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Preface

The Quartus® II Installation & Licensing for UNIX and Linux Workstations manual provides the information you need to install and start the Quartus II design software.

This manual is intended for all Quartus II software users, from beginning to advanced.

This manual provides comprehensive information for installing and licensing the Quartus II software, and includes information about the following topics:

- How to install the Quartus II software and related software.
- How to license the Quartus II software correctly.
- Additional workstation configuration information that allows you to properly configure a workstation for use with the Quartus II software.
- Other documentation and technical support information.
Documentation Conventions

The Quartus® II Installation & Licensing for UNIX and Linux Workstations manual uses the following conventions to make it easy for you to find and interpret information.

Typographic Conventions

Quartus II documentation uses the typographic conventions shown in the following table:

<table>
<thead>
<tr>
<th>Visual Cue</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bold Initial Capitals</strong></td>
<td>Command names; dialog box, page, and tab titles; and button names are shown in bold, with initial capital letters. For example: <strong>Find Text</strong> command, <strong>Save As</strong> dialog box, and <strong>Start</strong> button.</td>
</tr>
<tr>
<td><strong>bold</strong></td>
<td>Directory names, project names, disk drive names, file names, file name extensions, software utility names, software executable names, and options in dialog boxes are shown in bold. Examples: <em>quartus</em> directory, <em>d:</em> drive, <em>license.dat</em> file.</td>
</tr>
<tr>
<td>Initial Capitals</td>
<td>Keyboard keys, user-editable application window fields, and menu names are shown with initial capital letters. For example: Delete key, the Options menu.</td>
</tr>
<tr>
<td>&quot;Subheading Title&quot;</td>
<td>Subheadings within a manual section are enclosed in quotation marks. In manuals, titles of Help topics are also shown in quotation marks.</td>
</tr>
<tr>
<td><strong>Italic Initial Capitals</strong></td>
<td>Help categories, manual titles, section titles in manuals, and application note and brief names are shown in italics with initial capital letters. For example: <em>FLEXlm End Users Guide.</em></td>
</tr>
<tr>
<td><strong>italics</strong></td>
<td>Variables are enclosed in angle brackets (&lt; &gt;) and shown in italics. For example: <code>&lt;file name&gt;</code>, <code>&lt;CD-ROM drive&gt;</code>.</td>
</tr>
<tr>
<td>Courier font</td>
<td>Anything that must be typed exactly as it appears is shown in Courier. For example: <code>\quartus\bin\lmulti lmhostid</code>.</td>
</tr>
<tr>
<td>←</td>
<td>Enter or return key.</td>
</tr>
<tr>
<td>■</td>
<td>Bullets are used in a list of items when the sequence of the items is not important.</td>
</tr>
<tr>
<td>✓</td>
<td>The checkmark indicates a procedure that consists of one step only.</td>
</tr>
<tr>
<td>🔄</td>
<td>The hand points to information that requires special attention.</td>
</tr>
</tbody>
</table>
Terminology

The following table shows terminology that is used throughout the Quartus II Installation & Licensing for UNIX and Linux Workstations manual:

<table>
<thead>
<tr>
<th>Term</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>“click”</td>
<td>Indicates a quick press and release of the left mouse button.</td>
</tr>
<tr>
<td>“double-click”</td>
<td>Indicates two clicks in rapid succession.</td>
</tr>
<tr>
<td>“choose”</td>
<td>Indicates that you need to use a mouse or key combination to start an action.</td>
</tr>
<tr>
<td>“select”</td>
<td>Indicates that you need to highlight text and/or objects or an option in a dialog box with a key combination or the mouse. A selection does not start an action. For example: Select Chain Description File, and click OK.</td>
</tr>
<tr>
<td>“turn on”/“turn off”</td>
<td>Indicates that you must click a check box to turn a function on or off.</td>
</tr>
</tbody>
</table>
Installing the Quartus II Software

What's in Chapter 1:

Introduction 2
Quartus II System Requirements 3
Uninstalling Previous Versions of the Quartus or Quartus II Software 5
The Quartus II Install Script 5
Installing Software on Solaris Workstations 6
Installing Software on Linux Workstations 12
Installing Software on HP-UX Workstations 18
Introduction

This section describes the requirements and procedures for installing the following software CD-ROM versions (some listed CD-ROMs may not be included in your current Altera® package):

- Quartus® II Design Software for UNIX Workstations Version 5.0 (Solaris 8 and 9 only)
- Quartus II Design Software for Linux Workstations Version 5.0 (Red Hat Linux 7.3 and 8.0 & Red Hat Enterprise Linux 3.0 only)
- Quartus II Device Information for UNIX & Linux Workstations Version 5.0
- Altera VHDL & Verilog HDL Simulation Tool for Use with the Quartus II Software (ModelSim®) Version 6.0c
- MegaCore® IP Library Version 5.0

This section also describes the requirements and procedures for the following software versions that are available only by downloading from the Altera web site:

- Quartus II Design Software for UNIX Workstations (64-bit) Version 5.0 (Solaris 8 and 9 only)
- Quartus II Design Software for Linux Workstations (64-bit AMD64/EM64T processors) Version 5.0 (Red Hat Enterprise Linux 3.0 WS for AMD64/EM64T only)
- Quartus II Design Software for HP-UX Workstations Version 5.0 (HP-UX 11.0 only)

[Obtaining HP-UX, 64-bit Solaris, and 64-bit Linux Versions]

The HP-UX, 64-bit Solaris, and 64-bit Linux versions of the Quartus II software are not included in Quartus II subscription packages, but you can download the HP-UX version from https://www.altera.com/support/software/download/altera_design/quartus_unix/dnl-quartus_hpux.jsp, and you can download the 64-bit Solaris and Linux versions from https://www.altera.com/support/software/download/altera_design/quartus_unix/dnl-quartus_64.jsp.
Quartus II System Requirements

Your system must meet the following minimum requirements:

■ One of the following workstations:
  - Sun Ultra workstation with 256-MB system memory running Solaris version 8 or 9 (for 32-bit and 64-bit Solaris workstations)
  - Intel Pentium III or compatible processor-based PC operating at 450 MHz or faster with 256-MB system memory, running Red Hat Linux 7.3 or 8.0 or Red Hat Enterprise Linux 3.0 (for 32-bit Linux workstations)
  - AMD64 processor or Intel EM64T processor or compatible processor-based PC with 1-GB memory, running Red Hat Enterprise Linux 3.0 (for 64-bit Linux workstations)
  - HP 9000 Series 700/800 workstation with 256-MB system memory running HP-UX version 11.0 with ACE dated November, 1999 or later

■ The following disk space requirements:
  - For Sun Solaris workstations, 1.79 GB of available disk space on the drive or partition where you are installing the Quartus II software
  - For Linux workstations, 1.73 GB of available disk space on the drive or partition where you are installing the Quartus II software
  - For HP-UX workstations, 1.54 GB of available disk space on the drive or partition where you are installing the Quartus II software

■ ISO 9660–compatible CD-ROM drive

■ Color monitor

■ 10/100 Mb Ethernet connection for use with the EthernetBlaster download cable.

■ Serial port for use with the MasterBlaster™ communications cable
CHAPTER 1: INSTALLING THE QUARTUS II SOFTWARE

QUARTUS II SYSTEM REQUIREMENTS

- Parallel port for use with the ByteBlasterMV™ parallel port download cable (Linux workstations only)

- A valid X-Windows display, which is required when running the Quartus II software

- One of the following window managers:
  - dtwm
  - vuewm
  - mwm
  - olwm
  - kde (Linux workstations only. The kde version must be the version that is included with Red Hat Linux 7.3 or 8.0 or Red Hat Enterprise Linux 3.0.)
  - gnome (Linux workstations only. The gnome version must be the version that is included with Red Hat Linux 7.3 or 8.0 or Red Hat Enterprise Linux 3.0.)

- A web browser with an Internet connection, which is required to enable the Quartus II software Internet connectivity features. If you are using the Netscape Navigator or Microsoft Internet Explorer browser, version 5.0 or later is required.

For Information About Refer To

<table>
<thead>
<tr>
<th>Specific disk space and memory requirements</th>
<th>Quartus II readme.txt file, which is located in the top-level directory of the Quartus II software CD-ROM. After installation, the readme.txt file is available from the Quartus II Help menu and in the Quartus II system directory.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Updated information about system requirements and the most current version of the Quartus II Installation &amp; Licensing for UNIX and Linux Workstations manual.</td>
<td>Quartus II Installation &amp; Licensing for UNIX and Linux Workstations manual on the Altera web site</td>
</tr>
<tr>
<td>Latest information on new features, device support, EDA interface support, and known issues and workarounds for the Quartus II software</td>
<td>Quartus II Software Release Notes document on the Altera web site</td>
</tr>
<tr>
<td>Quartus II software features and how they work with your design flow</td>
<td>Introduction to Quartus II manual on the Altera web site</td>
</tr>
</tbody>
</table>
Uninstalling Previous Versions of the Quartus or Quartus II Software

If you have installed a previous version of the Quartus® or Quartus II software, you can uninstall that software, if you wish, before installing the current version of the Quartus II software.

To uninstall a previous version of the Quartus or Quartus II software:

☑ Delete the Quartus II system directory (default name is quartus).

The Quartus II Install Script

The Quartus II software Install script installs the Quartus II software.

You should be aware of the following information before you install the Quartus II software:

■ Commands that do not fit on a single line in this manual are indicated by indentations of subsequent lines.

■ The UNIX environment is case sensitive. You must enter directory names, file names, and file name extensions exactly as shown.

■ The default CD-ROM directory is /cdrom/cdrom0. If you use a different CD-ROM directory, substitute the appropriate name in the installation steps.
By default, the Quartus II software is installed in the /usr/quartus directory. The installation procedure creates this directory, if it does not already exist. If you use a different directory name, substitute the appropriate name for <Quartus II system directory> in the installation steps.

Your workstation must have drivers capable of supporting an ISO 9660 CD-ROM drive.

If you will run the Quartus II software using a network (multiuser) license, make sure that the license server uses version 8.0 or later of the FLEXlm License Manager Server software. By default, the Quartus II software installs version 9.2 of the FLEXlm License Manager Server software on the user workstation. For more information, refer to “Upgrading or Setting Up a License Manager Server” on page 31.

You must install the Quartus II Device Information for UNIX & Linux Workstations CD-ROM in order to begin using the Quartus II software.

If you want to preserve project compilation databases from an earlier version of the Quartus II software before installing a newer version, Altera recommends that you open the design in the earlier version of the software and export a version-compatible database for the design by using the Export Database command (Project menu). After you have installed a newer version of the Quartus II software, you can import the database in the new version by using the Import Database command (Project menu). For more information about importing and exporting version-compatible databases, see “Overview: Using Version-Compatible Database Files” in Quartus II Help. Version-compatible database files are available in Quartus II software version 4.1 and later.

Installing Software on Solaris Workstations

This section describes the procedures for installing the Quartus II software and related software on Solaris workstations.
Installing the Quartus II Software on Solaris Workstations

You can install the Quartus II software on Sun Ultra workstations running Solaris 8 or 9.

Before You Install the Quartus II Software

You must have superuser or “root” privileges to mount and unmount the CD-ROM drive. If you are running Volume Manager, the CD-ROM drive is mounted and unmounted automatically as /cdrom/cdrom0 (you do not need to have root privileges to mount a CD-ROM with the Volume Manager), and you need to perform only steps 1 and 3, and can skip the other steps.

To install the Quartus II software and device information on a Solaris workstation, follow these steps:

1. Insert the Quartus II Design Software for UNIX Workstations (Solaris 8 and 9 only) CD-ROM or the Quartus II Design Software for UNIX Workstations (64-bit) (Solaris 8 and 9 only) CD-ROM into your CD-ROM drive.

2. Mount the CD-ROM into your CD-ROM drive. For information about mounting CD-ROMs on Solaris workstations, refer to “Mounting & Unmounting CD-ROMs on Solaris Workstations” on page 72 in Appendix B.

3. To install the Quartus II software, type the following command at the command prompt:

   /cdrom/cdrom0/install

   You are guided through the installation procedure.

4. Unmount the CD-ROM drive. For information about unmounting CD-ROMs on Solaris workstations, refer to “Mounting & Unmounting CD-ROMs on Solaris Workstations” on page 72 in Appendix B.

