



Sun™ Management Center Hardware Diagnostic Suite 2.0 User's Guide

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Preface

The *Sun Management Center Hardware Diagnostic Suite 2.0 User's Guide* provides instructions on how to use the Hardware Diagnostic Suite 2.0 software through the Sun™ Management Center 3.5 application.

Note – The Sun Management Center Hardware Diagnostic Suite 2.0 is referred to as the Hardware Diagnostic Suite throughout this document.

Note – The Sun Management Center software version 3.5 is referred to as Sun Management Center throughout this document.

Before You Read This Book

In order to fully use the information in this document, you must have knowledge of the topics discussed in the *Sun Management Center 3.5 Software User's Guide*.

How This Book Is Organized

Chapter 1 provides an overview of the Sun Hardware Diagnostic Suite application.

Chapter 2 outlines how to install the Sun Hardware Diagnostic Suite application.

Chapter 3 describes how to access the Sun Hardware Diagnostic Suite application.

Chapter 4 describes how to configure, run, schedule, and review a Sun Hardware Diagnostic Suite test session.

Chapter 5 describes how to view and customize the Sun Management Center alarms for use with the Sun Hardware Diagnostic Suite.

Appendix A describes the Sun Hardware Diagnostic Suite tests.

Appendix B describes the Hardware Diagnostic Suite's console panels, buttons, and menus.

Using UNIX Commands

This document does 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:

- Online documentation for the Solaris[™] software environment at:
<http://www.sun.com>
- Other software documentation that you received with your system

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. Replace command-line variables with real names or values.	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. To delete a file, type <code>rm filename</code> .

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	#

Where to Get More Information

For the latest information on Sun Management Center and the Hardware Diagnostic Suite, go to the Sun Management Center web site:

<http://www.sun.com/sunmanagementcenter>

This web site provides access to:

- Documentation
- Licensing information
- Downloading facilities

Refer to the most recent Sun Management Center release notes for a complete list of related documents.

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Hardware Diagnostic Suite Overview

This chapter covers the following topics:

- “What is the Hardware Diagnostic Suite?” on page 1
- “Hardware Diagnostic Suite Architecture” on page 3

What is the Hardware Diagnostic Suite?

The Hardware Diagnostic Suite 2.0 application is a Sun™ Management Center 3.5 software solution that tests and validates Sun SPARC hardware in an enterprise environment.

The Hardware Diagnostic Suite enhances system availability by stimulating and detecting hardware faults, and warning you about latent problems before they cause system downtime.

This application supports device testing in both 32-bit and 64-bit Solaris operating environments.

The Hardware Diagnostic Suite 2.0 is supported on Solaris 2.6, 7, 8, and 9 software.

It is also possible to run only the Hardware Diagnostic Suite console on a Windows NT or Windows 98 system. See Sun Management Center documentation for further guidelines on Solaris and Windows version support.

Features

- Provides tests that stimulate, detect, and report failing field replaceable units (FRUs) with suggested steps for problem resolution, enhancing system availability
- Performs testing that is data-safe, not resource intensive, and can run concurrently with day-to-day applications
- Supports networked systems, enabling administrators to monitor and manage multiple test sessions on Sun systems remotely
- Provides the ability to schedule test sessions to run automatically one time, or periodically for routine system validation
- Provides the ability to alert the system administrator to important Hardware Diagnostic Suite events through the Sun Management Center alarm management features
- Logs all test session details in easily accessible log files
- Takes advantage of the Sun Management Center enterprise-wide security measures to authorize or limit user access

Note – The Hardware Diagnostic Suite is not intended for stressful or data-destructive offline testing, testing when no operating environment is running, or analyzing data for failure prediction.

Hardware Diagnostic Suite Architecture

The Hardware Diagnostic Suite is composed of three components:

- Hardware Diagnostic Suite (HDS) agent and tests
- Hardware Diagnostic Suite (HDS) server
- Hardware Diagnostic Suite (HDS) console

Each Hardware Diagnostic Suite component is installed with the corresponding Sun Management Center (Sun MC) component during the Sun Management Center installation.

The communication between these components is shown in FIGURE 1-1 and described in the following sections.

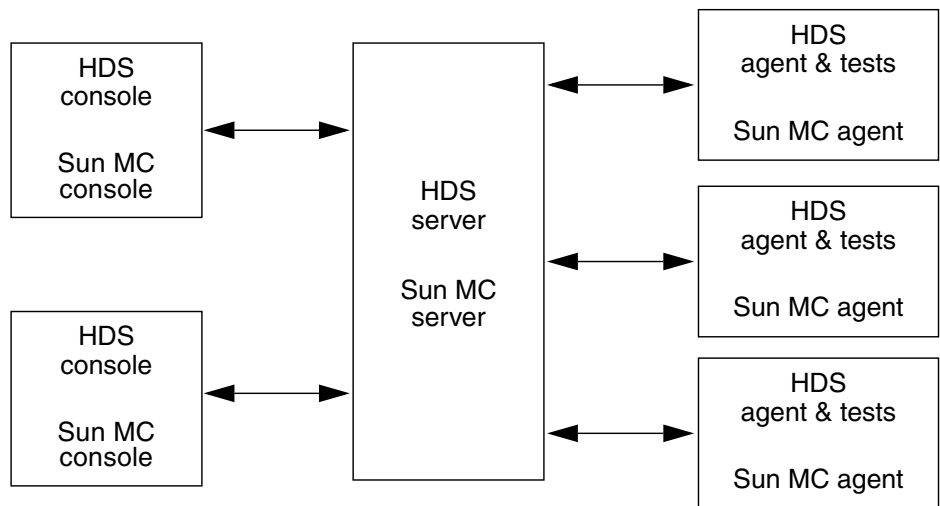


FIGURE 1-1 Communication Between Hardware Diagnostic Suite Components

Hardware Diagnostic Suite Agent and Tests

Agent

The Hardware Diagnostic Suite agent component manages the test session on a given host. The agent interacts with the Hardware Diagnostic Suite server to pass test information to the appropriate Hardware Diagnostic Suite console. The agent performs the following activities:

- Probes the host's configuration
- Executes test sessions
- Monitors test sessions
- Logs test error messages and sends notification

The Hardware Diagnostic Suite agent is installed on the host where diagnostic testing is to be performed and where the Sun Management Center agent is installed.

Tests

The collection of tests in the Hardware Diagnostic Suite application includes tests for multiple categories of hardware:

- Communication
- Memory
- Network
- Peripherals
- Processor
- Storage enclosure

These tests support device testing in a 32-bit and a 64-bit Solaris operating environment.

You can select any number of tests for a given test session. Each test runs non-intrusively and nondestructively, so each Hardware Diagnostic Suite test session is safe to run on a system that is running other applications.

The tests are installed on the host where diagnostic testing is to be performed and where the Sun Management Center agent is installed.

Hardware Diagnostic Suite Server

The Hardware Diagnostic Suite server component accepts requests from the console and passes these requests to the appropriate Hardware Diagnostic Suite agent. It then relays the response from the agents back to the console.

The multithreaded server is based on Java™ technology and handles multiple data requests from various Hardware Diagnostic Suite agents and users.

The Hardware Diagnostic Suite server is installed with the Sun Management Center server. The server components only need to be installed on a single host in the enterprise network to communicate with other agents and consoles, but that host must also have the Sun Management Center server installed.

Hardware Diagnostic Suite Console

The Hardware Diagnostic Suite console (FIGURE 1-2) is the graphical user interface between you and the Hardware Diagnostic Suite server. It enables you to perform the following tasks:

- Select devices to test
- Initiate testing
- Monitor a test session
- Access log information
- Schedule testing

The Hardware Diagnostic Suite console runs in the Sun Management Center console details window.

Appendix B describes each Hardware Diagnostic Suite console window panel, dialog box, and control button.

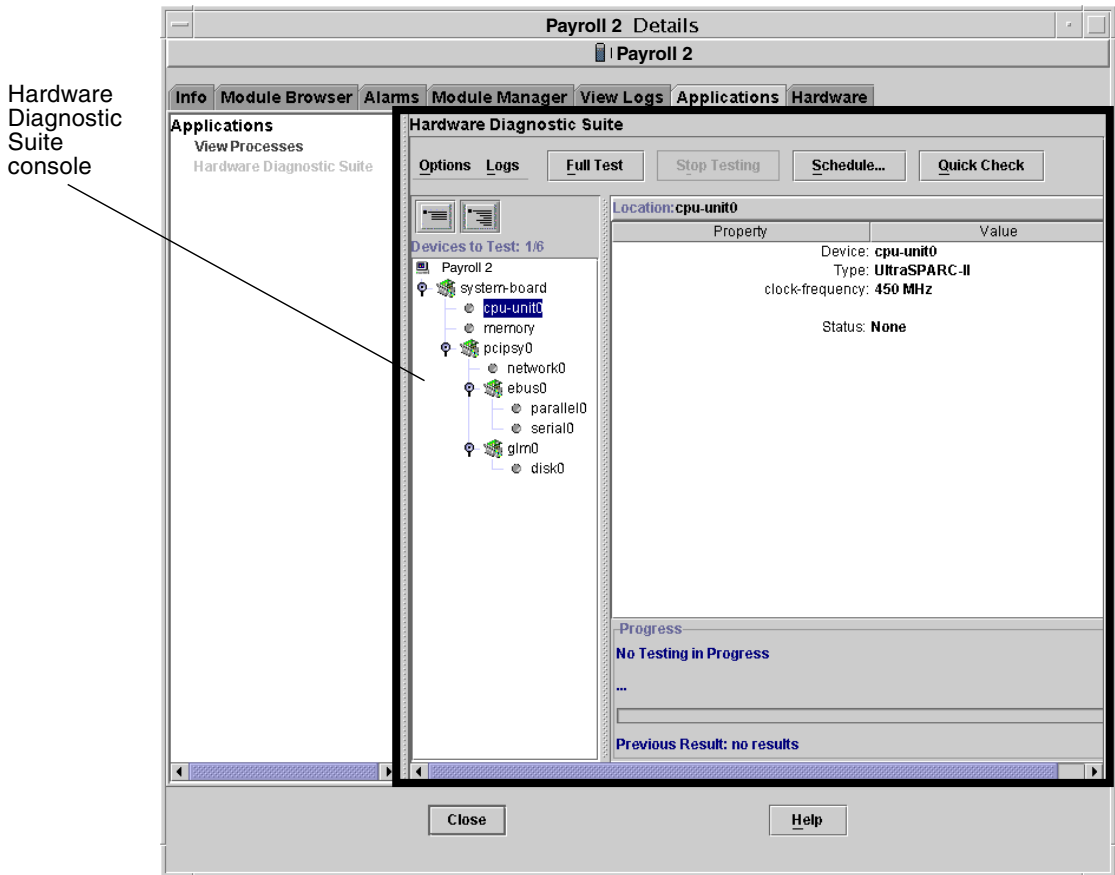


FIGURE 1-2 Hardware Diagnostic Suite Console

Installing and Uninstalling the Hardware Diagnostic Suite Software

This chapter covers the basics of installation concerns for the Hardware Diagnostic Suite. For further information about installation requirements, refer to the *Sun Management Center 3.5 Software Installation and Configuration Guide*.

Before You Install

Required Disk Space

The Hardware Diagnostics Suite requires 11 Mbytes if all components are installed. TABLE 2-1 shows the disk space used by each component:

TABLE 2-1 Disk Space Used

Component	Package	Disk Space (approximate)
Server	SUNWed	350 Kbytes
Agent and tests	SUNWedag, SUNWedagx	8 Mbytes
Console	SUNWhdrmi	6 Kbytes
Common server and agent components	SUNWedcom	18 Kbytes
Help files, English only	SUNWedh	1.7 Mbytes
All components		11 Mbytes

Note – Additional space is needed to install localized help and message packages on top of the English packages. Each language is less than 2 Mbytes of additional space. Allow 13 Mbytes for a non-English installation.

System Load

When you run an additional application, such as a diagnostic application, on a system that is running day-to-day operations, you should consider the additional system load that is introduced.

TABLE 2-2 shows the typical system load on the CPU and memory resources when you run the Hardware Diagnostic Suite components. These measurements were made on an Ultra™ 60 Workstation with 256 MB of memory.

TABLE 2-2 Hardware Diagnostic Suite Component System Load Statistics

Component ¹	CPU Activity While Hardware Diagnostic Suite Is Idle	CPU Activity While Hardware Diagnostic Suite Is Running at Full Capacity	Memory Used (RAM/Swap in Kbytes)
Agent	0.05%	0.5–0.9%	3560/5888
Tests	N/A	0.2–0.9%	2000–4000/3000–5000
Server	0.04–0.09%	1–4%	12232/33120
Console	0.05–0.5%	4–8%	31216/45712

¹ Depending on which components are loaded on the system under test, you might only need to consider the added load of the Hardware Diagnostic Suite agent and tests (server and console components are typically loaded elsewhere in the network).

Required Patches

TABLE 1 describes the Solaris™ operating environment patches that must be installed on each system that runs the Hardware Diagnostic Suite agent.

The Hardware Diagnostic Suite installation script checks to see if these patches are installed on your system, and warns you if they are not present. In most cases, the installation script asks you if you want to install them, and if you answer “yes”, they are installed for you. If you answer “no”, the installation stops.

For Solaris 2.6, one of the required patches is not included in the Hardware Diagnostics Suite installation script because this patch is a comprehensive patch for the kernel that requires separate installation (see TABLE 1). Install this patch before you run the Hardware Diagnostic Suite installation script.

TABLE 1 Required Patches

Solaris Release	Patches Included in the Hardware Diagnostic Suite Installation Script	Patches Not Included In The Installation Script
Solaris 2.6	105591-14 107733-10	105181-21 (see note below)
Solaris 7	106300-16 106327-15 106950-18	none
Solaris 8	none	none
Solaris 9	none	none

Note – For the Solaris 2.6 release, you need patch 105181-21 or later. The Sun Enterprise 10000 systems require a later version of patch 105181-21.

