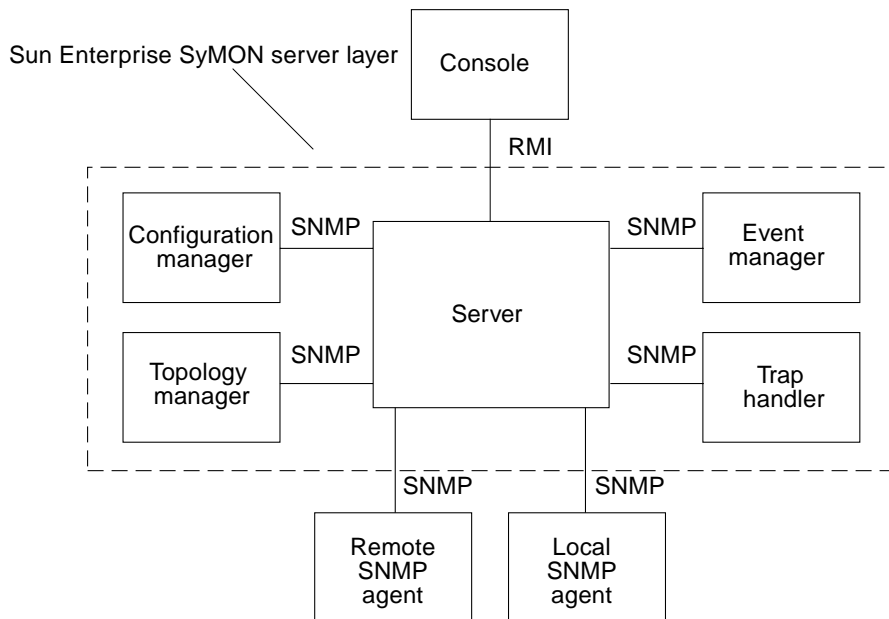


FIGURE 1-2 Sun Enterprise SyMON Server Layer

The server component is the core of the server layer. It is based on Java technology and is multithreaded, and it handles multiple data requests from various Sun Enterprise SyMON users.

Sun Enterprise SyMON Topology manager provides services including the management of user domains and the topology layout of managed objects.

The Trap handler is a centralized SNMP trap receptor that performs logging and forwarding of traps to interested components. It is this server layer component that is responsible for receiving all alarm notifications.

The Sun Enterprise SyMON Configuration manager provides security services to the server and the agents.

The Sun Enterprise SyMON Event manager sends and receives event information from the agents. These events can trigger alarms, which are forwarded to the console.

Agent Layer

The agent layer performs the actual information gathering, monitoring, and management of objects on the nodes managed by the Sun Enterprise SyMON software. The server layer interacts with the agent layer to gain access to the managed objects by using SNMP.

Sun Enterprise SyMON agents are scalable, extensible, and SNMP-based. They monitor and manage objects including hardware, operating systems, and applications by loading modules that focus on a specific aspect of the system, as well as application health and performance.

The agents use rules to determine the status of the managed objects. When the conditions specified by a rule become true, the software automatically generates alarms or performs actions as specified in the rules.

Server Context

A Sun Enterprise SyMON server context is defined as the server layer and the agent layers. When starting the console, you log into a particular server context. The managed objects whose agents send information to that same server also belong to the same server context.

A managed object can belong to the same server context or a remote server context. (A managed object in a remote server context sends information to a different server while a managed object in the same server context sends information to the server host that is connected to your console.)

By default, the Sun Enterprise SyMON software *manages* an object in the same server context but only *monitors* an object in a remote server context. For a precise definition of manage and monitor, see the Glossary. For more information on the server context, see Chapter 15.

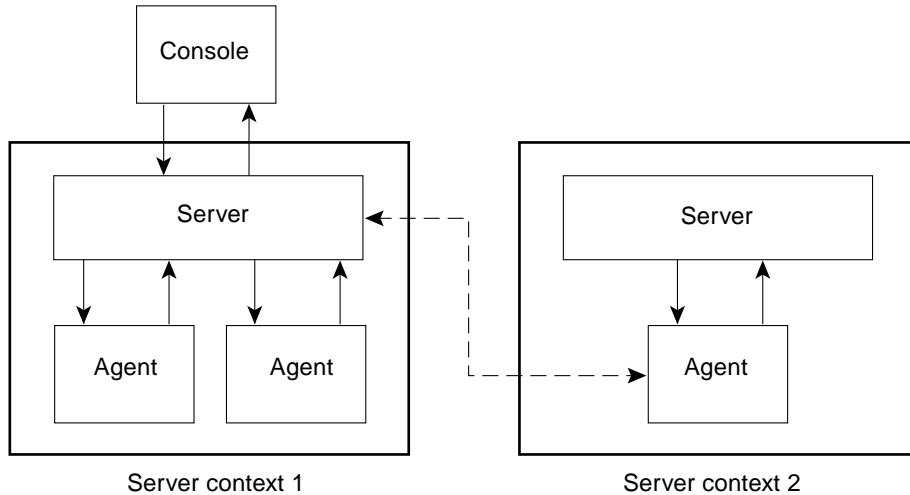


FIGURE 1-3 Console Logs Into a Server Context

Sun Enterprise SyMON Concepts

The following concepts are fundamental to understanding Sun Enterprise SyMON software:

- Domains
- Modules
- Alarms and Rules

Note – In this document, “domain” refers to a Sun Enterprise SyMON administrative domain, and should not be confused with uses of the term “domain” related to other Sun products or documentation. See Chapter 4 for more information.

Domains

A *domain* is a hierarchical collection of resources that you want to monitor and manage. The resources can include a complete campus, individual buildings, hosts, networks, subnets, links, and so on. Each domain may consist of these resources, which can be combined with other resources to form groups within a domain. Each of these groups may contain additional groups of resources, providing a multilevel, hierarchical domain.

You should create domains based on your business needs. You can create one or more domains. For example, you may create a lab domain that contains all the lab machines. Similarly, you may create an accounting domain that contains all the machines used for accounting.

The Sun Enterprise SyMON software displays the domain and its members in a visual representation (FIGURE 1-4).

In the following example, the host, `Payroll12`, belongs to the `Building B` group, which belongs to the `Payroll Servers 1` domain.

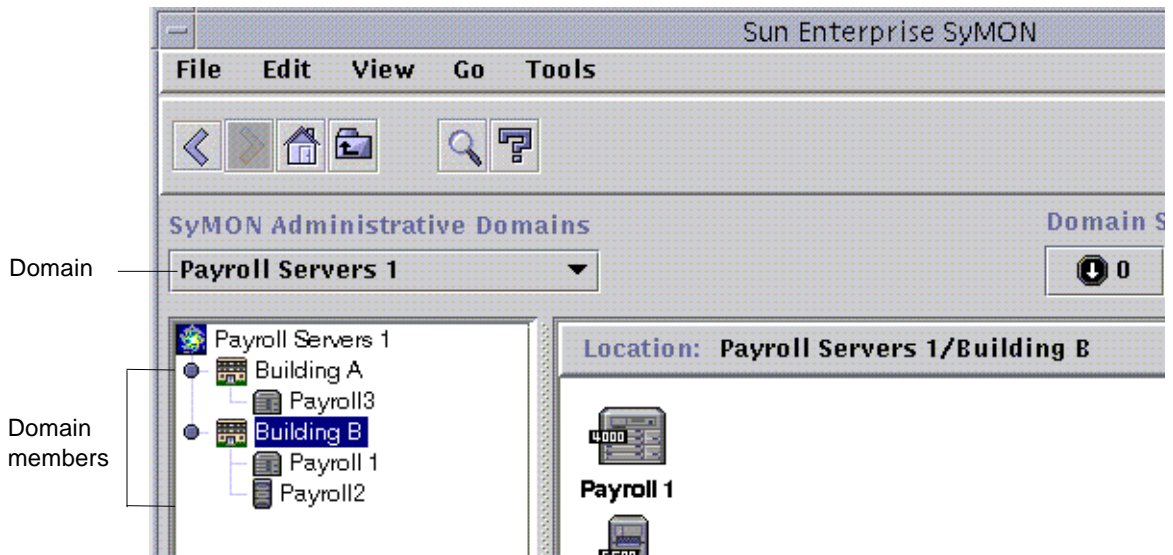


FIGURE 1-4 Sun Enterprise SyMON Main Console Window Showing a Domain and Its Members

Modules

Unlike most agents, the Management Information Base (MIB) provided by Sun Enterprise SyMON agents is not implemented in a monolithic code that contains a wide variety of functionality in a single program. Instead, Sun Enterprise SyMON software uses several components, called *modules*, for each agent. Each module implements its own MIB. Therefore, the Sun Enterprise SyMON agent MIB is the cumulative total of all the modules and their individual MIBs (FIGURE 1-5).

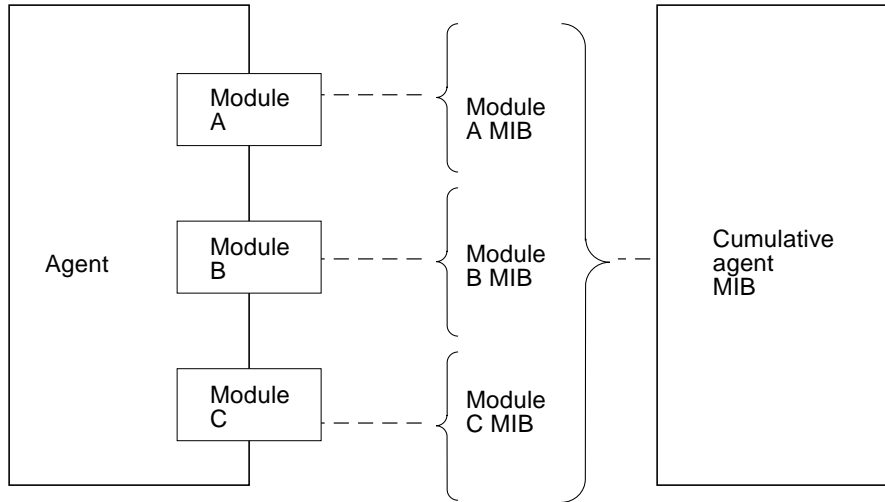


FIGURE 1-5 Sun Enterprise SyMON Agent MIB

Sun Enterprise SyMON modules monitor and manage the resources of systems, applications, and network devices.

The modules serve two purposes:

- To monitor and notify you (through alarms) when error conditions occur
- To monitor and notify you (through alarms) when performance tuning is required

For more information on alarms, see “Alarms and Rules” on page 9.

Each module consists of one or more properties that can be monitored on your system. For example, one of the default modules loaded during installation is the Kernel Reader. This module monitors kernel properties. These properties include user statistics, disk statistics, file system usage, and so on.

Note – You can add or remove modules dynamically. This feature enables you to customize the modules loaded on each agent (object), based on your need.

Alarms and Rules

Sun Enterprise SyMON software enables you to monitor your system with alarms of differing severities. The thresholds that generate these alarms are defined in the modules. The software enables you to set the thresholds that trigger simple alarms.

For example, one of the properties of the Kernel Reader module is the number of user sessions. The software enables you to set the threshold that generates the alarm. For example, you may tell Sun Enterprise SyMON software to generate a critical alarm when there are seven or greater user sessions. Similarly, you may also tell the software to generate only a cautionary alarm when there are five-to-six user sessions.

Although the software is configured with default alarm conditions, you can set and define your own alarm thresholds for simple alarms such as those based on the simple `rCompare` (comparison) rule.

Complex rules also generate alarms. For example, one complex rule states that when a disk is over 75 percent busy, the average queue length is over 10 entries and the wait queue is increasing, then an alert alarm is generated. This rule combines three conditions:

- Percentage of the disk that is busy
- Average queue length
- Wait queue

Unlike simple rules, these complex rules are predefined and cannot be modified. Consequently, you cannot set thresholds for complex alarms.

When an alarm is generated, the software notifies you through the main console window.

For more information on alarms, see Chapter 13. For more information on rules, see Appendix E.

Sun Enterprise SyMON Monitoring Features

Sun Enterprise SyMON software includes the following monitoring features:

- Autonomous Agents
- Main Console Window
- Hierarchy and Topology Views
- Processes View
- Log View

- Physical View
- Logical View
- Graph
- Security

These are graphical user interface or GUI-based features, except for autonomous agents. Security is both a GUI-based and command-line feature.

Autonomous Agents

Sun Enterprise SyMON agents work autonomously by actively sampling key data on host systems. These agents can be polled through SNMP `get` requests for the current status of the monitored data.

When an agent gathers data for a monitored resource, it checks the data against the alarm threshold set for the resource and determines whether the data values constitute an alarm condition. If the monitored data meets the alarm threshold, the agent performs the action associated with the alarm condition. Agents send asynchronous messages (SNMP traps) to the server, which delivers notification of the change in the status of the monitored data.

Main Console Window

Sun Enterprise SyMON software provides a main console window to depict, monitor, and interact with your system. You can monitor multiple domains, spanning different locations, through multiple console windows.

Hierarchy and Topology Views

Sun Enterprise SyMON software offers both hierarchy and topology views (for every domain) and hierarchy and contents views (for every object). The hierarchy enables you to navigate through the domain or host to find the object of interest. The topology view or contents view displays the members of the object that is selected in the hierarchy.

For a domain, the hierarchy and topology views are displayed in the main console window. In addition, you may customize the domain topology view by adding a background or creating a connection between objects in the domain.

For an object, the hierarchy and contents views are displayed in the Details window. The Details window consists of a series of tabs; the tabs are dependent on the type of object. For example, a typical host object contains the following tabs: Info, Browser, Alarms, Processes, Log View, and Configuration.

Processes View

The processes view tab button enables you to view and select detailed information about processes running on the selected host or node.

Log View

The log view tab button enables you to view informational messages, including error messages, about your host.

Physical View

The physical view provides you with photo-realistic front, back, and side views of the host. With your mouse button, you can click on individual components of the host and see detailed information about that component. For example, you can click on a board in a server, and see detailed information about that board, such as CPUs, memory, and board temperature.

Note – Physical views are only available for some hardware platforms.

Logical View

Sun Enterprise SyMON software provides a logical view of the overall hardware configuration of the host. Like the physical view, you can click on a single component and obtain detailed information about that hardware component.

Note – Logical views are only available for some hardware platforms.

Graph

Sun Enterprise SyMON software enables you to create a two-dimensional graph of any monitored data property that has a numerical value.

Security

The Sun Enterprise SyMON security feature authenticates user login and access control privileges for users and groups. It enables users to set security permissions at the domain, group, host, and module levels.

You can restrict access by setting different permissions. For example, one group of users can see and modify properties on a host while a second group of users can only see the host (with no modification privileges).

You can access Sun Enterprise SyMON security features from the Attribute Editor within the software.

Getting Started With the Sun Enterprise SyMON Software

Note – For additional documentation describing new functionality, refer to the *Sun Enterprise SyMON 2.0.1 Software Release Notes*, which is located on the Sun Enterprise SyMON web site: <http://www.sun.com/symon> and on the Sun Enterprise SyMON 2.0.1 CD.

Sun Enterprise SyMON supports multiple hardware platforms. Refer to the *Sun Enterprise SyMON Configuration and Deployment Guide* on the Sun Enterprise SyMON web site for more information on the supported hardware platforms: <http://www.sun.com/symon/>.

This *Sun Enterprise SyMON 2.0.1 Software User's Guide* describes the software functionality that is common to all the supported hardware platforms while platform-specific information is included in the supplements. For example, Sun Enterprise SyMON functionality specific to the SPARCserver™ 1000 and 1000E, the SPARCcenter™ 2000 and 2000E, and the Sun Enterprise™ 6x00/5x00/4x00/3x00 is contained in the *Sun Enterprise SyMON 2.0.1 Supplement for Sun Enterprise Midrange Servers*. This supplement is located on the Sun Enterprise SyMON web site: <http://www.sun.com/symon> and in the Sun Enterprise SyMON 2.0.1 CD.

Note – For complete information on how you can use the Sun Enterprise SyMON software to manage and monitor your machines, read *both* this user's guide and the hardware supplement applicable to your machines.

After installing Sun Enterprise SyMON software, spend some time navigating through the various windows and testing their functionality. By exploring and testing the software, you will have a better understanding of how you can customize Sun Enterprise SyMON software to aid in your system monitoring. See Appendix A for more information.

If you prefer to set up your monitoring environment now, see Chapter 15 for information on security.

Preparing to Install the Sun Enterprise SyMON 2.0.1 Software

This chapter describes the requirements your system must meet prior to installation of the Sun Enterprise SyMON version 2.0.1 product on your system.

The following topics are discussed in this chapter:

- System Requirements
- Sun Enterprise SyMON Agent Supported Systems
- Supported Operating Environments
- Sun Enterprise SyMON Compatibility
- Installation Packages
- Pre-Install Information
 - To Resolve the SNMP Port Conflict
- Uninstalling the Sun Enterprise SyMON Software
 - To Remove Sun Enterprise SyMON Software

Note – Sun Enterprise SyMON software limitations and bugs are listed on the web at <http://www.sun.com/symon>.

System Requirements

The Sun Enterprise SyMON installation script enables you to install the console layer, the server layer, and the agent layer separately or together. TABLE 2-1 lists the minimum disk space requirements for the three layers.

Note – If you are installing all three layers on one machine, you must have a minimum of 50 Mbytes of disk space available. This is not the sum total of the disk space requirements for the individual layers, as the layers share some common packages.

TABLE 2-1 Minimum Disk Space Required for the Sun Enterprise SyMON Installation

Layer	Minimum Disk Space Required (Mbytes)
Server	45
Agent	25
Console	25

Note – Depending upon your system, disk space requirements may be different. Refer to the *Sun Enterprise SyMON Configuration and Deployment Guide* on the following web site for more information on Sun Enterprise SyMON disk space requirements: <http://www.sun.com/symon>.

Sun Enterprise SyMON Agent Supported Systems

For the latest information on supported hardware platforms, go to the following web site: <http://www.sun.com/symon>. The Config-Reader module is required for hardware configuration information.

The Config-Reader and the Dynamic Reconfiguration modules are not supported on all Sun hardware platforms. All the other core Sun Enterprise SyMON modules are supported on Sun hardware platforms. For more information on core modules, see Appendix C and Appendix D. For more information on supported hardware platforms, go to the Sun Enterprise SyMON web site and read the *Sun Enterprise SyMON Configuration and Deployment Guide*.

Supported Operating Environments

The following Solaris operating environments are supported with the Sun Enterprise SyMON 2.0.1 product:

- Solaris 2.5.1 or subsequent compatible versions
- Solaris 2.6 or subsequent compatible versions
- Solaris 7 (32-bit and 64-bit modes)

Note – Sun Enterprise SyMON software is supported only on Solaris *SPARC Platform Edition* systems, not on Solaris *Intel Platform Edition* systems.

Sun Enterprise SyMON Compatibility

Version 2.0.1 of Sun Enterprise SyMON software is compatible with:

- Any simple network management protocol SNMP V1, V2c, and V2usec entities, regardless of the operating environment and architecture
- Solstice Enterprise Agents™ of Solaris 2.6 and 7 software can be converted to subagents of the Sun Enterprise SyMON agent
- Version 2.0 of Sun Enterprise SyMON software

Sun Enterprise SyMON software *does not* offer:

- Backward compatibility with the Solstice SyMON™ 1.x software
- SunVTS™ support in the Sun Enterprise SyMON 2.0.1 software

Sun Enterprise SyMON Component Layer Compatibility

There are three supported combinations of the Sun Enterprise SyMON component layers, as shown below:

TABLE 2-2 Supported Combinations of the Sun Enterprise SyMON Component Layers

Console	Server	Agent
2.0	2.0	2.0
2.0.1	2.0.1	2.0.1
2.0.1	2.0.1	2.0

Installation Packages

By design, Sun Enterprise SyMON software is an open and extensible system management tool, and the packaging and installing of this product reflects this extensibility. The Sun Enterprise SyMON product is divided into a core set of packages, and a set of add-on components. Although this distinction exists, the installation and setup of all Sun Enterprise SyMON software (including add-on components) is done with a single command as described in the following sections.

Core Packages

The core packages provide the fundamental layers, such as console, server, and agent. In addition, the core packages provide architecture-specific support for the SPARCserver™ 1000 and 1000E, the SPARCcenter™ 2000 and 2000E, and the Sun Enterprise™ 6x00/5x00/4x00/3x00 systems.

TABLE 2-3 describes the core packages provided with the Sun Enterprise SyMON 2.0.1 software.

TABLE 2-3 Sun Enterprise SyMON 2.0.1 Core Packages

Package Name	Description
SUNWescon	Console package
SUNWesagt	Agents package
SUNWesmod	Agent modules
SUNWsyncfd	Config-Reader module for the core Sun Enterprise SyMON product ¹
SUNWesdb	Database
SUNWescom	Common Components
SUNWeshlp	Help
SUNWesjp	Additional Components
SUNWesrv	Server
SUNWessa	Server/Agent
SUNWesae	/etc files needed by the Agent
SUNWesse	/etc files needed by the Server

1. The Config-Reader module for the core Sun Enterprise SyMON product supports the SPARCserver 1000 and 1000E, the SPARCcenter 2000 and 2000E, and the Sun Enterprise 6x00/5x00/4x00/3x00 systems. Config-Reader modules for other hardware platforms are included in the platform-specific add-on components.

These packages are located on the Sun Enterprise SyMON 2.0.1 Software CD or the Sun Enterprise SyMON web site (<http://www.sun.com/symon>). To install these packages, see “Pre-Install Information” on page 21” and “Installing the Software on Your System” on page 28.

Add-on Components

Depending on the hardware platform on which you are installing Sun Enterprise SyMON software, your system may require additional add-on platform-specific components. These add-on components, described in the *Sun Enterprise SyMON 2.0.1 Supplement* for your hardware platform, provide additional functionality such as support for other Sun hardware architectures or new agent management.

Note – Always read your *Sun Enterprise SyMON 2.0.1 Supplement* for architecture-specific installation instructions before installing Sun Enterprise SyMON software on a particular hardware platform. Refer to the Sun Enterprise SyMON 2.0.1 CD or go to the web site: <http://www.sun.com/symon> and click on Documentation for the supplement.

Add-on components are released in one of two ways:

- as part of the Sun Enterprise SyMON distribution (CD or web download image)
- separately (add-on component only)

If the add-on components are part of the Sun Enterprise SyMON distribution, the add-on components are installed during the installation process. The core components are installed first, followed by installation of the add-on components that are part of the distribution.

Many add-on components offer architecture-specific support. Because of this, the installation checks your hardware. For example, if an add-on component package supports workstation systems, the workstation package is automatically added when Sun Enterprise SyMON is installed on a workstation host. In some cases, user confirmation is required prior to installing an add-on component package.

If the add-on component is released separately, the add-on component will include installation instructions.

Note – Refer to your supplement for more information.

Pre-Install Information

The following table briefly lists some of the pre-requisite information that you should have before installing the version 2.0.1 of Sun Enterprise SyMON software.

TABLE 2-4 Issues to Consider Prior to Installing Sun Enterprise SyMON Software

Issue	Description
Removing old packages	Make sure to remove all the Solstice SyMON 1.x packages. For example, the following packages must be removed: SUNWsyse, SUNWsym, SUNWsyrt, SUNWsys, SUNWsyu, SUNWsyua, SUNWsyub, SUNWsyuc, SUNWsyud, SUNWsyue, and SUNWsyuf. For more information, see “Uninstalling the Sun Enterprise SyMON Software” on page 24
Component layers you want to install	Decide which component layers you want to install - Server, Agent, Console, and Help.
Space needed in /opt	Make sure you have enough space available in /opt. If not, make more space or make a soft link to an area with more space from /opt/SUNWsymon. For more information, see “Where to Install Sun Enterprise SyMON Software” on page 29
Permissions	Make sure you have permissions to write into the /var/opt (or /opt/SUNWsymon) directory as root. You also need privileges to type commands, such as chmod, in that directory.
Set up	Component layer(s) you want to set up are: Server, Agent, Console. Component layers that have been installed must be set up.
Information needed for server	Note that when you install the server, you do not need to have the console on the same machine. Also, it helps if you have information on the following items: license key for the software, ports to be used, and password to be used (referred to as a <i>seed</i>).
Information needed for agent	Seed (password) to be used. Sun Enterprise SyMON server host if server is not installed on agent machine.
Information needed for console	None.
Information needed for add-on components	Add-on dependent data. For more information, refer to your supplement.
Online help	Decide whether to set up Sun Enterprise SyMON online help on a remote machine.

Port Conflicts with SNMP Legacy Agents

Sun Enterprise SyMON software may conflict with port numbers that are used by legacy subagents. Systems with Solaris 2.6 or Solaris 7 operating environments have two potential conflicting processes in the following areas: `snmpdx` and `mibiisa`.

If you install the software using standard defaults, you may run into port conflicts with these processes and be unable to start the agent. The setup process notifies you if there is a problem. Here is an example:

```
----- WARNING -----
It appears that agent.snmpPort 161 is already is use.
SyMON agent may not be able to run due to this conflict.
There are two ways to correct this conflict:
1. Reconfigure the port that Symon uses.
2. Stop the process that is using the port.
You are currently running snmpdx, which may be causing the
conflict.
Do you want to use a different port number for agent.snmpPort?
[y|n|q]
```

If you choose to use a different port number, the following prompt is displayed:

```
What port number would you like to use? x
Updating /var/opt/SUNWsymon/cfg/domain-config.x with new port
number.
```

Caution – If you choose to correct the port conflict by stopping the process that is using the port, remember to do so before the Sun Enterprise SyMON agent is started. If the Sun Enterprise SyMON agent fails to start correctly, refer to the `agent.log` file to see if there is a port conflict.

Note – View the log file with the command:

```
/opt/SUNWsymon/sbin/es-run ccat /var/opt/SUNWsymon/log/agent.log.
```

The log file displays error messages similar to the following:

```
error    Nov 05 13:24:59 agent parsing error in base-agent.x(132):
error creating interface: inet://:161/udp: address already in use
error    Nov 05 13:24:59 agent          *** aborting execution ***
```


▼ To Resolve the SNMP Port Conflict

- **Make one of the following changes.**
 - Change the port numbers used by the Sun Enterprise SyMON software, as described in “Port Conflicts with SNMP Legacy Agents” on page 22 or “Configuring Sun Enterprise SyMON Software to Use Different Port Addresses” on page 306.
 - Turn off `snmpdx` and `mibiisa` by completing the following two steps:
 - a. **Turn off `snmpdx` and `mibiisa` by using the following command:**

```
# /etc/rc3.d/S76snmpdx stop
```

- b. **Prevent `snmpdx` and `mibiisa` from starting the next time the machine is booted to avoid conflicts. Rename the start-up script with the following command to prevent the `snmpdx` and `mibiisa` daemons from starting the next time the machine is rebooted:**

```
# mv /etc/rc3.d/S76snmpdx /etc/rc3.d/S76snmpdx
```

In addition to these two processes (`snmpdx` and `mibiisa`), your system may have other legacy SNMP agents utilizing port 161. Therefore, you need to take action to resolve this port conflict with the Sun Enterprise SyMON agent.

Note – For more information, see “Configuring a Legacy SNMP Agent as a Subagent of a Sun Enterprise SyMON Agent” on page 304 and “Configuring Sun Enterprise SyMON Software to Use Different Port Addresses” on page 306.

Uninstalling the Sun Enterprise SyMON Software

We suggest that you delete previous versions of Sun Enterprise SyMON software from your system before you install a newer version on the same server. In some cases, previous versions are un-installed for you. Refer to the following table to see how this might affect your site:

TABLE 2-5 When to Uninstall Sun Enterprise SyMON Software

Current version of SyMON:	Method of installation:	How to uninstall previous versions:
1.x	Any	See your Solstice SyMON 1.0 documentation for information on removing Solstice SyMON 1.0 software
2.0	Installation script from the CD or the web	Sun Enterprise SyMON 2.0.1 software removes the previous version

If you must manually remove previous versions, the uninstall program (`es-uninst`) removes all packages that are part of the Sun Enterprise SyMON software, including the add-on packages.

Note – If the Sun Enterprise SyMON software already replaced an earlier independent installation of the `configd` package `SUNwsycfd`, then this package will not be uninstalled by the `es-uninst` script.

▼ To Remove Sun Enterprise SyMON Software

1. Type the following command.

```
# /opt/SUNWsymon/sbin/es-uninst
```

2. Type `y` to uninstall Sun Enterprise SyMON software, or `n` to cancel your request.



Caution – This utility does not enable you to remove Sun Enterprise SyMON packages selectively. Once you type `y`, all the packages are removed. There is no additional warning before package removal begins.

The contents of the `/var/opt/SUNWsymon` directory remain and are unaltered by the uninstall script. The state of the domain configuration is retained for subsequent installations or upgrades.

Note – To verify if there are packages that are left, type the following command:
`pkginfo -c symon.`

Installing the Sun Enterprise SyMON 2.0.1 Software

This chapter explains how to install the Sun Enterprise SyMON™ version 2.0.1 product on your system.

The following topics are discussed in this chapter:

- To Upgrade from 2.0 to 2.0.1 Software
- To Install the Sun Enterprise SyMON Packages From the CD
- To Install the Sun Enterprise SyMON Packages From the Web
- To Set Up Sun Enterprise SyMON Online Help on a Remote Machine
- To Set Up Sun Enterprise SyMON Component Layers
- To Add Sun Enterprise SyMON Users
- To Start the Sun Enterprise SyMON Software
- To Exit the Sun Enterprise SyMON Console
- To Stop the Sun Enterprise SyMON Server and Agents

Note – Sun Enterprise SyMON software known limitations and bugs are listed on the web at <http://www.sun.com/symon>.

Upgrading from Sun Enterprise SyMON 2.0 to 2.0.1 Software

When you are upgrading from Sun Enterprise SyMON 2.0 to 2.0.1 software, follow these steps:

▼ To Upgrade from 2.0 to 2.0.1 Software

1. **Install the new Sun Enterprise SyMON 2.0.1 server and console packages first.**
You can install these at the same time, or if you want to install them separately, install the server first, and then the console.
2. **Upgrade the agent(s).**

Installing the Software on Your System

This section describes how to install, set up, and run your Sun Enterprise SyMON 2.0.1 software. Read this section for general information about your Sun Enterprise SyMON installation then follow the steps in the appropriate procedure, based on your delivery method (CD or the web).

Install Sun Enterprise SyMON software using the `inst-es` script. During installation, you may install the console, server, agent, and help layers separately or in combination.

Note – The coexistence of the Solstice SyMON 1.x and Sun Enterprise SyMON 2.x software is not supported on the same server. In addition, you may have Sun Enterprise SyMON sessions running on different servers or server contexts. For more information on server context, see Chapter 1 and Chapter 15.

What to Do About Files or Component Layers from Earlier Versions of Sun Enterprise SyMON Software

If you have Solstice SyMON 1.x packages installed on your system, the installation script fails. You must remove all Sun Enterprise SyMON 1.x packages before installing Sun Enterprise SyMON 2.0.1 software.



Caution – The Sun Enterprise SyMON 2.0.1 installation script may overwrite Solstice SyMON 1.x files. Consequently, you may lose your customized event rules. If you have modified Solstice SyMON 1.x rules, then you *must back up* these rules before installing Sun Enterprise SyMON 2.0.1 software. Depending on where you modified your event rules, back up the `/etc/opt/SUNWsymon` directory or the `/opt/SUNWsymon/etc` directory.

If you have Sun Enterprise SyMON 2.0 component layers already installed on your system and they are out of date with the new version of the installation package and the files that you are trying to install, the install script prompts you to uninstall the previously installed packages. You can either:

- uninstall immediately and proceed with a fresh installation, or
- quit the current session and uninstall the necessary packages automatically by using the `es-uninst` command, and then proceed with the installation.



Caution – If you are reinstalling the Sun Enterprise SyMON software and would like to restore it to a “new” state, do the following:

- Make sure to move any custom configuration files that may have been created within the `/opt/SUNWsymon` directory during the previous sessions.
- Remove all subdirectories and files within the `/var/opt/SUNWsymon` directory by using the following command: `rm -rf /var/opt/SUNWsymon`.
- Complete the installation and setup as described in this chapter.
- Then restore the moved files back to this location.

The result of this process is that previous database entries are cleared, as well as your topology. Be sure this is what you want to do before proceeding.

Where to Install Sun Enterprise SyMON Software

Sun Enterprise SyMON packages are installed in `/opt/SUNWsymon`.

If there is not enough disk space in the `/opt/SUNWsymon` directory to accommodate the Sun Enterprise SyMON packages, then do the following:

- **Create a symbolic link to any other file system in which enough space is available.**

```
# mkdir /directory/SUNWsymon
# ln -s /directory/opt/SUNWsymon /opt/SUNWsymon
```



Caution – Install the Sun Enterprise SyMON agent on every monitored or managed host. In addition, you *must install* a Sun Enterprise SyMON agent on your Sun Enterprise SyMON server host (even if you choose not to run this agent). When the server is installed, the Sun Enterprise SyMON installation program displays a message to tell you that it is installing the agent as well.

Note – You can get a listing of all packages related to Sun Enterprise SyMON software that are currently installed with the following command:

```
pkginfo -c symon.
```

▼ To Install the Sun Enterprise SyMON Packages From the CD

Note – Familiarize yourself with the following file on the CD before beginning your installation: `/cdrom/symon_2_0_1/INSTALL.README`.

Any late-breaking news that develops concerning this software installation procedure is placed at the Sun Enterprise SyMON web site:
<http://www.sun.com/symon>.

1. Place the Sun Enterprise SyMON 2.0.1 CD in the CD-ROM drive.
2. Open a command window and (if you are not already superuser) become superuser by using the `su` command.
3. If you are running the Sun Enterprise SyMON server for the first time, edit the `/etc/nsswitch.conf` file. Be sure the `groups` entry has `files` as the first token.

```
groups:files nis
```

4. Change to the CD-ROM directory.
 - If you are using the Volume Manager (`vold`), type:

```
# cd /cdrom/symon_2_0_1
```


- If the CD-ROM drive is not already mounted, mount the drive by typing:

```
# mkdir /cdrom/symon_2_0_1
# mount -o ro -F hsfs /dev/dsk/cXtYdZs0 /cdrom/symon_2_0_1
# cd /cdrom/symon_2_0_1
```

5. List the files in the `symon_2_0_1` directory.

```
# ls
Copyright    FR_Copyright    Sol_2.5.1    Sol_7
Docs         INSTALL.README  Sol_2.6      inst-es      windows
```

6. Launch the Sun Enterprise SyMON installation script by typing the following command:

```
# ./inst-es
```

The script presents an interactive list of questions, that guides you through the installation procedure.

7. Select the Sun Enterprise SyMON component layers (agent, server, console, or help) you want to install.

```
Copyright    FR_Copyright    Sol_2.5.1    Sol_7
Docs         INSTALL.README  Sol_2.6      inst-es      windows
```

Note – Be sure to read “Sun Enterprise SyMON Online Help” on page 34 before installing the online help.

Note – The `inst-es` script enables you to set up your Sun Enterprise SyMON component layers. A set of questions guides you through the setup procedures.

Sun Enterprise SyMON packages are installed in `/opt/SUNWsymon`.

Note – The installation process installs the Sun Enterprise SyMON packages (including any applicable hardware add-on component packages) for your system. In some cases, user confirmation is required prior to installing an add-on component. Refer to the supplement for more information.

▼ To Install the Sun Enterprise SyMON Packages From the Web

Note – Before installing Sun Enterprise SyMON on your system, read the `INSTALL_README` file in the downloaded packages. This file provides additional information that helps you during the installation process.

1. Using your web browser, go to the Sun Enterprise SyMON web site.

```
http://www.sun.com/symon/
```

2. Click the mouse button on Download Software.

Note – Prior to downloading the Sun Enterprise SyMON software, you must determine which OS versions you will be installing Sun Enterprise SyMON on. There is a separate Sun Enterprise SyMON download file for each OS version.

3. Follow the instructions on this web page and download your Sun Enterprise SyMON packages. Store the software in a location that is accessible by `root`.
4. Open a command window and (if you are not already superuser) become superuser by using the `su` command.
5. After you have downloaded the Sun Enterprise SyMON packages, connect to the directory where you want the packages located. Use the following command:

```
cd /download_directory
```

6. Extract the Sun Enterprise SyMON packages via the following command:

```
# zcat downloaded_filename | tar xvf -
```

If you downloaded multiple OS (operating system) versions of the Sun Enterprise SyMON packages, you may extract all OS versions into a single directory. Simply execute the above command for all downloaded package files without changing the current directory.

Note – Place only packages of the same Sun Enterprise SyMON software version in the same directory.

7. **If you are running the Sun Enterprise SyMON server for the first time, edit the `/etc/nsswitch.conf` file. Be sure the `groups` entry has `files` as the first token.**

```
# groups:files nis
```

8. **List the files in the `symon_2_0_1` directory.**

```
# ls
Copyright   FR_Copyright   Sol_2.5.1     Sol_7
Docs        INSTALL.README Sol_2.6        inst-es  windows
```

Note – Your directory may appear different, depending on the OS versions you downloaded and which directory the OS was extracted into.

9. **Become `root`, if you are not already and complete the following:**

- Launch the Sun Enterprise SyMON installation script as shown below:.

```
# cd /download_directory
# inst-es
```

The script presents an interactive list of questions, that guides you through the installation procedure.

10. **Select the Sun Enterprise SyMON component layers (agent, server, console, or help) you want to install.**

Note – Be sure to read “Sun Enterprise SyMON Online Help” on page 34 before installing the online help.

Note – The `inst-es` script enables you to set up your Sun Enterprise SyMON component layers. A set of questions guides you through the setup procedures.

Sun Enterprise SyMON packages are installed in `/opt/SUNWsymon`.

Note – The installation process installs the Sun Enterprise SyMON packages (including any applicable add-on component) for your system. In some cases, user confirmation is required prior to installing an add-on component. Refer to the supplement for more information.

Installing Separately Released Add-on Components

If you have separately released add-on components you want to install, refer to the supplement for installation information.

Sun Enterprise SyMON Directories

After a successful installation and setup, the following directories are created.

TABLE 3-1 Sun Enterprise SyMON Directories

Directory	Description
<code>/opt/SUNWsymon</code>	Root directory or softlink directory which contains the infrastructure and applications of Sun Enterprise SyMON
<code>/etc/opt/SUNWsymon</code>	Contains the <code>init</code> scripts for Sun Enterprise SyMON software applications
<code>/var/opt/SUNWsymon</code>	Contains the Sun Enterprise SyMON configuration files for your system

Sun Enterprise SyMON Online Help

The Sun Enterprise SyMON online help, based on the *Sun Enterprise SyMON 2.0.1 User's Guide*, is designed to be a quick reference. Once your software installation is complete, you may use your browser to view the English online help files in the `/opt/SUNWsymon/lib/locale/C/help` directory, where `C` represents the English version. Refer to the Sun Enterprise SyMON online help for detailed information about windows or procedures.

For heterogeneous console installations (that is, an environment which has the Sun Enterprise SyMON console component layer installed on both Solaris operating environment workstations and personal computers [PCs]), the Sun Enterprise SyMON help file Uniform Resource Locator (URL) should be of the type `http://`. The console component layer for PCs does not include the online help packages. Instead, the `httpd` daemon should be installed on the Sun Enterprise SyMON help server where the help packages are loaded.

This help server has the Sun Enterprise SyMON help packages installed and is http-accessible. All consoles can connect to this help server for online help.

Installing Online Help

Note – Complete the following procedure *only* if you are installing Sun Enterprise SyMON online help on a remote machine (not on your console host) or if you are running the Sun Enterprise SyMON console on a PC.

The following procedure sets up a Sun Enterprise SyMON help server so that the online help package is web-accessible.

▼ To Set Up Sun Enterprise SyMON Online Help on a Remote Machine

1. **If it has not already been installed, install the `httpd` daemon on the Sun Enterprise SyMON help server.**
2. **Modify the `/etc/http/httpd.conf` file to specify `doc_root` as `/opt/SUNWsymon/lib/locale/C/help`, where `C` represents the English version.**

For example:

```
# Host Parameters
url {
doc_root                "/opt/SUNWsymon/lib/locale/C/help"
user_doc_enable"yes"
    user_doc_root"public_html"
cgi_enable"yes"
cgi_dns_enable"no"
cgi_suffix_enable"no"
cgi_user"nobody"
log_type"clf"
log_prefix"/var/http/logs/http"
log_max_files7# number of log files
log_cycle_time1440# minutes i.e. 1 day
log_max_file_size1048576# bytes i.e. 1 MB
ssi_enable"no"
ssi_exec"no"
}
```

3. Start the `httpd` daemon on the Sun Enterprise SyMON help server.
4. During the installation and set up of your Sun Enterprise SyMON server component layer, specify the base URL for Sun Enterprise SyMON online help.



Caution – Do not click Return. Instead, type `http://<online-help-server-host>`.

The SyMON base URL is relative to the SyMON Console. The SyMON Console is able to request help documentation via the network. If you have installed SyMON help documentation in an http-accessible location within your network, you may specify this location. If SyMON help is installed on the console host, simply accept the default value.

Please enter base URL to SyMON help [local]:

Note – The word “local” in the last line of the above message refers to the console, not a local server.

Setting Up Sun Enterprise SyMON Component Layers

Complete the following procedure:

- when you change your setup configuration, such as changing the server context
- when asked to do so in your supplement

(If your installation was unsuccessful, see “Uninstalling the Sun Enterprise SyMON Software” on page 24.)

Note – You may also need to complete the following procedure when you change your setup configuration, such as changing the server context or changing the security seed, after you have successfully installed the software. For more information, see “Sun Enterprise SyMON Remote Server Access” on page 287 and “Security Seeds” on page 38.

Note – If there is a potential conflict for port addresses, see “Configuring Sun Enterprise SyMON Software to Use Different Port Addresses” on page 306 before completing the steps in this section.

▼ To Set Up Sun Enterprise SyMON Component Layers

1. Open a command window and, if you are not already root, become `root`.
2. Change to the directory that contains the Sun Enterprise SyMON setup script by typing the following command:

```
# cd /opt/SUNWsymon/sbin
```

3. Run the setup script to set up the component layers.

```
# ./es-setup
```

4. The setup script finds the installed component layers on your system with set up requirements and enables you to select the components to set up. A set of questions guides you through the setup procedures.

Note – See the supplement for more information about set up of add-on components.

Sun Enterprise SyMON Groups

Sun Enterprise SyMON assigns users to groups. Three groups are created by default during the installation process. They are:

- esops
- esadm
- esdomadm

See “Access Control (ACL) Categories” on page 282 in Chapter 15 for more information.

Security Seeds

Sun Enterprise SyMON software generates a security key used for communications between processes. A seed (or password) must be provided to initialize the keys. You can choose your own seed, an alphanumeric string of up to eight characters, or use the standard Sun Enterprise SyMON default (`maplesyr`). Here is the prompt from the setup script:

```
Do you want to generate these keys using the SyMON default seed?  
[y|n|q]
```

The seed can be changed at a later time using the procedure described in “Setting Up Sun Enterprise SyMON Component Layers” on page 37. Also see “Regenerating Security Keys” on page 301 for more information.

Note – If you choose to enter a seed of your own rather than accept the default, be sure to keep a record of the seed for use at a later time.

Sun Enterprise SyMON Licensing

Sun Enterprise SyMON software is free-of-charge to manage or monitor an individual object or host.

The software creates a default domain consisting of one managed object, the host where the Sun Enterprise SyMON server resides. You may manually configure the software to change the managed host to another system; however, this is the limit of free-of-charge use.

A Sun Enterprise SyMON right-to-use license is required to create more than one domain and to manage or monitor more than one host object. If you do not purchase a license, you will be operating in violation of your license agreement. For information on purchasing a license, see the web site, <http://www.sun.com/symon/>.

If you exceed the allowed number of objects, or if you exceed the time period allowed for your demonstration license, a message is displayed during login, to alert you that you have exceeded the limits of your license.

```
-----  
Exceed License Limit!!!  
Authenticated:   XXX  
Used:           YYY  
  
Invalid licenses!!  
Error(s) occurs in your license(s)  
Please verify your license(s)  
-----
```

If you have exceeded your license limit, contact your Sun service representative or authorized Sun service provider for more information.

During the setup of the server component, you are given the opportunity to specify a license token.

- If you have a license token, you may enter it during setup.

- If you do not have a license token, you may run the software without one as described above. When you get a license token, you can install it using the `es-lic` script.

```
# cd /opt/SUNWsymon/sbin
# ./es-lic

-----
Enterprise SyMON License Program
-----

Please enter license key:
#
```

Sun Enterprise SyMON Users

Sun Enterprise SyMON users are valid UNIX users on the Sun Enterprise SyMON server. As such, the system administrator has to add valid users into the following file: `/var/opt/SUNWsymon/cfg/esusers`.

If a user's name is not in this file, that user cannot log into Sun Enterprise SyMON software. (See the following section for more information.)

Public and Private Users

During the Sun Enterprise SyMON server setup, the file `/var/opt/SUNWsymon/cfg/esusers` is created and the following users are added to the file automatically:

- `espublic`
`espublic` is comparable to logging into a UNIX system as `guest`. It enables users to have “general” privileges. For example, when a user tries to access information from a session running in a different Sun Enterprise SyMON server from their own, they are given access as `espublic` and are able to view the information as a `guest` only.
- `esmaster`
`esmaster` is comparable to being superuser in UNIX. It automatically gives “admin” access privileges to users logging into the software.

The administrator has to add the additional list of user IDs for all other users who need to log into Sun Enterprise SyMON software. All users in this file have “general” access privileges, by default, unless they are given additional privileges using the procedures described in “Using Access Control (ACL)” on page 289.

Note – The user names `espublic` and `esmaster` are not configurable during installation. They must specifically be defined as `espublic` and `esmaster`.

▼ To Add Sun Enterprise SyMON Users

1. **Become superuser (on the Sun Enterprise SyMON server host).**
2. **Edit the file `/var/opt/SUNWsymon/cfg/esusers`. Make sure that the user name is that of a valid UNIX user.**
3. **Add the user name on a new line.**
4. **Save the file and exit the editor.**

Note – By adding a user to the users list, the user has default privileges. See “Default Privileges” on page 295 and “Overriding the Default Privileges” on page 296 for more information.

For more information on setting up users, see Chapter 15.

▼ To Grant a User `esadm`, `esops`, or `esdomadm` Privileges

1. **Become superuser.**
2. **Make sure that the user is a valid Sun Enterprise SyMON user.**
You may do this by adding the user to the `/var/opt/SUNWsymon/cfg/esusers` file.
3. **Edit the `/etc/group` file.**
4. **Add the user to one of the following lines as applicable: `esadm`, `esops`, or `esdomadm`.**
5. **Save the file and exit the editor.**

Starting the Sun Enterprise SyMON Software

Sun Enterprise SyMON components are started with the `es-start` utility. The syntax for this utility is:

```
# /opt/SUNWsymon/sbin/es-start -option(s)
```

Note – The Sun Enterprise SyMON processes are generally started in the background unless you specify the `-i` option (valid for only one process in the interactive mode). The console process is run in the foreground so it can be killed easily using Control-C.

The choices for *option(s)* are listed in TABLE 3-2.

TABLE 3-2 Options for `es-start` Choices

Option	Definition
a	Starts agent
c	Starts console
e	Starts Event manager
f	Starts Configuration manager
h	Lists the options for the <code>es-start</code> utility
i	Starts agent in interactive mode; valid only for one of the a, t, f, l, p, and e options
l	Starts Platform agent
p	Starts Topology manager
s	Starts server
t	Starts Trap handler
A	Starts all components except the console. Equivalent to <code>es-start -aefpst</code>
S	Starts server and all the server subcomponents. Equivalent to <code>es-start -efpst</code>

For example, to start the agents and server, use the `es-start -A` option. To start the agent on a monitored host, use the `es-start -a` option.

Note – You must be `root` to start any of the Sun Enterprise SyMON components except the console.

If you need to pass any arguments to the processes being started, you can do so by listing those arguments after these options. For example, if you wanted to start the console and tell it to use port 2090, you would use this command.

```
# es-start -c -- -p 2090
```

Here are the commonly used start commands:

TABLE 3-3 Common Start Commands

To start:	Command
Server-only	<code>es-start -S</code>
Agent-only	<code>es-start -a</code>
Server + agent	<code>es-start -A</code>
Console	<code>es-start -c</code>

After starting other processes, there may be a delay of several seconds before the console is able to respond.

Note – You can start more than one process at a time. For example, to start both the console and the server + agent, enter `es-start -Ac`.

▼ To Start the Sun Enterprise SyMON Software

1. Change directory to the `/opt/SUNWsymon/sbin` directory.

```
# cd /opt/SUNWsymon/sbin
```

2. If applicable, start the Sun Enterprise SyMON server by typing:

```
# ./es-start -s
```

3. If applicable, start the Sun Enterprise SyMON agent by typing:

```
# ./es-start -a
```

4. Type `es-start -c` at the prompt to start the console.

```
# ./es-start -c
```

Note – You do not have to be `root` to run the Sun Enterprise SyMON console.

The Sun Enterprise SyMON login panel (FIGURE 3-1) is displayed. See TABLE 3-4 for more information on the login panel buttons.



FIGURE 3-1 Sun Enterprise SyMON Login Panel

TABLE 3-4 lists the buttons in the login panel and their corresponding functions.

TABLE 3-4 Sun Enterprise SyMON Login Panel Buttons

Button	Function
Login	Enables users to open the Sun Enterprise SyMON application.
Help	Displays the online help for this panel.
Options	Displays a dialog box which enables you to specify the port number of the Sun Enterprise SyMON server and the security scheme for console to Sun Enterprise SyMON server messages.
Exit	Exits the software.

- 5. Log in using a valid UNIX user account. This account must be listed in the `/var/opt/SUNWsymon/cfg/esusers` file in the Sun Enterprise SyMON server machine.**

Note – The user accounts, `espublic` and `esmaster`, should not be used.

- 6. Type the host name of the Sun Enterprise SyMON server in the Server Host field.**
- 7. If you are not using the Sun Enterprise SyMON server default port addresses or want to set the console to Sun Enterprise SyMON server message security:**

- a. Click the **Options** button.
- b. Type the **Sun Enterprise SyMON server RMI host port number in the Server Port Number field.**
See “To Reconfigure Sun Enterprise SyMON RMI Port Address” on page 308 for more information.
- c. Click the circle next to the appropriate security message option (FIGURE 3-2).



FIGURE 3-2 Sun Enterprise SyMON Login Options Dialog

These options allow you to choose among the following:

- **No Message Authentication:** If you select this, only the user login is authenticated. Messages between the console and the server are not verified for authentication.
- **Console-to-Server Message Authentication:** If you select this, the server verifies the authenticity of the messages coming from the console. However, the console does not verify the messages from the server.
- **Console-Server-Console Message Authentication:** If you select this, both the console and the server authenticate the messages coming from the other.

- d. Click the **OK** button.
8. Check that you typed in all the information correctly in the **Sun Enterprise SyMON Login window** (FIGURE 3-1).

9. Click the Login button in the Sun Enterprise SyMON Login window to log into the Sun Enterprise SyMON console.

The message is displayed on the Current status line:
“Login successful. Launching console.”

The main console window is displayed (FIGURE 3-3).

Note – You may see a warning dialog box before the main console window is displayed if: the console software version does not match the server version, or you have exceeded the limits of your license.



FIGURE 3-3 Sun Enterprise SyMON Main Console Window

Exiting and Stopping the Sun Enterprise SyMON Software

You exit the console through the main console window, and the server and agent components through a shell window.

Sun Enterprise SyMON server and agent components are stopped with the `es-stop` utility. The syntax is:

```
# /opt/SUNWsymon/sbin/es-stop -option(s)
```

The choices for *option(s)* are listed in TABLE 3-5.

TABLE 3-5 Options for `es-stop` Choices

Option	Definition
a	Stops the agent
e	Stops the Event manager
f	Stops the Configuration manager
h	Lists the options for the <code>es-stop</code> utility
l	Stops the Platform agent
p	Stops the Topology manager
s	Stops the server
t	Stops the Trap handler
A	Stops all the components except the console
S	Stops the server and all the server subcomponents (Trap handler, Topology manager, Configuration manager, and Event manager)

Note – You must be `root` to stop the Sun Enterprise SyMON server and agents.

▼ To Exit the Sun Enterprise SyMON Console

1. Select **File** ► **Exit** from the menu bar on the main console window.
The Exit Sun Enterprise SyMON dialog is displayed (FIGURE 3-4).
2. Click the **Exit** button to exit the application or the **Cancel** button to cancel your request.



FIGURE 3-4 Exit Sun Enterprise SyMON Dialog

▼ To Stop the Sun Enterprise SyMON Server and Agents

- Stop the Sun Enterprise SyMON agents and the server subcomponents by typing:

```
# /opt/SUNWsymon/sbin/es-stop -A
```


Using Sun Enterprise SyMON Administrative Domains

A Sun Enterprise SyMON administrative domain is an arbitrary collection of resources that can include a complete campus, individual buildings, hosts, networks, subnets, links, and so on. The organization of a domain collection is in a hierarchy.

Note – In this document, “domain” refers to a Sun Enterprise SyMON administrative domain, and should not be confused with other uses of the term “domain” related to other Sun products or documentation.

This chapter covers the following topics:

- To Set a Home Domain
- To Select Domain Manager
- To Create Domains
- Populating Domains
- To Select a Domain
- To Delete a Domain
- To Set a Remote Domain
- To Set Security for a Domain

Sun Enterprise SyMON software can monitor a multitude of hosts. To enable you to perform your monitoring tasks in an efficient manner, Sun Enterprise SyMON software organizes hosts into groups. The biggest (highest level) grouping is a domain. A domain is an arbitrary grouping of hosts, subnets, networks, buildings, and so on.

You can create one or multiple domains, each with an unique name. Each domain consists of one or more members, arranged in a hierarchy. For example, you may decide that a domain consists of all the hosts in one building. Or, you may decide that a domain consists of all the hosts in a campus.

Note – Spend some time and think about how you want to organize your hosts into different domains.

Decide if you need additional groups below the domain to organize your hosts. For example, if there are several hundred hosts, it is impractical to place your hosts individually in one domain.

You may decide to break the domain into a set of smaller groups; for example, campuses. The Headquarters domain might consist of several campus locations (FIGURE 4-1).

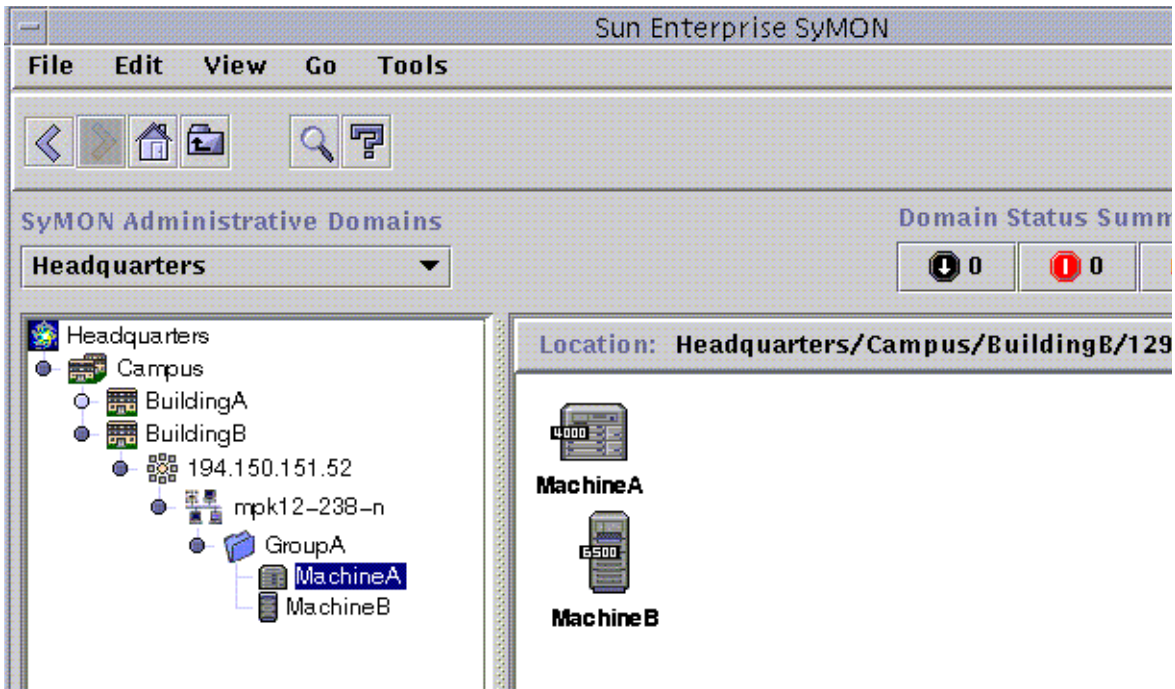


FIGURE 4-1 Example Domain

Each of these campus locations may be broken into smaller groups; for example, buildings. Similarly, each building may be broken into smaller groups; for example, networks, subnets, and groups. Finally, each group comprises individual hosts.

In this particular example, the hierarchical order, from highest level to lowest level, is domain, campus, building, network, subnet, group, and individual host. For detailed information on creating domains, see "To Create Domains" on page 58.

Starting Sun Enterprise SyMON Software

When starting the software for the first time, a dialog is displayed (FIGURE 4-2) prompting you to set a home domain. The home domain is the domain that is displayed whenever the console is started.

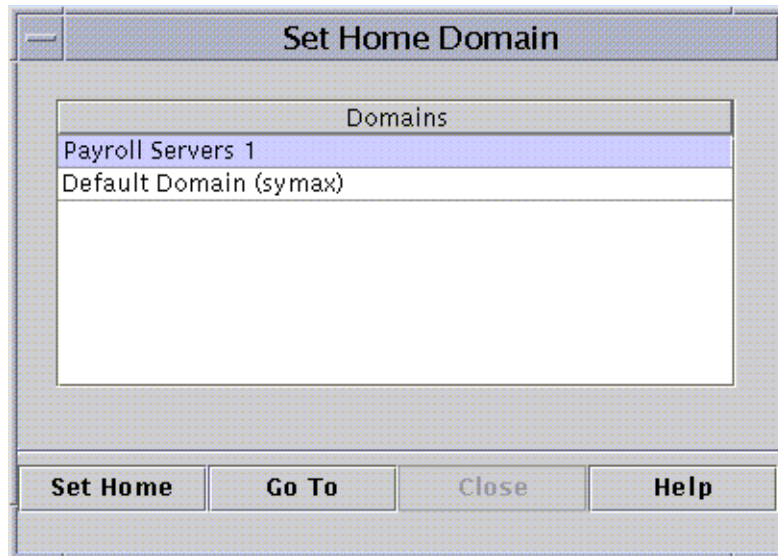


FIGURE 4-2 Set Home Domain Dialog

During installation, a default domain (named after your server host) is automatically created for you.

● **Proceed with one of the following:**

- Select the default domain and click on the Set Home button. Your default domain is set as your home domain and is displayed. For more information, see “To Set a Home Domain” on page 54.
- Select the default domain and click on the Go To button. The main console window is displayed with this default domain.

The default domain consists of one object, your server host.

- If you want to explore the main console window, see Chapter 7.
- If you want to explore monitoring features, see Chapter 8.

- If you want to create additional domains, see “To Create Domains” on page 58.
- If you want to create additional objects in your domain, see “Populating Domains” on page 58.

▼ To Set a Home Domain

1. Proceed with one of the following:

- Click the Set Home button (FIGURE 4-2) in the Set Home Domain dialog.
- Select File ► Set Home Domain in the Sun Enterprise SyMON main console window (FIGURE 4-3).

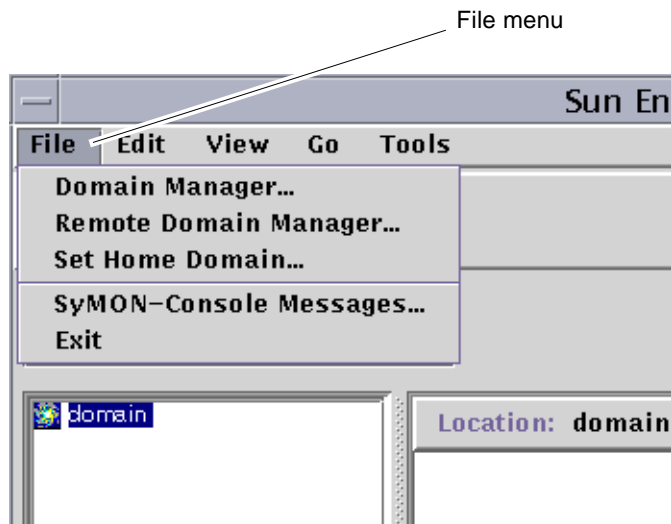


FIGURE 4-3 Sun Enterprise SyMON File Menu

The Set Home Domain dialog (FIGURE 4-4) is displayed.

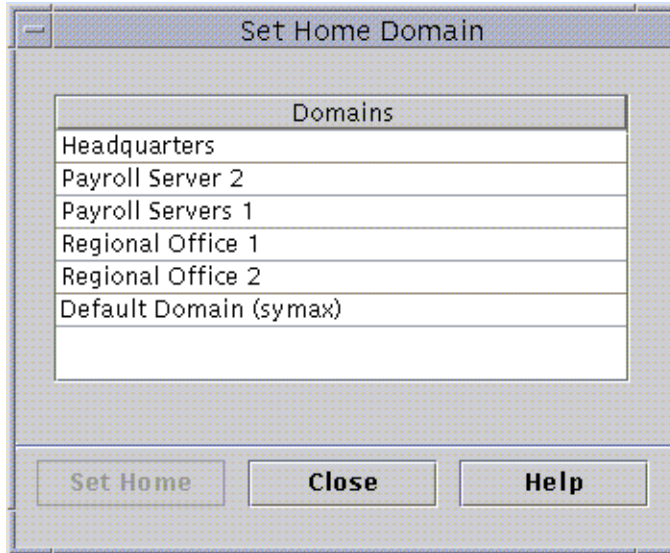


FIGURE 4-4 Set Home Domain Dialog

2. Select the domain you want to set as your home domain.

The selected domain is highlighted.

3. Click the Set Home button.

You see the following message at the bottom of the Set Home Domain dialog.

```
Setting Home Domain...Please wait
```

When the home domain has been set, the message changes.

```
Home domain successfully set.
```

4. Click the Close button.

The main console window is updated and the home domain is displayed (FIGURE 4-5).

At this time, you may want to populate your domain. See "Populating Domains" on page 58 for more information.

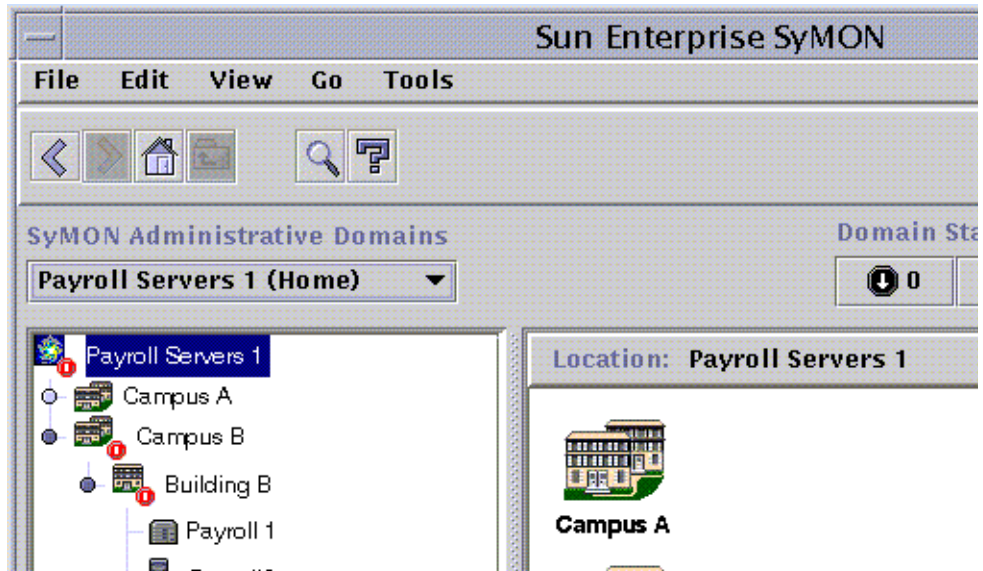


FIGURE 4-5 Home Domain

Creating Domains

The Sun Enterprise SyMON software enables you to create domains with the Domain manager window.

▼ To Select Domain Manager

- In the main console window, select **File** ► **Domain Manager** (FIGURE 4-3). The Domain Manager is displayed (FIGURE 4-6).

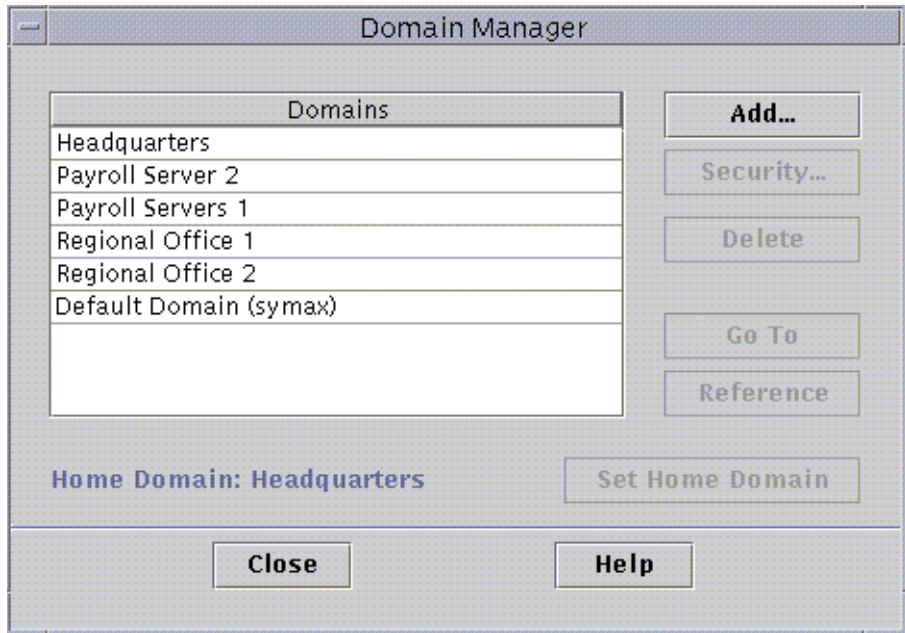


FIGURE 4-6 Domain Manager

Note – In the Domain Manager, some of the buttons are grayed out until you select a domain.

TABLE 4-1 Domain Manager Buttons

Button	Description
Add	Displays the Create Domain dialog.
Security	Displays the Attribute Editor with the security tab selected for the highlighted domain.
Delete	Deletes the selected domain and all its members.
Go To	Updates the main console window to display the selected domain. You may also “go to” a domain by double-clicking on it.
Reference	Inserts the selected domain into the current domain.
Set Home Domain	Sets the selected domain as the domain that is always displayed whenever the console is started. See “To Set a Home Domain” on page 54 for more information.

▼ To Create Domains

1. **Select File ► Domain Manager (FIGURE 4-3) from the main console window.**
The Domain Manager is displayed (FIGURE 4-6).
2. **In the Domain Manager, click the left mouse button on Add.**
The Create Domain dialog is displayed (FIGURE 4-7).

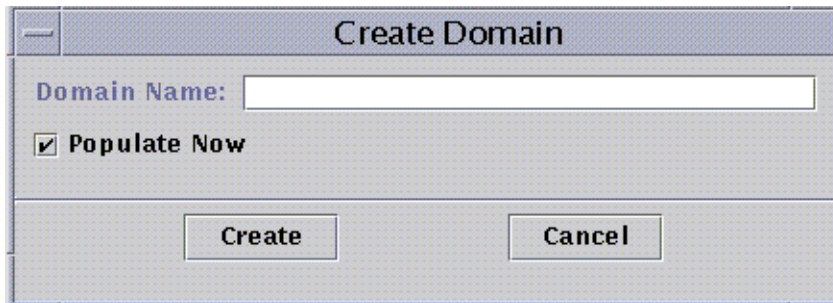


FIGURE 4-7 Create Domain Dialog

3. **Type in the name of the new domain in the Domain Name field.**
4. **If you do not want your domain populated now, be sure the Populate Now check box is turned off.**

The default choice is for Sun Enterprise SyMON software to display a dialog enabling you to start the Discovery Manager immediately after creating a domain. For more information about the Discovery Manager, see Chapter 6.

5. **Click the Create button.**
6. **Create additional domains or populate your domain manually.**

If you do not have the right security permissions to create a domain, an error message is displayed. See Chapter 15 for more information on security.

Populating Domains

Once you have created your domain(s), you can begin to populate these domains (and their subordinate groups). There are three methods to add hosts and other resources to a domain collection:

- **Populate with the Discovery Manager**—see Chapter 6. Discovery Manager searches the network for resources. This is the default method for populating a newly created domain. The search can be time-consuming, but you can shorten the search by setting limits.

- Populate with the Discovery Manager at scheduled intervals by using the Scheduling feature—see “Starting the Discovery Requests Window” on page 98. You can set the search to occur hourly, daily, weekly, or monthly. This feature enables you to search periodically for new managed objects on the network.
- Manually populate with the Create an Object menu—see Chapter 5. This method enables you to add objects one at a time and is useful for adding a small number of known resources. For example, if you have installed a new host, you can use Create an Object to add the host to the local domain immediately.

Managing Domains

Once you have created domains, you can manage them.

Selecting Domains

You can list domains through the Domain Manager window (FIGURE 4-6) or the Sun Enterprise SyMON main console window.

▼ To Select a Domain

1. Proceed with one of the following:

- Select File ► Domain Manager in the main console window (FIGURE 4-3).
- In the main console window, click the left mouse button on the SyMON Administrative Domains pull-down menu (FIGURE 4-8).

The current list of domains is displayed.

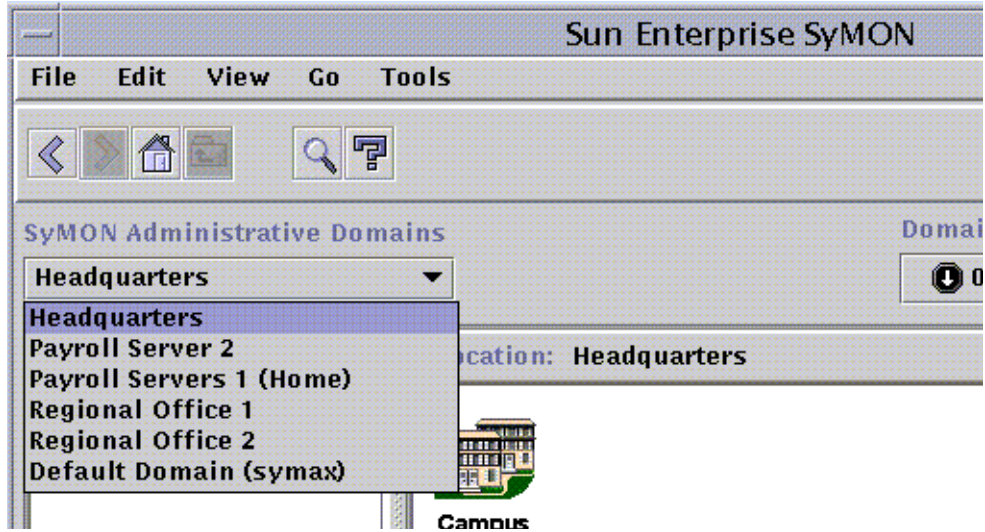


FIGURE 4-8 Sun Enterprise SyMON Main Console Window with a List of Current Domains

2. Click the left mouse button on the domain you want to view.

The main console window is updated and displays the selected domain. The SyMON Administrative Domains button changes to display the name of the domain you have selected.

Deleting Domains

You must have the appropriate security permission to delete a domain. For more information on Sun Enterprise SyMON security, see Chapter 15.

▼ To Delete a Domain



Caution – Deleting a domain also deletes all the members of that domain.

1. In the Domain Manager window, highlight the name of the domain you want to delete.

2. Click the Delete button.

The Confirm Domain Deletion dialog (FIGURE 4-9 or FIGURE 4-10) is displayed.

