

HP ProLiant DL580 Generation 2 and HP ProLiant ML570 Generation 2 Server Hot-Add Memory



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Abstract

This guide provides reference information for Hot-Add Memory functionality for the HP ProLiant DL580 Generation 2 and HP ProLiant ML570 Generation 2 servers.

Audience Assumptions

This guide is for the person who installs, administers, and troubleshoots servers. HP assumes you are qualified in the servicing of server equipment and trained in recognizing hazards in products with hazardous energy levels.

Purpose of this Document

This document is intended to provide you with information on how to use the Hot-Add functionality, and how to quickly and easily increase the amount of memory in the server without powering down or rebooting the system.

Hot-Add Memory Installation on HP ProLiant DL580 Generation 2 and ML570 Generation 2 Servers

Overview

Hot-Add functionality allows you to upgrade the amount of memory in the server without powering down or rebooting the server. This functionality eliminates server downtime and service interruption when performing a memory upgrade.

Hot-Add functionality is a feature developed for the HP ProLiant DL580 Generation 2 and HP ProLiant ML570 Generation 2 servers. These servers can be upgraded through a System ROM, dated February 4, 2003 and later, and Advanced System Management Controller Driver, version 5.28 and later, available at:

Table 1: Hot-Add Upgrade Driver Locations

Server	Driver Location
ProLiant ML570 G2 and DL580 G2 servers (Hot-Plug Memory Configuration Utility)	h18023.www1.hp.com/support/files/server/us/download/17143.html
ProLiant ML570 G2 server (Advanced System Management Controller Driver)*	www.compaq.com/support/files/server/us/locate/7266.html
ProLiant DL580 G2 server (iLO Advanced System Management Controller Driver)*	www.compaq.com/support/files/server/us/locate/7263.html

* Drivers must be version 5.28 or later to support Hot-Add memory. Install the drivers which support the Hot-Add functionality after installing Microsoft® Windows® Server 2003. If a driver earlier than version 5.28 is already installed, upgrade the driver and reboot the system.

This feature joins Dual-Board Hot-Plug Memory Mirroring, Single-Board Mirroring, and Online Spare Memory as advanced memory features on these platforms. For more information on these features, refer to the white papers located at www.hp.com/support/home.

Description

Hot-Add Functionality

Hot-Add functionality is made possible by a combination of a Hot-Add aware OS (currently Windows Server 2003 Enterprise Edition), system BIOS, and the Hot-Add memory driver (the Advanced System Management Controller Driver provides this function on these platforms). In addition, the hardware platform needs to support hot-pluggable memory modules or cards.

Hot-Add functionality allows a system in Advanced ECC mode, with a single memory board (meaning one memory board slot is empty), to dynamically have its memory resources increased by insertion of another memory board (with identical DIMM configuration as the existing board) while operating.

Hot-Add versus Hot-Mirror

Upon a board insertion, an option setting tracks whether the System ROM should treat the board insertion as a Hot-Mirror (providing mirroring functionality) or Hot-Add (providing additional memory available to the OS and applications).

While the Advanced Memory Protection Mode does have dependencies on the Hot-Add versus Hot-Mirror configuration mode, no strict dependencies exist between the two, and they operate independently.

Select the board insertion mode through ROM-Based Setup Utility (RBSU) or the Hot-Plug Memory Configuration Utility. The default board insertion mode is Hot-Mirror.

Hot-Add functionality takes advantage of the hardware responsible for allowing a board to be inserted during runtime that is used for Dual-Board Memory Mirroring mode and Hot-Mirroring.

With a Hot-Add board insertion, the OS is provided with additional memory resources while operating without the need to reboot the server. Unlike Hot-Add board insertion, Hot-Mirror dynamically places the system in a mirroring state but the OS does not have access to additional memory. The primary function of the new memory is to provide mirroring support and protection against multi-bit memory errors.

When the board insertion is complete, the OS registers the additional memory and it is then available for use by the OS and applications. The server can support up to 32 GB of memory, and a Hot-Add board insertion can upgrade to the total memory capacity, assuming all DIMM configuration requirements are met.

Requirements for a Hot-Add Functionality Upgrade

The following requirements and conditions must be met when configuring the servers for Hot-Add memory functionality.

