Flex System, NeXtScale System, and System x Basic Troubleshooting Information

Note

Before using this information and the product it supports, read the general information in Appendix B "Notices" on page 25 and read the *Safety Information* on the *Documentation* CD.

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informaçes de Segurança.

在安装本产品之前，请仔细阅读 Safety Information
(安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Ls sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας
(safety information).

.לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

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Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się
z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informaçes sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la informacin de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

ཐོན་རྫས་འདི་བདེ་སྐྱིད་མ་བྱས་གོང་། སྐོར་གྱི་ཡིད་གཟབ་
བྱ་འདུ་མིན་ཡོད་པའི་འོད་སྟེར་བསྒྲུ་གོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۈر مەھسۇلاتنى ئورنتشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

Youq mwngz yungh canjbinj neix gaxgonq, itdingh aeu doeg aen canjbinj soengq cungj vahgangj ancien siusik.

Guidelines for trained service technicians

This section contains information for trained service technicians.

Inspecting for unsafe conditions

Use this information to help you identify potential unsafe conditions in a device that you are working on.

Each device, as it was designed and manufactured, has required safety items to protect users and service technicians from injury. The information in this section addresses only those items. Use good judgment to identify potential unsafe conditions that might be caused by unsupported alterations or attachment of unsupported features or optional devices that are not addressed in this section. If you identify an unsafe condition, you must determine how serious the hazard is and whether you must correct the problem before you work on the product.

Consider the following conditions and the safety hazards that they present:

- Electrical hazards, especially primary power. Primary voltage on the frame can cause serious or fatal electrical shock.
- Explosive hazards, such as a damaged CRT face or a bulging capacitor.
- Mechanical hazards, such as loose or missing hardware.

To inspect the product for potential unsafe conditions, complete the following steps:

1. Make sure that the power is off and the power cords are disconnected.
2. Make sure that the exterior cover is not damaged, loose, or broken, and observe any sharp edges.
3. Check the power cords:
   - Make sure that the third-wire ground connector is in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.
   - Make sure that the power cords are the correct type.
   - Make sure that the insulation is not frayed or worn.
4. Remove the cover.

5. Check for any obvious unsupported alterations. Use good judgment as to the safety of any unsupported alterations.

6. Check inside the system for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.

7. Check for worn, frayed, or pinched cables.

8. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Guidelines for servicing electrical equipment

Observe these guidelines when you service electrical equipment.

- Check the area for electrical hazards such as moist floors, nongrounded power extension cords, and missing safety grounds.

- Use only approved tools and test equipment. Some hand tools have handles that are covered with a soft material that does not provide insulation from live electrical current.

- Regularly inspect and maintain your electrical hand tools for safe operational condition. Do not use worn or broken tools or testers.

- Do not touch the reflective surface of a dental mirror to a live electrical circuit. The surface is conductive and can cause personal injury or equipment damage if it touches a live electrical circuit.

- Some rubber floor mats contain small conductive fibers to decrease electrostatic discharge. Do not use this type of mat to protect yourself from electrical shock.

- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.

- Locate the emergency power-off (EPO) switch, disconnecting switch, or electrical outlet so that you can turn off the power quickly in the event of an electrical accident.

- Disconnect all power before you perform a mechanical inspection, work near power supplies, or remove or install main units.

- Before you work on the equipment, disconnect the power cord. If you cannot disconnect the power cord, have the customer power-off the wall box that supplies power to the equipment and lock the wall box in the off position.

- Never assume that power has been disconnected from a circuit. Check it to make sure that it has been disconnected.

- If you have to work on equipment that has exposed electrical circuits, observe the following precautions:
  - Make sure that another person who is familiar with the power-off controls is near you and is available to turn off the power if necessary.
  - When you work with powered-on electrical equipment, use only one hand. Keep the other hand in your pocket or behind your back to avoid creating a complete circuit that could cause an electrical shock.
  - When you use a tester, set the controls correctly and use the approved probe leads and accessories for that tester.
  - Stand on a suitable rubber mat to insulate you from grounds such as metal floor strips and equipment frames.

- Use extreme care when you measure high voltages.

- To ensure proper grounding of components such as power supplies, pumps, blowers, fans, and motor generators, do not service these components outside of their normal operating locations.

- If an electrical accident occurs, use caution, turn off the power, and send another person to get medical aid.

Safety statements

These statements provide the caution and danger information that is used in this documentation.

Important: Each caution and danger statement in this documentation is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled "Statement 1," translations for that caution statement are in the *Safety Information* document under "Statement 1."

Be sure to read all caution and danger statements in this documentation before you perform the procedures. Read any additional safety information that comes with your system or optional device before you install the device.

Statement 1

DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:	To Disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Statement 5

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

2 ⬛ ➡ ⊐≡

1 ⬛ ➡ ⊐≡

Statement 8

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Chapter 1. Introduction

This *Troubleshooting* document provides procedures to help you solve some basic problems that might occur with your Lenovo® Flex System, NeXtScale System®, or System x® products.

The product documentation contains additional, more-detailed troubleshooting information and procedures. The most up-to-date product documentation for all of your Flex System, NeXtScale System, and System x products is available in the following Lenovo Information Centers.

- **Flex System Information Center:** http://pic.dhe.ibm.com/infocenter/flexsys/information/index.jsp
- **NeXtScale System Information Center:** http://pic.dhe.ibm.com/infocenter/nxtscale/documentation/index.jsp
- **System x Information Center:** http://shop.lenovo.com/us/en/systems/

Related documentation

In addition to this *Troubleshooting* document, the following documentation is available:

- *Flex System Enterprise Chassis Installation and Service Guide*This document contains detailed information about setting up, configuring, and troubleshooting the Flex System Enterprise Chassis and its components.
- *Flex System Chassis Management Module Installation Guide*This document contains detailed information about setting up, configuring, and resolving connection problems with the Chassis Management Module.
- *Flex System Chassis Management Module User's Guide*This document explains how to use the Chassis Management Module user interface to manage chassis components.
- *Flex System Manager Installation and Service Guide*This document contains detailed information about setting up, configuring, and troubleshooting the IBM Flex System Manager management node.
- *Flex System Installation and Service Guides* (for the compute nodes) These documents contain detailed information about installing, configuring, updating, and troubleshooting specific Flex System compute nodes.
- *Flex System User's Guides* (for the network devices) These documents contain detailed information about installing, configuring, updating, and troubleshooting specific Flex System network devices, which include network switches, pass-thru modules, and adapters.
- *NeXtScale System Installation and Service Guides* (for the compute nodes)These documents contain detailed information about installing, configuring, updating, and troubleshooting specific NeXtScale System compute nodes.
- *NeXtScale System Installation and Service Guides* (for the enclosures)These documents contain detailed information about installing, configuring, updating, and troubleshooting specific NeXtScale System enclosures.
- *System x Installation and Service Guides* (for the servers) These documents contain detailed information about installing, configuring, updating, and troubleshooting specific System x servers.

