User's Manual

飞凌嵌入式 FORLINX EMBEDDED

OKMX6UL-C3

ARM Cortex-A7

Linux Manual

Rev. 1.3

2017/03/07

Forlinx Embedded Technology Co. Ltd. www.forlinx.net

Address: 2699 Xiangyang North Avenue, Baoding, Hebei, China. TEL:0312-3102663 FAX:0312-3112651

ATTENTIONS

Working Voltage: DC5V ±10%

Operating Temp.: -0～70 ℃

Humidity: 10%~90% (none condensing)

Attentions:

- Hot-plug of core board and peripheral modules is strictly prohibited.
- Please follow all the warnings and instructions marked on the product.
- Please always keep the product dry. Once it is splashed or immersed by any liquid, cut off the power and dry it out immediately.
- Please store and operate the product in ventilating conditions to avoid damages brought by overhigh temperature.
- Please do not use or store the product in dusty or untidy conditions.
- Please do not use or store the product in alternate cold and hot conditions to avoid condensing which will damage components.
- Please do not treat the product rudely. Any falling-off, knocking and violate shaking may cause destruction to circuit and components.
- Please do not clean the product with organic solvents or corrodible liquids.
- Please do not dismantle or repair the product by yourself. Contact us when the product malfunctions.
- Please do not modify the product by yourself or use accessories unauthorized by us. Otherwise, the damage caused by that will be on your part and not included in guarantee terms.

Contact Forlinx Technical Support if you have any questions.

Note

Below marks may be helpful to you to read this manual

- Means parallel options

this mark is for the file path

ls this is for Linux PC command. Users need input the command after the # mark.

root@freescale ~$ is hyper terminal command, and users need input command after $

 : needs your attention

Copyright Announcement

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Version-updating Record

Time	Version	Details
Aug. 21, 2017	V1.4	Updated RS485 device name, set Ethernet default IP, CAN is available by default, QT updated to QT4.8.6, added PSAM testing method
Mar.7, 2017	V1.3	Added supporting to NAND Flash, uboot menu option and industrial grade NIC
Nov.1, 2016	V1.2	Added supporting to wm8960, wifi, otg converted to host, usb camera, and 3G module
Aug.25, 2016	V1.1	6ul_m_20160720 version, added supporting to 4G module, improved power supply to 3-wire serial interface, deleted eth2 description
July.22, 2016	V1.0	First edition

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Technical Support and Updating

1. Technical Support

1.1 Information about our company's software and hardware
1.2 Problems related to our software and hardware manuals
1.3 After-sale technical support for OEM and ODM
1.4 Requirement of source code and other info which is lost or updated
1.5 Malfunction diagnose and other after-sale services

2. Range of Technical Discussion (non-compulsory)

2.1 Modification and comprehension of source code
2.2 How to port OS
2.3 Software and hardware problems occured in self-modifying and programming

3. Accesses to Technical Support

3.1 Tel (non-instant messenger): 0312-3119192
3.2 Email address (non-instant messenger) :
3.2.1. About Linux: linux@forlinx.com
3.2.2. About WinCE: wince@forlinx.com
3.2.3. About Android: android@forlinx.com
3.3 Forum (non-instant): http://bbs.witech.com.cn

4. Timetable for Technical Support

9:00am to 11:30am, 13:30pm to 17:00pm, Monday to Friday
Support will not be available on public holidays. Please send your questions to the email addresses above or Column Technical Support in forum. We'll reply as soon as we are back.

5. Accesses to Materials

Log in "bbs.witech.com.cn". Click "*materials for development board*" and download whatever you need.

CONTENTS

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Chapter 1 Overview

OKMX6UL-C3 main control unit was designed by Folinx based on NXP i.MX6UL processor. Expanding the i.MX 6 series, the i.MX 6UltraLite is a high performance, ultra-efficient processor family featuring an advanced implementation of a single ARM® Cortex®-A7 core, which operates at speeds up to 528 MHz. The i.MX 6UltraLite applications processor includes an integrated power management module that reduces the complexity of external power supply and simplifies power sequencing. Each processor in this family provides various memory interfaces, including 16-bit LPDDR2, DDR3, DDR3L, raw and managed NAND flash, NOR flash, eMMC, Quad SPI and a wide range of other interfaces for connecting peripherals such as WLAN, Bluetooth™, GPS, displays and camera sensors.
Freescale i.MX6UltraLite

OKMX6UL-C3 with eMMC

Partition	Name	Deviation	Capability	File system	Spec
/dev/mmcblk1boot0	Bootloader	1KB	2MB	RAM	bootloader
/dev/mmcblk1p1	Boot kernel	10MB	500MB	FAT32	Kernel DTB
/dev/mmcblk1p2	File system partition	Follow Boot	Left	Ext4	Root file system

OKMX6UL-C3 with 256M NAND Flash

Partition	Name	Capability	Spec
/dev/mtd0	Bootloader	4MB	bootloader
/dev/mtd1	logo	2MB	logo
/dev/mtd2	ENV	1MB	variable
/dev/mtd3	DTB	3MB	DTB
/dev/mtd4	Kernel (booting)	8MB	kernel
/dev/mtd5	File system partition	left	Root directory yaffs2

OKMX6UL-C3 with 1G NAND Flash

Partition	Name	Capability	Spec
/dev/mtd0	Bootloader	8MB	bootloader
/dev/mtd1	logo	2MB	logo
/dev/mtd2	ENV	1MB	variable
/dev/mtd3	DTB	3MB	DTB
/dev/mtd4	Kernel (booting)	8MB	kernel
/dev/mtd5	File system partition	left	Root directory yaffs2

ENV is preserved for environment variable, and DTB is device tree

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Linux3.14.38 Software Features

Driver	Driver Source Code Location in Kernel
NIC	drivers/net/ethernet/freescale/fec_main.c
LCD Backlight	drivers/video/backlight/pwm_bl.c
USB Disk	drivers/usb/storage/
SD card	drivers/mmc/card/
RTC	drivers/rtc/rtc-rx8010.c
Serial Port	drivers/tty/serial/imx.c
Watchdog	drivers/watchdog/imx2_wdt.c
CAN	drivers/net/can/flexcan.c
GPIO	drivers/misc/gpio/gpio-user.c
RS485	drivers/tty/serial/imx.c
GPRS	drivers/tty/serial/imx.c

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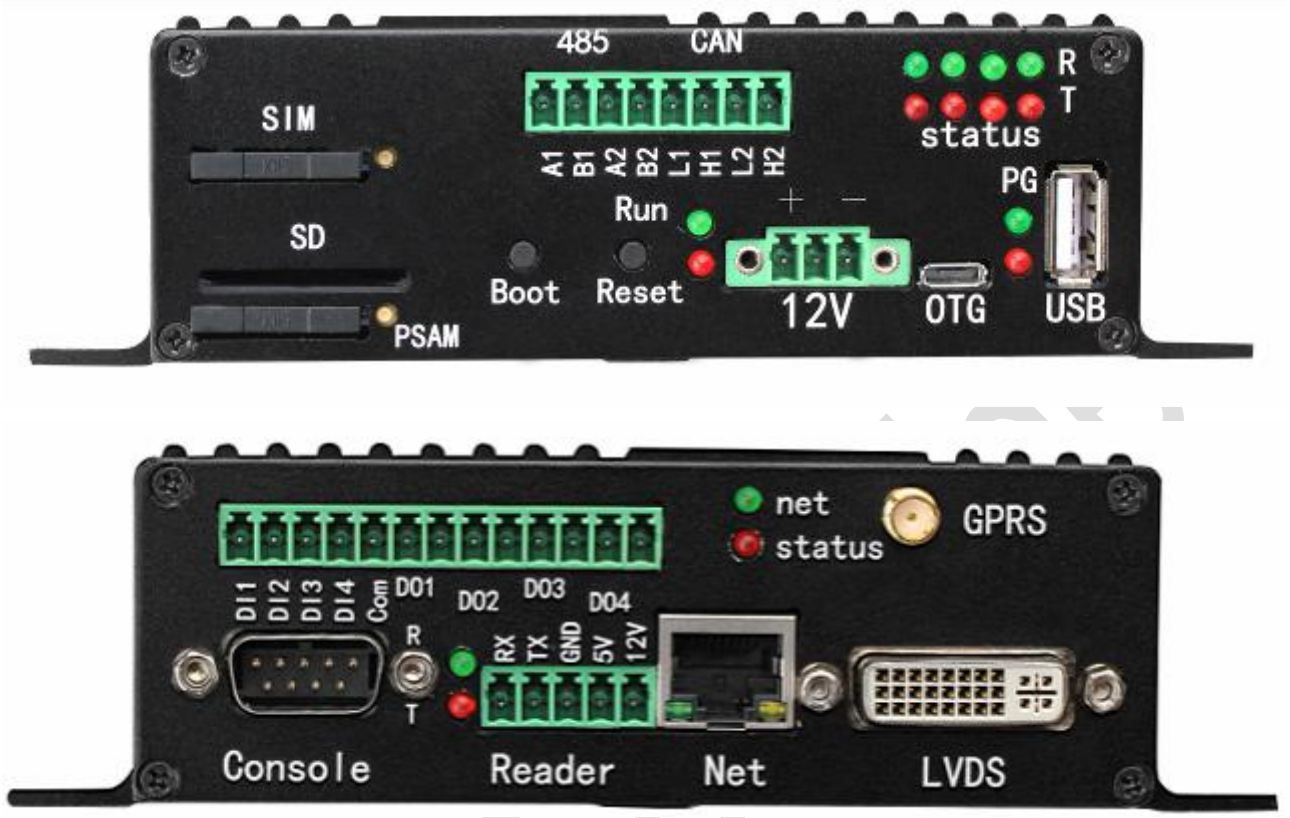
Chapter 2 OKMX6UL-C3 Appearance



Chapter 3 OS Image Flashing

One-key flash means flash OS image to eMMC or NAND Flash via SD card or USB OTG.

Falsh tool we provide supports two methods to work with GPIO. Create dev/gpio node or call node of sys/class/gpio. Users could refer to Linux\test and source code\DI, DO or GPIO demo to design users' program.

3.1 Booting Mode Selection

Booting mode settings

1. 4 couples of jumpers are all on the left of eMMC, if keep pressing boot key, meanwhile press reset key or connect power, then release boot key, users could flash OS to eMMC by SD card or USB. If press reset key directly, or connect with power (please make sure super-capacitor discharging over) to boot system from eMMC.
2. if 4 couples of jumpers are all on left of NAND Flash, if keep pressing boot key, meanwhile press reset key or connect power, then release boot key, users could flash OS to NAND Flash by SD card or USB. If press reset key directly, or connect with power (please make sure super-capacitor discharging over) to boot system from NAND Flash.

3.2 Flash OS Image to eMMC or NAND Flash

3.2.1 Flash OS Image to by USB

Notice: before flashing please firstly read about Linux\image\readme.txt, do not connect SD card to the board.

Firstly, please copy flash tool Mfgtools.rar to PC and extract it, the flash tool is saved in

Linux\tools \OTG\ mfgtools.rar

Device tree is with two methods available for GPIO control, one is dev/gpio, and the other one is sys/class/gpio mode, please select device tree according to the uboot. Testings are different with device tree.

3.2.1.1 Flash OS image to eMMC by USB

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1. mfgtool2-console-ddr512m-emmc1.vbs is flash tool for Linux Console, eMMC capability is 512M LvDDR3, while mfgtool2-qt4-ddr512m-emmc1.vbs is flash tool for Linux QT4, eMMC capability is also 512M LvDDR3
To flash OS Linux console to eMMC by mfgtool2-console-ddr512m-emmc1.vbs, below image files are needed(path: Mfgtools\Profiles\Linux\OS Firmware\files\ linux)

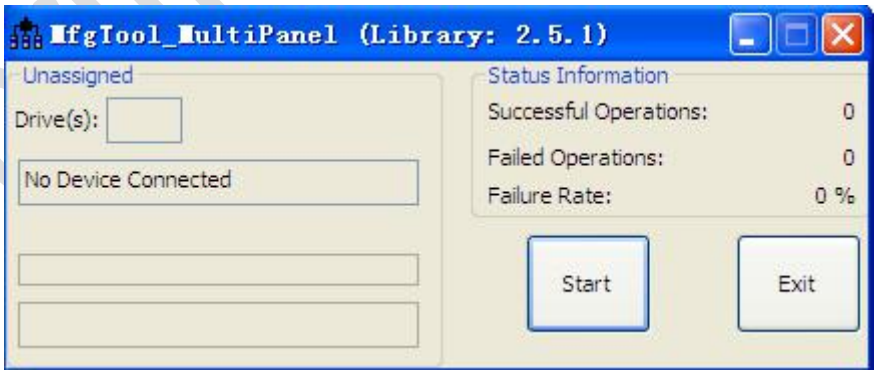
```
│ logo-7.bmp
│ zImage
│ u-boot-256mnand-ddr256m.imx
├──dtb
│ imx6ul-14x14-evk-gpmi-gpio.dtb
│ imx6ul-14x14-evk-gpmi-iomuxc.dtb
└──console
rootfs.tar.bz2
```

to flash OS Linux QT to eMMC by mfgtool2-qt4-ddr512m-emmc1.vbs, then below files are needed (Mfgtools\Profiles\Linux\OS Firmware\files\ linux)

```
│ logo-7.bmp
│ zImage
│ u-boot-256mnand-ddr256m.imx
├──qt4
│ rootfs-nand.tar.bz2
└──dtb
        imx6ul-14x14-evk-gpmi-gpio.dtb
        imx6ul-14x14-evk-gpmi-iomuxc.dtb
```

system is booting with device tree of imx6ul-14x14-evk.dtb by default. If users want to work with other device trees to be their default system booting device tree, please rename the device tree as imx6ul-14x14-evk.dtb to replace dtb\imx6ul-14x14-evk.dtb

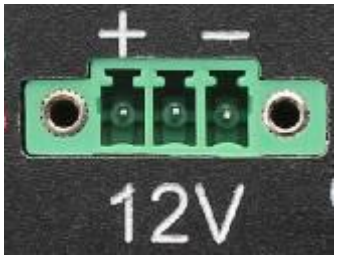
2. double click on PC to run mfgtool2-console-ddr512m-emmc1.vbs or mfgtool2-qt4-ddr512m-emmc1.vbs (the files could be used directly)



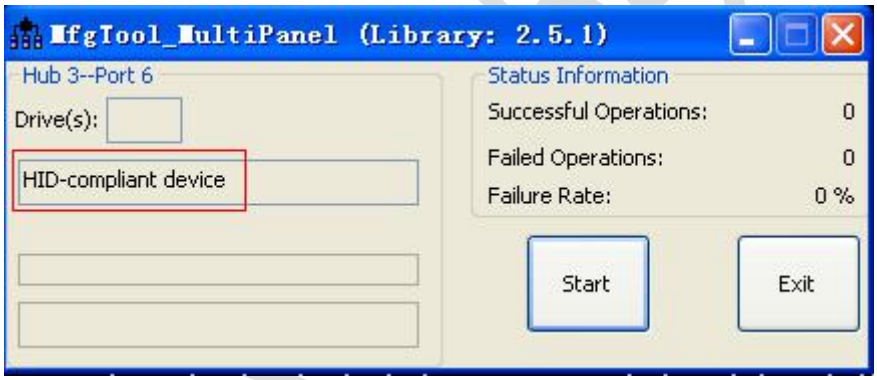
3. connect OKMX6UL-C3 OTG port with PC via Micro USB cable.

