** README document for Ubuntu 16.04 versions **

INSTALLATION OF QUARTUS AND SUPPORTING SOFTWARES

==

A) Check for Ubuntu updates:

Type the following command in the terminal

```
- sudo apt-get update
```

**** Only for 64-bit Ubuntu,** following libraries are required on the machine. So run these (additional) commands in the terminal

----

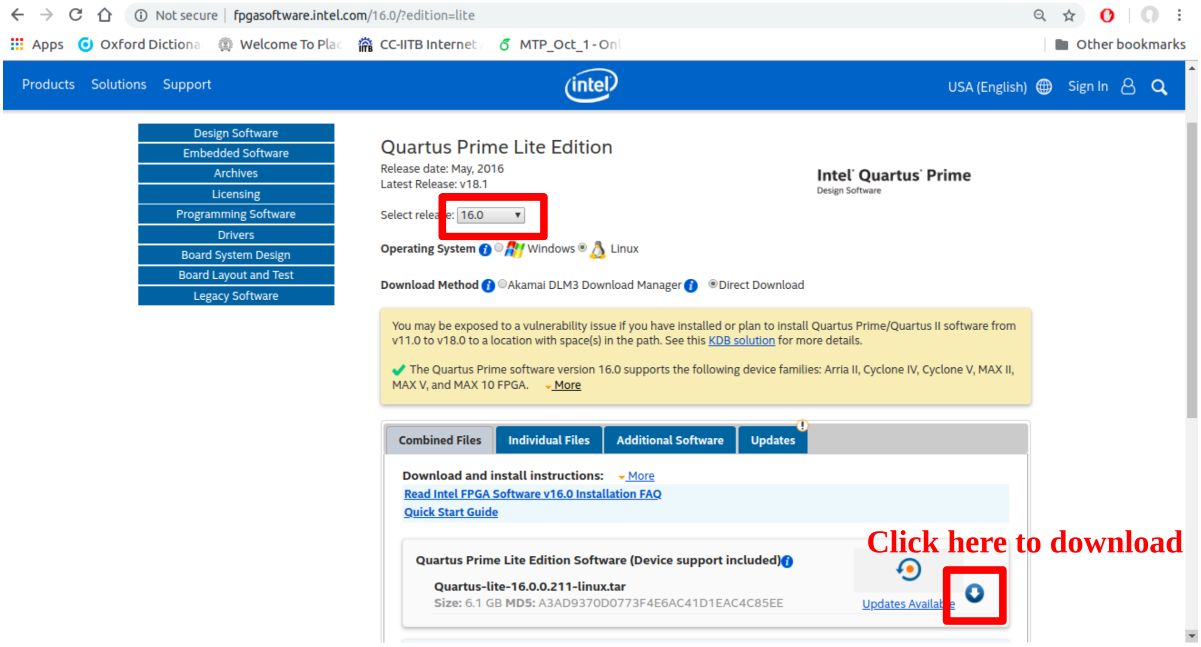
```
sudo apt-get install libxft2
sudo apt-get install libxft2:i386
sudo apt-get install libncurses5
sudo apt-get install libncurses5:i386
sudo apt-get install libxtst6
sudo apt-get install libsm6:i386
sudo apt-get install libxtst6:i386
```

B) Altera Quartus II:- is a programmable logic device design software produced by Altera. Quartus II enables analysis and synthesis of HDL designs, which enables the developer to compile their designs, perform timing analysis, examine RTL diagrams, simulate a design's reaction to different stimuli, and configure the target device with the programmer. Quartus includes an implementation of VHDL and Verilog for hardware description, visual editing of logic circuits, and vector waveform simulation).**(Source: https://en.wikipedia.org/wiki/Altera_Quartus)**

* Steps to install Quartus-II Lite Linux(Version 16.0):

1) Go to this link:
http://fpgasoftware.intel.com/?edition=lite&language=en_US

2) Download '**Quartus-lite-16.0.0.211-linux.tar**' as shown in image below.



Quartus Prime Lite Edition

Release date: May, 2016
Latest Release: v18.1

Select release: 16.0

Operating System ○ Windows ● Linux

Download Method ○Akamai DLM3 Download Manager ●Direct Download

You may be exposed to a vulnerability issue if you have installed or plan to install Quartus Prime/Quartus II software from v11.0 to v18.0 to a location with space(s) in the path. See this KDB solution for more details.

✓ The Quartus Prime software version 16.0 supports the following device families: Arria II, Cyclone IV, Cyclone V, MAX II, MAX V, and MAX 10 FPGA. More

Download and install instructions: More
Read Intel FPGA Software v16.0 Installation FAQ
Quick Start Guide

Quartus Prime Lite Edition Software (Device support included)

Quartus-lite-16.0.0.211-linux.tar
Size: 6.1 GB MD5: A3AD9370D0773F4E6AC41D1EAC4C85EE

Click here to download

Create an ‘individual’ account, if it asks to create an account to be able to download the Quartus.

3) Go to the location, where the file is downloaded.

4) Extract or uncompress by “right click” on the file and use “Extract Here” option
or run the command:
sudo tar -xvf Quartus-lite-16.0.0.211-linux.tar

5) Then go to the uncompressed folder “Quartus-lite-16.0.0.211-linux” by using

```
cd  Quartus-lite-16.0.0.211-linux
```

