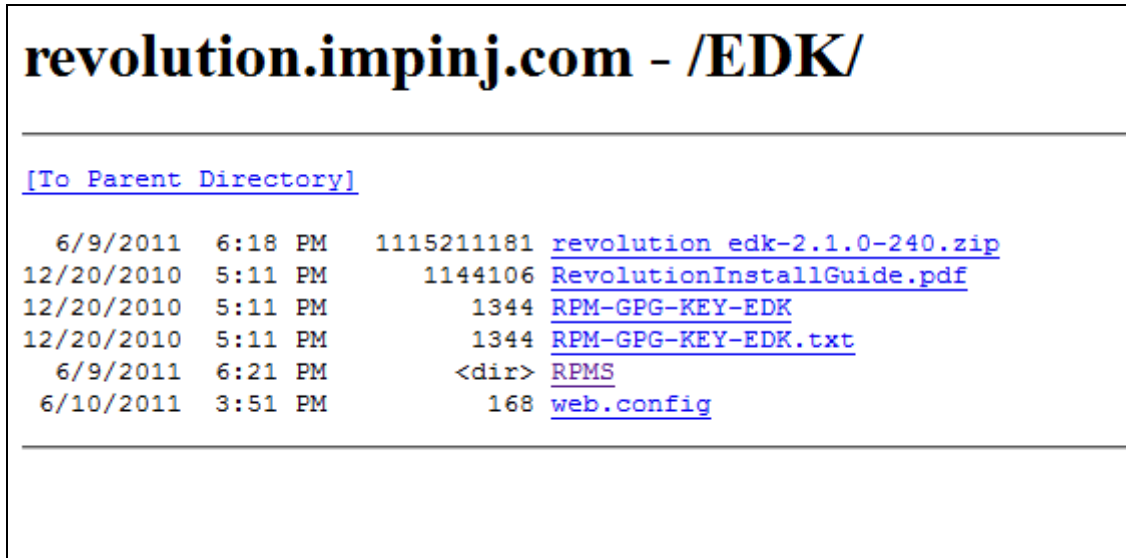
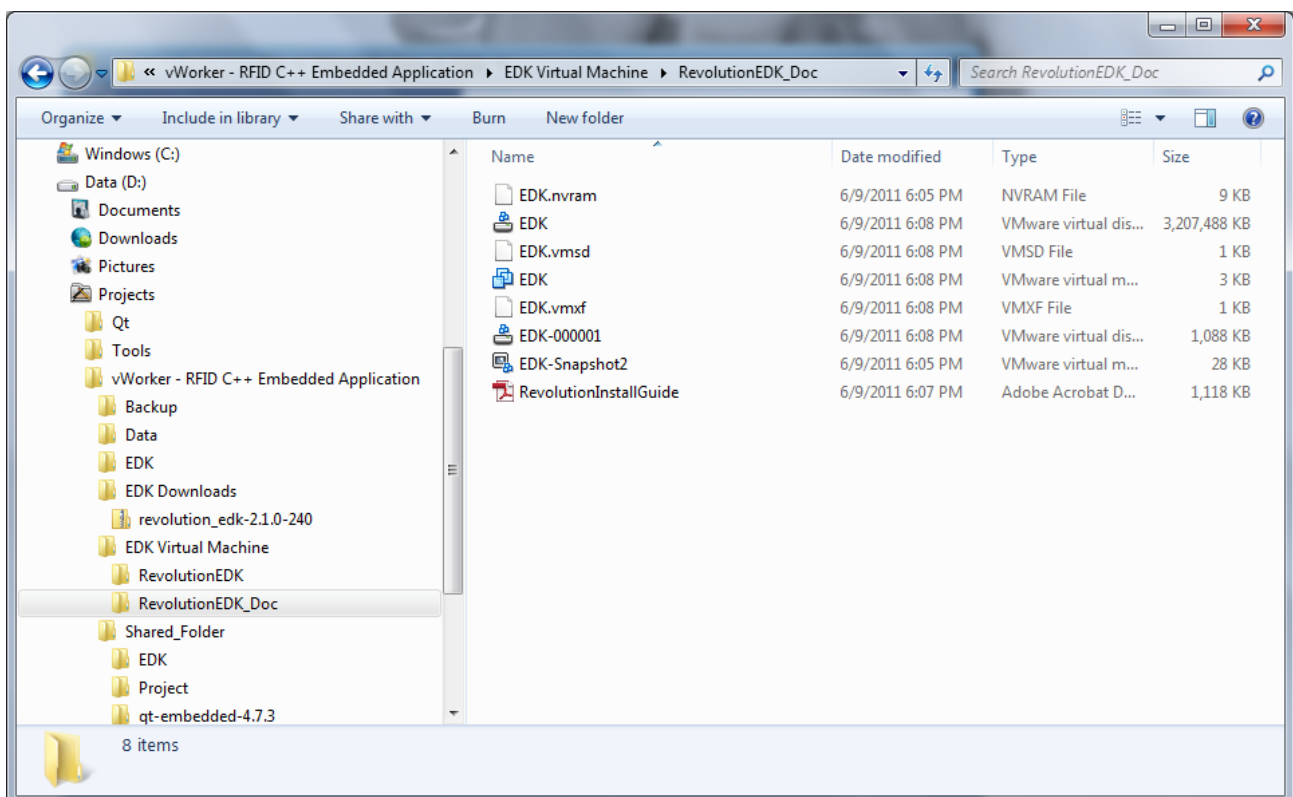


How to setup development environment for Impinj Readers, with Qt Framework in Windows 7

1. Download the Impinj development environment from: <http://revolution.impinj.com/EDK/>



2. Unzip the EDK to your local disk. In my case I used the following folder scheme:



3. Download and install the free VMWare Player from :
http://downloads.vmware.com/d/info/desktop_downloads/vmware_player/3_0

The screenshot shows the VMware Player download page. At the top, there's a navigation bar with links: Cloud Computing, Virtualization, Solutions, Products, Services, Support & Downloads, Partners, and Company. Below this, a breadcrumb trail reads 'Home > Downloads > VMware Player v3.0'. The main heading is 'Download VMware Player'. To the right, there's a search box labeled 'Search VMware Downloads' with a dropdown menu set to 'All Downloads' and a 'Search' button. Below the heading, there's a section 'Download VMware Player' with instructions to click the 'Download' link on one of the versions below. It also includes a 'Stay Informed' section with links to 'Release Notes' and 'VMware Usage Guidelines'. A 'Looking to promote VMware Player on your site?' section mentions accepting the 'VMware Usage Guidelines' to gain access to the VMware Player icon. Other versions of VMware Player are listed: 2.5, 2.0, 1.0. At the bottom, there's a table with columns: PRODUCT, VERSION, and RELEASE DATE. The table lists 'VMware Player 3.1.4' with a 'View History' link, version '3.1.4', and release date '2011/03/29'. A 'Download' button is next to the entry. To the right of the table, there's a 'Need Help Downloading?' link. The table is preceded by tabs: 'Product Downloads', 'Drivers & Tools', and 'Open Source'.

Cloud Computing Virtualization Solutions Products Services Support & Downloads Partners Company

Home > Downloads > VMware Player v3.0

Download VMware Player

Search VMware Downloads

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Download VMware Player

Click on the "Download" link on one of the versions below to gain access to your binaries.

Stay Informed

Be sure to read the [Release Notes](#) for each version prior to downloading.

Looking to promote VMware Player on your site?

Please read and accept the [VMware Usage Guidelines](#) to gain access to VMware Player icon.

Other versions of VMware Player: [2.5](#), [2.0](#), [1.0](#)

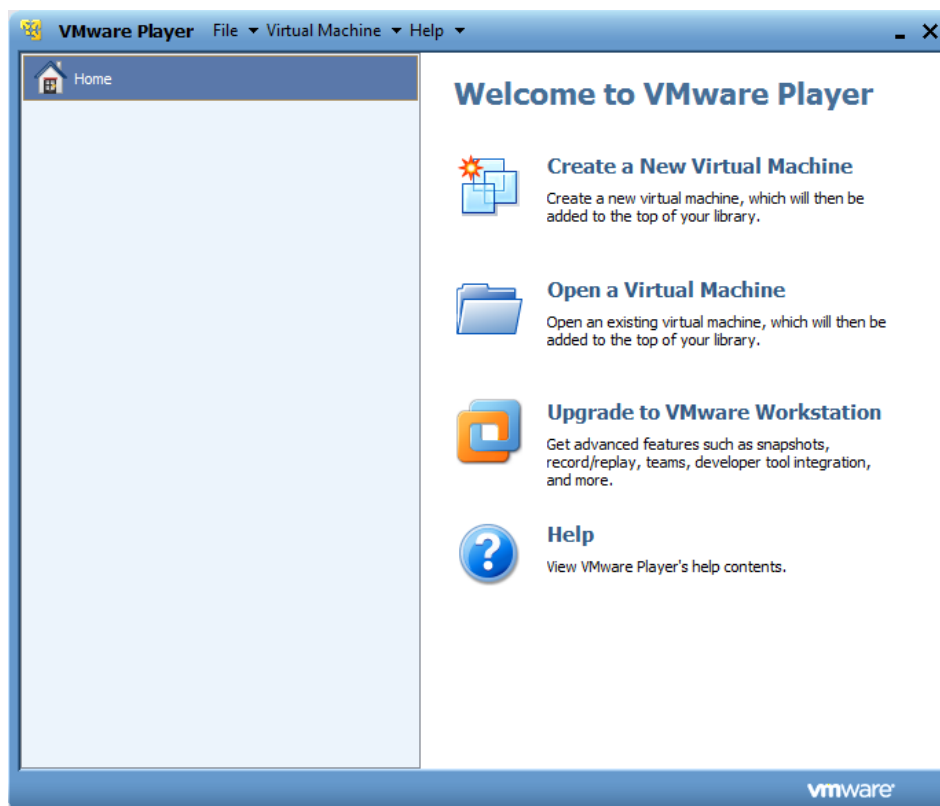
Product Downloads Drivers & Tools Open Source

Need Help Downloading?