4. four couples of jumpers are all on left of eMMC

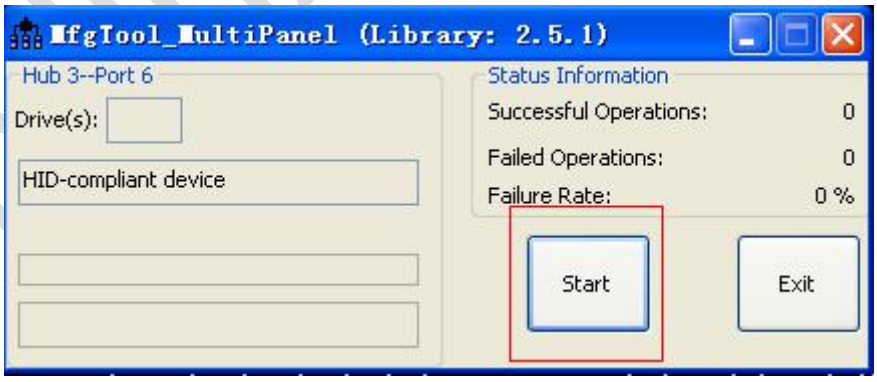
5. press boot key, power on OKMX6UL-C3 (or keep pressing boot key, meanwhile press reset key, recognized as HID, then release boot key) power input voltage DC12V



6. when the PC is the first time to connect with OKMX6UL-C3, it will automatically install driver, after installation, in flash tool, device will be shown as HID-compliant device



7. lick to start OS flashing, during flashing, it will prompt dialogue of whether formatting, just select cancel or skip it, keep patient until flashing finished



8. Flash finished as below

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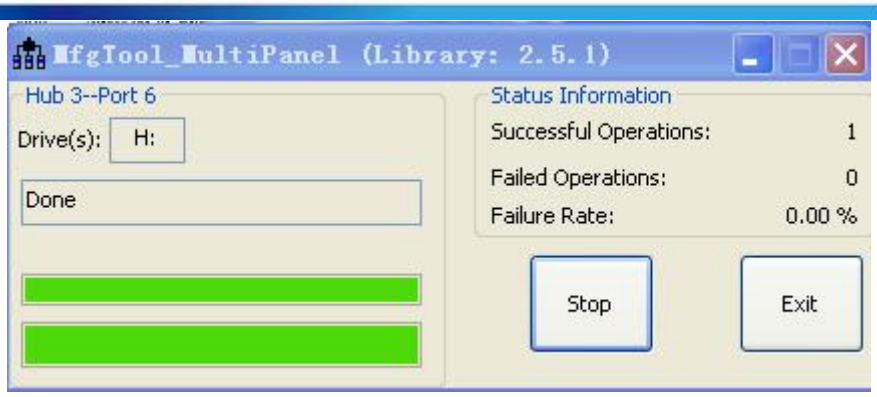

9. after finishing, it will prompt Done, then please click stop and exit, close flash tool to finish OS flashing
10. power on the board or reset the board to boot OS Linux.

3.2.1.2 Flash OS image to NAND Flash by USB

1. mfgtool2-console-ddr256m-nand256m.vbs is flash tool to flash Linux Console to NAND Flash with 256M DDR3 and 256M NAND Flash, and mfgtool2-console-ddr256m-nand1g.vbs is flash tool to flash Linux console to OKMX6UL-C3 with 256M DDR3 and 1G NAND Flash , while mfgtool2-qt4-ddr256m-nand256m.vbs is flash tool to flash Linux QT to NAND Flash with 256M DDR3 and mfgtool2-qt4-ddr256m-nand1g.vbs is flash tool to flash Linux QT to NAND Flash with 1G DDR3

To flash Linux console to NAND Flash by mfgtool2-console-ddr256m-nand256m.vbs, below files (Mfgtools\Profiles\Linux\OS Firmware\files\ linux) are needed

```
│  logo-7.bmp
│  zImage
│  u-boot-256mnand-ddr256m.imx
├──dtb
│  imx6ul-14x14-evk-gpmi-gpio.dtb
│  imx6ul-14x14-evk-gpmi-iomuxc.dtb
└──console
rootfs.tar.bz2
```

to flash Linux QT to NAND Flash by mfgtool2-qt4-ddr256m-nand256m.vbs, below files are needed (Mfgtools\Profiles\Linux\OS Firmware\files\ linux)

```
│  logo-7.bmp
│  zImage
│  u-boot-256mnand-ddr256m.imx
├──qt4
│  rootfs-nand.tar.bz2
└──dtb
imx6ul-14x14-evk-gpmi-gpio.dtb
imx6ul-14x14-evk-gpmi-iomuxc.dtb
```

to flash Linux Console to 1G NAND Flash by mfgtool2-console-ddr256m-nand1g.vbs, below files are needed (Mfgtools\Profiles\Linux\OS Firmware\files\ linux)

```
│  logo-7.bmp
│  zImage
│  u-boot-256mnand-ddr256m.imx
├──dtb
│  imx6ul-14x14-evk-gpmi-gpio-1g.dtb
│  imx6ul-14x14-evk-gpmi-iomuxc-1g.dtb
└──console
rootfs.tar.bz2
```

to flash Linux QT to 1G NAND Flash by mfgtool2-console-ddr256m-nand1g.vbs, below files are needed (Mfgtools\Profiles\Linux\OS Firmware\files\ linux)

```
│  logo-7.bmp
│  zImage
│  u-boot-256mnand-ddr256m.imx
├──qt4
│  rootfs-nand.tar.bz2
└──dtb
imx6ul-14x14-evk-gpmi-gpio-1g.dtb
imx6ul-14x14-evk-gpmi-iomuxc-1g.dtb
```

2. double click mfgtool2-console-ddr256m-nand256m.vbs, mfgtool2-qt4-ddr256m-nand256m.vbs, mfgtool2-console-ddr256m-nand1g.vbs, mfgtool2-qt4-ddr256m-nand1g.vbs on PC to start flashing. The four couples of jumpers are all on left of NAND Flash.

3.2.2 Flash OS Image by SD Card

Notice: during OS Flashing by SD card, please do not connect the board with SDIO WIFI module

Flash tool path

OKMX6UL-C3\Linux\tools\SD\ 1G_nand\nand-createSdcard-qt4.tar.bz2 (Linux QT for OKMX6UL-C3 with 256M DDR3 and 1G NAND Flash)

OKMX6UL-C3 \Linux\tools\SD\ 256M_nand\256M_nand-createSdcard-qt4.tar.bz2 (Linux QT for OKMX6UL-C3 with 256M DDR3 and 256M NAND Flash)

OKMX6UL-C3 \Linux\tools\SD\ emmc\emmc-createSdcard-qt4.tar.bz2 (Linux QT for OKMX6UL-C3 with 512M LvDDR3 and 4G eMMC)

Flash tools for Linux QT and Linux console are different, rootfs file systems in system are different, other device trees and uboot are without any difference.

3.2.2.1 Make an SD card for OKMX6UL-C3 with 4G eMMC

1. Make SD card

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Firstly, please copy emmc-createSdcard-qt4.tar.bz2 to Ubuntu (any directory you like), here we suppose it to be /home/forlinx/work

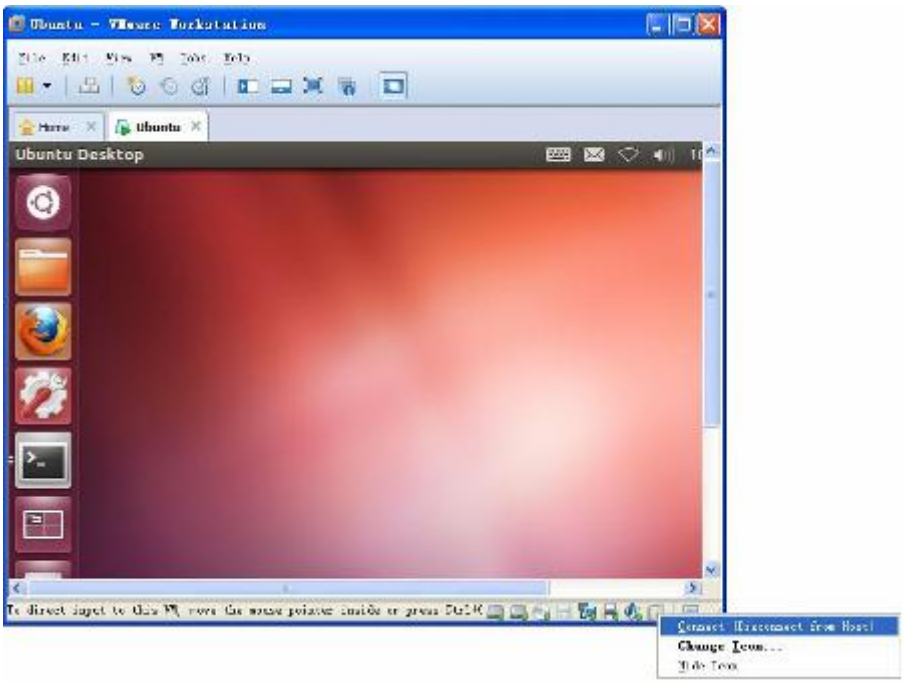
Steps are as below

1. extract createSdcard-qt4.tar.bz2 by below command

#cd /home/forlinx/work/

#tar xvf createSdcard-qt4.tar.bz2

2.plug SD to PC via an USB card reader (if the U-disk could not be recognized by VMware, please connect as below)



step into /home/forlinx/work/createSdcard-qt4 and execute below script

./createSdCard.sh

After the above command, PC disk and U-disk will be listed on the terminal, please select your SD card accordingly and press Enter key.

Notice: Users could recognize which one is your U-disk according to check its capability by sda/sdb/sdc, if your U-disk capability is 4G, then its size will be shown as 3872256 byte≈ 4G.. to avoid confusion, it's better not to work with U-disk more than 1.

Select 1 and press enter key

Format it, select Y and press enter key to finish formatting

Format is done as below

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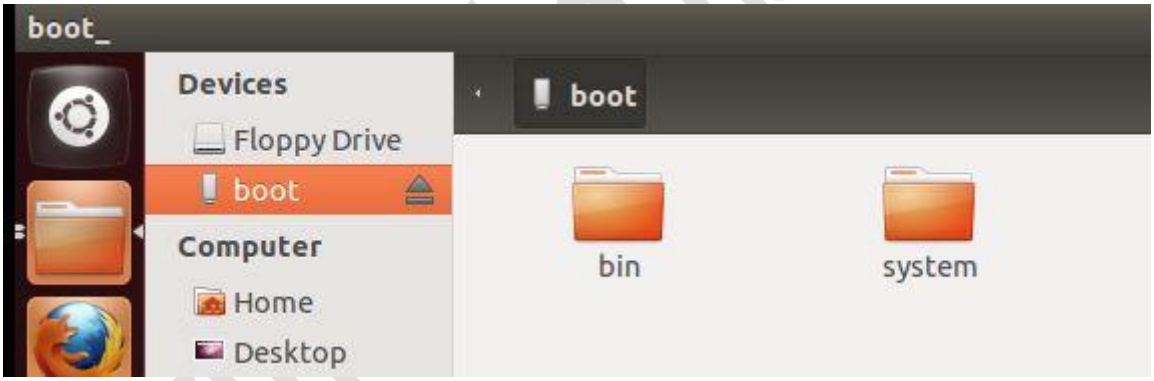
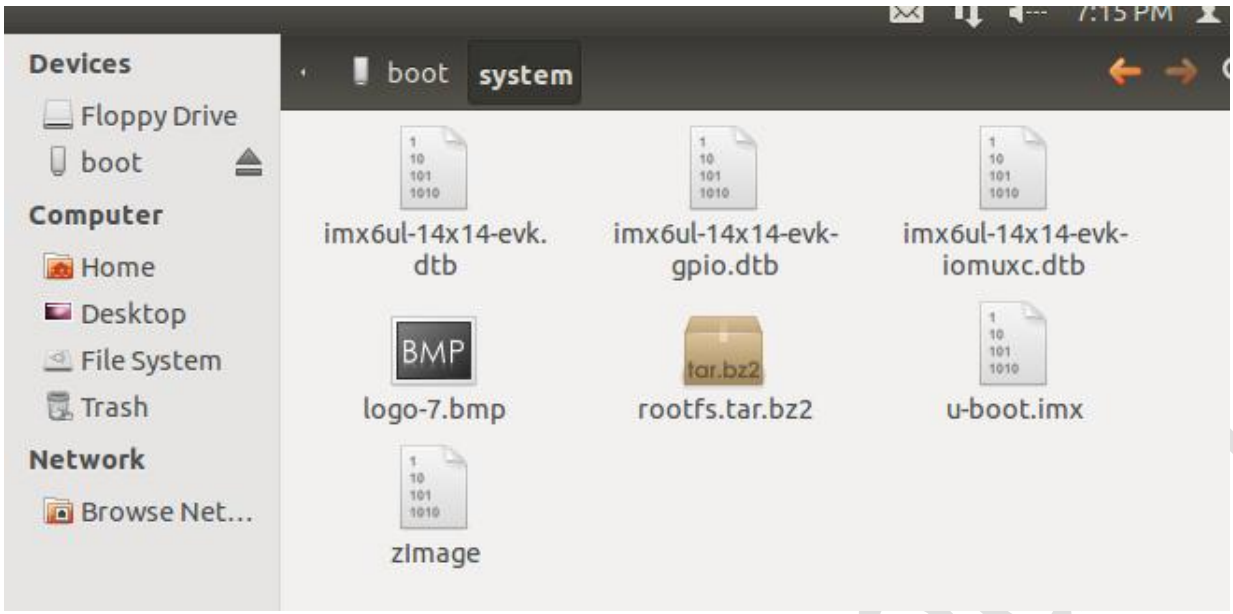
```
untar update.tar.bz2 to boot partition
bin/
bin/zImage
bin/u-boot.imx
bin/imx6ul-14x14-evk.dtb
bin/ramdisk.img.u
bin/imx6ul-14x14-evk.dts
system/
system/rootfs.tar.bz2
system/zImage
system/u-boot.imx
system/imx6ul-14x14-evk.dtb
system/logo.bmp
Buring th u-boot.imx to sdcard
129+0 records in
129+0 records out
132096 bytes (132 kB) copied, 0.284852 s, 464 kB/s
315+0 records in
315+0 records out
322560 bytes (323 kB) copied, 1.49111 s, 216 kB/s

Syncing....


Un-mount the partitions

Remove created temp directories

Operation Finished
```

Then you can see there are bin and system folder in boot folder, files in bin folder could not modified, and files in system folder will be flashed to eMMC, see as below





SD card for Linux console and Linux QT are just different with system/rootfs.tar.bz2, users could switch in windows, but please noticed that file name should be rootfs.tar.bz2

Notice: users just create the SD card one time, in the future, if users want to replaced with new file system, just need copy new compiled u-boot.imx, zImage and rootfs.tar.bz2 to system folder to replace the original images, Replace imx6ul-14x14-evk.dtb by any device tree to select the correspond device tree in uboot menu
Eg. Rename imx6ul-14x14-evk.dtb as imx6ul-14x14-evk-7-r.dtb, select boot logo as 1-7.0 inch Resistance. imx6ul-14x14-evk.dtb is the default device tree to be flashed to OKMX6UL-C3

2. Flash OS image to OKMX6UL-C3 by SD card

Plug in the above prepared SD card to card slot of the board, set the board to be booted from eMMC, keep pressing boot key, click reset key or connect the board with power, then release boot key, system will be booted from SD card. Flash OS to eMMC,

After flashing, it will be shown as below printed information

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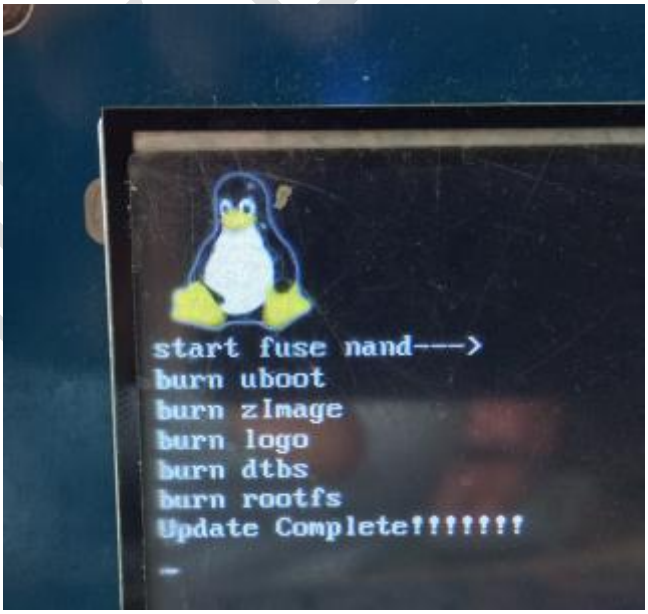
Below “update complete!!!” indicates OS image was flashed to the board.