Notices and statements

The caution and danger statements in this document are also in the multilingual *Safety Information* document, which is provided on the *Documentation* CD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* document.

Notices and statements in this document

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate possible damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or hazardous to you. A danger statement is placed just before the description of a potentially lethal or hazardous procedure step or situation.

Chapter 2. Flex System devices

This section provides information to help you solve some basic problems that might occur with a Flex System chassis, compute node, or network I/O device.

Before you begin

Before you use the troubleshooting procedures in this document, review the following information:

- The documentation for the individual Flex System products contains detailed troubleshooting procedures. The Flex System documentation is available at http://pic.dhe.ibm.com/infocenter/flexsys/information/index.jsp.

  – The *Flex System Enterprise Chassis Installation and Service Guide* contains detailed troubleshooting procedures that explain the light path diagnostics, event logs, messages, and error codes.

  – The *Flex System Chassis Management Module Installation Guide* contains detailed information about setting up, configuring, and resolving connection problems for the Chassis Management Module.

  – The *Flex System Chassis Management Module User's Guide* explains how to use the Chassis Management Module user interface to manage chassis components.

  – If a Flex System Manager management node is installed in your chassis, you can use the *Flex System Manager* documentation to identify and resolve problems with the devices installed in the chassis. The Flex System Manager documentation contains detailed troubleshooting procedures that explain the event logs, messages, error codes.

  – The *Installation and Service Guides* for the compute nodes contain detailed troubleshooting procedures that explain the light path diagnostics, event logs, messages, and error codes.

  – The *User's Guides* for the network I/O modules might contain additional troubleshooting procedures that you can use to diagnose the problem.

- Lenovo continually updates the support website with RETAIN tips and techniques that you can use to solve problems with Flex System products. To find any service bulletins or RETAIN tips that are available for the Flex System products, go to the support website at http://www.lenovo.com/support. In the **Search support** field, enter `retain` and the four-digit Machine Type for the device (for example, `retain 8721`). If the device does not have a four-digit Machine Type, enter `retain` and the product type (for example, `retain i/o module`).

If you cannot diagnose and correct a problem by using the information in this section, see the detailed troubleshooting procedures and information in your Flex System product documentation and Appendix A "Getting help and technical assistance" on page 21 for more information.

Note: The documentation that comes with your operating system and software also contains troubleshooting information.

Diagnosing a Flex System hardware problem

Before you call for service, complete the following steps to diagnose a basic problem with your Flex System device.

1. **Return the device to the condition it was in before the problem occurred.** If any hardware, software, or firmware was changed before the problem occurred, if possible, reverse those changes. This might include any of the following items:

   - Hardware components

- Device drivers and firmware
- System software
- System UEFI firmware
- System input power or network connections

2. **Make sure that the power supplies are working properly.** Check the chassis power supplies. Make sure that the ac and dc power LEDs are all lit and the fault LEDs are all off. If any fault LEDs are lit, see the chassis documentation for the instructions to correct the problem.

3. **Make sure that sufficient power is available for the hardware configuration.** See the Chassis Management Module documentation for the instructions to view the power consumption. If insufficient power is available, see the chassis documentation for the instructions to correct the problem.

4. **View the event logs and LEDs.** The devices are designed for ease of diagnosis of hardware and software problems.

   - **Event logs:** See the Chassis Management Module, the Flex System Manager, and the chassis documentation for information about viewing the notification events and the instructions to correct problems.

   - **Software or operating-system error codes:** See the documentation for the software or operating system for information about a specific error code. See the manufacturer's website for documentation.

   - **Chassis LEDs:** Make sure that the check log and fault LEDs are off and the power LED (white, backlit logo) is lit. If the check log or fault LEDs are lit, check the event logs for errors; then, see the chassis documentation for the instructions to correct the problem.

   - **Chassis Management Module LEDs:** Make sure that the error LED is off and the power-on LED is lit. If the error LED is lit, check the event logs for errors; then, see the chassis documentation for the instructions to correct the problem.

   - **Flex System Manager and compute-node LEDs:** Make sure that the check log and fault LEDs are off and the power LEDs are lit. If any of the check log or fault LEDs are lit, check the event logs for errors; then, see the Flex System Manager, compute node, and chassis documentation for the instructions to correct the problem.

   - **Fan LEDs:** Make sure that the fault LEDs are off and the power-on LEDs are lit. If any of the fault LEDs are lit, check the event logs for errors; then, see the chassis documentation for the instructions to correct the problem.

   - **I/O module LEDs:** Make sure that the I/O module is powered on, its OK LEDs are lit, and its error LEDs are off.

     – If the I/O module will not power on, go to "I/O module will not power on" on page 7.

     – If the OK LED is off, reseat the module and wait for 60 seconds. If the OK LED remains off, go to "I/O module LEDs are off" on page 8.

     – If an error LED is lit, check the event log for I/O module power errors.

5. **Check for and apply code updates.** Fixes or workarounds for many problems might be available in updated device firmware or device drivers.

   Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

   a. **Install UpdateXpress system updates.** You can install code updates that are packaged as an UpdateXpress System Pack or UpdateXpress CD image. An UpdateXpress System Pack contains an integration-tested bundle of online firmware and device-driver updates. Be sure to separately install any listed critical updates that have release dates that are later than the release date of the UpdateXpress System Pack or UpdateXpress image.

    b. **Install manual system updates:**

       1) **Determine the existing code levels.** See the Chassis Management Module or the Flex System Manager documentation for instructions.

       2) **Download and install updates of code that is not at the latest level.** To display a list of available updates, go to the Fix Central website at http://www.ibm.com/support/fixcentral.

       When you click an update, an information page is displayed, including a list of the problems that the update fixes. Review this list for your specific problem; however, even if your problem is not listed, installing the update might solve the problem.

6. **Check for and correct an incorrect configuration.** If a system device is incorrectly configured, a system function can fail to work when you enable it; if you make an incorrect change to the I/O module or compute-node configuration, a system function that has been enabled can stop working.

    a. **Make sure that all installed hardware and software are supported.** See the ServerProven website at http://www.lenovo.com/us/en/ serverproven/ and make sure that the I/O module supports the installed operating system, optional devices, and software levels. The I/O modules in the chassis must be compatible with the network adapters and ports in the nodes, and with the external network switches. If any hardware or software component is not supported, uninstall it to determine whether it is causing the problem. You must remove nonsupported hardware before you contact an approved warranty service provider for support.

    b. **Make sure that the I/O module is installed and configured correctly.** Many configuration problems are caused by loose cables or incorrectly seated I/O modules. You might be able to solve the problem by reseating the I/O module in the chassis.

    c. **Make sure that the compute node is installed and configured correctly.** Many configuration problems are caused by loose cables or incorrectly seated adapters. You might be able to solve the problem by reseating the compute node or by turning off the compute node, reconnecting cables, reseating network adapters, and turning the compute node back on.