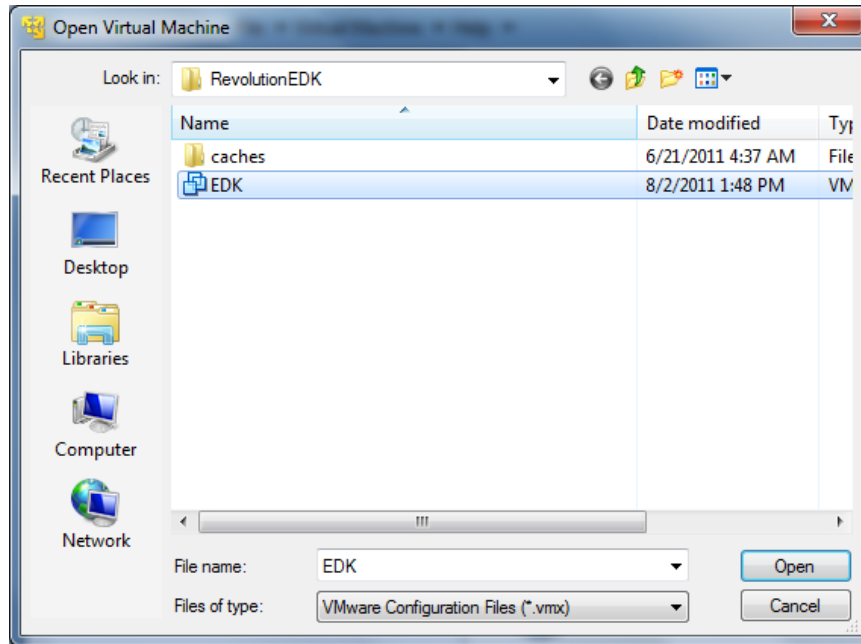
PRODUCT	VERSION	RELEASE DATE
VMware Player 3.1.4	View History	3.1.4
		2011/03/29

Download

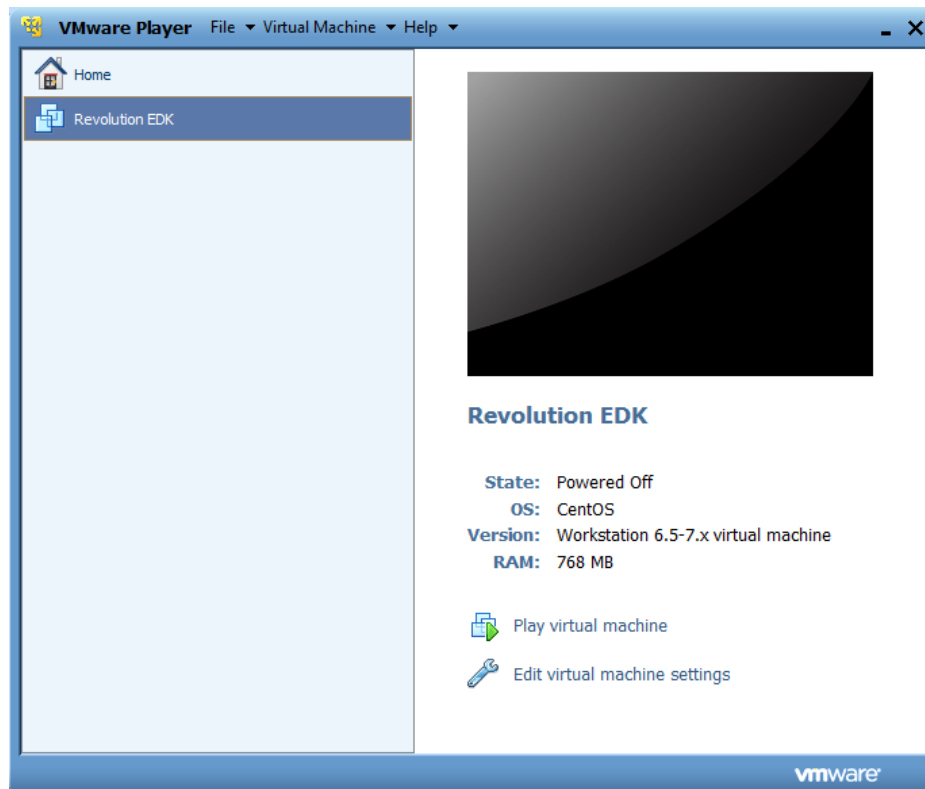
4. Now its time to configure and play the virtual machine. Run your installation of VMWare Player.



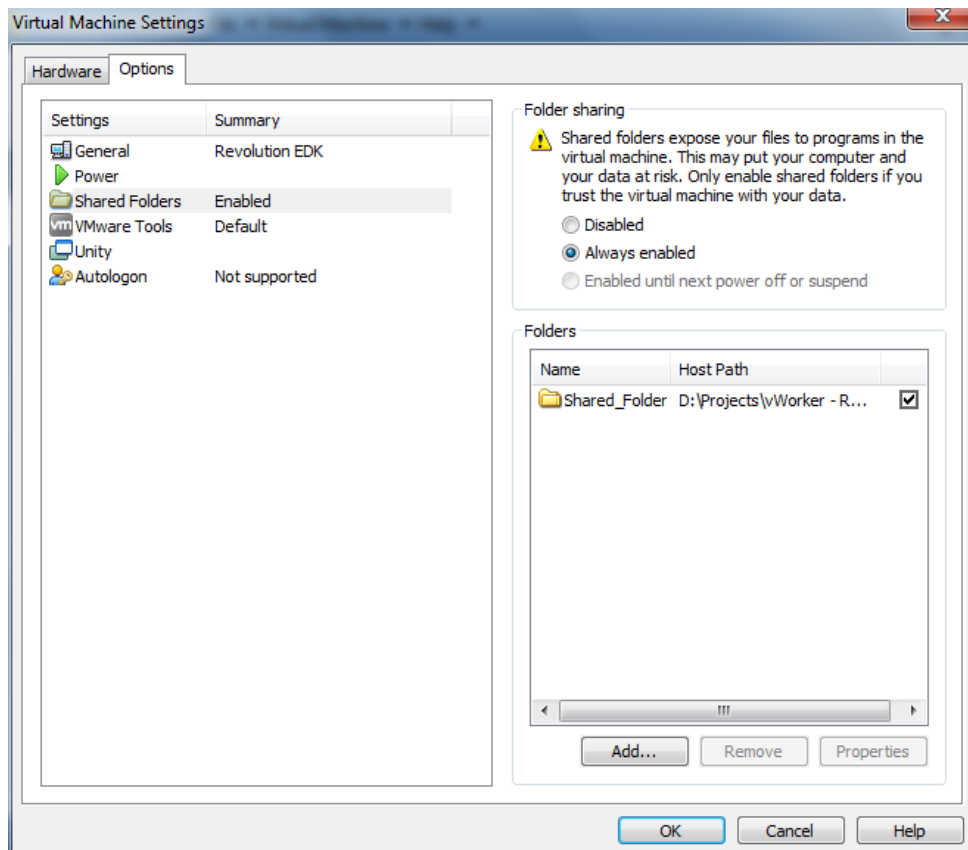
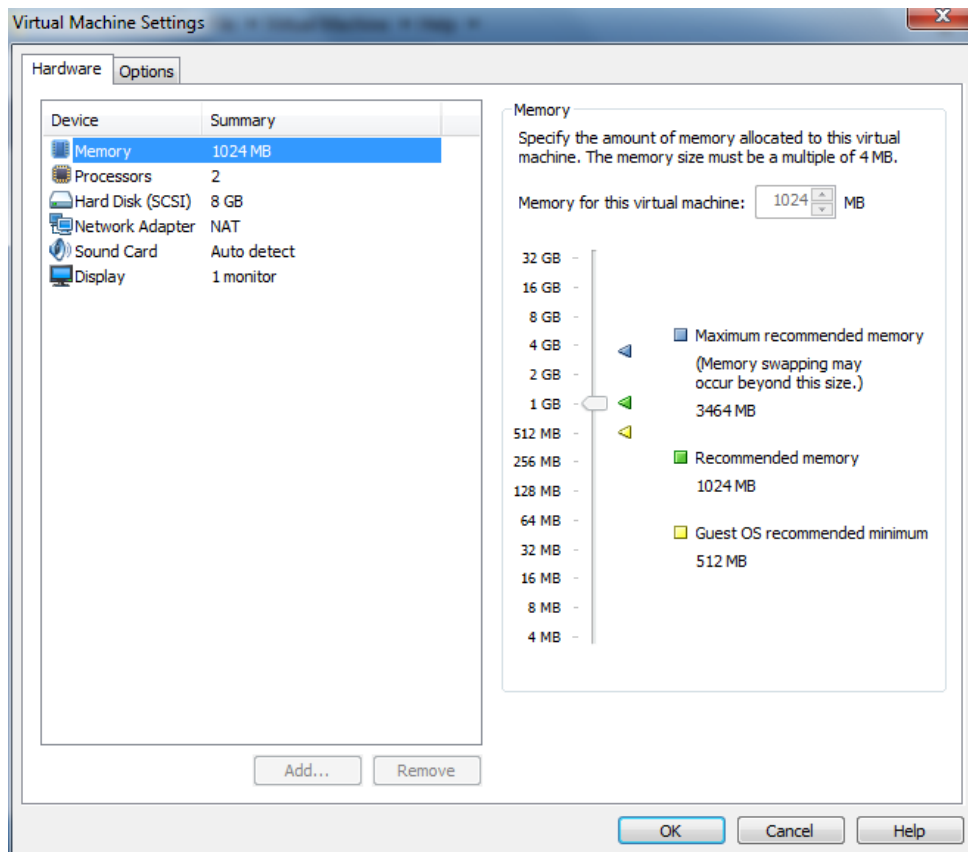
5. From menu select File > Open Virtual Machine. And select your virtual machine in the same folder you unzipped before.



6. After selecting Open, the virtual machine will be added to the library.



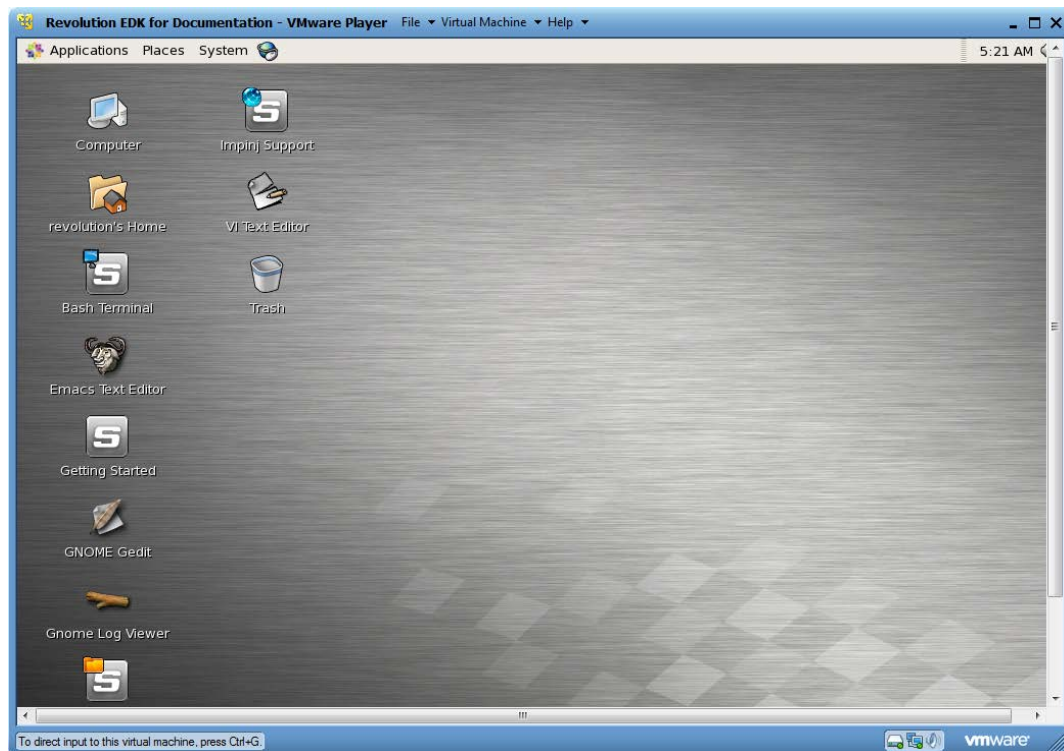
7. Now go to 'Edit Virtual Machine Settings', and set variables as follows.