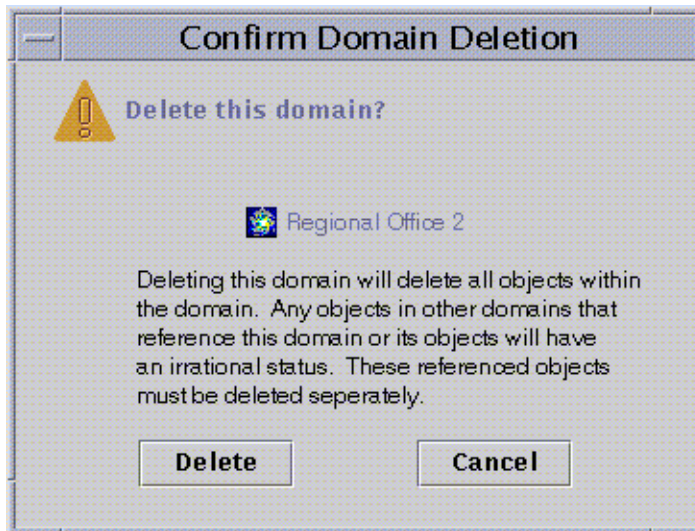


FIGURE 4-9 Confirm Domain Deletion Dialog

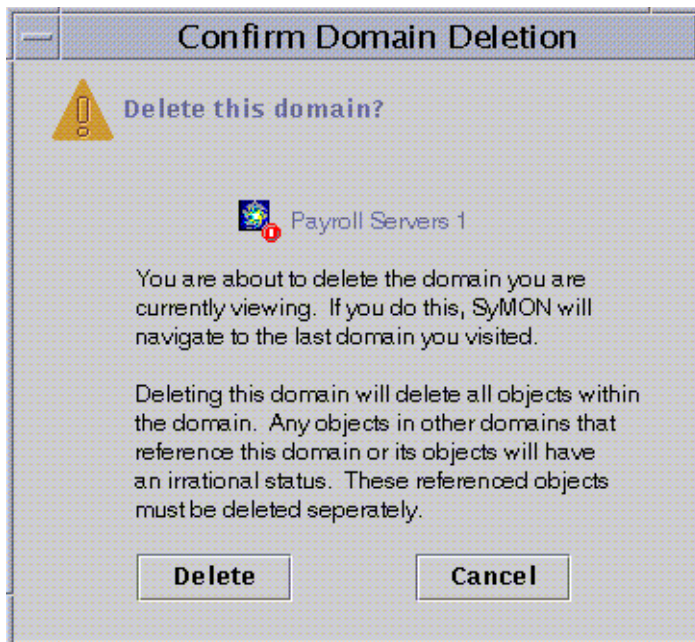


FIGURE 4-10 Confirm Domain Deletion Dialog for Current Domain

3. Click Delete.

The Confirm Domain Deletion dialog displays the following message.

Deleting domain...Please wait.

When the domain has been successfully deleted, the dialog is removed and the Domain Manager updates the list of domains.

4. Click the Close button in the Domain Manager.

Monitoring Remote Domains

Remote domains are domains created in a different Sun Enterprise SyMON server context. See Chapter 15 for a description of server context.

If you are interested in an object in a different server context, you can still *monitor* the remote resource by referencing the remote domain in your local domain. However, you are not able to *manage* the remote resource unless you log out of your current Sun Enterprise SyMON server context and log into the remote server context. You can manage monitored properties on a resource *only* if the agent on that resource sends event management information to the server to which your console is connected. By default, Sun Enterprise SyMON security gives you “read-only” privileges for remote domains. For more information on security, see Chapter 15.

Note – You can reference a remote domain to *monitor* resources in that domain. You *cannot* manage monitored properties on a remote resource.

For example, your current Sun Enterprise SyMON server context may be based in the Headquarters domain. A second, remote Sun Enterprise SyMON server context may be based in Regional Office 1. When workers are absent from Regional Office 1, system administrators in Headquarters can monitor the regional office domains by referencing these remote domains in the Headquarters server context. If an emergency occurs, administrators in Headquarters can notify a Regional Office 1 administrator immediately.

Note – Remote domains enable you to monitor critical resources continuously.

Here is an example of how remote monitoring works. In the following figure, Domain A is monitoring objects 1 and 2 (which are assigned to Domain A) as well as remotely monitoring objects 3 and 4, which are assigned to Domain B. Note that Domain A cannot monitor objects 3 or 4 without going through remote Domain B.

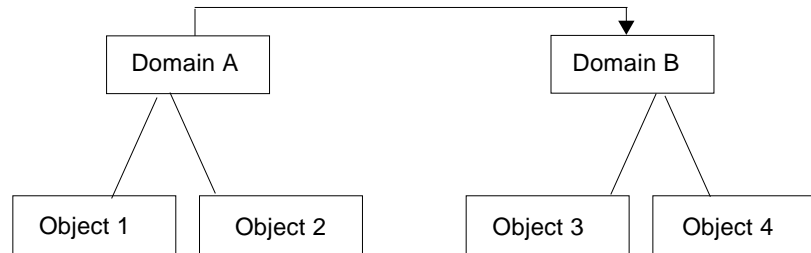


FIGURE 4-11 Remote Domain



Caution – Do not create a domain with a circular reference (to itself).

For example, do not create a domain (Domain A) which references another domain (Domain B) which in turn, contains a reference to Domain A.)

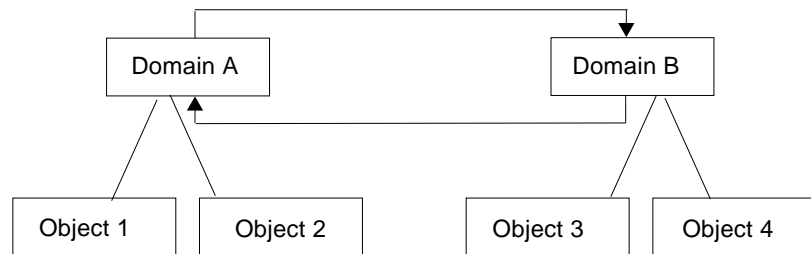


FIGURE 4-12 Remote Domain - Circular Domain Reference

If it is necessary for the two domains to monitor each other, to avoid creating a circular domain reference, create a domain member (for example, a group) under domains A and B as shown below.

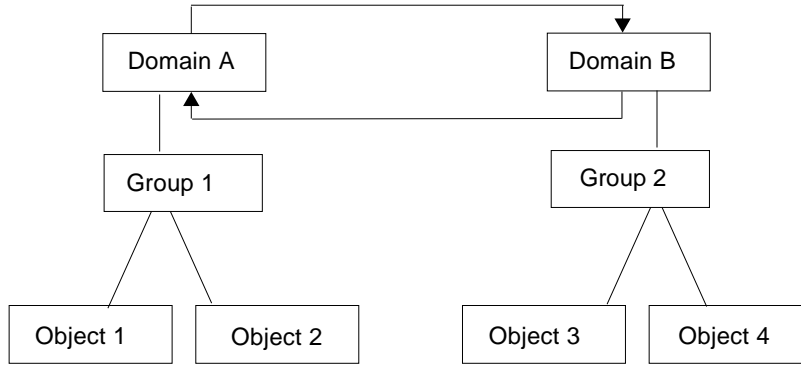


FIGURE 4-13 Remote Domains - Setting Up for Successful Cross-Monitoring

Now when making a remote reference, Domain A can reference Group 2 under Domain B, while Domain B can reference Group 1 under Domain A.

▼ To Set a Remote Domain

1. In the main console window, select **File ► Remote Domain Manager** (FIGURE 4-3). The Remote Domain Manager dialog is displayed (FIGURE 4-14).

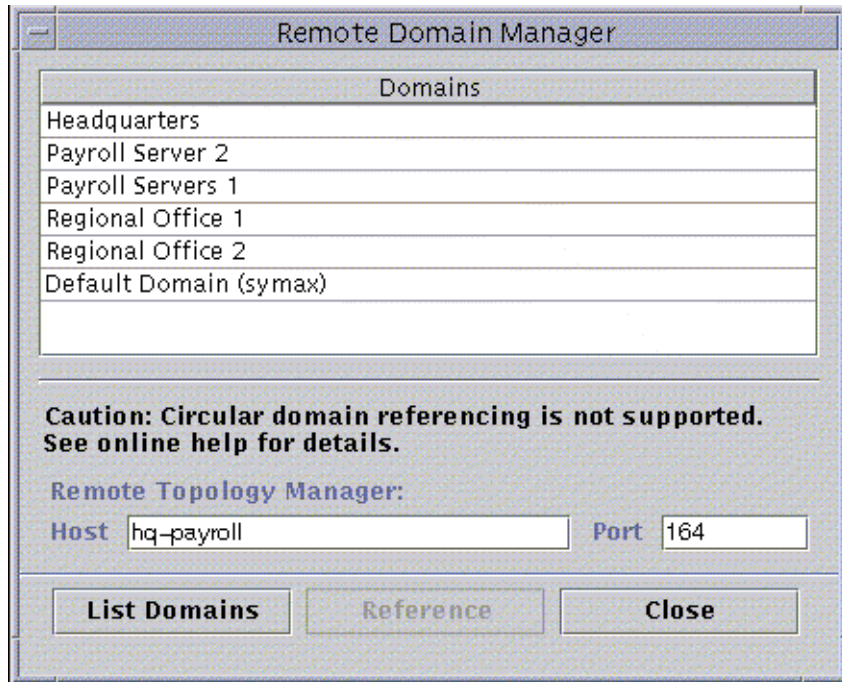


FIGURE 4-14 Remote Domain Manager

2. Type the name of the remote server in the **Host** field. If applicable, also type the appropriate number in the **Port** field.

By default, the Topology manager is installed on the server on port 164.

3. Click the **List Domains** button.

A list of domains on the remote server is displayed.

4. Click the domain you want to reference.

The selected domain is highlighted.

5. Click the **Reference** button.

The selected domain is created as a reference domain in the currently selected domain in the main console window (FIGURE 4-15).

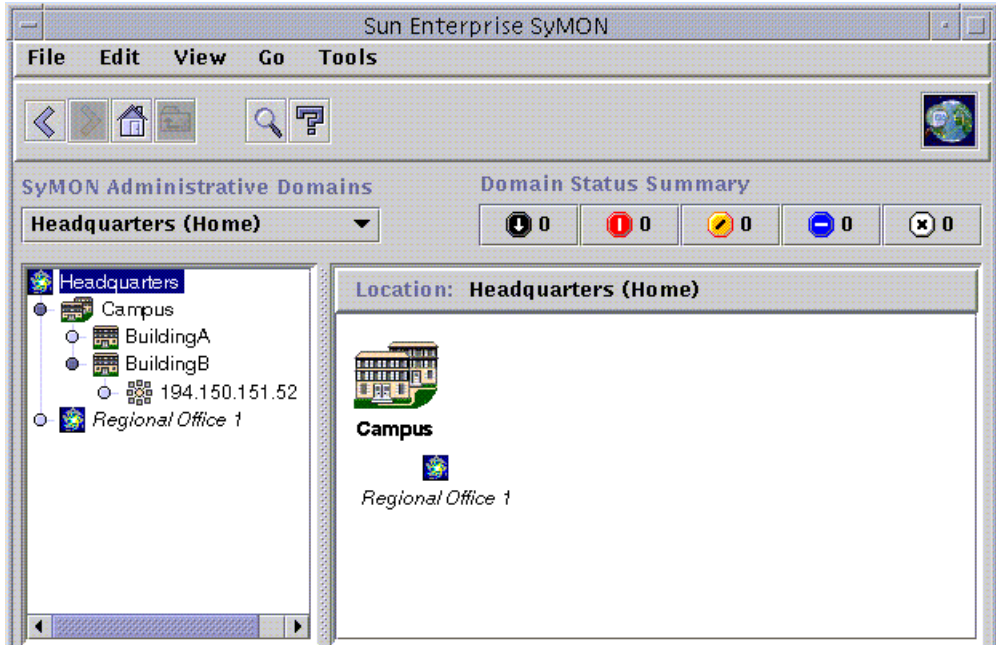


FIGURE 4-15 Referencing a Remote Domain

Attribute Editor for a Domain

The domain Attribute Editor provides additional information about the selected domain and the rules governing its behavior. Use the Attribute Editor to edit security information for the domain.

Note – Each Attribute Editor displays one or more tab buttons, depending on the type of Attribute Editor. The Attribute Editor that is displayed is dependent on the selected object.

▼ To Set Security for a Domain

1. Proceed with one of the following:

- Open the Attribute Editor for a domain by clicking the right mouse button on the domain icon and highlight Attribute Editor from the pop-up menu in the hierarchy view.

- Select File ► Domain Manager in the main console window. Then select a domain and click the Security button.
2. **If not already selected, click the Security tab** (FIGURE 4-16).
 3. **Type the name(s) of user and administrator groups in the appropriate fields.**
See Chapter 15 for more information.
 4. **Complete this procedure with one of the following actions:**
 - Click OK to accept the changes you have made and close this window.
 - Click Apply to apply your changes without closing this window.
 - Click Reset to reset the Attribute Editor to the default parameters.
 - Click Cancel to cancel your request.

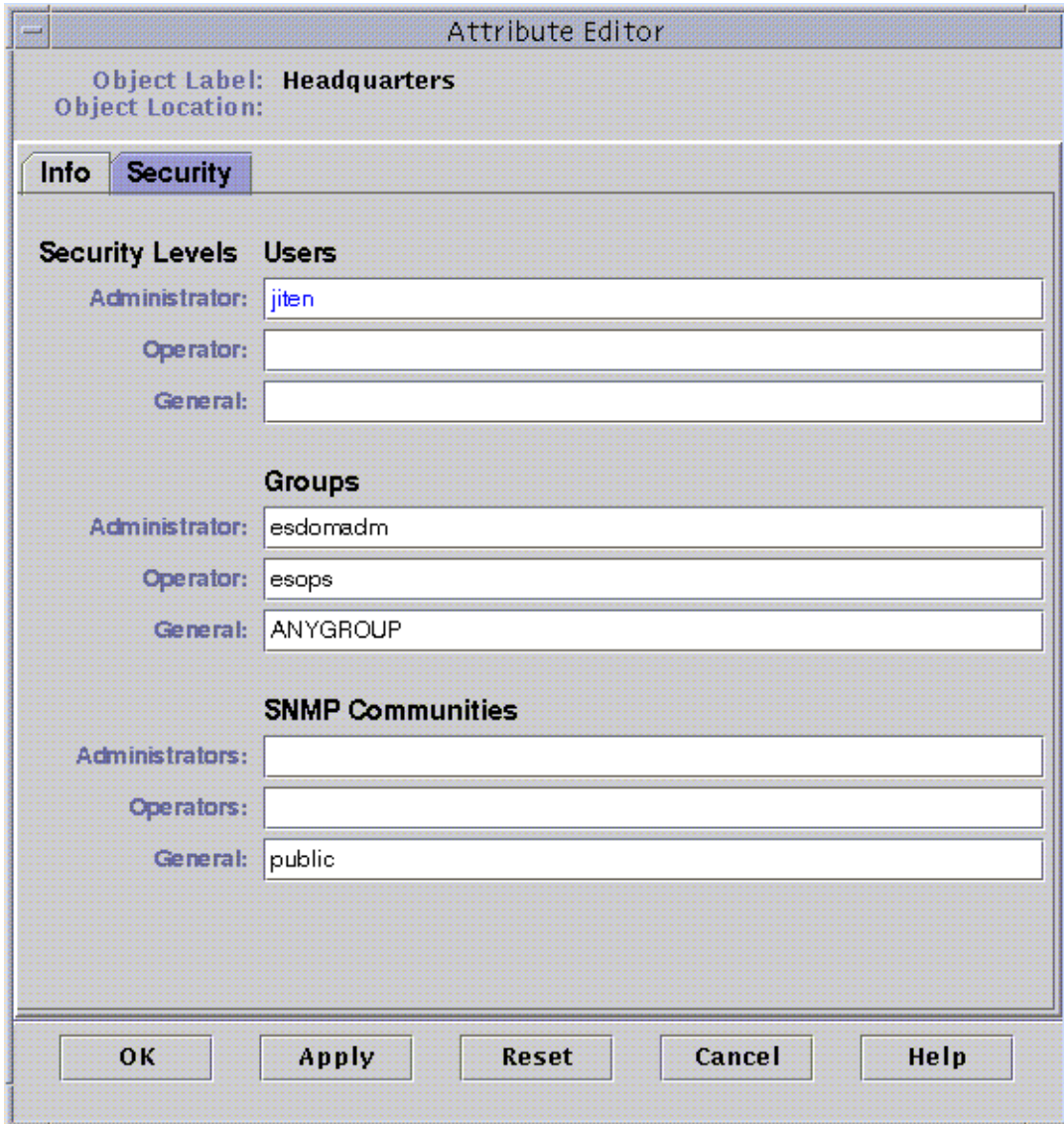


FIGURE 4-16 Attribute Editor for a Domain

Objects

This chapter describes how to create and monitor objects.

This chapter discusses how:

- To Create a Node
- To Create a Module Object
- To Create a Group
- To Create a Composite Object
- To Create a Segment
- To Connect Objects
- To Copy an Object
- To Copy a Group of Objects
- To Modify an Object
- To Cut and Paste Objects
- To Delete Objects

Sun Enterprise SyMON objects represent parts (or *nodes*) of a network and include hardware and software components such as hosts (workstations and servers), printers, routers, modules, and so on. A segment of the network itself can even be an object.

Note – For additional information, refer to your supplement. The supplement contains important hardware-specific information about creating an object.

To monitor or manage an object, you create a node to represent it in a domain or group. If the group does not yet exist, you must first create the group.

You can create and monitor or manage one or more domains containing nodes for multiple objects (such as the workstations and other devices connected to the server). For information about domains, see Chapter 4.

Creating a Node

You create nodes through the Edit pull-down menu in the main console window.

▼ To Create a Node

Note – A domain must exist before you can create a node. To create a domain, see “To Create Domains” on page 58.

- 1. In the hierarchy view of the main console window, select the domain in which you want to create the new object.**

Select the lowest level group of the domain where the new object should be created.

For example, if you want to create a node in a building that is in one of the campuses of a domain, then select the building in the domain as the lowest level group.

- 2. In the main console window, select Edit ► Create an Object (FIGURE 5-4).**

The Create Topology Object window is displayed. By default the tab is set to Node (FIGURE 5-1).

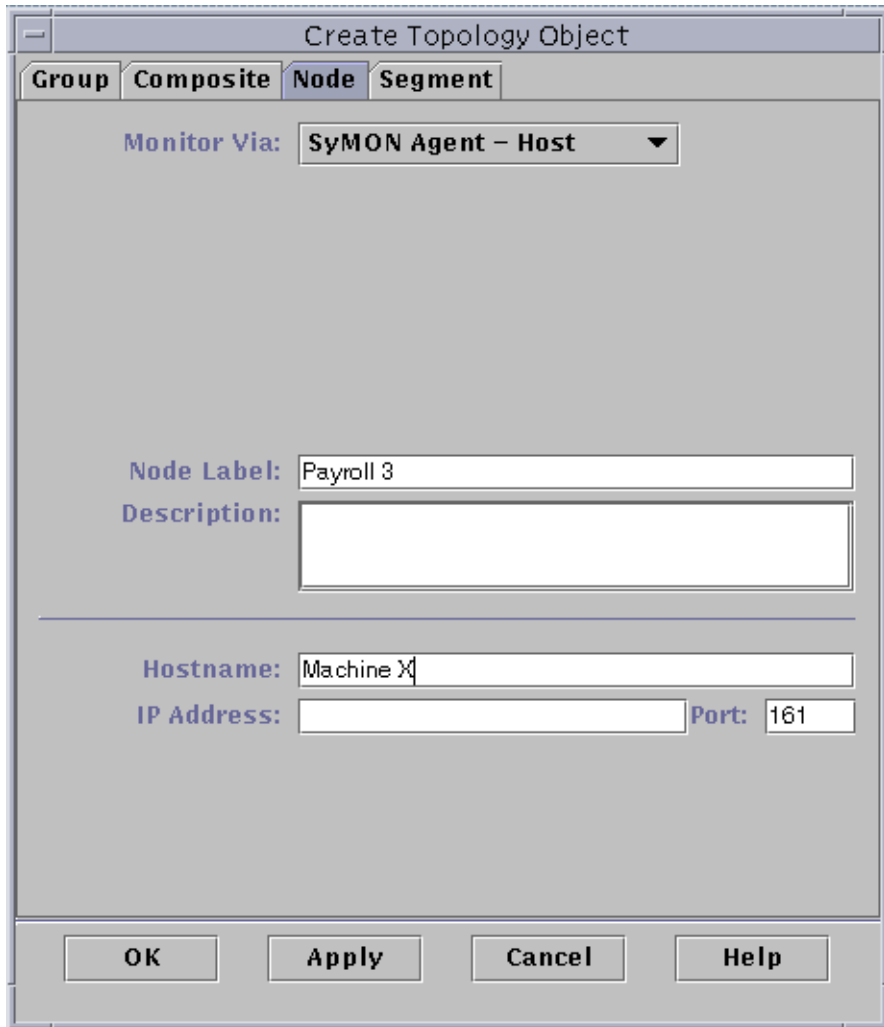


FIGURE 5-1 Create Topology Object Window—Node Tab

3. In the upper half of the Create Topology Object menu, set up the new node:

- a. Click the Monitor Via button to see the pull-down menu, then select the software or agent to monitor the new node.

There are seven categories of agents and monitors (TABLE 5-1). If an agent is not available for your selected object, SNMP Ping usually works. If you do not select an available agent or ping command, the creation fails.

TABLE 5-1 Types of Sun Enterprise SyMON Monitoring

Type	Description	Effect
Agent – Host	Monitor and manage a host that has an active agent that is installed and running.	The status of the agent on the host can be monitored. The Details window of the Sun Enterprise SyMON agent host contains tabs such as Info, Browser, Alarms, and so forth. The Entity Polling Type in the Info tab is <code>ahost</code> .
Agent – Module	Monitor and manage a module that has an active Sun Enterprise SyMON agent that is installed and running.	The status of the Sun Enterprise SyMON Module on the agent host can be monitored. The Details window contains Info and Browser tabs. The Entity Polling Type in the Info tab is <code>amod</code> .
Agent - Platform	For more information, see your supplement.	
SNMP Proxy	Monitor and manage the device through a Sun Enterprise SyMON agent that is running a Sun Enterprise SyMON proxy module for that device. (The proxy module must have been previously loaded into the agent by using the Load Module dialog. See Chapter 12.) Communication between the Sun Enterprise SyMON Topology manager and the agent is SNMPv2 usec. Communication between the Sun Enterprise SyMON agent and the remote device is SNMPv1 or SNMPv2, depending on the proxy module.	The Proxy Monitoring module data can be seen. The Details window contains the Info and Browser tabs. The Entity Polling Type in the Info tab is <code>aprox</code> .

TABLE 5-1 Types of Sun Enterprise SyMON Monitoring (Continued)

Type	Description	Effect
SNMP Ping	Monitor the device by using SNMP ping command. The Sun Enterprise SyMON Topology manager communicates with the device using SNMPv1. (There are no management capabilities provided for devices monitored by the SNMP ping command.)	The availability of the SNMP agent on the device can be monitored. The Details window contains only the Info tab. The Entity Polling Type in the Info tab is snmp.
ICMP Ping	Monitor the device by using the Internet Control Message Protocol (ICMP) ping command. (There are no management capabilities provided for devices monitored by the ICMP ping command.)	The accessibility of the device can be monitored. The Details window contains only the Info tab. The Entity Polling Type in the Info tab is ping.
Non-Monitored	Created node is for display only. Its status is not monitored.	No aspects of the device are monitored. The Details window contains only the Info tab. The Entity Polling Type in the Info tab is dummy.

b. If applicable, select a type from the pull-down menu in the Type field.

The list of choices varies widely according to the type of monitoring you selected in the previous step.

Note – For information about creating an object for your specific platform, see the supplement.

TABLE 5-2 Choices Available in the Type Pull-Down Menu

Monitor by	Agent - Host	Agent - Module	SNMP Proxy	SNMP Ping	ICMP Ping	Non-monitored
Type	Workstation, Server,	Local Module	Router, Concentrator, Workstation, Printer, PC, Server	Router, Concentrator, Workstation, Printer, PC, Server	Router, Concentrator, Workstation, PC, Server	Printer, Workstation, Router, Concentrator, Server, PC

c. If applicable, scroll and select an object in the Create Topology Object window.

For some types of monitoring, the right side of the Create Topology Object window displays the set of icons for the object you have selected. The icons are displayed in the hierarchy and topology views in the main console window when the node is created.

d. (Optional) Create a unique new name in the Node Label field.

e. (Optional) Type a description of the node.

4. In the lower half of the Create Topology Object window, type the requested information.

The questions in the lower half of the window vary with the agent or monitor that you selected in Step 4a, above. The Non-Monitored selection does not require further information, but most agent or monitor selections ask you to enter:

- Node host name
- Node IP address

You can enter either the host name, the IP address, or both. If there is a conflict between the host name and the IP address, the host name takes precedence.

Other agent or monitor selections may also ask for one or more of the following:

- Sun Enterprise SyMON agent port number (the default is 161)
- Proxy host name and IP address
- Read/write SNMP communities
- Module name

5. Complete this procedure with one of the following actions:

- Click OK to accept the changes you have made and close this window.
- Click Apply to apply your changes without closing this window.
- Click Cancel to cancel your request.

This message is displayed at the bottom of the Create Topology Object window:

Creating Node... Please Wait.

- If the request is completed successfully, the main console window is updated and the new node is displayed.
- If the creation fails, an error message is displayed at the bottom of the Create Topology Object window. The cause of the error may be that you do not have permission to create this node, or that you must start a Sun Enterprise SyMON agent on the node.

Note – If you are connected to one Sun Enterprise SyMON server context and create a node on another Sun Enterprise SyMON server context, ownership of the new node on the second server context defaults to the `espublic` identity instead of your login identity. This situation is normal. The `espublic` identity is imposed for security of transactions between Sun Enterprise SyMON server contexts. For more information, see “Sun Enterprise SyMON Remote Server Access” on page 287.

If you want to make any changes to the new node, see “Modifying Objects” on page 89.

Creating a Monitored Module Object

If you want to monitor one or more module objects on a number of hosts, you may find it useful to create module objects for each host and place all of the modules in a common location (that is, in the same group or domain). The procedure for creating a module object is similar to that for creating a node.

▼ To Create a Module Object

- 1. In the hierarchy view of the main console window, select the domain in which you want to create the new object.**
- 2. In the main console window, select Edit ► Create an Object (FIGURE 5-4).**
- 3. Select the Node tab in the Create Topology Object window.**
- 4. Select SyMON Agent – Module in the Monitor Via field (FIGURE 5-2).**

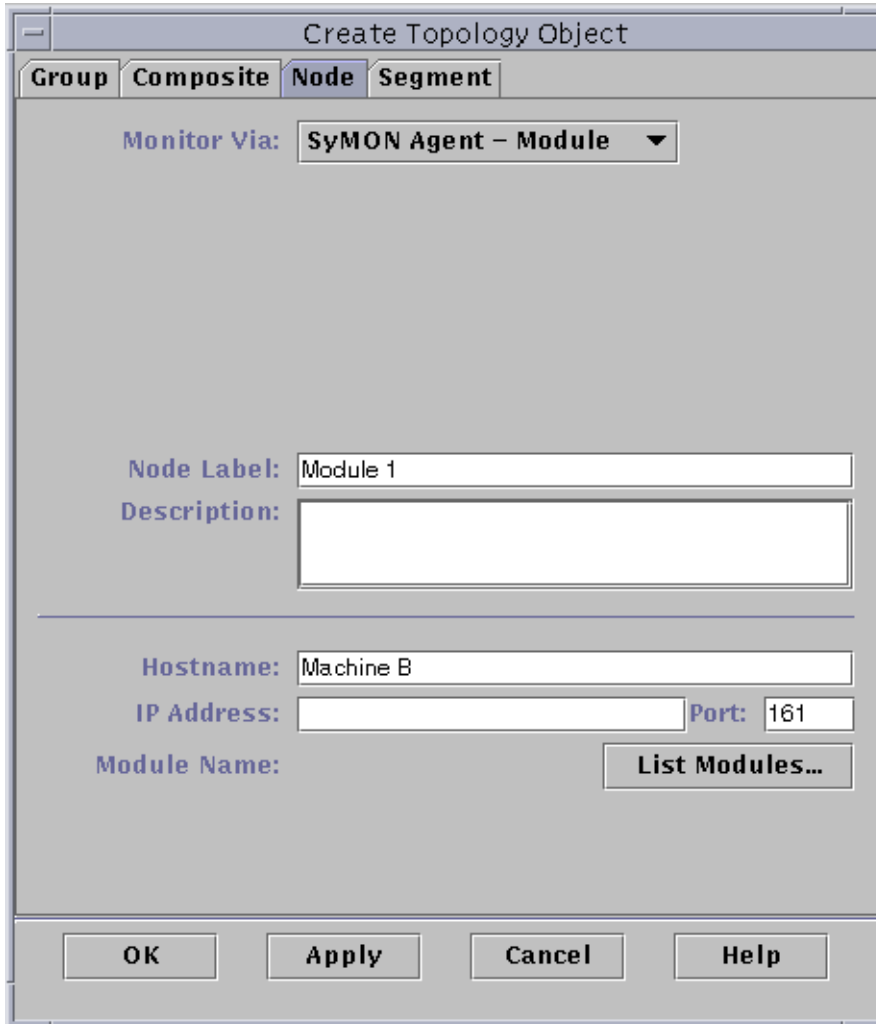


FIGURE 5-2 Create Topology Object Window for SyMON Agent - Module

5. (Optional) Type a node label.

6. (Optional) Type a description.

7. Type a host name or IP address.

You can enter either the host name, the IP address, or both. If there is a conflict between the host name and the IP address, the host name takes precedence.

8. If necessary, change the port number.

9. Click the List Modules button to display a list of modules that are currently loaded on the host.

If the module that you want to use is not loaded, see “To Load a Module” on page 212. If the module that you want to use is not enabled, see “To Enable a Module” on page 224.

The module list is displayed (FIGURE 5-3).

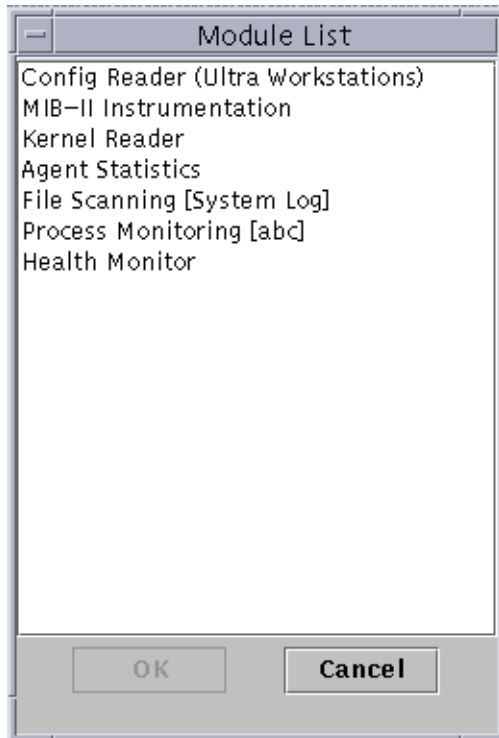


FIGURE 5-3 Module List

10. Select the module that you want to monitor and click OK.

The module list closes.

11. Complete this procedure with one of the following actions:

- Click OK to accept the changes you have made and close this window.
- Click Apply to apply your changes without closing this window.
- Click Cancel to cancel your request.

Creating Groups

You can create two types of groups, General and IP-based. General groups are based on geography (campus or building). IP-based groups are based on networks or subnets.

▼ To Create a Group

1. In the hierarchy view of the main console window, click the domain in which you want the new group.

Select (by clicking) a location in the domain where the new group should be created.

For example, if you want to create a group in a building that is in one of the campuses of a domain, then click the building icon in the domain.

2. In the main console window, select **Edit ► Create an Object** (FIGURE 5-4).

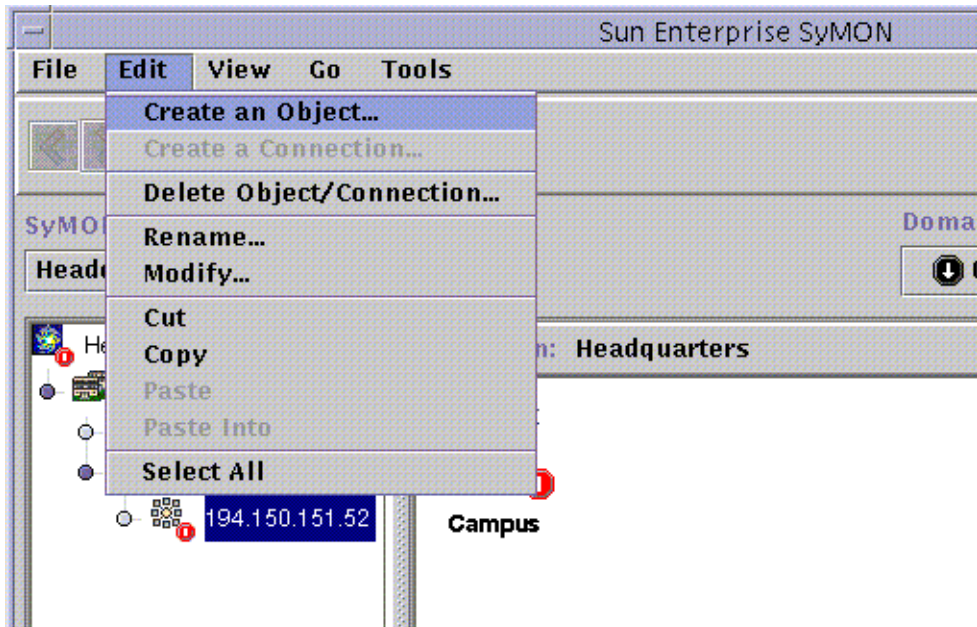


FIGURE 5-4 Creating an Object

The Create Topology Object window is displayed.

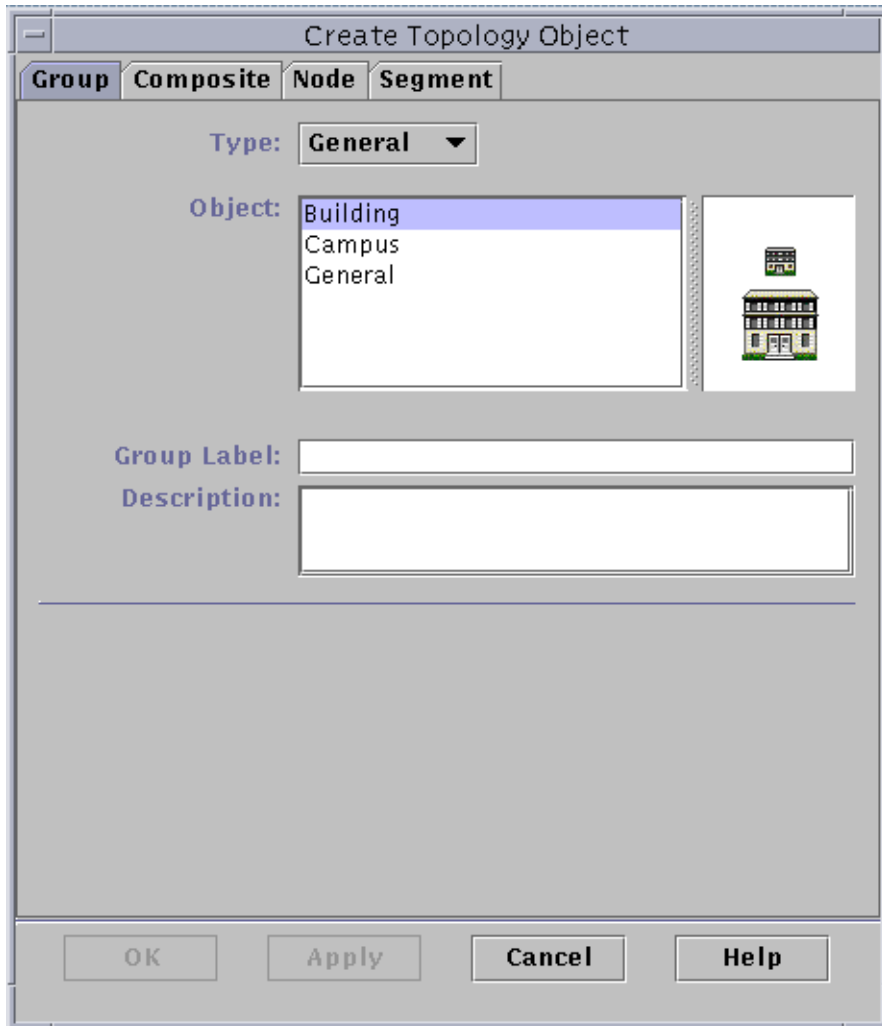


FIGURE 5-5 Creating a Group in the Create Topology Object Window

3. In the Create Topology Object window:

a. Click the Group tab (FIGURE 5-5).

b. Change the Type field, if desired (General or IP-Based).

c. Select the object type (Building, Campus, or General).

The right side of the window is updated with an icon corresponding to the object type.

d. Create a new group Label.

- e. (Optional) Type a description in the optional Description field.
- f. For an IP-based group, specify the IP address and the subnet mask.

Note – The creation of an IP-based group results in the creation of an empty network or subnet “container” which you can populate using the Create Topology Object window.

4. Complete this procedure with one of the following actions:

- Click OK to accept the changes you have made and close this window.
- Click Apply to apply your changes without closing this window.
- Click Cancel to cancel your request.

If you selected OK or Apply, this message is displayed at the bottom of the Create Topology Object window:

Creating group... Please Wait.

If the request ends successfully, the main console window is updated and the group is displayed.

If the request fails, an error message is displayed at the bottom of the Create Topology Object window. The cause of the error may be that you do not have the right permission to create this group.

If you want to make any changes to the new group, see “Modifying Objects” on page 89.

5. Add components to your group:

- Use the Create Topology Object window. See “To Create a Node” on page 70.
- Copy and paste objects from other groups into the new group. See “Copying Objects” on page 87.

Creating a Composite Object

You create composite objects through the Edit pull-down menu in the Create Topology Object window.

▼ To Create a Composite Object

- 1. In the hierarchy view of the main console window, select the Sun Enterprise SyMON domain in which you want to create the new composite object.**

Select the lowest level group of the domain where the new composite object should be created.

- 2. In the main console window, select Edit ► Create an Object (FIGURE 5-4).**

The Create Topology Object window is displayed. By default the tab is set to Node.

- 3. Click the Composite tab in the Create Topology Object window.**

The window changes to display settings available for composite objects (FIGURE 5-6).

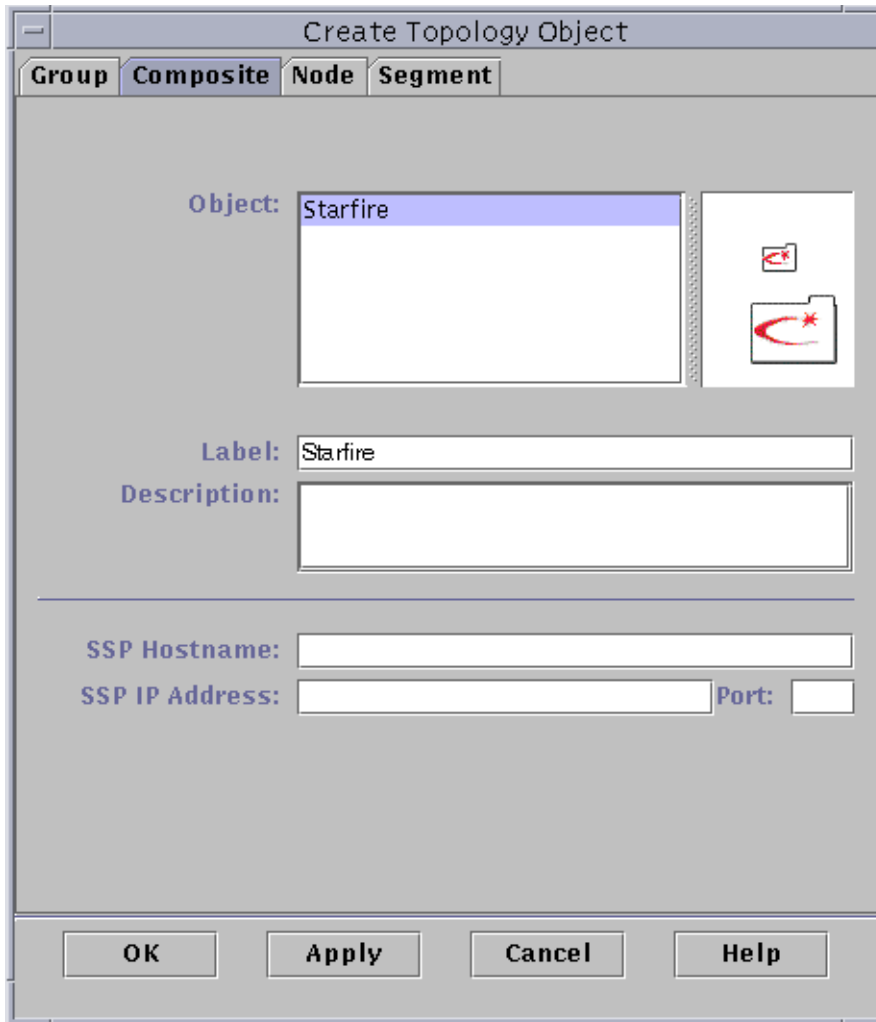


FIGURE 5-6 Create Topology Object Window—Composite Tab

4. Select an object in the Create Topology Object window.

For some types of monitoring, the right side of the Create Topology Object window displays the set of icons for the object you have selected. The icons are displayed in the hierarchy and topology views in the main console window when the composite object is created.

5. Create a unique new name in the Label field.

6. (Optional) Type a description of the node.

7. In the lower half of the Create Topology Object window, type the requested information.

- SSP Hostname
- SSP IP Address
- Sun Enterprise SyMON agent port number (the default is 161)

You can enter either the host name, the IP address, or both. If there is a conflict between the host name and the IP address, the host name takes precedence.

8. Complete this procedure with one of the following actions:

- Click OK to accept the changes you have made and close this window.
- Click Apply to apply your changes without closing this window.
- Click Cancel to cancel your request.

This message is displayed at the bottom of the Create Topology Object window:

Creating Composite Object... Please Wait.

- If the request is completed successfully, the main console window is updated and the new composite object is displayed.
- If the creation fails, an error message is displayed at the bottom of the Create Topology Object window. The cause of the error may be that you do not have the permission to create this object, or that you must start a Sun Enterprise SyMON agent on the object.

Note – If you are connected to one Sun Enterprise SyMON server context and create an object on another Sun Enterprise SyMON server context, ownership of the new object on the second server context defaults to the `espublic` identity instead of your login identity. This situation is normal. The `espublic` identity is imposed for security of transactions between Sun Enterprise SyMON server contexts. For more information, see “Sun Enterprise SyMON Remote Server Access” on page 287.

If you want to make any changes to the new object, see “Modifying Objects” on page 89.

Creating Segments

To complete your view of a domain, you can include segments of the networks linking the nodes in the domain.

▼ To Create a Segment

1. In the main console window:

- a. **In the left window, select a location in the domain where the new segment should be created.**

The segment is created at the selected (highlighted) level.

For example, if you want to create a segment in a building that is in one of the campuses of a domain, then select the building in the domain.

- b. **In the main console window, select **Edit ► Create an Object** (FIGURE 5-4).**

The Create Topology Object window is displayed (FIGURE 5-1).

2. In the Create Topology Object window:

- a. **Click the **Segment** tab (FIGURE 5-7).**

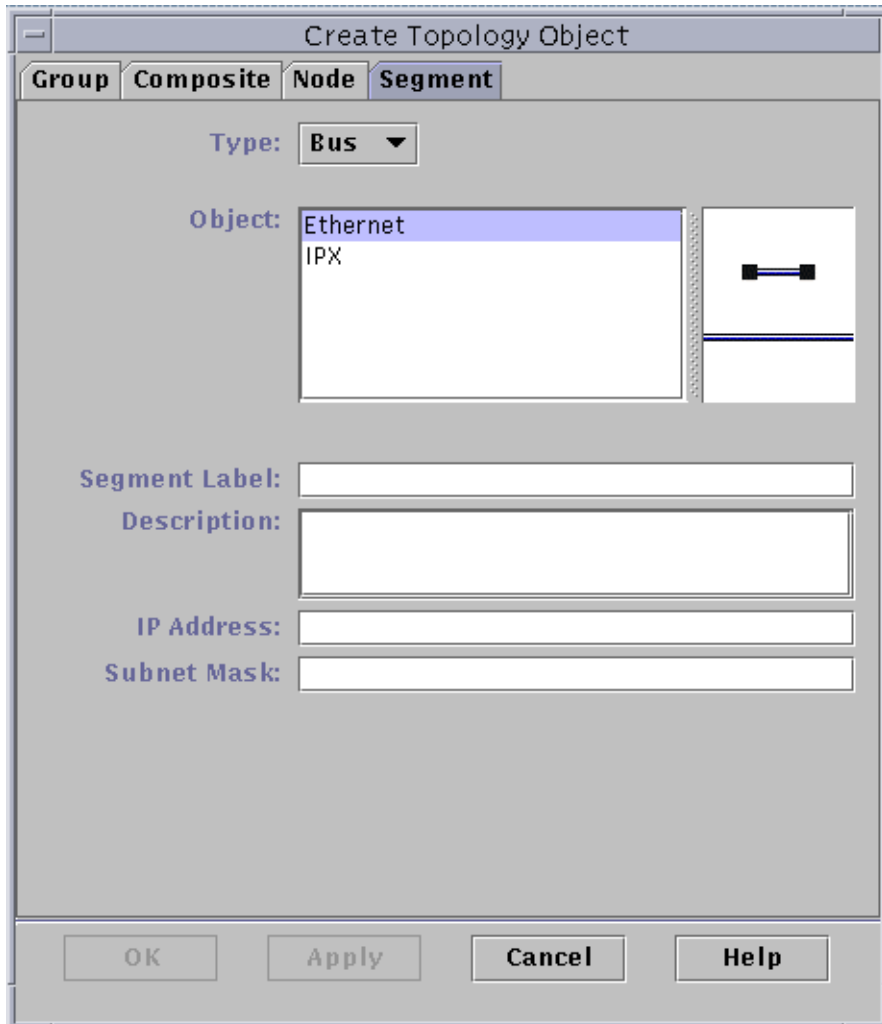


FIGURE 5-7 Segment Tab in the Create Topology Object Window

b. Change the Type field, if desired (Bus or Ring).

c. Select the object type.

The list of choices (Ethernet or IPX) changes with your selection in the Type field.

At the right in the Create Topology Object window is a window that displays large and small icons corresponding to the type of object you have selected. The icons are displayed in the topology view in the main console window when the segment is created.

d. Type a new segment label.

e. (Optional) Type a description in the Description field.

f. Type the IP address for this segment.

g. Type a subnet mask for this segment.

3. Complete this procedure with one of the following actions:

- Click OK to accept the changes you have made and close this window.
- Click Apply to apply your changes without closing this window.
- Click Cancel to cancel your request.

This message is displayed at the bottom of the Create Topology Object window:

Creating segment... Please Wait

If the request is completed successfully, the Create Topology Object window closes. The main console window is updated and the view is displayed.

If the request fails, an error message is displayed in the Create Topology Object window.

If you want to make any changes to the new segment, see “Modifying Objects” on page 89.

Connecting Objects

You can connect objects in the topology view.

▼ To Connect Objects

1. Select two objects in the topology view.

To select two objects, select the first object in the topology view. Hold down the Shift key and click the second object using the mouse button.

2. Select Edit ► Create a Connection.

A link is displayed between the objects.

Copying Objects

To move an object from one location in the topology view to another, use the Edit commands, `Cut` and `Paste`.¹ To copy an object into other topology views (leaving the original object in its current location), use `Copy` instead of `Cut`.

For example, you can create a domain that contains some of the objects that already exist in another domain. To do this, create a new domain (see Chapter 4), then copy existing objects into the new domain as described in the following procedure.

You can also copy a group (an object that contains other objects). In this case, the software does not create an independent, completely new group. Rather, it creates a symbolic link to the existing group. Thus every copy is a different “view” of the *same* group.

Note – You can select multiple objects by using the mouse button while holding down the Shift key.

For more information on the main console window, see Chapter 7.

Note – The copy, cut, and paste functions are available in the topology view. The copy and cut functions are also available in a pop-up window by clicking your right mouse button on the object.

▼ To Copy an Object

This procedure is for a single object. To copy a group, see “To Copy a Group of Objects” on page 88.

1. **In the main console window, select the existing object in the topology view.**
2. **At the top of the main console window, select Edit ► Copy in the pull-down menu.**

This message is displayed at the bottom of the main console window:

Copy successful

1. Sun Enterprise SyMON 2.0.1 software does not support drag and release as an operation for moving objects.

3. Open the destination group or domain.

The destination group is displayed in the topology view.

4. At the top of the main console window, select Edit ► Paste.

The pasted object is displayed in the destination group or domain, and this message is displayed at the bottom of the main console window:

Paste successful

▼ To Copy a Group of Objects

To copy objects that are in one group and paste the copies into another group:

1. In the topology view, select the objects to be copied.

To copy all objects in the topology view, select Edit ► Select All in the main console window menu bar.

To copy two or more objects selectively:

a. Click the first object to select it.

b. On the keyboard hold down the Shift key and click one or more additional objects.

2. Select Edit ► Copy in the main console window menu bar.

When the objects are copied, this message is displayed at the bottom of the main console window:

Copy Successful

3. In the hierarchy view, select (highlight) the new group or domain where the group is to be copied.

4. Select Edit ► Paste Into in the main console window menu bar.

Alternatively, you can click with your left mouse button on the destination domain and select Paste Into from the pop-up menu.



Caution – If you select Edit ► Paste (instead of Edit ► Paste Into), the objects may be pasted into the wrong group. If this occurs, highlight the duplicate objects and select Edit ► Delete Object/Connection.



Caution – When you copy a group in the Sun Enterprise SyMON software, the new copy (a symbolic link) is labelled with italic font. The italic font is a reminder that this is a link. If you add or remove objects from this group, the original group and all copies of the group are affected.

Note – An object in the cut (pre-move) state remains visible—and selected with dashed lines—until it has been successfully pasted. If you change your mind and no longer want to paste the object, you can remove it from the cut state by clicking on it a second time.

Modifying Objects

Once you have created or copied an object, you can change the object through the Modify Object window. The changes affect only the description of the object (in the Sun Enterprise SyMON server database) and do not modify the object itself.

▼ To Modify an Object

1. **Select the object in the main console window.**
2. **Select Edit ► Modify in the main console window.**

The Modify Object window is displayed (FIGURE 5-8). (The appearance of the window varies widely, depending on whether the object is a group, node, composite object, or segment.) The following example shows how to modify a node.

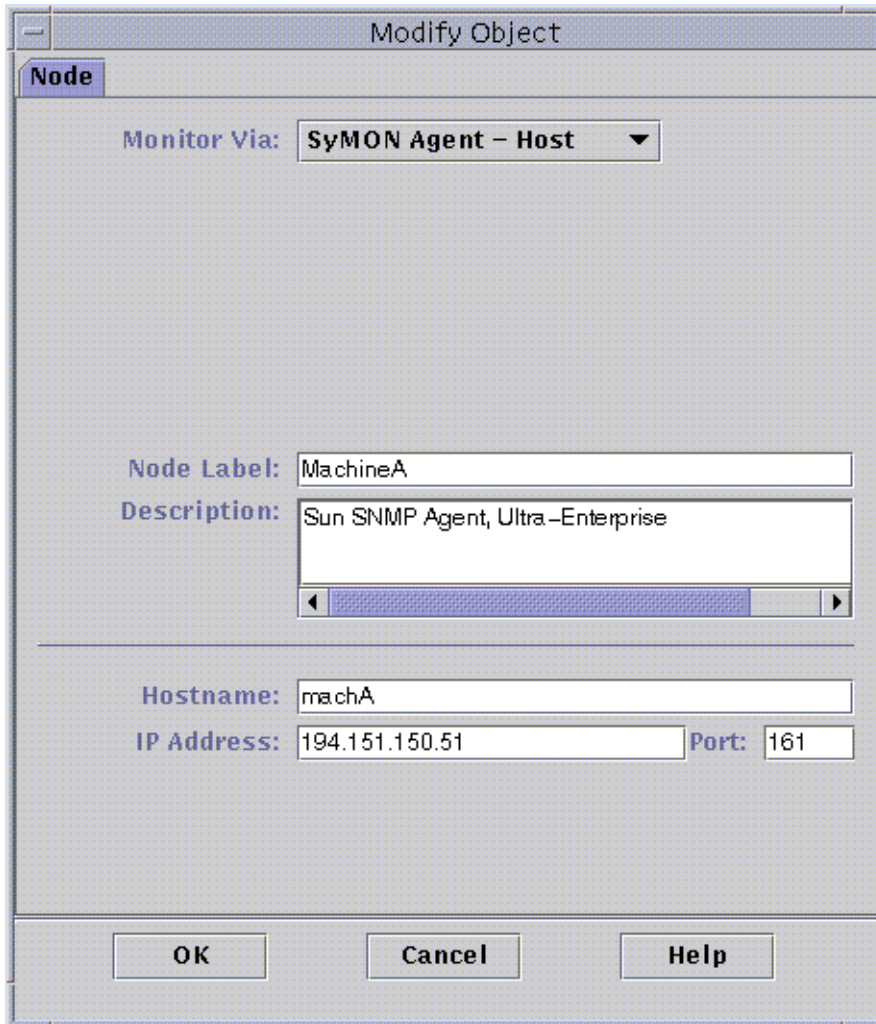


FIGURE 5-8 Modify Object Window—Example for a Node

3. Edit the characteristics as needed.

If you are modifying a group object, the available characteristics are:

- Type: General or IP-Based
- Object: Building, Campus, or General
- Group Label
- Description
- IP Address (for IP-Based only)
- Subnet Mask (for IP-Based only)

For a node, the available characteristics are:

- Monitor Via: SyMON Agent - Host, SyMON Agent - Module, SyMON Agent - Platform, SNMP Proxy, SNMP Ping, ICMP Ping, or Non-Monitored
- Node Label
- Description
- (Additional characteristics such as host name, IP address, or port may be listed, depending on the type of node.)

For a segment, the available characteristics are:

- Type: Bus or Ring
- Object: Ethernet or IPX
- Segment Label
- Description
- IP Address
- Subnet Mask

For a composite object, the available characteristics are:

- Object
- Label
- Description
- SSP host name
- SSP IP address
- Port

See your supplement for more information.

4. Click OK to save your changes, or Cancel to leave the characteristics unchanged.

Cutting and Pasting Objects

Objects can be cut (to be moved) or deleted (permanently) from the topology view in the main console window. An object that is cut is temporarily saved in memory and can be immediately pasted into one or more areas¹. An object that is deleted cannot be recalled. For instructions on deleting objects, see “Deleting Objects” on page 94. For more information about the main console window, see Chapter 7.

Cut and paste functions work the same for all kinds of objects (hosts, modules, and groups).



Caution – Do not use the cut function to delete objects. This function should only be used to move objects. To delete an object, use Edit ► Delete in the main console window. See “Deleting Objects” on page 94.

▼ To Cut and Paste Objects

1. Select an existing object in the topology view.

If you have not selected an object, the Cut and Delete functions are grayed out.

2. Select Edit ► Cut (FIGURE 5-9) in the main console window.

A dashed line is displayed around the selected object. (The object does not immediately disappear. This allows objects, such as processes which should not be interrupted, to continue running until they are pasted into a new location.) The object remains visible until it has been successfully pasted.

Note – You can cancel a Cut operation by clicking on the object a second time.

¹ Sun Enterprise SyMON 2.0.1 software does not support drag and release as an operation for moving objects.

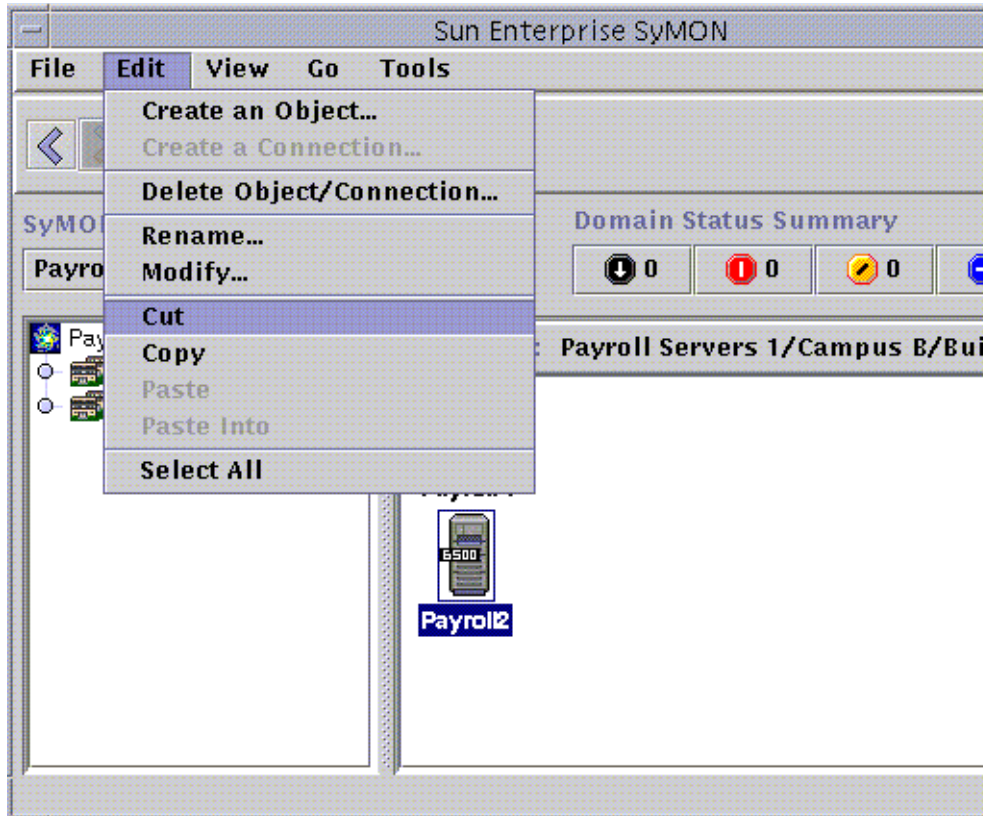


FIGURE 5-9 Cut, Copy, and Paste Options

When the Cut operation succeeds, this message is displayed at the bottom of the main console window:

```
Cut successful
```

3. Navigate to the destination location in the topology view.
4. Select **Edit** ► **Paste**. The object is displayed in this location and is removed from the previous location.

Deleting Objects

The Edit ► Delete command removes an object completely. To move an object to another location, see “To Copy an Object” on page 87 or “To Cut and Paste Objects” on page 92.

For more information on the main console window, see Chapter 7.

▼ To Delete Objects

Note – To delete a domain, use the delete command in the Domain Manager window; see “Deleting Domains” on page 60.

- 1. Select an existing object in the topology view.**

If you have not selected an object, the Delete function is grayed out.

- 2. Select Edit ► Delete Object/Connection from the top of the main console window (FIGURE 5-10).**

You are prompted to confirm or cancel the deletion.

If the Delete operation succeeds, the object is removed, and this message is displayed at the bottom of the main console window:

Delete successful

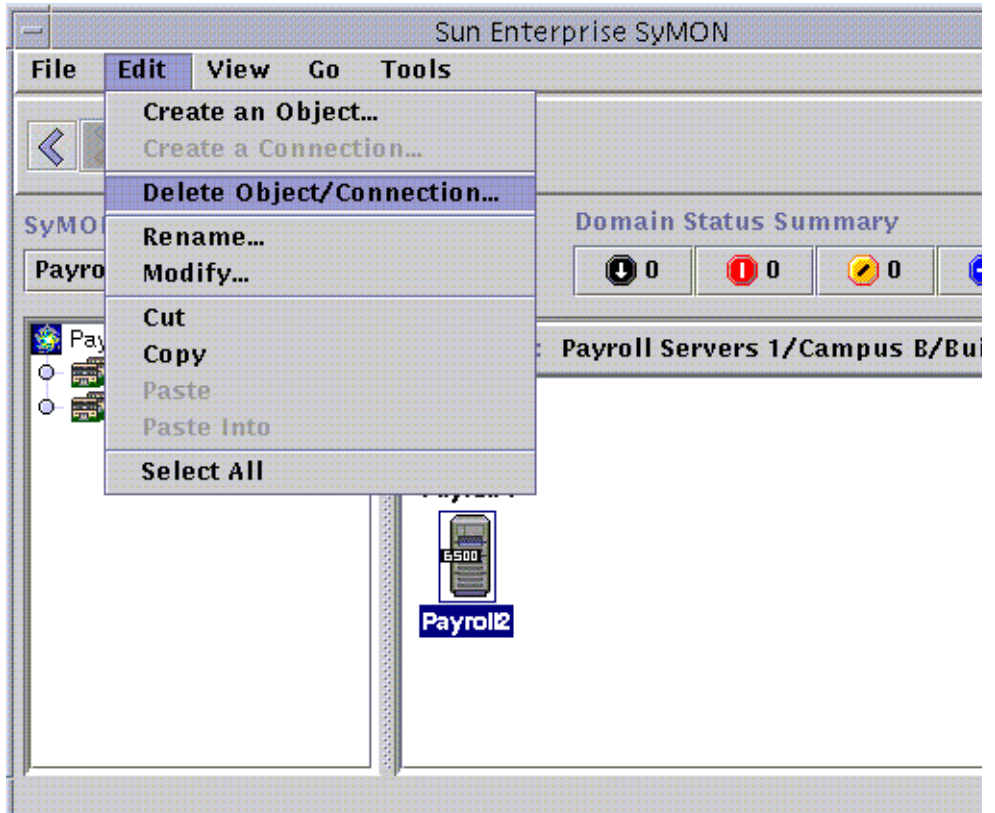


FIGURE 5-10 Delete Option

Discovery Manager

You can use the Discovery Manager to populate automatically domains that you have created. For example, automatically populating domains is very useful if you have a large network. To add members manually with the Create Topology Object window, see Chapter 5.

The following topics are covered in this chapter:

- To Start the Discovery Requests Window
- To Initiate a Discovery Request
- To Customize a Discovery Request
- To Modify a Discovery Request
- To Start, Stop, or Delete a Discovery Request

The Discovery Manager can find or “discover” hosts, routers, networks, and subnets (see “Overview of IP Addressing” on page 375) in a local server context. The Discovery Manager cannot discover objects where a Sun Enterprise SyMON agent is configured to a different server context (see “Sun Enterprise SyMON Server Context” on page 287).

The Discovery Manager can also find and group topology objects which are related; either to a single hardware platform/chassis or a group of cooperating hardware platform/chassis. This discovery and grouping allows convenient management of the related objects and is described in the add-on supplement for those machine architectures which have this grouping requirement.

Note – For additional information, refer to your supplement. The supplement contains important platform-specific information about discovering objects.

You can create one or more discovery requests. Each request runs as a separate process and populates the domain with the objects that it has discovered.

You can also schedule requests to run periodically and look for new hosts.

Starting the Discovery Requests Window

To begin a Discovery Request, start the Discovery Requests Window.

▼ To Start the Discovery Requests Window

Start the Discovery Requests window in one of two ways:

- When you create a domain in the Create Domain dialog (FIGURE 4-7) the Populate Now option is selected by default.

If you click Create in the Create Domain dialog while the Populate Now option is selected, a dialog window enables you to start the discovery process immediately.

For more information on creating domains, see Chapter 4.

- Select the domain in the SyMON Administrative Domains pull-down menu. then select Tools ► Discover in the main console window (FIGURE 6-1).

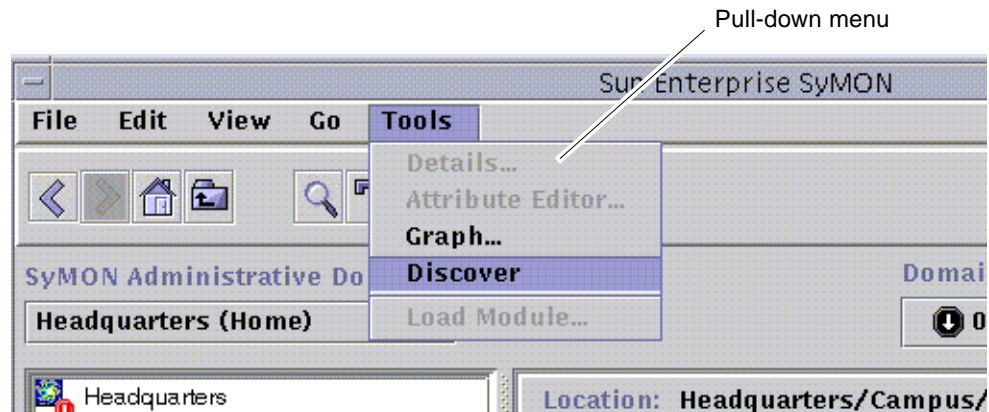


FIGURE 6-1 Tools Pull-down Menu

The Discovery Requests window is displayed (FIGURE 6-2).

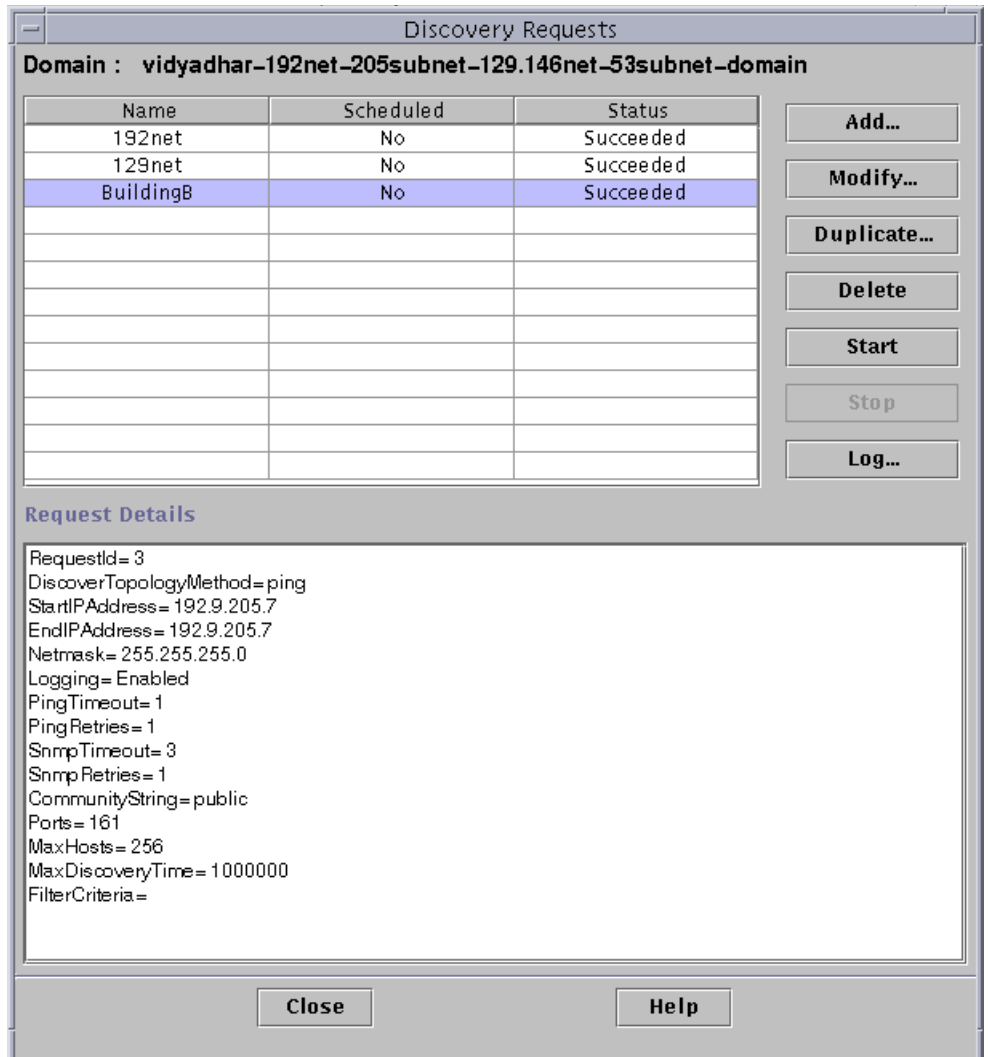


FIGURE 6-2 Discovery Requests Window

The Discovery Requests window displays information containing the fields in TABLE 6-1.

TABLE 6-1 Discovery Requests Window Fields

Field	Description
Name	A unique name which you create for the request
Scheduled	“Yes” if the request is scheduled, “No” if not scheduled
Status	Reflects the current state of the discovery request. The states may be: <ol style="list-style-type: none">1. New. A new request was added but has never been processed.2. Queued. A request has been sent to the server but processing has not yet started.3. Running. The request is currently being processed.4. Succeeded. The request has been successfully processed.5. Failed. Processing of the request has failed.6. Stopped. The user has stopped the process.7. 0 Host found. The request did not find any hosts that passed the filter limits.

The Discovery Requests window has the buttons listed in TABLE 6-2.

TABLE 6-2 Discovery Requests Window Buttons

Button	Description
Add	Click this button to create a new Discovery Request through the New Discovery Request window (FIGURE 6-2).
Modify	Select a Discovery Request and click this button to make changes.
Duplicate	Select a Discovery Request and click this button to create a copy of the request.
Delete	Select a Discovery Request and click this button to delete the request.
Start	Select a Discovery Request that is not running and is not scheduled to run at a different time, and click this button to start the request.
Stop	Select a Discovery Request that is running and click this button to stop the request.
Log	Select a Discovery Request and click this button to see a log of the results generated from the selected discovery request runs.

Initiating a Discovery Request

You can discover hosts by using the `ping` command or by using routing tables.

Note – Currently the Discovery feature is supported only for domains and not for any subordinate groups. You can add requests only for a domain.

Note – Read Appendix F before initiating a discovery request using routing tables. Appendix F explains the basic concepts of routing, network classes, and netmasks.

Note – For additional information, refer to your supplement. The supplement contains important platform-specific information about discovering objects.

▼ To Initiate a Discovery Request

1. Click the Add button in the Discovery Requests window.

The New Discover Request window is displayed (FIGURE 6-3). The Discover tab is highlighted by default.

Tip – You can copy an existing discovery request by highlighting the existing request and clicking the Duplicate button. To edit the settings for the new discovery request, see “Modifying a Discovery Request” on page 111.

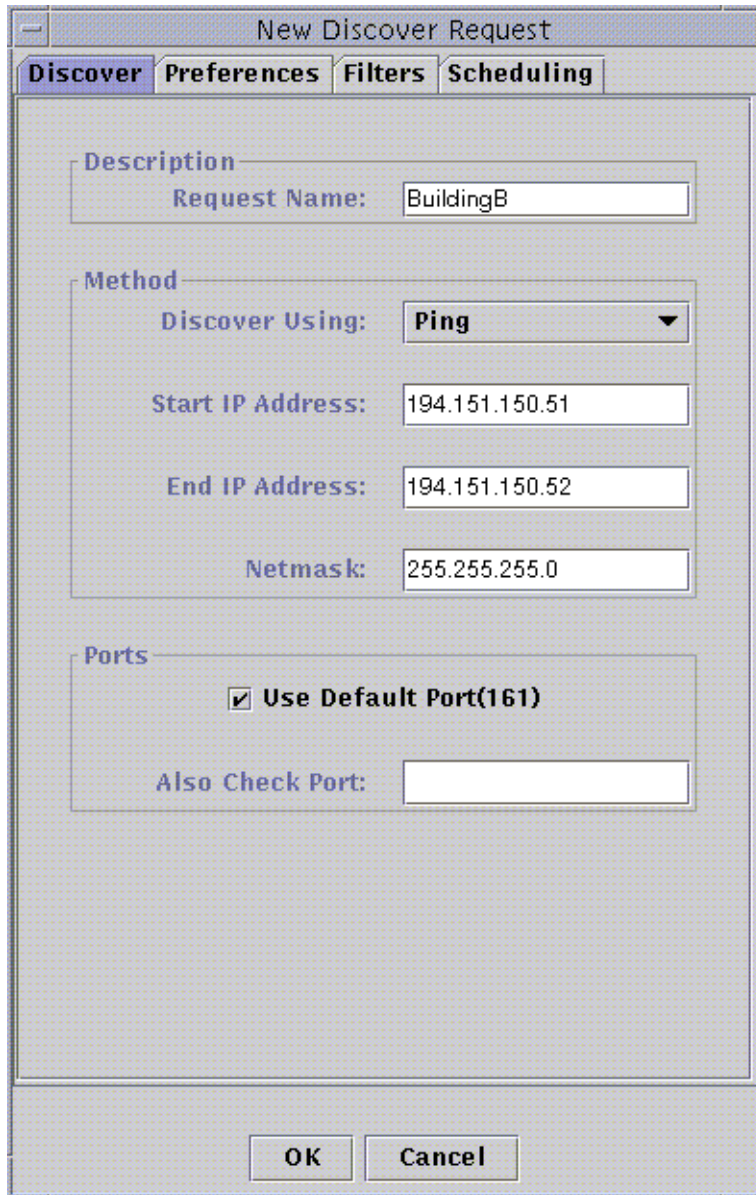


FIGURE 6-3 New Discover Request Window

- 2. (Optional) Type a new name for your discovery request in the Request Name field.**

Multiple requests are listed in the Discovery Requests window, enabling you to select a request and edit the related search pattern.

3. In the Discover Using field, select the method that should be used for discovering the network (Ping or Routing Table).

- If you selected Ping, type the start and end IP addresses and netmask (FIGURE 6-3).
The discovery process uses the `Ping` command and searches for hosts and routers in the specified IP address range. It then places the hosts in the appropriate networks and subnets based on the netmask.
- If you selected Routing Table, type the number of hops (the number of routers a packet goes through before reaching its destination).
The discovery process starts from the Topology manager/ Sun Enterprise SyMON server host and goes through the specified number of hops to report subnets and hosts *n* hops away. The number of hops limits the “distance” of destination hosts from the host on which the Topology manager or Sun Enterprise SyMON server is running.