7. **See controller and management software documentation.** If the problem is associated with a specific function, see the documentation for the associated controller and management or controlling software to verify that the controller is correctly configured. For problems with operating systems or software or devices, go to the Support Portal at http://www.lenovo.com/support.

8. **Check for troubleshooting procedures and RETAIN tips.** Troubleshooting procedures and RETAIN tips document known problems and suggested solutions. To search for troubleshooting procedures and RETAIN tips, go to the Support Portal at http://www.lenovo.com/support. Search with the Machine Type and the term `retain` (for example, `retain 8721`). If the device does not have a Machine Type, enter `retain` and the product type such as `i/o module` (for example, `retain i/o module`).

9. **Check the I/O module settings.** In most cases, unless you are very familiar with the setup of your company's internal server network, you will want to configure the I/O module so that it is managed on the Chassis Management Module management network and the external management over all ports setting is set to **disabled**.

10. **Establish a minimum working configuration.** Be aware that to complete this procedure, you must shut down all devices; then, remove them from the chassis. See "Isolating the failing Flex System component" on page 6 for instructions.

11. If you have completed the diagnostic procedure provided in this document and the problem remains, see the diagnostic information and procedures in your product documentation and Appendix A "Getting help and technical assistance" on page 21 for more information.

Important: If you have completed all of the diagnostic procedures provided in this document and in your product documentation and the problem remains, the problem might not have been previously identified.

After you have verified that all code is at the latest level, all hardware and software configurations are valid, and no LEDs or log entries indicate a hardware component failure, contact an approved warranty service

provider for assistance with additional problem determination and possible hardware replacement. See "Hardware service and support" on page 23 for more information.

To open an online service request, go to the Electronic Services website at http://www.ibm.com/support/entry/portal/Open_service_request. Be prepared to provide information about any error codes and collected data and the problem determination procedures that you have used.

Isolating the failing Flex System component

There are times when the only way to determine the cause of a problem is to start with a minimum working configuration; then, add components one-by-one until you can identify the component that is causing the problem.

To isolate a problem to a specific component, complete the following steps:

1. Log in to the Chassis Management Module web interface. Use the `displaylog` command to check the CMM event log for error messages; then, solve any problems that you find before you continue with step 2 "power down and remove compute nodes" on page 6. See the *Chassis Management Module User's Guide* and the *Chassis Management Module Command-Line Interface Reference* for instructions.

2. Power down all of the compute nodes; then, slide them out of the chassis approximately 25.4 mm (1.0 in).

3. To avoid disrupting communication with external devices, make sure that all external devices that are attached to the I/O modules are powered down; then, slide the I/O modules out of the chassis approximately 25.4 mm (1.0 in).

4. Make sure that there is a working power supply in power-supply bay 1, and that its ac and dc power LEDs are lit.

5. Slide the power supplies in power-supply bays 2, 3, 4, 5 and 6 out of the chassis approximately 25.4 mm (1.0 in).

6. Make sure that the Chassis Management Module is working properly:

   a. Log in to the Chassis Management Module and check the System Status page for any problems.

   b. Make sure that the power supply is displayed on the Chassis Management Module Power Management page.

   c. Check the CMM event log for new error messages and resolve any errors that you find. (You have removed some components from the chassis, so you can ignore any messages that are related to those components or to nonredundant modules.)

7. If this minimum configuration is working, continue with 8 "install first compute node in bay 1" on page 6. Otherwise, contact an approved warranty service provider for assistance.

8. Install an X Architecture compute node in node bay 1; then, turn on the compute node.

   Note: When you reinstall a compute node, you must install it in the same node bay from which you removed it. Some compute node configuration information and update options are established according to node bay number. Reinstalling a compute node into a different node bay can have unintended consequences.

   a. Use the Flex System Console Breakout Cable to attach a keyboard, video, and mouse device to the compute node; then, make sure that the compute node successfully completes POST and the operating system starts.

      • If the compute node fails POST and an error message or checkpoint code is displayed, see the compute node documentation for instructions to correct the problem.

      • If the compute node starts but the keyboard or mouse does not work, try a different compute node.

         – If the keyboard or mouse fails for only one compute node, suspect the compute node. If necessary, contact an approved warranty service provider for assistance with additional problem determination and possible hardware replacement of the failing compute node.

– If the keyboard or mouse fails for both compute nodes, suspect the Chassis Management Module. Make sure that the Chassis Management Module firmware is at the latest level. If necessary, contact or an approved warranty service provider for assistance with additional problem determination and possible hardware replacement of the failing Chassis Management Module.

9. Restart the compute node; then, press F2 during POST to run the on-board diagnostic program. See the compute node documentation for more information about the on-board diagnostic program.

10. Slide the Ethernet switch in I/O module bay 1 back into the chassis and connect it to the network; then, check the System Status page in the Chassis Management Module to make sure that the switch completes its POST and no errors are displayed in the CMM event log.

11. You now should have a minimum working configuration that includes the Chassis Management Module, one power supply, one compute node, one switch, and the chassis fans. Reinstall the components one-by-one until you can identify the component that is causing the problem.

    a. Slide the power supply back into power-supply bay 2; then, check the System Status page in the Chassis Management Module for any error conditions. Make sure that the ac and dc power LEDs are lit and the fault LEDs are off. Repeat this step for each power supply until they are all installed; then, continue with b. "isolate I/O modules" on page 7.

    b. Slide the I/O module back into I/O module bay 2; then, check the System Status page in the Chassis Management Module for any error conditions. Make sure that the switch completes its POST and no errors are displayed in the CMM event log. Repeat this step for each I/O module until they are all installed; then, continue with c. "isolate compute nodes" on page 7.

    c. Slide the compute node into node bay 2; then, check the System Status page in the Chassis Management Module for any error conditions. Make sure that the compute node successfully completes POST and the operating system starts. Repeat this step for each compute node until they are all installed.

    If the problem returns after you install a power supply, I/O module, or compute node, contact an approved warranty service provider for assistance with additional problem determination and possible hardware replacement of the failing component. If the problem does not return, an improperly seated component might have been the cause of the original problem.

12. If you have completed this procedure and the problem remains, return to "Diagnosing a Flex System hardware problem" on page 3 and continue with 11 "isolating failed components" on page 5.

Solving basic Flex System I/O module problems

This section provides additional information and procedures to help you solve some basic problems that might occur with a Flex System I/O module.

The product documentation for the Flex System I/O modules might contain additional troubleshooting information. The product documentation for all of the Flex System network devices is available at: http://pic.dhe.ibm.com/infocenter/flexsys/information/index.jsp.

I/O module will not power on

If the I/O module will not power on, the problem might be caused by the I/O module, a power supply, configuration settings in the Chassis Management Module, or a defective I/O bay in the chassis.

To diagnose this problem, complete the following steps:

1. If you have not already done so, complete 1 "return device to pre-problem condition" on page 3 through 4 "view event logs and LEDs" on page 4 in "Diagnosing a Flex System hardware problem" on page 3.

