

PhyBOARD-WEGA-AM335x Single Board Computer

QT Manual



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SOM PCB No	: 1397.0
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QT Application Development for phyBOARD-WEGA-AM335x:

In this Manual, we are going to describe how to use **Qt application** for development.

1. First chapter – Deals with the installation of Qt Creator.
2. Second chapter – Explains how to configure QT creator for cross compilation.
3. Third chapter – Describes how to write an application using Qt Creator and
4. Fourth chapter – Describes Qt Creator with UART Demo application.

1. Application development using Qt Creator:

With the help of example projects, we will teach you how to work with Qt.

Explain how to run Qt application on target (ARM architecture), in Linux (Ubuntu) environment.

1.1. Qt Creator Installation

Qt in linux

First of all install Qt Creator with the help of Ubuntu Software Center

Enter Qt Creator in the search box in the right top corner (in Ubuntu Software Center).
Install it (see the below image)

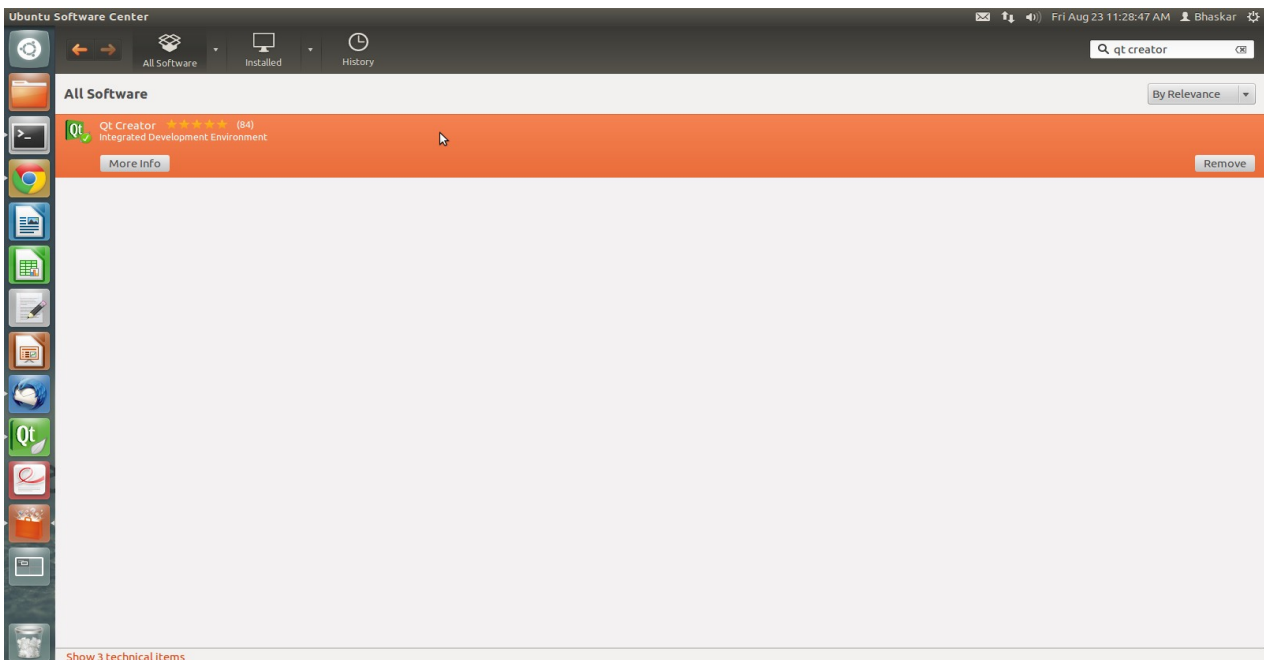


Figure 1.1

1.2. Network Settings(Host and Target)

In Host :

Click on Dash Home and enter as Network Connections and click.

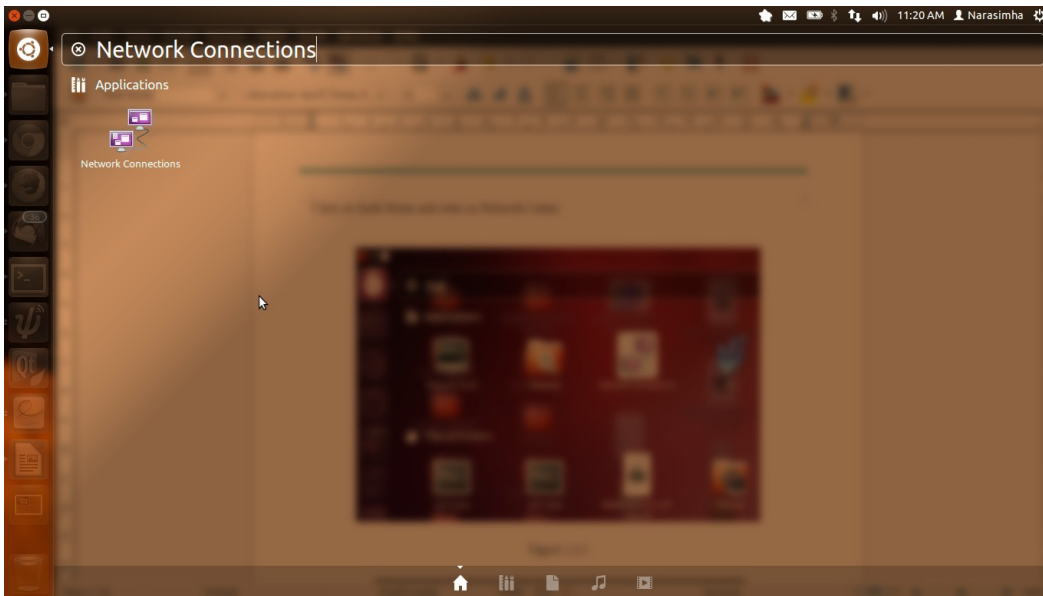


Figure 1.2.1

Here click on Add label and give a connection name as shown below.

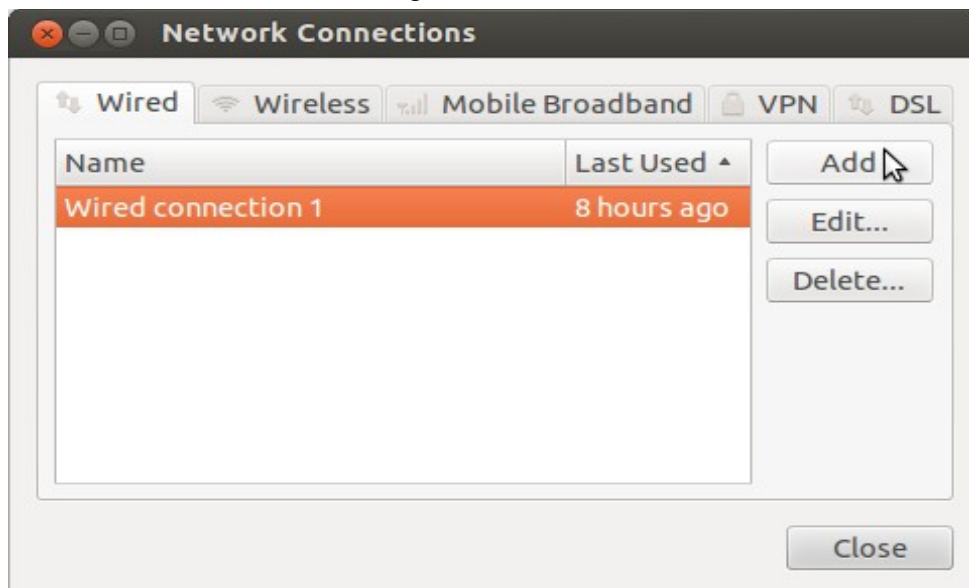


Figure 1.2.2

Here you need to select Method as Manual and click Add label again do ip settings then Save as shown below.

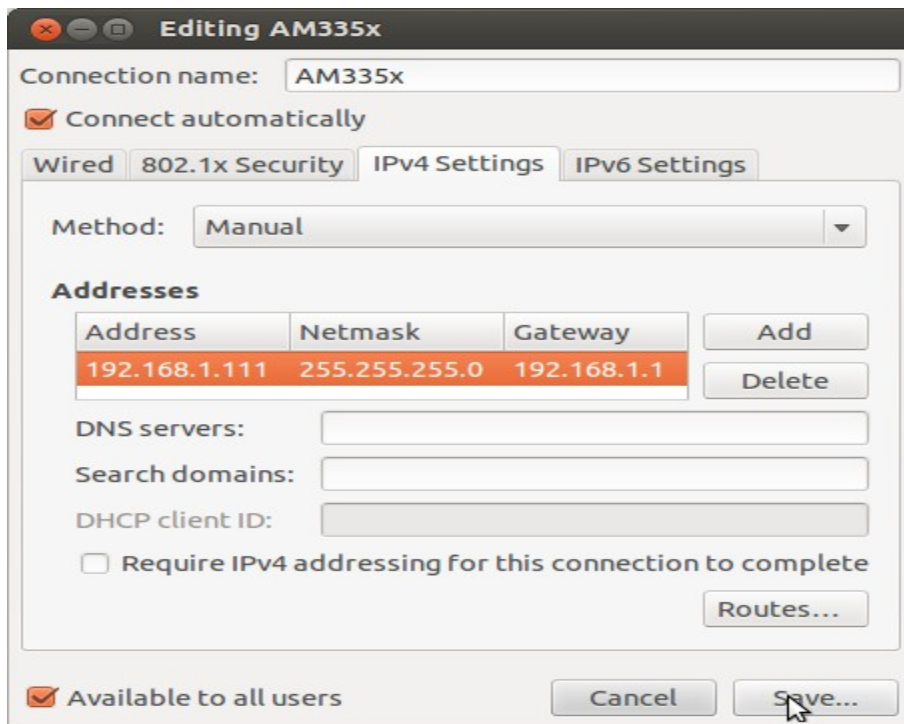


Figure 1.2.3

Then finally you will get successfully as below if your Connection Established correctly.

