

OpenVINO

Installation Guide

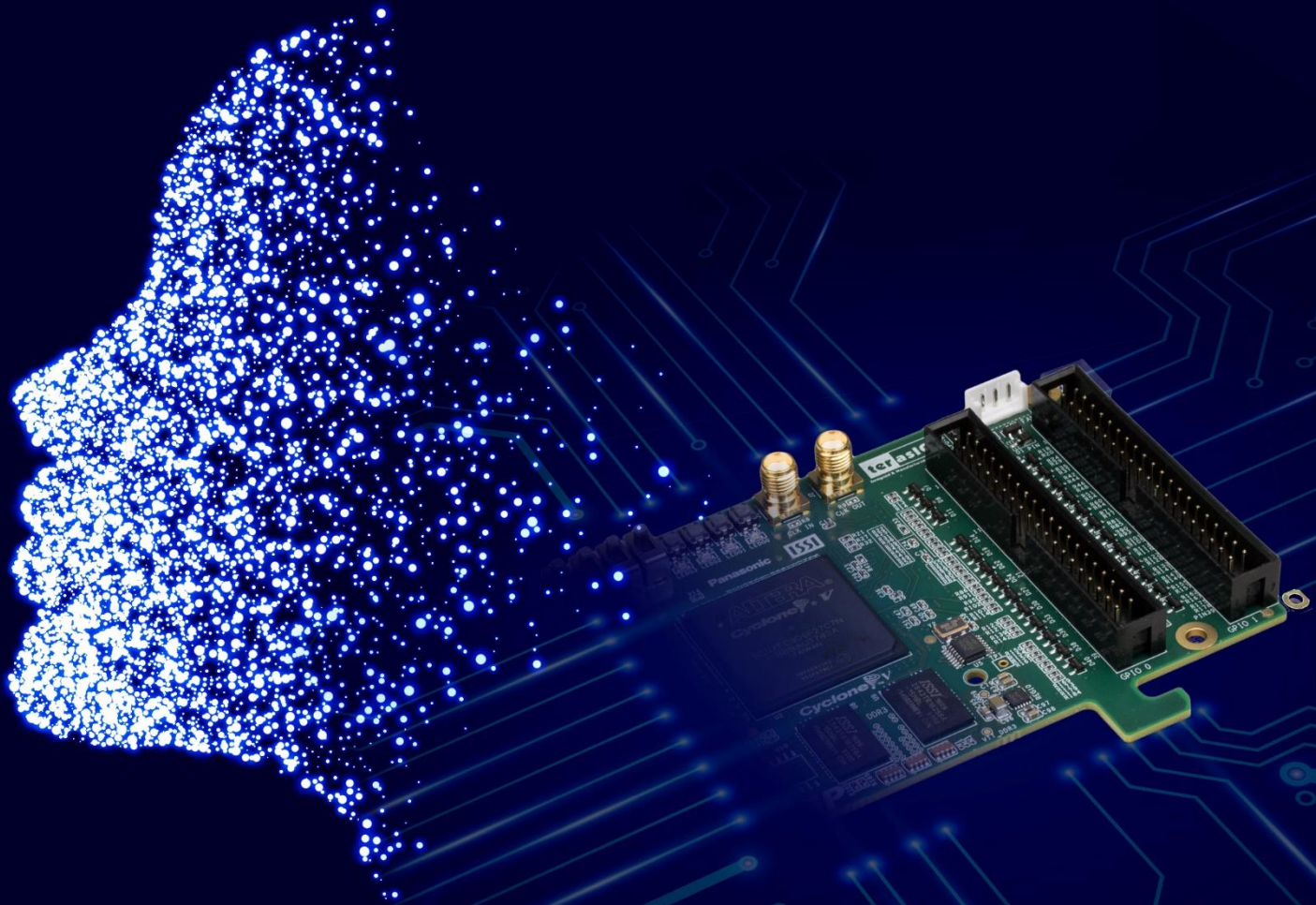


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OpenVINO Toolkit Installation

1.1 About the Guide

This document will show you how to set up the OpenVINO development environment, including how to install the Intel® Distribution of OpenVINO toolkit for Linux with FPGA Support on your PC, how to set up the Starter Platform for OpenVINO™ Toolkit, configuring and programming the kit.

1.2 Introduction

This chapter described how to install the FPGA OpenVINO toolkit under Linux OS environment. The Intel® Distribution of OpenVINO toolkit for Linux with FPGA Support, the version of Linux that users can install is as follows:

- Ubuntu 16.04.x long-term support (LTS), 64-bit
- CentOS 7.6, 64-bit
- Yocto Project Poky Jethro v2.0.3, 64-bit

To download The Intel® Distribution of OpenVINO toolkit for Linux with FPGA Support, please go to the link below (File name: l_openvino_toolkit_fpga_p_2019.1.094.tgz; Size: 2344 MB):

http://registrationcenter-download.intel.com/akdlm/irc_nas/15381/l_openvino_toolkit_fpga_p_2019.1.094.tgz

Note: To use the OpenVINO toolkit on the Starter Platform for OpenVINO™ Toolkit, you can only use the OpenVINO toolkit version in the link above.

1.3 Install OpenVINO Toolkit for Linux with FPGA Support

OpenVINO Toolkit for Linux with FPGA Support installation steps are described as below:

1. Copy the l_openvino_toolkit_fpga_p_2019.1.094.tgz OpenVINO installation package to the desktop.
2. Open the Terminal in the Linux, and type “*sudo su*” to switch to root (super user).
3. Unzip the .tgz compressed file: *tar xvzf l_openvino_toolkit_fpga_p_2019.1.094.tgz*, the default path is l_openvino_toolkit_fpga_p_2019.1.094, as shown in the figure below.

```
root@terasic: /home/terasic/Desktop
terasic@terasic:~$ sudo su
[sudo] password for terasic:
root@terasic:/home/terasic# cd Desktop/
root@terasic:/home/terasic/Desktop# tar xvzf l_openvino_toolkit_fpga_p_2019.1.094.tgz
l_openvino_toolkit_fpga_p_2019.1.094/
l_openvino_toolkit_fpga_p_2019.1.094/pset/
l_openvino_toolkit_fpga_p_2019.1.094/pset/32e/
l_openvino_toolkit_fpga_p_2019.1.094/pset/32e/libz/
l_openvino_toolkit_fpga_p_2019.1.094/pset/32e/libz/libz.so
l_openvino_toolkit_fpga_p_2019.1.094/pset/32e/libz/libz.so.1
l_openvino_toolkit_fpga_p_2019.1.094/pset/32e/libz/libz.so.1.2.11
l_openvino_toolkit_fpga_p_2019.1.094/pset/32e/platforms/
l_openvino_toolkit_fpga_p_2019.1.094/pset/32e/platforms/libqxcb.so
l_openvino_toolkit_fpga_p_2019.1.094/pset/32e/qt/
l_openvino_toolkit_fpga_p_2019.1.094/pset/32e/qt/libQt5Core.so
l_openvino_toolkit_fpga_p_2019.1.094/pset/32e/qt/libQt5Core.so.5
l_openvino_toolkit_fpga_p_2019.1.094/pset/32e/qt/libQt5Core.so.5.12
l_openvino_toolkit_fpga_p_2019.1.094/pset/32e/qt/libQt5DBus.so
l_openvino_toolkit_fpga_p_2019.1.094/pset/32e/qt/libQt5DBus.so.5
l_openvino_toolkit_fpga_p_2019.1.094/pset/32e/qt/libQt5DBus.so.5.12
l_openvino_toolkit_fpga_p_2019.1.094/pset/32e/qt/libQt5Gui.so
```

4. Enter folder l_openvino_toolkit_fpga_p_2019.1.094, then input command *ls* to view the files contained in the current installation package directory, as shown in the figure below.

```
root@terasic: /home/terasic/Desktop/l_openvino_toolkit_fpga_p_2019.1.094
-2019.1.094-2019.1.094.x86_64.rpm
l_openvino_toolkit_fpga_p_2019.1.094/rpm/intel-openvino-opencv-lib-ubuntu-xenial
-2019.1.094-2019.1.094.x86_64.rpm
l_openvino_toolkit_fpga_p_2019.1.094/rpm/intel-openvino-opencv-lib-yocto-jethro-
2019.1.094-2019.1.094.x86_64.rpm
l_openvino_toolkit_fpga_p_2019.1.094/rpm/intel-openvino-openvx-2019.1.094-2019.1
-094.x86_64.rpm
l_openvino_toolkit_fpga_p_2019.1.094/rpm/intel-openvino-openvx-ubuntu-2019.1.094
-2019.1-094.x86_64.rpm
l_openvino_toolkit_fpga_p_2019.1.094/rpm/intel-openvino-openvx-yocto-2019.1.094-
2019.1-094.x86_64.rpm
l_openvino_toolkit_fpga_p_2019.1.094/rpm/intel-openvino-setupvars-2019.1.094-201
9.1-094.x86_64.rpm
l_openvino_toolkit_fpga_p_2019.1.094/EULA.txt
l_openvino_toolkit_fpga_p_2019.1.094/PUBLIC_KEY.PUB
l_openvino_toolkit_fpga_p_2019.1.094/install.sh
l_openvino_toolkit_fpga_p_2019.1.094/install_GUI.sh
l_openvino_toolkit_fpga_p_2019.1.094/install_openvino_dependencies.sh
l_openvino_toolkit_fpga_p_2019.1.094/silent.cfg
root@terasic:/home/terasic/Desktop# cd l_openvino_toolkit_fpga_p_2019.1.094
root@terasic:/home/terasic/Desktop/l_openvino_toolkit_fpga_p_2019.1.094# ls
EULA.txt          install_openvino_dependencies.sh  pset          rpm
install_GUI.sh    install.sh                       PUBLIC_KEY.PUB silent.cfg
root@terasic:/home/terasic/Desktop/l_openvino_toolkit_fpga_p_2019.1.094#
```


5. Execute `./install_openvino_dependencies.sh` to run the script files, install some dependency files. The execution result is shown in the figure below.

```
root@terasic: /home/terasic/Desktop/l_openvino_toolkit_fpga_p_2019.1.094
l_openvino_toolkit_fpga_p_2019.1.094/rpm/intel-openvino-opencv-lib-ubuntu-xenial
-2019.1.094-2019.1.094.x86_64.rpm
l_openvino_toolkit_fpga_p_2019.1.094/rpm/intel-openvino-opencv-lib-yocto-jethro-
2019.1.094-2019.1.094.x86_64.rpm
l_openvino_toolkit_fpga_p_2019.1.094/rpm/intel-openvino-openvx-2019.1.094-2019.1
-094.x86_64.rpm
l_openvino_toolkit_fpga_p_2019.1.094/rpm/intel-openvino-openvx-ubuntu-2019.1.094
-2019.1.094.x86_64.rpm
l_openvino_toolkit_fpga_p_2019.1.094/rpm/intel-openvino-openvx-yocto-2019.1.094-
2019.1.094.x86_64.rpm
l_openvino_toolkit_fpga_p_2019.1.094/rpm/intel-openvino-setupvars-2019.1.094-201
9.1.094.x86_64.rpm
l_openvino_toolkit_fpga_p_2019.1.094/EULA.txt
l_openvino_toolkit_fpga_p_2019.1.094/PUBLIC_KEY.PUB
l_openvino_toolkit_fpga_p_2019.1.094/install.sh
l_openvino_toolkit_fpga_p_2019.1.094/install_GUI.sh
l_openvino_toolkit_fpga_p_2019.1.094/install_openvino_dependencies.sh
l_openvino_toolkit_fpga_p_2019.1.094/silent.cfg
root@terasic:/home/terasic/Desktop# cd l_openvino_toolkit_fpga_p_2019.1.094
root@terasic:/home/terasic/Desktop/l_openvino_toolkit_fpga_p_2019.1.094# ls
EULA.txt          install_openvino_dependencies.sh  pset          rpm
install_GUI.sh    install.sh                       PUBLIC_KEY.PUB silent.cfg
root@terasic:/home/terasic/Desktop/l_openvino_toolkit_fpga_p_2019.1.094# ./install_openvino_dependencies.sh
```

