

To install Quartus-II, ModelSim, UrJTAG, GHDL, GTKWave and Krypton CPLD board drivers

**** README document for Ubuntu 12.04 and Ubuntu 14.04 only ****

**** Please read the instructions carefully and type the commands without any mistake**

A) For Ubuntu updates:

- sudo apt-get update

((Don't use "IIT ftp servers" in the Ubuntu centre for downloading updates. Use "Servers in India"))

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

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)

*** To install Quartus-II (Version 12.0):**

1) Download the TAR file from the WEL server (This will take time to download. File size approx. 3.8 GB).

http://wel.ee.iitb.ac.in/teaching_labs/WEL%20Site/ee214/resources/12.0_178_quartus_free_linux.tar.gz

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

3) Then run the command: sudo tar -zxvf 12.0_178_quartus_free_linux.tar.gz

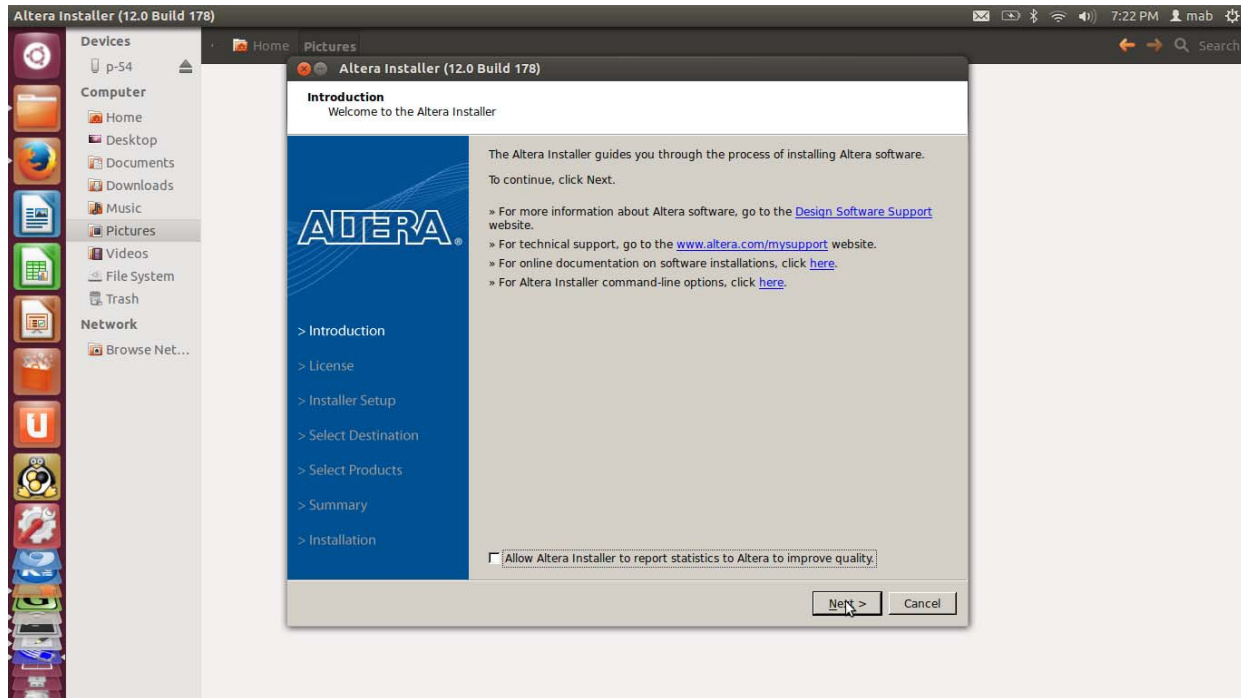
4) Then go to the uncompressed folder "12.0_178_quartus_free_linux",