After flashing, please press reset key, system will boot from eMMC.

3.2.2.2 Flash OS image to NAND Flash by SD card

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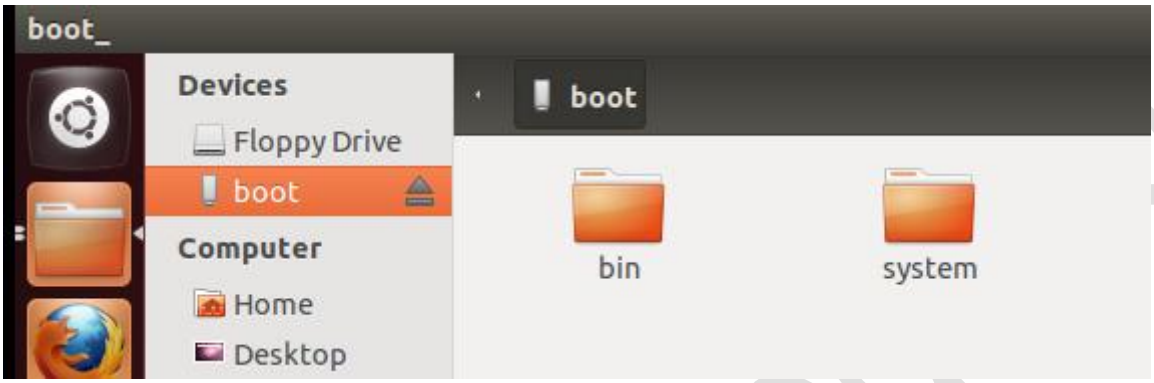
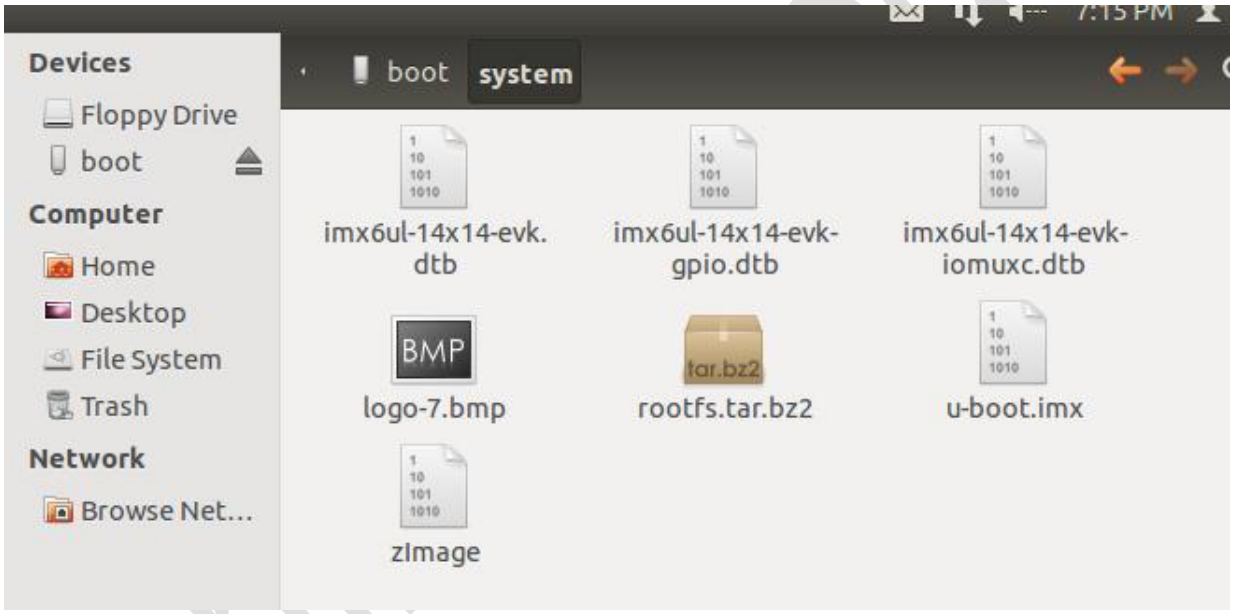
1. Make SD card

Firstly, please copy nand-createSdcard-qt4.tar.bz2 to Ubuntu (any directory you like), here we suppose it to be /home/forlinx/work

Steps are same as card making for eMMC

After making the card, there will be bin and system directories, please do not do any change to bin, and flash files in system to NAND Flash





SD card for Linux console and Linux QT are just different with system/rootfs.tar.bz2, users could switch in windows, but please noticed that file name should be rootfs.tar.bz2

Notice: users just create the SD card one time, in the future, if users want to replaced with new file system, just need copy new compiled u-boot.imx, zImage and rootfs.tar.bz2 to system folder to replace the original images,

Replace imx6ul-14x14-evk.dtb by any device tree to select the correspond device tree in uboot menu

Eg. Rename imx6ul-14x14-evk.dtb as imx6ul-14x14-evk-7-r.dtb, select boot logo as 1-7.0 inch Resistance.

imx6ul-14x14-evk.dtb is the default device tree to be flashed to OKMX6UL-C3

2. Flash OS image to OKMX6UL-C3 by SD card

Plug in the above prepared SD card to card slot of the board, set the board to be booted from NAND, keep pressing boot key, click reset key or connect the board with power, then release boot key, system will be booted from SD card. Flash OS to NAND,

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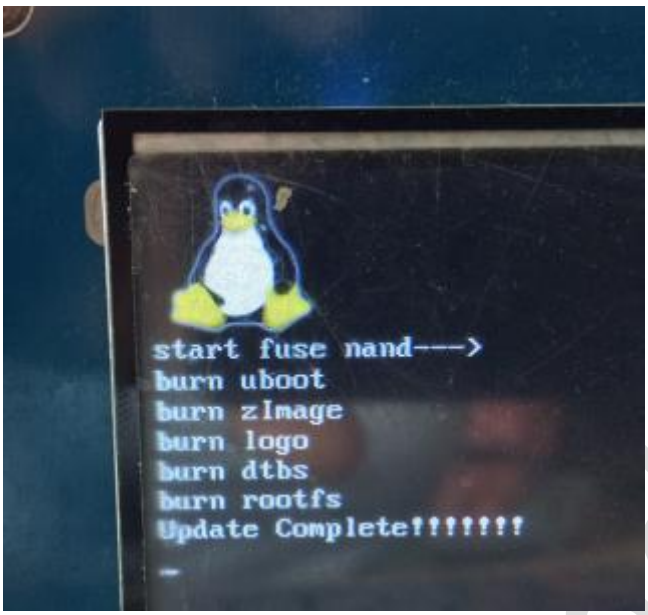
After flashing, it will be shown as below printed information

Below “update complete!!!” indicates OS image was flashed to the board.



After flashing, please press reset key, system will boot from NAND Flash

3.3 Modify LCD Parameters from Uboot

If users do not select device tree when board is booting, the device tree will be (emmc) imx6ul-14x14-evk.dtb, or (nand) imx6ul-14x14-evk-gpmi.dtb

Users could select device tree in uboot menu

1. run serial port debug terminal, power on the board and press space key to get into below menu

```
Hit any key to stop autoboot:  0
---------------MAIN MENU---------------
1. Screen Type Menu
2. Change The Calibrate
0. Exit To Boot Shell
Enter your number:
:1
```

2. type in 1 to step into MENU OF SCREEN TYPE as below

```
---------------MENU OF SCREEN TYPE---------------
1. iomuxc-dtb
2. gpio-dtb
0. return
:
```

iomuxc-dtb is for device tree selection of (emmc) imx6ul-14x14-evk-iomux.dtb;

(256M nand）imx6ul-14x14-evk-gpmi-iomuxc.dtb, its nand_add is 0x700000

(1G nand) imx6ul-14x14-evk-gpmi-iomuxc-1g.dtb，its nand_addr is oxb00000.

gpio-dtb is for device tree selection of (emmc) imx6ul-14x14-evk-gpio.dtb ；

(256M nand) imx6ul-14x14-evk-gpmi-gpio.dtb，its nand_addr is 0x740000。

（1G nand）imx6ul-14x14-evk-gpmi-gpio-1g.dtb，its nand_addr is oxb40000

Input the corresponding sequence to select device tree, eg, to work with iomuxc-dtb device tree, please type in 1 and then input 0 to quit menu, restart the board to make the settings valid.

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3.4 System Updating

1. by SD card

Copy the compiled u-boot.imx, zImage, device tree and rootfs.tar.bz2 to OKMX6UL-C3 \Linux\src\ createSdcard.tar.bz2\update.tar.bz2\system, and flash image to eMMC or NAND Flash accordingly.

2. by USB

Copy the compiled u-boot.imx, zImage, device tree and rootfs.tar.bz2 to OKMX6UL-C3 \Tools\mfgtools\Profiles\Linux\OS Firmware\files \linux, and then flash the image to eMMC or NAND Flash by Mfgtools

3. another method to change device(only available for OKMX6UL-C3 with eMMC but not for NAND)

after system booted, copy imx6ul-14x14-evk-iomuxc.dtb to U-disk, and connect with OKMX6UL-C3, type in hyper terminal below command

#cd /media/mmcblk1p1/

#cp /media/sda1/imx6ul-14x14-evk-iomuxc.dtb /media/mmcblk1p1/imx6ul-14x14-evk-iomuxc.dtb

#sync

#sync

#sync

#reboot

Press any key to get into uboot menu, select option 1 -MENU OF SCREEN TYPE, and then option 1 -iomuxc-dtb,

Then restart the board.

Users could also change other device tree according to this method accordingly.

4. if your board is NAND Flash version, you can also update system as below. Firstly copy flash_erase to file system root

Update kernel

#cd root

#./flash_erase /dev/mtd4 0 0

Erasing 512 Kibyte @ 780000 -- 100 % complete

nandwrite -p /dev/mtd4 -p /root/zImage

Writing at 0x00000000

…

Writing at 0x00580000

Update device tree

#./flash_erase /dev/mtd3 0 0

Erasing 512 Kibyte @ 280000 -- 100 % complete

nandwrite -p /dev/mtd3 -p /root/imx6ul-14x14-evk-gpmi-iomuxc.dtb

Writing at 0x00000000

nandwrite -s 0x40000 -p /dev/mtd3 -p /root/imx6ul-14x14-evk-gpmi-gpio.dtb

Update logo:

#./flash_erase /dev/mtd1 0 0

Erasing 512 Kibyte @ 180000 -- 100 % complete

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#nandwrite -p /dev/mtd1 -p /root/logo-7.bmp

3.5 Recalibration

When Linux QT flashed and booted for the first time, LCD calibration is needed, users could finish calibration by precisely touching "+" step by step, users just need do this calibration work one time, if you want to recalibrate it, please execute below command to delete the former calibration file

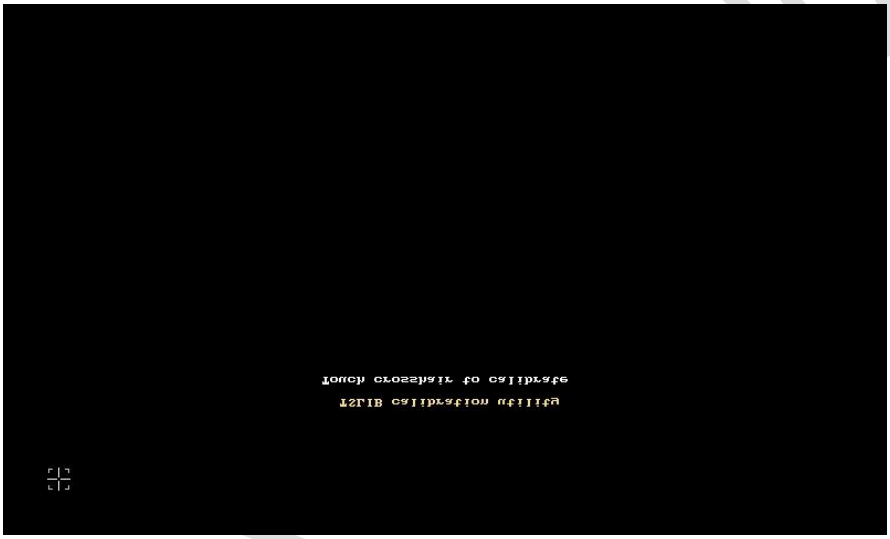
root@freescale ~$ rm /etc/pointercal

root@freescale ~$ sync

power off and then restart the board, you will get calibration interface.

3.6 Power On the Board for the First Time

1. update system and run it for the first time, you will get into LCD TSLIB calibration interface, please finish calibration accordingly



2. you will get below printed information on PC serial terminal, and you just need input "root" and then press enter key to get into command line; about how to work with debug port, please refer to Chapter 4.

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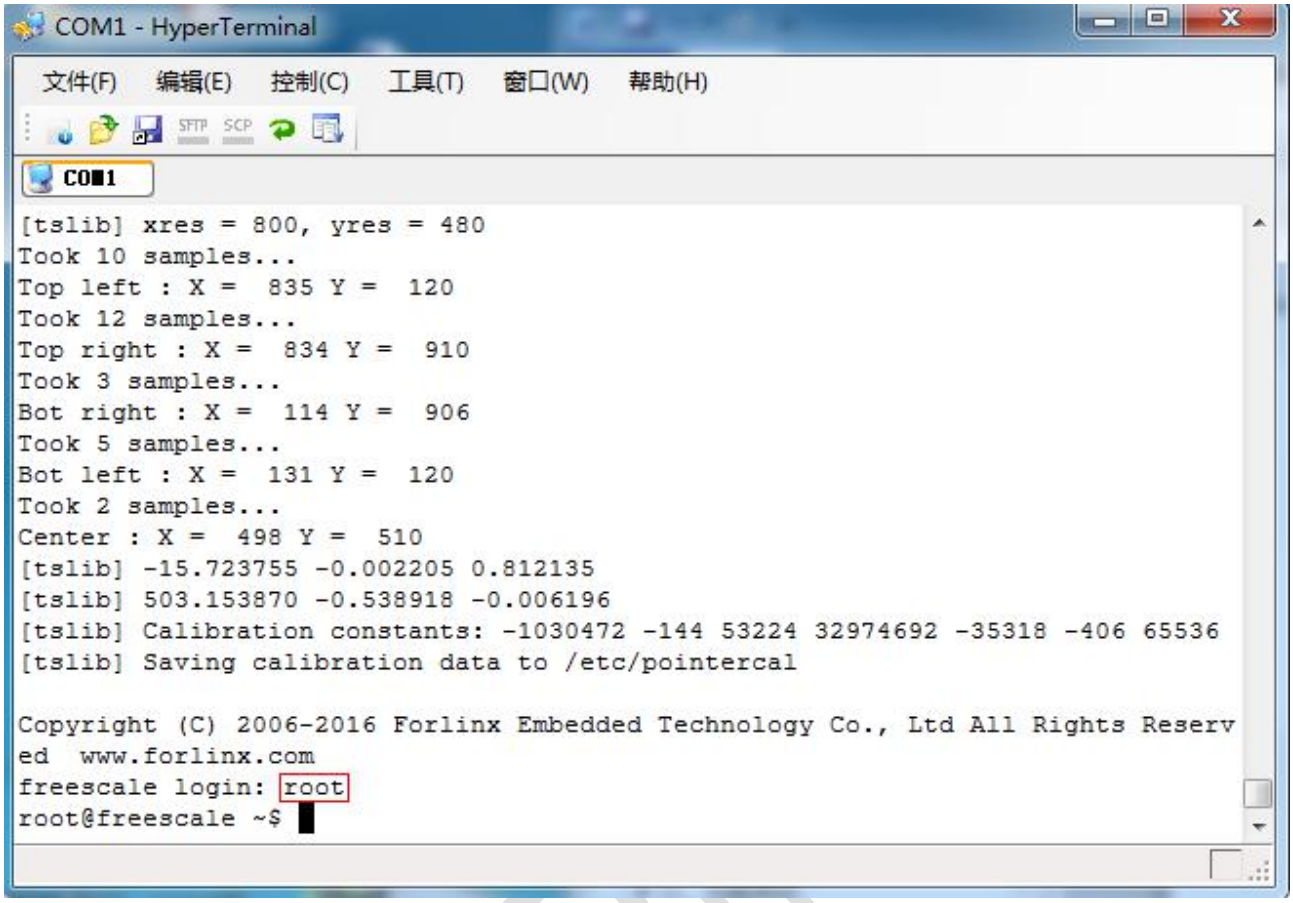

COM1 - HyperTerminal
文件(F) 编辑(E) 控制(C) 工具(T) 窗口(W) 帮助(H)
COM1
[tslib] xres = 800, yres = 480
Took 10 samples...
Top left : X = 835 Y = 120
Took 12 samples...
Top right : X = 834 Y = 910
Took 3 samples...
Bot right : X = 114 Y = 906
Took 5 samples...
Bot left : X = 131 Y = 120
Took 2 samples...
Center : X = 498 Y = 510
[tslib] -15.723755 -0.002205 0.812135
[tslib] 503.153870 -0.538918 -0.006196
[tslib] Calibration constants: -1030472 -144 53224 32974692 -35318 -406 65536
[tslib] Saving calibration data to /etc/pointercal
Copyright (C) 2006-2016 Forlinx Embedded Technology Co., Ltd All Rights Reserved www.forlinx.com
freescale login: root
root@freescale ~$

Chapter 4 How to Work with Linux

In this chapter, start with root@freescale/$ means type in command in serial terminal of PC, and then press Enter key, please **notice** that missing space key in command may cause failure or errors

Sometimes, except type in command in PC serial terminal, users also need sending and receiving data by SSCOM, thus you should make sure the PC is with two serial ports (users could expand it by USB), or work with two PCs.