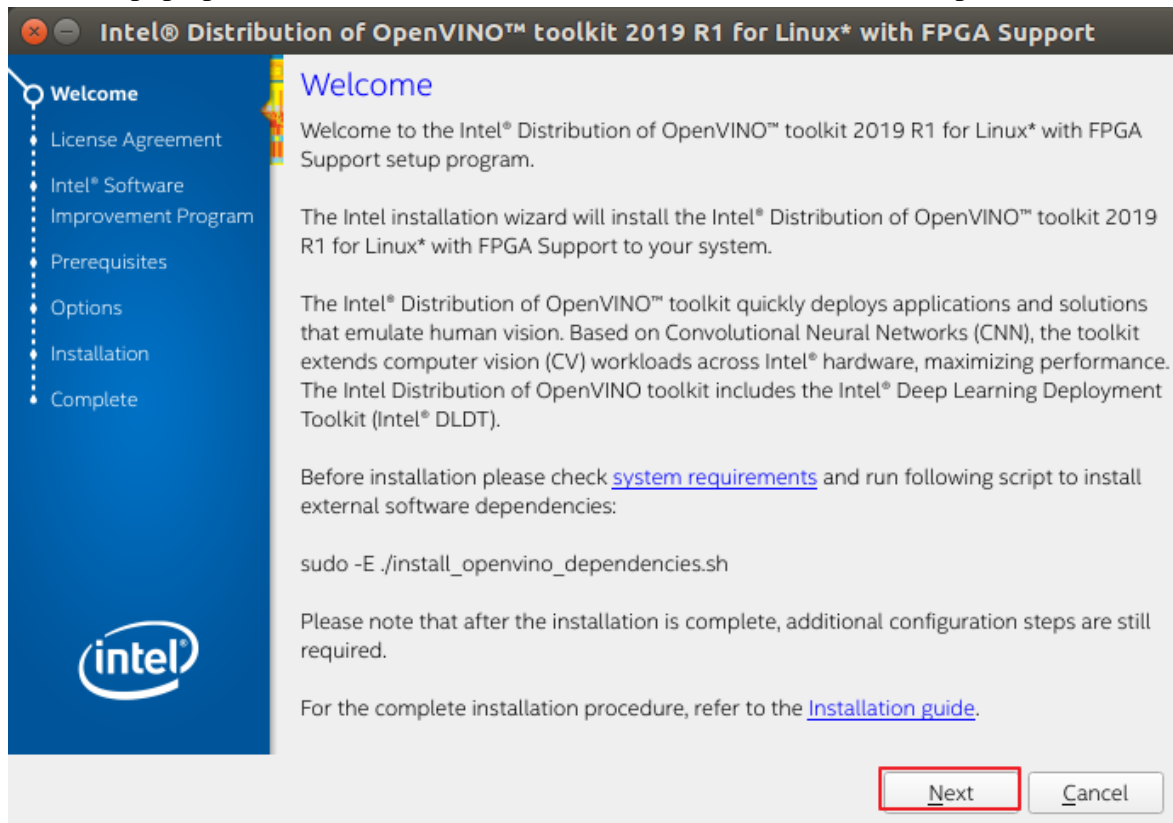
It will take a while to complete, please wait patiently. As shown in the figure below, the dependency files are installed successfully.

```
root@terasic: /home/terasic/Desktop/l_openvino_toolkit_fpga_p_2019.1.094
Fetched 605 kB in 5s (111 kB/s)
(Reading database ... 182663 files and directories currently installed.)
Preparing to unpack .../libglib2.0-dev_2.48.2-0ubuntu4.4_amd64.deb ...
Unpacking libglib2.0-dev (2.48.2-0ubuntu4.4) over (2.48.2-0ubuntu4.1) ...
Preparing to unpack .../libglib2.0-bin_2.48.2-0ubuntu4.4_amd64.deb ...
Unpacking libglib2.0-bin (2.48.2-0ubuntu4.4) over (2.48.2-0ubuntu4.1) ...
Preparing to unpack .../libglib2.0-0_2.48.2-0ubuntu4.4_amd64.deb ...
Unpacking libglib2.0-0:amd64 (2.48.2-0ubuntu4.4) over (2.48.2-0ubuntu4.1) ...
Preparing to unpack .../gststreamer1.0-plugins-base_1.8.3-1ubuntu0.3_amd64.deb ...
Unpacking gststreamer1.0-plugins-base:amd64 (1.8.3-1ubuntu0.3) over (1.8.3-1ubuntu0.2) ...
Processing triggers for man-db (2.7.5-1) ...
Processing triggers for libc-bin (2.23-0ubuntu5) ...
Setting up libglib2.0-0:amd64 (2.48.2-0ubuntu4.4) ...
Setting up libglib2.0-bin (2.48.2-0ubuntu4.4) ...
Setting up libglib2.0-dev (2.48.2-0ubuntu4.4) ...
Setting up gststreamer1.0-plugins-base:amd64 (1.8.3-1ubuntu0.3) ...
Processing triggers for libc-bin (2.23-0ubuntu5) ...
Reading package lists... Done
Building dependency tree
Reading state information... Done
libpng12-dev is already the newest version (1.2.54-1ubuntu1.1).
0 upgraded, 0 newly installed, 0 to remove and 627 not upgraded.
```

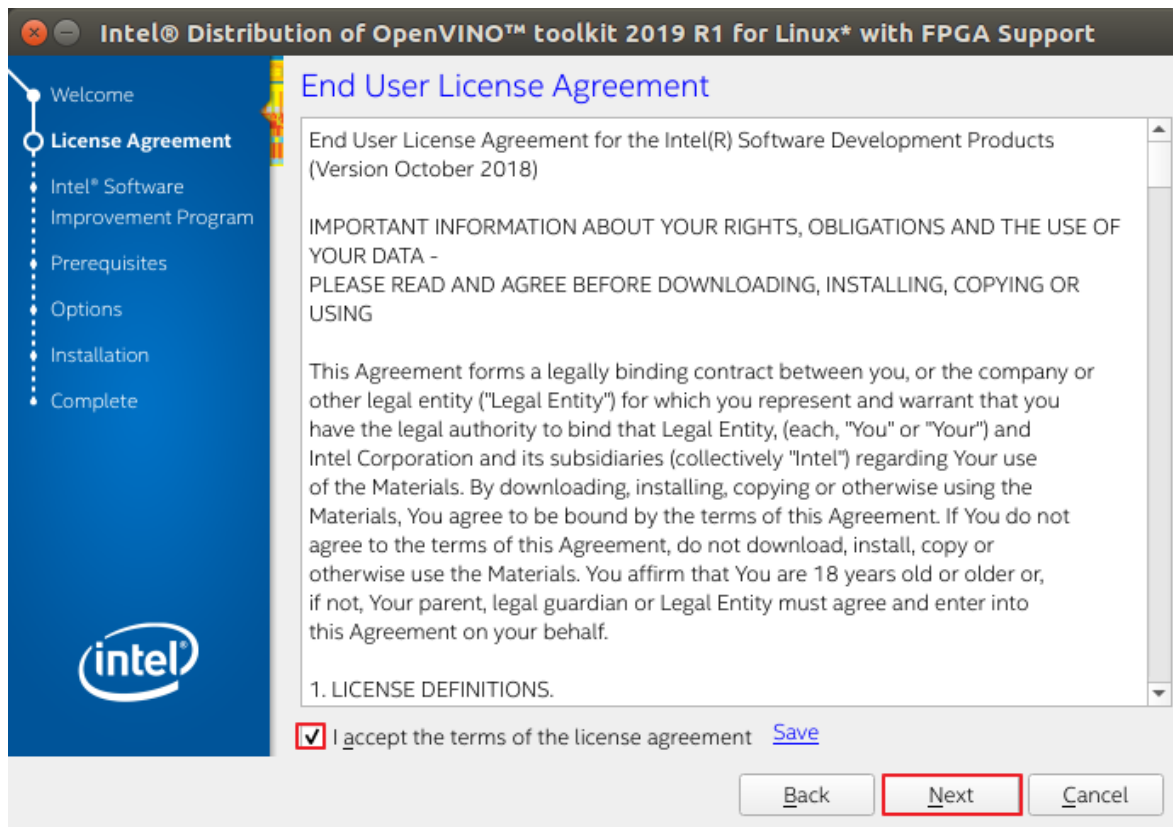
6. Install the software core components: users can choose the GUI interface or command line instruction to install the components. GUI interface installation is recommended and we used GUI interface to show the installation.
 - 1) Execute command `./install_GUI.sh` to start GUI interface installation.

```
root@terasic: /home/terasic/Desktop/l_openvino_toolkit_fpga_p_2019.1.094
Preparing to unpack .../libgl1-mesa-glx_2.48.2-0ubuntu4.4_amd64.deb ...
Unpacking libgl1-mesa-glx (2.48.2-0ubuntu4.4) over (2.48.2-0ubuntu4.1) ...
Preparing to unpack .../libgl1-mesa-glx_2.48.2-0ubuntu4.4_amd64.deb ...
Unpacking libgl1-mesa-glx:amd64 (2.48.2-0ubuntu4.4) over (2.48.2-0ubuntu4.1) ...
Preparing to unpack .../gststreamer1.0-plugins-base_1.8.3-1ubuntu0.3_amd64.deb ...
Unpacking gststreamer1.0-plugins-base:amd64 (1.8.3-1ubuntu0.3) over (1.8.3-1ubuntu0.2) ...
Processing triggers for man-db (2.7.5-1) ...
Processing triggers for libc-bin (2.23-0ubuntu5) ...
Setting up libgl1-mesa-glx:amd64 (2.48.2-0ubuntu4.4) ...
Setting up libgl1-mesa-glx (2.48.2-0ubuntu4.4) ...
Setting up libgl1-mesa-dev (2.48.2-0ubuntu4.4) ...
Setting up gststreamer1.0-plugins-base:amd64 (1.8.3-1ubuntu0.3) ...
Processing triggers for libc-bin (2.23-0ubuntu5) ...
Reading package lists... Done
Building dependency tree
Reading state information... Done
libpng12-dev is already the newest version (1.2.54-1ubuntu1.1).
0 upgraded, 0 newly installed, 0 to remove and 627 not upgraded.
root@terasic:/home/terasic/Desktop/l_openvino_toolkit_fpga_p_2019.1.094# ls
EULA.txt          install_openvino_dependencies.sh  pset          rpm
install_GUI.sh    install.sh                       PUBLIC_KEY.PUB  silent.cfg
root@terasic:/home/terasic/Desktop/l_openvino_toolkit_fpga_p_2019.1.094# ./install_GUI.sh
```

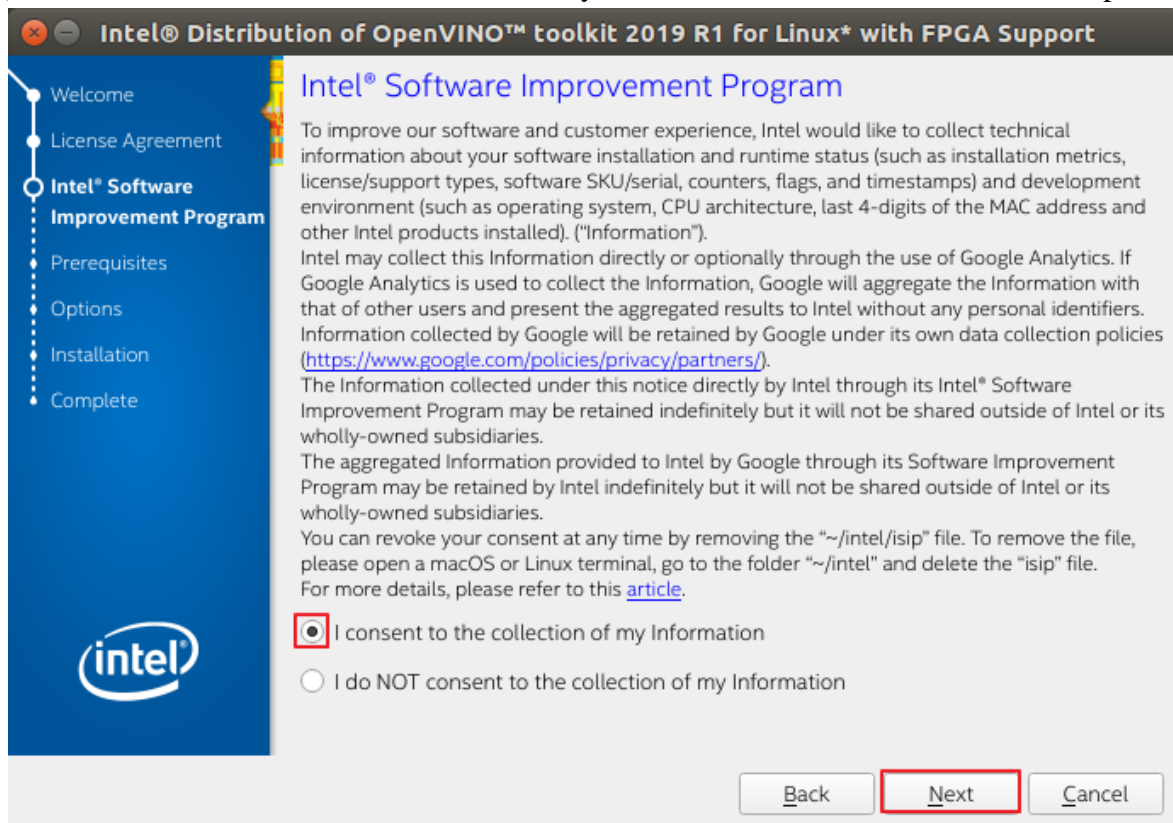
2) It will pop up the GUI installation interface, and click Next for next step.



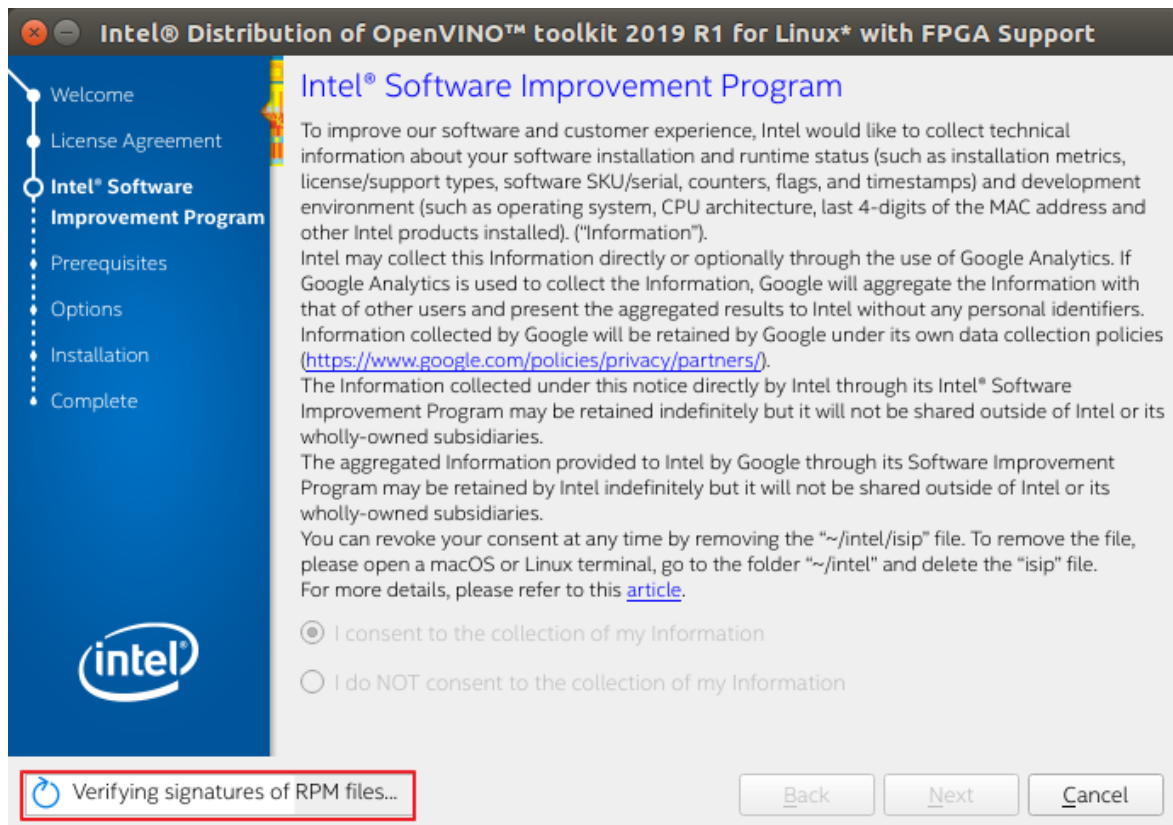
3) Check the accept option, and click Next for next step.



