

# Sun Server X4-4

Security Guide

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Sun Server X4-4

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# Overview

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This document provides general security guidelines to help you protect the Oracle Sun Server X4-4, its network interfaces, and the network switches to which it is connected.

The following topics are covered in this section:

- [“System Overview ” on page 7](#)
- [“Security Principles” on page 8](#)

## System Overview

The Sun Server X4-4 supports the following components:

- Intel Xeon® E7-8895 v2 15-core 2.8GHz processors with the following configurations:
  - Two processors installed in sockets 0 and 1
  - Four processors installed in sockets 0 through 3
- Up to eight memory riser modules are supported (two risers per CPU) in the server chassis. Each riser module supports up to twelve DDR3-1600 ECC registered low-voltage DIMMs, allowing up to twenty-four DIMMs per processor. Installed DIMMs must be the same type and size.
  - A two CPU system using four riser modules. In the minimum configuration, each riser is populated with four DIMMs (8 GBDIMMs, 16 GBDIMMs, or 32 GB LRDIMMs). Additional DIMMs can be added up to a maximum of 1.5 TB of system memory.
  - A four CPU system using eight riser modules. In the minimum configuration, each riser is populated with four DIMMs (8 GB DIMMs, 16 GB DIMMs, or 32 GB LRDIMMs). Additional DIMMs can be added up to a maximum of 3 TB of system memory.
- Eleven PCI Express 3.0 slots that accommodate low-profile PCIe cards. In configurations that include a SAS HBA card, the HBA card is installed in slot 2. All slots support x8 PCIe connections. Two slots are also capable of supporting x16 PCIe cards.
  - Slots 1 through 7, 9, and 10: x8 connector
  - Slots 8 and 11: x8 or x 16 connector

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**Note** - PCIe slots 7 through 11 are only functional in four CPU systems.

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- For internal storage, the server chassis provides:
  - Six 2.5-inch drive bays, accessible through the front panel. All bays can be populated with SAS-2 HDDs or SATA-3 SSDs.
  - An optional DVD+/-RW drive on the front of the server, below the drive bays. This SATA DVD connects to a USB-SATA bridge, so that it appears to the system software as a USB storage device.
  - SAS-2 HBA PCIe card options:
    - Sun Storage 6 Gb SAS PCIe HBA. Supports RAID levels : 0, 1, 10.
    - Sun Storage 6 Gb SAS PCIe RAID HBA. Supports RAID levels : 0, 1, 1E, 10, 5, 5EE, 6 with Battery Backed Write Cache (BBWC).
- Two 1030/2060 Watt AC input auto-ranging hot-swappable power supplies.

A two-CPU system can operate with low-line 100 - 127 VAC sources. A four-CPU system can only operate with high-line 200 - 240 VAC sources, but high-line is also supported for a two-CPU system configuration.
- Integrated Baseboard Management Controller (BMC), which supports the following:
  - Industry-standard IPMI feature set
  - Remote KVMS, DVD, and floppy over IP
  - Includes serial port
  - Ethernet access to SP through a dedicated 10/100/1000 RJ-45 Gigabit Ethernet (GbE) management port and optionally through one of the host GbE ports (sideband management)
- The Oracle System Assistant server setup tool, which is embedded on a preinstalled USB flash drive.

## Security Principles

There are four basic security principles: access, authentication, authorization, and accounting.

- **Access**

Access refers to physical access to hardware, or physical or virtual access to software.

  - Use physical and software controls to protect your hardware and data from intrusion.
  - Refer to the documentation that came with your software to enable any security features available for the software.
  - Install servers and related equipment in a locked, restricted access room.



- If equipment is installed in a rack with a locking door, keep the door locked except when you have to service components in the rack.
- Restrict access to connectors or ports, which can provide more powerful access than SSH connections. Devices such as system controllers, power distribution units (PDUs), and network switches provide connectors and ports.
- Restrict access to hot-plug or hot-swap devices in particular because they can be easily removed.
- Store spare field-replaceable units (FRUs) and customer-replaceable units (CRUs) in a locked cabinet. Restrict access to the locked cabinet to authorized personnel.