** ll for showing permission x means executable.

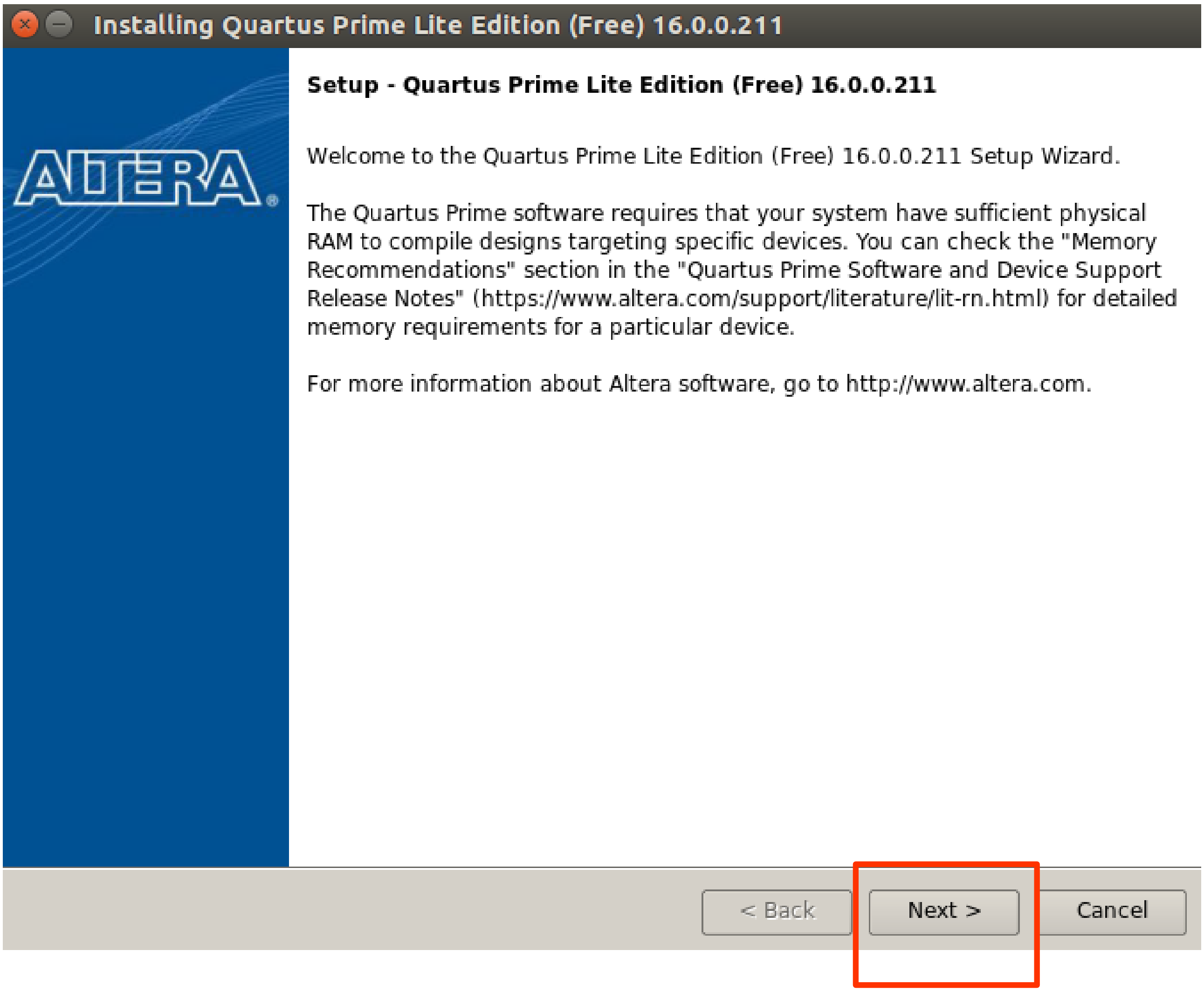
6) Then run the command: ./setup.sh

If some permission issue comes then execute the following commands (ls -la)

```
chmod +x setup.sh
chmod +x components/*
```

Then run the command: ./setup.sh

Now the installation starts.



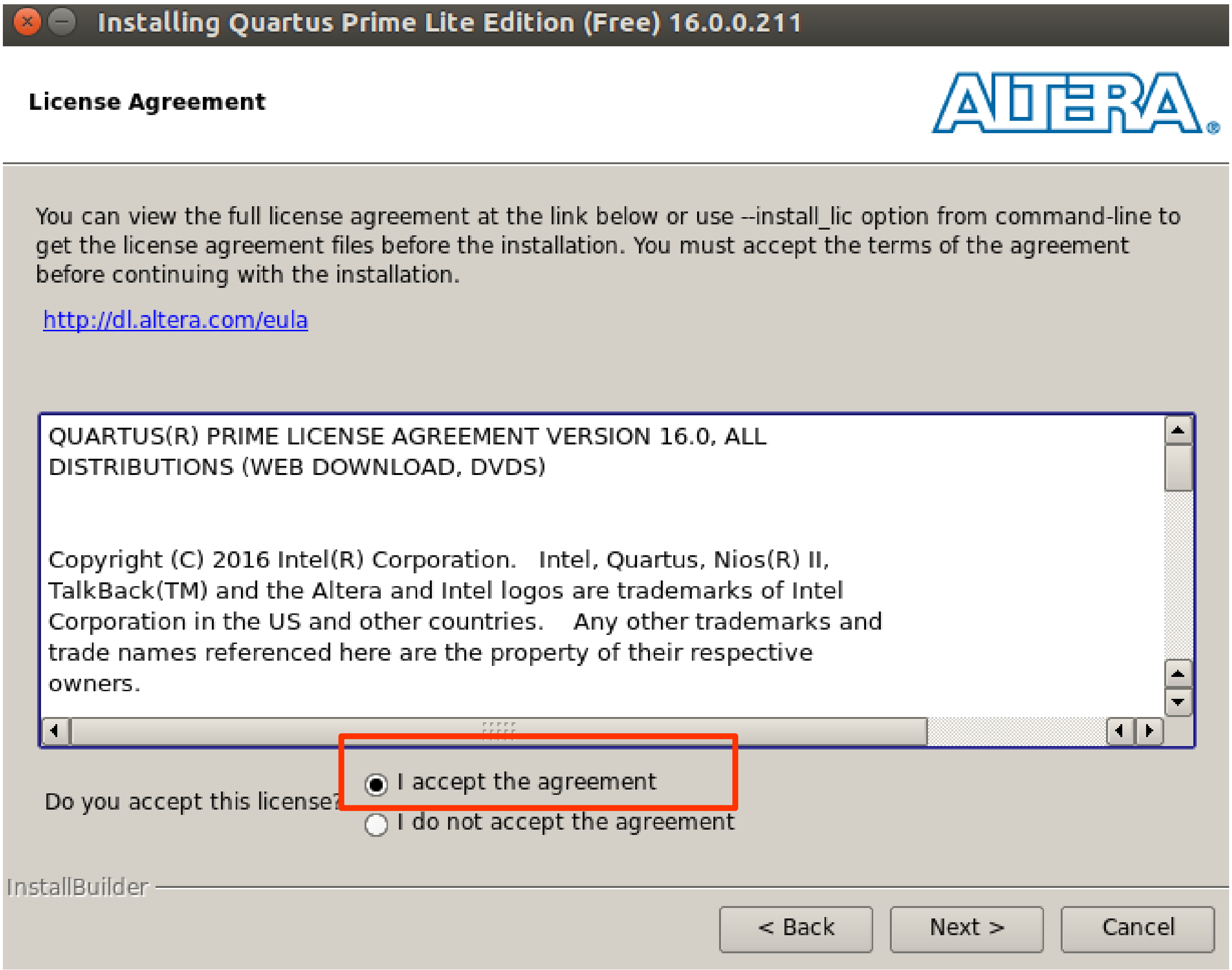
Installing Quartus Prime Lite Edition (Free) 16.0.0.211

Setup - Quartus Prime Lite Edition (Free) 16.0.0.211

Welcome to the Quartus Prime Lite Edition (Free) 16.0.0.211 Setup Wizard.

The Quartus Prime software requires that your system have sufficient physical RAM to compile designs targeting specific devices. You can check the "Memory Recommendations" section in the "Quartus Prime Software and Device Support Release Notes" (https://www.altera.com/support/literature/lit-rn.html) for detailed memory requirements for a particular device.

