

Performing an HP ProLiant server NMI crash dump

HOWTO, 2nd edition



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Abstract

This document provides a description of the HP ProLiant server implementation of NMI-based Crash Dump facilities. This facility can be beneficial to system administrators in their root cause failure analysis.

NMI Crash Dump allows customers to obtain critical diagnostic information in the event of system lock-ups and other failures. Both user-initiated and automatic crash dump support is presented.

NMI Crash Dump overview

Non-Maskable Interrupt (NMI) Crash Dump is a diagnostic mechanism. It allows for crash dump files to be created in situations when a system is hung and not able to respond to traditional debug mechanisms.

Crash Dump analysis is an essential part of diagnosing reliability problems such as hangs in operating systems, device drivers, and applications. Many crashes will freeze a system in such a way that your only recourse is to do a hard reset-(i.e. power cycle the system). Since resetting the system erases any information that would support an analysis of the problem, it is desirable for the system to be able to perform a memory dump before a hard reset is performed. A dump switch and the associated support in Windows Server 2003, Windows 2000, and NetWare 6.5 provide this function.

Figure 1. NMI Crash Dump issue resolution events



The NMI Crash Dump jumper pins or switch can be used to diagnose software failures by forcing the operating system to invoke the NMI handler and generate a crash dump log. The crash dump log can provide critical information for root-cause analysis that may be difficult or impossible to obtain through other means. A user initiates an NMI event by shorting the jumper pins, by pressing the switch, or through the Integrated Lights-Out Virtual NMI feature. The NMI can allow a hung system to become responsive enough to generate a crash dump log.

WARNING:

Using the NMI Crash Dump jumper pins or switch on a functioning system (using any operating system) will cause the unit to abruptly halt. This is the designed functionality of the NMI Crash Dump jumper pins or switch. Thus, it should never be used during normal operation.

The appropriate system management driver must be loaded in order to properly differentiate an NMI caused by the jumper pins or dump switch from a PCI SERR NMI. The jumper pins and dump switch operate even if the appropriate driver is not loaded. If present, the driver disables the Automatic Server Recovery (ASR) feature so that the server does not reboot when a debug session is in progress.

The NMI Crash Dump jumper pins or switch may not work in all situations: after another NMI has already occurred in the system, when the OS crash handler is incapable of running properly, and following some hardware failures.

Table 1. Highlights and benefits of the NMI Crash Dump feature

	NMI product highlights	NMI product benefits
Microsoft Windows operating systems	Registry changes are required to generate a crash dump when the NMI dump switch is used. No special installation requirements are needed.	Allows user level settings for a crash dump file generation to be obeyed.
Novell NetWare operating system	Part of the core operating system. No special installation requirement.	NetWare 6.5 provides customers with options to choose a local partition (including USB devices), specify the target file location, compress the core dump, select the core dump type, and either dump all memory or skip cache memory.
ProLiant hardware	Jumper pins or dump switch are provided on each ProLiant server to generate an NMI.	Jumper pins or dump switch are connected to a ProLiant hardware device that causes an NMI (PCI SERR) and initiates the crash dump file creation.
ProLiant software	The appropriate system management driver is needed.	This function is dependent upon the appropriate driver being installed. All drivers are distributed with the ProLiant Support Pack (PSP). The PSP detects and installs the appropriate driver for the server automatically.

NOTE:

The NMI Crash Dump jumper pins or switch will cause an NMI upon activation. This feature does not require any software to generate the NMI.

Initiating NMI Crash Dumps

NMI Crash Dumps may be initiated through the jumper pins or switch provided on the ProLiant server or remotely through the Virtual NMI button in Integrated Lights-Out (iLO) Advanced or Integrated Lights-Out 2 (iLO 2) Advanced.

Through NMI Crash Dump jumper pins or switch

The NMI Crash Dump jumper pins or switch generate a PCI SERR under all operating systems (OS). Initiating core memory dumps may be attainable under each individual OS.

Figures 2 and 3 are examples of jumper pins and switches found on ProLiant servers. For exact placement, refer to the illustration on the hood label of the server or in the user guide.

Figure 2. Example of jumper pins found on a ProLiant DL360 G5 server

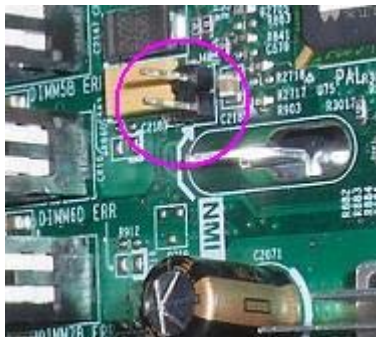
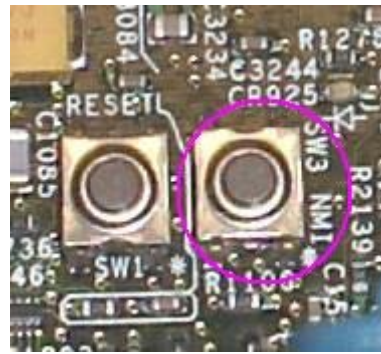


Figure 3. Example of a jumper switch found on a ProLiant DL580 G2 server



Under Novell NetWare 6.5

1. Cause a short in the NMI Crash Dump jumper pins or switch. This action presents an ABEND screen.
2. From the ABEND screen, press **Y** to create a core dump.
3. Note that the core dump file will be saved on the C: drive (typically C:\COREDUMP.IMG). An adequate amount of free space must be available on the C: drive to store the entire core dump file, which can be as large as the memory installed in the system.
4. Under some circumstances, you may have to force entry into the NetWare debugger. Press **shift-alt-shift-esc** to enter the debugger, then use the **.c** command to initiate a core dump.