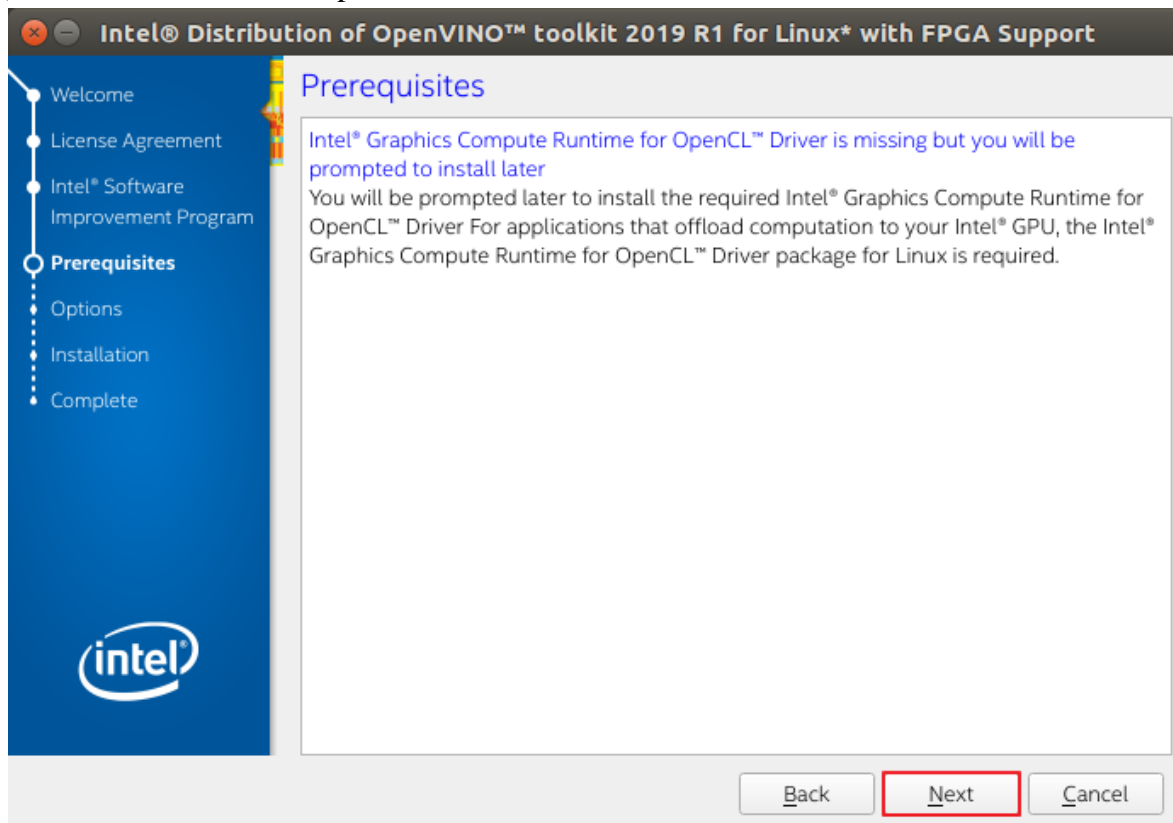
- 4) Check the I consent to the collection of my information and click Next for next step.



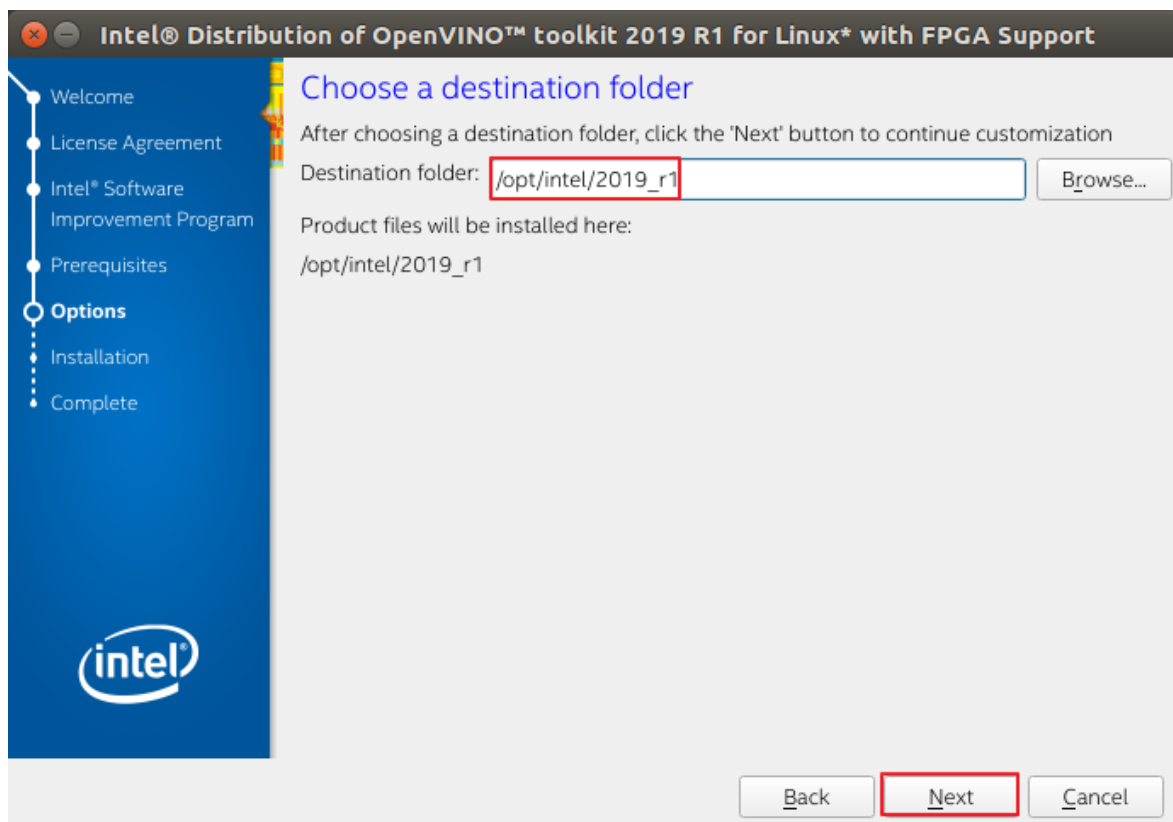
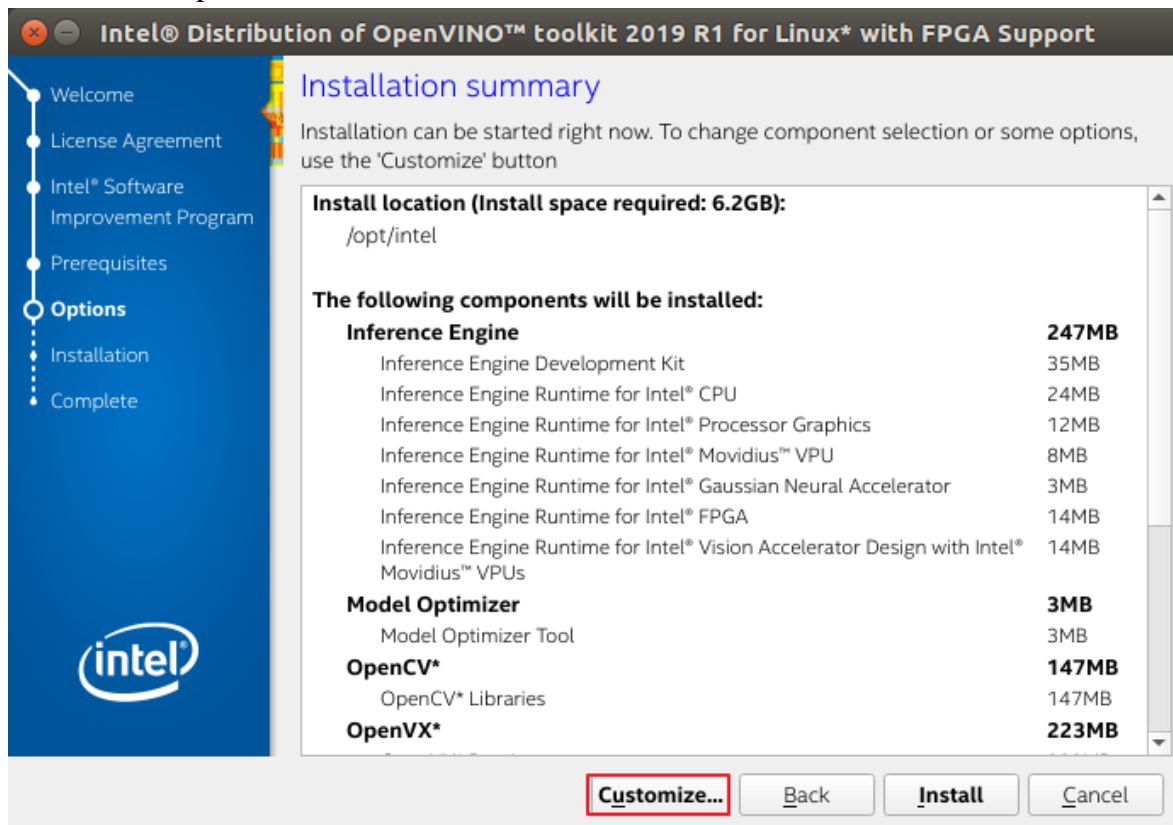
- 5) It will take few minutes to verify signature of RPM files, please wait patiently.

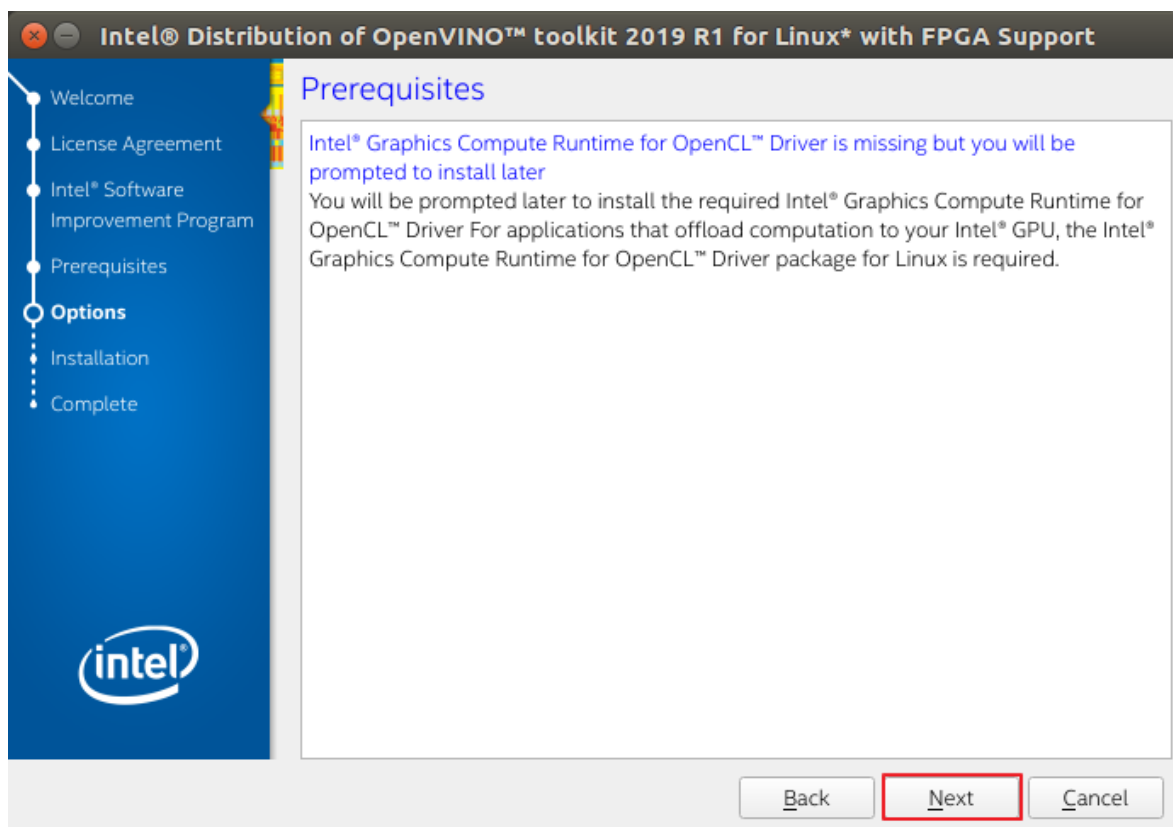
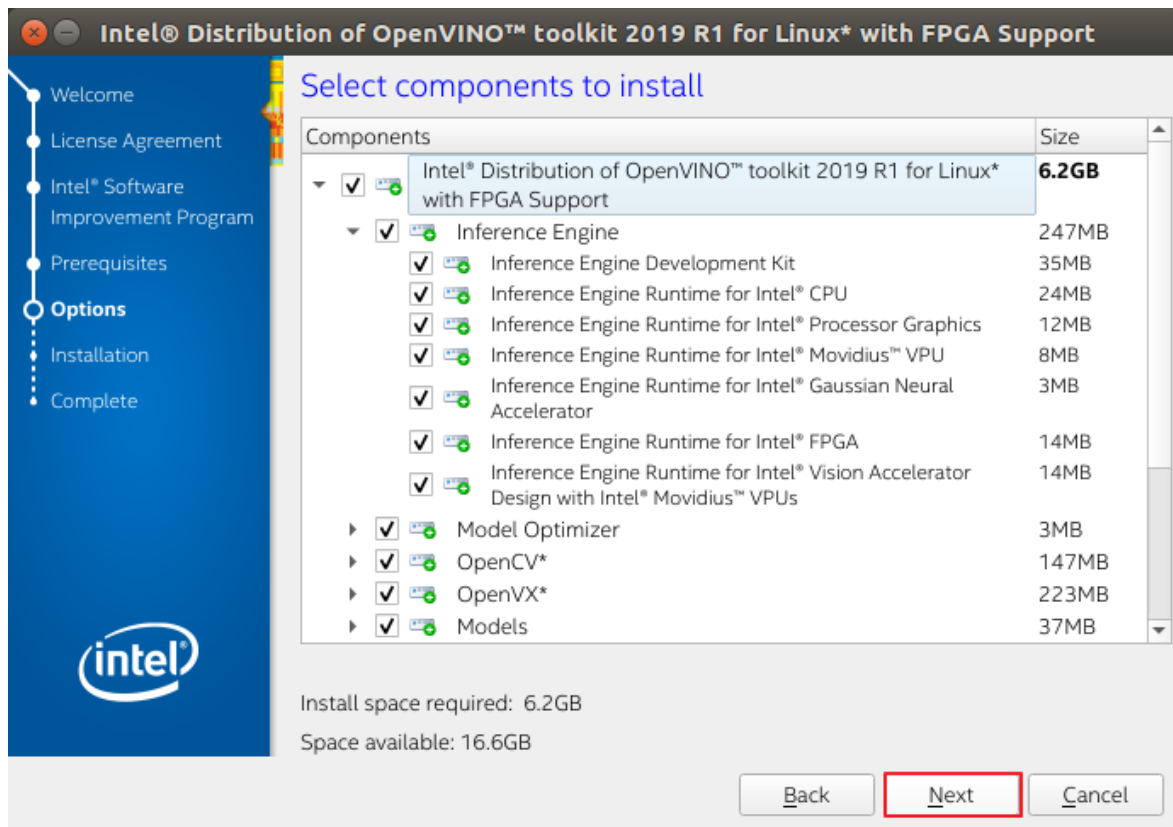


