



Mac Pro
Apple Server
Diagnostics
User Guide

For Version 3X108

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Simultaneously published in the United States and Canada.

019-1973/2010-11

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Apple Server Diagnostics tests your server for hardware issues.

Apple Server Diagnostics, also referred to as *Server Diagnostics*, runs a customizable set of tests to help you diagnose issues with the following components:

- AirPort
- Bluetooth®
- Boot ROM
- Ethernet controller
- Fan
- Hard drive
- Memory
- Processor
- Sensor
- USB ports
- Video controller

You can run Apple Server Diagnostics in Extensible Firmware Interface (EFI), which is referred to as *Server Diagnostics EFI*, or in Mac OS X Server, which is referred to as *Server Diagnostics Mac OS X*.

By running Server Diagnostics EFI, you can diagnose hardware issues that prevent Mac OS X Server from successfully starting up. You can also run tests without interference from Mac OS X Server.

However, Server Diagnostics Mac OS X provides an enhanced interface and has more extensive sensor, hard drive, and video controller tests. For a comparison and description of available tests, see “Server Diagnostics Test Reference” on page 37.

You can test the server by running Server Diagnostics on the server. You can also run Server Diagnostics remotely on a computer with a network connection to the server.

Note: This guide describes how to use Apple Server Diagnostics version 3X108, which is included on the *Admin Tools* disc (Mac OS X Server version 10.6 or later).

Overview of Server Diagnostics Configurations

You can install and run Server Diagnostics in a variety of ways, so choose the method that best suits your needs. There are several options, each with advantages and disadvantages:

Option	Considerations
Use the preinstalled Server Diagnostics EFI	<p>Advantages:</p> <ul style="list-style-type: none">• You can use Server Diagnostics EFI.• You don't need a portable storage device.• No installation is necessary. <p>Disadvantages:</p> <ul style="list-style-type: none">• You need physical access to the server.• Damage to the startup volume may prevent access to Server Diagnostics EFI.• You can't save logs or screenshots locally.• You must restore Server Diagnostics if you erase the volume it's installed on.
Install Server Diagnostics EFI on a portable storage device	<p>Advantages:</p> <ul style="list-style-type: none">• You can use Server Diagnostics EFI.• You can use the same portable storage device to test multiple servers.• You can save logs and screenshots locally. <p>Disadvantages:</p> <ul style="list-style-type: none">• You need physical access to the server.• You need a volume on the portable storage device that has 100 MB of available space and that doesn't have Mac OS X or Mac OS X Server installed.• The portable storage device must be physically connected to the server.
Host a NetBoot server	<p>Advantages:</p> <ul style="list-style-type: none">• You can use Server Diagnostics EFI.• You don't need to install Server Diagnostics on an internal volume on the server or on a portable storage device.• You can use a single Server Diagnostics install image to test multiple servers. <p>Disadvantages:</p> <ul style="list-style-type: none">• You need physical access to the server.• You need a server to host NetBoot service and the Server Diagnostics install image.• The server must be on the same subnet as the NetBoot server.• You can't save logs or screenshots locally.

Option	Considerations
Start up the Server Diagnostics EFI located on the <i>Admin Tools</i> disc	<p>Advantages:</p> <ul style="list-style-type: none"> You can use Server Diagnostics EFI. You can use the same disc to test multiple servers. <p>Disadvantages:</p> <ul style="list-style-type: none"> You need network access to the server. You can't save logs locally.
Install Server Diagnostics Mac OS X on a portable storage device	<p>Advantages:</p> <ul style="list-style-type: none"> You can use Server Diagnostics Mac OS X. You can use a single portable storage device to test multiple servers. <p>Disadvantages:</p> <ul style="list-style-type: none"> You need an empty volume on the portable storage device with 10 GB of available space. You must install Mac OS X Server on the empty volume. The portable storage device must be physically connected to the server.
Install Server Diagnostics Mac OS X on an internal volume	<p>Advantages:</p> <ul style="list-style-type: none"> You can use Server Diagnostics Mac OS X. You don't need physical access to the server to run Server Diagnostics Mac OS X remotely (if you have Apple Remote Desktop). <p>Disadvantages:</p> <ul style="list-style-type: none"> You need an empty volume on the server with 10 GB of available space. You must install Mac OS X Server on the empty volume.

Requirements

Before you can run Server Diagnostics, you must meet general, storage device, and local and remote requirements.

General Requirements

To run Server Diagnostics, you need the following:

- A Mac Pro with Mac OS X Server v10.6 or later installed
- The *Mac OS X Server Install DVD* and *Admin Tools* disc included with the Mac Pro (both discs should be version 10.6 or later)

Storage Device Requirements

Depending on whether you want to run Server Diagnostics EFI, Server Diagnostics Mac OS X, or both, you need empty volumes on the server or on a portable storage device.

To run Server Diagnostics Mac OS X, the storage device must use the GUID Partition Table partition scheme. If you're running only Server Diagnostics EFI on the storage device, you don't need to use the GUID Partition Table partition scheme.

You can run both versions of Server Diagnostics by having two empty volumes on the same server or portable storage device. You need at least one of the following:

In order to	You need
Run Server Diagnostics EFI	A volume on the server that has at least 100 MB of available space, but doesn't have Mac OS X or Mac OS X Server installed
Run Server Diagnostics Mac OS X	An empty volume on the server with at least 10 GB of available space, which will be used for a dedicated Mac OS X Server installation
Test multiple servers and run Server Diagnostics EFI	A USB 2.0 flash drive, or USB 2.0 or FireWire hard drive with a volume that has at least 100 MB of available space but doesn't have Mac OS X or Mac OS X Server installed
Test multiple servers and run Server Diagnostics Mac OS X	A USB 2.0 or FireWire hard drive that has an empty volume with at least 10 GB of available space

Local and Remote Requirements

To run Server Diagnostics locally on the server, you need to connect a keyboard, mouse, and display.

To run Server Diagnostics remotely, you need the following:

- A Macintosh computer with Mac OS X v10.6 or later installed. This computer is referred to as the *host computer*.
- A server with Mac OS X Server v10.6 or later installed. This server is referred to as the *client server*.
- A network connection with DHCP active or a direct Ethernet connection from the host computer to the client server.
- The client server must have Server Diagnostics installed on an internal volume or on a connected portable storage device; or it must be able to run Server Diagnostics from a NetBoot server.
- The host computer must run Server Diagnostics Mac OS X. The client server can run Server Diagnostics EFI or Server Diagnostics Mac OS X.
- If the client server is running Server Diagnostics Mac OS X, you must be able to log in to the *root* account. The root account gives a system administrator complete access to the server.

NetBoot Server Requirements

To host Server Diagnostics EFI on a NetBoot server, your NetBoot server must:

- Have Mac OS X Server v10.5 (10.5.8 or later recommended) or Mac OS X Server v10.6 (10.6.4 or later recommended) installed.
- Be on the same subnet as the server being tested.
- Have 100 MB of hard disk space available for a Server Diagnostics NetBoot image.

Before you can run Server Diagnostics, you must set up your testing environment and install Server Diagnostics.

Make sure you meet Server Diagnostics requirements before attempting setup and installation. For information, see “Requirements” on page 9.

Server Diagnostics EFI is preinstalled on the server. The instructions in this chapter show you how to install Server Diagnostics in a different location or set up a NetBoot server.

Setting Up a Storage Device for Server Diagnostics Installation

To set up an internal volume or portable storage device for Server Diagnostics installation, you need at least 100 MB of available space for Server Diagnostics EFI or at least 10 GB of available space for Server Diagnostics Mac OS X, which requires installing Mac OS X Server. These requirements are described in detail in “Storage Device Requirements” on page 9.