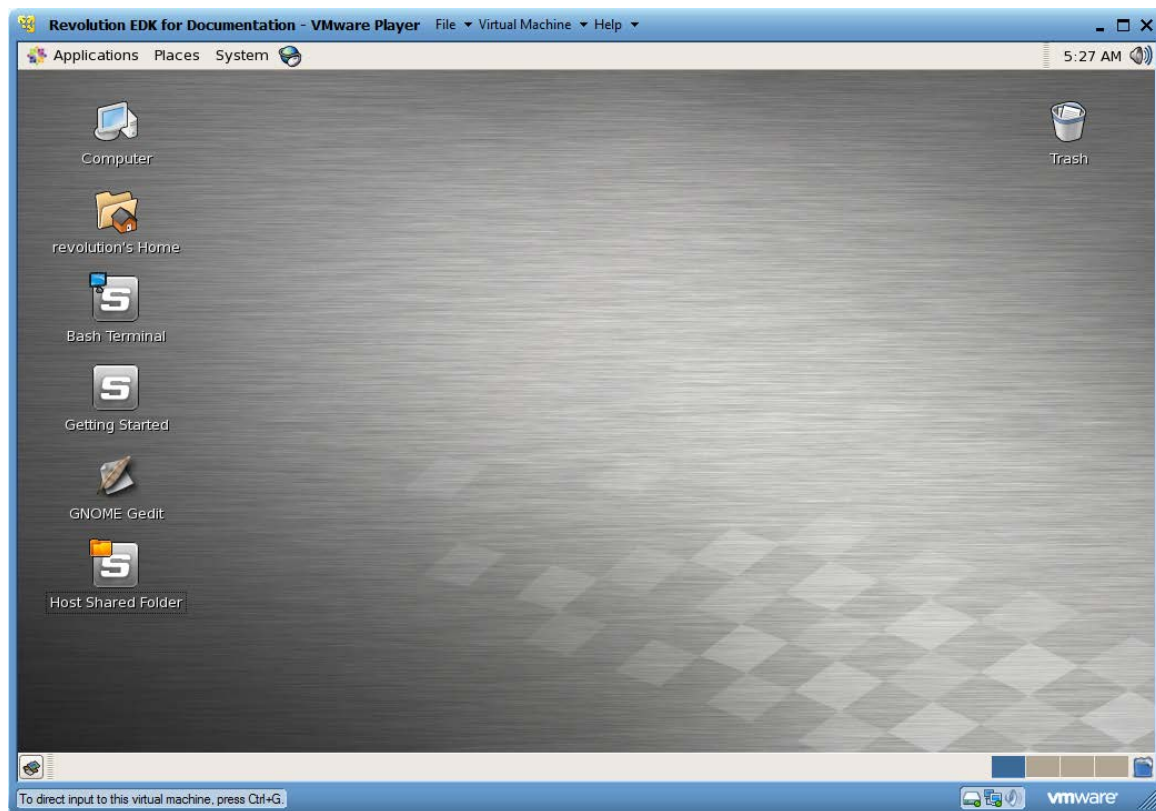
8. Press Ok and return to the main window. Now press 'Play virtual machine'. The virtual machine will start booting up. Wait until you get the following screen.



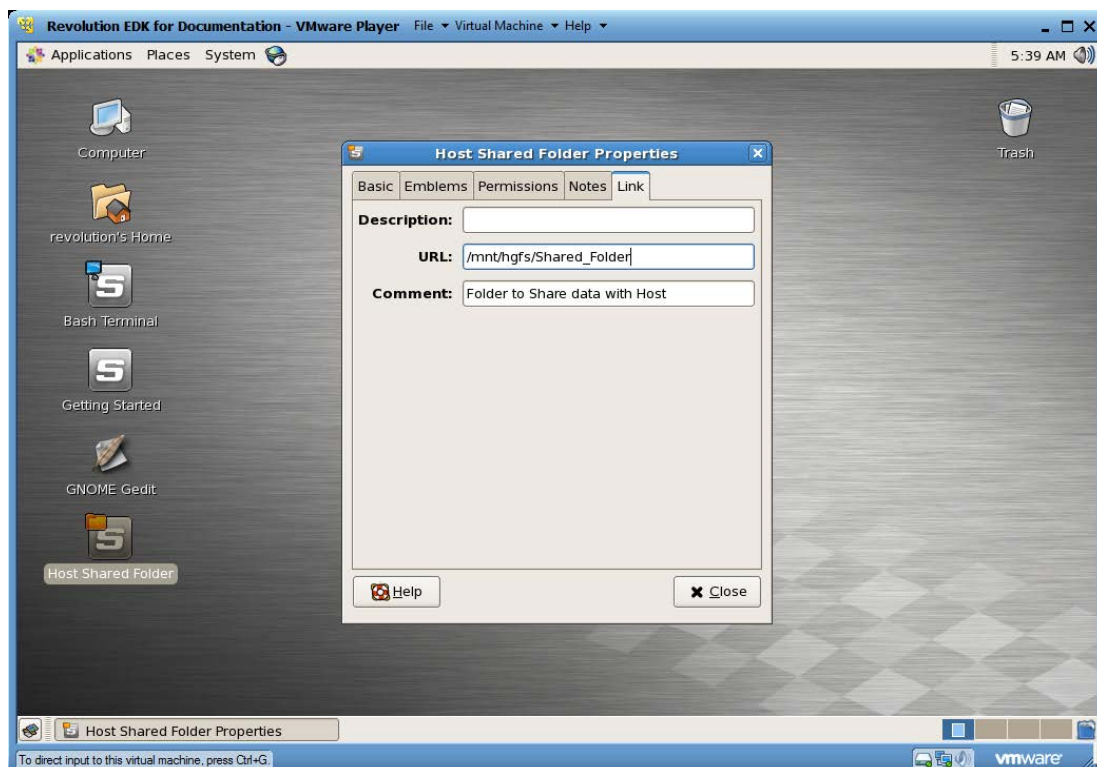
9. Enter username "**revolution**", and proceed to the main screen.



10. Now we will configure the environment inside the virtual machine. For starters, you can have a look at basic documentation by clicking the icon named 'Getting Started'. We will get rid of some irrelevant icons from the desktop.



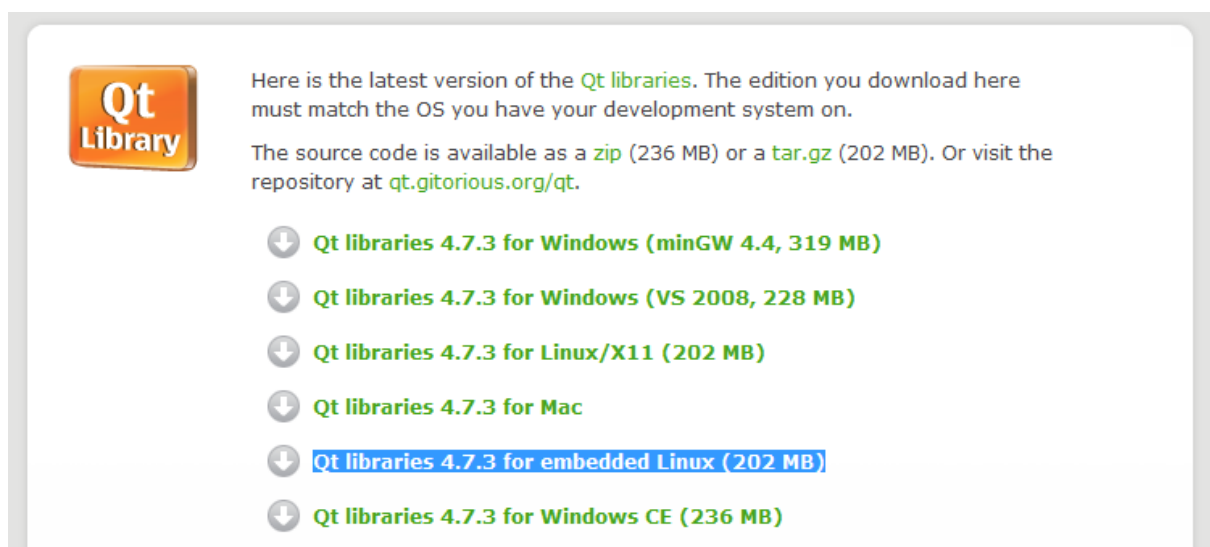
11. Now edit the Host Shared Folder icon, and change its properties to reflect the correct shared folder path.



Double click the icon afterwards to check that it opens the folder without giving errors. We will need this folder a lot during the course of development.

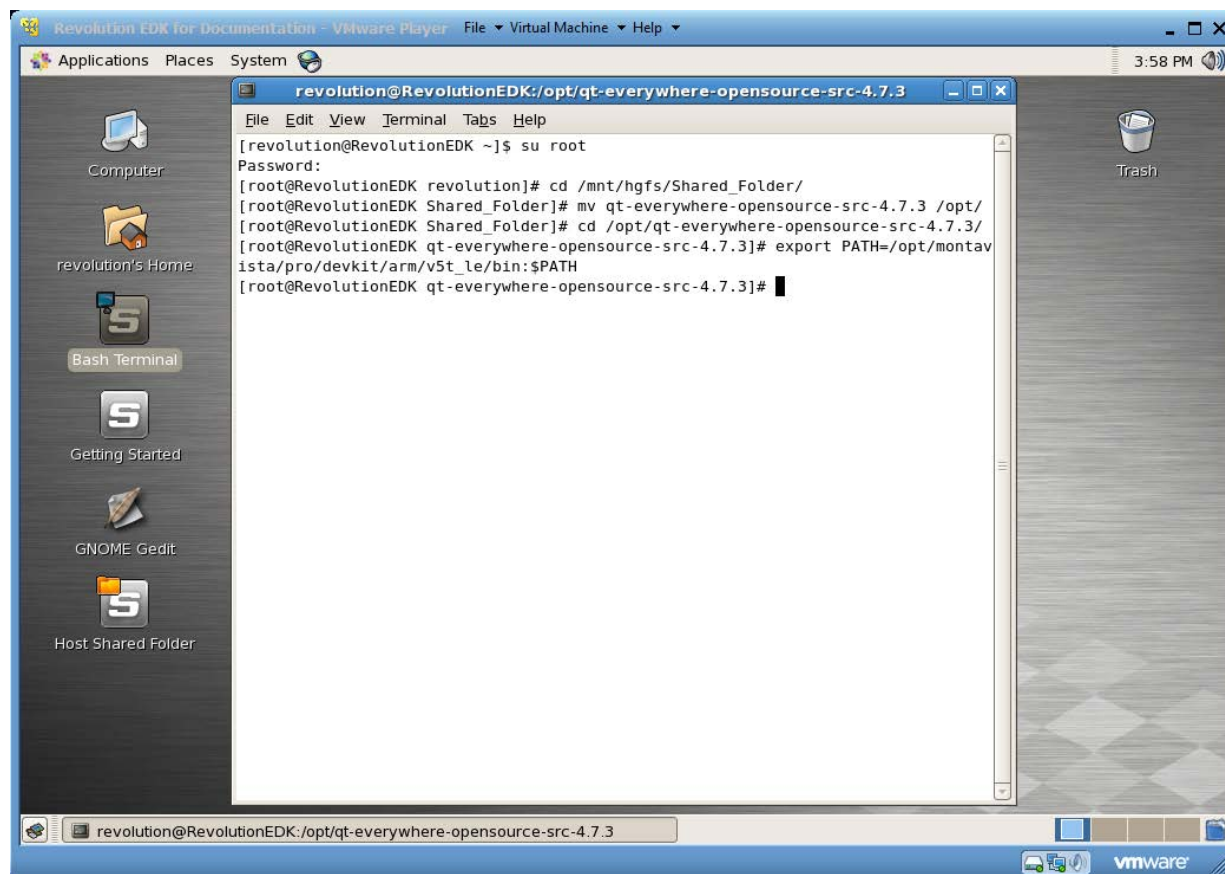
12. Since I decided to use a framework to develop the project, so that a lot of convenience classes are available for easy development. For that I selected my favorite Qt framework, now owned by Nokia. Go to the following link in the host and download the “[Qt libraries 4.7.3 for embedded Linux \(202 MB\)](http://qt.nokia.com/downloads)”