Downloading Hardware Diagnostic Suite

The Hardware Diagnostic Suite software is bundled with the core Sun Management Center software. You can obtain these programs either from the Sun Management Center 3.5 CDs, or from the Sun website at:

<http://www.sun.com/sunmanagementcenter>

Refer to the *Sun Management Center 3.5 Installation and Configuration Guide* for procedures and information about installation, including:

- Installation requirements
- Licensing Sun Management Center
- System preparation
- CD installation
- Web-based installation

Installation and Removal

The Hardware Diagnostic Suite software is an add-on option when you install the Sun Management Center software with the `es-inst` script, and can be uninstalled using the Sun Management Center `es-uninst` script.

Hardware Diagnostic Suite can also be installed separately, after core Sun Management Center installation, using the GUI installation method. See the *Sun Management Center 3.5 Software Installation and Configuration Guide* for further details.

Note – If you do not plan to reinstall the Hardware Diagnostic Suite, answer `yes` to remove the `crontab` entries. When Hardware Diagnostic Suite schedule `crontab` entries remain, but the Hardware Diagnostic Suite agent is no longer installed, you might receive `cron` errors.

▼ To Install Hardware Diagnostic Suite Using the `es-inst` Script

1. **Run the `es-inst` script.**

2. **Choose the directory where you want the files to reside.**

The default location is `/opt`.

3. **Accept the appropriate core Sun Management Center packages.**

The script asks you whether you want to use these as a production environment or a developer environment, and whether you want server, agent, or console components installed. It also gives you a choice of language to install. See the *Sun Management Center 3.5 Software Installation and Configuration Guide* for more information about the core software.

4. **When you are prompted to select optional add-on features, accept the Advanced System Monitoring package.**

This option includes all Hardware Diagnostic Suite packages.

5. **Accept any packages designed for your specific platform.**

For example, if you are installing this software on a Sun Fire™ 15K, look for packages specific to that system type. See the documentation collection at <http://www.sun.com/sunmanagementcenter> for platform-specific information.

6. Accept any packages designed for the hardware you intend to test.

For example, if you intend to use Hardware Diagnostic Suite to test storage arrays, look for packages specific to that hardware type.

▼ To Uninstall Hardware Diagnostic Suite Using the `es-uninst` Script

1. Run the `es-uninst` script from your Sun Management Center directory.

The default location is `/opt/SUNWsymon/sbin`.

2. Say No when asked if you want to uninstall your entire environment.

Choosing to uninstall your Production Environment, for example, would uninstall all of Sun Management Center, not just Hardware Diagnostic Suite.

3. Say Yes when asked if you want to uninstall Advanced System Monitoring.

This removes all Hardware Diagnostic Packages. You will also be asked whether you wish to retain the data from this version for later upgrades.

After Reinstalling Sun Management Center

If you reinstall the Sun Management Center software, you must reinstall the Hardware Diagnostic Suite software.

Refer to the *Sun Management Center 3.5 Software Installation and Configuration Guide* for:

- System requirements
- Supported systems
- Preinstallation information
- Installation and removal instructions

Reactivating Schedule Information After an Upgrade

Note that even if you have saved data from your previous version of Hardware Diagnostic Suite when upgrading, Hardware Diagnostic Suite 2.0 does not automatically recognize old schedules. The scheduling information remains, but the entries are no longer called as active `cron` jobs.

To make old schedules active again, you must transfer the information from the `/var/opt/SUNWhwdiag/sched.cron` file to your `crontab` file.

Note – If you want to reestablish old schedules, you must do so before creating any new ones. Creating a new schedule pushes the new `crontab` data to the `sched.cron` file and overwrites it, erasing the old unattached schedules.

Hardware Diagnostic Suite Packages

The installation of the Hardware Diagnostic Suite is performed by the Sun Management Center software installation script, never by installing individual packages. However, for general information, the following table lists the packages that make up the Hardware Diagnostic Suite.

TABLE 2-3 Hardware Diagnostic Suite Packages

Package Name	Description
SUNWed	Server package
SUNWedag	Agent and tests package
SUNWhdrmi	Console package
SUNWedagx	64-bit agent and tests package
SUNWedcom	Common components for server and agent
SUNWedh	Help package (English only)

Accessing Hardware Diagnostic Suite Software

This chapter describes how to access the Hardware Diagnostic Suite software through the Sun Management Center software.

Note – The Hardware Diagnostic Suite software is automatically installed when you install the Sun Management Center software. Refer to the *Sun Management Center 3.5 Software Installation and Configuration Guide* for details.

Accessing Hardware Diagnostic Suite Through Sun Management Center

Below is an outline of the procedures needed to access the Hardware Diagnostic Suite software through Sun Management Center. It is important to perform these procedures in the order listed. Detailed, step-by-step instructions follow.

1. Start the Sun Management Center server and agent (refer to the *Sun Management Center 3.5 User's Guide* for details). These Sun Management layers are usually automatically running on the systems for which they are installed.
2. Start the Sun Management Center console (“To Start the Sun Management Center Console” on page 14).
3. Access the Hardware Diagnostic Suite console through the Sun Management Center console (“To Access the Hardware Diagnostic Suite Console Through Sun Management Center” on page 16).

▼ To Start the Sun Management Center Console

Note – The following procedure assumes that the Sun Management Center application (the Sun Management Center server and agent) is already running in your enterprise network. For information on starting the Sun Management Center application, refer to the *Sun Management Center 3.5 User's Guide*.

1. Start the Sun Management Center console:

```
# /opt/SUNWsymon/sbin/es-start -c &
```

Note – You do not have to be superuser to start the Sun Management Center console.

The Sun Management Center Login dialog box is displayed (FIGURE 3-1).

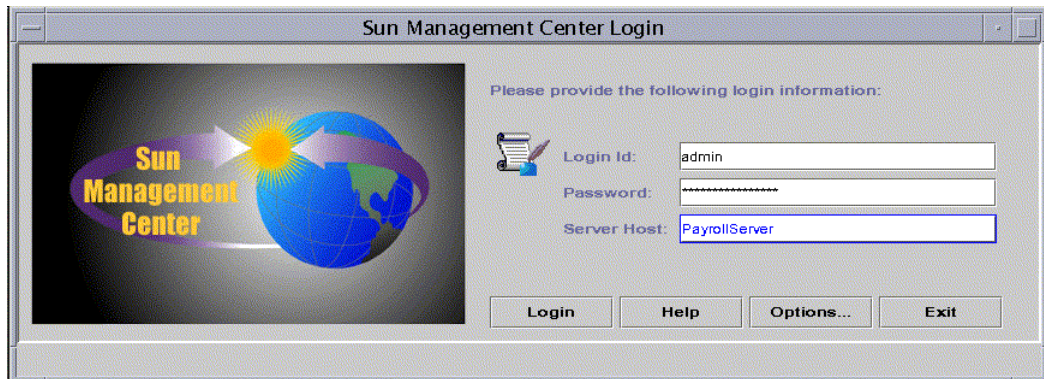


FIGURE 3-1 Sun Management Center Login Dialog Box

2. Log into Sun Management Center.

You must supply the following information:

- Login ID—A valid Solaris user account. This account must also be listed in the `/var/opt/SUNWsymon/cfg/esusers` file on the Sun Management Center server machine.
- Password—The valid Solaris password for the login account.
- Server Host—The hostname of the Sun Management Center server.

3. Click the Login button.

The Sun Management Center main console window is displayed (FIGURE 3-2).

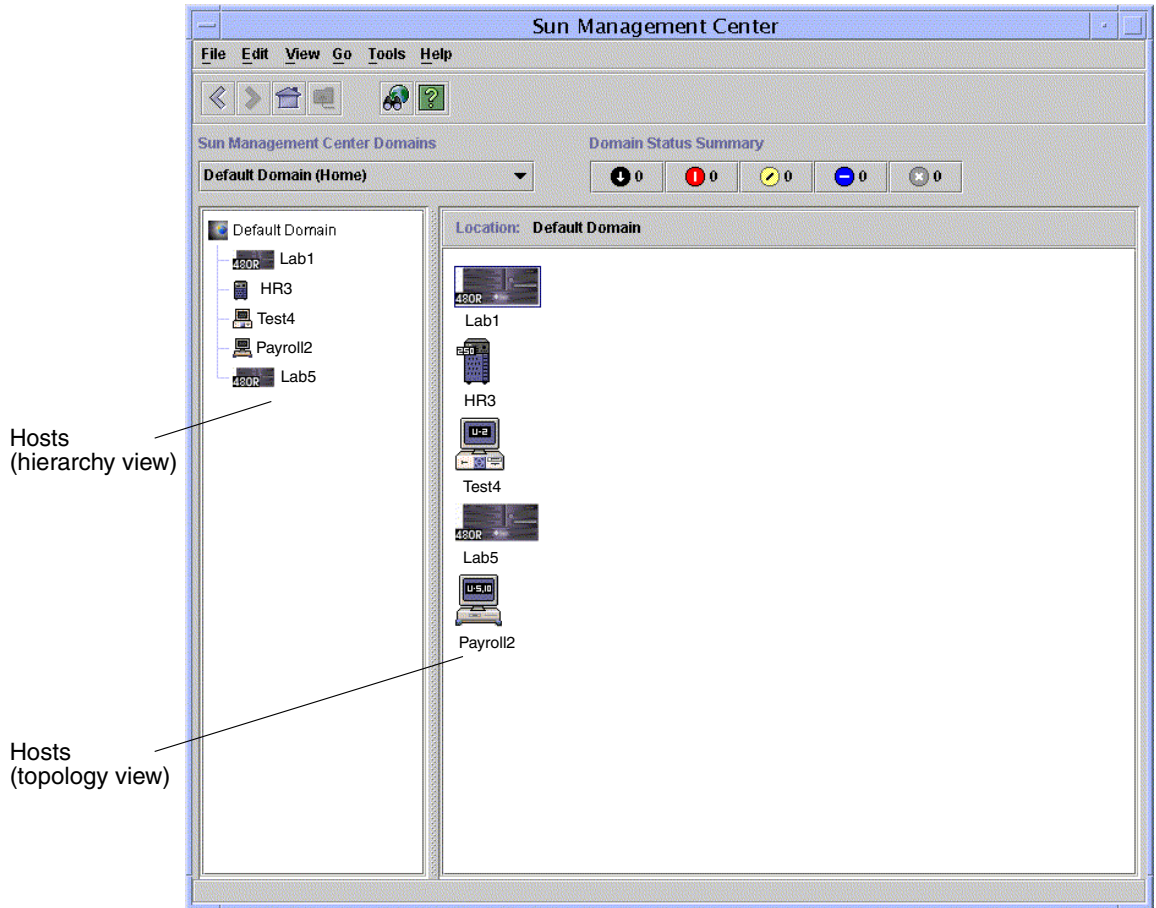


FIGURE 3-2 Sun Management Center Main Console Window

▼ To Access the Hardware Diagnostic Suite Console Through Sun Management Center

1. **Locate the host you want to test in the Sun Management Center main window (FIGURE 3-2).**

If you cannot locate the host, consider the following:

- Make sure you have the correct Sun Management Center domain.
- Make sure the host is configured as an object in Sun Management Center.
- Use the Sun Management Center topology search feature by selecting Go, then Search to search for the desired host.

Refer to the *Sun Management Center 3.5 User's Guide* for further details.

2. **Select the host for testing in one of the following ways:**

- Double-click your left mouse button on the selected host icon in the hierarchy view or the topology view.
- Right-click the desired host and highlight Details from the pop-up menu in the hierarchy or topology view.
- Left-click the selected host icon in the hierarchy view or the topology view. Select Tools, then Details.

The Details window for the selected host is displayed (FIGURE 3-3).

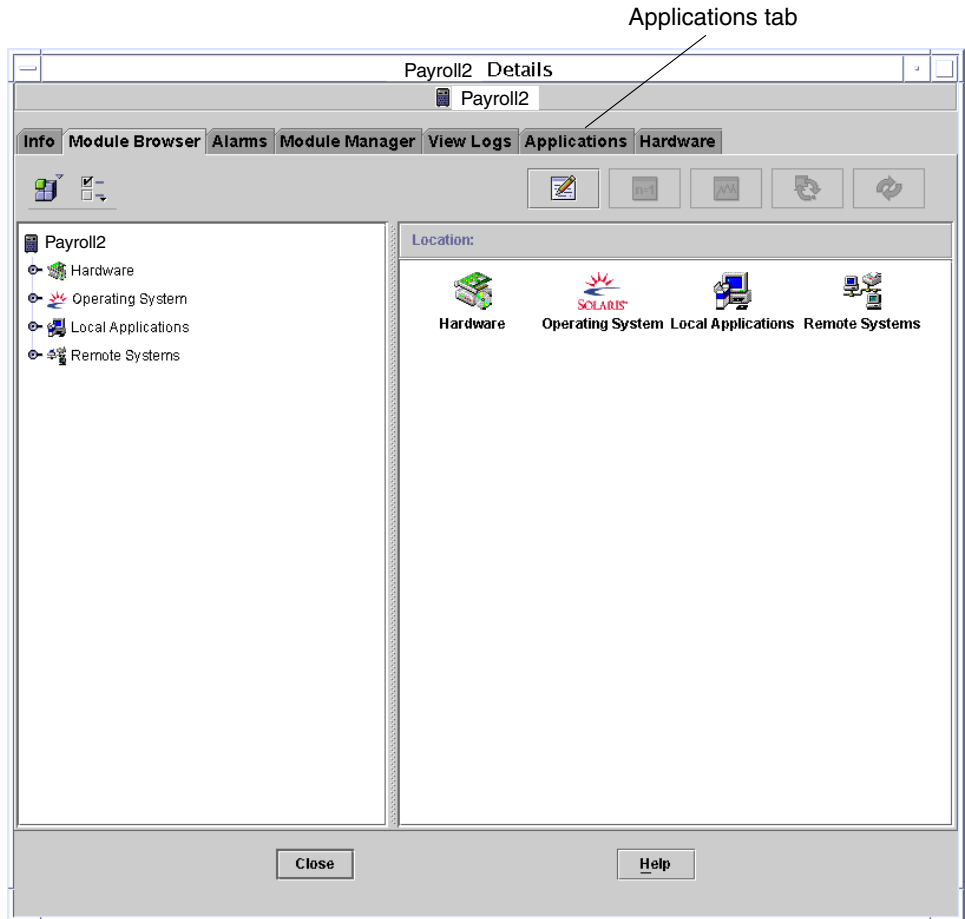


FIGURE 3-3 Sun Management Center Details Window

3. Click the **Applications tab** to access the Sun Management Center add-on products (see FIGURE 3-3).
4. Click the **Hardware Diagnostic Suite** option from the list of Applications in the left panel (see FIGURE 3-4).

