# Linux Screen (40 Series) Development Guide

DWIN Technology Co., Ltd. +86 400 018 9008 www.dwin-global.com



## **Contents**

Chapter 1 Environment Setup	1
1.1 Ubuntu16.04 Configuration	1
1.1.1 Introduction	1
1.1.2 Environment Requirements	1
1.1.3 VMware Workstation Installation	1
1.1.4 Download Ubuntu	4
1.1.5 Install Ubuntu	5
1.1.6 Shared Folder Settings	13
1.2 Install RK3566 Toolchain	17
1.3 Development Board Configuration	17
1.3.1 Terminal Software	
1.3.2 Serial Connection	17
1.3.3 Ethernet SSH Connection	19
1.3.4 IP Configuration	20
Chapter 2 QT Project Cross-compilation	21
2.1 qmake	
2.2 USB Download	22
2.3 Run The Dwinqtdemo Program	22
2.4 Network Connection	
2.4.1 Network Configuration	23
Revision Records	24

# **Chapter 1 Environment Setup**

## 1.1 Ubuntu16.04 Configuration

#### 1.1.1 Introduction

This chapter will introduce the installation of a virtual machine and the configuration of Ubuntu16.04. If you have already installed Ubuntu16.04, you can <u>click here</u>.

#### 1.1.2 Environment Requirements

CPU: no specific requirement Memory: generally over 2G.

Host machine OS: Windows XP, Windows 7 and above.

Software version: you can choose VMware workstation 10 and above for Windows according to your needs, it is not recommended to use previous versions.

#### Note:

This example will use VMware Workstation 15 Pro for installation demonstration.

#### 1.1.3 VMware Workstation Installation

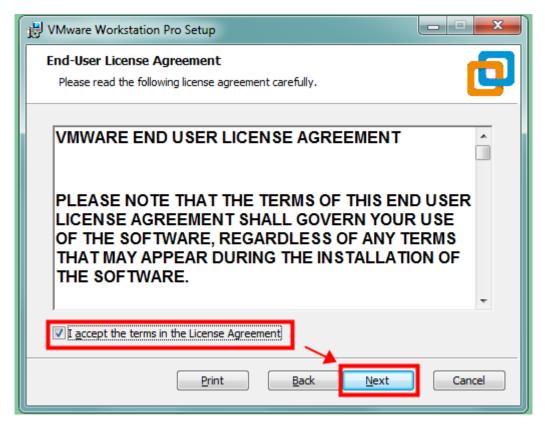
(1) Download VMware Workstation pro installation package on the official website below. https://www.vmware.com/products/workstation-pro.html

(2) Double clicks on downloaded exe file to start the installation and click "Next".

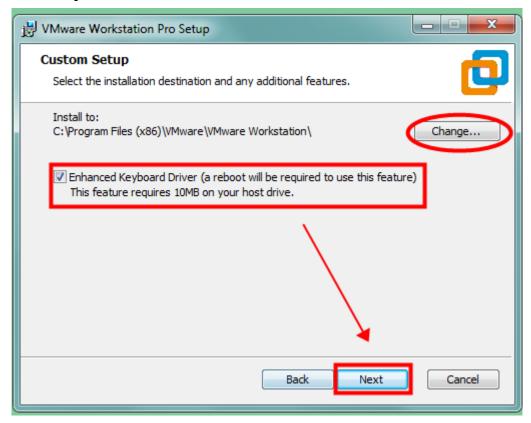


(3) Select "I accept the terms in the License Agreement" and click "Next".

www.dwin-global.com 1 +86 400 018 9008



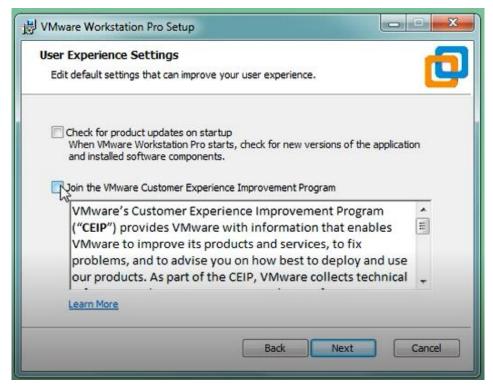
(4) Select the installation destination. Click "Change" if you want to install on another destination. Select "Enhanced Keyboard..." and then click "Next".



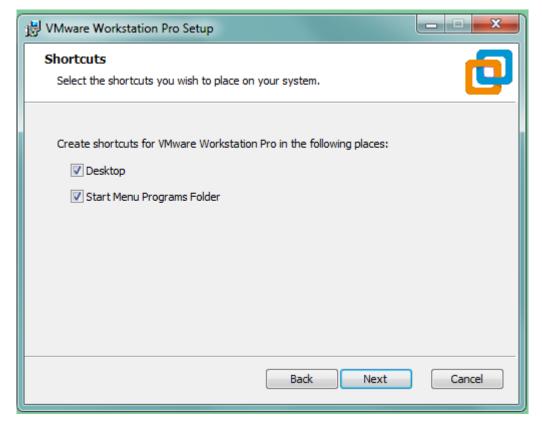
(5) Select "Check for product updates on startup" and "Join the VMware Customer Experience Improvement Program" based on what you need. Then click "Next".