4.1 Command Line Testing

4.1.1 Work with Serial Port

2x serial port are available on OKMX6UL-C3, they are marked on enclosure as Console and Reader shown as below

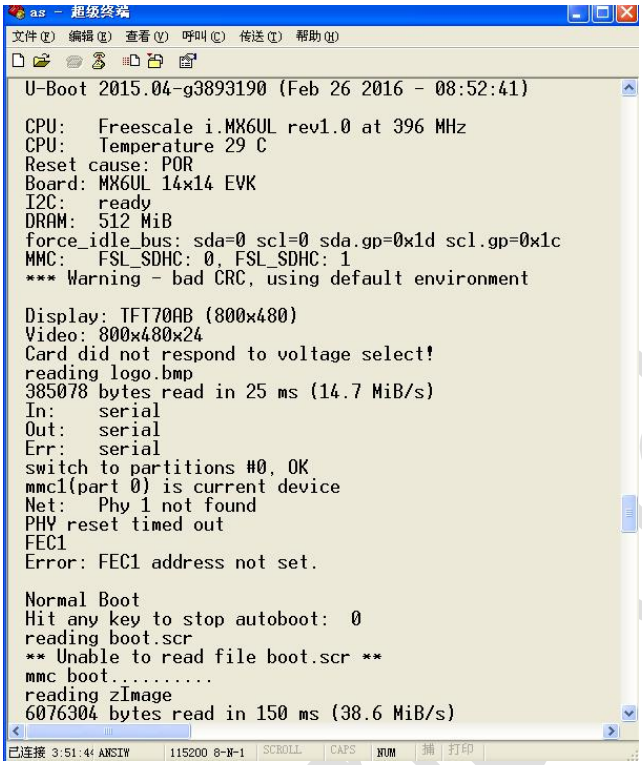
4.1.1.1 Debug Port: Console

The Console port is for checking OKMX6UL-C3 running mode, it is just for debug purpose.

1. connect Console on OKMX6UL-C3 with PC via a serial port cable with dual female headers
2. open hyper terminal (Win 7 users could use OKMX6UL-C3\Tool\Hyper Terminal.rar) to do below settings

Select serial port according

Please notice that here the baud rate is 115200, 8-bit data bit, without parity check, 1-bit stop bit without data flow control. After settings, start the OS and you will get debug information as below



1. users just need input “root” and press Enter key to get into command line

4.1.1.2 Reader Port

Device name of Reader port in Linux system is /dev/ttymxc1

Please check below steps to test this Reader port

1. connect Reader port to PC serial port, match R terminal with TX terminal of PC, and T terminal with RX terminal of PC, G terminal with GND on PC
2. input below command to hyper terminal, after running tty_test, it will send out data “forlinx uart test…..bz” with baud rate of 9600

root@freescale ~$ tty_test /dev/ttyS6

Serial port printing information is shown as below

Welcome to TTYtest! Press Ctrl + 'c' to stop.

/dev/ttymxc2,creat thread 726717552 sucess

/dev/ttymxc2,creat thread 735261808 sucess

abcdefg

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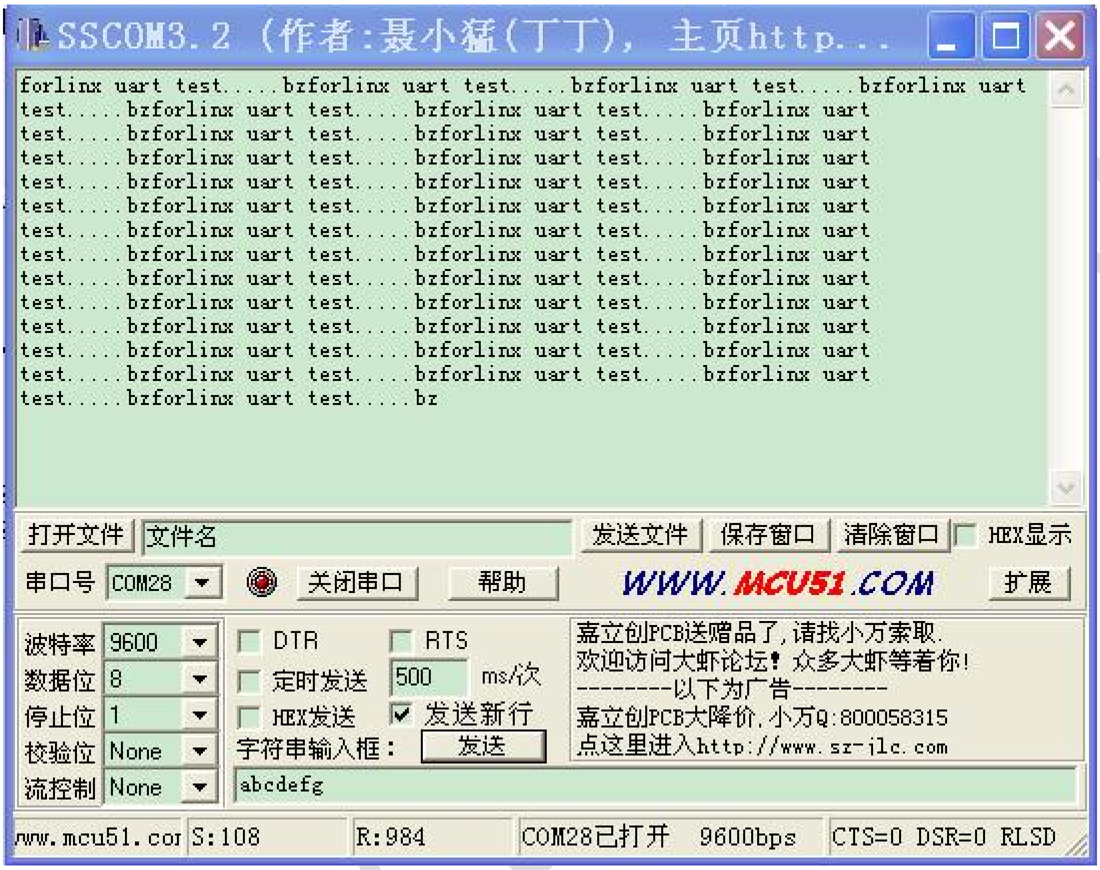
abcdefg

3. Send "abcdefg" from PC to OKMX6UL-C3 by SSCOM3.2 (**notice**; please make sure to choose send a new line for SSCOM3.2, if selecting HEX, please input 0d 0a at the end of character string), when OKMX6UL-C3 is sending out data, T LED will be lightening, when receiving data, R LED will be lightening. SSCOM3.2 is saved in OKMX6UL-C3\Tool



4.1.2 Display Testing

Cut off power supply, connect OKMX6UL-C3 with a 7'' LVDS display, power on the board to run system, and start working with the display.

Topway brand 7'' display LMT070DICFWD-AKA is supported by this OKMX6UL-C3

Folrinx kindly provide file system with tslib of LMT070DICFWD-AKA, if you want to port your own tslib to the unit, please refer to files in Linux\src\topway. topway-tslib.tar.bz2 is a compiled tslib, users just need extract it to rootfs.

4.1.3 PWM Backlight Controlling

Backlight brightness is rating from 1 to 7, 7 is the highest brightness and 1 is for closing brightness. Get into system and type in below command to hyper terminal to test backlight

Notice: iomux node is different with GPIO, iomux is corresponding to backlight.8, while gpio node is backlight.9

1. to check current display backlight maximum value

root@freescale/$cat /sys/devices/soc0/backlight.8/backlight/backlight.8/max_brightness

serial port will get current display backlight value

7

2. to check current display backlight value

root@freescale /$cat /sys/devices/soc0/backlight.8/backlight/backlight.8/brightness

serial port will get current display backlight value

6

3. to set backlight value for the current display

root@freescale/$echo 3 > /sys/devices/soc0/backlight.8/backlight/backlight.8/brightness

after setting, please check by

root@freescale /$cat /sys/devices/soc0/backlight.8/backlight/backlight.8/brightness

serial port will get current display backlight value

3

4.14 System Reset

4.1.4.1 Reset System Manually

Users could press reset key to restart system.

4.1.4.2 Auto Reset by Watchdog

1. set watchdog to reset system time as 5

root@freescale /$ wdttest /dev/watchdog settimeout 5&

```
root@freescale /$ wdttest /dev/watchdog settimeout 5&
root@freescale /$

U-Boot 2015.04-gb365e7091b-dirty (Mar 09 2017 - 14:19:58)

CPU:   Freescale i.MX6UL rev1.0 at 396 MHz
CPU:   Temperature 43 C
Reset cause: POR
Board: MX6UL 14x14 EVK
I2C:   ready
DRAM:  512 MiB
NAND:  256 MiB
MMC:   FSL_SDHC: 0
Display: TFT70AB (800x480)
Video: 800x480x24

NAND read: device 0 offset 0x400000, size 0x80000
 524288 bytes read: OK

NAND read: device 0 offset 0x400000, size 0x80000
 524288 bytes read: OK
 display bmp cfb_console.c
In:    serial
Out:   serial
Err:   serial
Net:   Phy 1 not found
```

2. execute wdttest command, feed the dog in time to avoid restarting (10 is in unit of second)

root@freescale /$ wdttest /dev/watchdog keepalive 10 &

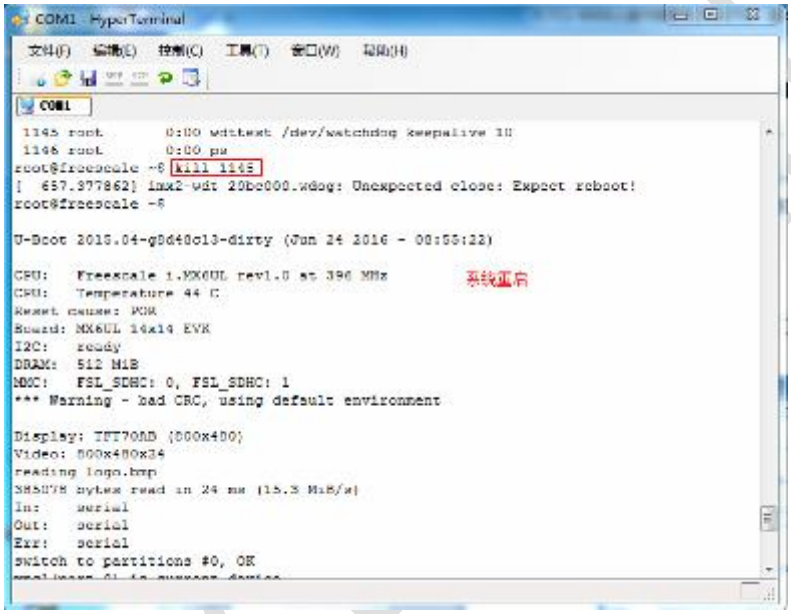
if kill this process, system will be restarted after 10 seconds, please check it by ps command

root@freescale /$ ps

```
1125 root       0:00 /sbin/klogd
1134 nobody     0:00 /sbin/boa
1140 root       0:00 {rc_mxc.S} /bin/bash /etc/rc.d/rc_mxc.S
1141 root       0:07 ./fluidlauncher -qws
1143 root       0:00 -sh
1145 root       0:00 wdttest /dev/watchdog keepalive 10
1146 root       0:00 ps
```

Kill the process by below command

root@freescale /$ kill 1145



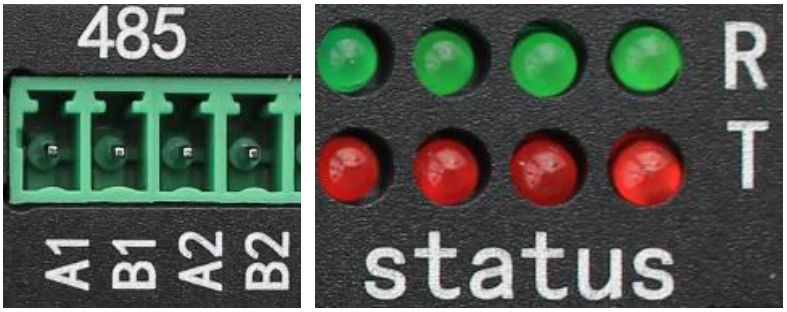
/etc/rc.d/rc.local is added with # wdtdogreset &, to turn on this function, users should delete the precding comments and restart the unit

4.1.5 RS485 Testing

Connect a RS485 module with OKMX6UL-C3 or connect RS485 on two OKMX6UL-C3 (A1 to A1, B1 to B1) to test RS485

/dev/ttymxc3 is for 485_1, and /dev/ttymxc4 is for 485_2, the file system is /dev/ttyS4.

when OKMX6UL-C3 is sending out data. The T LED will be lightening, while when OKMX6UL-C3 is receiving data, the R LED will be lightening.