The Hardware Diagnostic Suite console window is displayed.

Hardware Diagnostic Suite option

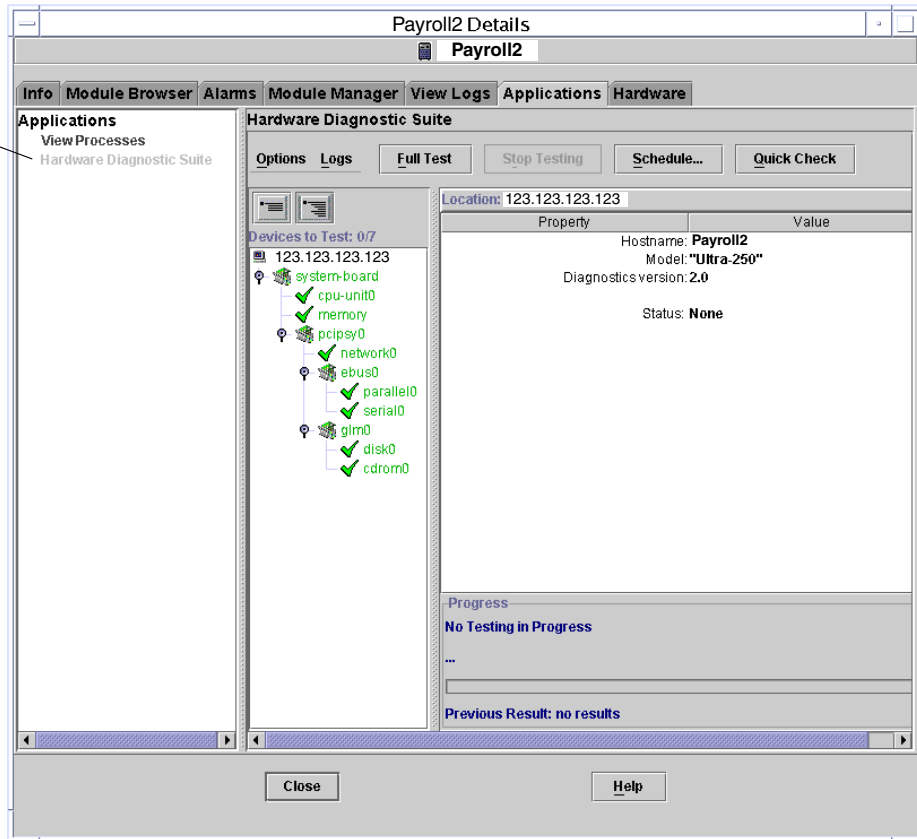


FIGURE 3-4 Hardware Diagnostic Suite Console Window

Note – The Hardware Diagnostic Suite agent starts automatically when you select the Applications tab.

Running a Hardware Diagnostic Suite Test Session

This chapter describes how to configure, run, schedule, and review a Hardware Diagnostic Suite test session. The main topics are:

- “Preparing Devices for a Test Session” on page 20
- “Selecting Devices for a Test Session” on page 20
- “Starting a Test Session” on page 23
- “Monitoring a Test Session” on page 24
- “Suspending, Resuming, and Stopping a Test Session” on page 27
- “Reviewing Test Results” on page 28
- “Resetting the Hardware Diagnostic Suite Console” on page 29
- “Scheduling a Test Session” on page 30
- “Running the Hardware Diagnostic Suite in a DR Environment” on page 36

The procedures in this chapter assume that the Hardware Diagnostic Suite is already running as described in Chapter 3.

See Appendix B for descriptions of all Hardware Diagnostic Suite console panels, buttons, and menus.

Preparing Devices for a Test Session

The following tests require media to be installed before the test is run:

- “CDROM Test” on page 56
- “Floppy Test” on page 58

See the appropriate test description in Appendix A for details, and install the necessary media before starting the test.

Selecting Devices for a Test Session

When the Hardware Diagnostic Suite window is displayed for a host, the system configuration is probed to display devices that can be tested. Select the device that you want to test in the hierarchy view. Expand the hierarchy view if device listings are collapsed.

▼ To Select a Device to Test

1. **If necessary, expand the hierarchy view to show the devices on the host by clicking one of the hierarchy view buttons (FIGURE 4-1).**

Note – For more details about the Collapse/Expand Hierarchical View panel buttons, refer to “Hierarchical View Panel” on page 70.

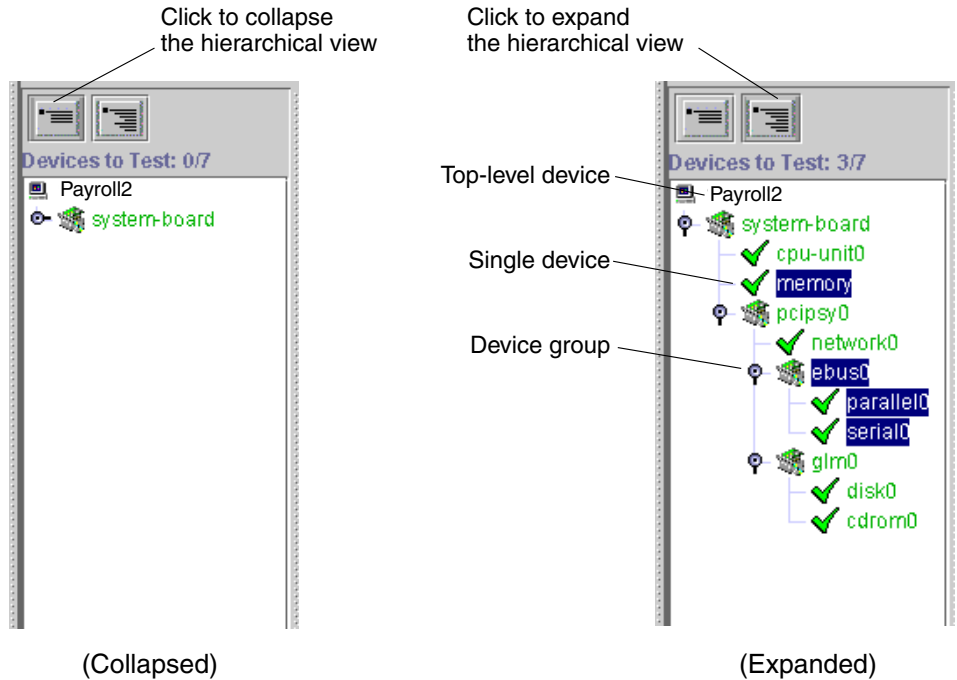


FIGURE 4-1 Expanding the Hierarchical View

2. Click the device or device group that you want to test.

The device is highlighted as shown in FIGURE 4-1.

By default, if you select another device, the previous device is no longer selected.

You can select individual devices, entire groups of devices, or the top level device (host) for testing with a single click at the appropriate level.

If you click a device, the Device Display panel shows additional information about that device.

Note – To select more than one device, hold down the Control key to pick and choose devices to select, or hold down the Shift key while clicking on whole sections of devices. The Device Description panel on the right describes the last device that was selected.

▼ To Reprobe the System for Devices

The Hierarchical View panel only displays devices recognized by the Hardware Diagnostic Suite agent when the application is first started. If, for example, you add hot-pluggable devices or perform a dynamic reconfiguration after starting Hardware Diagnostic Suite, use the Reprobe function to check the system and update the list of testable devices.

Note – When you add a device to your system, you must first perform the appropriate task (such as a reconfiguration boot) to enable the Solaris kernel to recognize the device. Once the device is recognized by the Solaris operating environment, use the Reprobe command.

1. **Select Reprobe for Devices from the Options drop-down menu, just above the Hierarchical View panel.**

The Hardware Diagnostic Suite agent rechecks the system for all testable devices and displays them in the Hierarchical View panel.

Starting a Test Session

Before you start a test session, make the following decisions:

- Choose to run a Full Test session or to run a Quick Check as described in TABLE 4-1.
- Choose to run the tests now, or schedule the session to run in the future (“Scheduling a Test Session” on page 30).

TABLE 4-1 Test Modes

Test Mode	Description
Full Test	Performs functional, data-safe, non-resource-intensive tests that exercise the subsystems of the devices that are selected in the Hierarchical View panel.
Quick Check	Runs a brief test on all selected devices. The Quick Check tests attempt to communicate with each selected device to confirm connectivity. No functional device testing occurs.

Note – All tests are designed so they will not interfere with the applications that are currently running on a system.

▼ To Run a Full Test Session Now

- **After selecting devices to test, click the Full Test button.**

Functional tests for each selected device are run sequentially until all tests are complete.

For information about viewing the progress of the test session, refer to “Monitoring a Test Session” on page 24.

▼ To Run a Quick Check Test Now

- **After selecting devices to test, click the Quick Check button.**

Quick connectivity tests for each selected device are run sequentially until all tests are complete.

For information about viewing the progress of the test session, refer to “Monitoring a Test Session” on page 24.

Monitoring a Test Session

The Hardware Diagnostic Suite console displays information about each device and each test as it runs and displays the results of each test.

▼ To Monitor the Tests in Progress

1. View the progress of each test as it runs (FIGURE 4-2).

As each device is tested, device information is shown in the Device Description panel, and test information is displayed in the Progress panel.

The screenshot displays a console window with the following sections:

- Location:** network0
- Property** | **Value**
- Device: **hme0**
- Host_Name: **Payroll12**
- Host Address: **129.142.81.166**
- Host ID: **807695d3**
- Domain Name: **deptA.com**
- Status: **Passed**
- Progress**
- Testing: **network0**
- "Send ICMP broadcast to find target."...
- Previous Result: network0 Passed**

Annotations in the image point to the following elements:

- Device under test:** Points to the Device: **hme0** line.
- Device Description panel:** Points to the entire table area containing device details.
- Progress panel:** Points to the bottom section containing the test name and progress bar.

FIGURE 4-2 Device Description Panel and Progress Panel

The Progress panel (FIGURE 4-2) displays the following information:

- The device under test, the subtest that is currently running, and test messages.
- A bar that represents the progress of the current test.
- The status (passed/failed) of the previous test.

2. View the status of all tested devices in the Hierarchy View.

When a Hardware Diagnostic Suite test detects a successful or failing test on a device, the pass or fail condition is immediately displayed in the Hierarchical View panel (FIGURE 4-3). TABLE 4-2 describes the test indicators.

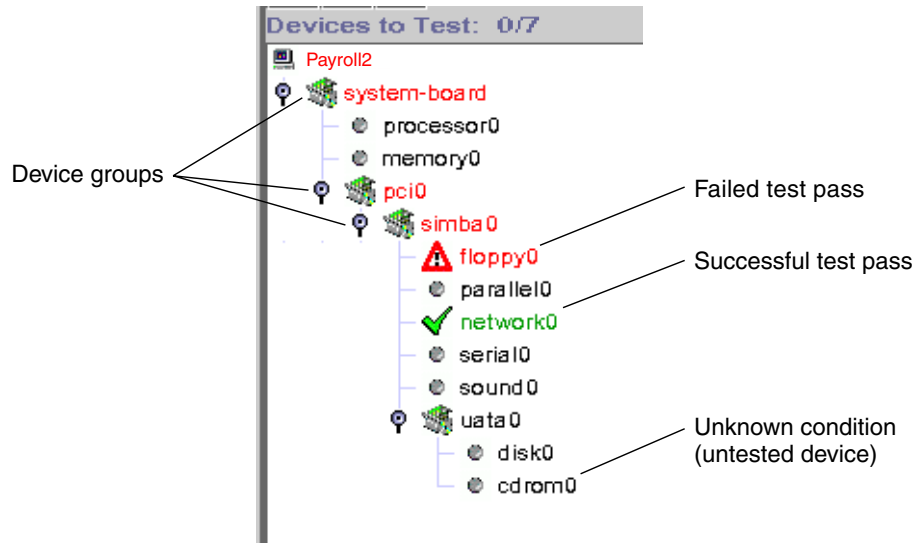





FIGURE 4-3 Pass and Fail Conditions in the Hierarchy View

TABLE 4-2 Hierarchical View Panel Indicators

Indicator	Condition	Description
	Unknown	The device is in an unknown state, usually because it has not been tested or the test has not completed. The device name is displayed in black text.
	Successful test pass	When a test completes with no failures detected, the device is marked with a green chicanery in the Hierarchical View panel. The device name is displayed in green text.
	Failed test pass	As soon as a failure is detected, the device is marked with this indicator. The device name and the group(s) that the failing device belongs to are displayed in red text. The red text highlights the hierarchy of devices involved in the detected failure. The information and error log files are updated with the error condition information. In addition, if you double-click the device, a pop-up window displays the error message.

3. To view additional information about a device, click the device name in the hierarchy view.

If the device is in an unknown (untested) state or has a successful test pass indicator, additional information about that device is displayed in the Device Description panel.

If the device shows a failing test indicator, a pop-up window displays more information about the failure (FIGURE 4-4). This failure information is also recorded in the error log. See “Reviewing Test Results” on page 28.

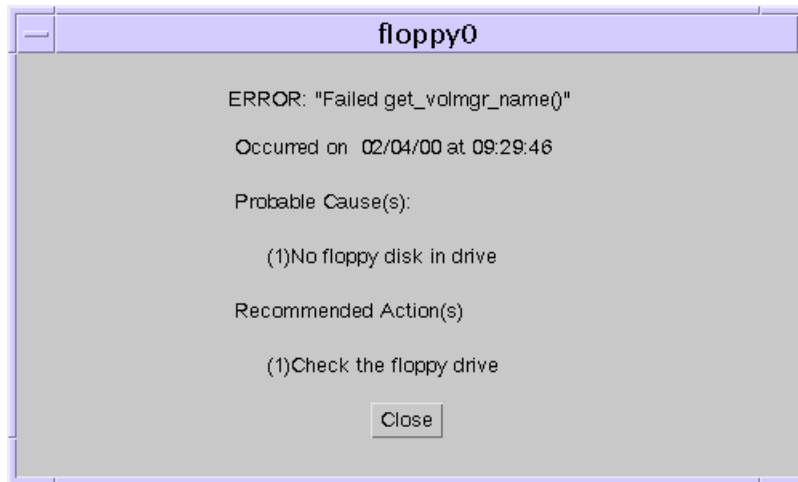


FIGURE 4-4 Error Message Pop-up

Suspending, Resuming, and Stopping a Test Session

You can suspend a Hardware Diagnostic Suite test session and resume it as described in the following procedures.