2. Log in to the Chassis Management Module and check for any problems:

    a. Check the System Status page for any messages.

b. Check the Chassis Management Module vital product data (VPD) to validate the VPD for the I/O module.

c. Make sure that the I/O module and the network adapter are compatible. If the I/O module is a switch and it is in bay 3 or bay 4, the type of optional network adapter that is installed in the compute node must match the I/O module type. For example, if the I/O module is a 10 Gb Ethernet switch, an optional 10 Gb Ethernet adapter must be installed in the right-most I/O connector of each compute node that will access the external network.

d. Make sure that the Chassis Management Module firmware VPD is compatible with the I/O module firmware. Update the firmware, if needed.

e. Check the Chassis Management Module event log for power recovery events or system-management processor communication errors. If there are errors for multiple chassis components, the problem might be related to the chassis. See the chassis documentation for the instructions to correct the problem.

3. Use the Chassis Management Module to restart the I/O module.

4. Make sure that the chassis I/O bay is functioning properly. If you have an equivalent, functional I/O module, replace the failing I/O module with the equivalent I/O module.

   Note: The equivalent I/O module must be the same type of I/O module as the failing I/O module. For example, you can replace an Ethernet switch only with another Ethernet switch.

   • If the equivalent I/O module powers on, the chassis I/O bay is functioning properly. Contact an approved warranty service provider for assistance with additional problem determination and possible hardware replacement of the failing I/O module.

   • If you do not have an equivalent I/O module, move the failing I/O module to the same I/O bay in a different chassis. If the I/O module powers on, the I/O bay in the original chassis might be defective. If the I/O module does not power on, contact an approved warranty service provider for assistance with additional problem determination and possible hardware replacement of the failing I/O module.

   • If you do not have an equivalent I/O module or another chassis, return to "Diagnosing a Flex System hardware problem" on page 3 and continue with 5 "making sure that firmware and device drivers are up to date" on page 4.

I/O module LEDs are off

If the LEDs are off for an I/O module but the LEDs are lit for other I/O modules in the same chassis, the problem might be caused by the I/O module, a power supply, or a defective I/O bay in the chassis.

To diagnose this problem, complete the following steps:

1. Check the chassis power supplies. Make sure that the ac and dc power LEDs are all lit and the fault LEDs are all off. If any fault LEDs are lit, see the chassis documentation for the instructions to correct the problem.

2. Make sure that the chassis I/O bay is functioning properly. If you have an equivalent I/O module and its LEDs work, replace the failing I/O module with the equivalent I/O module.

   Note: The equivalent I/O module must be the same type of I/O module as the failing I/O module. For example, you can replace an Ethernet switch only with another Ethernet switch.

   • If the LEDs light on the equivalent I/O module, the I/O bay is functioning properly. Contact an approved warranty service provider for assistance with additional problem determination and possible hardware replacement of the failing I/O module.

   • If you do not have an equivalent I/O module, move the failing I/O module to the same I/O bay in a different chassis. If the LEDs light on the failing I/O module, the I/O bay in the original chassis might be defective. If the LEDs do not light, contact an approved warranty service provider for assistance with additional problem determination and possible hardware replacement of the failing I/O module.

- If you do not have an equivalent I/O module or another chassis, return to "Diagnosing a Flex System hardware problem" on page 3 and continue with 5 "making sure that firmware and device drivers are up to date" on page 4.

Ethernet network connection issues

Troubleshooting network connection issues is a complex subject that far exceeds the scope of this document. Because of its complexity, there is a tendency to attribute many networking problems to defective hardware when the actual cause of the problem is the network configuration. In general, the quality of today's network hardware is very high, and genuine hardware failures are very rare. Firmware code and configuration problems account for the vast majority of network problems, but it can be quite difficult to find the root cause of the problems, especially in production networks.

This section provides the information to help you verify that basic network connectivity exists. Instructions to diagnose subtle or complex issues with device drivers, firmware, configuration, or Ethernet connection to the Chassis Management Module are not included. For the purpose of this document, basic connectivity is defined as the ability to successfully ping another host. Network failures outside of the Internet Control Message Protocol (ICMP) ping connectivity are outside of the scope of this document. It also should be noted that if ping works, it is very unlikely that defective hardware is the cause of the larger issue. (See the documentation that came with the chassis for information about troubleshooting problems with Ethernet connection to the Chassis Management Module.)

Network connectivity is accomplished by sending traffic through a series of devices. These devices connect to one another only when they successfully negotiate a connection link between one another. Generally, the traffic path is as follows: device>link>device>link>device> (and so on). It is important to understand that even when all network devices are working correctly, a link failure can occur if the two devices are not configured appropriately. To effectively troubleshoot networking issues, you first must understand how each device on the network works; then, use ping or network sniffers to determine how far the Ethernet packets travel on the network. The logical path that is needed to ping a host on the external network is as follows: node>midplane>internal switch port>possible upper layer protocols>external switch port>cabling>upstream switch port>host on the network.

Compute node

There are several components in the compute node that must function properly for the node to send Ethernet packets through the chassis midplane to the switches.

Network interface card (NIC) and its device driver: The NIC can be disabled in the operating system or in the compute node UEFI code. If it is disabled, the device driver will not detect the interface and will generate errors during startup. In the MicrosoftWindows operating systems, the NIC will appear as a disabled adapter in the Properties file for My Network Places. The Linux operating system will generate errors at startup when the device driver tries to insert into the kernel. Both operating systems will show the NIC as being disabled. Device driver problems usually generate error messages during operating-system startup. The message might indicate only that the NIC is disabled, but you must interpret the message to determine whether it is a disabled NIC or the device driver that is causing the error. If the interface does not respond to a ping of the statically assigned IP address, the device driver, the NIC, or both are not working correctly.

One thing to consider when you troubleshoot Ethernet problems on the chassis is that each operating system does not assign the two physical NICs in the same order. For example, MicrosoftWindows might assign the NIC that is connected to the switch in I/O bay 1 the first IP interface, and Linux might assign the NIC that is connected to the switch in I/O bay 1 the second IP interface. To determine which IP interface is assigned to which switch, use one of the following methods:
- Disable the interface within the operating system; then, see which switch port stops functioning.
- Disable the switch port; then, see which IP interface stops functioning in the operating system.
- Examine the MAC address table of the switch to see which MAC address is associated with which port.

Network teaming: Flex System compute nodes support NIC network teaming, and the teaming software tools all provide multiple algorithms for teaming the NICs. When you troubleshoot an Ethernet problem, temporarily disable the team. If you cannot disable the team, make sure that you and the user know which NIC is which in the teaming configuration. This might seem simple, but it is not. The first NIC in the compute node is connected to the switch in I/O bay 1, and the second NIC in the compute node is connected to the switch in I/O bay 2; however, the operating systems do not always present the NICs in that order. Different versions of Linux and MicrosoftWindows might present the two NICs in different orders. Do not assume that the first NIC that is presented by the operating system is the first NIC in the compute node. To determine which I/O bay is assigned to which NIC, disable the port that is assigned to the switch; then, see which NIC in the compute node stops functioning.

