FPGA Vendor Tools Installation Guide

Version 1.5

Revision History

Revision	Description of Change	Date
v1.1	Initial Release	3/2017
v1.2	Updated for Release 1.2	8/2017
v1.4	Updated for Release 1.4	9/2018
v1.5	Updated for Release 1.5	4/2019

Table of Contents

1 References

This document assumes a basic understanding of the Linux command line (or "shell") environment. A working knowledge of OpenCPI is required for understanding what vendor tools are necessary to perform various operations. However, no OpenCPI knowledge is required to perform the toolset installation and configuration herein. The reference(s) in Table 1 can be used as an overview of OpenCPI and may prove useful.

Title	Link
OpenCPI Overview	`Overview.pdf`
Acronyms and Definitions	`Acronyms_and_Definitions.pdf`
Getting Started	`Getting_Started.pdf`
Installation Guide	`RPM_Installation_Guide.pdf`

Table 1: References

2 Supported Vendor Tools and OpenCPI functionality

OpenCPI utilizes third party FPGA vendor tools to perform various operations, such as, building bitstreams or, for certain platforms, loading bitstreams into FPGAs. Table 2 describes the OpenCPI functionality that is provided by each supported vendor tool with regards to building bitstreams (hardware or simulation), loading of bitstreams, or running a simulation. Since licensing of vendor tool plays a critical role in build for certain target devices and usage of a given tool, its relationship is also listed.

Note that Quartus Standard and Quartus Pro are *different tools*. These two tools support different sets of devices and users should consult Intel's documentation for more information. Older versions of some FPGA tools have been supported by OpenCPI but are not actively regression tested, such as, Vivado 2015.4 and Quartus Standard Edition 15.1.

OpenCPI + {Tool}	**Version/License**	**Supported simulators**	**Load bitstreams onto**	**Run applications on these platforms**	**Build bitstreams for**	**Build software for**
OpenCPI *ONLY* (without vendor tools)			Zynq-7000	Zynq-7000 based[1], x86-only		x86
Xilinx Vivado	2017.1 with WebPACK License	`xsim`			Zynq-7000[2]	
	2013.4 (SDK only)[4]					Zynq-7000 ARM
	2017.1 *and* 2013.4 SDK with WebPACK License	`xsim`			Zynq-7000[2]	Zynq-7000 ARM
Xilinx LabTools 14.7			ML605	x86/ML605		
Xilinx ISE 14.7	WebPACK License	`isim`	ML605	x86/ML605	Zynq-7000[2]	Zynq-7000 ARM
	Full License	`isim`	ML605	x86/ML605	Zynq-7000, ML605	Zynq-7000 ARM
Intel Quartus Standard 17.1 with License			ALST4	x86/ALST4	ALST4	
Intel Quartus Pro Edition 17.0.2 with License					arria10soc[3]	
Mentor Graphics ModelSim DE 10.6e with License		modelsim			modelsim	

[1] "Zynq-7000 based" platform includes both a Zynq-7000's FPGA and ARM PS. The usage of "Zynq" or "Zynq-based" does not imply Zynq UltraScale+ devices.

[2] Building bitstreams with a WebPACK license is limited to certain Zynq parts. Refer to the vendor's documentation for further information.

[3] While there are currently no OpenCPI Board Support Packages developed for Quartus Pro, HDL workers can be built targeting the *arria10soc* device family.

[4] The relationship between the Vivado Design Edition and SDK is discussed in 3.1.

Table 2: Added-value of Vendor Tools to OpenCPI

3 Xilinx Toolset Installation and Configuration

3.1 Xilinx Vivado Installation in CentOS 6/7

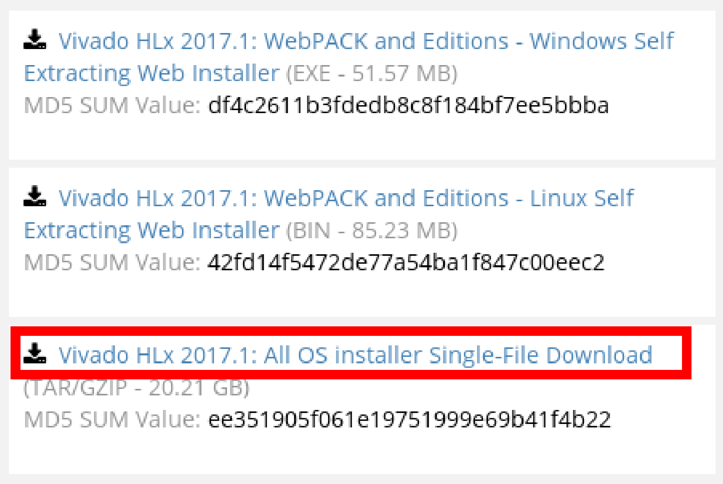
As described in Table 2, building for OpenCPI board support packages (BSPs) which are Xilinx FPGA-based requires various Xilinx FPGA tools to be installed.

In the case of Zynq-7000 based OpenCPI BSPs, the required tools are Vivado 2017.1 *and* Vivado 2013.4's SDK, where the 2013.4 SDK is necessary because OpenCPI's "`xilinx13_3`" and "`xilinx13_4`" software platforms require an SDK with matching glibc/glibc++ versions. An SDK meeting this requirement can be found explicitly in either ISE 14.7 or Vivado 2013.4 SDK. For more information on this requirement you can reference the README for the `xilinx13_3` software platform. This is located in the core project (*e.g.*: `<core-project>/rcc/platforms/xilinx13_3`).

In the case of the ML605 development board (PCIe), only ISE v14.7 is required, because the host's gcc-compiler will be used.

3.1.1 Xilinx Vivado 2017.1 Installation in CentOS 6/7

1. A Xilinx account is required for this step. Download the Vivado 2017.1 installation files from Xilinx's download site: `https://www.xilinx.com/support/download/index.html/content/xilinx/en/downloadNav/vivado-design-tools/2017-1.html`.



Vivado HLx 2017.1: WebPACK and Editions - Windows Self Extracting Web Installer (EXE - 51.57 MB)
MD5 SUM Value: df4c2611b3fdedb8c8f184bf7ee5bbba

Vivado HLx 2017.1: WebPACK and Editions - Linux Self Extracting Web Installer (BIN - 85.23 MB)
MD5 SUM Value: 42fd14f5472de77a54ba1f847c00eec2

Vivado HLx 2017.1: All OS installer Single-File Download (TAR/GZIP - 20.21 GB)
MD5 SUM Value: ee351905f061e19751999e69b41f4b22

Figure 1: Xilinx Vivado 2017.1 Download

2. If installing Xilinx tools in a permission-restricted directory, you may need to change the umask temporarily:

```
% sudo su -
% umask 0002
```

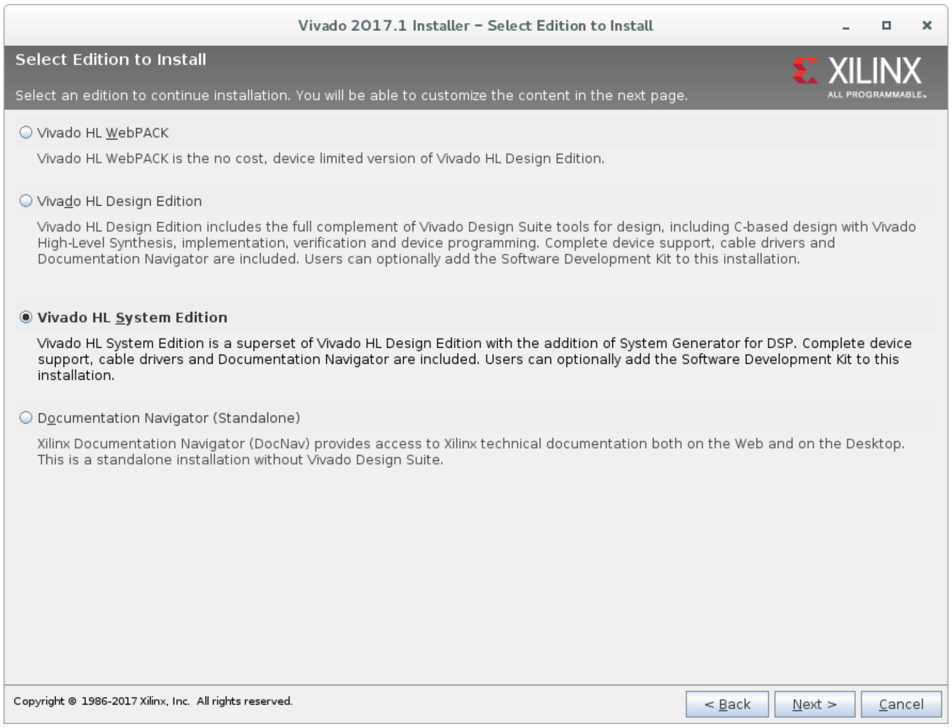
3. Extract the tarball:

```
% tar -xf Xilinx_Vivado_SDK_2017.1_0415_1.tar.gz
```

4. Enter the resulting directory and run the installer:

```
% cd Xilinx_Vivado_SDK_2017.1_0415_1
% ./xsetup
```

5. Step through the installation process. Refer to the images below when applicable.



Vivado 2017.1 Installer – Select Edition to Install

Select Edition to Install

Select an edition to continue installation. You will be able to customize the content in the next page.

○ Vivado HL WebPACK

Vivado HL WebPACK is the no cost, device limited version of Vivado HL Design Edition.

○ Vivado HL Design Edition

Vivado HL Design Edition includes the full complement of Vivado Design Suite tools for design, including C-based design with Vivado High-Level Synthesis, implementation, verification and device programming. Complete device support, cable drivers and Documentation Navigator are included. Users can optionally add the Software Development Kit to this installation.

● **Vivado HL System Edition**

Vivado HL System Edition is a superset of Vivado HL Design Edition with the addition of System Generator for DSP. Complete device support, cable drivers and Documentation Navigator are included. Users can optionally add the Software Development Kit to this installation.

○ Documentation Navigator (Standalone)

Xilinx Documentation Navigator (DocNav) provides access to Xilinx technical documentation both on the Web and on the Desktop. This is a standalone installation without Vivado Design Suite.

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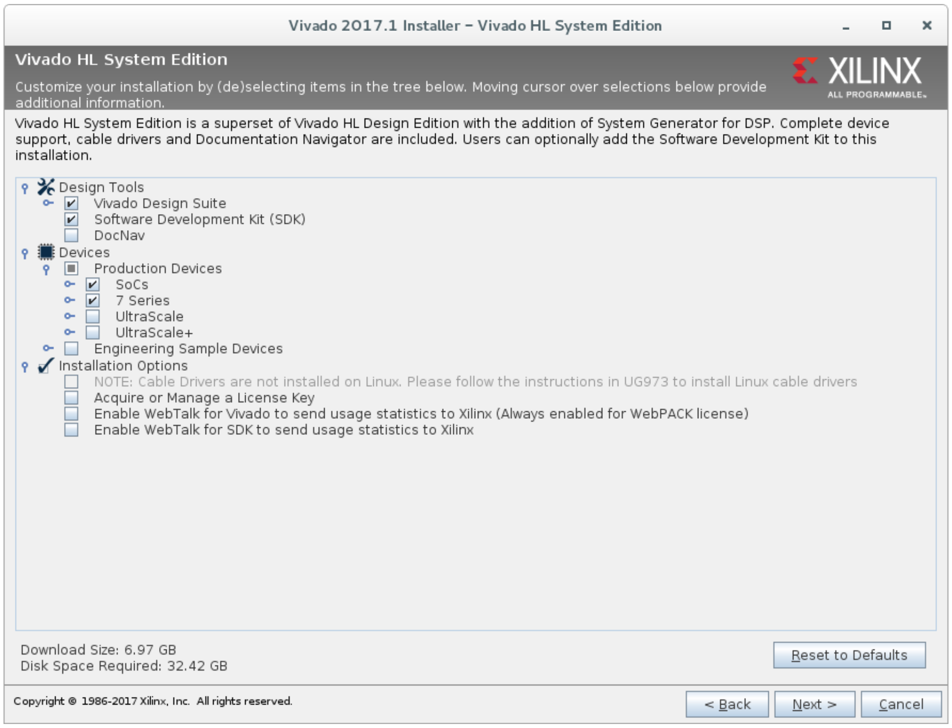
Figure 2: Xilinx Vivado Installer

We do not direct you to acquire a license, but if you do not already have one, you will need to select "Acquire or Manage a License Key" in the image below.



Vivado 2017.1 Installer – Vivado HL System Edition

Vivado HL System Edition

Customize your installation by (de)selecting items in the tree below. Moving cursor over selections below provide additional information.

Vivado HL System Edition is a superset of Vivado HL Design Edition with the addition of System Generator for DSP. Complete device support, cable drivers and Documentation Navigator are included. Users can optionally add the Software Development Kit to this installation.

- Design Tools
  - ☑ Vivado Design Suite
  - ☑ Software Development Kit (SDK)
  - □ DocNav
- Devices
  - ▣ Production Devices
    - ☑ SoCs
    - ☑ 7 Series
    - □ UltraScale
    - □ UltraScale+
  - □ Engineering Sample Devices
- Installation Options
  - □ NOTE: Cable Drivers are not installed on Linux. Please follow the instructions in UG973 to install Linux cable drivers
  - □ Acquire or Manage a License Key
  - □ Enable WebTalk for Vivado to send usage statistics to Xilinx (Always enabled for WebPACK license)
  - □ Enable WebTalk for SDK to send usage statistics to Xilinx

Download Size: 6.97 GB
Disk Space Required: 32.42 GB

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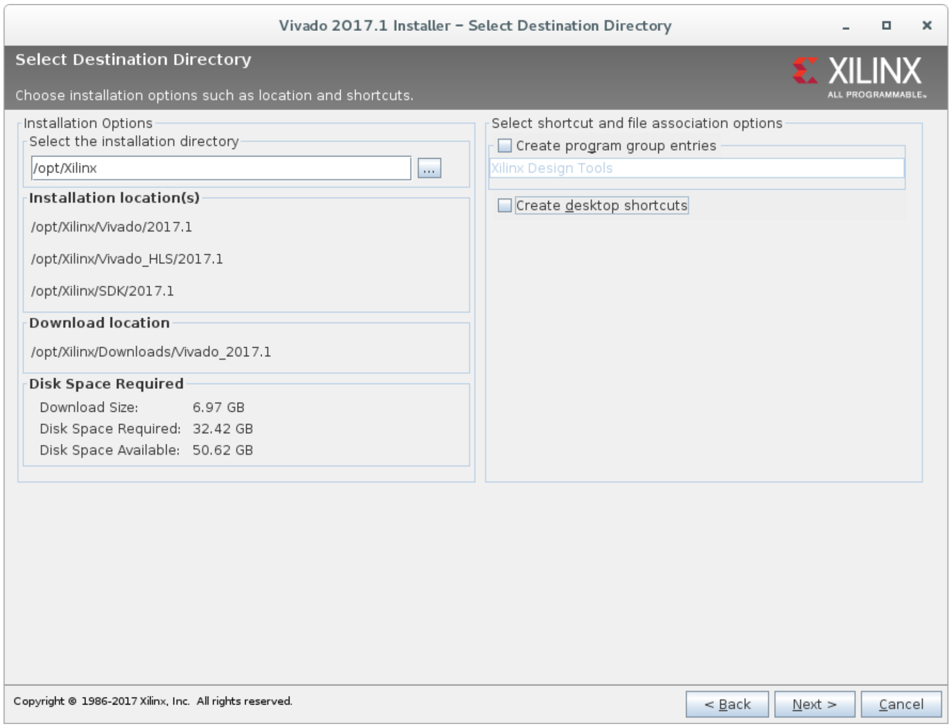
Figure 3: Xilinx Vivado Installation Choice

Take note of the installation directory chosen (e.g. `/opt/Xilinx`) as well as the Vivado version (e.g. `2017.1`) for later use.