<http://qt.nokia.com/downloads>

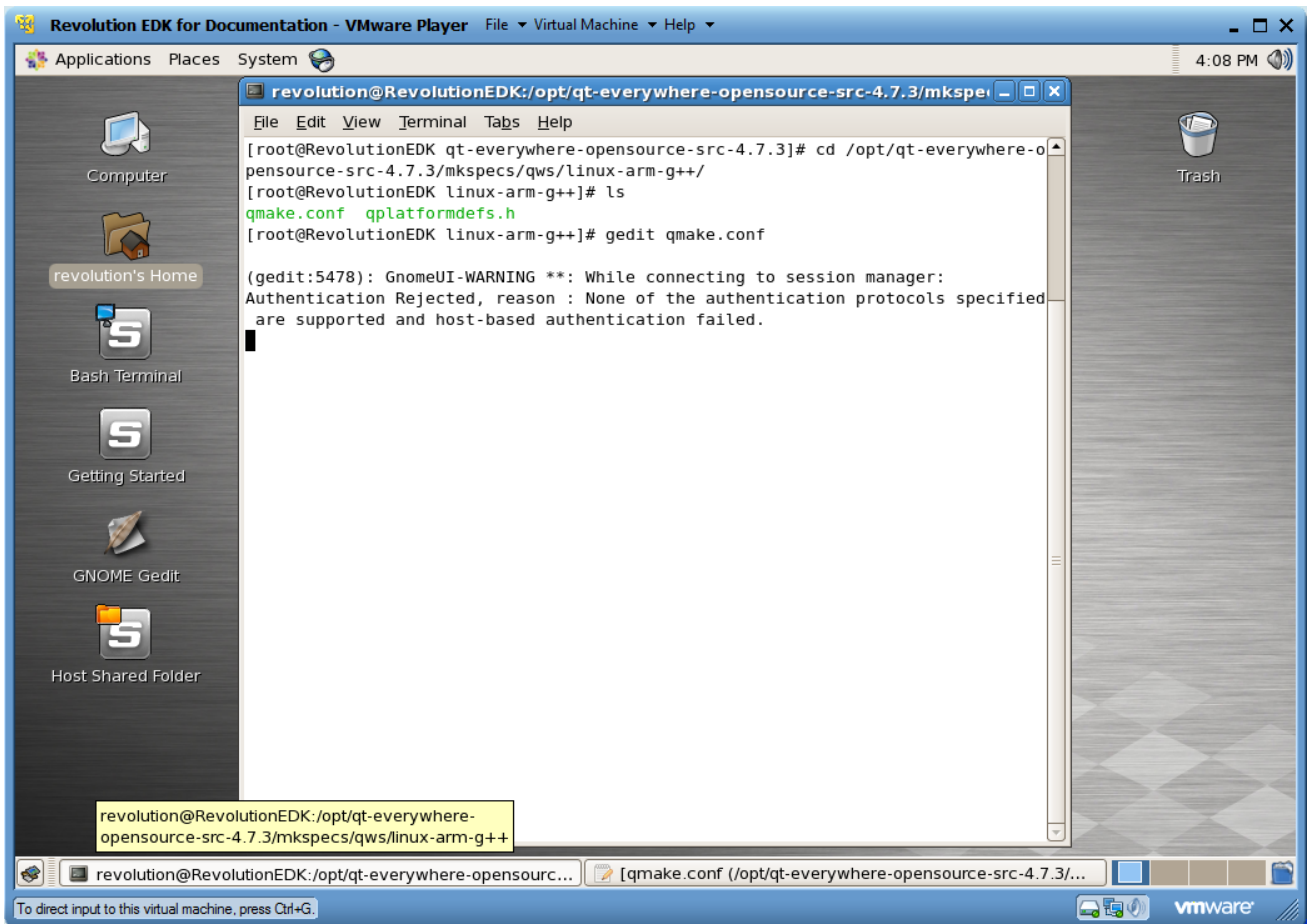


Unzip the downloaded archive to the Shared_Folder using 7Zip utility or your favorite archive handling program. Extraction can take a while so please be patient.

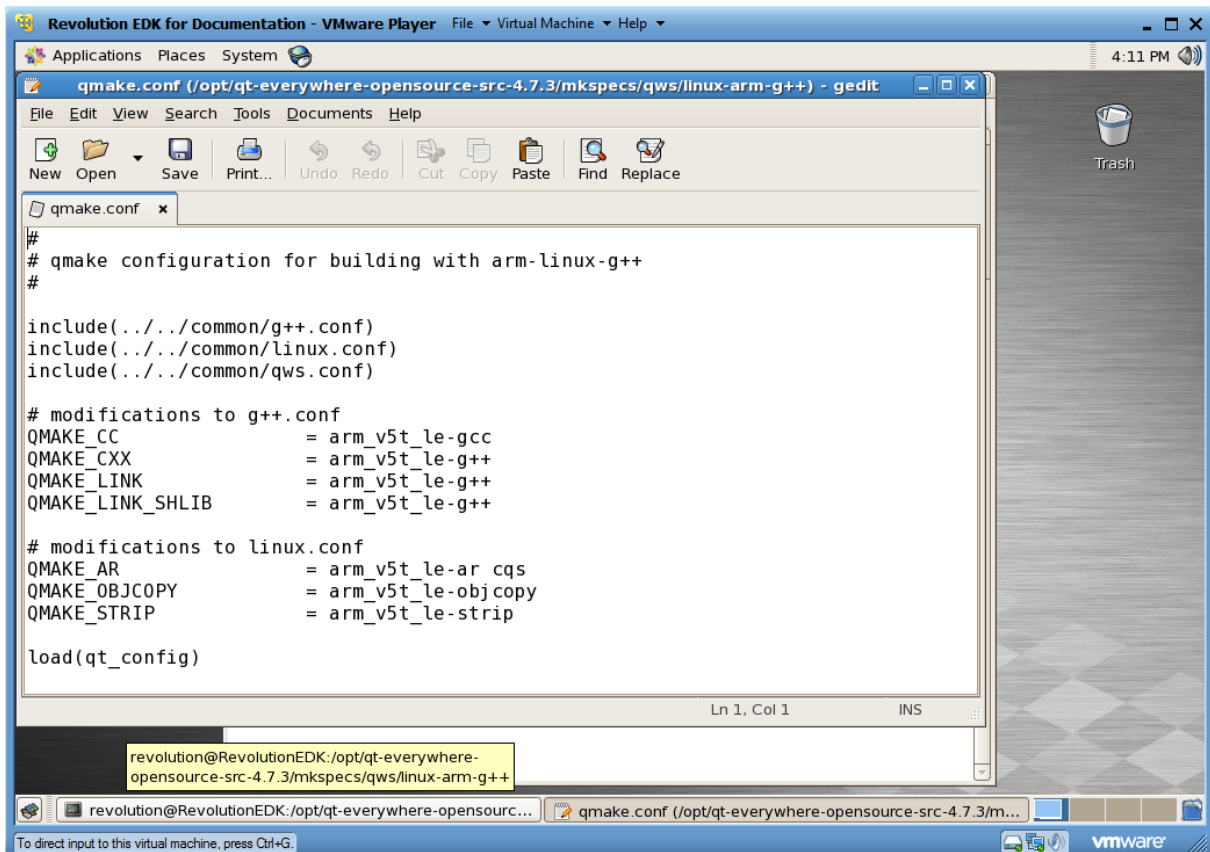
13. Now go to the virtual machine and open a Bash Terminal, and issue following commands on the command line. Root password is 'edk'.



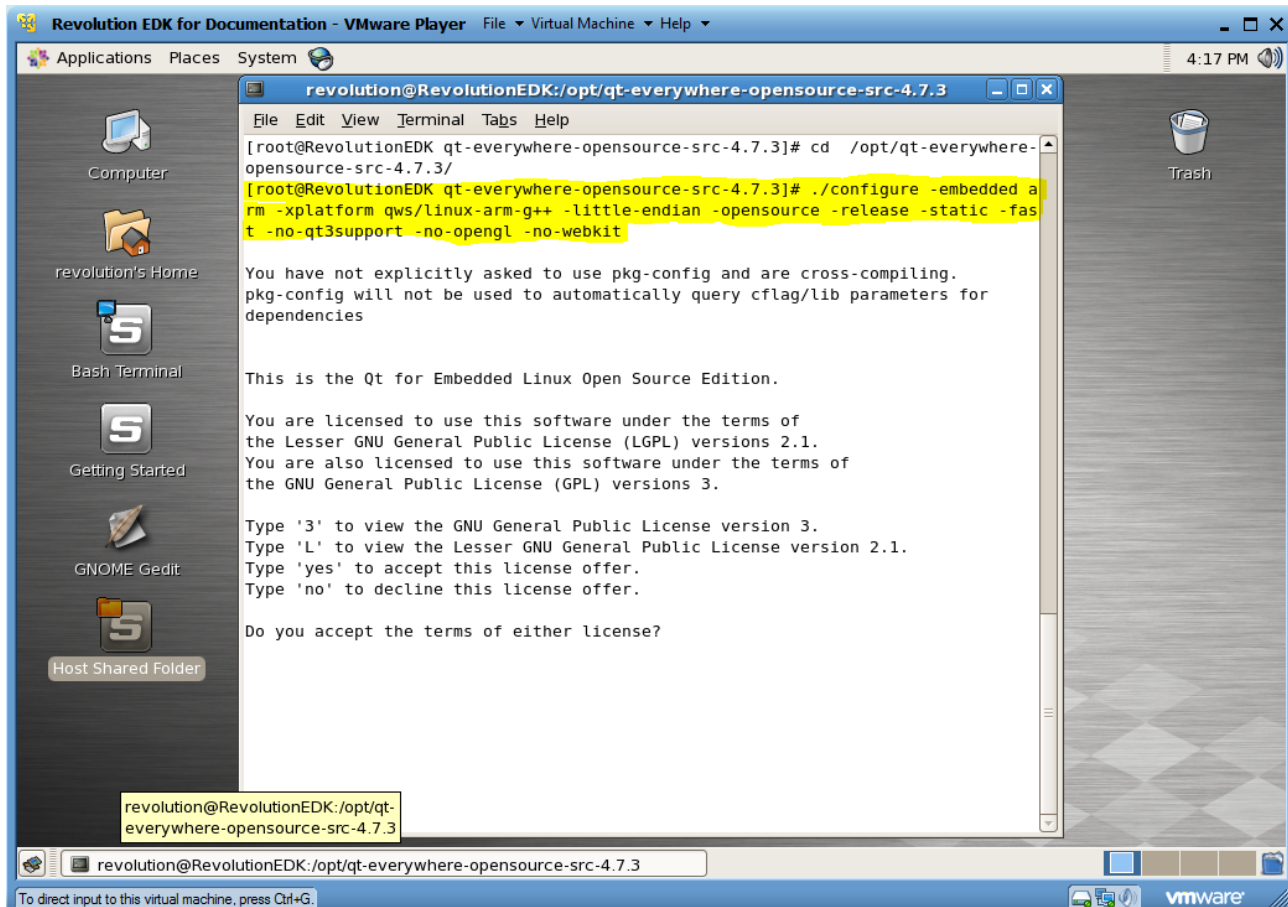
14. Then use following commands.