5. When prompted by the install script, insert the Quartus II Device Information for UNIX & Linux Workstations CD-ROM into your CD-ROM drive.
6. Repeat steps 2-4 to mount and install the Quartus II device information and unmount the CD-ROM drive.

---

### Installing Device Support Required for Using the Quartus II Tutorial

You must install support for Cyclone™ EP1C6 devices if you want to complete the Basic or LogicLock™ Quartus II tutorial. In addition, you must install support for MAX® II EPM570 and Stratix® EP1S25 devices if you want to complete the Optional MAX+PLUS® II conversion and Stratix tutorial modules.

### Installing the 64-bit Version of the Quartus II Software on Solaris Workstations

You can install the 64-bit version of the Quartus II software on Sun Ultra workstations running Solaris 8 or 9.

If your project requires addressability of computer memory greater than 4 GB for the `quartus_map`, `quartus_fit`, and `quartus_tan` executables, you can use a 64-bit version of the Quartus II software for Solaris workstations. Compiling designs with the 64-bit version of the Quartus II software requires more system memory. You may notice a decrease in compilation times if there is not sufficient physical memory to accommodate the increased memory usage. This effect can be mitigated by increasing the total physical memory on the system. The Solaris 64-bit version of the Quartus II software is not included in Quartus II subscription packages, but you can download the software from the [https://www.altera.com/support/software/download/altera_design/quartus_unix/dnl-quartus_64.jsp](https://www.altera.com/support/software/download/altera_design/quartus_unix/dnl-quartus_64.jsp) page of the Altera web site.

---

### Before You Install the Quartus II Software

You must have superuser or “root” privileges to mount and unmount the CD-ROM drive. If you are running Volume Manager, the CD-ROM drive is mounted and unmounted automatically as `/cdrom/cdrom0` (you do not need to have root privileges to mount a CD-ROM with the Volume Manager), and you need to perform only steps 1 and 3, and can skip the other steps.
To install the 64-bit version of the Quartus II software and device information on a Solaris workstation, follow these steps:

1. Download the software from the [https://www.altera.com/support/software/download/altera_design/quartus_unix/dnl-quartus_64.jsp](https://www.altera.com/support/software/download/altera_design/quartus_unix/dnl-quartus_64.jsp) page of the Altera web site and follow the untarring instructions on the web site.

2. To install the Quartus II software type the following command at the command prompt:

   ```
   /<download directory path>/install
   ```

   You are guided through the installation procedure.

3. When prompted by the install script, insert the Quartus II Device Information for UNIX & Linux Workstations CD-ROM into your CD-ROM drive.

4. Mount the CD-ROM into your CD-ROM drive. For information about mounting CD-ROMs on Solaris workstations, refer to “Mounting & Unmounting CD-ROMs on Solaris Workstations” on page 72 in Appendix B.

5. To install the Quartus II device information, type the following command at the command prompt:

   ```
   /cdrom/cdrom0/install
   ```

   You are guided through the installation procedure.

6. Unmount the CD-ROM drive. For information about unmounting CD-ROMs on Solaris workstations, refer to “Mounting & Unmounting CD-ROMs on Solaris Workstations” on page 72 in Appendix B.

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**Installing Device Support Required for Using the Quartus II Tutorial**

You must install support for Cyclone EP1C6 devices if you want to complete the Basic or LogicLock Quartus II tutorial. In addition, you must install support for MAX II EPM570 and Stratix EP1S25 devices if you want to complete the Optional MAX+PLUS II conversion and Stratix tutorial modules.
Installing the ModelSim-Altera Software on Solaris Workstations

You can install the ModelSim-Altera software on Sun Ultra workstations running Solaris 8 or 9. The ModelSim-Altera readme file in the modelsim directory on the CD-ROM provides information on the ModelSim-Altera software operating requirements and licensing. You should read the readme file before installing the ModelSim-Altera software.

Before You Install the Model-Sim Altera Software

You should be aware of the following information before you install the Model-Sim Altera software:

- You must have superuser or “root” privileges to mount and unmount the CD-ROM drive. If you are running Volume Manager, the CD-ROM drive is mounted and unmounted automatically as /cdrom/cdrom0 (you do not need to have root privileges to mount a CD-ROM with the Volume Manager), and you need to perform only steps 1 and 3, and can skip the other steps.

- Your workstation must have an ISO 9660 CD-ROM drive.

To install the ModelSim-Altera software on a Solaris workstation, follow these steps:

1. Insert the Altera VHDL & Verilog HDL Simulation Tool for Use with the Quartus II Software (ModelSim) CD-ROM into your CD-ROM drive.

2. Mount the CD-ROM into your CD-ROM drive. For information about mounting CD-ROMs on Solaris workstations, refer to “Mounting & Unmounting CD-ROMs on Solaris Workstations” on page 72 in Appendix B.

3. To install the ModelSim-Altera software, type the following command at the command prompt:

   /cdrom/cdrom0/unix/install.ms

   You are guided through the installation procedure. The installation procedure prompts you to specify the operating system and the system directory for installing the ModelSim-Altera software.
4. Unmount the CD-ROM drive. For information about unmounting CD-ROMs on Solaris workstations, refer to “Mounting & Unmounting CD-ROMs on Solaris Workstations” on page 72 in Appendix B.

Installing the MegaCore IP Library on Solaris Workstations

You can install the MegaCore IP Library on Sun Ultra workstations running Solaris 8 or 9. The MegaCore IP Library readme.txt file in the top-level directory on the CD-ROM provides information on the MegaCore IP Library operating requirements and licensing. You should read the readme.txt file before installing the MegaCore IP Library.

Before You Install the MegaCore IP Library

You should be aware of the following information before you install the MegaCore IP Library:

- You must have superuser or “root” privileges to mount and unmount the CD-ROM drive. If you are running Volume Manager, the CD-ROM drive is mounted and unmounted automatically as /cdrom/cdrom0 (you do not need to have root privileges to mount a CD-ROM with the Volume Manager), and you need to perform only steps 1 and 3, and can skip the other steps.
- Your workstation must have an ISO 9660 CD-ROM drive.

To install the MegaCore IP Library on a Solaris workstation, follow these steps:

1. Insert the MegaCore IP Library CD-ROM into your CD-ROM drive.

2. Mount the CD-ROM into your CD-ROM drive. For information about mounting CD-ROMs on Solaris workstations, refer to “Mounting & Unmounting CD-ROMs on Solaris Workstations” on page 72 in Appendix B.

3. To install the MegaCore IP Library, type the following command at the command prompt:

   /cdrom/cdrom0/solaris/install

   You are guided through the installation procedure.
4. Unmount the CD-ROM drive. For information about unmounting CD-ROMs on Solaris workstations, refer to “Mounting & Unmounting CD-ROMs on Solaris Workstations” on page 72 in Appendix B.

<table>
<thead>
<tr>
<th>For Information About</th>
<th>Refer To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using MegaCore functions with the Quartus II design software</td>
<td>MegaCore user guides that are installed with the MegaCore IP Library and on the Altera web site.</td>
</tr>
</tbody>
</table>

### Installing Software on Linux Workstations

This section describes the procedures for installing the Quartus II software and related software on Linux workstations.

### Installing the Quartus II Software on Linux Workstations

You can install the Quartus II software on PCs running Red Hat Linux 7.3 or 8.0 or Red Hat Enterprise Linux 3.0.

#### Before You Install the Quartus II Software

You must have superuser or “root” privileges to mount and unmount the CD-ROM drive. If you are logged in on a console, you do not need to have root privileges to mount a CD-ROM.

To mount the CD-ROM drive and install the Quartus II software and device information on a Linux workstation, follow these steps:

1. Insert the Quartus II Design Software for Linux Workstations (Red Hat Linux 7.3 and 8.0 & Red Hat Enterprise Linux 3.0 Only) CD-ROM into your CD-ROM drive.
2. Mount the CD-ROM into your CD-ROM drive. For information about mounting CD-ROMs on Linux workstations, refer to “Mounting & Unmounting CD-ROMs on Linux Workstations” on page 74 in Appendix B.

3. To install the Quartus II software, type the following command at the command prompt:

   `/mnt/cdrom/install`

   You are guided through the installation procedure.

4. Unmount the CD-ROM drive. For information about unmounting CD-ROMs on Linux workstations, refer to “Mounting & Unmounting CD-ROMs on Linux Workstations” on page 74 in Appendix B.

5. When prompted by the install script, insert the Quartus II Device Information for UNIX & Linux Workstations CD-ROM into your CD-ROM drive.

6. Repeat steps 2-4 to mount and install the Quartus II device information and unmount the CD-ROM drive.

### Installing Device Support Required for Using the Quartus II Tutorial

You must install support for Cyclone EP1C6 devices if you want to complete the Basic or LogicLock Quartus II tutorial. In addition, you must install support for MAX II EPM570 and Stratix EP1S25 devices if you want to complete the Optional MAX+PLUS II conversion and Stratix tutorial modules.

### Installing the 64-bit Version of the Quartus II Software on Linux Workstations

You can install the 64-bit Quartus II software on PCs running Red Hat Enterprise Linux 3.0 WS for AMD64/EM64T only.

If your project requires addressability of computer memory greater than 4 GB for the `quartus_map`, `quartus_fit`, and `quartus_tan` executables, you can use a 64-bit version of the Quartus II software for Linux workstations. Compiling designs with the 64-bit version of the Quartus II software requires more system memory. You may notice a decrease in compilation
times if there is not sufficient physical memory to accommodate the increased memory usage. This effect can be mitigated by increasing the total physical memory on the system. The Linux 64-bit version of the Quartus II software is not included in Quartus II subscription packages, but you can download the software from the https://www.altera.com/support/software/download/altera_design/quartus_unix/dnl-quartus_64.jsp page of the Altera web site.

![Before You Install the Quartus II Software](Image)

You must have superuser or “root” privileges to mount and unmount the CD-ROM drive. If you are logged in on a console, you do not need to have root privileges to mount a CD-ROM.

To install the 64-bit version of the Quartus II software and device information on a Linux workstation, follow these steps:

1. Download the software from the https://www.altera.com/support/software/download/altera_design/quartus_unix/dnl-quartus_64.jsp page of the Altera web site and follow the untarring instructions on the web site.

2. To install the Quartus II software type the following command at the command prompt:

   ```bash
   /<download directory path>/install
   ```

   You are guided through the installation procedure.

3. When prompted by the install script, insert the Quartus II Device Information for UNIX & Linux Workstations CD-ROM into your CD-ROM drive.

4. Mount the CD-ROM into your CD-ROM drive. For information about mounting CD-ROMs on Linux workstations, refer to “Mounting & Unmounting CD-ROMs on Linux Workstations” on page 74 in Appendix B.

5. To install the Quartus II device information, type the following command at the command prompt:

   ```bash
   /mnt/cdrom/install
   ```
You are guided through the installation procedure.

6. Unmount the CD-ROM drive. For information about unmounting CD-ROMs on Linux workstations, refer to “Mounting & Unmounting CD-ROMs on Linux Workstations” on page 74 in Appendix B.

### Installing Device Support Required for Using the Quartus II Tutorial

You must install support for Cyclone EP1C6 devices if you want to complete the Basic or LogicLock Quartus II tutorial. In addition, you must install support for MAX II EPM570 and Stratix EP1S25 devices if you want to complete the Optional MAX+PLUS II conversion and Stratix tutorial modules.

### Installing the ModelSim-Altera Software on Linux Workstations

You can install the ModelSim-Altera software on PCs running Red Hat Linux 7.3 or 8.0 or Red Hat Enterprise Linux 3.0. The ModelSim-Altera readme file in the modelsim directory on the CD-ROM provides information on the ModelSim-Altera software operating requirements and licensing. You should read the readme file before installing the ModelSim-Altera software.

### Before You Install the ModelSim-Altera Software

- You must have superuser or “root” privileges to mount and unmount the CD-ROM drive. If you are logged in on a console, you do not need to have root privileges to mount a CD-ROM.
- Your workstation must have an ISO 9660 CD-ROM drive.

To install the ModelSim-Altera software on a Linux workstation, follow these steps:

1. Insert the Altera VHDL & Verilog HDL Simulation Tool for Use with the Quartus II Software (ModelSim) CD-ROM into your CD-ROM drive.