www.dwin-global.com 2 +86 400 018 9008

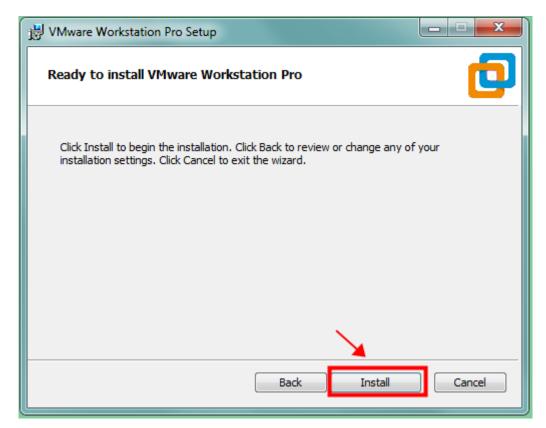




(6) Select the shortcuts you wish to place on your system. It's recommended to select both. Click "Next".



(7) Click "Install" to start the installation.



(7) The installation is completed. Click "Finish" to exit the Setup Wizard.



#### 1.1.4 Download Ubuntu

(1) Download Ubuntu 16.04 from the official website below.

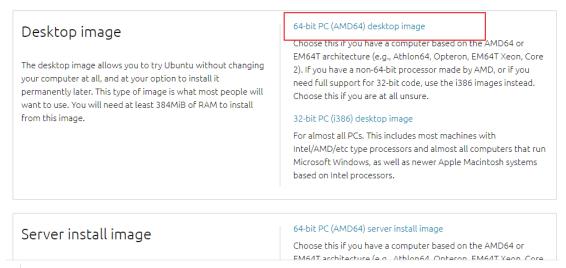
https://releases.ubuntu.com/16.04/

(2) Select "64-bit PC(AMD64) desktop image" to download "ubuntu-16.04.7-desktop-amd64.iso".

www.dwin-global.com 4 +86 400 018 9008

## Select an image

Ubuntu is distributed on two types of images described below.

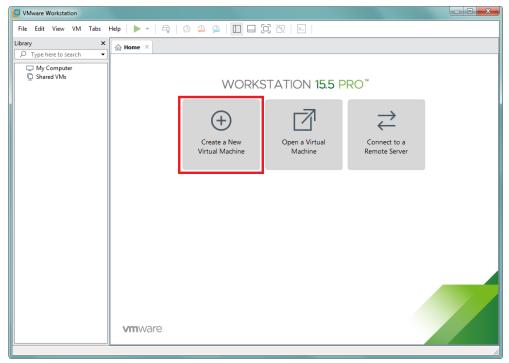


#### 1.1.5 Install Ubuntu

(1) Open VMware Workstation Pro.

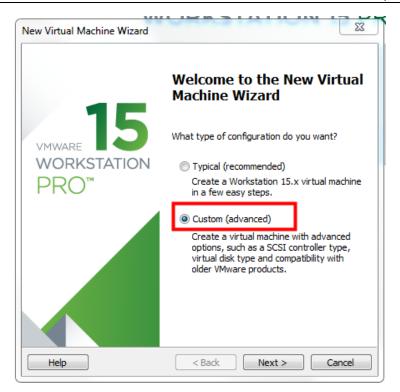


(2) Click "Create a new virtual machine".

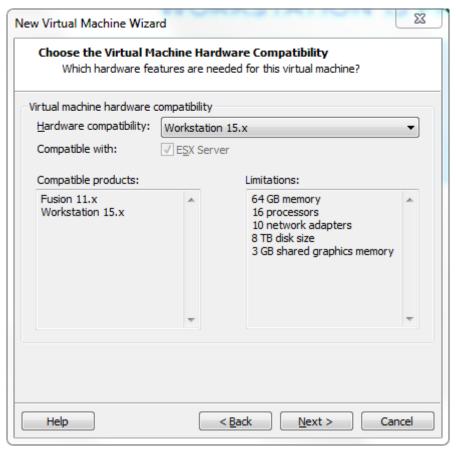


(3) Select "Custom (advanced)" and click "Next".



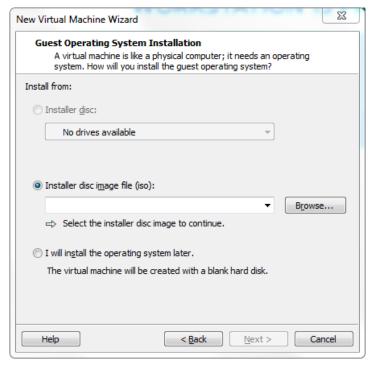


#### (4) Click "Next"

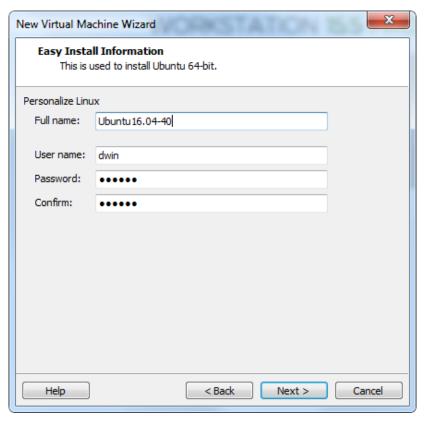


(5) Select "Installer disc image file (iso)", next click "Browse...", and select the downloaded Ubuntu \*\*\*.iso file. This installer will automatically recognize and read file. Click "Next".