15. This will open a gedit session where we will change the names of variables to as follows.



16. Press Save and exit the gedit session. Now we are ready to cross-compile the Qt framework for our impinj speedway hardware. Now on the Bash terminal issue the following command.



```
revolution@RevolutionEDK:/opt/qt-everywhere-opensource-src-4.7.3
File Edit View Terminal Tabs Help
[root@RevolutionEDK qt-everywhere-opensource-src-4.7.3]# cd /opt/qt-everywhere-opensource-src-4.7.3/
[root@RevolutionEDK qt-everywhere-opensource-src-4.7.3]# ./configure -embedded arm -xplatform qws/linux-arm-g++ -little-endian -opensource -release -static -fast -no-qt3support -no-opengl -no-webkit

You have not explicitly asked to use pkg-config and are cross-compiling.
pkg-config will not be used to automatically query cflag/lib parameters for
dependencies

This is the Qt for Embedded Linux Open Source Edition.

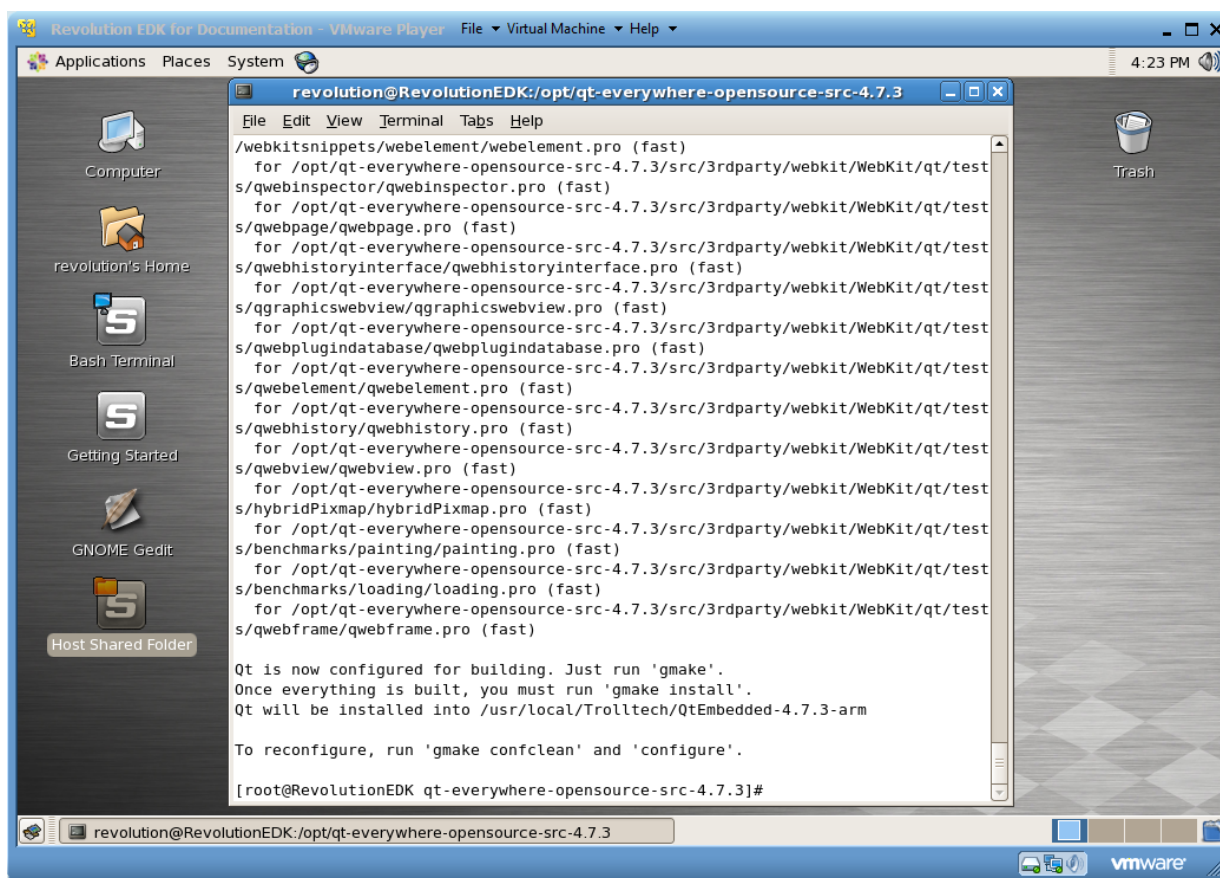
You are licensed to use this software under the terms of
the Lesser GNU General Public License (LGPL) versions 2.1.
You are also licensed to use this software under the terms of
the GNU General Public License (GPL) versions 3.

Type '3' to view the GNU General Public License version 3.
Type 'L' to view the Lesser GNU General Public License version 2.1.
Type 'yes' to accept this license offer.
Type 'no' to decline this license offer.

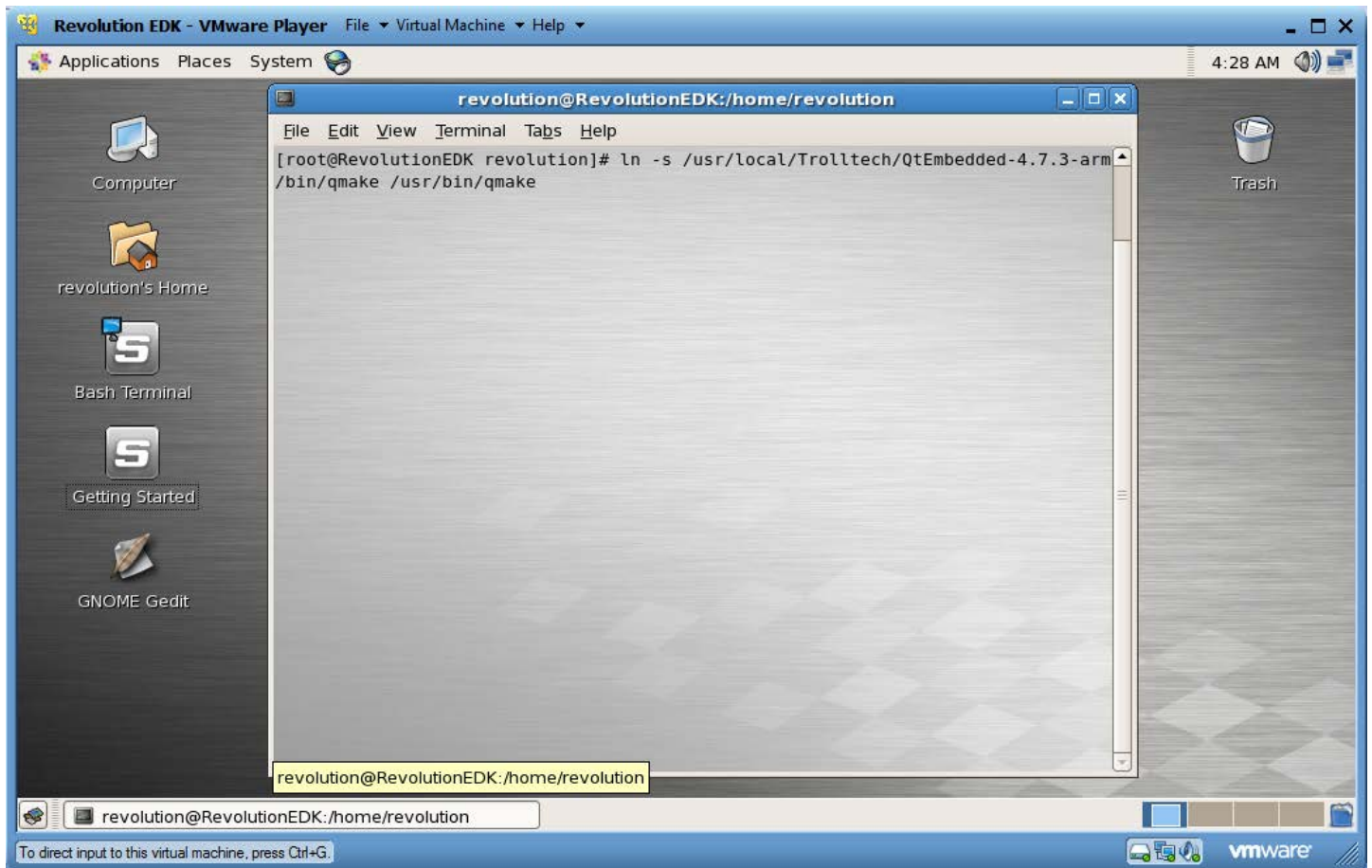
Do you accept the terms of either license?
```

The yellow highlighted command is very important and should be typed carefully with no errors.

17. Type 'yes' and press enter. Now please be patient and wait for the process to finish. The process will modify make files for the entire Qt framework source. At the end of the process, the screen should look like this.