If you’re installing Server Diagnostics Mac OS X on a volume, the storage device should use the GUID Partition Table partition map scheme.

To view the storage device’s partition map scheme, open Disk Utility and select the storage device. Make sure you select the storage device and not a volume within the storage device.

At the bottom of the Disk Utility window, Partition Map Scheme should be GUID Partition Table.

To repartition an in-use storage device, run Disk Utility from the *Mac OS X Install DVD* or the *Mac OS X Server Install DVD* or run Disk Utility while your server is connected to another computer and is in target disk mode. These methods erase the contents of your server’s hard disk and require you to reinstall and reconfigure Mac OS X Server.

WARNING: The following instructions could erase all data on your storage device. Back up critical data before performing the following instructions.

To create and format empty storage device volumes:

- 1 Insert the *Mac OS X Server Install DVD*.
- 2 Restart the server and hold down the server's Option key while it restarts.
- 3 When a list of startup disks appears, select Mac OS X Server Install Disc and click the arrow button.

If it isn't listed and you're connecting to a computer over AirPort, select the AirPort network in the pop-up menu under the startup disk list.

- 4 Select a language and click Next (right-arrow).
- 5 Choose Utilities > Disk Utility.
- 6 Select the storage device you want to set up.

Make sure you select a storage device, and not volumes within the storage device. Volumes within a storage device are indented one level.

- 7 Click the Partition tab.
- 8 If the partition map scheme of the storage device isn't GUID Partition Table and you're going to install Server Diagnostics Mac OS X, choose something besides "Current" in the Volume Scheme pop-up menu, then click Options, select GUID Partition Table, and click OK.

Changing the volume scheme erases all data on the storage device.

- 9 Review the partition sizes and adjust them to meet Server Diagnostics storage requirements.

To do this	Do this
Display a partition's size	Click the partition and review the Size field.
Set the size of the partition	Edit the Size field.
Create more partitions	Select a partition and click the Add (+) button.
Delete partitions	Select it and click the Delete (-) button.
Name a partition	Select it and enter a name in the Name field. Because this name is used when selecting which volume to start up Mac OS X from, choose a name that identifies the volume as being used for Server Diagnostics.

- 10 If you're installing Server Diagnostics EFI on a volume, select the volume and choose MS-DOS (FAT) from the Format pop-up menu.

If you're installing Server Diagnostics Mac OS X on a volume, select the volume and choose Mac OS Extended (Journaled).

- 11 Click Partition.
- 12 Choose Disk Utility > Quit Disk Utility, and then choose Mac OS X Installer > Quit Mac OS X Installer.

After you finish setting up volumes, you can install Server Diagnostics EFI or Server Diagnostics Mac OS X. For information, see the following topics:

- “Installing Server Diagnostics EFI” on page 13
- “Installing Server Diagnostics Mac OS X” on page 14

Installing Server Diagnostics EFI

Before you install Server Diagnostics EFI, make sure your storage device has a volume that has at least 100 MB of available space and that is formatted as MS-DOS (FAT). The volume will be erased, so make sure all important data on the volume is backed up. For more information, see “Setting Up a Storage Device for Server Diagnostics Installation” on page 11.

To perform these instructions, you need the *Admin Tools* disc v10.6 or later included with the server.

If you perform this task to install Server Diagnostics EFI on an internal volume on the server, you need administrator access to the server. If you perform this task to install Server Diagnostics EFI on a portable storage device, you can use any computer that you have administrator access to.

If you want to connect a host computer directly to the server and the host computer doesn't provide DHCP service on the port used to connect to the server, you must create a file on the server that assigns an IP address to the server. However, if the host computer provides DHCP service, don't create this file. For information about how to find out if a computer is providing DHCP service, see *Network Services Administration* at www.apple.com/server/macosx/resources.

To install Server Diagnostics EFI:

- 1 Insert the *Admin Tools* disc.
- 2 On the server, open `AppleServerDiagnosticsEFI.pkg` (located in `/Diagnostics/` on the disc).
- 3 Follow the onscreen instructions, and at the Select Destination step, choose a volume that has at least 100 MB of available space and doesn't have Mac OS X Server installed.
- 4 If you're asked to authenticate, authenticate as a user with administrator privileges.

- 5 If you want to connect a host computer directly to the server and the host computer doesn't provide DHCP service on the port used to directly connect to the server, do the following:
 - a Open TextEdit (located in /Applications/).
 - b In a new file, enter an IP address that's not in use by the host computer.
For example, enter:
123.123.123.123
If TextEdit doesn't open with a new blank file, choose File > New.
 - c Choose Format > Make Plain Text.
 - d Choose File > Save As.
 - e Name the file `axd_set_ip_address`, and then change the location of the file to the volume with Server Diagnostics EFI installed.
 - f Select "If no extension is provided, use '.txt,'" and then click Save.

Restoring Server Diagnostics EFI

Server Diagnostics EFI is preinstalled on the startup volume. If you erase the startup volume, you'll erase Server Diagnostics EFI. If you install Server Diagnostics EFI instead of restoring it, you can't start up Server Diagnostics EFI by holding down the D key at startup.

To restore Server Diagnostics EFI:

- 1 Insert the *Admin Tools* disc.
- 2 On the server, open `AppleServerDiagnosticsHD.pkg` (located in /Diagnostics/ on the disc).
- 3 Follow the onscreen instructions, and at the Select Destination step, choose a volume that has Mac OS X Server installed.
- 4 If you're asked to authenticate, authenticate as a user with administrator privileges.

Installing Server Diagnostics Mac OS X

Before you install Server Diagnostics Mac OS X, make sure that your storage device uses the GUID Partition Table partition scheme and that it has an empty volume with 10 GB of available space. For more information, see "Setting Up a Storage Device for Server Diagnostics Installation" on page 11.

If you perform this task to install Server Diagnostics Mac OS X on an internal volume on the server, you need administrator access to the server. If you perform this task to install Server Diagnostics Mac OS X on a portable storage device, you can use any computer you have administrator access to.

Installing Server Diagnostics Mac OS X involves three steps:

- Install Mac OS X Server with minimal options selected.
- Copy Server Diagnostics Mac OS X from the *Admin Tools* disc to */Applications/*.
- Configure Mac OS X Server.

By dedicating a minimal installation of Mac OS X Server for use with Server Diagnostics Mac OS X, you reduce the risk of server processes interrupting Server Diagnostics testing.

To install Server Diagnostics Mac OS X:

- 1 Insert the *Mac OS X Server Install DVD*.
- 2 Restart the server and hold down the server's Option key while it restarts.
- 3 When a list of startup disks appears, select Mac OS X Server Install Disc and click the arrow button.

If it isn't listed and you're connecting to a computer over AirPort, select the AirPort network in the pop-up menu under the startup disk list.

- 4 Continue through the installer until you reach the step where you select the disk to install Mac OS X Server on.
- 5 Select a volume that's at least 10 GB.

If the volume isn't empty, choose Utilities > Disk Utility. Select the volume. In the Erase pane, click Erase. After the volume is erased, choose Disk Utility > Quit Disk Utility.

- 6 Click Customize, deselect all checkboxes, click OK, and then click Install.

When the Installer finishes installing Mac OS X Server, the computer restarts and the Mac OS X Server setup assistant opens.

- 7 Continue through the setup assistant and enter information that's requested.

In the Users and Groups step, select Configure Manually. Don't enable services.

When you finish entering information in the setup assistant, the login window appears.

- 8 Log in with the user name "root" and the password of the user you created in the setup assistant.

You must set up and run Server Diagnostics Mac OS X as root. Otherwise, you can't test the server you've installed Server Diagnostics Mac OS X on.

- 9 Insert the *Admin Tools* disc.