Note – Routing Table discovery requests require that you run an SNMP agent at port 161. This can be a Sun Enterprise SyMON agent, `snmpdx`, or any SNMP agent provided by your network management package.

For more information on routing tables, see Appendix F.

4. Click the OK button to start the discovery process, or go to the other tabs in this window to customize your discovery request. See “Customizing Your Discovery Request” on page 104.

When you start the discovery process:

- The discovery process discovers all nodes that are running the Sun Enterprise SyMON 2.0.1 agent, when the nodes are all located in the same Sun Enterprise SyMON server context. The discovery process does not include agent nodes that belong to another Sun Enterprise SyMON server context. That is, nodes that are running Sun Enterprise SyMON agents in a remote Sun Enterprise SyMON server context are ignored.
- Nodes that are not running a Sun Enterprise SyMON agent are listed as ping hosts.
- The discover process discovers all nodes running an SNMP agent, where the nodes are not connected to any Sun Enterprise SyMON server. The information gathered for SNMP agents is very limited.

Note – Each discovery request is assigned a Request ID. This ID is an unique Sun Enterprise SyMON internal identifier of the request. Therefore, the Request IDs are not in sequential order. The Request ID displays in the Request Details portion of the Discovery Requests Window.

Note – If a host is extremely busy, a discovery process that is gathering data for that host may time out. If a timeout occurs for a host that is a Sun Enterprise SyMON agent, the host is reported as a ping host. If this happens, you may want to increase the SNMP timeout period. See “Customizing Your Discovery Request” on page 104” for more information.

5. If a Sun Enterprise SyMON server or agent is incorrectly reported to be a ping host, create a new icon by re-running discovery with larger timeout and retry values.

Customizing Your Discovery Request

You can customize your new discovery request by clicking on one of the four tabs on the New Discover Request window. The tabs are labelled Discover, Preferences, Filters, and Scheduling. TABLE 6-3 summarizes the tabs and the options for these tabs. (If you want to change an existing Discovery Request, see “Modifying a Discovery Request” on page 111).

TABLE 6-3 Summary of Discovery Variables

Variable	Definition
Discover	
Request Name	Descriptive name for this request, for example, “My Lab.” This name is optional.
Discover Using	Ping: Sweeps all addresses within the range specified by Start IP Address and End IP Address. Alternatively, you can supply the value of the netmask and let the Discovery Manager calculate the end address, using Start IP Address. Routing Table: Discovery Manager consults the routing table of the Sun Enterprise SyMON server and determines its address, subnet address, and router(s). It proceeds from there to discover more routers, networks, and subnets.
Start IP Address	These parameters apply to ping discovery requests. They specify the address range within which the Discovery Manager tries to find hosts and routers.
End IP Address	

TABLE 6-3 Summary of Discovery Variables (*Continued*)

Variable	Definition
Netmask	<p>This parameter applies to ping discovery requests. It is used to segment networks into subnets. If you supply the netmask but not the end IP address, the subnet address is calculated, and the end address is set to the last address within that subnet.</p> <p>To find out if your network is subnetted and the value of the netmask, check the <code>/etc/netmasks</code> file or the name service maps if you are using NIS (network information service) or DNS (domain name service).</p>
Port	<p>Port 161 is the default setting for Sun Enterprise SyMON objects. The Discovery Manager also tries an alternate port that you can specify in the Also Check Port field. If neither port responds, the Discovery Manager concludes that the object is not running a Sun Enterprise SyMON agent.</p>
Preferences	
Logging	
Log discover request progress?	<p>Setting this flag enables logging for that request. The discovery process places the log files in the <code>/var/opt/SUNWsymon/cfg/discover</code> directory. There is one log file per user-domain. Currently, this directory is used for debugging only.</p>
Ping	
Timeout (sec.)	<p>Amount of time (in seconds) that the Discovery Manager should wait for a response to a ping request before timing out.</p>
Retries	<p>Number of times the Discovery Manager should send a ping request before giving up.</p>
SNMP	
Timeout (sec.)	<p>Amount of time that the Discovery Manager should wait for a response to a SNMP request before timing out.</p>
Retries	<p>Number of times the Discovery Manager should attempt a SNMP request.</p>
Community String	<p>One or more strings separated by the pipe () character. The default value is public.</p>
General	
Maximum Hosts	<p>Maximum number of hosts that should be discovered.</p>
Maximum Time (sec.)	<p>Maximum amount of time (in seconds) of the discovery process in real time.</p>

TABLE 6-3 Summary of Discovery Variables (*Continued*)

Variable	Definition
Filters	
Criteria	
Select Filter Criteria	Filter by host name, operating system, or platform type. Filtering uses the <code>grep</code> command to search for the supplied value.
Host Names	
Operating System	
Platform Type	
Filters	This field remains blank until you select a filter criteria. The contents of this field vary according to your selection(s). You can choose to include or exclude values in the filtering process. For host names, you specify names and wildcard characters. For operating systems and platform types, you select from pull-down menus.
Scheduling	
Scheduling	
Discover new hosts periodically?	If selected, then the specified discovery request is scheduled to run at the specified start time and frequency.
Settings	
Start Time (hh:mm)	Specify the time (between 00:00 and 23:59) when discovery should be started.
Frequency	In the pull-down menu, select Hourly, Daily, Weekly, or Monthly.
Day of Week	In the pull-down menu, select the day when discovery should run.
Day of Month (1..28)	Specify the (numerical) day of the month when discovery should run. You cannot enter a day unless you have selected Monthly as the frequency.

▼ To Customize a Discovery Request

You can specify limits for the New Discover Request window through the Preferences and Filters tabs. You can also schedule the new discovery request to run periodically through the Scheduling tab.

1. Click the Preferences tab.

The New Discover Request Preferences window is displayed (FIGURE 6-4).

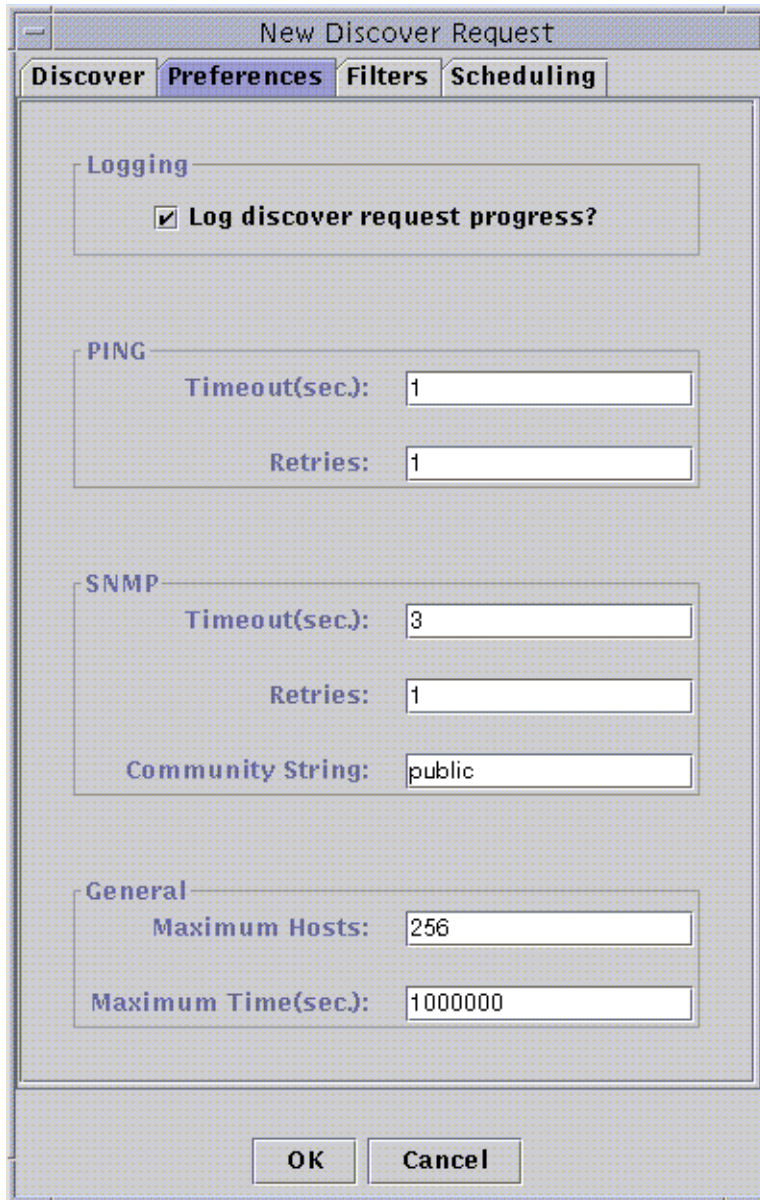


FIGURE 6-4 New Discover Request Preferences Window

2. Type your selections in the Logging, PING, SNMP, and General fields.

TABLE 6-3 lists the variables in the New Discover Request Preferences window.

3. Click the Filters tab.

The New Discover Request Filters window is displayed (FIGURE 6-5).

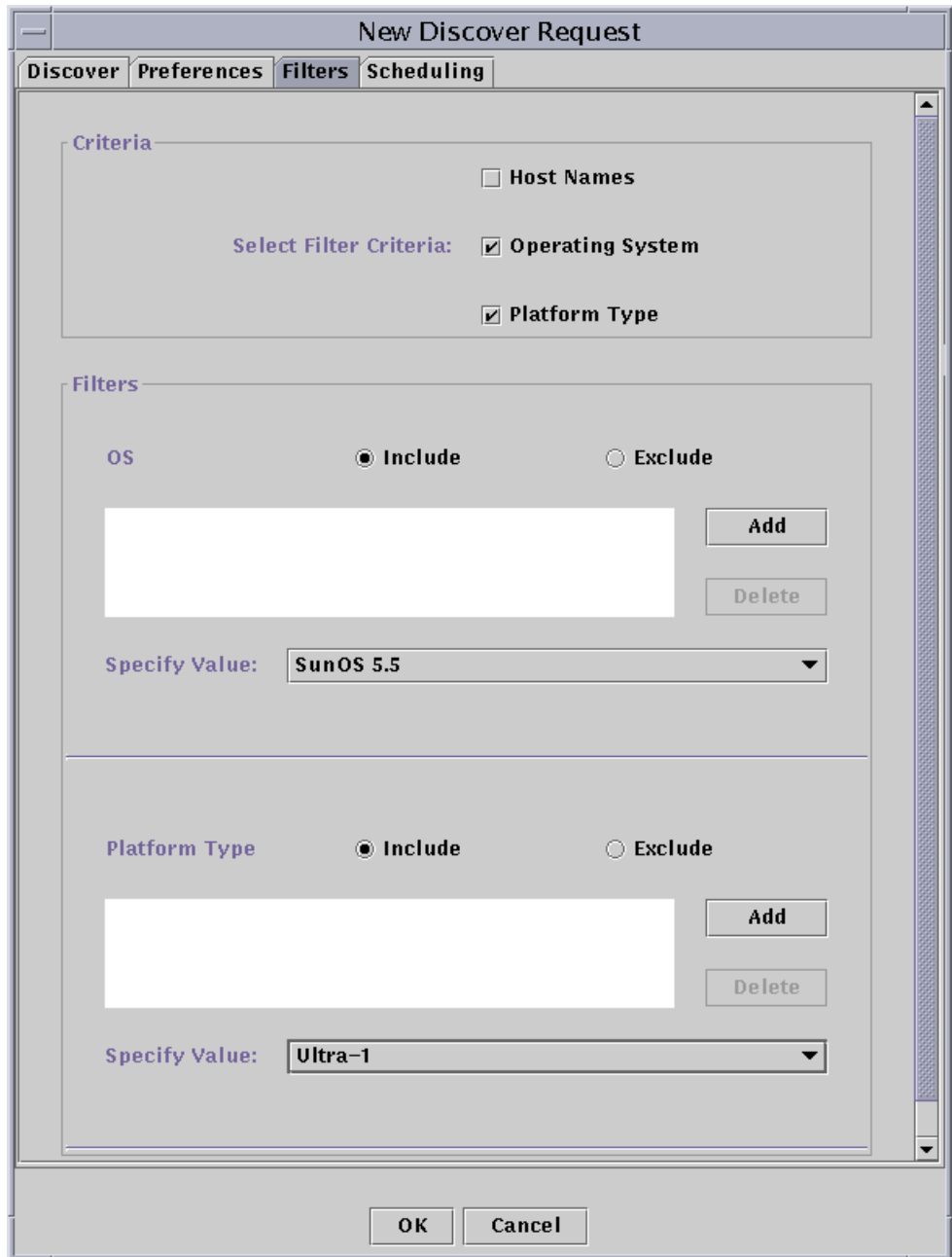


FIGURE 6-5 New Discover Request Filters Window

4. Click one or more boxes for host names, operating system, or platform type.

By default, the Filters area is blank. As you select each box, the Filters area adds new fields. These fields enable you to include or exclude items in the discover search, and to specify the host names, operating systems, and platform types to be included or excluded.

Note – If you use a filter, the discovery finds only hosts running the Sun Enterprise SyMON agent.

5. Click the Scheduling tab.

The New Discover Request Scheduling window is displayed (FIGURE 6-6).

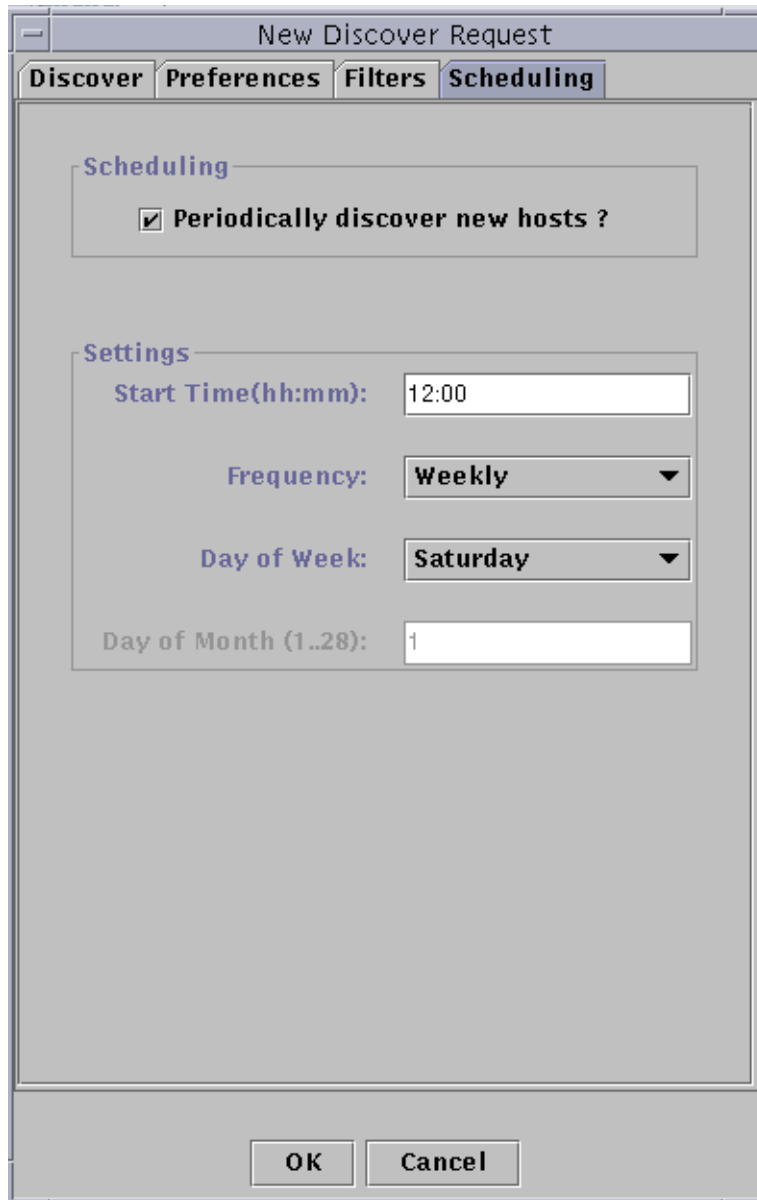


FIGURE 6-6 New Discover Request Scheduling Window

6. If you want to schedule automatic discoveries, click the button for “Periodically discover new hosts?” and customize the settings in the Settings area of the window.

7. **When you have finished your edits, click OK to save the new discovery request, or click Cancel to cancel your changes.**

If you click OK and you have not selected Periodically discover new hosts in the Scheduling tab, a pop-up dialog is displayed, offering several choices for running the new discovery request.

- To save the discovery request and begin running it periodically at the scheduled times, click Yes.
- To save the discovery request, but not schedule it to run, click No.
- To cancel the new discovery request without saving it, click Cancel.

8. **Click Close to exit the window.**

Modifying a Discovery Request

If you have previously created a periodic discovery request, you can change the search patterns for that discovery request through the Discovery Requests window (FIGURE 6-2).

▼ To Modify a Discovery Request

1. **Select Tools ► Discover in the main console window (FIGURE 6-1).**

The Discovery Requests window is displayed.

2. **Find and select the name of the discovery request you want to modify.**

3. **Click the Modify button.**

The Edit Discover Request window is displayed. As confirmation, the top bar of the window displays the ID of the request and the Description field displays the name of the request.

4. **Select the Discover, Preferences, Filters, and Scheduling tabs and in turn, change settings as needed.**

5. **Complete this procedure with one of the following actions:**

- Click OK to accept the changes you have made and close this window.
- Click Cancel to cancel your request.

If you click OK, a pop-up dialog is displayed, offering several choices for running the modified discovery request.

6. **Exit from the window:**

- To start the discovery request and run it immediately, click Yes.
- To schedule the discovery request, but not run it immediately, click No.
- To cancel the running of the discovery request entirely, click Cancel.

Starting, Stopping, or Deleting a Discovery Request

If you have previously created a discovery request, you can start, stop, or delete it through the Discovery Requests window (FIGURE 6-2).

▼ To Start, Stop, or Delete a Discovery Request

1. **Select Tools ► Discover in the main console window** (FIGURE 6-1).

The Discovery Requests window is displayed.

2. **Select the name of the discovery request you want to modify.**
3. **Click the Start, Stop, or Delete button to start, stop, or delete a request, respectively.**

Sun Enterprise SyMON Software Main Console Window

The Sun Enterprise SyMON software main console window (FIGURE 7-1) has the following regions:

- Main Console Window
- Domain View
 - Hierarchy View
 - Topology View
- Menu Bar
- Navigation Buttons
- SyMON Administrative Domains Pull-Down Menu
- Help Button
- Domain Status Summary

Main Console Window

The main console window (FIGURE 7-1) is the primary user interface. It provides:

- Visual representations of the managed objects (for example, hosts and networks)
- Ability to manipulate attributes and properties associated with the managed objects (for example, create alarm threshold conditions).

The features shown in FIGURE 7-1 are described in this chapter.

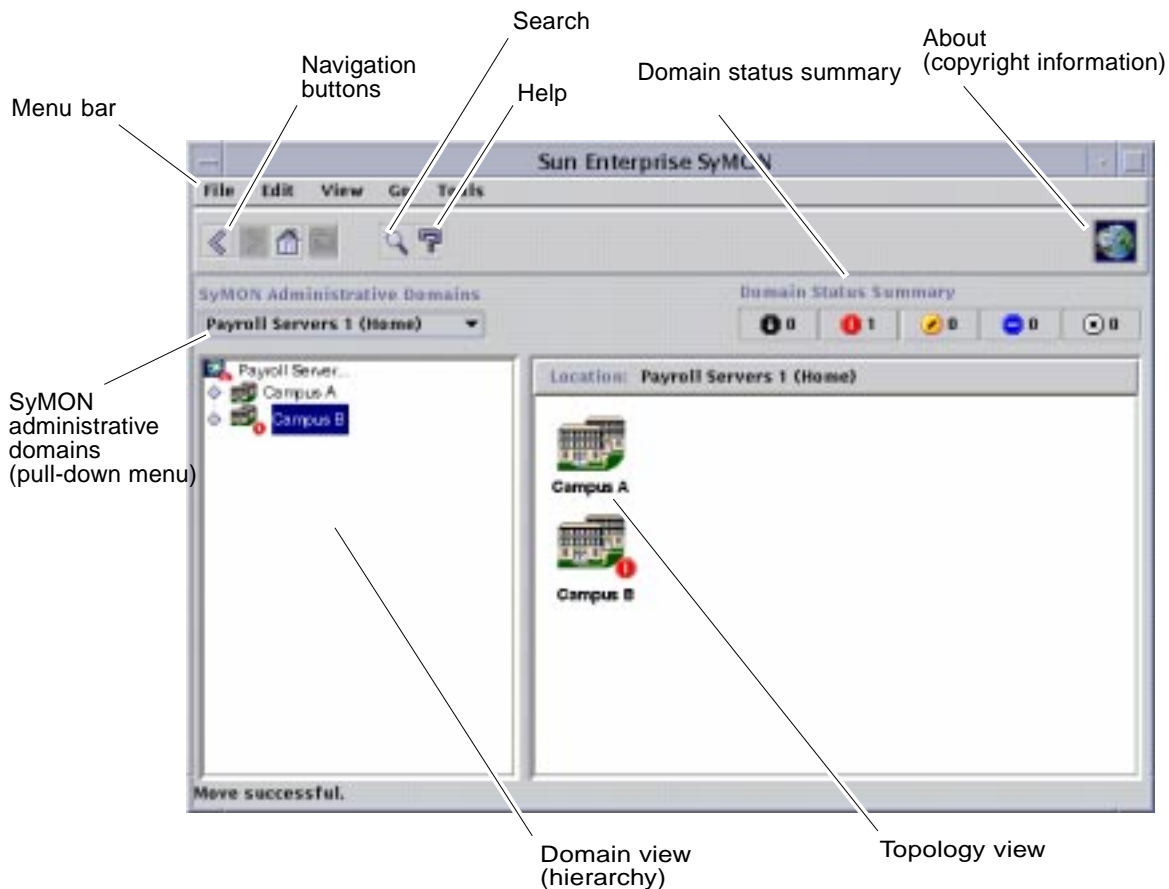


FIGURE 7-1 Main Console Window

Domain View

Once you have created a domain and have populated it with objects (groups and hosts, and so forth), you can see the domain and its objects in the hierarchy (tree) view and the topology (regional) view of this domain.

The domain view enables you to build collections of objects that support your monitoring and management tasks. You can group your host sets by buildings, subnets, or other group objects. You can selectively view all objects (such as hosts, routers, and servers) in the domain, or selected objects (such as the servers) that support a specific function that interests you.

The Domain view shows you the objects contained in a domain; the domain itself, and any groups and hosts contained in that domain.

FIGURE 7-2 illustrates an example of a domain. In this example, Headquarters represents a domain that consists of all the host machines in the headquarters office. The host machines are found in one geographic (campus) site. The campus has two buildings, and each building contains a network, subnet, group, and host machines.

You may choose to create a similar type of domain, and you can group your machines by subnet, rather than by building. You should create a domain and its subordinate groups in a hierarchy that best supports your monitoring activities.

For more information on domains, see Chapter 4.

The main console window (FIGURE 7-2) displays two views of a domain and its members. The left side of the domain view is the hierarchy (tree) view and the right side is the topology view.

- Hierarchy tree

The hierarchy tree view displays the relationship between a domain and its members. Some objects in the hierarchy view contain other objects which can be a group of objects or a single object. Some objects are both.

In FIGURE 7-2, Building B is an object contained in the domain named Headquarters, but is also a group itself. Building B contains the network 194.150.151.52, the subnet mpk12-238-n, GroupA, and hosts machineA and machineB.

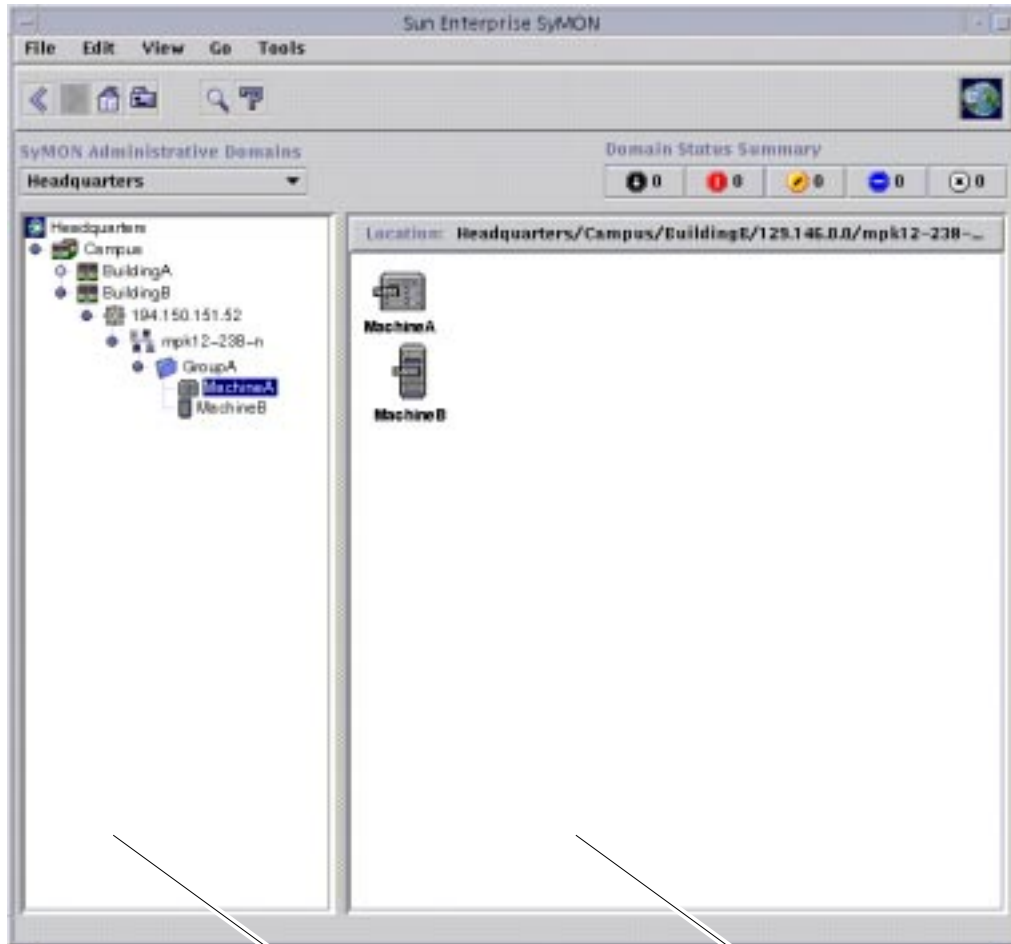
For more information, see “Hierarchy View” on page 116.

- Topology view

The topology view displays the member(s) of an object selected in the hierarchical tree.

In FIGURE 7-2, the selected object in the hierarchy tree is MachineA.

For more information, see “Topology View” on page 118.



Hierarchy view (hierarchical tree)

Topology view

FIGURE 7-2 Main Console Window With Hierarchy and Topology Views

Hierarchy View

Two types of windows contain hierarchy views:

- Domain view in the main console window (FIGURE 7-1)
- Browser view in the Details window (FIGURE 14-2)

The domain hierarchy view displays the domain and its members.

The Browser hierarchy view displays the host and its modules. This view is part of the Browser Details window (Chapter 8).

Both the domain hierarchy view and the Browser hierarchy view behave in the same manner. In both windows, the hierarchy view is on the left side of the window.

The mouse actions in the hierarchy view are summarized in TABLE 7-1.

TABLE 7-1 Mouse Actions in the Hierarchy View

Mouse Action	Result
Click with left or right mouse button on the circle next to the object	“Expands” (opens) details or “collapses” (closes) details of the selected object.
Double-click with the left mouse button on an object icon	For a host object, starts the Details window or moves the Details window to the foreground if it is already open. For a domain or group object, unrolls or rolls details of the selected object. Also, the topology view is updated with the members of the selected object.
Click with the left mouse button on object icon	Displays the members of the selected object in the topology view. However, if the object icon is a host (in the main console window), then the Details window is displayed.
Click with the right mouse button and hold on the object label	Pop-up menu is displayed. See “Pop-up Menu” on page 119 for more information.

▼ To Obtain Specific Information About the Hierarchy View

If an object has a light-colored circle next to it, there are additional levels of information that are hidden. You can obtain more information about the object by examining its subordinate objects. To obtain specific information about subordinate objects, complete the step in one of the following methods.

Method 1

- **Click on the circle next to the object to “unroll” the tree branch.**
The circle changes to a darker color, and the subordinate objects are displayed.

Method 2

- **Double-click with the left mouse button on the object icon or the label.**

▼ To Obtain General Information About the Hierarchy View

If an object has a dark-colored circle next to it, lower levels of the hierarchy are currently displayed (in most cases). You can obtain information about the container object by “rolling up” (hiding) the lower levels. To obtain general information about a container object, complete the step in one of the following methods.

Method 1

- **Click on the circle next to the object to “roll up” the tree branch.**
The circle changes to a lighter color, and the group (container) object is displayed.

Method 2

- **Double-click with the left mouse button on the object icon or the label.**

Topology View

The topology view displays the members of the object selected in the hierarchy view.

There are two types of windows that contain topology views:

- Domain view in the main console window (FIGURE 7-1).
- Browser contents view in the Details window (Chapter 8).

Both the domain and browser contents views behave in the same manner.

The mouse actions in the topology view are summarized in TABLE 7-2.

TABLE 7-2 Mouse Actions in the Topology View

Mouse Action	Result
Double-click with the left mouse button on the icon	Opens details about the selected object. However, if the object is a host (in the main console window), then the Details window is displayed.
Click with the left mouse button on the icon	Selects icon.
Click with the right mouse button and hold on the icon	Pop-up menu is displayed. See “Pop-up Menu” on page 119 for more information.

Tool Tip Balloon

As you move the mouse over various areas in the main console window, *tool tip* balloons are displayed momentarily. A tool tip is a description of the selected object or a description of a property and value column of any data property table (Chapter 9). Property tables provide information about the monitored property and are described in Appendix C and Appendix D.

▼ To See a Tool Tip Balloon

- Place your mouse over an object.

After a brief delay, a tool tip is displayed that provides a short description of that object (FIGURE 7-3).

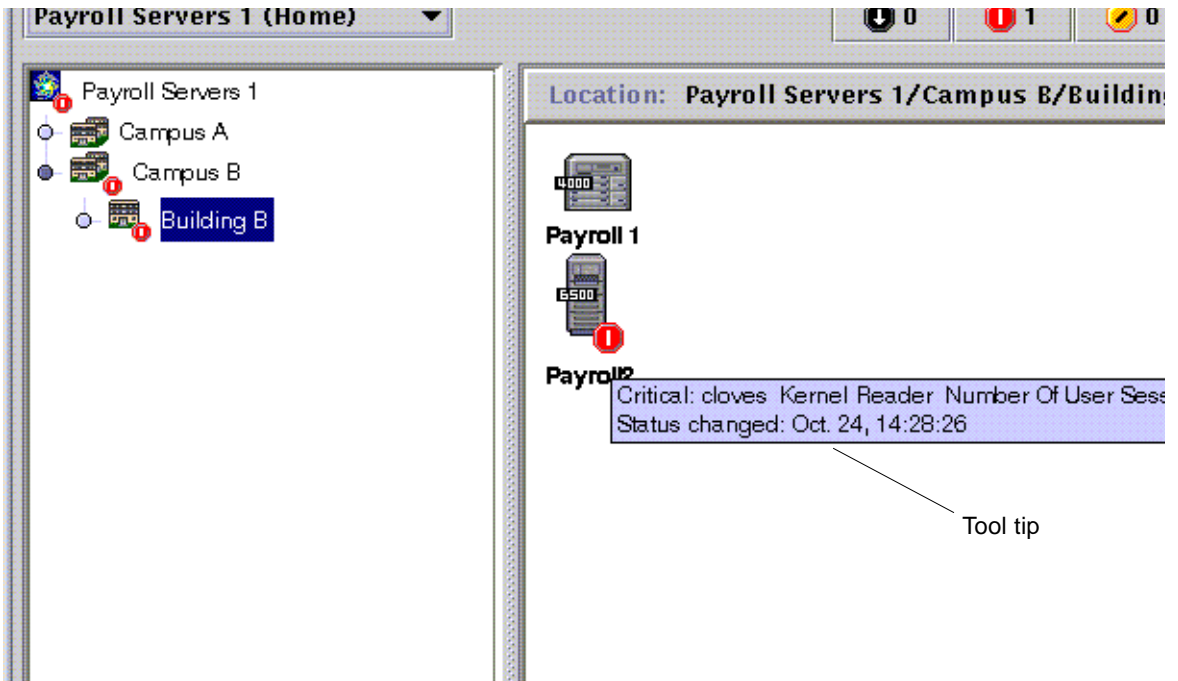


FIGURE 7-3 Tool Tip Balloon

Pop-up Menu

Pop-up menus are available for all objects in the hierarchy and topology views. The contents of a menu vary according to the capability of the object selected.

▼ To Access a Pop-Up Menu

1. **Click the right mouse button on the object.**

The pop-up menu is displayed.

2. **Click the left button to select a menu item (TABLE 7-3).**

The following table lists common items in the approximate order in which they are displayed in the pop-up menus. Some items are not displayed in all menus.

TABLE 7-3 Common Pop-Up Menu Items

Menu Item	Description
Cut	Cuts the selected object. The cut object is enclosed in a dashed box until it is pasted into a new location. To cancel the cut operation, click on the object.
Copy	Copies the selected object.
Rename	Displays the Rename Object window.
Modify	Displays the Modify Object window.
Attribute Editor	Displays the Attribute Editor. For information about editing a domain, see Chapter 4. For information about editing a host, see Chapter 10. For information about editing a module, see Chapter 12. For information about editing security, see Chapter 15.
Load Module	Displays the Load Module dialog. For more information on the Load Module dialog, see “To Load a Module” on page 212.
Details	Displays the Details window. For more information on the Details window, see Chapter 14.

Note – Depending on the object you selected, all the pop-up menu items listed in TABLE 7-3 may not be displayed.

Menu Bar

The menu bar is at the top of the main console window (FIGURE 7-4).

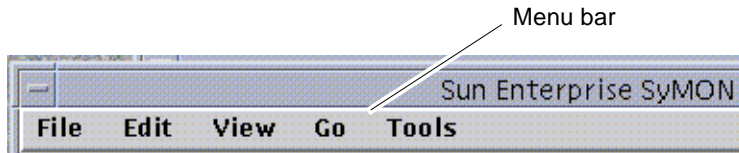


FIGURE 7-4 Menu Bar

Select (highlight) an object by clicking it in the hierarchy or topology view, then click a menu name (File, Edit, View, Go, or Tools). If a menu name is grayed out, that option is not available for the object that you have selected.

▼ To Use the Main Console Window Menu Bar

The menus are of the pull-down style.

- 1. Click an entry in the menu bar to display a pull-down menu.**
- 2. Click an entry in the pull-down menu to initiate that action.**

The menus in the menu bar are described below.

File Menu Options

TABLE 7-4 Options for the File Menu

Option	Description
Domain Manager	The Domain manager enables you to create your domain(s). For more information on Domain Manager, see Chapter 4.
Remote Domain Manager	For more information on Remote Domain Manager, see Chapter 4.
Set Home Domain	Sets your home domain.
SyMON-Console Messages	Opens the SyMON-Console Messages window. The window displays messages generated by the Sun Enterprise SyMON application, but does not include general UNIX messages.
Exit	Exits the current console session and all related Sun Enterprise SyMON windows. A pop-up dialog asks you to confirm the exit request.

Edit Menu Options

TABLE 7-5 Options for the Edit Menu

Option	Description
Create an Object	Creates a group, a composite object, a node, or a network segment in the domain that is currently highlighted in the console window. See Chapter 5.
Create a Connection	Connects two objects in the topology view. You may choose the type of connection to be General, RS-232, T1, or T3. The connection is represented by a line between the objects.
Delete Object/Connection	Deletes the highlighted object or connection. A dialog asks you to confirm the deletion request.
Rename	Enables you to rename the highlighted object. Displays a dialog for you to enter the new name.
Modify	Brings up the Modify Object menu. For more information on the Modify Object menu, see "Modifying Objects" on page 89.
Cut	Displays a dashed line around the selected object. The object is not removed until you paste it into a new location.
Copy	Copies the selected object into a temporary buffer.

TABLE 7-5 Options for the Edit Menu (*Continued*)

Option	Description
Paste	Pastes the cut or copied object into the domain or group that is currently displayed in the hierarchy or the topology view.
Paste Into	Pastes the cut or copied object into the selected domain or group.
Select All	Selects all objects in the topology view.

View Menu Options

TABLE 7-6 Options for View

Option	Description
Topology Layouts	Enables you to change the style of display in the topology view. The styles are: Network, Grid (square grid pattern), List (single vertical list), Bus, Star (equidistant lines connected to a center), Spoked Ring (equidistant lines in a circle).
Set Topology Background	Displays the Set Topology Background window. You can add a background image to a topology view by selecting from a list of graphics files. (The list may not be in alphabetical order.) You can also use this window to remove a background image by clicking the Unset button.

Go Menu Options

TABLE 7-7 Go Menu Items

Menu Item	Action
Back	Takes you to the previous console view.
Forward	Takes you to the next console view (if applicable).
Home	Takes you to the top of your home domain in the hierarchy view.
Up	Takes you up one level in the hierarchy view.
History	Lists recent locations that you have viewed in the current console session. Select an entry to return to that location.
Search	Opens the Topology Search window to search for the object label that you specify. If one or more objects are found, the full path or paths are displayed.

Tools Menu Options

TABLE 7-8 Tools Menu Items

Menu Item	Action
Details	Enables you to see detailed information (if available) for a selected object. For more information about the Browser Details window, see Chapter 8. For more information about the Details Alarm window, see Chapter 13. For more information about the remaining categories in the Details window, see Chapter 14.
Attribute Editor	Displays the Attribute Editor. For information about editing a domain, see Chapter 4. For information about editing a host, see Chapter 10. For information about editing a module, see Chapter 12. For information about editing security, see Chapter 15.
Graph	Displays the Open Graph window. You can select from a list of saved graphs. For information on the graphing function, see Chapter 9.
Discover	Enables you to search for objects in a geographical location. For information about the Discovery Requests window, see Chapter 6.
Load Module	Enables you to load a Sun Enterprise SyMON module for a selected object. For information about the Load Module window, see Chapter 12.

Navigation Buttons

As you move through different domains and through different levels within the domains, the domain views are stored in memory. The navigation buttons (FIGURE 7-5) in the main console window help you move back and forth between these views.



FIGURE 7-5 Navigation Buttons

Note – The navigation buttons perform the same function as the Go menu items.

TABLE 7-9 Navigation Buttons

Button	Description
Forward Button	The forward button is represented by an arrow pointing right (FIGURE 7-5). Clicking this button displays the next screen.
Back Button	The back button is represented by an arrow facing left (FIGURE 7-5). Clicking this button displays the previous screen.
Home Button	The home button is represented by a house (FIGURE 7-5). Clicking on this button returns you to the highest level of the domain.

SyMON Administrative Domains Pull-Down Menu

The SyMON Administrative Domains pull-down menu is shown in FIGURE 7-6. This menu displays the current list of domains and enables you to switch from one domain to another. Clicking on the domain updates and displays the selected domain.

The default domain is the domain that is always displayed whenever the main console is started.

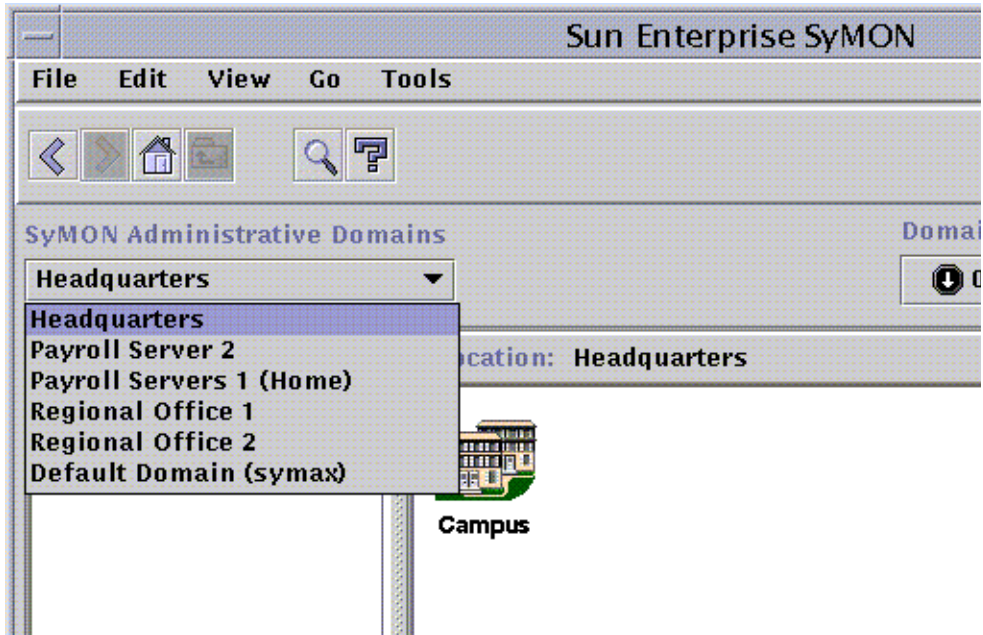


FIGURE 7-6 Administrative Domains Pull-Down Menu

▼ To View the Current List of Domains

1. **In the main console window, click the SyMON Administrative Domains button.**
The pull-down menu with the current list of domains is displayed.
2. **Click the domain that you want to view.**
The main console window is updated and displays the selected domain. The SyMON Administrative Domains button changes to display the name of the domain you have selected.

Help Button

Clicking the Help button (FIGURE 7-7) displays the online *Sun Enterprise SyMON 2.0.1 Software User's Guide*.

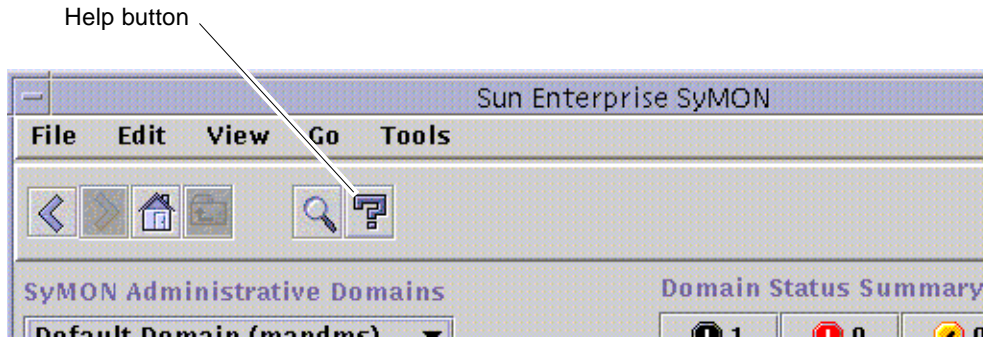


FIGURE 7-7 Help Button

Domain Status Summary

The domain status summary displays the number of managed objects that have unacknowledged open alarms, by level of severity, in the selected Administrative Domain. (FIGURE 7-8).

Note – If a host has multiple alarms at several different severity levels, the host is represented at only one severity level (the highest severity level for that host).

For more information on the domain status summary, see “Seeing Alarms in Domain Status Summary” on page 241.



FIGURE 7-8 Domain Status Summary

Browser

This chapter covers the following topics:

- To Start the Details Window
- To Set Security for a Host or Module

Details View

The details view is a subset of the Domain view. The highest hierarchical object in a details view is the host machine or module (if you have created a module object). For more information, see “To Create a Module Object” on page 75. Unlike the domain view, the details view enables you to see modules and the various monitored properties and statistics contained in the modules.

Using the Details Window

You can start the Details window from the main console window.

The Details window provides you with detailed information about that individual host. This window has several tab buttons, that may include the following:

- Info
- Browser
- Alarms
- Processes
- Log View
- Configuration

Note – The tab buttons that are displayed in the Details window are dependent on the type of object selected. In addition, the Configuration tab is missing if the Config-Reader module is not supported on your system. For additional information on the tabs for your specific hardware object, see your supplement.

Each tab button, as described in the following table, updates the window with a new panel consisting of information represented by that tab button.

TABLE 8-1 Details Window—Common Tab Buttons

Tab Button	Description
Info	Provides general information about the host including host name, IP address, polling type, and so on. This information is collected at the time the object is created.
Browser	Enables you to navigate through the hierarchy and contents views of the host, set alarm thresholds, and view and graph monitored data properties. This is the default view when the Details window opens.
Alarms	Displays the alarms for this host. Enables you to acknowledge or delete alarms.
Processes	Displays the processes running on the host. (You must load the Solaris Process Details module to see the processes.)
Log View	Displays informational messages, including error messages, about your host. Enables you to search, monitor, and examine system and EntDiag log messages.
Configuration	Displays configuration information about your host for selected hardware platforms. Configuration information may include the physical and logical view of your host. If the hardware platform is not supported by the Config-Reader module, this tab button is missing in the Details window.

For more information on these buttons, see Chapter 14.

▼ To Start the Details Window

- **Proceed with one of the following:**
 - Click the right mouse button on the selected object and highlight Details from the pop-up menu in the hierarchy view (FIGURE 8-1) or the topology view.
 - With your left mouse button, double-click on the selected host icon in the hierarchy view or the topology view.

- In the main console window, select the object then select Tools ► Details (FIGURE 8-2).

Be sure to select a managed object, not a domain, as the Details window is not available for domains.

The Details window (with the browser tab pre-selected) is displayed.

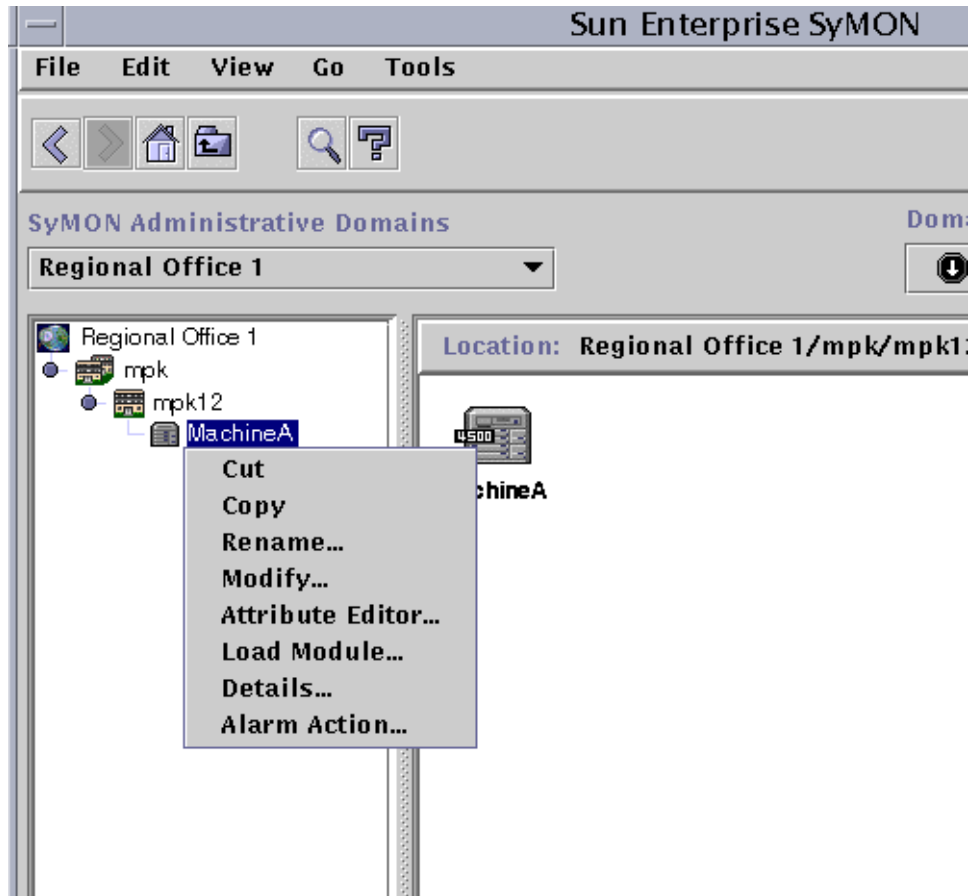


FIGURE 8-1 Opening the Details Window from the Pop-Up Menu

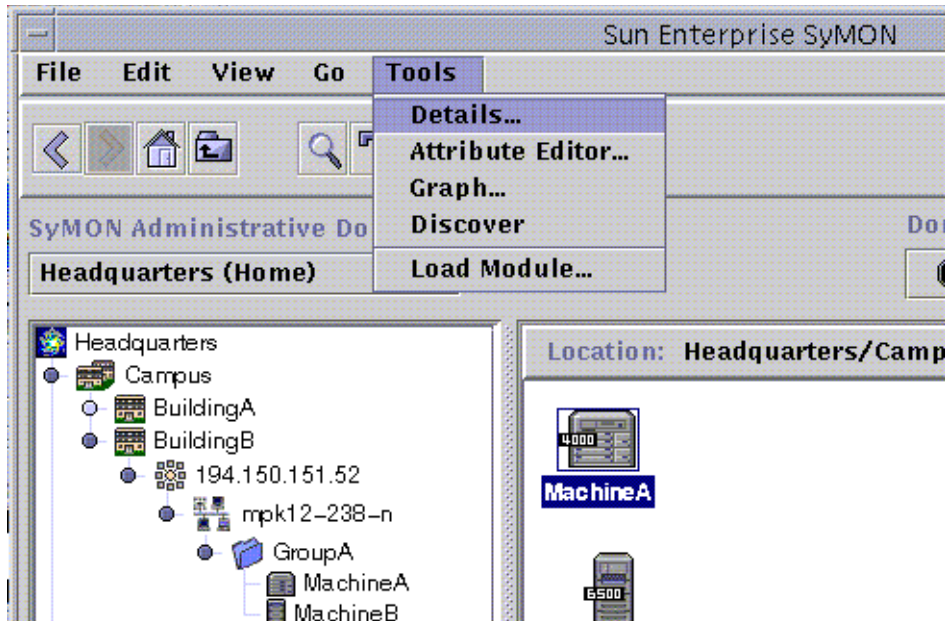


FIGURE 8-2 Opening the Details Window from the Tools Menu

▼ To Exit the Details Window

- Click the Close button located at the bottom of the Details window.

Browser Tab

The host contains four subordinate groups: hardware, operating system, local applications, and remote systems. The Sun Enterprise SyMON modules belong to one of these four categories.

Sun Enterprise SyMON software monitors hosts by using modules. Modules are software components that monitor data pertaining to the health indicators and resources of systems, applications, and network devices.

FIGURE 8-3 is an example of the host view for `MachineB`. The left side of the host view is the hierarchy (tree) view and the right side is the contents view. The host hierarchy view displays the relationship between the host and its modules. In this example, the loaded operating system modules are the MIB-II Instrumentation and the Kernel Reader modules.

By using the Browser Details window, you can set alarm thresholds and view and graph monitored data properties for your host.

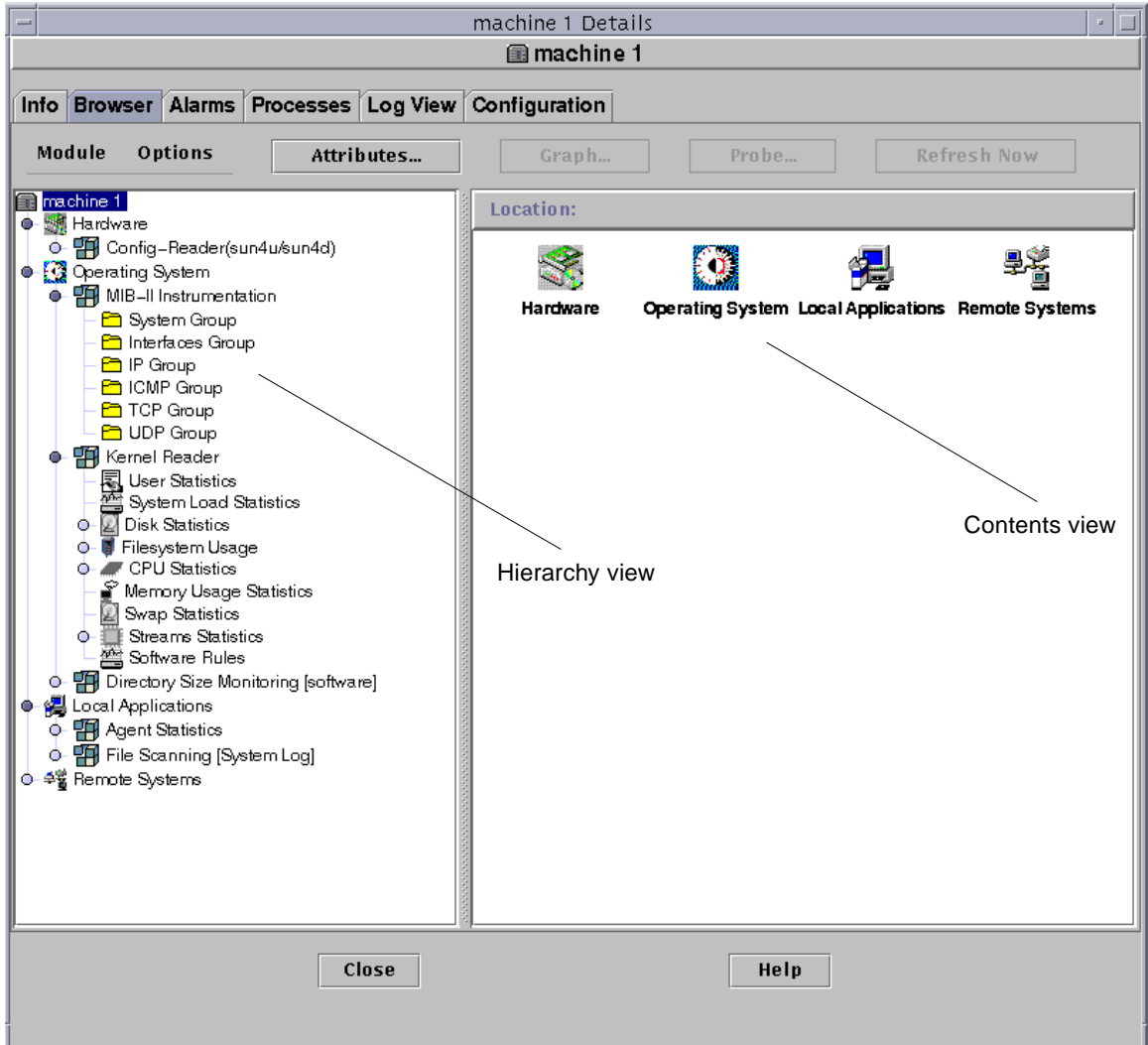


FIGURE 8-3 Browser Details Window

The Browser tab (FIGURE 8-3) contains the hierarchy and contents view for a host.

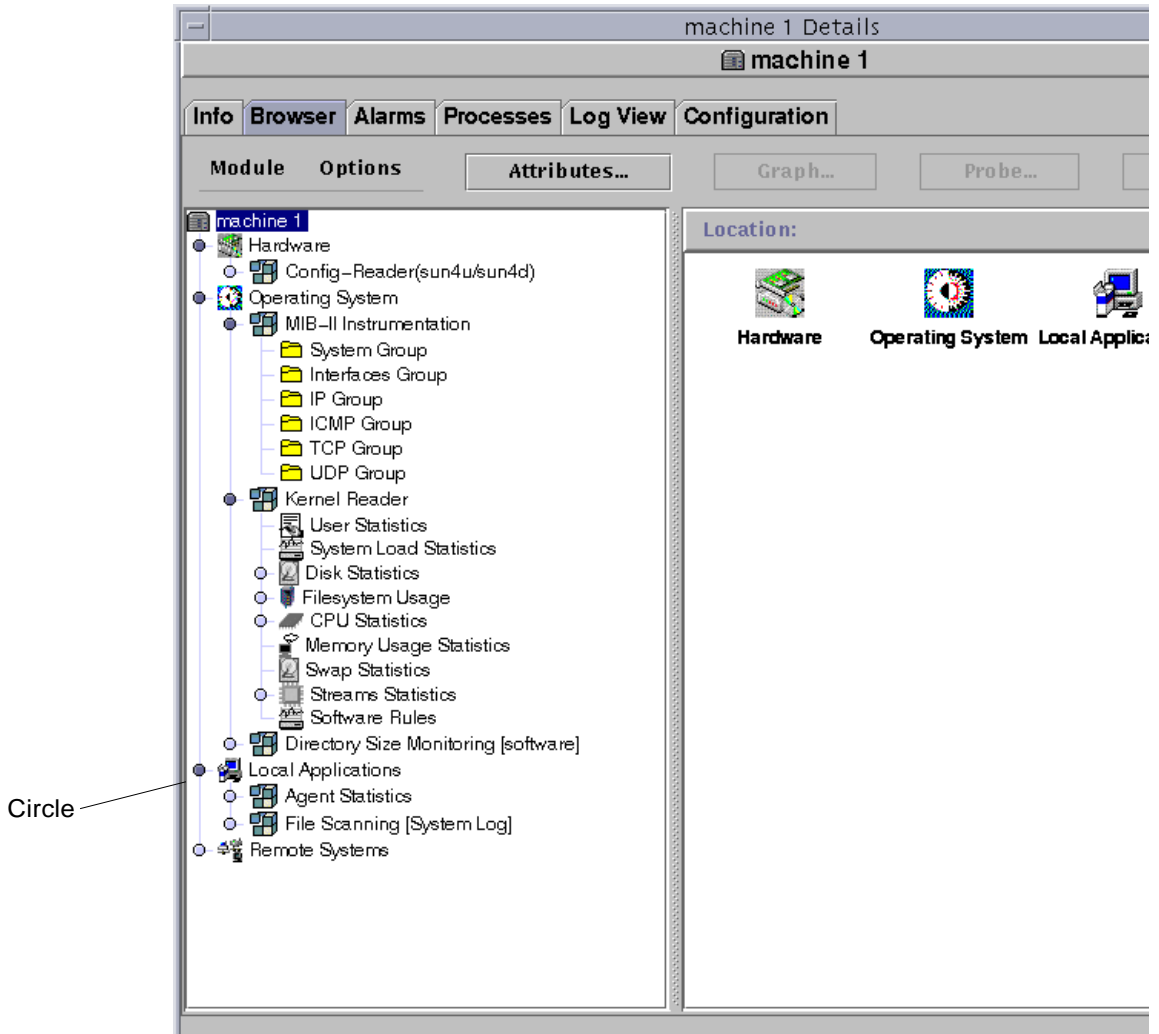


FIGURE 8-4 Light-Colored Circles “Unroll” to Provide Additional Levels of Detail

Tip – You may be able to see more information by holding the mouse pointer over the object for several seconds. A pop-up balloon (tool tip) is displayed, showing additional information about the object. These tool tips are also displayed for data property table cells and are useful if information in a table cell is too long to display completely.

Tip – If the hierarchy view has a light-colored circle (FIGURE 8-4), you can click the circle or double-click the icon next to the circle to “unroll” and display more levels of detail.

Each host contains categories for Hardware, Operating System, Local Applications, and Remote Systems. For more information on modules, see Appendix C and Appendix D.

Hardware

The Hardware category consists of the Config-Reader module, which monitors the host configuration, including information and status for power supplies, keyswitch, fans, remote console, the system in general, and so on.

There are different Config-Reader modules for different hardware platforms. If your system is supported by a Config-Reader module, it is automatically loaded during installation.

For more information on the Config-Reader module for your hardware platform, refer to your supplement.

Operating System

The Operating System category includes modules that monitor the operating environment of the host:

- Directory Size Monitoring
- File Monitoring
- Kernel Reader
- MIB-II Instrumentation
- NFS File Systems
- NFS Statistics
- Solaris Process Details

Local Applications

The Local Applications category includes modules that monitor the local applications on the host:

- Agent Statistics
- Data Logging Registry
- Dynamic Reconfiguration

- File Scanning
- Health Monitor
- Print Spooler
- Process Monitoring

Remote Systems

The Remote Systems category includes modules that monitor remote systems:

- MIB-II Proxy Monitoring module
- HP JetDirect module (monitors HP printers equipped with a JetDirect card)

Browser Buttons

The Browser Details window includes a row of buttons at the top of the panel.

TABLE 8-2 Browser Buttons

Menu Item	Definition
<u>Module</u>	FIGURE 8-5
Load Module	Enables you to add a module to the host. The host must be selected or this option is grayed out. For more information, see “To Load a Module” on page 212.
Edit Module	Enables you to edit module parameters. The module must be selected or this option is grayed out. For more information, see “To Edit Module Parameters” on page 222.
Enable Module	Enables you to enable a module. The module must be selected or this option is grayed out. For more information, see “To Enable a Module” on page 224.
Disable Module	Enables you to disable a module. The module must be selected or this option is grayed out. For more information, see “To Disable a Module” on page 224.
Unload Module	Enables you to unload a module from the host. The module must be selected or this option is grayed out. For more information, see “To Unload a Module” on page 225.
<u>Options</u>	FIGURE 8-6
Copy	Enables you to copy a module. You may paste the copied module in the topology or hierarchy view of the main console. This enables you to monitor the module properties without having the Details window open. For more information, see “To Create a Module Object” on page 75.

TABLE 8-2 Browser Buttons (*Continued*)

Menu Item	Definition
Copy To Graph Clipboard	Enables you to add another data property (with the same units) to an existing graph. Used with Add From Graph Clipboard menu item in graphing window. See “To Graph Two Data Properties” on page 156.
Add Row	Adds a row to a data property table. See “To Add a Row” on page 146.
Enable Row	Enables a row (that has been disabled) in a data property table.
Disable Row	Disables a row in a data property table.
Edit Row	Enables you to edit information for a row in a data property table.
Delete Row	Deletes a row in a data property table.
<u>Attributes</u>	Displays the attribute editor for the selected object. The Attribute Editor provides additional information about the selected object and the rules governing its behavior. Use the Attribute Editor to edit information about the object.
<u>Graph</u>	Graphs the selected monitored data property.
<u>Probe</u>	Enables you to run selected commands on the monitored data property.
<u>Refresh Now</u>	Refreshes the information in the displayed data property table.

Note – The browser buttons are grayed out when the command is not appropriate for the selected object.

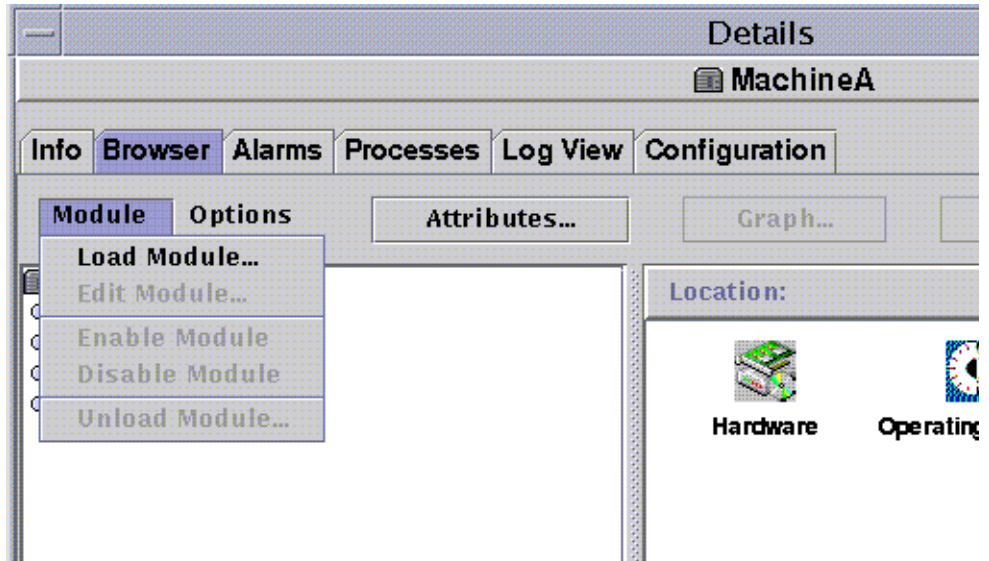


FIGURE 8-5 Module Menu Options in Details Window

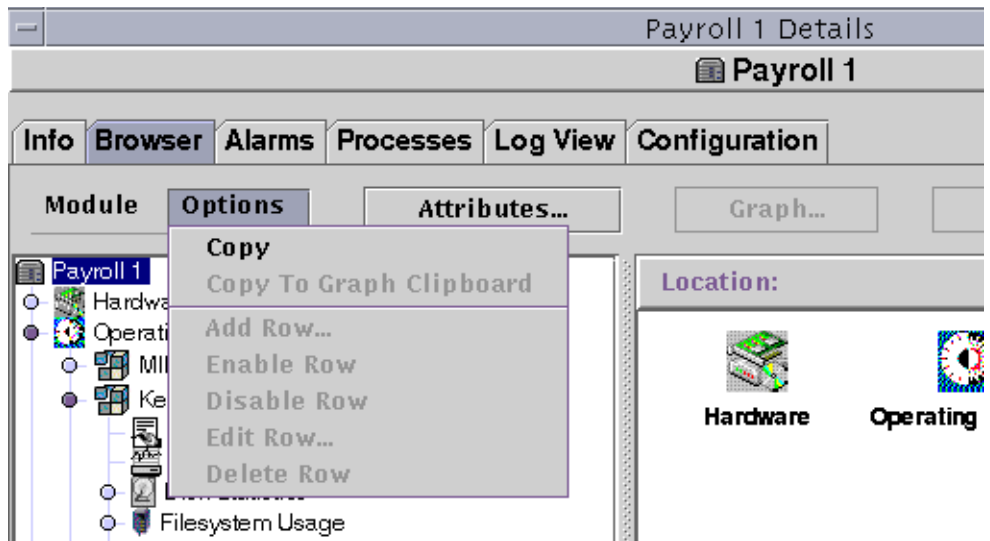


FIGURE 8-6 Options Menu Options in Details Window

Host Security

In the Details window, Sun Enterprise SyMON software offers security at two levels: the host itself and at the module level. You may also set security at the host level only. In this case, anyone with the appropriate security can load modules, set alarm thresholds, acknowledge alarms, and so on.

You may also set security permissions at the module level. In this case, only those users with the appropriate module permissions can perform actions on the module. Module security can be used as a “subset” of host security.

For example, at the host level, you can set security permissions so that users A, B, and C can load modules and create alarm thresholds. User A loads the Health Monitor module and creates customized alarm thresholds. However, users B and C can change user A’s work unless security permissions have also been set at the Health Monitor module level, enabling only user A to set alarm thresholds.

Note – In the case where security is set at both levels, the security permissions at the module level take precedence over the security permissions at the host level.

Consequently, only user A can create alarm thresholds for the Health Monitor module.

For more information on security, see Chapter 15.



FIGURE 8-7 Attribute Editor for a Host or Module

▼ To Set Security for a Host or Module

1. Open the Attribute Editor for a host or module by proceeding with one of the following:

- Click the right mouse button on the host or module and highlight Attribute Editor from the pop-up menu.
 - Click the Attributes button.
2. **Click the Security tab** (FIGURE 8-7).
 3. **Type the name(s) of user and administrator groups in the appropriate fields.**
For more information on the security fields, see Chapter 15.
 4. **Complete this procedure with one of the following actions:**
 - Click OK to accept the changes you have made and close this window.
 - Click Apply to apply your changes without closing this window.
 - Click Reset to reset the Attribute Editor to the default parameters.
 - Click Cancel to cancel your request and close the window.

Monitoring and Graphing Data Properties

This chapter covers the following topics:

- To Display a Data Property
- To Add a Row
- To Refresh Displayed Data
- To Probe a Property
- To Graph A Monitored Data Property
- To Graph Two Data Properties
- To Save Graphing Parameters
- To Open a Graph
- To Apply a Graph Template

Monitoring Data Properties

Using your mouse, you can navigate through the hierarchy (tree) view in the Details window to view the monitored properties.

The lowest-level object in the host hierarchy is the monitored property. The software provides both tabular and graphical information about a monitored property.

Once the data has been displayed, you can refresh the data. In addition, you can graph up to five data properties simultaneously. These actions are described in the following sections.

▼ To Display a Data Property

Note – The following example uses the Kernel Reader module.

1. **In the Browser Details window, double-click on the Operating System icon in the hierarchy (tree) view.**

The operating system modules are displayed in both the hierarchy and contents views.

2. **Double-click on the Kernel Reader icon in the contents view or single click in the light-colored circle next to the Kernel Reader icon in the hierarchy view.**

The Kernel Reader statistics are displayed.

3. **Double-click on the System Load Statistics icon in either the hierarchy or the contents view (FIGURE 9-1).**

The monitored properties are displayed in a property table.

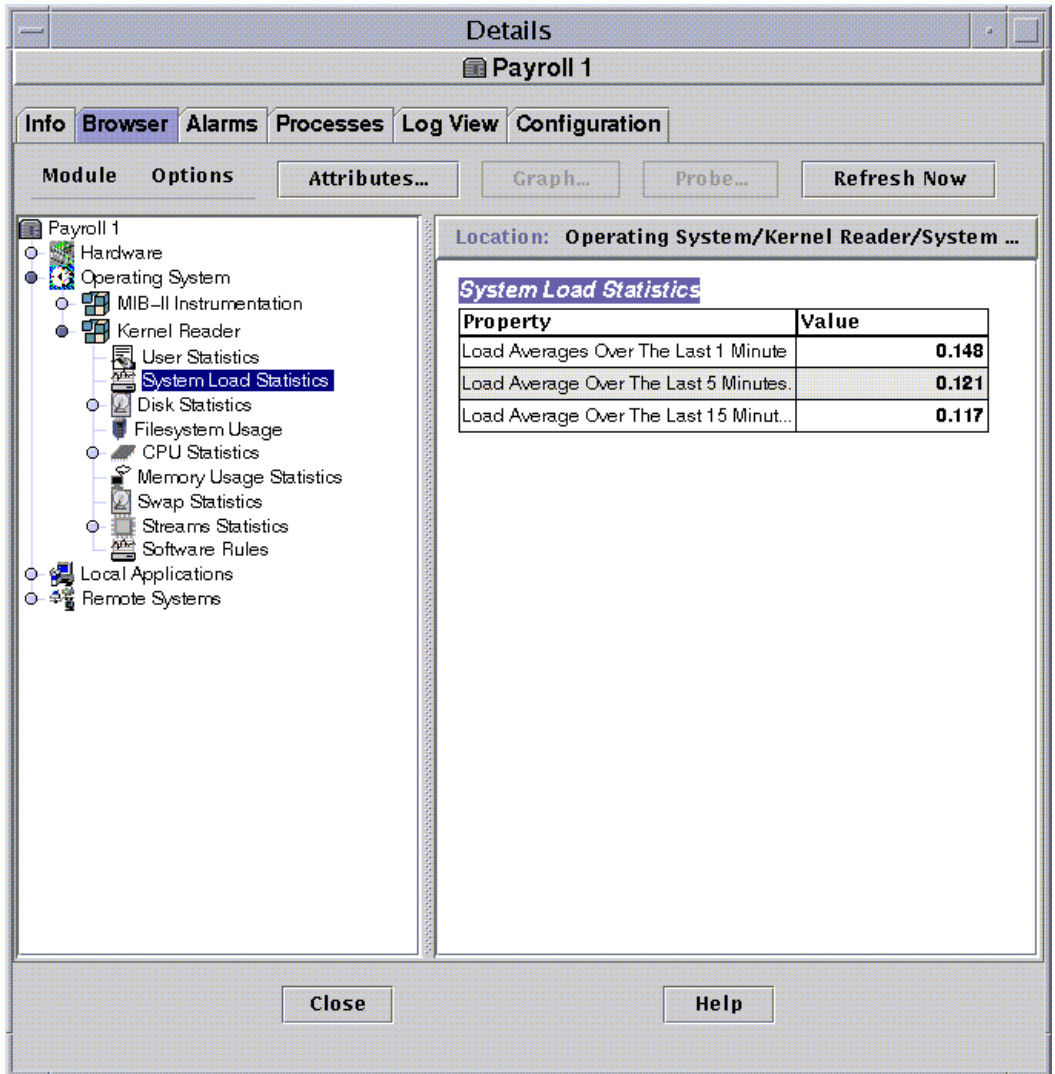


FIGURE 9-1 System Load Statistics

Working with Rows

For selected modules, the software enables you to add, delete, enable, or disable rows for the data property tables (TABLE 9-1). When these modules are initially loaded, the data property tables are empty. You must “add a row” to monitor the data property.

TABLE 9-1 Sun Enterprise SyMON Modules That Require You to Add Rows

Module Name	Description
File Monitoring	Each added row defines the monitored “file”.
File Scanning	Each added row defines the “pattern” which must be matched within the monitored file.
Process Monitoring	Each added row defines the “pattern” which must be matched from all the processes that are running on the agent object.

For more information on the file monitoring module, see Appendix C. For more information on the file scanning and process monitoring modules, see Appendix D.

▼ To Add a Row

The following example procedure uses the File Monitoring module. If this module is not loaded, see “To Load a Module” on page 212.

- 1. In the Browser Details window, double-click on the Operating System icon in the hierarchy (tree) view.**

The operating system modules are displayed in both the hierarchy and contents views.

- 2. Double-click on the File Monitoring icon in the contents view or single click in the light-colored circle next to the File Monitoring icon in the hierarchy view.**

The File Monitoring Status folder is displayed.

- 3. Double-click on the File Monitoring Status folder in either the hierarchy or the contents view.**

An empty property table is displayed.