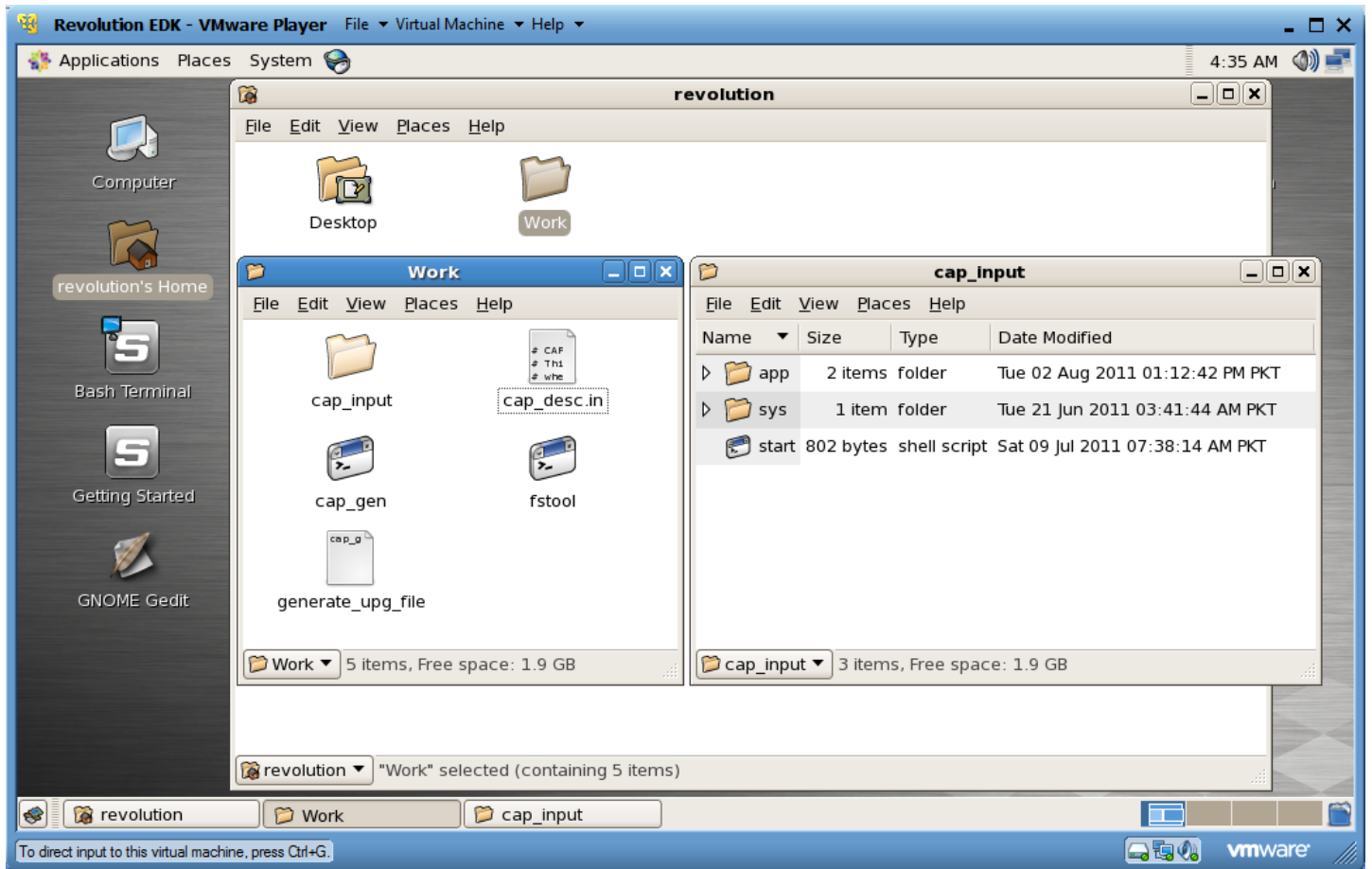


18. Follow the on-screen instructions, and issue '**gmake**' and '**gmake install**' commands. These two commands will take a long time to process. When the process is clean run the following command.



If it says, file exists, then its ok. We only wanted to make sure if for some reason the symbolic link wasn't created, then it should be present.

19. Now we will create our working folders. Open Revolution's Home from desktop icon and create folders as shown below.



20. In the Work folder, create a file (right click -> Create Document -> Empty File). Rename it to cap_desc.in. Double click to edit the file and copy paste the following lines into it. Then save and exit the editor.

CAP Description File

This file contains the settings used by the CAP generation tool

when a CAP partition upgrade file is produced.

[Description]

Version is a 4 part number in decimal with each part limited to

0-255. It is the version of the CAP to be generated.

Version = 0.3.0.0

Valid Reader Hardware is a 3 part number in decimal representing

the reader model and major/minor revisions on which the CAP may be

loaded. Each field may be replaced by a '*' to mean 'all'.

#

Format = aaa-bbb-ccc

aaa - Model number

bbb - Major revision

ccc - Minor revision

Valid Reader Hardware = *-*-*

File System Layout is an value used by the reader to determine how

the CAP partition should be loaded to flash. Currently the only

supported layout version is 10.

File System Layout = 10

Input Directory is the top-level directory of the filesystem to

create. The files under this directory will be available on the

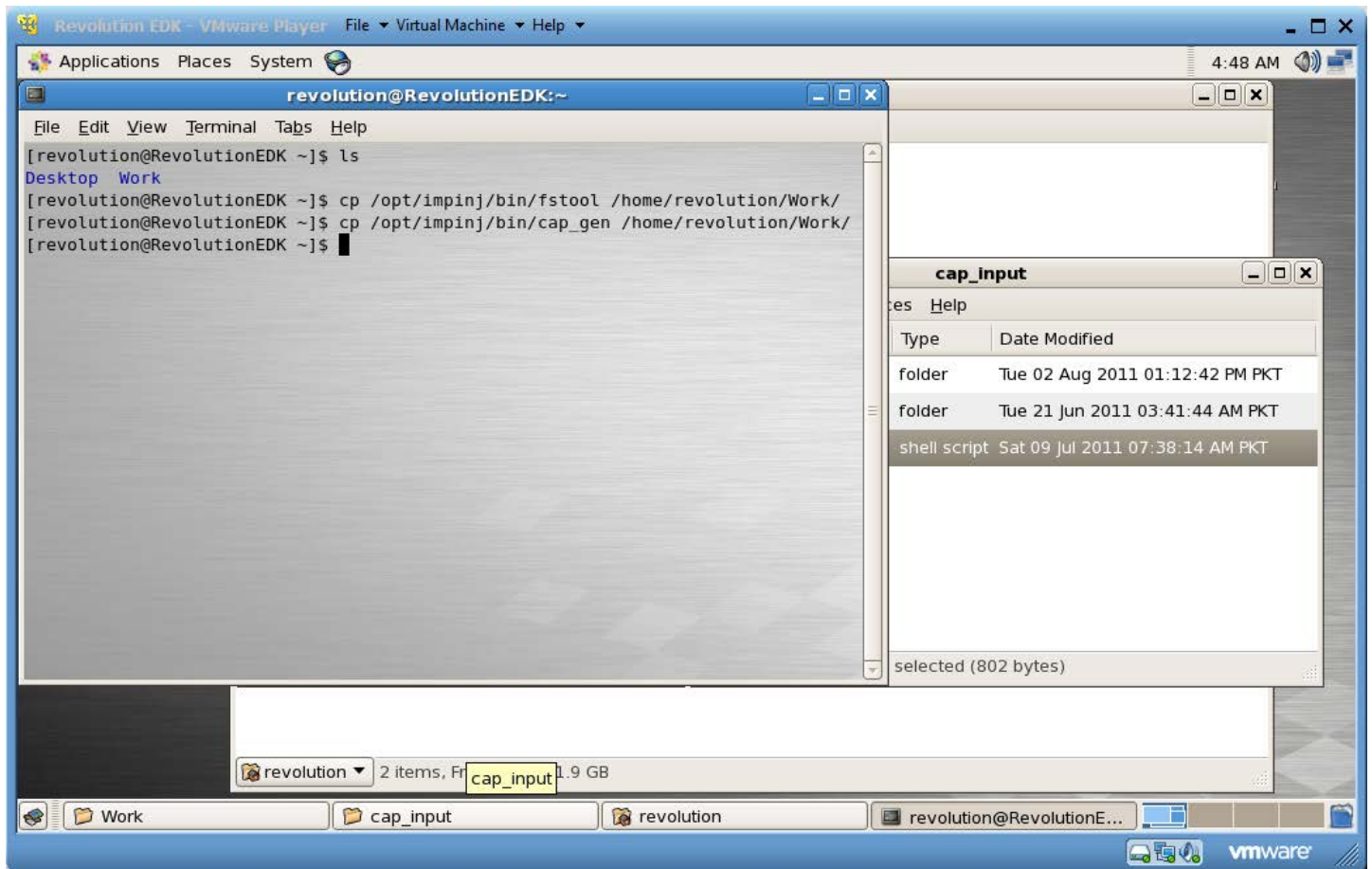
reader under /cust after the CAP is loaded.

Input Directory = /home/revolution/Work/cap_input

21. Now create another file and rename it to generate_upg_file. Double click to edit it and add the following line to it.

cap_gen -d cap_desc.in -o cap.upg

22. Now do the following on the command line.



Now your work directory is complete.

23. Now in the cap_input directory create a file named "start" and add the following script into it.

```
#!/bin/sh
```

```
# Configure NTP time sync
```

```
echo -e "server time.datasport.com\r" > /etc/ntp.conf
```

```
# Modify TCP parameters
```

```
echo 10 > /proc/sys/net/ipv4/tcp_keepalive_time
```

```
echo 5 > /proc/sys/net/ipv4/tcp_keepalive_intvl
```

```
echo 3 > /proc/sys/net/ipv4/tcp_keepalive_probes
```

```
# Preparartion for a dirty way to detect USB storage disconnections
```

```
#umount /mnt/usbfs/usbsda1
```

```
#mkdir /mnt/usbfs/usbsda1/UsbNotPresent
```

```
#mount /dev/sda1 /mnt/usbfs/usbsda1
```

```
# Wait until the network is both connected and we have a DNS server
```

```
# if we are
```

```
while true; do
```

```
netconf | grep -q "connectionStatus='Connected'"
```

```
if [ $? = 0 ]
```

```
then
```

```
netconf | grep -q "ipAddressMode='Static'"
```

```
if [ $? = 0 ]
```

```
then
```

```
#don't wait around for a dns server. It won't come
```

```
break;
```

```
else
```

```
dnsconf | grep -q Server
```

```
if [ $? = 0 ]
```

```
then
```

```
break;
```

```
fi
```

```
fi
```

```
fi
```

```
sleep 1
```

```
done
```

```
#if LLA is enabled, wait until mDNSd starts and reset syslog
```

```
netconf | grep -q "LLAStatus='enabled'"
```

```
if [ $? = 0 ]
```

```
then
```

```
while [ ! -f "/var/run/mdnsd.pid" ]
```

```
do
```

```
sleep 1;
```

```
done
```

```
while [ ! -f "/var/run/syslogd.pid" ]
```

```
do
```

```
sleep 1;
```

```
done
```

```
kill -9 `cat /var/run/syslogd.pid`  
sleep 2  
/sbin/syslogd -m 0 &  
sleep 2  
fi
```

```
# For firmware 4.6.2.240, start ntpd manually  
/usr/sbin/ntpd
```

```
(( count = 1 ))
```

```
while true ; do  
    if [ -f /cust/app/DataOne ] ; then  
        if [ -x /cust/app/DataOne ] ; then  
            /cust/app/DataOne  
            /usr/bin/logger -p user.notice \  
            "Restarting DataOne, count $count."  
            echo -e "Restarting DataOne, count $count." >>  
            /mnt/usbfs/usbsda1/log/log.txt  
            (( count = count + 1 ))  
        fi  
        sleep 3  
    else  
        exit 0  
    fi  
done
```