Select Destination Directory

Choose installation options such as location and shortcuts.

Installation Options

Select the installation directory: /opt/Xilinx

Installation location(s)

/opt/Xilinx/Vivado/2017.1

/opt/Xilinx/Vivado_HLS/2017.1

/opt/Xilinx/SDK/2017.1

Download location

/opt/Xilinx/Downloads/Vivado_2017.1

Disk Space Required

Download Size:	6.97 GB
Disk Space Required:	32.42 GB
Disk Space Available:	50.62 GB

Select shortcut and file association options

□ Create program group entries

Xilinx Design Tools

□ Create desktop shortcuts

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Figure 4: Xilinx Vivado Install Location

3.1.2 OpenCPI Considerations

1. Note that sourcing the "`<Vivado-install-dir>/Vivado/<Vivado-version>/settings64.sh`" script will interfere with OpenCPI's environment setup. Accordingly, it is *highly* recommended to always source these scripts and execute any follow-on commands in a *separate terminal*.

2. To use OpenCPI with any Xilinx Vivado installation, it is required to set the following environment variables before running OpenCPI commands. Note that each of the following `export` statements is only necessary under the following conditions:

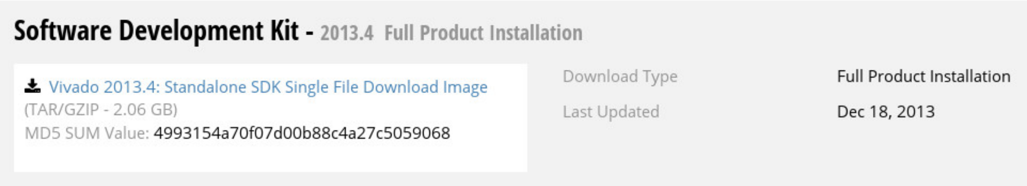
   - When using a non-default installation location (i.e. anything other than `/opt/Xilinx`)
   - When Vivado *and* ISE are both being used and are installed in different locations
   - Or when multiple versions of Vivado are installed and you wish to use a version other than the newest.

   ```
   % export OCPI_XILINX_VIVADO_DIR=<Vivado-install-dir>
   % export OCPI_XILINX_VIVADO_VERSION=<Vivado-version>
   ```

If OpenCPI has been installed prior to the Vivado installation, and it is desired to make the aforementioned environment variables set automatically upon login for all users, the variables should be added in `/opt/opencpi/cdk/env.d/xilinx.sh`. Logging out and logging back into the user account will apply said variables.

3.1.3 Xilinx Vivado 2013.4 SDK Only Installation in CentOS 6/7

1. A Xilinx account is required for this step. Download the Vivado 2013.4 Standalone SDK installation files from Xilinx's download site: `https://www.xilinx.com/support/download/index.html/content/xilinx/en/downloadNav/vivado-design-tools/archive.html`. Navigate to "2013.4" → "Software Development Kit".



Software Development Kit - 2013.4 Full Product Installation

Vivado 2013.4: Standalone SDK Single File Download Image
(TAR/GZIP - 2.06 GB)
MD5 SUM Value: 4993154a70f07d00b88c4a27c5059068

Download Type Full Product Installation
Last Updated Dec 18, 2013

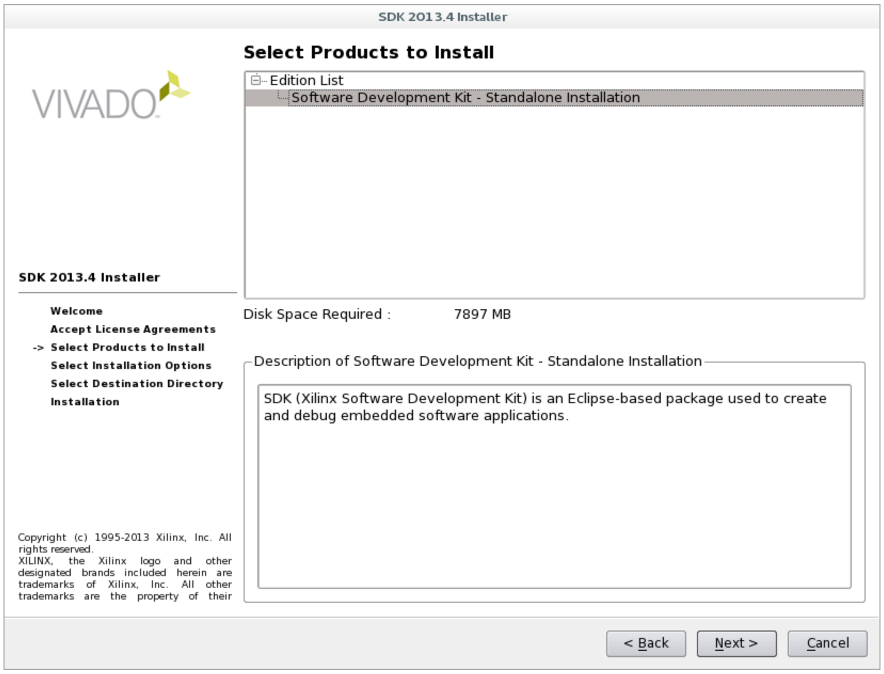
Figure 5: Xilinx Vivado 2013.4 SDK Download

2. If installing Xilinx tools in a permission-restricted directory, you may need to change the umask temporarily:
   ```
   % sudo su -
   % umask 0002
   ```

3. Extract the tarball:
   ```
   % tar -xf Xilinx_SDK_2013.4_1210_1.tar
   ```

4. Enter the resulting directory and run the installer:
   ```
   % cd Xilinx_SDK_2013.4_1210_1
   % ./xsetup
   ```

5. Step through the installation process. Refer to the images below when applicable.



SDK 2013.4 Installer

Select Products to Install

Edition List
- Software Development Kit - Standalone Installation

Disk Space Required : 7897 MB

Description of Software Development Kit - Standalone Installation

SDK (Xilinx Software Development Kit) is an Eclipse-based package used to create and debug embedded software applications.

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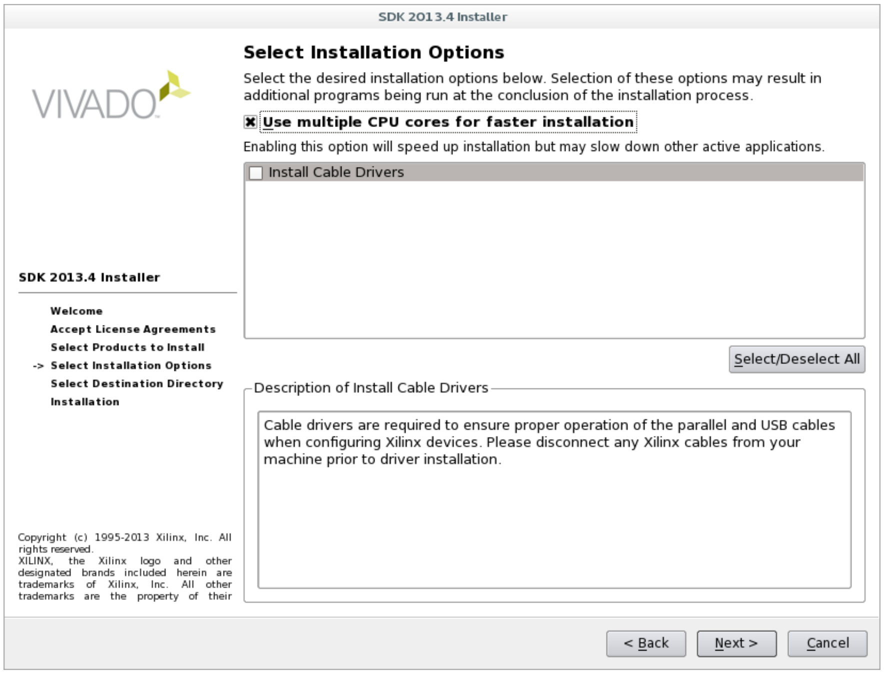
VIVADO
SDK 2013.4 Installer
Welcome
Accept License Agreements
-> Select Products to Install
Select Installation Options
Select Destination Directory
Installation
< Back
Next >
Cancel

Figure 6: Xilinx Vivado SDK Installer



SDK 2013.4 Installer

Select Installation Options

Select the desired installation options below. Selection of these options may result in additional programs being run at the conclusion of the installation process.

☒ **Use multiple CPU cores for faster installation**

Enabling this option will speed up installation but may slow down other active applications.

☐ Install Cable Drivers

Description of Install Cable Drivers

Cable drivers are required to ensure proper operation of the parallel and USB cables when configuring Xilinx devices. Please disconnect any Xilinx cables from your machine prior to driver installation.

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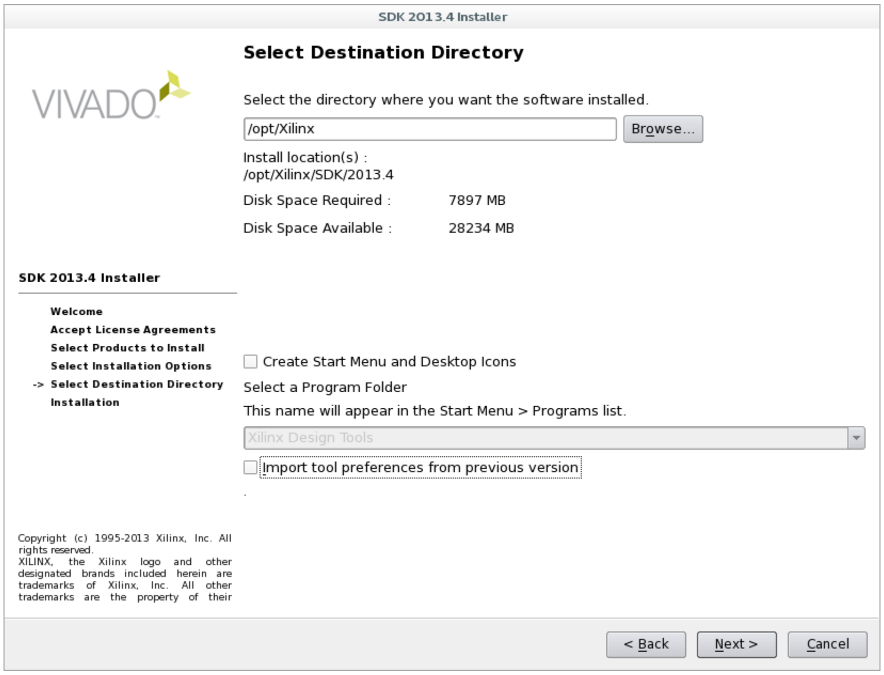
VIVADO
SDK 2013.4 Installer
Welcome
Accept License Agreements
Select Products to Install
-> Select Installation Options
Select Destination Directory
Installation
Select/Deselect All
< Back
Next >
Cancel

Figure 7: Xilinx Vivado SDK Installation Choice

Take note of the installation directory chosen (e.g. `/opt/Xilinx`) as well as the Vivado version (e.g. `2013.4`) for later use.



SDK 2013.4 Installer

Select Destination Directory

Select the directory where you want the software installed.

/opt/Xilinx

Install location(s) :
/opt/Xilinx/SDK/2013.4

Disk Space Required : 7897 MB

Disk Space Available : 28234 MB

□ Create Start Menu and Desktop Icons

Select a Program Folder

This name will appear in the Start Menu > Programs list.

Xilinx Design Tools

□ Import tool preferences from previous version

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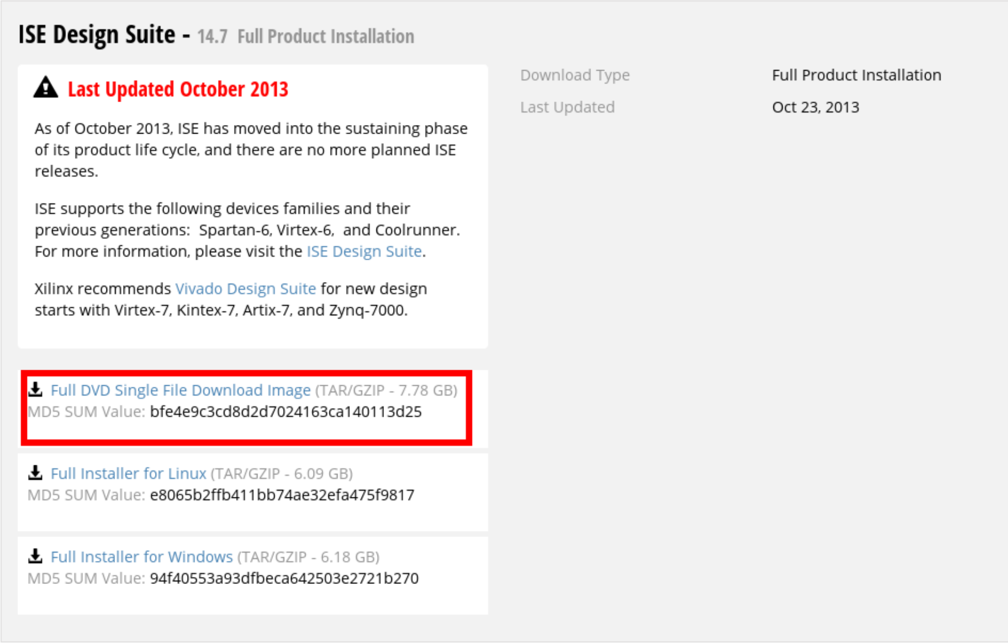
VIVADO
Browse...
SDK 2013.4 Installer
Welcome
Accept License Agreements
Select Products to Install
Select Installation Options
-> Select Destination Directory
Installation
< Back
Next >
Cancel

Figure 8: Xilinx Vivado SDK Install Location

3.2 Xilinx ISE 14.7 Installation in CentOS 6/7

1. A Xilinx account is required for this step. Download the ISE 14.7 installation files from Xilinx's download site: `https://www.xilinx.com/support/download/index.html/content/xilinx/en/downloadNav/design-tools.html`.



ISE Design Suite - 14.7 Full Product Installation

Last Updated October 2013

As of October 2013, ISE has moved into the sustaining phase of its product life cycle, and there are no more planned ISE releases.

ISE supports the following devices families and their previous generations: Spartan-6, Virtex-6, and Coolrunner. For more information, please visit the ISE Design Suite.

Xilinx recommends Vivado Design Suite for new design starts with Virtex-7, Kintex-7, Artix-7, and Zynq-7000.