2. Mount the CD-ROM into your CD-ROM drive. For information about mounting CD-ROMs on Linux workstations, refer to “Mounting & Unmounting CD-ROMs on Linux Workstations” on page 74 in Appendix B.
3. To install the ModelSim-Altera software, type the following command at the command prompt:

```
/mnt/cdrom/unix/install.ms
```

You are guided through the installation procedure. The installation procedure prompts you to specify the operating system and the system directory for installing the ModelSim-Altera software.

4. Unmount the CD-ROM drive. For information about unmounting CD-ROMs on Linux workstations, refer to “Mounting & Unmounting CD-ROMs on Linux Workstations” on page 74 in Appendix B.

---

**Installing the MegaCore IP Library on Linux Workstations**

You can install the MegaCore IP Library on PCs running Red Hat Linux 7.3 or 8.0 or Red Hat Enterprise Linux 3.0. The MegaCore IP Library `readme.txt` file in the top-level directory on the CD-ROM provides information on the MegaCore IP Library operating requirements and licensing. You should read the `readme.txt` file before installing the MegaCore IP Library.

---

**Before You Install the MegaCore IP Library**

You should be aware of the following information before you install the MegaCore IP Library:

- You must have superuser or “root” privileges to mount and unmount the CD-ROM drive. If you are logged in on a console, you do not need to have root privileges to mount a CD-ROM.
- Your workstation must have an ISO 9660 CD-ROM drive.

To install the MegaCore IP Library on a Linux workstation, follow these steps:

1. Insert the MegaCore IP Library CD-ROM into your CD-ROM drive.

2. Mount the CD-ROM into your CD-ROM drive. For information about mounting CD-ROMs on Linux workstations, refer to “Mounting & Unmounting CD-ROMs on Linux Workstations” on page 74 in Appendix B.
3. To install the MegaCore IP Library, type the following command at the
   command prompt:

   `/mnt/cdrom/linux/install`

   You are guided through the installation procedure.

4. Unmount the CD-ROM drive. For information about unmounting
   CD-ROMs on Linux workstations, refer to “Mounting & Unmounting
   CD-ROMs on Linux Workstations” on page 74 in Appendix B.

---

### For Information About

| Using MegaCore functions with the Quartus II design software | MegaCore user guides that are installed with the MegaCore IP Library and on the Altera web site |

---

### Installing the Nios II Embedded Processor Software on Linux Workstations

You can install the Nios II Embedded Processor Evaluation Edition software on PCs running Red Hat Linux 7.3 or 8.0 or Red Hat Enterprise Linux 3.0. The Nios II Embedded Processor `readme` file in the top-level directory on the CD-ROM provides information on the Nios II Embedded Processor software. You should read the `readme` file before installing the Nios II Embedded Processor software.

---

### Before You Install the Nios II Embedded Processor Software

You should be aware of the following information before you install the MegaCore IP Library:

- You must have superuser or “root” privileges to mount and unmount the CD-ROM drive.
- Your workstation must have an ISO 9660 CD-ROM drive.
To install the Nios II Embedded Processor software on a Linux workstation, follow these steps:


2. Mount the CD-ROM into your CD-ROM drive. For information about mounting CD-ROMs on Linux workstations, refer to “Mounting & Unmounting CD-ROMs on Linux Workstations” on page 74 in Appendix B.

3. To install the Nios II Embedded Processor software, type the following command at the command prompt:

```
/mnt/cdrom/install
```

You are guided through the installation procedure.

4. Unmount the CD-ROM drive. For information about unmounting CD-ROMs on Linux workstations, refer to “Mounting & Unmounting CD-ROMs on Linux Workstations” on page 74 in Appendix B.

### Installing Software on HP-UX Workstations

This section describes the procedures for installing the Quartus II software and related software on HP-UX workstations.

#### Installing the Quartus II Software on HP-UX Workstations

You can install the Quartus II software on HP 9000 Series 700/800 workstations running HP-UX version 11.0.
To install the Quartus II software and device information on an HP-UX workstation, follow these steps:

1. Download the software from the https://www.altera.com/support/software/download/altera_design/quartus_unix/dnl-quartus_hpux.jsp page of the Altera web site and follow the untarring instructions on the web site.

2. To install the Quartus II software, type the following command at the command prompt:

   `/<download directory path>/install`

   You are guided through the installation procedure.

3. When prompted by the install script, insert the Quartus II Device Information for UNIX & Linux Workstations CD-ROM into your CD-ROM drive.

4. Mount the CD-ROM into your CD-ROM drive. For information about mounting CD-ROMs on HP-UX workstations, refer to “Mounting & Unmounting CD-ROMs on HP-UX Workstations” on page 75 in Appendix B.

5. To install the device information, type the following command at the command prompt:

   `/cdrom/install`

   You are guided through the installation procedure.

Before You Install the Quartus II Software

You should be aware of the following before you install the Quartus II software:

- The HP-UX version of the Quartus II software is not included in Quartus II subscription packages, but you can download the software from the https://www.altera.com/support/software/download/altera_design/quartus_unix/dnl-quartus_hpux.jsp page of the Altera web site.

- You must have superuser or “root” privileges to mount and unmount the CD-ROM drive.
6. Unmount the CD-ROM drive. For information about unmounting CD-ROMs on HP-UX workstations, refer to “Mounting & Unmounting CD-ROMs on HP-UX Workstations” on page 75 in Appendix B.

## Installing Device Support Required for Using the Quartus II Tutorial

You must install support for Cyclone EP1C6 devices if you want to complete the Basic or LogicLock Quartus II tutorial. In addition, you must install support for MAX II EPM570 and Stratix EP1S25 devices if you want to complete the Optional MAX+PLUS II conversion and Stratix tutorial modules.

## Installing the ModelSim-Altera Software on HP-UX Workstations

You can install the ModelSim-Altera software on HP 9000 Series 700/800 workstations running HP-UX version 11.0. The ModelSim-Altera readme file in the modelsim directory on the CD-ROM provides information on the ModelSim-Altera software operating requirements and licensing. You should read the readme file before installing the ModelSim-Altera software.

## Before You Install the ModelSim-Altera Software

You should be aware of the following before you install the ModelSim-Altera software:

- You must have superuser or “root” privileges to mount and unmount the CD-ROM drive.
- Your workstation must have an ISO 9660 CD-ROM drive.
- The HP-UX workstation mount command cannot read long file names. The pfs daemons allow the HP-UX workstation to read long file names that might be used for files in the CD-ROM. Before you install the ModelSim-Altera software, verify that the pfs daemons in step 4 are not running. Altera recommends stopping any pfs daemons that are currently running on the HP-UX workstation.
To install the ModelSim-Altera software on an HP-UX workstation, follow these steps:

1. Become superuser and specify the directory where you want to mount the CD-ROM drive. The CD-ROM drive is usually placed in the top-level directory. To become superuser and access this directory, type the following commands at the command prompt:

   su -
   cd /

2. Find the device ID for the CD-ROM drive so you can mount the correct device. To view a list of the possible device IDs, type the following command at the command prompt:

   /usr/sbin/ioscan -fn -C disk

3. To create the cdrom directory, type the following command at the command prompt:

   mkdir /cdrom

4. To start the pfs daemons, type the following commands at the command prompt:

   /usr/sbin/pfs_mountd&
   /usr/sbin/pfsd&

5. Insert the Altera VHDL & Verilog HDL Simulation Tool for Use with the Quartus II Software (ModelSim) CD-ROM into your CD-ROM drive.

6. To mount the CD-ROM drive, type the following command at the command prompt:

   /usr/sbin/pfs_mount -t iso9660 -x unix /dev/dsk/<device name of CD-ROM> /cdrom

   The pfs_mount command is followed by the device ID and the directory on which you are mounting the CD-ROM drive.

7. To install the ModelSim-Altera software, type the following command at the command prompt:

   /cdrom/unix/install.ms
If you have previously mounted and unmounted this CD-ROM, a number may be appended to the device name of the CD-ROM, in which case you should use the complete name and number for `<device name of CD-ROM>`. For example, if the device name appears as `modelsim`, use that name.

You are guided through the installation procedure. The installation procedure prompts you to specify the operating system and the system directory for installing the ModelSim-Altera software.

8. To unmount the CD-ROM drive, type the following command at the command prompt:

   `/usr/sbin/pfs_umount /dev/dsk/<device name of CD-ROM>/cdrom`

To successfully unmount the CD-ROM drive, you must make sure that no one is accessing the directory structure at or below the `cdrom` directory. If another user is using the CD-ROM drive, you may receive the following message:

   `pfs_umount: cannot unmount /cdrom : Device busy`

To determine whether you are accessing the CD-ROM drive yourself, type the following command at the command prompt:

   `pwd`

You should see the `/` prompt on your screen. If you do not, you should type `cd /` again.

---

**After You Install the ModelSim-Altera Software**

After installing the ModelSim-Altera software, Altera recommends stopping the `pfs` daemons started in step 4.
# Chapter Two

**Licensing the Quartus II Software**

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</thead>
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Introduction

This section describes how to license the Quartus II software. To set up your license for the Quartus II software, you must perform the following steps, each of which are described in more detail in this section:

1. If necessary, obtain a license file. The Quartus II software requires a license.dat license file for each server that supports a valid, unexpired network (multiuser) license or for each node-locked (single-user) license. This same license file can also enable the additional Altera synthesis and simulation tools included with Altera software subscriptions, as well as the MAX+PLUS II software.

2. Modify the license file for your network license (FLOATPC, FLOATNET, or FLOATLNX).

3. Set up and configure the FLEXlm license manager server for a UNIX or Linux workstation.

4. Configure each workstation.

5. Configure each Quartus II user’s environment.

6. Start the Quartus II software.

7. Specify the location of the license file.

8. Specify a web browser.

9. Register for an Altera.com account.

Obtaining a License File

When you start the Quartus II software, if the software cannot detect a valid license file, you are asked whether you want to run in evaluation mode for 30 days, perform an automatic license retrieval from the Altera web site, or specify the correct location of a valid license file.

You can also obtain an ASCII license file, license.dat, from the Licensing section of the Altera web site at www.altera.com/licensing if you have the following information:
Your Altera ID, which is a six-digit number that is provided when you purchase the Quartus II development system. This number can be found on the packing list that is shipped with the Quartus II software.

Your serial number, which is printed on the side of the Quartus II software shipping box and on the Registration & License File Request Form, which is also included with the Quartus II software package. This number begins with the letter G, and is followed by five digits (Gxxxxx).

The host ID number, for UNIX or Linux network license servers. To find your UNIX or Linux network license server host ID by using FLEXlm utilities, type the following command at a command prompt (where <operating system> represents hp11, linux, or solaris):

```
/usr/<Quartus II system directory>/<operating system>/lmutil lmhostid
```

To obtain a license file, follow these steps:

1. Start the Quartus II software as described in the “Starting the Quartus II Software” on page 43.
2. Select **Perform automatic web license retrieval** to request a valid license file automatically from the Altera web site. You are guided through the licensing procedure.

   *or*

   To request a license file at a later time, point your web browser to the Altera web site at [www.altera.com/licensing](http://www.altera.com/licensing). The Altera Software Licensing page is displayed.

3. If you are using a network (multiuser) license, select the FLOATPC, FLOATNET, or FLOATLNX license option.

4. Specify the requested information.

5. You will receive an e-mail from Altera with a `license.dat` file attached, as well as the license file text. You may either use the attached license file, or copy the lines from the attached license file to an existing license file. When you receive the license file text, save it in the `/usr/local/flexlm/licenses` directory. If you are using your `license.dat` file with both the Quartus II software and the MAX+PLUS II software, Altera recommends that you save it in a top-level directory named `flexlm`.