For more information about Altera software, go to http://www.altera.com.


Installing Quartus Prime Lite Edition (Free) 16.0.0.211

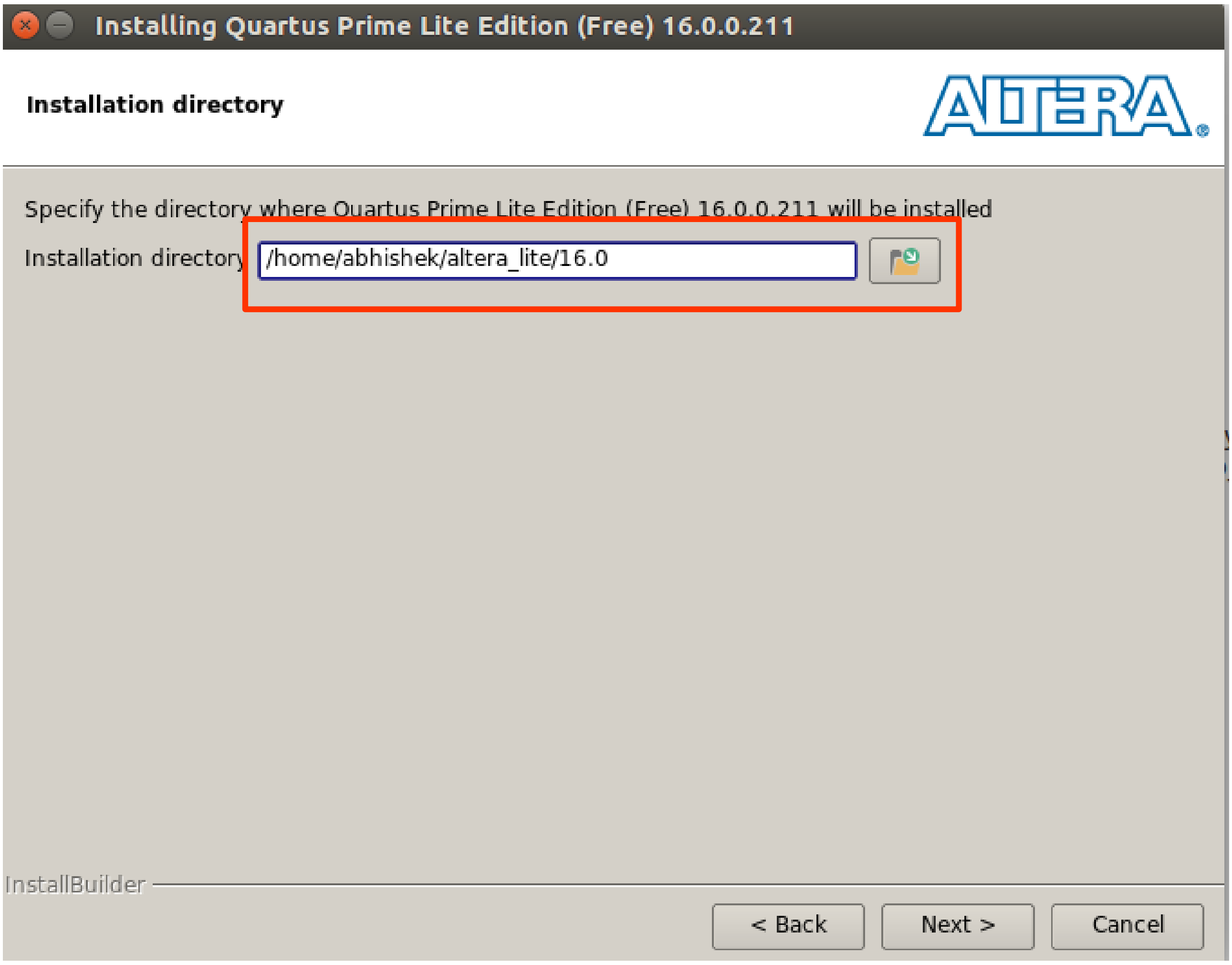
License Agreement

You can view the full license agreement at the link below or use --install_lic option from command-line to get the license agreement files before the installation. You must accept the terms of the agreement before continuing with the installation.

http://dl.altera.com/eula

```
QUARTUS(R) PRIME LICENSE AGREEMENT VERSION 16.0, ALL
DISTRIBUTIONS (WEB DOWNLOAD, DVDS)


Copyright (C) 2016 Intel(R) Corporation.   Intel, Quartus, Nios(R) II,
TalkBack(TM) and the Altera and Intel logos are trademarks of Intel
Corporation in the US and other countries.    Any other trademarks and
trade names referenced here are the property of their respective
owners.
```

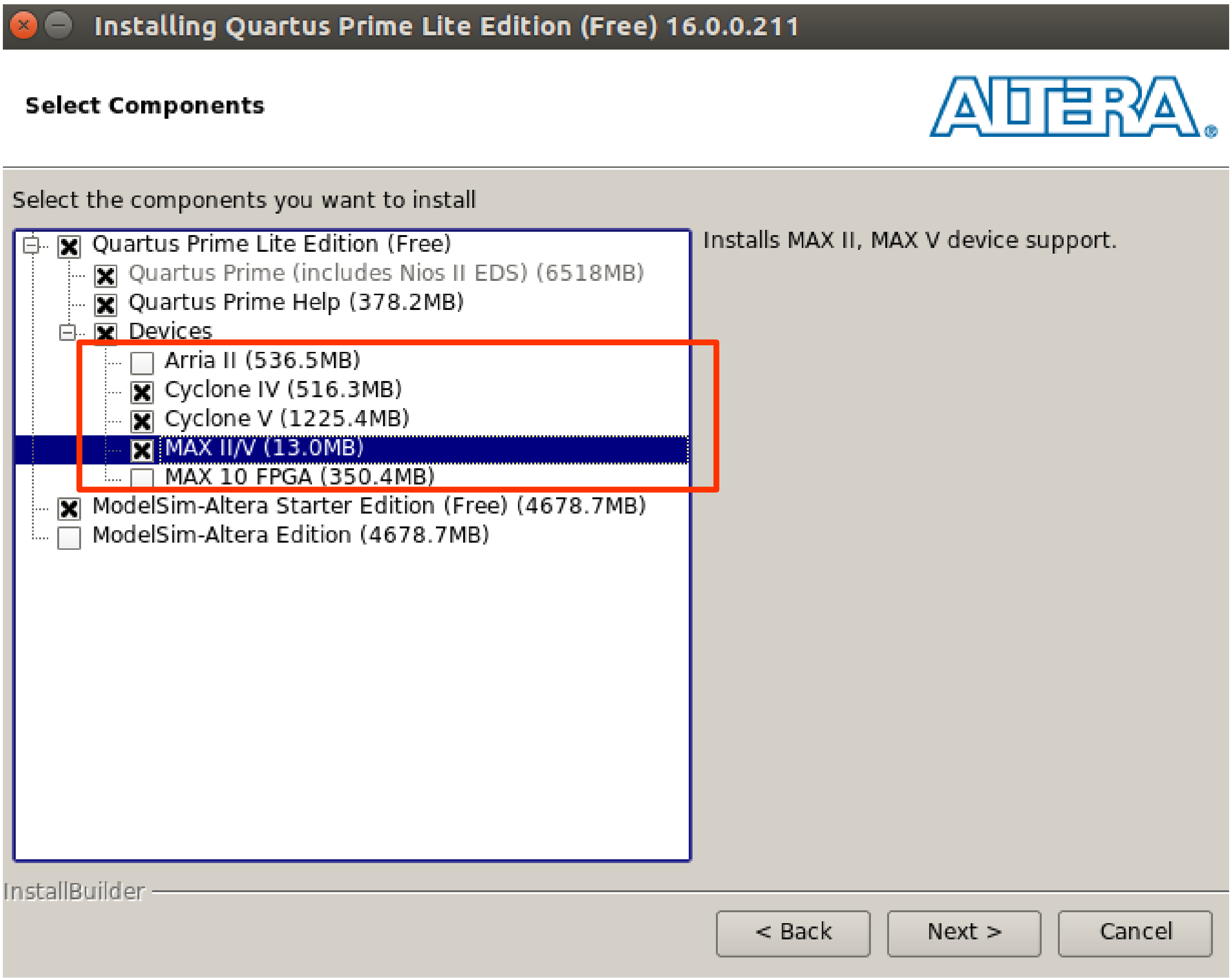
Do you accept this license? ● I accept the agreement ○ I do not accept the agreement