- **Authentication**

Authentication refers to ensuring that users of hardware or software are who they say they are.

- Set up authentication features such as a password system in your platform operating systems to ensure that users are who they say they are.
- Ensure that your personnel use employee badges properly to enter the computer room.
- For user accounts: use access control lists where appropriate; set time-outs for extended sessions; set privilege levels for users.

- **Authorization**

Authorization refers to restrictions placed on personnel to work with hardware or software.

- Allow personnel to work only with hardware and software that they are trained and qualified to use.
- Set up a system of Read/Write/Execute permissions to control user access to commands, disk space, devices, and applications.

- **Accounting**

Accounting refers to software and hardware features used to monitor login activity and maintenance of hardware inventories.

- Use system logs to monitor user logins. Monitor system administrator and service accounts in particular because those accounts can access powerful commands.
- Keep a record of the serial numbers of all your hardware. Use component serial numbers to track system assets. Oracle part numbers are electronically recorded on cards, modules, and motherboards, and can be used for inventory purposes.
- To detect and track components, provide a security mark on all significant items of computer hardware such as FRUs. Use special ultraviolet pens or embossed labels.



# Using Server Configuration and Management Tools

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Follow these security guidelines when using software and firmware tools to configure and manage your server.

- “Oracle System Assistant Security” on page 11
- “Oracle ILOM Security” on page 12
- “Oracle Hardware Management Pack Security” on page 13

## Oracle System Assistant Security

Oracle System Assistant is a preinstalled tool that helps you to locally or remotely configure and update server hardware and to install supported operating systems. For information about how to use Oracle System Assistant, refer to the *Oracle X4 Series Servers Administration Guide* at:

<http://www.oracle.com/goto/x86AdminDiag/docs>

The following information will help you to understand security issues related to Oracle System Assistant.

- **Oracle System Assistant contains a bootable root environment.**

Oracle System Assistant is an application that runs on a preinstalled, internal USB flash drive. It is built on top of a bootable Linux root environment. Oracle System Assistant also provides the ability to access its underlying root shell. Users who have physical access to the system, or who have remote KVM (keyboard, video, mouse, and storage) access to the system through Oracle ILOM, will be able to access Oracle System Assistant and the root shell.

A root environment can be used to change system configuration and policies, as well as to access data on other disks. It is recommended that physical access to the server be protected and that the administrator and console privileges for Oracle ILOM users be assigned sparingly.

- **Oracle System Assistant mounts a USB storage device that is accessible to the operating system.**

In addition to being a bootable environment, Oracle System Assistant is also mounted as a USB storage device (flash drive) that is accessible to the host operating system after installation. This is useful when accessing tools and drivers for maintenance and reconfiguration. The Oracle System Assistant USB storage device is both readable and writeable and could potentially be exploited by viruses.

It is recommended that the same methods for protecting disks be applied to the Oracle System Assistant storage device, including regular virus scans and integrity checking.

- **Oracle System Assistant can be disabled.**

Oracle System Assistant is a useful tool in helping to set up the server, update and configure firmware, and install the host operating system. However, if the security implications described above are unacceptable, or if the tool is not needed, Oracle System Assistant can be disabled. Disabling Oracle System Assistant means that the USB storage device will no longer be accessible to the host operating system. In addition, it will not be possible to boot Oracle System Assistant.

You can disable Oracle System Assistant from either the tool itself or from BIOS. Once disabled, Oracle System Assistant can only be re-enabled from the BIOS Setup Utility. It is recommended that BIOS Setup be password-protected so that only authorized users can re-enable Oracle System Assistant. For information about how to disable and re-enable Oracle System Assistant, refer to the Oracle X4 Series Servers Administration Guide at:

<http://www.oracle.com/goto/x86AdminDiag/docs>

## Oracle ILOM Security

You can actively secure, manage, and monitor system components using Oracle Integrated Lights Out Manager (Oracle ILOM) management firmware, which is preinstalled on this server, on other Oracle x86-based servers, and on some Oracle SPARC-based servers.