   *Figure 1 and Figure 2 show sample network license files for UNIX and Linux workstations that function as a single license server.*
### Figure 1. Sample Network License File for a Single UNIX Workstation Server

<table>
<thead>
<tr>
<th>Server name</th>
<th>Server host ID number</th>
<th>Optional port number</th>
<th>Number of licenses requested</th>
<th>Authorization code</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERVER alice 807f1034 1800</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VENDOR alterad &quot;/usr/quartus/solaris/alterad&quot; USE_SERVER</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEATURE altera_mainwin alterad 2006.12 permanent 5 391A92407D4B SIGN=&quot;0191 120C BB64 BC39 E5C8 EBBB 7894 E064 D348 61CC 5C6F 16DD 1269 F246 D07E 19C8 CAE3 E3E3 6965 E38D 1452 BB74 20E9 E6F6 5718 89AC 0E23 B5B2 1581 E453&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEATURE quartus alterad 2006.12 permanent 5 7A496D25A602 SIGN=&quot;1C66 DAC6 1DAB C886 727B 65DF FAC2 B479 3E3C 656D 3561 E5D0 BBA3 C45C 4DDC 0F2F 68F5 4DF1 6F63 7785 2F5D 1480 1B0A 70DE 2220 1952 DDCD 9F4D 6D61 A177&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Figure 2. Sample Network License File for a Single Linux Workstation Server

<table>
<thead>
<tr>
<th>Server name</th>
<th>Server host ID number</th>
<th>Optional port number</th>
<th>Number of licenses requested</th>
<th>Authorization code</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERVER alice 807f1034 1800</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VENDOR alterad &quot;/usr/quartus/linux/alterad&quot; USE_SERVER</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEATURE altera_mainwin_lnx alterad 2006.12 permanent 5 391A92407D4B SIGN=&quot;0191 120C BB64 BC39 E5C8 EBBB 7894 E064 D348 61CC 5C6F 16DD 1269 F246 D07E 19C8 CAE3 E3E3 6965 E38D 1452 BB74 20E9 E6F6 5718 89AC 0E23 B5B2 1581 E453&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEATURE quartus alterad 2006.12 permanent 5 7A496D25A602 SIGN=&quot;1C66 DAC6 1DAB C886 727B 65DF FAC2 B479 3E3C 656D 3561 E5D0 BBA3 C45C 4DDC 0F2F 68F5 4DF1 6F63 7785 2F5D 1480 1B0A 70DE 2220 1952 DDCD 9F4D 6D61 A177&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER 2: LICENSING THE QUARTUS II SOFTWARE

OBTAINING A LICENSE FILE

If you are using the Quartus II software with a node-locked (single-user) license, skip to “Configuring Each Workstation” on page 35.

The FLEXlm licensing scheme also allows you to set up three redundant license servers to serve a network (multiuser) license. You can obtain a license file for redundant servers by performing the steps described earlier in this section for obtaining a license file. Figure 3 shows a sample redundant server license file.

**Figure 3. Sample Redundant Server License File**

<table>
<thead>
<tr>
<th>Server name</th>
<th>Server host ID number</th>
<th>Optional port number</th>
<th>Number of licenses requested</th>
<th>Authorization code</th>
</tr>
</thead>
<tbody>
<tr>
<td>alice</td>
<td>807f1043 1800</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>king</td>
<td>807f1042 1800</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>queen</td>
<td>807f1041 1800</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VENDOR</td>
<td>alterad &quot;/usr/quartus/solaris/alterad&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USE_SERVER</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEATURE</td>
<td>altera_mainwin alterad 2006.12 permanent 5 391A92407D4B SIGN=0191 120C \</td>
<td>\</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BB64 BC39 E5C8 EBBB 7894 E064 D348 61CC 5C6F 16DD 1269 F246 D07E 19C8 CAE3 \</td>
<td>\</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E3E3 6965 E38D 1452 BB74 20E9 E6F6 5718 89AC 0E23 B5B2 1581 E453&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEATURE</td>
<td>quartus alterad 2006.12 permanent 5 7A496B23A403 SIGN=1C66 DAC6 1DAB C886 \</td>
<td>\</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>727B 65DF FAC2 B479 E3E3 656D 3561 E5D0 BBA3 C45C 4DDC 0F2F 68F5 4DF1 6F63 \</td>
<td>\</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7785 2F5D 1480 1B0A 70DE 2220 1952 DDCD 9F4D 6D61 A177&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**For Information About**

Setting up and administering license servers, including setting up three redundant license servers

**Refer To**

*FLEXlm End Users Guide*, which is available from the Support Services section of the Macrovision web site at [www.macrovision.com](http://www.macrovision.com)
Modifying the License File

The license.dat file must be modified before it can be used by the license server.

---

### Node-Locked (Single-User) License

If you have a node-locked (single-user) license, you can skip this section and go to “Starting the Quartus II Software” on page 43.

---

The first few lines of the license file are shown in the following example (your license file may not contain all the VENDOR entries, depending on which software you have enabled):

```plaintext
SERVER <host name> <8- or 12-character host or NIC ID> <port number>
VENDOR altera "<path to daemon executable>"
VENDOR mgcld "<path to daemon executable>"
```

To modify the license file, follow these steps:

1. In the license.dat file, type the variables that are described in Table 1. The host or NIC ID will already be entered in the license file.

2. Make sure the license file meets these guidelines:
   - The license file name must have a .dat extension. If your text editor adds .txt or another extension to the file name, such as license.dat.txt, you must rename the file to have only a .dat extension.
   - The license file must have a carriage return at the end of the last FEATURE line.
   - Any FEATURE line that wraps to a second or third line must contain a backslash (\) at the end of the line to indicate that it continues.
Table 1. Variables to Modify in the License File (license.dat)

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Description</th>
<th>Directory</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;host name&gt;</td>
<td>The host name of the server; for example, my_server.</td>
<td></td>
</tr>
<tr>
<td>&lt;port number&gt;</td>
<td>The port number for the license manager service on the server; for example, 1800. The port number is optional and should be different from the port number for any other service on the machine.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td></td>
</tr>
<tr>
<td>alterad &quot;&lt;path to daemon executable&gt;&quot;</td>
<td>Path to the Altera vendor daemon executable alterad.</td>
<td>Solaris: /&lt;Quartus II system directory&gt; / solaris/alterad</td>
</tr>
<tr>
<td></td>
<td>(2)(3)</td>
<td>HP-UX: /&lt;Quartus II system directory&gt; / hp11/alterad</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Linux: /&lt;Quartus II system directory&gt;/</td>
</tr>
<tr>
<td></td>
<td></td>
<td>linux/alterad</td>
</tr>
<tr>
<td>mgcld &quot;&lt;path to daemon executable&gt;&quot;</td>
<td>Path to the Mentor Graphics vendor daemon executable mgcld.</td>
<td>Solaris: /&lt;ModelSim-Altera system directory&gt;/sunos5aloem/mglslib/mgcld</td>
</tr>
<tr>
<td></td>
<td>(2)(3)(4)</td>
<td>HP-UX: /&lt;ModelSim-Altera system directory&gt;/hp700aloem/mglslib/mgcld</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Linux:/&lt;ModelSim-Altera system directory&gt;/linuxaloem/mglslib/mgcld</td>
</tr>
</tbody>
</table>

Notes:

(1) If you do not specify a port number in the license file, the FLEXlm License Manager will automatically choose a free port between 27000 and 27009. However, to prevent port number conflicts, you can specify a port number. If three redundant servers are being used, you must specify a port number. Choose a port number greater than 1024, because port numbers less than 1024 are privileged port numbers on UNIX servers.

(2) In some network environments, the license server does not have an installation of the software tool(s) that provides the necessary vendor daemon (alterad or mgcld). In this case, copy the required daemon from another machine that does have an installation of the software. Find the file in the directory location specified. Save the file in a similarly named directory or any other location on the license server. Specify the daemon location on the license server in the license file.

(3) If the path server has spaces in it, enclose the full path in quotation marks.

(4) If you are not using a license file for the ModelSim-Altera software, you may delete this line.
Upgrading or Setting Up a License Manager Server

This section provides instructions for configuring network licensing for the Quartus II software on Sun Ultra workstations running Solaris 8 or 9, Intel Pentium III or compatible processor-based PCs running Red Hat Linux 7.3 or 8.0 or Red Hat Enterprise Linux 3.0, or HP 9000 Series 700/800 workstations running HP-UX version 11.0 with ACE dated November, 1999 or later.

Upgrading the FLEXlm License Server Software

To support network licensing, the Quartus II software requires the FLEXlm License Manager server software version 8.0 or later. The install script installs the FLEXlm License Manager server software automatically on your user workstation, but you should also verify that the version of the FLEXlm License Manager software or the license server software is 8.0 or later. If the FLEXlm License Manager software is version 8.0 or later, skip to “Rereading an Existing UNIX or Linux Workstation License File” on page 32.

To determine which version of the FLEXlm License Manager server software you are using:

✓ On the computer running the FLEXlm License Manager server software, type the following commands at a command prompt:

```
/FLEXlm system directory path>/lmgrd -v ➔
/FLEXlm system directory path>/alterad -v ➔
```

If the `lmgrd` or `alterad` daemons are not from the FLEXlm software version 8.0 or later, you must upgrade both daemons with the versions provided in the installation of the Quartus II software.

To upgrade an older version of the FLEXlm License Manager server software, follow these steps:

1. Make a backup copy of the `lmgrd` and `alterad` daemons you are currently using.
2. Copy the new versions of the files to the computer running the license server over the daemons you are currently using. You may have to shut down the license server software to complete this step.

   If you used the install script to install the FLEXlm License Manager server software, the current version of the lmgrd and alterad daemons are located in the following directories:

   \(<\text{Quartus II system directory path}>/<\text{operating system name}>/\text{alterad}\)
   \(<\text{Quartus II system directory path}>/<\text{operating system name}>/\text{lmgrd}\)

   where \(<\text{operating system name}>\) can be solaris, linux, or hp11.

3. Copy the FLEXlm software utility lmutil from the Quartus II system directory to the license server computer.

4. Restart the FLEXlm license server by typing the following commands at a command prompt:

   \(<\text{FLEXlm system directory path}>/\text{lmutil} -c \text{lmdown} <\text{license file path}>\)
   \(<\text{FLEXlm system directory path}>/\text{lmgrd} -c <\text{license file path}>\)
   \([ -l <\text{optional log path}> ]\)

**Rereading an Existing UNIX or Linux Workstation License File**

The Quartus II software uses the FLEXlm software to administer licensing for single users or for multiple users in a network installation. If you have an existing FLEXlm license server with an existing license file for the MAX+PLUS II software or software from another vendor, and the FLEXlm license server is version 8.0 or later, you can add, by copying and pasting, the Altera FEATURE lines from your Quartus II license.dat file into your existing license file. Paste the Quartus II FEATURE line as shown in the sample license file in Figure 1 on page 27. Make sure you have also modified the license file according to the guidelines in “Modifying the License File” on page 29.

If you make these changes to your license file, you must reread the license file or restart the license server before you can run the Quartus II software for the first time.
Refer to “Upgrading the FLEXlm License Server Software” on page 31 to verify that you are using the latest supported version of the FLEXlm License Server software, or if you need to upgrade an older version of the FLEXlm License Server software.

To reread your license file on a license server:

1. Type the following command at a command prompt:

   ```
   /<Quartus II system directory>/<operating system name>/lmutil
   lmreread
   ```

   where `<operating system name>` can be `solaris`, `linux`, or `hp11`.

   or

2. Restart the license server.

For Information About

Refer To

Using the FLEXlm utilities to administer and troubleshoot the FLEXlm License Manager software

*FLEXlm End Users Guide*, which is available from the Support Services section of the Macrovision web site at [www.macrovision.com](http://www.macrovision.com)

---

**Configuring a New UNIX or Linux Workstation License Server**

The Quartus II software uses the FLEXlm software to administer licensing for single users or for multiple users in a network installation. If you do not have an existing FLEXlm license server, you must configure a new Solaris, Linux, or HP-UX license server before starting the Quartus II software for the first time.
You should be aware of the following information before you configure a new license server:

- If you have an existing FLEXlm license server, refer to “Rereading an Existing UNIX or Linux Workstation License File” on page 32.

- Make sure you have obtained a valid license file according to the guidelines in “Obtaining a License File” on page 24, and that you have modified the license file according to the guidelines in “Modifying the License File” on page 29.

- These instructions assume that you have installed the license.dat file in the /usr/local/flexlm/licenses directory. If you have installed the license file in a different directory, substitute the appropriate path name for that directory.

To configure a new license server:

✓ Type the following command at a command prompt:

```
/Quartus II system directory>/operating system name>/lmgrd -c
/usr/local/flexlm/licenses/license.dat
```

where <operating system name> can be solaris, linux, or hp11.