Supported Operating Systems

At present, Hot-Add functionality is supported on Windows Server 2003 Enterprise Edition.

Memory Mode Requirements for Hot-Add

Several rules and limitations apply regarding when Hot-Add functionality is supported.

Hot-Add is supported only in the following modes:

- Advanced ECC with a single memory board (one memory board slot available)
- Dual-Board Memory Mirroring Mode (refer to “Changing Dual-Board Hot-Plug Memory Mirroring to Hot-Add Without Removing the Memory Board”)

Hot-Add is NOT supported in the following modes:

- Advanced ECC when both memory boards are installed. In this case, no empty memory board slots are available for additional memory to be inserted.
- Online Spare Mode
- Single-Board Mirroring Mode

IMPORTANT: If you attempt a Hot-Add board insertion while in Online Spare mode or Single-Board Mirroring Mode, all LEDs on the memory board flash amber and the system internal speaker emits a warning tone as soon as the board is latched, before closing the locking switch. If this occurs, remove the board. It will not affect server operation.

DIMM Configuration Requirements for Hot-Add

The DIMM configuration rules for Hot-Add are very stringent. The DIMM configuration on the new memory board must exactly match that of the existing board to double the amount of available memory.

If any DIMM configuration errors are found on the newly inserted board, the LEDs for the DIMMs that are incorrect flash amber several seconds after the board is inserted. An invalid DIMM error could occur because the DIMM is not the same type as the corresponding DIMM on the existing board or because a DIMM is installed on the new board which was unpopulated on the existing board.

If a DIMM configuration error is detected, unlock the board and remove it to make any DIMM configuration corrections. The board can then be re-inserted and the Hot-Add procedure completed normally.

If a board insertion is aborted because of a DIMM configuration error, the Advanced System Management Controller Driver is notified. It will log in the Integrated Management Log (IML) and the NT Eventlog that a Board Insertion was attempted and suffered from a DIMM configuration error.

If a DIMM configuration error is detected, the System ROM aborts the board insertion. System operation is not negatively effected.

Configuring the Servers for Hot-Add Functionality

Hot-Add memory functionality can be configured using either the Hot-Plug Memory Configuration Utility or RBSU.

Hot-Plug Memory Configuration Utility

The Hot-Plug Memory Configuration Utility is a Windows Server 2003 Enterprise Edition application that allows you to select Hot-Add or Hot-Mirror. This allows the server to be configured for the desired board insertion mode at runtime without rebooting the server. This is useful if the proper mode was not selected in RBSU. Also, this application displays the currently selected mode. The Hot-Plug Memory Configuration Utility for Windows Server 2003 is located at h18023.www1.hp.com/support/files/server/us/download/17143.html

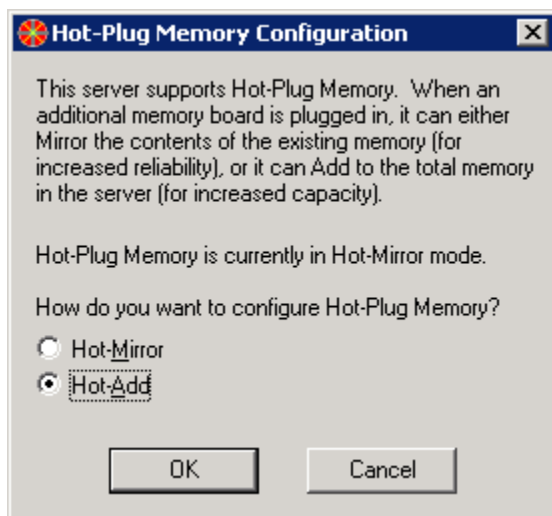


Figure 1: Hot-Plug Memory Configuration Utility

RBSU Options

The board insertion mode is also configurable in RBSU. The menu for selecting the board insertion mode in RBSU (refer to Figures 2 through 5) can be accessed by selecting the **System Options** menu, then the **Hot-Plug Board Insertion Mode** menu.

The options under Hot-Plug Board Insertion Mode are **Hot-Mirror** and **Hot-Add**. The mode currently selected is highlighted.

NOTE: The default board insertion mode is Hot-Mirror.