- 10 Open a Finder window and drag the AppleServerDiagnostics.app file from /Diagnostics/ on the *Admin Tools* disc to the /Applications/ folder on the server.
- 11 If you're setting up a client server, open a Finder window, select the /Applications/ folder, choose New Folder from the Action (gear) pop-up menu, and name the folder AppleServerDiagnosticsClient.

Client servers are remotely controlled by host computers.

- 12 Open System Preferences (located in /Applications/) and change the following options in System Preferences panes.

System Preferences pane	Recommended configuration
Accounts	Select the System Administrator account, and click Login Items. Click Add (+), select AppleServerDiagnostics.app (typically located in /Applications/), and click Add.
CDs & DVDs	In all pop-up menus, choose Ignore.
Desktop & Screen Saver	In the Screen Saver pane, drag the "Start screen saver" slider to Never.
Energy Saver	In the Sleep pane, drag both sliders to Never, and deselect "Put hard disk(s) to sleep when possible."
Exposé and Spaces	In the Exposé pane, in all pop-up menus, choose "--." In the Spaces pane, deselect Enable Spaces.
Software Update	In the Scheduled Check pane, deselect "Check for updates."

If you can't change settings in System Preferences, click the lock button and authenticate.

After installing the Server Diagnostics Mac OS X, you must log in as root to run Server Diagnostics to test your own server. If you don't log in as root, Server Diagnostics Mac OS X enters host mode and waits for a connection to a client server to control.

Setting Up a NetBoot Server

Before you set up a NetBoot server, make sure you have an available server that meets the requirements described in "NetBoot Server Requirements" on page 10.

After you set up a NetBoot server, you install the Server Diagnostics NetBoot image. Because the Server Diagnostics NetBoot image is a special image, you can't use System Image Utility to delete the image.

For information about deleting the Server Diagnostics NetBoot image, see "Deleting the Server Diagnostics NetBoot Image" on page 18.

To set up a NetBoot server:

- 1 Open Server Admin (located in /Applications/Server/).
- 2 If the server that will host NetBoot isn't listed, do the following:
 - a Click the Add (+) button and choose Add Server.
 - b Enter the IP address of the server in the Address field and enter the user name and password of the server administrator in the User Name and Password fields.
 - c Click Connect.
- 3 Click the disclosure triangle for the server that will host NetBoot.
- 4 If NetBoot isn't listed, select the server and click Settings; then, in the Services pane, select NetBoot and click Save.
- 5 Select NetBoot, click Settings, and then click General.
- 6 In the "Enable NetBoot on at least one port" list, select the Enable checkboxes for the interfaces that you want to serve the Server Diagnostics NetBoot images over.

If multiple network interfaces are listed, it's likely that only one of the interfaces is on the same subnet as your server.

If you're not sure which interface is on the same subnet, open Network Utility (located in /Applications/Utilities/) on your NetBoot server and your server. In the Info pane, choose different network interfaces on the NetBoot server and your server and compare the IP Address fields.

Usually, computers are on the same subnet if their IP addresses start with same numbers (for example, they may both start with 192.168.2).
- 7 In the volume list, select the Images checkbox and Client Data checkbox for the volume that will store the Server Diagnostics NetBoot image.

The volume must have at least 100 MB of available space.
- 8 Click Save.
- 9 In a Finder window, navigate to the Diagnostics folder on the *Admin Tools* disc, and then open `AppleServerDiagnosticsNetBoot.pkg`.
- 10 Follow the onscreen instructions to install the Server Diagnostics NetBoot package.
- 11 In Server Admin, select NetBoot, and then click Images.
- 12 If the Server Diagnostics NetBoot image has the same index (listed in the Index column) as another image, deselect the Enable checkbox for the conflicting image.

Don't change any default Server Diagnostics NetBoot image settings.
- 13 Click Start NetBoot.

Deleting the Server Diagnostics NetBoot Image

You can't use System Image Utility to delete the Server Diagnostics NetBoot image. Instead, you must delete the Server Diagnostics NetBoot image in the NetBoot image folder, which is located at:

```
/Volumes/volumename/Library/NetBoot/NetBootSP#
```

Replace *volumename* with the name of the volume that you're installing the Server Diagnostics NetBoot image onto. The number (#) varies, depending on whether you're using several NetBoot volumes.

If you're using only one NetBoot volume, the Server Diagnostics NetBoot image is located in NetBootSP0. If you're using several NetBoot volumes, the Server Diagnostics NetBoot image may be located in a different folder (for example, NetBootSP1, NetBootSP4, or NetBootSP11).

To delete the Server Diagnostics NetBoot image:

- Open a Finder window and delete AXD.nbi from the NetBoot image folder.

This chapter describes several methods that let you change the startup disk to the volume with Server Diagnostics installed.

Before you start up Server Diagnostics, make sure everything is properly installed and configured. For information, see Chapter 2, “Setup and Installation.”

Changing the Startup Disk

Server Diagnostics is usually installed on a dedicated volume to minimize the risk of server processes interrupting the tests. Because of this, you must change the startup disk to the volume with Server Diagnostics installed before you can use the tools.

To test a client server remotely, first start up Server Diagnostics on the host computer and then start up Server Diagnostics on the client server.

To start up Server Diagnostics, set the startup volume of the server to the volume or disk image containing Server Diagnostics.

If Mac OS X Server starts up by default on your server, you can change the startup disk in the Startup Disk pane of System Preferences. Otherwise, you can temporarily change the startup disk by holding down a key while starting up the server:

Goal	Hold down this key at server startup
Choose the Server Diagnostics volume before starting up Mac OS X	Option
Start up the preinstalled Server Diagnostics EFI	D
Start up using the Server Diagnostics EFI disk image from a NetBoot server	F1

If you erase the volume Server Diagnostics EFI is installed on, you can't use the D key to run it.

If you insert the *Admin Tools CD* in another computer and run Remote Install Mac OS X (located in `/Applications/Utilities/` on the computer), you can hold down the Option key and choose the Administration Tools volume before starting up Mac OS X to run Server Diagnostics EFI from the disc.

The Startup Disk pane of System Preferences can start up Server Diagnostics Mac OS X, but not Server Diagnostics EFI. You can press the Option key at startup to start up Server Diagnostics Mac OS X or Server Diagnostics EFI.

The server becomes unavailable when you use Server Diagnostics. Before starting tests, alert users that the server will be unavailable.

Changing the Startup Disk in System Preferences

If Mac OS X Server starts up by default on your server, you can use System Preferences to change the startup disk. The list of startup volumes includes internal volumes and connected portable storage device volumes.

When you change the startup disk in System Preferences, you can't select a startup disk with Server Diagnostics EFI installed. To change the startup disk to the volume with Server Diagnostics EFI installed, change the startup disk at startup. For information, see "Changing the Startup Disk Temporarily at Startup" on page 21.

To change the startup disk in System Preferences:

- 1 Open System Preferences on the server, and then select Startup Disk.
- 2 If the lock icon is locked, click it and then authenticate as a system administrator.
- 3 Select the startup disk with the Server Diagnostics and click Restart.

When you're done using Server Diagnostics, change the startup disk back to the volume you were using previously.

Changing the Startup Disk Using the Command-Line Interface

If Mac OS X Server starts up by default on your server, you can use the command-line interface to change its startup disk. You can use the command-line interface to start up from internal volumes and connected portable storage device volumes.

You can also change the startup disk of a remote server using the command-line interface. Remote login must be enabled on the remote server (enabled by default). You can enable remote login in the Sharing pane of System Preferences.

When you change the startup disk using the command-line interface, you can't select a startup disk with Server Diagnostics EFI installed. To change the startup disk to the volume with Server Diagnostics EFI installed, change the startup disk at startup. For more information, see "Changing the Startup Disk Temporarily at Startup" on page 21.