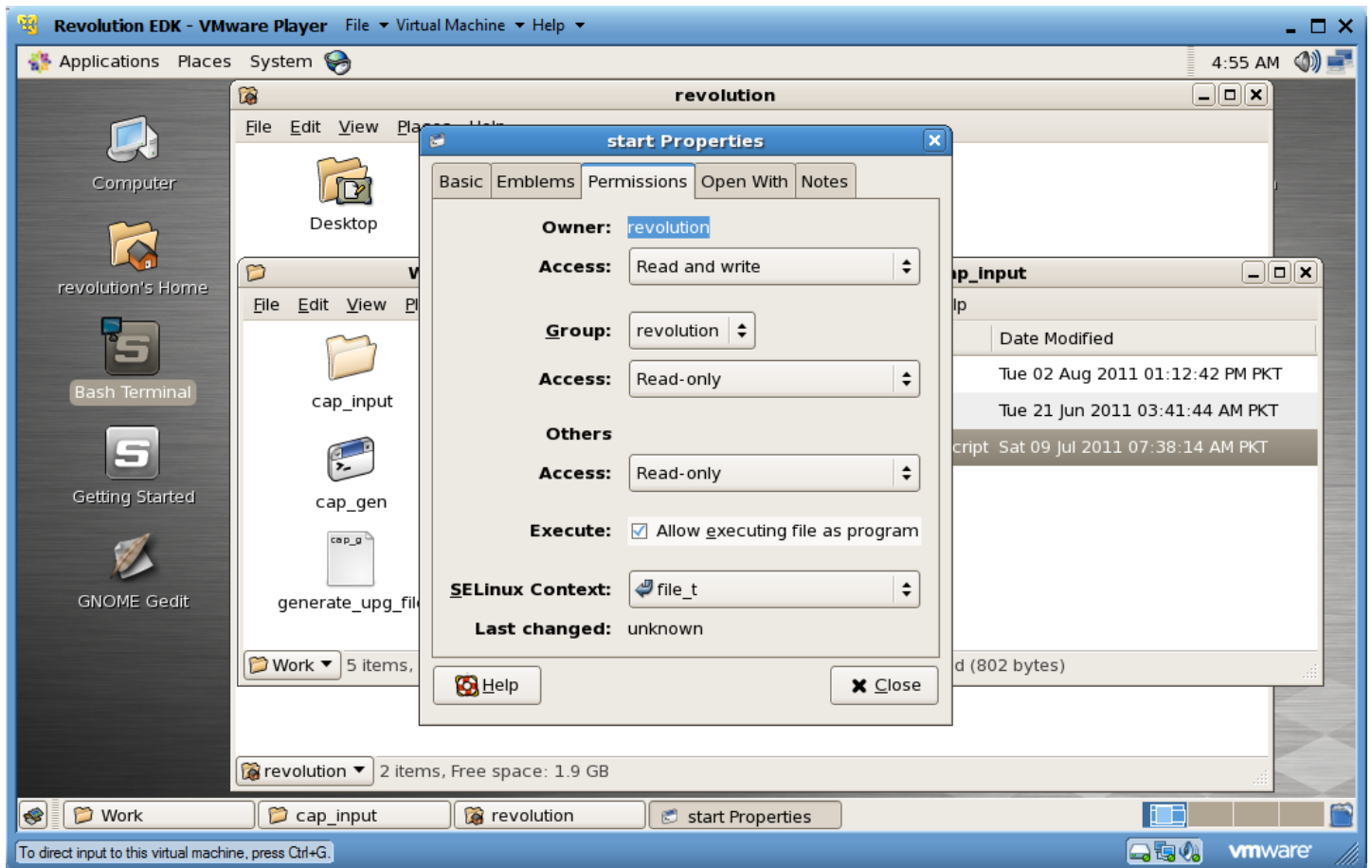
24. Now in the sys folder, create a file named “reader.conf” and add the following lines into it.

```
[rshell]  
password=developer
```

```
[SoftwareFeatures]  
StartFTP=yes
```

25. The remaining app folder is where we will copy our DataOne application and its config files before generating the cap.upg file.

26. Do not forget to change permissions for the start and generate_upg_file files that we just created. Right Click -> Properties -> Permissions -> Allow executing file as a program (set it to checked)

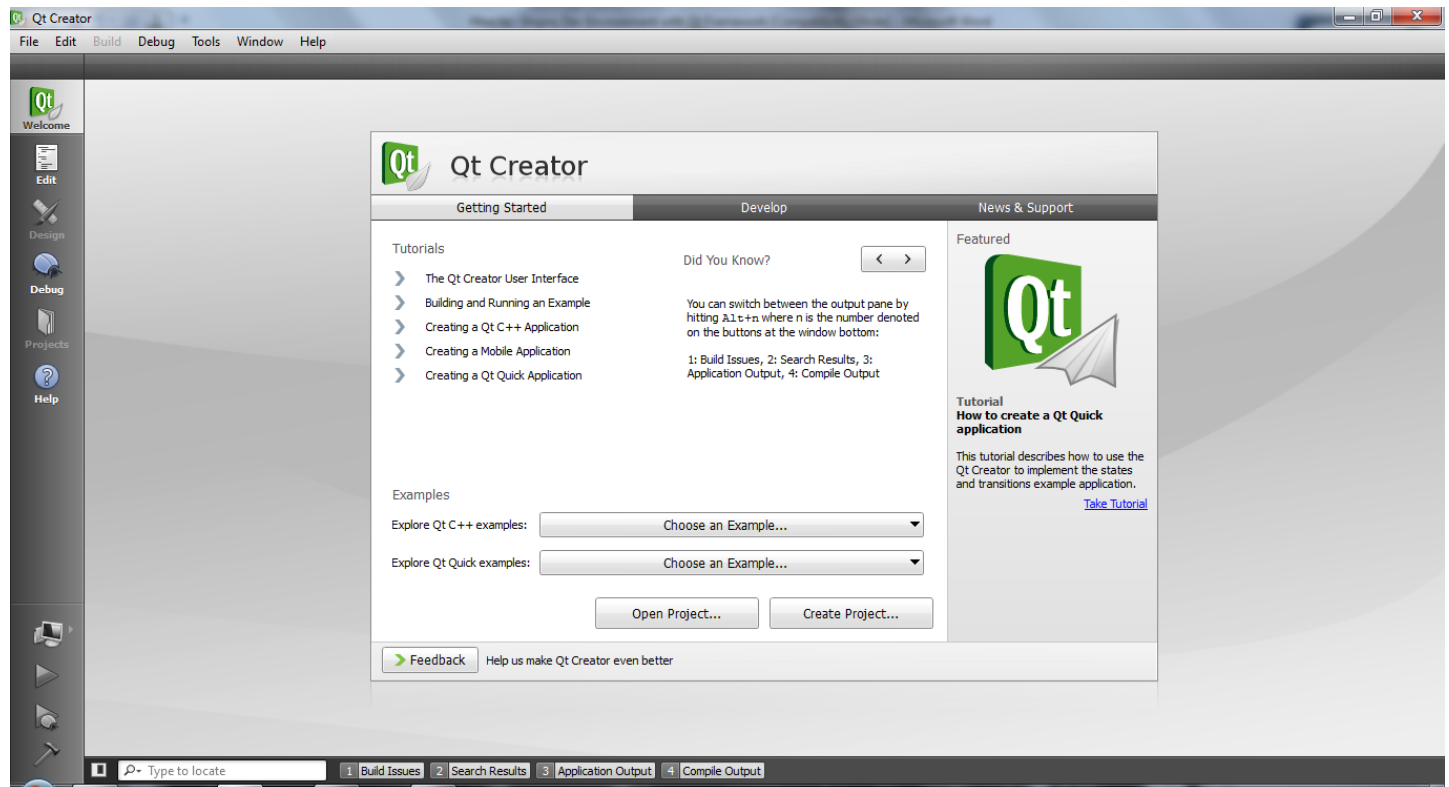


27. Now we need a god quality source code editor. We could use the Emacs, VI or Gedit inside the virtual machine, but they are so primitive and only provide basic functionality. Therefore I decided to use Qt's own native editor called Qt Creator. I tried to recompile it from source for our virtual machine's environment, but I found that it is not compatible with certain OS libraries of this version of CentOS. So, I decided to use the editor on windows and share the source with the virtual machine through shared_folder.

28. Extract the source code package to the disk, and if you are using the same folder architecture as mine, you should see the folders EDK and Project in the Shared_Folder.

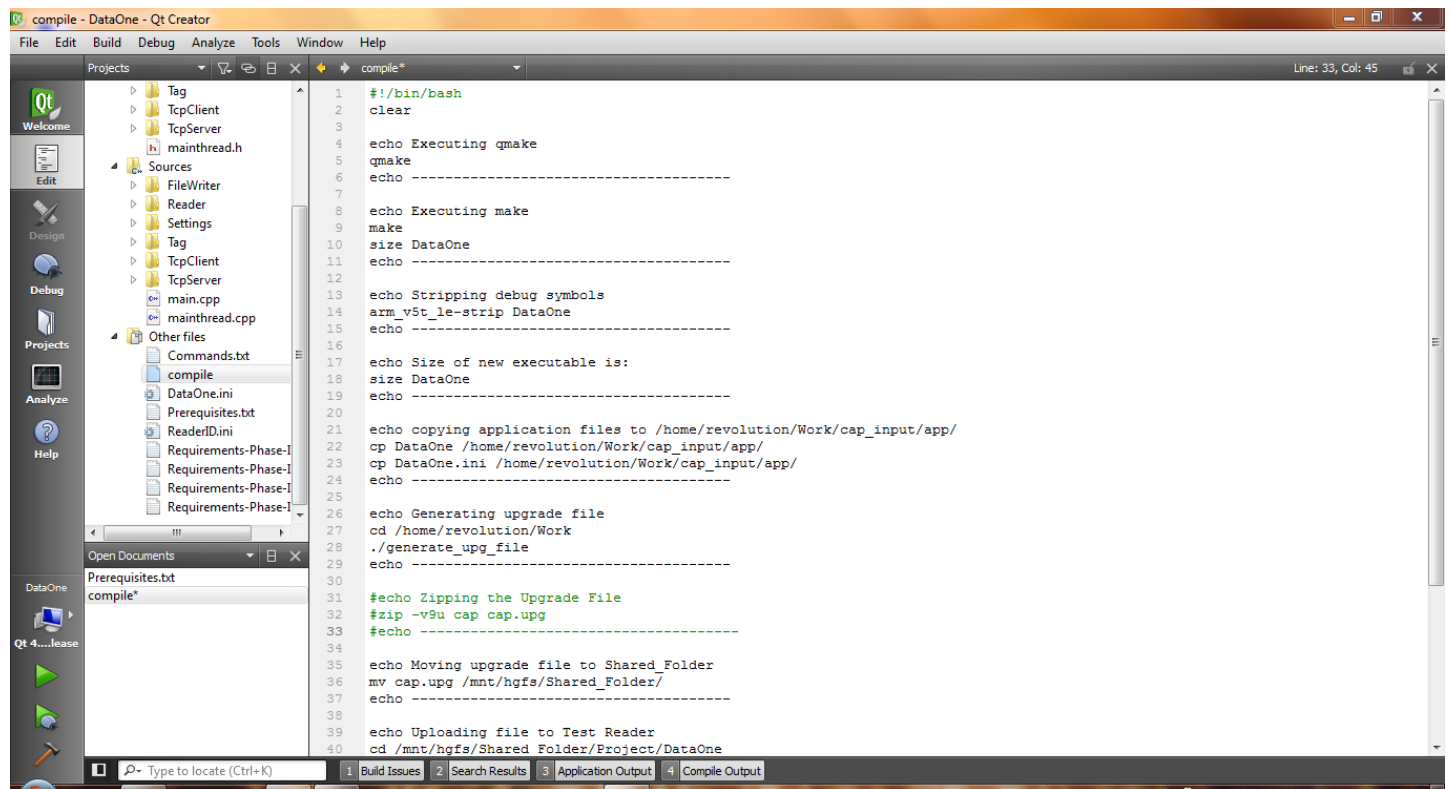
29. Download and install Qt SDK from <http://qt.nokia.com>. Complete SDK is of considerable size, but installing SDK is better than manually linking the libraries and sources from different locations.

30. After the installation is complete, run the QtCreator from Start Menu -> All Programs -> Qt SDK. Qt Creator looks like this.