Location: Operating System/File Monitoring [files]/File Monitoring Status

File Monitoring Table

Name	Description	Filename	Last Modified	File
<input type="button" value="Refresh"/> <input type="button" value="Add Row..."/>				

FIGURE 9-2 File Monitoring Table

4. Proceed with one of the following:

- Click the right mouse button in the table row and select the Add Row command from the pop-up menu (FIGURE 9-2).
- In the Details window, select Options ► Add Row.
The Row Adder window is displayed (FIGURE 9-3).

5. Type the appropriate information in the text fields.

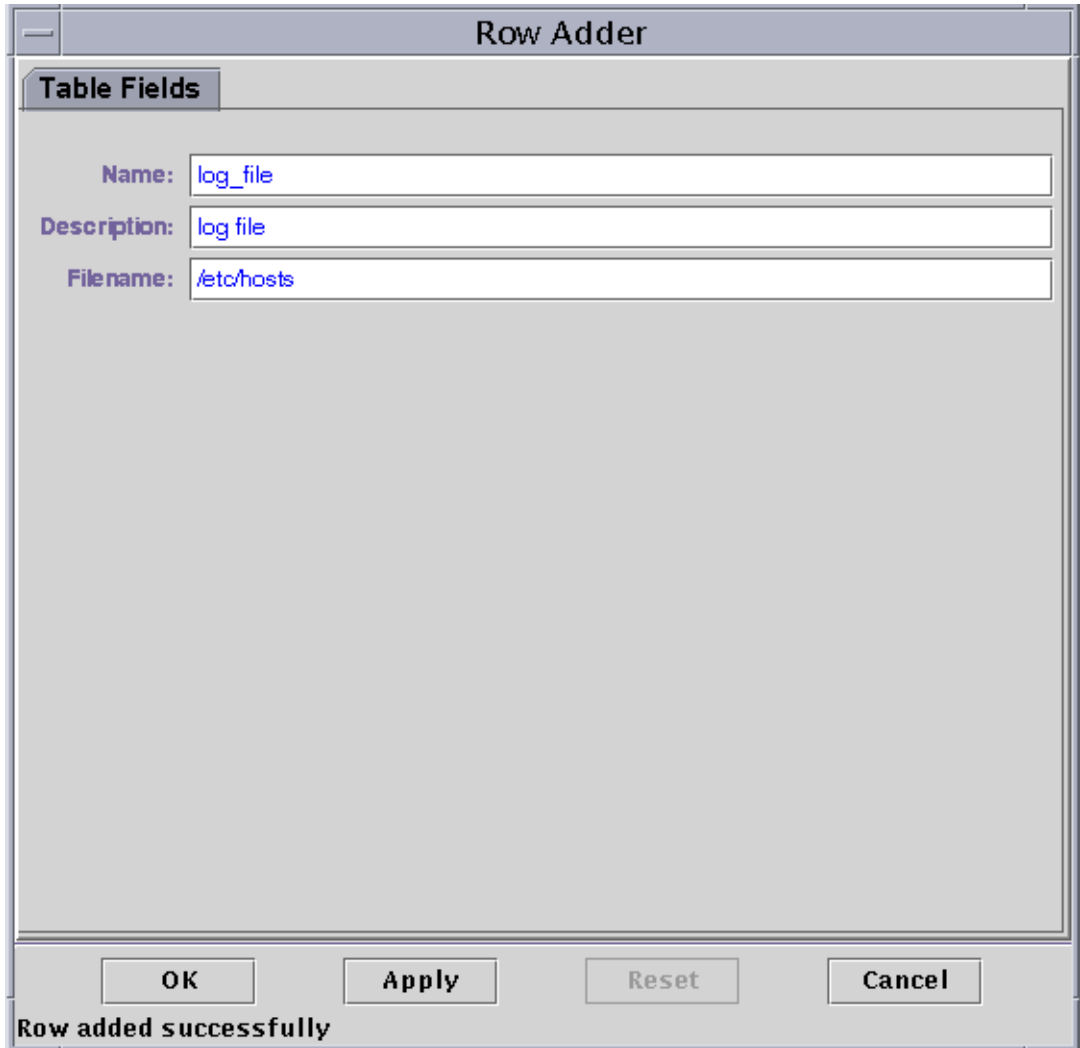


FIGURE 9-3 Row Adder Window for the File Monitoring Module

6. Complete this procedure with one of the following actions:

- Click OK to accept the changes you have made and close this window.
- Click Apply to apply your changes without closing this window.
- Click Reset to reset the window to the default parameters.
- Click Cancel to cancel your request.

The added row is displayed in the contents view (FIGURE 9-4).

Location: Operating System/File Monitoring [Monitors the files in /export]/Fi...

File Monitoring Table

Name	Description	Filename	Last Modified	File Size
log_file	log file	/etc/hosts	10/12/98 13:45:13	

FIGURE 9-4 Updated File Monitoring Table

Note – The Row Adder window that is displayed is dependent on the selected module. FIGURE 9-5 and FIGURE 9-6 illustrate examples of the Row Adder window for the File Scanning and Process Monitoring modules, respectively.

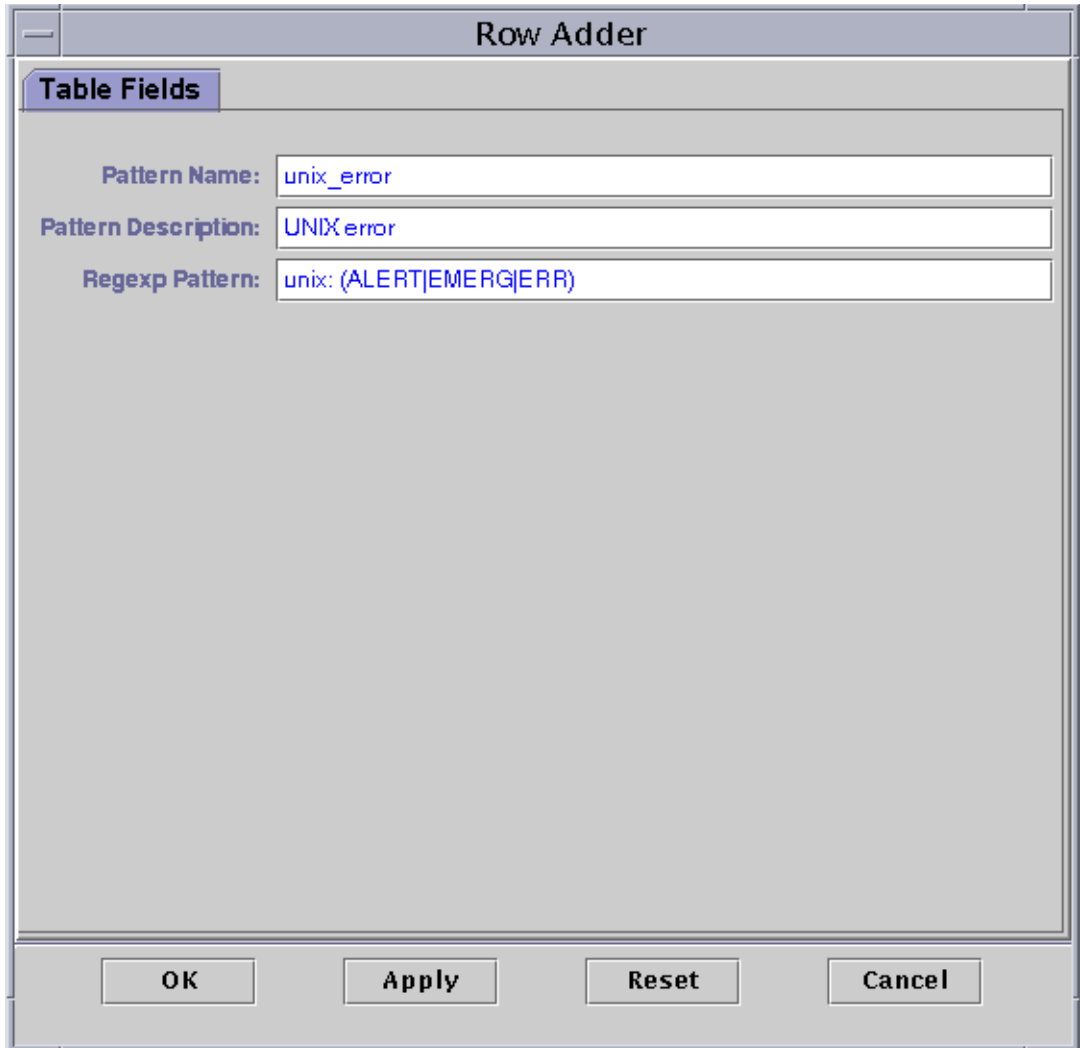


FIGURE 9-5 Row Adder Window for the File Scanning Module

The image shows a graphical user interface window titled "Row Adder". At the top, there is a tab labeled "Table Fields". Below the tab, there are five input fields, each with a label on the left and a text box on the right. The labels and their corresponding values are: "Entry Name: first", "Name Pattern: esd", "Argv Pattern: esd", "User Specification: root", and "Entry Description: symon-agent". At the bottom of the window, there are four buttons: "OK", "Apply", "Reset", and "Cancel".

FIGURE 9-6 Row Adder Window for Process Monitoring Module

▼ To Refresh Displayed Data

- **Proceed with one of the following:**
 - Click the right mouse button in the data property table row and select Refresh from the pop-up menu (FIGURE 9-7).

- Click the Refresh Now button.

In this example, the System Load Statistics table is updated with the latest information.

Note – You may also set up a refresh interval and the Sun Enterprise SyMON software automatically updates your monitored data at your designated time interval. For information on accomplishing this task, see “Refresh Tab in the Attribute Editor” on page 178.

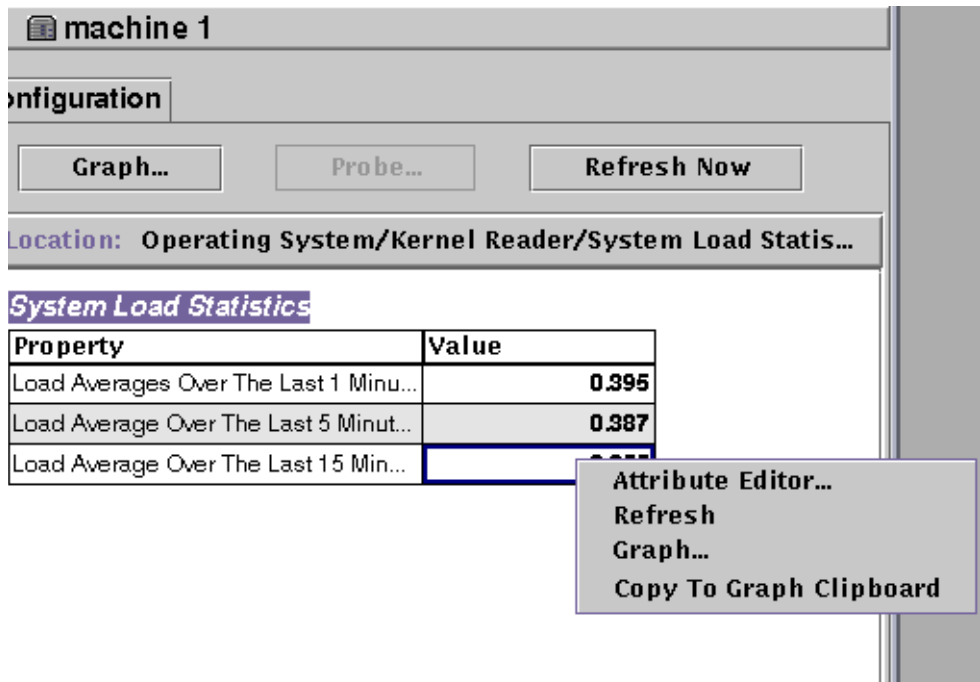


FIGURE 9-7 Monitored Data Property Pop-up Menu

Probing Properties

On selected properties, the software enables you to use pre-determined UNIX commands including list files, the `vmstat` command, and so on. The Probe button is not grayed out when probe commands are applicable.

The following procedure explains how to probe a property in the Directory Size Monitoring module. If you have not done so already, load this module by following the procedure “To Load a Module” on page 212.

▼ To Probe a Property

1. **In the Browser Details window, double-click on the Operating System icon in the hierarchy (tree) view.**

The operating system modules are displayed in both the hierarchy and contents views.

2. **Double-click on the Directory Size Monitoring icon in the contents view or single click in the light-colored circle next to the Directory Size Monitoring icon in the hierarchy view.**

The Directory Monitoring Status folder is displayed.

3. **Double-click on the Directory Monitoring Status folder icon in either the hierarchy or the contents view.**

The monitored data properties are displayed in a property table.

4. **Proceed with one of the following:**

- Click the right mouse button in the Directory Monitoring table row and select the List Files or Recursively List Files command from the pop-up menu (FIGURE 9-8).
- Click the Probe button (FIGURE 9-9), select the appropriate command, and click the OK or Cancel button.

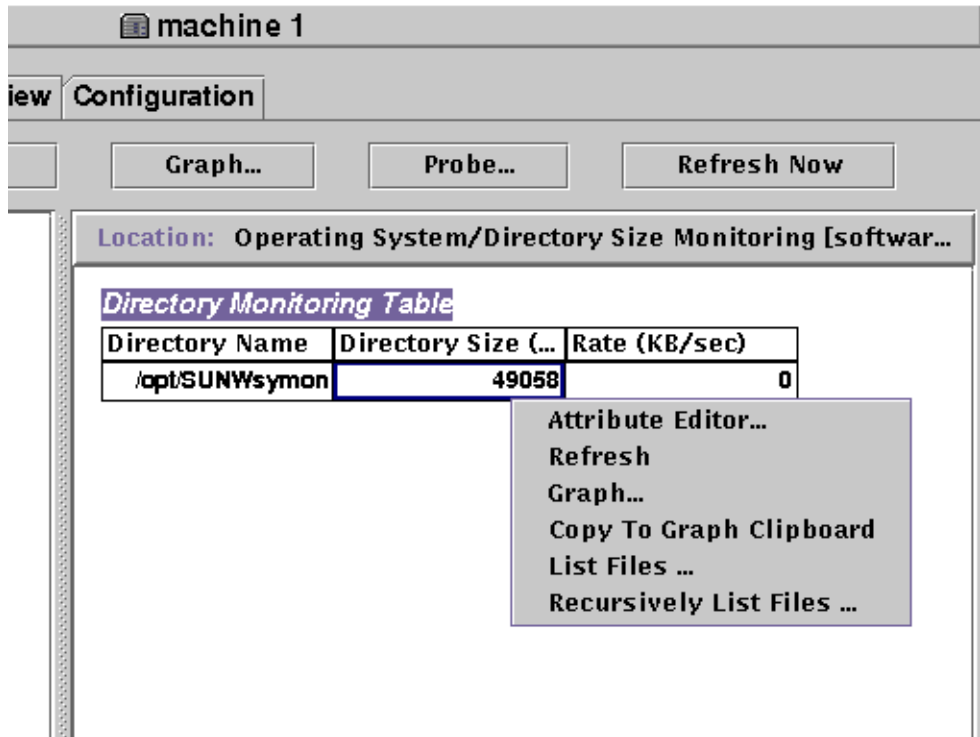


FIGURE 9-8 Probe Commands in the Pop-up Menu



FIGURE 9-9 Probe Select Dialog

Graphing Properties

The software enables you to graph most monitored data properties (FIGURE 9-10).

▼ To Graph A Monitored Data Property

- **Proceed with one of the following:**
 - Click the right mouse button in any table cell containing a data property you want to graph, and select Graph from the pop-up menu (FIGURE 9-7).

- Select (highlight) the desired data property, and then click the Graph button at the top of the Details window.

The graphing window is opened and the values of the property are plotted as a function of time. The plotting is dynamic and continues even if the graphing window is iconified on the desktop. Plotting stops, however, if the window is closed.

Note – Placing your cursor and clicking with the right mouse button in a property row or column displays the pop-up menu for that property.

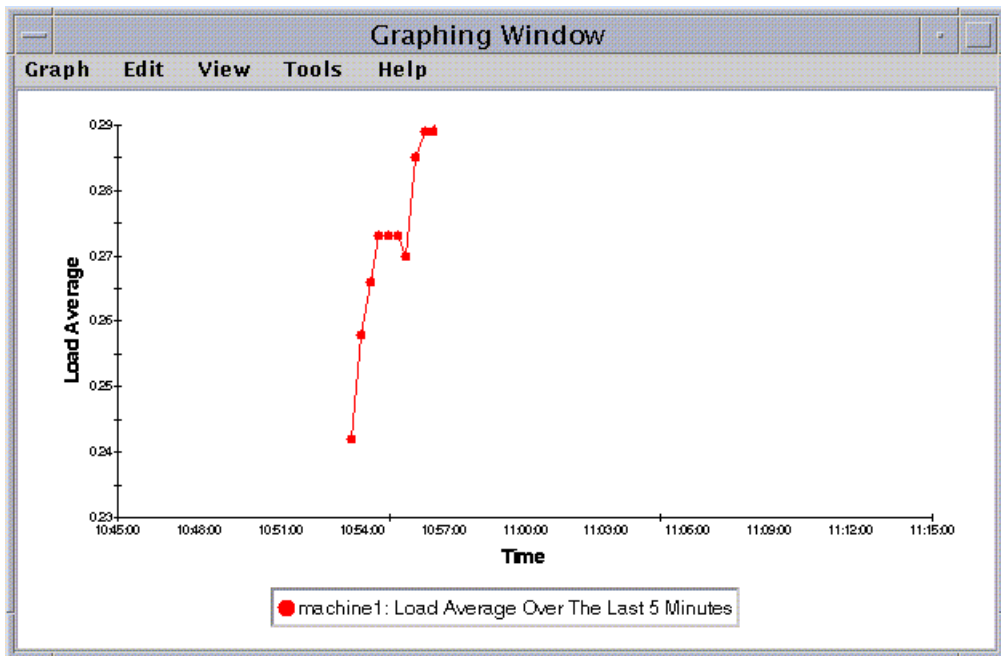


FIGURE 9-10 Graph of System Load Statistics Average Over the Last Five Minutes

▼ To Graph Two Data Properties

1. Click the right mouse button in the data property table cell.

In this example, the Load Averages Over the Last 1 Minute table cell is selected.

2. Proceed with one of the following:

- Click the right mouse button in the table cell and select the Copy to Graph Clipboard command from the pop-up menu (FIGURE 9-11).

- In the Details window, select Options ► Copy to Graph Clipboard.

Note – The Copy to Graph Clipboard command works only when the units of the data item are the same. Also, Copy to Graph Clipboard places the data on a clipboard. The data is not actually placed on the graph until you complete the following step.

3. Go to the graphing window in which you want the additional property to be plotted. Select Graph ► Add From Graph Clipboard (FIGURE 9-12).

The second data property is added (FIGURE 9-13).

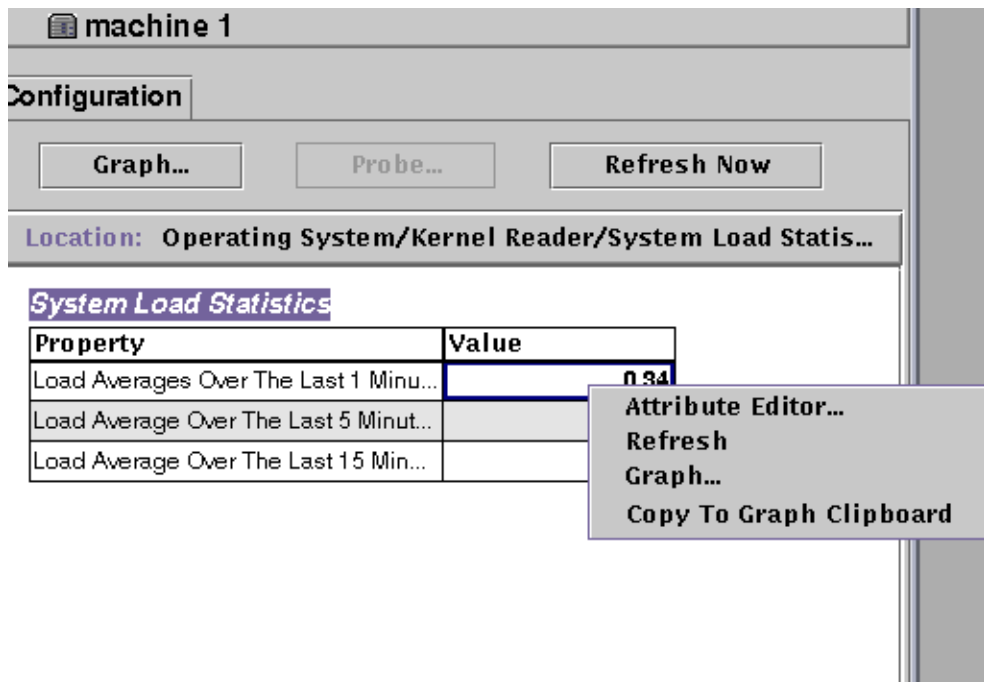


FIGURE 9-11 Copying Load Averages Over the Last One Minute to the Graph

Note – You may graph up to 5 datasets at one time on a single graph.

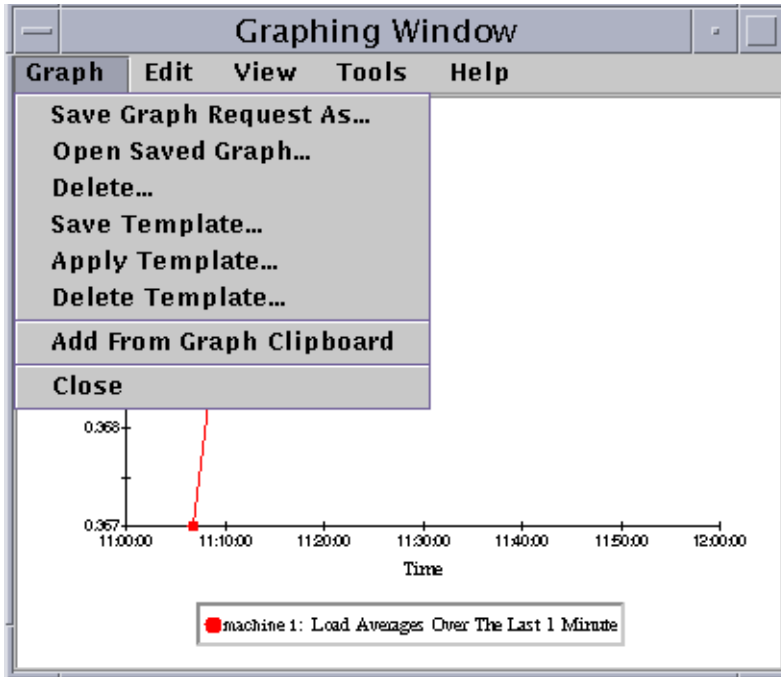


FIGURE 9-12 Adding Load Averages Over the Last One Minute to the Graph

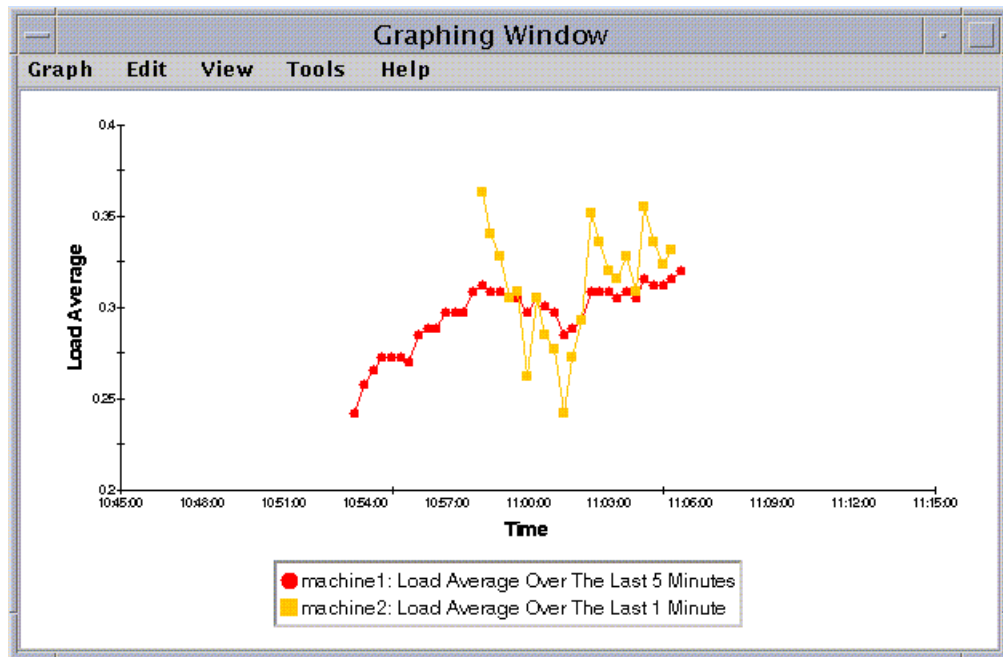


FIGURE 9-13 Load Averages Over the Last One and Five Minutes

▼ To Save Graphing Parameters

1. Select **Graph ► Save Graph Request As** or **Select Graph ► Save Template in the Graphing window**.

The **Save Graph Request** function (FIGURE 9-14) enables you to save the host name and the data property or properties that have been graphed. Once saved, a graph of this property on this host can be pulled up quickly from inside the graphing window (as shown here) or from the main console window under the **Tools** menu. A newly opened graph starts plotting fresh data.

The **Save Template** function (FIGURE 9-15) enables you to save any custom features you have added to your graph including axis labeling, headers, footers, legend, and so on. (For more information see “Graphing Menus” on page 162.)

2. Type the name in the **Enter Graph Name** or **Enter Template Name** fields.
3. Click the **Save** button to save your graph request (template) or click the **Cancel** button to cancel your request.

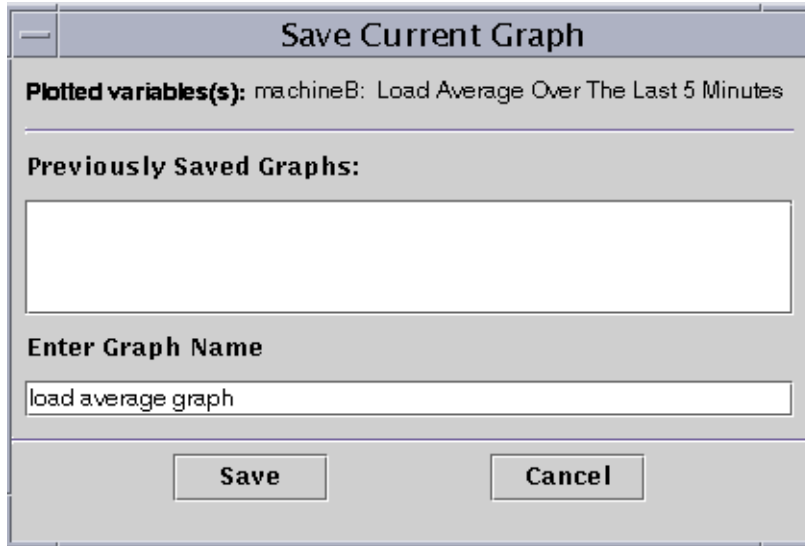


FIGURE 9-14 Save Graph Request Dialog

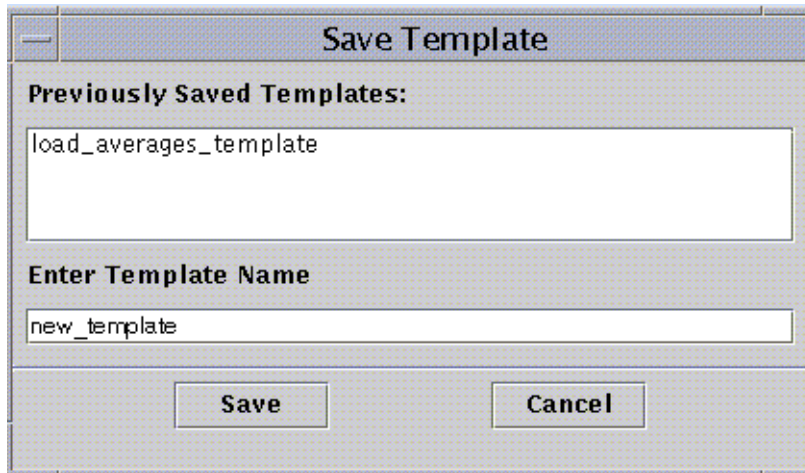


FIGURE 9-15 Save Template Dialog

▼ To Open a Graph

1. Select **Graph** ► **Open Saved Graph** in the **Graphing** window.

The Open Graph dialog is displayed (FIGURE 9-16).

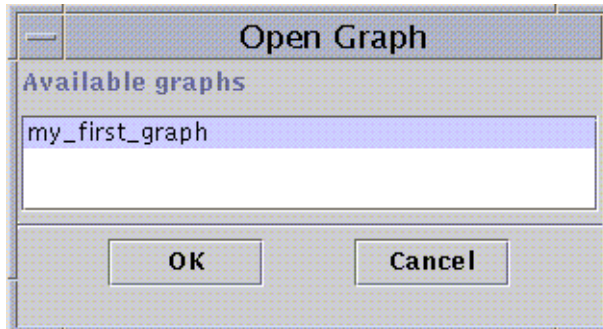


FIGURE 9-16 Open Graph Dialog

2. **Select (highlight) a saved graph from the list.**
3. **Click the OK button to open the graph or the Cancel button to cancel your request.**

▼ To Apply a Graph Template

1. **Select Graph ► Apply Template in the Graphing window.**

The Apply Template dialog is displayed (FIGURE 9-17). This dialog enables you to apply saved custom features to the current graph.

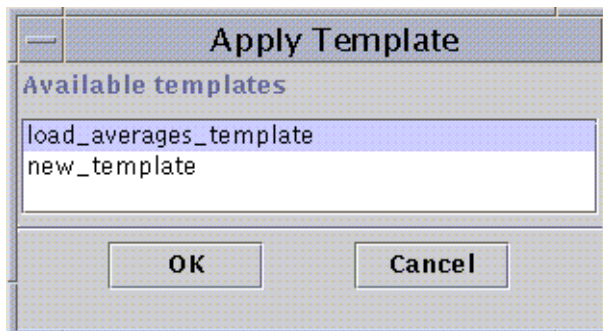


FIGURE 9-17 Apply Template Dialog

2. **Select (highlight) a saved template from the list.**
3. **Click the OK button to apply the template to the current graph or the Cancel button to cancel your request.**

Graphing Menus

There are five Graphing window menu items:

- Graph
- Edit
- View
- Tools
- Help

Graph Menu Items

TABLE 9-2 Graph Menu Items

Menu Item	Description
Save Graph Request as	Saves the host name and data property (properties) that are plotted.
Open Saved Graph	Opens a previously saved graph.
Delete	Deletes a previously saved graph.
Save Template	Saves any custom changes you make on the graph.
Apply Template	Applies a saved template to the current graph.
Delete Template	Deletes a previously saved graph template.
Add From Graph Clipboard	Adds an additional dataset to an existing graph. Choose this menu item after selecting a property to “copy to graph clipboard.”
Close	Closes the graphing window.

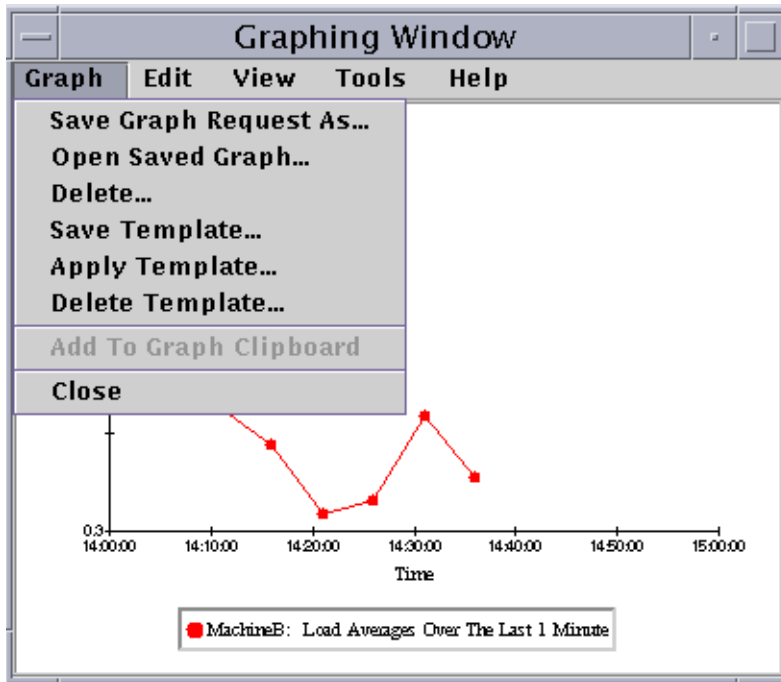


FIGURE 9-18 Graph Menu Items

The graph utility enables you to customize the look and feel of your graphs through the edit menu items (TABLE 9-3).

Note – Header, Footer, Axes, and Legend changes are not visible unless the view option corresponding to that part of the graph is toggled on (TABLE 9-4).

Edit Menu Items

TABLE 9-3 Edit Menu Items

Menu Item	Description
Chart Type	Changes graph type to line, area, or bar graph.
Main Titles	Changes the text, font, font style, point size, and orientation of the header, footer, legend, x-axis or y-axis title. In addition, this dialog enables you to select and customize the border around the title.
Axes	Edits the range and the spacing of the x- and y-axes. This menu item is suggested for advanced users only (FIGURE 9-20 and FIGURE 9-21).
Border	Determines the border type (including a no border option).

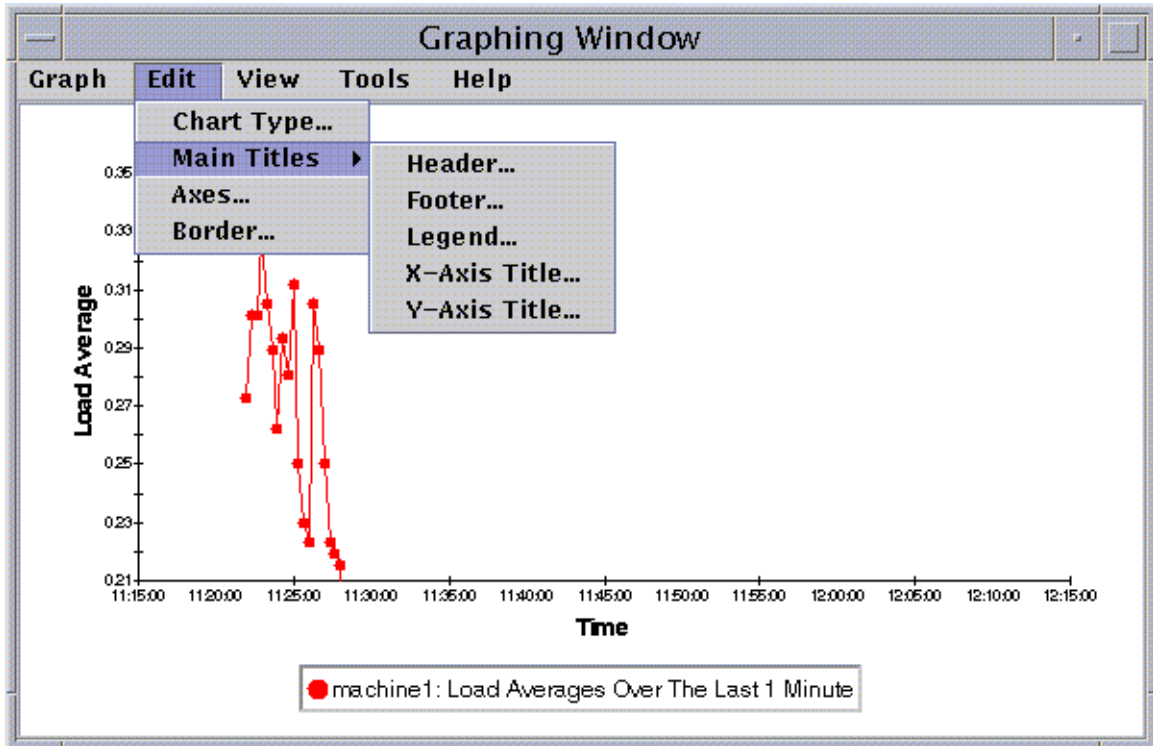


FIGURE 9-19 Edit Menu Items

Note – Editing axes requires some care in choosing the correct values. If you should choose values for Min and Max that are impossible to plot, the dialog, in most cases, gives you an error message describing the problem. However, if you simply choose values that are possible, but result in the plotted points no longer being visible, you are not warned with an error message.

FIGURE 9-20 and FIGURE 9-21 show the axes dialog for the x-axis and y-axis, respectively.

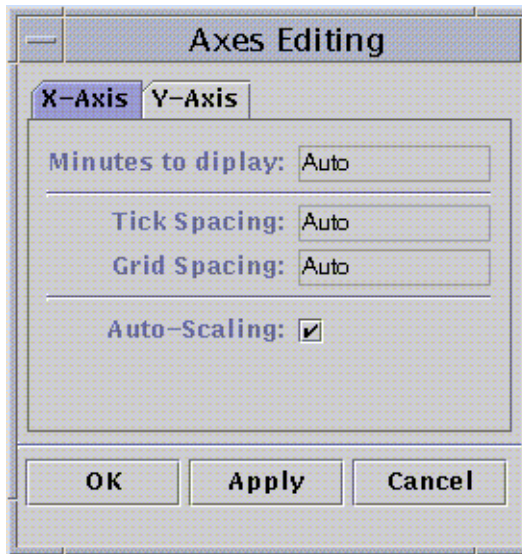


FIGURE 9-20 X-Axis Editing Dialog

The software chooses appropriate default x-axis values using “Autoscaling”. If you want to change the values, then you must turn off autoscaling by unchecking the checkbox.

You may then change:

- Number of minutes to be plotted
- Positioning of ticks
- Positioning of grid lines

Note – Ticks are the small lines that mark off intervals on an axis.

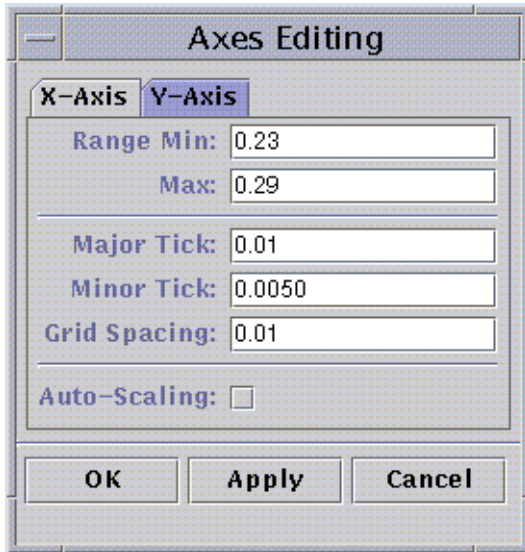


FIGURE 9-21 Y-Axis Editing Dialog

The software chooses appropriate default y-axis values using “Autoscaling”. If you want to change the values, then you must turn off autoscaling by unchecking the checkbox.

You may then change:

- Minimum and maximum values shown on the y-axis
- Major tick positions (the interval at which numerical labels are shown)
- Minor tick positions (showing smaller intervals)
- Grid spacing

View Menu Items

TABLE 9-4 View Menu Items

Menu Item	Description
Live Data	Displays the monitored property (properties) data points.
Show Header	Displays the header text.
Show Footer	Displays the footer text.
Show Axis Titles	Displays the x-and y-axes titles.
Show Axes	Displays the x-and y-axes.
Show Grids	Displays a grid pattern in the graphing window.
Show Legend	Displays the legend text.
Rotate Graph	Rotates the graph by 90, 180, or 270 degrees.
Flip	Flips the graph over (x-axis flips the x-axis, y-axis flips the y-axis).
Reset View	Resets rotate and flip options to the default (graph upright) setting.

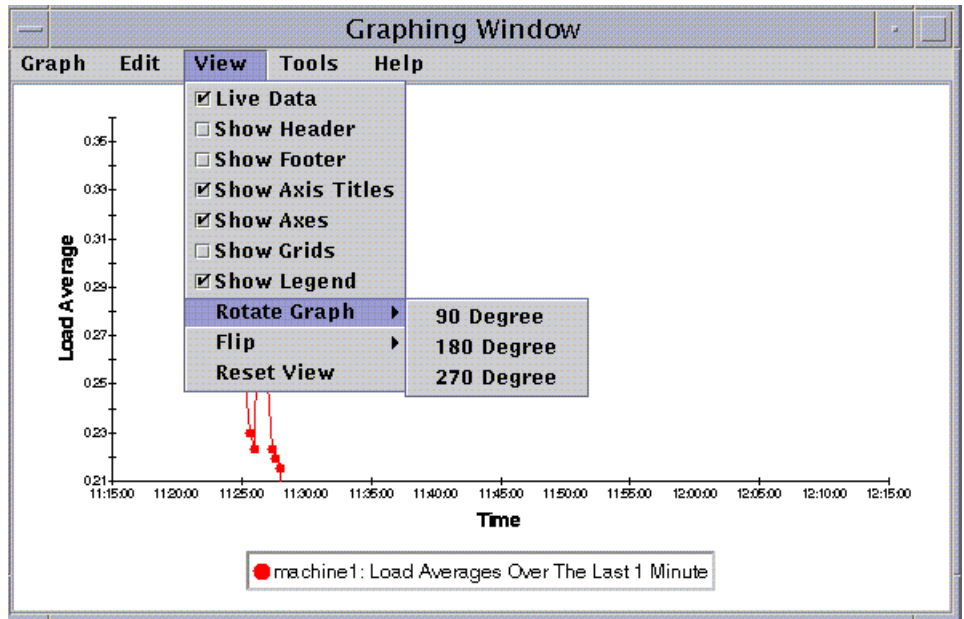


FIGURE 9-22 View Menu Items

Tools Menu Items

TABLE 9-5 Tools Menu Items

Menu Item	Description
Zoom	Toggle to turn on the zoom option, which focuses on a selected area of the graph. Hold down the Shift key while dragging out a rectangle with the mouse.
Translate	Toggle to turn on the translate option, which moves the graphing window side to side or back and forth. Hold down the Control key while moving the mouse left-right or up-down.
Restore	Removes the effects of the zoom and translate options; undo option.

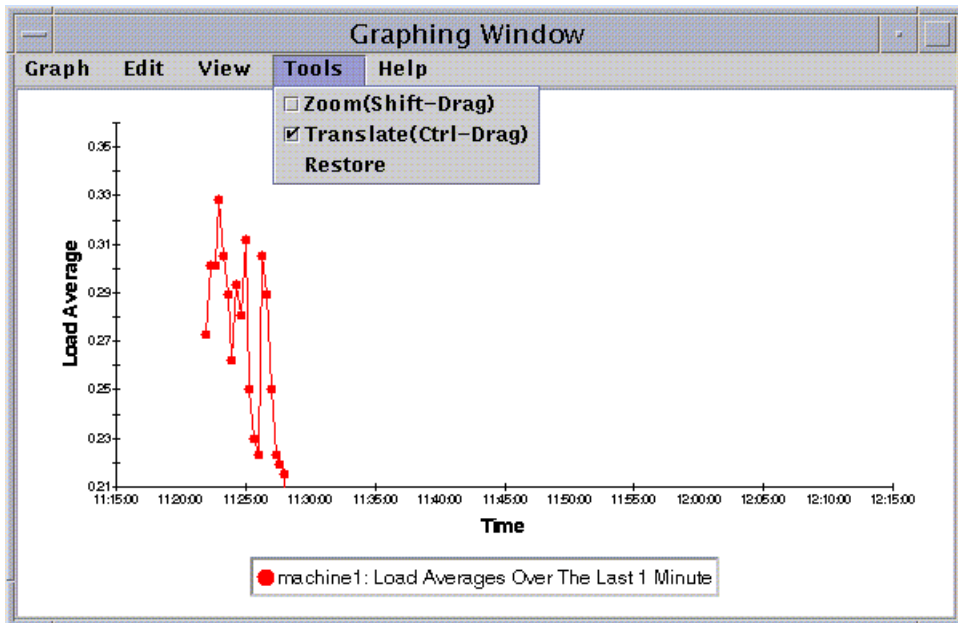


FIGURE 9-23 Tools Menu Items

Attribute Editor

This chapter covers the following topics:

- To Open the Attribute Editor
- To Create an Alarm
- To Send an Email
- To Set a Refresh Interval
- To Set a History Interval

Attribute Editor for a Data Property

The Attribute Editor for a data property provides additional information about the property and enables you to customize various monitoring criteria. You can use the attribute editor to set:

- Alarm thresholds
- Actions when alarm conditions occur
- The refresh interval
- A logging schedule for historical data points

The Attribute Editor consists of a series of one or more tab buttons at the top of the window that enables you to switch between different panels. The tab buttons for the System Load Statistics data property are:

- Info
- Alarms
- Actions
- Refresh
- History

Note – Each Attribute Editor displays one or more of these tab buttons, depending on the type of Attribute Editor. The Attribute Editor that is displayed is dependent on the selected object.

▼ To Open the Attribute Editor

1. Click the right mouse button and select a data property table cell (FIGURE 10-1).
2. Proceed with one of the following:
 - Click the right mouse button in a table row and select Attribute Editor from the pop-up menu.
 - Click the Attributes button.

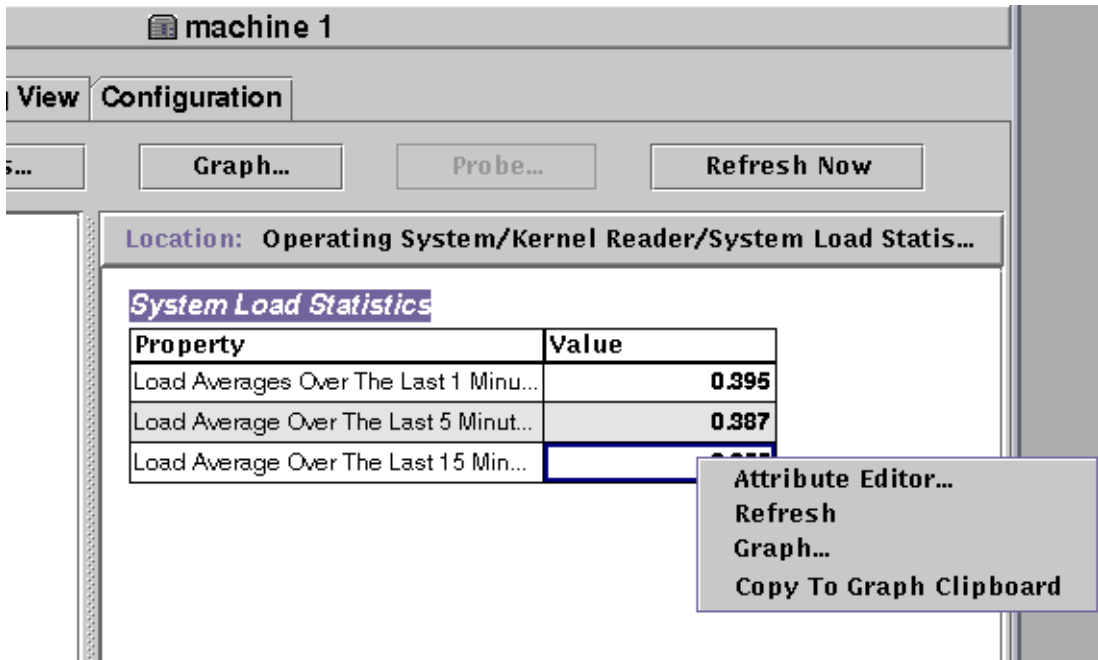


FIGURE 10-1 Selected Data Property

Information Tab in the Attribute Editor

The Information panel (FIGURE 10-2) provides you with additional information about the selected object.

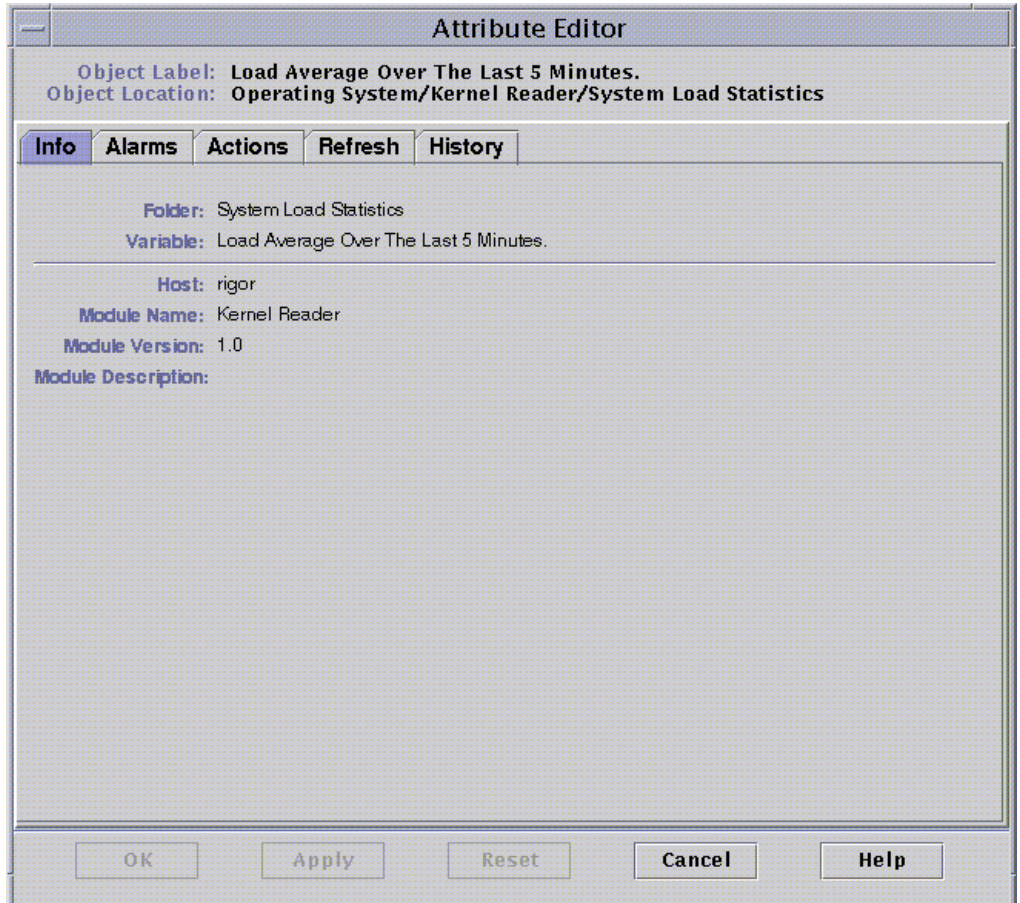


FIGURE 10-2 Attribute Editor Info Tab for a Monitored Property

Alarms Tab in the Attribute Editor

The Alarms panel (FIGURE 10-3) enables you to set alarm thresholds (TABLE 10-1) for simple alarms only.

Simple alarms are based on thresholds. A monitored data property is greater than, less than, not equal to, or equal to a single threshold value. By contrast, complex alarms are based on a set of conditions becoming true. For more information on alarm rules, see Appendix E.

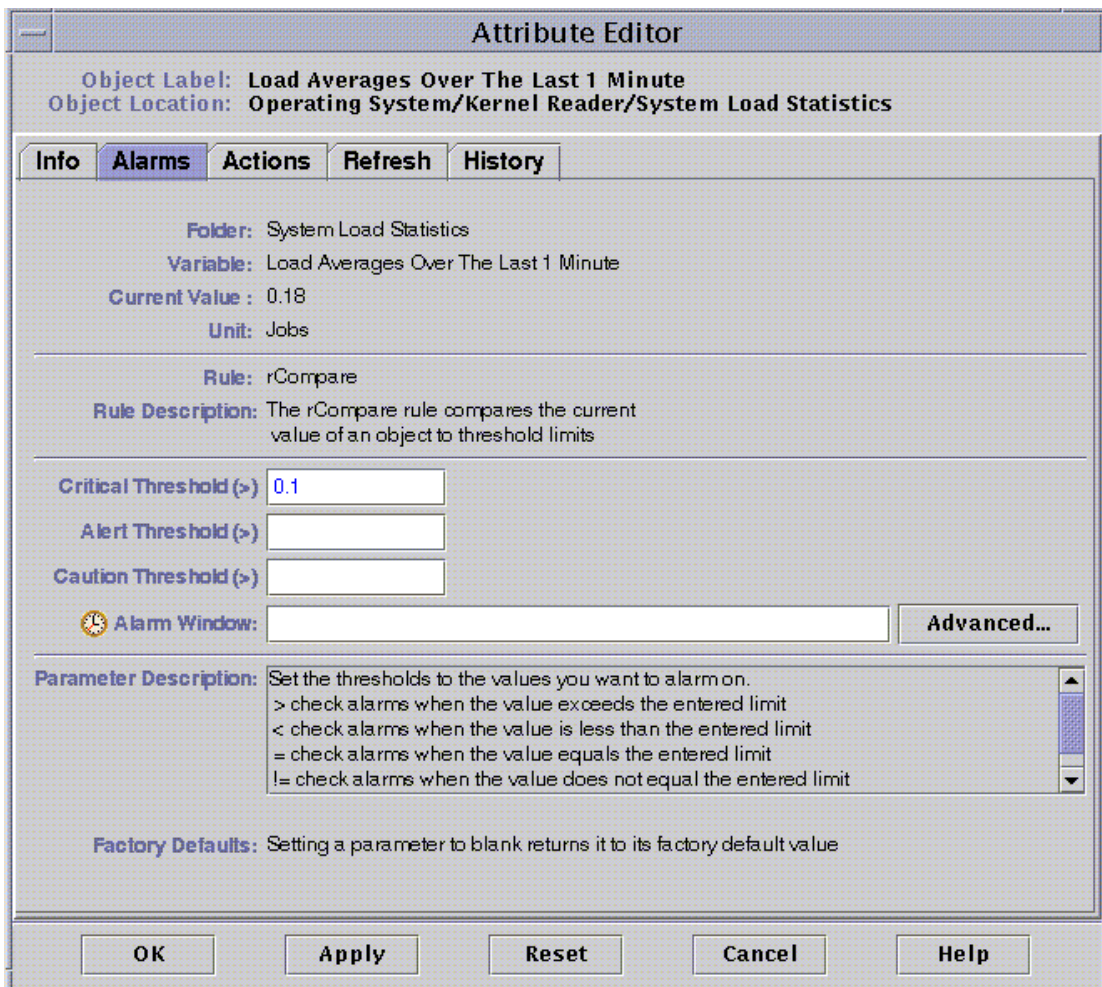


FIGURE 10-3 Attribute Editor Alarms Tab for a Monitored Property

TABLE 10-1 shows common simple alarm limits for monitored properties. The alarm limits are also displayed in the Parameter Description field (FIGURE 10-3). You may set thresholds for one or more of these alarm limits for selected data properties.

TABLE 10-1 Common Simple Alarm Limits in Sun Enterprise SyMON Software

Alarm Limit	Description
Critical Threshold (>)	Critical (red) alarm occurs if value exceeds limit entered in this field.
Alert Threshold (>)	Alert (yellow) alarm occurs if value exceeds limit entered in this field.
Caution Threshold (>)	Caution (blue) alarm occurs if value exceeds limit entered in this field.
Critical Threshold (<)	Critical (red) alarm occurs if value is below the limit entered in this field.
Alert Threshold (<)	Alert (yellow) alarm occurs if value is below the limit entered in this field.
Caution Threshold (<)	Caution (blue) alarm occurs if value is below the limit entered in this field.
Alarm Window	Alarm occurs only during this time period. For example, if you type <code>day_of_week=fri</code> , an alarm occurs only if the alarm condition exists on a Friday. If an alarm condition exists on Tuesday, no alarm is registered.

The software offers you the following flexibility in setting your alarms:

- Determine the thresholds that trigger an alarm of a particular severity
- Determine when alarms are sounded (for example, only on weekdays)

Note – You need the appropriate security permission to set an alarm threshold. See Chapter 15 for more information.

▼ To Create an Alarm

The following example illustrates how to create a simple alarm. This example creates an alarm threshold in the Kernel Reader module.

1. Click the Browser tab button in the Details window.

2. Click the light-colored circle next to the Operating System icon in the hierarchy tree view.

The Operating System modules are displayed.

3. Click the light-colored circle next to the Kernel Reader icon.

The Kernel Reader properties are displayed.

4. Double-click on the System Load Statistics icon.

The System Load Statistics properties table is displayed in the contents view.

5. Click with your left mouse button and select the table cell for Load Averages Over the Last 1 Minute.

6. Click the Attributes button.

The Attribute Editor window is displayed.

7. Click on the Alarms tab button.

The alarm rows are displayed.

8. Type a value in the Critical Threshold (>) field which is less than the current value.

Entering this value enables you to create a critical alarm.

9. Complete one of the following actions:

- Click OK to accept the changes you have made and close this window.
- Click Apply to apply your changes without closing this window.
- Click Reset to reset the Attribute Editor to the default parameters.
- Click Cancel to cancel your request.

After some time, the Load Average Over the Last 1 Minute data field in the table turns red. In addition, red alarm icons are displayed on the following folders and icons: Operating System, Kernel Reader, and System Load Statistics (unless your system has an open, unacknowledged severity 1 black alarm).

10. Click the Alarms tab button in the Details window.

The alarm you created should be reflected in the alarms table. See Chapter 13 for more information on this subject.

11. Acknowledge this alarm.

For more information, see “To Acknowledge and Delete Alarms” on page 249.

12. Create additional alarm thresholds and familiarize yourself with their operation.

Once you have created these alarms, you can set up security permissions so that another Sun Enterprise SyMON software user cannot change your alarm thresholds. For more information on security, see Chapter 15.

Note – You do not need to fill in alarm information for all alarm thresholds. For example, you may choose to create only a critical alarm threshold.

The preceding example illustrates creating a situation where an alarm is registered if a value exceeds the alarm limit. TABLE 10-1 lists other common alarm limits in the software.

Actions Tab in the Attribute Editor

The Actions tab in the Attribute Editor (FIGURE 10-4) enables you to instruct the software to perform a predetermined action if an alarm occurs.

Note – Acceptable actions include scripts that are stored in the `/var/opt/SUNWsymon/bin` directory. These scripts execute with `root` permissions.

For example, you can enter the name of a script in the critical action field so that an email is sent to a system administrator whenever a critical alarm is generated for the Load Average Over the Last Five Minutes data property.

In FIGURE 10-4, you can set separate actions for different alarm conditions or one for any alarm condition (action on any change).

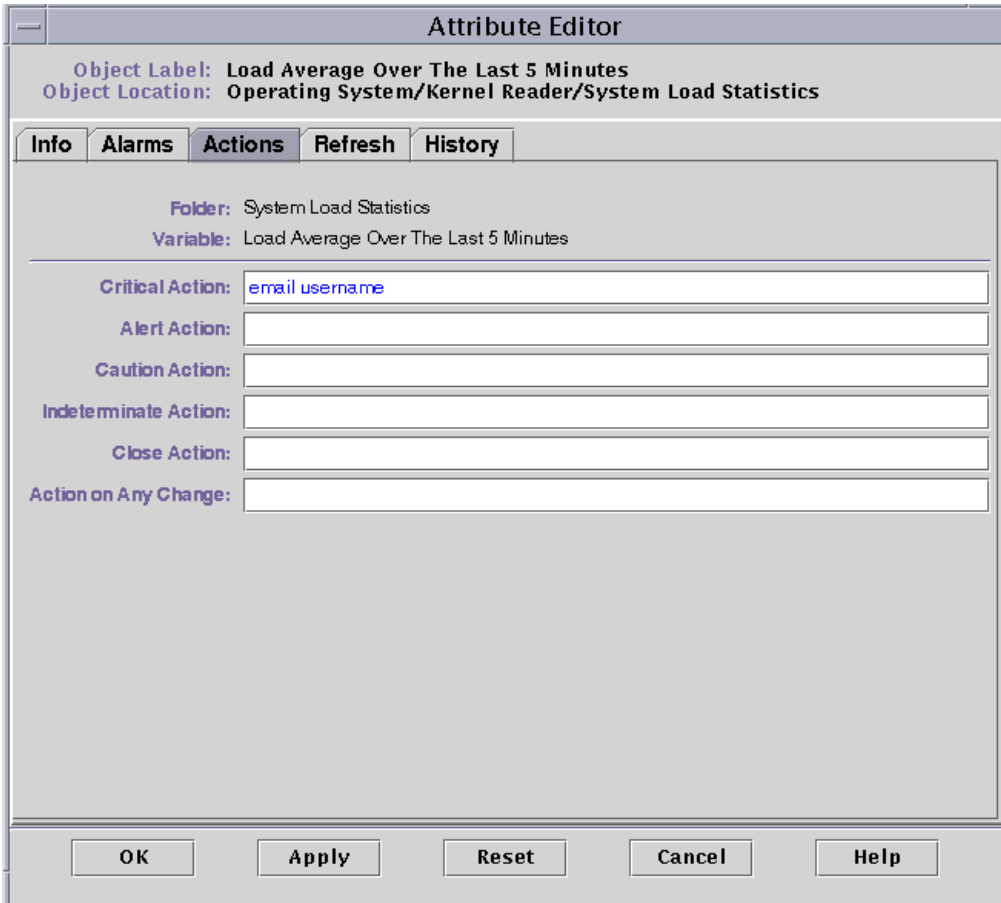


FIGURE 10-4 Attribute Editor Actions Tab for a Monitored Property

▼ To Send an Email

The following example procedure describes how to send an email to a user when a critical alarm occurs.

- 1. Click the Browser tab button in the Details window.**
- 2. Click the light-colored circle next to the Operating System icon in the hierarchy tree view.**

The Operating System modules are displayed.
- 3. Click the light-colored circle next to the Kernel Reader icon.**

The Kernel Reader properties are displayed.
- 4. Double-click on the System Load Statistics icon.**

The System Load Statistics properties table is displayed in the contents view.
- 5. Click with your left mouse button and select the table cell for Load Averages Over the Last 5 Minutes.**
- 6. Click the Attributes button.**

The Attribute Editor window is displayed.
- 7. Click the Actions tab button.**

The action rows are displayed.
- 8. Type `email username` in the Critical Action field.**
- 9. Complete this procedure with one of the following actions:**
 - Click OK to accept the changes you have made and close this window.
 - Click Apply to apply your changes without closing this window.
 - Click Reset to reset the Attribute Editor to the default parameters.
 - Click Cancel to cancel your request.

The following email is sent to the user whenever a critical alarm occurs.

```
Date: Wed, 28 Oct 1998 15:25:39 -0800
From: root@MachineB (0000-Admin(0000))
Mime-Version: 1.0

SyMON alarm action notification ... {Critical: machineB Kernel
Reader Used KB > 1000Kilo Bytes}
```

Refresh Tab in the Attribute Editor

The Refresh panel (FIGURE 10-5) enables you to set the refresh interval for this object. The refresh interval is the interval between the times when the Sun Enterprise SyMON agent samples the monitored property.

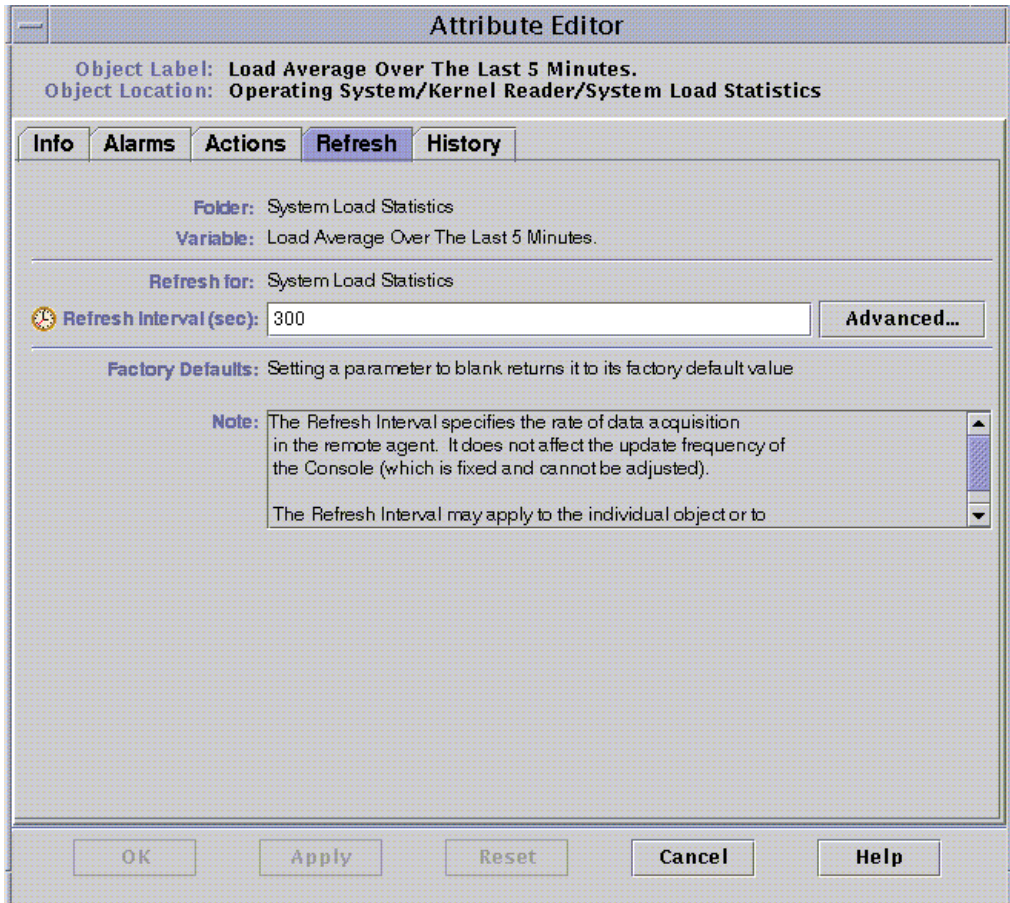


FIGURE 10-5 Attribute Editor Refresh Tab for a Monitored Property

▼ To Set a Refresh Interval

The following example illustrates how to set a refresh interval in the System Load Statistics module.

1. Click the Browser tab button in the Details window.

2. Click the light-colored circle next to the Operating System icon in the hierarchy tree view.

The Operating System modules are displayed.

3. Click the light-colored circle next to the Kernel Reader icon.

The Kernel Reader properties are displayed.

4. Double-click on the System Load Statistics icon.

The System Load Statistics properties table is displayed.

5. Click with your left mouse button and select the table cell for Load Averages Over the Last 5 Minutes.

6. Click the Attributes button.

The Attribute Editor window is displayed.

7. Click the Refresh tab button.

The refresh panel is displayed.

8. Type a value (in seconds) in the Refresh Interval field or click the Advanced button.

In this example, type 300 in the entry field. The refresh interval is five minutes. For more information on the Advanced button, see “Using the Time Editor” on page 185.

9. Complete this procedure with one of the following actions:

- Click OK to accept the changes you have made and close this window.
- Click Apply to apply your changes without closing this window.
- Click Reset to reset the Attribute Editor to the default parameters.
- Click Cancel to cancel your request.

Whenever the System Load Statistics table is displayed, the values in the table are refreshed every five minutes.

History Tab in the Attribute Editor

The history tab in the Attribute Editor enables you to save older data for a monitored property. In FIGURE 10-6, a history of data points is recorded every 120 seconds (sample interval). This information may either be stored in a disk file or in the memory cache.

There are two types of disk files: circular (maximum of 1000 lines) and text. These files are located in the `/var/opt/SUNWsymon/log` directory.

If you select memory cache, you must also indicate how many data points should be saved in the Max Size (sample) field.

Note – You may view this data in a graph by opening the graph for this monitored property. If you have selected memory cache, the graph is displayed with the historical data.

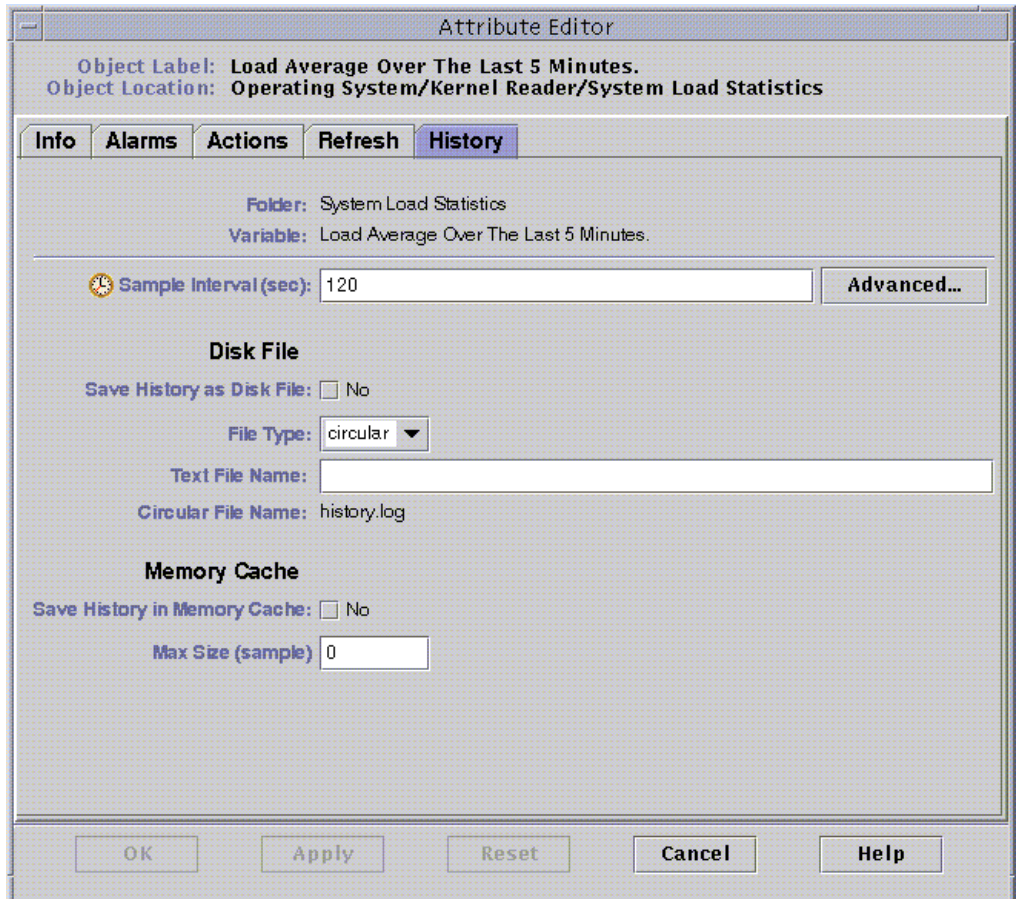


FIGURE 10-6 Attribute Editor History Tab for a Monitored Property

▼ To Set a History Interval

- 1. Click the Browser tab button in the Details window.**
- 2. Click the light-colored circle next to the Operating System icon in the hierarchy tree view.**

The Operating System modules are displayed.
- 3. Click the light-colored circle next to the Kernel Reader icon.**

The Kernel Reader properties are displayed.
- 4. Double-click the System Load Statistics icon.**

The System Load Statistics properties table is displayed.
- 5. Click with your left mouse button and select the table cell for Load Averages Over the Last 5 Minutes.**
- 6. Click the Attributes button.**

The Attribute Editor window is displayed.
- 7. Click the History tab button.**

The history panel is displayed.
- 8. Type a value (in seconds) in the Sample Interval field or click on the Advanced button.**

In this example, type 120 in the entry field. A history data point is collected every two minutes. For more information on the Advanced button, see “Using the Time Editor” on page 185.
- 9. Click in the check box next to Save History as Disk File or Save History in Memory Cache.**
- 10. If you decided to save history as a disk file, determine the file type (circular or text) and type the file name in the Text File Name field (text file only).**

A circular disk file is automatically saved under the name `history.log`. If you do not choose a file name for your text file, it is automatically saved under the name `agent_default.history`.
- 11. If you decided to save history in memory cache, type the number of history data points in the Max Size (sample) field.**

For example, if you set this field to 1000, only the most current 1000 data points are stored in the memory cache. Any older data points are discarded. These data points may be graphed. See “To Graph A Monitored Data Property” on page 155 for more information.
- 12. Complete this procedure with one of the following actions:**
 - Click OK to accept the changes you have made and close this window.

- Click Apply to apply your changes without closing this window.
- Click Reset to reset the Attribute Editor to the default parameters.
- Click Cancel to cancel your request.

Time Editor

This chapter covers the following topics:

- To Create a Time Expression Using the Cyclic and Comparison Tabs
- To Create a Time Expression Using the Absolute and Cron Tabs
- To Create an Alarm Schedule Using the Comparison Tab

Using the Time Editor

Use the Time Editor (FIGURE 11-1) to schedule monitoring activities. For example, you may want a particular module to be operational only during business hours. Or you may want to record the history of a monitored property only during peak activity.

You can use the Time Editor to set the schedule for a module, for alarms, for a refresh interval, and for history data collection.

Note – The schedule (set by the Time Editor) for a module overrides the schedule for alarms, refresh intervals, and history. If the module is not “on,” the data properties are not monitored and the alarms, refresh, and history schedules are meaningless.