TCPIP configuration of the operating system: When you verify basic network connectivity for the chassis, make sure that you know the IP address, subnet mask, and VLAN ID (if assigned) for the compute node and for the host that you are trying to ping. If there are 802.1Q VLANs in the environment, the compute node and all other switches on the network between the chassis and the host also must be configured to use 802.1Q VLANs.

Chassis midplane issues

If you suspect a problem with the chassis midplane, consider the following information:

- You cannot configure the Ethernet connections on the chassis midplane between the compute nodes and the switches.
- The speed and duplex settings for the compute node NIC and the internal switch ports must remain set to their default value of **autonegotiation**.
- Do not change the layer 1 properties of the compute-node-to-switch connection. Attempts to configure the layer 1 characteristics on the compute node or switch will cause a link failure that falsely appears to be a midplane failure.
- An improperly seated connector on the chassis midplane can cause a physical link problem between the compute node port and the chassis-switch port. Always inspect the compute node and switch connectors, and reseat the compute node and switch in the chassis early on in the debug process.
- If a midplane failure occurs, you will see one compute node NIC fail to establish a link with the internal switch port, but the other NIC in the same compute node will establish a link.
- If a midplane failure occurs, multiple compute nodes will fail in the same way in the node bay, and the failure also will be the same for multiple switches in the I/O bay.

Internal switch port issues

If you suspect a problem with the internal switch port, consider the following information:

- Do not change the layer 1 properties of the compute-node-to-switch connection. Attempts to configure the layer 1 characteristics on the compute node or switch will cause a link failure that falsely appears to be a chassis midplane failure.
- If the chassis is using Virtual LANs (VLANs), you must configure the internal switch port properly to pass the traffic from itself to any other internal or external port.

Possible issues with upper-layer protocols

Most users do not use the layer 3-7 functionality that is supported by some Flex System switches, but when this functionality is being used, it can be a source of failures. Generally, failures with the upper-layer protocol are due to the layer 2 VLAN tagging, the Port Virtual LAN ID (PVID) configuration, or both. In either case, diagnosing problems at this layer requires examination of the chassis-switch configuration and upstream-switch configuration by a network specialist.

External switch port issues

Most chassis networking problems are caused by the improper configuration of the external switch ports to communicate with an upstream switch. Successful connectivity between the chassis switch and the upstream switch requires that both devices are configured properly, and the cable between the two devices is fully functional. If a link is established but the network traffic is not passing over the link, collect the configuration information for the chassis switch and upstream switch; then, consult with a network specialist. If the chassis fails to establish a link, consider the following information:

- The default configuration for the Chassis Management Module (CMM) is to enable all internal and external ports for I/O modules 1 - 4. However, if a chassis has problems linking externally, log in to the CMM and make sure that the **External Ports** setting is **Enabled** for the I/O modules that are having link problems.

- In the past, users experienced link failures with 10/100 switches that were configured with speed and duplex set to autonegotiation, and they solved these problems by hard coding the switch ports to 100/Full. The gigabit standard has improved the situation significantly, so now, more problems are being caused by trying to hard code the switch ports to 1000/Full than are being solved. If the switch cannot keep the link up with another switch, make sure that the configuration setting for the switch and upstream switch are set to **autonegotiation** for speed and duplex.

- To verify that the external ports are working on a switch:

  - Using a known good networking cable, connect two external ports to one another; then, continue testing on all of the ports. If the link comes up, that is verification that those ports are not having a physical failure.

  - Connect a notebook computer or other host to the switch ports on the chassis that is having the problem. If the notebook computer brings up the link, the ports are not having a physical failure. If the external links do not come up when this test is completed, reset the switch to the default configuration and repeat the test. A failure at this point indicates that the switch is defective and should be replaced. Contact an approved warranty service provider for assistance with additional problem determination and possible hardware replacement

  If these tests indicate that the port is not having a physical failure, collect the configuration information for the chassis switch and upstream switch; then, consult with a network-switch specialist.

Cabling issues

The type of cables that you use will depend on the types of switches that you have installed in the Flex System chassis. The chassis supports Category 5e (Cat 5e) or higher Ethernet cables and multimode and single mode fiber-optic cables. Cables do not have any diagnostics, and to a user, a defective cable can look like a defective Ethernet port on either the switch or the upstream switch. Defective cables are not common, but they are more common than defective switch ports. If you are having connectivity problems, make sure that the cable is good. If you have an equivalent cable that is known to be good, you can use it to connect the switch to the upstream switch to see if a defective cable is causing the problem.

Upstream switch port issues

Defective network hardware can cause network connectivity problems, but incorrect configuration is a much more common cause of these problems. To verify that a switch port is configured properly to connect to the chassis, obtain the configuration information for the switch and for the upstream switch; then, consult with a network-switch specialist. If you cannot gather the upstream switch configuration information, troubleshooting the connection problem will become guesswork, which is not an effective technique.

Chapter 3. NeXtScale System devices

This section provides troubleshooting information to help you solve some basic problems that might occur with a NeXtScale System server or enclosure.

Before you begin

Before you use the troubleshooting procedures in this document, review the following information:

- The NeXtScale System *Installation and Service Guides* contain detailed troubleshooting procedures that explain the light path diagnostics, event logs, messages, and error codes. You can locate the *Installation and Service Guide* for your server or enclosure at http://pic.dhe.ibm.com/infocenter/nxtscale/documentation/index.jsp.
- Lenovo continually updates the support website with RETAIN tips and techniques that you can use to solve problems with NeXtScale System products. To find any service bulletins or RETAIN tips that are available for your products, go to the support website at http://www.lenovo.com/support. In the **Search support** field, enter **retain** and the four-digit Machine Type for your server or enclosure.

If you cannot diagnose and correct a problem by using the information in this section, see the troubleshooting procedures and information in your product documentation and Appendix A "Getting help and technical assistance" on page 21 for more information.

Note: The documentation that comes with your operating system and software also contains troubleshooting information.

Diagnosing a NeXtScale System hardware problem

Before you call for service, complete the following steps to diagnose a basic problem with your server.

1. **Return the server to the condition it was in before the problem occurred.** If any hardware, software, or firmware was changed before the problem occurred, if possible, reverse those changes. This might include any of the following items:
   - Hardware components
   - Device drivers and firmware
   - System software
   - UEFI firmware
   - System input power or network connections
2. **Check for software or operating-system error codes.** See the documentation for the software or operating system for information about a specific error code. See the manufacturer's website for documentation.
3. **Check for and correct an incorrect configuration.** If the server is incorrectly configured, a system function can fail to work when you enable it; if you make an incorrect change to the server configuration, a system function that has been enabled can stop working.
   a. **Make sure that all installed hardware and software are supported.** See http://www.lenovo.com/us/en/ serverproven/ to verify that the server supports the installed operating system, optional devices, and software levels. If any hardware or software component is not supported, uninstall it to determine whether it is causing the problem. You must remove nonsupported hardware before you call for service.

b. **Make sure that the server, operating system, and software are installed and configured correctly.** Many configuration problems are caused by loose power or signal cables or incorrectly seated adapters. You might be able to solve the problem by turning off the server, reconnecting cables, reseating adapters, and turning the server back on.