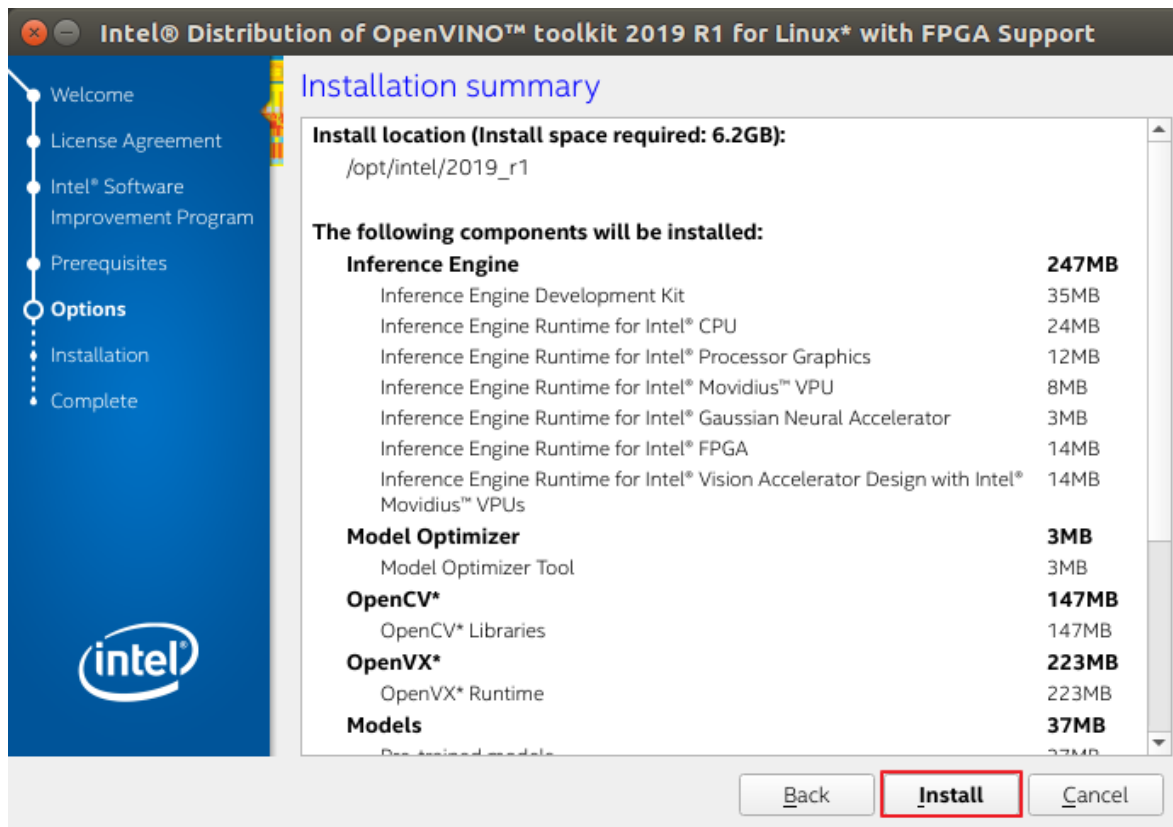
6) Click Next for next step.



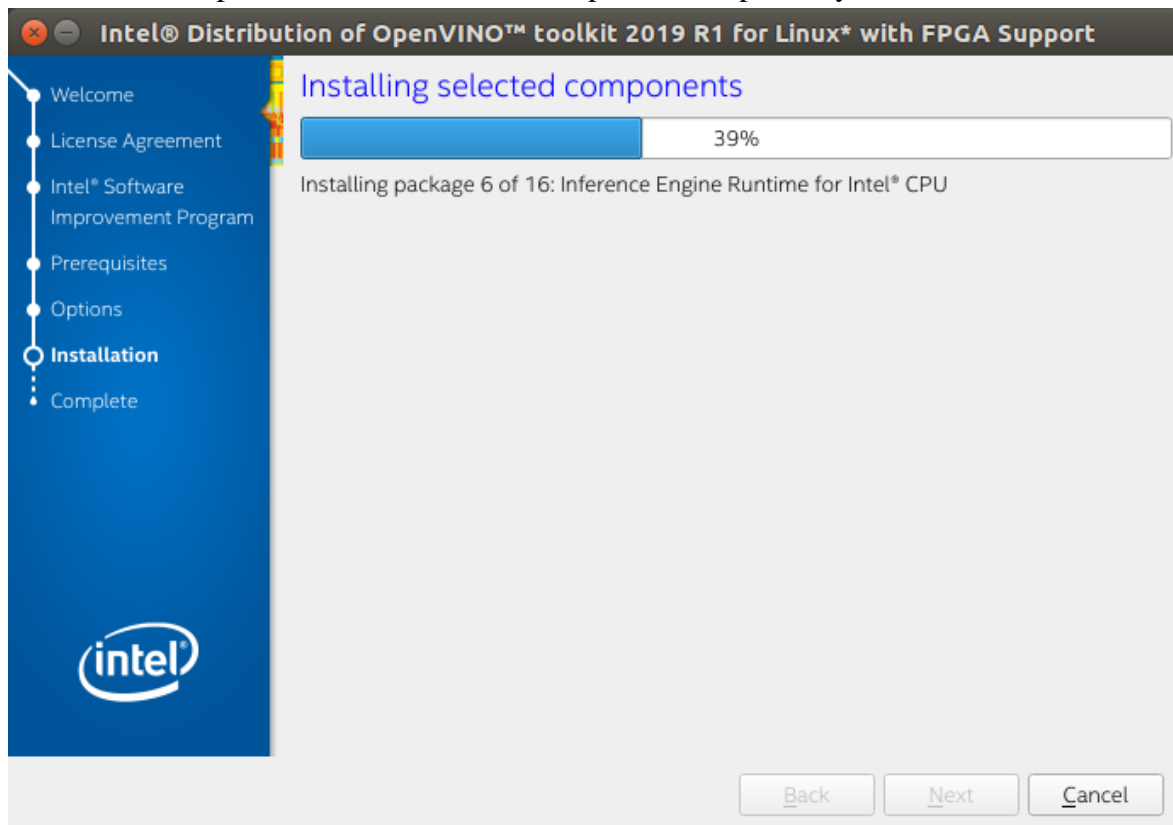
- 7) In this version, we use custom installation path, as shown below. But user can use the default installation path.



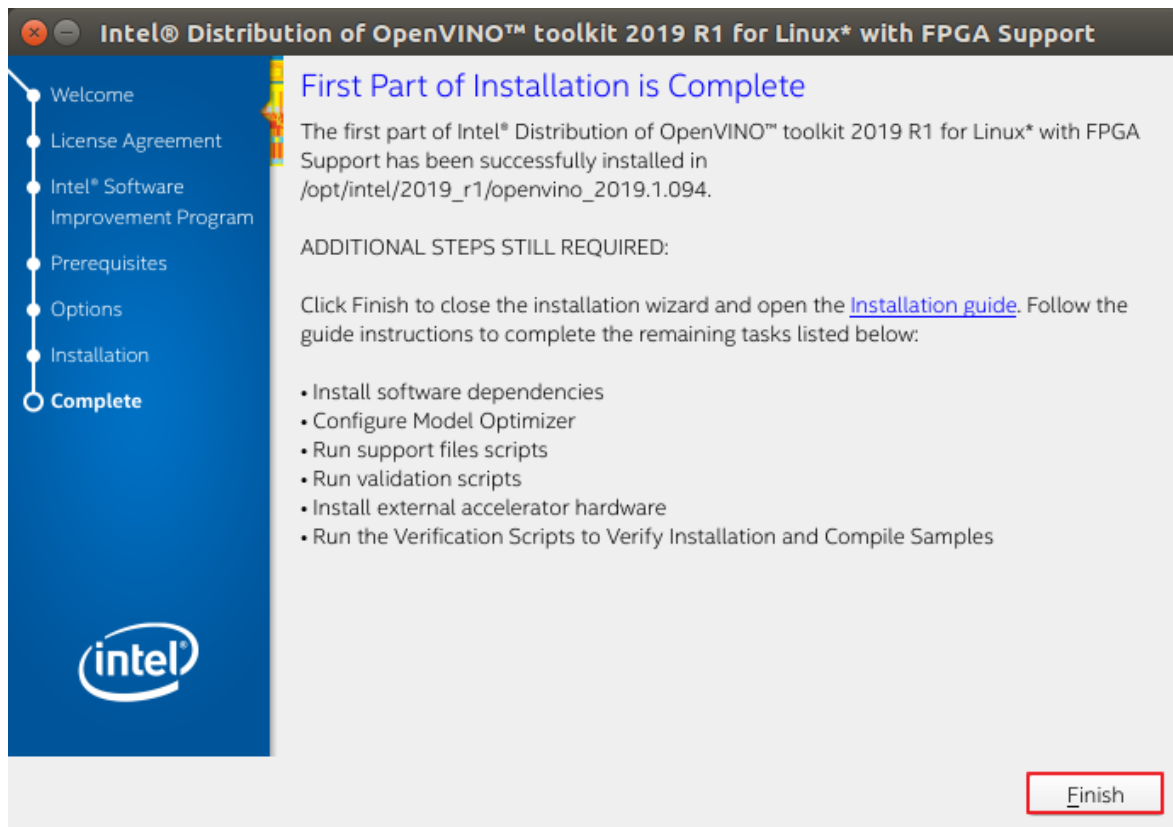




The installation process will take some time, please wait patiently.



After installing completely, click Finish to quit the installation interface, and close the current terminal.