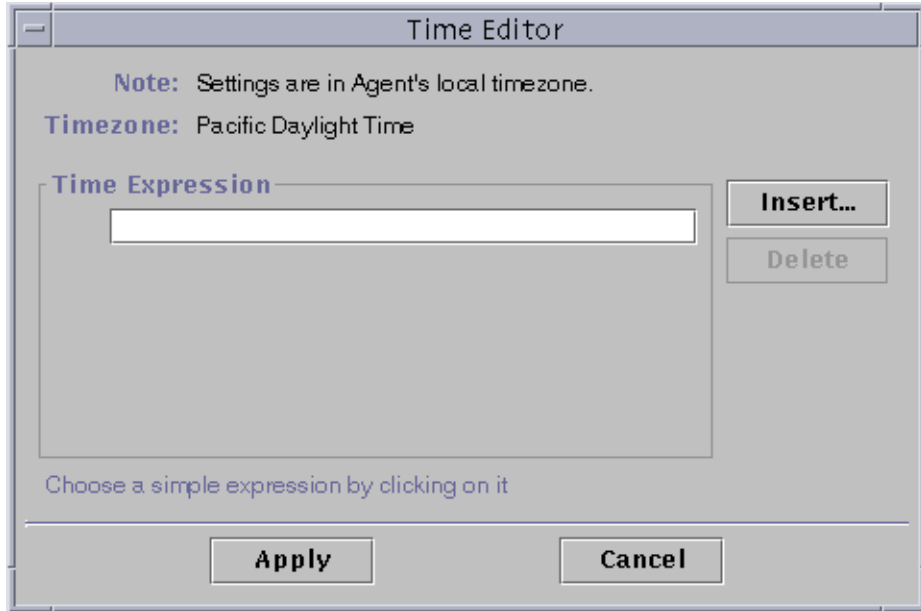


FIGURE 11-1 Time Editor

There are four basic types of Time Expressions:

- Cyclic – Periodic events
- Absolute – Starting at a particular time
- Comparison – Allowing events at specific times
- Cron – Allowing events at specified times using cron input format

These Time Expressions can be used separately or in combination.

Note – All four Time Expressions are valid for history sample and refresh intervals. However, only the comparison tab is valid for alarm and module schedules.

Combining Time Expressions

The following examples illustrate combining Time Expressions to set a history interval.

Note – Sampling for the history interval does not occur unless the module is also on (according to the module schedule).

▼ To Create a Time Expression Using the Cyclic and Comparison Tabs

Note – This procedure is also valid for a refresh interval.

1. **Click on the Advanced button in the History tab of the Attribute Editor for a data property.**

See “To Set a History Interval” on page 182 for more information.

The Time Editor is displayed (FIGURE 11-1).

2. **If any value is in the Time Expression field, highlight the value and delete it by clicking the Delete button.**

3. **Click the Insert button.**

The Time window is displayed with the Cyclic tab selected.

4. **Determine the frequency for the history interval (FIGURE 11-2).**

In this example, the history interval is set for every hour. That is, the software checks the System Load Average Over the Last 5 Minutes every hour.

- a. **Highlight the number field and click the up or down arrows until the number 1 is displayed.**
- b. **Highlight the units field and click the up or down arrows until hours is displayed.**

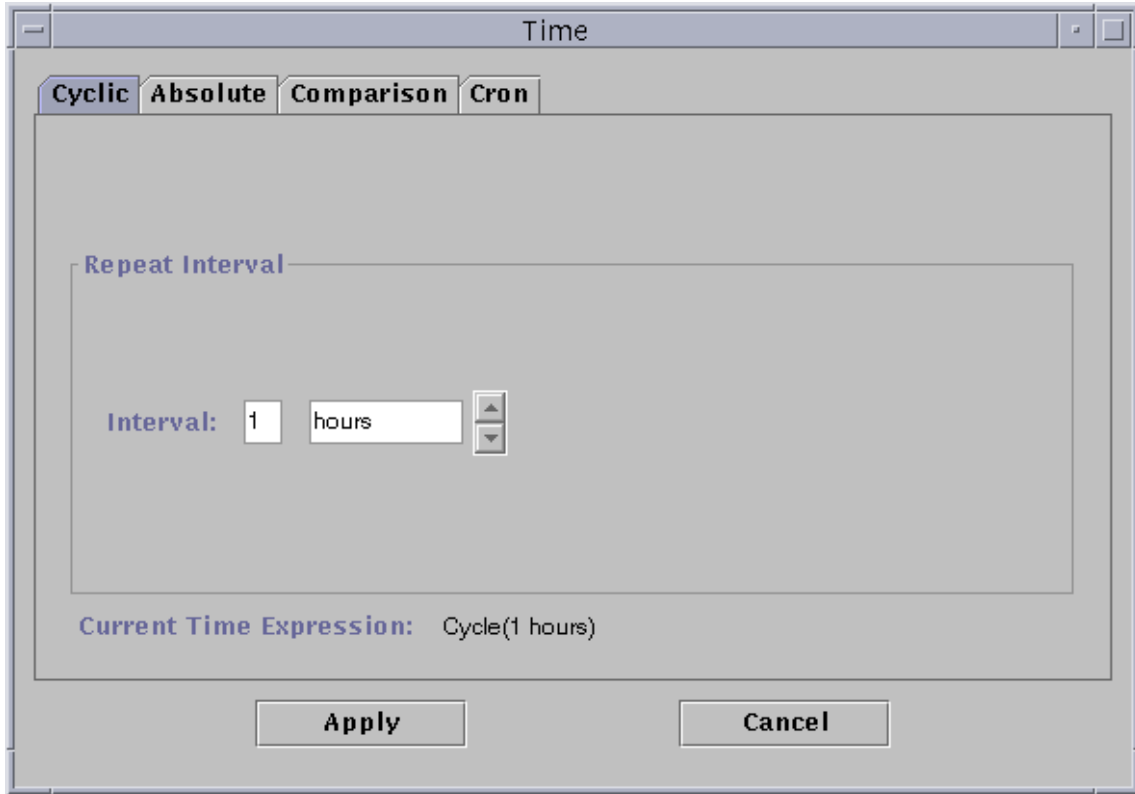


FIGURE 11-2 Setting a Cyclic Time of One Hour

5. **Click the Apply button.**
 - Cycle(1 hours) is displayed in the Time Editor (FIGURE 11-3).

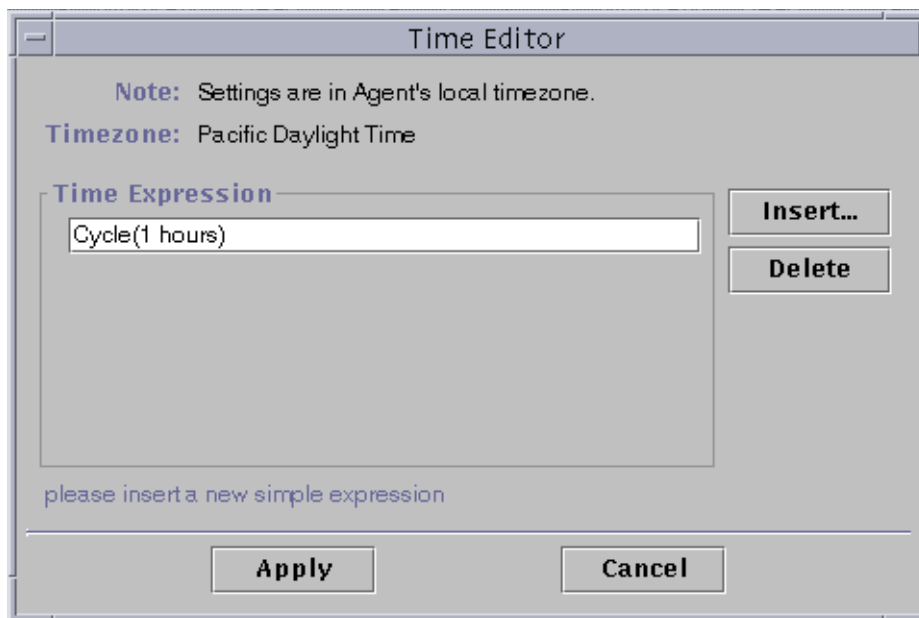


FIGURE 11-3 Time Editor With Cyclic Time of One Hour

6. Click the Insert button.

The Time window is displayed with the Cyclic tab selected.

7. Click the Comparison tab.

The Time window is displayed with the Comparison tab selected.

8. Determine the start of the Time Range (Monday).

The time range determines the time period when the software checks the system load average every hour. The software does not check the system load average outside the time period specified by this window. In this example, the time range is from Monday to Friday, inclusive.

a. Select Day of week from the left pull-down menu.

b. Select \geq from the middle pull-down menu.

c. Select Monday from the right pull-down menu.

The time expression is displayed in the Current Time Expression field (FIGURE 11-4).

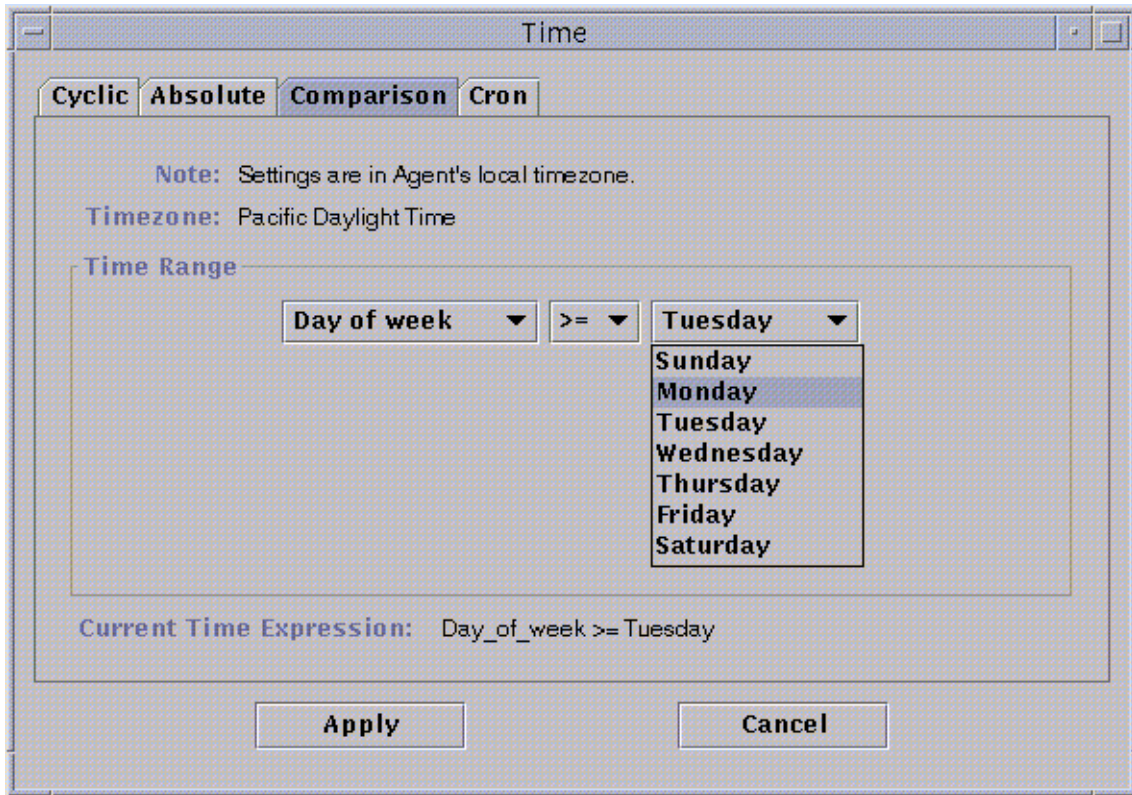


FIGURE 11-4 Setting the Start Range to Monday

9. Click the Apply button.

The Time Editor is updated. The Current Time Expression now reads `Day_of_week >= Monday`. However, the Time Editor also enables you to select the Or expression (FIGURE 11-5).

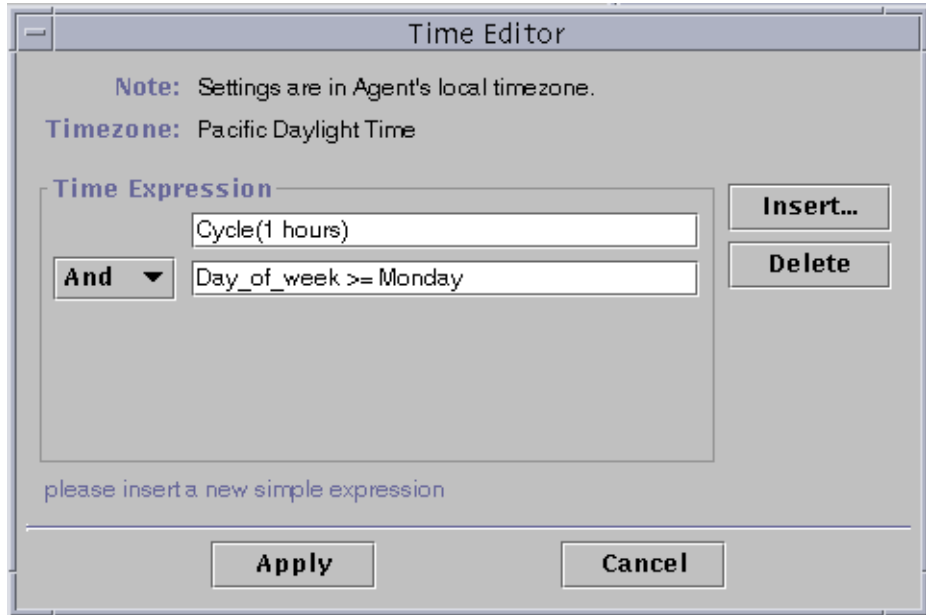


FIGURE 11-5 Time Editor Is Updated With a Start Range of Monday

10. Determine the end of the Time Range by clicking the Insert button.
11. Click on the Comparison tab of the Time window.
The Time window is displayed with the Comparison tab selected.
12. Determine the end of the Time Range (Friday).
 - a. Select Day of week from the left pull-down menu.
 - b. Select <= from the middle pull-down menu.
 - c. Select Friday from the right pull-down menu.
The Time expression is displayed in the Current Time Expression field (FIGURE 11-6).

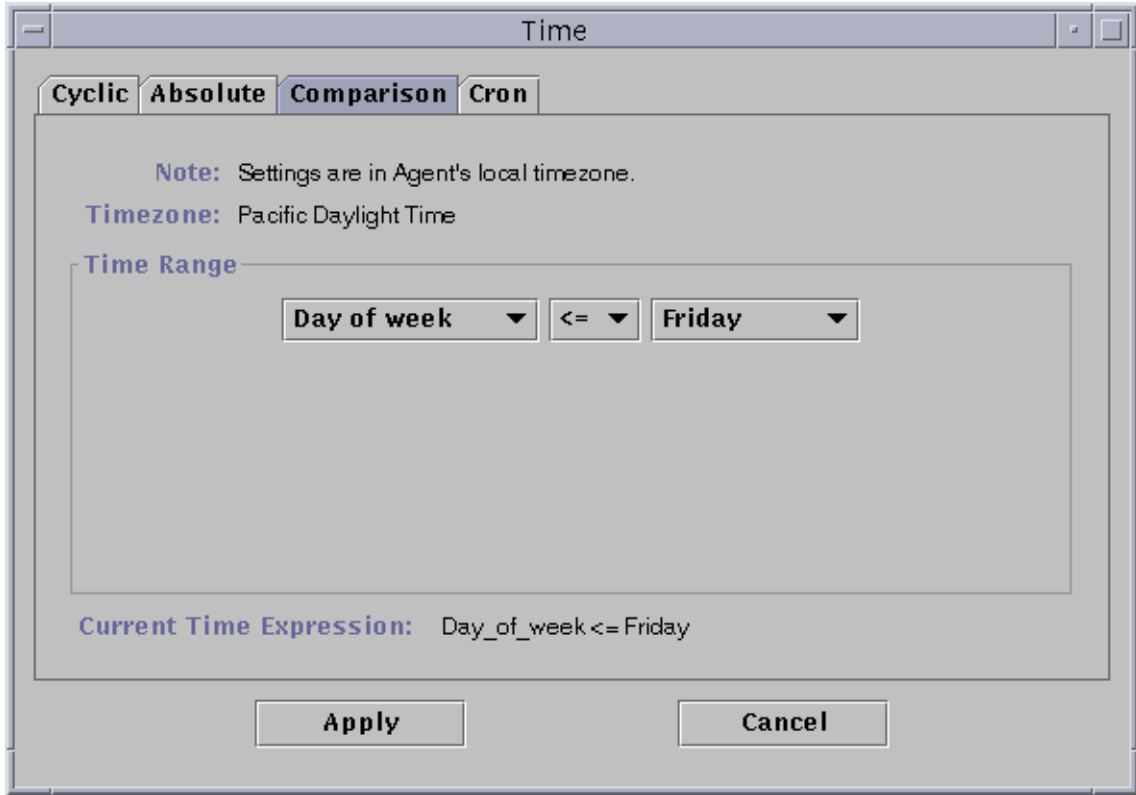


FIGURE 11-6 Setting the End Range to Friday

13. Click the Apply button.

The Time Editor is updated. The Time Expression fields now read Cycle(1 hours) and Day_of_week>=Monday and Day_of_week<=Friday (FIGURE 11-7).

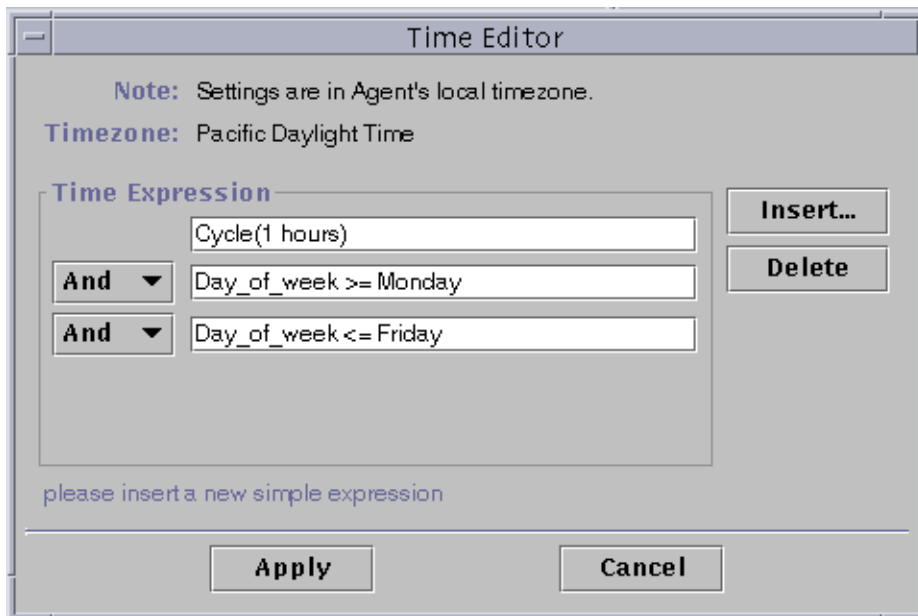


FIGURE 11-7 Time Editor Showing a Cycle Time of One Hour From Monday to Friday

14. Click the Apply button.

The Sample Interval field in the Attribute Editor is updated. The software will check the system load average (over five minutes) at every hour, from 12:00 AM Monday to 12:00 AM Saturday morning.

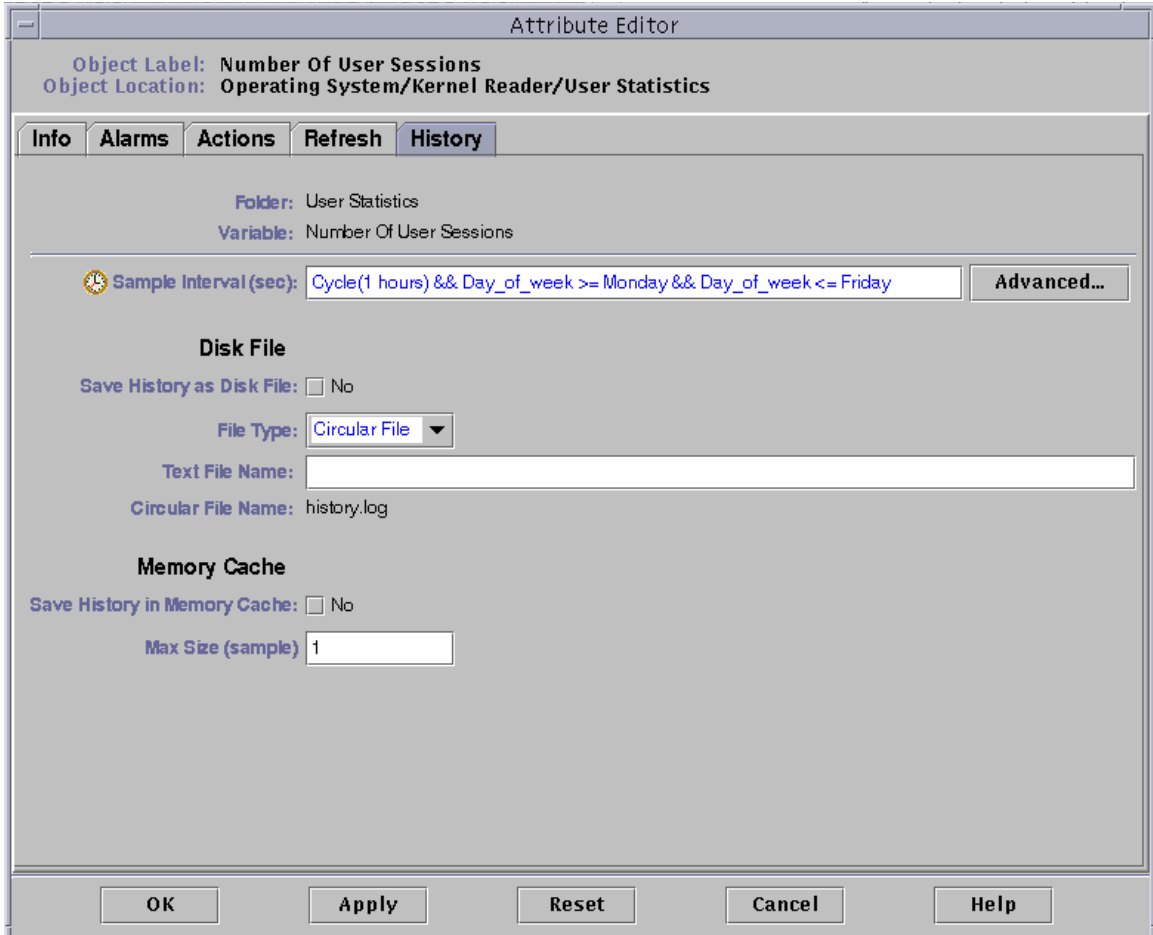


FIGURE 11-8 Updated History Attribute Editor Showing a Cycle Time of One Hour From Monday to Friday

▼ To Create a Time Expression Using the Absolute and Cron Tabs

Note – This procedure is also valid for a refresh interval.

1. **Click on the Advanced button in the History tab of the Attribute Editor for a data property.**

See “To Set a History Interval” on page 182 for more information.

The Time Editor is displayed (FIGURE 11-1).

2. **If any value is in the Time Expression field, highlight the value and delete it by clicking the Delete button.**

3. **Click the Insert button.**

The Time window is displayed with the Cyclic tab selected.

4. **Click the Absolute tab.**

The Time window is displayed with the Absolute tab selected.

5. **Determine the starting time and date (FIGURE 11-9).**

- a. **Highlight the hour, minute, and if desired, the seconds fields and click the up or down arrow until the correct time is displayed.**

- b. **Highlight the month, date, and year fields and click the up or down arrow until the correct date is displayed.**

The starting date and time are displayed in the Current Time Expression field.

Note – Time is displayed using the 24-hour clock.

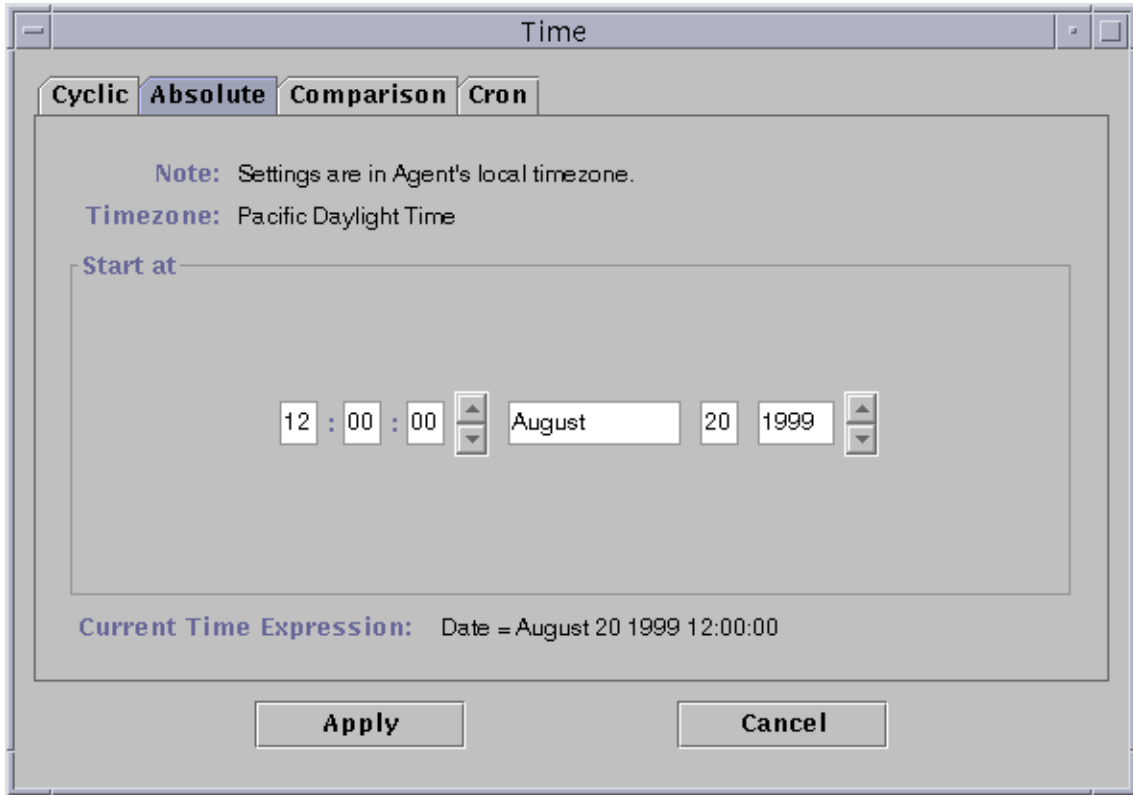


FIGURE 11-9 Starting Time of 12:00:00 PM on August 20, 1999

6. Click the Apply button.

The starting date and time are displayed in the Time Editor (FIGURE 11-10).

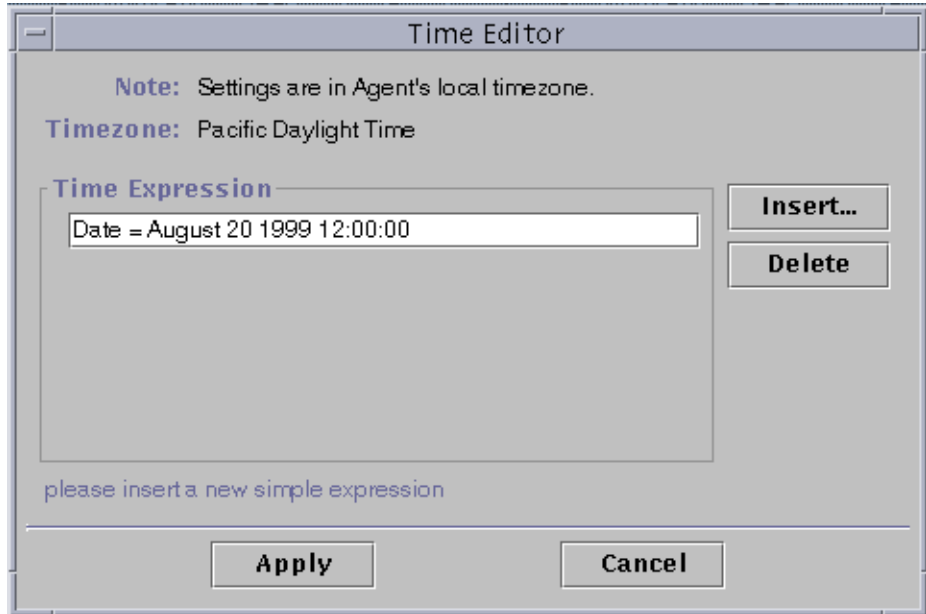


FIGURE 11-10 Time Editor With Starting Time of 12:00:00 PM August 20, 1999

7. Click the Insert button.

8. Click the Cron tab.

The Time window is displayed with the Cron tab selected.

9. Select the time when the history interval is active.

The software does not check the system load average outside the time specified by this window. In this example, the condition is at 3:00 AM every Monday through Friday.

a. Select 0 from the Minute pull-down menu.

b. Select 3rd from the hour pull-down menu.

These first two pull-down menus set the time at 3:00 AM.

c. Select Every from the Day of month pull-down menu.

d. Select Every from the Month pull-down menu.

These two pull-down menus set the date for every day.

e. Select Monday from the final pull-down menu.

The Current Time Expression field reads Cron(03**1). This expression states that the history window is only active at 3:00 AM every Monday (FIGURE 11-11).

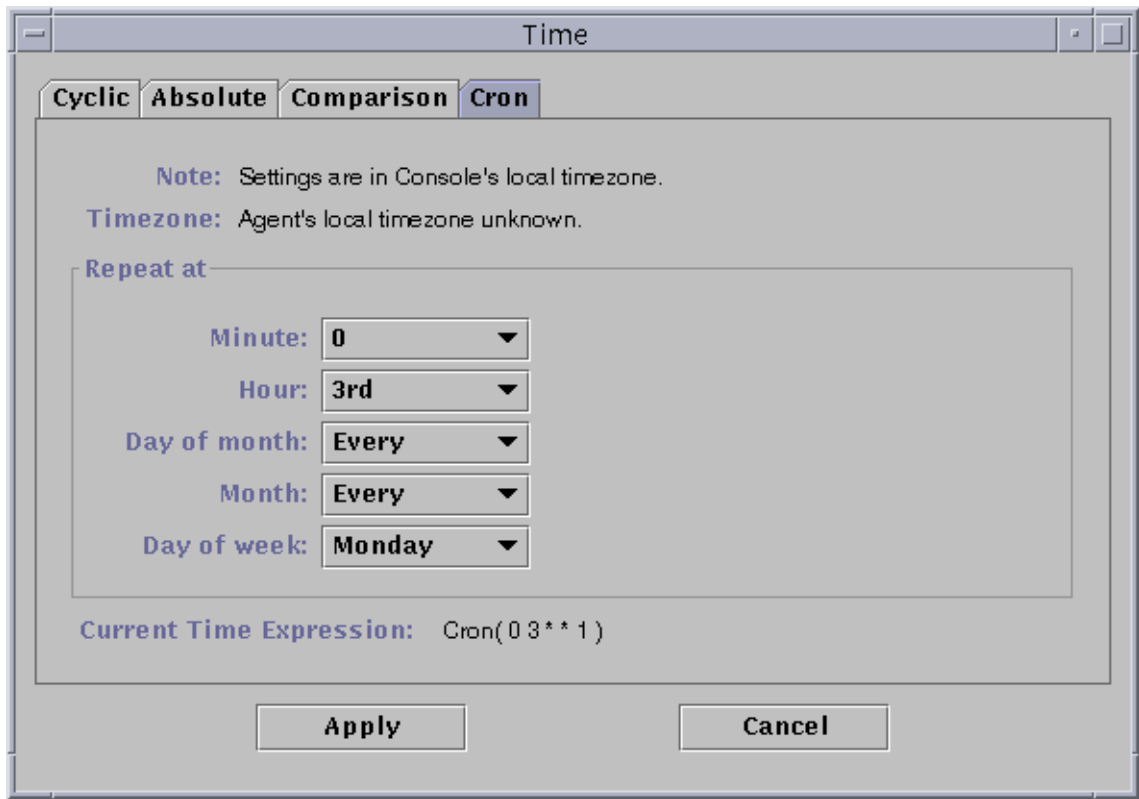


FIGURE 11-11 Cron Tab Selected With 3:00 AM Every Monday

10. Click the Apply button.

The Time Editor is updated. The Time Expression now states Cron(03**1) (FIGURE 11-12).

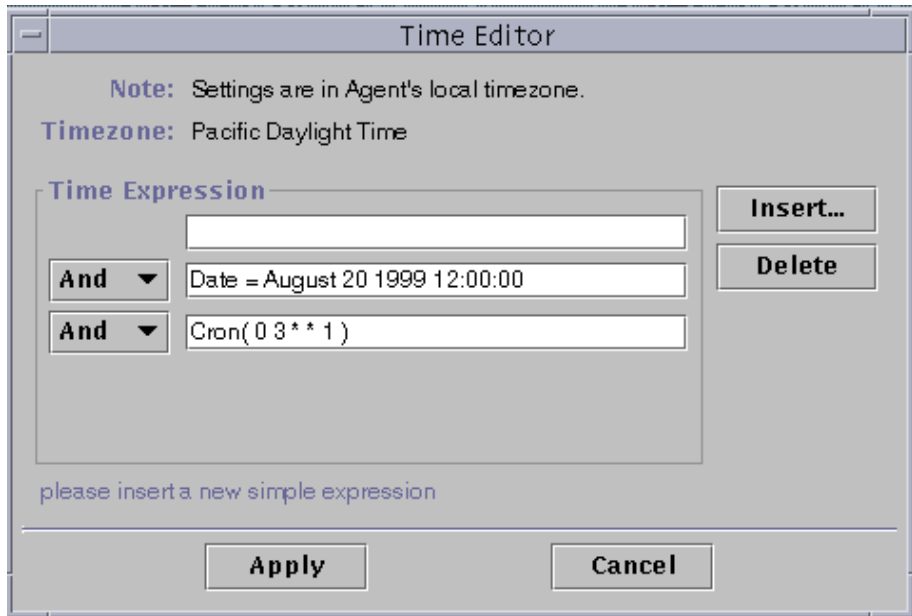


FIGURE 11-12 Time Editor Selected With Starting Date/Time 12:00:00 PM, August 20, 1999, and History Interval Start Time of 3:00 AM Every Monday

11. Place the cursor in the Cron field on the Time Editor screen. Backspace using the left arrow key until the cursor is between the ending parenthesis and the number 1. Type -5, so that the value in this field now reads Cron(03**1-5).

This expression states that the history interval is only active at 3:00 AM every Monday through Friday (FIGURE 11-13).

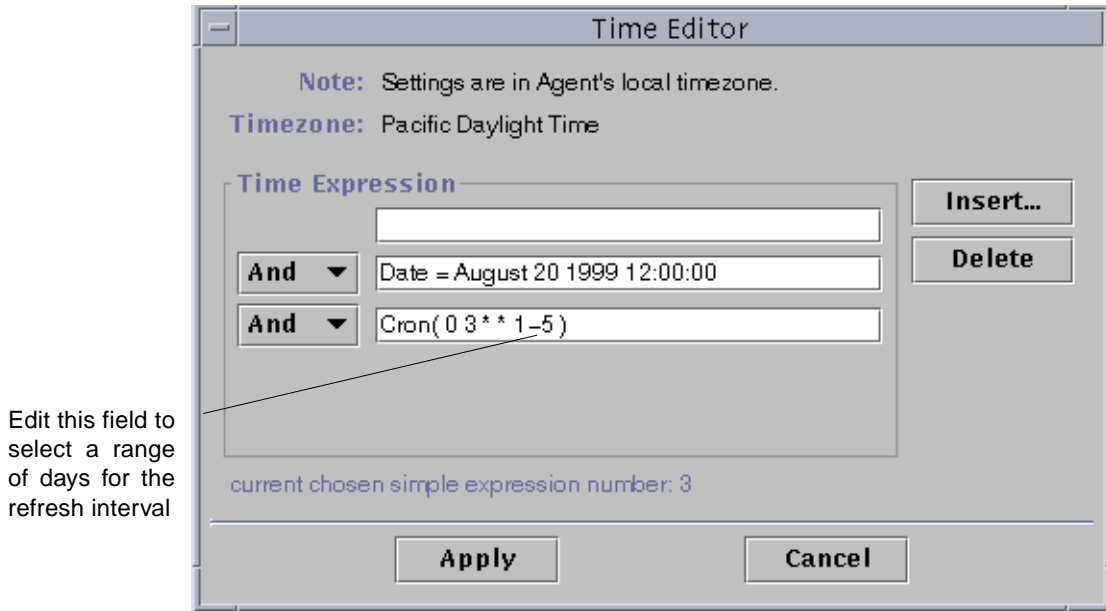


FIGURE 11-13 Time Editor With Starting Date/Time of 12:00:00 PM, August 20, 1999 and History Interval of 3:00 AM Every Monday Through Friday

12. Click the Apply button.

The Time Editor is updated. In this example, the history window is active at 3:00 AM every Monday through Friday after the starting date and time of 12:00 PM August 20, 1999 (FIGURE 11-14).

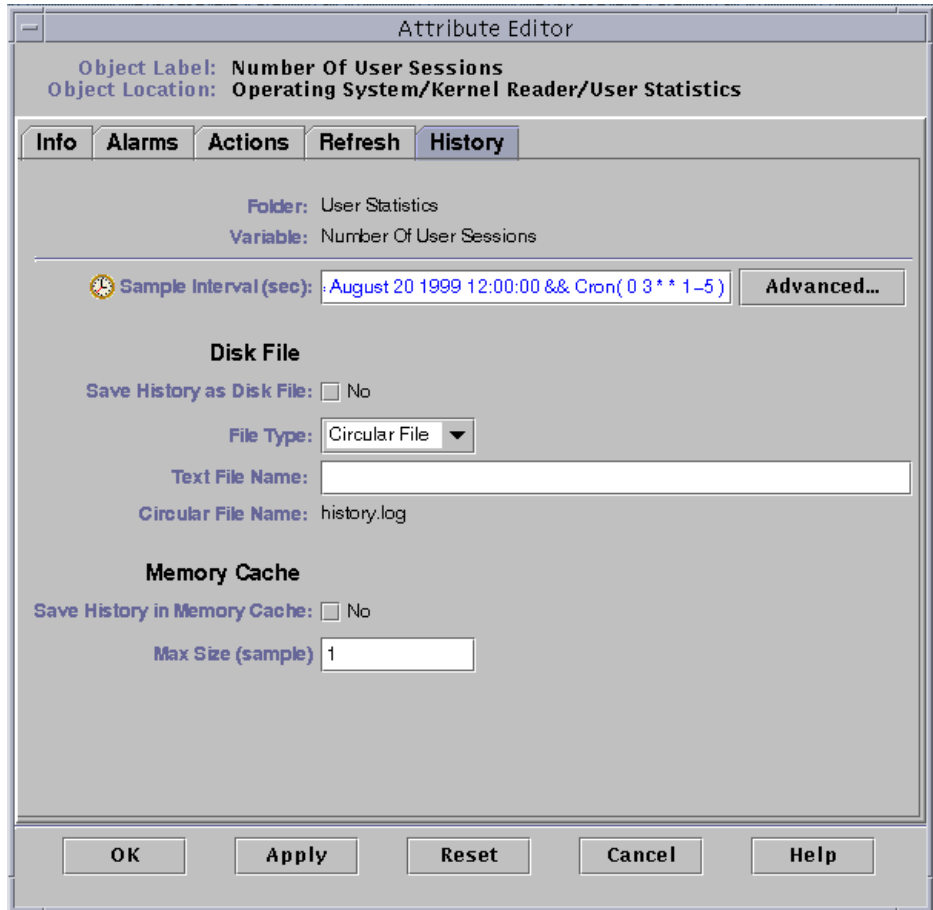


FIGURE 11-14 History Interval With Starting Time of 12:00 PM August 20, 1999 and 3:00 AM Every Monday Through Friday

▼ To Create an Alarm Schedule Using the Comparison Tab

Note – This procedure is also valid for a module schedule.

- 1. Click on the Advanced button in the Alarms tab of the Attribute Editor for a data property.**

See “To Create an Alarm” on page 174 for more information.

The Time Editor is displayed (FIGURE 11-1).

- 2. If any value is in the Time Expression field, highlight the value and delete it by clicking the Delete button.**

- 3. Click the Insert button.**

The Time window is displayed with the Comparison tab selected.

- 4. Determine the start of the Time Range (9:00 AM).**

The time range determines the time period when the software checks the system load average. The software does not check the system load average outside the time period specified by this window. In this example, the time range is from 9:00 AM to 5:00 PM every day.

- a. Select Hour from the left pull-down menu.**

- b. Select >= from the middle pull-down menu.**

- c. Select 9 from the right pull-down menu.**

The Time expression Hour>=9 is displayed in the Current Time Expression field (FIGURE 11-15).

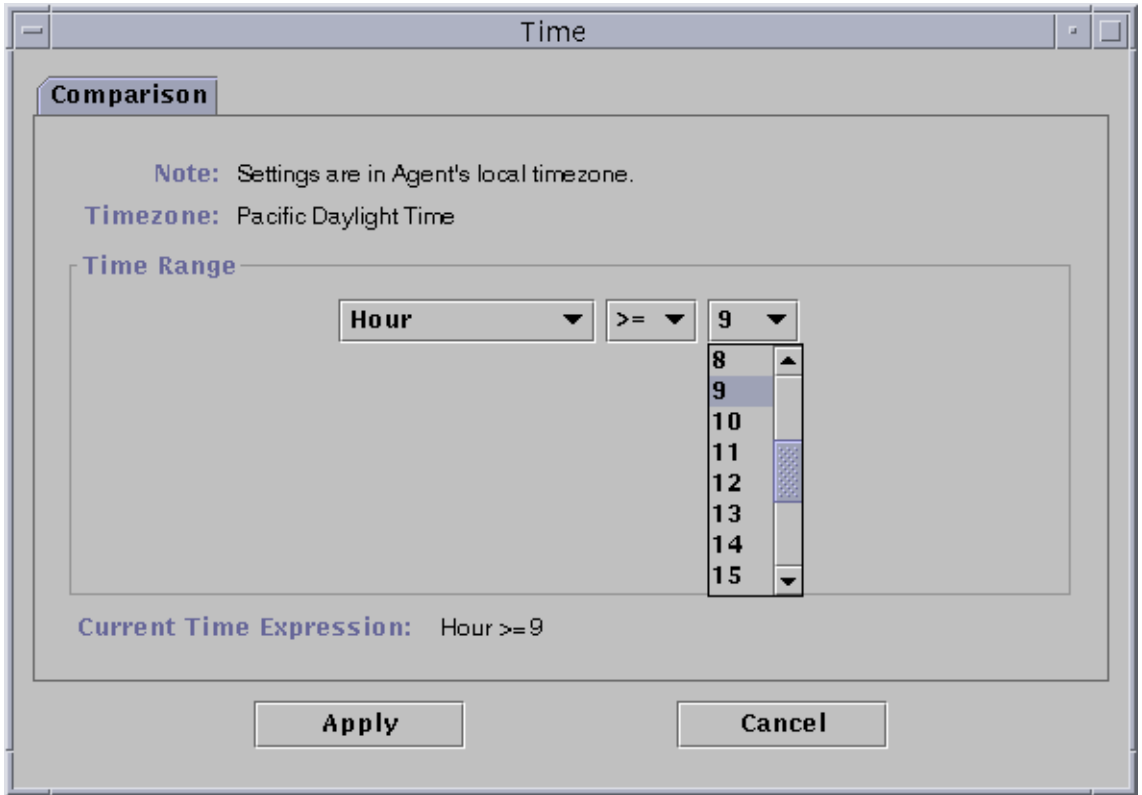


FIGURE 11-15 Comparison Tab With Greater Than or Equal to 9:00 AM

5. Click the Apply button.

The Time Editor is updated. The Current Time Expression now reads Hour>=9. In this example, both conditions should occur in the alarm window time range. However, the Time Editor also enables you to select the Or expression (FIGURE 11-16).

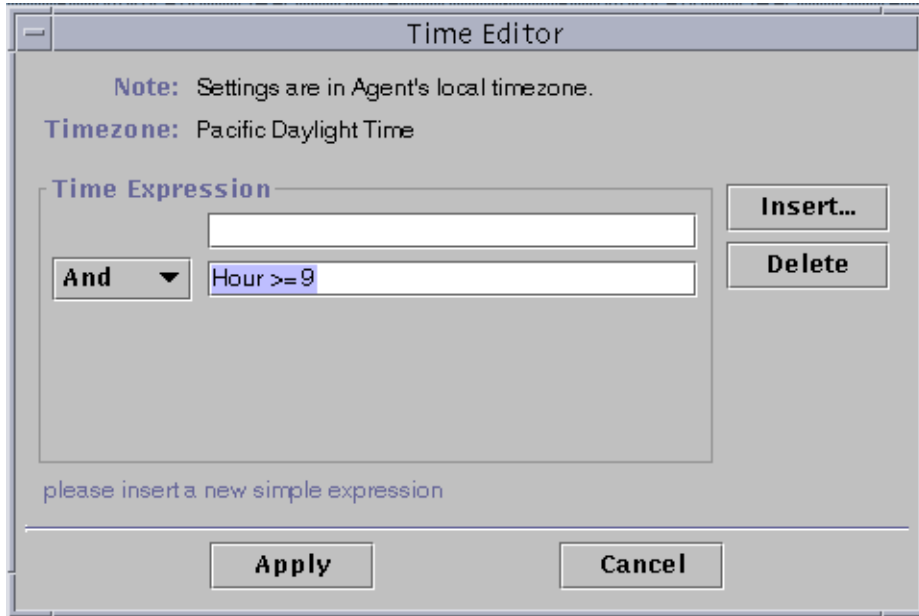


FIGURE 11-16 Time Editor With Greater Than or Equal to 9:00 AM

6. Determine the end of the Time Range by clicking the Insert button.

The Time window is displayed with the Comparison tab selected.

7. Determine the end of the Time Range (Friday).

a. Select Hour from the left pull-down menu.

b. Select <= from the middle pull-down menu.

c. Select 17 from the right pull-down menu.

The Time expression Hour<=17 is displayed in the Current Time Expression field (FIGURE 11-17).

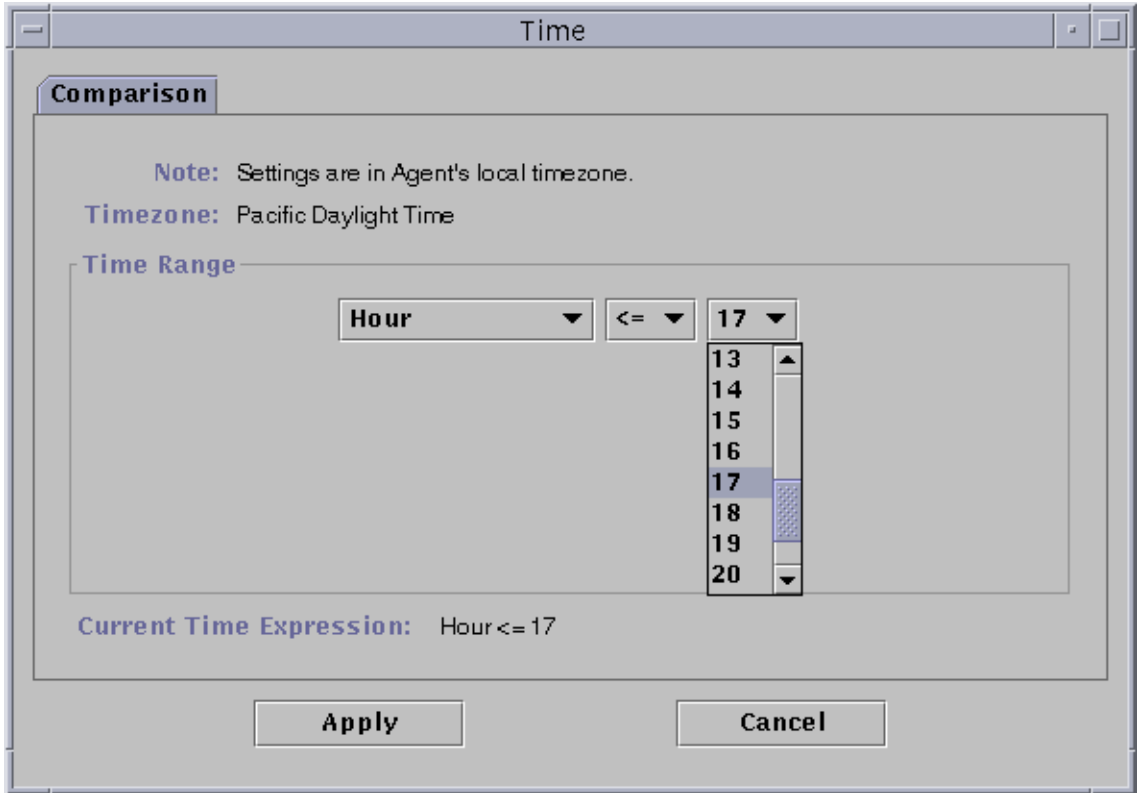


FIGURE 11-17 Comparison Tab With Less Than or Equal to 5:00 PM

8. Click the Apply button.

The Time Editor is updated. The Time expression now reads Hour>=9 And Hour<=17 (FIGURE 11-18).

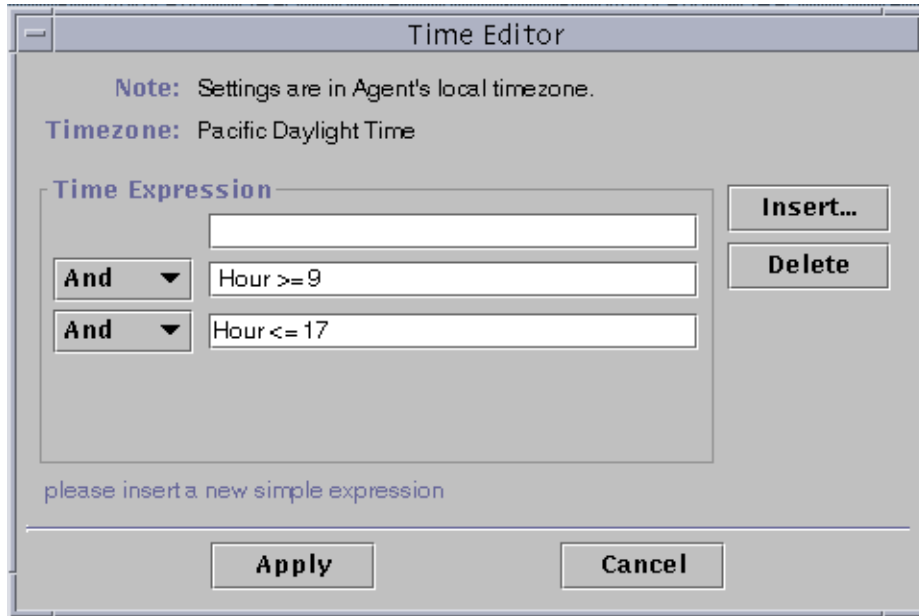


FIGURE 11-18 Time Editor With Time Interval Between 9:00 AM and 5:00 PM

9. Click the Apply button.

The alarm window field in the Attribute Editor is updated. The software will check the system load average (over five minutes) from 9:00 AM Monday to 5:00 PM Friday (FIGURE 11-19).

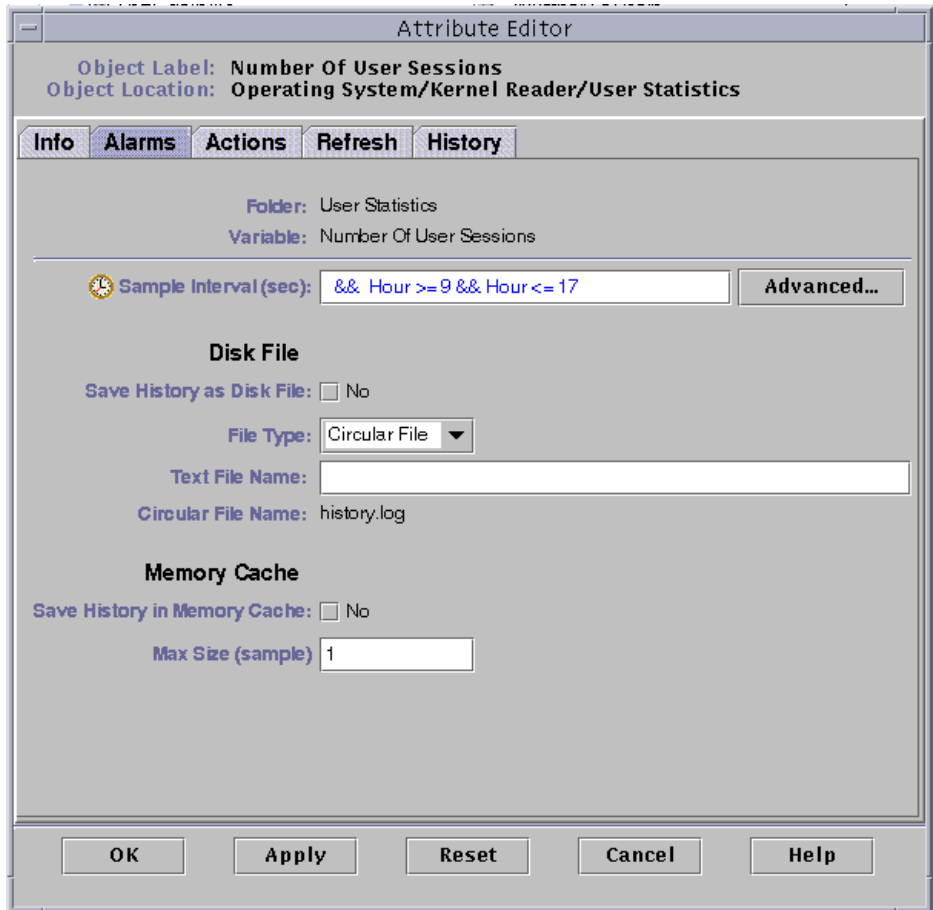


FIGURE 11-19 Alarms Attribute Editor With Alarm Window From 9:00 AM to 5:00 PM Every Day

Managing Modules

This chapter briefly describes the Sun Enterprise SyMON modules and explains how to manage them.

The following topics are covered:

- Default Modules
- To Load a Module
- To Edit Module Parameters
- To Disable a Module
- To Enable a Module
- To Unload a Module
- To Set a Module Schedule
- To Set Security Permissions for a Module

Sun Enterprise SyMON Modules

Sun Enterprise SyMON modules are responsible for collecting data from specific monitored resources. These modules can be dynamically loaded, enabled, disabled, and unloaded into a Sun Enterprise SyMON agent.

- Loading a module adds the module icon to the Browser Details window, defines the managed object and data properties, and starts data acquisition. The data properties for the managed object are displayed in the Details window. The data display is periodically refreshed.
- Enabling a module restarts data acquisition if the module has been previously disabled. The data display for the managed object is periodically refreshed in the Details window.
- Disabling a module temporarily stops data acquisition for the managed object until the module is enabled. While a module is disabled, the data is not refreshed.

- Unloading a module stops data acquisition for the managed object. The managed object and data properties are undefined and the module icon is removed from the Browser Details window.

Default Modules

Some or all of the following modules are loaded by default when you install the software.

- Agent Statistics
- File Scanning
- MIB-II Instrumentation
- Kernel Reader
- Config-Reader (for supported hardware platforms)

Module List

TABLE 12-1 lists generic modules that you can load and use. The list of modules that is displayed for your system is dependent on the type of platform you have. See your supplement for more information on platform-specific modules, including the Config-Reader and Dynamic Reconfiguration module. For information on the other Sun Enterprise SyMON modules, see Appendix C and Appendix D.

TABLE 12-1 Sun Enterprise SyMON Modules

Module	Description
Agent Statistics	Provides information about the health of the agent installed on a host by monitoring the objects, processes and execution of processes by the agent.
Config-Reader	Provides the hardware configuration of the host. Both the physical view and the logical view require that this module be loaded.
Data Logging Registry	Provides information about data logging in agents including log destination, module name, logging interval, and buffer length. Multiple copies of this module can be loaded.
Directory Size Monitoring	Enables you to isolate and monitor the size of any directory and its subdirectories on a host where a Sun Enterprise SyMON agent is installed. Multiple copies of this module can be loaded.
Dynamic Reconfiguration	Enables Sun Enterprise SyMON software users to perform dynamic reconfiguration operations on DR-enabled monitored hosts.

TABLE 12-1 Sun Enterprise SyMON Modules (*Continued*)

Module	Description
File Monitoring	Monitors selected files on a host. Monitored parameters include file size and timestamps. Multiple copies of this module can be loaded. This module requires you to add rows in the data property table. For more information, see “To Add a Row” on page 146.
File Scanning	Scans files on a host for specified patterns. Multiple copies of this module can be loaded. This module requires you to add rows in the data property table. For more information, see “To Add a Row” on page 146.
HP JetDirect	Monitors the status of HP printers equipped with a JetDirect card. Multiple copies of this module can be loaded.
Health Monitor	Enables you to monitor various resources usage in your host such as CPU, disk, NFS, and SMNP.
Kernel Reader	Provides kernel statistics, such as CPU details, system call, faults, streams, disk information, and page information.
MIB-II Instrumentation	Provides the system, interfaces, IP, ICMP (internet control message protocol), TCP (transmission control protocol), and UDP (user datagram protocol) MIB-II (management information base) group information of the monitored host.
MIB-II Proxy Monitoring	Provides proxy management of hosts that are running non-Sun Enterprise SyMON MIB-II SNMP agents. Multiple copies of this module can be loaded.
NFS File Systems	Provides information about the NFS file systems on monitored hosts by monitoring the amount of disk space occupied by mounted or unmounted file systems and the amount of used and available space as well as the file system’s remaining total capacity.
NFS Statistics	Monitors the number of NFS calls and RPC (remote procedure calls) received by the server as well as the status of the transaction activity on the monitored host. Multiple copies of this module can be loaded.
Print Spooler	Monitors the status of the printer daemon and print queue on the monitored host as well as the printer devices installed on it.
Process Monitoring	Monitors one or more processes on the host. Specifies monitored processes by matching patterns. Multiple copies of this module can be loaded. This module requires you to add rows in the data property table. For more information, see “To Add a Row” on page 146.
Solaris Process Details	Displays detailed information of Solaris processes running on a host where the Sun Enterprise SyMON agent has been installed. The Process Details window requires that this module be loaded.

For more information on modules, see Appendix C.

Note – The Config-Reader and Dynamic Reconfiguration modules are supported only on specific hardware platforms. For more information, refer to your supplement.

Note – Depending on your system hardware, additional modules may be supported. For more information, refer to the Sun Enterprise SyMON web site: <http://www.sun.com/symon>.

Loading Modules

To load a module, follow these steps.

▼ To Load a Module

1. **Select the host machine on which the module will be loaded by clicking on the host machine icon.**

Note – If you haven't selected a host before attempting to load a module, the Load Module option in the Tools pull-down menu is gray and cannot be used.

2. **Open the Load Module dialog by doing one of the following:**
 - Click the right mouse button on the selected host icon and highlight Load Module from the pop-up menu in the hierarchy view (FIGURE 12-1) or the topology view (FIGURE 12-2).
 - In the main console window, select Tools ► Load Module (FIGURE 12-3).
 - In the Details window, select host name and then Module ► Load Module (FIGURE 12-4).

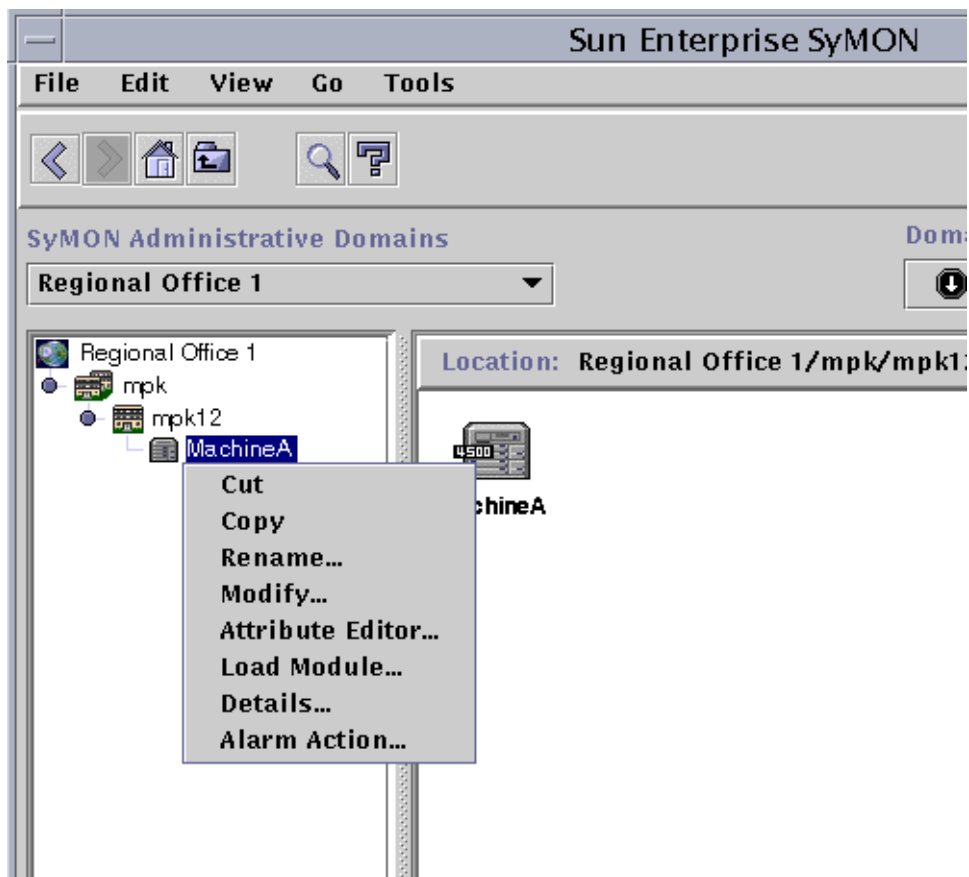


FIGURE 12-1 Load Module Pop-Up Menu in Hierarchy View

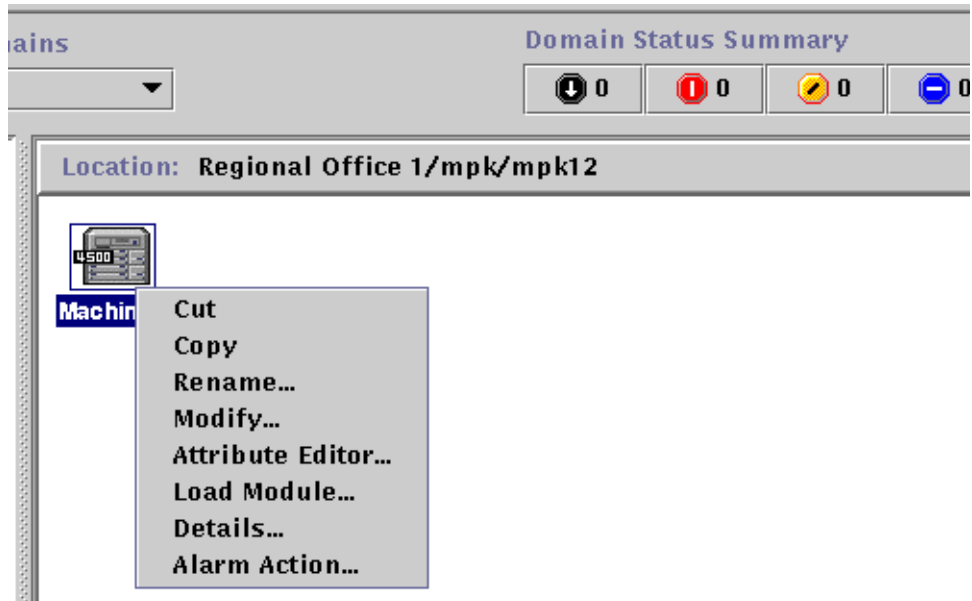


FIGURE 12-2 Load Module Pop-Up Menu in Topology View

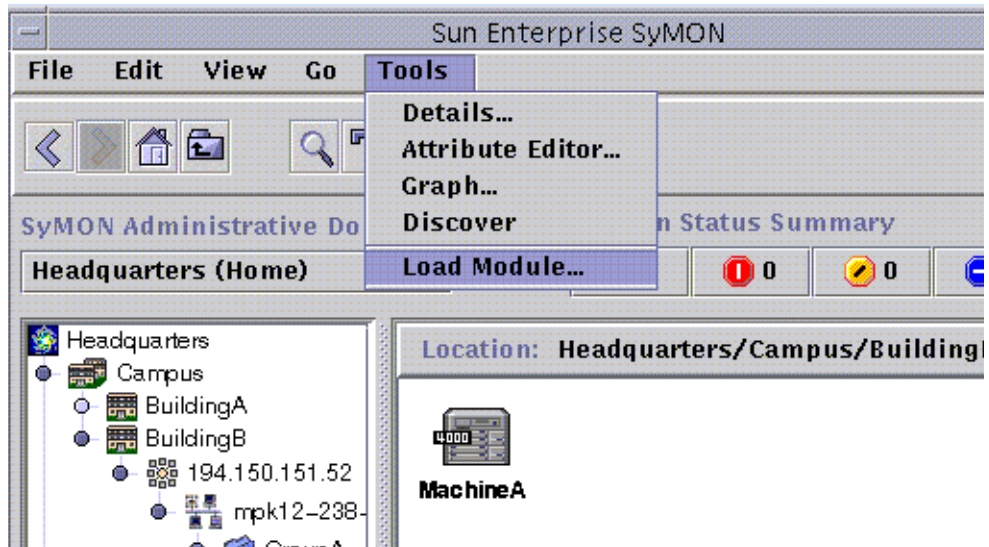


FIGURE 12-3 Tools Menu in Main Console Window

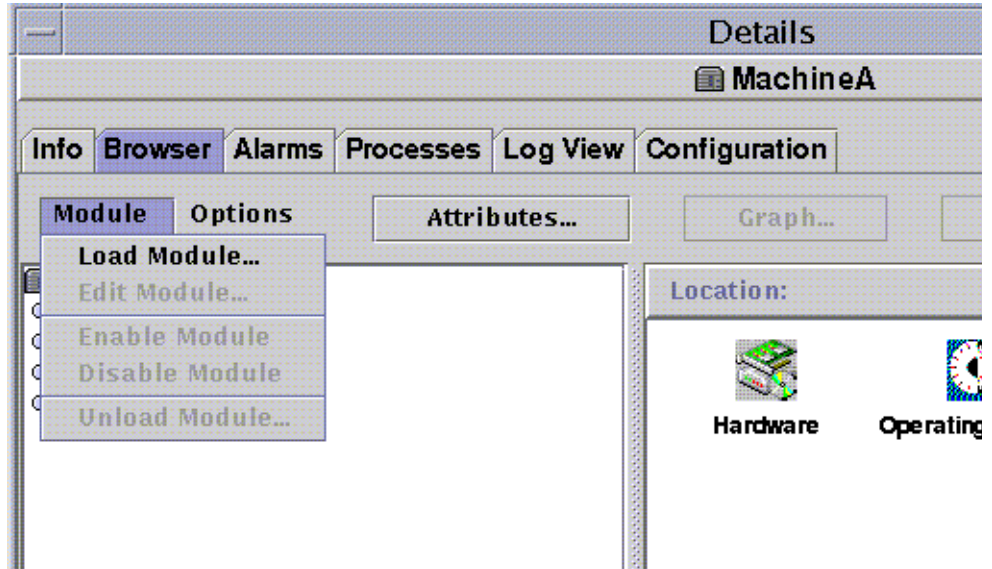


FIGURE 12-4 Load Module Menu in Details Window

The Load Module dialog is displayed (FIGURE 12-5).

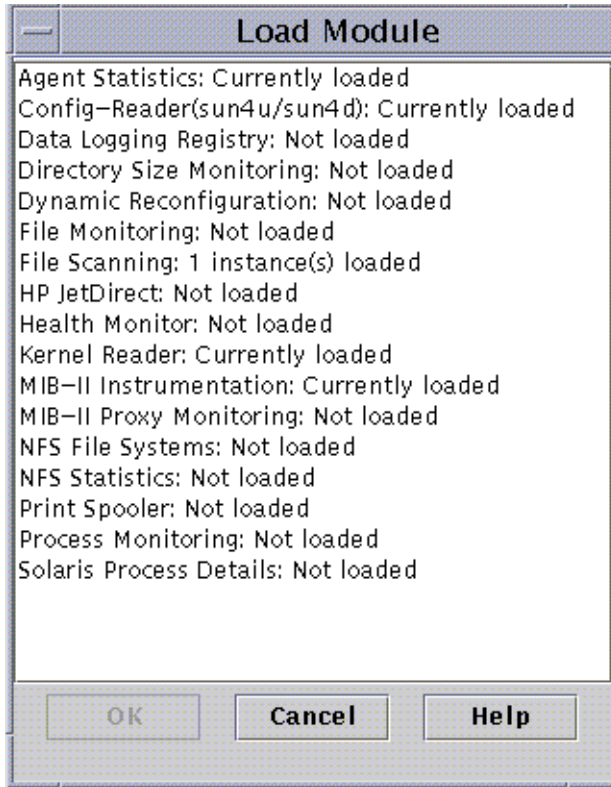


FIGURE 12-5 Load Module Dialog

The Load Module dialog lists all Sun Enterprise SyMON modules. If a number appears next to the module name, for example as shown above for the File Scanning Module, the number indicates the number of existing instances of that module on your host. An instance is a single word or alpha-character string that is used internally within the Sun Enterprise SyMON agent to identify uniquely a particular module or a row within a module.

Note – Some modules can have multiple instances loaded on a host.

Note – You must specify a unique name for each instance when multiple instances of the same module are loaded.

3. Click the name of the module you want to load.

4. Click the OK button.

The Module Loader dialog is displayed. The contents of the dialog varies with the module that is selected. FIGURE 12-6 and FIGURE 12-7 show possible examples of the dialog.

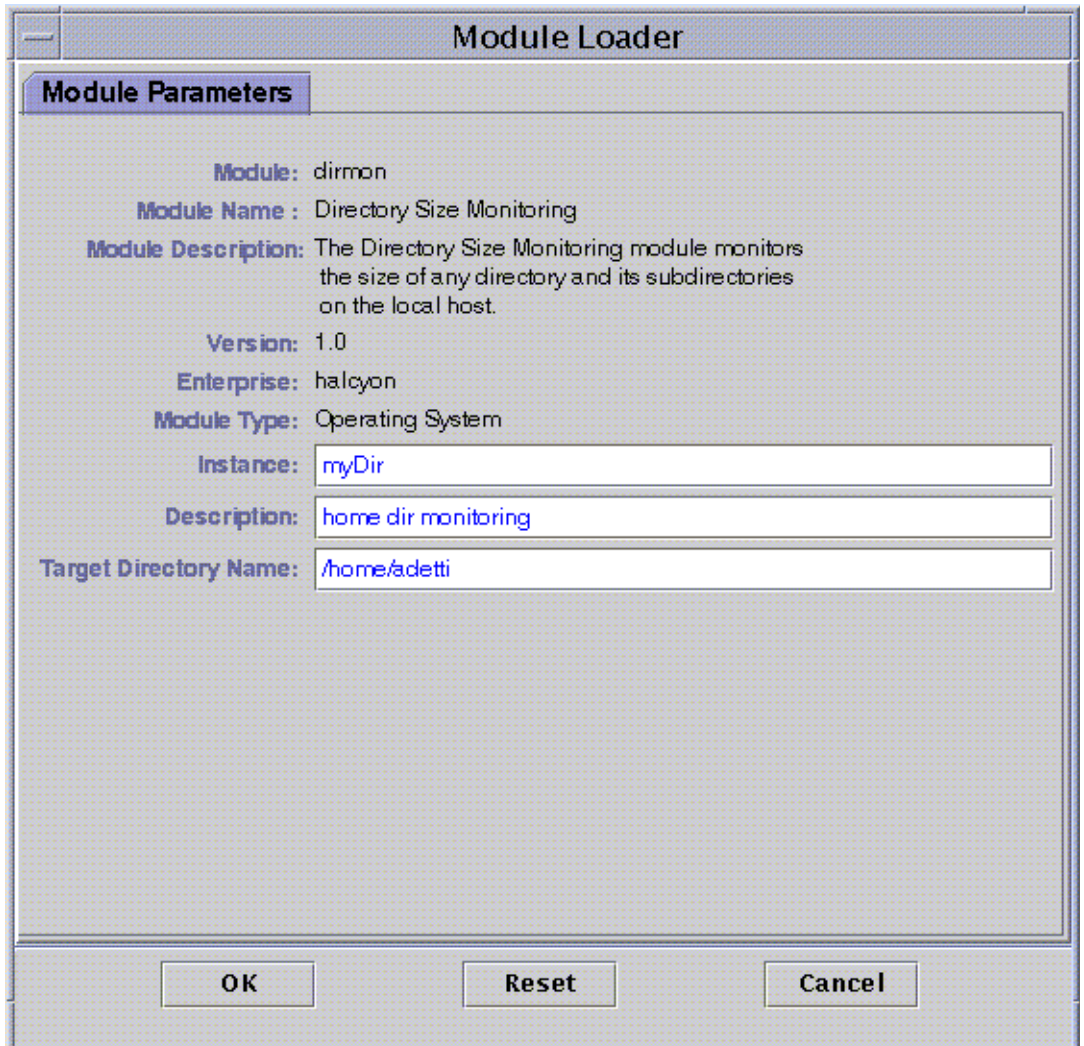


FIGURE 12-6 Module Loader Dialog For Directory Size Monitoring



FIGURE 12-7 Module Loader Dialog for Process Monitoring

5. If necessary, type the relevant information into any editable name fields.

For example, the Directory Size Monitoring module requires you to enter the name of the instance, a description, and the target directory name. (An instance is a single word or alpha-character string that is used internally within the Sun Enterprise SyMON agent to identify uniquely a particular module or a row within a module.)