cd 12.0_178_quartus_free_linux

5) cd altera_installer

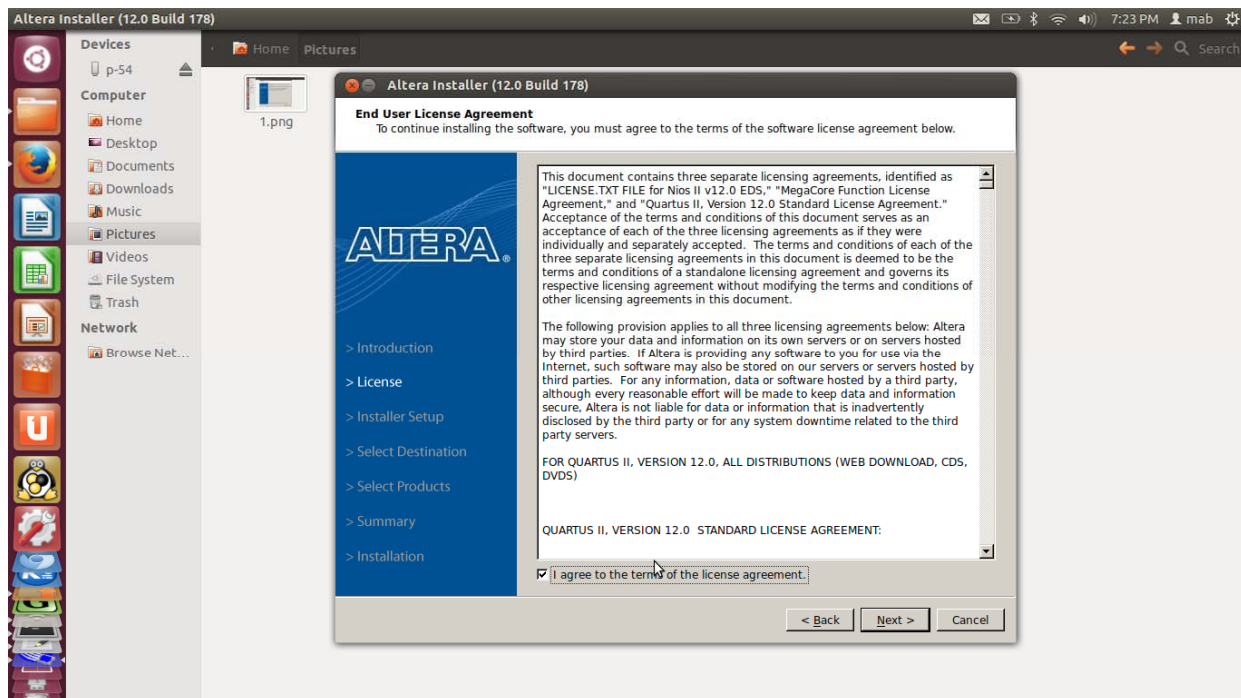
6) cd bin

7) sudo ./altera_installer_gui --gui

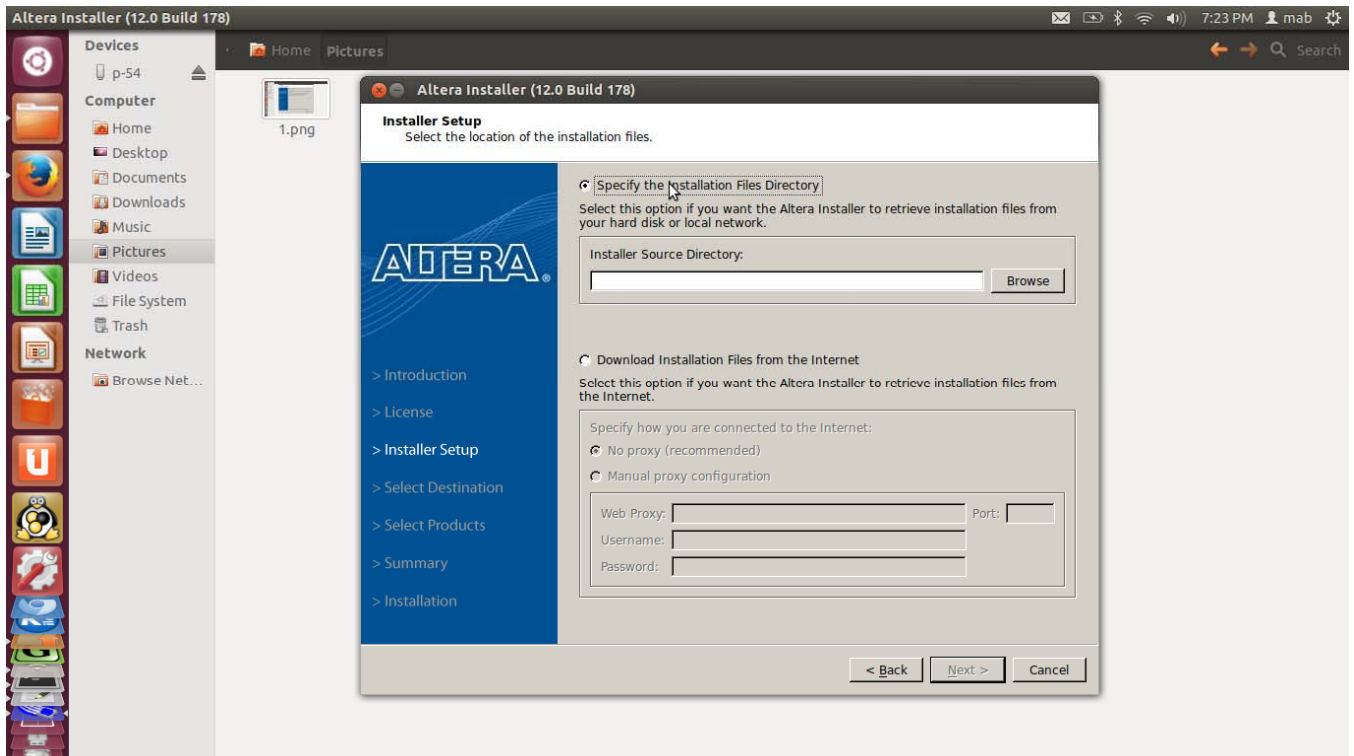


Click 'Next'