Download Type	Full Product Installation
Last Updated	Oct 23, 2013

Full DVD Single File Download Image (TAR/GZIP - 7.78 GB)
MD5 SUM Value: bfe4e9c3cd8d2d7024163ca140113d25

Full Installer for Linux (TAR/GZIP - 6.09 GB)
MD5 SUM Value: e8065b2ffb411bb74ae32efa475f9817

Full Installer for Windows (TAR/GZIP - 6.18 GB)
MD5 SUM Value: 94f40553a93dfbeca642503e2721b270

Figure 9: Xilinx ISE Download

2. If installing Xilinx tools in a permission-restricted directory, you may need to change the umask temporarily:

   ```
   % sudo su -
   % umask 0002
   ```

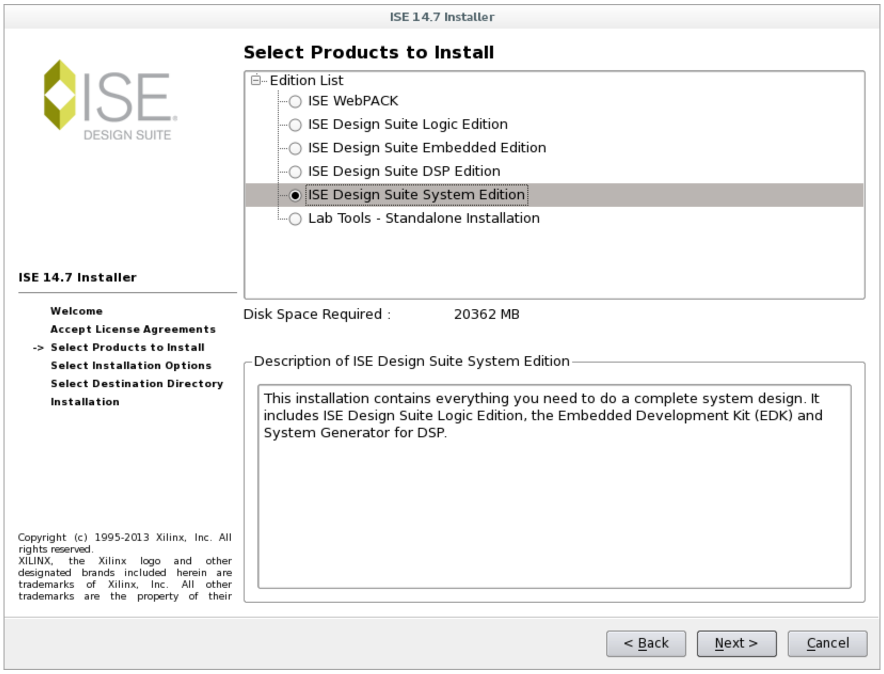
3. Extract the tarball:

   ```
   % tar -xf Xilinx_ISE_DS_14.7_1015_1.tar
   ```

4. Enter the resulting directory and run the installer:

   ```
   % cd Xilinx_ISE_DS_14.7_1015_1
   % ./xsetup
   ```

5. Run through the installation process. Refer to the images below when applicable. Note that the checkbox for cable drivers is left unchecked. Cable driver installation, if necessary, should be handled after this installation is complete. See section 3.5 for more information.



ISE 14.7 Installer

Select Products to Install

⊟ Edition List
- ○ ISE WebPACK
- ○ ISE Design Suite Logic Edition
- ○ ISE Design Suite Embedded Edition
- ○ ISE Design Suite DSP Edition
- ● ISE Design Suite System Edition
- ○ Lab Tools - Standalone Installation

Disk Space Required : 20362 MB

Description of ISE Design Suite System Edition

This installation contains everything you need to do a complete system design. It includes ISE Design Suite Logic Edition, the Embedded Development Kit (EDK) and System Generator for DSP.

ISE 14.7 Installer

Welcome
Accept License Agreements
-> Select Products to Install
Select Installation Options
Select Destination Directory
Installation

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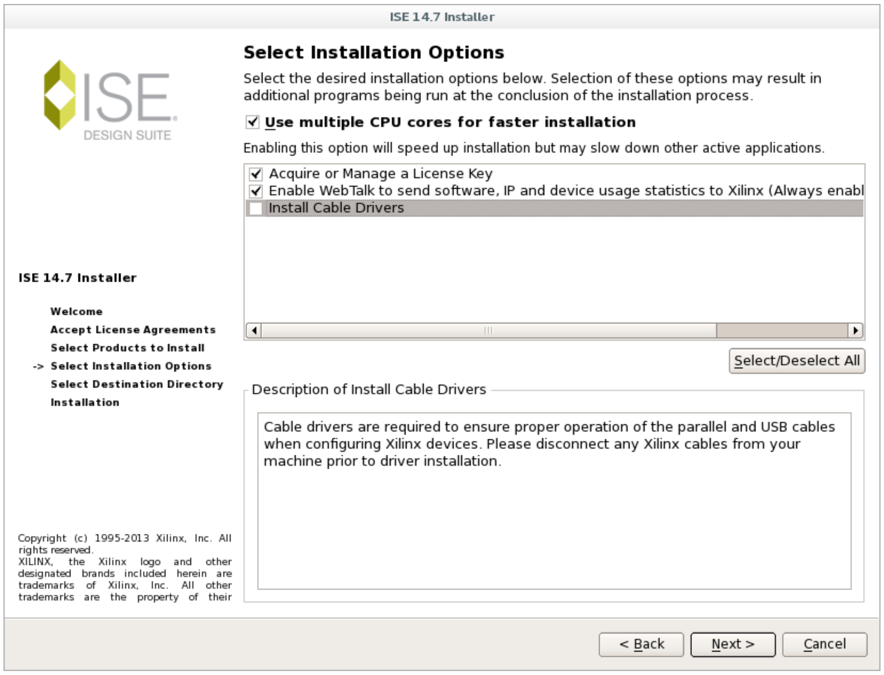
Figure 10: Xilinx ISE Installer



ISE 14.7 Installer

Select Installation Options

Select the desired installation options below. Selection of these options may result in additional programs being run at the conclusion of the installation process.

☑ **Use multiple CPU cores for faster installation**

Enabling this option will speed up installation but may slow down other active applications.

☑ Acquire or Manage a License Key
☑ Enable WebTalk to send software, IP and device usage statistics to Xilinx (Always enabl
☐ Install Cable Drivers

Description of Install Cable Drivers

Cable drivers are required to ensure proper operation of the parallel and USB cables when configuring Xilinx devices. Please disconnect any Xilinx cables from your machine prior to driver installation.

ISE 14.7 Installer

Welcome
Accept License Agreements
Select Products to Install
-> Select Installation Options
Select Destination Directory
Installation

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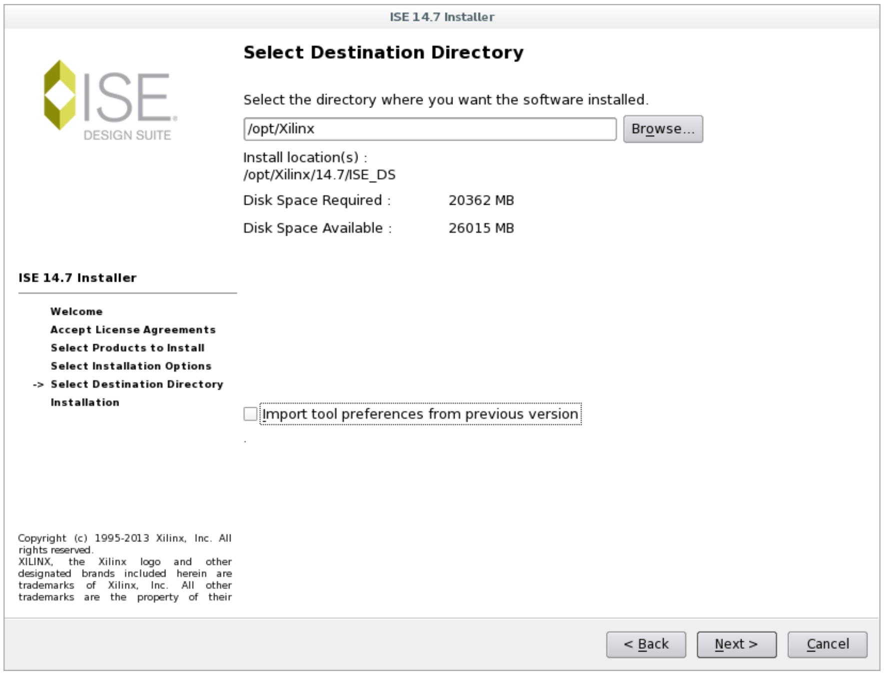
Figure 11: Xilinx ISE Installation Choice

Take note of the installation directory chosen (e.g. `/opt/Xilinx`) as well as the LabTools version (e.g. `14.7`) for later use.


ISE 14.7 Installer

Select Destination Directory

Select the directory where you want the software installed.

/opt/Xilinx

Install location(s) :
/opt/Xilinx/14.7/ISE_DS

Disk Space Required :	20362 MB
Disk Space Available :	26015 MB

□ Import tool preferences from previous version

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ISE DESIGN SUITE
Browse...
ISE 14.7 Installer
Welcome
Accept License Agreements
Select Products to Install
Select Installation Options
-> Select Destination Directory
Installation
< Back
Next >
Cancel

Figure 12: Xilinx ISE Install Location

3.2.1 OpenCPI Considerations

1. Note that sourcing the "`<ISE-install-dir>/<version>/LabTools/settings64.sh`" or "`<ISE-install-dir>/<version>/LabTools/settings32.sh`" scripts will interfere with OpenCPI's environment setup. Accordingly, it is *highly* recommended to always source these scripts and execute any follow-on commands in a *separate terminal*.

2. To use OpenCPI with any Xilinx ISE or LabTools installation, it is required to set the following environment variables before running OpenCPI commands. Note that each of the following `export` statements is only necessary under the following conditions:

   - When using a non-default installation location (i.e. anything other than `/opt/Xilinx`)
   - Non-default version (i.e. anything other than `14.7`) of the tools were used.

   If only one of Xilinx LabTools or ISE is installed,

   ```
   % export OCPI_XILINX_DIR=<ISE-or-LabTools-install-dir>
   % export OCPI_XILINX_VERSION=<ISE-or-LabTools-version>
   ```

   If Xilinx LabTools and ISE are the same version and installed in the same directory,

   ```
   % export OCPI_XILINX_DIR=<ISE-and-LabTools-install-dir>
   % export OCPI_XILINX_VERSION=<ISE-and-LabTools-version>
   ```

   If Xilinx LabTools and ISE are the same version and are installed in different directories,

   ```
   % export OCPI_XILINX_DIR=<ISE-install-dir>
   % export OCPI_XILINX_LAB_TOOLS_DIR=<LabTools-install-dir>
   % export OCPI_XILINX_VERSION=<ISE-and-LabTools-version>
   ```

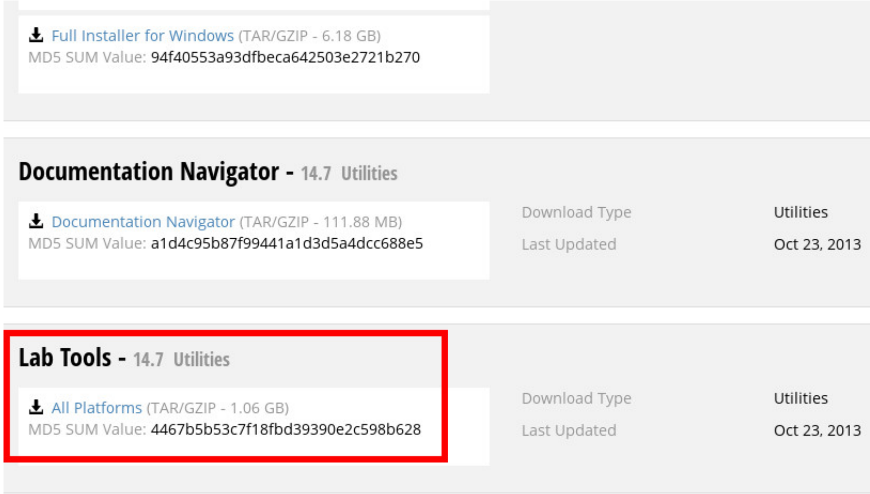
   If Xilinx LabTools and ISE are different versions (LabTools will be ignored),

   ```
   % export OCPI_XILINX_DIR=<ISE-install-dir>
   % export OCPI_XILINX_VERSION=<ISE-version>
   ```

If OpenCPI has been installed prior to the ISE installation, and it is desired to make the aforementioned environment variables set automatically upon login for all users, the variables should be added in `/opt/opencpi/cdk/env.d/xilinx.sh`. Logging out and logging back into the user account will apply said variables.

3.3 Xilinx LabTools 14.7 Installation in CentOS 6/7

1. A Xilinx account is required for this step. Download the LabTools 14.7 installation files from Xilinx's download site: `https://www.xilinx.com/support/download/index.html/content/xilinx/en/downloadNav/design-tools.html`.



Full Installer for Windows (TAR/GZIP - 6.18 GB)
MD5 SUM Value: 94f40553a93dfbeca642503e2721b270

Documentation Navigator - 14.7 Utilities

Documentation Navigator (TAR/GZIP - 111.88 MB)
MD5 SUM Value: a1d4c95b87f99441a1d3d5a4dcc688e5

Download Type Utilities
Last Updated Oct 23, 2013

Lab Tools - 14.7 Utilities

All Platforms (TAR/GZIP - 1.06 GB)
MD5 SUM Value: 4467b5b53c7f18fbd39390e2c598b628

Download Type Utilities
Last Updated Oct 23, 2013

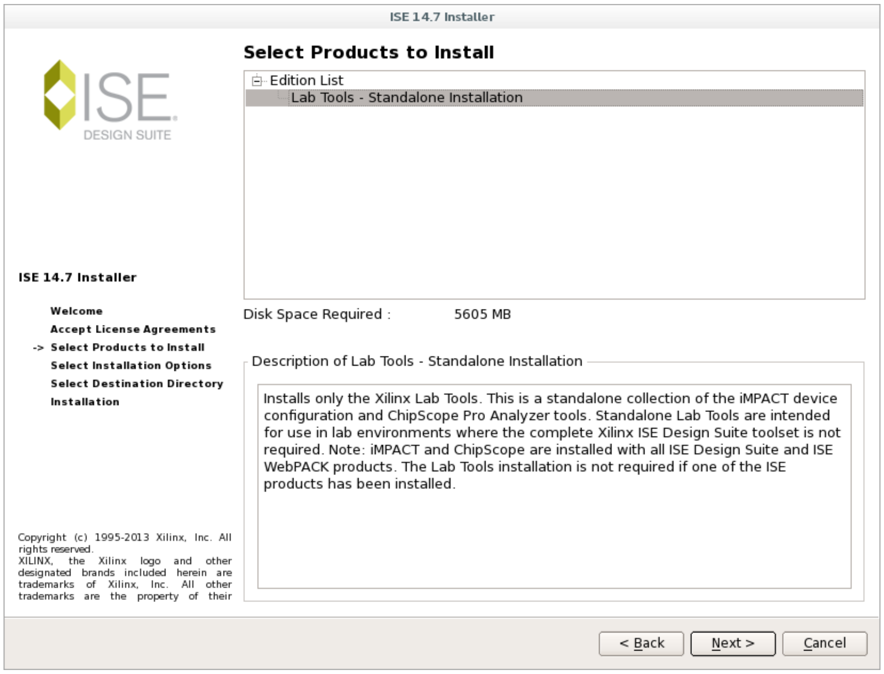
Figure 13: Xilinx LabTools Download

2. If installing Xilinx tools in a permission-restricted directory, you may need to change the umask temporarily:
```
% sudo su -
% umask 0002
```

3. Extract the tarball:
```
% tar -xf Xilinx_LabTools_14.7_1015_1.tar
```

4. Enter the resulting directory and run the installer:
```
% cd Xilinx_LabTools_14.7_1015_1
% ./xsetup
```

5. Step through the installation process. Refer to the images below when applicable. Note that the checkbox for cable drivers is left unchecked. Cable driver installation, if necessary, should be handled after this installation is complete. See section 3.5 for more information.