If you do not type in information for a necessary field, the software responds with an error message and the module is not loaded.

6. Complete this procedure with one of the following actions:

- Click OK to accept the changes you have made and close this dialog.
- Click Reset to undo your changes.
- Click Cancel to cancel your request.

Note – You can also double-click a module name in the Load Module dialog to load that module.

Editing Modules

The Sun Enterprise SyMON software enables you to edit modules by changing module parameters and enabling or disabling modules.

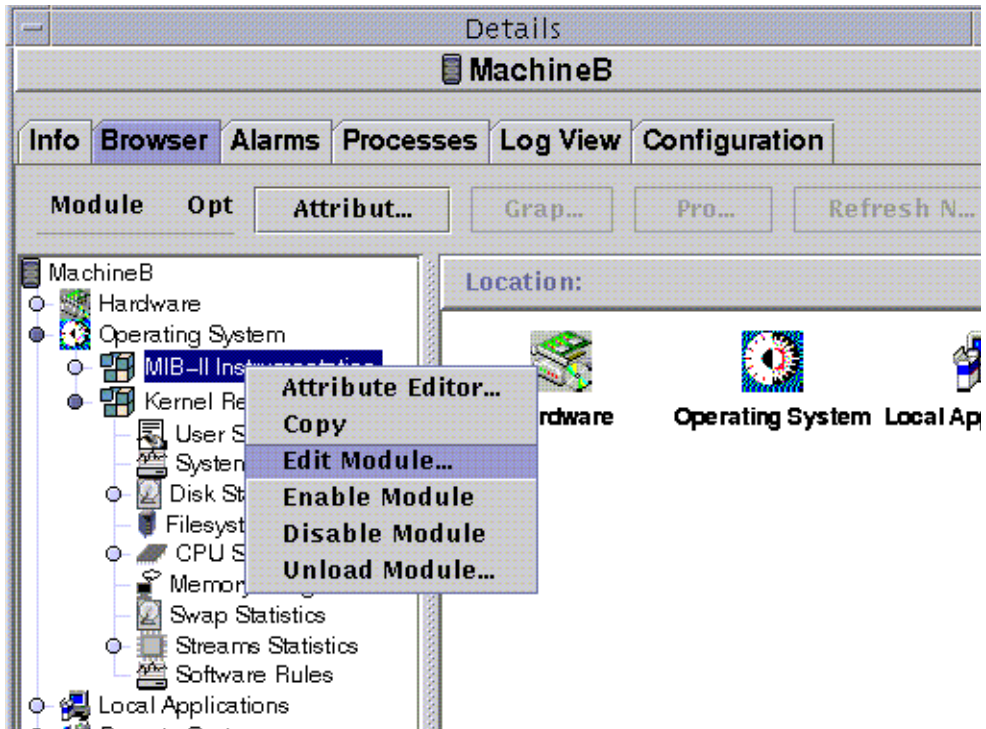


FIGURE 12-8 Edit Module Pop-Up Menu in Hierarchy View

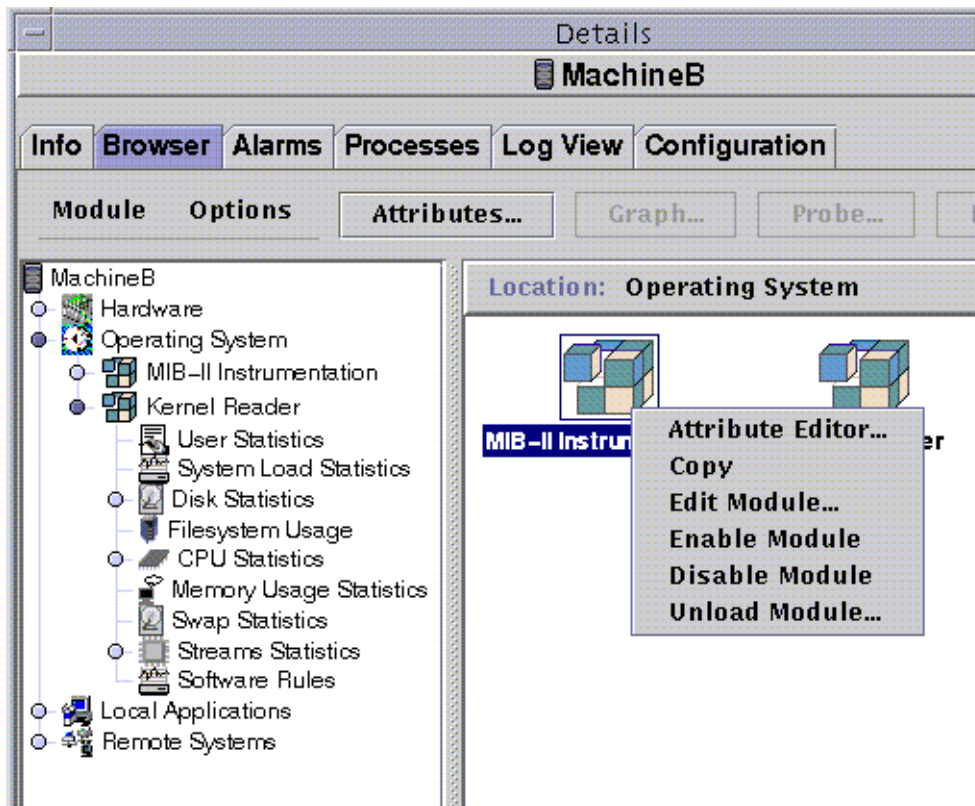


FIGURE 12-9 Edit Module Pop-Up Menu in Contents View

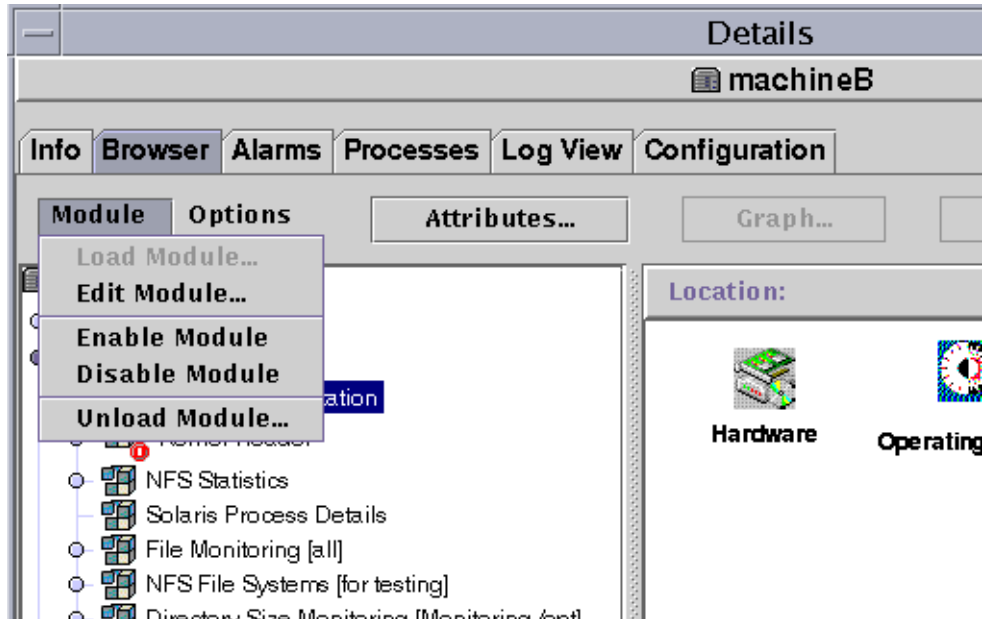


FIGURE 12-10 Edit Module Menu in Details Window

▼ To Edit Module Parameters

1. **Select the selected module.**
2. **Proceed with one of the following:**
 - Click the right mouse button and highlight Edit Module from the pop-up menu in the hierarchy view (FIGURE 12-8) or the Contents view (FIGURE 12-9).
 - In the Details window, select Module ► Edit Module (FIGURE 12-10). The Module Parameters Editor is displayed.
3. **Type the relevant information into the editable fields.**

FIGURE 12-11 shows an example. The actual display varies with the module that is selected.

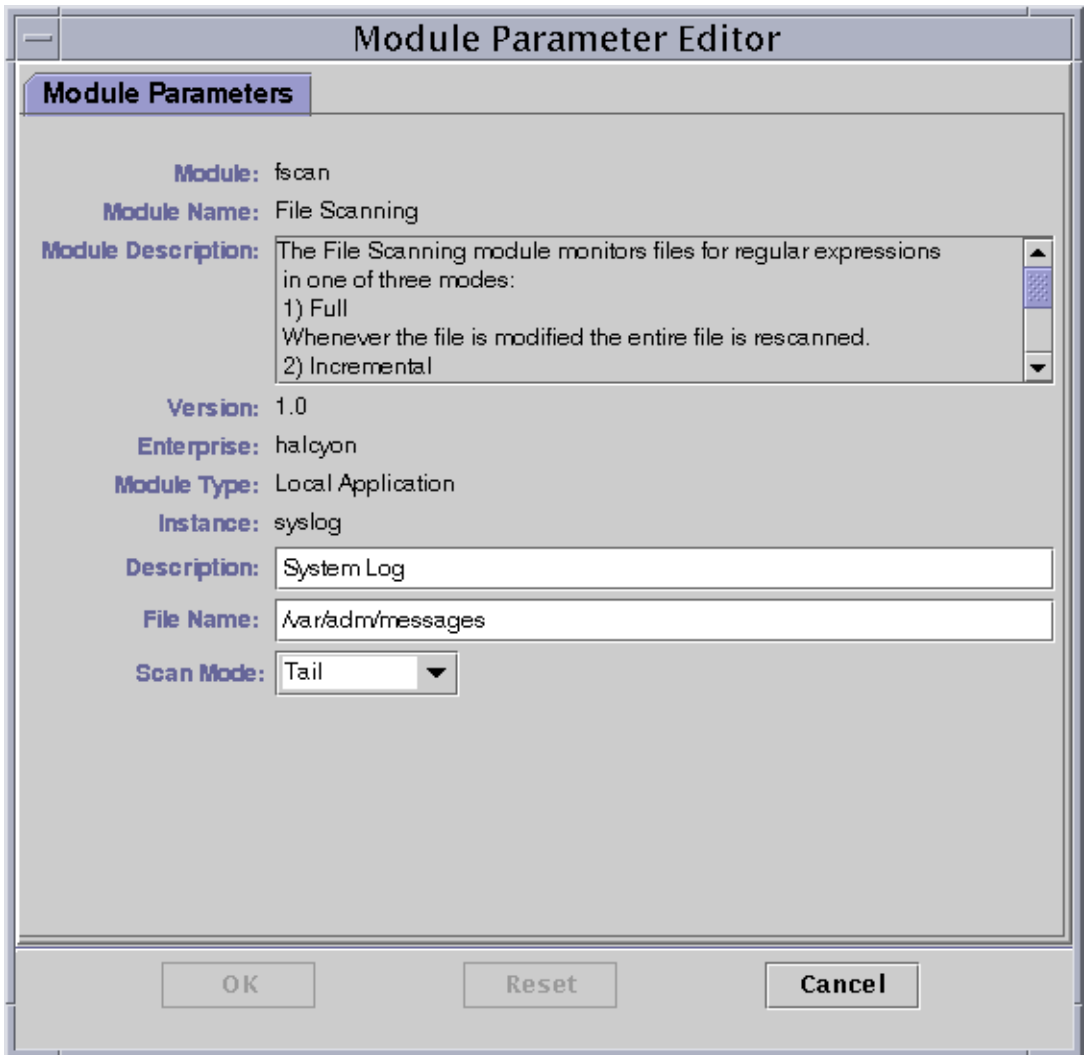


FIGURE 12-11 Module Parameter Editor

4. Complete this procedure with one of the following actions:

- Click OK to accept the changes you have made and close this window.
- Click Reset to reset the module to the default parameters.
- Click Cancel to cancel your request.

▼ To Disable a Module

- Click the right mouse button on the selected module and highlight **Disable Module** from the pop-up menu in the hierarchy (FIGURE 12-8) or **Contents view** (FIGURE 12-9).

OR

- In the **Details window**, select **Module ► Disable Module** (FIGURE 12-10).

When the module has been disabled (turned off), the following message is displayed at the bottom of the **Details window** (FIGURE 12-12).

```
Module successfully disabled.
```

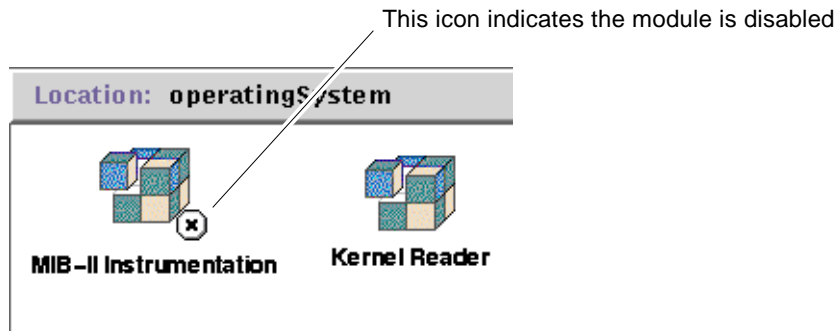


FIGURE 12-12 MIB-II Instrumentation Module Is Disabled

If the disabled module is the Solaris Process Details module, the following message is displayed at the bottom of the **Details window**.

```
Solaris Process Details module disabled. Process data may not be current.
```

▼ To Enable a Module

- Click the right mouse button on the selected module and highlight **Enable Module** from the pop-up menu in the hierarchy (FIGURE 12-8) or **Contents view** (FIGURE 12-9).

OR

- **In the Details window, select Module ► Enable Module (FIGURE 12-10).**

When the module has been enabled (turned on), the following message is displayed at the bottom of the Details window.

Module successfully enabled.

▼ To Unload a Module

1. Proceed with one of the following:

- Click the right mouse button on the selected module and select Unload Module from the pop-up menu in the hierarchy view (FIGURE 12-8) or the contents view (FIGURE 12-9).
- In the Details window, select Module ► Unload Module (FIGURE 12-10).

The Confirm Module Unload dialog is displayed (FIGURE 12-13).

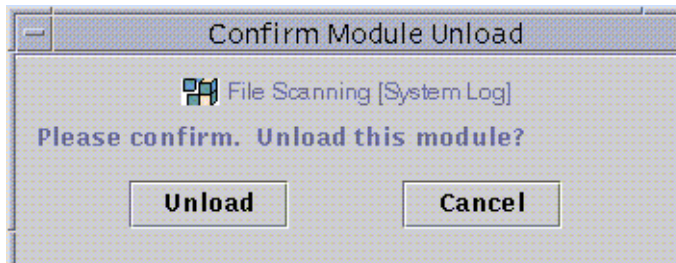


FIGURE 12-13 Unload Module Dialog

- ### 2. Click the Unload button to remove the module or the Cancel button to cancel this request.

Monitoring Modules

Tip – If you want to monitor one type of module on a number of hosts, you can create module objects for each host and place all of the objects in a common location (that is, in the same group or domain). To create a module object, see “To Create a Module Object” on page 75.

Attribute Editor for a Module

The Attribute Editor for a module provides additional information about the module and enables you to customize various monitoring criteria. You can use the module Attribute Editor to set:

- Module schedules
- Security permissions

Note – The Attribute Editor consists of a series of one or more tab buttons at the top of the window that enables you to switch between different panels. The buttons that are displayed are dependent on the selected object.

Setting a Module Schedule

You may determine when a module should be active and when it should be inactive by setting a schedule. For example, you can schedule a module to run between 8:00 AM and 5:00 PM every day. At all other times, the module is inactive, whether or not an alarm condition exists.

▼ To Set a Module Schedule

1. **Open the Attribute Editor for a module by proceeding with one of the following:**
 - Click the right mouse button on the selected module icon and highlight Attribute Editor from the pop-up menu in the hierarchy view (FIGURE 12-1) or the topology view (FIGURE 12-2).

- In the Details window, click the Attributes button.
2. **Click the Schedule tab** (FIGURE 12-14).
 3. **Click the Advanced button and set the module schedule.**
See “Using the Time Editor” on page 185 for details.
 4. **Complete this procedure with one of the following actions:**
 - Click OK to accept the changes you have made and close this window.
 - Click Apply to apply your changes without closing this window.
 - Click Reset to reset the Attribute Editor to the default parameters.
 - Click Cancel to cancel your request.

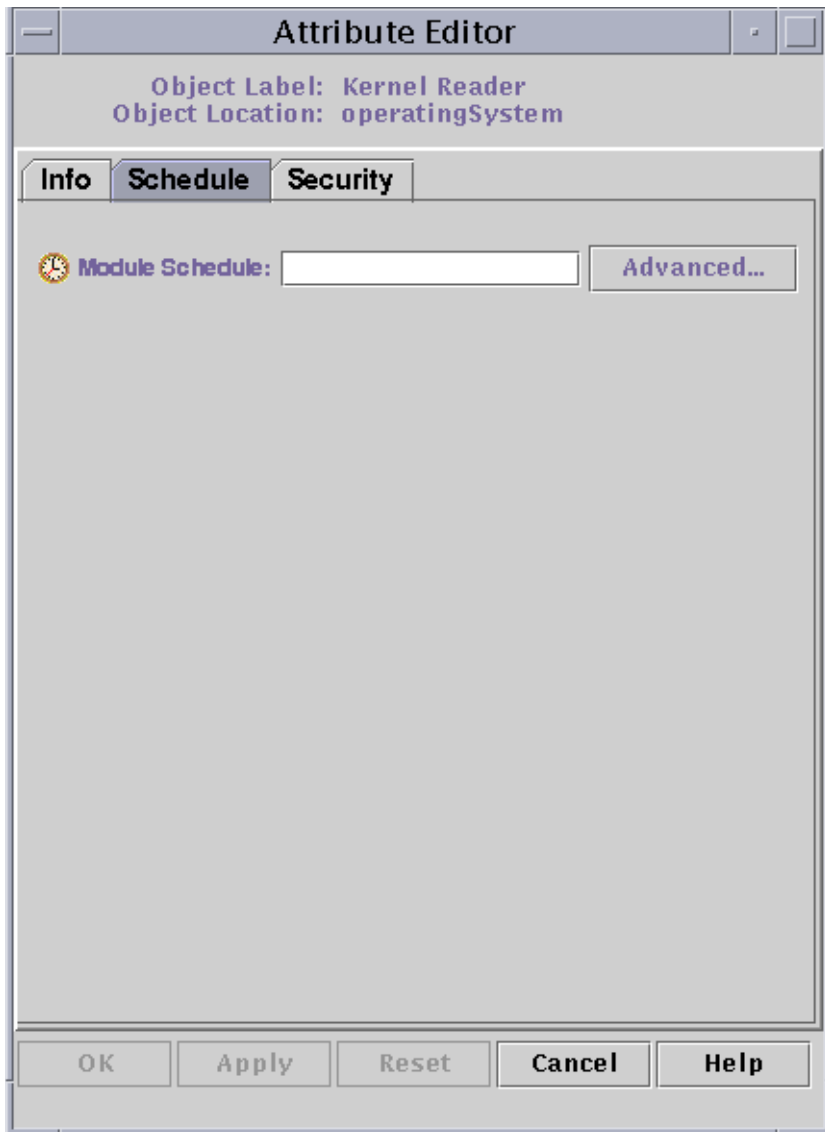


FIGURE 12-14 Setting a Module Schedule

Setting Security Permissions for a Module

You can set security permissions for an individual module.

The security permissions for a module override the default security permissions for its parent object or host. For example, if a user has administrator privileges for a module, but only general privileges for the host, the user still retains administrator privileges for the module. For further information on privileges, see Chapter 15.

▼ To Set Security Permissions for a Module

- 1. Open the Attribute Editor for a module by proceeding with one of the following:**
 - Click the right mouse button on the selected host icon and highlight Attribute Editor from the pop-up menu in the hierarchy view (FIGURE 12-1) or the topology view (FIGURE 12-2).
 - In the Details window, click the Attributes button.
- 2. Click the Security tab (FIGURE 12-15).**
- 3. Type the name(s) of user and administrator groups in the appropriate fields.**
- 4. Complete this procedure with one of the following actions:**
 - Click OK to accept the changes you have made and close this window.
 - Click Apply to apply your changes without closing this window.
 - Click Reset to reset the Attribute Editor to the default parameters.
 - Click Cancel to cancel your request.

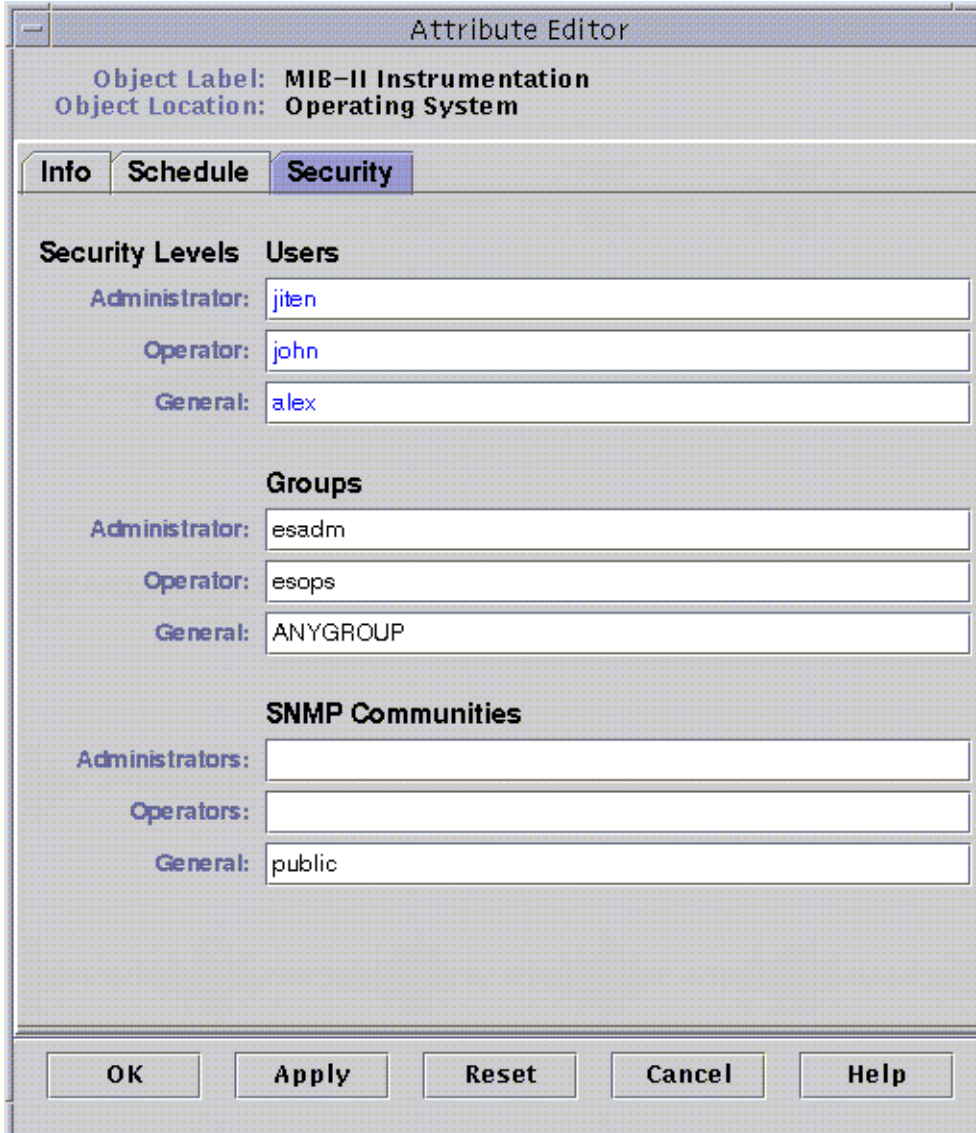


FIGURE 12-15 Setting Module Security in the Attribute Editor

Alarms

This chapter provides details on alarms.

The Sun Enterprise SyMON software monitors your hardware and software and notifies you, through alarms, when abnormal conditions occur. These alarms are triggered by conditions falling outside of predetermined ranges, or by Sun Enterprise SyMON rules. Default alarm conditions and rules are included in the modules. In addition, you may also set up your own alarm thresholds. For a list of Sun Enterprise SyMON rules, see Appendix E.

This chapter explains alarms with the following topics:

- Sun Enterprise SyMON Alarms
 - Types of Alarms
- Notifying Users That a Host or Agent is Down
 - To Set Up User Notification for Down Host or Agent
- Creating Alarms
- Viewing Alarm Information
 - Colored Alarm Icons
 - Seeing Alarms in Domain Status Summary
 - To Access Alarms from the Main Console Window
- Information on Alarms
 - To Access Alarms from the Alarms Tab in the Details Window
 - Alarm Categories
 - Alarm States
 - To View Alarm Categories
 - To Sort Alarms
 - To Reset the Alarm Table
- Acknowledging and Deleting Alarms
 - To Acknowledge and Delete Alarms
- Creating Alarm Conditions
 - To Create Alarm Conditions To Monitor Hosts

Note – The messages displayed in the Alarms tab of the Details window are always in English. They are not translated in other languages.

Sun Enterprise SyMON Alarms

The software displays alarm information for managed objects. To access information on alarms for an object, access the Alarms Details window. This window displays alarms for a particular object.

Note – The Sun Enterprise SyMON agent is configured so that only one server receives alarm information from that agent.

You can acknowledge, delete, and manage the alarms on an object in a domain by using the Alarms Details window. For more information, see “To Access Alarms from the Alarms Tab in the Details Window” on page 244.

Types of Alarms

Managed object status is displayed in the Domain Status Summary from the main console window (FIGURE 13-1).

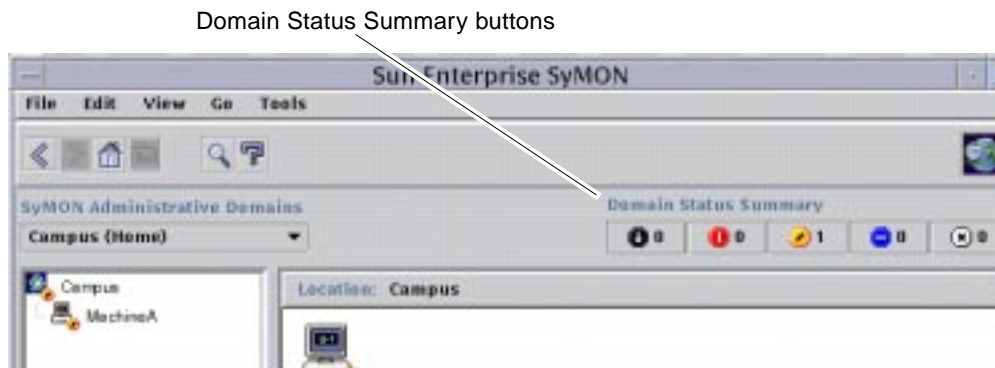


FIGURE 13-1 Domain Status Summary in the Main Console Window

The numbers next to the alarm icons indicate the number of managed objects whose highest severity open, unacknowledged alarm is represented by the icon. For example, the number 1 next to the yellow alarm icon indicates that there is a managed object whose highest severity alarm is yellow (alert). The severity of alarms are designated by icons. The different icons represent different severities (FIGURE 13-2).

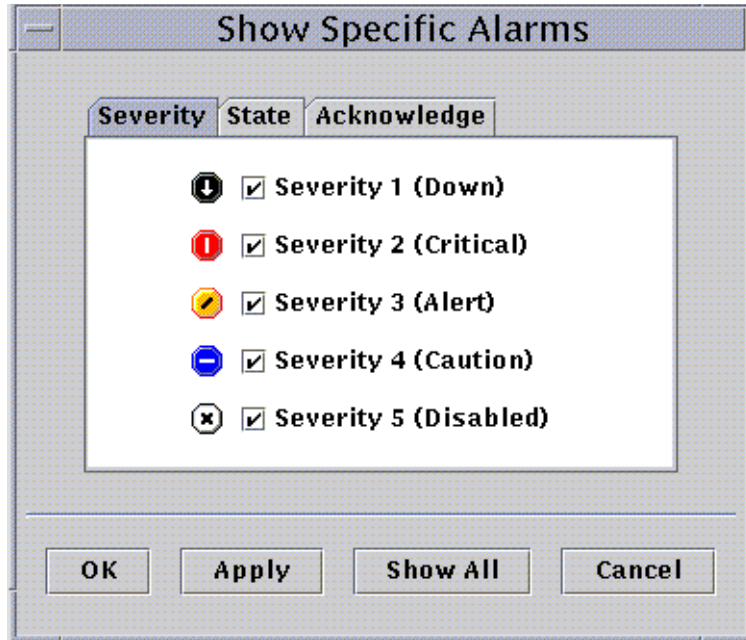


FIGURE 13-2 Alarm Severities

Down Alarms

A down alarm (severity 1 in FIGURE 13-2) indicates that a service-affecting condition has occurred and an immediate corrective action is required. An example of this condition is when a resource defined by a managed object has gone out of service and that resource is required; for example, a module has gone down (exited).

Down alarms are represented by black alarm icons with a down arrow.

Critical Alarms

A critical alarm (severity 2 in FIGURE 13-2) indicates that a service-affecting condition has developed and an urgent corrective action is required. An example of this condition is when a severe degradation in the capability of an object has occurred and the object needs to be restored to full capability.

Critical alarms are represented by red alarm icons.

Alert Alarms

An alert alarm (severity 3 in FIGURE 13-2) indicates that a non-service-affecting condition has developed and a corrective action should be taken in order to prevent a more serious fault.

Alert alarms are represented by yellow alarm icons.

Caution Alarms

A caution alarm (severity 4 in FIGURE 13-2) indicates the detection of a potential or an impending service-affecting fault, before any significant effects have occurred. Action should be taken to diagnose further (if necessary) and correct the problem in order to prevent it from becoming a more serious service-affecting fault.

Caution alarms are represented by blue alarm icons.

Off/Disabled Alarms

A disabled alarm (severity 5 in FIGURE 13-2) indicates that a resource for a managed object has been disabled; for example, a module is disabled.

Disabled alarms are represented by white alarm icons with an 'X'.

Note – Objects with black star icons, that may look like a “splat” on your screen, are objects with irrational states, not to be confused with alarms, where the status of the object is unknown or undetermined.

If the black star or splat icon shows up in the main console window, it indicates that the object is in an irrational state. This means that there has been a data acquisition failure on that object. The failure does not come out of a rule so there is no alarm associated with it.

An example of this is presented in FIGURE 13-3.

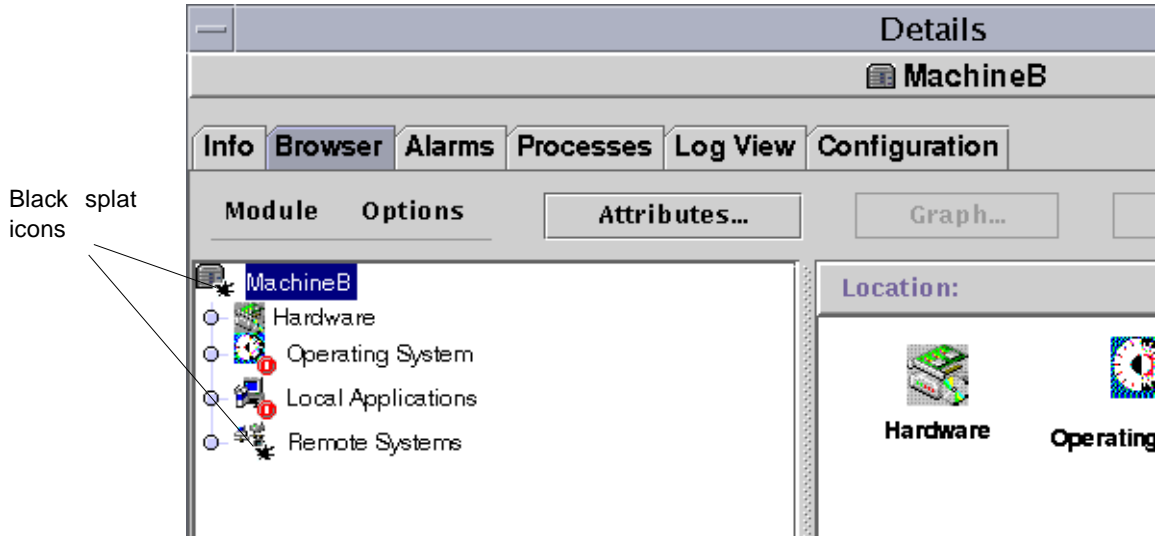


FIGURE 13-3 Objects with Irrational States Identified by Black Star or “Splat” Icon

Note – When you view the data property table for the object, a row colored pink is another indication that you have an irrational state for the object.

Notifying Users That a Host or Agent is Down

You can configure the Sun Enterprise SyMON software to send you an email notification if a host or agent is down. You can notify:

- yourself only
- several people, or
- all email recipients linked to the group to which the host or agent belongs

▼ To Set Up User Notification for Down Host or Agent

1. In the main console window, select the host or group of hosts that you want to receive notification about if the host or agent is down.
2. Click the right mouse button to display the pop-up menu, and select Alarm Action (FIGURE 13-4).

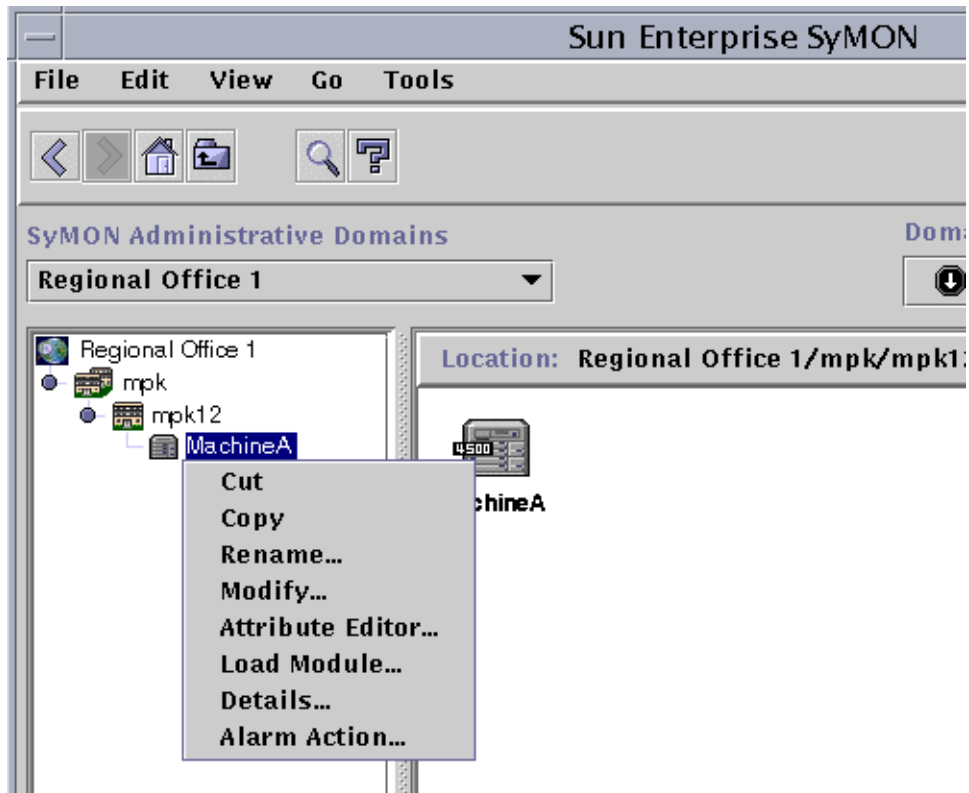


FIGURE 13-4 Pop-Up Menu in Hierarchy View

The Alarm Action version of the Attribute Editor is displayed (FIGURE 13-5).

3. Enter the email address and username to be notified for the host down, and agent down condition.

To notify more than one person, use the format `email username1, username2, and so on`.

- 4. To include any email users who are linked to the down host or agent group, click “yes” in the Include Group Actions - Host Down or Agent Down fields. When you have made all the changes, click Apply.**

For example, MachineA is selected as the object for which notification is to be received in FIGURE 13-4. MachineA belongs to the group mpk12. Any user monitoring a machine in group mpk12 would be included in a group notification for MachineA.



FIGURE 13-5 Attribute Editor - Alarm Action

5. Click OK to close the Attribute Editor - Alarm Action screen.

Creating Alarms

The software offers the following flexibility in setting your alarms:

- Determine the thresholds that trigger an alarm of a particular severity
- Determine when alarms are sounded (for example, only on weekdays)

For more information on creating alarms, see “To Create an Alarm” on page 174.

Viewing Alarm Information

Sun Enterprise SyMON software uses four methods (FIGURE 13-6) to alert you that an *unacknowledged open* alarm condition exists:

- Relevant row or column is colored in the property table (contents view)
- Colored icons in the hierarchy (tree) view
- Colored icons in the topology view
- Alarms in Domain Status Summary

Colored Alarm Icons

The type of alarm icon determines the severity of the alarm. For example, a red alarm icon indicates a critical condition has developed and corrective action is required right away. By contrast, a blue alarm icon indicates a potential or an impending service-affecting fault.

In FIGURE 13-6, there is an unacknowledged, open critical alarm in the Swap Statistics properties table, in the `Used KB` row. The row is shaded red, which corresponds to the color of a critical alarm.

The following illustration presents alarms in the Details window.

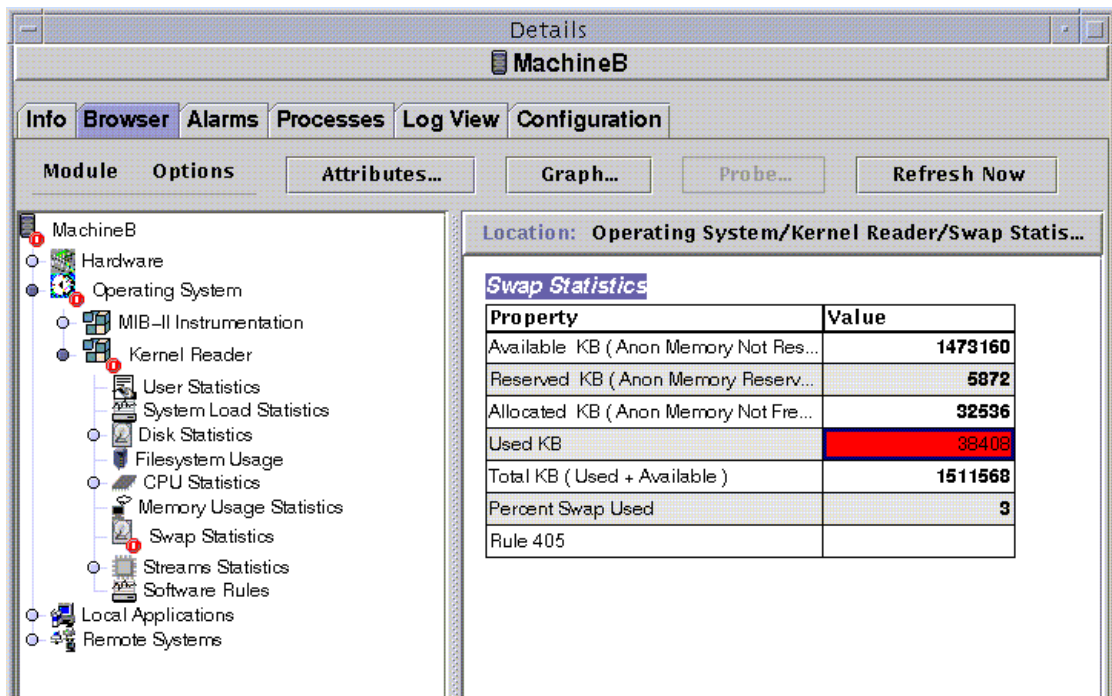


FIGURE 13-6 Alarms in the Details Window

The colored alarm icons are propagated up the hierarchy tree view, from the individual module up to the host. For example, in FIGURE 13-6, there is an unacknowledged, open error condition (critical alarm) in the Swap Statistics icon. You see this same red alarm icon on the Swap Statistics icon, on the Kernel Reader icon module, on the Operating System icon, and the host icon.

In addition, you also see a red alarm icon on the corresponding host, group (if any), or domain in the main console window unless an unacknowledged open black alarm (of higher severity) exists.

Note – Unacknowledged alarms take precedence over acknowledged alarms. If there are two or more types of alarms in the hierarchy, the color of the more severe *unacknowledged* alarm is propagated up the tree. For example, if there is a yellow *unacknowledged* alarm in CPU usage, and a red *unacknowledged* alarm in Disk Statistics, only the red colored alarm icon is propagated. However, if there is a yellow *unacknowledged* alarm in CPU usage, and a red *acknowledged* alarm in Disk Statistics, only the yellow colored alarm icon is propagated.



FIGURE 13-7 Alarms in the Contents View

Seeing Alarms in Domain Status Summary

The Domain Status Summary button panel displays the number of managed objects in the domain that have at least one *unacknowledged open* alarm of that severity.

Note – If there are two or more types of alarms in the host, the color of the more severe *unacknowledged open* alarm is displayed in the Domain Status Summary.

If the most severe alarm on one host is critical (red) and the most severe alarm on another host is alert (yellow), then you see the number 1 next to both the red-colored alarm icon and the yellow-colored alarm icon.

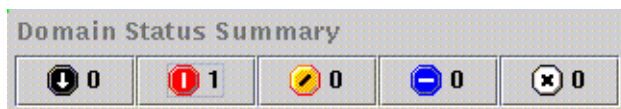


FIGURE 13-8 Domain Status Summary Buttons

▼ To Access Alarms from the Main Console Window

1. **Click on one of the Domain Status Summary buttons in the main console window.** (FIGURE 13-8).

A list of objects which have at least one open, unacknowledged alarm, whose highest severity is that of the icon on the button, is displayed in the Domain Status Details window (FIGURE 13-9).

For example, if you click on the button with the yellow alarm icon (alert alarms), the Domain Status Details window displays a list of objects whose highest severity, *unacknowledged, open* alarms are yellow (alert). The number of objects displayed is equal to the number on the button (within approximately a five second delay period).

2. **Complete this procedure with one of the following actions:**
 - Double click on the row in the table.
 - Single click on the row to select it, and then click the Details button.

The Alarms Details window is displayed (FIGURE 13-10).

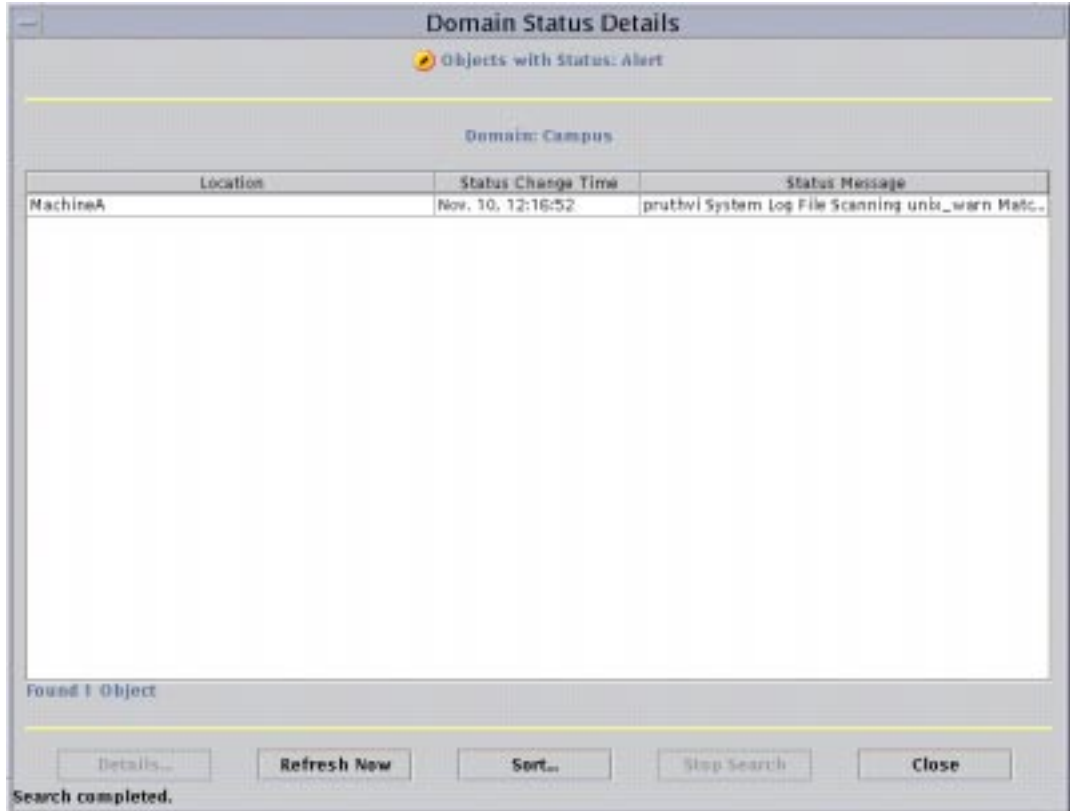


FIGURE 13-9 Domain Status Details Window

Information on Alarms

The Alarms tab in the Details window presents a table that contains the statistical summary of all alarm data for a given managed object.

Note – If the object is a platform, see your supplement for more information.

▼ To Access Alarms from the Alarms Tab in the Details Window

1. Click with your right mouse button on the selected host icon in the main console window and highlight Details from the pop-up menu.

The Details window is displayed.

2. Click on the Alarms tab button.

The Alarms Details window is displayed (FIGURE 13-10).

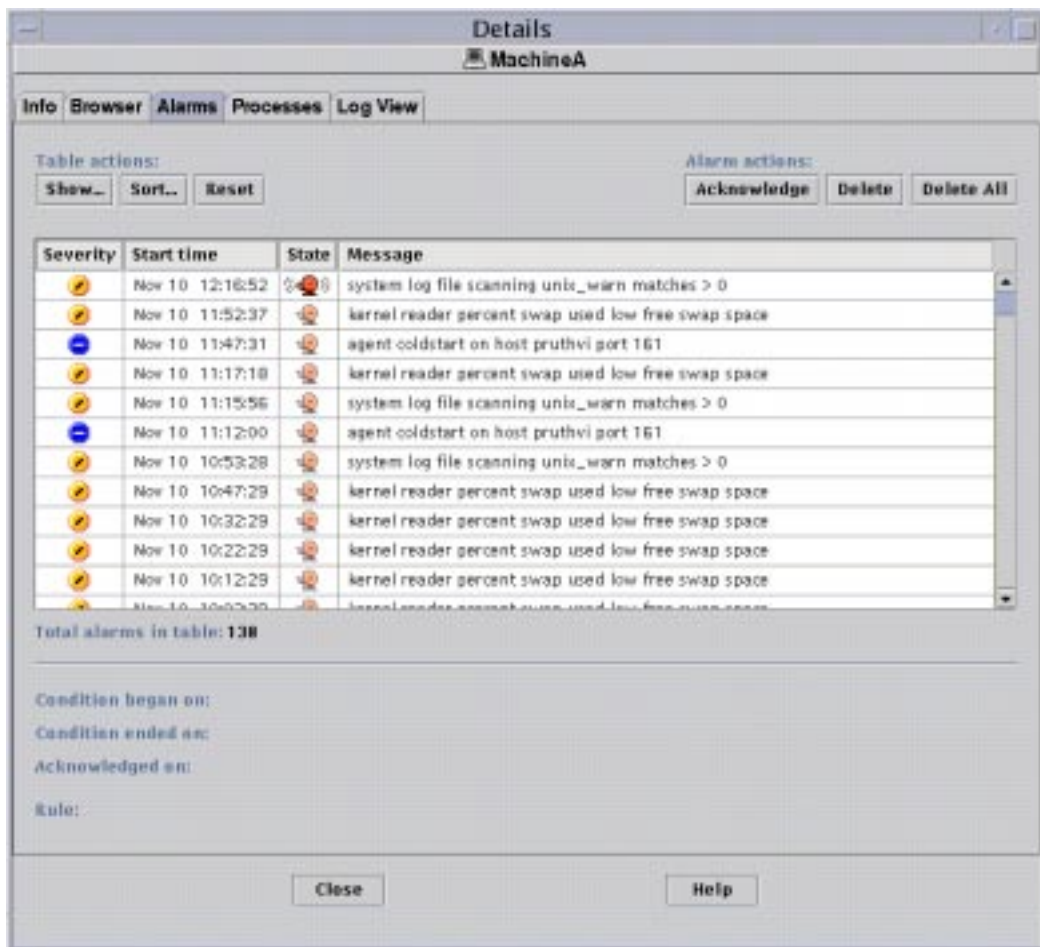


FIGURE 13-10 Alarms Tab Data from the Details Window

Alarm Categories

The Alarms tab presents different categories of detailed alarm information. Some of this information is always displayed in the alarms table (TABLE 13-1) while additional information is displayed when an alarm row is highlighted (TABLE 13-2).

TABLE 13-1 Alarm Categories Displayed in Table

Category	Description
Severity	Graphic indicator whose color indicates the severity of the alarm; black is most severe and white is least severe
Start time	Time the alarm first occurred
State	Open or closed
Message	Abbreviated message that indicates the type of alarm

Note – Acknowledged alarms are indicated with a green check in the Severity column.

TABLE 13-2 Additional Alarm Information Displayed When a Single Row is Selected

Category	Description
Condition began on	Date/Time the alarm condition has started
Condition ended on	Date/Time the alarm condition has been fixed
Acknowledged on	Date/Time the alarm was acknowledged by a particular user
Rule	Name that identifies the rule file which caused the alarm (for example, a rule number). For non-rule based alarms, the name <code>rCompare</code> is used.

Alarm States

There are also two different alarm states:

- Open
- Closed

An Open alarm is one in which the condition which caused the alarm still exists. A Closed alarm means the condition no longer exists. Open alarms are “ringing” while closed alarms are “silent” (FIGURE 13-11).

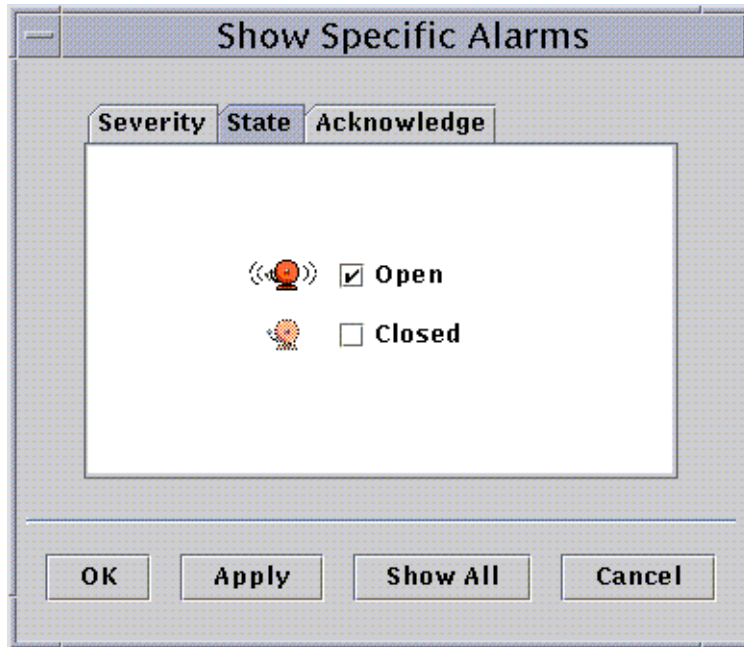


FIGURE 13-11 Open and Closed Alarms

▼ To View Alarm Categories

The Alarm Details window has an option that enables you to filter on an alarm category and show a subset of the alarms.

1. **Click on the Show button below the Table actions field.**

The Show Specific Alarms window (FIGURE 13-11) is displayed.

2. **Click on the appropriate tab to filter your alarm request.**

The selected tab is darkened.

Note – If you want to see all the alarms in the alarms table, simply click the Show All button.

3. **Click on the Severity tab (FIGURE 13-2).**

The Severity tab enables you to show alarms of the selected severity.

4. **Click on the check box next to a severity to show alarms of that severity.**

The selected severity has a check in the check box next to its name.

Note – You may select one or more types of severity to show in the alarms table.

5. Click on the State tab (FIGURE 13-11).

The State tab enables you to show open and closed alarms.

6. Click on Open or Closed to show these types of alarms.

The selected state has a check in the check box next to its name.

Note – You may select open, closed, or both to show in the alarms table.

7. Click on the Acknowledge tab.

The Acknowledge tab enables you to show acknowledged and unacknowledged alarms.

8. Click on Acknowledged or Unacknowledged to show these types of alarms.

The selected state has a check in the check box next to its name.

Note – You may select acknowledged, unacknowledged, or both to show in the alarms table.

9. Complete this procedure with one of the following actions:

- Click OK to accept the changes you have made and close this window.
- Click Apply to apply your changes without closing this window.
- Click Cancel to cancel your request.

▼ To Sort Alarms

You can sort the alarm rows in the table (FIGURE 13-12).



FIGURE 13-12 Sort Alarm Table

1. Click on the Sort button below the Table actions field.

The Sort Alarm Table window is displayed.

2. Select your sort feature by clicking in the circle next to your selection.

You may sort by starting time (from the newest alarm to the oldest alarm), by severity (from the most severe to the least severe), or by state (with open alarms listed first, followed by closed alarms).

The selected sort feature has a darkened circle next to its name.

3. Complete this procedure with one of the following actions:

- Click OK to accept the changes you have made and close this window.
- Click Apply to apply your changes without closing this window.
- Click Cancel to cancel your request.

▼ To Reset the Alarm Table

● **Click the Reset button.**

The alarm table is dynamically updated as new alarms are displayed and some existing ones close. These updates are displayed, regardless of what is selected as the Show button viewing options. As these conditions occur over time, the table may no longer reflect the current Show settings. Clicking the Reset button will update the table to reflect the current Show settings once again.

Acknowledging and Deleting Alarms

You may update information about alarms in the Alarms Details window.

▼ To Acknowledge and Delete Alarms

1. Select the alarms you want to update by clicking the selected row(s) in the table.

Clicking the selected row(s) displays additional information associated with that alarm. The additional information consists of the starting time of the alarm, the ending time of the alarm, the acknowledgment time and the user who acknowledged the alarm, and the rule.

Note – You may select several rows at once by holding down your mouse button and moving the mouse over the selected rows. If, after you selected several rows, you want to skip a few rows and select other rows, simply hold down the Control key and select the additional rows.

2. Click the appropriate button under the Alarm actions field.

You may perform the actions listed in TABLE 13-3.

TABLE 13-3 User Actions That Can Be Performed on Alarms

User Action	Description
Acknowledge	User and time of acknowledgment is registered. When an alarm is acknowledged, the alarm icon in the Severity column has a green check mark beside it.
Delete	Deletes all the selected alarms from the table. The deleted alarm(s) is saved into an archive file on the server.
Delete all	Deletes all the closed alarms from the table. The deleted alarm(s) is saved into an archive file on the server.

Note – You can delete open alarms, but the potential exists for alarm information in the Alarms windows to differ from alarm information in the hierarchy view and the topology view. That is, the alarms are deleted from the alarms table, but the alarm icons may still be present in the hierarchy and topology views. An example of when this action may be required would be in the case of an unloaded module. Orphaned alarms may remain in view and may need to be manually deleted.



Caution – You should only delete open alarms when there is no other method to remove these alarms.

Creating Alarm Conditions

Sun Enterprise SyMON software enables you to create alarm conditions that help you to monitor the hosts in your domain. The main purpose of this section is to help you create alarm conditions and familiarize yourself with their operation. This will help you control alarm conditions.

▼ To Create Alarm Conditions To Monitor Hosts

- 1. Navigate through the Operating System modules until you see the User Statistics icon (part of the Kernel Reader module).**
- 2. Select Attribute Editor from the pop-up menu.**

The Attribute Editor enables you to edit information about this property.
- 3. Create an alarm condition by following the procedure in “To Create an Alarm” on page 174.**
- 4. Click on the Alarms tab button in the Details window.**

The alarm you created should be reflected in the Alarms table.
- 5. Acknowledge, then delete this alarm if the alarm is closed.**
- 6. Create additional alarm conditions and familiarize yourself with their operation.**

Once you have created these alarms, you can set up security permissions so that another Sun Enterprise SyMON user cannot change your alarm thresholds. For information on accomplishing this task, see Chapter 15.

Details

The Sun Enterprise SyMON Details window provides detailed information about a selected object.

The following topics are covered in this chapter unless noted otherwise:

- Starting the Details Window
- Info Tab
- Browser Tab (covered in Chapter 8)
- Alarms Tab (covered in Chapter 13)
- Processes Tab
 - Configuring the Process Display
 - Process Statistics Window
 - Process Summary Field
- Log View Tab
 - Filtering Your Messages
 - Finding Specific Log Messages
- Configuration Tab
 - Resources
 - Physical View
 - Logical View

The Details window displays several tab buttons. The commonly seen buttons are shown in TABLE 14-1.

Clicking a tab button updates the window with the panel for that tab.

Note – The tab buttons that are displayed in the Details window are dependent on the type of object selected. For example, the Configuration tab is missing if the Config-Reader module is not supported on your system. For additional information on the tabs for your specific hardware object, see your supplement.

TABLE 14-1 Common Details Window Tab Buttons

Tab Button	Description
Info	Provides general information such as host name, IP address, and polling type.
Browser	Enables you to navigate through the hierarchy and contents views of the hardware, operating system, local applications, and remote systems (for navigation purposes). (The Browser is covered separately in Chapter 8.)
Alarms	Displays alarm status messages and the alarm controls for the host or node. Enables you to acknowledge or delete alarms. (Alarms are covered separately in Chapter 13.)
Processes	Displays information about processes running in the host.
Log View	Displays entries from host log files (such as system message logs).
Configuration	Displays configuration information (resources, physical view, logical view, and dynamic reconfiguration status and controls), if available, for a host.

Starting the Details Window

You can start the Details window from the main console window.

▼ To Start the Details Window

1. **Double click the left mouse button on an object icon in either the hierarchy view or the topology view.**

Be sure to select an object, not a domain, as the Details window is not available for domains.

The Details window is displayed (FIGURE 14-1).

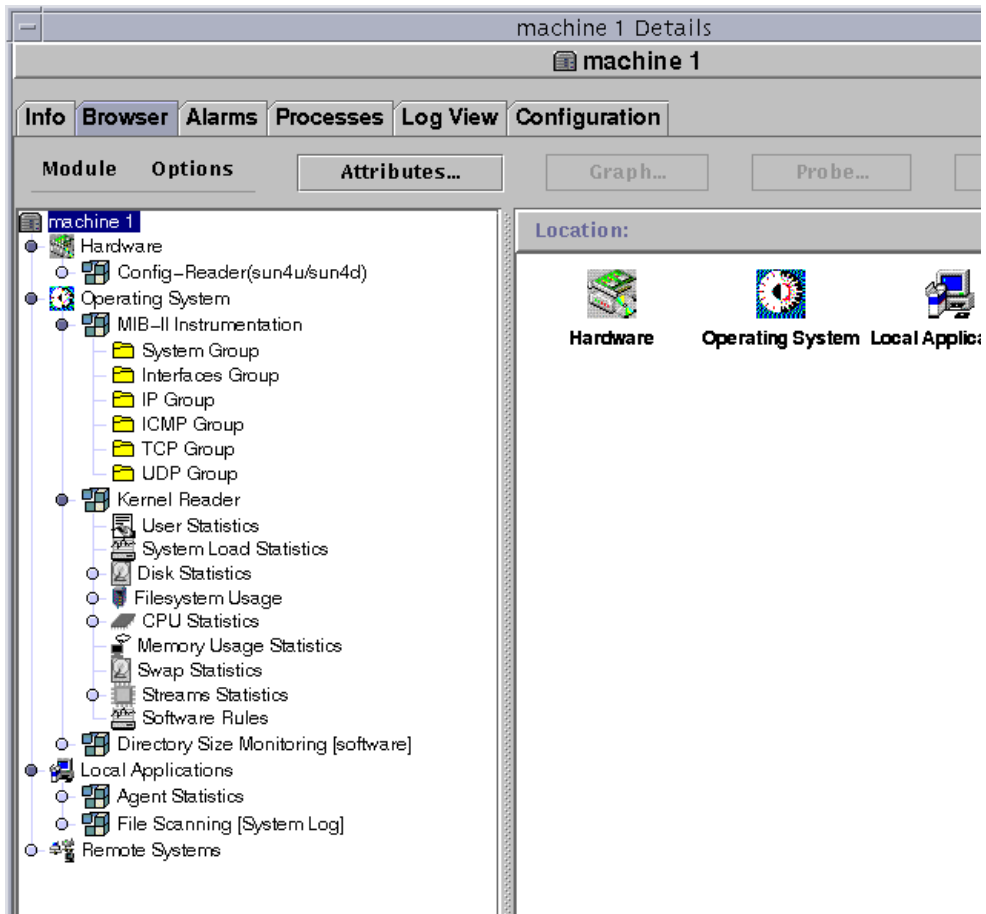


FIGURE 14-1 Details Window for a Selected Object

2. Click a tab to view detailed information for that category.

Tip – Some tabs have the ability to display many levels of detail. Double-click icons in the Details window to see additional levels of information. A category may have many subcategories.

Tip – If information in a table cell is too long to be displayed in full, you may be able to see more information by holding the mouse pointer in the cell for several seconds. A pop-up balloon (tool tip) is displayed, showing the complete text contained in that cell.

Tip – If the hierarchy view has a light-colored circle next to an icon (FIGURE 14-2), you can click the circle or double-click the icon next to the circle to expand the hierarchy view (“unroll” and display more levels of detail).

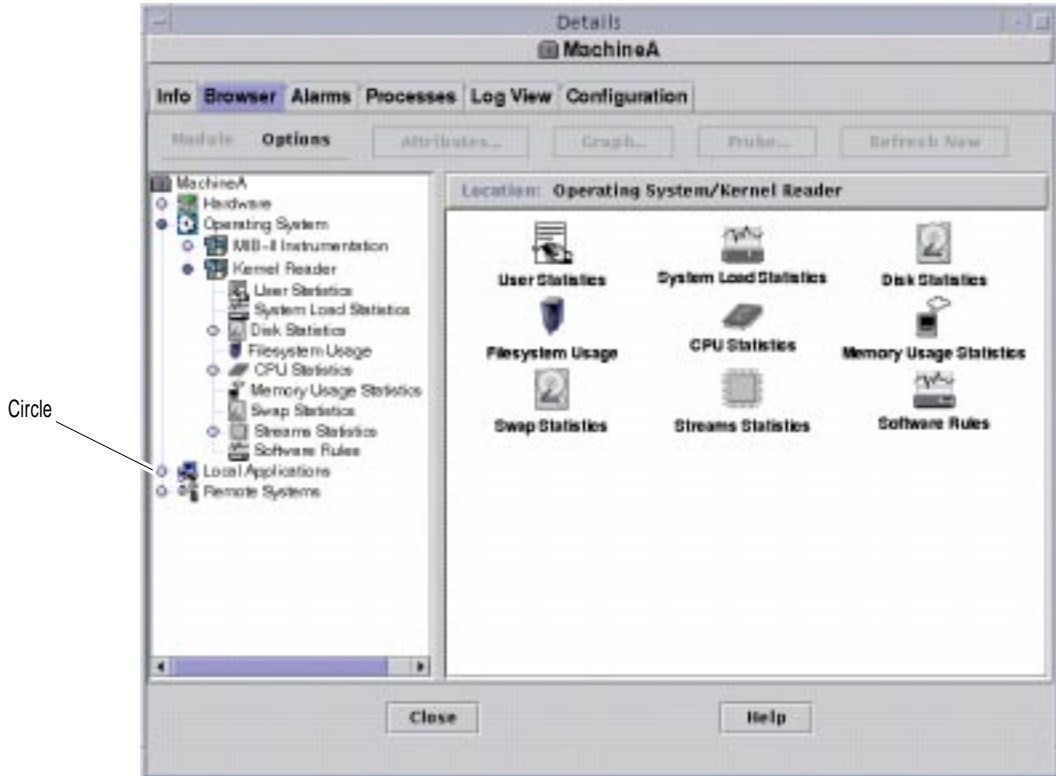


FIGURE 14-2 Light-Colored Circles “Unroll” to Provide Additional Levels of Detail

▼ To Close the Details Window.

- Click the Close button located at the bottom of the window.

Info Tab

Clicking the Info tab displays the Properties table.

The general properties are listed in the following table.

TABLE 14-2 General Properties in the Info Tab of the Details Window

Property	Description
Entity Desc	Label that you selected when you created the node.
Entity Full Desc	Optional description you entered when you created the node.
Hostname	Machine name.
IP Address	IP address.
Netmask	Netmask associated with the host.
Operating System	Operating system type and version.
Entity Family	Hardware architecture.
Entity Trap Destination	Host IP address of Sun Enterprise SyMON server which receives this host's trap information.
Entity Event Destination	Host IP address of Sun Enterprise SyMON server which receives this host's events information.
Entity Polling Type	Agent or SNMP.
Target Hostname	Host name of the target.
Target IP Address	IP address of the target.

Browser Tab

The Browser tab displays hierarchy and contents views of the hardware, operating system, local applications, and remote systems.

See Chapter 8 for detailed information on using the Browser tab.

Alarms Tab

The Alarms Details window displays the alarms for the host.

See Chapter 13 for detailed information on using Sun Enterprise SyMON alarms.

Processes Tab

The Processes tab process viewer (FIGURE 14-3) enables you to view and select detailed information about processes running on the selected host or node. The displays are continually updated.

Note – The Solaris Process Details module must be loaded to use the process viewer. For instructions, see “To Load a Module” on page 212.

Note – If the Solaris Process Details module is not loaded when you first click the Processes tab, then you must load the module, and close then reopen the Details window to see the processes. Thereafter, the Solaris Process Details module is unloaded or loaded dynamically. That is, you no longer need to close and reopen the Details window to see the processes whenever this module is unloaded or loaded.

Details MachineB

Info Browser Alarms **Processes** Log View Configuration

View Columns

PID	User	CPU%	Memory%	CommandLine
22303	root	2.8	1.1	esd - init agent -dir /var/opt/SUNWsymon
3	root	0.1	0.0	fsflush
0	root	0.0	0.0	sched
1	root	0.0	0.1	/etc/init -
2	root	0.0	0.0	pageout
566	root	0.0	0.1	/usr/lib/saf/sac -t 300
487	root	0.0	0.1	vxnotify -f -w 15
443	root	0.0	0.1	/usr/sbin/nscd
8	root	0.0	0.2	vxconfigd -m boot
384	root	0.0	0.1	/usr/shin/kerhd

pmap Output For Process Id: 22303

```

22303:      esd - init agent -dir /var/opt/SUNWsymon
00010000 224K read/exec      dev: 32,312 ino: 22969
00056000 48K read/write/exec  dev: 32,312 ino: 22969
0006200011656K [heap]
0006200011656K read/write/exec
EEE90000 24K read/exec      /opt/SUNWsymon/base/lib/sparc-sun-solaris2.5/libprocess.so.1.0
EEEE4000 8K read/write/exec /opt/SUNWsymon/base/lib/sparc-sun-solaris2.5/libprocess.so.1.0
EEEE0000 8K read/exec      /opt/SUNWsymon/base/lib/sparc-sun-solaris2.5/pkgprocess.so
EEEE0000 8K read/write/exec /opt/SUNWsymon/base/lib/sparc-sun-solaris2.5/pkgprocess.so
EEED0000 88K read/exec     /opt/SUNWsymon/lib/platform/cfg/cfg_sun4u.so.2
EEEF4000 16K read/write/exec /opt/SUNWsymon/lib/platform/cfg/cfg_sun4u.so.2
EEEF8000 8K read/write/exec
EEF00000 16K read/exec     /opt/SUNWsymon/base/lib/sparc-sun-solaris2.5/pkgpfa.so

```

Process Summary:

```

Total=46   Running=1   Sleeping=44   Runnable=0
Idle=0     Zombies=0   Traced=1     Sxbrk=0

```

Close Help

FIGURE 14-3 Processes Tab

Configuring the Process Display

▼ Selecting Columns for Viewing

1. Click the **View Columns** button above the **Process** table to display the **View Columns** pull-down menu.

A pull-down menu is displayed (FIGURE 14-4) that enables you to add or remove columns from the table.



FIGURE 14-4 View Columns Menu

2. Highlight one or more process properties that you want to display.

The check box next to each selected property is displayed with a check mark (FIGURE 14-4) and the right side of the Process Viewer window is updated. The new column or columns are added to the display, to the right of the existing columns.

The total number of processes displayed is listed in the Process Summary field at the bottom of the Details window.

TABLE 14-3 lists the properties that are available for the Processes view.

TABLE 14-3 Process Viewer Properties

Property	Description
PID	Process Identifier.
PPID	Process ID of the parent.
UID	Effective user ID number.
User	Effective user login name.
EUser	Effective user ID.
Group ID	Group ID of the user.
EGroup	Effective group ID of the user.
Session ID	Process ID of the session leader.
PGroup	Process ID of the process group leader.
Tty	Controlling terminal for the process. A question mark (?) is printed when there is no controlling terminal.
Start time	Starting time of the process, in hours, minutes, and seconds. (The start time for a process that is more than 24 hours old is given in months and days.)
Time	Cumulative execution time for the process.
State	State of the process.
Wait Channel	Address of an event for which the process is sleeping. If blank, the process is running.
Class	Scheduling class of the process.
Address	Memory address of the process.
Size	Size (in pages) in main memory for the image of the swappable process.
Priority	Priority of the process.
Nice	Decimal value of the system scheduling priority of the process.

TABLE 14-3 Process Viewer Properties (*Continued*)

Property	Description
CPU%	Ratio of CPU time used recently to CPU time available in the same period, expressed as a percentage.
Memory%	Ratio of the process's resident set size to the physical memory on the machine, expressed as a percentage.
Command	Command name.
CommandLine	Full command name and its arguments, up to a limit of 80 characters.

Sorting Columns

You can sort the processes (rows) by the properties (column headers) in ascending or descending order. For example, you can sort the CPU% column starting with either the smallest or the largest value first.

▼ To Sort Columns in Ascending Order

- **Click the property (table column header).**
The processes (rows) are updated in ascending order for that property.

▼ To Sort Columns in Descending Order

- **Click the property (table column header) while holding down the Shift key.**
The processes (rows) are updated in descending order for that property.

Moving Columns

You can rearrange the order of columns.

▼ To Reorder Columns in the Table

1. **Select a column by clicking and holding down the mouse button on the table column header.**
2. **Drag the column to the desired position.**

Process Statistics Window

The Output For Process ID window displays statistics for your choice of either pmap, pstack, pfiles, or pldd for any highlighted process in the Process View window.

TABLE 14-4 Process Statistics

Statistic	Description
pmap	Prints the address space map of each process.
pstack	Prints a stack trace for each lightweight process (lwp) in each process.
pfiles	Reports <code>fstat(2)</code> and <code>fcntl(2)</code> information for all open files in each process.
pldd	Prints dynamic libraries for the process.

Process Summary Field

The Process Summary field lists statistics for all processes, active or inactive.

Log View Tab

The log viewer (FIGURE 14-5) enables you to view system log messages and logged error messages from the Sun Enterprise Diagnostics (EntDiag) software.