▼ To Suspend a Test Session

1. **While a test session is running, select the Options button to access the Options menu.**
2. **Select the Suspend option.**

The Hardware Diagnostic Suite test session is suspended until you resume it. The progress panel displays, "Testing Suspended."

▼ To Resume a Test Session

1. **While a test session is suspended, select the Options button to access the Options menu.**
2. **Select Resume.**

The Hardware Diagnostic Suite test session that was suspended starts to run again.

▼ To Stop a Test Session

- **While a test session is running, click the Stop Testing button.**

All testing stops.

Reviewing Test Results

In addition to the test results displayed in the Hierarchical View panel, two log files contain information about every Hardware Diagnostic Suite test session:

- **Information Log**—Contains informative messages, such as start and stop times and pass and failure information. The information messages are recorded in the `/var/opt/SUNWhwdiag/logs/hwdiag.info` file.
- **Error Log**—Contains all Hardware Diagnostic Suite error messages that have occurred during the test sessions. The error messages are recorded in the `/var/opt/SUNWhwdiag/logs/hwdiag.err` file.

▼ To View the Hardware Diagnostic Suite Log files

1. **Select the Logs button, just above the Hierarchical View panel, to access the Logs menu.**
2. **Select the log (Information or Errors) that you want to view.**

A window that contains the Hardware Diagnostic Suite messages is displayed.

TABLE 4-3 describes the types of error messages.

TABLE 4-3 Error Message Categories

Message Category	Description
FATAL	Severe errors that indicate a serious hardware failure was detected while testing the device. The problem might be so severe that the test was unable to communicate with the device in any way. The Hardware Diagnostic Suite test might have detected a data compare or a hardware error. These errors are recorded in the Error log file.
ERROR	A hardware error was detected, such as missing media, a loose cable, or a disconnection. This type of error is usually less severe than a fatal error. These errors are recorded in the Error log file.
WARNING	Some occurrence was detected that is not a hardware error. These messages are recorded in the Information log file.
INFO	Informative, nonerror type events such as start and stop times. These messages are recorded in the Information log file.

Resetting the Hardware Diagnostic Suite Console

To clear the Hardware Diagnostic Suite console of previous test information, perform a reset as described below.

▼ To Reset the Console

1. **Select the Options button to access the Options menu.**
2. **Select the Reset option.**

All previous test results are cleared from the console.

Note – The Hardware Diagnostic Suite log files are *not* cleared.

Scheduling a Test Session

The Hardware Diagnostic Suite scheduling function creates entries in the superuser's `crontab` file. When the start date and time criteria are met, the test session, as configured in the Scheduler, starts automatically. You do not need to start Sun Management Center software to run a scheduled test session.

To check the results of any prior test session, view the Hardware Diagnostic Suite log files as described in "To View the Hardware Diagnostic Suite Log files" on page 29.

▼ To Schedule a Test Session

1. **In the Hardware Diagnostic Suite console, click the Schedule button.**

The Schedule panel with scheduling instructions is displayed (FIGURE 4-5).

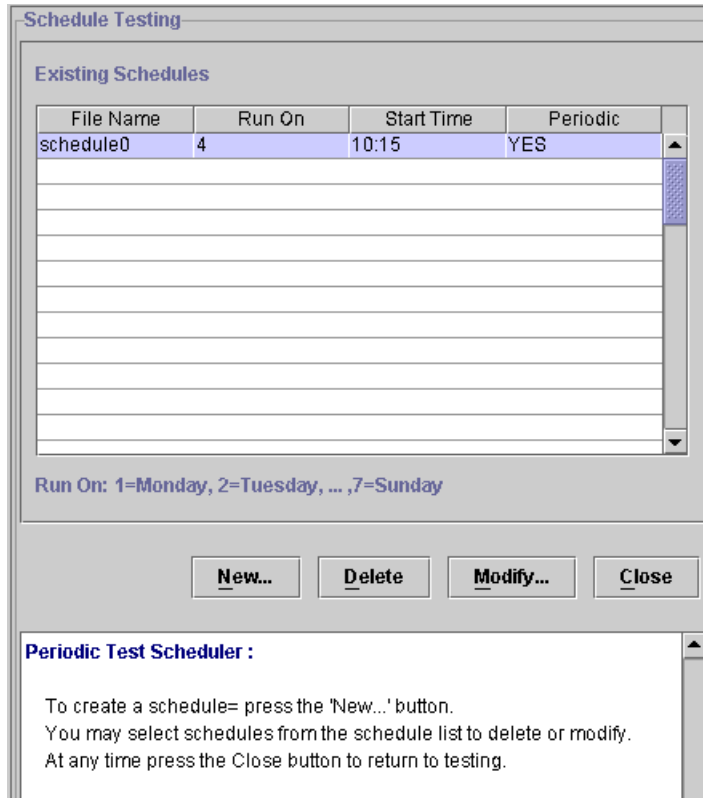


FIGURE 4-5 Schedule Panel

Note – A scheduled test session will not start if Hardware Diagnostic Suite is already running a test session at that time.

2. Select the New button.

The Schedule Form is displayed (FIGURE 4-6).

The screenshot shows a dialog box titled "Schedule Testing" with the following fields and options:

- Name field:** A text box containing "schedule1".
- Start Time field:** A dropdown menu showing "00:00".
- Run On:** Two tabs: "Periodic" (selected) and "One Time".
- Periodic scheduler:** A grid of checkboxes for days: Every Day, Monday(1), Tuesday(2), Wednesday(3), Thursday(4), Friday(5), Saturday(6), Sunday(7).
- One Time scheduler:** (No visible options shown).
- Configuration:** Two tabs: "Custom" (selected) and "Pre-packaged".
- Custom configuration tab:** Radio buttons for Full Test and Quick Check.
- Pre-packaged configuration tab:** (No visible options shown).
- Use selected items in device tree.** (A link text).
- Buttons:** "OK" and "Cancel".
- Scheduling Tests:** A scrollable text area containing instructions: "To schedule testing, fill in the fields of the schedule form. To run periodically on specific days, choose the 'Periodic' tab. To run once on a specific date, choose the 'One Time' tab. To select your own devices to test, choose the 'Custom' tab. To use pre-packed test configurations, choose the 'Pre-packaged' tab."

Annotations with arrows point to the Name field, Start Time field, Periodic scheduler, One Time scheduler, Custom configuration tab, and Pre-packaged configuration tab.

FIGURE 4-6 Schedule Form

3. Enter a schedule name in the Name field.

You can use the name that is shown in the Name field (the Hardware Diagnostic Suite displays a unique name each time a schedule is created), or specify a different name. The following naming rules apply:

- The name must be a unique schedule name.
- The name must be between 1 and 20 alphanumeric characters.
- The only permitted nonalphanumeric character is the _ (underscore).

4. Enter the start time for the test session that you are scheduling.

You can use the 24-hour clock settings in 15-minute intervals that are located in the pull-down list, or type in your own start time in the Start Time field.

5. Enter the date for the test session in the Run On field.

- Choose the Periodic tab (FIGURE 4-6) to create a schedule that runs the Hardware Diagnostic Suite test session at regular intervals. Select the days of the week that you want testing to occur. This schedule remains in effect until you delete or modify it.
- Choose the One Time tab (FIGURE 4-6) to create a schedule that will only run one time. Specify the date using the *mm/dd/yyyy* format. This schedule will only run one time, but remains in the list of schedules so that you can modify it if you want it to run again. You must delete the schedule to remove it from the list.

6. Configure the test mode and the devices to test in the Configuration field.

There are two methods to do this:

- Choose the Custom tab (FIGURE 4-6) to create a schedule that tests the devices selected in the Hierarchical View panel:
 - i. **Select either Full Test or Quick Check for the test mode (see TABLE 4-1 for test mode descriptions).**
 - ii. **Select the devices to test in the Hierarchical View panel.**
- Choose the Pre-packaged tab (FIGURE 4-6) to create a schedule that runs a predefined Hardware Diagnostic Suite test session, and select one of the predefined tests as described in TABLE 4-4.

TABLE 4-4 Predefined Tests

Test Name	Description
Connection Check	Sets up a schedule to run Quick Check tests on all available devices.
Functional Check	Sets up a schedule to run Full Tests on all available devices.
Processor(s) Check	Sets up a schedule that runs the Processor test (in Full Test mode) on all processors in the system.

TABLE 4-4 Predefined Tests *(Continued)*

Test Name	Description
Hard Disk Check	Sets up a schedule that runs the Disk test (in Full Test mode) on all the disks in the system.
Odd Disk Testing	Sets up a schedule that runs the Disk test (in Full Test mode) on every other disk in the system, beginning with the first disk (as seen in the Hierarchical View panel). This test is useful when there are many disks in the system.
Even Disk Testing	Sets up a schedule that runs the Disk test (in Full Test mode) on every other disk in the system beginning with the second disk (as see in the Hierarchical View panel). This test is useful when there are many disks in the system.

7. Apply your test session schedule information by clicking the OK button.

Your schedule information is applied, the Schedule Form is closed, and the Schedule panel is displayed. Your new Hardware Diagnostic Suite test session schedule is listed in the Existing Schedules list (FIGURE 4-7).

Note – For descriptions of all Scheduling buttons, refer to “Schedule Form Buttons” on page 82.

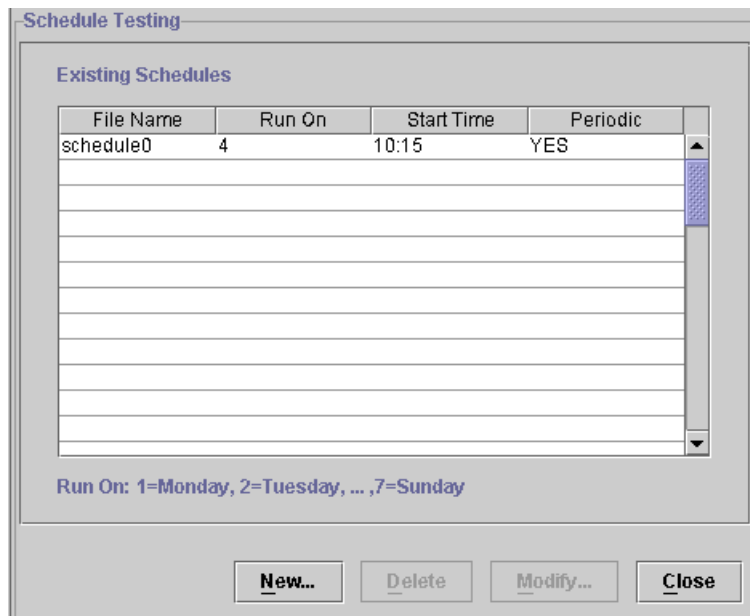


FIGURE 4-7 Existing Schedules List

8. Exit the scheduling function by clicking the Close button. The Schedule panel is closed.

▼ To Modify a Schedule

1. **Select the Schedule button.**
The Hardware Diagnostic Suite displays the Schedule panel with the list of schedules.
2. **Select the schedule that you want to modify.**
The schedule is highlighted.
3. **Select the Modify button.**
The Schedule Form is displayed (FIGURE 4-6).
4. **Change the schedule entries as needed.**

Note – If you change the name of the schedule, the Hardware Diagnostic Suite creates another schedule with the newly specified name. It does not modify the name of the original schedule.

5. Click the OK button to apply your changes.
6. Click the Close button to close the Schedule panel.

▼ To Delete a Schedule

1. **Select the Schedule button.**
The Schedule panel with the list of schedules is displayed.
2. **Click the schedule that you want to delete.**
The schedule is highlighted.
3. **Select the Delete button.**
The selected schedule is deleted and removed from the list.
4. **Select the Close button to close the Schedule panel.**

Running the Hardware Diagnostic Suite in a DR Environment

The Hardware Diagnostic Suite agent is aware of dynamic reconfiguration (DR) operations that are performed when you use the `cfgadm` command (`unconfigure` or `configure`). When the Hardware Diagnostic Suite is running and a DR operation is performed, the console is replaced with a message indicating that a DR event is taking place. When the DR operation is finished, the Hardware Diagnostic Suite probes the system to determine and display all testable devices.

Note – The Hardware Diagnostic Suite does not automatically reprobe the devices after a DR `power-on` or `power-off` operation. To test the devices that were added after a `power-on`, perform a reprobe from the Options menu.

Using Hardware Diagnostic Suite With Sun Management Center Alarms

This chapter describes how to view and customize Sun Management Center alarms for use with the Hardware Diagnostic Suite:

- “Sun Management Center Alarms Overview” on page 38
- “To View and Acknowledge an Alarm” on page 41
- “To Edit the Alarm Thresholds for Hardware Diagnostic Suite” on page 42
- “To Create Your Own Alarm Trigger” on page 47
- “To Create an Alarm Action” on page 48

Note – The procedures in this chapter assume that the Hardware Diagnostic Suite is already running as described in Chapter 3.

For additional information about Sun Management Center alarms, refer to the *Sun Management Center 3.5 User’s Guide*.

Sun Management Center Alarms

Overview

The Sun Management Center software monitors your system and notifies you, using alarms, when abnormal conditions occur. These alarms are triggered when conditions fall outside the predetermined ranges.

The Hardware Diagnostic Suite uses the Sun Management Center Hardware Diagnostic Suite feature to trigger and display alarm conditions for the host you are testing. By default, every Hardware Diagnostic Suite test session error message triggers a Sun Management Center critical alarm. The alarm is displayed in the Sun Management Center console. Additionally, you can define which Hardware Diagnostic events trigger Sun Management Center alarms, and you can define the actions that take place when an alarm occurs.