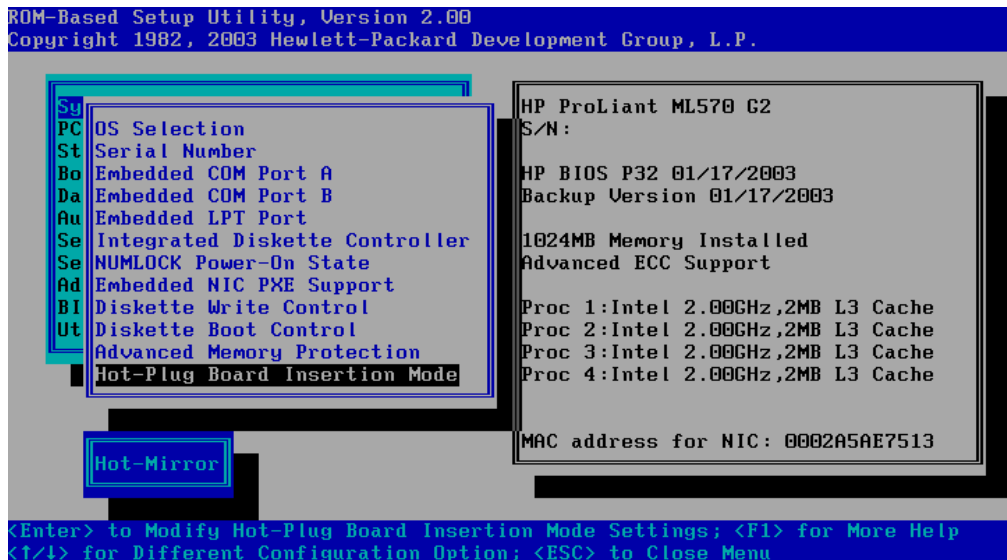


Figure 2: RBSU Hot-Plug Board Insertion Mode settings

The following sequence of screens provide details for selecting Hot-Add mode.

NOTE: The screens in this document show the ProLiant ML570 G2 server for consistency, but the same screens apply for the ProLiant DL580 G2 server.