Installing Quartus Prime Lite Edition (Free) 16.0.0.211

Installation directory

Specify the directory where Quartus Prime Lite Edition (Free) 16.0.0.211 will be installed

Installation directory /home/abhishek/altera_lite/16.0

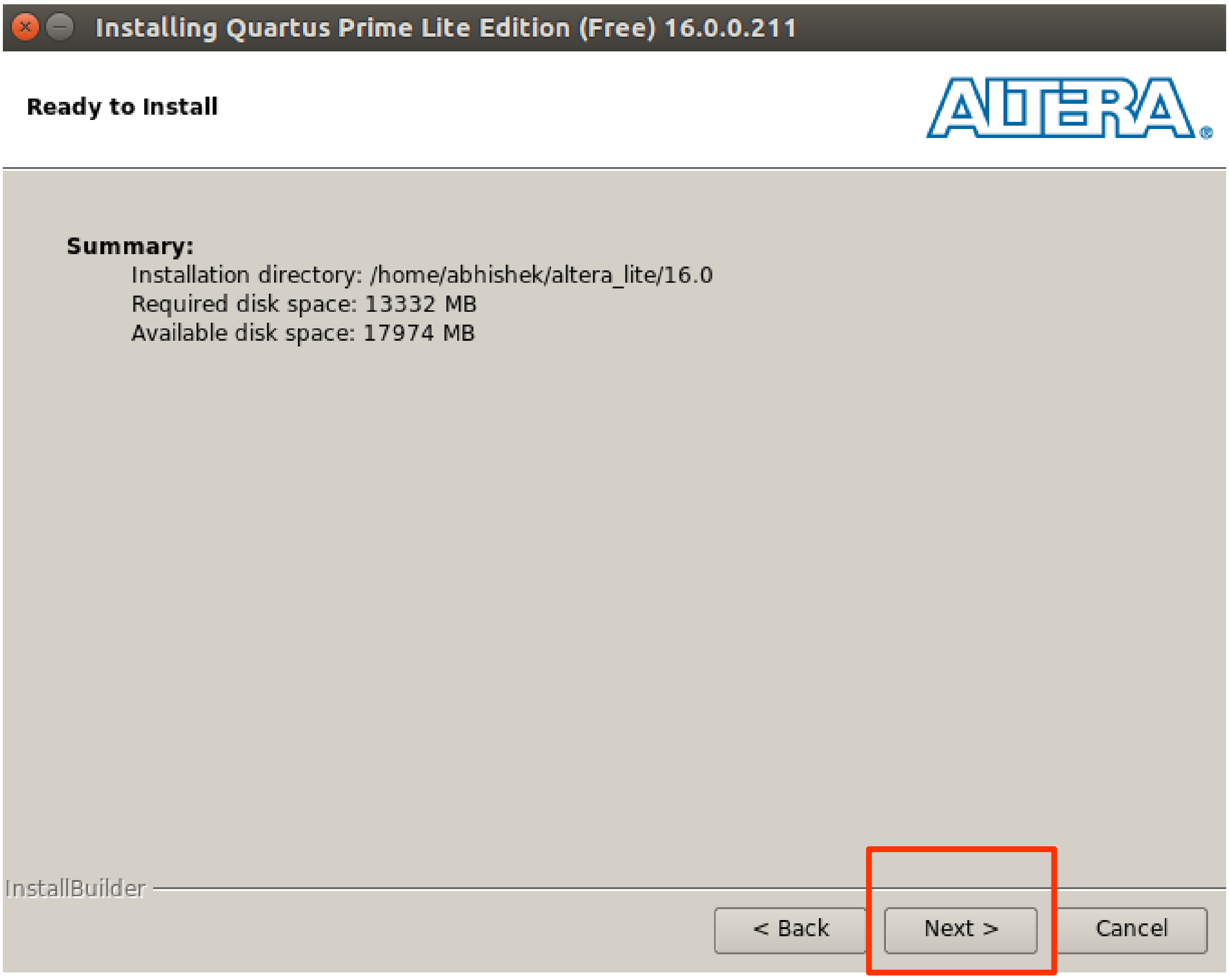


Select Components

Select the components you want to install

- ☒ Quartus Prime Lite Edition (Free)
  - ☒ Quartus Prime (includes Nios II EDS) (6518MB)
  - ☒ Quartus Prime Help (378.2MB)
  - ☒ Devices
    - □ Arria II (536.5MB)
    - ☒ Cyclone IV (516.3MB)
    - ☒ Cyclone V (1225.4MB)
    - ☒ MAX II/V (13.0MB)
    - □ MAX 10 FPGA (350.4MB)
- ☒ ModelSim-Altera Starter Edition (Free) (4678.7MB)
- □ ModelSim-Altera Edition (4678.7MB)