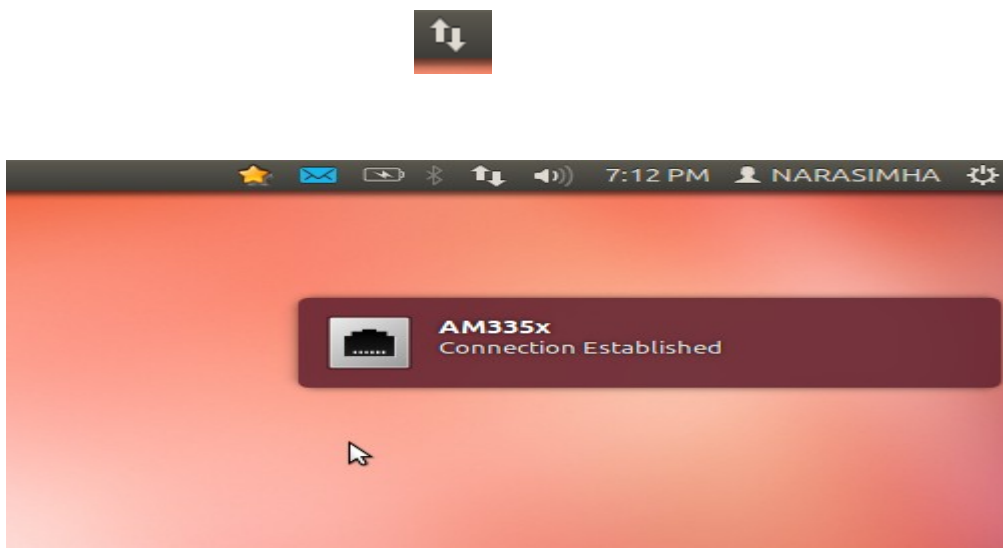


Figure 1.2.4

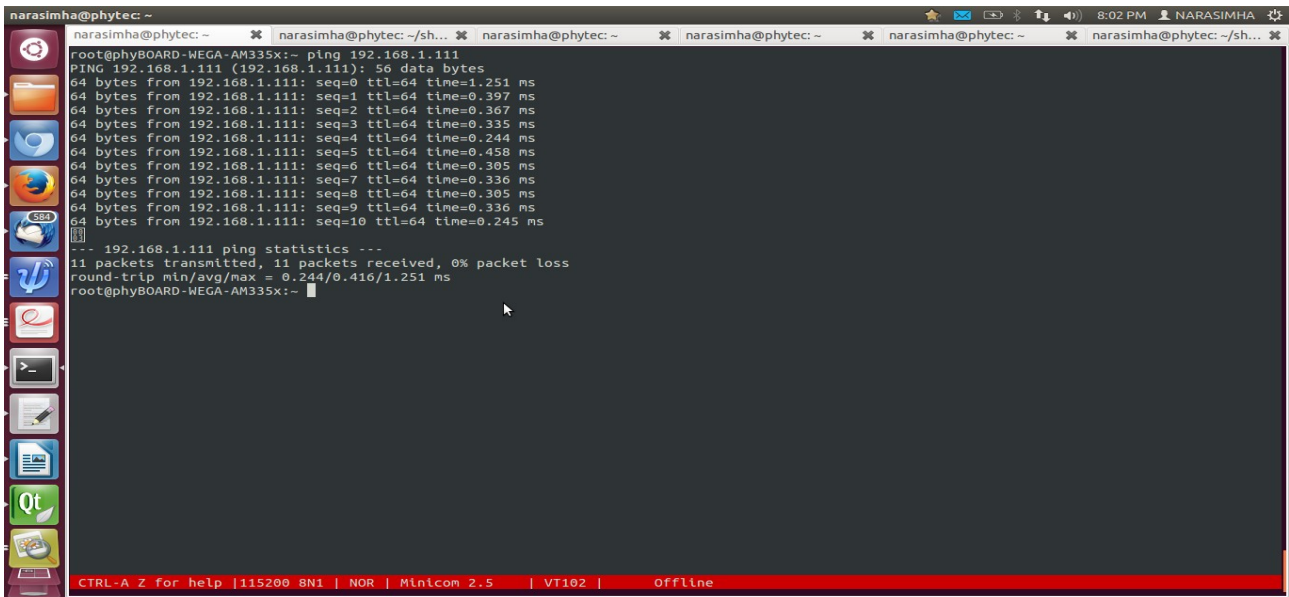


Figure 1.2.7

2. QT Creator Configuration for phyBOARD-WEGA-AM335x

2.1. Configuring QT Creator for Cross Compilation

Now let's setup QT creator to configure **qmake**. From the QT creator main menu shown below:

Select the following:

Tools -> Options...

On the left side vertical menubar click **Build & Run**

Click the **Qt Versions** tab under Build & Run

Remove any versions that may already exist to make sure you start with a clean configuration

Click **Add...** on the right

Note: Here navigate to the path of qmake in our PC (refer section 2.3.2).

Select qmake then **click on Open**

Double click on **Version Name** and give the Qt Version a descriptive name in below image .

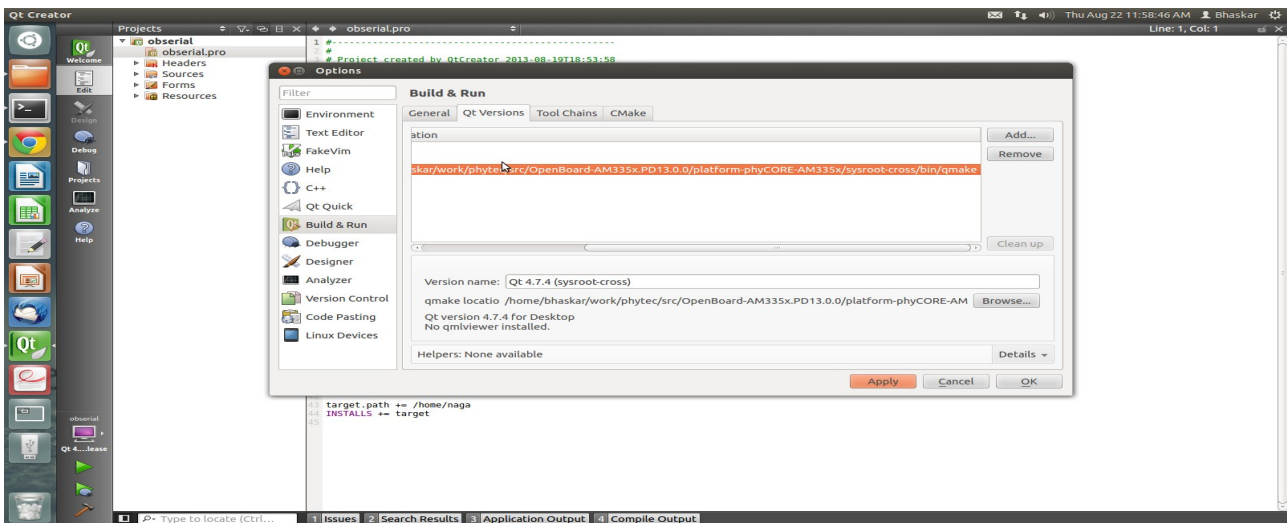


Figure 2.1.1

Export the Tool chain Path (refer 2.2.3)

Click the **Tool Chains** tab under Build & Run

Click **Add** in the top right and add a **GCC**

For **Compiler Path** select Browse

Navigate to `/home/<user>/work/phytec/src/arm-cortexa8-linux-gnueabi/f/bin`

Note: Here navigate to the path where you have exported the tool chain

Select Compiler Path: Click on Browse and select path of compiler

`/home/<user>/work/phytec/src/arm-cortexa8-linux-gnueabi/f/bin/arm-cortexa8-linux-gnueabi/f-gcc.`

Debugger: Click on Browse & select path of Debugger `home/<user>/work/phytec/src/arm-cortexa8-linux-gnueabi/f/bin/arm-cortexa8-linux-gnueabi/f-gdb`, as shown below.

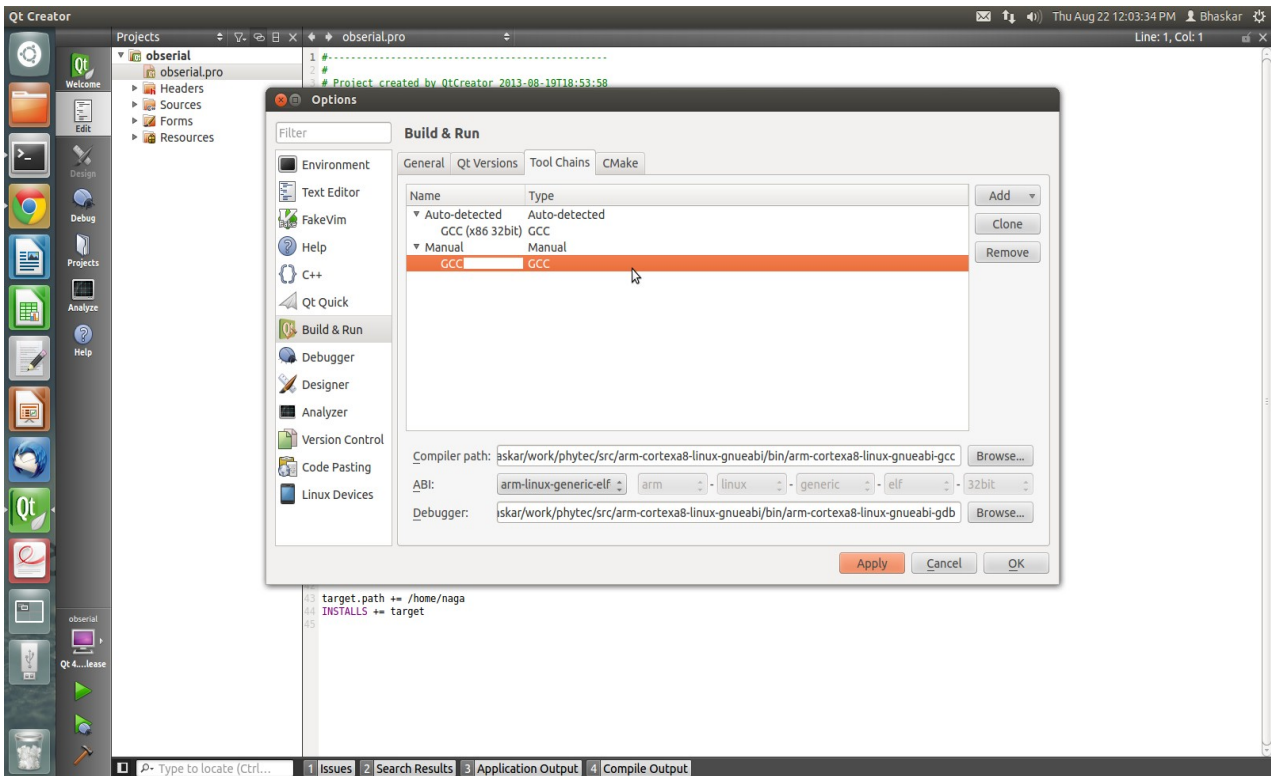


Figure 2.1.2

Now let's setup our Target. While still in the **Tools -> Options** menu

On the left side of the window, select the **Linux Devices** tab

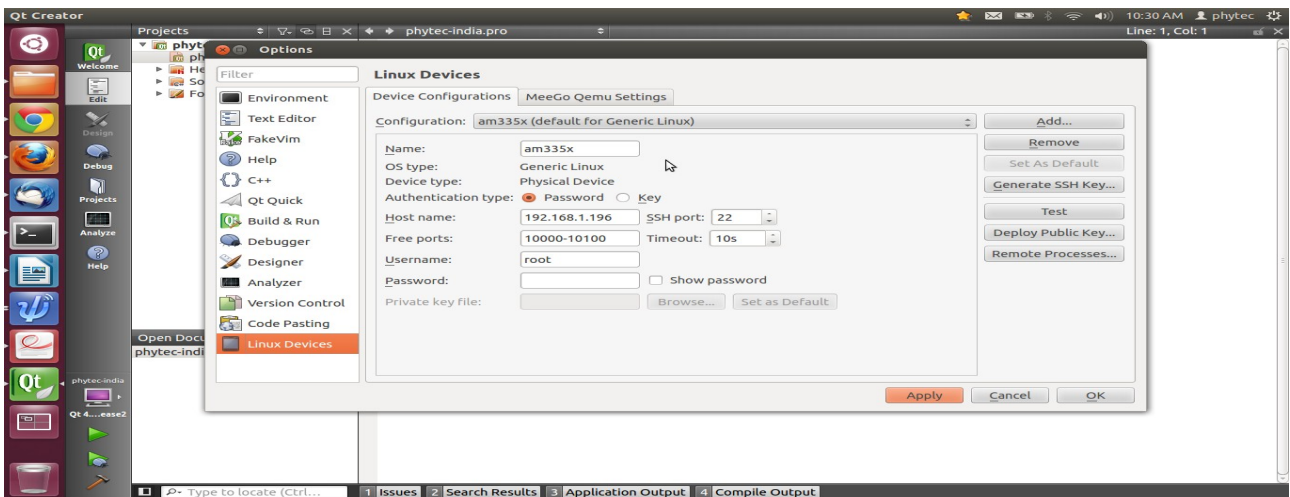


Figure 2.1.3

In Linux Devices: click the **Device Configurations** tab.