Sun Management Center can be configured to send email when certain alarms are triggered, and to execute scripts that perform an action on the system. For example, if the Hardware Diagnostic Suite detects an error on one FPU of a multiprocessor system, the event can raise an alarm that automatically triggers the execution of a script that takes the suspect CPU offline. In the meantime, an email notification is immediately sent to the system administrator. See FIGURE 5-7 for a flow chart of alarm actions.

Sun Management Center uses alarm indicators (TABLE 5-1) to alert you when an alarm condition occurs.

TABLE 5-1 Alarm Indicators






Indicator	Severity	Description
 (black)	1 Down	A service-affecting condition has developed and an <i>immediate</i> corrective action is required. For example, a Sun Management Center managed object has gone out of service and that resource is required.
 (red)	2 Critical	A service-affecting condition has developed and corrective action is required. This type of error is generated when a hardware failure is detected by a Hardware Diagnostic Suite test session.
 (yellow)	3 Alert	A non-service-affecting condition has developed and corrective action should be taken in order to prevent a more serious fault.
 (blue)	4 Caution	A potential or an impending service-affecting fault has been detected, before any significant effects have occurred.
 (gray)	5 Disabled	A resource has been disabled.

TABLE 5-2 describes the Sun Management Center window in which the alarm indicators are displayed.

TABLE 5-2 Locations of Alarm Indicators

Alarm Indicator Location	Description
Sun Management Center Main Window	Colored alarm indicators appear next to the host in the hierarchy and topology views. Also, the number of alarms for different categories is displayed in the Domain Status Summary (the group of circular colored alarm indicators in the upper right portion of the window). See FIGURE 3-2.
Details Window	A small colored alarm indicator appears next to the hostname at the very top of the Details window.
Details Window (Module Browser tab)	Colored alarm indicators appear next to the Sun Management Center module that generated the alarm. Hardware Diagnostic Suite generated alarms appear next to the Local Applications indicator in the hierarchy and topology views.
Details Window (Alarms tab)	All alarm indications (unacknowledged and acknowledged) are listed in a table.

Alarm Information

The Alarms tab displays the host alarms with the following information:

TABLE 5-3 Alarm Table Description

Category	Description
Severity	Graphic indicator whose color indicates the severity of the alarm as described in TABLE 5-1. A green check next to the indicator means that the alarm is acknowledged. If no check is present, the alarm is unacknowledged.
Start time	Indicates the time the alarm first occurred.
State	A “ringing” open indicator means the condition that caused the alarm still exists. A “silent” closed indicator means the condition no longer exists.
Action	Indicates the action assigned to the alarm.
Message	Abbreviated message that indicates the type of alarm.

▼ To View and Acknowledge an Alarm

1. **In the Sun Management Center main window, look at the host in the hierarchy view or the topology view.**

If an alarm indicator (TABLE 5-1) is displayed, there is an unacknowledged alarm condition that warrants further investigation.

Only one alarm indicator can be displayed for a host at a given time. If there are two or more types of alarms for the host, the more severe unacknowledged alarm takes precedence and is propagated up the tree. All alarms are listed in the Sun Management Center alarms window.

Note – Sun Management Center displays alarms for many kinds of events. Not all displayed alarms are generated by a Hardware Diagnostic Suite test session.

Note – The Sun Management Center agent is configured so that only one server receives alarm information from that agent.

2. **If an alarm exists, follow these steps to view and acknowledge the alarm condition:**

- a. **Double-click the host in the main Sun Management Center window to open the Details window.**

- b. **Select the Alarms tab.**

The Alarms window is displayed (FIGURE 5-1). All alarms for this host are displayed.

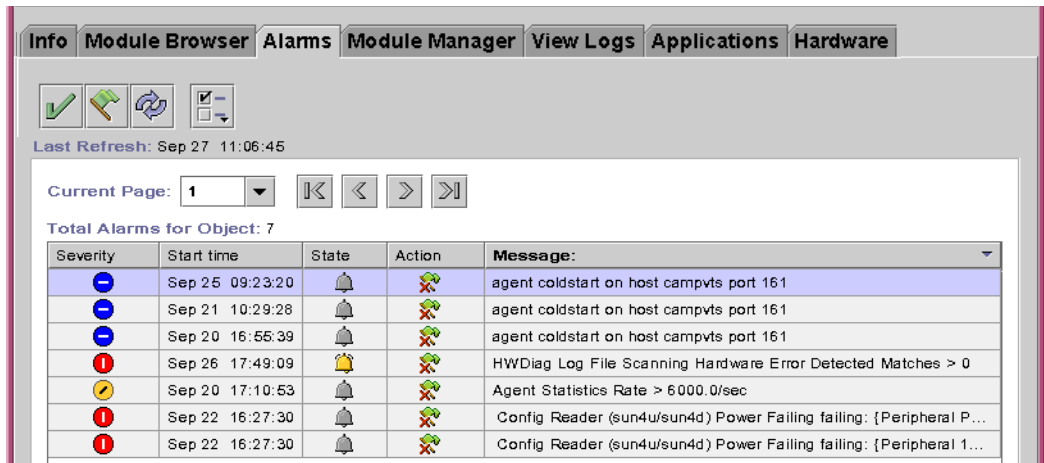



FIGURE 5-1 Alarms Tab

3. To acknowledge an alarm, select the alarm and click the check button .

The alarm is marked *acknowledged* in the Alarms tab list. Acknowledged alarms are not displayed in other Sun Management Center windows.

Additional information about Sun Management Center alarms can be found in the *Sun Management Center 3.5 User's Guide*.

▼ To Edit the Alarm Thresholds for Hardware Diagnostic Suite

By default, the Hardware Diagnostic Suite error and information log files are scanned by Sun Management Center for any occurrence of the `ERROR` or `FATAL` text pattern. If the pattern is detected, an alarm is generated. You can modify the error condition criteria or create your own pattern which will generate an alarm when it is logged.

1. In the Sun Management Center main window, open the Details window for the host for which you plan to set or modify an alarm condition. (See FIGURE 3-3.)
2. Select the Details window Module Browser tab.
3. Double-click the Local Applications icon in the topology view.
4. Double-click the Hardware Diagnostic Suite icon in the topology view.

- Double-click the Hardware Diagnostic Suite Agent icon in the topology view.
The Hardware Diagnostic Suite Agent properties are displayed (FIGURE 5-2).

Location: Local Applications/Hardware Diagnostic Suite/Hardware Diagnostic ...

Hardware Diagnostic Suite Agent 1 0 0 0

Property	Value
HWDS UDP Port	0

Hardware Diagnostic Errors 2 0 0 0

Pattern Name ▾	Regexp Pattern	Pattern Description	Matches
diag_error	ERROR	Hardware Error D...	0
diag_fatal	FATAL	Hardware Failure	0

FIGURE 5-2 Hardware Diagnostic Suite Agent Properties

TABLE 5-4 describes these properties.

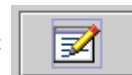
TABLE 5-4 Hardware Diagnostic Suite Agent Properties

Table Name	Row/Column	Description
Hardware Diagnostic Suite Agent	HWDS UDP Port	Used for communication between Hardware Diagnostics agent and server.
Hardware Diagnostic Errors	Pattern Name	Specifies the Pattern Name property. Pattern Name is the index key for this table and must be unique. Default Hardware Diagnostic Suite Error pattern names are: <ul style="list-style-type: none"> • <code>diag_error</code> - The pattern that scans for Hardware Diagnostic Suite test session error messages. • <code>diag_fatal</code> - The pattern that scans for Hardware Diagnostic Suite test session fatal error messages.
	Pattern Description	Specifies a description for the <code>regex</code> patterns. Hardware Diagnostic Suite descriptions are: Hardware Error Detected Hardware Failure
	Regex Pattern	Defines the pattern that generates the alarm. The default Hardware Diagnostic Suite patterns are: ERROR—When this pattern occurs in the Hardware Diagnostic Suite log file, this indicates that a hardware error that requires intervention occurred. It might be due to missing media, a loose cable, or a disconnection. FATAL—When this pattern occurs, it is an indication that the hardware failure was unrecoverable. The Hardware Diagnostic Suite test might have detected a data miscompare or a hardware error. See TABLE 4-3 for descriptions of Hardware Diagnostic Suite error types.
	Matches	Displays the number of pattern matches that have occurred. When this number matches the alarm threshold, an alarm is triggered. This table cell is also used to define the alarm thresholds as described in Step 6 through Step 9.

6. Select either the **ERROR** or **FATAL** data property by clicking on the **Regex Pattern** table cell. (See TABLE 4-1 for error type descriptions.)

7. Open the **Attribute Editor** by doing one of the following:

- Right-click inside the **Matches** table cell and select **Attribute Editor** from the pop-up menu.
- Click the **Attributes** button at the top of the **Details** window:



The initial Attribute Editor panel shows information about the attribute. You cannot edit the properties for alarms in this panel.

8. Select the Alarms tab in the Attribute Editor.

The alarms panel is displayed (FIGURE 5-3). This panel enables you to set alarm thresholds.

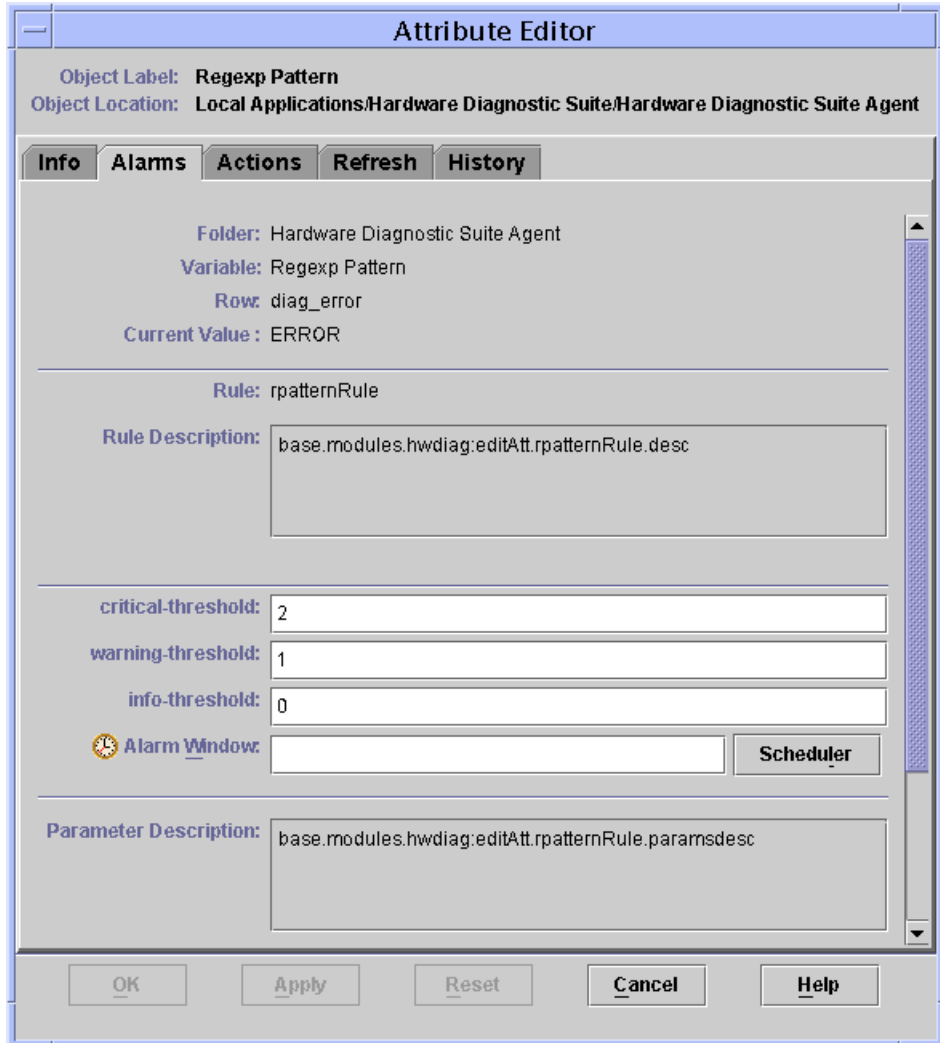


FIGURE 5-3 Attribute Editor, Alarms Panel

9. Define the desired alarm thresholds by entering the appropriate numbers in the alarm threshold fields.

The alarm threshold determines the type of alarm to generate based on the number of pattern matches that occur (TABLE 5-5).

TABLE 5-5 Alarm Thresholds

Fields for New Values	Description
Critical-threshold	Specify an integer value. If the pattern occurs more times than this value, a Critical (red) alarm is generated.
Warning-threshold	Specify an integer value. If the pattern occurs more times than this value, an Alert (yellow) alarm is generated.
Info-threshold	Specify an integer value. If the pattern occurs more times than this value, a Caution (blue) alarm is generated.
Alarm Window	An 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.

For example, you select the attribute editor for the FATAL pattern Regexp column. You enter values of 3, 2, and 1 for critical-threshold, warning-threshold, and info-threshold respectively.

When a Hardware Diagnostic Suite test session logs fatal errors, the type of alarm now displayed would be:

- A blue Caution alarm when one fatal error is logged.
- A yellow Alert alarm when two fatal errors are logged.
- A red Critical alarm when three or more fatal errors are logged.

The default thresholds for both `diag_error` and `diag_fatal` patterns are:

- Info-threshold 0
- Warning-threshold 1
- Critical-threshold 2

To reset the thresholds to Hardware Diagnostic Suite default values, enter blanks in the fields.

▼ To Create Your Own Alarm Trigger

The Sun Management Center Hardware Diagnostic Suite enables you to create your own pattern that will trigger an alarm when the defined pattern appears in the Hardware Diagnostic Suite error log file.