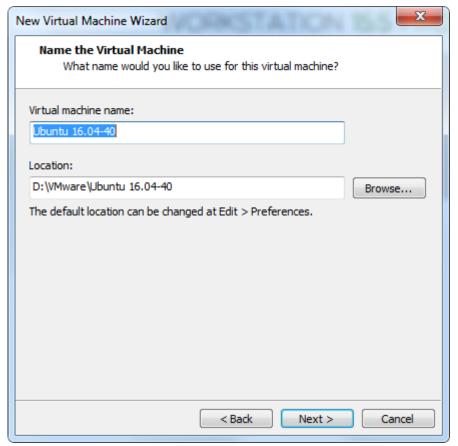


(6) Enter the custom name and password. The password is the Ubuntu login password and sudo privilege password. Click "Next".

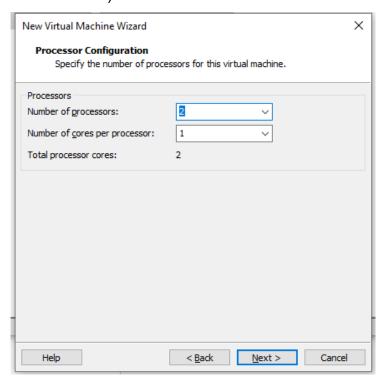


(7) Set the Ubuntu name and location, and click "Next".



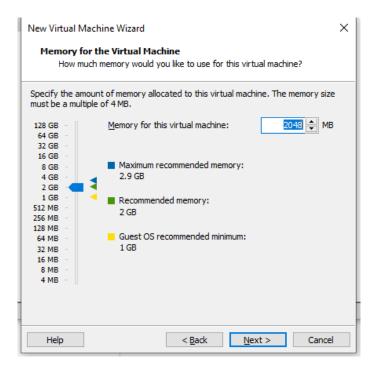


(8) According to needs and the computer configuration, allocate processors and cores (here the total number of processor cores is set to 2). Then click "Next".

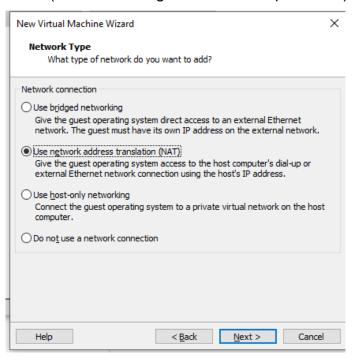


(9) The default operating memory is 2G (enough and changeable), click "Next".



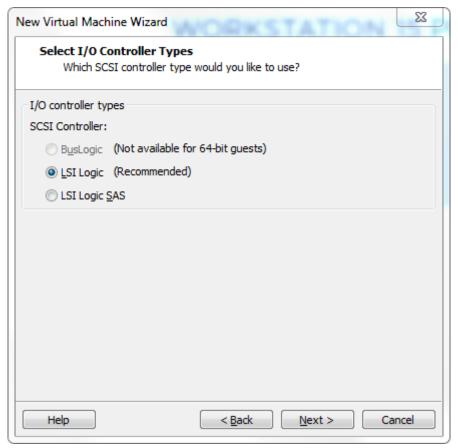


(10) Keep default configuration (or choose bridge network for tftp transfer). Click "Next".

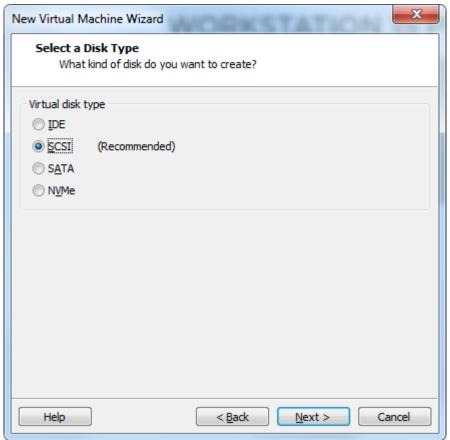


(11) Keep default and click "Next".



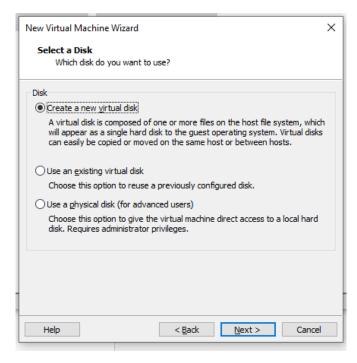


(12) Keep default and click "Next".