You must be able to authenticate as the root account to change the startup disk using the command-line interface.

Note: The Terminal commands described in this task are case-sensitive, and must be entered as shown.

To change the startup disk using the command-line interface:

- 1 Open Terminal (located in /Applications/Utilities/).
- 2 If you want to connect to a remote server, enter the following in the Terminal window, and authenticate when requested:

```
ssh username@serveraddress
```

Replace *username* with the short name of a user who can authenticate as the root account on the server. Replace *serveraddress* with the URL, IP address, or host name of the server.

- 3 Enter the following, and then authenticate as the root account:

```
sudo bless -folder "/Volumes/volumename/System/Library/CoreServices"  
-setBoot
```

Replace *volumename* with the name of the volume you want to start up from.

When you're done using Server Diagnostics, change the startup disk back to the volume you were using previously.

Changing the Startup Disk Using Apple Remote Desktop

If you have Apple Remote Desktop, you can change the startup disk of remote computers to an internal volume or connected portable storage device volume.

For information about using Apple Remote Desktop to set a computer's startup disk, see the *Apple Remote Desktop Administrator Guide*, located at www.apple.com/remotedesktop.

Changing the Startup Disk Temporarily at Startup

If your server has trouble starting up Mac OS X Server or doesn't have Mac OS X Server installed, you can temporarily change the startup disk by holding down a key while the server is starting up. This requires that you have a keyboard and mouse attached to the server and that you can restart the server.

If a firmware password is set, you can't temporarily change the startup disk by holding down the D or F1 key. You can do it by holding down the Option key, but you must authenticate with the firmware password.

For information about disabling the firmware password, see "Disabling the Firmware Password" on page 22.

To temporarily change the startup disk at startup:

- 1 Restart the server.
- 2 While the server is restarting, hold down the Option key until a list of volumes appears.

If you're asked to authenticate, enter the firmware password and click the Continue (right-arrow) button.

If you haven't erased the preinstalled Mac OS X Server volume with Server Diagnostics EFI, you can start up Server Diagnostics EFI by holding down the D key instead of the Option key.

To start up Server Diagnostics EFI from a NetBoot image hosted on a NetBoot server, hold down the F1 key instead of the Option key.

Each alternative starts up Server Diagnostics EFI and bypasses the list of volumes described in the next step.

- 3 If you displayed the list of volumes instead of immediately starting up Server Diagnostics, select the volume with Server Diagnostics, and then click the arrow button to start up.

The Server Diagnostics EFI volume is listed as EFI Boot. If you've inserted the *Admin Tools* disc in another computer with Mac OS X or Mac OS X Server v10.6 or later installed and you run Remote Install Mac OS X, the Server Diagnostics EFI volume is listed as Administration Tools.

After you finish using Server Diagnostics EFI and restart the server, it starts up from the default startup volume.

Disabling the Firmware Password

If a firmware password is enabled, you can't temporarily change the startup volume by pressing and holding F1 or D at startup.

If a firmware password is enabled and you try to temporarily change the startup volume by holding down the Option key at startup, you must authenticate.

To disable the firmware password:

- 1 Insert the *Mac OS X Server Install DVD*.
- 2 Restart the server and hold down the server's Option key while it restarts.
- 3 When a list of startup disks appears, select Mac OS X Server Install Disc and click the arrow button.

If the disk isn't listed and you're connecting to a computer over AirPort, select the AirPort network in the pop-up menu under the startup disk list.

- 4 After selecting a language, choose Utilities > Firmware Password Utility.
- 5 In Firmware Password Utility, click Change.
- 6 Deselect "Require password to change firmware settings," and click OK, then authenticate when asked.
- 7 Choose Firmware Password Utility > Quit Firmware Password Utility.
- 8 Choose Mac OS X Installer > Quit Mac OS X Installer.
- 9 Click Startup Disk, select the startup disk with Mac OS X Server installed, and then click Restart.

Server Diagnostics Mac OS X and Server Diagnostics EFI have different interfaces and functionality. This chapter describes how to use both sets of Server Diagnostics.

Before you can use Server Diagnostics, make sure you've properly started up the tools. For information, see Chapter 3, "Starting Up Server Diagnostics."

Setting Server Diagnostics to Host, Client, or Local Mode

Server Diagnostics can start up in any of three modes, depending on whether:

- You're opening Server Diagnostics EFI or Server Diagnostics Mac OS X
- Any of the computers on the same subnet are host computers
- A host computer is directly connected
- You're logged in as root
- You're running Server Diagnostics Mac OS X on a computer that isn't a Mac Pro with Mac OS X Server installed

The following table describes the three modes:

Mode	Description	Automatically enters mode if
Host	The computer searches for servers that are on the same subnet and start Server Diagnostics in remote mode. When one is found, the host computer controls Server Diagnostics on the client server.	You run Server Diagnostics Mac OS X and: <ul style="list-style-type: none">• The computer isn't a Mac Pro with Mac OS X Server installed• You're not logged in as root
Client	The server can be controlled by a host computer.	You're running Server Diagnostics EFI and a host computer is on the same subnet or is directly connected.
Local	The server runs all tests locally.	You're running Server Diagnostics EFI and a host computer isn't on the same subnet and isn't directly connected.

If you're logged in as root on the server and you run Server Diagnostics Mac OS X, you can choose which mode to enter.

Remotely Testing a Client Server

To test a client server, you first start up Server Diagnostics on the host computer, set it to connect to the client server, start up the Server Diagnostics on the client server and then set the client server to be a client of the host computer.

The host computer must run Server Diagnostics Mac OS X. The client server can run Server Diagnostics Mac OS X or Server Diagnostics EFI. The available tests are based on which Server Diagnostics the client server is running.

When you start up Server Diagnostics EFI, the server looks for a host computer. If it finds a host computer, the server enters client mode. If it doesn't find a host computer, the server enters local mode.

When you start up Server Diagnostics Mac OS X, the server becomes a host computer if either of the following are true:

- You logged in to Mac OS X with an account that isn't root.
- You're running Server Diagnostics Mac OS X on a computer that isn't a Mac Pro with Mac OS X Server installed.

If Server Diagnostics Mac OS X doesn't automatically become a host computer, it asks if it should connect to a client server, be a client of a host computer, or run tests locally.

To remotely test a client server:

- 1 On the host computer, open Server Diagnostics Mac OS X (typically located in /Applications/).
- 2 Choose from the following:
 - If the host computer is a Mac Pro with Mac OS X Server installed and you're logged in as root, when Server Diagnostics Mac OS X opens, a dialog asks you to choose which mode to enter. Choose "Connect to remote server" and click OK.
 - If your computer isn't a Mac Pro with Mac OS X Server installed, the dialog doesn't appear, and Server Diagnostics Mac OS X automatically enters host mode.
- 3 On the client server, change the startup disk to a volume with Server Diagnostics and restart it.

You can also temporarily change the startup disk to be a volume with Server Diagnostics on it or to a Server Diagnostics NetBoot disk image when you start up the server.

For information about how to change or temporarily change the startup volume, see Chapter 3, "Starting Up Server Diagnostics."

- 4 If you're starting up Server Diagnostics Mac OS X, log in as root.
- 5 If Server Diagnostics Mac OS X doesn't open automatically, open the Apple Server Diagnostics application (typically located in /Applications/), choose "Client of a remote host," and then click OK.

If you're starting up Server Diagnostics EFI, the server enters client mode.

- 6 Verify that the host computer and client server have established a successful connection by reviewing the following:
 - The IP address field in the Server Diagnostics window on the host computer should match the IP address assigned to the client server.
 - The name of the Server Diagnostics window on the host computer is "Apple Server Diagnostics remote log," not "Apple Server Diagnostics local log."
 - The log area of the client server uses more of the Server Diagnostics window. Shut Down, Restart, and a few other buttons are removed.