<table>
<thead>
<tr>
<th>For Information About</th>
<th>Refer To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuring a new UNIX workstation license server</td>
<td>readme.txt file, which is located in the top-level directory of the Quartus II software CD-ROM</td>
</tr>
<tr>
<td>Setting up and administering license servers, including setting up three redundant license servers</td>
<td>FLEXlm End Users Guide, which is available from the Support Services section of the Macrovision web site at <a href="http://www.macrovision.com">www.macrovision.com</a></td>
</tr>
</tbody>
</table>

**Installing the FLEXlm Software on Another License Server**

You can install the FLEXlm software on an additional Solaris, Linux, or HP-UX license server.
To install the FLEXlm software on another license server, perform the following steps:

1. Create a directory named `<Quartus II system directory>/<operating system name>` on the additional license server, where `<operating system name>` can be solaris, linux, or hp11.

2. Copy the following files from the `<Quartus II system directory>/<operating system name>` directory of your original Quartus II software into the new `/usr/quartus/<operating system name>` directory:
   - lmgrd
   - lmutil
   - alterad

## Configuring Each Workstation

Before starting the Quartus II software for the first time, you must configure each UNIX or Linux workstation that will run the Quartus II software.

### Configuring Each Solaris Workstation

For each Sun Solaris UNIX workstation that will run the Quartus II software, you must verify the required runtime patches and kernel configuration before starting the Quartus II software for the first time.

<table>
<thead>
<tr>
<th>Before You Configure a Solaris Workstation</th>
</tr>
</thead>
<tbody>
<tr>
<td>You should be aware of the following information before you configure a Solaris workstation:</td>
</tr>
<tr>
<td>— You must have superuser or “root” privileges to install runtime patches or modify kernel configuration.</td>
</tr>
<tr>
<td>— Solaris 9 workstations do not require runtime patches.</td>
</tr>
</tbody>
</table>
Verifying Required Runtime Patches (Solaris 8 Only)

Make sure that each workstation has the runtime and graphics card patches that are required to run the Quartus II software on a Solaris 8 UNIX workstation. The last two numbers of the patches represent the version number and can be substituted with a more recent version number. Refer to Table 2 for a list of patches and descriptions.

To determine which patch is installed on your system, type the following command at a command prompt:

```
showrev -a | grep <patch number>
```

If the patches are not installed on your system, you should download the appropriate replacement patch from the Sun Microsystems support web site at sunsolve.sun.com. Altera recommends checking the Altera Find Answers page, which is available from the Support Center section of the Altera web site at www.altera.com/answers, for late-breaking information on required and optional operating system patches. In addition, the latest version of the Quartus II Installation & Licensing for UNIX and Linux Workstations manual, which is available in PDF format from the Altera web site at www.altera.com/literature, may contain updated information on patches.

Table 2 lists the runtime patches for Solaris 8.

**Table 2. Solaris 8 Runtime Patches**

<table>
<thead>
<tr>
<th>Runtime Patches</th>
<th>Description</th>
<th>Reason for Patch</th>
</tr>
</thead>
<tbody>
<tr>
<td>109147-12 or later</td>
<td>SunOS 5.8 Linker patch</td>
<td>Correct dynamic load and unload of shared libraries</td>
</tr>
</tbody>
</table>

*Note: If you are unable to install this runtime patch, the Quartus II software still functions, but online Help is not available and the graphical user interface performance and general stability may be affected.*

Verifying Kernel Configuration (Solaris Only)

You should perform the following steps on a UNIX workstation running Solaris 8 or 9 to ensure that the system’s kernel configuration meets the minimum system requirements to run the Quartus II software, if necessary:
1. Check the configuration parameters listed below to make sure that the values listed in the system file, which is located in the etc directory, are greater than or equal to the recommended values listed below.

<table>
<thead>
<tr>
<th>Solaris Parameter</th>
<th>Recommended Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pt_cnt</td>
<td>200</td>
</tr>
<tr>
<td>shmax</td>
<td>8388608</td>
</tr>
<tr>
<td>shmmni</td>
<td>1000</td>
</tr>
<tr>
<td>shmseg</td>
<td>16</td>
</tr>
<tr>
<td>semmni</td>
<td>1000</td>
</tr>
</tbody>
</table>

2. If one or more of the parameters do not have the recommended values, change the values to the recommended values by adding one or more of the following lines to the system file:

```
set pt_cnt=200
set shmsys:shminfo_shmax=8388608
set shmsys:shminfo_shmmni=1000
set shmsys:shminfo_shmseg=16
set shmsys:shminfo_semmni=1000
```

3. Restart the workstation.

### Configuring Each HP-UX Workstation

For each HP-UX 11.0 UNIX workstation that will run the Quartus II software, you must verify the required runtime patches and kernel configuration before starting the Quartus II software for the first time.

---

**Before You Configure Each HP-UX Workstation**

You must have superuser or “root” privileges to install runtime patches or modify kernel configuration.
Verifying Required Runtime Patches

Make sure that each workstation has the runtime patches that are required to run the Quartus II software on a HP-UX workstation. Refer to Table 3 for a list of patches and descriptions.

Table 3. HP-UX 11.0 Runtime Patches

<table>
<thead>
<tr>
<th>Runtime Patches</th>
<th>Description</th>
<th>Reason for Patch</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSS_25447 (1)</td>
<td>s700_800 11.00 X/Motif 32bit Runtime OCT2001 Periodic Patch</td>
<td>Required for the Quartus II software to function correctly due to operating system deficiencies</td>
</tr>
<tr>
<td>PHSS_30965 (2)</td>
<td>s700_800 11.00 ld(1) and Linker Tools Cumulative Patch</td>
<td>Required for the Quartus II software to function correctly due to operating system deficiencies</td>
</tr>
</tbody>
</table>

Notes:
(1) You must install this patch only if one of the following patches is installed on your system: PHSS_20142 or PHSS_22946.
(2) You must install this patch only if you do not have it or a previous version of it installed on your system. If the patch is not installed on your system, you may get an internal error and the Quartus II software will not function correctly. The Quartus II software will indicate whether the patch or a previous version of the patch is already installed on your system.

To determine which patch is installed on your system, type the following command at the command prompt:

```
/usr/sbin/swlist -v | grep <patch name and number>
```

If one of the patches in each set of required patches is not installed on your system, you must download the appropriate replacement patch:

1. Back up your UNIX workstation before installing a patch.
2. Download the patch from the Hewlett-Packard support web site at us-support.external.hp.com.
3. Copy the patch to the tmp directory.
4. Type the following commands from the tmp directory:
   ```
   sh <patch name and number>
   ```
5. To start the SD Install program, type the following command:
   
   \texttt{swinstall} \\

6. Select the path to the patch.

7. To install the patch, choose \texttt{Install} (Actions menu).

<table>
<thead>
<tr>
<th>For Information About</th>
<th>Refer To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late-breaking information on required operating system patches</td>
<td>Altera Find Answers page, which is available from the Support Center section of the Altera web site at \texttt{www.altera.com/answers}</td>
</tr>
<tr>
<td>Updated information on patches</td>
<td>\texttt{Quartus II Installation &amp; Licensing for UNIX and Linux Workstations} manual on the Altera web site</td>
</tr>
</tbody>
</table>

**Verifying Kernel Configuration (HP-UX Only)**

You should perform the following steps to verify whether the system’s kernel configuration meets the minimum system requirements to run the Quartus II software:

1. Back up your UNIX workstation before modifying your kernel configuration.

2. Type the following command at the command prompt:
   
   \texttt{sam} \\

3. In the \texttt{SAM Areas} folder, double-click the \texttt{Kernel Configuration} icon.

4. In the \texttt{Kernel Configuration} folder, double-click the \texttt{Configurable Parameters} icon.

5. Choose \texttt{Apply Tuned Parameter Set} (Actions menu). The \texttt{Tuned Kernel Parameter Sets} dialog box appears.

6. In the \texttt{Select a Tuned Parameter Set} list, select \texttt{CAE/ME/General Eng. Workstation 64-Bit Kernel}.

7. Click OK.
8. In the Configurable Parameters list in the Kernel Configuration dialog box, scroll to view the configuration parameters and change them to the recommended settings, if necessary.

Check the configuration parameters listed below to make sure that the values shown in the Current Values column in the Kernel Configuration dialog box are greater than or equal to the recommended values listed below. If they are not, change the values to the recommended values.

<table>
<thead>
<tr>
<th>HP-UX 11.0 Parameter</th>
<th>Recommended Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>semmnu</td>
<td>1000</td>
</tr>
<tr>
<td>semume</td>
<td>100</td>
</tr>
<tr>
<td>semmni</td>
<td>1000</td>
</tr>
<tr>
<td>shmmax</td>
<td>8388608</td>
</tr>
<tr>
<td>shmsseg</td>
<td>16</td>
</tr>
</tbody>
</table>

9. To close the Configurable Parameters list, choose Exit (File menu). The Create a New Kernel dialog box appears.

10. Click Create New Kernel Now.

11. Click OK. The system creates a new kernel, and then restarts.

If you receive an error message pertaining to sem_lock or sem_unlock, you must increase the semmnu parameter to a value larger than 1000 and the semume parameter to a value larger than 100.

Configuring Each Linux Workstation

For each Linux workstation that will run the Quartus II software, you must verify the libraries and kernel configuration before starting the Quartus II software for the first time.
Verifying Required Libraries (Linux Only)

To use the Visual MainWin software, which is required to run the Quartus II software on Linux workstations, the Linux workstation requires the GNU libc libraries (glibc). Table 4 lists the glibc versions required for each version of the Red Hat Linux supported by the Quartus II software.

Table 4. Required glibc Version for Linux Workstations

<table>
<thead>
<tr>
<th>Red Hat Linux Version</th>
<th>glibc Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.3</td>
<td>glibc 2.2.5-34</td>
</tr>
<tr>
<td>8.0</td>
<td>glibc 2.2.93-5</td>
</tr>
<tr>
<td>Enterprise 3.0</td>
<td>glibc 2.3.2-95</td>
</tr>
</tbody>
</table>

The GNU libc libraries are available at the Red Hat Linux web site, which is www.redhat.com.

Verifying Kernel Configuration (Linux Only)

You should perform the following steps to ensure that the system’s kernel configuration meets the minimum system requirements to run the Quartus II software:

1. Check the configuration parameters listed below to make sure that the values listed in the limits.conf file, which is located in the /etc/directory directory, are greater than or equal to the recommended values listed below.

<table>
<thead>
<tr>
<th>Linux Parameter</th>
<th>Recommended Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>hard nofile</td>
<td>32768</td>
</tr>
<tr>
<td>soft nofile</td>
<td>32768</td>
</tr>
</tbody>
</table>

Before You Configure Each Linux Workstation

You must have superuser or “root” privileges to install runtime patches or modify kernel configuration.
2. If one or more of the parameters do not have the recommended values, change the values to the recommended values by adding one or more of the following lines to the `limits.conf` file:

```
* hard nofile 32768
* soft nofile 32768
```

### Asterisks (*) in limits.conf File
The asterisks (*) in the previous lines are part of the code and must be included in the your `limits.conf` file.

3. Type the following command at the command prompt:

```
echo 356 40000 32 32000 > /proc/sys/kernel/sem
```

### Adding Kernel Configuration Command to Linux Workstation Startup Scripts
The previous command takes effect immediately; however, Altera recommends that your system administrator also add the commands to the workstation’s startup scripts, because the command is reset whenever you restart the workstation.

---

## Configuring Each Quartus II User’s Environment

Make sure that the following steps have been performed for each Quartus II software user before starting the Quartus II software for the first time:

1. Update each user’s `PATH` environment variable in the `.cshrc` file, which is located in the home directory, to include the `bin` directory in the Quartus II system directory, which is usually the `/usr/quartus/bin` directory. To update the `PATH` environment variable, type the following command at a command prompt:

```
setenv PATH \${PATH}:/<Quartus II system directory>/bin
```
2. Save the changes to the .cshrc file, and then type the following commands at a command prompt:

```
cd
source .cshrc
```

Starting the Quartus II Software

After you have followed all the guidelines for configuring each workstation and each user environment, you can start the Quartus II software by typing the following command at a command prompt:

```
quartus
```

When you start the Quartus II software, if the software cannot detect a valid license file, you will see a prompt with the following options:

- **Enable 30-day evaluation period with no license file (no programming file support)**—This option allows you to continue to use the Quartus II software for 30 days without programming file support. After 30 days, you must have a valid license file in order to use the software.