4. **Run Dynamic System Analysis (DSA) and collect system data.** Run Dynamic System Analysis (DSA) to collect information about the hardware, firmware, software, and operating system. Have this information available when you call for service. For instructions for running DSA, see the *Dynamic System Analysis Installation and User's Guide*.

   Note: To download the latest version of DSA code and the *Dynamic System Analysis Installation and User's Guide*, go to http://www.ibm.com/support/entry/portal/docdisplay?lndocid=SERV-DSA.

   DSA provides the primary methods of testing the major components of the server, such as the system board, Ethernet controller, keyboard, mouse (pointing device), serial ports, and hard disk drives. You can also use them to test some external devices. If you are not sure whether a problem is caused by the hardware or by the software, you can use the diagnostic programs to confirm that the hardware is working correctly. Before you run DSA, be aware of the following issues:

   • When you run DSA, a single problem might cause more than one error message. When this happens, correct the cause of the first error message. The other error messages usually will not occur the next time you run DSA.

   • Determine whether the failing server is part of a shared hard disk drive cluster (two or more servers sharing external storage devices). If it is part of a cluster, you can run all diagnostic programs except the ones that test the storage unit (that is, a hard disk drive in the storage unit) or the storage adapter that is attached to the storage unit. The failing server might be part of a cluster if any of the following conditions is true:

     – You have identified the failing server as part of a cluster (two or more servers sharing external storage devices).

     – One or more external storage units are attached to the failing server and at least one of the attached storage units is also attached to another server or unidentifiable device.

     – One or more servers are located near the failing server.

   If the server is part of a shared hard disk drive cluster, run one test at a time. Do not run any suite of tests, such as "quick" or "normal" tests, because this might enable the hard disk drive diagnostic tests.

5. **Check for and apply code updates.** Fixes or workarounds for many problems might be available in updated UEFI firmware, device firmware, or device drivers. To display a list of available updates for the server, go to http://www.ibm.com/support/fixcentral.

   Important:

   • Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

   • Installing the wrong firmware or device-driver update might cause the server to malfunction. Before you install a firmware or device-driver update, read any readme and change history files that are provided with the downloaded update. These files contain important information about the update and the procedure for installing the update, including any special procedure for updating from an early firmware or device-driver version to the latest version.

   a. **Install UpdateXpress system updates.** You can install code updates that are packaged as an UpdateXpress System Pack or UpdateXpress CD image. An UpdateXpress System Pack contains an integration-tested bundle of online firmware and device-driver updates for your server. In addition, you can use the ToolsCenter Bootable Media Creator to create bootable media that is suitable for applying

firmware updates and running preboot diagnostics. For more information about UpdateXpress System Packs, see http://www.ibm.com/support/entry/portal/docdisplay?Indocid=SERV-XPRESS.

For more information about the Bootable Media Creator, see http://www.ibm.com/support/entry/portal/docdisplay?Indocid=LNVO-BOMC.

Be sure to separately install any listed critical updates that have release dates that are later than the release date of the UpdateXpress System Pack or UpdateXpress image.

   b. **Install manual system updates.**

      1) **Determine the existing code levels.**In DSA, click **Firmware/VPD** to view system firmware levels, or click **Software** to view operating-system levels.

      2) **Download and install updates of code that is not at the latest level.**To display a list of available updates for the server, go to http://www.ibm.com/support/fixcentral.

         When you click an update, an information page is displayed, including a list of the problems that the update fixes. Review this list for your specific problem; however, even if your problem is not listed, installing the update might solve the problem.

6. **See the controller and management software documentation.** If the problem is associated with a specific function (for example, if a RAID hard disk drive is marked offline in the RAID array), see the documentation for the associated controller and management or controlling software to verify that the controller is correctly configured.

Problem determination information is available for many devices such as RAID and network adapters.

For problems with operating systems, software, or devices, go to http://www.lenovo.com/support.

7. **Check for troubleshooting procedures, service bulletins, and RETAIN tips.** Lenovo continually updates the support website with the latest tips and techniques that you can use to solve problem that you might have with the server. Troubleshooting procedures, service bulletins, and RETAIN tips document known problems and suggested solutions. To search for troubleshooting procedures and RETAIN tips, go to http://www.lenovo.com/support and search for your server's 4-digit Machine Type, and `retain`.

8. If you have completed the diagnostic procedure provided in this document and the problem remains, see the diagnostic information and procedures in your product documentation and Appendix A "Getting help and technical assistance" on page 21 for more information.

Important: If you have completed all of the diagnostic procedures provided in this document and in your product documentation and the problem remains, the problem might not have been previously identified.

After you have verified that all code is at the latest level, all hardware and software configurations are valid, and no LEDs or log entries indicate a hardware component failure, contact an approved warranty service provider for assistance with additional problem determination and possible hardware replacement. See "Hardware service and support" on page 23 for more information.

To open an online service request, go to the Electronic Services website at http://www.ibm.com/support/entry/portal/Open_service_request. Be prepared to provide information about any error codes and collected data and the problem determination procedures that you have used.

Chapter 4. System x devices

This section provides troubleshooting information to help you solve some basic problems that might occur with a System x server.

Before you begin

Before you use the troubleshooting procedures in this document, review the following information:

- The System x *Installation and Service Guides* contain detailed troubleshooting procedures that explain the light path diagnostics, event logs, messages, and error codes. You can locate the System x *Installation and Service Guide* for your server at http://shop.lenovo.com/us/en/systems/

  Note: To download the latest version of DSA code and the *Dynamic System Analysis Installation and User's Guide*, go to http://www.ibm.com/support/entry/portal/docdisplay?Indocid=SERV-DSA.

  .
- Lenovo continually updates the support website with RETAIN tips and techniques that you can use to solve problems with System x products. To find any service bulletins or RETAIN tips that are available for your products, go to the support website at http://www.lenovo.com/support. In the **Search support** field, enter `retain` and the four-digit Machine Type for your server.

If you cannot diagnose and correct a problem by using the information in this section, see the troubleshooting procedures and information in your product documentation and Appendix A "Getting help and technical assistance" on page 21 for more information.

Note: The documentation that comes with your operating system and software also contains troubleshooting information.

Diagnosing a System x hardware problem

Before you call for service, complete the following steps to diagnose a basic problem with your server.