Testing the Local Server Using Server Diagnostics EFI

To test the local server, make sure none of the computers on the same subnet as the server is running Server Diagnostics Mac OS X in host mode. If a computer on the same subnet is running Server Diagnostics Mac OS X tools in host mode, the server automatically enters client mode.

To test the local server using Server Diagnostics EFI:

- Restart the server and hold down the Option or F1 key to start up the volume or NetBoot disk image with Server Diagnostics EFI.

For information about how to temporarily change the startup volume while starting the computer, see Chapter 3, “Starting Up Server Diagnostics.”

When Server Diagnostics EFI starts up and doesn’t find a host computer, it enters local mode.

Testing the Local Server Using Server Diagnostics Mac OS X

To test the local server, you must log in as root. If you don’t log in as root, Server Diagnostics Mac OS X enters host mode.

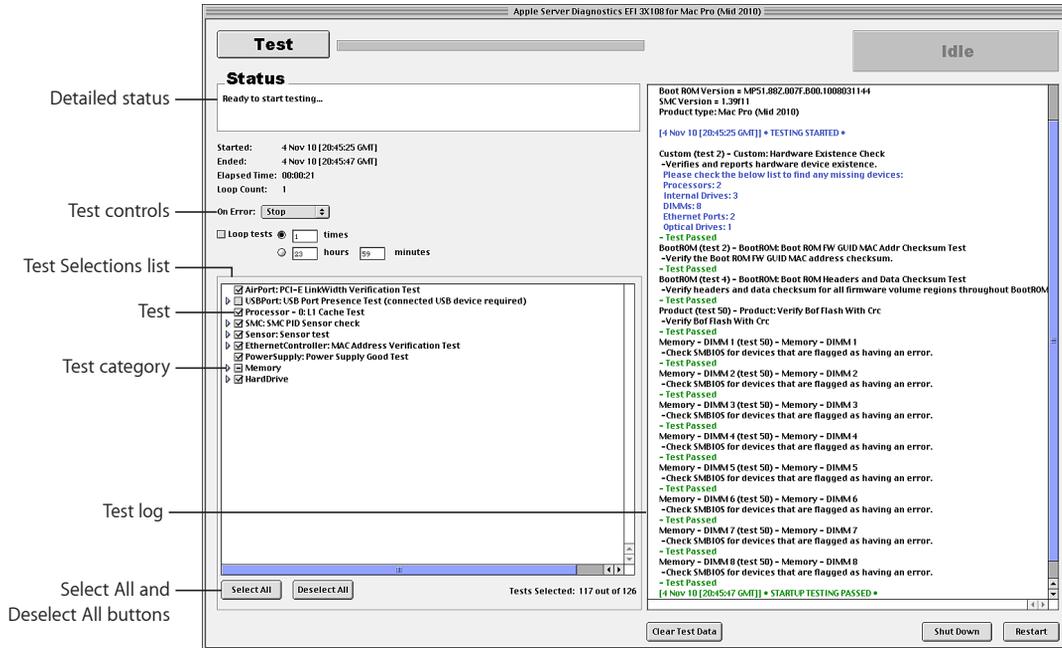
To test the local server using Server Diagnostics Mac OS X:

- 1 Change the startup disk of the server to a volume with Server Diagnostics Mac OS X, restart it, and log in as root.
- 2 If Server Diagnostics Mac OS X doesn’t open automatically, open it (typically located in /Applications/).
- 3 When Server Diagnostics Mac OS X opens, choose “Local” from the dialog that appears and click OK.

Using Server Diagnostics EFI

In Server Diagnostics EFI, the test controls and test selections are split across two panes. Regardless of which pane you're looking at, you can do the following:

- View the test log, test settings, and status
- Start tests
- Clear the test log
- Restart the server
- Shut down the server



For more information about Server Diagnostics EFI, see the following sections.

Customizing Server Diagnostics EFI Test Settings

You can customize Server Diagnostics test settings by choosing which tests are run, whether to loop tests, and whether to stop or continue testing when an error occurs.

To customize Server Diagnostics EFI test settings:

- 1 In Server Diagnostics EFI, select the test settings you want.

To do this	Do this
Choose which tests are run	Do any of the following: <ul style="list-style-type: none">• To select a test, select the checkbox next to the test.• To select a specific test within a category of tests, click the disclosure triangle next to the category, and then select individual tests.• To select all tests, click Select All.• To remove all tests, click Deselect All.
Loop all selected tests	Do one of the following: <ul style="list-style-type: none">• To loop selected tests a specific number of times, select "Loop # times" and replace # with the number of times to loop.• To run tests once, select "Loop # times" and replace # with the number 1.• To loop tests for a specific amount of time, select "Loop for # hours and # minutes" and replace # with number of hours and minutes to loop. When the specified time is reached, the current loop must complete before the tests stop. For example, if one loop of your test set takes 2 hours to complete and your specified time is 3 hours, Server Diagnostics stops testing in 4 hours. (Instead of stopping at 3, it waits for the current test set loop to complete before stopping.)
Change what to do when an error occurs	In the On Error pop-up menu, do one of the following: <ul style="list-style-type: none">• To stop testing when the first error occurs, choose Stop.• To continue testing when errors occur, choose Continue.

- 2 To run the test, click Test.

Clearing the Test Log

The test log contains all test messages that have occurred during the current Server Diagnostics session. If you quit Server Diagnostics, the log is cleared.

To clear the test log without quitting Server Diagnostics, click Clear Test Data.

Viewing the Hardware Profile

The hardware profile lists all hardware components in the server.

You can view the hardware profile by choosing Hardware Profile > Display Hardware Profile.

Shutting Down or Restarting the Server

You can shut down or restart the server in Server Diagnostics EFI.

To shut down or restart the server:

- Click Shut Down or Restart.

Viewing Saved Logs

When you start up Server Diagnostics EFI from a volume in MS-DOS (FAT) format, it creates a log of its test results in the /AppleServerDiagnosticsLogs/ folder of the volume with Server Diagnostics EFI installed.

This log is updated as tests complete. If the server crashes during tests, review the log to see which test it crashed on.

If you run the preinstalled Server Diagnostics EFI or Server Diagnostics EFI from the *Admin Tools* disc, or a NetBoot disc image, logs aren't saved.

The logs are named `AppleServerDiagnostics_date_time_serialnumber.txt`.

The *date* and *time* indicate when Server Diagnostics EFI started up. The time is in Greenwich Mean Time (GMT), using a 24-hour format.

The values use this format:

Value	Format	Example
<i>date</i>	DDMonYear	15Jul2009
<i>time</i>	HH_MM_SS	19_23_46
<i>serialnumber</i>	#####	AB12345CD6E

Taking Screenshots

You can take screenshots of Server Diagnostics EFI, which are saved as BMP files in the root folder of the volume with Server Diagnostics EFI installed.

If you run Server Diagnostics EFI from the *Admin Tools* disc, a NetBoot disc image, or a volume that isn't in MS-DOS (FAT) format, you can't take screenshots.