Use a dedicated internal network for the service processor (SP) to separate it from the general network. Oracle ILOM provides server control and monitoring functions to system administrators. Depending on the authorization level granted to the administrators, these functions might include the ability to power off the server, create user accounts, mount remote storage devices, and so on. Therefore, to maintain the most reliable and secure environment for Oracle ILOM, the dedicated network management port or the sideband management port on the server must always be connected to an internal trusted network or dedicated secure management/private network.

Limit the use of the default Administrator account (`root`) to the initial Oracle ILOM login. This default Administrator account is provided only to aid with the initial sever installation.

Therefore, to ensure the most secure environment, you must change the default Administrator password (changeme) as part of the initial setup of the system. In addition to changing the password for the default Administrator account, new user accounts with unique passwords and assigned authorization levels should be established for each new Oracle ILOM user.

Refer to Oracle ILOM documentation to understand more about setting up passwords, managing users, and applying security-related features, including Secure Shell (SSH), Secure Socket Layer (SSL), and RADIUS authentication. For security guidelines that are specific to Oracle ILOM, refer to the *Oracle Integrated Lights Out Manager (ILOM) Security Guide*, which is part of the Oracle ILOM documentation library for the release of Oracle ILOM that you are using. You can find the Oracle ILOM documentation at:

<http://www.oracle.com/goto/ILOM/docs>

## Oracle Hardware Management Pack Security

Oracle Hardware Management Pack is available for your server, and for many other x86-based servers and some SPARC servers. Oracle Hardware Management Pack features two components: an SNMP monitoring agent and a family of cross-operating system command-line interface tools (CLI Tools) for managing your server.

With the Hardware Management Agent SNMP Plugins, you can use SNMP to monitor Oracle servers and server modules in your data center with the advantage of not having to connect to two management points, the host and Oracle ILOM. This functionality enables you to use a single IP address (the host's IP address) to monitor multiple servers and server modules. The SNMP Plugins run on the host operating system of Oracle servers.

You can use the Oracle Server CLI Tools to configure Oracle servers. The CLI Tools work with Oracle Solaris, Oracle Linux, Oracle VM, other variants of Linux, and Microsoft Windows operating systems.

Refer to the Oracle Hardware Management Pack documentation for more information about these features. For security guidelines that are specific to Oracle Hardware Management Pack, refer to the *Oracle Hardware Management Pack (HMP) Security Guide*, which is part of the Oracle Hardware Management Pack documentation library. You can find the Oracle Hardware Management Pack documentation at:

<http://www.oracle.com/goto/OHMP/docs>



# Planning a Secure Environment

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Use the following notes before and during the installation and configuration of a server and related equipment.

The following topics are covered:

- “Operating System Security Guidelines” on page 15
- “Network Ports and Switches” on page 16
- “VLAN Security” on page 16
- “Infiniband Security” on page 17
- “Hardware Physical Security ” on page 17
- “Software Security” on page 18

## Operating System Security Guidelines

Refer to Oracle operating system (OS) documents for information on:

- How to use security features when configuring your systems
- How to operate securely when you add applications and users to a system
- How to protect network-based applications

Security Guide documents for supported Oracle operating systems are part of the documentation library for the operating system. To find the Security Guide document for an Oracle operating system, go to the Oracle operating system documentation library:

Operating System	Link
Oracle Solaris OS	<a href="http://docs.oracle.com/cd/E23824_01/html/819-3195/index.html">http://docs.oracle.com/cd/E23824_01/html/819-3195/index.html</a>
Oracle Linux OS	<a href="http://linux.oracle.com">http://linux.oracle.com</a>
Oracle VM OS	<a href="http://www.oracle.com/technetwork/documentation/vm-096300.html">http://www.oracle.com/technetwork/documentation/vm-096300.html</a>

For information on operating systems from other vendors, such as Red Hat Enterprise Linux, SUSE Linux Enterprise Server, Windows, and VMware ESXi, refer to the vendor's documentation.