1. **Return the server to the condition it was in before the problem occurred.** If any hardware, software, or firmware was changed before the problem occurred, if possible, reverse those changes. This might include any of the following items:
   - Hardware components
   - Device drivers and firmware
   - System software
   - UEFI firmware
   - System input power or network connections
2. **Check for software or operating-system error codes.** See the documentation for the software or operating system for information about a specific error code. See the manufacturer's website for documentation.
3. **Check for and correct an incorrect configuration.** If the server is incorrectly configured, a system function can fail to work when you enable it; if you make an incorrect change to the server configuration, a system function that has been enabled can stop working.
   a. **Make sure that all installed hardware and software are supported.** See http://www.lenovo.com/us/en/ serverproven/ to verify that the server supports the installed operating system, optional devices, and software levels. If any hardware or software component

is not supported, uninstall it to determine whether it is causing the problem. You must remove nonsupported hardware before you call for service.

b. **Make sure that the server, operating system, and software are installed and configured correctly.** Many configuration problems are caused by loose power or signal cables or incorrectly seated adapters. You might be able to solve the problem by turning off the server, reconnecting cables, reseating adapters, and turning the server back on.

4. **Run Dynamic System Analysis (DSA) and collect system data.** Run Dynamic System Analysis (DSA) to collect information about the hardware, firmware, software, and operating system. Have this information available when you call for service. For instructions for running DSA, see the *Dynamic System Analysis Installation and User's Guide*.

Note: To download the latest version of DSA code and the *Dynamic System Analysis Installation and User's Guide*, go to http://www.ibm.com/support/entry/portal/docdisplay?lndocid=SERV-DSA.

DSA provides the primary methods of testing the major components of the server, such as the system board, Ethernet controller, keyboard, mouse (pointing device), serial ports, and hard disk drives. You can also use them to test some external devices. If you are not sure whether a problem is caused by the hardware or by the software, you can use the diagnostic programs to confirm that the hardware is working correctly. Before you run DSA, be aware of the following issues:

- When you run DSA, a single problem might cause more than one error message. When this happens, correct the cause of the first error message. The other error messages usually will not occur the next time you run DSA.

- Determine whether the failing server is part of a shared hard disk drive cluster (two or more servers sharing external storage devices). If it is part of a cluster, you can run all diagnostic programs except the ones that test the storage unit (that is, a hard disk drive in the storage unit) or the storage adapter that is attached to the storage unit. The failing server might be part of a cluster if any of the following conditions is true:

  – You have identified the failing server as part of a cluster (two or more servers sharing external storage devices).

  – One or more external storage units are attached to the failing server and at least one of the attached storage units is also attached to another server or unidentifiable device.

  – One or more servers are located near the failing server.

  Important: If the server is part of a shared hard disk drive cluster, run one test at a time. Do not run any suite of tests, such as "quick" or "normal" tests, because this might enable the hard disk drive diagnostic tests.

5. **Check for and apply code updates.** Fixes or workarounds for many problems might be available in updated UEFI firmware, device firmware, or device drivers. To display a list of available updates for the server, go to http://www.ibm.com/support/fixcentral.

   Important:

   - Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

   - Installing the wrong firmware or device-driver update might cause the server to malfunction. Before you install a firmware or device-driver update, read any readme and change history files that are provided with the downloaded update. These files contain important information about the update and the procedure for installing the update, including any special procedure for updating from an early firmware or device-driver version to the latest version.

   a. **Install UpdateXpress system updates.** You can install code updates that are packaged as an UpdateXpress System Pack or UpdateXpress CD image. An UpdateXpress System Pack contains an integration-tested bundle of online firmware and device-driver updates for your server. In addition, you

can use the ToolsCenter Bootable Media Creator to create bootable media that is suitable for applying firmware updates and running preboot diagnostics. For more information about UpdateXpress System Packs, see http://www.ibm.com/support/entry/portal/docdisplay?Indocid=SERV-XPRESS.

For more information about the Bootable Media Creator, see http://www.ibm.com/support/entry/portal/docdisplay?Indocid=LNVO-BOMC.

Be sure to separately install any listed critical updates that have release dates that are later than the release date of the UpdateXpress System Pack or UpdateXpress image.

  b. **Install manual system updates.**

   1) **Determine the existing code levels.** In DSA, click **Firmware/VPD** to view system firmware levels, or click **Software** to view operating-system levels.

   2) **Download and install updates of code that is not at the latest level.** To display a list of available updates for the server, go to http://www.ibm.com/support/fixcentral.

   When you click an update, an information page is displayed, including a list of the problems that the update fixes. Review this list for your specific problem; however, even if your problem is not listed, installing the update might solve the problem.

6. **See the controller and management software documentation.** If the problem is associated with a specific function (for example, if a RAID hard disk drive is marked offline in the RAID array), see the documentation for the associated controller and management or controlling software to verify that the controller is correctly configured.

   Problem determination information is available for many devices such as RAID and network adapters.

   For problems with operating systems, software, or devices, go to http://www.lenovo.com/support.

7. **Check for troubleshooting procedures, service bulletins, and RETAIN tips.** Lenovo continually updates the support website with the latest tips and techniques that you can use to solve problem that you might have with the server. Troubleshooting procedures, service bulletins, and RETAIN tips document known problems and suggested solutions. To search for troubleshooting procedures and RETAIN tips, go to http://www.lenovo.com/support and search for your server's 4-digit Machine Type, and `retain`.

8. If you have completed the diagnostic procedure provided in this document and the problem remains, see the diagnostic information and procedures in your product documentation and Appendix A "Getting help and technical assistance" on page 21 for more information.

Important: If you have completed all of the diagnostic procedures provided in this document and in your product documentation and the problem remains, the problem might not have been previously identified.

After you have verified that all code is at the latest level, all hardware and software configurations are valid, and no LEDs or log entries indicate a hardware component failure, contact an approved warranty service provider for assistance with additional problem determination and possible hardware replacement. See "Hardware service and support" on page 23 for more information.

To open an online service request, go to the Electronic Services website at http://www.ibm.com/support/entry/portal/Open_service_request. Be prepared to provide information about any error codes and collected data and the problem determination procedures that you have used.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you.

Use this information to obtain additional information about Lenovo and Lenovo products, and determine what to do if you experience a problem with your Lenovo system or optional device.

Note: This section includes references to IBM web sites and information about obtaining service. IBM is Lenovo's preferred service provider for the System x, Flex System, and NeXtScale System products.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself.

If you believe that you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare before you call.

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated software, firmware, and operating-system device drivers for your Lenovo product. The Lenovo Warranty terms and conditions state that you, the owner of the Lenovo product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check http://www.lenovo.com/us/en/serverproven/ to make sure that the hardware and software is supported by your product.
- Go to http://www.lenovo.com/support to check for information to help you solve the problem.
- Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.
    - Hardware and Software Maintenance agreement contract numbers, if applicable
    - Machine type number (Lenovo 4-digit machine identifier)
    - Model number
    - Serial number
    - Current system UEFI and firmware levels
    - Other pertinent information such as error messages and logs
- Go to http://www.ibm.com/support/entry/portal/Open_service_request to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to the service technicians. The Lenovo service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

Information about your Lenovo system and preinstalled software, if any, or optional device is available in the product documentation. That documentation can include printed documents, online documents, readme files, and help files.

See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. Lenovo maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.lenovo.com/support.

Getting help and information from the World Wide Web

Up-to-date information about Lenovo products and support is available on the World Wide Web.