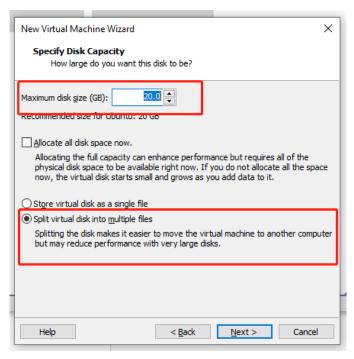


(13) Select "Create a new virtual disk" and click "Next".

+86 400 018 9008 www.dwin-global.com 10



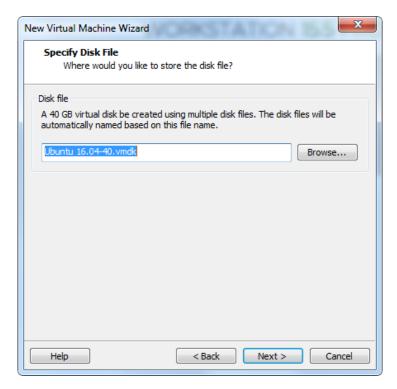
(14) Specify the disk capacity. If there is enough computer memory, it is recommended to set 30G or more because small memory may not be able to meet the subsequent demand. Select "Split virtual disk into multiple files". Click "Next". If the disk capacity is small, you can expand it (see subsequent sections).



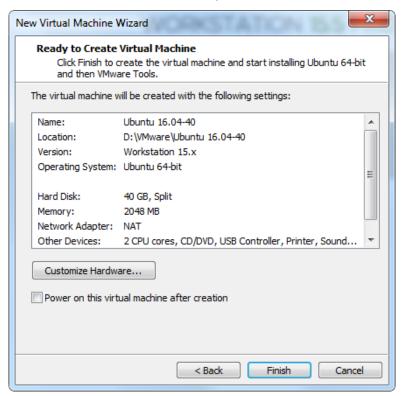
(15) The disk will be named automatically. Keep the default and click "Next".

www.dwin-global.com 11 +86 400 018 9008





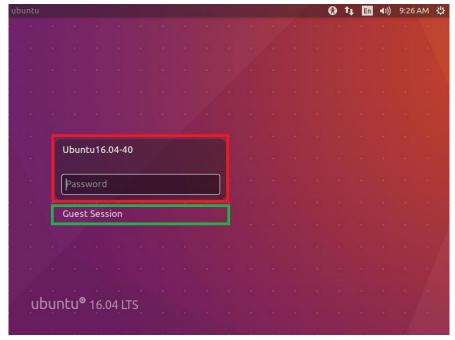
(16) Click "Finish" and the virtual machine will be opened and installed.



(17) Wait for a while.



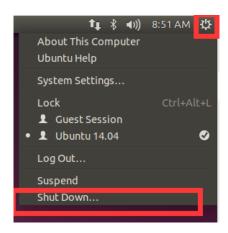
(18) When this page appears, the installation of Ubuntu is complete (Note: The login interface has two user login entries. The red box is user-defined, and the green box is the system default).



(19) Next, we'll start configuring some of the required settings for Ubuntu.

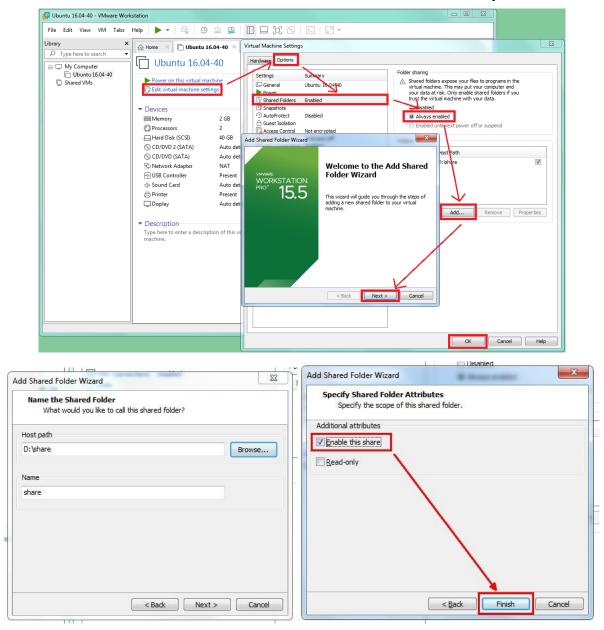
## 1.1.6 Shared Folder Settings

(1) Shut down Ubuntu.

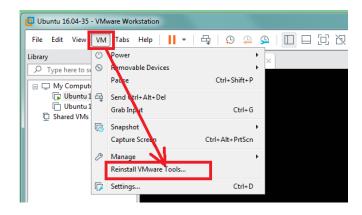




(2) After shutdown, click "Edit Virtual Machine Settings" -> "Options" -> "Shared Folder" -> "Always Enable" -> "Add", to add a folder as a medium for file transfer between the host and the virtual machine. click "Next" and follow the Add Shared Folder Wizard. Finally click "OK".