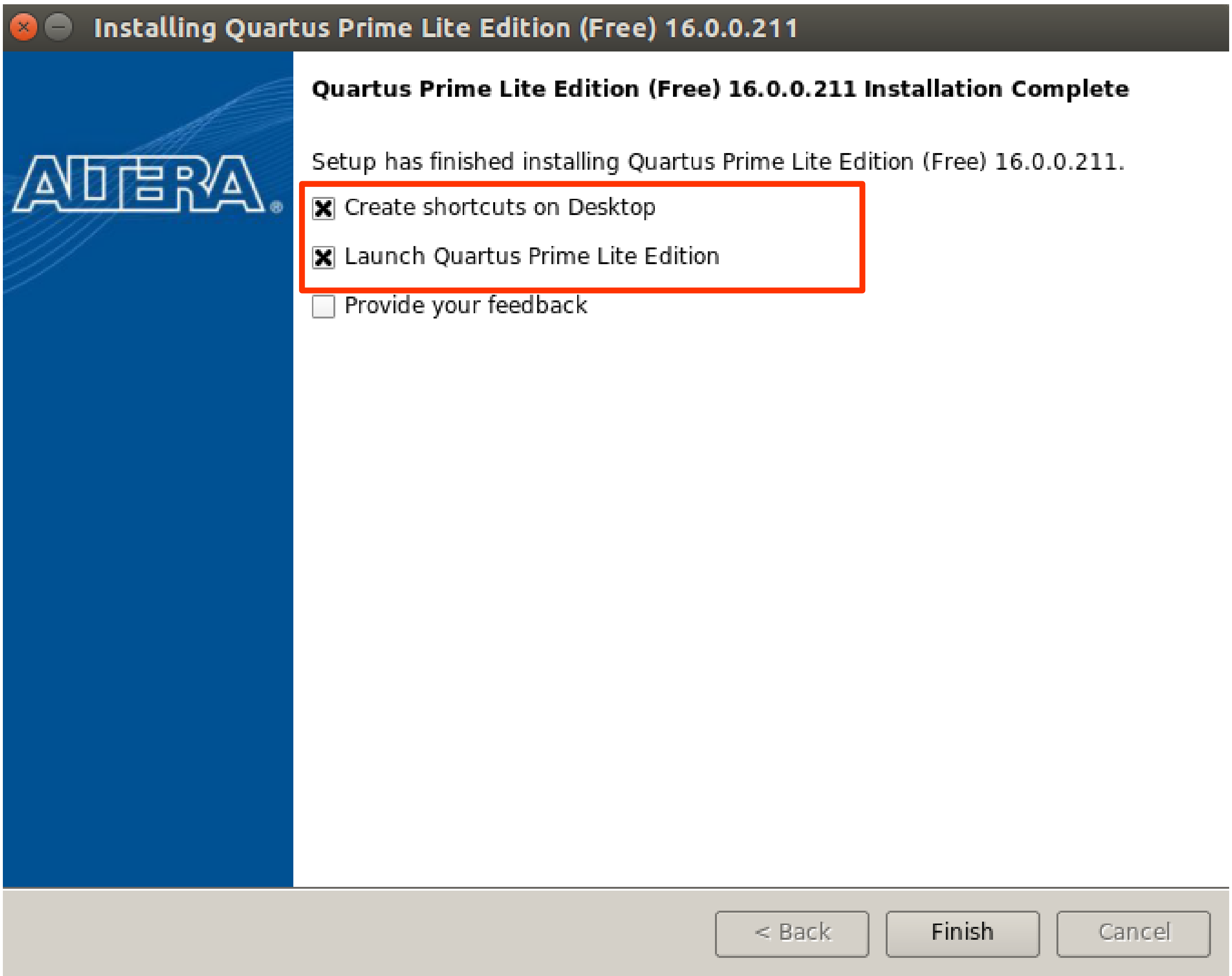
Installs MAX II, MAX V device support.



Ready to Install

Summary:

Installation directory: /home/abhishek/altera_lite/16.0
Required disk space: 13332 MB
Available disk space: 17974 MB



Installing Quartus Prime Lite Edition (Free) 16.0.0.211

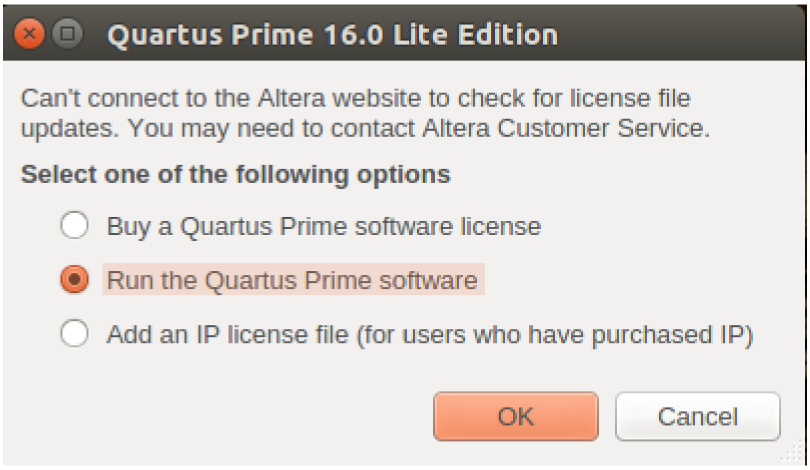
Quartus Prime Lite Edition (Free) 16.0.0.211 Installation Complete

Setup has finished installing Quartus Prime Lite Edition (Free) 16.0.0.211.

☒ Create shortcuts on Desktop

☒ Launch Quartus Prime Lite Edition

□ Provide your feedback



Quartus Prime 16.0 Lite Edition

Can't connect to the Altera website to check for license file updates. You may need to contact Altera Customer Service.

Select one of the following options

○ Buy a Quartus Prime software license

● Run the Quartus Prime software

○ Add an IP license file (for users who have purchased IP)

You are done with the Quartus-II Installation.

Now, to invoke Quartus-II GUI for your assignments, double click directly on the desktop icon.

C) Modelsim:

1. After installation go to, cd <Quartus_installtion_PATH>altera_lite/16.0/modelsim_ase/bin

2. Run the command **./vsim**.

ModelSim Graphical environment will be available to test your simulation results.