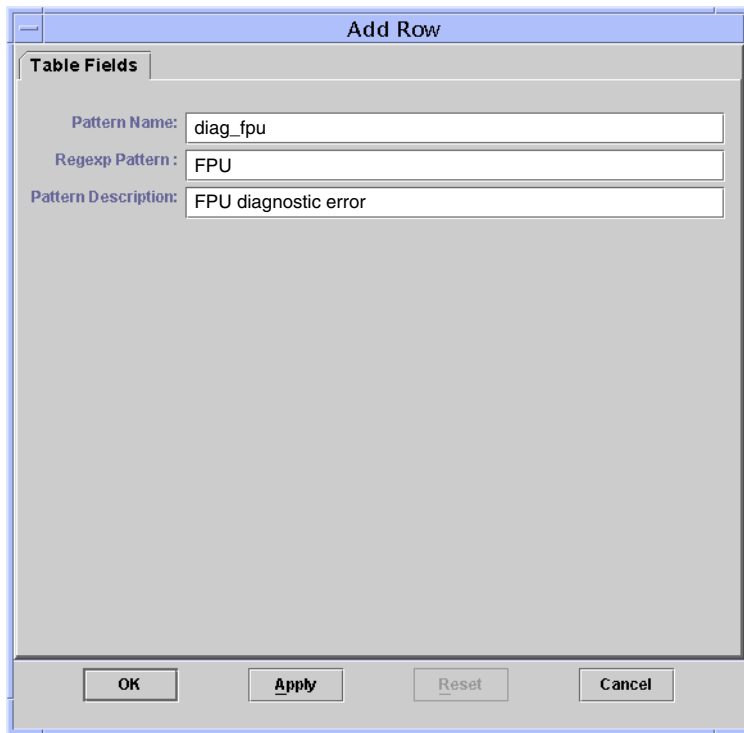
1. Open the Hardware Diagnostic Suite folder.

For instructions on how to do this, see “To Edit the Alarm Thresholds for Hardware Diagnostic Suite” on page 42, Step 1 through Step 5.

2. To add a new Hardware Diagnostic Suite log file pattern that will generate an alarm condition, perform the following steps:

a. Right-click anywhere on the Hardware Diagnostic Errors Table and select New Row from the pop-up menu.

The Add Row dialog box appears (FIGURE 5-4).



The screenshot shows a dialog box titled "Add Row" with a "Table Fields" tab. It contains three text input fields: "Pattern Name:" with the value "diag_fpu", "Regexp Pattern:" with the value "FPU", and "Pattern Description:" with the value "FPU diagnostic error". At the bottom of the dialog are four buttons: "OK", "Apply", "Reset", and "Cancel".

FIGURE 5-4 Sun Management Center Add Row Dialog Box

b. Enter information in the fields using the descriptions in TABLE 5-6.

Refer to TABLE 5-4 for detailed explanations of these fields.

TABLE 5-6 Add Row Dialog Box Field Descriptions

Field Name	Description
Pattern Name	Specifies the name of the alarm condition that you are creating.
Regex Pattern	Specifies the regular expression (pattern) that generates the alarm condition.
Pattern Description	Specifies a description for the regexp patterns.

c. Complete one of the following actions:

- Click OK to apply the changes and close this window.
- Click Apply to apply the changes without closing this window.
- Click Reset to clear all field entries without closing this window.
- Click Close to clear all field entries and close this window.

d. Create the alarm thresholds that define the type of alarm that is triggered.

For instructions on how to do this, see “To Edit the Alarm Thresholds for Hardware Diagnostic Suite” on page 42.

Once you apply your changes, the new row is inserted in the table. If a Hardware Diagnostic Suite test session logs a message that contains the pattern you specified, an alarm is generated for that host.

▼ To Create an Alarm Action

By default, the Hardware Diagnostic Suite sends email to root when an Error or Fatal error is detected. However, you can customize the alarm action to do something different, such as run a script.

Note – These scripts execute with superuser permissions.

1. Open the Hardware Diagnostic Suite folder.

For instructions on how to do this, see “To Edit the Alarm Thresholds for Hardware Diagnostic Suite” on page 42, Step 1 through Step 5.

2. Open the Attribute editor for the Regex Pattern table cell in the Hardware Diagnostic Errors Table.

For instructions on how to do this, see “To Edit the Alarm Thresholds for Hardware Diagnostic Suite” on page 42, Step 6 through Step 7.

3. Select the Actions Tab in the Attribute Editor.

The Actions menu is displayed as shown in FIGURE 5-5. TABLE 5-7 describes the fields.

The screenshot shows the 'Attribute Editor' dialog box with the 'Actions' tab selected. The dialog has a title bar 'Attribute Editor' and a close button. Below the title bar, it displays 'Object Label: Regexp Pattern' and 'Object Location: Local Applications/Hardware Diagnostic Suite/Hardware Diagnostic Suite Agent'. A tabbed interface at the top includes 'Info', 'Alarms', 'Actions' (selected), 'Refresh', and 'History'. The main area shows 'Folder: Hardware Diagnostic Suite Agent', 'Variable: Regexp Pattern', and 'Row: diag_fatal'. A section titled 'Automatic' contains six rows of action configuration: 'Critical Action', 'Alert Action', 'Caution Action', 'Indeterminate Action', 'Close Action', and 'Action on Any Change'. Each row has a text input field, an 'Actions...' button, and an 'Automatic' checkbox. At the bottom, there are buttons for 'OK', 'Apply', 'Reset', 'Cancel', and 'Help'.

FIGURE 5-5 Attribute Editor, Actions Tab

TABLE 5-7 Actions Tab Field Descriptions

Field	Description
Critical Action	Specifies the action to take when a critical (red) alarm is generated.
Alert Action	Specifies the action to take when a critical (yellow) alarm is generated.
Caution Action	Specifies the action to take when a critical (blue) alarm is generated.
Indeterminate Action	Specifies the action to take when an “indeterminate” indicator occurs. An object with an indeterminate state appears with a black star, or “splat”, next to it. This is less serious than an alarm.
Close Action	Specifies the action when the alarm is closed.
Action on Any Change	Specifies the action that runs when any variable change occurs, whether or not an alarm is generated.

4. Add an action to the action fields.

Note – The action to email root for any Hardware Diagnostic Suite critical alarm is the default configuration. You only need to add an action to an action field if you want to modify or create additional actions.

You can only specify one action in an action field. To have more than one action (to send email *and* run a script, for example), you must specify the actions in separate fields. The following example describes how to do this.

a. Click the Actions button next to the level (Critical, Alert, and so on) of your choice.

The Action Selection window is displayed (FIGURE 5-6).

b. Specify the email recipient.



FIGURE 5-6 Action Field Specifying an Email Address

An email recipient (in this case `admin@shift1`) is added to the Alert Action field.

In this example, the `Critical Action: email root` entry is the default action. In a subsequent step, the critical action will be redefined to run a script. By adding an email recipient to the Alert Action field, an alarm will generate an email and run the script.

The Hardware Diagnostic Suite does not generate “Alert” alarms by default. For this example to work, you must also set up an alarm threshold for the Alert condition. See “To Edit the Alarm Thresholds for Hardware Diagnostic Suite” on page 42.

In this example, the following email is sent to the addressee whenever an alert alarm occurs for any fatal error:

```
Date: Tue, 12 Oct 1999 15:25:39 -0800
From: root@Payroll2 (0000-Admin(0000))
Mime-Version:1.0

Sun Management Center alarm action notification ... {Alert:
Payroll2 File Scanning Hardware Error Detected Matches > 1}
```

c. **To create an action that runs a script when a critical Hardware Diagnostic Suite alarm is raised, perform the following:**

i. **Place the script in the `/var/opt/SUNWsymon/bin` directory, making sure that execute permissions are set.**

Note – The script must reside in the `/var/opt/SUNWsymon/bin` directory before you can select it from the Action Selection pull-down menu. It is run with superuser privileges.

ii. **Select the script from the Available Scripts pull-down menu.**

iii. **Click OK in the menu.**

In this example, the administrator wrote a script (`/var/opt/SUNWsymon/bin/edproc.sh`) that runs a program using the `p_online()` system call to disable one processor on a multiprocessor system. The administrator also created a new alarm trigger that generates an alarm when a fatal FPU error is detected during a Hardware Diagnostic Suite test session.

Together, these custom alarm settings will have the result described in the flowchart in FIGURE 5-7:

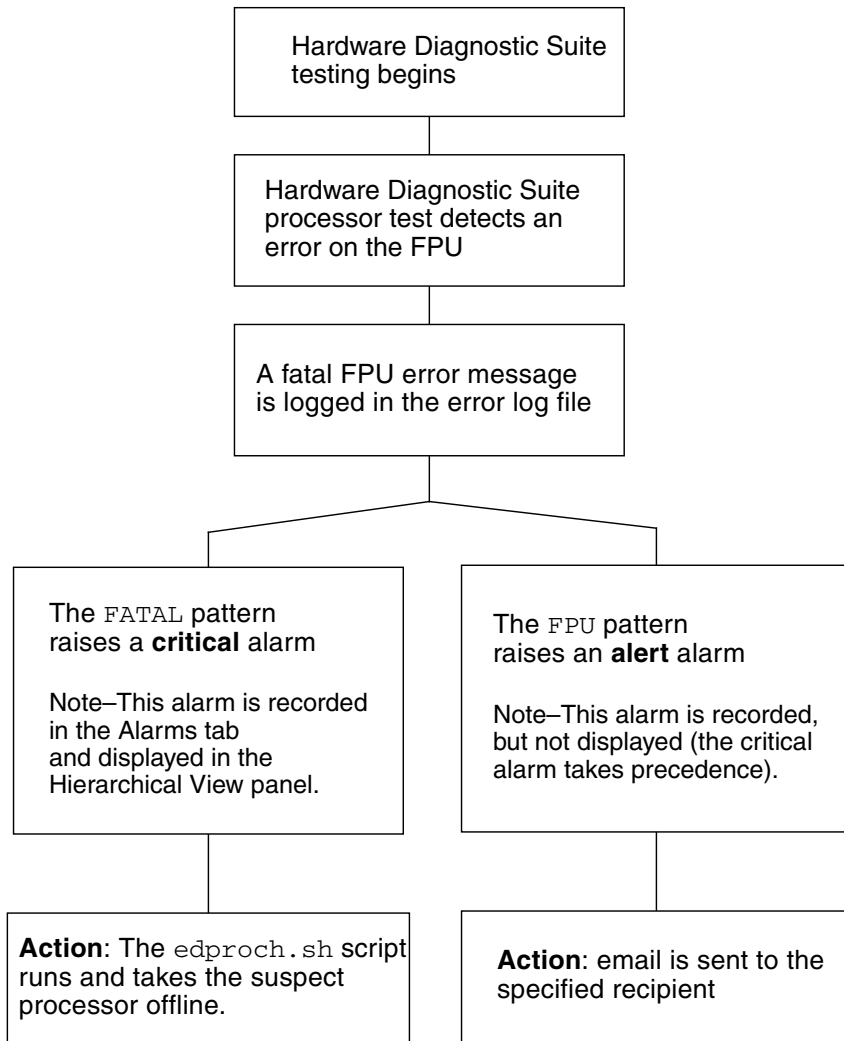


FIGURE 5-7 Alarm Action Flow Chart

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

- 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.

Hardware Diagnostic Suite Test Reference

This appendix contains descriptions of the following Hardware Diagnostic Suite tests and lists all test requirements:

- “CDROM Test” on page 56
- “Disk Test” on page 57
- “Floppy Test” on page 58
- “Memory Test” on page 59
- “Network Test” on page 60
- “Parallel Port Test” on page 61
- “Processor Test” on page 62
- “Serial Port Test” on page 63
- “Sun StorEdge A5x00 Enclosure Test” on page 64
- “Sun StorEdge A/D 1000 Enclosure Test” on page 65
- “SPARCstorage Array Controller Test” on page 66
- “Tape Test” on page 67

CDROM Test

The CDROM test checks the CD-ROM drive.

Each track is classified as follows:

- Mode 1 uses error detection/correction code (288 bytes).
- Mode 2 uses auxiliary data space or an audio track.

TABLE A-1 CDROM Test Descriptions and Requirements

Test Mode	Description	Requirements
Quick Check	Verifies that a CD-ROM drive is connected to the system.	None
Full Test	Verifies the functionality of the drive by accessing and reading the media in the drive. If the media contains audio and the audio test is enabled, the test tries to play it. Only a small percentage of the media is read, as this is sufficient to verify the functionality of the drive. It also keeps the test runtime from being unnecessarily extended. If the device is busy at the time of testing, the test exits after printing a message indicating that the device is unavailable for testing.	Load a CD-ROM (data or audio) into the drive before starting this test.

Disk Test

The Disk test verifies the functionality of hard drives.

TABLE A-2 Disk Test Descriptions and Requirements

Test Mode	Description	Requirements
Quick Check	Opens the drive, checks the drive configuration, reads a few blocks, and then closes the drive. All UNIX drive error messages are monitored and displayed. No hard drive data is written and no file system test is performed.	None
Full Test	Opens the drive, checks the drive configuration, performs a read-only test on the drive under test, and performs random seek checks. No file system test is run. When the test is done, the test closes the drive. All UNIX hard drive error messages are monitored and displayed.	None

Floppy Test

The Floppy test checks the diskette drive.

TABLE A-3 Floppy Test Descriptions and Requirements

Test Mode	Description	Requirements
Quick Check	Opens the diskette drive. All UNIX diskette drive error messages are monitored and displayed. No data is written and no file system test is performed.	Load a UNIX-formatted diskette into the drive.
Full Test	Opens the diskette drive, checks the configuration, and performs a read-only test on the diskette. No file system test is run. When the test is complete, the test closes the diskette drive. All UNIX diskette error messages are monitored and displayed.	Load a UNIX-formatted diskette into the drive.

Memory Test

The Memory test checks the physical memory of the system. The test locates parity errors, hard and soft error correction code (ECC) errors, memory read errors, and addressing problems. The pseudo driver `mem(7)` is used to read the physical memory.

This test reads through all available physical memory. It does not write to any physical memory locations.