ISE 14.7 Installer

Select Products to Install

⊟ Edition List
- Lab Tools - Standalone Installation

Disk Space Required : 5605 MB

Description of Lab Tools - Standalone Installation

Installs only the Xilinx Lab Tools. This is a standalone collection of the iMPACT device configuration and ChipScope Pro Analyzer tools. Standalone Lab Tools are intended for use in lab environments where the complete Xilinx ISE Design Suite toolset is not required. Note: iMPACT and ChipScope are installed with all ISE Design Suite and ISE WebPACK products. The Lab Tools installation is not required if one of the ISE products has been installed.

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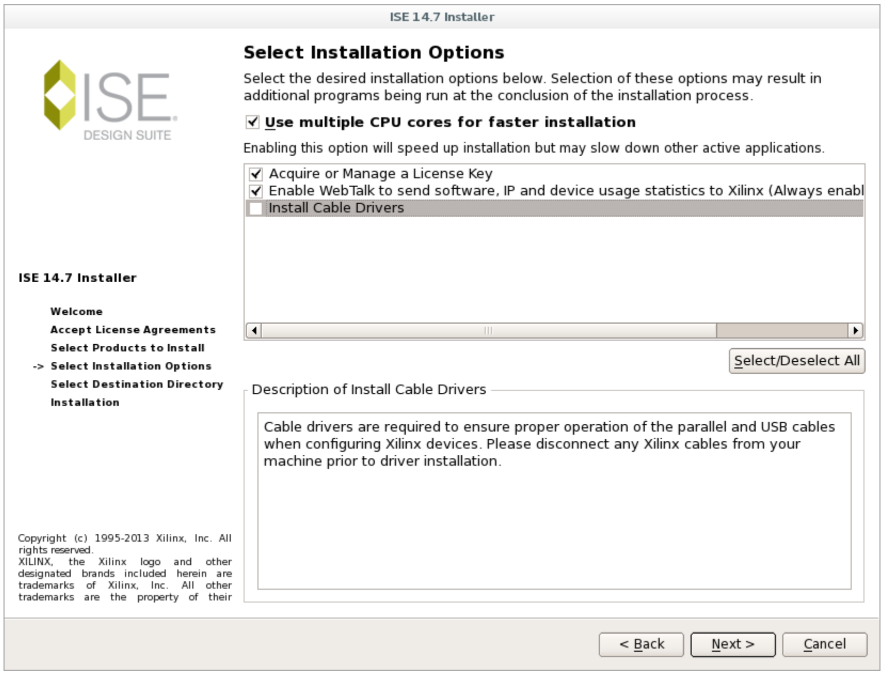
ISE DESIGN SUITE
ISE 14.7 Installer
Welcome
Accept License Agreements
-> Select Products to Install
Select Installation Options
Select Destination Directory
Installation
< Back
Next >
Cancel

Figure 14: Xilinx LabTools Installer



ISE 14.7 Installer

Select Installation Options

Select the desired installation options below. Selection of these options may result in additional programs being run at the conclusion of the installation process.

☑ **Use multiple CPU cores for faster installation**

Enabling this option will speed up installation but may slow down other active applications.

☑ Acquire or Manage a License Key
☑ Enable WebTalk to send software, IP and device usage statistics to Xilinx (Always enabl
□ Install Cable Drivers

Description of Install Cable Drivers

Cable drivers are required to ensure proper operation of the parallel and USB cables when configuring Xilinx devices. Please disconnect any Xilinx cables from your machine prior to driver installation.

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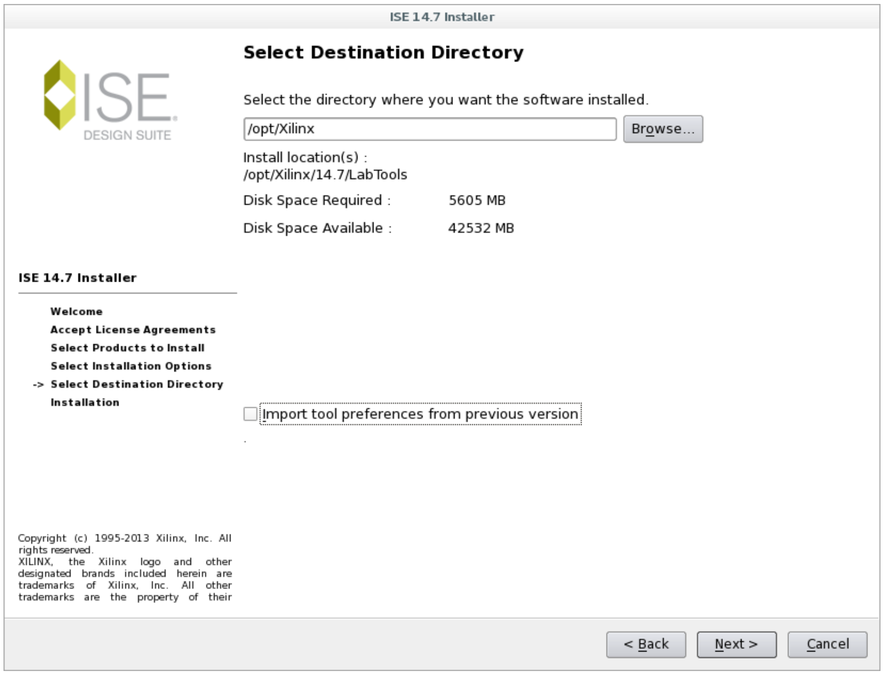
ISE DESIGN SUITE
ISE 14.7 Installer
Welcome
Accept License Agreements
Select Products to Install
-> Select Installation Options
Select Destination Directory
Installation
Select/Deselect All
< Back
Next >
Cancel

Figure 15: Xilinx LabTools Installation Choice

Take note of the installation directory chosen (e.g. `/opt/Xilinx`) as well as the LabTools version (e.g. `14.7`) for later use.


ISE 14.7 Installer
ISE DESIGN SUITE
ISE 14.7 Installer
Welcome
Accept License Agreements
Select Products to Install
Select Installation Options
-> Select Destination Directory
Installation
Browse...
< Back
Next >
Cancel

Select Destination Directory

Select the directory where you want the software installed.

/opt/Xilinx

Install location(s) :
/opt/Xilinx/14.7/LabTools

Disk Space Required : 5605 MB

Disk Space Available : 42532 MB

□ Import tool preferences from previous version

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Figure 16: Xilinx LabTools Install Location

3.3.1 OpenCPI Considerations

1. Note that sourcing the "`<LabTools-install-dir>/<version>/LabTools/settings64.sh`" or "`<LabTools-install-dir>/<version>/LabTools/settings32.sh`" scripts will interfere with OpenCPI's environment setup. Accordingly, it is *highly* recommended to always source these scripts and execute any follow-on commands in a *separate terminal.*

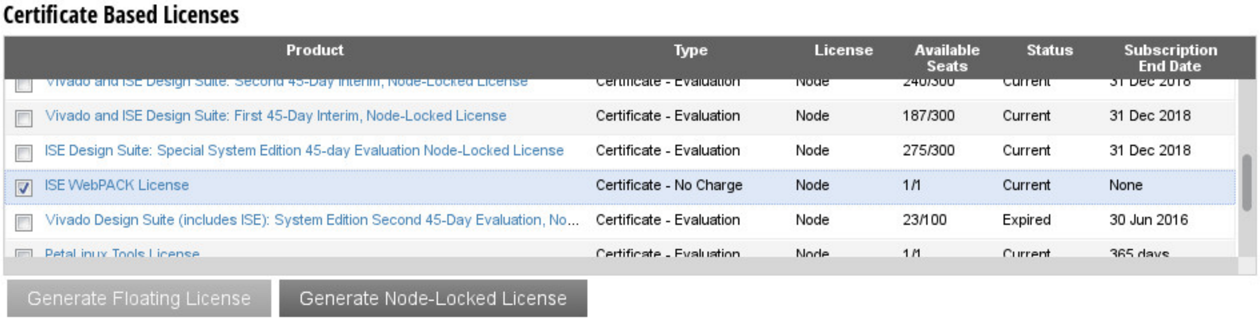
2. To use OpenCPI with any Xilinx ISE or LabTools installation, it is required to set the environment variables according to Section 3.2.1 before running OpenCPI commands.

3.4 Xilinx Toolset Licensing

A license, either WebPACK or non-WebPACK, is required for Xilinx Vivado and Xilinx ISE, however the Xilinx LabTools does not require a license.

3.4.1 Generate and download a license file from Xilinx

1. The following screenshots show is an example of Xilinx's license website with a ISE WebPACK license selected. Refer to 2 to determine which license is necessary. To generate a license, navigate to `http://www.xilinx.com/getlicense` and login (or create an account). Generate a license file:

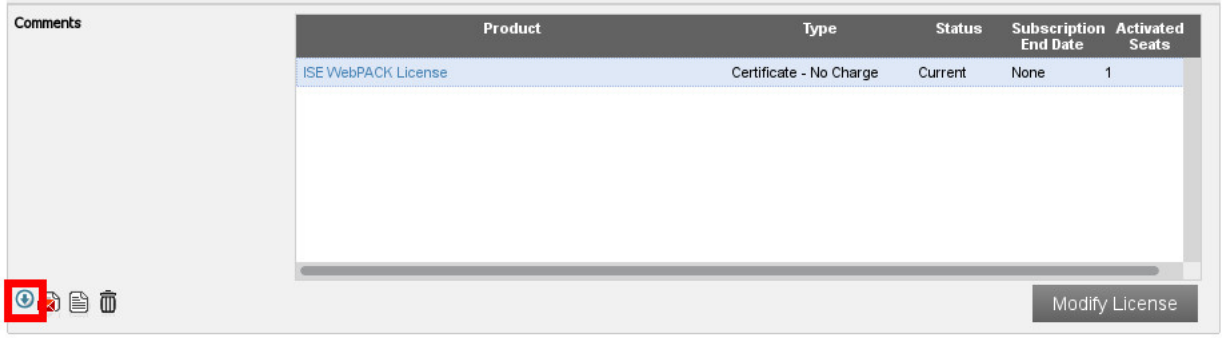


Certificate Based Licenses

	Product	Type	License	Available Seats	Status	Subscription End Date
□	Vivado and ISE Design Suite: Second 45-Day Interim, Node-Locked License	Certificate - Evaluation	Node	240/300	Current	31 Dec 2018
□	Vivado and ISE Design Suite: First 45-Day Interim, Node-Locked License	Certificate - Evaluation	Node	187/300	Current	31 Dec 2018
□	ISE Design Suite: Special System Edition 45-day Evaluation Node-Locked License	Certificate - Evaluation	Node	275/300	Current	31 Dec 2018
☑	ISE WebPACK License	Certificate - No Charge	Node	1/1	Current	None
□	Vivado Design Suite (includes ISE): System Edition Second 45-Day Evaluation, No...	Certificate - Evaluation	Node	23/100	Expired	30 Jun 2016
□	PetaLinux Tools License	Certificate - Evaluation	Node	1/1	Current	365 days

Figure 17: Generate Xilinx license file

2. Download the file and move it to the intended location:



Comments

Product	Type	Status	Subscription End Date	Activated Seats
ISE WebPACK License	Certificate - No Charge	Current	None	1

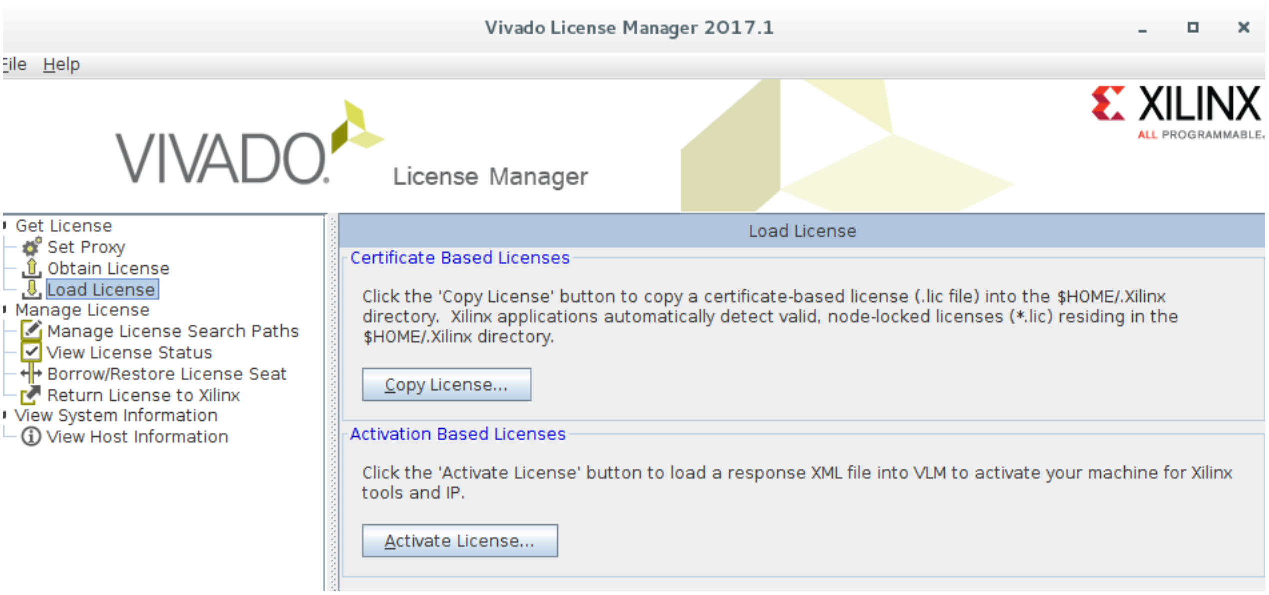
Figure 18: Download Xilinx license file

3.4.2 Load license into Vivado

1. In a terminal, run "`source <Vivado-install-dir>/Vivado/<version>/settings64.sh`".

2. Open up the license manager and load the downloaded license. The license manager can be launched either from the Vivado GUI, or from the command line by running:
`sudo <Vivado-install-dir>/Vivado/<version>/bin/vlm`

   Here, you can either navigate to "Load License" and load a copy of the license file, or you can enter the license search paths via "Manage License Search Paths".