- **Perform automatic web license retrieval**—This option allows you to request a license file automatically from the Licensing section of the Altera web site and guides you through the procedure. See “Obtaining a License File” on page 24 for more information.

- **Specify valid license file**—This option displays the License Setup page of the Options dialog box (Tools menu), which allows you to specify the location of your license file. See the next section, “Specifying the License File,” for more information.
If you want to enable the Internet connectivity features of the Quartus II software, you should also follow the guidelines in “Specifying a Web Browser” on page 48.

Specifying the License File

Once you have obtained a license file and set up a license server, you must specify the location of the license file for each user (or “client”). You can specify the license file with either of the following methods, which are described in more detail in this section:

- Specify the license file using the Quartus II software
- Specify the license file using the .cshrc file on client workstations

Specifying the License File by Using the Quartus II Software

To specify the license file within the Quartus II software, follow these steps on each workstation that will be running the Quartus II software:

1. If you have not already done so, start the Quartus II software, as described in “Starting the Quartus II Software” on page 43.

Specifying the License File with the ModelSim-Altera Software and MAX+PLUS II Software

If you are using the Altera-provided ModelSim-Altera simulation software, which is included with Altera software subscriptions, and/or you are using the MAX+PLUS II software, you should specify the license file with the .cshrc file.

Starting the Quartus II Software for the First Time

When you start the Quartus II software, if the software cannot detect a valid license file, you are asked whether you want to run in evaluation mode for 30 days, request a valid license file automatically from the Altera web site, or specify the correct location of a valid license file.
2. Select **Specify valid license file** to specify the name of the license file. The **License Setup** page of the **Options** dialog box (Tools menu) is displayed. Figure 4 shows the **License Setup** page.

To specify the license file at a later time, choose **License Setup** (Tools menu). The **License Setup** page is displayed.

---

**Figure 4. License Setup Page of the Options Dialog Box**

- **Current license**
- **Option to use LM_LICENSE_FILE variable**
- **License file location**
- **License file**
- **Web License Update button**

---

**Licensed AMPP/MegaCore functions**

- **Vendor**
- **Product**
- **Version**

- **ALTERA**
  - Microprocessor Library (0001)
  - Fast Fourier Transform (0002)
  - Color Space Converters (0003)
  - 32-bit, 32-MHz Master/Target w/DMAP (0004)
  - Cyclic Redundancy Generator/Checker (0005)
  - UART (0006)
  - UART Only (0007)
  - UART (0008)
  - UART (0009)

- **ALTERA**
  - 32-bit, 32-MHz Target Only (0007)

---

**Local System Info**

- **System ID**: 00a621a96
3. In the License file box, specify the full path name of the license.dat file. You can click Browse (...) to locate the license.dat file. Altera recommends that you store the license.dat file in a directory named /usr/local/flexlm/licenses.

You can also specify the location of the license file by typing a name of the format <port>@<host> instead of a license file path name, where <host> is the name of the server where the license file is stored and <port> is the port listed in the license.dat file. See Figure 1 on page 27 for a sample network license file to determine your port and server name, and refer to Table 1 on page 30 for more information about port numbers. If there is no port listed in the license.dat file, you can simply specify @<host>.

<table>
<thead>
<tr>
<th>Specifying Multiple License Files and/or Servers</th>
</tr>
</thead>
<tbody>
<tr>
<td>If you have more than one license file or server, separate the port and host specifications with colons (:), with no spaces between the names and numbers. For example:</td>
</tr>
<tr>
<td>1800@king:/usr/local/lib/license.dat:270000@queen</td>
</tr>
</tbody>
</table>

If you want to use the current LM_LICENSE_FILE value specified in the .cshrc file, turn on Use LM_LICENSE_FILE variable.

4. If you want to check the Altera web site for license file updates, click Web License Update.

5. If you want to use the Quartus II software in the “Subscription Expiration” grace period, click Begin 30-day Grace Period. The “Subscription Expiration” grace period allows you to use the Quartus II software with programming file support for 30 days. When the grace period expires, you must obtain an updated license file at the Altera web site to continue using the Quartus II software with programming file support.

6. Click OK.

The Licensed AMPP/MegaCore functions list of the License Setup page lists all of the features and products that are available for the license.
Specifying the License File in the .cshrc File on Client UNIX & Linux Workstations

To specify the license file in the .cshrc file on each client (user) workstation, make sure that you update the LM_LICENSE_FILE variable that is specified in the .cshrc file located in each user’s home directory. You must edit this file for each user, or provide clear instructions that describe which lines the user needs to enter or edit:

✓ Make sure that each user has an LM_LICENSE_FILE variable that is set to the full directory path name of the license file. To update this variable, add the following line to the .cshrc file for each user:

```bash
setenv LM_LICENSE_FILE /usr/local/flexlm/licenses/license.dat
```

or

✓ If you want to specify the name of the server on which the license file is stored, add the following line to the .cshrc file for each user:

```bash
setenv LM_LICENSE_FILE=<port>@<host>
```

where <host> is the name of the server and <port> is the port listed in the license.dat file. See Figure 1 on page 27 for a sample network license file to determine your port and server name, and refer to Table 1 on page 30 for more information about port numbers. If there is no port listed in the license.dat file, you can simply specify @<host>. 

Using the setenv Environment Variable with Multiple Applications

If more than one application uses this environment variable, separate the different paths with a colon (:) with no spaces between the path names. For example:

```bash
setenv LM_LICENSE_FILE /usr/local/flexlm/licenses/license.dat:/tmp/license.xyz
```

or
If you want the Quartus II software to use the \texttt{LM\_LICENSE\_FILE} setting from your \texttt{.cshrc} file, make sure \texttt{Use LM\_LICENSE\_FILE variable} is turned on in the \texttt{License Setup} page of the \texttt{Options} dialog box (Tools menu).

### Specifying a Web Browser

You must specify your web browser location in the \texttt{Options} dialog box to enable the Internet connectivity features of the Quartus II software. To specify your web browser location, follow these steps:

1. Start the Quartus II software.
2. Choose \texttt{Options} (Tools menu).
3. In the Category list, select \texttt{Internet Connectivity}. The \texttt{Internet Connectivity} page appears. Figure 6 on page 48 shows the \texttt{Internet Connectivity} page of the \texttt{Options} dialog box.
4. In the Web browser box, specify the full path name of your web browser. You can click \texttt{Browse} to locate your web browser.
5. If you are using a proxy server, specify the proxy address and port:
   - \texttt{a.} Turn on Access the web using a proxy server (UNIX platforms only).
   - \texttt{b.} In the Address box, type the proxy address.
   - \texttt{c.} In the Port box, type the port number.
6. Click \texttt{OK}.

---

\textbf{Using the setenv Environment Variable with Multiple Applications}

If you have more than one license file or server, separate the port and host specifications with colons (:), with no spaces between the names and numbers. For example:

\texttt{1800@king:/usr/local/lib/license.dat:270000@queen}
Registering for an Altera.com Account

Your copy of the Quartus II software is registered at the time of purchase; however, in order to use the mySupport web site to view and submit service requests, you must also register for an Altera.com account. An Altera.com account is required only for using the mySupport web site; however, having an Altera.com account will also make it easier for you to use many other...
Altera web site features, such as the Download Center, Licensing Center, Altera Technical Training online class registration, or Buy On-Line-Altera eStore features.

To register for an Altera.com account, follow these steps:

1. Go to the mySupport web site:
   - To start your web browser and connect to the mySupport web site while running the Quartus II software, choose **Altera on the Web > Quartus II Service Request** (Help menu).
   - or
   - Point your web browser to the mySupport web site at **www.altera.com/mysupport**.

2. Follow the instructions on the mySupport web site to register for an Altera.com account.

If you are not a current Altera subscription user, you can still register for an Altera.com account.
Introduction

This section describes how to change additional workstation configuration items including Quartus II general environment variables, Quartus II NativeLink® environment variables, user names, language settings, and fonts.

Setting Environment Variables

This section describes the environment variables that the Quartus II software uses to configure various options and locate files.

If you are using the C shell, environment variables are located in your .cshrc file, and have the following format:

```
setenv <environment variable> <value>
```

If you are using the Bourne or Korn shell, environment variables are located in your .profile file, and have the following format:

```
set <environment variable> = <value>
```

Quartus II General Environment Variables

The Quartus II software installation process initializes the following variables, but you may wish to change them to optimize your system performance.

QUARTUS_ROOTDIR

The QUARTUS_ROOTDIR variable specifies the name of the Quartus II system directory. The default directory is /usr/quartus. You should change this variable only if the system displays an error message indicating that Quartus II files cannot be found when you start the program.
**MWFONT_CACHE_DIR**

The **MWFONT_CACHE_DIR** variable specifies the name of the Quartus II font cache directory. The default directory is `/<user’s home directory>/.mw`.

**QUARTUS_MWWM**

The **QUARTUS_MWWM** variable specifies how the Quartus II software should interact with the system’s window manager. By default, the **QUARTUS_MWWM** environment variable is set to `allwm` (except for Linux workstations) and the Quartus II software operates normally with all supported window managers (refer to “Quartus II System Requirements” on page 3 for a list of supported window managers). If you are not using one of the default window managers, make sure you set the **QUARTUS_MWWM** environment variable to `allwm` to allow the Quartus II software to determine the most compatible mode.

**Quartus II NativeLink Environment Variables**

The Quartus II software installation process initializes the following variables, but you must set them to use the NativeLink features of the Quartus II software.

**QUARTUS_INIT_PATH**

The **QUARTUS_INIT_PATH** variable specifies the path(s) of the EDA tool(s) to be launched from within the Quartus II software. You must set this variable to launch other EDA tools from within the Quartus II software.

**QUARTUS_INIT_LIBPATH**

The **QUARTUS_INIT_LIBPATH** specifies the **LD_LIBRARY_PATH** variable needed by some EDA tools. You should set this variable to the EDA tool’s **LD_LIBRARY_PATH** if the EDA tool requires an **LD_LIBRARY_PATH** variable.
Other Workstation Configuration Information

This section describes other workstation configuration information, including user names, language settings, fonts, and printers:

- If you want to change user names at a workstation using the `su` command, you must type the following command at the command prompt before starting the Quartus II software:

  ```
  su <username>
  ```

  Changing user names using the `su <username>` command (without the dash) causes the new user to use the environment settings from the previous user, which may cause the Quartus II software to stop responding.

- The Quartus II software does not support UNIX language settings other than English. The `LANG` variable must be set to `C` for the Quartus II software to function correctly.

- By default, generated fonts are saved to the `/<user’s home directory>/mw` directory; however, having the font cache saved to these directories for each user may cause unnecessary duplication of fonts. You can avoid this problem by specifying a directory to contain all the generated fonts for the display. To specify this directory, type the following command at the command prompt:

  ```
  setenv MWFONT_CACHE <new directory name>
  ```

- If the Quartus II software stops responding due to an internal error, determine whether any of the following processes are running:

  ```
  mwrpcss quartus_edata quartus_sim quartus_pow quartus_stp quartus_pgm quartus_cpf quartus_sh quartus_cdb
  ```
You can determine which processes are running by typing the following command at the command prompt:

```
/usr/bin/ps -ef
```

You must then terminate these processes by typing the following command at the command prompt:

```
kill - 9 <process ID number>
```

- You can use the `mwcleanup` utility to clean up system resources and terminate all MainWin applications by typing the following command at the command prompt:

```
mwcleanup
```

- If you want to configure a printer with the MainWin control panel, follow these steps:

  a. Become non-root and run `mwcontrol`, which is located in the `/<Quartus II system directory>/bin` directory. The MainWin Control Panel dialog box appears.

  b. Double-click Printers. The MainWin Printers dialog box appears.


  d. Click Next. The Identify your Unix Printer wizard appears.

  e. Select the printer you want to use with the Quartus II software.

  f. Click Next. The Print Command wizard appears.

  g. In the Print Command box, type the following command:

     ```
     /bin/sh -c "cat %s | lpr -P <printer name>; rm %s"
     ```

  h. Click Next. The Printer Name wizard appears.

  i. Type a name for the printer and click Next. The Finish Adding New Printer wizard appears.

  j. Verify that the printer information is correct and click Finish.
If you want to test the printer, follow these steps:

a. Start the Quartus II software and open a text file.

b. Choose Print (File menu) and select the printer you configured in the above procedure.

c. Click OK. If the printer is properly configured, the text file will print on the specified printer.
Chapter Four

Documentation & Technical Support

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<td>Using Quartus II Help</td>
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<td>Contacting Altera</td>
<td>64</td>
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</tbody>
</table>
Starting the Quartus II Tutorial

The online tutorial introduces you to the features of the Quartus II design software. It shows you how to create and process your own logic designs quickly and easily. The modular design of the Basic and Optional tutorials allows you to choose the areas of the Quartus II software that you want to learn about:

- The Basic tutorial guides you through the steps required to create, compile, perform timing analysis on, simulate, and program a sample finite impulse response (FIR) filter design, called `fir_filter`.