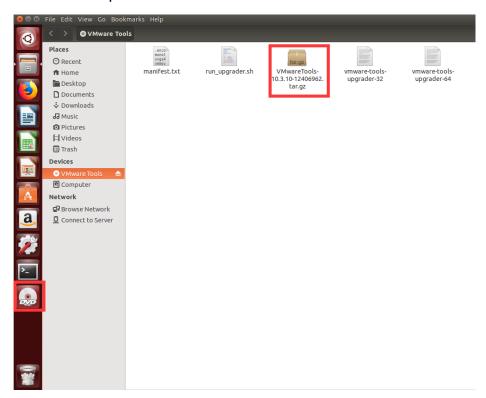
(3) Click "Power on this virtual machine" to start the virtual machine. Click "VM" -> "Install VMware Tools" (Note: The 'Install VMware Tools' is only selectable after powering on. In the example, VMware Tools have already been installed, so it shows 'Reinstall VMware Tools').



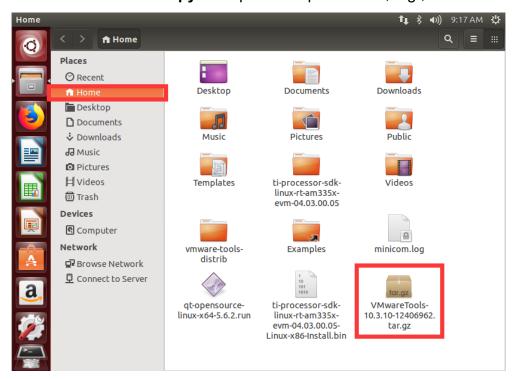
www.dwin-global.com 14 +86 400 018 9008



(4) Click the "DVD" icon and open it to see a tar file "VMwareTools-10.3.10-12406962.tar.gz".



(5) Right click the tar file and click "copy to" a path with permission, e.g., to "Home".



(6) At this point, we need to open the terminal as shown. Click the upper left icon and enter "**Terminal**" and click the "**Terminal**" icon (the terminal can be locked in the taskbar by right-clicking the icon and select "**Lock to Launcher**"). You can also press [Ctrl]+[Alt]+[T] under the root directory to open the terminal.

www.dwin-global.com 15 +86 400 018 9008

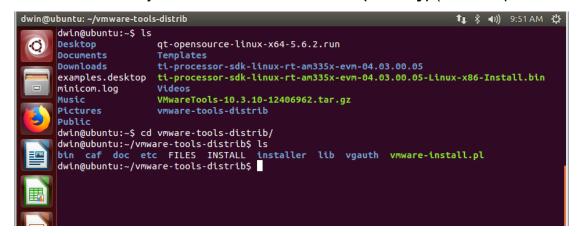




(7) Enter the command to enable the operable privilege: **sudo chmod +x VM** (to display the full name by **Tab** key) (**enter**). (Note: for the first time to use the administrator sudo privilege, you need to enter the password, i.e., the login password, which is not visible when entering.)

```
dwin@ubuntu:~$ sudo chmod +x VMwareTools-10.3.10-13959562.tar.gz
[sudo] password for dwin:
dwin@ubuntu:~$ tar -xvf V
Videos/
dwin@ubuntu:~$ tar -xvf VMwareTools-10.3.10-13959562.tar.gz
```

(8) Enter the decompression command: **tar -xvf VM (Tab key) (Enter)**, then it will automatically extract the tar file to the current directory. You can see the decompressed file named "vmware-tools-distrib" in the current directory. Enter the command: **cd vm (Tab key)** (The rest part is omitted).



(9) Enter the operation command: **sudo** . **/vm (Tab)**, and then the installation will start. When [yes] or [no] appears, just type **yes** and enter for all the following options until the installation is complete as shown.

```
Skipping rebuilding initrd boot image for kernel as no drivers to be included in boot image were installed by this installer.

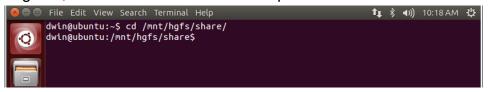
vmware-tools start/running
The configuration of VMware Tools 10.3.10 build-13959562 for Linux for this running kernel completed successfully.

Found VMware Tools CDROM mounted at /media/dwin/VMware Tools. Ejecting device /dev/sr0 ...
Enjoy,

--the VMware team
```

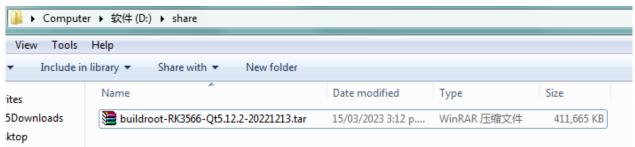


(10) At this time, we can enter the command: **cd /mn** (Tab all the way to the shared folder you set), the path is /mnt/hfgs/\*\*\*, and the shared folder is set up here.



#### 1.2 Install RK3566 Toolchain

(1) Use the shared folder or SFTP to move the RK3566 tar file to Ubuntu.