To take a screenshot:

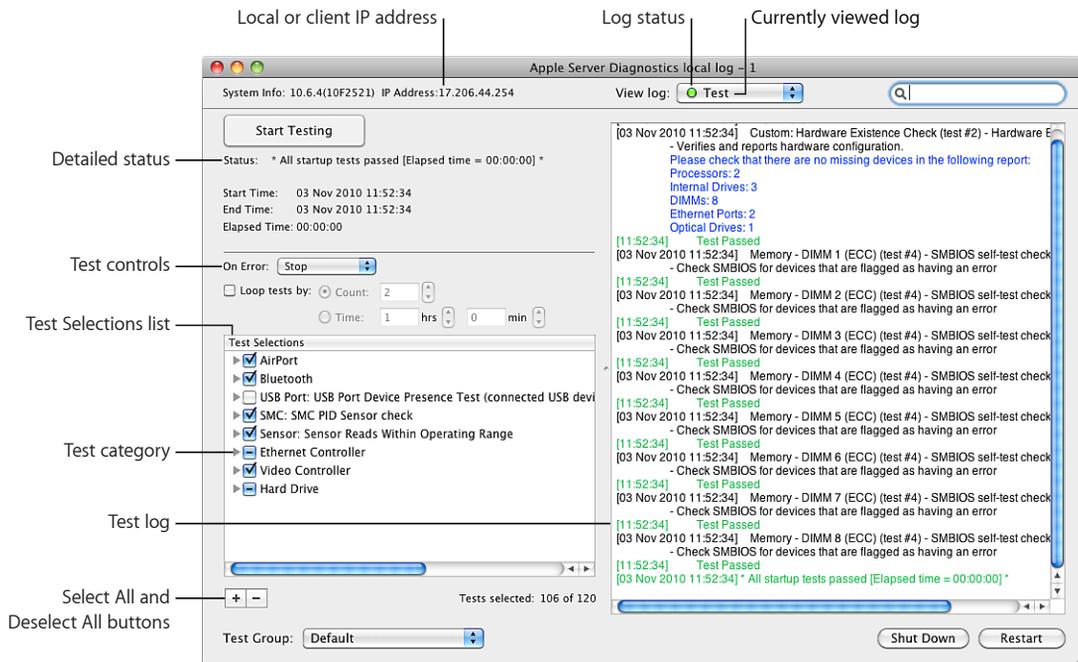
- In Server Diagnostics EFI, press Command-Shift-3.

After you press Command-Shift-3, the system pauses for a few seconds and then takes the screenshot.

Using Server Diagnostics Mac OS X

Server Diagnostics Mac OS X changes based on whether you're running it locally, as a client, or as a host. In client mode, you can't change test settings, select different tests, or shut down or restart the server. Therefore, the test log uses most of the window.

In local and host mode, you can access all Server Diagnostics Mac OS X features in the main window.



For more information about using Server Diagnostics Mac OS X, see the following sections.

Customizing Server Diagnostics Mac OS X Test Settings

You can customize Server Diagnostics test settings in several ways by choosing which tests are run, whether to loop tests, and whether to stop or continue testing when an error occurs.

To customize Server Diagnostics Mac OS X test settings:

- 1 In Server Diagnostics Mac OS X, select the test settings you want.

To do this	Do this
Choose which tests are run	In the Test Selections list, do the following: <ul style="list-style-type: none">• To select a test, select the checkbox next to the test.• To select a specific test within a category of tests, click the disclosure triangle next to the category, and then select individual tests.• To select all tests, click the Select All (+) button.• To remove all tests, click the Deselect All (-) button.
Loop all selected tests	Select "Loop tests by," and then do the following: <ul style="list-style-type: none">• To loop selected tests a specific number of times, select Count and enter a number of times to loop.• To loop selected tests for a specific amount of time, select Time and enter the number of hours and minutes to loop. When the specified time is reached, the current loop must complete before the tests stop. For example, if one loop of your test set takes 2 hours to complete and your specified time is 3 hours, Server Diagnostics Mac OS X stops testing in 4 hours. (Instead of stopping at 3, it waits for the current test set loop to complete before stopping.)
Change what to do when an error occurs	In the On Error pop-up menu, do the following: <ul style="list-style-type: none">• To stop testing when the first error occurs, choose Stop.• To continue testing when errors occur, choose Continue.

- 2 To save your customized test settings for future use, in the Test Group pop-up menu, choose Save Current Group, enter a name for the group, and click OK.

For more information, see "Working with Test Groups" on page 33.

- 3 To run the test, click Start Testing.

When the test completes, a PASSED or FAILED message appears on screen.

- 4 Click anywhere to close the message.

Working with Test Groups

You can create test groups based on your customized test settings. These are similar to templates because they allow you to reuse your test settings without having to change each setting individually. After choosing a test group, you can still change its settings.

There are several test groups included with Server Diagnostics Mac OS X. These test groups stop when an error occurs, and they aren't looped.

Test group	Test selections
Default	All memory, fan, hard drive, sensor, SMC PID sensor, and power supply tests. Ethernet MAC address verification and ROM checksum verification.
Quick Test	All sensor tests.

You can also export a test group to a file. By exporting a test group, you can use that file to re-create that test group on other Server Diagnostics installations. For example, if you install Server Diagnostics Mac OS X on several servers, you can copy the test group file to each of them, making identical tests available without having to manually create a new test group.

To work with test groups:

- In Server Diagnostics Mac OS X, choose the options you want.

To do this	Do this
Use a test group	In the Test Group pop-up menu, choose a test group.
Create a new test group	In the Test Group pop-up menu, choose Save Current Group. Enter a name for the group and click OK.
Delete a test group	In the Test Group pop-up menu, choose a test group. Choose Edit > Delete Test Group. You can't delete the Default or Quick Test test groups.
Export a test group	Choose File > Export Test Group, choose a location, name the test group, and click Save.
Import a test group	Choose File > Open, select an .axdconfig file, and click Open.

Viewing Logs

You can view the following types of logs in Server Diagnostics Mac OS X:

Log type	Description
Test	All messages from tests run in the current Server Diagnostics Mac OS X session.
Hardware Info	Listing and description of all installed hardware.

When you view logs in Server Diagnostics Mac OS X, a colored circle next to the log name indicates whether the log is able to be loaded.

Color	Status
No circle	You haven't loaded the log during this Server Diagnostics session, or the log hasn't been created yet.
Yellow	The log didn't load. This usually occurs when there isn't any data in the log.
Green	The log loaded.

To view logs:

- 1 Open Server Diagnostics Mac OS X.
- 2 If tests are running, wait for them to complete or stop them.
If tests are running, you can view only the test log.
- 3 Do any the following:

To do this	Do this
View logs in the current or chosen volume	Choose a log from the "View log" pop-up menu.
Search for specific text within the log	Enter text in the search field. When you press Return, matching text is highlighted in the log area.
Clear logs	Choose Logs > Clear <i>current</i> Log, or choose Logs > Clear All Logs. The name of the currently viewed log replaces <i>current</i> .
Refresh logs	Choose Logs > Refresh Current Log.

Setting Log Preferences

You can set up log preferences so the Server Diagnostics test logs are saved to a file at a location you choose. Server Diagnostics test logs are created when you start a Server Diagnostics session.

When Server Diagnostics Mac OS X saves a log, it overwrites any log of the same name. Log preferences can customize the name of the log file so that the log files aren't overwritten.

If you don't use any naming options, the log is saved as:

```
AppleServerDiagnostics_serialnumber_mode_autosave_log.txt
```

If you're testing locally, *mode* is replaced by "local." If you're testing remotely, *mode* is replaced by "remote."

If you use all naming options, the log is saved as:

```
AppleServerDiagnostics_serialnumber_mode_autosave_log_date_ethernetMACaddress_uniquename.txt
```

The appended values use this format:

Value	Format	Example
<i>date</i>	DD_Mon_Year	15_Jul_2010
<i>ethernetMACaddress</i>	##_##_##_##_##_##	01_23_45_67_89_ab
<i>unique</i> name	- #	- 1

The unique name is appended only if a file with the same name exists.