PS, New version of NetworkX will cause the model optimizer working incorrectly, ensure the version not higher than NetworkX 2.3. Run following commands to avoid the problem:

```
cd /opt/intel/2019_r1/opencvino_2019.1.094/deployment_tools/model_optimizer
sed -i -e 's/(networkx>=[0-9\.\.])$/$\1,<=2.3/' requirements*.txt
```

1.4 OpenVINO Toolkit environment test

1. Open in terminal by right clicking on the Desktop. Enter command “*sudo su*” to change user to root (super user).

```
root@terasic: /home/terasic/Desktop/l_openvino_toolkit_fpga_p_2019.1.094
terasic@terasic:~$ sudo su
[sudo] password for terasic:
root@terasic: /home/terasic#
```

2. Input below command to set OpenVINO environment:
`source /opt/intel/2019_r1/opencvino/bin/setupvars.sh`
 It will show “OpenVINO environment initialized”.

```
root@terasic: /home/terasic
terasic@terasic:~$ sudo su
[sudo] password for terasic:
root@terasic: /home/terasic# source /opt/intel/2019_r1/opencvino/bin/setupvars.sh
[setupvars.sh] OpenVINO environment initialized
root@terasic: /home/terasic#
```

3. Switch to the demo path with command:
`cd /opt/intel/2019_r1/opencvino/deployment_tools/demo/`

```
root@terasic: /opt/intel/2019_r1/opencvino/deployment_tools/demo
terasic@terasic:~$ sudo su
[sudo] password for terasic:
root@terasic:/home/terasic# source /opt/intel/2019_r1/opencvino/bin/setupvars.sh
[setupvars.sh] OpenVINO environment initialized
root@terasic:/home/terasic# cd /opt/intel/2019_r1/opencvino/deployment_tools/dem
o
root@terasic:/opt/intel/2019_r1/opencvino/deployment_tools/demo# ls
car_1.bmp  demo_security_barrier_camera.sh  README.txt
car.png    demo_squeezenet_download_convert_run.sh  squeezenet1.1.labels
root@terasic:/opt/intel/2019_r1/opencvino/deployment_tools/demo#
```

4. Execute squeezenet demo: `./demo_squeezenet_download_convert_run.sh`

```
root@terasic: /opt/intel/2019_r1/opencvino/deployment_tools/demo
terasic@terasic:~$ sudo su
[sudo] password for terasic:
root@terasic:/home/terasic# source /opt/intel/2019_r1/opencvino/bin/setupvars.sh
[setupvars.sh] OpenVINO environment initialized
root@terasic:/home/terasic# cd /opt/intel/2019_r1/opencvino/deployment_tools/dem
o
root@terasic:/opt/intel/2019_r1/opencvino/deployment_tools/demo# ls
car_1.bmp  demo_security_barrier_camera.sh  README.txt
car.png    demo_squeezenet_download_convert_run.sh  squeezenet1.1.labels
root@terasic:/opt/intel/2019_r1/opencvino/deployment_tools/demo# ./demo_squeezen
et_download_convert_run.sh
```

5. The Demo script will install the required toolkit automatically. Please wait patiently, the time is depending on the internet environment.
6. The result is shown in the figure below (this demo is only run on the CPU):

```
root@terasic: /opt/intel/2019_r1/opencvino/deployment_tools/demo
479    0.0419133    car wheel
751    0.0091072    racer, race car, racing car
436    0.0068162    beach wagon, station wagon, wagon, estate car, beach waggon,
station waggon, waggon
656    0.0037564    minivan
586    0.0025741    half track
717    0.0016069    pickup, pickup truck
864    0.0012027    tow truck, tow car, wrecker
581    0.0005882    grille, radiator grille

total inference time: 195.1670349
Average running time of one iteration: 195.1670349 ms

Throughput: 5.1238161 FPS

[ INFO ] Execution successful

#####

Demo completed successfully.

root@terasic:/opt/intel/2019_r1/opencvino/deployment_tools/demo#
```

7. The OpenVINO toolkit is installed properly now, please refer to the Appendix if users get the numpy or other errors when run the demo.
8. After the environment testing is completed, please continue the steps in Chapter 2.

Starter Platform for OpenVINO™ Toolkit

Development Environment

This chapter lists the environment with OpenVINO Started Kit and introduces the installation of the Starter Platform for OpenVINO™ Toolkit, the same development environment is recommended when users set up the applications.

2.1 Development Environment

■ Choose OpenVINO toolkit

The OpenVINO toolkit supports Windows and Linux OS, but only Linux OpenVINO toolkit supports FPGA, so users need to choose OpenVINO toolkit for Linux with FPGA Support. Detailed installation steps can refer to chapter1.

■ Linux OS

- Ubuntu 16.04.3 long-term support (LTS), 64-bit

■ FPGA boards

- Starter Platform for OpenVINO™ Toolkit (tsp.terasic.com)



2.2 Development Package Content

Starter Platform for OpenVINO™ Toolkit development package download link:

<https://www.terasic.com.tw/cgi-bin/page/archive.pl?Language=English&CategoryNo=167&No=1159&PartNo=4>

2.3 Install Quartus Programmer

In order to configure the FPGA and configuration device of the Starter Platform for OpenVINO™ Toolkit, the user will need to install the Quartus Programmer. The detailed steps are as follows:

1. Download Quartus Programmer installation package from the link below to the PC desktop.

http://fpgasoftware.intel.com/17.1/?edition=standard&platform=linux&download_manager=dlm3

Quartus Prime Standard Edition

Release date: November, 2017

Latest Release: v18.1

Intel® Quartus® Prime
Design Software

Select edition: Standard ▾

Select release: 17.1 ▾

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 17.1 supports the following device families: Stratix IV, Stratix V, Arria II, Arria V, Arria V GZ, Arria 10, Cyclone 10 LP, Cyclone IV, Cyclone V, MAX II, MAX V, and MAX 10 FPGA. [More](#)

Combined Files

Individual Files

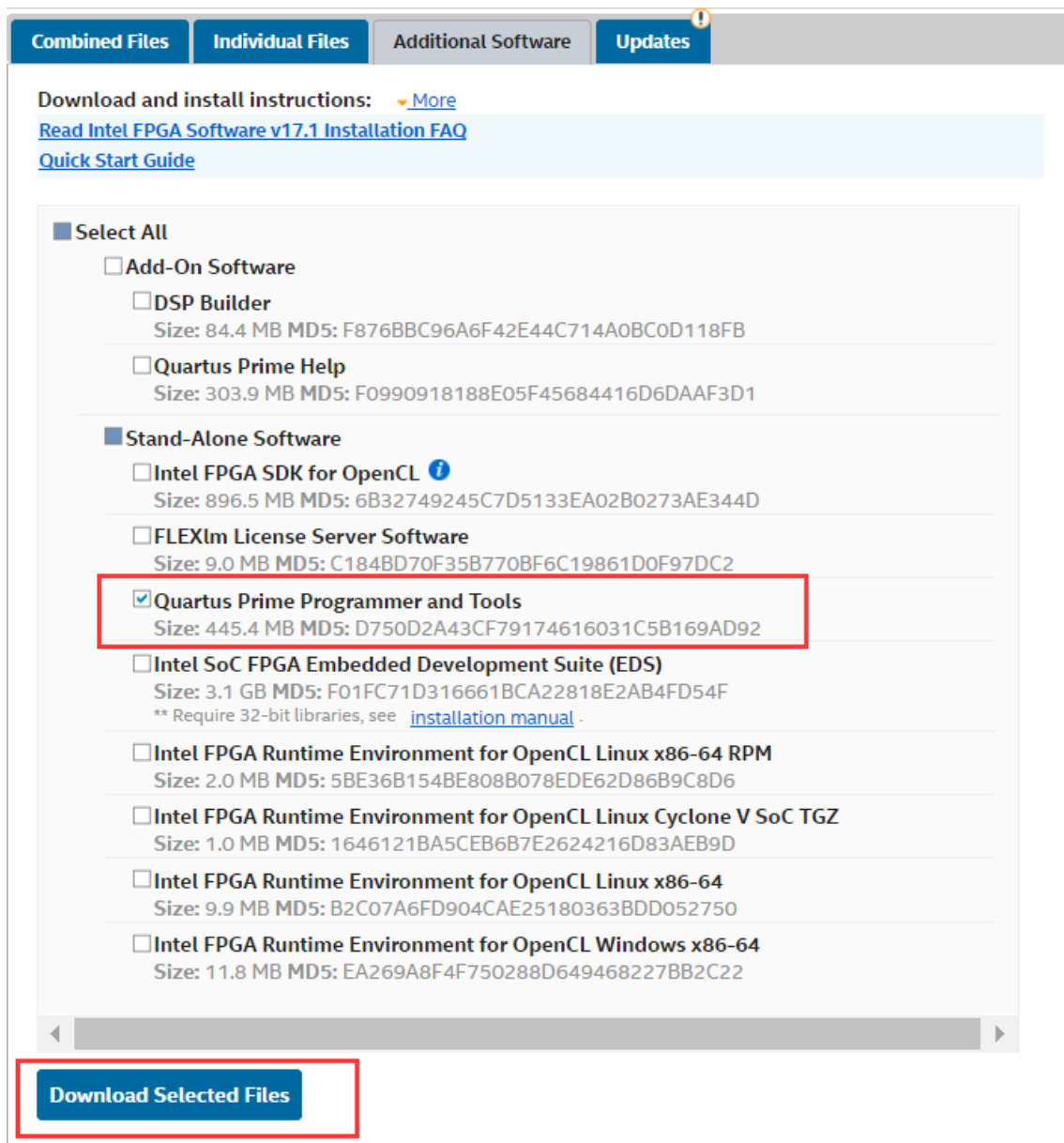
Additional Software

Updates 

Download and install instructions: [More](#)

[Read Intel FPGA Software v17.1 Installation FAQ](#)

[Quick Start Guide](#)



2. Install Quartus Programmer

- 1) Open the Terminal in the Linux and type “*sudo su*” to switch to root (super user).
- 2) Input below command, add executable attribution.
`chmod +x QuartusProgrammerSetup-17.1.0.590-linux.run`

```

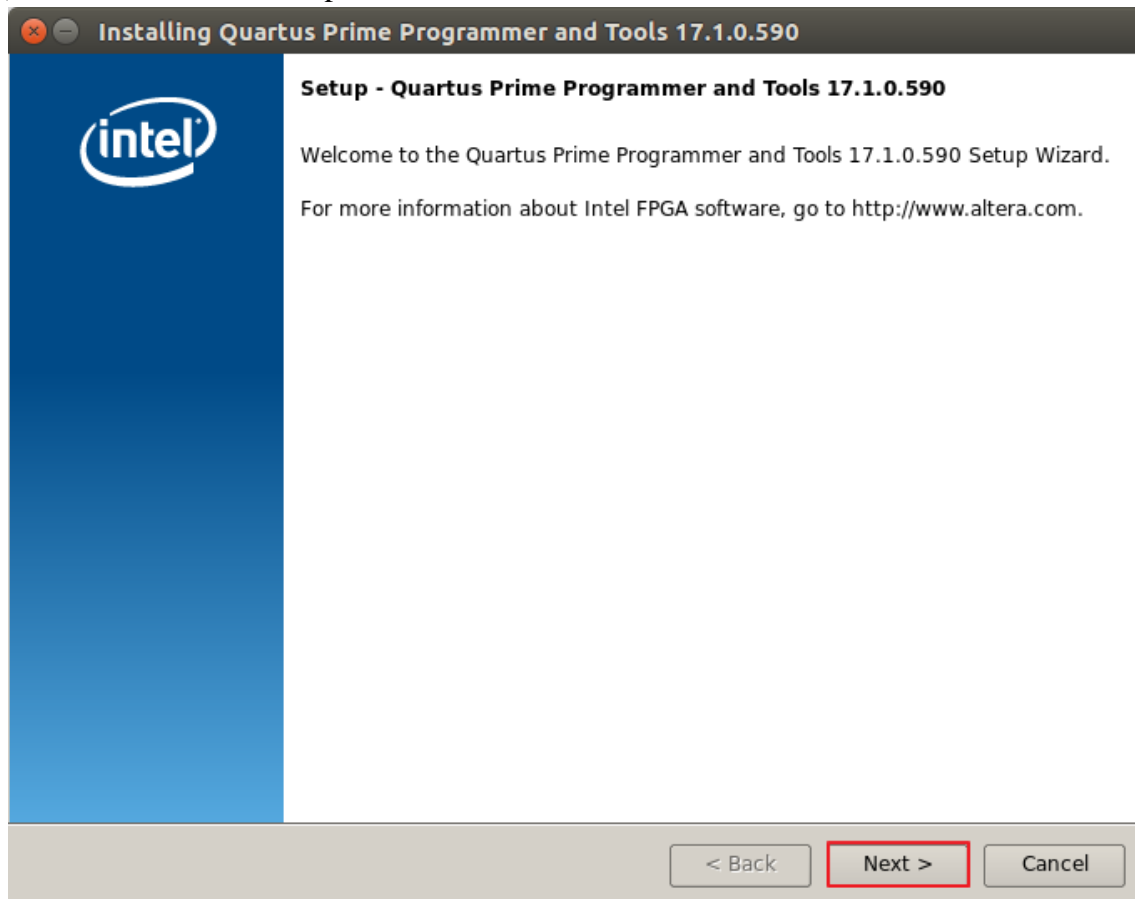
root@terasic: /home/terasic/Desktop
terasic@terasic:~$ sudo su
[sudo] password for terasic:
root@terasic: /home/terasic# cd Desktop/
root@terasic: /home/terasic/Desktop# chmod +x QuartusProgrammerSetup-17.1.0.590-l
linux.run

```

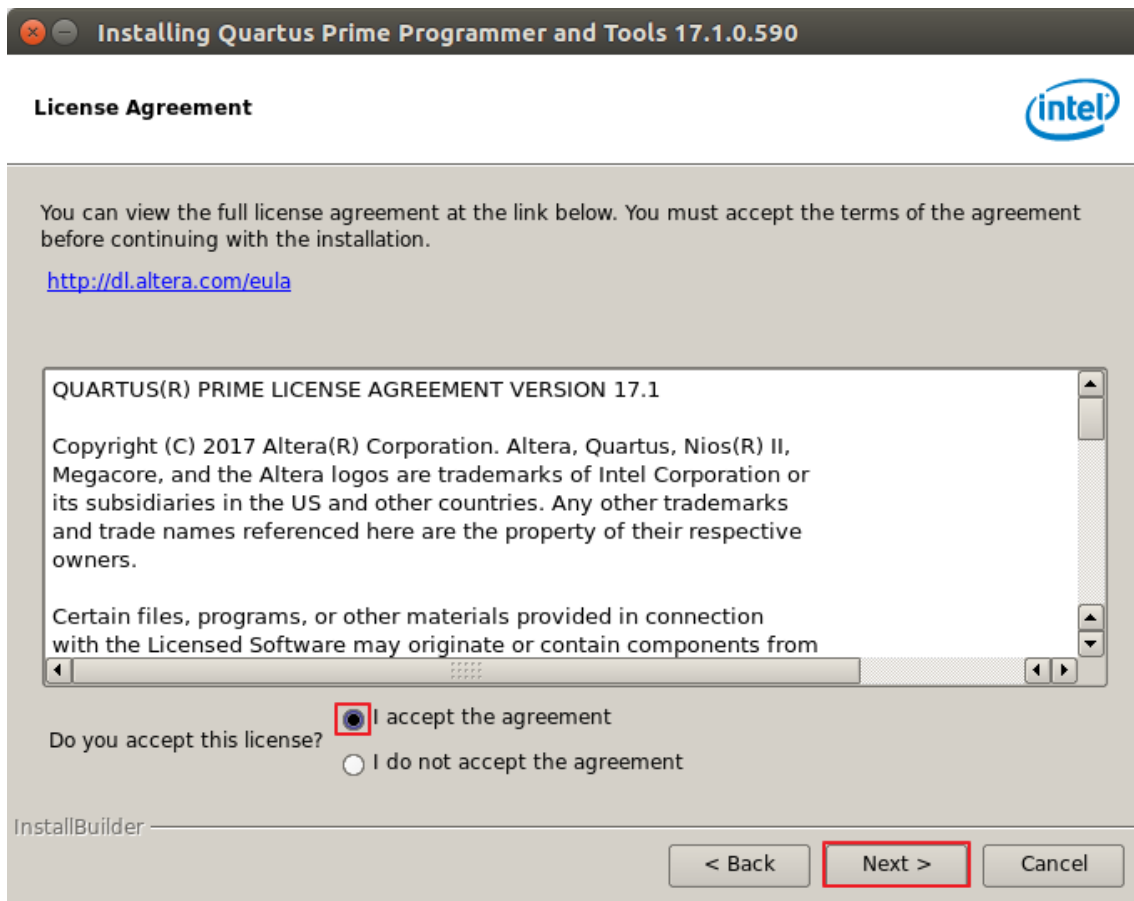
- 3) Execute installation file: `./QuartusProgrammerSetup-17.1.0.590-linux.run`

```
root@terasic: /home/terasic/Desktop
terasic@terasic:~$ sudo su
[sudo] password for terasic:
root@terasic:/home/terasic# cd Desktop/
root@terasic:/home/terasic/Desktop# chmod +x QuartusProgrammerSetup-17.1.0.590-l
inux.run
root@terasic:/home/terasic/Desktop# ./QuartusProgrammerSetup-17.1.0.590-linux.ru
n
```

4) Click Next to next step.