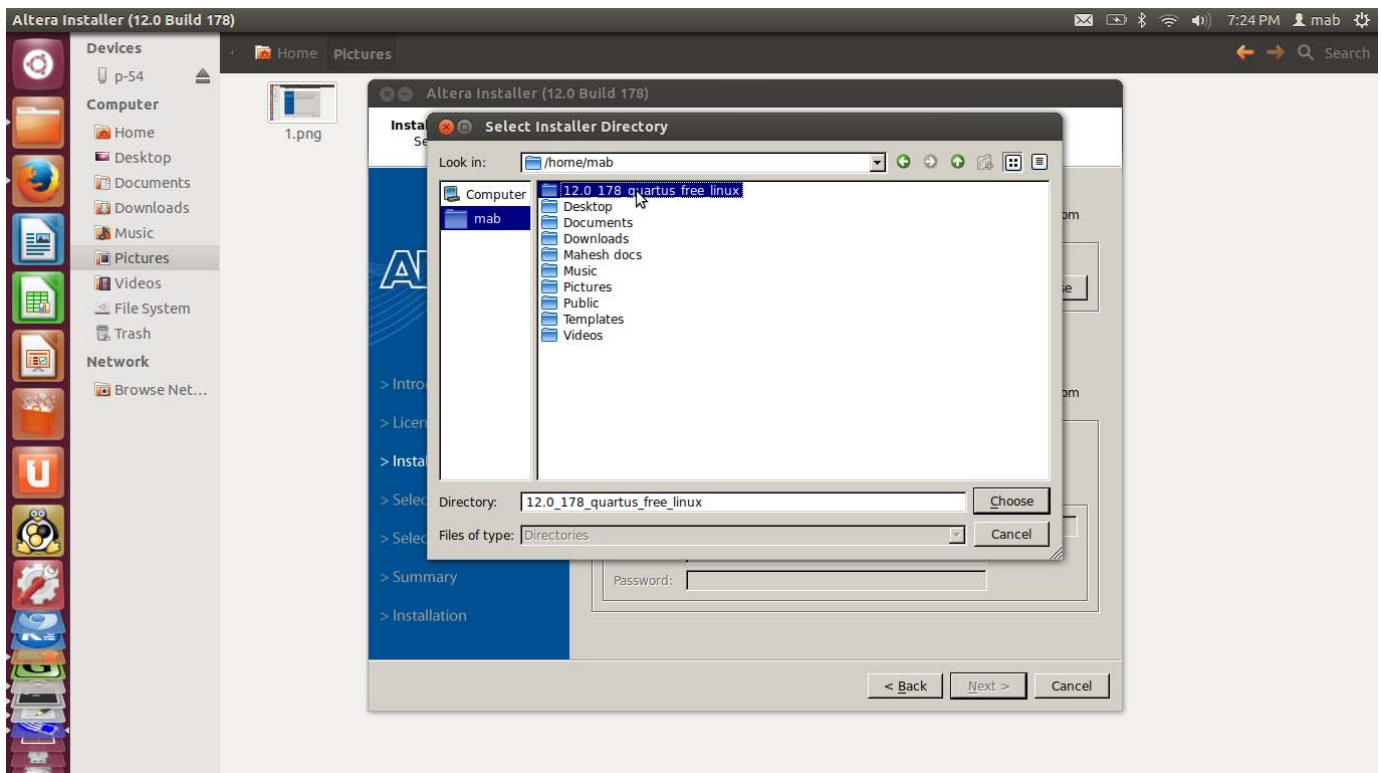
8) Tick ☒ I Agree and Click 'Next'



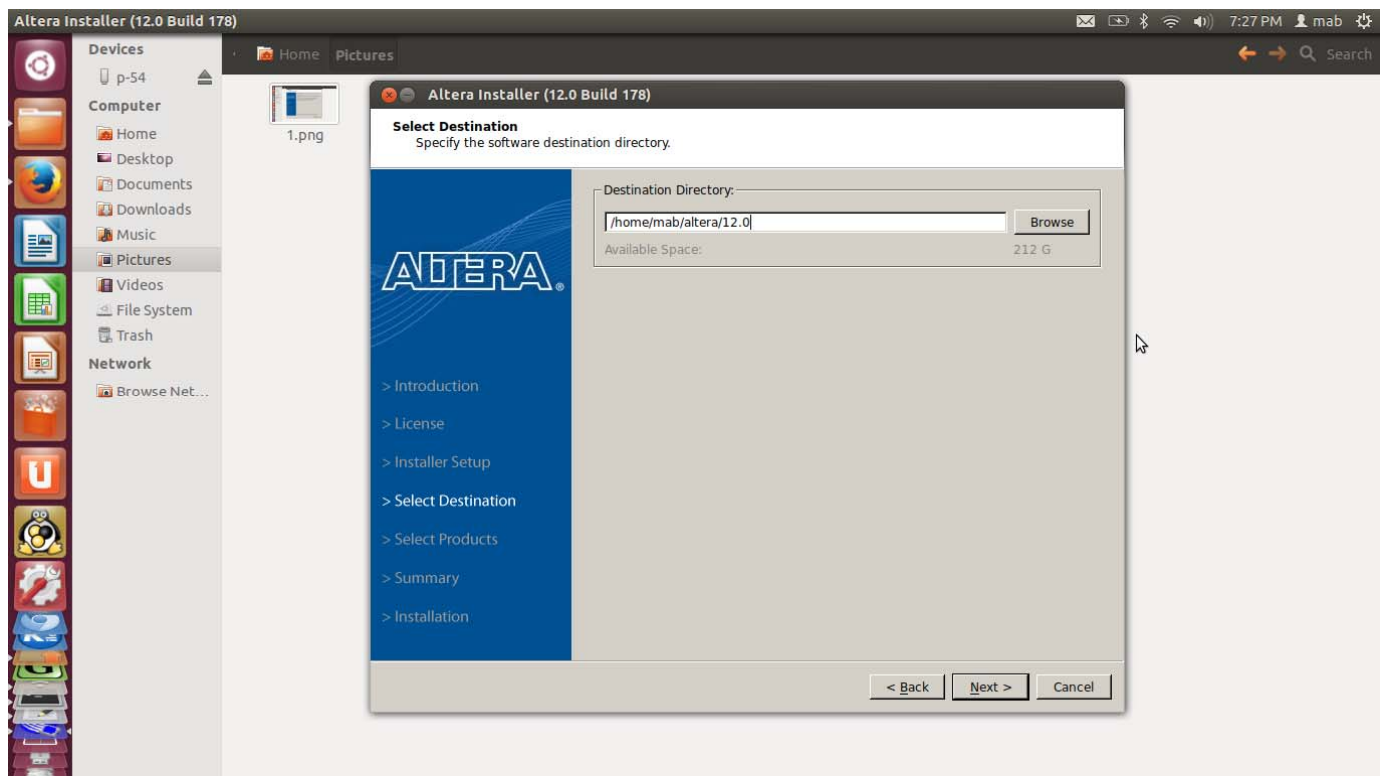
9) Select "Specify the Installation files Directory"