- (2) Move the tar file to the root directory (/home/dwin) by shared folder. Enter the command: **sudo mv buil (Tab)~**. Wait a while and it will be moved to the root directory.
- (3) Enter the command tar -xvf bu(TAB)(enter) to extract the tar file.
- (4) Enter the following command in substance:

#### cd bui(TAB)(enter)

#### source env-setup(enter)

(5) Enter the command **qmake -v** to check the version of qmake and see if the environment is successfully built.

```
dwin@ubuntu:~/buildroot-RK3566-Qt5.12.2-20221213$ source env-setup.sh
dwin@ubuntu:~/buildroot-RK3566-Qt5.12.2-20221213$ qmake -v
QMake version 3.1
Jsing Qt version 5.12.2 in /home/dwin/buildroot-RK3566-Qt5.12.2-20221213/usr/local/Qt-5.12.2/lib
```

## 1.3 Development Board Configuration

#### 1.3.1 Terminal Software

(1) You can download and use either SecureCRT or MobaXterm, and this section will introduce the use of MobaXterm.



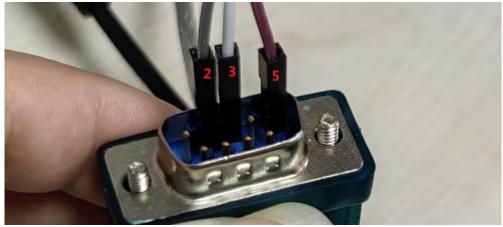
(2) There are two connection options: Serial (UART 0) connection and Telnet connection by a network cable.

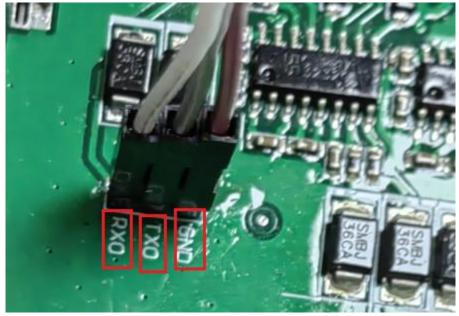
#### 1.3.2 Serial Connection

(1) Serial (UART 0) connection. As illustrated in the following pictures, connect No.2 to TX, No.3 to

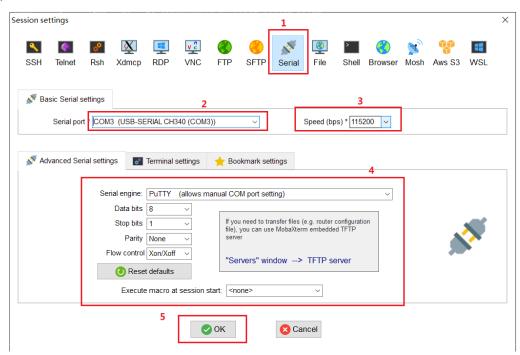
www.dwin-global.com 17 +86 400 018 9008

RX and No.5 to GND. (RS232 as an example here.)





(2) Select [Sessions]-> [New Session]. First, select "serial". Next, select serial port and select speed. Last, check the information and click "OK" to finish.

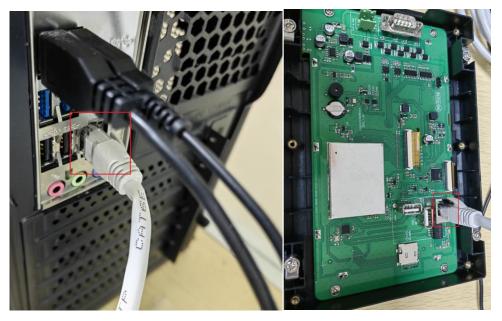


www.dwin-global.com 18 +86 400 018 9008

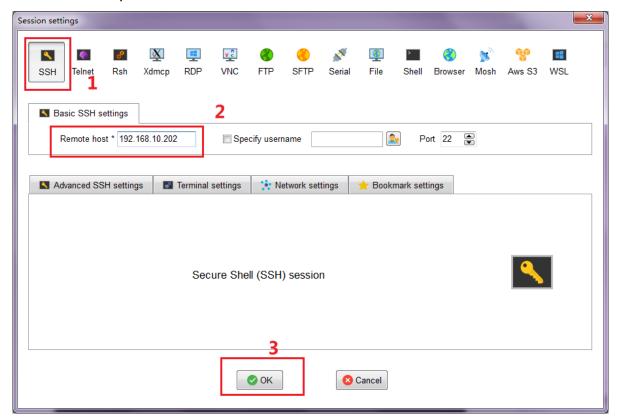
(3) Power up the development board, and enter "root" to start. (Note: If you operate after a while after powering up, there may be no text on the displayed interface, and only a black screen with no boot information. In this case, you only need to enter "root").

#### 1.3.3 Ethernet SSH Connection

(1) Plug the network cable into the development board network port, an refer the specific notes on the Internet.