There are two testing methods

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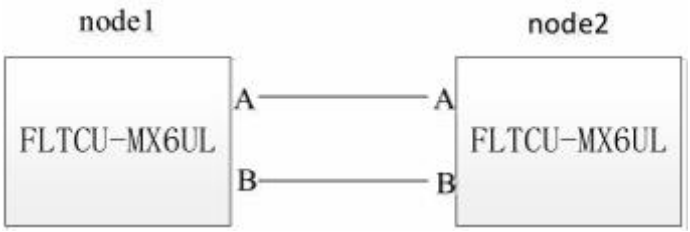
Method 1:

Connect two OKMX6UL-C3 as below



Type in below command to node1 in hyper terminal, during sending mode, users cold press “Ctrl+C” to pause the testing

root@freescale /$ 485-test /dev/ttyS3 9600

printing information is as below

```
root@freescale /$ 485-test  /dev/ttymxc3 9600

Welcome to TTYtest! Press Ctrl + 'c' to stop.

/dev/ttymxc3,creat thread 1994450032 sucess
/dev/ttymxc3,creat thread 1986061424 sucess
sendTotal=    9 num =    1 send = "3DUfw
sendTotal=   18 num =    2 send = "3DUfw
sendTotal=   27 num =    3 send = "3DUfw
recvTotal=  10 num =  1 recv =
bd18011110ff114ba
recvTotal=  20 num =  2 recv =
bd18011110ff114ba
sendTotal=   36 num =    4 send = "3DUfw
recvTotal=  30 num =  3 recv =
bd18011110ff114ba
sendTotal=   45 num =    5 send = "3DUfw

/dev/ttymxc3,Send: 5 ,Receive: 3
```

Type in below command to node2 in hyper terminal, during sending mode, users cold press “Ctrl+C” to pause the testing

root@freescale /$ 485-test /dev/ttyS3 9600

printed information is as below

```
root@freescale /$ 485-test  /dev/ttymxc3 9600

Welcome to TTYtest! Press Ctrl + 'c' to stop.

/dev/ttymxc3,creat thread 1994450032 sucess
/dev/ttymxc3,creat thread 1986061424 sucess
sendTotal=    9 num =    1 send = "3DUfw
sendTotal=   18 num =    2 send = "3DUfw
sendTotal=   27 num =    3 send = "3DUfw
recvTotal=  10 num =  1 recv =
bd18011110ff114ba
recvTotal=  20 num =  2 recv =
bd18011110ff114ba
sendTotal=   36 num =    4 send = "3DUfw
recvTotal=  30 num =  3 recv =
bd18011110ff114ba
sendTotal=   45 num =    5 send = "3DUfw

/dev/ttymxc3,Send: 5 ,Receive: 3
```

Please test RS485-2 by below command, and steps are same as RS485-1

root@freescale /$ 485-test /dev/ttyS4 9600

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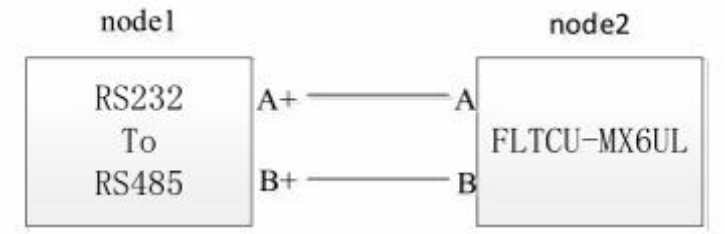
method 2

connect a RS232 to RS485 module with RS485 on OKMX6UL-C3, connect A+ (RS232 to RS485 module) with A (OKMX6UL-C3), and B+(RS232 to RS485 module) with B (OKMX6UL-C3)



Type in below command in hyper terminal, and meanwhile SSCOM3.2 on PC will receive this character string, during sending mode, users could pause it by "Ctrl+C"

root@freescale /$ 485-test /dev/ttyS4 9600

```
root@freescale /$ 485-test  /dev/ttymxc3 9600

Welcome to TTYtest! Press Ctrl + 'c' to stop.

/dev/ttymxc3,creat thread 1994450032 sucess
/dev/ttymxc3,creat thread 1986061424 sucess
sendTotal=    9 num =    1 send = "3DUfw
sendTotal=   18 num =    2 send = "3DUfw
sendTotal=   27 num =    3 send = "3DUfw
recvTotal=  10 num =  1 recv =
bd18011110ff114ba
recvTotal=  20 num =  2 recv =
bd18011110ff114ba
sendTotal=   36 num =    4 send = "3DUfw
recvTotal=  30 num =  3 recv =
bd18011110ff114ba
sendTotal=   45 num =    5 send = "3DUfw

/dev/ttymxc3,Send: 5 ,Receive: 3
```

Send "abd180011110ff0114ba" by SSCOM3.2 from PC to OKMX6UL-C3

Notice: please set SSCOM3.2 to send new line

Test RS485-2 by below command and steps are same with RS485-1

root@freescale /$ 485-test /dev/ttyS4 9600

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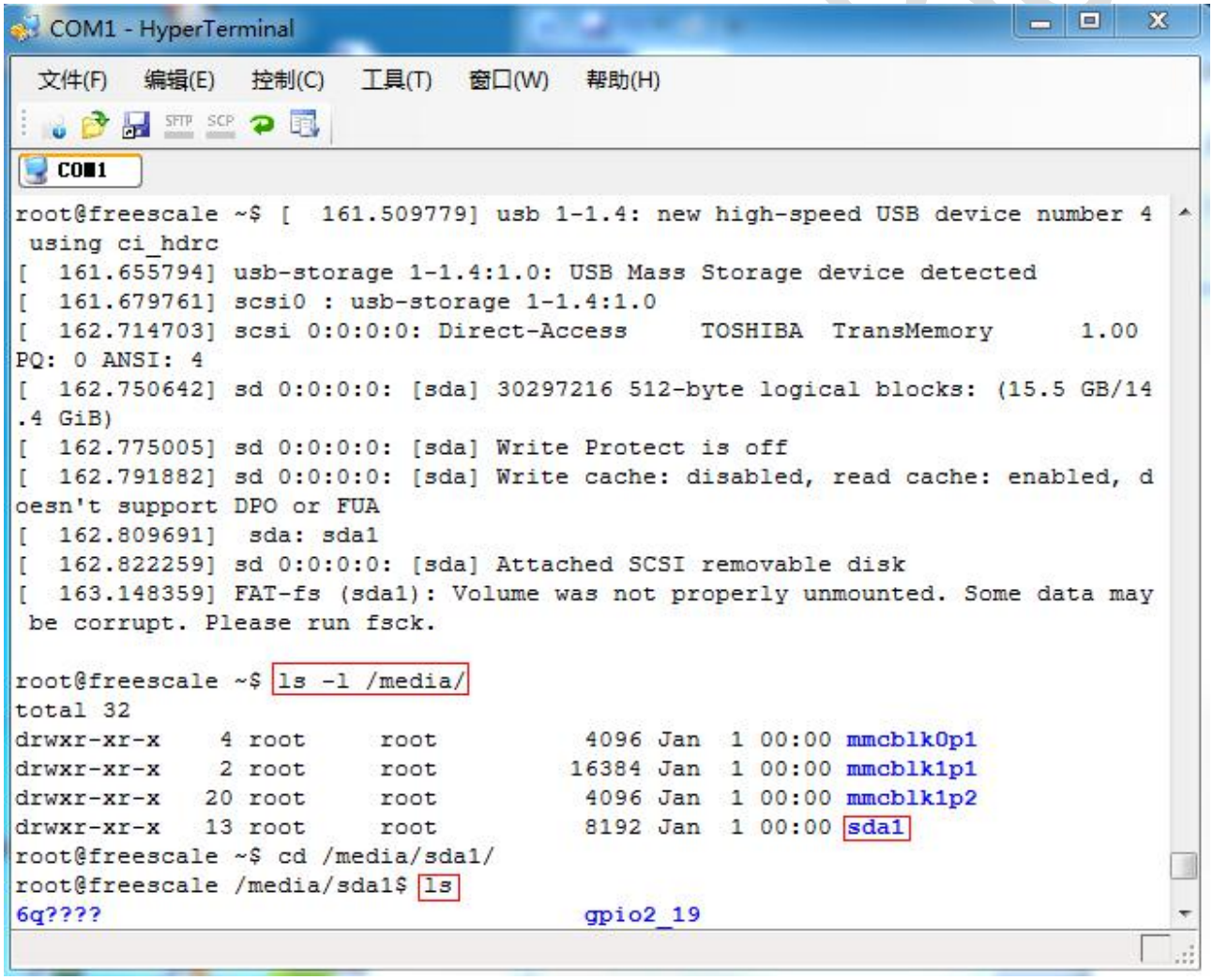
4.1.6 USB Testing

4.1.6.1 USB host storage testing

Connect an U-disk to OKMX6UL-C3 and hyper terminal will print below information



If the U-disk can automatically mounted to /media/sdxx and available for visiting, then it indicates the USB host port works well

4.1.6.2 USB to OTG converted to host testing

Connect u-disk to OTG port on OKMX6UL-C3 by cable, and U-disk is available for visiting

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```
root@freescale /$ [  145.410464] usb 1-1: new high-speed USB device number 3 using ci_hdrc
[  145.572758] usb-storage 1-1:1.0: USB Mass Storage device detected
[  145.602199] scsi1 : usb-storage 1-1:1.0
[  146.612962] scsi 1:0:0:0: Direct-Access     Generic  Mass-Storage     1.11 PQ: 0 ANSI: 2
[  147.394973] sd 1:0:0:0: [sda] 15523840 512-byte logical blocks: (7.94 GB/7.40 GiB)
[  147.405308] sd 1:0:0:0: [sda] Write Protect is off
[  147.412680] sd 1:0:0:0: [sda] No Caching mode page found
[  147.418076] sd 1:0:0:0: [sda] Assuming drive cache: write through
[  147.433406] sd 1:0:0:0: [sda] No Caching mode page found
[  147.438792] sd 1:0:0:0: [sda] Assuming drive cache: write through
[  147.449844]  sda: sda1
[  147.460914] sd 1:0:0:0: [sda] No Caching mode page found
[  147.466268] sd 1:0:0:0: [sda] Assuming drive cache: write through
[  147.490319] sd 1:0:0:0: [sda] Attached SCSI removable disk
[  147.664569] FAT-fs (sda1): Volume was not properly unmounted. Some data may be corrupt. Please run fsck.
```

To check content in U-disk by #ls –la /media/sda1