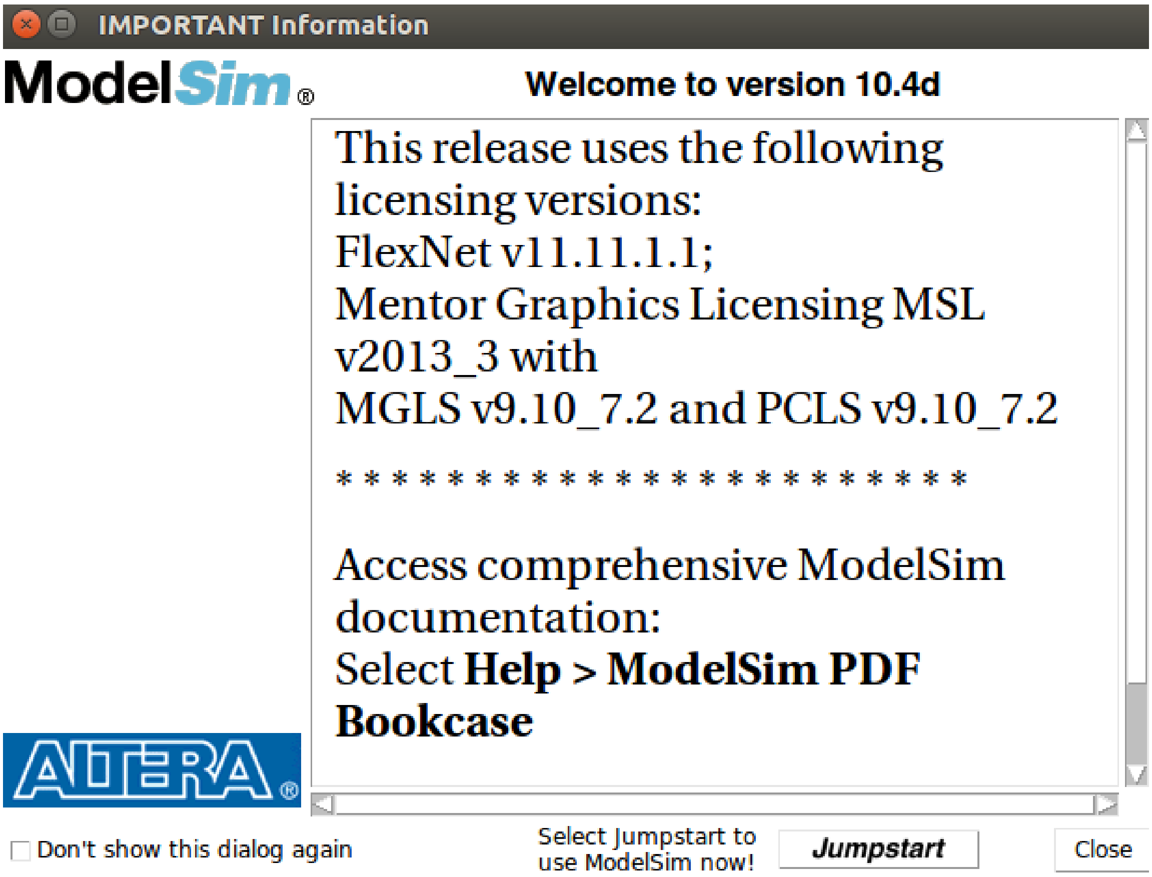
Additional settings for Ubuntu 16.04 only:

If you are getting the error (“Could not find ../linux_rh60”) for ModelSim on Ubuntu 16.04, use the following corrections.

- cd /<Quartus_installtion_PATH>/altera/16.0/modelsim_ase/bin
- sudo gedit vsim

(Note: Keep a original copy of a vsim file as a backup. If you make any mistake in the editing, then it will be difficult for you to find out the errors)

- change mode=${MTI_VCO_MODE:-""} to mode=${MTI_VCO_MODE:-"32"}
- change vco="linux_rh60" to vco="linux"



IMPORTANT Information

Welcome to version 10.4d

This release uses the following licensing versions:
FlexNet v11.11.1.1;
Mentor Graphics Licensing MSL v2013_3 with
MGLS v9.10_7.2 and PCLS v9.10_7.2

* *

Access comprehensive ModelSim documentation:
Select **Help > ModelSim PDF Bookcase**

□ Don't show this dialog again

Select Jumpstart to use ModelSim now!

If graphical interface doesn’t work and shows the following error, install following dependencies:

- **sudo apt-get install libxft2:i386**
- **sudo apt-get install libxrender1:i386 libxtst6:i386 libxi6:i386**
- **sudo dpkg --add-architecture i386**
- **sudo apt-get update**
- **sudo apt-get install build-essential**
- **sudo apt-get install gcc-multilib g++-multilib lib32z1 lib32stdc++6 lib32gcc1 expat:i386 fontconfig:i386 libfreetype6:i386 libexpat1:i386 libc6:i386 libgtk-3-0:i386 libcanberra0:i386 libpng12-0:i386 libice6:i386 libsm6:i386 libncurses5:i386 zlib1g:i386 libx11-6:i386 libxau6:i386 libxdmcp6:i386 libxext6:i386 libxft2:i386 libxrender1:i386 libxt6:i386 libxtst6:i386**

Testing of Modelsim through Quartus-II (Optional)

- Open the .qpf project file in the Quatus-II environment (This will include all the related files)
- Open the VDHL files of this project
- Compile the project files
- Then, run **RTL Simulation** in the Tools menu (This will invoke the modelsim window).

D) To install UrJTAG (Software tool to download bit file from PC to CPLD board)

1) **sudo apt-get remove urjtag**

or **sudo apt-get remove urjtag:i386** (to remove other versions of Urjtag, if any)

2) Unzip the file ‘urjtag.zip’.

3) Install the package by **typing** (do not copy the name of the file) following in the terminal:

sudo apt install /<PATH of Urjtag file>/urjtag_0.10+r2007-1_i386.deb

4) Then follow the steps to add the "device information file" (“altera.tar.gz” is available inside the the folder ‘urjtag’ extracted earlier.)

- **sudo cp -r /<PATH>/altera.tar.gz /usr/share/urjtag** (Mention correct location of "altera.tar.gz" file)
- **cd /usr/share/urjtag**
- **sudo tar -zxvf altera.tar.gz**
- **sudo chmod -R 755 altera**

Note: Since higher versions of urjtag has compatibility issues, we will stop the update of the urjtag by locking it to the currently installed version.

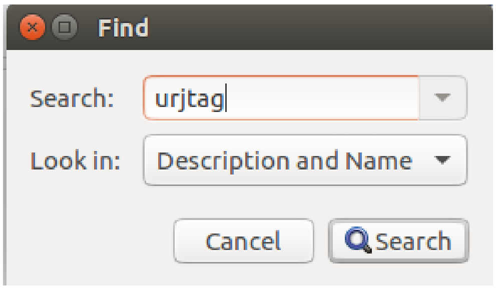
1) Open the application ‘Synaptic Package Manager’.