Click **Add...** in the top right and select **Generic Linux** device and click on **Start Wizard**

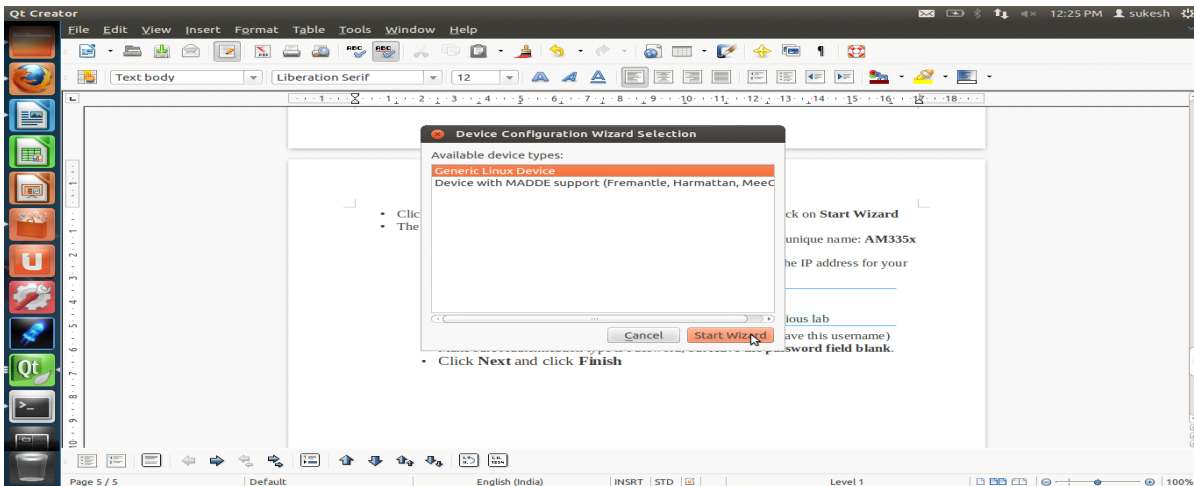


Figure 2.1.4

The **Device Configuration Wizard Selection Dialog** box comes up, Change the name **Generic Linux Device** to give the device a unique name: **AM335x**,

Type in the IP address Box as – **192.168.1.196** (For your target),

In the Box - **The Username to log into device**, write entry as **root**,

Make sure Authentication type is Password, but **leave the password field blank**.

Click **next** and click **Finish**

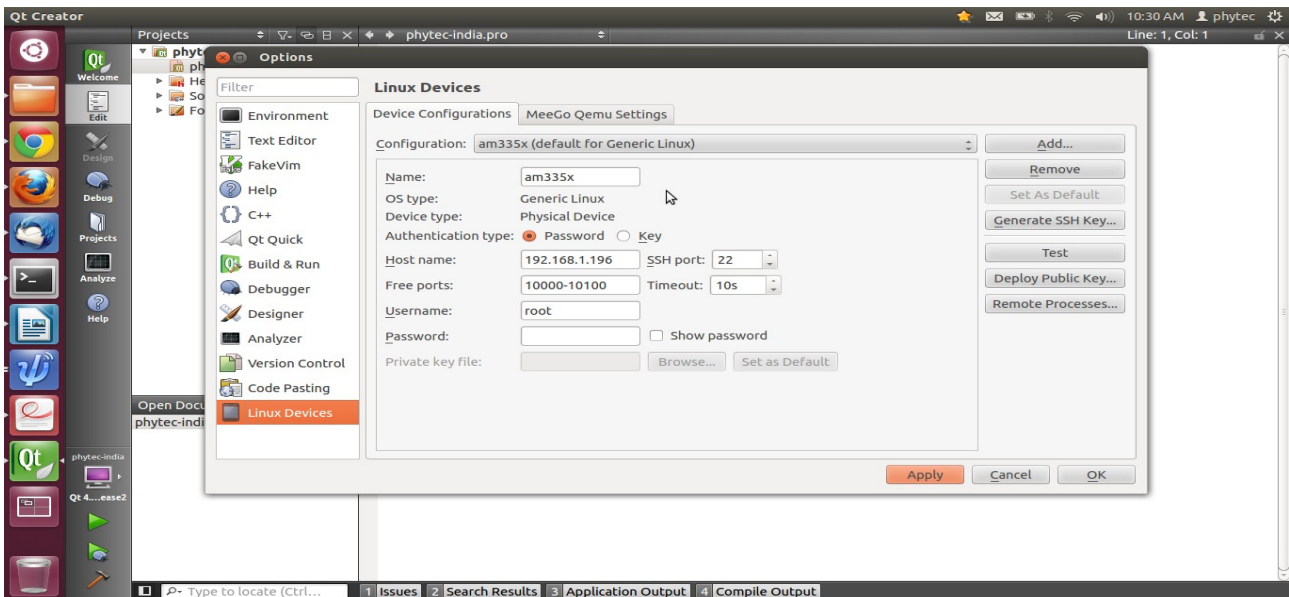


Figure 2.1.5

Now you should see Device test finished successfully, so you can close the window

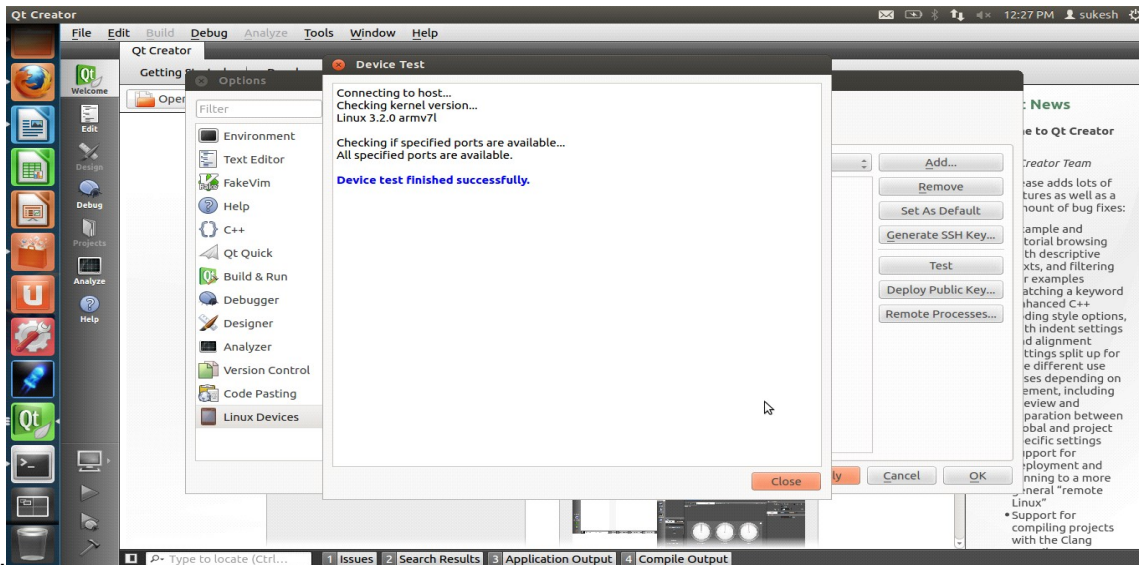


Figure 2.1.6

Now we need to setup an SSH key so that the host can communicate with the target

Still under the Device Configurations tab click "Generate SSH Key..."