```
root@freescale /$ ls -la /media/sda1/
total 148
drwxr-xr-x    4 root     root          4096 Jan  1 00:00 .
drwxr-xr-x    8 root     root          4096 Jan  1 00:00 ..
drwxr-xr-x    2 root     root          4096 Oct 31  2016 bin
-rwxr-xr-x    1 root     root         35039 Jan  1  1980 imx6ul-14x14-evk-csi-ok.dtb
-rwxr-xr-x    1 root     root         36415 Oct 31  2016 imx6ul-14x14-evk-csi.dtb
-rwxr-xr-x    1 root     root         36419 Oct 31  2016 imx6ul-14x14-evk.dtb
-rwxr-xr-x    1 root     root         22898 Nov  1  2016 led.png
drwxr-xr-x    2 root     root          4096 Oct 31  2016 system
```

4.1.6.3 USB OTG g_mass_storage testing

Mount an U-disk or an SD card to PC

Firstly, please connect the U-disk or SD card to OKMX6UL-C3 (modify file=xxx, xxx is device name of U-disk or SD card, eg. file=/dev/mmcblk0p1, for SD card), and then connect OTG to PC

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Upload modules one by one

root@freescale ~$ insmod /lib/modules/3.14.38-6UL_ga\+ge4944a5/kernel/fs/configfs/configfs.ko

root@freescale ~$ insmod /lib/modules/3.14.38-6UL_ga\+ge4944a5/kernel/drivers/usb/gadget/libcomposite.ko

root@freescale ~$ insmod /lib/modules/3.14.38-6UL_ga\+ge4944a5/kernel/drivers/usb/gadget/usb_f_mass_storage.ko

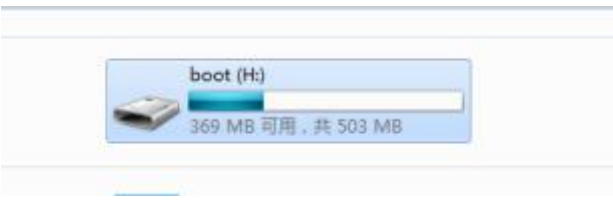
Upload U-disk by below command

root@freescale ~$ insmod /lib/modules/3.14.38-6UL_ga\+ge4944a5/kernel/drivers/usb/gadget/g_mass_storage.ko file=/dev/sda1 removable=1

serial port will print below information

[374.255909] Number of LUNs=8
[374.258847] Mass Storage Function, version: 2009/09/11
[374.269131] LUN: removable file: (no medium)
[374.274227] Number of LUNs=1
[374.277427] LUN: removable file: /dev/sda1
[374.281550] Number of LUNs=1
[374.285608] g_mass_storage gadget: Mass Storage Gadget, version: 2009/09/11
[374.292609] g_mass_storage gadget: userspace failed to provide iSerialNumber
[374.300543] g_mass_storage gadget: g_mass_storage ready
root@freescale ~$ [374.535681] g_mass_storage gadget: high-speed config #1: Linux File-Backed Storage

U-disk (will be mounted to PC), users could read or write to U-disk



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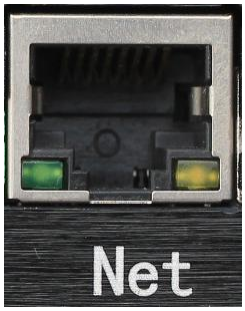
4.1.7 NIC Testing

4.1.7.1 Ethernet Testing

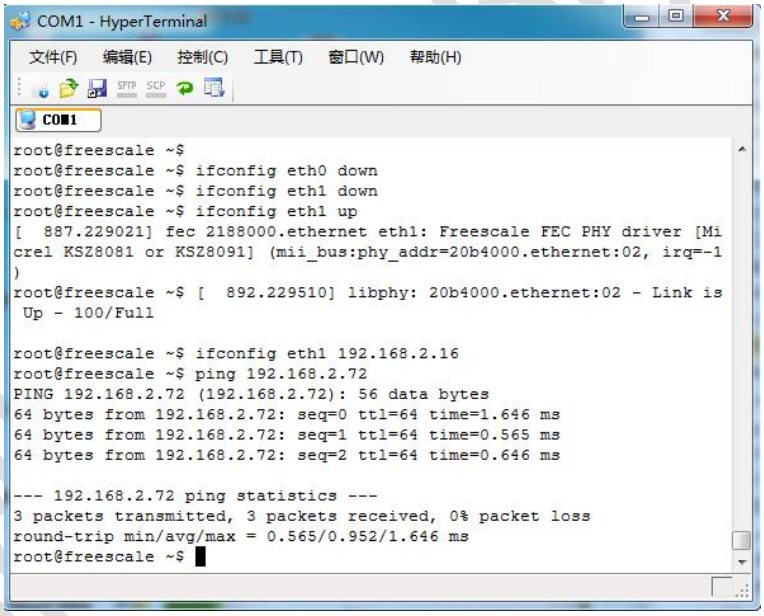
2x fast Ethernet ports are available on OKMX6UL-C3, one port is a preserved port without soldering. Before testing, please connect PC with OKMX6UL-C3 via an Ethernet cable, and set PC IP as fixed IP (here we set it as 192.168.2.72), and set net as eth1, the default IP is 192.168.0.232



Type in below command to hyper terminal to set OKMX6UL-C3 IP as 192.168.0.72, type in ping command

root@freescale ~$ifconfig eth1 192.168.0.72

if the Ethernet works well, it will show below information



Stop ping testing by Ctrl+C

4.1.7.2 Ethernet Related Service

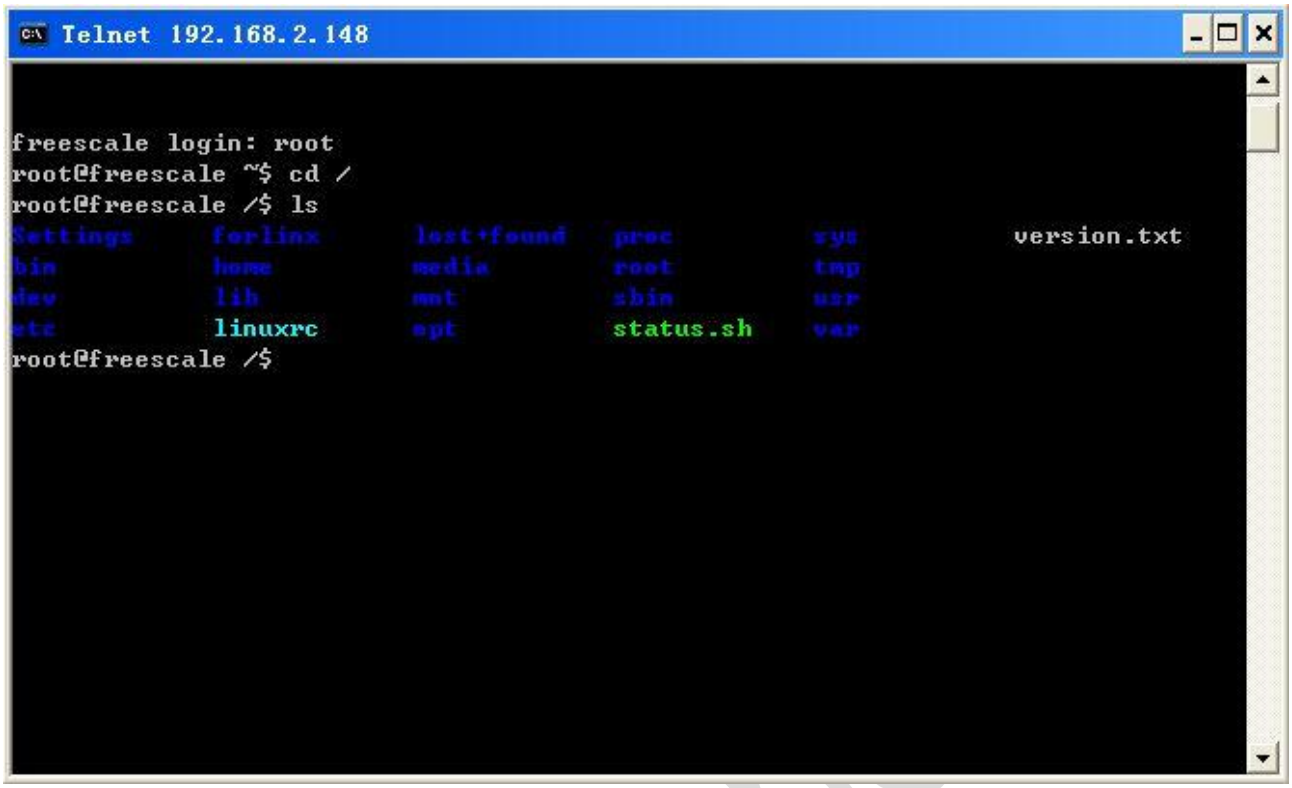
Telnet service

Telnet service is set in /etc/inetd.conf for single board computer iMX6 which could be used as a telnet server once the IP is set.

To check whether the telnet service is available by below command

root@freescale ~$ netstat -al

Example: single board computer iMX6 IP is 192.168.2.148, type in telnet 192.168.2.148 in windows as user name root and none code(click start-> run, input cmd and press enter key to step into windows command interface)



Web service

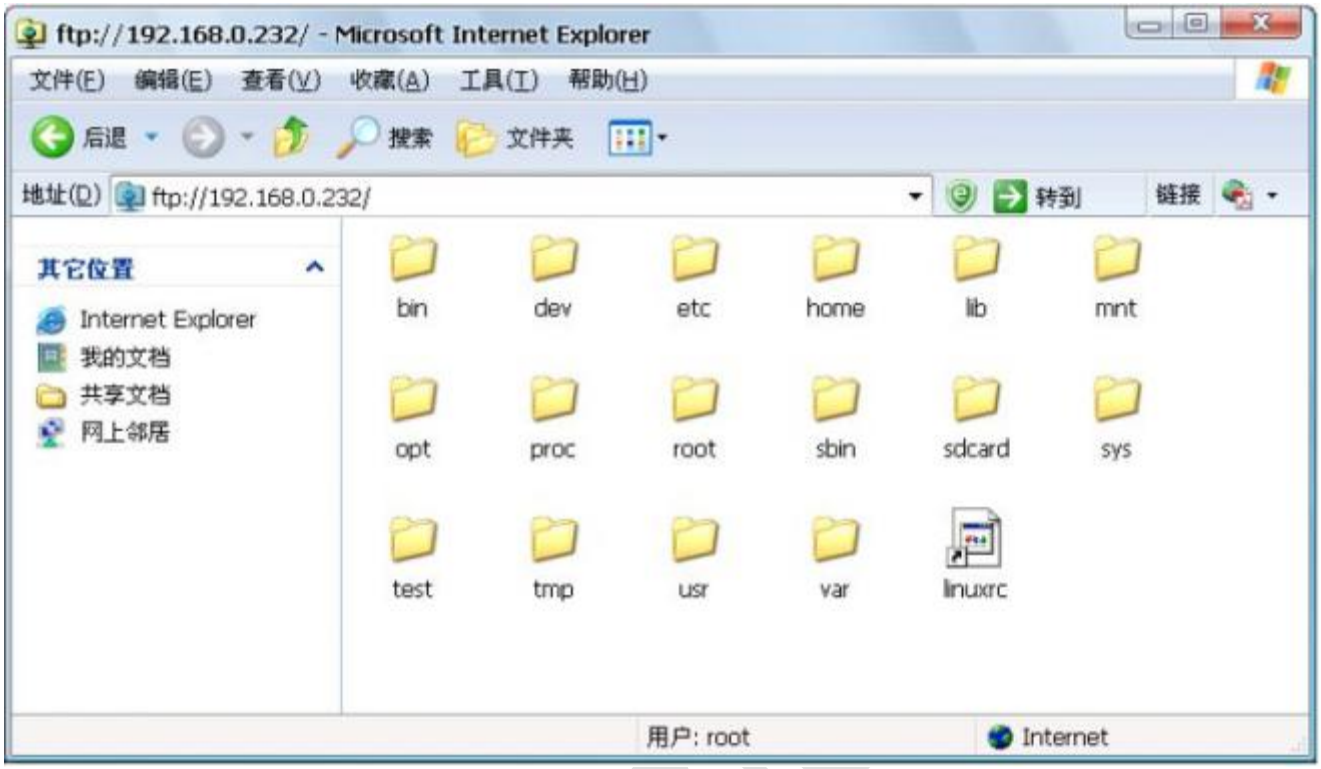
We imported webserver：boa for the single board computer

boa webserver is a compact and high-efficiency web server which could run in Unix or Linux supported with CGI and opening source code, it's specially suitable for embedded system with single command http server

The boa is automatically to run as system is booted, input IP address in IE to browse network pages in webserver

FTP service

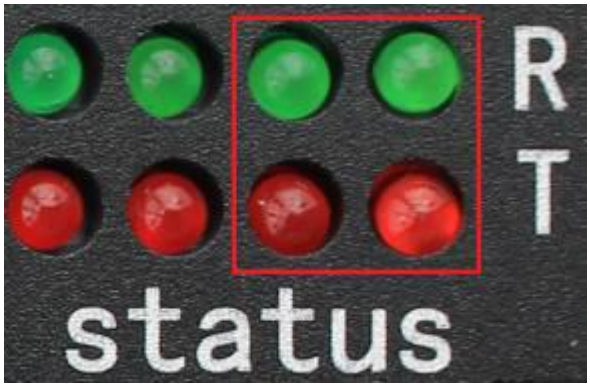
The FTP service automatically boots with the system, and users could visit software by this. The user name is toot and pass code is root.



By FTP, users could transfer files between single board computer and PC

4.1.8 CAN Testing

Two CAN ports are available on OKMX6UL-C3, L header and H1 header are for CAN1 port, L2 header and H2 header are for CAN2 port.



The OKMX6UL-c3 could be used as a CAN device

Connection: connect H header of OKMX6UL-C3 with H header of another CAN device, connect L header of OKMX6UL-C3 with L header of another CAN device

When OKMX6UL-C3 is sending out data, T LED will be lightening, and when it is receiving data, R LED will be lightening

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4.1.8.1 CAN1 Settings and Testing

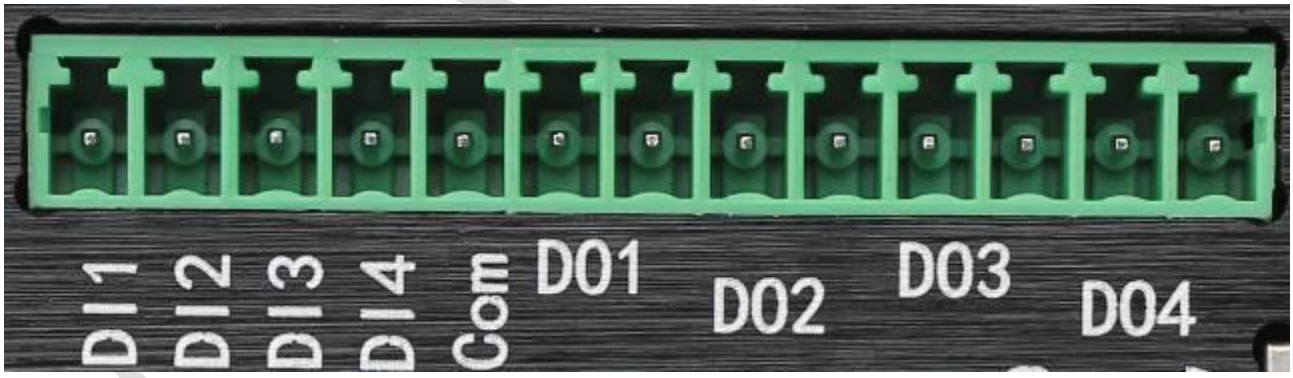
1. can 0 is available with system booting by default
2. take client terminal to send data and server terminal to receive data (users could use two OKMX6UL-C3 to test)
server terminal to receive data by below command
root@freescale ~$candump can0
interface = can0, family = 29, type = 3, proto = 1
client terminal to send data
root@freescale ~$cansend can0 -i 0x10 0x11 0x22 0x33 0x44 0x55 0x66 0x77 0x88
interface = can0, family = 29, type = 3, proto = 1
and server terminal will receive below data
<0x010> [8] 11 22 33 44 55 66 77 88

4.1.8.2 CAN2 Settings and Testing

1. CAN0 is available with system booting by default
2.set client terminal to send data and server terminal to receive data
Server terminal can receive data by below command
root@freescale ~$candump can1
interface = can0, family = 29, type = 3, proto = 1
make client terminal to send data by below command
root@freescale ~$cansend can1 -i 0x10 0x11 0x22 0x33 0x44 0x55 0x66 0x77 0x88
interface = can0, family = 29, type = 3, proto = 1
and then the server terminal will receive below data
<0x010> [8] 11 22 33 44 55 66 77 88

4.1.9 GPIO Testing

DI/DO ports are shown as below



4.1.9.1 Replay output testing (DO)

Method 1 (execute echo command and shell script to control)

Set output to low level
root@freescale/forlinx/test $ ./close.sh 251 DO1 outputs low level
root@freescale/forlinx/test $ ./close.sh 252 DO2 outputs low level
root@freescale/forlinx/test $ ./close.sh 253 DO3 outputs low level
root@freescale/forlinx/test $ ./close.sh 254 DO4 outputs low level

set output to high level
root@freescale/forlinx/test $./open.sh 251 DO1 outputs high level
root@freescale/forlinx/test $./open.sh 252 DO2 outputs high level
root@freescale/forlinx/test $./open.sh 253 DO3 outputs high level
root@freescale/forlinx/test $./open.sh 254 DO4 outputs high level
Method 2 (to control output by write function and c language)
root@freescale/forlinx/test $ ./DO1-high DO1 outputs high
root@freescale/forlinx/test $ ./DO1-low DO1 outputs low

root@freescale/forlinx/test $ ./DO2-high DO2 outputs high
root@freescale/forlinx/test $ ./DO2-low DO2 outputs low

root@freescale/forlinx/test $ ./DO3-high DO3 outputs high
root@freescale/forlinx/test $ ./DO3-low DO3 outputs low

root@freescale/forlinx/test $ ./DO4-high DO4 outputs high
root@freescale/forlinx/test $ ./DO4-low DO4 outputs low

4.1.9.2 Read DI Electronic Level

Method 1 (by device tree iomux-dtb, path: OKMX6UL-C3/Linux/Image/ imx6ul-14x14-evk-iomux.dtb)
When external input high level
root@freescale/forlinx/test $ ./in-test.sh 117
root@freescale/forlinx/test $ ./in-test.sh 118
root@freescale/forlinx/test $ ./in-test.sh 119
root@freescale/forlinx/test $ ./in-test.sh 120

Exporting pin 117.
Setting pin in.
2097152

Exporting pin 118.
Setting pin in.
4194304

Exporting pin 119.
Setting pin in.
8388608

Exporting pin 120.
Setting pin in.
16777216

When external outputs low level
root@freescale/forlinx/test $ ./in-test.sh 117

root@freescale/forlinx/test $ ./in-test.sh 118
root@freescale/forlinx/test $ ./in-test.sh 119
root@freescale/forlinx/test $ ./in-test.sh 120
serial port will output
Exporting pin 117.
Setting pin in.
0

Exporting pin 118.
Setting pin in.
0

Exporting pin 119.
Setting pin in.
0

Exporting pin 120.
Setting pin in.
0
Method 2 (by device tree gpio-dtb, path: OKMX6UL-C3/Linux/Image/ imx6ul-14x14-evk-gpio.dtb)
root@freescale /$ gpio-test in 0
DI1 input high level, gpio 0 state 1
DI1 input low level, gpio 0 state 0

root@freescale /$ gpio-test in 1
DI2 input high level, gpio 1 state 1
DI2 input low level, gpio 1 state 0

root@freescale /$ gpio-test in 2
DI3 input high level, gpio 2 state 1
DI3 input low level, gpio 2 state 0

root@freescale /$ gpio-test in 3
DI4 input high level, gpio 3 state 1
DI4 input low level, gpio 3 state 0

4.1.9.3 Status LED Controlling

The file system is added with green indicators, when system is running, green LED will keep shinning, users could delete preceding comment of source forlinx/test/sys-green.sh & and source forlinx/test/heartbeat.sh & in /etc/rc.d/rc.local
source forlinx/test/sys-green.sh & is with device tree of imx6ul-14x14-evk-iomuxc.dtb, while source forlinx/test/heartbeat.sh & is with device tree of imx6ul-14x14-evk-gpio.dtb, they are just two different solutions to make the green LED keep shinning

to test the indicators, users should delete comment of source forlinx/test/sys-green.sh & and source forlinx/test/heartbeat.sh & in /etc/rc.d/rc.local

modify root@freescale $ vi /etc/rc.d/rc.local to

#source forlinx/test/sys-green.sh &

#source forlinx/test/heartbeat.sh &

Testing method 1 (by device tree iomux-dtb)

To set indicators shinning by below command

root@freescale /forlinx/test$./sys-led-on.sh (both green indicators and red indicators will always lighting)

to set indicator off by below command

root@freescale /forlinx/test$ ./sys-led-off.sh (both green indicators and red indicators will be off)

```
root@freescale /forlinx/test$ ./sys-led-on.sh
sys_run_green ON
sys_error_red ON
root@freescale /forlinx/test$ ./sys-led-off.sh
sys_run_green OFF
sys_error_red OFF
root@freescale /forlinx/test$
```

Testing method 2 (by device tree gpio-dtb)

root@freescale /$ gpio-test out 9 1 green system running indicators off

root@freescale /$ gpio-test out 9 0 green system running indicators on

root@freescale /$ gpio-test out 10 1 red fault indicator off

root@freescale /$ gpio-test out 10 0 red fault indicators lighting

4.1.0 GPRS Module Testing

GPRS module is an optional module, if users buy the OKMX6UL-C3 with 4G module, please refer to chapter 4.14

4.1.10.1 Turn On or Turn Off SIM800A

Method 1 (by device tree gpio-dtb)

root@freescale$ gpio-test out 4 0

root@freescale$ gpio-test out 4 1 turn off SIM800A and indicator will be off

root@freescale$ gpio-test out 4 0

root@freescale$ gpio-test out 4 1 turn on SIM800A and indicator lighing

method 2 (by device tree iomux-dtb)

root@freescale /forlinx/test$ ./gprs-off.sh turn off SIM800A and indicator will be off

root@freescale /forlinx/test$ ./gprs-on.sh turn on SIM800A and indicator will be lighting

4.1.10.2 How Set SIM800A

Connect OKMX6UL-C3 with GPRS module SIM800A, and get into command line to execute below command

root@freescale ~$ pppd call gprs /dev/ttymxc2 &

serial port printing information is as below

timeout set to 15 seconds

abort on (\nDELAYED\r)

abort on (\nBUSY\r)

abort on (\nERROR\r)