If you do not have synaptic package manager, you can install by typing following in terminal:

sudo apt-get update

sudo apt-get install synaptic

2) Open the synaptic package manager, Search for ‘urjtag’



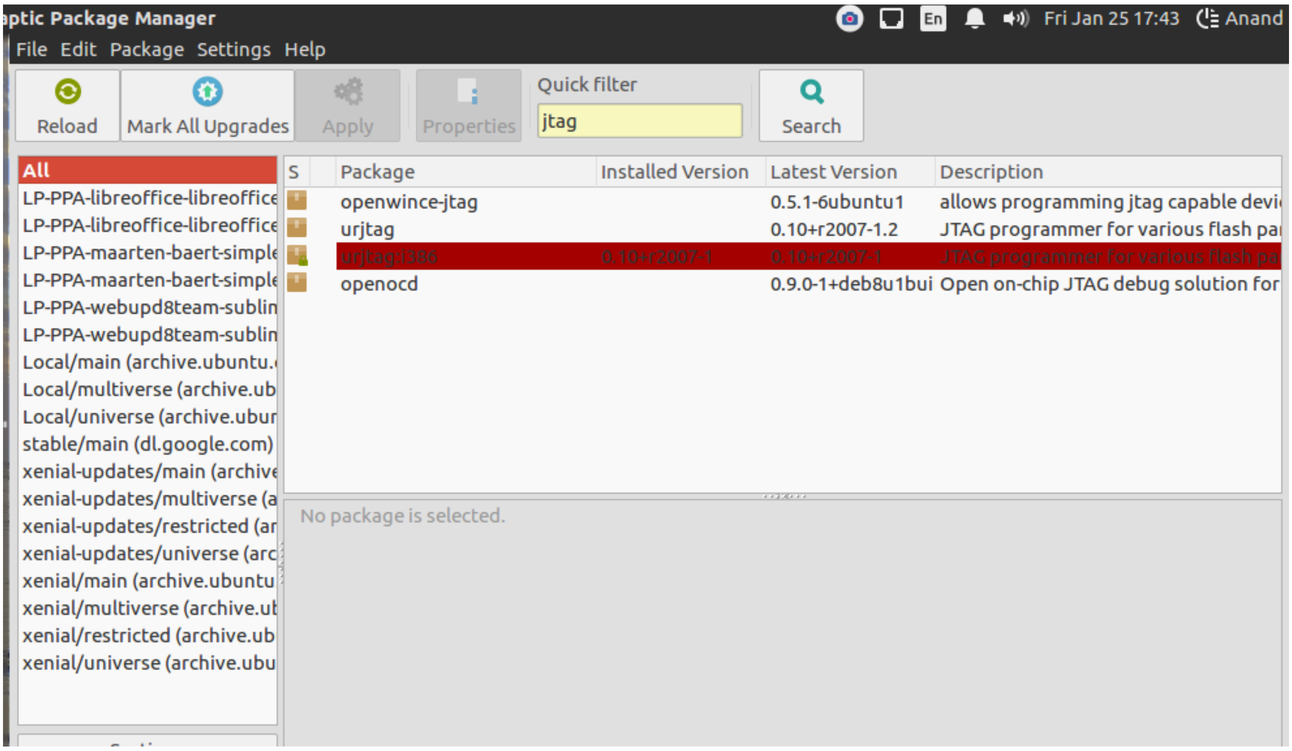
Search: urjtag

Look in: Description and Name

3) Select ‘urjtag:i386’.

4) Go to *Packages->Lock Version.*

After locking it to the given version, ‘urjtag’ will turn red in color.


ptic Package Manager
Fri Jan 25 17:43
Anand
File
Edit
Package
Settings
Help
Reload
Mark All Upgrades
Apply
Properties
Search
All
LP-PPA-libreoffice-libreoffice
LP-PPA-libreoffice-libreoffice
LP-PPA-maarten-baert-simple
LP-PPA-maarten-baert-simple
LP-PPA-webupd8team-sublin
LP-PPA-webupd8team-sublin
Local/main (archive.ubuntu.
Local/multiverse (archive.ub
Local/universe (archive.ubur
stable/main (dl.google.com)
xenial-updates/main (archive
xenial-updates/multiverse (a
xenial-updates/restricted (ar
xenial-updates/universe (arc
xenial/main (archive.ubuntu
xenial/multiverse (archive.ul
xenial/restricted (archive.ub
xenial/universe (archive.ubu
No package is selected.

Quick filter: jtag

S	Package	Installed Version	Latest Version	Description
	openwince-jtag		0.5.1-6ubuntu1	allows programming jtag capable devi
	urjtag		0.10+r2007-1.2	JTAG programmer for various flash pa
	urjtag:i386	0.10+r2007-1	0.10+r2007-1	JTAG programmer for various flash pa
	openocd		0.9.0-1+deb8u1bui	Open on-chip JTAG debug solution for

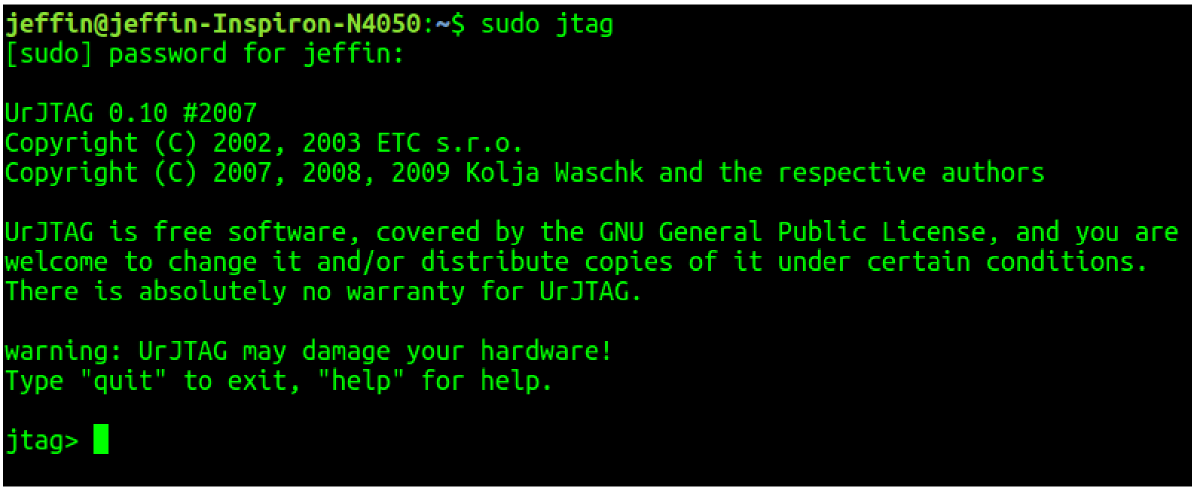
Now you have successfully locked the installed version of urjtag !

Lab Work: To check the connection with Krypton CPLD and to download "bit file" to the board:

First, connect the Krypton board to your PC.