## Network Ports and Switches

Different switches offer different levels of port security features. Refer to the switch documentation to learn how to do the following:

- Use authentication, authorization, and accounting features for local and remote access to the switch.
- Change every password on network switches that might have multiple user accounts and passwords by default.
- Manage switches out-of-band (separated from data traffic). If out-of-band management is not feasible, then dedicate a separate virtual local area network (VLAN) number for in-band management.
- Use the port mirroring capability of the network switch for intrusion detection system (IDS) access.
- Maintain a switch configuration file off-line and limit access only to authorized administrators. The configuration file should contain descriptive comments for each setting.
- Implement port security to limit access based upon MAC addresses. Disable auto-trunking on all ports.
- Use these port security features if they are available on your switch:
  - **MAC Locking** involves associating a Media Access Control (MAC) address of one or more connected devices to a physical port on a switch. If you lock a switch port to a particular MAC address, superusers cannot create backdoors into your network with rogue access points.
  - **MAC Lockout** disables a specified MAC address from connecting to a switch.
  - **MAC Learning** uses the knowledge about each switch port's direct connections so that the network switch can set security based on current connections.

## VLAN Security

If you set up a virtual local area network (VLAN), remember that VLANs share bandwidth on a network and require additional security measures.

- Define VLANs to separate sensitive clusters of systems from the rest of the network. This decreases the likelihood that users will gain access to information on these clients and servers.



- Assign a unique native VLAN number to trunk ports.
- Limit the VLANs that can be transported over a trunk to only those that are strictly required.
- Disable VLAN Trunking Protocol (VTP), if possible. Otherwise, set the following for VTP: management domain, password, and pruning. Then set VTP into transparent mode.

## Infiniband Security

Keep Infiniband hosts secure. An Infiniband fabric is only as secure as its least secure Infiniband host.

- Note that partitioning does not protect an Infiniband fabric. Partitioning only offers Infiniband traffic isolation between virtual machines on a host.
- Use static VLAN configuration, when possible.
- Disable unused switch ports and assign them an unused VLAN number.

## Hardware Physical Security

Physical hardware can be secured fairly simply: limit access to the hardware and record serial numbers.

- **Restrict access**
  - Install servers and related equipment in a locked, restricted access room.
  - If equipment is installed in a rack with a locking door, keep the door locked except when you have to service components in the rack. Lock the door after servicing the equipment.
  - Restrict access to USB consoles, which can provide more powerful access than SSH connections. Devices such as system controllers, power distribution units (PDUs), and network switches can have USB connections.
  - Restrict access to hot-plug or hot-swap devices in particular because they can be easily removed.
  - Store spare field-replaceable units (FRUs) or customer-replaceable units (CRUs) in a locked cabinet. Restrict access to the locked cabinet to authorized personnel.
- **Record serial numbers**
  - Put a security mark on all significant items of computer hardware, such as FRUs. Use special ultraviolet pens or embossed labels.
  - Keep a record of the serial numbers of all your hardware.

- Keep hardware activation keys and licenses in a secure location that is easily accessible to the system manager in system emergencies. The printed documents might be your only proof of ownership.

## Software Security

Most hardware security is implemented through software measures.

- Change all default passwords when installing a new system. Most types of equipment use default passwords, such as changeme, that are widely known and would allow unauthorized access to the equipment.
- Change every password on network switches which might have multiple user accounts and passwords by default.
- Limit the use of the default Administrator account (root) to a single administrator user. Always create a new Oracle ILOM account for each new user. Ensure that a unique password and a proper level of authorization privileges (operator, administrator, and so on) always are assigned to each Oracle ILOM user account.
- Use a dedicated network for service processors to separate them from the general network.
- Protect access to USB consoles. Devices such as system controllers, power distribution units (PDUs), and network switches can have USB connections, which can provide more powerful access than SSH connections.
- Refer to the documentation that came with your software to enable any security features available for the software.
- Implement port security to limit access based upon MAC addresses. Disable autotrunking on all ports.

# Maintaining a Secure Environment

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After the initial installation and setup, use Oracle hardware and software security features to continue controlling hardware and tracking system assets.