```
abort on (\nNO DIALTONE\r)
abort on (\nNO CARRIER\r)
send (^MAT^M)
expect (OK)
AT^M^M
OK
-- got it

send (ATS0=0^M)
expect (OK)
^M
ATS0=0^M^M
OK
-- got it

send (ATE0V1^M)
expect (OK)
^M
ATE0V1^M^M
OK
-- got it

send (AT+CGDCONT=1,"IP","CMNET"^M)
expect (OK)
^M
^M
OK
-- got it

send (ATDT*99***1#^M)
expect (CONNECT)
^M
^M
CONNECT
-- got it

send (^M)
Serial connection established.
using channel 1
Using interface ppp0
Connect: ppp0 <--> /dev/ttymxc2
Warning - secret file /etc/ppp/pap-secrets has world and/or group access
sent [LCP ConfReq id=0x1 <asyncmap 0x0> <magic 0x488b1dc9> <pcomp> <accomp>]
rcvd [LCP ConfReq id=0x1 <asyncmap 0xa0000> <auth pap>]
```

sent [LCP ConfAck id=0x1 <asyncmap 0xa0000> <auth pap>]
rcvd [LCP ConfRej id=0x1 <magic 0x488b1dc9> <pcomp> <accomp>]
sent [LCP ConfReq id=0x2 <asyncmap 0x0>]
rcvd [LCP ConfAck id=0x2 <asyncmap 0x0>]
Warning - secret file /etc/ppp/pap-secrets has world and/or group access
sent [PAP AuthReq id=0x1 user="cmnet" password=<hidden>]
rcvd [PAP AuthAck id=0x1 "Login OK"]
Remote message: Login OK
PAP authentication succeeded
sent [IPCP ConfReq id=0x1 <compress VJ 0f 01> <addr 0.0.0.0> <ms-dns1 0.0.0.0> <ms-dns3 0.0.0.0>]
sent [IPCP ConfReq id=0x1 <compress VJ 0f 01> <addr 0.0.0.0> <ms-dns1 0.0.0.0> <ms-dns3 0.0.0.0>]
rcvd [IPCP ConfReq id=0x1 <addr 192.200.1.21>]
sent [IPCP ConfAck id=0x1 <addr 192.200.1.21>]
rcvd [IPCP ConfRej id=0x1 <compress VJ 0f 01>]
sent [IPCP ConfReq id=0x2 <addr 0.0.0.0> <ms-dns1 0.0.0.0> <ms-dns3 0.0.0.0>]
rcvd [IPCP ConfNak id=0x2 <addr 10.23.184.112> <ms-dns1 202.99.160.68> <ms-dns3 202.99.166.4>]
sent [IPCP ConfReq id=0x3 <addr 10.23.184.112> <ms-dns1 202.99.160.68> <ms-dns3 202.99.166.4>]
rcvd [IPCP ConfAck id=0x3 <addr 10.23.184.112> <ms-dns1 202.99.160.68> <ms-dns3 202.99.166.4>]
local IP address 10.23.184.112
remote IP address 192.200.1.21
primary DNS address 202.99.160.68
secondary DNS address 202.99.166.4

4.1.10.3 Connection Testing

To test whether connection is available by ping www.google.com
root@freescale ~$ ping www.google.com
Serial port printing information is shown as below
PING www.baidu.com (61.135.169.121): 56 data bytes
64 bytes from 61.135.169.121: seq=1 ttl=51 time=2467.756 ms
64 bytes from 61.135.169.121: seq=2 ttl=51 time=4864.425 ms
64 bytes from 61.135.169.121: seq=3 ttl=51 time=4007.484 ms

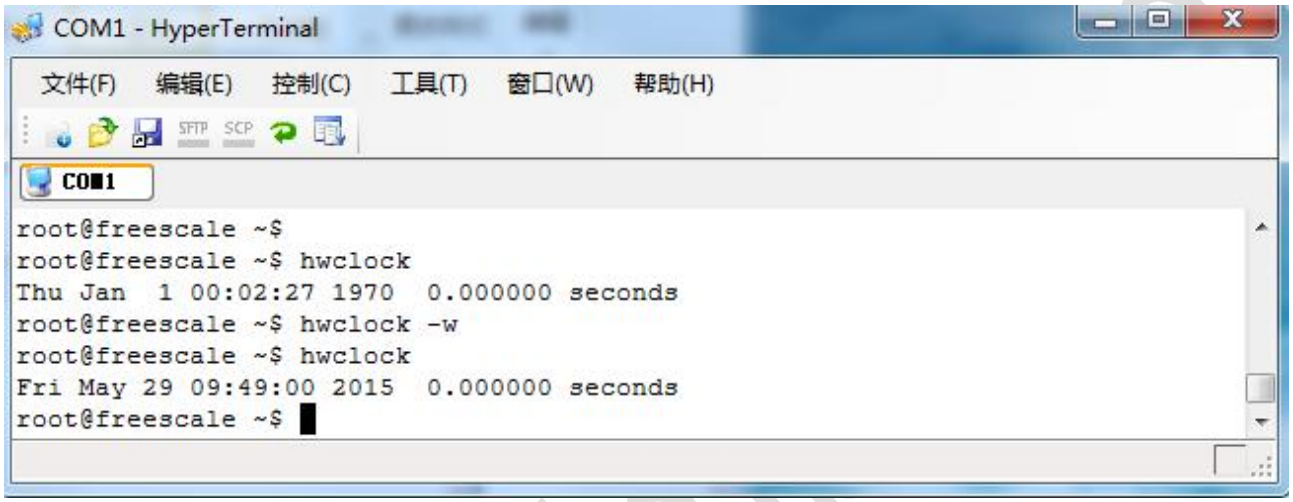
4.1.11 RTC Testing

Before the testing, please make sure the single board computer is with a button cell.
Test RTC by date an hwclock to set software and hardware time.
To check system time by root@freescale ~$ date
RTC setting command is as below
root@freescale ~$ date -s 2015.05.29-09:47:13
Fri May 29 09:47:13 UTC 2015
Note: date form: MMDDhhmm[[YY]YY][.ss]

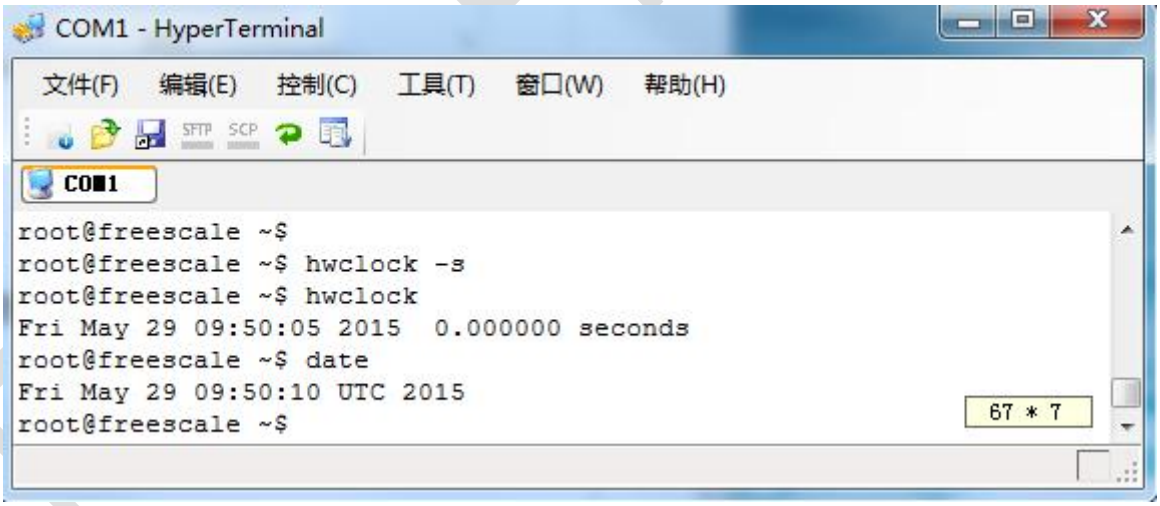
```
root@freescale ~$ date
Thu Jan  1 00:00:43 UTC 1970
root@freescale ~$ date -s 2015.05.29-09:47:13
Fri May 29 09:47:13 UTC 2015
root@freescale ~$ date
Fri May 29 09:47:19 UTC 2015
root@freescale ~$
```

To check hardware time by root@freescale ~$ hwclock

To set time to clock chip by hwclock –w, if without this setting, system time won't update automatically



Power off and restart system to read RTC time by hwclock -s — , if software time and hardware time are keep sync., it indicates RTC is workable



4.1.12 ESAM Module and PSAM Module Testing

4.1.12.1 Turn On or Turn Off ESAM or PSAM

Method 1 (by iomux-dtb)

1. input below command to output low level to ESAM-SIM

root@freescale/forlinx/test $ ./esam-sim-low.sh

ESAM_SIM LOW

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2. execute below command to output high level to ESAM-SIM

root@freescale/forlinx/test $ ./esam-sim-high.sh

ESAM_SIM HIGH

3. execute below command to output low level to ESAM-SIM-PWR

root@freescale/forlinx/test $ ./esam-sim-pwr-low.sh

ESAM_SIM_PWR low

4. execute below command to output high level to ESAM-SIM-PWR

root@freescale/forlinx/test $ ./esam-sim-pwr-high.sh

ESAM_SIM_PWR high

Method 2 (by gpio-dtb)

root@freescale /$ gpio-test 7 0 out output low level to ESAM-SIM

root@freescale /$ gpio-test 7 1 out output high level to ESAM-SIM

root@freescale /$ gpio-test 8 0 out output low level to ESAM-SIM-PWR

root@freescale /$ gpio-test 8 1 out output high level to ESAM-SIM-PWR

4.1.12.2 ESAM Testing

Set ESAM-SIM with low level and ESAM-SIM-PWR with low level, then ESAM module will be workable

Input in debug port root@freescale $ sim-test

And you will get serial port printing information as below

get atr

0x3b 0x69 0x 0 0x 0 0x43 0x21 0x 1 0x 0 0x 0 0x 0 0x 0 0x 9 0xcb

send cmd

xmt errval 0

read result

0xb0 0x12 0x10 0x21 0x 1 0x 0 0x 0 0x 0 0x 0 0x 9

And you will get hexadecimal, it indicates ESAM works well

4.1.12.3 PSAM Testing

Set ESAM-SIM with high level and ESAM-SIM-PWR with low level, then PSAM is available

Execute command of root@freescale $ sim-test

You will get below printing informastion

get atr

0x3b 0x69 0x 0 0x 0 0x43 0x21 0x 1 0x 0 0x 0 0x 0 0x 0 0x 9 0xcb

send cmd

xmt errval 0

read result

0xb0 0x12 0x10 0x21 0x 1 0x 0 0x 0 0x 0 0x 0 0x 9

You will get hexadecimal, it indicates PSAM works well

4.1.13 Brownout Detection

When power works well, PG green LED is lighting, when cut off power, the PG green LED will be off and red LED is lighting. During brownout, the board will be supplied with power by super-capacitor

Test method 1 (by iomux-dtb)

When power is on, to output a value other than 0 by command of root@freescale/forlinx/test $ ./pg.sh

Power failure or cut off power, super-capacitor will supply power to OKMX6UL-C3, execute below command will get value 0

root@freescale/forlinx/test $ ./pg.sh

method 2 (by gpio-dtb)

when power is on, the state value is 1

root@freescale/forlinx/test $ gpio-test in 6

and serial port will print gpio 6 state 1

when power failure or cut off power, the board will get power supply from super-capacitor, and state value will be 0

root@freescale/forlinx/test $ gpio-test in 6

serial port outputs gpio 6 state 0

notice: printing information is not available until the capacitor charging for a while

4.1.14 3G Module Network Testing

Currently ZTE 3G module MF210 (China Union) is supported

1) power on and run OKMX6UL-C3, connect with a 3G module MF210 to PCIE port, check printing information by command of dmesg | grep GSM and below information indicates the 3G module is recognized and uploaded

```
root@freescale /$ dmesg |grep GSM
[    1.461127] usbserial: USB Serial support registered for GSM modem (1-port)
[    2.643039] option 1-1.2:2.2: GSM modem (1-port) converter detected
[    2.661891] usb 1-1.2: GSM modem (1-port) converter now attached to ttyUSB0
[    2.687967] option 1-1.2:2.3: GSM modem (1-port) converter detected
[    2.700721] usb 1-1.2: GSM modem (1-port) converter now attached to ttyUSB1
[    2.726575] option 1-1.2:2.4: GSM modem (1-port) converter detected
[    2.739670] usb 1-1.2: GSM modem (1-port) converter now attached to ttyUSB2
[    2.765545] option 1-1.2:2.5: GSM modem (1-port) converter detected
[    2.778657] usb 1-1.2: GSM modem (1-port) converter now attached to ttyUSB3
[    2.798747] option 1-1.2:2.6: GSM modem (1-port) converter detected
[    2.811819] usb 1-1.2: GSM modem (1-port) converter now attached to ttyUSB4
```

2) type in hyper terminal command of pppd call wcdma-mf210 &

root@freescale ~$ pppd call wcdma-mf210 &

abort on (NO CARRIER)

abort on (ERROR)

abort on (NO DIALTONE)

abort on (BUSY)

abort on (NO ANSWER)

send (AT^M)

expect (OK)

AAT^M^M

Address: 2699 Xiangyang North Avenue, Baoding, Hebei, China. TEL:0312-3102663 FAX:0312-3112651

```
OK
-- got it

send (ATZ^M)
expect (OK)
^M
ATZ^M^M
OK
-- got it

send (AT+CGDCONT=1,\"IP\",\"3gnet\",,0,0^M)
expect (OK)
^M
AT+CGDCONT=1,"IP","3gnet",,0,0^M^M
OK
-- got it

send (AT+CFUN=1^M)
expect (OK)
^M
AT+CFUN=1^M^M
OK
-- got it

send (ATDT*99#^M)
expect (CONNECT)
^M
ATDT*99#^M^M
CONNECT
-- got it

send (^M)
Serial connection established.
Using interface ppp0
Connect: ppp0 <--> /dev/ttyUSB2
CHAP authentication succeeded
CHAP authentication succeeded
Could not determine remote IP address: defaulting to 10.64.64.64
local IP address 10.22.71.228
remote IP address 10.64.64.64
primary DNS address 202.99.160.68
secondary DNS address 202.99.166.4
```

3) after connection, please try ping www.baidu.com

root@freescale ~$ ping www.baidu.com
PING www.baidu.com (61.135.169.121): 56 data bytes
64 bytes from 61.135.169.121: seq=1 ttl=51 time=68.605 ms
64 bytes from 61.135.169.121: seq=2 ttl=51 time=78.753 ms
64 bytes from 61.135.169.121: seq=3 ttl=51 time=68.195 ms

4.1.15 4G Module Testing

The 4G module is an optional module.

Prepare a 4G SIM card for 4G module me909s-821 pci, insert the SIM card to slot, and connect a main antenna ipex, power on and run the board

1. after booting, please input command of root@freescale /$ ifconfig -a and you will get below printing information

```
root@freescale /$ ifconfig -a
can0      Link encap:UNSPEC  HWaddr 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00
          NOARP  MTU:16  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:10
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
          Interrupt:142

can1      Link encap:UNSPEC  HWaddr 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00
          NOARP  MTU:16  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:10
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
          Interrupt:143

eth0      Link encap:Ethernet  HWaddr A2:16:DD:BB:39:BF
          BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

eth1      Link encap:Ethernet  HWaddr 6E:A4:10:BB:84:3C
          BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

lo        Link encap:Local Loopback
          LOOPBACK  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

sit0      Link encap:IPv6-in-IPv4
          NOARP  MTU:1480  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

usb0      Link encap:Ethernet  HWaddr 02:1E:10:1F:00:00
          BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

Input ls –l /dev/ttyUSB* and you will get

```
root@freescale /$ ls -l /dev/ttyUSB*
crw-rw----    1 root     uucp      188,   0 Jan  1 00:00 /dev/ttyUSB0
crw-rw----    1 root     uucp      188,   1 Jan  1 00:00 /dev/ttyUSB1
crw-rw----    1 root     uucp      188,   2 Jan  1 00:00 /dev/ttyUSB2
crw-rw----    1 root     uucp      188,   3 Jan  1 00:00 /dev/ttyUSB3
crw-rw----    1 root     uucp      188,   4 Jan  1 00:00 /dev/ttyUSB4
```