31. Click on the Open Project button and navigate to `..\Shared_Folder\Project\Speedway_Application_Qt\Speedway` for opening our application project. If at first opening, the Qt creator says that it has found user configuration from some other machine, then select NO. It will create new environment settings according to your machine. But actually they have no effect on our project as we are not using those settings.

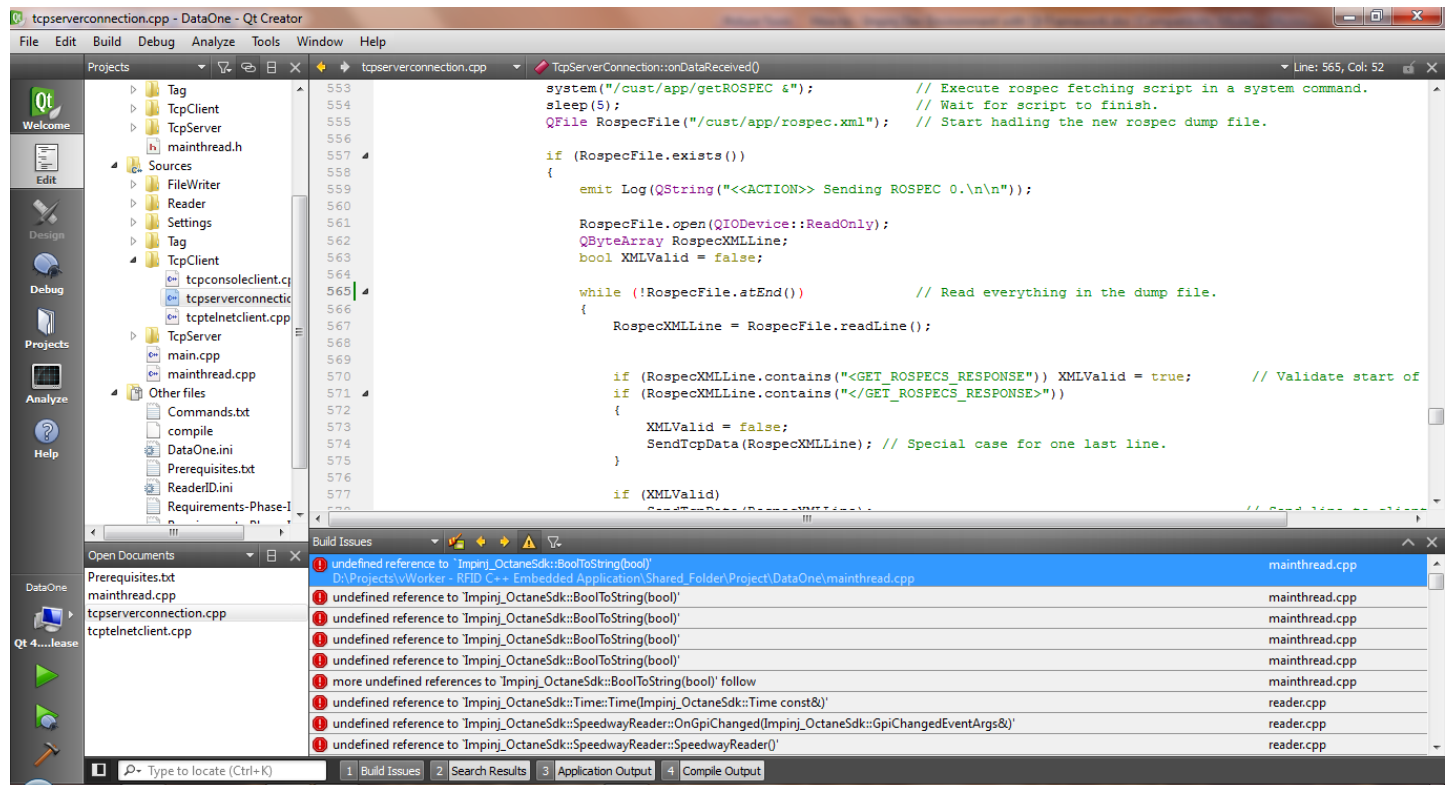
32. Now you can edit the source code and associated files. I have created a script file for automating the compile and generating the upgrade file as follows. This script will be executed from terminal inside EDK virtual machine.



The screenshot shows the Qt Creator IDE with a project named 'DataOne'. The 'Projects' pane on the left shows the project structure, including 'Sources' (mainthread.h, FileWriter, Reader, Settings, Tag, TcpClient, TcpServer, main.cpp, mainthread.cpp) and 'Other files' (Commands.txt, compile, DataOne.ini, Prerequisites.txt, ReaderD.ini, Requirements-Phase-I, Requirements-Phase-I, Requirements-Phase-I). The 'compile*' script is open in the editor, showing the following commands:

```
1  #!/bin/bash
2  clear
3
4  echo Executing qmake
5  qmake
6  echo -----
7
8  echo Executing make
9  make
10 size DataOne
11 echo -----
12
13 echo Stripping debug symbols
14 arm_vSt_le-strip DataOne
15 echo -----
16
17 echo Size of new executable is:
18 size DataOne
19 echo -----
20
21 echo copying application files to /home/revolution/Work/cap_input/app/
22 cp DataOne /home/revolution/Work/cap_input/app/
23 cp DataOne.ini /home/revolution/Work/cap_input/app/
24 echo -----
25
26 echo Generating upgrade file
27 cd /home/revolution/Work
28 ./generate_upg_file
29 echo -----
30
31 #echo Zipping the Upgrade File
32 #zip -v9u cap cap.upg
33 #echo -----
34
35 echo Moving upgrade file to Shared_Folder
36 mv cap.upg /mnt/hgfs/Shared_Folder/
37 echo -----
38
39 echo Uploading file to Test Reader
40 cd /mnt/hgfs/Shared_Folder/Project/DataOne
```

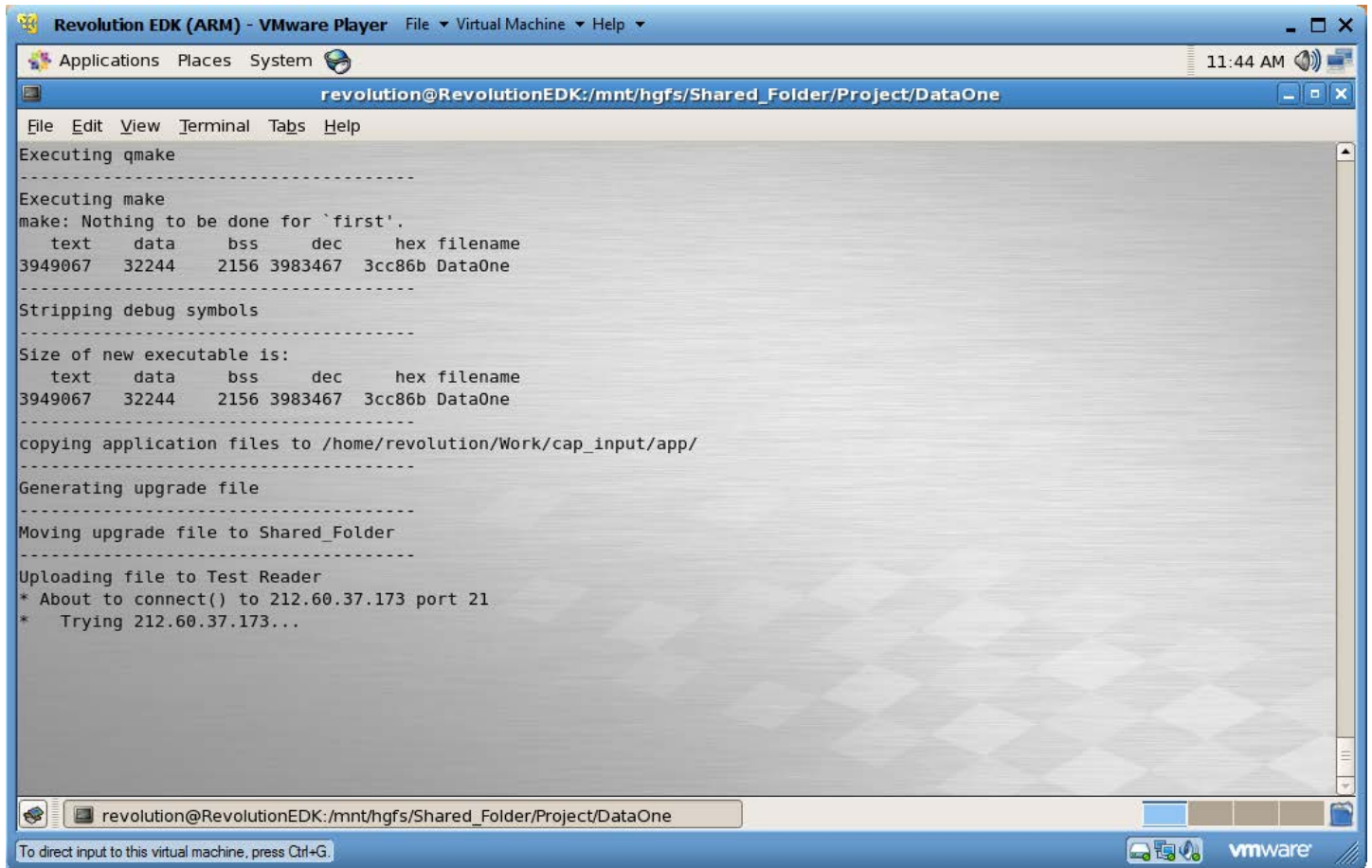
33. After editing the source code in Qt Creator, you can hit the hammer button on bottom left and it will try to build the project. It will indicate all build issues in the following way.



The red icons show that there were errors in the build process. But, if the output looks like in the above picture, it is OK. Because we only wanted to check the syntax errors here. We will actually compile the project inside the virtual machine, because, relevant `impinj` and `Octane SDK` libraries are inside the virtual machine and not on windows.

34. Once you are satisfied with your code, save the project (File -> Save All). Then go inside the virtual machine and execute compile script from terminal.

[revolution@RevolutionEDK DataOne]\$./Compile



```
Revolution EDK (ARM) - VMware Player  File  Virtual Machine  Help  11:44 AM
Applications  Places  System
revolution@RevolutionEDK:/mnt/hgfs/Shared_Folder/Project/DataOne
File Edit View Terminal Tabs Help
Executing qmake
-----
Executing make
make: Nothing to be done for `first'.
  text    data    bss    dec    hex filename
3949067  32244    2156 3983467 3cc86b DataOne
-----
Stripping debug symbols
-----
Size of new executable is:
  text    data    bss    dec    hex filename
3949067  32244    2156 3983467 3cc86b DataOne
-----
copying application files to /home/revolution/Work/cap_input/app/
-----
Generating upgrade file
-----
Moving upgrade file to Shared_Folder
-----
Uploading file to Test Reader
* About to connect() to 212.60.37.173 port 21
* Trying 212.60.37.173...
```

Voila..... you have successfully compiled the application, generated the upgrade file and copied it to the Shared_Folder. This script is also configured to upload the new executable to reader through FTP. Also, you can upgrade your reader from its HTTP interface.

35. Please read the file Prerequisites.txt in the main folder of the project. This will help you understand what you need to know to start with this project.

Good luck...
The End.