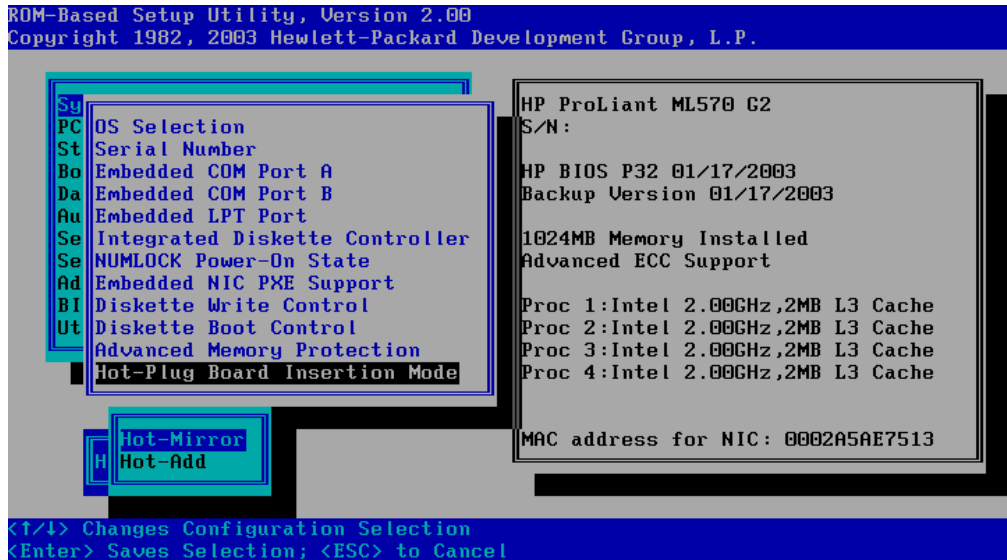


Figure 3: Changing RBSU Hot-Plug Board Insertion Mode

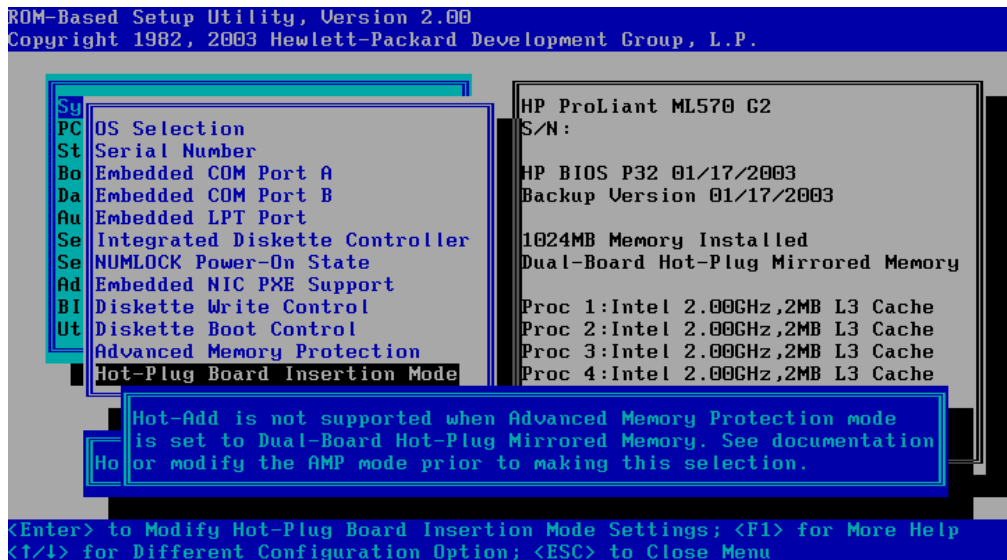


Figure 4: RBSU Hot-Add warning (when in Dual-Board Hot-Plug Mirrored Memory mode)

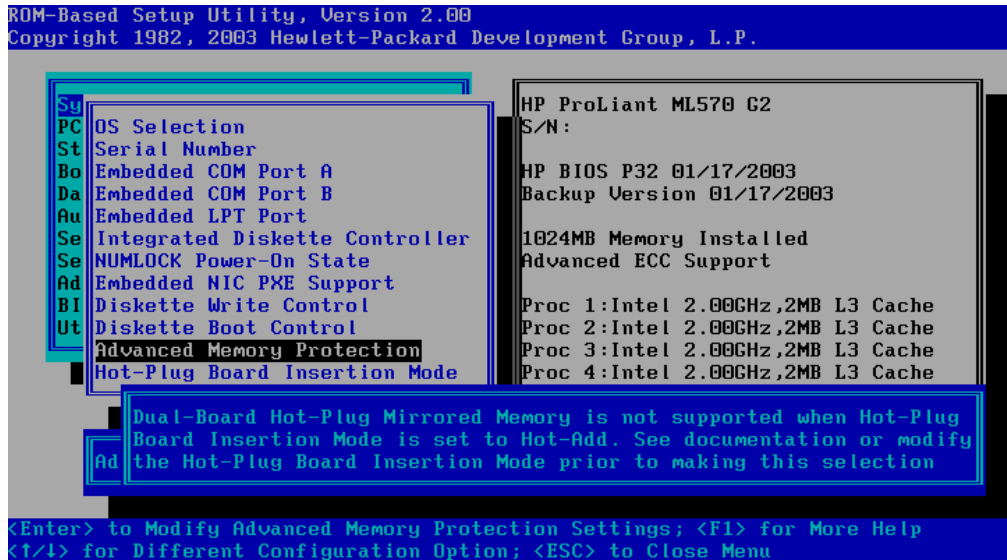


Figure 5: RBSU Dual-Board Hot-Plug Mirrored Memory warning (when in Hot-Add mode)

Typical Hot-Add Board Insertion with an Empty Memory Slot

A typical Hot-Add board insertion is very similar to a board insertion when performing a hot-plug event in Dual-Board Hot-Plug Memory Mirroring mode.

The memory board is inserted and latched (refer to the documentation that shipped with the server). If board insertions are allowed, close the locking switch after latching. Board insertions would not be permitted in Online Spare Mode or Single-Board Memory Mirroring. If a board is inserted and latched when in one of these modes, all the LEDs on the memory board flash amber and the internal system speaker emits a warning tone until the board is removed.