A log for the local server with all naming options enabled (using the example values) is saved as:

```
AppleServerDiagnostics_AB12345CD6E_local_autosave_log_15_Jul_2010_01_23_45_67_89_ab - 1.txt
```

To set log preferences:

- 1 In Server Diagnostics Mac OS X, choose AppleServerDiagnostics > Preferences.
- 2 To automatically save test logs, select “Auto-save test log.”
If you don’t select this option, you can’t perform the steps that follow.
- 3 To choose the location of the automatically saved log, click “Choose auto-save location,” select a location, and then click Open.
- 4 Configure the test log naming options.

To do this	Do this
Ensure newly created log files don’t overwrite old log files	Select “Use unique name.”
Append the Ethernet address of the server that’s being tested	Select “Append Ethernet Address.”
Append the run time and date of the session’s first tests	Select “Append time and date.”

Shutting Down or Restarting the Server

If you’re running Server Diagnostics Mac OS X on the local server or on a host computer, you can shut down or restart the server by clicking Shut Down or Restart.

If the server is in client mode, you can’t shut down or restart the server locally.

Quitting Server Diagnostics Mac OS X While a Test Is Running

If you try to quit Server Diagnostics Mac OS X while a test is running, you can’t print or save logs from the current Server Diagnostics session. Make sure you print or save critical logs before quitting.

Instead of quitting in the middle of a test, you can stop the current test, print or save logs, and then quit.

Server Diagnostics Test Reference

This reference describes the tests available in Server Diagnostics and gives estimates for how long the tests take to complete.

The types of tests available depend on if you're using Server Diagnostics EFI or Server Diagnostics Mac OS X, and on your server model and configuration.

Comparison of Available Tests

The following table compares the tests available by component, depending on if you're using Server Diagnostics EFI or Server Diagnostics Mac OS X. For more information about the specific tests available for each component, see "Server Diagnostics EFI Tests" on page 38 and "Server Diagnostics Mac OS X Tests" on page 44.

A ✓ indicates that a test is available:

Component tested	Available in Server Diagnostics EFI	Available in Server Diagnostics Mac OS X	Notes
AirPort	✓	✓	Different tests are available depending on the tool.
Bluetooth		✓	
Ethernet controller	✓	✓	Different tests are available depending on the tool.

Component tested	Available in Server Diagnostics EFI	Available in Server Diagnostics Mac OS X	Notes
Hard drive	✓	✓	Different tests are available, depending on the tool and whether solid state drives are installed.
Memory (simple)	✓		This tests all memory using a single CPU core.
Memory (multicore)	✓		This tests all memory using all available CPU cores.
Memory (extended)	✓		Tests all memory.
Power supply	✓		
Processor	✓		
Sensor	✓	✓	Server Diagnostics Mac OS X has an additional sensor test.
SMC PID sensor	✓	✓	
USB port	✓	✓	
Video controller		✓	

Server Diagnostics EFI Tests

These tests are available if your server is running Server Diagnostics EFI.

Startup Tests

These tests run when you start up Server Diagnostics EFI.

Test	Estimated completion time	Description
Hardware Existence	1 second	Compares a table of sensors and fans with what's connected to the logic board. If a sensor or fan isn't found, an error occurs. All sensors and hard drives found can be individually tested using sensor and hard drive tests.
Boot ROM Checksum	1 second	Verifies the Boot ROM checksum.
Boot ROM FW GUID MAC Addr Checksum	1 second	Verifies the Boot ROM FireWire GUID MAC address checksum.

Test	Estimated completion time	Description
Boot ROM Headers and Data Checksum	15 seconds	Verifies headers and data checksum for all firmware volume regions throughout the Boot ROM.
Verify BOF Flash with CRC	1 second	Verifies that the low and high limits for testing sensors are correctly set.
SMBIOS Self-Test	1 second	<p>Checks the SMBIOS tables for 32-bit errors (type 18) and 64-bit errors (type 33). Also verifies that the mapped-in DIMM size is appropriate for the slot it's inserted into. If there's a size mismatch, an error occurs.</p> <p>When the server tests memory at startup, it maps out bad memory. This mapped-out memory is hidden from the system and diagnostics so the non-SMBIOS memory tests don't test it. The SMBIOS test reports these mapped-out DIMMS.</p>

AirPort Tests

Test	Estimated completion time	Description
PCI-E LinkWidth Verification	1 second	Verifies PCI link width is as expected.

Ethernet Controller Tests

Test	Estimated completion time	Description
MAC Address Verification	1 second	Verifies MAC address isn't all FFs or 00s.

Hard Drive Tests

When Server Diagnostics EFI starts, it performs a hardware existence test. Hard drives found during this test can be tested individually using hard drive tests.

Test	Estimated completion time	Description
Full Read	3 hours for a 1 TB drive	Performs a DMA full-read scan at 1250 RPM. This checks the entire hard drive for slow-read failures. This test is available for hard drives, but not solid-state drives.
Abbreviated Read	2 minutes	Performs a DMA scan at 1250 RPM. This checks the first 10 GB of the hard drive for slow-read failures. This test is available for hard drives, but not solid-state drives.
Check SMART Status	1 second	Check the SMART status of a hard drive. This test is available for hard drives, but not solid-state drives.

Memory Tests

Simple Memory Tests

In Server Diagnostics EFI, memory tests (simple, multicore, and extended) are grouped under Memory tests.

Note: The time required to complete memory tests correlates to the amount of memory being tested. These estimates are based on testing 8 GB of memory.

Test	Estimated completion time	Description
Address as Data	15 seconds	Tests memory using the memory address as data.
Patterns	40 seconds	Tests memory using different data patterns.
Marching Ones and Zeros	30 seconds	Tests memory by walking 1s and 0s up and down memory.
Knaizuk Hartmann	20 seconds	Tests memory using this algorithm.
MOD3	1 minute	Tests memory using this algorithm.
March U	3 minutes	Tests memory using Van de Goor's March U algorithm.

Test	Estimated completion time	Description
Random	45 seconds	Uses pseudo-random values.
Block Checkerboard 32	15 seconds	Alternates 32-bit words with all 1s and all 0s, and then with all 0s and all 1s.
Bit Checkerboard 32	15 seconds	Alternates bits with all 1s and all 0s, and then with all 0s and all 1s.
Sequential Byte Block 32	32 minutes	Fills bytes sequentially with patterns starting at 0x00 and ending at 0xFF.
Walking One 32	15 minutes	Walks 1s up and down memory.
Walking Zero 32	15 minutes	Walks 0s up and down memory.
Walking Spread Bit 32	15 minutes	Walks 0b01 up and then walks 0b10 down memory.
Walking Bit Flip 32	15 minutes	Alternates words with walking 1 and walking 0, and then alternates with walking 0 and walking 1.

Multicore Memory Tests

In Server Diagnostics EFI, all memory tests (simple, multicore, and extended) are grouped under Memory tests.

Note: The time required to complete memory tests correlates to the amount of memory being tested. These estimates are based on testing 8 GB of memory.

Test	Estimated completion time	Description
MP Block Checkerboard	10 seconds	Alternates 32-bit words with all 1s and all 0s, and then with all 0s and all 1s.
MP Bit Checkerboard	10 seconds	Alternates bits with all 1s and all 0s, and then with all 0s and all 1s.
MP Sequential Byte Block	16 minutes	Fills bytes sequentially with patterns starting at 0x00 and ending at 0xFF.
MP Walking One	7 minutes	Walks 1s up and down memory.
MP Walking Zero	7 minutes	Walks 0s up and down memory.
MP Walking Spread Bit	7 minutes	Walks 0b01 up and then walks 0b10 down memory.

Test	Estimated completion time	Description
MP Walking Bit Flip	7 minutes	Alternates words with walking 1 and walking 0, and then alternates words with walking 0 and walking 1.
Check Hardware Errors	2 seconds	Tests specific registers for memory related errors. Running this test at the end of memory testing may help catch memory errors generated during other memory tests.