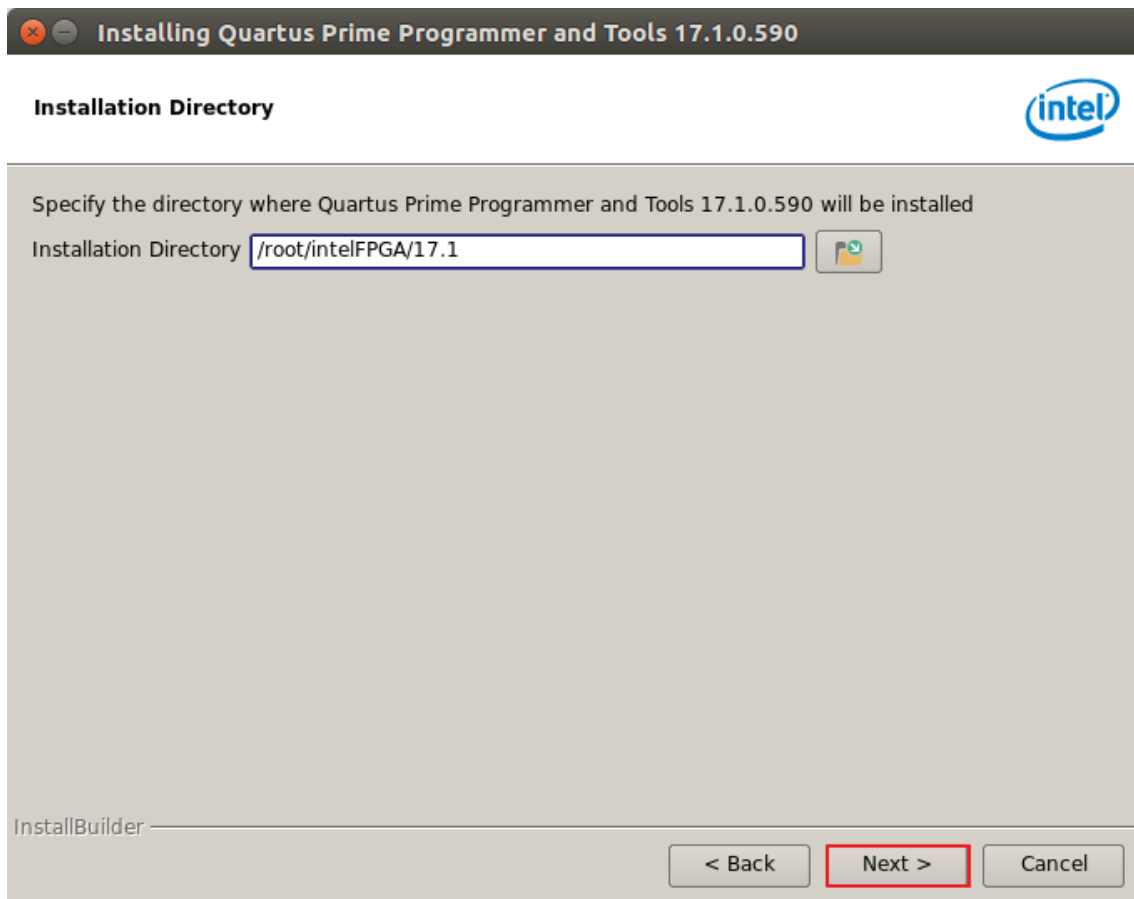


5) Check the I accept the agreement option and click Next for next step.

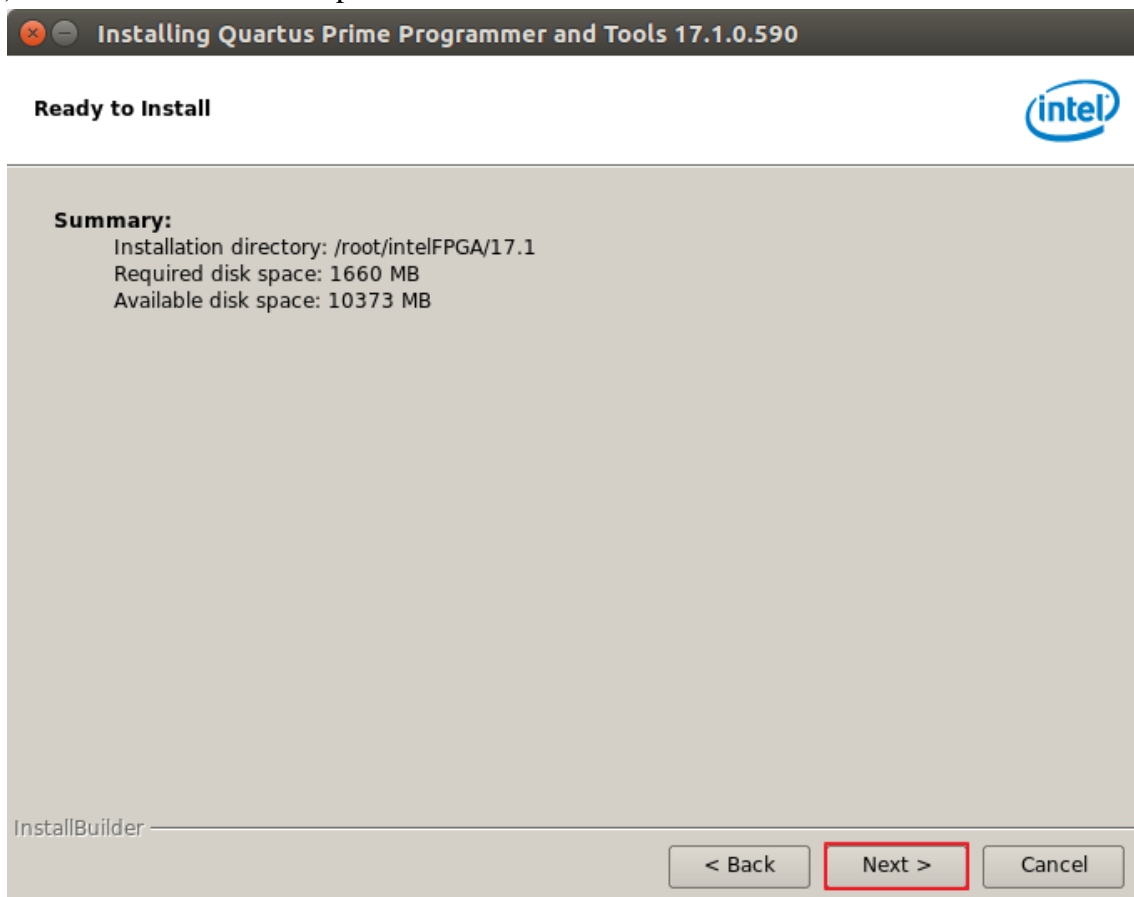


6) Click Next for next step.

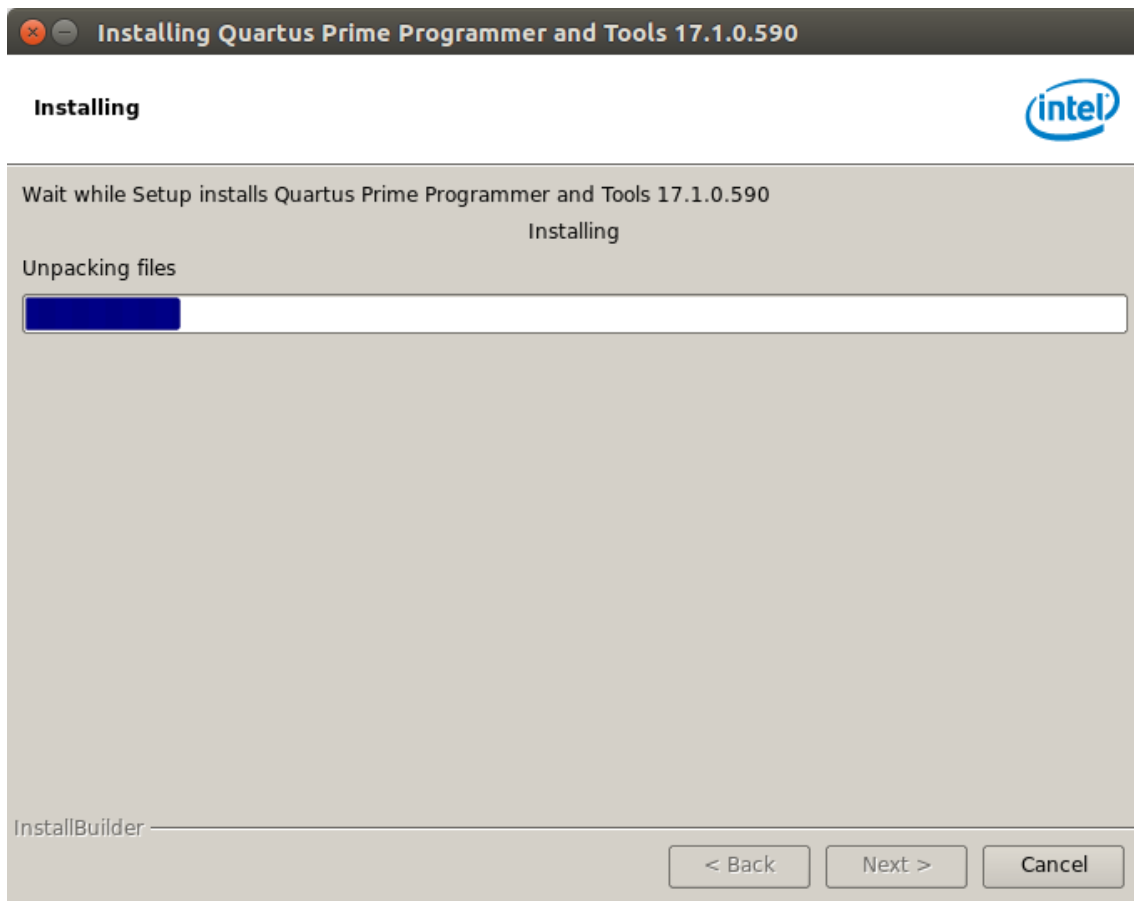
Note: It is recommended to install the Quartus programmer to the default installation path as shown in the picture below, as the `bringup_board.sh` shell script (which will run in the section 2.6) needs to use this path. If the user installs the Quartus programmer to a different path, the script may not find the Quartus Programmer, and user needs to modify the contents of the shell script to the correct path corresponding to his/her Quartus programmer installation path.



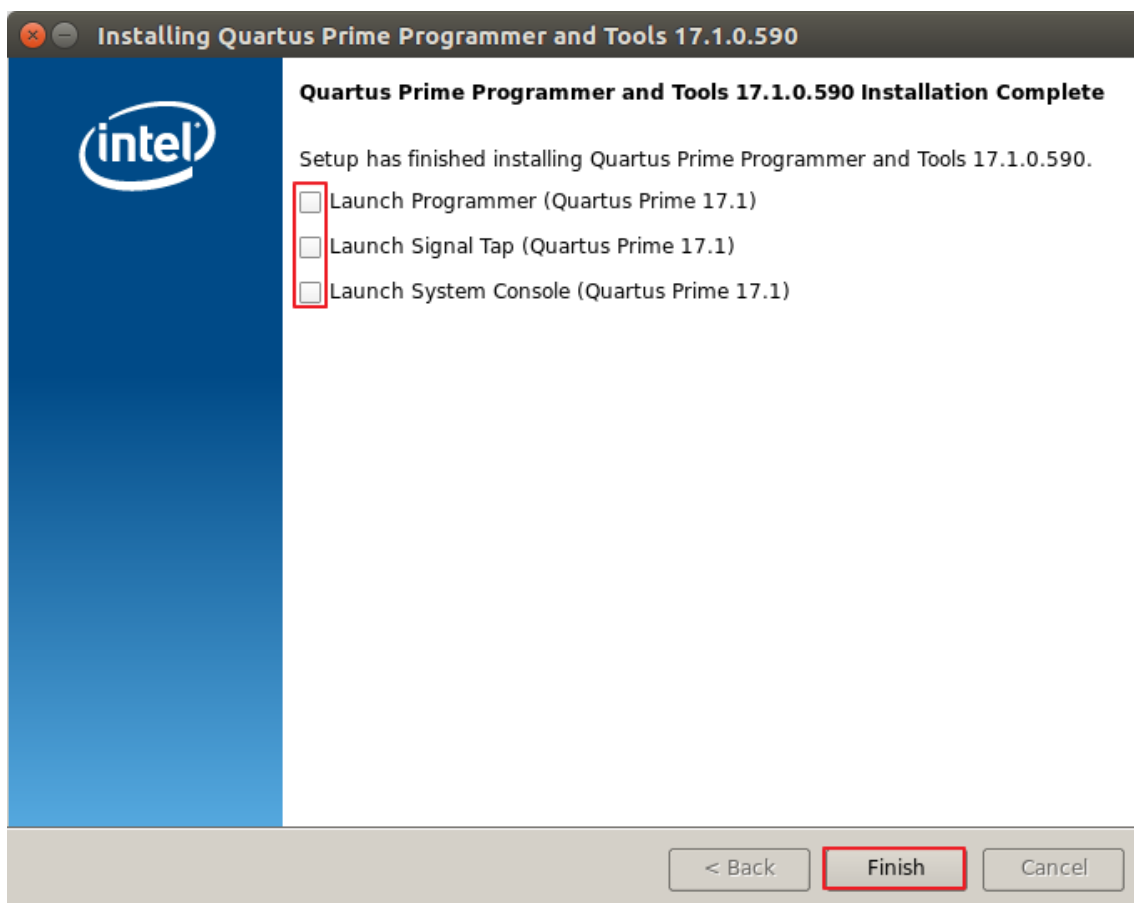
7) Click Next for next step



8) The installation process will take some time, please kindly wait.