Once the locking switch is closed, the System ROM begins the board power-up and initialization process. While this process is taking place, all memory board LEDs are off except the Memory Status LED that blinks green. It will continue to blink green until the board insertion is complete or until an error aborts the board insertion. A successful board insertion takes approximately 30 seconds to 2 minutes, depending on the amount of memory installed on the board.

If a DIMM configuration error is detected, the insertion is aborted and the LED(s) next to the invalid DIMM(s) blink amber. You can then remove the board, fix the DIMM configuration issue, and re-insert the board.

When a successful Hot-Add board insertion is complete, the Memory Status LED turns solid green and all populated DIMM LEDs turn green. Unlike on a Hot-Mirror board insertion, the Mirroring Status LED and the Board Removable LED remain off.

Changing Dual-Board Hot-Plug Memory Mirroring to Hot-Add Without Removing the Memory Board

In general, a system must be in Advanced ECC mode with only one memory board installed in order to do a Hot-Add board insertion.

However, if you have a system configured for Dual-Board Hot-Plug Memory Mirroring mode, you may decide not to use mirroring protection, and instead use additional memory to improve performance. Without Hot-Add support, you would have to power-cycle the system, run RBSU, select the Advanced Memory Protection Mode as Advanced ECC, and boot back into the OS.

With Hot-Add support, you can perform the conversion from Dual-Board Memory Mirroring mode to Advanced ECC mode with the OS making full use of the installed memory without requiring any downtime.

To convert from Dual-Board Memory Mirroring Mode to Advanced ECC mode:

NOTE: It is not necessary to physically remove the board between steps 2 and 3. Simply unlock and then lock the memory board. No unlatching or removal is required.

1. Run the Hot-Plug Memory Configuration Utility and select the board insertion mode as **Hot-Add**. (The mode would have previously been Hot-Mirror since the system is in Dual-Board Hot-Plug Memory Mirroring mode.)
2. Unlock memory board 2 (refer to Figure 6) and wait for the board to power down. This usually takes no more than a second to complete. The Memory Status LED will blink green until the board is without power. Once complete, the Memory Status LED will be off.

-
3. Lock the memory board. The Hot-Add board insertion starts. When complete, the OS will have use of all the memory previously reserved for mirroring functionality.

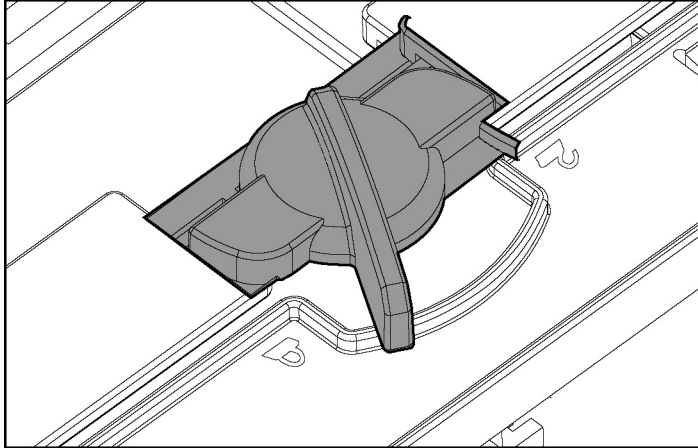


Figure 6: Locking and unlocking the memory board (locked position shown)

Additional Considerations When Upgrading to Hot-Add Functionality

Test for Faulty DIMMs Before a Hot-Add Board Insertion

HP strongly recommends that the DIMMs be validated before attempting a Hot-Add board insertion. If a faulty DIMM is installed, the server could experience problems.

Hot-Add Functionality and Applications

After a Hot-Add board insertion, the OS will have use of the newly installed memory. However, applications that are already running may not immediately begin making use of the new memory.

If an application is already running, it may have already allocated and requested its memory. In this situation, the application would need to be restarted (or some other action taken) for it to begin taking advantage of the expanded memory. Other applications that continuously request additional memory usually can take advantage of the new memory without any user intervention.

NOTE: Some programs that report the total memory in a server (such as the System Information Utility that comes with Microsoft Windows) do not include memory that has been hot-added, although the memory is available and is being used by the OS.