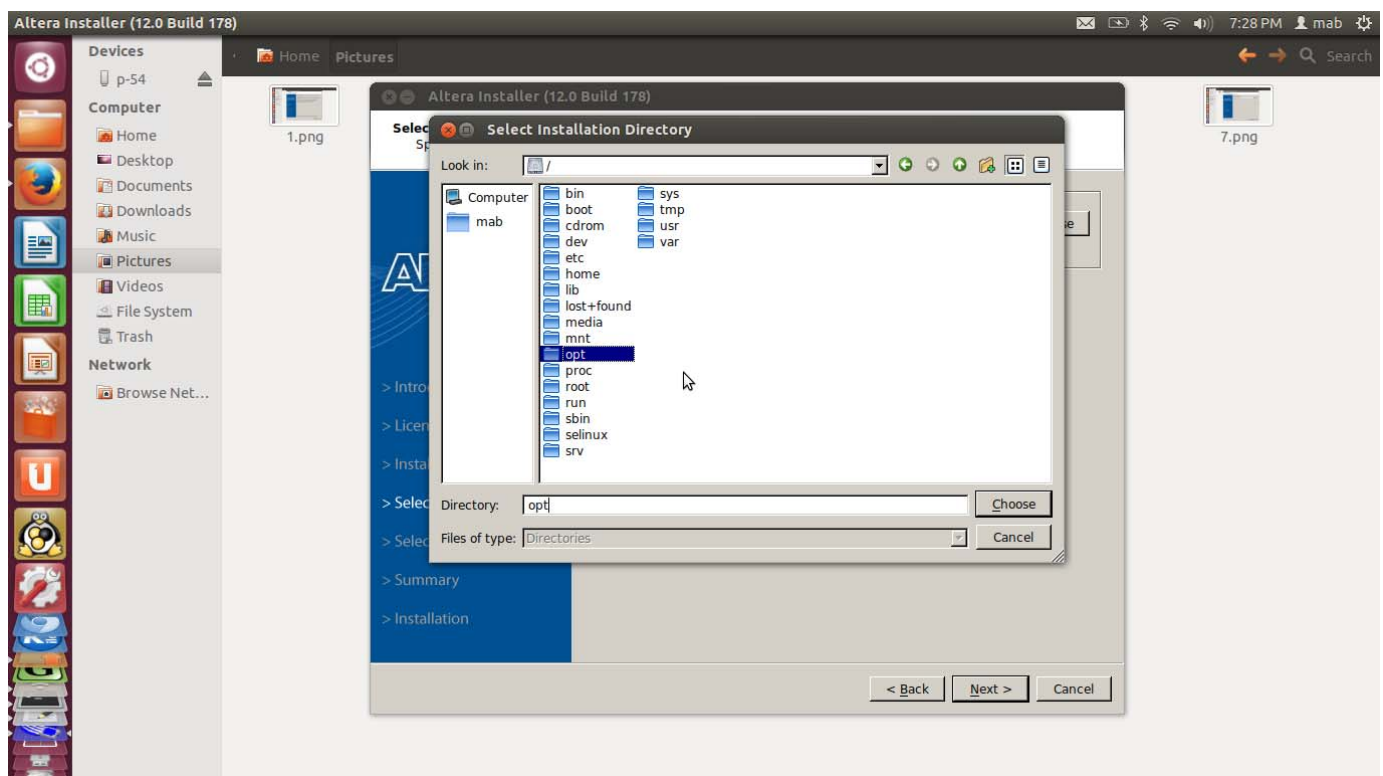
10) Browse and choose the location of the "12.0_178_quartus_free_linux" and click "Next".