- The Optional tutorial modules focus on topics such as making the transition from the MAX+PLUS II software, using the LogicLock feature, and using Stratix device features. You do not need to complete the Basic tutorial to begin any of the Optional tutorial modules.

To start the Quartus II tutorial after you have successfully installed the Quartus II software:

 Tick Choose **Tutorial** (Help menu).

After you start the tutorial, the Quartus II window resizes to allow you to view the Tutorial window and the Quartus II software simultaneously.

---

Before You Start the Quartus II Tutorial

You should be aware of the following information before you start the Quartus II tutorial:

- You must have installed support for Cyclone EP1C6 devices if you want to complete the Basic or LogicLock tutorial. In addition, you must have installed support for MAX II EPM570 and Stratix EP1S25 devices if you want to complete the Optional MAX+PLUS II Conversion and Stratix tutorial modules. If you did not install support for these devices, refer to “The Quartus II Install Script” on page 5 in Chapter 1, “Installing the Quartus II Software.”

- The tutorial is designed for display online. However, if you want to print one or more of the tutorial modules, click the **Printing Options** button located at the beginning of each module and then click the link to open the appropriate printable version.
CHAPTER 4: DOCUMENTATION & TECHNICAL SUPPORT

USING QUARTUS II HELP

Using Quartus II Help

The Quartus II software includes a platform-independent Help system that provides comprehensive documentation for the Quartus II software and more details about the specific messages generated by the Quartus II software. You can view Help in one of the following ways:

- Press F1 from a highlighted menu command or active dialog box for context-sensitive help.
- Choose Index (Help menu) to view the Index tab. The Index lets you search for and display all Help topics related to a keyword or phrase.
- Choose Contents (Help menu) to view the Contents tab. The Contents outlines the design flow and groups related topics into folders, but does not list all the topics in Quartus II Help.
- Choose Search (Help menu) to perform a search with the Search tab. The Search finds a maximum of 500 topics containing the search keyword.
- Choose Messages (Help menu) to view the Messages list. The Messages list provides an alphabetical list of all messages and offers detailed Help on each message.
- Choose Glossary (Help menu) to view the Glossary list. The Glossary list provides definitions to key terminology in the Quartus II software.

For Information About Refer To
Using Quartus II Help “Help Menu Commands” in Quartus II Help
“Using Quartus II Help Effectively” in Quartus II Help

Getting Help on a Message

To view Help on an individual message, follow these steps:

1. In the Messages window, select the message on which you want to receive Help.
2. Choose Help (right button pop-up menu).
To view the entire alphabetical list of messages:

✓ Choose **Messages** (Help menu).

or

✓ Choose **Contents** (Help menu), and select **Messages List** from the end of the Contents.

---

**Using Context-Sensitive Help**

To view context-sensitive help for a specific item:

✓ Press F1 from a highlighted menu command or active dialog box for context-sensitive help.

or

✓ Press Shift+F1 or choose the **Context-Sensitive Help** button on the toolbar. The pointer turns into a Help pointer. You can then point to a menu command or active window and click for context-sensitive help.

---

**Navigating Help**

The Help window includes a **Contents** tab, **Index** tab, **Search** tab, and **Favorites** tab that can help you navigate through thousands of Help topics.

---

**Using the Index Tab**

To find and display a Help topic using the Index, follow these steps:

1. Choose **Index** (Help menu) or, if the Help window is already open, click the **Index** tab.

2. Type the entry you want to find in the **Type in the keyword to find** box.

3. In the list of keywords, select the entry or subentry.
4. To open the topic, click Display or double-click the entry.

**Using the Search Tab**

To search all topics in Quartus II Help for specific keywords, follow these steps:

1. Choose Search (Help menu) or, if the Help window is already open, click the Search tab.

2. Type the word or words that you want to find:
   - To find topics with adjacent words, type the words in double quotation marks. For example, “this and that” finds topics that contain the exact phrase “this and that.”
   - To find topics that contain the words, type the words without double quotation marks. For example, this and that finds topics that contain any combination of the words “this,” “and,” and “that.”

3. If necessary to narrow your search, select AND, OR, NEAR, or NOT from the list.

4. If necessary, turn on Search previous results, Match similar words, or Search titles only.

5. Click List Topics.

6. Select the topic you want to display.

7. Click Display.
Using the Contents Tab

To view groups of related topics, follow these steps:

1. Choose Contents (Help menu) or, if the Help window is already open, click the Contents tab.

2. Select the Help folder topic you want to view.

3. Click the + icon to expand the folder and view the names of individual Help topics.

4. Select the topic you want to display.

Using the Favorites Tab

To add Help topics to your Favorites list:

1. Open the Help window.

2. Open the topic that you want to add to your Favorites list.

3. Click the Favorites tab to open it.

4. Click Add to add the topic to your list of favorite Help topics.

Printing Help Topics

To print Quartus II Help topics from the Contents tab, follow these steps:

1. In the Contents tab, select the Help folder or Help topic that you want to print.

2. Choose Print (right button pop-up menu).

   or

   Click the Print button on the toolbar.

3. Select the appropriate print option:

   - To print the selected topic, select Print the selected topic.
4. Click OK.

**Finding a Keyword in a Help Topic**

To search for a keyword in an open Quartus II Help topic, follow these steps:

1. To open the Find dialog box, press Ctrl + F.
2. In the Find what box, type the search text.
3. If necessary, turn on one or both of the following options:
   - Match whole word only
   - Match case
4. In the Direction list, select a search direction.
5. Click Find Next.
6. If necessary, click Find Next again to find the next instance of the search text.
7. To end the search, click Cancel.

**Viewing a Glossary Definition**

To view the alphabetical glossary list:

✔ Choose Glossary (Help menu).

or

✔ Choose Contents (Help menu), and select Glossary List from the end of the Contents.
Contacting Altera

You can contact Altera for technical support and product information.

Technical Support

If you need technical support, you can visit the Altera web site or the mySupport web site, or you can call the Altera Applications Department.

Table 1. Quartus II Technical Support Resources

<table>
<thead>
<tr>
<th>Resource</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altera web site:</td>
<td><a href="http://www.altera.com">www.altera.com</a></td>
</tr>
<tr>
<td></td>
<td>Includes the Altera Find Answers page, which is available from the Support Center section of the Altera web site at <a href="http://www.altera.com/answers">www.altera.com/answers</a>.</td>
</tr>
<tr>
<td>mySupport web site:</td>
<td><a href="http://www.altera.com/mysupport">www.altera.com/mysupport</a></td>
</tr>
<tr>
<td></td>
<td>or choose Altera on the Web &gt; Quartus II Service Request (Help menu) in the Quartus II software. This web site allows you to submit, view, and update technical support service requests.</td>
</tr>
<tr>
<td>Telephone:</td>
<td>(800) 800-EPLD (7:00 a.m. to 5:00 p.m. Pacific time, M–F) You will need your 6-digit Altera ID to access the hotline.</td>
</tr>
<tr>
<td></td>
<td>(408) 544-8767 (7:00 a.m. to 5:00 p.m. Pacific time, M–F)</td>
</tr>
</tbody>
</table>

Registering for an Altera.com Account

In order to use the mySupport web site to view and submit service requests, you must also register for an Altera.com account. An Altera.com account is required only for using the mySupport web site; however, having an Altera.com account will also make it easier for you to use many other Altera web site features, such as the Download Center, Licensing Center, Altera Technical Training online class registration, or Buy On-Line-Altera eStore features. For more information, refer to “Registering for an Altera.com Account” on page 49 in Chapter 2, “Licensing the Quartus II Software.”
### Product Information

If you need the latest Altera product information or literature, go to the Literature section of the Altera web site at [www.altera.com/literature](http://www.altera.com/literature). You can also purchase printed sets of documentation from the Shop Altera web site at [www.shopaltera.com](http://www.shopaltera.com).

<table>
<thead>
<tr>
<th>For Information About</th>
<th>Refer To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altera technical support services</td>
<td>The Contact Altera section of the Altera web site</td>
</tr>
</tbody>
</table>


Appendix A
Quartus II File Organization

What's in Appendix A:
Quartus II File Organization
Quartus II File Organization

During the Quartus II software installation, the following directories are created on your workstation:

- The /usr/quartus directory (the main directory where the Quartus II software files are installed) contains system software and data files and includes the subdirectories described in Tables 1 through 5.

- The /usr/qdesigns directory contains tutorial and sample files and includes the subdirectories described in Table 5 on page 70.

The /usr/quartus directory includes the subdirectories listed in Table 2.

### Table 1. Quartus II System Directory (quartus) Structure  (Part 1 of 2)

<table>
<thead>
<tr>
<th>Directory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>./adm</td>
<td>Contains system administration scripts.</td>
</tr>
<tr>
<td>./bin</td>
<td>Contains wrapper scripts.</td>
</tr>
<tr>
<td>./devices</td>
<td>Contains device files.</td>
</tr>
<tr>
<td>./eda</td>
<td>Contains libraries for use with other EDA tools. Refer to Table 2 for information on the subdirectories of this directory.</td>
</tr>
<tr>
<td>./hp11</td>
<td>Contains platform-specific files for HP-UX 11.0 UNIX workstation installations. Also contains Tcl scripts to perform tasks in the Quartus II software and other EDA software.</td>
</tr>
<tr>
<td>./libraries</td>
<td>Contains the Quartus II software directory for “self-contained” libraries. Refer to Table 3 on page 69 for information on the subdirectories of this directory.</td>
</tr>
<tr>
<td>./linux</td>
<td>Contains platform-specific files for 32-bit Linux workstation installations, including the ByteBlaster driver, which is required to use the ByteBlasterMV download cable with Linux workstations. Also contains Tcl scripts to perform tasks in the Quartus II software and other EDA software.</td>
</tr>
<tr>
<td>./linux64</td>
<td>Contains platform-specific files for 64-bit Linux workstation installations with Linux workstations. Also contains Tcl scripts to perform tasks in the Quartus II software and other EDA software.</td>
</tr>
<tr>
<td>./lmf</td>
<td>Contains Library Mapping Files (.lmf).</td>
</tr>
<tr>
<td>./mw</td>
<td>Contains files needed for the MainWin software.</td>
</tr>
</tbody>
</table>
APPENDIX A: QUARTUS II FILE ORGANIZATION

QUARTUS II FILE ORGANIZATION

APPENDIX A: QUARTUS II FILE ORGANIZATION

The /usr/quartus/eda directory includes the subdirectories described in Table 2.

Table 1. Quartus II System Directory (quartus) Structure (Part 2 of 2)

<table>
<thead>
<tr>
<th>Directory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>./objective_studio</td>
<td>Contains files needed for the Objective Studio software.</td>
</tr>
<tr>
<td>./qdesigns</td>
<td>Contains tutorial and sample files. Refer to Table 5 on page 70 for information on the subdirectories of this directory.</td>
</tr>
<tr>
<td>./solaris</td>
<td>Contains platform-specific files for 32-bit Solaris UNIX workstation installations. Also contains Tcl scripts to perform tasks in the Quartus II software and other EDA software.</td>
</tr>
<tr>
<td>./solaris64</td>
<td>Contains platform-specific files for 64-bit Solaris UNIX workstation installations. Also contains Tcl scripts to perform tasks in the Quartus II software and other EDA software.</td>
</tr>
<tr>
<td>./sopc_builder</td>
<td>Contains files needed for the SOPC Builder software.</td>
</tr>
</tbody>
</table>

The /usr/quartus/eda directory includes the subdirectories described in Table 2.