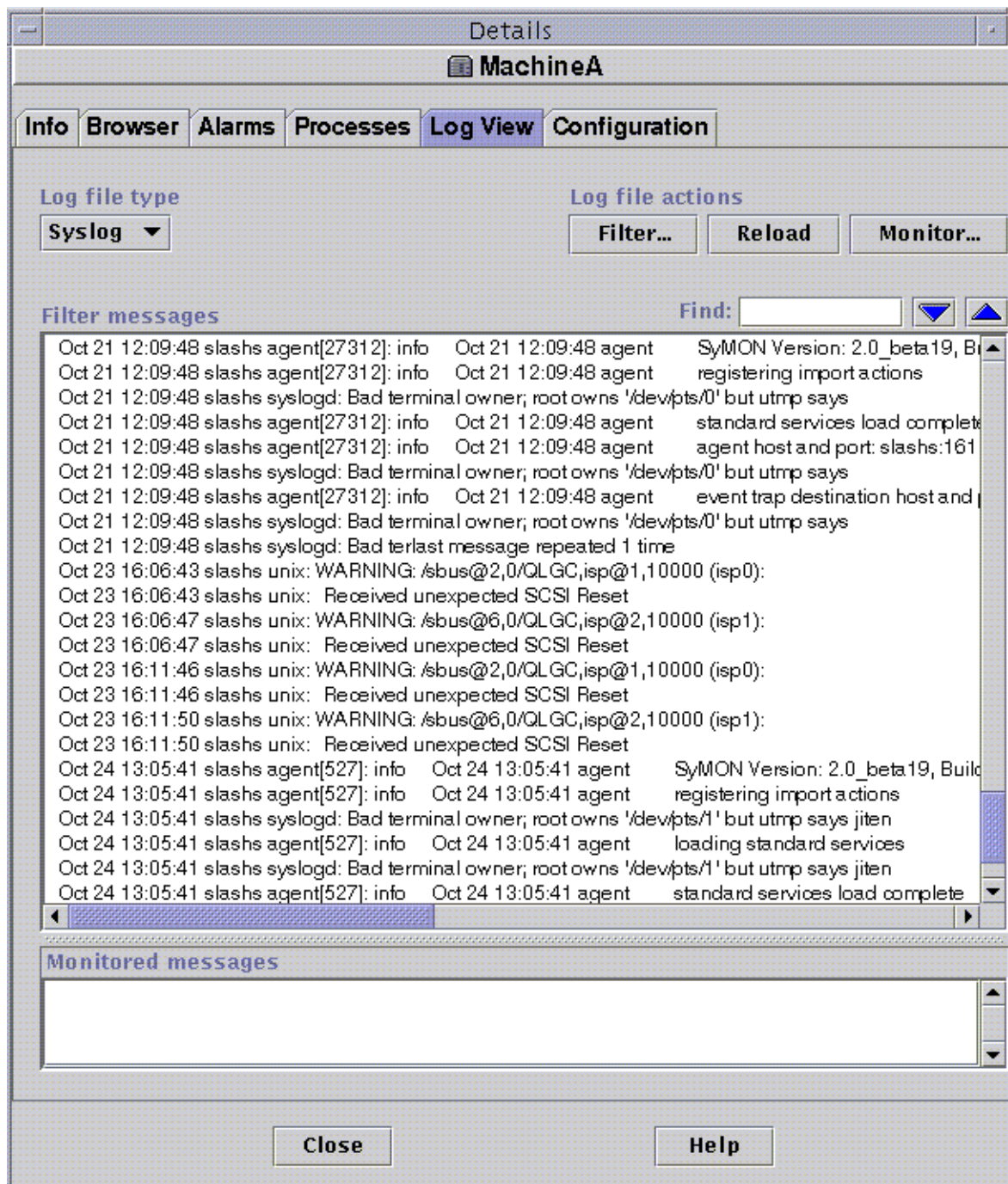


FIGURE 14-5 Logview Tab

Log File Type Button

You can view two types of messages:

- System log messages stored in the `/var/adm` directory
- EntDiag error messages

File names in the `/var/adm` directory start with the word “messages”. If the EntDiag software is installed, it logs error messages by default to the `/var/opt/SUNWentdiag/logs/entdiag.err` file.

▼ To View the Log File Messages

- Click the down arrow under the Log file type field and highlight either Syslog or EntDiag.

The selected type of messages is displayed in the log viewer table.

Note – Click the Reload button to refresh the display and add the latest log messages.

Filtering Your Messages

You can apply filters to display only those messages that match the date range and text pattern that you specify.

▼ To Filter Your Log Request

1. Click the Filter button in the log viewer (FIGURE 14-5).

The Message Filter Options dialog is displayed (FIGURE 14-6).

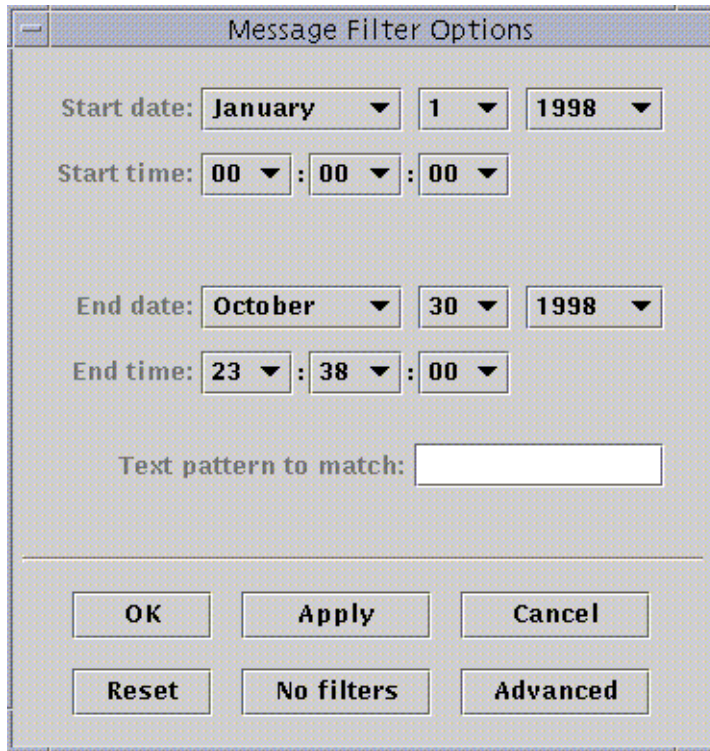


FIGURE 14-6 Message Filter Options Dialog

Note – If you do not want any filters applied to your log messages, click the “No Filters” button.

2. **Using the down arrows, select the starting date by highlighting the month, day, and year for the first log message you want to view.**
3. **Select the starting time by using the down arrows.**
Highlight the hour and minute for the first log message you want to view.
4. **Select the ending date.**
Highlight the month, day, and year for the last log message you want to view.
5. **Select the ending time.**
Highlight the hour and minute for the last log message you want to view.
6. **Type the text pattern to be matched in the field marked “Text pattern to match.”**

Note – Select a text pattern that is unique to the type of message in which you are interested.

7. Click the **Advanced** button if you want to refine further your filter request. Otherwise, skip to Step 10.

The advanced Message Filter Options dialog is displayed (FIGURE 14-7).

Message Filter Options

Start date: January 1 1998

Start time: 00 : 00 : 00

End date: October 30 1998

End time: 23 : 38 : 00

Text pattern to match:

Search direction: Forward
 Backward

Maximum matches to report:

OK Apply Cancel

Reset No filters Basic

FIGURE 14-7 Advanced Message Filter Options Dialog

8. To perform a forward or backward search through the log file, select **Forward** or **Backward**.

- 9. (Optional) Type the maximum number of log messages that should be matched in the field marked Maximum matches to report.**

If you leave the field empty or if you enter zero (0), all matching messages are reported.

- 10. Complete this procedure with one of the following actions:**

- Click OK to filter and reload your log messages and close this window.
- Click Apply to filter and reload your log messages without closing this window.
- Click Reset to reset to the default parameters.
- Click Cancel to cancel your request.

Reload Button

Click the Reload button to refresh and reload filtered messages.

Monitor Button

Monitoring enables you to view new log messages as they occur. The new messages are displayed in the lower half of the split pane window. With your mouse button, you can adjust the dividing bar between the upper half and the lower half of the split pane window to view more of one half than the other. Each new message that arrives is highlighted.

▼ To Monitor Log Messages

- 1. Click the Monitor button in the log viewer (FIGURE 14-5).**
The Monitor Filter Options dialog is displayed (FIGURE 14-8).

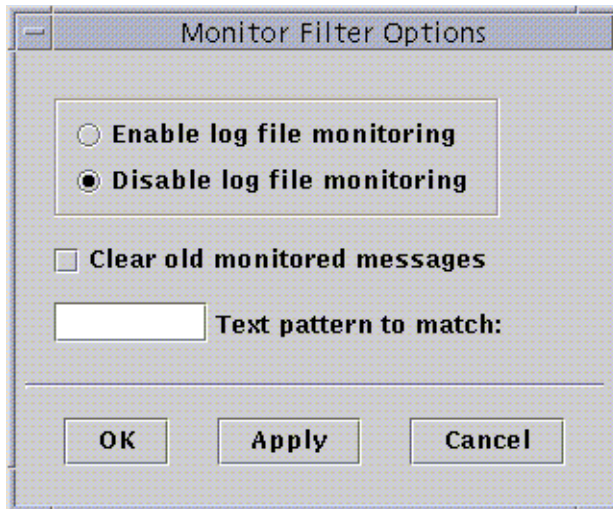


FIGURE 14-8 Monitor Filter Options Dialog

2. **Click the appropriate circle to enable or disable log file monitoring.**
The darkened circle indicates your choice.
3. **To display only currently monitored log messages, click the check box to clear old monitored messages.**
The check box is displayed with a check mark.
4. **Type the text pattern to be matched in the field marked Text pattern to match.**
You can use a UNIX regular expression. For information about regular expressions, refer to the `regex(1F)` man page.

Note – Select a text pattern that is unique to the type of message in which you are interested.

5. **Complete this procedure with one of the following actions:**
 - Click OK to monitor your log messages and close this window.
 - Click Apply to monitor your log messages without closing this window.
 - Click Cancel to cancel your request.

Finding Specific Log Messages

Once a set of filter messages has been loaded into the upper half of the split pane window, you can search for a specific character sequence within that set of messages.

Note – No meta characters, including the wildcard asterisk (*) character, are supported in the log view find feature.

▼ To Find a Log Message

1. **Type the specific character sequence (part of the log message) in the Find field (FIGURE 14-5).**

2. **Click Return or the down or up arrow to search the log messages for that sequence.**

The first matching message is highlighted.

3. **Click Return or the down or up arrow to continue your search and find additional occurrences of the matching sequence.**

Configuration Tab

Note – The Configuration tab is missing if this feature is not supported on your system.

The Configuration Details window (FIGURE 14-9) provides three choices for system information:

- Resources (default view)
- Physical View
- Logical View

Note – For additional information on the Configuration tab for your specific hardware object, see your supplement.

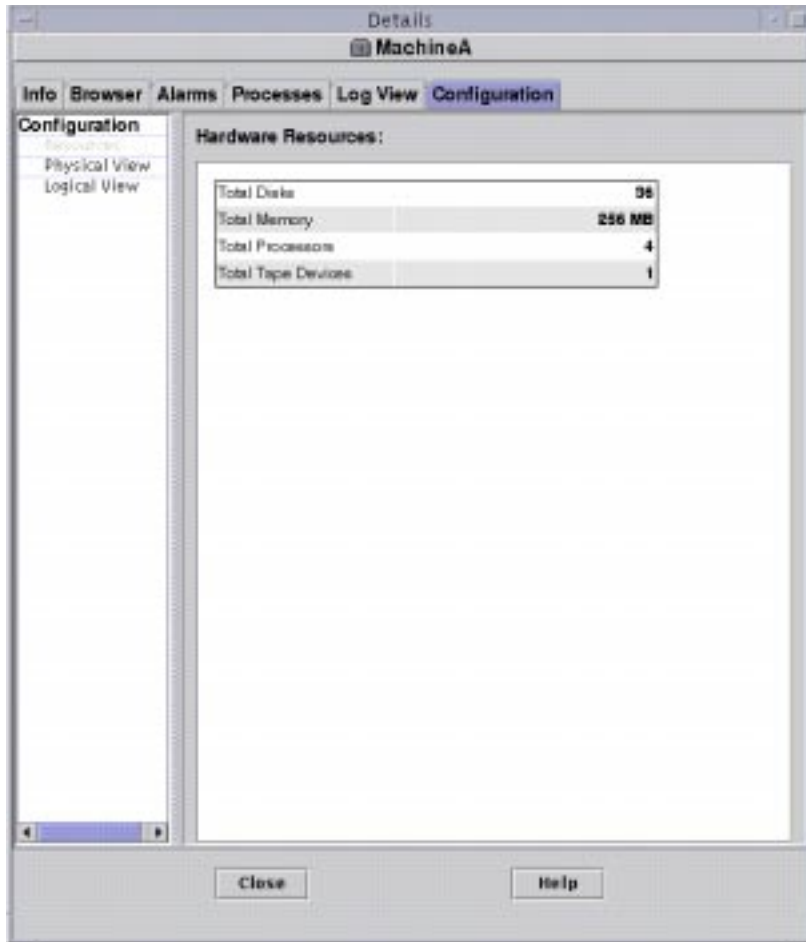


FIGURE 14-9 Configuration Details Window

▼ To View a Configuration

Note – If you load or unload the Config-Reader or Dynamic Reconfiguration modules while the Details window is open you must close, then reopen the Details window to see the results.

- **Click once to highlight the configuration in which you are interested.**
The right side of the window is updated and the selected feature is displayed.

Resources

The Sun Enterprise SyMON software displays a table of hardware resources of the selected host (FIGURE 14-9). Here are some typical values displayed in the table.

TABLE 14-5 Resources

Resource	Description
Total Disks	Total number of disks connected to the host
Total Memory	Total amount of memory connected to the host
Total Processors	Total number of processors connected to the host
Total Tape Devices	Total number of tape devices connected to the host

Your table may appear different. The resources vary, depending on the type of object displayed in the detail view.

Physical View

When you select the Physical view, the software displays a photo-realistic picture of the selected host (FIGURE 14-10), if available. Pictures are not available for some system types.

Note – This feature is usable only if the host is monitored by a Sun Enterprise SyMON agent.

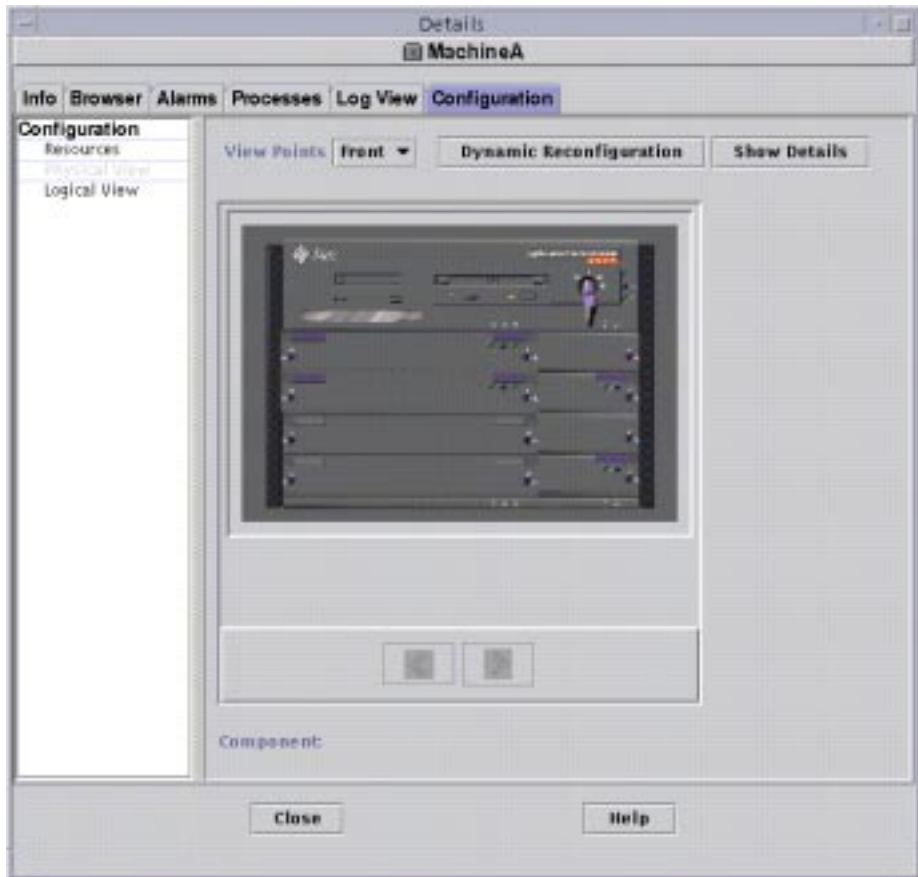


FIGURE 14-10 Configuration Physical View

View Points

If a picture of the system is available, it is displayed. For some systems, you can select alternate front, rear, and side views by selecting entries in the View Points pull-down menu. Pictures are not available for some system types.

For some systems, pictures of components such as CPU boards and I/O boards may also be available. As you move the mouse pointer over various parts of the system picture, the mouse pointer changes from an arrow to a hand icon when a detailed picture is available for an individual component. The individual component is highlighted, and the path name of the component is displayed in the Component field at the bottom of the window. Click a highlighted component to display the detailed picture of the component (FIGURE 14-11).

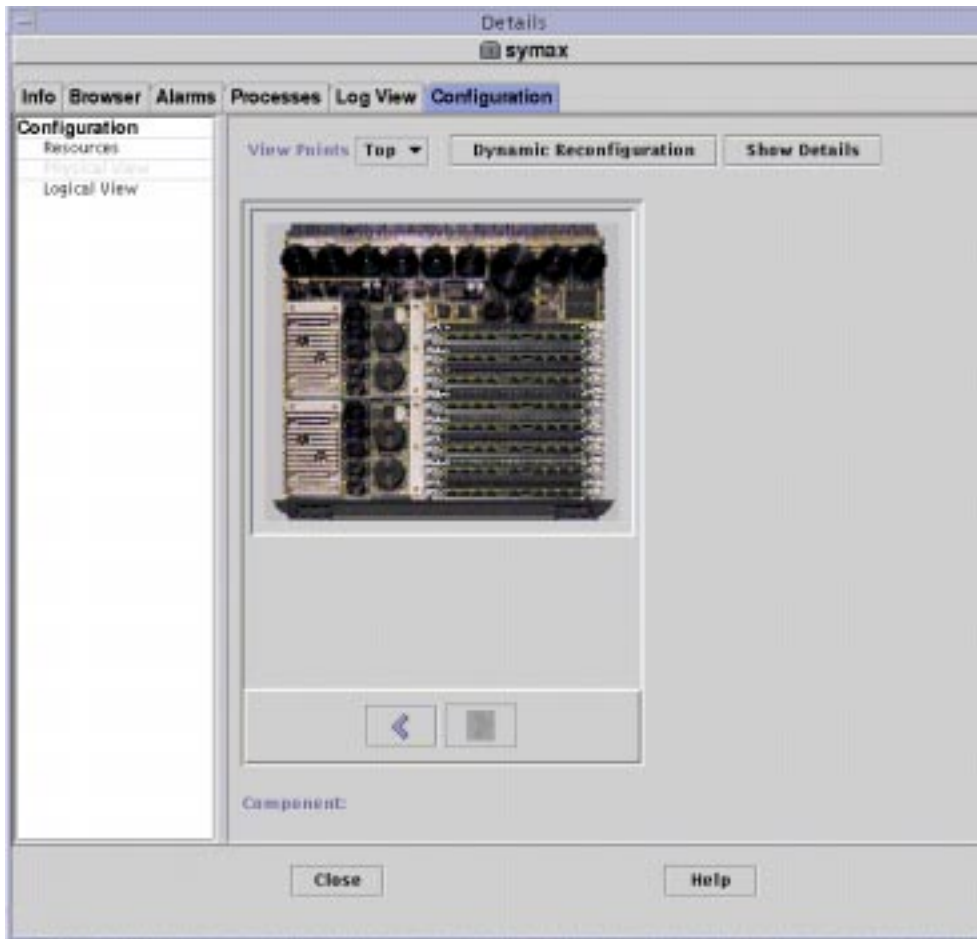


FIGURE 14-11 Component Physical View

The arrow buttons below the picture enable you to switch between system and component views.

Physical View When a Sun StorEdge Device is Connected

If a Sun StorEdge™ A5000, A5100, or A5200 is connected to the clicked component, a pop-up menu displays, which lists the devices that are connected. The Sun StorEdge A5000-series devices are displayed on this menu as `sena(0)`, `sena(1)`, and so on, as shown in the following figure.

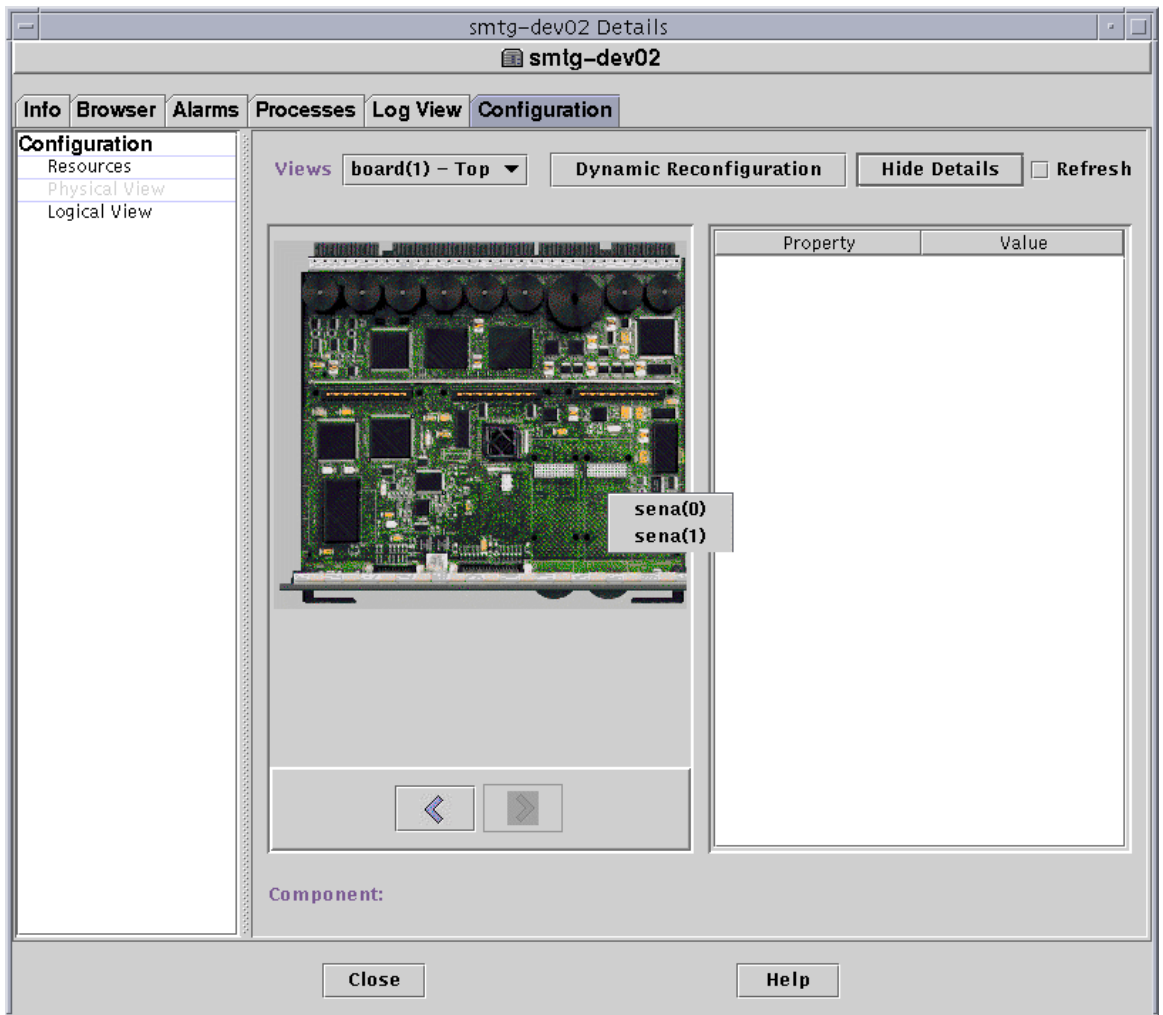


FIGURE 14-12 Pop-up sena Menu

You can select and view any of these storage devices from the pop-up sena menu. The following example shows the front view for the A5000 called sena(0). The device details display in the right section of the physical view window.

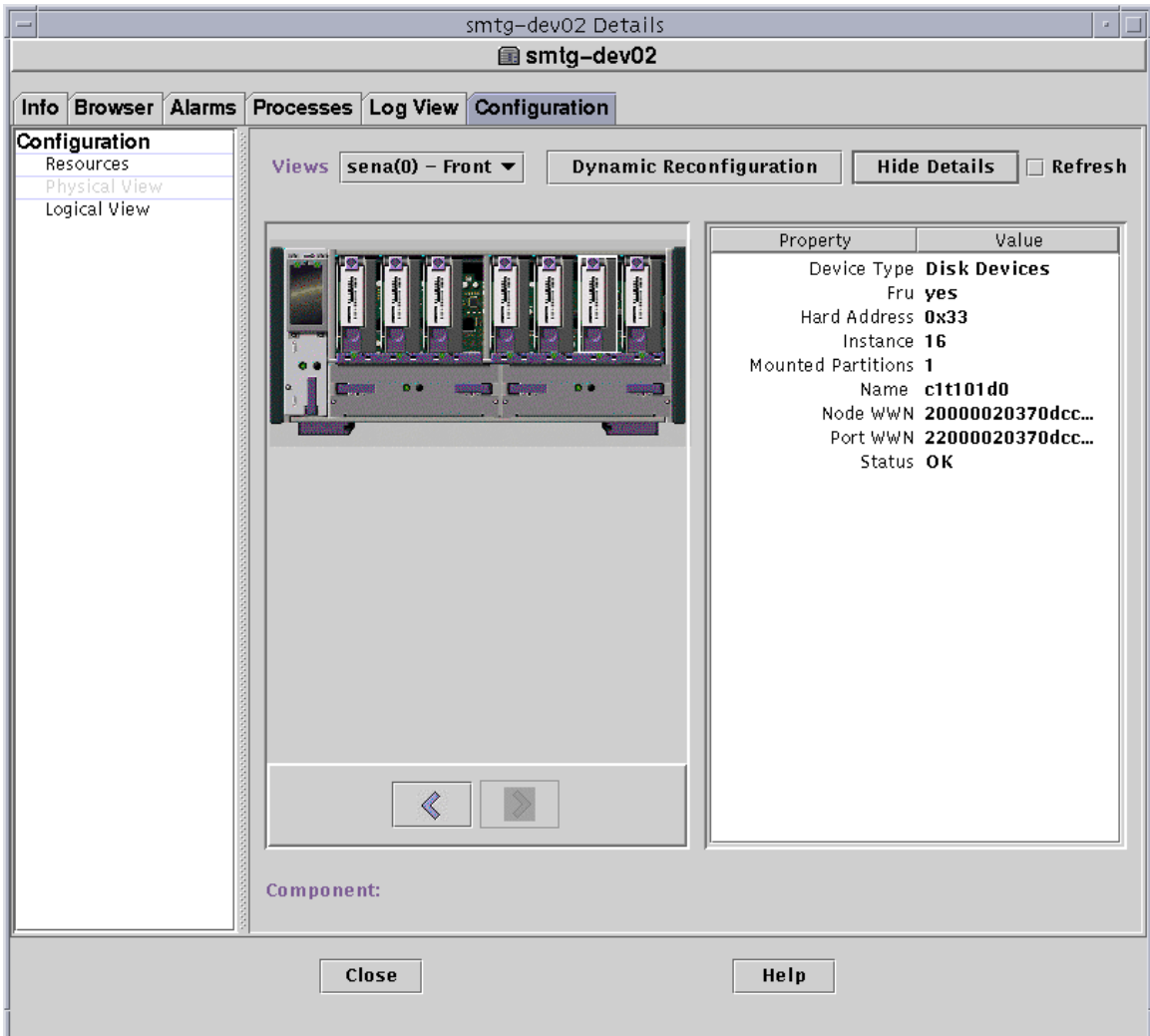


FIGURE 14-13 sena (0) Physical View with Details

Dynamic Reconfiguration

The Dynamic Reconfiguration button is displayed in the physical and logical views only for certain platforms. Refer to your hardware supplement for more information.

Show Details

Clicking the Show Details button (see FIGURE 14-10) displays the Property/Value view (FIGURE 14-14), which displays text describing the component that is selected in the View Points view. The button toggles between Show Details and Hide Details. Clicking the Hide Details button turns off the Property/Value view.

Note – After you show details for a component, you may click Refresh to update the information immediately. Otherwise, the information does not change from when you first opened the physical view.

Note – The Total Disks field in the Show Details properties *only* displays the number of internal disks. This number does not include the disks that are part of enclosures.

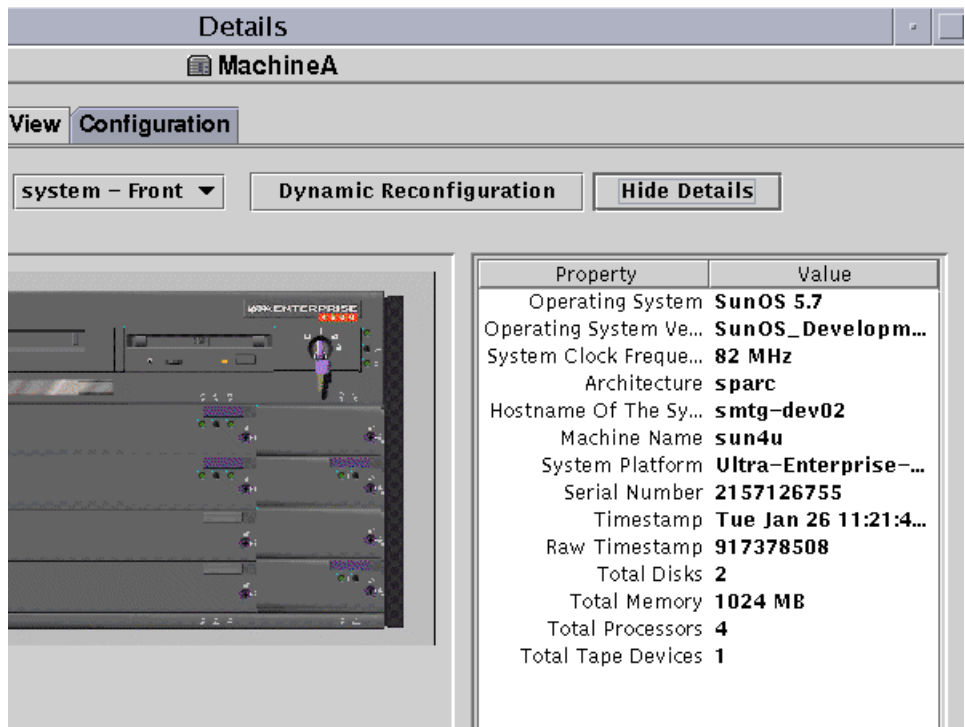


FIGURE 14-14 Property/Value View

Logical View

The software displays a Logical view configuration of a host (FIGURE 14-15) if the host is monitored by a Sun Enterprise SyMON agent. (Logical views are not available for ping hosts.)

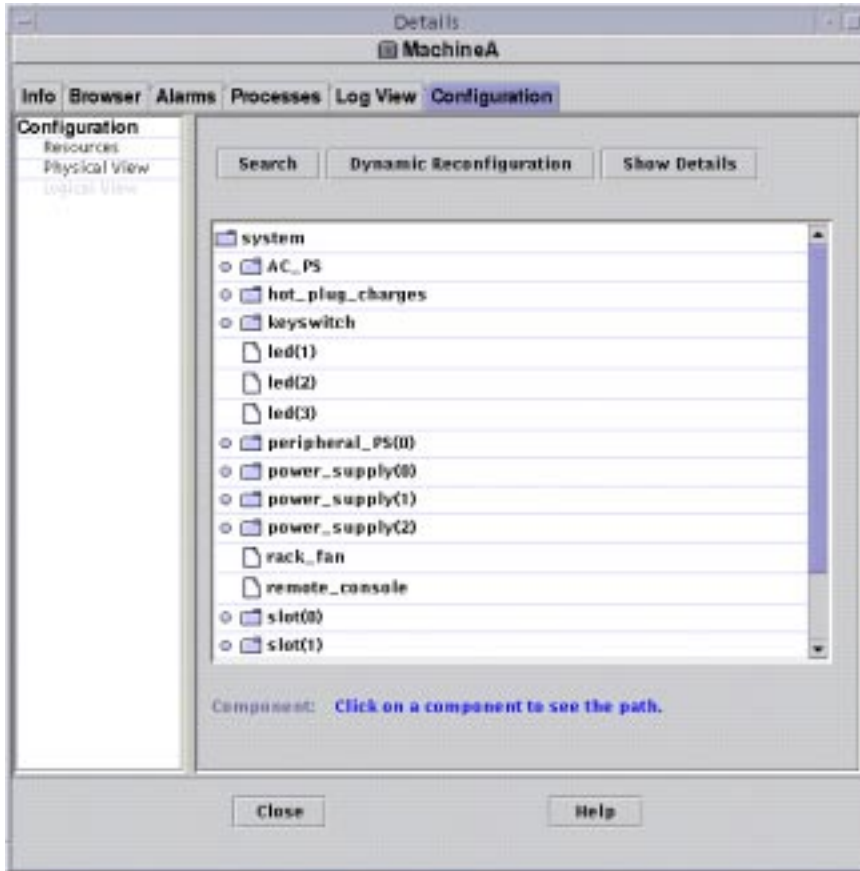


FIGURE 14-15 Configuration Logical View

Search

Clicking the Search button displays the Search window (FIGURE 14-16). Use the Search window to search for components in the Logical View window.

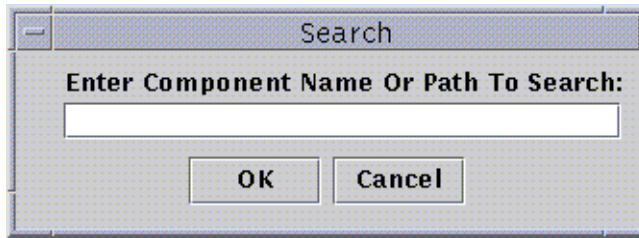


FIGURE 14-16 Search Window

Tip – The Search function is case-sensitive. The error message “Node not found” is displayed at the bottom of the Details window if the search does not locate the component in your system.

Tip – The Search function stops at the first instance found. For example, if you enter the word board, Search always stops at board(0). To find board #2, enter enough of the board name. For example, board(2) or just ard(2) are sufficient to identify the specific target uniquely.

Dynamic Reconfiguration

The Dynamic Reconfiguration feature in the Logical View is the same as is described in the previous section, “Physical View” on page 273.

Show Details

The Show Details feature in the Logical View is the same as is described in the previous section, “Physical View” on page 273.

Sun Enterprise SyMON Security

Security in Sun Enterprise SyMON software is based on Java™ security classes and SNMPv2 usec (SNMP version 2, user-based security model) security standards. This chapter discusses security features, users and groups, and their privileges.

The software offers the following layers of security:

- Only valid Sun Enterprise SyMON users can use the software.
- The software enables you to set security permissions or access control categories and provides control at the domain, group, host, and module levels.
- It authenticates user login and access control for individual managed properties.

This chapter contains the following information:

- Access Control (ACL) Categories
 - Sun Enterprise SyMON Users
 - Sun Enterprise SyMON Groups
 - Admin, Operator, and General Functions
- Specifying Access Control (ACL)
 - Admin, Operator, and General Access
 - Sun Enterprise SyMON Remote Server Access
- Using Access Control (ACL)
 - To Add Sun Enterprise SyMON Users
 - To Access ACL on a Module
 - To Add a User-Defined Group to an ACL
 - To Delete Sun Enterprise SyMON Users
- Default Privileges
 - Topology Manager Default Privileges
 - Other Sun Enterprise SyMON Component and Module Default Privileges
- Overriding the Default Privileges
 - To Override Default Privileges

Access Control (ACL) Categories

The software offers the following Access Control (ACL) categories:

- Admin, like the superuser (`root`) in UNIX
- Operator, as an operator who runs and monitors the system
- General, like guest access with read-only viewing privileges

To understand ACL categories, we first need to understand Sun Enterprise SyMON software users and groups. The following sections explain users and groups.

Sun Enterprise SyMON Users

Sun Enterprise SyMON users are valid UNIX users on the server host. As such, the system administrator has to add valid users into the following file;

```
/var/opt/SUNWsymon/cfg/esusers.
```

If a user's name is not in this file, that user cannot log into the Sun Enterprise SyMON software unless the user logs in as `espublic` or `esmaster` since these two user names are part of this file. (See the following section for more information.)

Public and Private Users

During the Sun Enterprise SyMON server setup, the file `/var/opt/SUNWsymon/cfg/esusers` is created and the following users are added to the file automatically:

- `espublic`
`espublic` is comparable to logging into a UNIX system as `guest`. It enables users to have “general” privileges. For example, when a user tries to access information from a session running in a different Sun Enterprise SyMON server from their own, they are given access as `espublic` and are able to view the information as a `guest` only.
- `esmaster`
`esmaster` is comparable to being superuser in UNIX. It automatically gives “admin” access privileges to users logging into the software.

The administrator has to add the additional list of user IDs for all other users who need to log into Sun Enterprise SyMON software. All users in this file have “general” access privileges, by default, unless they are given additional privileges using the procedures described in “Using Access Control (ACL)” on page 289.

Note – The user names `espublic` and `esmaster` are not configurable during installation. They must specifically be defined as `espublic` and `esmaster`.

General Users

Any user who is part of the `esusers` file is known as a “general” user. Sun Enterprise SyMON general users can, by default, perform the following functions:

- Log into the software
- View the domains, hosts, and modules that are created
- View the events
- Trigger manual refreshes
- Run ad hoc commands
- Graph data

Sun Enterprise SyMON Superuser

Implicitly, the Sun Enterprise SyMON superuser belongs to all the groups described in the following sections. Sun Enterprise SyMON superuser has “admin” privileges as described in “Sun Enterprise SyMON ADMINISTRATORS or `esadm`” on page 284.

Sun Enterprise SyMON Groups

The following groups are created by default on the server host during the Sun Enterprise SyMON server setup:

- `esops`
- `esadm`
- `esdomadm`

In addition, all the Sun Enterprise SyMON users belong to a hypothetical group, called `ANYGROUP`.

The above groups must be defined on the machine where the Sun Enterprise SyMON Configuration manager is running. They do not need to be defined on other machines. These groups are described in greater detail in the sections that follow.

Note – The preceding groups are defined in the `/etc/group` file. Note that although Sun Enterprise SyMON `esmaster` and `espublic` users are configured as members of the preceding groups, they are not explicitly mentioned in the `/etc/group` file.

Sun Enterprise SyMON OPERatorS or `esops`

Sun Enterprise SyMON software users belonging to the group `esops` are usually referred to as operator users who run, monitor, and to some extent, configure some parameters on the managed systems. As you can see in the following list, `esops` can perform operations, including some that are allowed for general users:

- Disable or enable modules
- Set module active time window
- Set alarm limits
- Set rule parameters
- Run alarm actions
- Run adhoc commands
- Set refresh interval
- Acknowledge, delete, or fix events
- Enable or disable history logging
- Set logging history parameters

Sun Enterprise SyMON ADMinistrators or `esadm`

Software users belonging to the group `esadm` can perform “admin” operations, which are a superset of the operations that can be performed by operator users as described in “Sun Enterprise SyMON OPERatorS or `esops`” on page 284. In addition to all the operations that “operator” users (`esops`) can perform, these “admin” users (`esadms`) can perform the following operations:

- Load or unload modules
- Set ACL users and groups
- View domains, hosts, or modules

Sun Enterprise SyMON DOMain ADMinistrators or `esdomadm`

The users belonging to the group `esdomadm` can perform the following “domain administrator” operations:

- Create domains
- Create groups within domains
- Add objects to groups or domains
- View domains, hosts, or modules

Note – Other than the privileges listed above, a user belonging to “`esdomadm`” is just a “general” user, unless configured otherwise.

Admin, Operator, and General Functions

TABLE 15-1 contains the different types of functions users can do by default.

This table is general in nature and applies to all modules. Individual modules may also have specific restrictions, which are under the control of the module.

TABLE 15-1 Domain Admin, Admin, Operator, and General Functions

Function	Domain Admin	Admin	Operator	General
Load modules		x		
Unload modules		x		
Create domains	x			
Create groups within domains	x	x		
Add objects to groups or domains	x	x		
View domains, hosts or modules	x	x	x	x
Set ACL users or groups		x		
Disable or enable modules		x	x	
Set module active time window		x	x	
Set alarm limits		x	x	
Set rule parameters		x	x	
Run alarm actions		x	x	
Run adhoc commands		x	x	
Set refresh interval		x	x	
Manually trigger a refresh		x	x	x
Enable or disable history logging		x	x	
Set logging history parameters		x	x	
Acknowledge, delete, or fix events		x	x	
View events		x	x	x

In Sun Enterprise SyMON software, the above categories maintain *inclusive* relationships or privileges. This means that, by default, a user who has `esadm` privileges can do anything that a user who has `esops` privileges can. But an

administrator has the option to change the default permissions so that a user who has `esops` privileges can do more than a `esadm` user. Inclusive relationships means that these three groups, `esops`, `esadm`, and `esdomadm`, do not have any code enforcement behind them which makes one group more powerful than the other.

For more information on how to override default privileges, see “Overriding the Default Privileges” on page 296.

Specifying Access Control (ACL)

The administrators (`esadm` group) can specify ACL features for users and groups for the following:

- Domains
- Groups within domains
- Hosts
- Modules

Admin, Operator, and General Access

An ACL specification consists of establishing or defining one or more of the following:

- Administrator users and administrator groups
A list of users and groups who can perform administrator operations. By default, they are `esadm` or `esdomadm`, wherever applicable.
- Operator users and operator groups
A list of users and groups who can perform operator operations. By default, they are `esops`.
- General users and general groups
A list of users and groups who can perform general operations. By default, this is a hypothetical group called `ANYGROUP`.
- Communities for administrators (SNMP)
A list of SNMP communities that can perform admin operations using SNMP protocol.
- Communities for operators (SNMP)
A list of SNMP communities that can perform operator operations using SNMP protocol.
- Communities for general (SNMP)
A list of SNMP communities that can perform general operations using SNMP protocol.

Sun Enterprise SyMON Remote Server Access

Users can access and view data from sessions running on remote Sun Enterprise SyMON servers. When a user tries to gain access to such information, that user is provided access as `espublic` (guest) with read-only privileges. The behavior of Sun Enterprise SyMON sessions running on different servers is defined in terms of each session's server context. See "Sun Enterprise SyMON Server Context" on page 287 for more information.

As a user, you can access and set up a different server context for a variety of reasons:

- To provide for separate security access privileges so that each server context could have different users and administrators and yet be accessible to each other
- To allow for physical separation between elements, as in the context of a wide area network (WAN)
- To increase performance since this would allow many hosts to be handled by one set of central components

By linking to a different server context, you can view the top level status of the objects in the other server context.

Sun Enterprise SyMON Server Context

A server context is defined as agents running on many hosts, all sharing a single set of the following central components:

- Sun Enterprise SyMON server
- Topology manager
- Event manager
- Trap handler
- Configuration manager

A server context is defined as a collection of Sun Enterprise SyMON agents and the particular server layer to which the console is connected. Agents within the same server context can talk to each other. Agents in remote server contexts can talk using read-only privileges.

Every Sun Enterprise SyMON component or agent is configured at installation to know the location of its Trap handlers and Event managers. Sun Enterprise SyMON software identifies the Trap handlers and the Event managers by their IP or port addresses. This means that if you want to determine if you are within your server context or are accessing information from another server context, you need to know the respective IP or port addresses of the servers that you access. Different server contexts have different port numbers.

A remote server context refers to a collection of agents and a particular server layer with which the remote agents are associated.

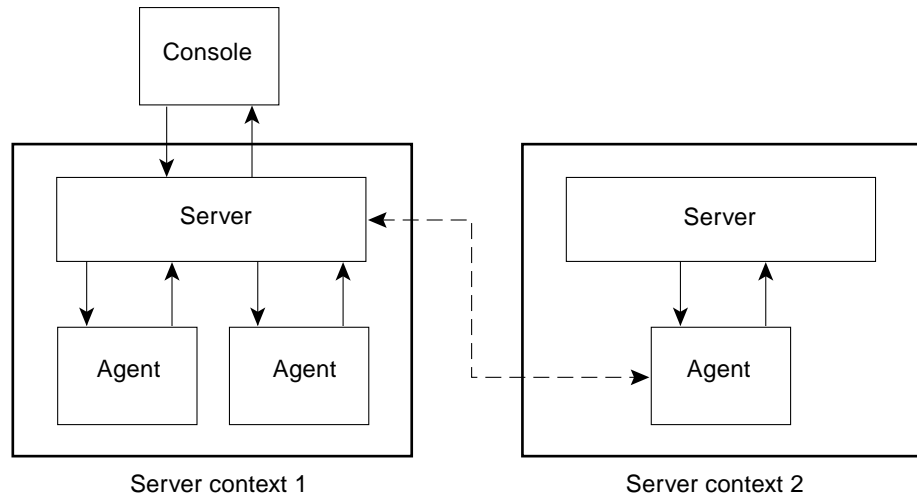


FIGURE 15-1 Remote Server Context

An agent gets its security configuration from the server layer. For example:

- Agents within the same server context can talk to each other.
- Agents in remote server contexts can talk remotely using read-only privileges.
- Requests to agents in remote servers are performed as the Sun Enterprise SyMON `espublic` user. This allows successful requests across servers, as long as Sun Enterprise SyMON sessions on both servers have the same password for user `espublic`.
- Each Sun Enterprise SyMON server maintains a list of agent IP or port address, to distinguish objects in its own context from objects on a different Sun Enterprise SyMON server.

Limitations While Crossing Servers

Some security restrictions apply when a user tries to communicate across server contexts.

In the current Sun Enterprise SyMON environment, you can access information from another server with a few limitations:

- If you try to access a different or remote server context, the server give you access with `espublic` user privileges. Thus you can access data but cannot modify or use the objects within the different server. You are restricted only to viewing the remote server objects. Therefore, the following consequences apply:
 - You can access other server contexts as long as the `espublic` user password is the same in all contexts.
 - You can view data in another context as user `espublic`, but you cannot perform control actions, such as setting alarm thresholds, and other similar functions.
- Edit functions work differently in a remote server. For example, you can *copy and paste* between contexts but cannot *cut and paste* between contexts.

Note – From a graphical user interface perspective, it is important to note that it may not be obvious that you are accessing a different server context. To identify if you are accessing a different server, check the server’s IP port number or address in the Info tab of the Details window.

Using Access Control (ACL)

The following sections describe how to perform the following key ACL functions:

- To Add Sun Enterprise SyMON Users
- To Access ACL on a Module
- To Add a User-Defined Group to an ACL
- To Grant a User `esadm`, `esops`, or `esdomadm` Privileges
- To Delete Sun Enterprise SyMON Users

▼ To Add Sun Enterprise SyMON Users

1. **Become superuser (on the Sun Enterprise SyMON server host).**
2. **Edit the file `/var/opt/SUNWsymon/cfg/esusers`. Make sure that the user name is that of a valid UNIX user.**
3. **Add the user name on a new line.**
4. **Save the file and exit the editor.**

Note – By adding a user to the users list, the user has default privileges. See “Default Privileges” on page 295 and “Overriding the Default Privileges” on page 296 for more information.

▼ To Access ACL on a Module

1. Proceed with one of the following:

- Click the right mouse button on the selected object and highlight Attribute Editor from the pop-up menu.
- Select Tools ► Attribute Editor in the main console window.

The Attribute Editor is displayed. The buttons at the bottom of the window are grayed out, with the exception of the Cancel and Help buttons. The remaining buttons become active if you modify any field in the window.

2. Select the Security tab within the Attribute Editor window (FIGURE 15-2).

3. Change the values as required.

For example, you may enter data as follows:

Attribute Editor

Object Label: **Headquarters**
Object Location:

Info **Security**

Security Levels **Users**

Administrator: jiten

Operator: john, alex, tina, lynn

General: nick, richie

Groups

Administrator: esdomadm

Operator: esops

General: ANYGROUP

SNMP Communities

Administrators:

Operators:

General: public

OK Apply Reset Cancel Help

FIGURE 15-2 Example of Security Fields in the Attribute Editor

Note – Use spaces between multiple entries as illustrated in the entries for “Operator” under “Users.”

The preceding example of the Attribute Editor with the Security tab selected contains the following field entries:

TABLE 15-2 Security Attributes

Attribute	Description
Administrator Users	A list of users. <code>jiten</code> is a user who can perform administrator operations
Operator Users	A list of operators. <code>john</code> and others are users who can perform operator operations. Note that their entries are separated by one or more spaces
General Users	A list of general users. Here, <code>nick</code> and <code>richie</code> are users who can perform general operations
Administrator Groups	All the users belonging to <code>esadm</code> and administrators can perform administrator operations. By default, they are <code>esadm</code> or <code>esdomadm</code> , as applicable
Operator Groups	All users belonging to <code>esops</code> can perform operator operations
General User Groups	<code>ANYGROUP</code> is a hypothetical group that can perform general operations. All Sun Enterprise SyMON users belong to this hypothetical group
Communities for Administrators	This field is empty denoting that there is no SNMP community that can perform admin operations using the SNMP protocol
Communities for Operators	This field is empty denoting that there is no SNMP community that can perform operator operations using the SNMP protocol
Communities for General Users	<code>public</code> is an SNMP community that can perform general operations using the SNMP protocol

Note – For more information on security privileges, see “Access Control (ACL) Categories” on page 282.

▼ To Add a User-Defined Group to an ACL

1. **Become superuser.**
2. **Create a group:**

```
# /usr/sbin/groupadd groupname
```

3. **Add users to the newly created group:**
 - a. **Edit the `/etc/group` file.**
 - b. **Add users to the group.**
 - c. **Save the file and exit the editor.**
4. **Add the new group to the ACL of interest.**

See “To Access ACL on a Module” on page 290 for more information.

▼ To Grant a User `esadm`, `esops`, or `esdomadm` Privileges

1. **Become superuser.**
2. **Make sure that the user is a valid Sun Enterprise SyMON user.**

You may do this by adding the user to the `/var/opt/SUNWsymon/cfg/esusers` file.
3. **Edit the `/etc/group` file.**
4. **Add the user to one of the following lines as applicable: `esadm`, `esops`, or `esdomadm`.**
5. **Save the file and exit the editor.**

▼ To Delete Sun Enterprise SyMON Users

1. **Become superuser on the Sun Enterprise SyMON server host.**
2. **Edit the file** `/var/opt/SUNWsymon/cfg/esusers`.
3. **Delete the line corresponding to the user name you want to delete.**
4. **Save the file and exit the editor.**
5. **Delete the user names from additional groups.**

After a user is deleted from the list of Sun Enterprise SyMON users, the user can no longer log into the Sun Enterprise SyMON server. Make sure to delete that user from all the ACLs.

Default Privileges

Domains are manipulated by the Topology manager. This section illustrates the default privileges for the Topology manager and for other agents and modules.

Topology Manager Default Privileges

The default privileges for Topology manager (where domains are maintained) are listed in the following table.

TABLE 15-3 Default Privileges for Topology Manager

Topology Manager	Default Privileges
List of Admin Users	
List of Operator Users	
List of General Users	
List of Admin SNMP Communities	
List of Operator SNMP Communities	
List of General SNMP Communities	public
List of Admin Groups	esdomadm
List of Operator Groups	esops
List of General Groups	ANYGROUP

Other Sun Enterprise SyMON Component and Module Default Privileges

The default privileges for all other components and modules are listed in the following table.

TABLE 15-4 Sun Enterprise SyMON Component and Module Default Privileges

Components/Modules	Default Privileges
List of Admin Users	
List of Operator Users	
List of General Users	
List of Admin Groups	esadm
List of Operator Groups	esops
List of General Groups	ANYGROUP
List of Admin SNMP Communities	
List of Operator SNMP Communities	
List of General SNMP Communities	public

The keyword `ANYGROUP` is not a true UNIX group, but is a special keyword that means that *“any user who can log into Sun Enterprise SyMON software is given general access to the objects.”*

Overriding the Default Privileges

In Sun Enterprise SyMON software, only administrators can override default privileges using the Attribute Editor to modify the ACL lists for that particular object.

The following section illustrates how to override default list privileges.

▼ To Override Default Privileges

- **Create the following override files in the `/var/opt/SUNWsymon/cfg` directory:**

- `agent-acls-d.dat`
- `topology-acls-d.dat`
- `event-acls-d.dat`
- `cfgserver-acls-d.dat`
- `trap-acls-d.dat`

The following example creates an admin group `wheel` for the agent instead of the `esadm`. By default, it makes user 1, `margot`, and user 2, `helen`, admin users for that agent.

Note that the lists of names are separated by spaces, such as, `helen` and `margot`.

The lines beginning with a pound sign (`#`) are comment lines and you may ignore them. They are presented here for reference purposes only.

Note – Remember to create similar files for each component or machine.

```
# File: agent-acls-d.dat
# Version: %I% %E% %U%
#
# Copyright (c) 1993-1997 Halcyon Inc.
#
# e.g.
#   adminUsers =
#   operatorUsers =
#   generalUsers =
#   adminCommunities =
#   operatorCommunities =
#   generalCommunities =
#   adminGroups =
#   operatorGroups =
#   generalGroups =
#
#   adminUsers = helen margot
#   adminGroups = wheel
#   operatorGroups = esops
#   generalGroups = ANYGROUP
#   generalCommunities = public
```

For platform-specific information about security, see your supplement.

Getting Started With Sun Enterprise SyMON Software

TABLE A-1 is an example of how you can use the Sun Enterprise SyMON software. This table includes a summary of some typical tasks and the order in which they should be done. Each task is referenced to another section in the manual, which provides detailed, step-by-step directions.

The tasks and the order in which they are included in this table is based on the assumption that you will explore and learn the software before setting up your actual monitoring environment.

TABLE A-1 Example Use of Sun Enterprise SyMON Software

Task	For More Information, Go to
Create a domain.	“To Create Domains” on page 58
Populate the domain by creating objects.	Chapter 5
Populate the domain with the Discovery manager.	Chapter 6
Familiarize yourself with the console window.	Chapter 7
Navigate through Sun Enterprise SyMON software using the hierarchy (tree view).	“Hierarchy View” on page 116
Navigate through Sun Enterprise SyMON software using the topology view.	“Topology View” on page 118
Open the Details window.	“To Start the Details Window” on page 130
Load other modules.	“To Load a Module” on page 212
Disable some modules	“To Disable a Module” on page 224
Unload some modules.	“To Unload a Module” on page 225
Monitor your system using the modules.	Appendix C and Appendix D
Explore the different modules.	“Browser Tab” on page 133

TABLE A-1 Example Use of Sun Enterprise SyMON Software (*Continued*)

Task	For More Information, Go to
Explore the processes view.	"Processes Tab" on page 257
Explore the log view.	"Log View Tab" on page 263
Explore the physical view.	"Configuration Tab" on page 270
Explore the logical view.	"Configuration Tab" on page 270
View a property table.	"Monitoring Data Properties" on page 143
View a graph of a property table.	"To Graph A Monitored Data Property" on page 155
Create an alarm.	"To Create an Alarm" on page 174
Watch the alarm go up the hierarchy (tree) view.	"To Create an Alarm" on page 174
View the alarm through the Details window.	"Viewing Alarm Information" on page 239
View the alarm through the domain status summary.	"To Access Alarms from the Main Console Window" on page 242
Sort the alarms and become familiar with the Alarms window.	"Information on Alarms" on page 243
Acknowledge the alarm.	"Acknowledging and Deleting Alarms" on page 249
Delete the alarm.	"Acknowledging and Deleting Alarms" on page 249
Create alarm conditions.	"To Create an Alarm" on page 174
Set the refresh interval.	"Refresh Tab in the Attribute Editor" on page 178
Set security.	Chapter 15

Note – For additional information specific to your hardware, see your supplement.

Miscellaneous Sun Enterprise SyMON Procedures

This appendix documents the following procedures:

- To Regenerate the Security Keys
- To Configure a Legacy SNMP Agent as a Subagent of a Sun Enterprise SyMON Agent
- To Determine if a Port Is Used
- To Reconfigure Sun Enterprise SyMON Software to Use Nondefault Port Addresses
- To Reconfigure Sun Enterprise SyMON SNMP Port Addresses
- To Reconfigure Sun Enterprise SyMON RMI Port Address
- To Create a Server Component as a Monitored Object
- To Increase the Critical Threshold for the Virtual Size Data Property.
- To Change the Default Values for Smart Delete in the Event Manager
- To Use `ccat` to Read Sun Enterprise SyMON Log Files
- To Use `ctail` to Read Sun Enterprise SyMON Log Files
- To Resolve a Hanging Main Console Window
- To Connect to Console Client Machines with DHCP

Regenerating Security Keys

The Sun Enterprise SyMON setup generates the security keys for Sun Enterprise SyMON components using the following default settings:

- Valid Sun Enterprise SyMON users are `espublic` and `esmaster`
- Sun Enterprise SyMON superuser is `esmaster`

Note – The software uses an 8-character string as a seed to make the generated key unique. During setup, you have the option to use the default Sun Enterprise SyMON seed or to use one that you create. The same seed must be used for all server and agent setups in a given server context. For more information on server context, see Chapter 15.

Sun Enterprise SyMON setup does not create UNIX accounts for the special users `espublic` and `esmaster`. You should not need to log into the Sun Enterprise SyMON console using these user IDs because they are reserved for internal communication between processes. However, some troubleshooting activities may require you to log in using one of these user IDs. If so, you have to create it and assign a password using the normal UNIX commands `useradd` and `passwd`.

The `esmaster` user ID bypasses normal permission checks, so use it with care. For normal operation, use an existing login account. Setup provides an opportunity to specify an existing user as a Sun Enterprise SyMON administrator. This user ID is added to the `esadm` and `esdomadm` groups as well as the `esusers` file. For more information on security and the Sun Enterprise SyMON superuser, see Chapter 15.

The security keys for the components need to be regenerated if one or more of the following is true:

- UDP ports of any of the Sun Enterprise SyMON agents are changed.
- Host names or IP addresses of the Sun Enterprise SyMON agent host change.

Note – Changing the host name or the IP address of the Sun Enterprise SyMON server is not supported.

▼ To Regenerate the Security Keys

Note – In these examples, *shared_secret* stands for a secret string of up to eight characters that is common to all machines in a server context. It is required as an argument to the script `base-usm-seed.sh`. A default (`maplesyr`) is provided by the software, but you can specify your own password if desired. This secret string or password is used to generate keys for communication between processes. `-u public` is needed to respond to external SNMP requests with `public` communities.

1. Log in as `root`.
2. Depending on your installation, type one of the following.
 - If you installed only the agent layer, type:

```
# /opt/SUNWsymon/sbin/es_run base-usm-seed.sh -s shared_secret -c agent -u public
```

- If you installed only the server layer, type:

```
# /opt/SUNWsymon/sbin/es_run base-usm-seed.sh -s shared_secret -c topology -u public
# /opt/SUNWsymon/sbin/es_run base-usm-seed.sh -s shared_secret -c trap event
cfgserver servers
```

- If you installed both the agent and server layers on one host, type:

```
# /opt/SUNWsymon/sbin/es_run base-usm-seed.sh -s shared_secret -u public
```

3. Restart the Sun Enterprise SyMON server.

See “To Start the Sun Enterprise SyMON Software” on page 43.

Configuring a Legacy SNMP Agent as a Subagent of a Sun Enterprise SyMON Agent

A legacy SNMP agent is a SNMP agent that is not part of the Sun Enterprise SyMON agent framework. In real world situations, you may need to configure one or more legacy agents as subagents of a Sun Enterprise SyMON agent.

Any legacy SNMP agent can be configured as a subagent of a Sun Enterprise SyMON Agent provided that:

- The legacy agent can run on a port other than 161.
- The legacy agent configuration supports running that agent as a non-daemon process.
- You have the legacy agent MIB definition file.

▼ To Configure a Legacy SNMP Agent as a Subagent of a Sun Enterprise SyMON Agent

1. **Log in as root.**
2. **If the file `/var/opt/SUNWsymon/cfg/subagent-registry-d.x` does not exist, copy it from the `/opt/SUNWsymon/base/cfg` directory:**

```
# cp /opt/SUNWsymon/base/cfg/subagent-registry-d.x /var/opt/SUNWsymon/cfg/
```

3. **In the file `/var/opt/SUNWsymon/cfg/subagent-registry-d.x`, find the block that is similar to CODE EXAMPLE B-1.**

CODE EXAMPLE B-1 Before Editing Registry file

```
# sa2 = {  
#   type           = legacy  
#   persist        = false  
#   snmpPort       = "20001"  
#   errorAction    = restart  
#   startCommand   = "/usr/lib/snmp/mibiisa -p %port"  
#   stopCommand    = "kill -9 %pid"  
#   pollInterval   = 60  
#   pollHoldoff    = 60
```

CODE EXAMPLE B-1 Before Editing Registry file (Continued)

```
# oidTrees = 1.3.6.1.2.1
# snmpVersion = SNMPv1
# securityLevel = noauth
# securityName = espublic
# }
```

4. Remove the comment symbol at the beginning of the line (#) so that the code looks like CODE EXAMPLE B-2:

CODE EXAMPLE B-2 After Removing the Comment Symbol in the Registry file

```
sa2 = {
    type = legacy
    persist = false
    snmpPort = "20001"
    errorAction = restart
    startCommand = "/usr/lib/snmp/mibiisa -p %port"
    stopCommand = "kill -9 %pid"
    pollInterval = 60
    pollHoldoff = 60
    managedTrees = "mib-2 sun"
    oidTrees = 1.3.6.1.2.1
    snmpVersion = SNMPv1
    securityLevel = noauth
    securityName = espublic
}
```

5. Modify the lines as follows:

- a. Change `sa2` to the unique subagent name for the agent.
- b. `type` is `legacy`.
- c. `persist` is `false` if the subagent is stopped when the Sun Enterprise SyMON agent exits. If this value is `true`, then the Sun Enterprise SyMON agent does not stop the subagent when the Sun Enterprise SyMON agent exits.
- d. `snmpPort` is the UDP port number on which you want to run the subagent.
- e. `errorAction` can be `restart`, `ignore`, or `kill`. If the `restart` option is used, then the Sun Enterprise SyMON agent tries to restart if it encounters an error when communicating with the subagent. The other options result in the respective behaviors.
- f. `startCommand` is the mandatory command to start the subagent. This command should contain `%port`, which is replaced by the value given in `snmpPort`.

- g. `stopCommand` is the command to stop the process. `%pid` can be used to represent the process ID (PID) of the subagent process.
- h. `pollInterval` defines the time (in seconds) in which the Sun Enterprise SyMON agent polls the subagent.
- i. `pollHoldoff` is the time (in seconds) after which the first poll is done on the subagent after the latter is started by the Sun Enterprise SyMON agent.
- j. `oidTrees` gives the space-separated list of SNMP OIDs managed by the subagent.
- k. `snmpVersion` can take values `SNMPv1` and `SNMPv2`.
- l. `securityLevel` can be `priv`, `auth`, or `noauth`.
- m. `securityName` is the SNMPv1 community name or SNMPv2 security name to use.

For more details, refer to the descriptions in the `subagent-registry-d.x` file.

6. Stop then restart the agent:

```
# /opt/SUNWsymon/sbin/es-stop -a
# /opt/SUNWsymon/sbin/es-start -a
```

Configuring Sun Enterprise SyMON Software to Use Different Port Addresses

This section describes how to configure Sun Enterprise SyMON software when there is potential conflict for port addresses.

▼ To Determine if a Port Is Used

- To determine if a specific port number is used in your system, type:

```
# /bin/netstat -an|grep port_number
```

The Sun Enterprise SyMON server communicates with the Sun Enterprise SyMON agents and the other server components (Topology manager, Configuration manager, Event manager, and Trap handler) using SNMP. By contrast, the server communicates with the Sun Enterprise SyMON consoles using remote method invocation (RMI).

Several components require the use of network ports, as shown in the following table.

TABLE B-1 Sun Enterprise SyMON Default Port Addresses

Layer	Component	Default Port Number
Agent	agent	161
Server	Trap handler	162
Server	Event manager	163
Server	Topology manager	164
Server	Configuration manager	165
Server	server	2099

Note – The SNMP port definitions for Sun Enterprise SyMON components are found in two files: the `/var/opt/SUNWsymon/cfg/domain-config.x` file, which exists in every machine running any Sun Enterprise SyMON component, and the `/var/opt/SUNWsymon/cfg/server-config.x` file, which exists on machines that have the Sun Enterprise SyMON server component installed.

In the `domain-config.x` file, there is one configuration block for each of the SNMP-based Sun Enterprise SyMON agents. In each configuration block there is (at least) one line which defines the port address for the corresponding agent. The default port definition for the Sun Enterprise SyMON server is in the `server-config.x` file.

Setup scripts automatically configure the components by using the default port addresses. However, if any of the default ports are being used, then you must take action to avoid such conflicts in network port addresses.

▼ To Reconfigure Sun Enterprise SyMON Software to Use Nondefault Port Addresses

1. **Run the `es-setup` script to create the `domain-config.x` and `server-config.x` (server configuration setup) files.**

2. **Edit these files with the new port numbers.**

See the next section and “To Reconfigure Sun Enterprise SyMON RMI Port Address” on page 308 for more information.

▼ To Reconfigure Sun Enterprise SyMON SNMP Port Addresses

1. **Log in as root.**

2. **Edit the `domain-config.x` file and change the address port to an unused port.**

This example illustrates changing the agent default port address from 161 to 1161.

Before:

```
agent = {  
    snmpPort = 161
```

After:

```
agent = {  
    snmpPort = 1161
```

3. **Save the file.**

Note – Hosts with Sun Enterprise SyMON agents using port addresses other than 161 can be added to the domain manually by using the Create Topology Object window or can be discovered automatically by specifying the port number in the discovery parameters. (For more information on the Create Topology Object window, see Chapter 5. For more information on how hosts are discovered automatically, see Chapter 6). Since you can only specify one port number in addition to port 161, it is best to select an alternate port number and use that number for all agent installations.

▼ To Reconfigure Sun Enterprise SyMON RMI Port Address

1. **Log in as root.**

2. Edit the `/var/opt/SUNWsymon/cfg/server-config.x` **file.**

3. Search for the block which starts with `rmiReceptor`.

For example:

```
rmiReceptor = {
    [ use RECEPTORS.RMI ]

#   property:rmiPort = 2099
#   property:rmiHost = localhost

# 0 means user authentication is disabled
# 1 means user authentication is enabled
# property:securityFlag = 1

# -1 means no limit
# 0 means make a guess at a limit (base on # of fd's)
# >0 specifies the exact limit

#
}
```

4. Uncomment the line that reads `property:rmiPort = 2099` **by deleting the pound (#) character.**

5. Change the address port to a new unused port number.

For example:

```
property:rmiPort = 1199
```

This example illustrates changing the server default port address from 2099 to 1199.

6. Save the file.

Monitoring Topology Manager and Event Manager

There are five components in the server layer:

- Sun Enterprise SyMON server
- Topology manager
- Trap handler
- Configuration manager
- Event manager

With the exception of the server, the other four components are Sun Enterprise SyMON agents loaded with specialized modules.

You may want to monitor the Topology manager, Trap handler, Configuration manager, and Event manager to determine their status. See the next section for more information.

The Configuration manager and the Trap handler are configured so that you do not need to perform any maintenance procedures. In addition, the default configurations of both the Topology manager and the Event manager work for most user environments. However, you can modify the default configurations for specialized environments.

The default configuration for the Topology manager and the Event manager (and all other Sun Enterprise SyMON agents) is defined by the Agent Statistics module. See “Agent Statistics Module” on page 355 for more information about this module.

This module includes features that guard against errors that may bring down the host. The default action is for the software to terminate the Topology manager process if predefined thresholds are exceeded.

▼ To Create a Server Component as a Monitored Object

1. In the main console window, select Edit ► Create an Object.

The Create Topology Object window is displayed. By default the tab is set to Group. For more information, see “To Create a Node” on page 70.

2. Click the Node tab.

The window changes to display settings available for nodes.

3. Click the Monitor Via button to see the pull-down menu, then select SyMON Agent - Host.

4. Type the name of the server component in the Node Label field.

5. (Optional) Enter a description of the node.

6. Enter the name of the Sun Enterprise SyMON server in the Hostname field.

7. Type the port number for the server component in the Port field (FIGURE B-1).

See the table entitled “Sun Enterprise SyMON Default Port Addresses” on page 307 for the default port values for each of the server components.

8. Complete this procedure with one of the following actions:

- Click OK to create the server component object and close this window.
- Click Apply to create the server component object without closing this window.
- Click Cancel to cancel your request.

Create Topology Object

Group **Node** **Segment**

Monitor Via: SyMON Agent - Host ▼

Node Label: event

Description:

Hostname: SyMON_server

IP Address: **Port:** 163

OK **Apply** **Cancel** **Help**

FIGURE B-1 Creating a Server Component as a Monitored Object

Topology Manager

The Topology manager enables the main console window to present logical objects in a topology view. It also provides the ability to create a logical object (such as a group) whose status summarizes the statuses of managed objects residing on multiple hosts.

Managed objects include networks, hosts, hardware components, and software components. The total number of objects and the contents of these objects determine the system resource requirement (for example, Virtual Size) for the Topology manager. This requirement must be less than the defaults set for the Topology manager.

If the Virtual Size of the Topology manager exceeds the default value, then the Topology manager exits with the error message, “error excessive virtual memory use.” To solve this error, you need to increase the default virtual size by completing the following procedure after you have carefully evaluated the situation.

▼ To Increase the Critical Threshold for the Virtual Size Data Property.

1. Create the Topology manager monitored object.

See “To Create a Server Component as a Monitored Object” on page 311.

2. Open the Details window by proceeding with one of the following:

- Click the right mouse button on the Topology manager object icon and highlight Details from the pop-up menu in the hierarchy view or the topology view.
- Double-click the left mouse button on the Topology manager icon in the hierarchy view or the topology view.
- Select the Topology manager icon in the main console window, then select Tools ► Details.

3. In the Browser Details window, double-click on the Local Applications icon in the hierarchy (tree) view.

4. Double-click on the Agent Statistics icon in the contents view or single click in the light-colored circle next to the Agent Statistics icon in the hierarchy view.

The Agent Statistics folders are displayed.

5. Double-click on the PA Process Statistics folder icon in either the hierarchy or the contents view.

The monitored properties are displayed in a property table (FIGURE B-2).

PA Process Statistics

Property	Value
Process ID	1891
Process Unique Id	PID1891
Process Name	esd
Process Status	Up
Process State	O
User ID	0
Virtual Size (KB)	13416
Resident Set Size (KB)	11424
Start Date	11/04/98
Start Time	00:20:11
CPU Time	2738
Percent CPU Time (%)	1
Context Switches	193413
System Calls	1122492
Command Line	esd - init topology ...

FIGURE B-2 PA Process Statistics Property Table

6. **Select the Virtual Size table cell, then proceed with one of the following:**
 - Click the right mouse button in the table row and select Attribute Editor from the pop-up menu.
 - Click the Attributes button.
7. **Click on the Alarms tab button.**

The alarm rows are displayed (FIGURE B-3).
8. **Type the desired value in the Critical Threshold (>) field.**
9. **Complete this procedure with one of the following actions:**
 - Click OK to create a new Critical Threshold value and close this window.
 - Click Apply to create a new Critical Threshold value without closing this window.
 - Click Cancel to cancel your request.

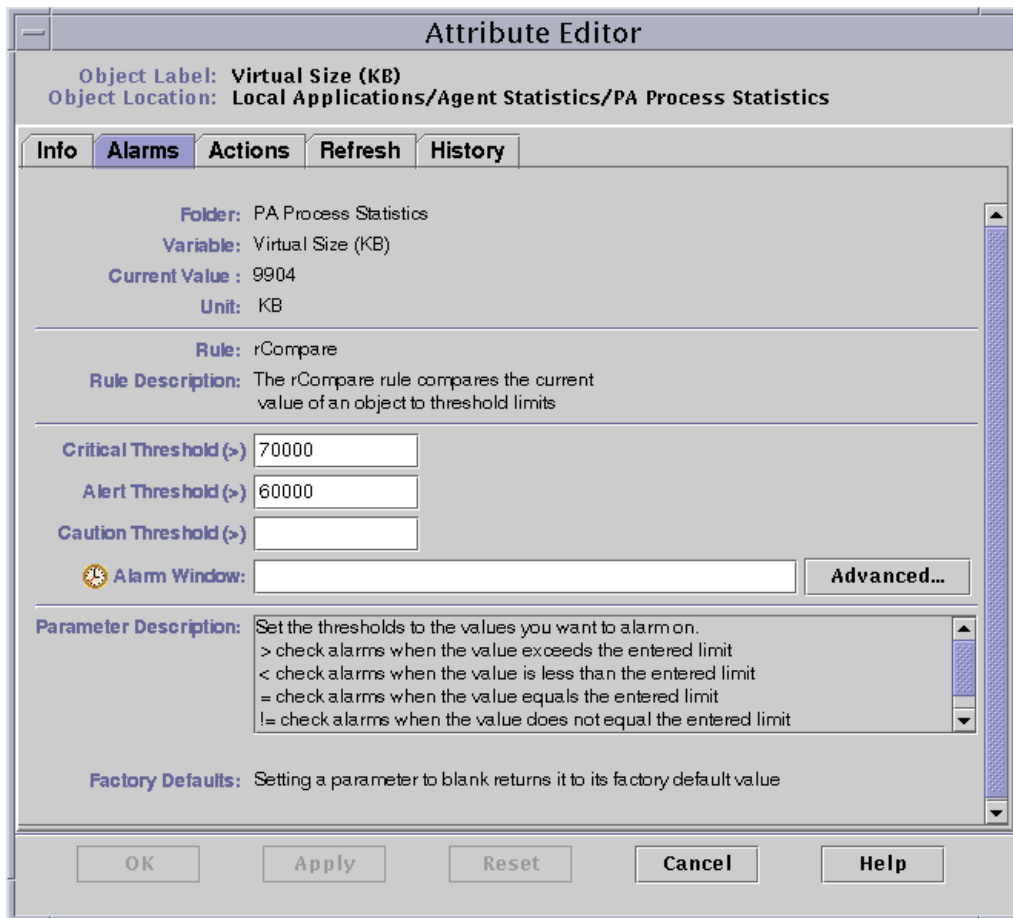


FIGURE B-3 Alarms Tab for the Virtual Size Property in the Topology Manager Object

Event Manager

The Event manager communicates with other server components through SNMP using the default port 163. Similar to the Topology manager, the Event manager is also loaded with the Agent Statistics module. In addition, the Event manager is automatically loaded with a specialized Event Management module which is displayed in the Browser Details window in the Local Applications category.