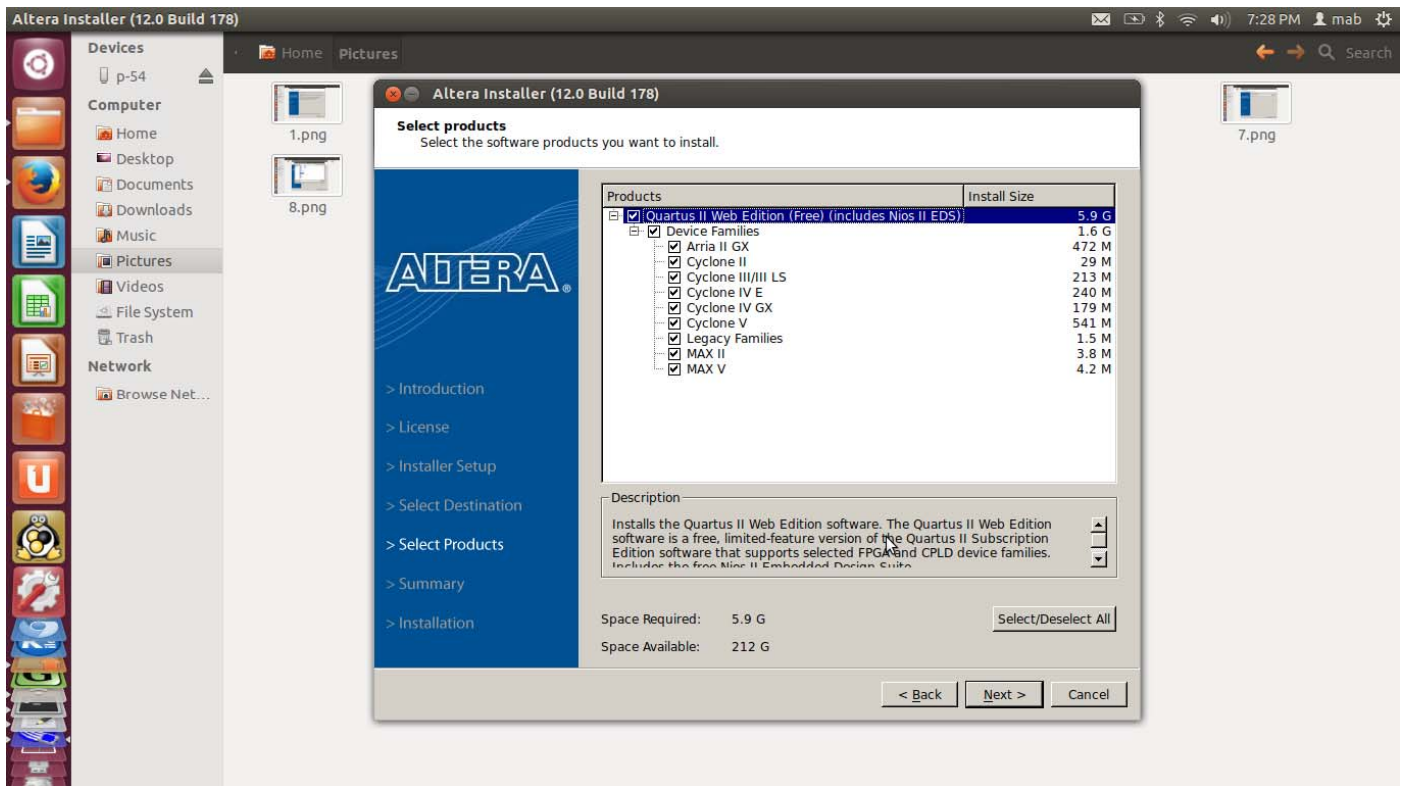
11) "Specify the software destination directory" on your machine and Click "Next".



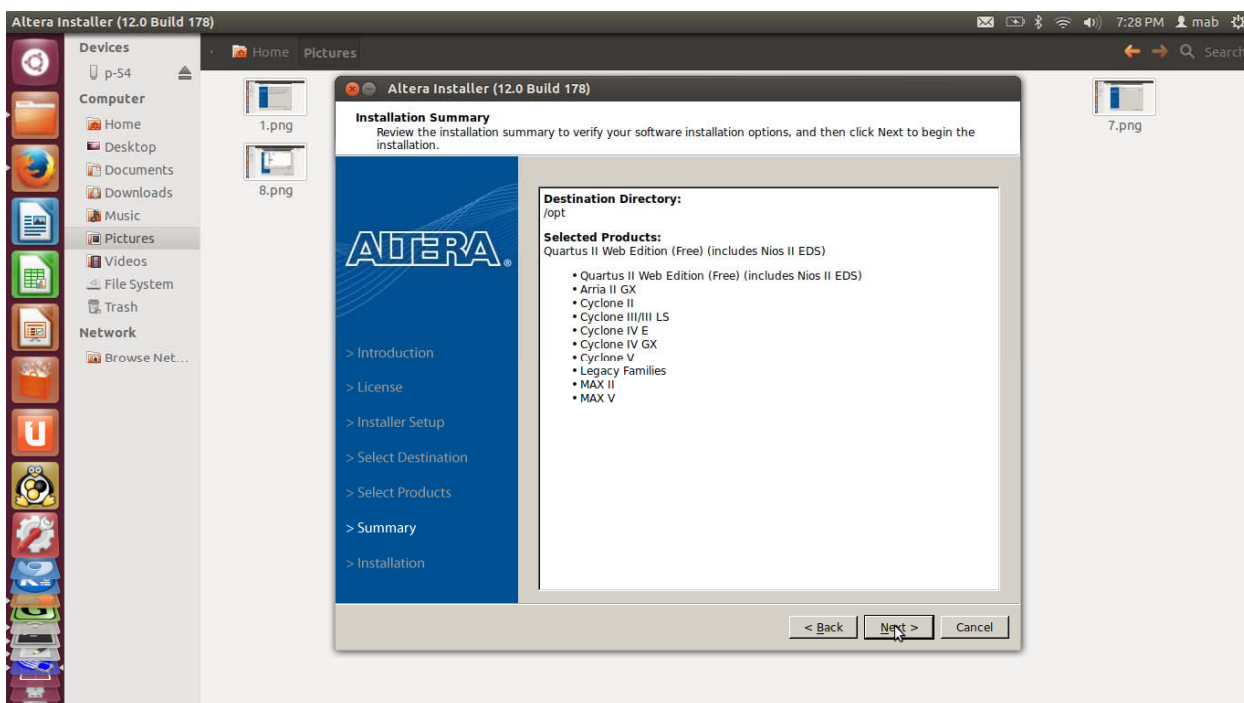
12) Choose Installation Directory `/opt` and Click "Next".