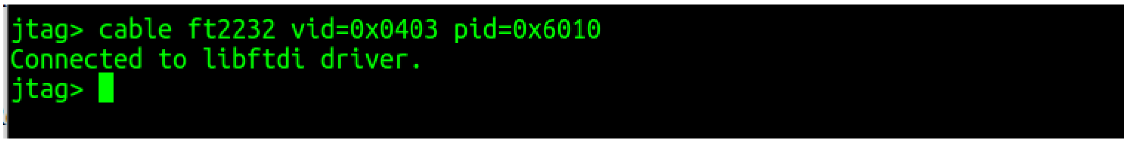
Type the following commands in the terminal

1) **sudo jtag**



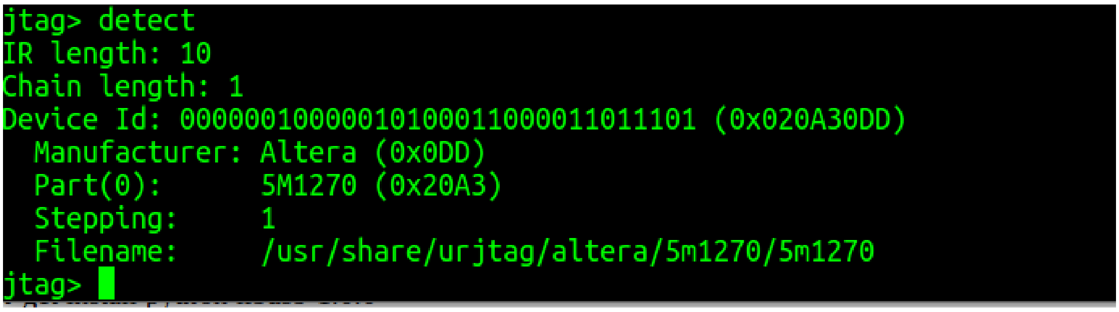
```
jeffin@jeffin-Inspiron-N4050:~$ sudo jtag
[sudo] password for jeffin:

UrJTAG 0.10 #2007
Copyright (C) 2002, 2003 ETC s.r.o.
Copyright (C) 2007, 2008, 2009 Kolja Waschk and the respective authors

UrJTAG is free software, covered by the GNU General Public License, and you are
welcome to change it and/or distribute copies of it under certain conditions.
There is absolutely no warranty for UrJTAG.

warning: UrJTAG may damage your hardware!
Type "quit" to exit, "help" for help.

jtag>
```

2) cable ft2232 vid=0x0403 pid=0x6010



```
jtag> cable ft2232 vid=0x0403 pid=0x6010
Connected to libftdi driver.
jtag>
```

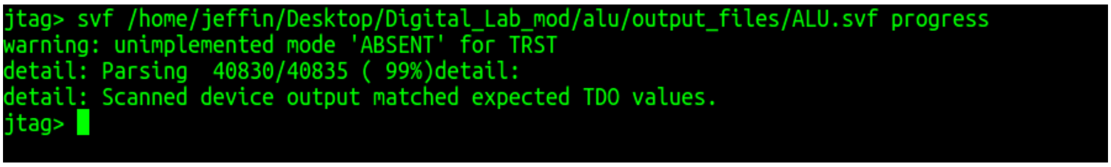
3) **detect**



```
jtag> detect
IR length: 10
Chain length: 1
Device Id: 00000010000010100011000011011101 (0x020A30DD)
  Manufacturer: Altera (0x0DD)
  Part(0):      5M1270 (0x20A3)
  Stepping:     1
  Filename:     /usr/share/urjtag/altera/5m1270/5m1270
jtag>
```

4) **svf <location of the svf file/filename.svf> progress**

(to download the bit file to CPLD board)



```
jtag> svf /home/jeffin/Desktop/Digital_Lab_mod/alu/output_files/ALU.svf progress
warning: unimplemented mode 'ABSENT' for TRST
detail: Parsing  40830/40835 ( 99%)detail:
detail: Scanned device output matched expected TDO values.
jtag> 
```

E) Installation of pyusb (Required for Scan Chain) [Required for Scan Chain]

1) Install Python and other dependencies:

sudo apt-get install python libusb-1.0.0

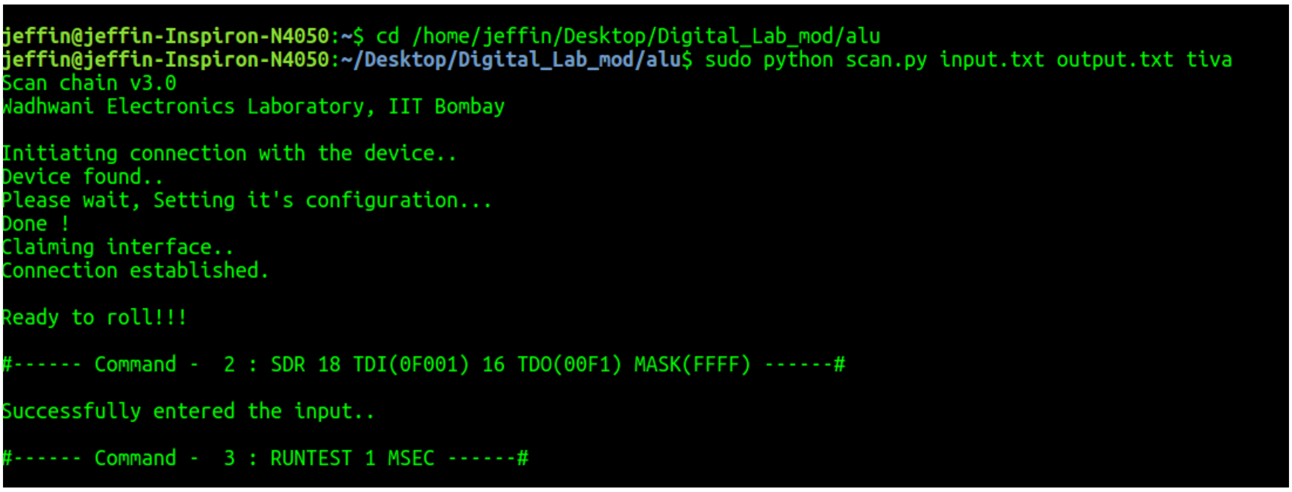
2) Locate the zip file ‘pyusb-master.zip’, and unzip it.

5) setup.py is available in the extracted folder

- **cd <path of setup.py>**
- **sudo apt install python-pip**
- **sudo python setup.py install**

6) cd <path of scan.py> (scan.py is available in scan chain supporting materials)

After the installation run the scan.py script with the following command.
For Tiva-C : sudo python scan.py input file output file tiva



```
jeffin@jeffin-Inspiron-N4050:~$ cd /home/jeffin/Desktop/Digital_Lab_mod/alu
jeffin@jeffin-Inspiron-N4050:~/Desktop/Digital_Lab_mod/alu$ sudo python scan.py input.txt output.txt tiva
Scan chain v3.0
Wadhwani Electronics Laboratory, IIT Bombay

Initiating connection with the device..
Device found..
Please wait, Setting it's configuration...
Done !
Claiming interface..
Connection established.

Ready to roll!!!

#------ Command -  2 : SDR 18 TDI(0F001) 16 TDO(00F1) MASK(FFFF) ------#

Successfully entered the input..

#------ Command -  3 : RUNTEST 1 MSEC ------#
```