Extended Memory Tests

Extended memory tests test all available memory.

In Server Diagnostics EFI, memory tests (simple, multicore, and extended) are grouped under Memory tests.

The availability of extended memory tests depends on the server model you test.

Note: The time required to complete memory tests correlates to the amount of memory being tested. These estimates are based on testing 8 GB of memory.

Test	Estimated completion time	Description
Extended Memory Test P00F	10 seconds	Tests memory using pattern 0. This fails if an error occurs.
Extended Memory Test P01F	10 seconds	Tests memory using pattern 1. This fails if an error occurs.
Extended Memory Test P02F	10 seconds	Tests memory using pattern 2. This fails if an error occurs.
Extended Memory Test P03F	10 seconds	Tests memory using pattern 3. This fails if an error occurs.
Extended Memory Test P04F	10 seconds	Tests memory using pattern 4. This fails if an error occurs.
Extended Memory Test P05F	10 seconds	Tests memory using pattern 5. This fails if an error occurs.
Extended Memory Test P06F	10 seconds	Tests memory using pattern 6. This fails if an error occurs.
Extended Memory Test P07F	10 seconds	Tests memory using pattern 7. This fails if an error occurs.

Power Supply Tests

Test	Estimated completion time	Description
Good	1 second	Checks if the power supply's good bit is set. If it's not set, this could indicate that the power supply isn't seated well or is bad, or that there's no AC connected.

Processor Tests

Test	Estimated completion time	Description
L1 Cache Test	3 seconds	Verifies that the L1 cache is good on all processor cores.

Sensor Tests

When Server Diagnostics EFI starts, it performs a hardware existence test. Sensors found during this test can be tested individually using sensor tests.

Test	Estimated completion time	Description
Sensor Reads	1 second	Verifies that the sensor reads are within the preset sensor limits.

SMC PID Sensor Tests

The System Management Controller (SMC) monitors the Proportional Integral Derivative (PID) controller which controls several important temperature sensors.

Test	Estimated completion time	Description
SMC PID Sensor	1 second	Verifies that the sensor reads controlled by the PID are within the preset sensor limits.

USB Tests

Connect USB devices before running USB tests.

Test	Estimated completion time	Description
Presence	1 second	Verifies that a USB device is connected.

Server Diagnostics Mac OS X Tests

These tests are available if your server is running Server Diagnostics Mac OS X.

Startup Tests

These tests run when you start up Server Diagnostics Mac OS X.

Test	Estimated completion time	Description
Hardware Existence	1 second	Compares a table of sensors and fans with what's connected to the logic board. If a sensor or fan isn't found, an error occurs. Sensors, and hard drives found can be individually tested using sensor, hard drive tests.
SMBIOS Self-Test	1 second	Checks the SMBIOS tables for 32-bit errors (type 18) and 64-bit errors (type 33). Also verifies that the mapped-in DIMM size is appropriate for the slot it's inserted into. If there's a size mismatch, an error occurs. When the server tests memory at startup, it maps out bad memory. The SMBIOS test reports these mapped-out DIMMS.

AirPort Tests

Test	Estimated completion time	Description
AirPort MAC Address Verification	1 second	Verifies MAC address isn't all FFs or 00s.
AirPort Power Cycle	5 seconds	Verifies AirPort by performing a wireless scan after turning AirPort power off, then turning AirPort power on.

Bluetooth Tests

Test	Estimated completion time	Description
Bluetooth USB Interface	1 second	Verifies USB interface between host and Bluetooth.
MAC Address Verification	1 second	Verifies MAC address isn't all FFs or 00s.
Bluetooth Power Cycle	10 seconds	Verifies USB interface between host and Bluetooth after turning Bluetooth power off and then turning Bluetooth power on.

Ethernet Controller Tests

Data loop tests can add to network traffic. Consider disconnecting from the network before running data loop tests.

Test	Estimated completion time	Description
MAC Address Verification	1 second	Verifies MAC address isn't all FFs or 00s.
MAC Loopback	25 seconds	Verifies that there's no data mismatch between sent and received data while looping within the MAC (a sublayer of the datalink layer in the ISO network reference model).
PHY 1000 Loopback	25 seconds per port	Verifies that there's no data mismatch between sent and received data while looping within the physical transport medium (PHY) at 1000 Mbps.
PHY Jumbo Packet Loopback	25 seconds per port	Verifies that there's no data mismatch between sent and received jumbo packet data while looping within the physical transport medium (PHY) at the the highest supported speed.

Hard Drive Tests

When Server Diagnostics Mac OS X starts, it performs a hardware existence test. Hard drives and solid-state drives found during this test can be tested individually using hard drive tests.

Test	Estimated completion time	Description
Threaded Surface Scan	3 hours for a 1 TB drive	Scans the entire surface of a hard drive. This test is available for hard drives, but not solid-state drives.
Threaded Surface Short Scan	2 minutes	Scans the first 10 GB of a hard drive. This test is available for hard drives, but not solid-state drives.
Check SMART Status	1 second	Checks the SMART status of a hard drive. This test is available for hard drives, but not solid-state drives.
Short Random Multi-block	5 minutes	Performs a threaded, random multi-block read of random ranges of the target hard drive. This isn't a full surface scan, but it causes rapid seeking and reading of hard drive blocks. If a block can't be read, an error occurs. This test is available for hard drives, but not solid-state drives.
SSD Threaded Media Scan	Not available	Scans the entire accessible area of a solid-state drive. This test is available for solid-state drives, but not hard drives.
SSD New Drive SMART Data	Not available	Checks the SMART status of a solid-state drive. This test is available for solid-state drives, but not hard drives.

Sensor Tests

When Server Diagnostics Mac OS X starts, it performs a hardware existence test. Sensors found during this test can be tested individually using sensor tests.

Test	Estimated completion time	Description
Sensor Reads	1 second	Verifies that the sensor reads are within the preset sensor limits.

SMC PID Sensor Tests

The System Management Controller (SMC) monitors the Proportional Integral Derivative (PID) controller which controls several important temperature sensors. SMC sensors can be tested individually using these tests.

Test	Estimated completion time	Description
SMC PID Sensor	1 second	Checks the SMC PID sensor warning counter for erratic behavior.

USB Tests

Connect USB devices before running USB tests.

Test	Estimated completion time	Description
Presence	1 second	Verifies that a USB device is connected.

Video Controller Tests

To run these tests, a display that supports 1024 by 768 or higher resolution must be attached to graphics cards being tested. The displays can't be in sleep mode. For example, if you have two graphics cards, they both need a display attached and both displays must not be in sleep mode.

Test	Estimated completion time	Description
OpenGL Point	10 seconds	Verifies video controller using a 2D point test.
OpenGL Line	10 seconds	Verifies video controller using a 2D line test.
OpenGL Triangle	10 seconds	Verifies video controller using a 2D triangle test.
OpenGL Quad	10 seconds	Verifies video controller using a 2D quadrilateral test.
OpenGL Quad with Texture	10 seconds	Verifies video controller using a 2D textured quadrilateral test.
OpenGL Rectangle	10 seconds	Verifies video controller using a 2D rectangle test.
OpenGL Cube	10 seconds	Verifies video controller using a 3D cube test.
OpenGL Cube with Fog	10 seconds	Verifies video controller using a 3D cube with fog test.
OpenGL Wireframe	10 seconds	Verifies video controller using a 3D wireframe test.
OpenGL Solid Red Model	10 seconds	Verifies video controller using a 3D solid red model test.
OpenGL Solid Red Model with Fog	10 seconds	Verifies video controller using a 3D solid red model with fog test.
Fragment Instruction	1 minute	Tests every instruction of the ARB fragment program.
Vertex Instruction	40 seconds	Tests every instruction of the ARB vertex program.