Select **Key size: 1024**

Key algorithm RSA

Then click **Generate SSH Key** in the SSH Key Configuration dialog box

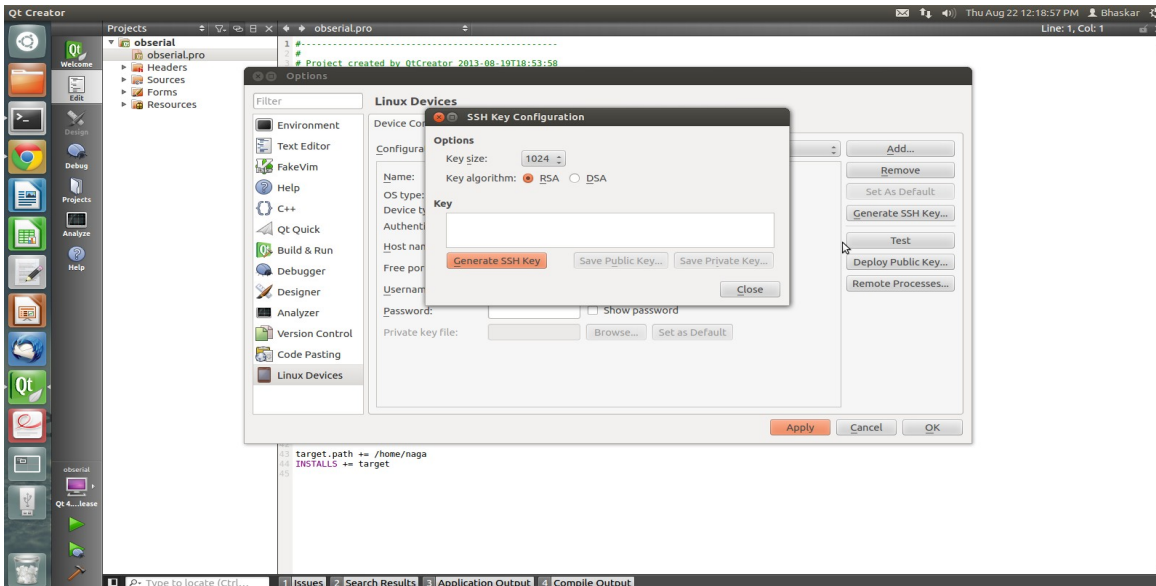


Figure 2.1.7

Click **Do not Encrypt key file**

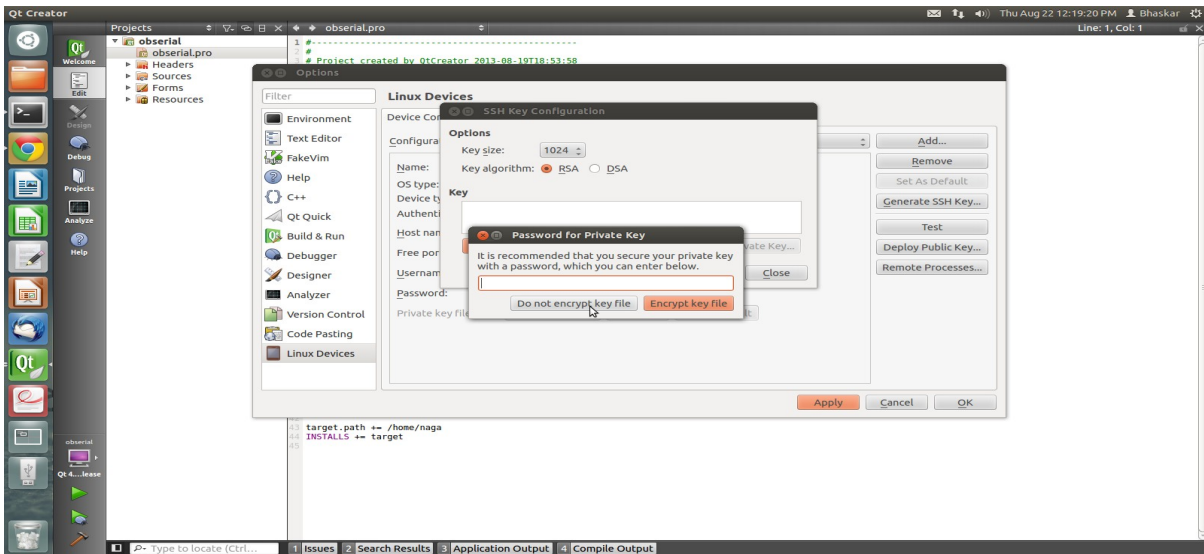


Figure 2.1.8

Then click **Save Public Key...**

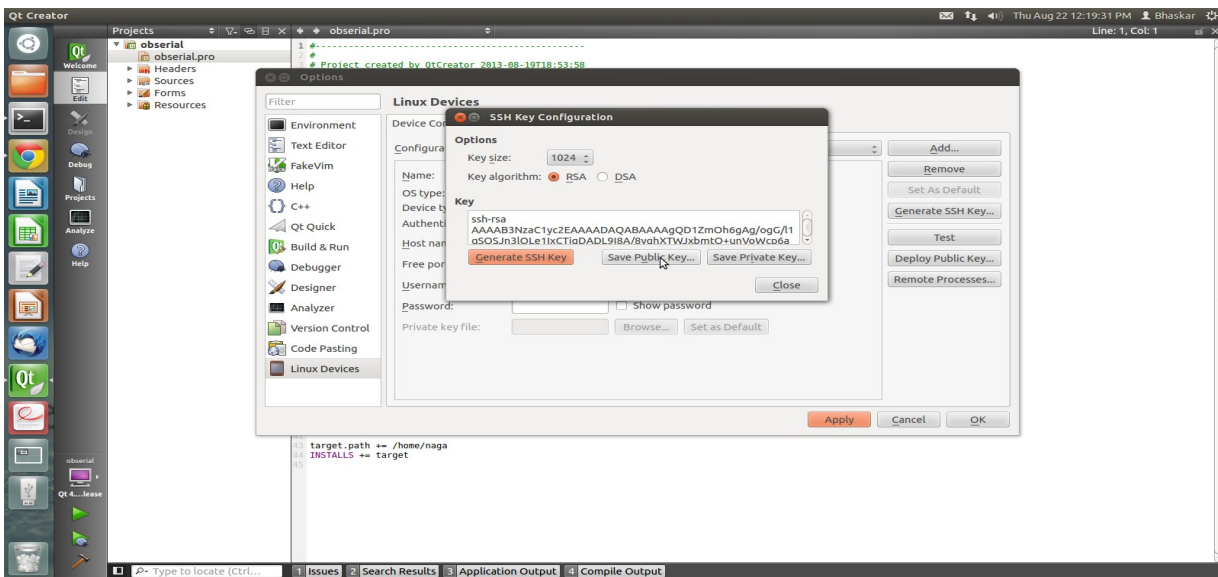


Figure 2.1.9

Just use the default name `id_rsa.pub` and **Click Save** and **Click Close** to close the Generate SSH Key window.

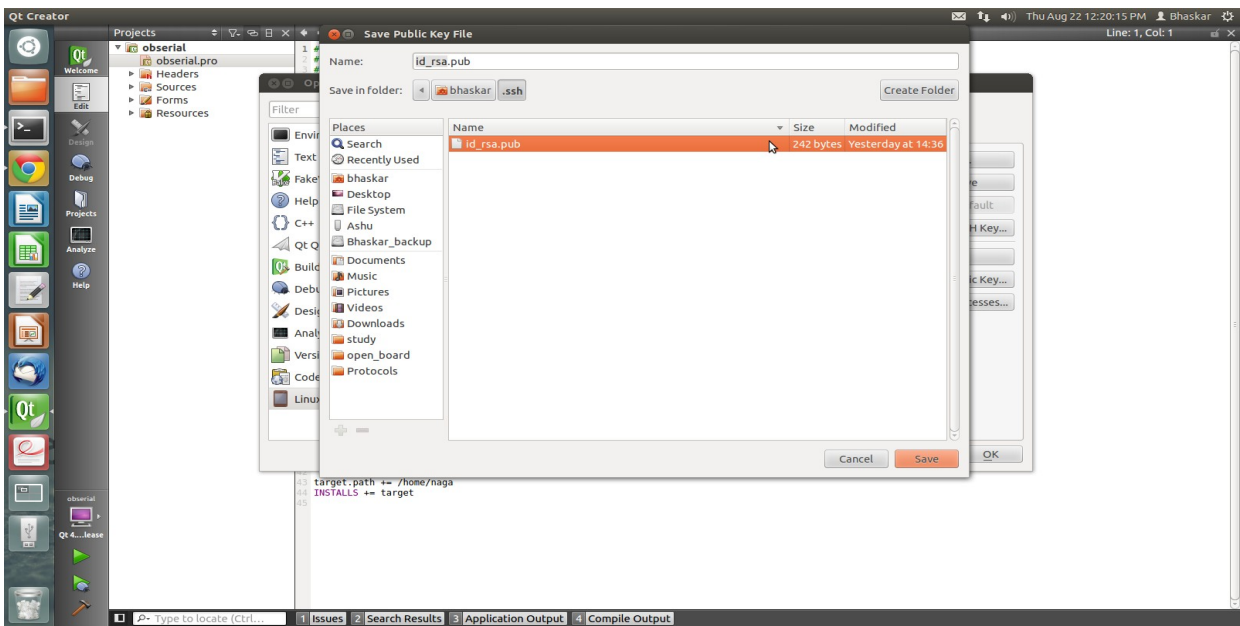


Figure 2.1.10

Under the Device Configurations tab now click **Deploy Public Key...**

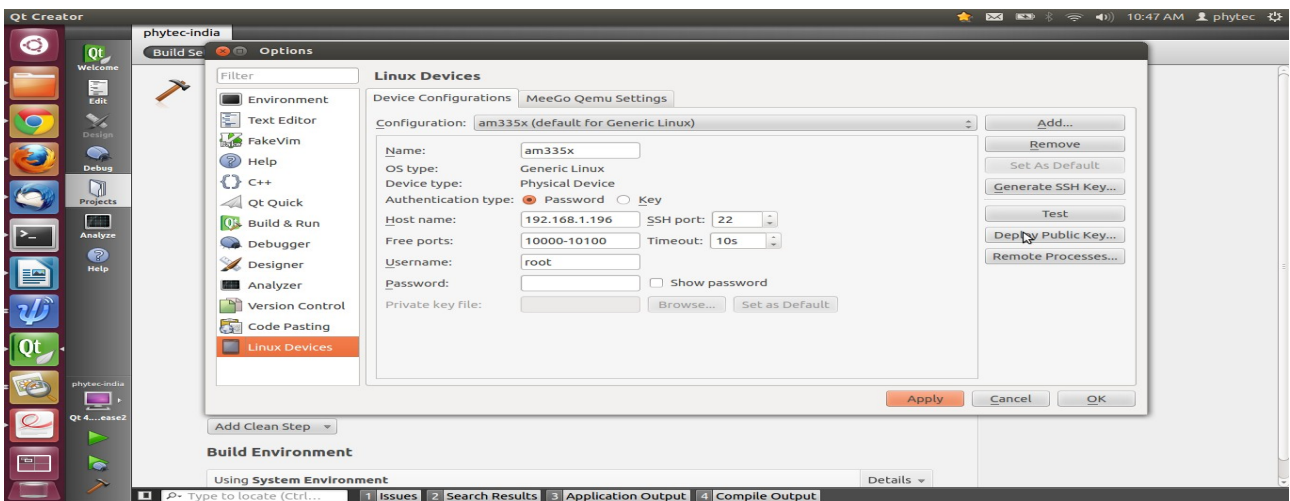


Figure 2.1.11

Select the file just generated (should be under /home/<user>/.ssh)

IMPORTANT : You may need to right click and select **show hidden files** or **Ctrl+h**

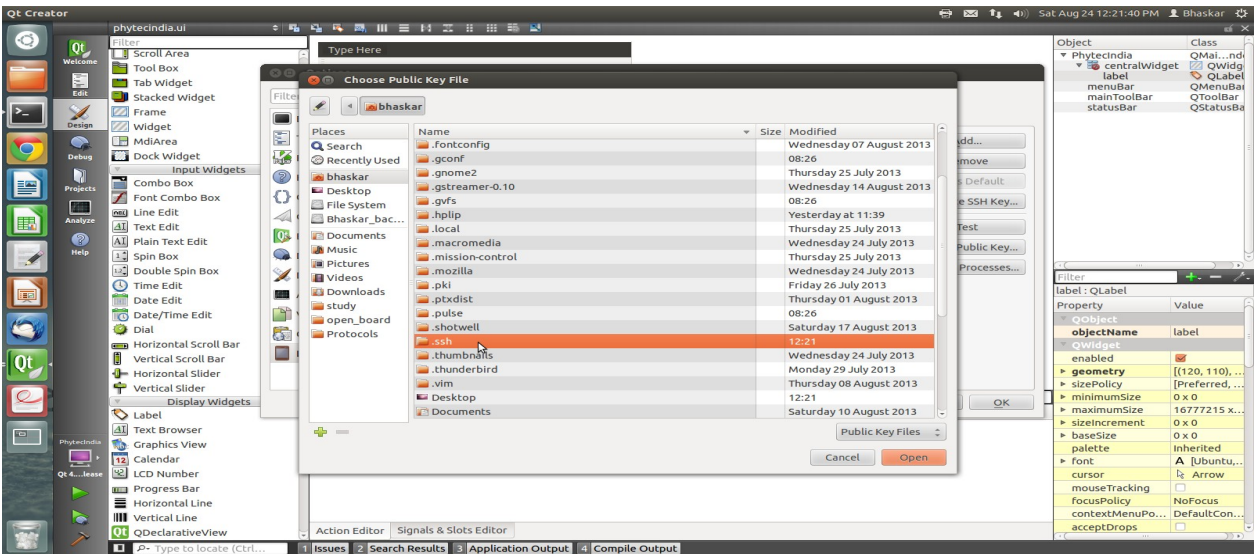


Figure 2.1.12

Select the file **id_rsa.pub** and click on **Open**, shortly a window should show up saying "Sucessfully"