On the World Wide Web, up-to-date information about Lenovo systems, optional devices, services, and support is available at http://www.lenovo.com/support. The most current version of the product documentation is available in the following product-specific Information Centers:

Flex System products: http://pic.dhe.ibm.com/infocenter/flexsys/information/index.jsp

System x products: http://shop.lenovo.com/us/en/systems/

NeXtScale System products: http://pic.dhe.ibm.com/infocenter/nxtscale/documentation/index.jsp

How to send DSA data

You can use the Enhanced Customer Data Repository to send diagnostic data to Lenovo.

Before you send diagnostic data to Lenovo, read the terms of use at http://www.ibm.com/de/support/ecurep/terms.html.

You can use any of the following methods to send diagnostic data:

- **Standard upload:** http://www.ibm.com/de/support/ecurep/send_http.html
- **Standard upload with the system serial number:** http://www.ecurep.ibm.com/app/upload_hw
- **Secure upload:** http://www.ibm.com/de/support/ecurep/send_http.html#secure
- **Secure upload with the system serial number:** https://www.ecurep.ibm.com/app/upload_hw

Creating a personalized support web page

You can create a personalized support web page by identifying Lenovo products that are of interest to you.

To create a personalized support web page, go to http://www.ibm.com/support/mynotifications. From this personalized page, you can subscribe to weekly email notifications about new technical documents, search for information and downloads, and access various administrative services.

Software service and support

Through the Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with your Lenovo products.

For more information about Support Line and other IBM services, see http://www.ibm.com/services or see http://www.ibm.com/planetwide for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Hardware service and support

IBM is Lenovo's preferred service provider for the System x, Flex System and NeXtScale System products.

You can receive hardware service through your Lenovo reseller or from IBM. To locate a reseller authorized by Lenovo to provide warranty service, go to http://www.ibm.com/partnerworld and click **Business Partner Locator**. For IBM support telephone numbers, see http://www.ibm.com/planetwide. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

Taiwan product service

Use this information to contact product service for Taiwan.

台灣 IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路 7 號 3 樓
電話：0800-016-888

IBM Taiwan product service contact information:

IBM Taiwan Corporation
3F, No 7, Song Ren Rd.
Taipei, Taiwan
Telephone: 0800-016-888

Appendix B. Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area.

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Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk.

Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Trademarks

Lenovo, the Lenovo logo, Flex System, System x, NeXtScale System, and x Architecture are trademarks of Lenovo in the United States, other countries, or both.

Intel and Intel Xeon are trademarks of Intel Corporation in the United States, other countries, or both.

Internet Explorer, Microsoft, and Windows are trademarks of the Microsoft group of companies.

Linux is a registered trademark of Linus Torvalds.

Other company, product, or service names may be trademarks or service marks of others.

Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1 024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard-disk-drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional memory module.

Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as `total bytes written` (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. Lenovo is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

Lenovo makes no representations or warranties with respect to non-Lenovo products. Support (if any) for the non-Lenovo products is provided by the third party, not Lenovo.

Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

Recycling information

Lenovo encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. Lenovo offers a variety of programs and services to assist equipment owners in recycling their IT products. For information on recycling Lenovo products, go to: http://www.lenovo.com/recycling.

Particulate contamination

Attention: Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the device that is described in this document.

Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the device to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If Lenovo determines that the levels of particulates or gases in your environment have caused damage to the device, Lenovo may condition provision of repair or replacement of devices or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 1. Limits for particulates and gases

Contaminant	Limits
Particulate	• The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2[1].
	• Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282.
	• The deliquescent relative humidity of the particulate contamination must be more than 60%[2].
	• The room must be free of conductive contamination such as zinc whiskers.
Gaseous	• Copper: Class G1 as per ANSI/ISA 71.04-1985[3]
	• Silver: Corrosion rate of less than 300 Å in 30 days
[1] ASHRAE 52.2-2008 - *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.	
[2] The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.	
[3] ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.	

Telecommunication regulatory statement

This product may not be certified in your country for connection by any means whatsoever to interfaces of public telecommunications networks. Further certification may be required by law prior to making any such connection. Contact a Lenovo representative or reseller for any questions.

Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment

generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Lenovo is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that might cause undesired operation.

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Lenovo cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the installation of option cards from other manufacturers.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Lenovo, Einsteinova 21, 851 01 Bratislava, Slovakia

Germany Class A statement

Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Deutschsprachiger EU Hinweis:Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der Lenovo empfohlene Kabel angeschlossen werden. Lenovo übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der Lenovo verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der Lenovo gesteckt/eingebaut werden.

Deutschland:

Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Betriebsmittein Dieses Produkt entspricht dem „Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln" EMVG (früher „Gesetz über die elektromagnetische Verträglichkeit von Geräten"). Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln, EMVG vom 20. Juli 2007 (früher Gesetz über die elektromagnetische Verträglichkeit von Geräten), bzw. der EMV EG Richtlinie 2004/108/EC (früher 89/336/EWG), für Geräte der Klasse A.

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen. Verantwortlich für die Konformitätserklärung nach Paragraf 5 des EMVG ist die Lenovo (Deutschland) GmbH, Gropiusplatz 10, D-70563 Stuttgart.

Informationen in Hinsicht EMVG Paragraf 4 Abs. (1) 4:**Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.**

Nach der EN 55022: „Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen."

Nach dem EMVG: „Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind." (Auszug aus dem EMVG, Paragraph 3, Abs. 4). Dieses Genehmigungsverfahren ist nach Paragraph 9 EMVG in Verbindung mit der entsprechenden Kostenverordnung (Amtsblatt 14/93) kostenpflichtig.

Anmerkung: Um die Einhaltung des EMVG sicherzustellen sind die Geräte, wie in den Handbüchern angegeben, zu installieren und zu betreiben.

Japan VCCI Class A statement

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。　　　　　　VCCI–A

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.

Japan Electronics and Information Technology Industries Association (JEITA) statement

高調波ガイドライン適合品

Japan Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guidelines (products less than or equal to 20 A per phase)

Japan Electronics and Information Technology Industries Association (JEITA) statement

高調波ガイドライン準用品

Japan Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guidelines with Modifications (products greater than 20 A per phase)

Korea Communications Commission (KCC) statement

이 기기는 업무용(A급)으로 전자파적합기기로
서 판매자 또는 사용자는 이 점을 주의하시기
바라며, 가정외의 지역에서 사용하는 것을 목
적으로 합니다.

This is electromagnetic wave compatibility equipment for business (Type A). Sellers and users need to pay attention to it. This is for any areas other than home.

Russia Electromagnetic Interference (EMI) Class A statement

ВНИМАНИЕ! Настоящее изделие относится к классу А.
В жилых помещениях оно может создавать радиопомехи, для
снижения которых необходимы дополнительные меры

People's Republic of China Class A electronic emission statement

中华人民共和国 "A类" 警告声明

声 明
此为A级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取切实可行的措施。

Taiwan Class A compliance statement

警告使用者：
這是甲類的資訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

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