Table 2. Quartus II EDA Directory (eda) Structure

<table>
<thead>
<tr>
<th>Directory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>./cadence</td>
<td>Contains technology libraries for Cadence EDA tools.</td>
</tr>
<tr>
<td>./ibis</td>
<td>Contains input files that allow the Quartus II software to generate design-specific IBIS Output Files for EDA tools.</td>
</tr>
<tr>
<td>./mentor</td>
<td>Contains technology libraries for Mentor Graphics EDA tools.</td>
</tr>
<tr>
<td>./sim_lib</td>
<td>Contains VHDL and Verilog HDL simulation libraries that are compatible with EDA tools from other vendors.</td>
</tr>
<tr>
<td>./synopsys</td>
<td>Contains technology libraries for Synopsys EDA tools.</td>
</tr>
<tr>
<td>./innoveda</td>
<td>Contains technology libraries for Innoveda EDA tools.</td>
</tr>
<tr>
<td>./fv_lib</td>
<td>Contains formal verification model libraries.</td>
</tr>
</tbody>
</table>

The /usr/quartus/libraries directory includes the subdirectories described in Table 3.
Table 3. Quartus II Library Directory (libraries) Structure

<table>
<thead>
<tr>
<th>Directory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>./megafuns</td>
<td>Contains megafunctions, including Library of Parameterized Modules (LPM) functions, corresponding Include Files (.inc) that contain their AHDL Function Prototypes, and corresponding Block Symbol Files (.bsf).</td>
</tr>
<tr>
<td>./others</td>
<td>Contains libraries of logic functions that provide compatibility between the Quartus II software and the MAX+PLUS II software.</td>
</tr>
<tr>
<td>./primitives</td>
<td>Contains Block Symbol Files (.bsf) for Quartus II primitives.</td>
</tr>
<tr>
<td>./software</td>
<td>Contains the boot loader library file that generates flash programming files with the Quartus II software and the ADS Toolset.</td>
</tr>
<tr>
<td>./vhdl87</td>
<td>Contains the library of IEEE Std. 1076–1987 VHDL packages.</td>
</tr>
<tr>
<td>./vhdl93</td>
<td>Contains the library of IEEE Std. 1076–1993 VHDL packages.</td>
</tr>
</tbody>
</table>

The /usr/quartus/sopc_builder directory includes the subdirectories described in Table 4.

Table 4. Quartus II SOPC Builder Directory (sopc_builder) Structure

<table>
<thead>
<tr>
<th>Directory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>./bin</td>
<td>Contains the executable software program files for the SOPC Builder software.</td>
</tr>
<tr>
<td>./bin/europa</td>
<td>Contains the HDL library generator.</td>
</tr>
<tr>
<td>./components</td>
<td>Contains the SOPC Builder software components.</td>
</tr>
<tr>
<td>./placeholders</td>
<td>Contains the SOPC Builder placeholders for the available components.</td>
</tr>
<tr>
<td>./examples</td>
<td>Contains the SOPC Builder example files.</td>
</tr>
<tr>
<td>./documents</td>
<td>Contains the SOPC Builder documentation.</td>
</tr>
<tr>
<td>./tutorials</td>
<td>Contains the SOPC Builder tutorial files.</td>
</tr>
</tbody>
</table>

The /usr/qdesigns directory includes the subdirectories described in Table 5.
### Table 5. Quartus II Work Directory (qdesigns) Structure

<table>
<thead>
<tr>
<th>Directory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>./tutorial</td>
<td>Contains the completed project and design files for the Basic tutorial. This directory includes a <code>readme.txt</code> file that contains important information about the tutorial.</td>
</tr>
<tr>
<td>./chiptrip</td>
<td>Contains the <code>chiptrip</code> project for use when completing the MAX+PLUS II Conversion tutorial module.</td>
</tr>
<tr>
<td>./fir_filter</td>
<td>Directory in which you should create the <code>fir_filter</code> project if you are completing the Design Entry tutorial module. Use this directory to prevent accidental changes to the original design files in the <code>/qdesigns/tutorial</code> directory.</td>
</tr>
<tr>
<td>./fir_filter/compile</td>
<td>Contains the <code>compile_fir_filter</code> project for use when completing the Compilation tutorial module independently or nonsequentially.</td>
</tr>
<tr>
<td>./fir_filter/timing</td>
<td>Contains the <code>timing_fir_filter</code> project for use when completing the Timing Analysis tutorial module independently or nonsequentially.</td>
</tr>
<tr>
<td>./fir_filter/simulate</td>
<td>Contains the <code>simulate_fir_filter</code> project for use when completing the Simulation tutorial module independently or nonsequentially.</td>
</tr>
<tr>
<td>./fir_filter/program</td>
<td>Contains the <code>program_fir_filter</code> project for use when completing the Programming tutorial module independently or nonsequentially.</td>
</tr>
<tr>
<td>./logiclock/topmult</td>
<td>Contains the <code>topmult</code> project for use when completing the LogicLock tutorial module.</td>
</tr>
<tr>
<td>./logiclock/lockmult</td>
<td>Contains the <code>lockmult</code> project for use when completing the LogicLock tutorial module.</td>
</tr>
<tr>
<td>./stratix</td>
<td>Contains the <code>stratix_tutorial</code> project for use when completing the Stratix tutorial module.</td>
</tr>
</tbody>
</table>
Mounting & Unmounting CD-ROMs

What’s in Appendix B:

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<th>Page</th>
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<tr>
<td>Mounting &amp; Unmounting CD-ROMs on Solaris Workstations</td>
<td>72</td>
</tr>
<tr>
<td>Mounting &amp; Unmounting CD-ROMs on Linux Workstations</td>
<td>74</td>
</tr>
<tr>
<td>Mounting &amp; Unmounting CD-ROMs on HP-UX Workstations</td>
<td>75</td>
</tr>
</tbody>
</table>
Introduction

The following appendix describes how to mount and unmount the Quartus II CD-ROMs and related CD-ROMs on UNIX and Linux workstations.

Mounting & Unmounting CD-ROMs on Solaris Workstations

Before You Mount a CD-ROM

You must have superuser or “root” privileges to mount and unmount the CD-ROM drive. If you are running Volume Manager, the CD-ROM drive is mounted and unmounted automatically as /cdrom/cdrom0 (you do not need to have root privileges to mount a CD-ROM with the Volume Manager), and you do not need to perform the mounting and unmounting procedures.

To mount a CD-ROM on a Solaris workstation, follow these steps:

1. Specify the directory where you want to mount the CD-ROM drive. The CD-ROM drive is usually placed in the top-level directory. To access this directory, type the following command at the command prompt:

   cd /

2. To create the /cdrom/cdrom0 directory, type the following command at the command prompt:

   mkdir /cdrom/cdrom0

3. If you have not already done so, insert the CD-ROM into your CD-ROM drive.

4. To mount the CD-ROM drive, type the following command at the command prompt:

   /sbin/mount -F hsfs -o ro /dev/dsk/<device name of CD-ROM> /cdrom/cdrom0
If you have previously mounted and unmounted this CD-ROM, a number may be appended to the device name of the CD-ROM, in which case you should use the complete name and number for `<device name of CD-ROM>`. For example, if the device name appears as `modelsim`, use that name.

To unmount a CD-ROM on a Solaris workstation, follow this step:

![checkmark] To unmount the CD-ROM drive, type the following command at the command prompt:

```
/sbin/umount /cdrom/cdrom0
```

To successfully unmount the CD-ROM drive, you must make sure no one is accessing the directory structure at or below the `cdrom` directory. If another user is using the CD-ROM drive, you may receive the following message:

```
umount: cannot unmount /cdrom/cdrom0: Device busy
```

To determine whether you are accessing the CD-ROM drive yourself, type the following command at the command prompt:

```
pwd
```

You should see the `/` prompt on your screen. If you do not, you should type `cd /` again.
Mounting & Unmounting CD-ROMs on Linux Workstations

Before You Mount a CD-ROM

You must have superuser or “root” privileges to mount and unmount the CD-ROM drive. If you are logged in on a console, you do not need to have root privileges to mount a CD-ROM.

To mount a CD-ROM on a Linux workstation, follow these steps:

1. If the `/mnt/cdrom` directory does not exist, type the following command at the command prompt:
   
   ```
   mkdir /mnt/cdrom
   ```

2. If you have not already done so, insert the CD-ROM into your CD-ROM drive.

3. To mount the CD-ROM drive, type the following command at the command prompt:
   
   ```
   /bin/mount /mnt/cdrom
   ```

   If you have previously mounted and unmounted this CD-ROM, a number may be appended to the device name of the CD-ROM, in which case you should use the complete name and number for `<device name of CD-ROM>`. For example, if the device name appears as `modelsim`, use that name.

To unmount a CD-ROM on a Linux workstation, follow this step:

✓ To unmount the CD-ROM drive, type the following command at the command prompt:

   ```
   /bin/umount /mnt/cdrom
   ```
To successfully unmount the CD-ROM drive, you must make sure that no one is accessing the directory structure at or below the cdrom directory. If another user is using the CD-ROM drive, you may receive the following message:

```
umount:/mnt/cdrom : Device busy
```

To determine whether you are accessing the CD-ROM drive yourself, type the following command at the command prompt:

```
pwd
```

You should see the `/` prompt on your screen. If you do not, you should type `cd /` again.

---

**Mounting & Unmounting CD-ROMs on HP-UX Workstations**

To mount and unmount a CD-ROM on an HP-UX workstation, follow these steps:

1. Specify the directory where you want to mount the CD-ROM drive. The CD-ROM drive is usually placed in the top-level directory. To access this directory, type the following command at the command prompt:

```
cd /
```

2. Find the device ID for the CD-ROM drive so you can mount the correct device. To view a list of the possible device IDs, type the following command at the command prompt:

```
/usr/sbin/ioscan -fn -C disk
```

Figure 1 shows sample output from this command, including sample device IDs.

---

**Before You Mount a CD-ROM**

You must have superuser or “root” privileges to mount and unmount the CD-ROM drive.
**Figure 1. Sample Device ID Output from ioscan Command**

```
<table>
<thead>
<tr>
<th>Disk</th>
<th>Date/Time</th>
<th>Status</th>
<th>Device Type</th>
<th>Device Name</th>
<th>File System Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10/0/14/0.0.0</td>
<td>CLAIMED</td>
<td>TEAC CD-532E-B</td>
<td>/dev/dsk/c0t0d0</td>
<td>/dev/rdsk/c0t0d0</td>
</tr>
<tr>
<td>1</td>
<td>10/0/15/1.5.0</td>
<td>CLAIMED</td>
<td>QUANTUM ATLAS10K-18LVD</td>
<td>/dev/dsk/c3t5d0</td>
<td>/dev/rdsk/c3t5d0</td>
</tr>
<tr>
<td>2</td>
<td>10/0/15/1.6.0</td>
<td>CLAIMED</td>
<td>QUANTUM ATLAS10K-18LVD</td>
<td>/dev/dsk/c3t6d0</td>
<td>/dev/rdsk/c3t6d0</td>
</tr>
</tbody>
</table>
```

The `-fn` option allows the `ioscan` command to show an extended information set, and the `-C` option filters the output to show only I/Os of disk type.

3. To create the `cdrom` directory, type the following command at the command prompt:

```
mkdir /cdrom
```

4. To mount the CD-ROM drive, type the following command at the command prompt:

```
/sbin/mount -o cdcase /dev/dsk/<device name of CD-ROM> /cdrom
```

The `-o cdcase` option creates lowercase file names in the CD file system. This command is followed by the device ID and the directory name on which you are mounting the CD-ROM drive.

To unmount a CD-ROM on an HP-UX workstation, follow these steps:

✓ To unmount the CD-ROM drive, type the following command at the command prompt:

```
/sbin/umount /cdrom
```

To successfully unmount the CD-ROM drive, you must make sure that no one is accessing the directory structure at or below the `cdrom` directory. If another user is using the CD-ROM drive, you may receive the following message:

```
umount: cannot unmount /cdrom : Device busy
```
To determine whether you are accessing the CD-ROM drive yourself, type the following command at the command prompt:

```
pwd
```

You should see the `/` prompt on your screen. If you do not, you should type `cd /` again.
Revision History

The information contained in the *Installation & Licensing for UNIX and Linux* manual version 5.0 revision 1 supersedes information published in previous versions.

Minor typographical changes were made to the previous version.
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