13) Select the software products (Tick ☒ all products) and Click “Next”.

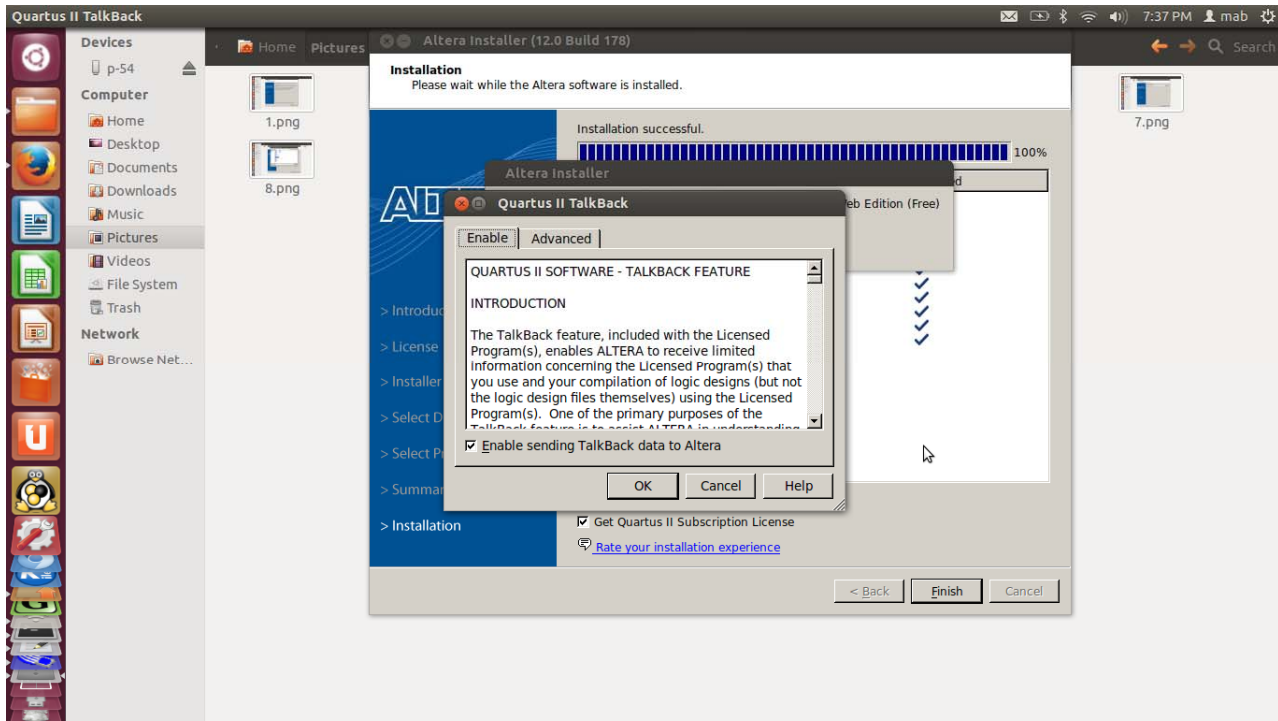


14) Now, the window will show “Summary of the installation”, Click “Next”.



15) Window will show the Installation progress.

16) At the end of the installation, you will get a pop-up window (Untick “Enable sending Talkback”)



17) In the end, for the pop-up window “Quartus II Installation finished”, Click “OK”.

18) Untick “Get Quartus II Subscription License” and Click “Finish”.

✓ You are done with the Quartus- II Installation.

Now, to use Quartus in future

- 1) goto the location- `cd /opt/quartus/bin`
- 2) quartus (Press enter)

C) ModelSim Installation steps

1. Download "ModelSimSetup-13.1.0.162.run" installation file from the server

http://wel.ee.iitb.ac.in/teaching_labs/WEL%20Site/ee214/resources/ModelSimSetup-13.1.0.162.run

- `chmod 755 ./ModelSimSetup-13.1.0.162.run`

Then run, `sudo ./ModelSimSetup-13.1.0.162.run` and Press [Enter] to continue

```
wel@w2-348: ~
Setting up libx32itm1 (4.8.4-2ubuntu1~14.04.3) ...
Setting up lib32atomic1 (4.8.4-2ubuntu1~14.04.3) ...
Setting up libx32atomic1 (4.8.4-2ubuntu1~14.04.3) ...
Setting up lib32asan0 (4.8.4-2ubuntu1~14.04.3) ...
Setting up libx32asan0 (4.8.4-2ubuntu1~14.04.3) ...
Setting up lib32quadmath0 (4.8.4-2ubuntu1~14.04.3) ...
Setting up libx32quadmath0 (4.8.4-2ubuntu1~14.04.3) ...
Setting up lib32gcc-4.8-dev (4.8.4-2ubuntu1~14.04.3) ...
Setting up libx32gcc-4.8-dev (4.8.4-2ubuntu1~14.04.3) ...
Setting up gcc-4.8-multilib (4.8.4-2ubuntu1~14.04.3) ...
Setting up gcc-multilib (4:4.8.2-1ubuntu6) ...
Setting up lib32stdc++6 (4.8.4-2ubuntu1~14.04.3) ...
Setting up lib32stdc++-4.8-dev (4.8.4-2ubuntu1~14.04.3) ...
Setting up libx32stdc++6 (4.8.4-2ubuntu1~14.04.3) ...
Setting up libx32stdc++-4.8-dev (4.8.4-2ubuntu1~14.04.3) ...
Setting up g++-4.8-multilib (4.8.4-2ubuntu1~14.04.3) ...
Setting up g++-multilib (4:4.8.2-1ubuntu6) ...
Setting up lib32z1 (1:1.2.8.dfsg-1ubuntu1) ...
Processing triggers for libc-bin (2.19-0ubuntu6.5) ...
wel@w2-348:~$ sudo ./ModelSimSetup-13.1.0.162.run
Warning: This installer detects you either don't have a display set up or don't
have the necessary GUI libraries installed, this installation will run in
console mode.
Press [Enter] to continue :
```