TABLE A-4 Memory Test Descriptions and Requirements

Test Mode	Description	Requirements
Quick Check	One percent of the memory is read. The test also displays how much physical memory is available. For systems that use ECC memory error handling, the test reports the ECC errors that have occurred since it was last invoked. The test reports ECC errors for a particular CPU, memory board, or SIMM.	None
Full Test	Performs the same test as for the Quick Check mode, except that more of the memory is read.	None

Network Test

The Network test checks all the networking hardware on the system CPU board and separate networking controllers (for example, a second SBus Ethernet controller). Such network devices include:

- Ethernet (ie and le)
- 100-Mbits per second Ethernet (be and hme)
- Token ring (tr and trp)
- Quad Ethernet (QED)
- Fiber optic (fddi, nf, bf, and pf)
- SPARCcluster™ system (em)
- ATM (sa and ba)
- HiPPI

For the test to be meaningful, the machine under test must be attached to a network with at least one other system on the network. This test mainly uses the Internet Control Message Protocol (ICMP), and requires at least two machines on a network—the machine under test and another machine reliable enough to be a test target. Both machines must support Transport Control Protocol/Internet Protocol (TCP/IP). The target machine must either be configured to respond to ICMP broadcast or to RPC broadcast.

First, the Network test determines the target machines to test. It sends an ICMP broadcast to find them. If it fails to find a necessary target, it tries an RPC broadcast to the RPC port mapper daemon. After finding the target, this test performs a random test in which it sends out 256 packets with random data length and random data.

The Receive Timeout is set to 120 seconds. The number of retries before an error is flagged is set to three.

TABLE A-5 Network Test Descriptions and Requirements

Test Mode	Description	Requirements
Quick Check	Checks whether the device is connected. It searches through all the network interfaces for a specified device name. If the network test does not find the device connected, the test fails; otherwise it passes.	System must be connected and configured for network communications through the network interface that is tested.
Full Test	Performs as described in the general description of the test.	System must be connected and configured for network communications through the network interface that is tested.

Parallel Port Test

The Parallel test verifies the functionality of the IEEE 1248 Centronics-compatible parallel port (ECP mode capable).

If the Parallel test completes successfully, the DMA circuitry and the device driver are functioning properly.

TABLE A-6 Parallel Test Descriptions and Requirements

Test Mode	Description	Requirements
Quick Check	Verifies that a bidirectional parallel port is configured on the system. The success of the test in this mode indicates that the system has the bidirectional parallel port hardware and the software driver installed.	None
Full Test	Checks the functionality of the device by performing an internal loopback test on the device, using the internal fifo loopback test <code>ioctl</code> . The algorithm used: <ul style="list-style-type: none">• set TFIFO mode• pio write/read/compare on fifo contents• dma write to fifo and pio read/compare	None

Processor Test

The Processor test checks the floating-point unit on machines with the SPARC™-based architecture. It runs a series of tests that check the registers, single- and double-precision floating point to integer conversions, addition, subtraction, multiplication, division, lock check, timing, and branching and non-branching condition instructions.

TABLE A-7 Processor Test Descriptions and Requirements

Test Mode	Description	Requirements
Quick Check	Checks the characteristics of the CPU.	None
Full Test	Exercises the functionality of the floating point unit.	None

Serial Port Test

The Serial test checks the on-board serial ports (`zs[0,1]`, `zsh[0,1]`, `se[0,1]`, `se_hdlc[0,1]`).

An asynchronous and a synchronous test are run in Full Test mode. They are described below:

- Asynchronous test – Uses the asynchronous communication protocol as described in the `zs(7D)` and `se(7D)` man pages. The `termio(7I)` interface is used for configuring port characteristics. The test writes and reads data through the loopback path and compares the data to the original data. The test first sends a single character. If no errors or timeouts are detected, the rest of the data is simultaneously written and read, then compared.
- Synchronous test – Uses the synchronous HDLC-framing interface as described in the `zsh(7D)` and `se_hdlc(7D)` man pages. Data is written and read in checksum-protected packets. The synchronous test runs in three phases:
 - The first phase looks for activity on the port. If no activity is detected for at least four seconds, the test proceeds to the next phase. If activity is detected, the serial test exits with an error.
 - The second phase attempts to send and receive one packet. If no packets are detected after five attempts, the test exits with an error. If a packet is returned, the result is compared to the original. If the length and content of the packets do not match exactly, the test exits with an error.
 - The third phase attempts to send many packets through the loop. Some packet drops are to be expected, especially on a heavily-loaded system. Each packet is compared with its original for length and content. If a mismatch is detected, the test exits with an error.

TABLE A-8 Serial Test Descriptions and Requirements

Test Mode	Description	Requirements
Quick Check	Opens the port to determine if the device is connected. If the open operation fails and the port is not busy, the test exits with an error. If the open operation is successful or fails with a busy or exclusive use error, then the port is considered connected, and the test passes.	None
Full Test	Performs synchronous and asynchronous testing. If the device supports an internal loopback, then the Full Test is run using the internal loopback. The <code>zs(7D)</code> device supports an internal synchronous loopback and the <code>se(7d)</code> device supports an internal asynchronous loopback.	None

Sun StorEdge A5x00 Enclosure Test

The Sun StorEdge A5x00 Enclosure test is used to verify the functionality of the Sun StorEdge™ A5x00 subsystems.

The Sun StorEdge A5x00 enclosure test detects all Sun StorEdge A5x00 enclosures connected to the host and collects relevant configuration information.

TABLE A-9 Sun StorEdge A5x00 Enclosure Test Descriptions and Requirements

Test Mode	Description	Requirements
Quick Check	The host connections and the status of the enclosure are checked. The test fails if there are any broken connections or if a critical enclosure condition is detected.	None
Full Test	Searches for all the active and inactive connections between the host and the enclosure and reports the number of existing active connections. The test diagnoses any inactive connections and reports the possible causes for the failure. The status of the enclosure is obtained by querying the SCSI Enclosure Services (SES) device in the enclosure. Detailed information regarding the status of the elements within the enclosure is reported. The test fails if a critical condition is detected in the enclosure.	None

Sun StorEdge A/D 1000 Enclosure Test

The Sun StorEdge A/D 1000 Enclosure test is used to verify the functionality of the Sun StorEdge 1000 enclosure.

The A/D 1000 Enclosure test detects all the connected Sun StorEdge enclosures and displays the status of the various elements in the enclosure.

TABLE A-10 Sun StorEdge A/D 1000 Enclosure Test Descriptions and Requirements

Test Mode	Description	Requirements
Quick Check	The enclosure status summary bits are read. Detailed information is reported only if an unrecoverable or critical condition is detected.	None
Full Test	Checks and reports the status of the following elements in the enclosure: <ul style="list-style-type: none">• Disk• Power supply• Fan• Temperature• RPA cache battery (Sun StorEdge A1000 only) An error is registered if an unrecoverable or critical condition is detected. Noncritical conditions are reported through warning messages.	None

SPARCstorage Array Controller Test

The SPARCstorage™ Array Controller test checks the functionality of the controller board on the SPARCstorage Array. The SPARCstorage Array Controller test isolates failures on the array disk drives from failures on the SSA controller board.

TABLE A-11 SPARCstorage Array Controller Test Descriptions and Requirements

Test Mode	Description	Requirements
Quick Check	Checks the state of the battery module and the fan module of the SPARCstorage Array.	None
Full Test	Exercises the hardware and software by invoking SCSI read buffer commands of various sizes to the NVRAM. These operations exercise all components except the SCSI devices: the host Fibre Channel hardware, the array Fibre Channel hardware, the array resident management software, and the hardware component interaction on the array controller card. Note—To test the hard drives, use the Disk test. This test also reports failure of the fan module and the NVRAM battery module of the SPARCstorage Array.	None

Tape Test

The Tape test verifies the presence or operation of various kinds of tape drives. It supports 4-mm, 8-mm, DLT, 1/4-inch cartridge, and 1/2-inch front-load tape drives.

TABLE A-12 Tape Test Descriptions and Requirements

Test Mode	Description	Requirements
Quick Check	Verifies that the drive can be opened and that the drive type can be determined. If both checks are successful, or if the drive is currently busy, then the test passes. The tape test fails if the open operation is unsuccessful for any reason other than that the drive is busy.	None
Full Test	Verifies that the drive can be opened and that the drive type can be determined. If both checks are successful, or if the drive is currently busy, then the test passes. The tape test fails if the open operation is unsuccessful for any reason other than that the drive is busy.	None

Hardware Diagnostic Suite Console Reference

This appendix contains descriptions of the Hardware Diagnostic Suite console panels and controls.

- “Hierarchical View Panel” on page 70
- “Hierarchy View Panel Buttons” on page 74
- “Device Description Panel” on page 74
- “Progress Panel” on page 75
- “Test Control Buttons” on page 75
- “Options and Logs Menus” on page 76
- “Sun Management Center Tab Selectors” on page 77
- “Lower Controls” on page 77
- “Schedule Panel” on page 77
- “Schedule Form” on page 80

Note – For step-by-step instructions on how to start and run the Hardware Diagnostic Suite, refer to “Accessing Hardware Diagnostic Suite Through Sun Management Center” on page 13, and “Running a Hardware Diagnostic Suite Test Session” on page 19.

Hardware Diagnostic Suite Console

You control the Hardware Diagnostic Suite application through the Hardware Diagnostic Suite console in the Sun Management Center Details window (FIGURE B-1). Each console panel button and control is described in the following section.

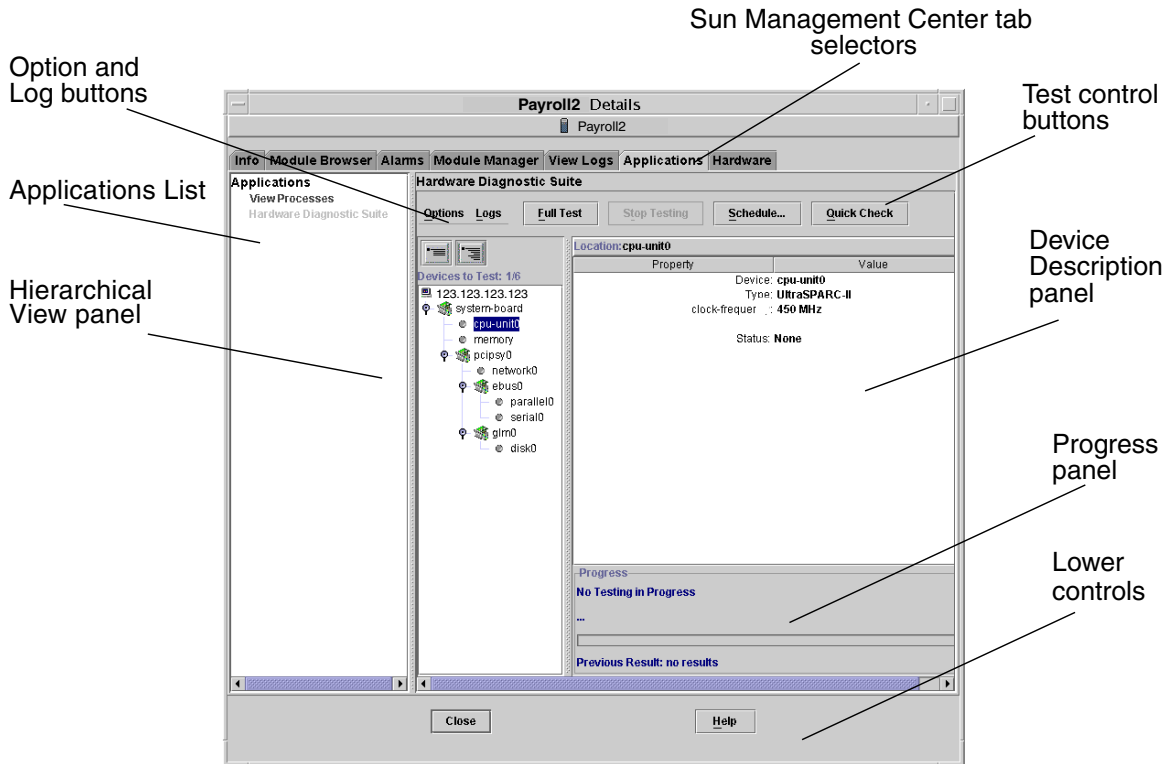


FIGURE B-1 Hardware Diagnostic Suite Console

Hierarchical View Panel

The Hierarchical View panel (FIGURE B-2) displays the host and the devices connected to the host. In this panel you select devices for testing and view test results. The Hierarchical View panel only displays devices that are testable with the Hardware Diagnostic Suite application. Devices that are not testable, or for which there is no Hardware Diagnostic Suite test, are not displayed.

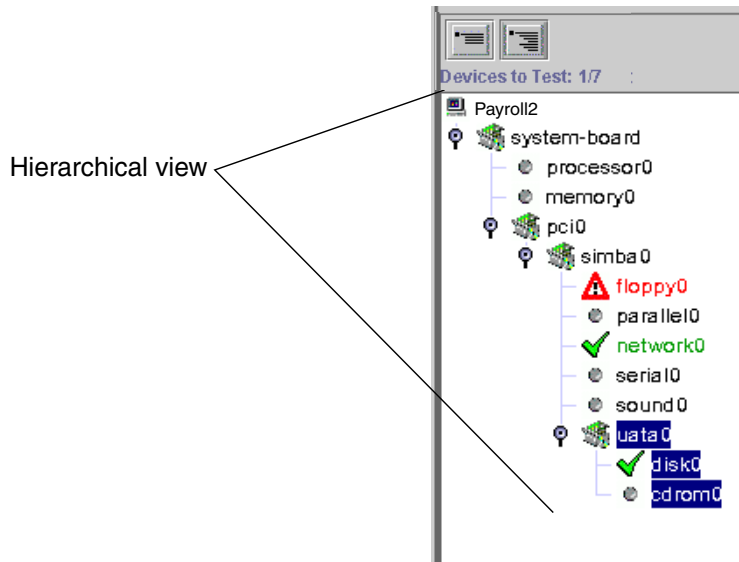


FIGURE B-2 Hierarchical View (Expanded View)

Devices in the Hierarchical View Panel

The Hierarchical View panel (FIGURE B-2 and FIGURE B-3) displays a graphical representation of the testable devices for host. The devices are displayed in groups according to their physical relationship to each other. For example, in FIGURE B-2 the diskette drive, parallel port, and so on are found in a group called `simba0` because that is the interface to which they are attached. The group at the top of the window, the host, represents the whole system.

The Hierarchical View can be expanded and collapsed with the View buttons at the top of the Hierarchical View panel.