NOTE:

To present an ABEND screen, make sure the "set auto restart after abend = 0" option is set in the startup.ncf file.

Under Microsoft Windows

Obtain the appropriate software as depicted in Table 2 before proceeding to the crash dump procedures.

Table 2. Prerequisites

	Microsoft operating system	HP software
Option 1	Microsoft Windows 2000 with Service Pack 4 or later	ProLiant Support Pack (PSP) for Microsoft Windows 2000
Option 2	Microsoft Windows Server 2003 with Service Pack 1 or later	ProLiant Support Pack (PSP) for Microsoft Windows Server 2003
Option 3	Microsoft Windows Server 2003 x64 Edition	ProLiant Support Pack (PSP) for Microsoft Windows Server 2003 x64 Edition

NOTE: Use either the PSP version that shipped with the ProLiant server or a later version from the HP website.

To generate a crash dump after an NMI:

1. Install a supported Microsoft Windows operating system, as directed by the onscreen directions.

NOTE:

For optimal functionality, HP highly recommends installing the PSP to obtain the appropriate system management driver, after operating system installation completes. This is an optional step since the system management driver is not required for the NMI functionality to work.

2. Enable the **write debugging information** option under the Startup and Recovery properties page in the Advanced tab of the System Control Panel applet.
3. Set the Windows registry:

To enable NMI Crash Dump:

```
HKEY_LOCAL_MACHINE\System\CurrentControlSet\Control\CrashControl\NMICrashDump = (DWORD)1
```

To disable NMI Crash Dump:

```
HKEY_LOCAL_MACHINE\System\CurrentControlSet\Control\CrashControl\NMICrashDump = (DWORD)0
```

WARNING:

Before making changes in the Registry, HP recommends that you make a copy of the system settings. This will allow you to restore the system settings if there are errors.

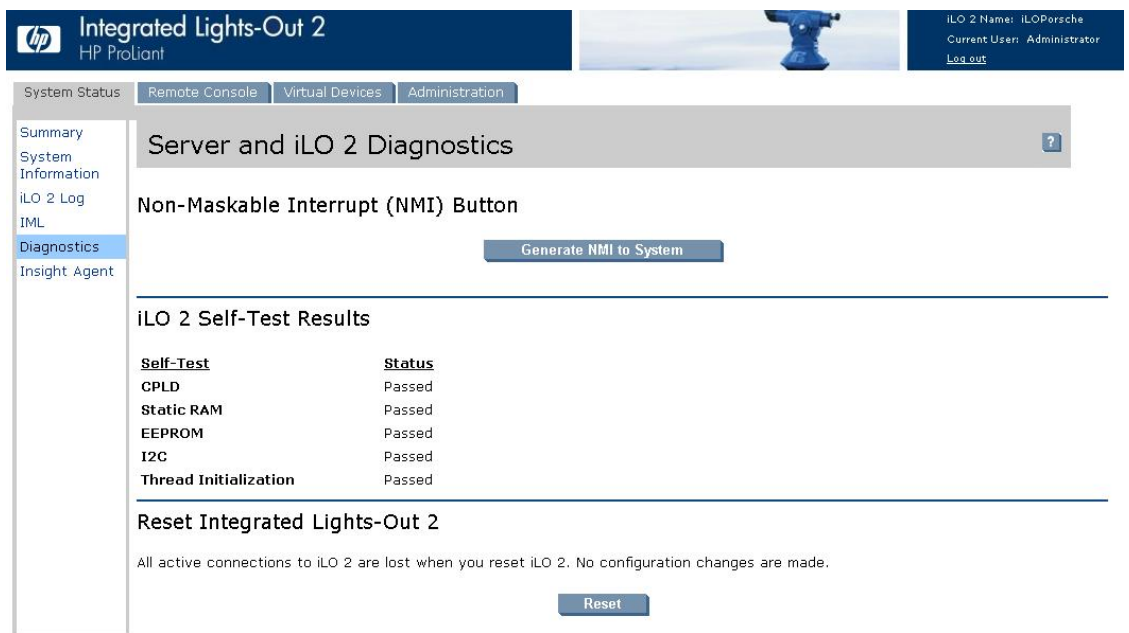
Through Integrated Lights-Out

ProLiant servers with Integrated Lights-Out (iLO) and Integrated Lights-Out 2 (iLO 2) can issue crash dump NMIs through a Web browser. The lights-out based virtual NMI button allows users to trigger an NMI without requiring physical access to the server chassis or knowing the precise location of the NMI control for the host. Access to this control is restricted to users with the iLO Virtual Power & Reset privilege. The same conditions and restrictions apply when using iLO.

To generate an NMI using iLO:

1. Log into the iLO processor of the target using an account with the Virtual Power & Reset privilege.
2. Navigate to the Diagnostics or Server and iLO Diagnostics screen.
3. Click the **Generate NMI to System** button (see Figure 1).

Figure 1. Generate NMI button screenshot



For more information

For additional information, refer to the resources listed below.

Source	Hyperlink
iLO product information and user guide	www.hp.com/go/ilo
ProLiant server information	www.hp.com/go/proliant
Industry Standard Server Technology Papers	www.hp.com/servers/technology

Call to action

Send comments about this paper to TechCom@HP.com.

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