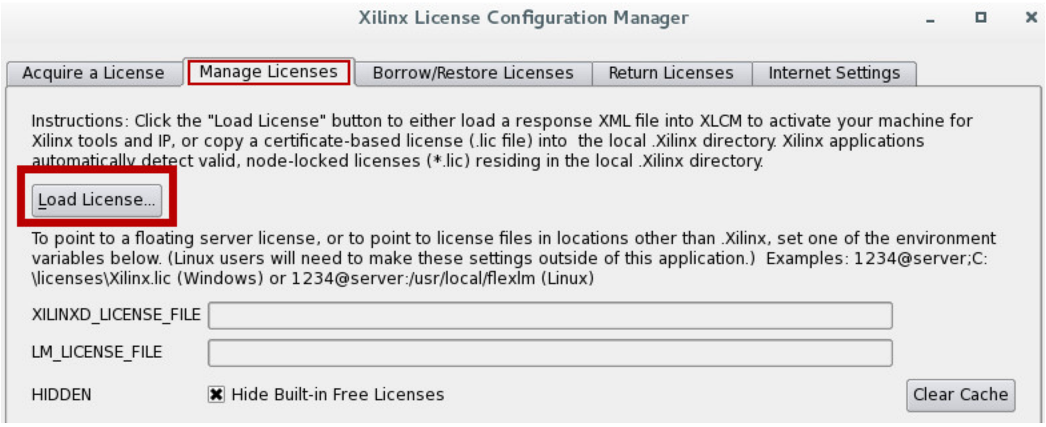
Click the 'Copy License' button to copy a certificate-based license (.lic file) into the $HOME/.Xilinx directory. Xilinx applications automatically detect valid, node-locked licenses (*.lic) residing in the $HOME/.Xilinx directory.

Click the 'Activate License' button to load a response XML file into VLM to activate your machine for Xilinx tools and IP.

Figure 19: Load Xilinx Vivado license file

3.4.3 Load license into ISE

1. In a terminal, run "`source <ISE-install-dir>/<version>/ISE_DS/settings64.sh`" (or settings32.sh if the system has a 32-bit architecture).
2. Open up the license manager and load the downloaded license. The license manager can either be launched from the ISE GUI, or launched from the command line by running:
   `sudo <ISE-or-LabTools-install-dir>/<version>/ISE_DS/common/bin/lin[64]/xlcm`



Instructions: Click the "Load License" button to either load a response XML file into XLCM to activate your machine for Xilinx tools and IP, or copy a certificate-based license (.lic file) into the local .Xilinx directory. Xilinx applications automatically detect valid, node-locked licenses (*.lic) residing in the local .Xilinx directory.

To point to a floating server license, or to point to license files in locations other than .Xilinx, set one of the environment variables below. (Linux users will need to make these settings outside of this application.) Examples: 1234@server;C:\licenses\Xilinx.lic (Windows) or 1234@server:/usr/local/flexlm (Linux)

XILINXD_LICENSE_FILE

LM_LICENSE_FILE

HIDDEN ☒ Hide Built-in Free Licenses

Figure 20: Load Xilinx ISE license file

3.4.4 Note on node-locked licenses in CentOS 7

If using a Xilinx node-locked license under CentOS 7, see the Red Hat Networking Guide to revert to the `eth`*N* naming convention.

3.4.5 OpenCPI Considerations

Note that sourcing the "`settings64.sh`" or "`settings32.sh`" scripts will interfere with OpenCPI's environment setup. Accordingly, it is *highly* recommended to always source these scripts and execute any follow-on commands in a *separate terminal.*

To enable a license for use by OpenCPI, the OpenCPI environment variable which supports locating the Xilinx license listing (file or server) must be configured. Edit the `/opt/opencpi/cdk/env.d/xilinx.sh` to support either a license file or server:

- license file:
  `export OCPI_XILINX_LICENSE_FILE=<PATH_TO_LIC>`
- license server:
  `export OCPI_XILINX_LICENSE_FILE=<port>@<server.ip.addr>`

If the `OCPI_XILINX_LICENSE_FILE` environment variable is not set, the license is assumed to be in one of the following locations:

- /opt/Xilinx/Xilinx-License.lic
- /opt/Xilinx/Vivado/Xilinx-License.lic

Alternatively, if using a floating license server, it is possible to set to the license server and Xilinx's environment variable, which will allow use of a local license, e.g. a local WebPACK license, by default and the served floating license when WebPACK license is not sufficient.[1]

- license server and local license:
  `export OCPI_XILINX_LICENSE_FILE=<port>@<server.ip.addr>`
  `export XILINXD_LICENSE_FILE=<PATH_TO_LOCAL_LIC>`

3.5 Xilinx Cable Driver Installation in CentOS 6/7

This section is a collection of notes or links that have been gathered for the installation or verification of Xilinx cable drivers for Vivado and ISE. However, it is not intended to an exhaustive list of instructions.

3.5.1 Vivado

The steps herein are a slightly modified subset of those outlined in `https://www.xilinx.com/support/answers/66440.html`.

1. Run the following command : `ls -al /etc/udev/rules.d`
2. Check if the following two files are present : `52-digilent-usb.rules 52-xilinx-pcusb.rules`
3. If the files above are not present, run the installer (*it is important to have the JTAG cable unplugged while you perform the installation*):
   `cd <YOUR_XILINX_INSTALL>/data/xicom/cable_drivers/<lin64 or lin32>/install_script/install_drivers;`
   `./install_drivers;`

3.5.2 ISE

Verifying udev rules

1. Run the following command : `ls -al /etc/udev/rules.d`
2. Check if the following file is present : `xusbdfwu.rules`
3. If the file is present, go to step 5. If the files above are not present, open the `setup_pcusb` script and change line 26 from `TP_USE_UDEV="0"` to `TP_USE_UDEV="1"`
4. Rerun the `setup_pcusb` installation script
5. `xusbdfwu.rules` should now be present in `ls -al /etc/udev/rules.d`. Open the file and change (if necessary)
   `SYSFS` to `ATTRS`
   `BUS` to `SUBSYSTEM`
   `$TEMPNODE` to `$tempnode`
6. Reload the udev rules by typing `udevadm control --reload-rules`

[1] See Xilinx "AR# 42507: What are the search order and locations..." and "AR# 44024: If a feature is licensed in multiple locations..."

3.5.3 Testing Cable Driver Installation

Vivado

After installing the cable driver as previously discussed, the Xilinx JTAG pod's LED may still not illumniate (Amber or Green). It has been observed that by attempting to establish a connection to the pod using the Vivado tools, only then will the pod be discovered and correctly illuminate it's LED. If after the cable driver has been load and the JTAG pod's LED is off (while connected to the host), perform the following steps to force pod discovery:

```
$ cd /opt/Xilinx/Vivado/2017.1
$ .  ./settings64.sh
```

Once the environment has been configured, launch the Vivado IDE and use the Hardware Manager to scan for JTAG pod. The expected result is for the pod to be recognized by the tools and its LED to illuminate Amber if its JTAG connector is not powered, or Green if the JTAG connect is powered.
(While this has not been confirmed, it is believed that some host system environments prevent non-interactive driver accesses.)

ISE

To verify successful cable driver installation, you can run the following:

```
$ cd /opt/Xilinx/14.7/ISE_DS
$ .  ./settings64.sh
$ cd
$ echo listusbcables | impact -batch
```

If the cable driver is successfully installed, "`Using libusb.`" will be included in the text printed to the screen.

4 Intel Quartus Toolset Installation and Configuration

4.1 Intel Quartus Prime Standard Edition 17.1 Installation in CentOS 7

1. Download the Quartus Prime Standard Edition 17.1 installation files from Altera's download site: `https://www.intel.com/content/www/us/en/programmable/downloads/download-center.html`. Choose `Standard Edition 17.1` and either choose the "Complete Download", or the "Multiple File Download" (for this option, make sure to download the device packages of interest). An `Intel Customer` account will be required.

2. If installing Quartus tools in a permission-restricted directory, you may need to change the umask temporarily:
```
% sudo su -
% umask 0002
```

3. Extract the tarball:
```
% tar xvf Quartus-17.1.0*.tar
```

4. Run the installer:
```
% ./setup.sh
```

5. Run through the installation process and choose your installation directory. Note that OpenCPI will search for Quartus Standard in `/opt/altera` or `~/intelFPGA` without any additional user settings.

4.1.1 OpenCPI Considerations

It may required to set the following environment variables before running OpenCPI commands. Note that `<quartus-version>` should be replaced with the appropriate Quartus version (e.g. `17.1`), and `<quartus-install-dir>` should be replaced with the installation directory (*e.g.* `~/intelFPGA`). Note also that each of the following `export` statements are only necessary when the non-default installation location (*e.g.* anything other than `~/intelFPGA`, `/opt/intelFPGA`, `~/altera` or `/opt/Altera`), or non-default version (*e.g.* anything other than the newest version) of the tools were used.
```
% export OCPI_ALTERA_DIR=<quartus-install-dir>
% export OCPI_ALTERA_VERSION=<quartus-version>
% export OCPI_ALTERA_LICENSE_FILE=<path_to_license_file>
```
These variables can be set automatically upon login for all users if added in `/opt/opencpi/cdk/env.d/altera.sh`. Logging out and logging back into the user account will apply said variables.

4.2 Intel Quartus Prime Pro Edition 17.0.2 Installation in CentOS 7

NOTE: Do not install Quartus Pro in the same directory as Quartus Standard because OpenCPI cannot differentiate between the two.
NOTE: Quartus Pro and Quartus Standard are *different tools*. The devices supported by each are different, and users should consult Intel documentation before choosing a tool edition.

1. Download the Quartus Prime Pro Edition 17.0 installation files from Altera's download site: `https://www.intel.com/content/www/us/en/programmable/downloads/download-center.html`. Choose `Pro Edition 17.0` and either choose the "Complete Download", or the "Multiple File Download" (for this option, make sure to download the device packages of interest). An `Intel Customer` account will be required.

2. If installing Quartus tools in a permission-restricted directory, you may need to change the umask temporarily:
```
% sudo su -
% umask 0002
```

3. Extract the tarball:
```
% tar xvf Quartus-pro-17.0.0*.tar
```

4. Run the installer:
```
% ./setup.sh
```

5. Run through the installation process and choose your installation directory. Note that OpenCPI will search for Quartus Pro in `~/intelFPGA_pro` or `/opt/intelFPGA_pro` without any additional user settings.

6. Download the 17.0.2 patch by navigating to the `Updates` tab and downloading "Quartus Prime Software v17.0 Update 2".

7. Run the installer:

   ```
   % ./QuartusProSetup-17.0.2*.run
   ```

4.2.1 OpenCPI Considerations

It may be required to set the following environment variables before running OpenCPI commands. Note that `<quartus-version>` should be replaced with the appropriate Quartus version (e.g. `17.0` not `17.0.2`), and `<quartus-install-dir>` should be replaced with the installation directory (*e.g.* `~/intelFPGA_pro`). Note also that each of the following `export` statements are only necessary when the non-default installation location (*e.g.* anything other than `~/intelFPGA_pro`, `/opt/intelFPGA_pro`, `~/altera` or `/opt/Altera`), or non-default version (*e.g.* anything other than the newest version) of the tools were used.

```
% export OCPI_ALTERA_PRO_DIR=<quartus-install-dir>
% export OCPI_ALTERA_PRO_VERSION=<quartus-version>
% export OCPI_ALTERA_PRO_LICENSE_FILE=<path_to_license_file>
```

These variables can be set automatically upon login for all users if added in `/opt/opencpi/cdk/env.d/altera.sh`. Logging out and logging back into the user account will apply said variables.

4.3 Licensing Notes

If the user runs the Quartus software in its native GUI mode outside of OpenCPI, a license file configuration *might* be stored in the variable `LICENSE_FILE` within `~user/.altera.quartus/quartus2.ini`; this setting overrides the `OCPI_ALTERA_LICENSE_FILE` noted above and may cause confusion.

5 ModelSim Installation and Configuration

5.1 ModelSim DE 16.0e Installation in CentOS 7

1. Download the ModelSim installation files for version 10.6e.

2. If installing ModelSim tools in a permission-restricted directory, you may need to change the umask temporarily:

   ```
   % sudo su -
   % umask 0002
   ```

3. Run the installer:

   ```
   % ./install.linux64
   ```

4. Run through the installation process and choose your installation directory. Note that OpenCPI has no default search paths for ModelSim installations.

5.1.1 OpenCPI Considerations

Users will need to set the following environment variables to use ModelSim with OpenCPI. Note that `<modelsim-version>` should be replaced with the appropriate ModelSim version (e.g. `10.6`), and `<modelsim-install-dir>` should be replaced with the installation directory (*e.g.* `~/modelsim_dlx`). The version variable need only be set if multiple ModelSim versions exist in this directory and the user wishes to use a version *other than the most recent*.

```
% export OCPI_MODELSIM_DIR=<modelsim-install-dir>
% export OCPI_MODELSIM_VERSION=<modelsim-version>
% export OCPI_MODELSIM_LICENSE_FILE=<path_to_license_file>
```

These variables can be set automatically upon login for all users if added in `/opt/opencpi/cdk/env.d/modelsim.sh`. Logging out and logging back into the user account will apply said variables.

5.2 Compile Xilinx/Zynq simulation libraries for ModelSim

This section describes how to compile Xilinx simulation libraries of a device(s) for a particular 3rd party simulator, such as ModelSim.

1. Compile Xilinx libraries for ModelSim
2. Modify `modelsim.ini` to include path of compiled Xilinx libraries

5.2.1 Compile Vivado's simulation libraries

This section provides the steps necessary to compile Xilinx Vivado's simulation libraries of the Zynq device, for ModelSim. If using ModelSim 10.4c, note that Vivado 2017.1 does not support compilation of simulation libraries for ModelSim versions earlier than 10.5c. Therefore, if using a ModelSim 10.4c, you will need to use an earlier version of Vivado (*e.g* 2015.4) to compile the simulation libraries. For this example, we use Vivado 2017.1 with ModelSim DE 10.6e.