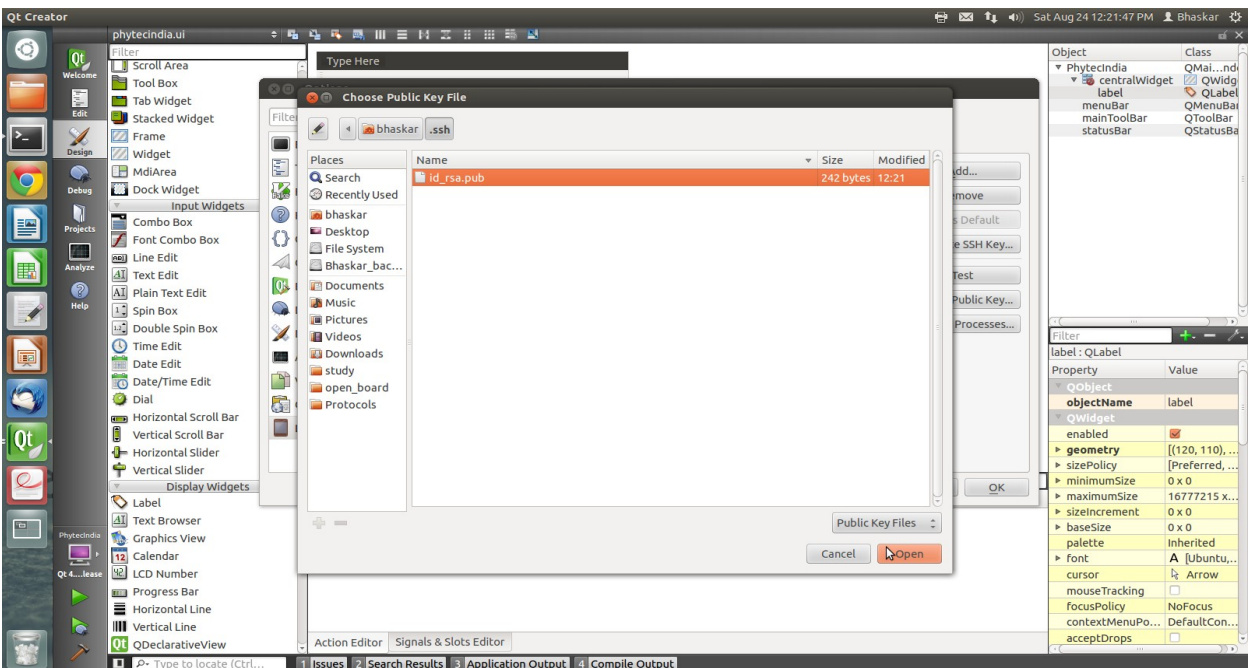


Figure 2.1.13

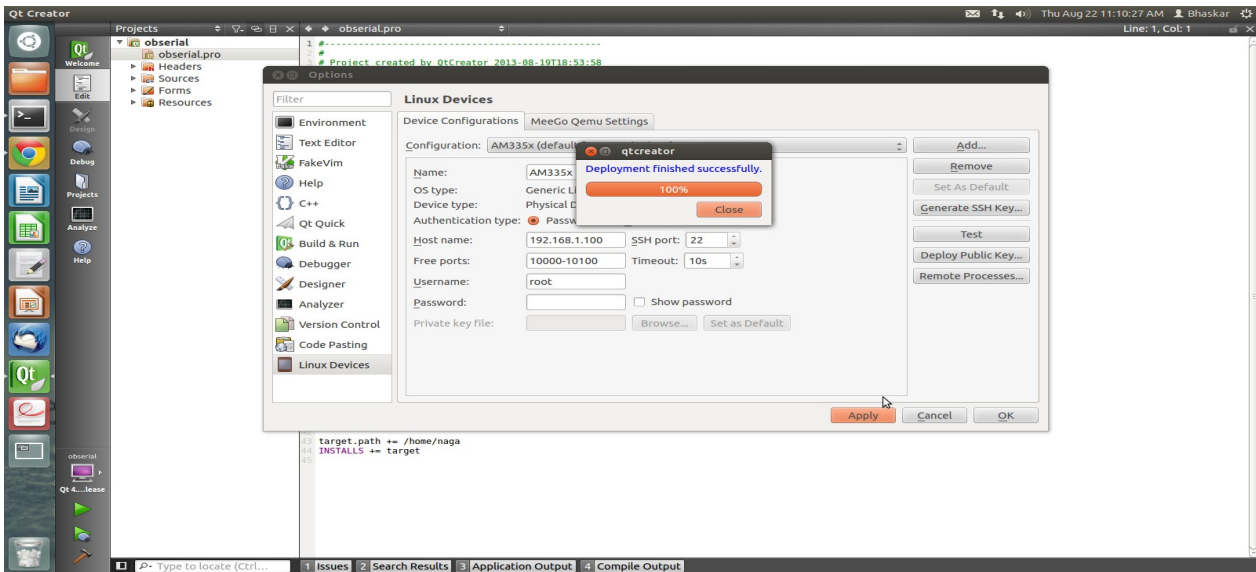


Figure 2.1.14

Close the window and **Click OK** to exit the Linux Devices Window.

2.2. Target Setup

Host Setup - First open the terminal (ALT+CTRL+T).

2.2.1. Toolchain Installation:

This section explains how to Install prebuilt toolchain binaries on the Host. Where as, building of Toolchain is explained in build system section.

2.2.2. Downloading the Toolchain:

Download the toolchain from the public ftp of PHYTEC from the link below.

<ftp://ftp.phytec.de/pub/Products/India/phyBOARD-WEGA-AM335x/Linux/PD14.0.0/tools/toolchain/arm-cortexa8-linux-gnueabihf.tar.bz2>

2.2.3. Export the Toolchain to Shell Path:

Extract the toolchain that has downloaded, from terminal issue the following commands:

```
$ mkdir ~/work
$ cp arm-cortex8-linux-gnueabihf.tar.bz2 ~/work
$ cd ~/work
$ tar -xvf arm-cortex8-linux-gnueabihf.tar.bz2
```

Now write a script that export the target Architecture and toolchain prefix as below.

```
$ vim env.sh

#!/bin/sh
export PATH=$PATH:/home/<user>/<path to toolchain bin>
export ARCH=arm
export CROSS_COMPILE=arm-cortexa8-linux-gnueabihf-
```

Save and exit from the editor. Execute the script by issuing

```
$ . env.sh
```

Note: The command is “dot space env.sh”. Execute the above command for shell where you are trying to start compilation of Qt.

Check whether the toolchain path is set or not by issuing

```
$ echo $PATH
```

Above command displays the entire paths that are added to Shell PATH variable separated by colon ':'. See if your path is printed on the terminal. If you are not able to see your toolchain path repeat the steps from the beginning of this section.

2.3. Building qmake using QT:

Method:1

Download QT version from the following link

http://download.qt-project.org/official_releases/qt/4.8/4.8.5/qt-everywhere-opensource-src-4.8.5.tar.gz

Compile the qt-everywhere-opensource-src-4.8.5 source file

```
$ cp qt-everywhere-opensource-src-4.8.5.tar.gz ~/work
```

```
$ cd ~/work
```

```
$ tar -xvf qt-everywhere-opensource-src-4.8.5.tar.gz
```

```
$ cd qt-everywhere-opensource-src-4.8.5
```

```
$ vim mkspecs/qws/linux-arm-gnueabi-g++/qmake.conf
```

```
    change arm-none-linux-gnueabi to arm-cortexa8-linux-gnueabihf  
save and exit
```

Execute the following configuration command

```
./configure -opensource -confirm-license -release -rpath -no-fast -no-sql-ibase -no-sql-mysql -no-sql-odbc -no-sql-psql -no-sql-sqlite2 -no-qt3support -no-mmx -no-3dnow -no-sse -no-sse2 -no-sse3 -no-ssse3 -no-sse4.1 -no-sse4.2 -no-avx -no-optimized-qmake -no-nis -no-cups -no-pch-reduce-relocations -force-pkg-config -prefix /opt/qt-cross -no-armfpa -make libs -nomake docs-ittle-endian -embedded arm -qt-decoration-styled -depths all -xplatform qws/linux-arm-gnueabi-g++
```

```
$ make
```

```
$ sudo make install
```

```
    check the binary file in /opt/qt-cross
```

```
$ ls /opt/qt-cross/bin
```

Method-2:

```
    use prebuilt qt-cross provided by Phytex
```

```
$ sudo cp qt-cross-hf.tar.bz2 /opt
```

```
$ cp /opt
```

```
$ sudo tar -xvf qt-cross-hf.tar.bz2
```

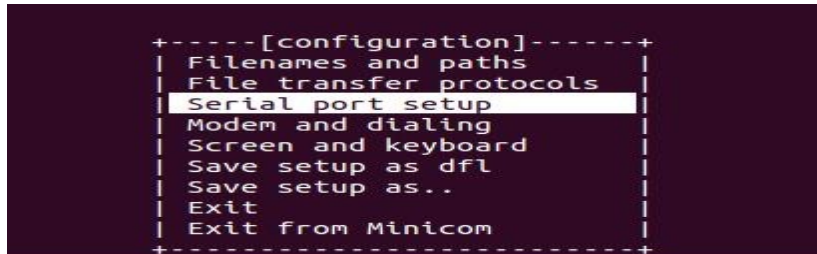
```
$ ls /opt/qt-cross/bin
```

Completed , Now use the qmake path for cross-compiling you application in QT-Creator.

2.4. Setting Serial Console (Minicom)

\$ sudo minicom -s

Select the option serial port setup from menu on terminal and press 'Enter'

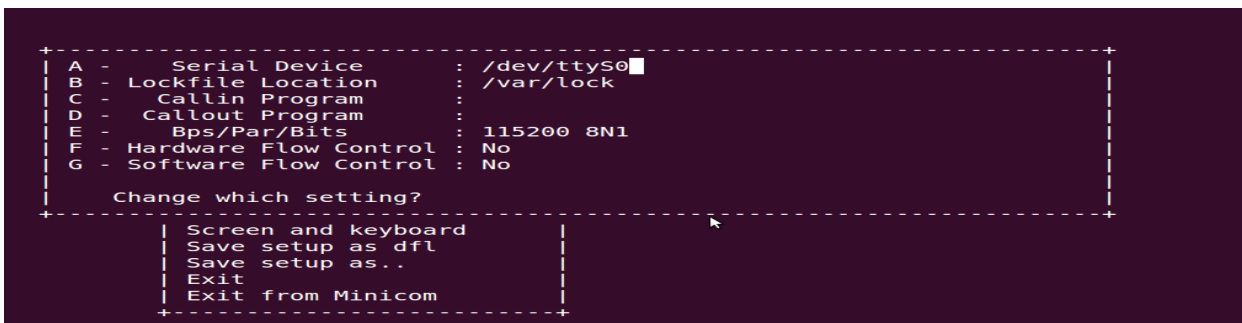


```
+-----[configuration]-----+
| Filenames and paths          |
| File transfer protocols      |
| Serial port setup           |
| Modem and dialing           |
| Screen and keyboard         |
| Save setup as dfl           |
| Save setup as..             |
| Exit                         |
| Exit from Minicom           |
+-----+-----+-----+-----+
```

Figure 2.4.1

Using the options at left; make the setting as shown in the figure 2.4.2

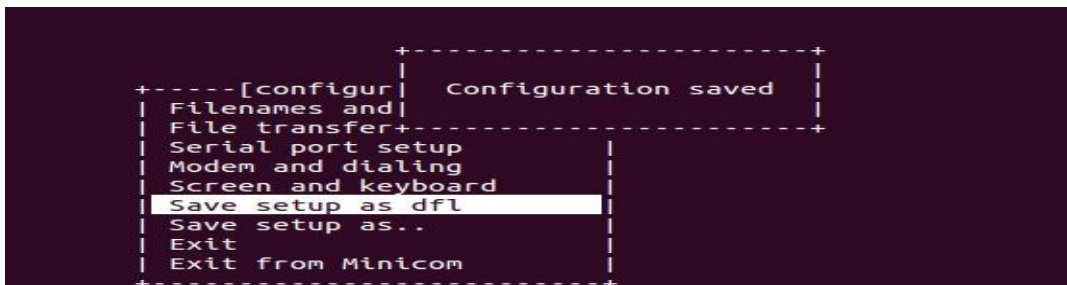
For **ex:** Serial device – `dev/ttyS0`, first press 'A' the cursor blinks at the particular line then change the device name to `/dev/ttyS0` and press 'ENTER'.



```
+-----+-----+-----+-----+
| A - Serial Device           | : /dev/ttyS0 |
| B - Lockfile Location       | : /var/lock  |
| C - Callin Program          | :             |
| D - Callout Program         | :             |
| E - Bps/Par/Bits            | : 115200 8N1 |
| F - Hardware Flow Control   | : No         |
| G - Software Flow Control   | : No         |
+-----+-----+-----+-----+
| Change which setting?      |
|                             |
| Screen and keyboard       |
| Save setup as dfl         |
| Save setup as..           |
| Exit                       |
| Exit from Minicom         |
+-----+-----+-----+-----+
```

Figure 2.4.2

After making all changes like **baud rate - 115200, hardware flow control - No** etc., press 'ENTER' to come out from the screen. Now, select the 'Save setup as dfl' it saves the setting as default. Have a look at the Screenshot below:



```
+-----+-----+-----+-----+
| [configur] Configuration saved |
| Filenames and                 |
| File transfer+-----+-----+
| Serial port setup             |
| Modem and dialing             |
| Screen and keyboard           |
| Save setup as dfl             |
| Save setup as..               |
| Exit                           |
| Exit from Minicom             |
+-----+-----+-----+-----+
```

Figure 2.4.3

Now select 'Exit' as below:

```
+-----[configuration]-----+
| Filenames and paths          |
| File transfer protocols      |
| Serial port setup           |
| Modem and dialing           |
| Screen and keyboard         |
| Save setup as dfl           |
| Save setup as..             |
| Exit                         |
| Exit from Minicom           |
+-----+
```

Figure 2.4.4

Now minicom terminal is ready to be used.