2. Choose an option [1] for starter edition

```
wel@w2-348: ~
Setting up lib32stdc++-4.8-dev (4.8.4-2ubuntu1~14.04.3) ...
Setting up libx32stdc++6 (4.8.4-2ubuntu1~14.04.3) ...
Setting up libx32stdc++-4.8-dev (4.8.4-2ubuntu1~14.04.3) ...
Setting up g++-4.8-multilib (4.8.4-2ubuntu1~14.04.3) ...
Setting up g++-multilib (4:4.8.2-1ubuntu6) ...
Setting up lib32z1 (1:1.2.8.dfsg-1ubuntu1) ...
Processing triggers for libc-bin (2.19-0ubuntu6.5) ...
wel@w2-348:~$ sudo ./ModelSimSetup-13.1.0.162.run
Warning: This installer detects you either don't have a display set up or don't
have the necessary GUI libraries installed, this installation will run in
console mode.
Press [Enter] to continue :

-----
Welcome to the ModelSim-Altera Edition or Starter Edition 10.1d (Quartus II
13.1.0.162) Setup Wizard.

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

-----
Select the ModelSim edition you like to install

[1] ModelSim-Altera Starter Edition: - License is not required.
[2] ModelSim-Altera Edition: - License is required.
Please choose an option [1] :
```


3. Press [Enter] to continue

```
wel@w2-348: ~  
Processing triggers for libc-bin (2.19-0ubuntu6.5) ...  
wel@w2-348:~$ sudo ./ModelSimSetup-13.1.0.162.run  
Warning: This installer detects you either don't have a display set up or don't  
have the necessary GUI libraries installed, this installation will run in  
console mode.  
Press [Enter] to continue :  
-----  
Welcome to the ModelSim-Altera Edition or Starter Edition 10.1d (Quartus II  
13.1.0.162) Setup Wizard.  
  
For more information about Altera software, go to http://www.altera.com.  
-----  
Select the ModelSim edition you like to install  
  
[1] ModelSim-Altera Starter Edition:  - License is not required.  
[2] ModelSim-Altera Edition:         - License is required.  
Please choose an option [1] : 1  
  
-----  
Please read the following License Agreement. You must accept the terms of this  
agreement before continuing with the installation.  
  
Press [Enter] to continue : █
```

4. Press [Enter] to continue, till it reaches the option of accepting the license agreement

```
wel@w2-348: ~  
This document contains four separate licensing agreements, identified  
as "LICENSE.TXT FILE for Nios II v13.1 EDS," "MegaCore Function  
License Agreement," "Altera SDK for OpenCL(tm)", and "Quartus II, Version 13.1  
Standard License  
Agreement." Acceptance of the terms and conditions of this document  
serves as an acceptance of each of the three licensing agreements as  
if they were individually and separately accepted. The terms and  
conditions of each of the three separate licensing agreements in this  
document is deemed to be the terms and conditions of a standalone  
licensing agreement and governs its respective licensing agreement  
without modifying the terms and conditions of other licensing  
agreements in this document.  
  
The following provision applies to all three licensing agreements  
below: Altera may store your data and information on its own servers  
or on servers hosted by third parties. If Altera is providing any  
software to you for use via the Internet, such software may also be  
stored on our servers or servers hosted by third parties. For any  
information, data or software hosted by a third party, although every  
reasonable effort will be made to keep data and information secure,  
Altera is not liable for data or information that is inadvertently  
disclosed by the third party or for any system downtime related to the  
third party servers.  
Press [Enter] to continue : █
```


5. Press 'y' to accept the license

```
wel@w2-348: ~  
Do you accept this license? [y/n]:  
Do you accept this license? [y/n]:  
Do you accept this license? [y/n]:  
Do you accept this license? [y/n]:  
Do you accept this license? [y/n]:  
Do you accept this license? [y/n]:  
Do you accept this license? [y/n]:  
Do you accept this license? [y/n]:  
Do you accept this license? [y/n]:  
Do you accept this license? [y/n]:  
Do you accept this license? [y/n]:  
Do you accept this license? [y/n]: y
```

6. Choose Installation directory: /opt/

```
wel@w2-348: ~  
Do you accept this license? [y/n]:  
Do you accept this license? [y/n]:  
Do you accept this license? [y/n]:  
Do you accept this license? [y/n]:  
Do you accept this license? [y/n]:  
Do you accept this license? [y/n]:  
Do you accept this license? [y/n]:  
Do you accept this license? [y/n]:  
Do you accept this license? [y/n]: y  
-----  
Specify the directory where ModelSim-Altera Starter Edition 13.1.0.162 will be  
installed  
Installation Directory [/home/wel/altera/13.1]: /opt/
```

7. Next this will show the summary and progress of the installation

```
wel@w2-348: ~  
Installation Directory [/home/wel/altera/13.1]: /opt/  
  
-----  
Ready to Install  
  
Summary:  
  Installation directory: /opt  
  Required disk space: 3529 MB  
  Available disk space: 35217 MB  
  
-----  
Wait while Setup installs ModelSim-Altera Starter Edition 13.1.0.162  
  
Installing  
0% _____ 50% _____ 100%  
#####
```

8. After completion of installation, cd /opt/modelsim_ase/bin then run the command **./vsim**. ModelSim Graphical environment will be available to test your simulation results.