- 9) Installation is completed, don't check the launch options, click Finish to quit the installation interface.



2.4 Install Starter Platform for OpenVINO™ Toolkit Development Package

1. Copy the terasic_demo.tar.gz file from the TSP_OPENVINO_BSP to the desktop and unzip it to the path: /opt/intel/2019_r1/openvino/deployment_tools/ by commands:

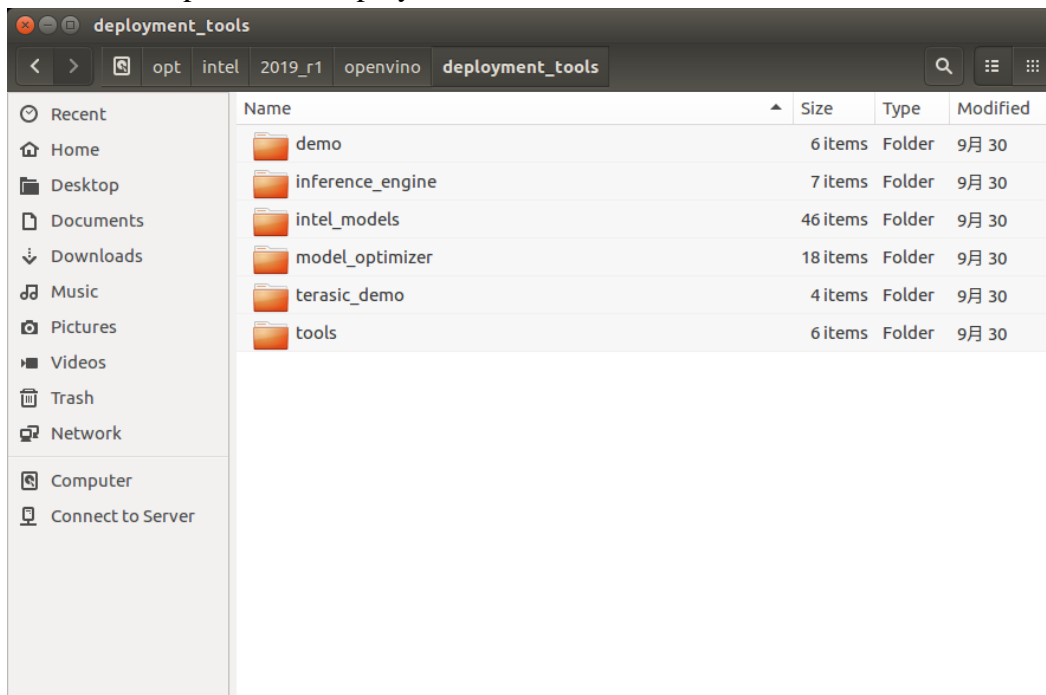
sudo tar xvzf terasic_demo.tar.gz

```
root@terasic: /home/terasic/Desktop
terasic@terasic:~$ sudo su
[sudo] password for terasic:
root@terasic:/home/terasic# cd Desktop/
root@terasic:/home/terasic/Desktop# sudo tar xvzf terasic_demo.tar.gz
```

sudo cp terasic_demo /opt/intel/2019_r1/openvino/deployment_tools/ -rf

```
root@terasic: /home/terasic/Desktop
terasic_demo/demo/pic_video/openvino_pictures/ILSVRC2012_val_00000196.JPEG
terasic_demo/demo/model/intel_models/head-pose-estimation-adas-0001/FP32/head-po
se-estimation-adas-0001.xml
terasic_demo/bitstreams/tsp/tsp/linux64/libexec/
terasic_demo/demo/model/intel_models/vehicle-detection-adas-binary-0001/FP32/lic
ense-plate-recognition-barrier-0001.bin
terasic_demo/demo/pic_video/openvino_pictures/ILSVRC2012_val_00000109.JPEG
terasic_demo/demo/model/intel_models/vehicle-license-plate-detection-barrier-010
6/FP32/vehicle-license-plate-detection-barrier-0106.xml
terasic_demo/bitstreams/tsp/tsp/linux64/libexec/flash.pl
terasic_demo/demo/model/intel_models/face-detection-adas-0001/FP16/
terasic_demo/demo/ir/FP16/SSD_GoogleNetV2/SSD_GoogleNetV2.xml
terasic_demo/demo/ir/FP16/
terasic_demo/demo/pic_video/openvino_pictures/ILSVRC2012_val_00000081.JPEG
terasic_demo/bitstreams/perl/lib/x86_64-linux/IO/Seekable.pm
terasic_demo/bitstreams/tsp/tsp/linux64/driver/aclpci.h
terasic_demo/demo/model/intel_models/pedestrian-and-vehicle-detector-adas-0001/F
P16/pedestrian-and-vehicle-detector-adas-0001.bin
terasic_demo/bitstreams/perl/lib/x86_64-linux/Socket.pm
terasic_demo/demo/model/intel_models/license-plate-recognition-barrier-0001/FP16
/license-plate-recognition-barrier-0001.bin
terasic_demo/bitstreams/tsp/tsp/linux64/driver/aclpci.c
root@terasic:/home/terasic/Desktop# sudo cp terasic_demo /opt/intel/2019_r1/open
vino/deployment_tools/ -rf
```

The file is copied to the deployment_tools folder as below:



2. Copy the terasic_demo.tar.gz file from the TSP_OPENVINO_BSP, and uncompress pic_loop_demo.tar.gz by commands:
tar xvzf pic_loop_demo.tar.gz

3. Copy the whole demo source code folder "classification_sample_for_pic_loop" to following path:
/opt/intel/2019_r1/opencvino/deployment_tools/inference_engine/samples/ by commands:
sudo cp pic_loop_demo/pic_loop_demo/classification_sample_for_pic_loop \
/opt/intel/2019_r1/opencvino/deployment_tools/inference_engine/samples/ -rf

```
root@terasic: /home/terasic/Desktop
terasic_demo/bitstreams/tsp/tsp/linux64/driver/aclpci.h
terasic_demo/demo/model/intel_models/pedestrian-and-vehicle-detector-adas-0001/FP16/pedestrian-and-vehicle-detector-adas-0001.bin
terasic_demo/bitstreams/perl/lib/x86_64-linux/Socket.pm
terasic_demo/demo/model/intel_models/license-plate-recognition-barrier-0001/FP16/license-plate-recognition-barrier-0001.bin
terasic_demo/bitstreams/tsp/tsp/linux64/driver/aclpci.c
root@terasic:/home/terasic/Desktop#
root@terasic:/home/terasic/Desktop# sudo cp terasic_demo /opt/intel/2019_r1/opencvino/deployment_tools/ -rf
root@terasic:/home/terasic/Desktop# tar xvzf pic_loop_demo.tar.gz
pic_loop_demo/
pic_loop_demo/pic_loop_demo/
pic_loop_demo/pic_loop_demo/07_classification_pic_loop.sh
pic_loop_demo/pic_loop_demo/classification_sample_for_pic_loop/
pic_loop_demo/pic_loop_demo/classification_sample_for_pic_loop/README.md
pic_loop_demo/pic_loop_demo/classification_sample_for_pic_loop/CMakeLists.txt
pic_loop_demo/pic_loop_demo/classification_sample_for_pic_loop/main.cpp
pic_loop_demo/pic_loop_demo/classification_sample_for_pic_loop/classification_sample.h
root@terasic:/home/terasic/Desktop# sudo cp pic_loop_demo/pic_loop_demo/classification_sample_for_pic_loop/ /opt/intel/2019_r1/opencvino/deployment_tools/inference_engine/samples/ -rf
root@terasic:/home/terasic/Desktop#
```

4. Copy 07_classification_pic_loop.sh to following path:
/opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo/demo/ by commands:
sudo cp pic_loop_demo/pic_loop_demo/07_classification_pic_loop.sh \
/opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo/demo/
5. Switch to the demo path with command:
cd /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo/demo
6. add execution property for 07_classification_pic_loop.sh by commands:
sudo chmod +x 07_classification_pic_loop.sh

```

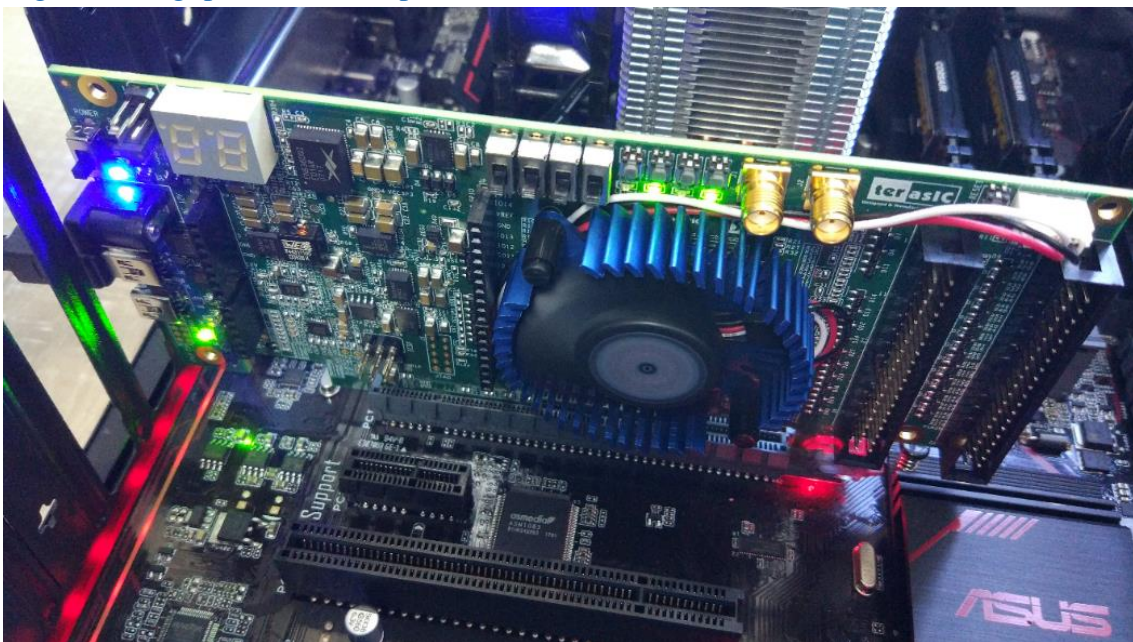
root@terasic: /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo/demo
terasic_demo/bitstreams/tsp/tsp/linux64/driver/ac1pci.c
root@terasic:/home/terasic/Desktop#
root@terasic:/home/terasic/Desktop# sudo cp terasic_demo /opt/intel/2019_r1/open
vino/deployment_tools/ -rf
root@terasic:/home/terasic/Desktop# tar xvzf pic_loop_demo.tar.gz
pic_loop_demo/
pic_loop_demo/pic_loop_demo/
pic_loop_demo/pic_loop_demo/07_classification_pic_loop.sh
pic_loop_demo/pic_loop_demo/classification_sample_for_pic_loop/
pic_loop_demo/pic_loop_demo/classification_sample_for_pic_loop/README.md
pic_loop_demo/pic_loop_demo/classification_sample_for_pic_loop/CMakeLists.txt
pic_loop_demo/pic_loop_demo/classification_sample_for_pic_loop/main.cpp
pic_loop_demo/pic_loop_demo/classification_sample_for_pic_loop/classification_sa
mple.h
root@terasic:/home/terasic/Desktop# sudo cp pic_loop_demo/pic_loop_demo/classifi
cation_sample_for_pic_loop/ /opt/intel/2019_r1/opencvino/deployment_tools/inferen
ce engine/samples/ -rf
root@terasic:/home/terasic/Desktop# sudo cp pic_loop_demo/pic_loop_demo/07_class
ification_pic_loop.sh /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo
/demo/
root@terasic:/home/terasic/Desktop# cd /opt/intel/2019_r1/opencvino/deployment_to
ols/terasic_demo/demo
root@terasic:/opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo/demo# sud
o chmod +x 07_classification_pic_loop.sh

```

2.5 Setup the Starter Platform for OpenVINO™ Toolkit to the host PC

1. Make sure the host PC is power off.
2. Install the Starter Platform for OpenVINO™ Toolkit to the PCIe X4/X8/X16 socket of the host PC.
3. Connect the DC 12V power to the Starter Platform for OpenVINO™ Toolkit if necessary.
4. Connect the USB Blaster II cable to the USB Blaster II connector of the Starter Platform for OpenVINO™ Toolkit.

NOTE: users cannot remove the USB Blaster II cable if the bitstream is programmed to the flash through the bringup_board.sh script.