3. Application development

3.1. Simple Demo Application:

Open a New Project

Under **Forms**, double click on **phytec.ui** - this will bring up the widget editor.

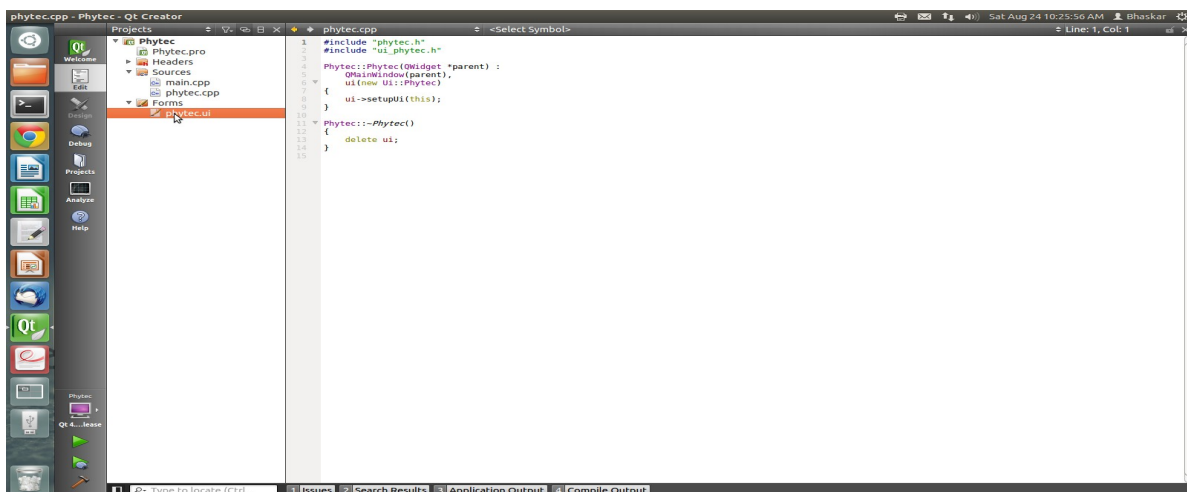


Figure 3.1.1

Find the **label widget** in the category of *display widgets*, left click and drag it on to the **User Interface (UI)**.

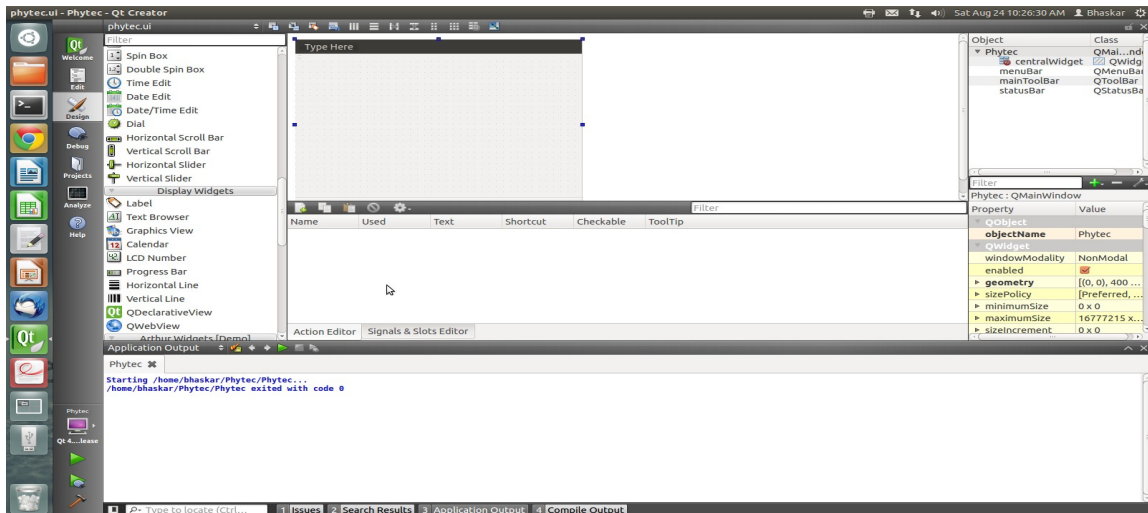


Figure 3.1.2

Type any name such as “PhytecIndia” into the label widget and stretch out the borders so you can see all the letters

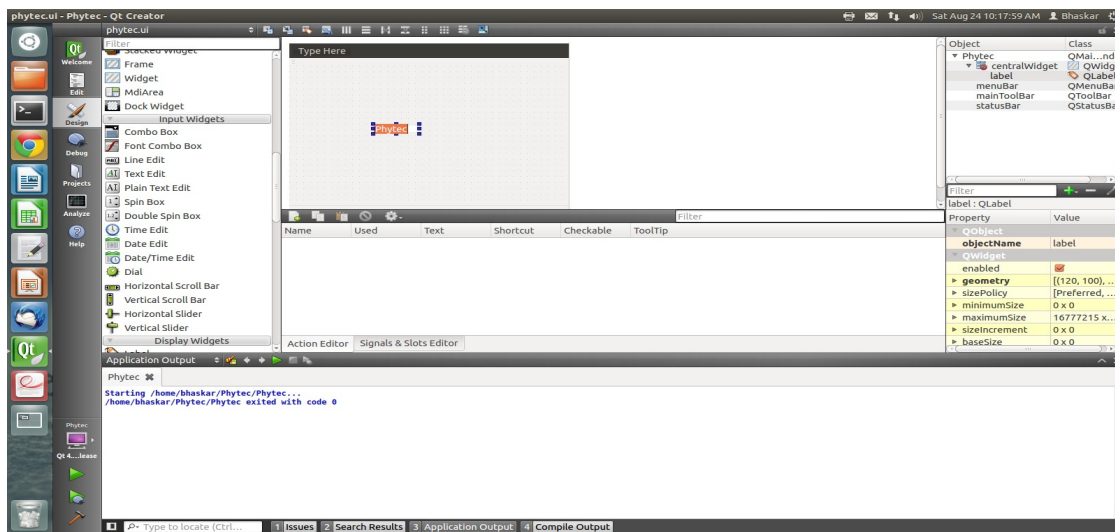


Figure 3.1.3

File->Save **phytec.ui**

Now we need to check and update the build and run settings:

On the left side vertical menubar select **Projects**

Select the **Build Settings** tab and select "Qt 4.8.5(sysroot-cross) Release" in Edit build configuration.

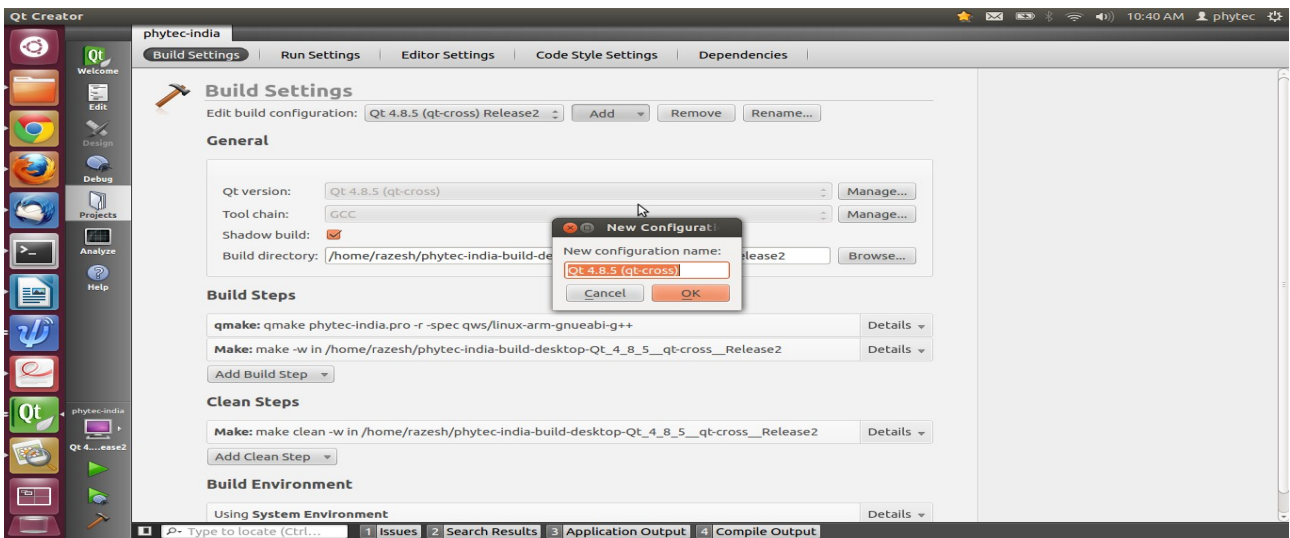


Figure 3.1.4

Now under the Projects Mode select the **Run Settings** tab

Under Deployment click **Add** and select **Deploy to Remote Linux Host**

However you see the **<no target path set>** error

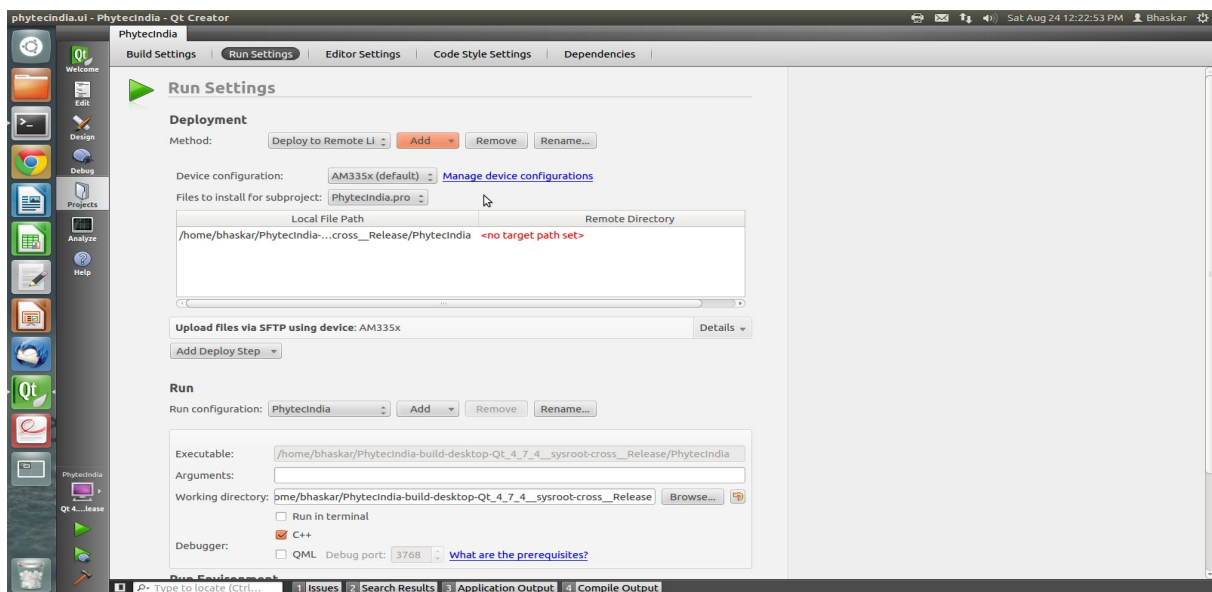


Figure 3.1.5

To fix the **<no target path set>** errors do the following:

Click on **Edit** on the left side vertical bar and click on **Phytecindia.pro**

Add the two lines below to the bottom of Phytecindia.pro as shown in the screen shot below

```
target.path += /home/phytec
INSTALLS += target
```

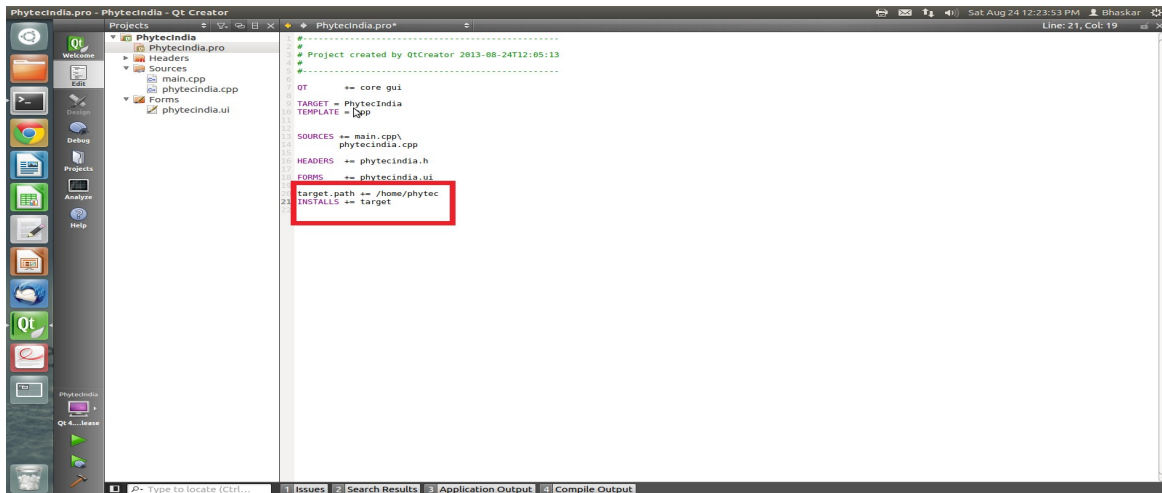


Figure 3.1.6

Select **File -> Save**

Click on **Projects** on the left side vertical bar and you should now see the error is gone and replaced with **/home/phytec**

Now in the Run portion: **Select Add -> terminal (on Remote Generic Linux Host)**

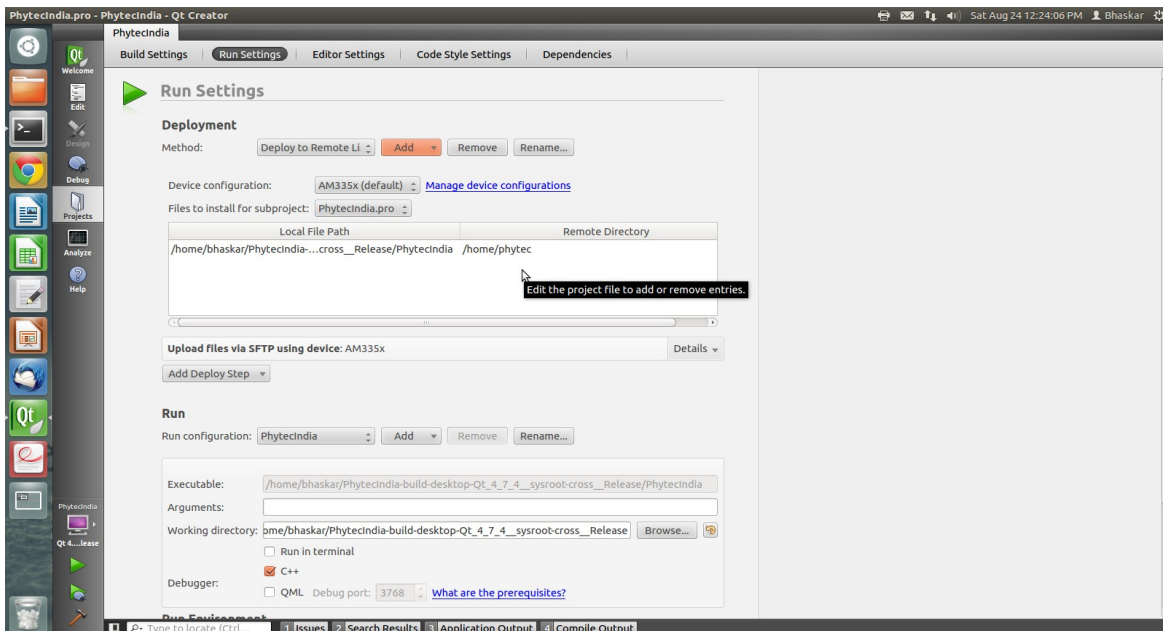
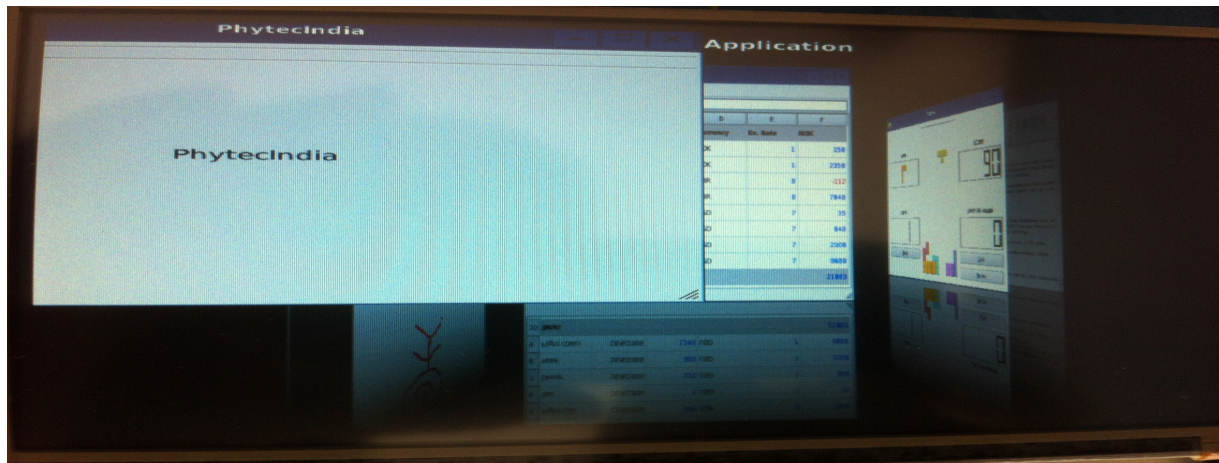


Figure 3.1.7

Finally, run the application:

Note: If application is not running add "-qws" to the Arguments section in Run settings. The Output can be seen in LCD display as shown below.



3.2. Uart Application

Download the Source code of Uart from the following link:

ftp://ftp.phytec.de/pub/Products/India/phyBOARD-WEGA-AM335x/Linux/PD13.0.0/src/apps/Qt_uart.tar.gz

Select **File-> Open File or Project**

Open the **obserial.pro** file in the Qt_uart folder, as shown in the screenshot below:

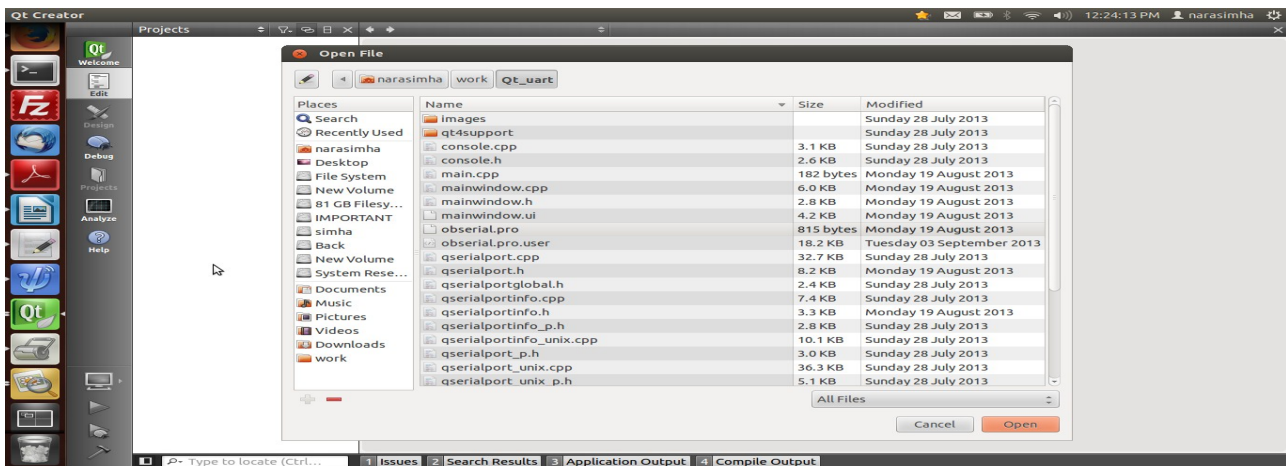


Figure 3.2.1

Click on **Edit** on the left side vertical bar and click on **obserial.pro**
 Add the below lines at the bottom of obserial.pro file as shown in the screen shot below.

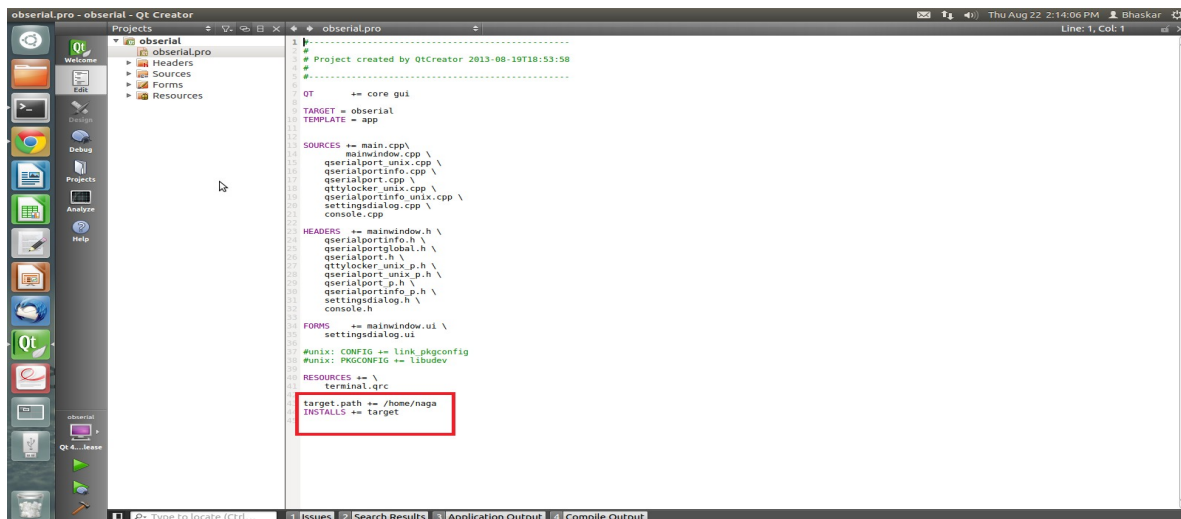


Figure 3.2.2

`target.path += /home/phytec`

`INSTALLS += target`

Select **File -> Save**

Now we need to check and update the and run settings:

Now under the Projects Mode select the **Run Settings** tab

Under Deployment click **Add** and select **Deploy to Remote Linux Host**

Now in the Run portion: **Select Add -> obserial (on Remote Generic Linux Host)**

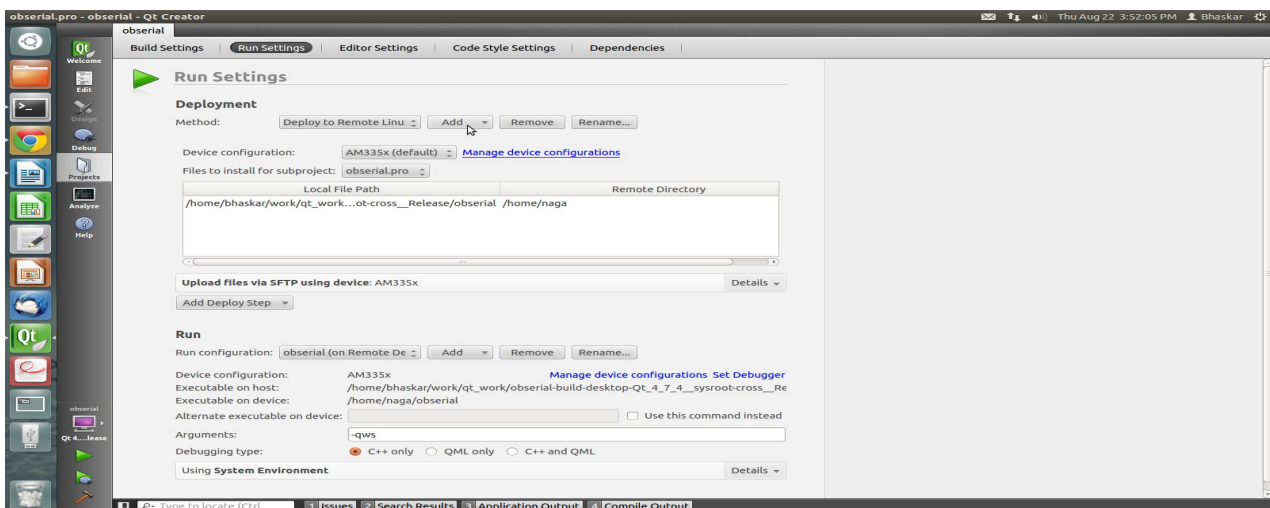


Figure 3.2.3

Now on **host side** (power up the target board and make proper settings and make sure Ethernet wire is connected on the target side).

To login to the target give the following command

`$ ssh root@< ip-address of target >`

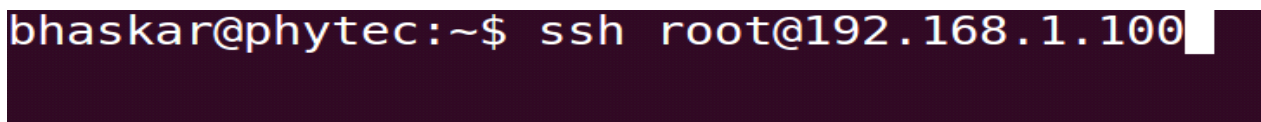


Figure 3.2.4

Now you are in **target**

```
bhaskar@phytec:~$ ssh root@192.168.1.100
root@phyCORE-AM335x:~$ ls
Settings  adc      audio    button   led      naga
root@phyCORE-AM335x:~$
```

Figure 3.2.5

Go to the path which we mentioned in bottom of the .pro file in Qt creator

i.e, target.path += /home/<user> (see the following image.)

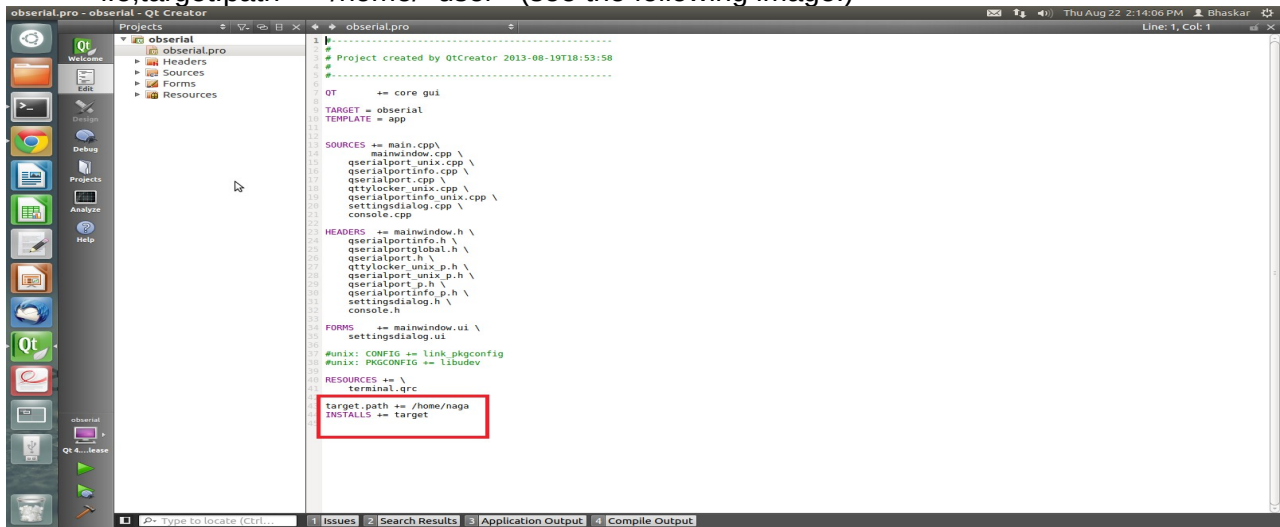


Figure 3.2.6

\$ cd /home /<user>

```
bhaskar@phytec:~$ ssh root@192.168.1.100
root@phyCORE-AM335x:~$ ls
Settings  adc      audio    button   led      naga
root@phyCORE-AM335x:~$ cd /
root@phyCORE-AM335x:/$ cd home/naga/
root@phyCORE-AM335x:~/naga$ ls
obserial
root@phyCORE-AM335x:~/naga$
```

Figure 3.2.7

Now execute the output file **./obserial -qws**

./obserial -qws

```
root@phyCORE-AM335x:~/naga$ ./obserial -qws
```

Figure 3.2.8

Now you will see the console in **LCD display**.

First, connect the **usb hub** to the target and then connect Mouse and Keyboard to that hub. Click on the setting icon (which is third icon in the below row)

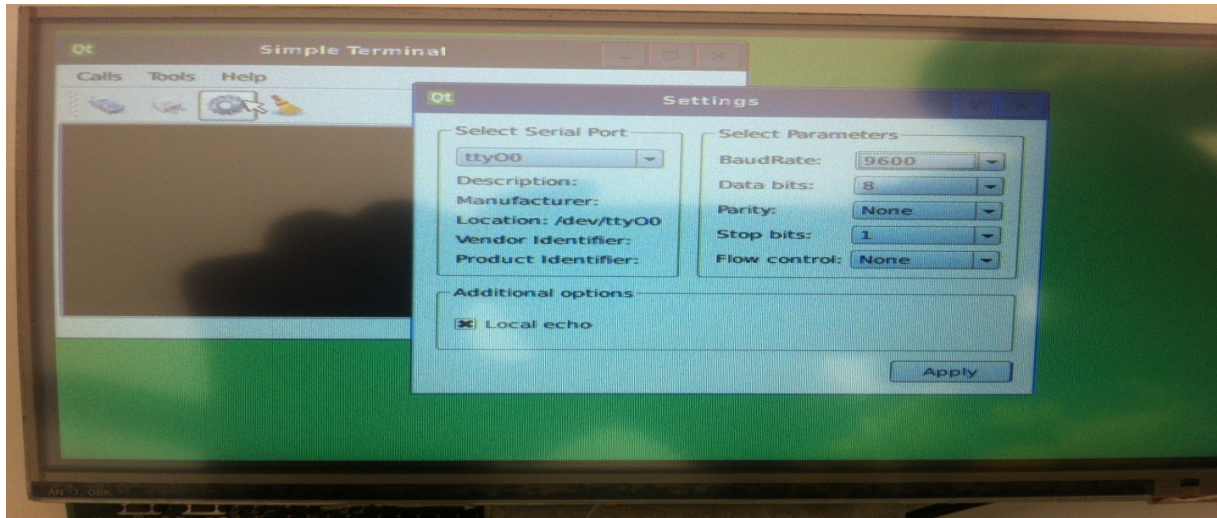


Figure 3.2.9

- ◆ Set the **Baud rate** (The baud rate settings in LCD display should match the baud rate in serial port settings in target)

NOTE: Set the serial port settings in LCD display (preferably **ttyO1**)

Click on the **Apply** button.

Next, Click on the icon (connect to serial port) which is first in the row.

Now, type any letters on keyboard which is connected to USB-Hub, it visible on terminal of the LCD display:

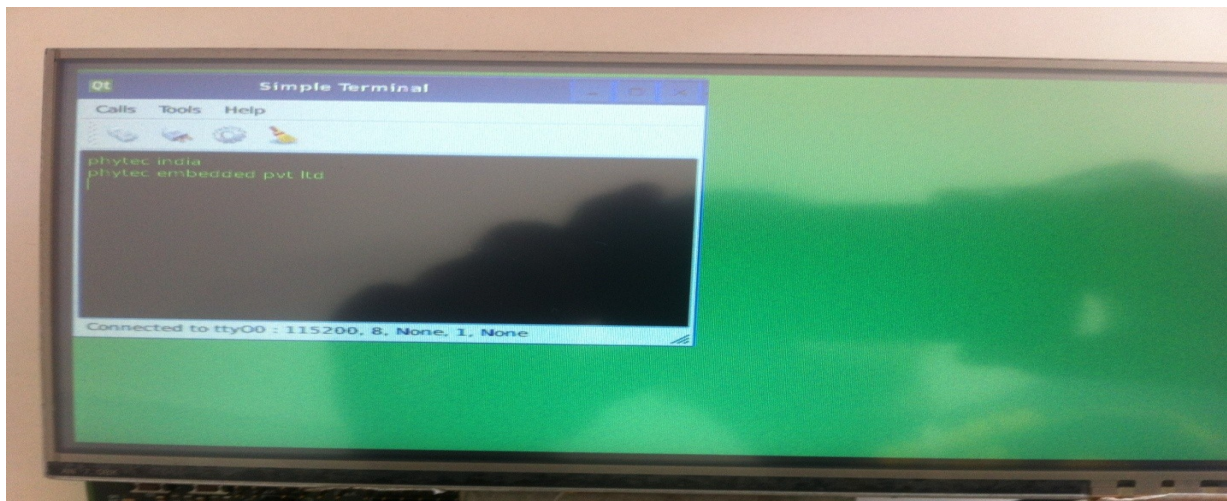


Figure 3.2.10

Open the **minicom** and log-in to the board

The same will be displayed on the minicom as below:

```
root@phyCORE-AM335x:~ phytec india phytec embedded pvt ltd
```

Figure 3.2.11

PHYTEC

**Get the dialog going ...
... and stay in touch**

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.....**We are looking forward to hear from you!**