The Event Management module is responsible for the overall maintenance of the event database. Its responsibilities include purging deleted events, renaming the trash file, and “smart delete” (FIGURE B-4).

Location: Local Applications/Event Management

Module

Property	Value
Purge Deleted Events	SUCCESS
Rename Trash File	SUCCESS
Smart Delete	SUCCESS

FIGURE B-4 Event Management Module Data Properties

Smart delete means that Sun Enterprise SyMON automatically deletes closed, fixed, and open events from the event database after a set period of time. By default, the closed or fixed events are removed from the database after seven days and the open events are removed after 30 days. You can change these defaults with the following procedure.

▼ To Change the Default Values for Smart Delete in the Event Manager

1. Create the Event manager monitored object.

See “To Create a Server Component as a Monitored Object” on page 311.

2. Open the Details window by proceeding with one of the following:

- Click the right mouse button on the Event manager icon and highlight Details from the pop-up menu in the hierarchy view or the topology view.
- Double-click the left mouse button on the Event manager icon in the hierarchy view or the topology view.
- Select the Event manager icon in the main console window then select Tools ► Details.

3. In the Browser Details window, double-click on the Local Applications icon in the hierarchy (tree) view.

4. Select the Event Management module and proceed with one of the following:

For more information, see “To Edit Module Parameters” on page 222.

- Click the right mouse button and highlight Edit Module from the pop-up menu in the hierarchy view or the contents view.

- In the Details window, select **Module ► Edit Module**.
The Module Parameters Editor is displayed.
- 5. Type the new time values into the editable fields.**
The default time values are displayed in FIGURE B-5.
- 6. Alternately, you may turn off “smart delete” by selecting Disabled in the pull-down menu next to the Smart Delete Enabled Switch field.**
- 7. Complete this procedure with one of the following actions:**
 - Click OK to accept the changes you have made and close this window.
 - Click Reset to reset the Module Parameter Editor to the default parameters.
 - Click Cancel to cancel your request.

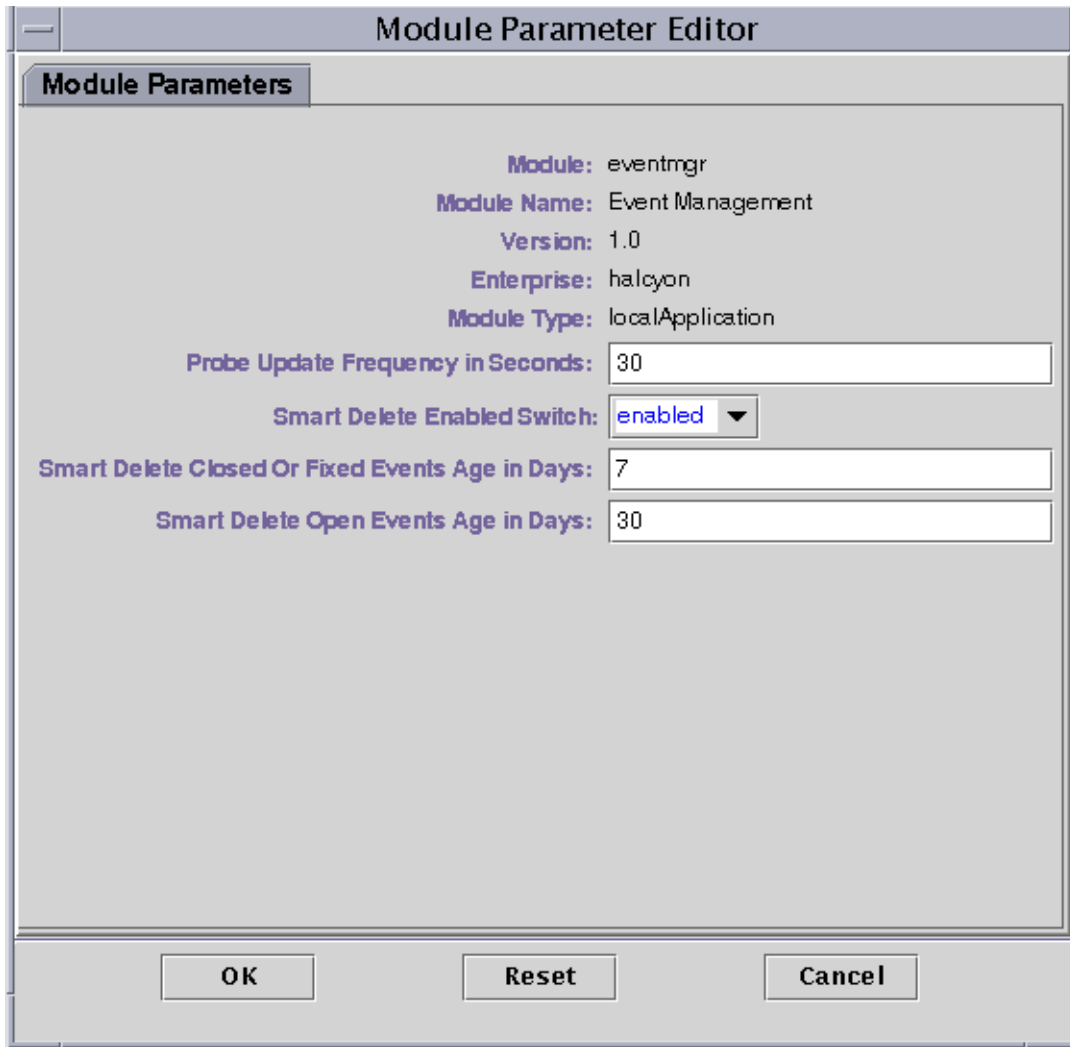


FIGURE B-5 Module Parameter Editor for the Event Management Module

Reading Sun Enterprise SyMON Log Files

The server and agents write to various log files in the directory, `/var/opt/SUNWsymon/log`.

These files are “circular log files.” A circular log file does not grow in size after a certain limit. As new messages are logged into the file, the oldest messages are removed.

Use the `es-run` interface with the `ctail` and `ccat` commands to view these log files. The `es-run` interface sets up the proper environment to run Sun Enterprise SyMON utilities. The utilities `ccat` and `ctail` display only the relevant data, after sorting the data in chronological order. The `ccat` and `ctail` commands are similar to the UNIX `cat` and `tail` commands, but are intended for use with Sun Enterprise SyMON circular log files.

▼ To Use `ccat` to Read Sun Enterprise SyMON Log Files

The `ccat` command reads the specified log file, sorts the messages in chronologically ascending order, and writes to the standard output. The `ccat` command takes one argument, which is the full path to the circular log file.

- Use the `es-run` interface with the `ccat` command:

```
# /opt/SUNWsymon/sbin/es-run ccat path_to_file/filename
```

▼ To Use `ctail` to Read Sun Enterprise SyMON Log Files

The `ctail` command reads the circular log file and by default writes the last 15 lines of the file to standard output.

The `ctail` command takes four arguments: *filename* and the `-f`, `-l`, and `-n` options where:

The *filename* argument is the full path name to the circular log file. The *filename* argument is mandatory.

`-f` option is used to monitor the growth of the log file. As the log file grows, the messages appended to the file are also written to the standard output. The `ctail -f` option is similar to the `-f` option for the UNIX `tail` command.

`-l` option is used to print the absolute line number at the beginning of each message.

`-n NumOfLines` option is used to change the number of lines displayed. By default only the last 15 lines are printed.

- Use the `es-run` interface with the `ctail` command:

```
# /opt/SUNWsymon/sbin/es-run ctail [-f, -l, -n NumOfLines] path_to_file_filename
```

Sun Enterprise SyMON Server Issues

This section discusses the following issues:

- The main console window hangs when users are attempting to start a new console window and connect to the Sun Enterprise SyMON server. However, existing console window connections encounter no problems.
- The Sun Enterprise SyMON server does not support console client machines that use dynamic IP address (DHCP).

Hanging Main Console Window

This problem occurs because threads that are reading from a socket can hang when there is a large discrepancy between the read and write rates at either end of a socket. The memory problem occurs when the Sun Enterprise SyMON server has a large amount of buffered data waiting to be sent to its clients. This buffered data is so large that the server runs out of memory while trying to write to the socket. Once this happens, the server does not recover.

▼ To Resolve a Hanging Main Console Window

1. **Edit the** `/opt/SUNWsymon/classes/base/server/bin/es-server.sh` **file.**
2. **Depending on the memory configuration on your Sun Enterprise SyMON server, increase the available memory to the server process.**

For example, double the default memory from 24 Mbytes to 48 Mbytes.

Console Client Machines with DHCP

The Sun Enterprise SyMON server does not connect properly to console client machines that use DHCP.

▼ To Connect to Console Client Machines with DHCP

1. **Edit the** `/opt/SUNWsymon/classes/base/console/bin/es-console.sh` **file.**
2. **Add the following after** `jre` **on the last line where** `IP_Address` **is the IP address of the console host.**

```
jre -Djava.rmi.server.hostname=IP_Address
```


Sun Enterprise SyMON Software - Operating System Modules

The Sun Enterprise SyMON software monitors various components of your system, including your hardware, operating environment, local applications, and remote systems. This section provides additional explanation for the core modules described in Chapter 12 and presents them in their respective categories.

This appendix describes the following modules. For more information on other modules that may be applicable to your particular system, see the next appendix, your supplement, or go to the Sun Enterprise SyMON web site: <http://www.sun.com/symon>.

- Operating System
 - Directory Size Monitoring Module
 - File Monitoring Module
 - MIB-II Instrumentation Module
 - Kernel Reader Module
 - NFS Statistics Module
 - Solaris Process Details Module

Most of these modules have default monitoring conditions that generate alarms when system values fall outside of these conditions. You may alter these default thresholds by creating your own alarm thresholds, as explained in Chapter 12.

Also, there are modules that utilize the *Add Row* operation to define what data properties to monitor. These modules will come up with empty tables and you have to execute an Add Row operation to activate the specifics for monitoring the modules.

The following table lists the modules described in this appendix alphabetically and provides details on those modules that are automatically loaded and those that can be loaded multiple times. It also points out those modules that utilize the Add Row utility.

TABLE C-1 Modules Loaded Automatically, Multiple Times, and Use 'Add Row' Operation

Alphabetical Listing of Core Modules	Module Loads Automatically	Module Loads Multiple Times	Module Uses Add Row Utility
Config-Reader Module ¹	X		
Directory Size Monitoring Module		X	
Dynamic Reconfiguration Module ²			
File Monitoring Module		X	X ³
Kernel Reader Module	X		
MIB-II Instrumentation Module	X		
NFS File Systems Module			
NFS Statistics Module			
Solaris Process Details Module			

1. Refer to your platform-specific supplement for more information on the Config-Reader module.

2. Refer to your platform-specific supplement for more information on the Dynamic Reconfiguration module.

3. Each added row defines what file to monitor.

Operating System

The following modules, when loaded, are found under the operating system icon:

- Directory Size Monitoring Module
- File Monitoring Module
- MIB-II Instrumentation Module
- Kernel Reader Module
- NFS Statistics Module
- Solaris Process Details Module
- NFS File Systems Module

These modules monitor the operating system on your host.

Directory Size Monitoring Module

This module enables you to isolate and monitor the size of any directory and its subdirectories on a host on which an agent is installed. The subdirectories and links may be viewed recursively using a window accessible from the modules pop-up menu.

Note – Any number of directories may be monitored individually by loading multiple instances of the Directory Size Monitoring module.

Directory Monitoring Status Table

The following table provides a brief description of the properties for Directory Size Monitoring:

TABLE C-2 Directory Size Monitoring Properties

Property	Description
Directory Name	Name of the directory being monitored
Directory Size (KB)	Current size of the directory in Kbytes
Rate (KB/sec)	Rate at which the directory is changing size in Kbytes per second

File Monitoring Module

This module enables you to monitor the files on a host. Any file or number of files may be isolated and monitored individually by loading multiple instances of the File Monitoring module. This module requires you to add rows for the data property tables. For more information, see “Working with Rows” on page 146.

File Monitoring Status Table

The following table lists the File Monitoring Status properties and their descriptions:

TABLE C-3 File Monitoring Properties

Property	Description
Name	Name of the file being monitored
Description	Descriptive name provided for this file when added
Filename	File being monitored
Last Modified	Date and time the file last changed
File Size (Bytes)	Size of the file
Size Rate (Bytes)	Number of bytes written per second

MIB-II Instrumentation Module

This section presents information on the MIB-II Instrumentation module. It describes the property tables that belong to the following MIB-II groups:

- MIB-II System Group Table
- MIB-II Interfaces Group Tables
- MIB-II IP Group Table
- MIB-II ICMP Group Table
- MIB-II TCP Group Tables
- MIB-II UDP Group Tables

MIB-II System Group Table

The following table provides a brief description of the properties for MIB-II System Group:

TABLE C-4 MIB-II System Group Properties

Property	Description
System Description	MIB-II system description or the description of the host (read-write)
System OID	Object identifier or the Object ID (OID) of the software system
Time Since System Is Up	Time in microseconds since the system is up
System Contact	The contact name for this system

TABLE C-4 MIB-II System Group Properties (*Continued*)

Property	Description
System Name	The qualified host name on which the agent is running (read-write)
System Location	The physical location of the host (read-write)
System Services	Sum integer value indicating the set of services primarily offered

MIB-II Interfaces Group Tables

The following tables provide a brief description of the properties for the MIB-II Interface group:

- MIB-II Interfaces Group Table
- MIB-II Interface Table

MIB-II Interfaces Group Table

The following table provides a brief description of the properties for MIB-II Interfaces Group:

TABLE C-5 MIB-II Interfaces Group Properties

Property	Description
Number of Interfaces	Number of interfaces to the machine, including the loopback

MIB-II Interface Table

The following table provides a brief description of the properties for MIB-II Interfaces:

TABLE C-6 MIB-II Interface Properties

Property	Description
IF Index	Index of the interface in this table
IF Descr	Description of the interface
IF Type	Type of the interface

TABLE C-6 MIB-II Interface Properties (*Continued*)

Property	Description
IF Largest MTU	Size of the largest datagram that can be sent on the interface
IF Speed	Bandwidth of the interface
IF Physical Address	Physical address of the interface
IF Admin Status	Desired state of the interface
IF Oper Status	Operational state of the interface
IF Last Change	Value of sysUpTime (that is, time when the system is up and running) when the operational state has changed last time
IF In Octets	Octets received on the interface
IF In Unicast Pkts	Unicast packets received on the interface
IF In NonUnicast Pkts	Non-unicast packets received on the interface
IF In Discards	Number of packets on the interface that are chosen to be discarded
IF In Errors	Number of inbound packets on the interface that contained errors
IF In Unknown Protos	Number of packets with unsupported protocol that were received on the interface
IF Out Octets	Number of octets transmitted out on the interface
IF Out Unicast Pkts	Number of unicast packets transmitted out on the interface
IF Out NonUnicast Pkts	Number of non-unicast packets transmitted out on the interface
IF Out Discards	Number of outbound packets on the interface that contained errors
IF Out Errors	Number of outbound packets that could not be transmitted because of errors
IF Out Queue Length	Length of the output packet queue
IF Specific	Reference to the MIB definitions specific to the particular media

MIB-II IP Group Table

The following tables provide a brief description of the properties for MIB-II IP:

- MIB-II Group Table
- IP Address Table
- IP Route Table
- IP NetToMedia Table

MIB-II Group Table

The following table provides a brief description of the properties for MIB-II IP Group:

TABLE C-7 MIB-II Group Properties

Property	Description
IP Forwarding	Indicates whether this entity is a gateway
IP Default TTL	Default Time-to-Live inserted into the IP headers
IP In Receives	Number of datagrams received
IP In Header Errors	Number of input datagrams discarded because of errors in IP headers
IP In Address Errors	Number of input datagrams discarded because of errors in destination IP address
IP Forwarded Datagrams	Number of forwarded datagrams
IP In Unknown Protos	Number of locally addressed datagrams that were discarded because of unsupported protocols
IP In Discards	Number of input datagrams that were discarded
IP In Delivers	Number of input datagrams that were successfully delivered
IP Out Requests	Number of datagrams that were supplied to IP for transmission
IP Out Discards	Number of output IP datagrams that were discarded
IP Out No Routes	Number of output IP datagrams that were discarded because no route destination was found
IP Reassemble Timeouts	Maximum time in seconds for which the received fragments were held for reassembly
IP Reassemble Requireds	Number of IP fragments received that required reassembly
IP Reassemble OKs	Number of IP datagrams that were successfully reassembled
IP Reassemble Fails	Number of failures detected by the reassembly algorithm
IP Fragmentation OKs	Number of IP datagrams that were successfully fragmented
IP Fragmentation Fails	Number of IP datagrams that have failed fragmentation
IP Fragmentation Creates	Number of IP datagram fragments that were generated due to fragmentation
IP Routing Discards	Number of routing entries that were chosen to be discarded

IP Address Table

The following table provides a brief description of the properties for IP Addresses:

TABLE C-8 IP Addresses Properties

Property	Description
IP Address Table	IP Address Table
IPAT IP Address	IP Address to which this entry's addressing information pertains
IPAT IfIndex	Index in the interface table for the corresponding interface
IPAT Net Mask	Subnet mask associated with the IP address
IPAT Broadcast Address	Value of the least significant bit in the IP broadcast address
IPAT Reassemble Max Size	Size of the largest IP datagram which can be reassembled by this entity

IP Route Table

The following table provides a brief description of the properties for IP Route:

TABLE C-9 IP Route Properties

Property	Description
IP Route Table	Entity's IP routing table
IP Route Destination	Destination IP address of the route
IP Route IfIndex	Index of the interface in the interface table through which the next hop of this route is reached
IP Route Metric1	Primary routing metric for the route that is specific to the routing 1 protocol
IP Route Metric2	Alternate routing metric for the route that is specific to the routing 2 protocol
IP Route Metric3	Alternate routing metric for the route that is specific to the routing 3 protocol
IP Route Metric4	Alternate routing metric for the route that is specific to the routing 4 protocol
IP Route NextHop	IP address of the next hop of this route
IP Route Type	Type of route
IP Route Proto	Routing mechanism through which this route was learned

TABLE C-9 IP Route Properties (*Continued*)

Property	Description
IP Route Age	Number of seconds since the route was last updated
IP Route Mask	Mask to be logical and with the destination address before being compared to the route destination
IP Route Metric5	Alternate routing metric for the route that is specific to the routing 5 protocol
IP Route Info	Reference to MIB definitions specific to the routing protocol

IP NetToMedia Table

The following table provides a brief description of the properties for IP NetToMedia:

TABLE C-10 IP NetToMedia Properties

Property	Description
IPN2M IfIndex	Index of the interface in the interface table on which this entry's equivalence is effective
IPN2M PhysAddress	Media-dependent physical address
IPN2M NetAddress	IP address corresponding to the physical address
IPN2M Type	Type of mapping

MIB-II ICMP Group Table

The following table provides a brief description of the properties for MIB-II ICMP Group:

TABLE C-11 MIB-II ICMP Group Properties

Property	Description
ICMP In Messages	Number of ICMP messages received
ICMP In Errors	Number of ICMP messages received with errors
ICMP In Dest Unreachs	Number of ICMP destination unreachable messages received
ICMP In Time Exceeds	Number of ICMP time exceeded messages received

TABLE C-11 MIB-II ICMP Group Properties *(Continued)*

Property	Description
ICMP In Parameter Problems	Number of ICMP parameter problem messages received
ICMP In Src Quenches	Number of ICMP source quench messages received
ICMP In Redirects	Number of ICMP redirect messages received
ICMP In Echos	Number of ICMP echo request messages received
ICMP In Echo Repls	Number of ICMP echo reply messages received
ICMP In Timestamps	Number of ICMP timestamp request messages received
ICMP In Timestamp Repls	Number of ICMP timestamp reply messages received
ICMP In Address Masks	Number of ICMP address mask request messages received
ICMP In Address Mask Repls	Number of ICMP address mask reply messages received
ICMP Out Messages	Number of ICMP messages that were attempted to send
ICMP Out Errors	Number of ICMP messages that were not send due to problems
ICMP Out Dest Unreachs	Number of ICMP destination unreachable messages sent
ICMP Out Time Exceeds	Number of ICMP time exceeded messages sent
ICMP Out Parameter Problems	Number of ICMP parameter problem messages sent
ICMP Out Src Quenches	Number of ICMP source quench messages sent
ICMP Out Redirects	Number of ICMP redirect messages sent
ICMP Out Echos	Number of ICMP echo request messages sent
ICMP Out Echo Repls	Number of ICMP echo reply messages sent
ICMP Out Timestamps	Number of ICMP timestamp request messages sent

TABLE C-11 MIB-II ICMP Group Properties (*Continued*)

Property	Description
ICMP Out Timestamp Reps	Number of ICMP timestamp reply messages sent
ICMP Out Address Masks	Number of ICMP address mask request messages sent
ICMP Out Address Mask Reps	Number of ICMP address mask reply messages sent

MIB-II TCP Group Tables

The following tables provide a brief description of the properties for MIB-II TCP:

- MIB-II TCP Group Table
- TCP Connections Table

MIB-II TCP Group Table

The following table provides a brief description of the properties for MIB-II TCP Group:

TABLE C-12 MIB-II TCP Group Properties

Property	Description
TCP Retransmission Algorithm	Algorithm used to determine the timeout value used for retransmitting unacknowledged octets
TCP Retransmit Min Timeout	Minimum value permitted by TCP implementation for the retransmission timeout
TCP Retransmit Max Timeout	Maximum value permitted by TCP implementation for the retransmission timeout
TCP Max Connections	Limit on the number of TCP connections
TCP Active Opens	Number of times TCP connections have transitioned to SYN-SENT from CLOSED state
TCP Passive Opens	Number of times TCP connections have transitioned to SYN-RCVD from LISTEN state
TCP Attempt Fails	Number of times TCP connections have transitioned from SYN-SENT or SYN-RCVD to COLSED state and from SYN-RCVD to LISTEN state

TABLE C-12 MIB-II TCP Group Properties (*Continued*)

Property	Description
TCP Established-to-Resets	Number of times TCP connections have transitioned from ESTABLISHED or CLOSE-WAIT to CLOSED state
TCP Current Established	Number of TCP connections for which the current state is ESTABLISHED or CLOSE-WAIT
TCP In Segments	Number of segments received
TCP Out Segments	Number of segments sent
TCP Retransmitted Segments	Number of segments retransmitted
TCP In Errors	Number of segments received in error
TCP Out With Reset Flag	Number of segments sent containing the RST flag

TCP Connections Table

The following table provides a brief description of the properties for TCP Connections:

TABLE C-13 TCP Connections Properties

Property	Description
TcpConn State	State of this TCP Connection
TcpConn Local Address	Local IP address for this TCP connection
TcpConn Local Port	Local port number for this TCP connection
TcpConn Remote Address	Remote IP address for this TCP connection
TcpConn Remote Port	Remote port number for this TCP connection

MIB-II UDP Group Tables

The following tables provide a brief description of the properties for MIB-II UDP:

- MIB-II UDP Group Table
- UDP Table

MIB-II UDP Group Table

The following table provides a brief description of the properties for MIB-II UDP Group:

TABLE C-14 MIB-II UDP Group Properties

Property	Description
UDP In Datagrams	Number of UDP datagrams delivered to UDP users
UDP No Port Datagrams	Number of received UDP datagrams for which there is no application at the destination port
UDP In Errors	Number of received UDP datagrams that could not be delivered
UDP Out Datagrams	Number of UDP datagrams sent

UDP Table

The following table provides a brief description of the properties for UDP:

TABLE C-15 UDP Properties

Property	Description
UDP Local Address	The local IP address for this UDP listener
UDP Local Port	The local port number for this UDP listener

Kernel Reader Module

The Kernel Reader module monitors kernel statistics and all kernel information including CPU statistics, system load statistics, disk statistics, file system usage, and so on. This section includes properties and their descriptions for all Kernel Reader managed objects:

- Disk Statistics Managed Objects Tables
- File System Usage Table
- System Load Statistics Table
- Filesystem Usage Table
- CPU Statistics Managed Object Tables
- Memory Usage Statistics Table
- Swap Statistics Table
- Streams Statistics Managed Objects Table
- Software Rules Table

The Kernel Reader module generates a warning alarm if it finds any disk with an increasing wait queue while busy.

A warning alarm occurs when the disk is over 75% busy and the average queue length is over 10 with an increasing wait queue. The warning alarm is on until the disk is not over 70% busy and the average queue length is no longer than 8. Similarly, this module generates a warning alarm if 90% of swap space is in use. The alarm remains open until the swap space in use is less than 80% of the total swap space.

The following table provides default alarm thresholds for applicable Kernel Reader modules:

TABLE C-16 Kernel Reader Alarm Thresholds

Alarm Threshold Message	Condition
Error	If file system kpctUsed is > 98
Warning	If file system kpctUsed is > 90
Error	If file system inode percentage is > 90
Warning	If file system inode percentage is > 80

Disk Statistics Managed Objects Tables

The following tables provide a brief description of the properties for Disk Statistics:

- Disk Details Table
- Disk Service Time Table

The following table provides a brief explanation of what these tables contain:

TABLE C-17 Disk Statistics Parameters

Property	Description
Disk Details	Details that pertain to the disk
Disk Service Time	Average time with relation to the processing of a transaction

Disk Details Table

The following table provides a brief description of the properties for Disk Details:

TABLE C-18 Disk Details Properties

Property	Description
Diskname	Name of the disk (sd0 and so on)
Diskalias	Name of the disk (c0t0d0 and so on)
Read Operation Per Sec	Read operation per sec
Writes Operation Per Sec	Writes operation per sec
Operation Per Sec (read + write)	Operation per sec (read and write)
Number Of Bytes Read	Number of bytes read
Number Of Bytes Written	Number of bytes written
Number Of Bytes Transferred (r+w)	Number of bytes transferred (read and write)
Average Number Of Transactions Waiting	Average number of transactions waiting
Average Number Of Transactions Running	Average number of transactions running

Disk Service Time Table

The following table provides a brief description of the properties for Disk Service Time:

TABLE C-19 Disk Service Time Properties

Property	Description
Diskname	Name of the disk (sd0 and so on)
Percentage Of Time There Is A Transaction Waiting For Service	Percentage of time there is a transaction waiting for service (wait queue length)
Percentage Of Time The Disk Is Busy	Percentage of time the disk is busy (transaction running)

TABLE C-19 Disk Service Time Properties (*Continued*)

Property	Description
Average Wait Service Time	Average wait service time
Average Run Service Time	Average run service time
Average Service Time	Average service time

Filesystem Usage Table

The following table provides a brief description of the properties for Filesystem Usage:

TABLE C-20 Filesystem Usage Properties

Property	Description
Mount Point	Mount point for the file system
Disk Name	Name of the device (/dev/dsk/ . . .)
Size (KB)	Total size of the filesystem in Kbytes
Free (KB)	Available disk space in Kbytes
Free KB (Non Root)	Available disk space for non-superusers in Kbytes
Percent Used	Percentage of Disk Space Used
Total Inodes	Total size of the filesystem in Kbytes
Available Inodes	Available disk space for the file system in Kbytes
Percentage Of Inodes Used	Percentage of Inodes Used

Note – The Find All Recent Files probe commands for UFS Filesystem Usage and VXFS Filesystem Usage *only* finds files that were created 24 or more hours ago. However, the Find All Files probe commands for UFS Filesystem Usage and VXFS Filesystem Usage finds all files, including those that have just been created (FIGURE C-1).

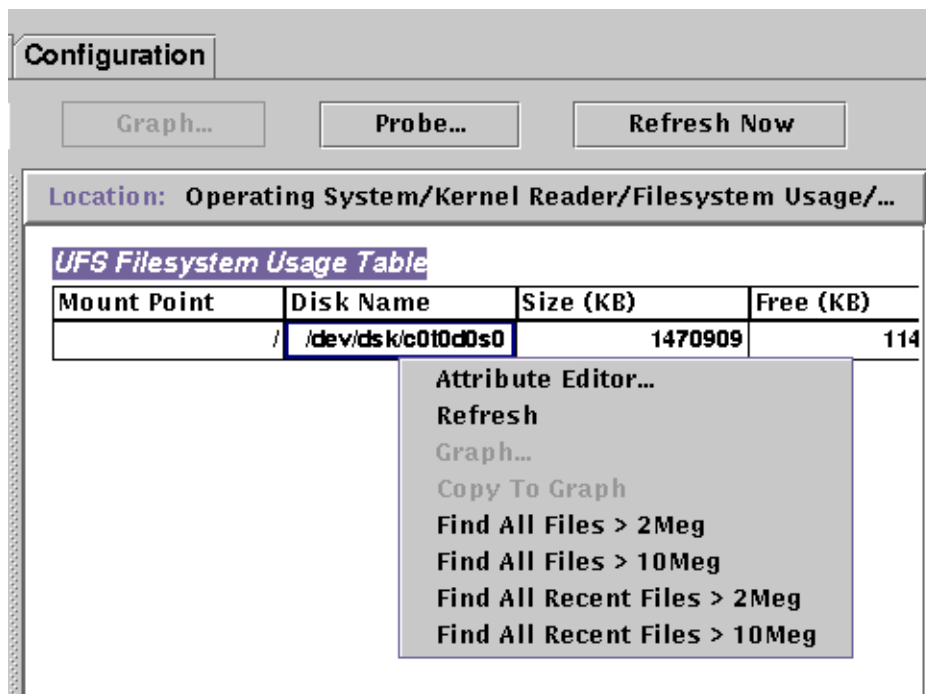


FIGURE C-1 Probe Commands for Filesystem Usage

User Statistics Table

The following table provides a brief description of the properties for Solaris User Statistics:

TABLE C-21 Solaris User Statistics Properties

Property	Description
Console User	User currently logged in on the console
Number Of Users	Number of unique users currently logged in
Number Of User Sessions	Number of currently active user sessions
Primary User	Login name of the primary user

System Load Statistics Table

The following table provides a brief description of the properties for System Load Statistics:

TABLE C-22 System Load Statistics Properties

Property	Description
1 Min Load Average	Load average over the last 1 minute
5 Min Load Average	Load average over the last 5 minutes
15 Min Load Average	Load average over the last 15 minutes

CPU Statistics Managed Object Tables

The following tables provide a brief description of the properties for CPU Statistics managed objects:

- CPU Utilization Table
- CPU I/O Table
- CPU Interrupts Table
- CPU Systemcall Table
- CPU Misc Table
- CPU Process
- CPU Regwindow Table
- CPU Pageinfo Table
- CPU Faults Table

CPU Utilization Table

The following table provides a brief description of the properties for CPU Utilization:

TABLE C-23 CPU Usage Properties

Property	Description
CPU Number	CPU number
% CPU Idle Time	Percentage of time spent by CPU on idle mode
% CPU User Time	Percentage of time spent by CPU on user mode
% CPU Kernel Time	Percentage of time spent by CPU on kernel mode
% CPU Wait Time	Percentage of time spent by CPU on wait mode

TABLE C-23 CPU Usage Properties (Continued)

Property	Description
% CPU Wait Time On I/O	Percentage of time spent by CPU on wait mode for I/O
% CPU Wait Time On Swap	Percentage of time spent by CPU on wait mode for swap
% CPU Wait Time On Pio	Percentage of time spent by CPU on wait mode for Pio
Times Idle Thread Scheduled	Percentage of idle time spent by CPU on threads scheduled

CPU I/O Table

The following table provides a brief description of the properties for CPU I/O:

TABLE C-24 CPU I/O Properties

Property	Description
CPU Number	Central Processing Unit (CPU) number
Physical Block Reads	Number of physical block reads
Physical Block Writes	Number of physical block writes
Logical Block Reads	Number of logical block reads
Logical Block Writes	Number of logical block writes
Raw I/O Reads	Number of raw I/O reads
Raw I/O Writes	Number of raw I/O writes
Bytes Read By Rdwr()	Number of bytes read by Rdwr()
Bytes Written By Rdwr()	Number of bytes written by Rdwr()
Terminal Input Characters	Number of terminal input characters
Chars Handled In Canonical Mode	Number of chars handled in canonical mode
Terminal Output Characters	Number of terminal output characters
Physical Block Writes	Number of physical block writes
Procs Waiting For Block I/O	Number of processes waiting for block I/O

CPU Interrupts Table

The following table provides a brief description of the properties for CPU Interrupts:

TABLE C-25 CPU Interrupts Properties

Property	Description
CPU Number	CPU number
Context Switches	Number of context switches
Traps	Number of traps
Device Interrupts	Number of device interrupts
Interrupts As Threads	Number of interrupts as threads
Intrs Blkd/Prempted/ Released	Number of interrupts blocked, pre-empted or released

CPU Systemcall Table

The following table provides a brief description of the properties for CPU Syscalls:

TABLE C-26 CPU Systemcall Properties

Property	Description
CPU Number	CPU number
System Calls	Number of system calls
Read+Readv System Calls	Number of read+ready system calls
Write+Writev System Calls	Number of Write+Writev system calls
Forks	Number of forks
Vforks	Number of Vforks
Execs	Number of executables
Msg Count	Number of message count
Semaphore Ops Count	Number of semaphore operation count
Pathname Lookups	Number of pathname lookups
ufs_iget() Calls	Number of ufs_iget() calls
Directory Blocks Read	Number of directory block reads
Inodes Taken With Attached Pages	Number of indexes taken with attached pages

TABLE C-26 CPU Systemcall Properties (*Continued*)

Property	Description
Indoes Taken With No Attached Pages	Number of indexes taken with no attached pages
Inode Table Overflows	Number of Inode table overflows
File Table Overflows	Number of file table overflows
Proc Table Overflows	Number of process table overflows

CPU Misc Table

The following table provides a brief description of the properties for CPU Miscellaneous:

TABLE C-27 CPU Miscellaneous Properties

Property	Description
CPU Number	CPU number
Involuntary Ctx Switches	Number of involuntary context switches
Thread_create(s)	Number of thread_create(s)
Cpu Migrations By Threads	Number of CPU migrations by threads
Xcalls To Other Cpus	Number of Xcalls to other CPUs
Failed Mutex Enters (adaptive)	Number of failed mutex enters (adaptive)
Rw Reader Failures	Number of read/write reader failures
Rw Write Failures	Number of read/write write failures
Loadable Module Loaded	Number of loadable module loaded
Loadable Module Unloaded	Number of loadable module unloaded
Tries To Acquire RW Lock	Number of tries to acquire read/write lock

CPU Regwindow Table

The following table provides a brief description of the properties for CPU Regwindow:

TABLE C-28 CPU Regwindow Properties

Property	Description
CPU Number	CPU number
User Overflows	Number of user overflows
User Underflows	Number of user underflows
System Overflows	Number of system overflows
System Underflows	Number of system underflows
System User Overflows	Number of system user overflows

CPU Pageinfo Table

The following table provides a brief description of the properties for CPU Pageinfo:

TABLE C-29 CPU Pageinfo Properties

Property	Description
CPU Number	CPU number
Reclaims	Number of reclaims
Reclaims From Free List	Number of reclaims from free list
Pageins	Number of pageins
Pages Paged In	Number of pages paged in
Pageouts	Number of pageouts
Pages Paged Out	Number of pages paged out
Swapins	Number of swap ins
Pages Swapped In	Number of pages swapped in
Swapouts	Number of swap outs
Pages Swapped Out	Number of pages swapped out
Pages Zero Filled On Demand	Number of pages zero filled on demand
Pages Freed By Daemon	Number of pages fixed by daemon

TABLE C-29 CPU Pageinfo Properties (*Continued*)

Property	Description
Pages Examined By Pageout Daemon	Number of pages examined by the pageout daemon
Revolutions Of The Page Daemon Hand	Number of revolutions of the page daemon hand
Times Pager Scheduled	Number of times pager scheduled

CPU Faults Table

The following table provides a brief description of the properties for CPU Faults:

TABLE C-30 CPU Faults Properties

Property	Description
CPU Number	CPU number
Minor Page Faults Via <code>hat_fault()</code>	Number of minor page faults through <code>hat_fault()</code>
Minor Page Faults Via <code>as_fault()</code>	Number of minor page faults through <code>as_fault()</code>
Major Page Faults	Number of major page faults
Copy-on-write Faults	Number of copy-on write faults
Protection Faults	Number of protection faults
Faults Due To Software Locking Req	Number of software locking faults
<code>as_fault()</code> s In Kernel <code>addr</code> Space	Number of in kernel <code>addr</code> space

Memory Usage Statistics Table

The following table provides a brief description of the properties for Memory Usage Statistics:

TABLE C-31 Memory Usage Statistics Properties

Property	Description
Physical Memory Available (MB)	Physical memory available in Mbytes
Physical Memory In Use (MB)	Physical memory in use in Mbytes

TABLE C-31 Memory Usage Statistics Properties (*Continued*)

Property	Description
Percent Memory Used	Percentage of memory used
Physical Memory Free (MB)	Physical memory free in Mbytes
Percent Memory Free	Percentage of memory free

Swap Statistics Table

The following table provides a brief description of the properties for Swap Statistics:

TABLE C-32 Swap Statistics Properties

Property	Description
Available KB (Anon Memory Not Reserved)	Swap available. Total reserved swap space.
Reserved KB (Anon Memory Reserved But Not Allocated)	Swap reserved
Allocated KB (Anon Memory Not Free)	Swap allocated
Used KB	Swap used
Total KB (Used + Available)	Swap total
Percent Swap Used	Percentage of swap used

Streams Statistics Managed Objects Table

The following section provides the various Streams Statistics properties for the following managed objects:

- Streams Head Cache
- Queue Cache
- Streams Messages
- Linkinfo Cache
- Strevent Cache
- Synoq Cache
- Qband Cache

The following table briefly describes the managed objects:

TABLE C-33 Streams Statistics Managed Objects

Properties	Description
Stream Head Cache	Kernel statistics for streams head cache
Queue Cache	Kernel statistics for queue cache
Streams Msgs	Kernel statistics for streams messages
Linkinfo Cache	Kernel statistics for link information cache
Strevent Cache	Kernel statistics for streams event cache
Syncq Cache	Kernel statistics for synoq cache
Qband Cache	Kernel statistics for qband cache

All of the preceding property tables have similar entries. These are listed in the following table.

All of the Streams Statistics managed objects have the same properties. The following table presents these common properties:

TABLE C-34 Streams Statistics Table Properties

Property	Description
The Name Of The Cache	Name of the cache
Current Usage (total - avail)	Cache's current usage
Maximum Capacity	Maximum capacity of the cache
Cumulative Total Of Allocations	Number of total cache allocations
Number of Allocation Failures	Number of allocation failures
Percent Used	Percentage of cache used

Software Rules Table

The following table provides a brief description of the properties for Software Rules:

TABLE C-35 Software Rules Properties

Property	Description
Rule rknrd105	Software rule (refer to rule rknrd105 in Appendix E)
Rule rknrd106	Software rule (refer to rule rknrd106 in Appendix E)

NFS Statistics Module

This section presents property tables for NFS Statistics:

- RPC Information Table
- NFS Information Table

Using the NFS Statistics module, statistical information on the Remote Procedure Calls (RPC) and Sun's distributed computing file system (NFS) calls may be monitored. The number of RPC and NFS calls received by the server and made by the client are monitored and displayed in the main console window along with the status of the transaction activity on the local host. The following tables list some of the properties monitored by this module with both the server and the client statistics.

RPC Information Table

The following table provides a brief description of the properties for RPC Information:

TABLE C-36 RPC Server and Client Information Properties

Property	Description
RPC Calls	Total number of RPC calls made by the host
Bad RPC Calls	Total number of calls rejected by the RPC layer
Bad RPC Calls %	Percentage of rejected calls compared to the total number of calls made (bad RPC Calls/RPC calls)
RPC Call Rate	Number of RPC calls made per second

NFS Information Table

The following table provides a brief description of the properties for NFS Information:

TABLE C-37 NFS Server and Client Information Properties

Property	Description
NFS Calls	Total number of NFS calls sent by the host
Bad NFS Calls	Total number of NFS calls rejected
Bad NFS Calls %	Percentage of rejected NFS calls compared to the total number of calls sent (bad NFS calls/NFS calls)
NFS Call Rate	Number of NFS calls sent per second

Solaris Process Details Module

The Solaris Process Details module parameters are listed in the following table. This table is seen when you try to load the module.

TABLE C-38 Solaris Process Details Parameters

Property	Description
Module Name	Name of the module (this is not editable)
Module Description	Description of the module (this is not editable)
Version	Version of the module (this is not editable)
Enterprise	SNMP enterprise in which the module is loaded (this is not editable)
Module Type	Type of the module (this is not editable)
Number of Processes	Number of processes that is obtained by the module based on the following selection criteria. One of the given numbers can be selected by the user.
Selection Criteria	Selection criteria by which the processes are sorted and selected. For example, the user can select the top 10 processes using this function.

The following section presents the Solaris Process property table.

Process Table

The following table provides a brief description of the properties for Solaris Process:

TABLE C-39 Process Properties

Property	Description
PS Process ID	Process ID of this process
PS Parent Process ID	Process ID of the parent of this process
PS User ID	Login ID of the user of this process
PS User Name	Login name of the user of this process
PS Effective User ID	Effective user ID of this process
PS Group ID	Real group ID of this process
PS Effective Group ID	Effective group ID of this process
PS Session ID	Process ID of the session leader of this process
PS Process Group ID	Process ID of the process group leader of this process
PS TTY	Controlling terminal for this process
PS Start Time	Starting time of this process
PS Time	Cumulative execution time of this process
PS State	State of this process
PS Wait Channel	Address of an event for which this process is waiting
PS Scheduling Class	Scheduling class of this process
PS Address	Memory address of this process
PS Size	Total size of this process in virtual memory
PS Priority	Priority of this process
PS Nice	Nice value of this process, which is used for priority computation
PS Percent CPU Time	Percent CPU time
PS Percent Memory	Percent memory
PS Command	Base name of the executable file for this process
PS Command Line	Full command name of this process, including the arguments

NFS File Systems Module

The NFS File Systems module enables you to monitor the NFS file systems on hosts running the Solaris 2 and Solaris 7 operating environments. The NFS File Systems module monitors the amount of disk space occupied by mounted or unmounted file systems: the amount of used and available space as well as the remaining total capacity.

When loading the NFS File Systems module, you may define which file systems you want to monitor by using pattern matching. Patterns may be used to filter which NFS file systems are monitored by file system or mount point.

File System Usage Table

The following table provides a brief description of the properties for NFS Filesystem Usage:

TABLE C-40 Filesystem Usage Properties

Property	Description
NFS Filesys	Name of the NFS filesystem
Size	Total size of the NFS filesystem in Kbytes
Used	Used disk space for the NFS file system in Kbytes
Available	Available disk space for the NFS file system in Kbytes
% Used	Percentage of NFS disk space used
Rate	Percentage capacity change per second
Mount Point	Mount point for the NFS filesystem
Entry Number	Entry number of the NFS filesystem

Sun Enterprise SyMON - Local & Remote Application Modules

The Sun Enterprise SyMON software monitors various components of your system, including your hardware, operating environment, local applications, and remote systems. This section provides additional explanation for the core modules described in Chapter 12 and presents them in their respective categories.

This appendix describes the following modules. For more information on other modules that may be applicable to your particular system, see the previous appendix, your supplement, or go to the Sun Enterprise SyMON web site: <http://www.sun.com/symon>.

- Local Applications
 - Agent Statistics Module
 - Data Logging Registry Module
 - Health Monitor Module
 - Print Spooler Module
 - Process Monitoring Module
 - File Scanning (System Log) Module
- Remote Systems
 - MIB-II Proxy Monitoring Module
 - HP JetDirect Module

Most of these modules have default monitoring conditions that generate alarms when system values fall outside of these conditions. You may alter these default thresholds by creating your own alarm thresholds, as explained in Chapter 12.

Also, there are modules that utilize the *Add Row* operation to define what data properties to monitor. These modules will come up with empty tables and you have to execute an Add Row operation to activate the specifics for monitoring the modules.

The following table lists the modules described in this appendix alphabetically and provides details on those modules that are automatically loaded and those that can be loaded multiple times. It also points out those modules that utilize the Add Row utility.

TABLE D-1 Modules Loaded Automatically, Multiple Times, and Use 'Add Row' Operation

Alphabetical Listing of Core Modules	Module Loads Automatically	Module Loads Multiple Times	Module Uses Add Row Utility
Agent Statistics Module	X		
Config-Reader Module ¹	X		
Data Logging Registry Module		X	
Dynamic Reconfiguration Module ²			
File Scanning (System Log) Module	X	X	X ³
HP JetDirect Module		X	
Health Monitor Module			
MIB-II Proxy Monitoring Module		X	
Print Spooler Module		X	
Process Monitoring Module		X	X ⁴

1. Refer to your platform-specific supplement for more information on the Config-Reader module.
2. Refer to your platform-specific supplement for more information on the Dynamic Reconfiguration module.
3. Each added row defines what pattern within the monitored file to match. The row needs to be added to the table, *Scan Table*.
4. Each row defines what pattern to match from all the processes that are running on the agent host.

Local Applications

The following modules, when loaded, are found under the local applications icon:

- Agent Statistics Module
- Data Logging Registry Module
- File Scanning (System Log) Module
- Health Monitor Module
- Process Monitoring Module
- Print Spooler Module

Agent Statistics Module

This section presents the following information on Agent Statistics:

- Object Statistics Table
- Commands Executed Table
- Transactions Performed Table
- PA Process Statistics Table
- PA Total Process Statistics Table

The Agent Statistics module monitors the health of the agent installed on a host. This module monitors the objects, processes, and execution of processes by the agent.

TABLE D-2 Agent Statistics Main Sections

Agent Statistics Tables	Description
Object Section	Displays data on the objects loaded onto the agent. Status field displays the current status of the TOE and binary objects loaded into and used by the agent.
Execution Section	Displays data on the number of TCL or TOE commands invoked by the agent interpreter. Also displays data on the number of asynchronous transactions initiated by the agent. Status field displays a brief description of the current status of the objects listed.

The following table provides a brief description of the Agent Statistics managed objects:

TABLE D-3 Agent Statistics Section Properties

Property	Description
Object Statistics	TOE Count - Number of TOE objects loaded into the agent bob Count - Number of binary object buffers used by the agent
Commands Executed	Total - Total number of commands that have been executed by the agent Rate (#/sec) - Number of commands executed by the agent per second
Transactions Performed	Total - Total number of transactions performed by the agent Rate (#/sec) - Number of transactions performed by the agent per second
PA Process Statistics	Process statistics pertaining to the PA
PA Total Process Statistics	Total process statistics pertaining to the PA

The following lists default alarm thresholds for applicable Agent Statistics modules:

TABLE D-4 Agent Statistics Alarm Thresholds

Agent Statistics	Condition
Error	If toeCount > 6000
Warning	If toeCount > 5000
Error	If bobcount > 1200
Warning	If bobcount > 1000
Warning	If commands rate > 6000
Warning	If transactions rate > 8
Error	If process size > 35000
Warning	If process size > 30000
Error	If rss > 25000
Warning	If percentage CPU time > 90
Warning	If totalstats.count > 15
Error	If totalstats.size > 40000
Warning	If totalstats.size > 35000
Warning	If totalstats.rss > 35000

The following sections describe the property tables for Agent Statistics.

Object Statistics Table

The Objects section displays data on the Objects loaded onto the agent. The Status field displays the current status of the TOE and binary objects loaded into and used by the agent.

The following table provides a brief description of the properties for Object Statistics:

TABLE D-5 Object Statistics Properties

Property	Description
Total TOE Objects	Number of TOE objects loaded into the agent
Total Bobs	Number of binary object buffers used by the agent

Commands Executed Table

The following table provides a brief description of the properties for Commands Executed:

TABLE D-6 Executed Commands Properties

Property	Description
Total Commands	Total number of commands that have been executed by the agent
Rate (/sec)	Number of commands executed by the agent per second

Transactions Performed Table

The following table provides a brief description of the properties for Performed Transactions:

TABLE D-7 Transactions Performed Properties

Property	Description
Total Transactions	Total number of transactions performed by the agent
Transaction Rate (/sec)	Number of transactions performed by the agent per second

PA Process Statistics Table

The software monitors the PA process statistics. The following table provides a brief description of the properties for PA Process Statistics:

TABLE D-8 PA Process Statistics Properties

Property	Description
Process ID	Identification number of the process
Process Unique Id	Unique identification number of the process
Process Name	Name of the process
Process Status	Status of the process
Process State	State of the process
User ID	User ID of the process
Virtual Size	Total size of the process

TABLE D-8 PA Process Statistics Properties (*Continued*)

Property	Description
Resident Set Size	Resident size of the process
Elapsed Time	Startup time of the process in seconds since January 1, 1970
Start Date	Startup date of the process
Start Time	Startup time of the process
CPU Time	CPU time used by the process
Percent CPU Time	Percentage of CPU time used by the process
Context Switches	Context switches of the process
System Calls	System calls made by the process
Command Line	Command line of the process

PA Total Process Statistics Table

The software monitors the total PA process statistics.

The following table provides a brief description of the properties for Total PA Process Statistics:

TABLE D-9 Total PA Process Statistics Properties

Property	Description
Number of Processes	Number of agent and child processes
Total Virtual Size	Total virtual size of agent and children
Total Res Size	Total resident set size of agent and children

Data Logging Registry Module

The Data Logging Registry consists of the registry table.

Registry Table

The following table provides a brief description of the properties for Data Logging Registry:

TABLE D-10 Data Logging Registry Properties

Property	Description
Log Destination State	State of the log file destination
Module Name	Module name for data value (data from this module is logged in the registry)
Instance Name	Name of the instance
Property Name	Property name for data value
Logging Interval	Logging interval for data value
File Logging	Name of the logged file
Data Cache	Cache data
Cache Size (samples)	Cache size samples

Health Monitor Module

The Health Monitor module monitors the health of your host. When alarm conditions occur, this module offers suggestions, if necessary, on how to improve the performance of the system.

For example, this module monitors the swap space that is available, reserved, allocated, and used. Sample alarm messages, from lowest to highest severity, include:

- No Worries: sufficient swap space available
- There is lots of unused swap space
- Not much swap left: perhaps add some more
- Swap space shortage: add some more now
- Dangerous swap space shortage: add more immediately

This section describes properties of the following Health Monitor module managed objects:

- Swap Table
- Kernel Contention Table
- NFS Table
- CPU Table
- Disk Table

- RAM Table
- Kernel Memory Table
- Directory Cache Table

The Health Monitor module tracks the system properties for the above as described in the following table:

TABLE D-11 Health Monitor Properties

Property	Description
Swap	Details the swap space
Kernel Contention	Monitors the kernel contention (mutex) properties
NFS	Provides NFS client information
CPU	Provides information on the power of the CPU
Disk	Presents the disc I/O information
RAM	Random Access Memory (RAM) information
Kernel Memory	Information on kernel memory
Directory Cache	Cache of the directory

Swap Table

The following table provides a brief description of the properties for Swap:

TABLE D-12 Swap Properties

Property	Description
Swap Available KB	Swap space value available
Swap Reserved KB	Swap space value reserved
Swap Allocated KB	Swap space value allocated
Swap Used KB	Swap space value used
Swap Rule	Rule for swap

Kernel Contention Table

The following table provides a brief description of the properties for Kernel Contention (mutex):

TABLE D-13 Kernel Contention Properties

Property	Description
Spins On Mutexes	Spins on mutexes (lock not acquired on first try) - Sum for all CPUs
Number Of CPUs	Number of CPUs
Spins On Mutexes Rule	Spins on mutexes (lock not acquired on first try) - Sum for all CPUs

NFS Table

The following table provides a brief description of the properties for NFS client information:

TABLE D-14 NFS Client Information Properties

Property	Description
Calls	Total number of RPC calls received
Badcalls	Total number of calls rejected by the RPC layer
Retrans	Call retransmitted due to a timeout
Badxids	Reply from server not corresponding to any outside call
Timeouts	Call timed out while waiting for a reply from server
Newcreds	Number of times authentication information was refreshed
Badverfs	Calls failed due to a bad verifier in response
Timer	Call timed out while waiting for a reply from server
Nomem	Failure to allocate memory
Can't Send	Failure to send NFS/RPC rule
NFS/RPC Rule	Value of the NFS/RPC rule

CPU Table

The following table provides a brief description of the properties for the central processing unit (CPU):

TABLE D-15 CPU Properties

Property	Description
Processes In Run Queue	Number of processes in run queue
Processes Waiting	Number of processes blocked for resources
Processes Swapped	Number of processes that can be run but swapped
CPU Power Rule	CPU power rule

Disk Table

The following table provides a brief description of the properties for Disk:

TABLE D-16 Disk Properties

Property	Description
Disk Name	Name of the disk
Disk Alias	Name of the disk (for example, c0t0d0)
Percent Disk Wait	Average number of transactions waiting for service
Percent Disk Busy	Percent of time disk is busy
Service Time (ms)	Average service time in milliseconds
Disk Rule	Disk rule

RAM Table

The following table provides a brief description of the properties for random access memory (RAM):

TABLE D-17 RAM Properties

Property	Description
Handspread	Value of hand spread (one of kernel parameters) pages
Scan rate	Page scan rate
Real Memory rule	Real memory rule

Kernel Memory Table

The following table provides a brief description of the properties for Kernel Memory:

TABLE D-18 Kernel Memory Properties

Property	Description
Total Kernel Allocation Fails	Value of kernel allocation failure
Physical Memory Free	Value of free physical memory
Kernel Memory Rule	Value of kernel memory rule

Directory Cache Table

The following table provides a brief description of the properties for Directory Cache:

TABLE D-19 Name Cache Statistics Properties

Property	Description
Cache Hits	Number of times a previously accessed page is found
Cache Misses	Number of times a previously accessed page is missed
DNLC Rule	DNLC (Directory Name Lookup Cache) rule

Print Spooler Module

The Print Spooler module monitors the status of the printer daemon and print queue on the local host as well as the printer devices installed on it.

- Printer LPsched Table
- Printer Devices Table
- Printer Queues Table

The following table describes the print spooler managed objects:

TABLE D-20 Print Spooler Properties

Property	Description
Lpsched Status	Status of the lpsched process
Printer Devices	Table lists information about the printer devices
Printer Queues	Table lists information about the printer queue

Printer LPsched Table

The printer daemon section displays data on the LP Request Scheduler. The following table provides a brief description of the properties for the Line Printer's Schedule (LPsched):

TABLE D-21 Printer LPsched Properties

Property	Description
LPsched state	Current status of the printer.

Printer Devices Table

The Printer Devices table lists the network printers installed on a network printer server(s). The instance name or alias of the printer is displayed in the Name field followed by the name of the host on which it is installed, displayed in the Machine field. If you are running a console displaying data monitored by an agent on a print server host, the path name of the printer device is displayed in the Device field.

The following table provides a brief description of the properties for Printer Devices:

TABLE D-22 Printer Devices Properties

Property	Description
Printer name	Name of the printer device
Host name	Name of the host to which the device is attached
Device name	Alphanumeric device name

Printer Queues Table

The Print Queues table lists the print queues on the local host and displays the status of each queue. The following table provides a brief description of the properties for Printer Queues:

TABLE D-23 Printer Queues Properties

Property	Description
Queue Name	Name of the printer
Queue State	Current status of the printer queue
Total Number of Queue Jobs	Total number of jobs in the queue
Total Number of Current Printer Jobs	Number of jobs currently spooled in the queue
Printer Queue Size	Total size (in Kbytes) of the jobs currently spooled in the queue

Process Monitoring Module

The following section describes the Process Monitoring module parameters and their property descriptions. This module requires you to add rows for the data property tables. For more information, see “Working with Rows” on page 146.

When a process “hit” is found, the %CPU and a count of the number of processes which match is displayed. If you want to change the module parameters, you can edit all the parameters except for the entry name by accessing the pop-up menu. See “Pop-up Menu” on page 119 for more information.

Process Statistics Table

The following table provides a brief description of the properties for Process Statistics:

Note – The first five row entries in TABLE D-24 must be entered by you when adding a row to the process statistics table. See “To Add a Row” on page 146 for more information.

TABLE D-24 Process Statistics Properties

Property	Description
Entry Name	Name of the entry (must be a unique name)
Name Pattern	Pattern to match the name of the process that you want to monitor
Argv Pattern	Pattern to match the arguments of the command which executes the process
User Specification	User name executing the command
Entry Description	Description of the entry (mandatory field)
Monitoring State	Toggle between on (row is enabled) and off (row is disabled). When the row is disabled, all the entries are displayed as 0 (zero).
Process Command	Name process
% CPU Usage	Percentage CPU used by the processes
Virtual Size	Total size of the processes
Resident Set Size	Resident size of the processes
Process Count	Number of the processes that matched the pattern

File Scanning (System Log) Module

The File Scanning module scans files on a host for user-specified patterns. Multiple instances of the File Scanning module may be loaded to scan multiple files. This module requires you to add rows for the data property tables. For more information, see “Working with Rows” on page 146.

The File Scanning module has the following managed objects:

- File ID Table
- File Statistics Table
- Scan Table

The following table provides a brief description of the properties for File Scanning:

TABLE D-25 File Scanning (System Log) Properties

Property	Description
File ID	Name given by you to the pattern used in the file scan
File Stats	State of the pattern listed
Scan Table	Name given by you to the pattern used in the file scan

File ID Table

The following table provides a brief description of the properties for File ID:

TABLE D-26 File ID Properties

Property	Description
Filename	Full path name of the file to be scanned
Scan Mode	Mode in which the file is being scanned
Start Time	Time the file scan was first started

File Statistics Table

The File Statistics table displays summary information on the file that is to be scanned. The following table provides a brief description of the properties for File Statistics:

TABLE D-27 File Statistics Properties

Property	Description
Modification Time	Date and time when the file was last modified
File Size	Size of the file in bytes
Number of Lines	Number of lines contained in the file
Lines Per Second	Rate at which the file is changing in lines per second

Scan Table

The following table provides a brief description of the properties for Scan:

TABLE D-28 Scan Table Properties

Property	Description
Pattern Name	Name given by you to the pattern used in the file scan
Pattern Description	Name of the pattern entry to be displayed in the name field of the Scan Results section
Regex Pattern	Regular expression pattern to be used when scanning the file for entries
Pattern State	State of the pattern listed (on/off). The off state indicates that the pattern listed will not be used in the file scan
Matches	Number of pattern matches found during the file scan
Total Matches	Total number of matches in current file

Remote Systems

The software enables you to monitor remote systems, such as HP printers equipped with a JetDirect card.

The following modules, when loaded, are found under the local remote system icon:

- MIB-II Proxy Monitoring Module
- HP JetDirect Module

MIB-II Proxy Monitoring Module

The MIB-II Proxy Monitoring module monitors the MIB-II parameters for remote systems. The various categories that monitor the MIB-II parameters on remote systems are listed in the following sections, which list MIB-II group tables:

- MIB-II System Group Table
- MIB-II Interfaces Group Tables
- MIB-II IP Group Table
- MIB-II ICMP Group Table
- MIB-II TCP Group Tables
- MIB-II UDP Group Tables

For more information on the properties of these parameters, see “MIB-II Instrumentation Module” on page 326, which lists the properties for local systems. The same functionality is applied on remote systems by the MIB-II Proxy Monitoring module. For more information on the definition of MIB-II, see the standards documentation RFC1213 (Request For Comments 1213).

HP JetDirect Module

Agents can monitor HP printers equipped with a JetDirect card by proxy using the HP JetDirect module. Multiple HP printers may be monitored by loading multiple instances of this module.

Printer Status Table

The following table provides a brief description of the properties for Printer Status:

TABLE D-29 General Printer Status Properties

Property	Description
Printer Display	Printer's status

For platform-specific information, see your supplement.

Sun Enterprise SyMON Software Rules

This appendix lists the Sun Enterprise SyMON rules for the following modules:

- Kernel Reader
- Health Monitor

A rule is an alarm check mechanism that allows for complex or special purpose logic in determining the status of a monitored host or node.

There are two types of rules—simple and complex:

- Simple rules are based on the rCompare rule, in which monitored properties are compared to the rule. If the rule condition becomes true, an alarm is generated. For example, a simple rule can be the percentage of disk space used. If the percentage of disk space used equals or is greater than the percentage specified in the rule, then an alarm is generated.
- Complex rules are based on multiple conditions becoming true. For example, one complex rule states that when a disk is over 75% busy and the average queue length is over 10 and the wait queue is increasing, then an alert alarm is generated.

Note – Any user-customized Solstice SyMON 1.x rules must be ported to the new environment before the rules can be used in Sun Enterprise SyMON 2.0.1 software.

Kernel Reader

The following table lists the Kernel Reader simple rules.

TABLE E-1 Kernel Reader Simple Rules

Property	Description
avg_1min	Load Averages Over The Last 1 Minute
avg_5min	Load Average Over The Last 5 Minutes
avg_15min	Load Average Over The Last 15 Minutes
cpu_delta	Difference between the previous and current time
cpu_idle	CPU idle time
cpu_kernel	CPU kernel time
cpu_user	CPU user time
cpu_wait	CPU wait time
ipctused	Percent of inodes used
kpctused	Percent of Kbytes used
mem-inuse	Physical Memory In Use (MBytes)
numusers	Number Of Users
numsessions	Number Of User Sessions
swap_used	Swap Used Kbytes
wait_io	CPU wait time breakdown
wait_pio	CPU wait time breakdown
wait_swap	CPU wait time breakdown

The following table lists the Kernel Reader complex rules.

TABLE E-2 Kernel Reader Complex Rules

Rule ID	Description	Type of Alarm
rknrd100	This rule covers a transitory event and generates an alert alarm when the disk is over 75% busy, the average queue length is over 10, and the wait queue is increasing. Alert alarm stays on until the disk is not over 70% busy and the average queue length is no longer than 8.	Alert
rknrd102	This rule covers a transitory event and generates an alert alarm if 90% of swap space is in use. Event causing the alarm stays open until swap space in use is less than 80% of the total swap space.	Alert
rknrd103	This rule covers a transitory event and generates an alert alarm if swapping and paging is high for a given CPU. This indicates that a CPU may be thrashing. Alert alarm is generated when CPU exceeds 1 swap-out, 10 page-ins, and 10 page-outs per second. Alert alarm stays on if CPU exceeds 1 swap-out, 8 page-ins, and 8 page-outs per second.	Alert
rknrd105	File System Full error. This rule looks for a file system full error message in the <code>syslog (/var/adm/message)</code> .	Alert alarm that is closed immediately
rknrd106	No swap space error. This rule looks for a no swap space error message in the <code>syslog (/var/adm/message)</code> .	Alert alarm that is closed immediately
rknrd400	This rule checks for a continuous CPU load over 6 per CPU for four hours.	Informational
rknrd401	This rule checks for disks being busy more than 90% of the file for <i>x</i> hours. The <code>parameters</code> field holds the last time CPU load was below 6, and is initialized to some date in the year 2001.	Informational
rknrd402	This rule checks if available swap space drops below 10% for <i>x</i> hours. The <code>parameters</code> field holds the last time CPU load was below 6, and is initialized to some date in the year 2001.	Informational
rknrd403	Test for Meta CPU events.	Informational
rknrd404	Test for Meta Disk events.	Informational
rknrd405	Test for Meta Swap events.	Informational

Health Monitor

The following table lists the Health Monitor complex rules.

TABLE E-3 Health Monitor Complex Rules

Rule ID	Description	Type of Alarm
rhltm000	This rule checks whether there is enough swap space.	Critical, Alert, Caution
rhltm001	Each time a CPU has to wait for a lock to become free, it wastes CPU power; and this event is counted, since the kernel uses mutually exclusive locks to synchronize its operation and keep multiple CPUs from concurrently accessing critical code and data regions.	Critical, Alert, Caution
rhltm002	This rule is based on the observation that NFS remote procedure call timeouts may be associated with duplicate responses after the call is retransmitted. This indicates that the network is okay but the server is responding slowly.	Critical, Alert, Caution
rhltm003	Here the run queue length is divided by the number of CPUs. This is based upon the fact that every CPU takes a job off the run queue in each time slice.	Critical, Alert, Caution
rhltm004	A busy or slow disk reduces system throughput and increases user response times. This rule identifies the disks that are loaded so that the load can be rebalanced.	Critical, Alert, Caution
rhltm005	RAM rule based on residency time for an unreferenced page. The virtual memory system indicates that it needs more memory when it scans looking for idle pages to reclaim for other uses.	Critical, Alert, Caution
rhltm006	This rule refers to the kernel memory allocation problem. It shows up when login attempts or network connections fail unexpectedly. There are two possible causes. Either the kernel has reached the extent of its address space, or the free list does not contain any pages to allocate. It is more a sign of a problem that may otherwise be overlooked.	Critical, Alert, Caution
rhltm007	There is a global cache of directory path name components called the directory name lookup cache, or Directory Name Lookup Cache Rule (DNLC). Missing a cache means that directory entries must be read from disk and scanned to locate the right file.	Critical, Alert, Caution

Internet Protocol Routing

This appendix describes:

- Overview of IP Addressing
 - Subnetting
 - Netmasks
-

Overview of IP Addressing

Internet protocol (IP) addresses are 32 bits long. Thus, there is a total possibility of approximately 4 billion addresses for the entire Internet. An IP address is expressed as a series of octets separated by dots. For example, the address 11111111 00000001 00000101 00001010 is written as 127.1.5.10, or using hexadecimal notation, 7f.1.5.a0.

Because of this vast number of addresses, there was a need to organize the network hierarchically into domains. This need led to the definition of name domains and network classes. Since each site can vary in size, IP addresses are divided into three main types or classes. A large site can reserve a class A address and receive 2^{24} individual addresses, while a small site can reserve a class C address and receive 2^8 individual addresses.

Network Classes

Class A uses the first octet for the network address, and the rest for host addresses within this network. For example, a site whose network address is 129.0.0.0 would own the 2^{24} addresses between 129.0.0.0 and 129.255.255.255.

Network	Host		
0xxxxxxx	xxxxxxx	xxxxxxx	xxxxxxx

Class B uses two octets for the network address, and two for the host address. For example, a site whose network address is 129.123.0.0 would own the 2^{16} addresses between 129.123.0.0 and 129.123.255.255.

Network		Host	
10xxxxxx	xxxxxxx	xxxxxxx	xxxxxxx

Class C uses three octets for the network address, and one for the host address. For example, a site whose network address is 129.123.456.0 would own the 2^8 addresses between 129.123.456.0 and 129.123.456.255.

Network			Host
110xxxxx	xxxxxxx	xxxxxxx	xxxxxxx

Subnetting

Subnetting is defined as dividing a network into smaller segments, or subnets, which is imperative for Class A and B networks. Routers do not forward packets outside a subnet if the destination address is within the same subnet. Thus, network traffic is decreased dramatically by segmenting a large network. For example, we have a class B network that is segmented into 255 subnets. Unless a packet destination is a host outside the subnet, a local packet is sent to 255 hosts instead of 256,000.

Netmasks

The format of the netmask is a series of 1s followed by a series of 0s. By ANDing an IP address with a netmask, we can get the address of the subnet.

Routers use netmasks to decide whether to forward a packet to an external subnet. For example, we have a machine with an IP address of 129.123.456.95 that is sending an email to another machine whose IP address is 129.123.456.100. By ANDing both IP addresses with a netmask (255.255.255.00), the result is 129.123.456.0 for both machines. The router then concludes that both the source machine and destination machine are in the same subnet. Therefore, the router does not forward the email to external subnets.

On the other hand, if the destination address is 129.123.567.100, then the resulting subnet address is 129.123.567.0. The router forwards the email to the external subnet (129.123.567.0).

Note – Although some of these examples apply to Ethernet links, the principles still apply regardless of the type of network.

Glossary

- agent** A software process, usually corresponding to a particular local managed host, that carries out manager requests and makes local system and application information available to remote users.
- alarm** An abnormal event, which may be indicative of current or impending problems, is detected by a Sun Enterprise SyMON agent. The agent passes information about the abnormal event to the Sun Enterprise SyMON server. The server passes this information on to the user as an alarm, when the abnormal event matches a predefined alarm threshold.
- alarm acknowledgment** Sun Enterprise SyMON users can acknowledge alarms, indicating that the alarm does not represent a serious problem or that the problem is being resolved. Acknowledged alarms take a lower priority than unacknowledged alarms.
- Attribute Editor** A window which provides information about the selected object. In addition, the Attribute Editor enables you to customize various monitoring criteria for that object. The monitoring criteria are dependent on the type of object. There are Attribute Editors for domains, hosts, modules, and data properties.
- bus** A point-to-point network component. Used by the software to represent a network link to which many other hosts may be connected.
- community** A string similar to a password that is used to authenticate access to an agent's monitored data.
- complex alarm** A complex alarm is based on a set of conditions becoming true. Unlike simple alarms, you cannot set thresholds for complex alarms.
- Console window** A graphical user interface component of Sun Enterprise SyMON software based on Java technology that is used to view monitored hosts (and managed objects) information and status and to interact with Sun Enterprise SyMON agents.

Discovery	A Sun Enterprise SyMON tool available from the main console window that is used to find hosts, routers, networks, and Simple Network Management Protocol (SNMP) devices that can be reached from the Sun Enterprise SyMON server.
domain	An arbitrary collection of hosts and networks that are monitored by the software as a single hierarchal entity. Users may choose to divide their enterprise into several domains, each to be managed by different users.
dynamic loadable modules	A Sun Enterprise SyMON agent module that can be loaded or unloaded at run time, enabling monitored properties to be displayed on the main console window without having to restart the console or agent.
event	A change in the state of a managed object.
file scanning	The act of scanning a file (usually a log file) for certain patterns (regular expressions) that may be indicative of problems or significant information. Sun Enterprise SyMON agents use file scanning to assist in the monitoring of systems and applications when these components do not provide direct access to status information.
graphical user interface	The graphical user interface, or GUI, is a window that provides the user with a method of interacting with the computer and its special applications, usually with a mouse or other selection device. The window usually includes such things as windows, an intuitive method of manipulating directories and files, and icons.
hierarchy view	A window view that defines objects in a hierarchy or tree relationship to one another. Objects are grouped depending on the rank of the object in the hierarchy.
hop	The number of routers a packet goes through before reaching its destination.
instance	A single word or alpha-character string that is used internally within the Sun Enterprise SyMON agent to identify uniquely a particular module or a row within a module.
manage	In Sun Enterprise SyMON software, manage is defined as being able to monitor, as well as manipulate the object. For example, management privileges include acknowledging and closing alarms, loading and unloading modules, changing alarm thresholds, and so on. Management privileges are similar to read, write, and execute access.
MIB	Management Information Base. A MIB is a hierarchical database schema describing the data available from an agent. The MIB is used by Sun Enterprise SyMON agents to store monitored data that can be accessed remotely.
module	A software component that may be loaded dynamically to monitor data resources of systems, applications and network devices.

- monitor** In Sun Enterprise SyMON software, monitor is defined as being able to observe an object, view alarms and properties. Monitoring privileges are similar to read-only access.
- node** A node is a workstation or server.
- object** A particular resource (computer host, network interface, software process, and so on) which is subject to monitoring or management by Sun Enterprise SyMON software. A managed object is one that you can manipulate. For example, you can acknowledge and turn off an alarm condition for an object that you can manage. A monitored object is one that you can observe but not acknowledge or otherwise manage.
- remote server context** A remote server context refers to a collection of Sun Enterprise SyMON agents and a particular server layer with which the remote agents are associated.
- request caching** The Sun Enterprise SyMON server consolidates duplicate outstanding requests originating from multiple consoles and eliminates the execution of redundant requests.
- rule** A rule is an alarm check mechanism that allows for complex or special purpose logic in determining the status of a monitored host or node.
- seed** The password for the Sun Enterprise SyMON user group called `esmaster`. The seed is an alpha-numeric string of up to 8 characters. (This is not necessarily a UNIX password.) You can select your own seed, or accept the default seed (`maplesyr`) provided by the Sun Enterprise SyMON software. If you select your own seed, be sure to record it for later reference.
- server** The collection of programs and processes (SNMP-based trap, event, topology, configuration, and Java server) that work on behalf of a Sun Enterprise SyMON user to help manage a particular set of networks, hosts and devices. Usually sends requests to Sun Enterprise SyMON agents, accepts collected data from them, and passes the data to the main console window for display.
- server context** See "remote server context."
- simple alarm** Simple alarms are based on one condition becoming true. You may set alarm thresholds for simple alarms.
- SNMP** Simple Network Management Protocol. A simple protocol designed to allow networked entities (hosts, routers, and so on) to exchange monitoring information.
- SNMPv2 usec** SNMP version 2, user-based security model security standards.
- Sun Enterprise SyMON superuser** Sun Enterprise SyMON superuser is a valid user on a server host. The superuser decides what the agents are in the context of the server. By default, the superuser password is used as a seed for security key generation.

Sun Enterprise SyMON

user Sun Enterprise SyMON users are the members of the `symon` group in the `/etc/group` file.

topology view The topology view displays the members of the object selected in the hierarchy view.

URL Uniform Resource Locator. An URL is a textual specification describing a resource which is network-accessible.

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