1. Open a terminal window and switch the user to root:

   ```
   > sudo su -
   ```

2. Configure the terminal for Xilinx Vivado by sourcing the setup script (for bash):

   ```
   > source /opt/Xilinx/Vivado/<version>/settings64.sh
   ```

3. Launch Vivado:

   ```
   > vivado
   ```

4. Select Tools → Compile Simulation Libraries...
5. Select the following:

   Simulator: ModelSim Simulator

   Language: VHDL

   Library: All

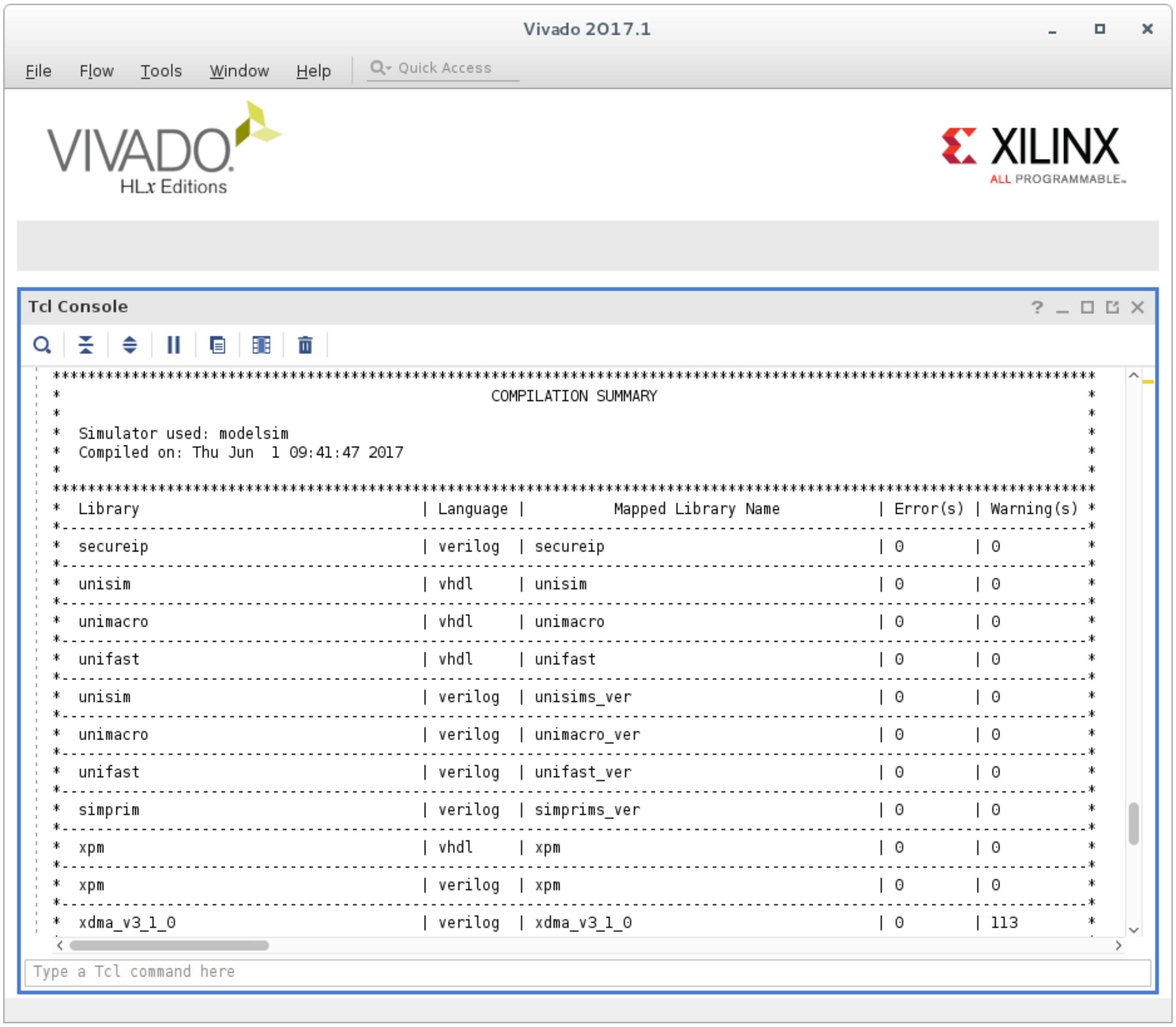
   Family: Zynq-7000

   Compiled library location: `/opt/Xilinx/Vivado/<version>/vhdl/modelsim/<version>/lin64`

   Simulator executable path: `/opt/Modelsim/modelsim_dlx/linuxpe`

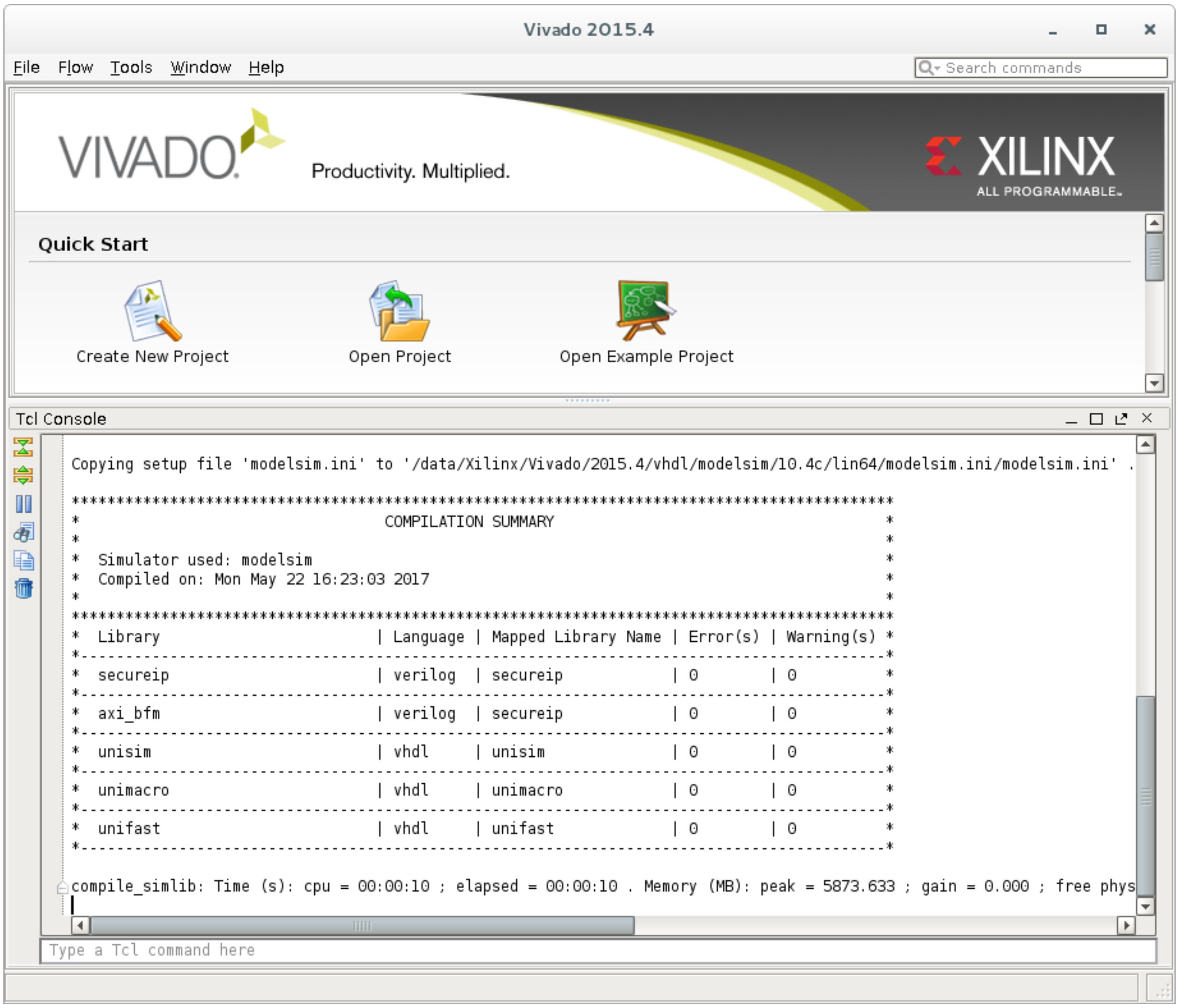
   Compile 32-bit libraries: Yes

6. Click "Compile"
7. Note that 2017.1 Vivado will result in errors for ModelSim versions earlier than 10.5c. Here, we show the results for Vivado 2017.1 with ModelSim DE 10.6e, and Vivado 2015.4 with ModelSim DE 10.4c.



```
**************************************************************************************************************************
*                                                   COMPILATION SUMMARY                                                  *
*                                                                                                                        *
*  Simulator used: modelsim                                                                                              *
*  Compiled on: Thu Jun  1 09:41:47 2017                                                                                 *
*                                                                                                                        *
**************************************************************************************************************************
*  Library                                  | Language |          Mapped Library Name            | Error(s) | Warning(s) *
*----------------------------------------------------------------------------------------------------------------------*
*  secureip                                 | verilog  | secureip                                | 0        | 0          *
*----------------------------------------------------------------------------------------------------------------------*
*  unisim                                   | vhdl     | unisim                                  | 0        | 0          *
*----------------------------------------------------------------------------------------------------------------------*
*  unimacro                                 | vhdl     | unimacro                                | 0        | 0          *
*----------------------------------------------------------------------------------------------------------------------*
*  unifast                                  | vhdl     | unifast                                 | 0        | 0          *
*----------------------------------------------------------------------------------------------------------------------*
*  unisim                                   | verilog  | unisims_ver                             | 0        | 0          *
*----------------------------------------------------------------------------------------------------------------------*
*  unimacro                                 | verilog  | unimacro_ver                            | 0        | 0          *
*----------------------------------------------------------------------------------------------------------------------*
*  unifast                                  | verilog  | unifast_ver                             | 0        | 0          *
*----------------------------------------------------------------------------------------------------------------------*
*  simprim                                  | verilog  | simprims_ver                            | 0        | 0          *
*----------------------------------------------------------------------------------------------------------------------*
*  xpm                                      | vhdl     | xpm                                     | 0        | 0          *
*----------------------------------------------------------------------------------------------------------------------*
*  xpm                                      | verilog  | xpm                                     | 0        | 0          *
*----------------------------------------------------------------------------------------------------------------------*
*  xdma_v3_1_0                              | verilog  | xdma_v3_1_0                             | 0        | 113        *
```

Figure 21: Vivado 2017.1 Compilation Output with ModelSim DE 10.6e



```
Copying setup file 'modelsim.ini' to '/data/Xilinx/Vivado/2015.4/vhdl/modelsim/10.4c/lin64/modelsim.ini/modelsim.ini' .

********************************************************************************************
*                                  COMPILATION SUMMARY                                     *
*                                                                                          *
*  Simulator used: modelsim                                                                *
*  Compiled on: Mon May 22 16:23:03 2017                                                   *
*                                                                                          *
********************************************************************************************
*  Library                        | Language | Mapped Library Name | Error(s) | Warning(s) *
*------------------------------------------------------------------------------------------*
*  secureip                       | verilog  | secureip            | 0        | 0          *
*------------------------------------------------------------------------------------------*
*  axi_bfm                        | verilog  | secureip            | 0        | 0          *
*------------------------------------------------------------------------------------------*
*  unisim                         | vhdl     | unisim              | 0        | 0          *
*------------------------------------------------------------------------------------------*
*  unimacro                       | vhdl     | unimacro            | 0        | 0          *
*------------------------------------------------------------------------------------------*
*  unifast                        | vhdl     | unifast             | 0        | 0          *
*------------------------------------------------------------------------------------------*

compile_simlib: Time (s): cpu = 00:00:10 ; elapsed = 00:00:10 . Memory (MB): peak = 5873.633 ; gain = 0.000 ; free phys
```

Figure 22: Vivado 2015.4 Compilation Output with ModelSim DE 10.4c

5.2.2 Compile ISE's simulation libraries

This section provides the steps necessary to compile Xilinx ISE's simulation libraries of the Zynq-7000 device, for ModelSim.

1. Open a terminal window and switch the user to root:

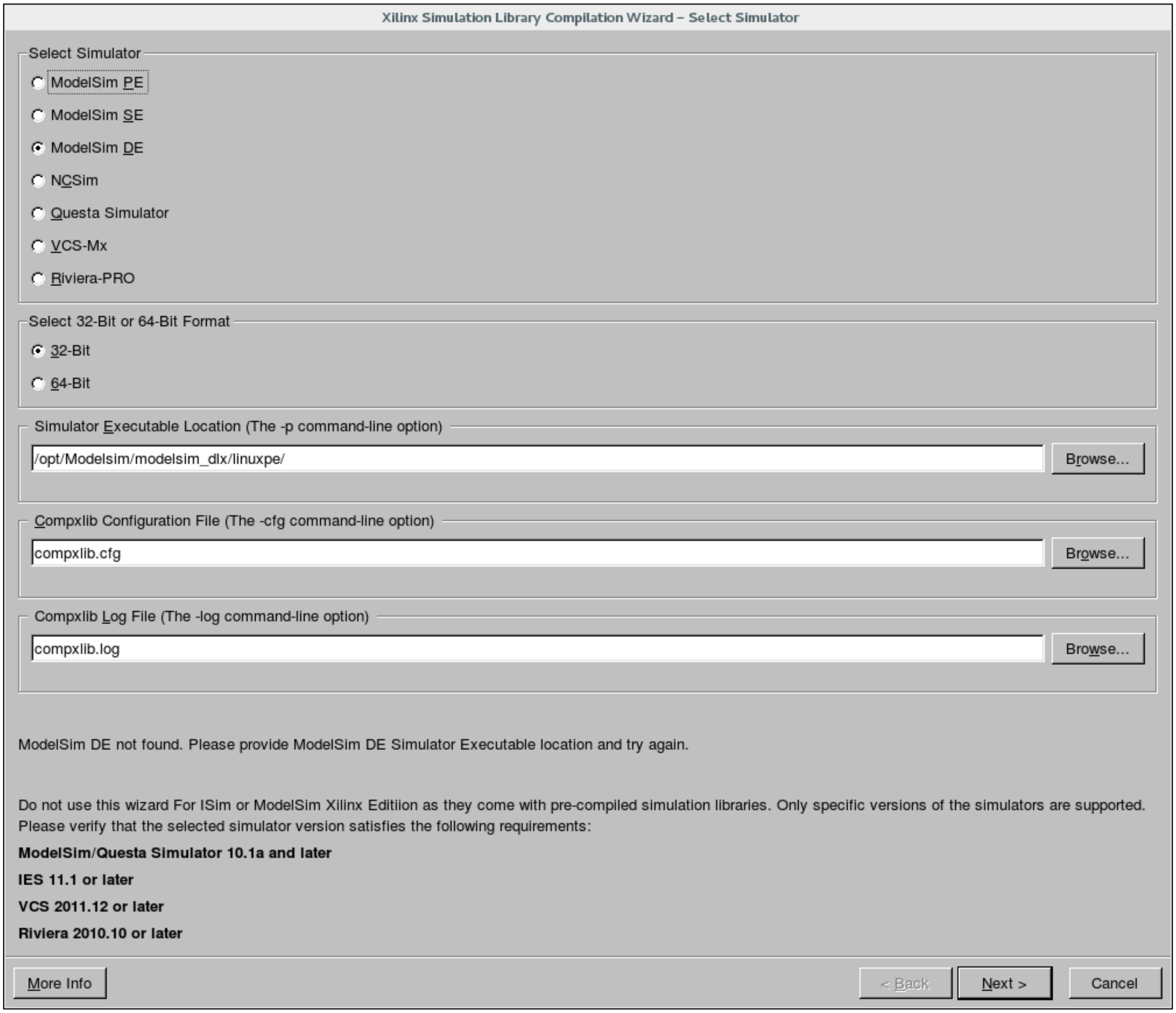
   ```
   > sudo su -
   ```

2. Configure the terminal window for Xilinx ISE by sourcing the setup script (for bash):

   ```
   > cd /opt/Xilinx/14.7/ISE_DS/
   > source settings64.sh
   ```

3. Launch the Xilinx CompXLib GUI:

   ```
   > cd /opt/Xilinx/14.7/ISE_DS/ISE/bin/lin64
   > ./compxlib
   ```



Xilinx Simulation Library Compilation Wizard – Select Simulator

Select Simulator

○ ModelSim PE

○ ModelSim SE

● ModelSim DE

○ NCSim

○ Questa Simulator

○ VCS-Mx

○ Riviera-PRO

Select 32-Bit or 64-Bit Format

● 32-Bit

○ 64-Bit

Simulator Executable Location (The -p command-line option): /opt/Modelsim/modelsim_dlx/linuxpe/

Compxlib Configuration File (The -cfg command-line option): compxlib.cfg

Compxlib Log File (The -log command-line option): compxlib.log

ModelSim DE not found. Please provide ModelSim DE Simulator Executable location and try again.