(2) First, click "Session" and select "New session" then select "SSH". Next, enter the IP of the development board and click "OK" (Note: the default IP of the development board is: 192.168.10.201 or 192.168.10.202. To achieve communication, the development board should be connected to the same LAN as the computer.



www.dwin-global.com 19 +86 400 018 9008

(3) Power on the development board and the following interface is displayed. Enter "root" for the username and "rockchip" for the password to start the operation.

```
? MobaXterm Personal Edition v21.2 ?
(SSH client, X server and network tools)

> SSH session to root@192.168.10.202
? Direct SSH : /
? SSH compression : x (disabled or not supported by server)
? SSH-browser : /
? X11-forwarding : / (remote display is forwarded through SSH)

> For more info, ctrl+click on help or visit our website.

sh: line 1: /usr/bin/xauth: No such file or directory
root@RK356X:~#
```

## 1.3.4 IP Configuration

To modify the IP, you can enter: **vi** /etc/init.d/netconfig or **vi** /etc/init.d/rcS and move to the last line but two and press "i" to edit. Press "Esc" after modifying the IP and enter: (colon)wq (enter), which means save and exit. In this way. The IP is modified.

www.dwin-global.com 20 +86 400 018 9008

# **Chapter 2 QT Project Cross-compilation**

## 2.1 qmake

(1) After enter the environment (running the "source env-setup.sh" command), enter the command "qmake-v" to check if the environment is correct.

Open the project folder you need to cross-compile (here using the provided folder named "DWIN\_QT\_DEMO" and adding it to "Ubuntu /home/dwin"). Enter the command: **qmake** (if the .pro file hasn't been generated, enter "**qmake -project**".) to generate the Makefile.



(2) Enter the command: **make**, and then a binary file named after the project will be generated. But the file cannot be run in Ubuntu, so you need to download it to the development board. You can refer to 2.2.

```
dwin@ubuntu:~/DWIN_QT_DEMO$ qmake -v

QMake version 3.1

Using Qt version 5.12.2 in /home/dwin/buildroot-RK3566-Qt5.12.2-20221213/usr/loc al/Qt-5.12.2/lib

dwin@ubuntu:~/DWIN_QT_DEMO$ ls

DWIN_QT_DEMO.pri DWIN_QT_DEMO$ qmake

Info: creating stash file /nome/dwin/DWIN_QT_DEMO/.qmake.stash

Project MESSAGE: You are running qmake on a generated .pro file. This may not wo rk!

dwin@ubuntu:~/DWIN_QT_DEMO$ ls

DWIN_QT_DEMO.pri DWIN_QT_DEMO$ make

aarch64-buildroot-linux-gnu-g++ -c -pipe --sysroot=/home/dwin/buildroot-RK3566-Qt

ts.12.2-20221213/aarch64-buildroot-linux-gnu/sysroot -02 -Wall -W -D_REENTRANT -

fPIC -DQT_NO_DEBUG -DQT_WIDGETS_LIB -DQT_GUI_LIB -DQT_SERIALPORT_LIB -DQT_SQL_LI

B -DQT_CORE_LIB -I. -I../buildroot-RK3566-Qt5.12.2-20221213/usr/local/Qt-5.12.2/include/QtGui
-I../buildroot-RK3566-Qt5.12.2-20221213/usr/local/Qt-5.12.2/include/QtGui
-I../buildroot-RK3566-Qt5.12.2-20221213/usr/local/Qt-5.12.2/include/QtGui
-I../buildroot-RK3566-Qt5.12.2-20221213/usr/local/Qt-5.12.2/include/QtGui
-I../buildroot-RK3566-Qt5.12.2-20221213/usr/local/Qt-5.12.2/include/QtGui
-I../buildroot-RK3566-Qt5.12.2-20221213/usr/local/Qt-5.12.2/include/QtGui
-I../buildroot-RK3566-Qt5.12.2-20221213/usr/local/Qt-5.12.2/include/QtGui
-I../buildroot-RK3566-Qt5.12.2-20221213/usr/local/Qt-5.12.2/include/Qtsql -I../buildroot-RK3566-Qt5.12.2-20221213/usr/local/Qt-5.12.2/include/Qtsql -I../buildroot-RK3566-Qt5.12.2-20221213/usr/local/Qt-5.12.2/include/Qtsql -I../buildroot-RK3566-Qt5.12.2-20221213/usr/local/Qt-5.12.2/include/Qtsql -I../buildroot-RK3566-Qt5.12.2-20221213/usr/local/Qt-5.12.2/include/Qtsql -I../buildroot-RK3566-Qt5.12.2-20221213/usr/local/Qt-5.12.2/include/Qtsql -I../buildroot-RK3566-Qt5.12.2-20221213/usr/local/Qt-5.12.2/include/Qtsql -I../buildroot-RK3566-Qt5.12.2-20221213/usr/local/Qt-5.12.2/include/Qtsql -I../buildroot-RK3566-Qt5.12.2-20221213/usr/local/Qt-5.12.2/include/Qtsql -I../buildroot-RK3566-Qt5.12.2-20221213/usr/local/Qt-5.12.2/mkspecs/lin
```

```
20221213/aarcho4-bullarool-linux-ghu/sysrool/usr/lib/../libo4/libm.so /home/awih
/buildroot-RK3566-Qt5.12.2-20221213/aarch64-buildroot-linux-ghu/sysroot/usr/lib/
../lib64/librt.a /home/dwin/buildroot-RK3566-Qt5.12.2-20221213/aarch64-buildroot
-linux-gnu/sysroot/usr/lib/../lib64/libffi.so`-lpthread
dwin@ubuntu:~/DWIN_QT_DEMO$ ls
dwinatdemo
                            moc_toolbody.o
                                                           qrc_DWIN_QT_DEMO.o
DWIN_QT_DEMO.pri
DWIN_QT_DEMO.pro
main.o
                            moc_toolcomtest.cpp
                                                          Resources
                            moc_toolcomtest.o
moc_toolheader.cpp
                                                           toolbasetest.o
mainwindow.o
                            moc toolheader.o
                                                           toolbody.o
                            moc_toolsqltest.cpp
Makefile
                                                          toolcomtest.o
                            moc_toolsqltest.o
moc_toolstartpage.cpp
moc_mainwindow.cpp
moc_mainwindow.o
                                                           toolheader.o
                                                          toolsqltest.o
                            moc_toolstartpage.o
moc_predefs.h
                                                           toolstartpage.o
moc_toolbasetest.cpp moc_tooltouchtest.cpp
                                                          tooltouchtest.o
moc_toolbasetest.o
                            moc_tooltouchtest.o
qrc_DW<u>I</u>N_QT_DEMO.cpp
                                                           tooltranslator.o
                                                           toolutility.o
moc_toolbody.cpp
dwin@ubuntu:~/DWIN OT DEMOS
```