If graphical interface don'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

```
wel@w2-348: /opt/modelsim_ase/bin  
wel@w2-348:/opt/modelsim_ase/bin$ ../../linux/vish: error while loading shared li  
braries: libXext.so.6: cannot open shared object file: No such file or directory  
█
```

After these installations, if you still find errors in invoking modelsim through Quartus II, try out the following steps to make **ModelSim ALTERA STARTER EDITION vsim** work on **Ubuntu-14.04** or sometimes in the other versions of Ubuntu

(Source: Matthew Swabey <http://mattaw.blogspot.in/2014/05/making-modelsim-altera-starter-edition.html>)

Problem 1: The free version of ModelSim Altera Edition is 32-bit only while the normal Linux PC will be 64-bit. On Linux this requires us to install the 32-bit versions of the libraries that it depends on and it is fully supported on linux like **Ubuntu 14.04**.

- `sudo dpkg --add-architecture i386`
- `sudo apt-get update` (Don't use "IIT ftp servers" in the Ubuntu software centre for downloading updates. Use "Servers in India")
- `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 libbc6: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`

Problem 2: If you have the following error when running vsim:

```
** Fatal: Read failure in vlm process (0,0)
Segmentation fault (core dumped)
```

Then you need to build a new version of freetype, a font setting library and modify ModelSim to use it. First download the source code of freetype 2.4.12.

<http://download.savannah.gnu.org/releases/freetype/freetype-2.4.12.tar.bz2>

Now install the build dependencies needed for libfreetype6, extract the source (using tar) and configure and build libfreetype:

- `sudo apt-get build-dep -a i386 libfreetype6`
- `tar -xjvf freetype-2.4.12.tar.bz2` (path to "freetype-2.4.12.tar.bz2")
- `cd freetype-2.4.12` (go to the extracted "freetype-2.4.12" folder)
- `./configure --build=i686-pc-linux-gnu "CFLAGS=-m32" "CXXFLAGS=-m32" LDFLAGS=-m32"`
- `make -j8`

The finished libraries are now available inside the "objs/.libs" directory. As they are necessary to run ModelSim, we need to copy them into the install directory and then modify ModelSim's vsim script to use the new libraries instead of the system wide versions.

Change directory to the directory where ModelSim is installed, `/opt/modelsim_ase/`, on my system. Note you may need to edit the directory paths to match those used on your system.

- `sudo mkdir lib32`
- `sudo cp {freetype-2.4.12 PATH}/objs/.libs/libfreetype.so* ./lib32`

Now, edit the vsim launch script to ensure the new freetype libraries are used:

- `sudo vim /opt/modelsim_ase/bin/vsim`

Search for the following line: `dir='dirname $arg0'`

and underneath add the following new line: `export LD_LIBRARY_PATH=${dir}/lib32`

Finally, Open quartus, go to --> Tools --> Options --> General --> EDA Tools options --> ModelSim-Altera and set the path `/opt/modelsim_ase/bin`. Then press OK.

D) To install GHDL simulation software:

- `sudo add-apt-repository ppa:pgavin/ghdl`
- `sudo install libc-bin libc-dev-bin libc6 libc6-amd64 libc6-dev-amd64`
- `sudo apt-get install glibc-doc`
- `sudo apt-get remove gnat-4.4-base`
- `sudo apt-get install ghdl`

E) To install GTKWAVE (waveform viewer):

- `sudo apt-get install gtkwave`

F) To install USB drivers for the Krypton CPLD board:

1) Go to the link

http://wel.ee.iitb.ac.in/teaching_labs/WEL%20Site/ee214/resources/51-usbblaster.rules

Right click and save the file on your machine (Don't change the name of the file).

2) `sudo cp -r 51-usbblaster.rules /etc/udev/rules.d` (copy the file to the given location)

(Write the correct location of the "51-usbblaster.rules" file, while using the command, e.g., if the location of the file is /home/user/Downloads/, then the command will be "`cp -r /home/user/Downloads/51-usbblaster.rules /etc/udev/rules.d`")

Reload drivers:

- `sudo udevadm control --reload`

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

- `sudo apt-get install urjtag`

**** To use UrJTAG with the Krypton board**

1) Download “altera.tar.gz” file from the link

http://wel.ee.iitb.ac.in/teaching_labs/WEL%20Site/ee214/resources/altera.tar.gz and then use the following steps

- `sudo cp -r 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`
- `jtag`

**** To check the connection with the Krypton CPLD and to download the bit file to the board, use following commands**

- 1) `jtag` (Connect the board with the PC/ laptop)
- 2) `cable ft2232 vid=0x0403 pid=0x6010`
- 3) `detect`
- 4) `svf (location of the svf file/filename.svf) progress` (to download the bit file to CPLD board)

See the results in the following snapshot after running each command

```
saujal@srv:~$ jtag

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> cable ft2232 vid=0x0403 pid=0x6010
Connected to libftdi driver.
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> svf Desktop/On_board_peripheral.svf progress
warning: unimplemented mode 'ABSENT' for TRST
detail: Parsing 40830/40830 (100%)
detail: Scanned device output matched expected TDO values.
jtag> █
```