- “Hardware Power Control” on page 19
- “Asset Tracking” on page 19
- “Updates for Software and Firmware” on page 20
- “Network Security” on page 20
- “Data Protection and Security” on page 21
- “Log Maintenance” on page 21

## Hardware Power Control

You can use software to turn on and off power to some Oracle systems. The power distribution units (PDUs) for some system cabinets can be enabled and disabled remotely. Authorization for these commands is typically set up during system configuration and is usually limited to system administrators and service personnel.

Refer to your system or cabinet documentation for further information.

## Asset Tracking

Use serial numbers to track inventory. Oracle embeds serial numbers in firmware on option cards and system mother boards. You can read these serial numbers through local area network connections.

You can also use wireless radio frequency identification (RFID) readers to further simplify asset tracking. An Oracle white paper, *How to Track Your Oracle Sun System Assets by Using RFID* is available at:

<http://www.oracle.com/technetwork/articles/systems-hardware-architecture/o11-001-rfid-oracle-214567.pdf>

## Updates for Software and Firmware

Keep your software and firmware versions current on your server equipment.

- Check regularly for updates.
- Always install the latest released version of the software or firmware on your equipment.
- Install any necessary security patches for your software.
- Remember that devices such as network switches and Express Modules also contain firmware and might require patches and firmware updates.

## Network Security

Follow these guidelines to secure local and remote access to your systems:

- Limit remote configuration to specific IP addresses using SSH instead of Telnet. Telnet passes user names and passwords in clear text, potentially allowing everyone on the LAN segment to see login credentials. Set a strong password for SSH.
- Use version 3 of Simple Network Management Protocol (SNMP) to provide secure transmissions. Earlier versions of SNMP are not secure and transmit authentication data in unencrypted text.
- Change the default SNMP community string to a strong community string if SNMP is necessary. Some products have PUBLIC set as the default SNMP community string. Attackers can query a community to draw a very complete network map and possibly modify management information base (MIB) values.
- Always log out after using the system controller if it uses a browser interface.
- Disable unnecessary network services, such as Transmission Control Protocol (TCP) or Hypertext Transfer Protocol (HTTP). Enable necessary network services and configure these services securely.
- Follow LDAP security measures when using LDAP to access the system. Refer to the Oracle ILOM Security Guide at: <http://www.oracle.com/goto/ILOM/docs> .
- Create a banner to state that unauthorized access is prohibited.
- Use access control lists where appropriate.
- Set time-outs for extended sessions and set privilege levels.
- Use authentication, authorization, and accounting (AAA) features for local and remote access to a switch.
- If possible, use the RADIUS and TACACS+ security protocols:
  - RADIUS (Remote Authentication Dial In User Service) is a client/server protocol that secures networks against unauthorized access

- TACACS+ (Terminal Access Controller Access-Control System) is a protocol that permits a remote access server to communicate with an authentication server to determine if a user has access to the network.
- Use the port mirroring capability of the switch for intrusion detection system (IDS) access.
- Implement port security to limit access based upon a MAC address. Disable auto trunking on all ports.

## Data Protection and Security

Follow these guidelines to maximize data protection and security:

- Back up important data using devices such as external hard drives or USB storage devices. Store the backed up data in a second, off-site, secure location.
- Use data encryption software to keep confidential information on hard drives secure.
- When disposing of an old hard drive, physically destroy the drive or completely erase all the data on the drive. Information can still be recovered from a drive after files are deleted or the drive has been reformatted. Deleting the files or reformatting the drive removes only the address tables on the drive. Use disk wiping software to completely erase all data on a drive.

## Log Maintenance

Inspect and maintain your log files on a regular schedule. Use these methods to secure log files:

- Enable logging and send system logs to a dedicated secure log host.
- Configure logging to include accurate time information, using Network Time Protocol (NTP) and timestamps.
- Review logs for possible incidents and archive them in accordance with a security policy.
- Periodically retire log files when they exceed a reasonable size. Maintain copies of the retired files for possible future reference or statistical analysis.