Do not use this wizard For ISim or ModelSim Xilinx Editiion as they come with pre-compiled simulation libraries. Only specific versions of the simulators are supported. Please verify that the selected simulator version satisfies the following requirements:

ModelSim/Questa Simulator 10.1a and later

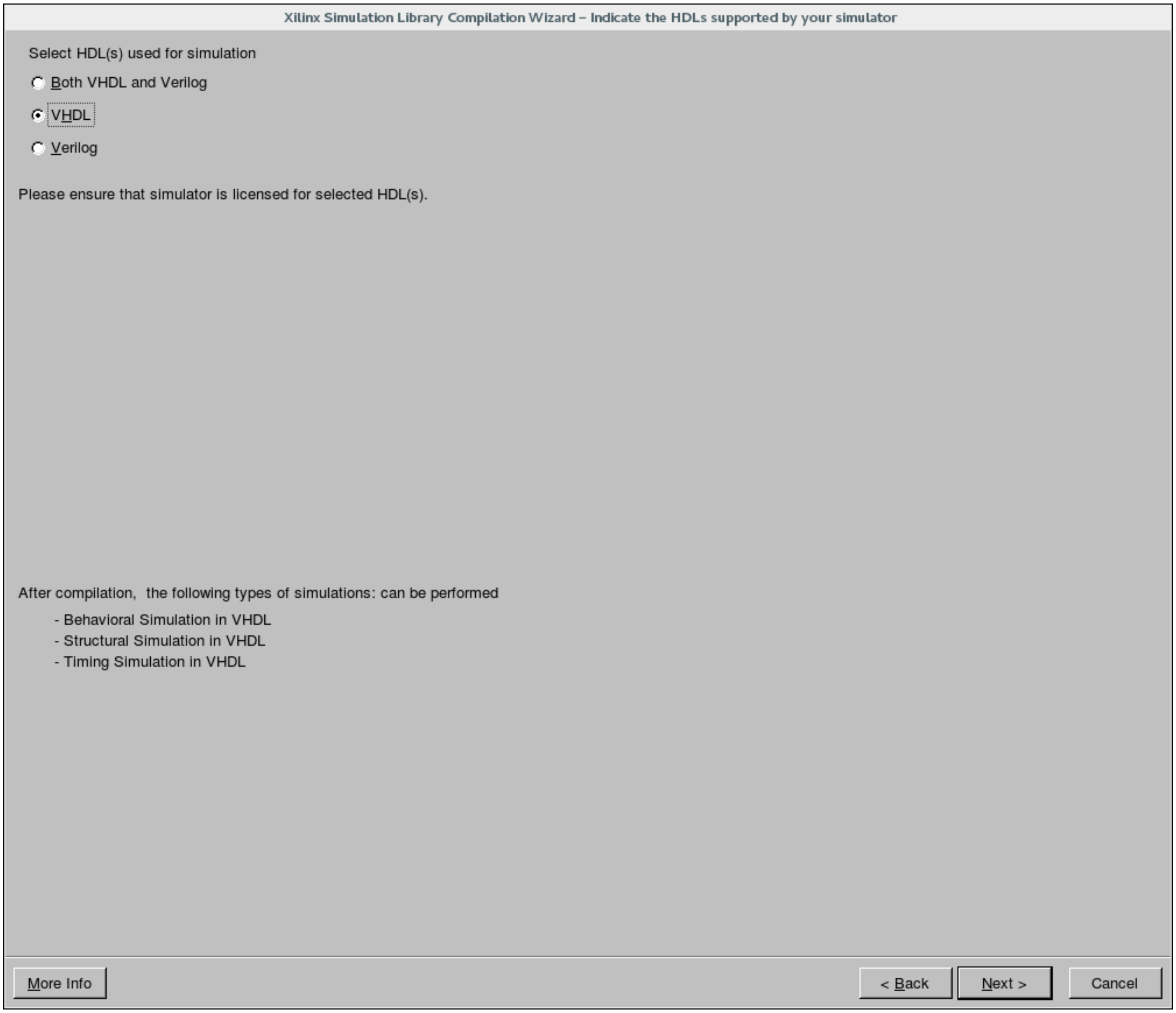
IES 11.1 or later

VCS 2011.12 or later

Riviera 2010.10 or later

Figure 23: Compilation Wizard - Select Simulator

4. Select ModelSim DE.
5. Set Simulator Executable Location.
6. Click “Next”.



Xilinx Simulation Library Compilation Wizard – Indicate the HDLs supported by your simulator

Select HDL(s) used for simulation

○ Both VHDL and Verilog

● VHDL

○ Verilog

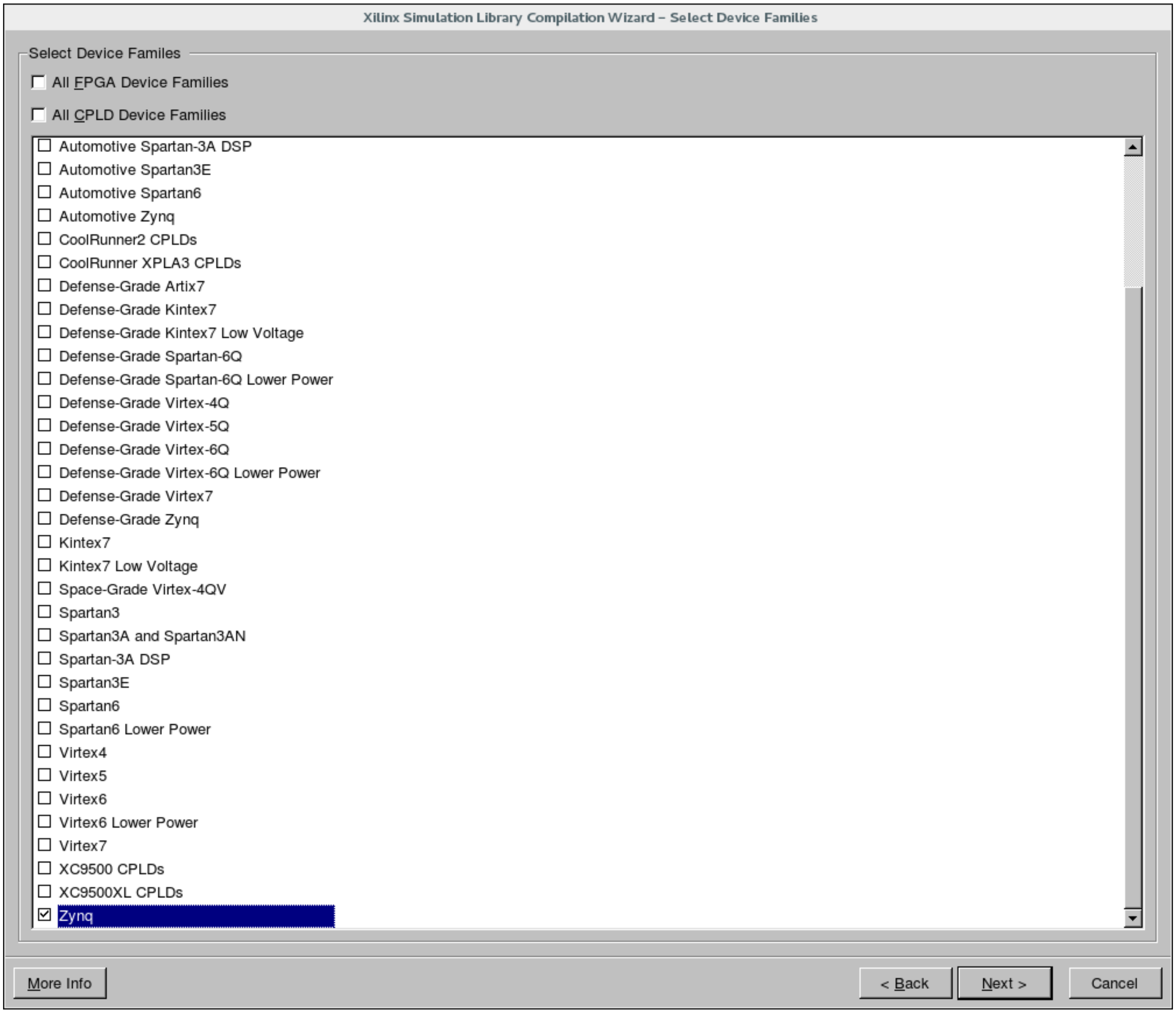
Please ensure that simulator is licensed for selected HDL(s).

After compilation, the following types of simulations: can be performed

- Behavioral Simulation in VHDL
- Structural Simulation in VHDL
- Timing Simulation in VHDL

Figure 24: Compilation Wizard - HDLs to support simulator

7. Select “VHDL”.
8. Click “Next”.


Xilinx Simulation Library Compilation Wizard – Select Device Families
More Info
< Back
Next >
Cancel

Select Device Familes

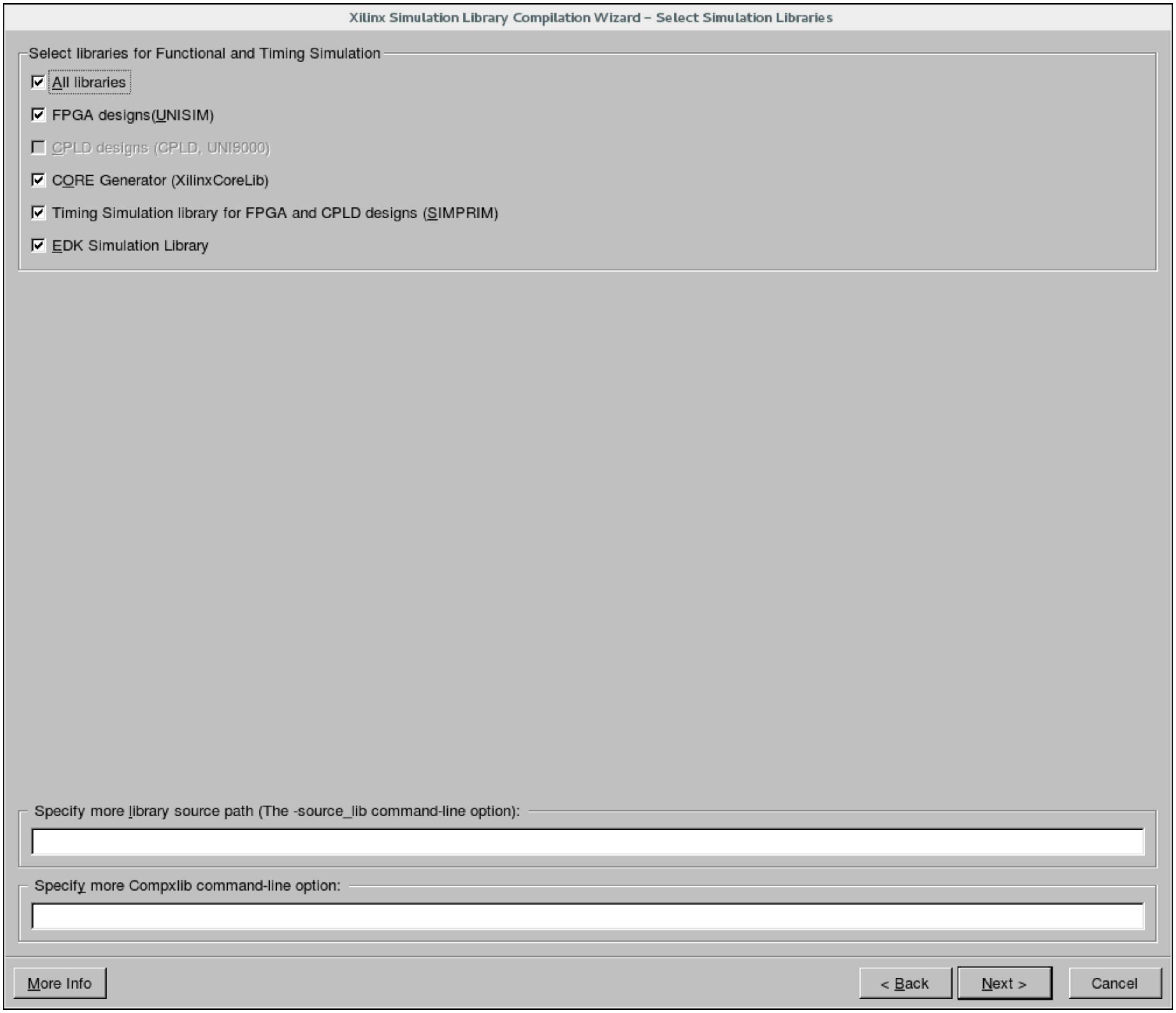
□ All FPGA Device Families

□ All CPLD Device Families

- □ Automotive Spartan-3A DSP
- □ Automotive Spartan3E
- □ Automotive Spartan6
- □ Automotive Zynq
- □ CoolRunner2 CPLDs
- □ CoolRunner XPLA3 CPLDs
- □ Defense-Grade Artix7
- □ Defense-Grade Kintex7
- □ Defense-Grade Kintex7 Low Voltage
- □ Defense-Grade Spartan-6Q
- □ Defense-Grade Spartan-6Q Lower Power
- □ Defense-Grade Virtex-4Q
- □ Defense-Grade Virtex-5Q
- □ Defense-Grade Virtex-6Q
- □ Defense-Grade Virtex-6Q Lower Power
- □ Defense-Grade Virtex7
- □ Defense-Grade Zynq
- □ Kintex7
- □ Kintex7 Low Voltage
- □ Space-Grade Virtex-4QV
- □ Spartan3
- □ Spartan3A and Spartan3AN
- □ Spartan-3A DSP
- □ Spartan3E
- □ Spartan6
- □ Spartan6 Lower Power
- □ Virtex4
- □ Virtex5
- □ Virtex6
- □ Virtex6 Lower Power
- □ Virtex7
- □ XC9500 CPLDs
- □ XC9500XL CPLDs
- ☑ Zynq

Figure 25: Compilation Wizard - Select Device Families

9. Uncheck “All FPGA Device Families”.
10. Uncheck “All CPLD Device Families”.
11. Check “Zynq”.
12. Click “Next”.



Xilinx Simulation Library Compilation Wizard – Select Simulation Libraries

Select libraries for Functional and Timing Simulation

☑ All libraries

☑ FPGA designs(UNISIM)

□ CPLD designs (CPLD, UNI9000)

☑ CORE Generator (XilinxCoreLib)

☑ Timing Simulation library for FPGA and CPLD designs (SIMPRIM)