2.6 Bring up the Starter Platform for OpenVINO™ Toolkit

1. Power on the host PC and open the Terminal.
2. Enter command “*sudo su*” to change user to root (super user), Enter your password.

```
root@terasic: /home/terasic/Desktop/l_openvino_toolkit_fpga_p_2019.1.094
terasic@terasic:~$ sudo su
[sudo] password for terasic:
root@terasic: /home/terasic#
```

3. Execute the below command, switch to the terasic_demo path:

`cd /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo/`

```
root@terasic: /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo
terasic@terasic:~$ sudo su
[sudo] password for terasic:
root@terasic: /home/terasic# cd /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo/
root@terasic: /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo#
```

4. Execute below command, program the pre-loaded bitstream file to the Flash device on the Starter Platform for OpenVINO™ Toolkit.

`./bringup_board.sh tsp_gt` (`./bringup_board.sh tsp_gx` for GX version)

```
root@terasic: /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo
[sudo] password for terasic:
root@terasic: /home/terasic# cd /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo/
root@terasic: /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo# ./bringup_board.sh tsp_gt
Programming startup image into tsp flash
Flash Programming...
Info: *****
Info: Running Quartus Prime Convert_programming_file
Info: Version 17.1.0 Build 590 10/25/2017 SJ Standard Edition
Info: Copyright (C) 2017 Intel Corporation. All rights reserved.
Info: Your use of Intel Corporation's design tools, logic functions
Info: and other software and tools, and its AMPP partner logic
Info: functions, and any output files from any of the foregoing
Info: (including device programming or simulation files), and any
Info: associated documentation or information are expressly subject
Info: to the terms and conditions of the Intel Program License
Info: Subscription Agreement, the Intel Quartus Prime License Agreement,
Info: the Intel FPGA IP License Agreement, or other applicable license
Info: agreement, including, without limitation, that your use is for
Info: the sole purpose of programming logic devices manufactured by
Info: Intel and sold by Intel or its authorized distributors. Please
Info: refer to the applicable agreement for further details.
Info: Processing started: Thu Apr 23 09:09:12 2020
```

5. It will take a few minutes to complete the configuration.


```

root@terasic: /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo
Info: to the terms and conditions of the Intel Program License
Info: Subscription Agreement, the Intel Quartus Prime License Agreement,
Info: the Intel FPGA IP License Agreement, or other applicable license
Info: agreement, including, without limitation, that your use is for
Info: the sole purpose of programming logic devices manufactured by
Info: Intel and sold by Intel or its authorized distributors. Please
Info: refer to the applicable agreement for further details.
Info: Processing started: Thu Apr 23 09:13:01 2020
Info: Command: quartus_pgm -m jtag -c 1 -o p;flash.jic
Info (213045): Using programming cable "C5P [1-3]"
Info (213011): Using programming file flash.jic with checksum 0x5FAADE20 for dev
ice 5CGTFD9D5@1
Info (209060): Started Programmer operation at Thu Apr 23 09:13:14 2020
Info (209018): Device 1 silicon ID is 0x19
Info (209044): Erasing ASP configuration device(s)
Info (209023): Programming device(s)
Info (209011): Successfully performed operation(s)
Info (209061): Ended Programmer operation at Thu Apr 23 09:16:32 2020
Info: Quartus Prime Programmer was successful. 0 errors, 0 warnings
Info: Peak virtual memory: 501 megabytes
Info: Processing ended: Thu Apr 23 09:16:32 2020
Info: Elapsed time: 00:03:31
Info: Total CPU time (on all processors): 00:00:43
root@terasic:/opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo#

```

6. Power off the host PC and the Starter Platform for OpenVINO™ Toolkit after the flash is configured completely, then power on the Starter Platform for OpenVINO™ Toolkit and host again.
7. Power on the host PC, click on the desktop to open the Terminal.
8. Enter command “`sudo su`” to change user to root (super user), enter your password.

```

root@terasic: /home/terasic/Desktop/l_opencvino_toolkit_fpga_p_2019.1.094
terasic@terasic:~$ sudo su
[sudo] password for terasic:
root@terasic:/home/terasic#

```

9. Input below command, check if the Starter Platform for OpenVINO™ Toolkit can be check through PCIe:

`lspci | grep Altera`

```

root@terasic: /home/terasic
terasic@terasic:~$ sudo su
[sudo] password for terasic:
root@terasic:/home/terasic# lspci | grep Altera
01:00.0 Unassigned class [ff00]: Altera Corporation Device d800 (rev 01)
root@terasic:/home/terasic#

```

2.7 OpenCL Runtime Test

1. Switch to Terasic_demo path.

```

root@terasic: /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo
terasic@terasic:~$ sudo su
[sudo] password for terasic:
root@terasic:/home/terasic# lspci | grep Altera
01:00.0 Unassigned class [ff00]: Altera Corporation Device d800 (rev 01)
root@terasic:/home/terasic# cd /opt/intel/2019_r1/opencvino/deployment_tools/tera
sic_demo/
root@terasic:/opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo# ls
bitstreams bringup_board.sh demo reprogram_temp.sof setup_board_tsp.sh
root@terasic:/opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo#

```

2. Input below command to install the driver:

```
source setup_board_tsp.sh
```

```
root@terasic: /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo
terasic@terasic:~$ sudo su
[sudo] password for terasic:
root@terasic:/home/terasic# lspci | grep Altera
01:00.0 Unassigned class [ff00]: Altera Corporation Device d800 (rev 01)
root@terasic:/home/terasic# cd /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo/
root@terasic:/opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo# ls
bitstreams  bringup_board.sh  demo  reprogram_temp.sof  setup_board_tsp.sh
root@terasic:/opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo# source s
etup_board_tsp.sh
```

3. Input y, as shown in the figure below:

```
root@terasic: /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo
terasic@terasic:~$ sudo su
[sudo] password for terasic:
root@terasic:/home/terasic# lspci | grep Altera
01:00.0 Unassigned class [ff00]: Altera Corporation Device d800 (rev 01)
root@terasic:/home/terasic# cd /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo/
root@terasic:/opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo# ls
bitstreams  bringup_board.sh  demo  reprogram_temp.sof  setup_board_tsp.sh
root@terasic:/opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo# source s
etup_board_tsp.sh
[setupvars.sh] OpenVINO environment initialized
INTELFPGAOCLSDKROOT is set to /opt/altera/aocl-pro-rte/aclrte-linux64. Using tha
t.

aoc was not found, but aocl was found. Assuming only RTE is installed.

AOCL_BOARD_PACKAGE_ROOT is set to /opt/altera/aocl-pro-rte/aclrte-linux64/board/
osk. Using that.
Adding /opt/altera/aocl-pro-rte/aclrte-linux64/bin to PATH
Adding /opt/altera/aocl-pro-rte/aclrte-linux64/host/linux64/lib to LD_LIBRARY_PA
TH
Adding /opt/altera/aocl-pro-rte/aclrte-linux64/board/tsp/linux64/lib to LD_LIBRA
RY_PATH
Do you want to install /opt/altera/aocl-pro-rte/aclrte-linux64/board/tsp? [y/n]
y
```

4. The driver is installed completely.


```

root@terasic: /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo
Adding /opt/altera/aocl-pro-rte/aclrte-linux64/board/tsp/linux64/lib to LD_LIBRARY_PATH
Do you want to install /opt/altera/aocl-pro-rte/aclrte-linux64/board/tsp? [y/n]
y
aocl install: Adding the board package /opt/altera/aocl-pro-rte/aclrte-linux64/board/tsp to the list of installed packages
aocl install: Setting up FCD
aocl install: Running install from /opt/altera/aocl-pro-rte/aclrte-linux64/board/tsp/linux64/libexec
Using kernel source files from /lib/modules/4.8.0-36-generic/build
make: Entering directory '/usr/src/linux-headers-4.8.0-36-generic'
CC [M] /tmp/opencv_driver_cj6rkt/aclpci_queue.o
CC [M] /tmp/opencv_driver_cj6rkt/aclpci.o
CC [M] /tmp/opencv_driver_cj6rkt/aclpci_fileio.o
CC [M] /tmp/opencv_driver_cj6rkt/aclpci_dma.o
CC [M] /tmp/opencv_driver_cj6rkt/aclpci_cvp.o
CC [M] /tmp/opencv_driver_cj6rkt/aclpci_cmd.o
LD [M] /tmp/opencv_driver_cj6rkt/aclpci_drv.o
Building modules, stage 2.
MODPOST 1 modules
CC /tmp/opencv_driver_cj6rkt/aclpci_drv.mod.o
LD [M] /tmp/opencv_driver_cj6rkt/aclpci_drv.ko
make: Leaving directory '/usr/src/linux-headers-4.8.0-36-generic'
root@terasic: /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo#

```

5. Enter command “*aocl diagnose*” to test if the Starter Platform for OpenVINO™ Toolkit can be booted up normally.

```

root@terasic: /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo# aocl diagnose
Warning:
No devices attached for package:
/opt/altera/aocl-pro-rte/aclrte-linux64/board/tsp

Verified that the kernel mode driver is installed on the host machine.

Using board package from vendor: Terasic
Querying information for all supported devices that are installed on the host machine ...

Device Name      Status      Information
acl0              Passed      Cyclone V HPC Reference Platform
                  PCIe dev_id = D800, bus:slot.func = 01:00.00, at Gen 1 with 1 lanes

Found 1 active device(s) installed on the host machine. To perform a full diagnostic on a specific device, please run
aocl diagnose <device_name>

DIAGNOSTIC_PASSED

Call "aocl diagnose <device-names>" to run diagnose for specified devices
Call "aocl diagnose all" to run diagnose for all devices
root@terasic: /opt/intel/2019_r1/opencvino/deployment_tools/terasic_demo#

```


The environment is set up completely, now user can run the FPGA demos by referring to “**OpenVINO Development Guide**”.

FAQ

The solutions for the problems happen when users are running the demo.

When run the cpu demo: `demo_squeezenet_download_convert_run.py`, users may get the error as shown in below figure:

1. Fail to download python module (internet issue)



```
root@localhost:/opt/intel/computer_vision_sdk/deployment_tools/demo
File Edit View Search Terminal Help
Collecting protobuf==3.5.1 (from -r /opt/intel/computer_vision_sdk_fpga_2018.2.300/
deployment_tools/model_optimizer/install_prerequisites/./requirements.txt (line 5)
)
  Downloading https://files.pythonhosted.org/packages/40/99/471fa05dab1cf69419c91bc
d7b5a7f3a0e251c76025bbdb40e08c367b728/protobuf-3.5.1-cp36-cp36m-manylinux1_x86_64.w
hl (6.4MB)
    100% |████████████████████████████████████████| 6.4MB 212kB/s
Collecting onnx>=1.1.2 (from -r /opt/intel/computer_vision_sdk_fpga_2018.2.300/depl
oyment_tools/model_optimizer/install_prerequisites/./requirements.txt (line 6))
  Downloading https://files.pythonhosted.org/packages/ae/24/e8c4ae1970533fa8e0db562
1b58c107a4679e6b5d2e3ede6d03d110a4e24/onnx-1.2.2-cp36-cp36m-manylinux1_x86_64.whl (
3.8MB)
    100% |████████████████████████████████████████| 3.8MB 309kB/s
Collecting grpcio>=1.8.6 (from tensorflow>=1.2.0->-r /opt/intel/computer_vision_sdk
_fpga_2018.2.300/deployment_tools/model_optimizer/install_prerequisites/./requirem
ents.txt (line 1))
  Could not find a version that satisfies the requirement grpcio>=1.8.6 (from tenso
rflow>=1.2.0->-r /opt/intel/computer_vision_sdk_fpga_2018.2.300/deployment_tools/mo
del_optimizer/install_prerequisites/./requirements.txt (line 1)) (from versions: )
No matching distribution found for grpcio>=1.8.6 (from tensorflow>=1.2.0->-r /opt/i
ntel/computer_vision_sdk_fpga_2018.2.300/deployment_tools/model_optimizer/install_p
rerequisites/./requirements.txt (line 1))
You are using pip version 9.0.3, however version 18.0 is available.
You should consider upgrading via the 'pip install --upgrade pip' command.
```

2. It points out that numpy can't be found.

```

root@localhost:/opt/intel/computer_vision_sdk/deployment_tools/demo - □ ×
File Edit View Search Terminal Help
.
If you want to install again, remove venv directory. Then run the script again

#####

Convert a model with Model Optimizer

Run python3.6 /opt/intel/computer_vision_sdk_fpga_2018.2.300/deployment_tools/model_optimizer/mo.py --input_model /opt/intel/computer_vision_sdk/deployment_tools/demo/./demo/classification/squeezenet/1.1/caffe/squeezenet1.1.caffemodel --output_dir ir/squeezenet1.1 --data_type FP32

Traceback (most recent call last):
  File "/opt/intel/computer_vision_sdk_fpga_2018.2.300/deployment_tools/model_optimizer/mo.py", line 28, in <module>
    from mo.main import main
  File "/opt/intel/computer_vision_sdk_fpga_2018.2.300/deployment_tools/model_optimizer/mo/main.py", line 24, in <module>
    import numpy as np
ModuleNotFoundError: No module named 'numpy'
Error on or near line 163; exiting with status 1
[root@localhost demo]#

```

Reason: The problems above are the same, the second problem is happened because of the first problem: it will download python module when users run the demo, the numpy can't be found if it failed to download the python module

Solution: Delete the venv directory, the venv directory is under:

/opt/intel/computer_version_sdk/deployment_tools/model_optimizer/, then run the demo again

Contact Terasic

Users can refer to below contacts for Terasic technical support and products information:

Tel : +886-3-575-0880

Email: support@terasic.com / sales@terasic.com

Site : <http://www.terasic.com>

Address : 9F., No.176, Sec.2, Gongdao 5th Rd, East Dist, Hsinchu City, 30070. Taiwan

Revision History

Version	Changes Log
V1.0	Initial Version
V1.1	Change some download link of toolkit
V1.2	Add Appendix
V1.3	Update pictures and operations for OpenVINO 2019R1
V1.4	Modify 4.13.0-50 to 4.13.0-45
V1.5	Delete the Linux kernel version 4.8 limitation for TSP