#### 2.2 USB Download

- (1) Put the cross-compiled files in the shared folder, you can copy the files using the command: **cp** (file name) (the path of shared folder), i.e., **cp** dwinqtdemo /mnt/hgfs/share/
- (2) Move the target file in the shared folder from the computer to the USB/SD card.
- (3) Insert the USB into the development board.
- (4) Open MobaXterm and connect. Enter the command: **cd** /**mnt**/**usb** to open the "usb" folder and select "sdax" folder. Copy or move the target file to the target directory (you can customize the folder to avoid clutter) using the command: **cp** (**target file**)(**folder**), i.e. **cp dwingtdemo** /**usr**/**bin**/.

## 2.3 Run the Dwingtdemo Program

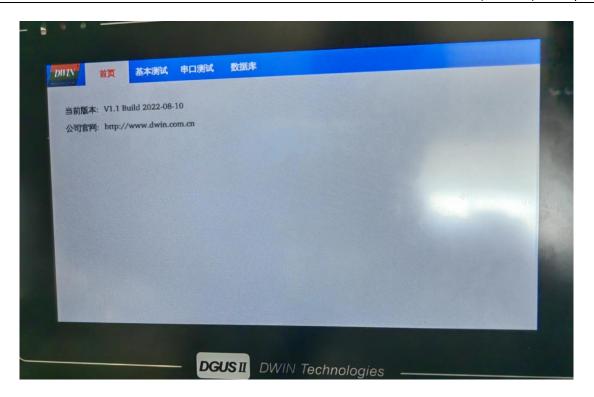
Configuration file should be modified to run the demo.

Enter the command: vi /etc/init.d/runqt(enter) and move the cursor to the beginning of the "qttesttool" line. Press i to enter insert mode. Input "#" to comment out this line. Move the cursor to the end of this line and press enter. Input the absolute path of dwinqtdemo+ a blank space +&. Then press Esc to exit insert mode. Enter ": wq" to save the modification.

You can run the demo using the command "./runqt".

```
# cd /etc/init.d/
# ./run
runhmi runqt runupdate
# ./rungt
```





## 2.4 Network Connection

## 2.4.1 Network Configuration

(1) 40 series devices use DHCP to automatically assign addresses by default. You only need to connect the network cable.

#### (23) Ping a website

```
root@RK356X:/etc/init.d# ping www.baidu.com
PING www.a.shifen.com (112.80.248.75) 56(84) bytes of data.
64 bytes from 112.80.248.75 (112.80.248.75): icmp_seq=1 ttl=56 time=31.2 ms
64 bytes from 112.80.248.75 (112.80.248.75): icmp_seq=2 ttl=56 time=30.0 ms
64 bytes from 112.80.248.75 (112.80.248.75): icmp_seq=3 ttl=56 time=30.1 ms
64 bytes from 112.80.248.75 (112.80.248.75): icmp_seq=4 ttl=56 time=29.7 ms
64 bytes from 112.80.248.75 (112.80.248.75): icmp_seq=5 ttl=56 time=30.4 ms
^C
--- www.a.shifen.com ping statistics ---
6 packets transmitted, 5 received, 16.6667% packet loss, time 5008ms
rtt min/avg/max/mdev = 29.670/30.244/31.158/0.506 ms
```

#### **Revision Records**

Rev	Revise Date	Content	Editor
00	2023-2-20	First Edition	Yu Yihe
01	2023-3-17	English version	Chen Lvzhi

Disclaimer: The product design is subject to alternation and improvement without prior notice.

Please contact us if you have any questions about the use of this document or our products, or if you would like to know the latest information about our products:

Customer service Tel: +86-400-018-9008

Customer service email: dwinhmi@dwin.com.cn

Website: www.dwin-global.com

DWIN Developer Forum: https://forums.dwin-global.com/index.php/forums

Thank you all for continuous support of DWIN, and your approval is the driving force of our progress!