Device Selection

In the Hierarchical View panel you select (for testing) individual devices, entire device groups, or the entire host, by clicking on the name of the item. Multiple devices in different groups can be selected by holding the Shift or Control key while clicking on additional devices. When a device (or group) is selected, it is highlighted with a dark rectangle (FIGURE B-3).

If you click the device, information about that device is displayed in the Device Description panel.

Hierarchical View Indicators

As soon as the Hardware Diagnostic Suite test detects a successful or failing test on a device, the pass and fail condition is displayed in the Hierarchical View (FIGURE B-3). A condition indicator is displayed for each tested device (TABLE B-1).

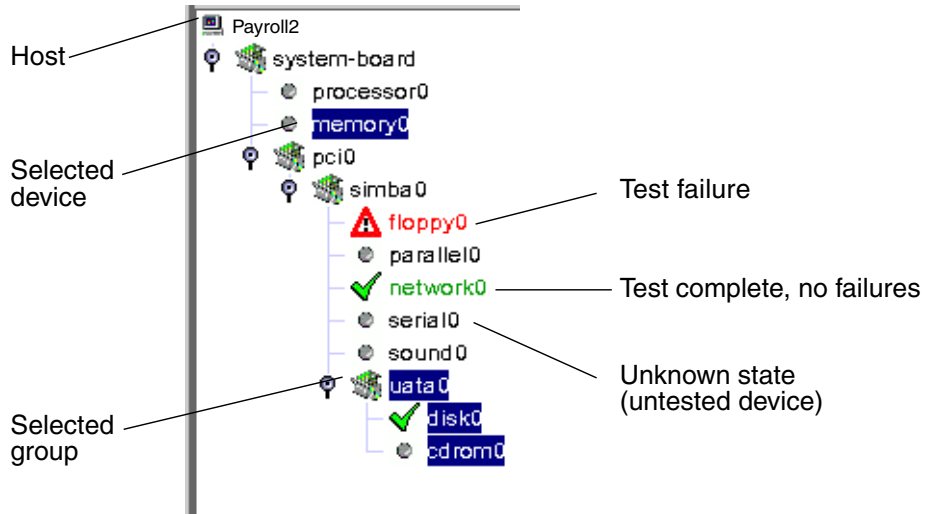


FIGURE B-3 Hierarchical View Panel Indicators

TABLE B-1 Hierarchical View Panel Indicators









Indicator	Name	Description
	Host	Represents all testable devices on the system.
	Board	Indicates a device group (a node that has other testable devices connected to it).
	Node	Indicates if a particular node has hidden subnodes (horizontal bar), or if the subnodes are displayed (vertical bar).

TABLE B-1 Hierarchical View Panel Indicators (*Continued*)

Indicator	Name	Description
	Device	Indicates an individual device node that is in an unknown state, usually because it has not been tested yet.
	Test Pass	Indicates that at least one successful test pass was made.
	Test Failure	Indicates that a test failure was detected.

Hierarchy View Panel Buttons

TABLE B-2 Hierarchy View Panel Button Descriptions

Icon	Name	Description
	Collapse View button	Collapses the view to show only the board level of devices under the host. Devices below this level are hidden from view.
	Expanded View button	Completely expands the list of devices in the Hierarchy View panel.

Device Description Panel

The Device Description panel displays information about each device as it is *visited* (click a device to visit it) in the Hierarchical View panel and tested while the Hardware Diagnostic Suite is running.



FIGURE B-4 Device Description Panel

Progress Panel

The Progress panel displays the following information:

- Current test information – Indicates which device is under test, shows which subtest is currently running, and displays test messages.
- Progress bar – Displays a graphical representation of the progress of the current test. For example, when the bar is half filled, the current test is half finished.
- Previous Result – Indicates whether the previous test passed or failed.

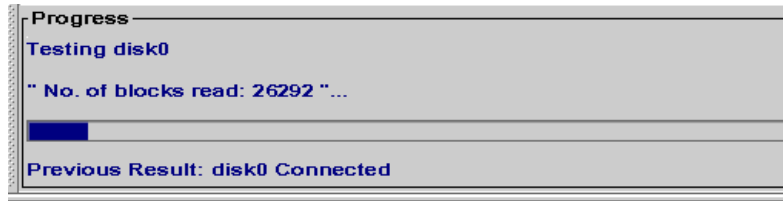


FIGURE B-5 Progress Panel

Test Control Buttons

The Hardware Diagnostic Suite test control buttons are used to start, stop, and schedule test sessions as described in TABLE B-3.

TABLE B-3 Test Control Button Descriptions

Name	Description
Full Test button	Begins a test session. The tests that run are based on the selections made in the Hierarchy View. When testing begins, the Full Test button dims and the test session information is displayed in the Progress panel.
Stop Testing button	Stops the test session. The most recent test name and test results are displayed in the Progress panel.
Schedule button	Used to create, edit, or delete a scheduled test session. Instructions are displayed in the Device Description panel and scheduling controls are displayed in the Progress panel.
Quick Check button	Starts a test session that runs a brief test on all selected devices. The Quick Check tests attempt to communicate with each selected device to confirm connectivity. No functional device testing occurs.

Options and Logs Menus

The Options and Logs menus provide access to the Hardware Diagnostic Suite test controls and log files.

Options Menu

The Options menu provides access to the following controls:

- Reset – Clears previous test results from the Hardware Diagnostic Suite display.
- Suspend – Interrupts the current test session.
- Resume – Resumes a test session that has been suspended.
- Reprobe for Devices – Causes the Hardware Diagnostic Suite agent to interrogate the system for testable devices. All testable devices are displayed in the Hierarchical View.

Logs Menu

The Logs menu provides access to the following Hardware Diagnostic Suite log files:

- View Information – Opens a window that displays the Hardware Diagnostic Suite information log. The information log contains informative messages about each Hardware Diagnostic Suite test session, such as start and stop times and pass and failure information.
- View Errors – Opens a window that displays the Hardware Diagnostic Suite error log. The error log is a collection of date- and time-stamped error messages that occurred during previous Hardware Diagnostic Suite test sessions.

Sun Management Center Tab Selectors

The Sun Management Center tab selectors can be used to access Sun Management Center features. Three of these tabs are relevant to Hardware Diagnostic Suite:

- **Module Browser** – Use to access the Sun Management Center file scanning modules to set up alarm conditions for the Hardware Diagnostic Suite. Refer to “Using Hardware Diagnostic Suite With Sun Management Center Alarms” on page 37.
- **Alarms** – Use to access the Sun Management Center alarm information. The Hardware Diagnostic Suite sets certain alarm conditions based on test results. Refer to “Using Hardware Diagnostic Suite With Sun Management Center Alarms” on page 37.
- **Applications** – Use to access the Hardware Diagnostic Suite application through the Sun Management Center console.

Lower Controls

The two buttons in the lower portion of the Hardware Diagnostic Suite console are described in TABLE B-4.

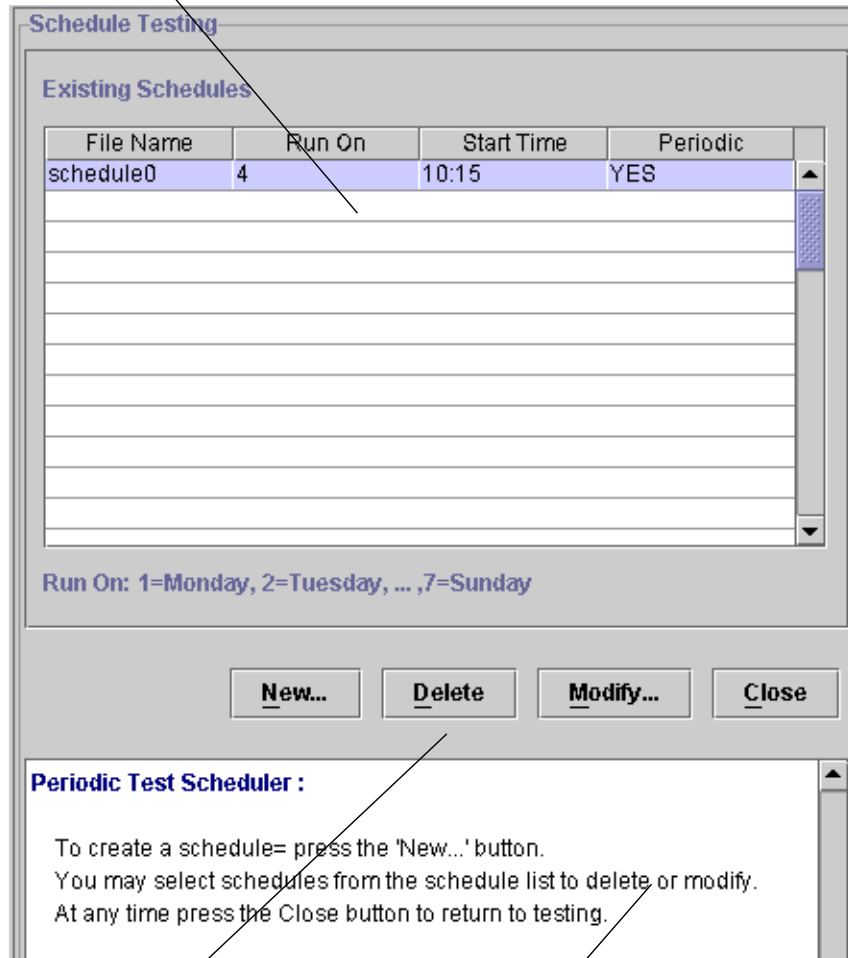
TABLE B-4 Lower Control Button Descriptions

Name	Description
Close Button	Closes the Details window where the Hardware Diagnostic Suite is running.
Help Button	Accesses online help.

Schedule Panel

Access the Schedule panel (FIGURE B-6) by clicking on the Schedule button. In this panel you create, delete, and modify Hardware Diagnostic Suite test schedules. The functions of the Schedule panel are described in the following sections and step-by-step scheduling instructions are described in “Scheduling a Test Session” on page 30.

Existing schedules



Schedule buttons

Scheduling instructions

FIGURE B-6 Hardware Diagnostic Suite Schedule Panel

Existing Schedules List

The Existing Schedules list (FIGURE B-6) displays a list of current schedules for this host. If nothing is shown in the list, there are no current Hardware Diagnostic Suite schedules.

The Existing Schedules list describes the schedules as follows:

- File Name – The name of the schedule.
- Run On – Indicates the days on which to run the scheduled test session.
- Start Time – Indicates the time of day that the test session is scheduled to start.
- Periodic – Indicates if the schedule is set up to run at regular intervals (Periodic=Yes), or if the schedule is set up to run one time (Periodic=No).

Schedule Panel Buttons

TABLE B-5 Schedule Panel Button Descriptions

Name	Description
New Button	Displays the Schedule Form.
Delete Button	Deletes the selected schedule.
Modify Button	Displays the Schedule Form for modifications.
Close Button	Closes the Schedule panel.

Schedule Form

Use the Schedule Form (FIGURE B-7) to create new Hardware Diagnostic Suite test session schedules and to modify existing Hardware Diagnostic Suite test session schedules. This form is displayed when the New or Modify buttons in the Schedule panel are selected. Each field of this form is described below.

Schedule Testing

File Name:

Start Time: ▼

Run On:

Periodic One Time

Every Day Monday(1) Tuesday(2) Wednesday(3)

Thursday(4) Friday(5) Saturday(6) Sunday(7)

Configuration:

Custom Pre-packaged

Full Test Quick Check

Use selected items in device tree.

OK Cancel

Scheduling Tests:

To schedule testing, fill in the fields of the schedule form.
To run periodically on specific days, choose the 'Periodic' tab.
To run once on a specific date, choose the 'One Time' tab.
To select your own devices to test, choose the 'Custom' tab.
To use pre-packed test configurations, choose the 'Pre-packaged' tab.

FIGURE B-7 Schedule Form

File Name Field

The File Name field specifies the name of the schedule that is being created or modified. Each Hardware Diagnostic Suite test session schedule name must be unique. A valid schedule name should be between one to 20 alpha-numeric characters. The only valid special character is the underscore (_).

Start Time

The Start Time field specifies the time when the scheduled test session begins.

Use the drop-down menu to select predefined start times that are available in 15-minute intervals, or type the specific time (based on a 12-hour clock) in the Start Time field. Select the appropriate AM or PM designation with the buttons provided.

Run On Field

The Run On field specifies the date for the scheduled test session. You can specify a date in two ways:

- **Periodic** – Used when a scheduled test session runs periodically on specified days. A Periodic schedule remains in effect until it is modified or deleted.
- **One Time** – Used when a scheduled test session runs one time. Specify the date using a *mm/dd/yyyy* format.

Configuration Field

The Configuration field specifies the test mode and the devices to test. Two methods are used to specify the test configuration information:

- **Custom** – (FIGURE B-7) Provides buttons to select Full Test or Quick Check test modes. You must further define the schedule by selecting the devices to test in the Hierarchical View.
- **Pre-Packaged** – Provides buttons to select pre-packaged test session schedules. These schedules are explained in TABLE B-6.

TABLE B-6 Pre-Packaged Schedule Configurations

Name	Description
Connection Check	Sets up a schedule to run Quick Check tests on all available devices.
Functional Check	Sets up a schedule to run Full tests on all available devices.
Processor(s) Check	Sets up a schedule that runs the Processor test (in Full Test mode) on all the processors in the system.

TABLE B-6 Pre-Packaged Schedule Configurations

Name	Description
Hard Disk Check	Sets up a schedule that runs the Disk test (in Full Test mode) on all the disks in the system.
Odd Disk Testing	Sets up a schedule that runs the Disk test (in Full Test mode) on every other disk in the system, beginning with the first disk (as seen in the Hierarchical View). This test is useful when there are many disks in the system.
Even Disk Testing	Sets up a schedule that runs the Disk test (in Full test mode) on every other disk in the system beginning with the second disk (as see in the Hierarchical View). This test is useful when there are many disks in the system.

Schedule Form Buttons

TABLE B-7 Schedule Form Button Descriptions

Name	Description
OK Button	Applies all schedule information and closes the Schedule Form.
Cancel Button	Cancels any changed schedule information and closes the Schedule Form.

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