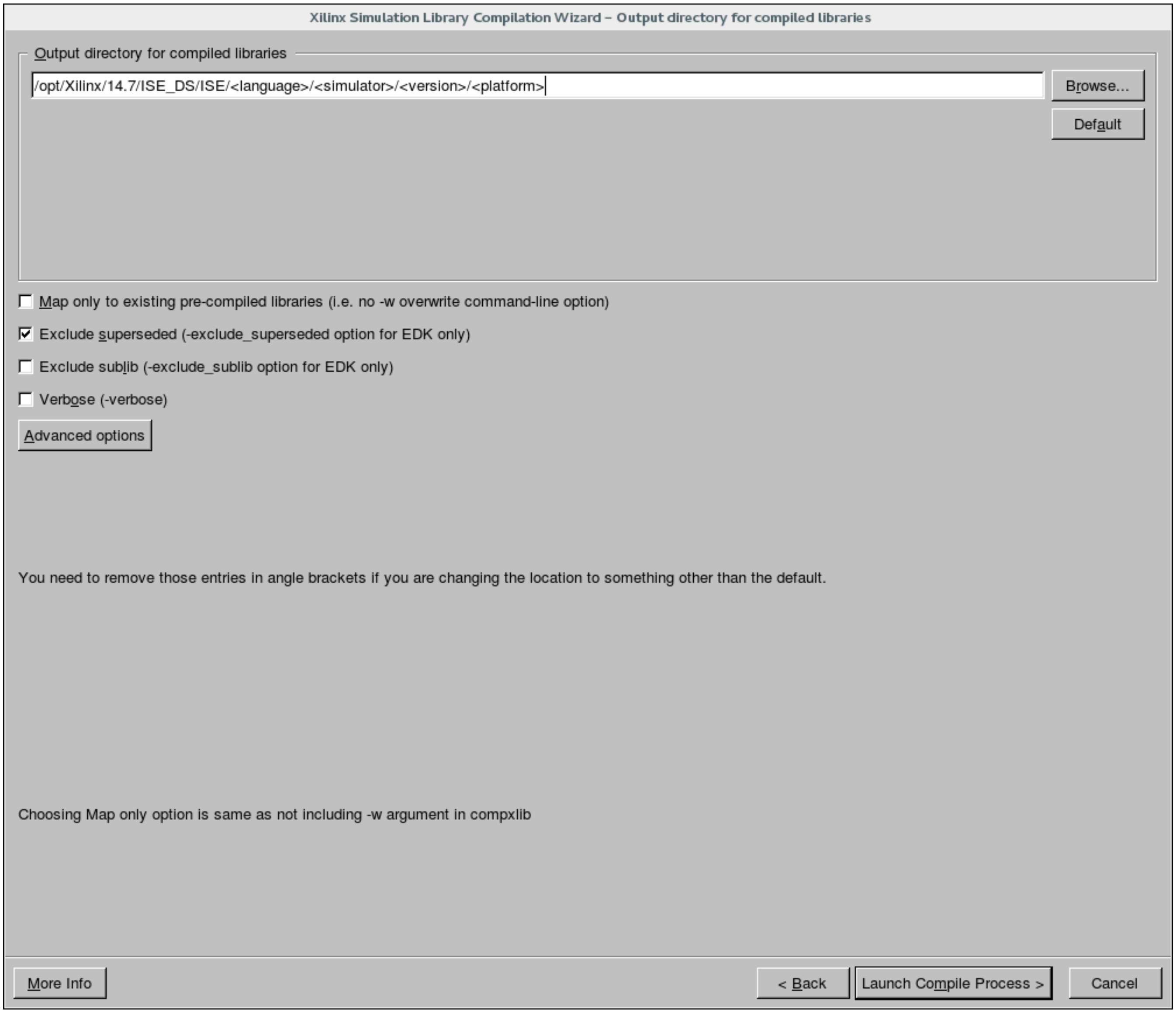
☑ EDK Simulation Library

Specify more library source path (The -source_lib command-line option):

Specify more Compxlib command-line option:

Figure 26: Compilation Wizard - Select Simulation Libraries

13. No change.
14. Click “Next”.



Xilinx Simulation Library Compilation Wizard – Output directory for compiled libraries

Output directory for compiled libraries

/opt/Xilinx/14.7/ISE_DS/ISE/<language>/<simulator>/<version>/<platform>

- ☐ Map only to existing pre-compiled libraries (i.e. no -w overwrite command-line option)
- ☑ Exclude superseded (-exclude_superseded option for EDK only)
- ☐ Exclude sublib (-exclude_sublib option for EDK only)
- ☐ Verbose (-verbose)

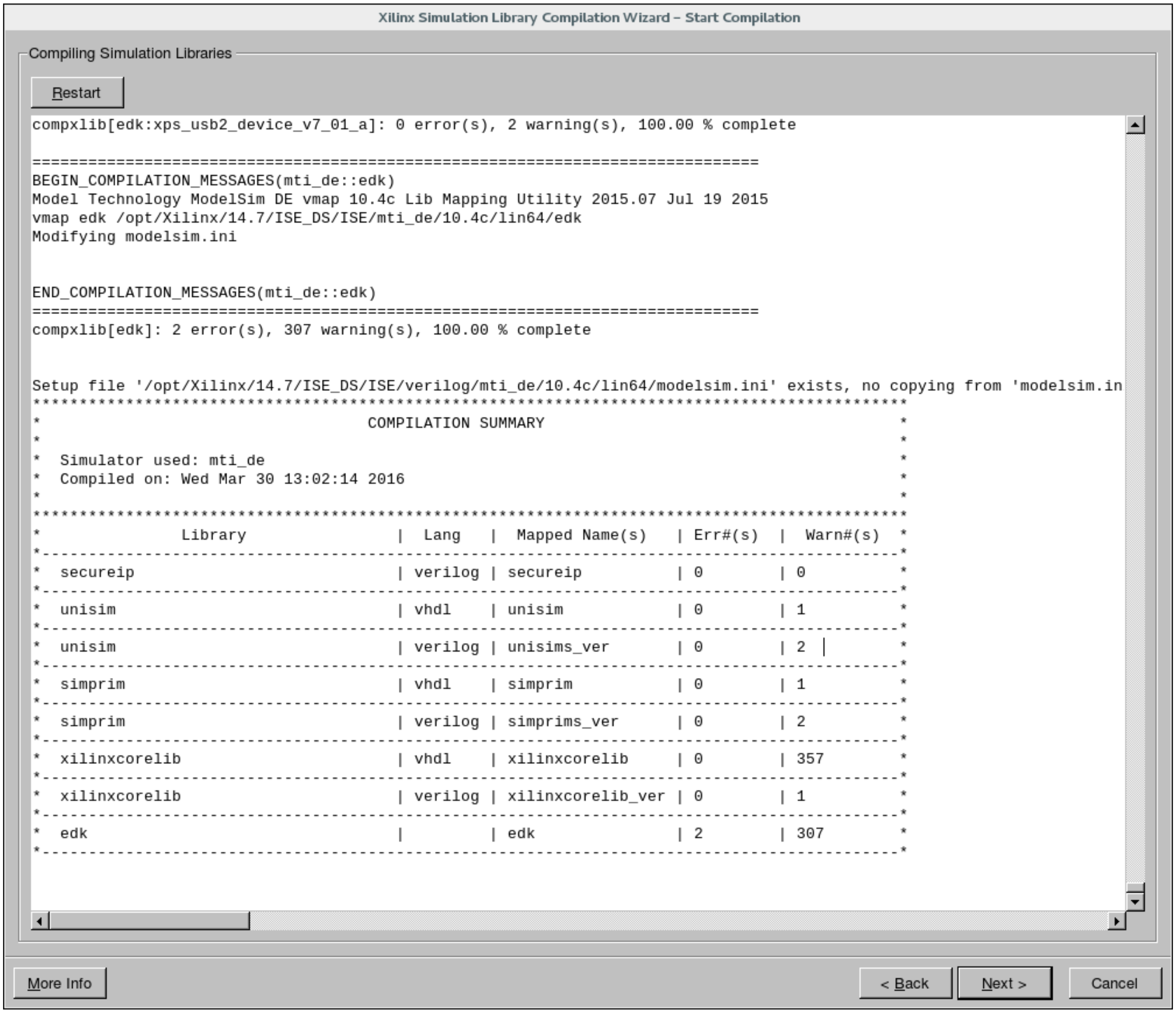
You need to remove those entries in angle brackets if you are changing the location to something other than the default.

Choosing Map only option is same as not including -w argument in compxlib

Figure 27: Compilation Wizard - Select Output directory

15. Select defaults.
16. Click “Launch Compile Process”.

    Note: This step will take approximately 20 mins.


Xilinx Simulation Library Compilation Wizard – Start Compilation
Compiling Simulation Libraries
Restart
More Info
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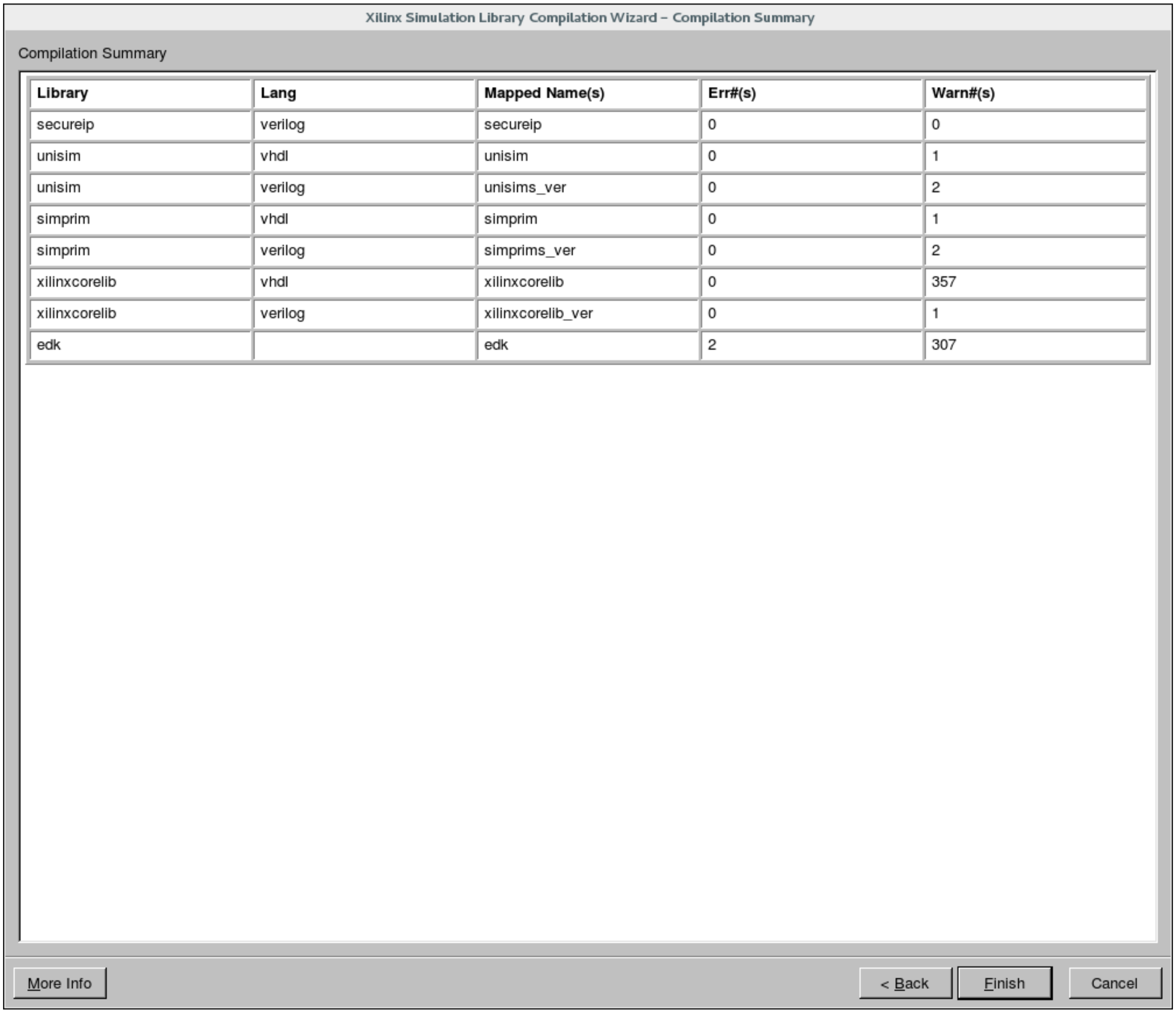
Next >
Cancel

```
compxlib[edk:xps_usb2_device_v7_01_a]: 0 error(s), 2 warning(s), 100.00 % complete

===============================================================================
BEGIN_COMPILATION_MESSAGES(mti_de::edk)
Model Technology ModelSim DE vmap 10.4c Lib Mapping Utility 2015.07 Jul 19 2015
vmap edk /opt/Xilinx/14.7/ISE_DS/ISE/mti_de/10.4c/lin64/edk
Modifying modelsim.ini


END_COMPILATION_MESSAGES(mti_de::edk)
===============================================================================
compxlib[edk]: 2 error(s), 307 warning(s), 100.00 % complete


Setup file '/opt/Xilinx/14.7/ISE_DS/ISE/verilog/mti_de/10.4c/lin64/modelsim.ini' exists, no copying from 'modelsim.in
***********************************************************************************************
*                                   COMPILATION SUMMARY                                       *
*                                                                                             *
*  Simulator used: mti_de                                                                     *
*  Compiled on: Wed Mar 30 13:02:14 2016                                                      *
*                                                                                             *
***********************************************************************************************
*               Library                 |  Lang   |  Mapped Name(s)   | Err#(s)  |  Warn#(s)  *
*---------------------------------------------------------------------------------------------*
*  secureip                             | verilog | secureip          | 0        | 0          *
*---------------------------------------------------------------------------------------------*
*  unisim                               | vhdl    | unisim            | 0        | 1          *
*---------------------------------------------------------------------------------------------*
*  unisim                               | verilog | unisims_ver       | 0        | 2          *
*---------------------------------------------------------------------------------------------*
*  simprim                              | vhdl    | simprim           | 0        | 1          *
*---------------------------------------------------------------------------------------------*
*  simprim                              | verilog | simprims_ver      | 0        | 2          *
*---------------------------------------------------------------------------------------------*
*  xilinxcorelib                        | vhdl    | xilinxcorelib     | 0        | 357        *
*---------------------------------------------------------------------------------------------*
*  xilinxcorelib                        | verilog | xilinxcorelib_ver | 0        | 1          *
*---------------------------------------------------------------------------------------------*
*  edk                                  |         | edk               | 2        | 307        *
*---------------------------------------------------------------------------------------------*
```

Figure 28: Compilation Wizard - Start Compilation

17. Click “Next”.


Xilinx Simulation Library Compilation Wizard – Compilation Summary
More Info
< Back
Finish
Cancel

Compilation Summary

Library	Lang	Mapped Name(s)	Err#(s)	Warn#(s)
secureip	verilog	secureip	0	0
unisim	vhdl	unisim	0	1
unisim	verilog	unisims_ver	0	2
simprim	vhdl	simprim	0	1
simprim	verilog	simprims_ver	0	2
xilinxcorelib	vhdl	xilinxcorelib	0	357
xilinxcorelib	verilog	xilinxcorelib_ver	0	1
edk		edk	2	307

Figure 29: Compilation Wizard - Compilation Summary

18. Click “Finish”.

5.2.3 Modify “modelsim.ini” to include path to built library

This section details the steps to modify the “`modelsim.ini`” file.

1. Browse to the install directory of ModelSim

   ```
   > cd /opt/Modelsim/modelsim_dlx
   ```

2. Open the modelsim.ini file as the root user

   ```
   > vi modelsim.ini
   ```

3. Locate the bottom of the “`[Library]`” section and add the following for Vivado:

   ```
   unifast = /opt/Xilinx/Vivado/2017.1/vhdl/modelsim/10.6e/lin64/unifast
   unisim = /opt/Xilinx/Vivado/2017.1/vhdl/modelsim/10.6e/lin64/unisim
   ```

4. Or, add the following for ISE:

   ```
   xilinxcorelib = /opt/Xilinx/14.7/ISE_DS/ISE/vhdl/mti_de/10.4c/lin64/xilinxcorelib
   unisim = /opt/Xilinx/14.7/ISE_DS/ISE/vhdl/mti_de/10.4c/lin64/unisim
   ```