Or input command of dmesg | grep GSM

Address: 2699 Xiangyang North Avenue, Baoding, Hebei, China. TEL:0312-3102663 FAX:0312-3112651

```
root@freescale /$ dmesg |grep GSM
[    1.461127] usbserial: USB Serial support registered for GSM modem (1-port)
[    2.643039] option 1-1.2:2.2: GSM modem (1-port) converter detected
[    2.661891] usb 1-1.2: GSM modem (1-port) converter now attached to ttyUSB0
[    2.687967] option 1-1.2:2.3: GSM modem (1-port) converter detected
[    2.700721] usb 1-1.2: GSM modem (1-port) converter now attached to ttyUSB1
[    2.726575] option 1-1.2:2.4: GSM modem (1-port) converter detected
[    2.739670] usb 1-1.2: GSM modem (1-port) converter now attached to ttyUSB2
[    2.765545] option 1-1.2:2.5: GSM modem (1-port) converter detected
[    2.778657] usb 1-1.2: GSM modem (1-port) converter now attached to ttyUSB3
[    2.798747] option 1-1.2:2.6: GSM modem (1-port) converter detected
[    2.811819] usb 1-1.2: GSM modem (1-port) converter now attached to ttyUSB4
```

The above information indicates 4G module is recognized and uploaded

2. execute below command

root@freescale /$ echo "ATE0" > /dev/ttyUSB2

root@freescale /$ cat /dev/ttyUSB2&

```
root@freescale /$ cat /dev/ttyUSB2&
root@freescale /$

^RSSI: 7


^HCSQ: "LTE",22,46,86,22
```

root@freescale /$ echo "AT^LEDCTRL=1"> /dev/ttyUSB2 turn on status indicator

```
root@freescale /$ echo "AT^LEDCTRL=1"> /dev/ttyUSB2
root@freescale /$

OK
```

root@freescale /$ echo "AT^NDISDUP=1,1,\"cmnet\""> /dev/ttyUSB2

printing information will be as below

```
root@freescale /$

OK


^NDISSTAT: 1,,,"IPV4"


^NDISSTAT: 0,50,,"IPV6"
```

Execute below command

root@freescale /$ ifconfig eth0 down

root@freescale /$ ifconfig eth1 down

root@freescale /$ ifconfig usb0 up

root@freescale /$ udhcpc -iusb0

and printing information will be shown as below

```
root@freescale /$ udhcpc -iusb0
udhcpc (v1.20.2) started
Sending discover...
Sending select for 10.109.195.65...
Lease of 10.109.195.65 obtained, lease time 518400
Deleting routers
adding dns 111.11.1.1
adding dns 111.11.11.1
root@freescale /$
```


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And now you can surf the internet

Execute command of root@freescale /$ ping www.baidu.com and printing information will be shown as below

```
root@freescale /$  ping www.baidu.com
PING www.baidu.com (111.13.100.91): 56 data bytes
64 bytes from 111.13.100.91: seq=0 ttl=52 time=29.643 ms
64 bytes from 111.13.100.91: seq=1 ttl=52 time=36.875 ms
64 bytes from 111.13.100.91: seq=2 ttl=52 time=36.283 ms
64 bytes from 111.13.100.91: seq=3 ttl=52 time=37.762 ms

--- www.baidu.com ping statistics ---
4 packets transmitted, 4 packets received, 0% packet loss
round-trip min/avg/max = 29.643/35.140/37.762 ms
root@freescale /$
```

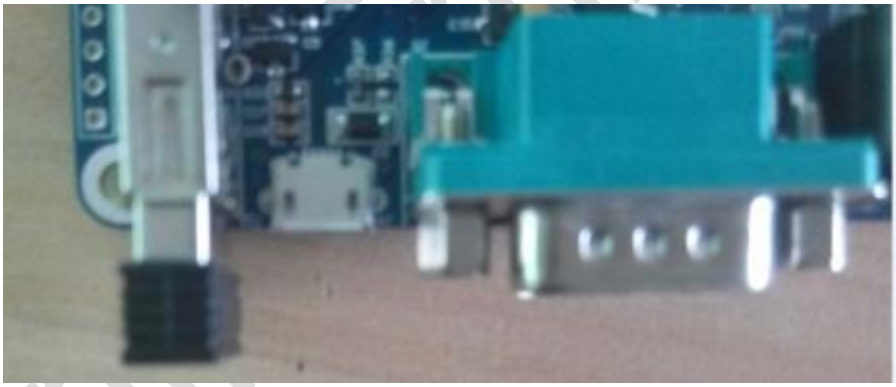
root@freescale/$ echo "AT^NDISDUP=1,0"> /dev/ttyUSB2 disconnect network

Notice: if you have to brownout power and restart system during debug, please do not power on the board until super-capacitor power released off, otherwise, please do not run 4G module

4.1.16 WIFI Testing

4.1.16.1 USB WIFI RTL8188eus Testing

USB WIFI module is an optional module. Please connect it as below:



Step 1: power off the board, connect USB WIFI to USB host of i.MX6 UL as above;

Step2: power on the board to boot OS Linux;

Step3: install rtl8188eus USB wifi module command to load the driver

root@freescale ~$insmod /lib/modules/3.14.38-6UL_ga\+ge4944a5/kernel/drivers/net/wireless/realtek/rtl8188EUS/8188eu.ko

Below printed information indicates the module is recognized

[30.003890] RTL871X: module init start

[30.007684] RTL871X: rtl8188eu v4.3.0.9_15178.20150907

[30.017344] RTL871X: build time: Jan 21 2016 14:03:40

[30.027889] bFWReady == _FALSE call reset 8051...

[30.069201] RTL871X: rtw_ndev_init(wlan0)

[30.099221] usbcore: registered new interface driver rtl8188eu

[30.105089] RTL871X: module init ret=0

Address: 2699 Xiangyang North Avenue, Baoding, Hebei, China. TEL:0312-3102663 FAX:0312-3112651

Step 4: execute below command to detect the wifi status, the router is encoded by wpa

root@freescale ~$ifconfig wlan0

to check printed information by below command

root@freescale ~$ ifconfig wlan0

wlan0 Link encap:Ethernet HWaddr 00:1D:43:50:55:AC
BROADCAST MULTICAST MTU:1500 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)

Step 5: close the Ethernet by below command

root@freescale ~$ifconfig eth0 down

Step 6: run USB WIFI by below command:

root@freescale ~$ifconfig wlan0 up

serial port printed information

root@freescale ~$ ifconfig wlan0 up

[100.300369] ==> rtl8188e_iol_efuse_patch

[100.780189] IPv6: ADDRCONF(NETDEV_UP): wlan0: link is not ready

Step 7: USB WIFI to scan wireless network device by below commands

root@freescale ~$ iwlist wlan0 scan

Cell 04 -Address: 00:21:27:65:77:5E
ESSID:"devnet"
Protocol:IEEE 802.11bg
Mode:Master
Frequency:2.437 GHz (Channel 6)
Encryption key:on
Bit Rates:54 Mb/s
Quality=20/100 Signal level=87/100

- **Encrypt router by wpa**

Step 8: Set USB WIFI ESSID by below command

iwconfig wlan0 essid devnet

Serial port printed information

root@freescale ~$ iwconfig wlan0 essid devnet
[272.011885] RTL871X: set ssid [devnet] fw_state=0x00000008
[272.105854] RTL871X: start auth
[272.115520] RTL871X: auth success, start assoc
[272.124945] RTL871X: assoc success
[272.129019] IPv6: ADDRCONF(NETDEV_CHANGE): wlan0: link becomes ready
[272.162721] RsvdPageNum: 8

Step 9: generate wpa code, wpa_passphrase command to input visible code

wpa_passphrase "devnet" > wpa.conf

1234567890 input visible code, press enter key and it will be save to wpa.conf

Step 10: connect to a router by below command

#wpa_supplicant -Dwext -cwpa.conf -iwlan0 &

Step 11: Auto IP address to allocate dhcp by below command

udhcpc -iwlan0

Step 12: to pin the network gateway by below command

root@freescale ~$ ping www.forlinx.net

```
root@freescale /$ ping www.forlinx.com
PING www.forlinx.com (223.4.217.169): 56 data bytes
64 bytes from 223.4.217.169: seq=0 ttl=116 time=34.545 ms
64 bytes from 223.4.217.169: seq=1 ttl=116 time=33.062 ms
64 bytes from 223.4.217.169: seq=2 ttl=116 time=33.745 ms
```

Step 13: uninstall the module by below command

root@freescale ~$ rmmod 8188eu

serial port will print below information

root@freescale ~$ rmmod 8188eu

[803.621628] RTL871X: module exit start

[803.625464] usbcore: deregistering interface driver rtl8188eu

[803.635545] RTL871X: indicate disassoc

[803.640137] RTL871X: rtw_cmd_thread: DriverStopped(1) SurpriseRemoved(0) break at line 478

[803.649932] RTL871X: rtw_ndev_uninit(wlan0)

[803.699236] RTL871X: rtw_dev_unload: driver not in IPS

[803.799548] usb 1-1.2: reset high-speed USB device number 3 using ci_hdrc

[803.934667] RTL871X: module exit success

4.1.16.2 On-board WIFI Testing

The WIFI module is soldered on carrier board as below

Step 1: if the board is soldered with WIFI&BT, please connect with antenna.

Step 2: power on and run system Linux, uploading the module

root@freescale~$insmod

/lib/modules/3.14.38-6UL_ga\+ge4944a5/kernel/drivers/net/wireless/realtek/rtl8723BU/8723bu.ko

Printing information is as below

[1017.473365] RTL871X: module init start

[1017.477159] RTL871X: rtl8723bu v4.3.16_14189.20150519_BTCOEX20150119-5844

[1017.488320] RTL871X: build time: Jan 21 2016 14:03:53

[1017.494054] RTL871X: rtl8723bu BT-Coex version = BTCOEX20150119-5844

[1017.654291] RTL871X: rtw_ndev_init(wlan0)

Address: 2699 Xiangyang North Avenue, Baoding, Hebei, China. TEL:0312-3102663 FAX:0312-3112651

[1017.681194] usbcore: registered new interface driver rtl8723bu
[1017.687106] RTL871X: module init ret=0
Step 3: execute below command, to check single board computer WIFI mode, router encrypted by wep
root@freescale ~$ifconfig wlan0
serial port will print below information
root@freescale ~$ ifconfig wlan0
wlan0 Link encap:Ethernet HWaddr CC:79:CF:08:4D:B8
BROADCAST MULTICAST MTU:1500 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)
Step 4: turn off NIC by below command
root@freescale ~$ifconfig eth0 down
step 5: run on-board WIFI by below command
root@freescale ~$ifconfig wlan0 up
[1134.327972] IPv6: ADDRCONF(NETDEV_UP): wlan0: link is not ready
Step 6: On-board WIFI to scan wireless device by below command
root@freescale ~$ iwlist wlan0 scan
Cell 04 - Address: 00:21:27:65:77:5E
ESSID:"devnet"
Protocol:IEEE 802.11bg
Mode:Master
Frequency:2.437 GHz (Channel 6)
Encryption key:on
Bit Rates:54 Mb/s
Quality=20/100 Signal level=87/100
Step 7: set IP for on-board WIFI by below command
#ifconfig wlan0 192.168.0.232
Step 8; set essid by command of #iwconfig wlan0 essid “devnet”
Serial port will print below information
root@freescale ~$ iwconfig wlan0 essid "devnet"
[56.553213] RTL871X: set ssid [devnet] fw_state=0x00000008
root@freescale ~$ [58.134322] RTL871X: ERROR OnBeacon: get beacon keys failed

[58.140042] RTL871X: start auth
[58.431051] RTL871X: auth success, start assoc
[58.441669] RTL871X: assoc success
[58.445545] IPv6: ADDRCONF(NETDEV_CHANGE): wlan0: link becomes ready

Step 9: set pass code by command of #iwconfig wlan0 key “1234567890”
Step 10: set gateway by command of #route add default gw 192.168.0.201
Auto IP allocate dhcp
udhcpc -iwlan0

root@freescale ~$ udhcpc -iwlan0
udhcpc (v1.20.2) started
Sending discover...
Sending select for 192.168.0.121...
Lease of 192.168.0.121 obtained, lease time 7200
Deleting routers
adding dns 192.168.0.1
step 11: ping ip by below command
#ping www.forlinx.net
Step 12: uninstall the loaded module
root@freescale ~$ rmmod 8723bu
serial port will print below information
root@freescale ~$ rmmod 8723bu
[834.587446] RTL871X: module exit start
[834.592493] usbcore: deregistering interface driver rtl8723bu
[834.600012] RTL871X: rtw_ndev_uninit(wlan0)
[834.649517] RTL871X: module exit success

4.1.17 Audio Recording / Playing Testing

1. do settings as below
root@freescale ~$ amixer sset Headphone 101,101 to set audio playing volume
root@freescale ~$amixer sset 'Left Output Mixer PCM' on
root@freescale ~$amixer sset 'Right Output Mixer PCM' on
root@freescale /usr/bin$ amixer cset name='Capture Volume' 63,63 to set audio recording volume
2. audio playing testing
root@freescale /usr/bin$ aplay /forlinx/sound/wo.wav to play audio file
Playing WAVE '/forlinx/sound/wo.wav' : Signed 16 bit Little Endian, Rate 22050 Hz, Stereo
3. audio recording testing
root@freescale /usr/bin$arecord -r 44100 -f S16_LE -c 2 -d 10 record.wav audio recording
Recording WAVE 'record.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
4. playing recorded audio file
root@freescale /usr/bin$ aplay record.wav
Playing WAVE 'record.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
root@freescale /usr/bin$

4.1.18 Video Playing Testing (software decode)

Video resolution and frame number are not high enough because of limitation of CPU source and short of hardware decoder
root@freescale /$ killall fluidlauncher
root@freescale /$ mplayer -fs /forlinx/media/test.mp4
Printed information is as below
MPlayer SVN-r34402-snapshot-4.6.2 (C) 2000-2011 MPlayer Team

Address: 2699 Xiangyang North Avenue, Baoding, Hebei, China. TEL:0312-3102663 FAX:0312-3112651

```
Playing /forlinx/media/test.mp4.
libavformat file format detected.
[lavf] stream 0: video (mpeg4), -vid 0
[lavf] stream 1: audio (aac), -aid 0, -alang und
VIDEO: [MP4V] 480x272 24bpp 23.976 fps 1396.4 kbps (170.5 kbyte/s)
Clip info:
major_brand: isom
minor_version: 1
compatible_brands: isom
creation_time: 2015-12-29 07:49:42
encoder: FormatFactory : www.pcfreetime.com
Load subtitles in /forlinx/media/
==========================================================================
Opening video decoder: [ffmpeg] FFmpeg's libavcodec codec family
Unsupported PixelFormat 61
Unsupported PixelFormat 53
Unsupported PixelFormat 81
Selected video codec: [ffodivx] vfm: ffmpeg (FFmpeg MPEG-4)
==========================================================================
==========================================================================
Opening audio decoder: [ffmpeg] FFmpeg/libavcodec audio decoders
AUDIO: 44100 Hz, 2 ch, s16le, 125.6 kbit/8.90% (ratio: 15700->176400)
Selected audio codec: [ffaac] afm: ffmpeg (FFmpeg AAC (MPEG-2/MPEG-4 Audio))
==========================================================================
[AO OSS] audio_setup: Can't open audio device /dev/dsp: No such file or directory
AO: [alsa] 44100Hz 2ch s16le (2 bytes per sample)
Starting playback...
Could not find matching colorspace - retrying with -vf scale...
Opening video filter: [scale]
Movie-Aspect is 1.78:1 - prescaling to correct movie aspect.
[swscaler @ 0x867658]No accelerated colorspace conversion found from yuv420p to
rgb565le.
[swscaler @ 0x867658]using unscaled yuv420p -> rgb565le special converter
VO: [fbdev] 480x272 => 484x272 BGR 16-bit [fs]
A: 0.1 V: 0.0 A-V: 0.058 ct: 0.000 0/ 0 ??% ??% ??,?% 0 0
......
```

Stop video playing by Ctrl + C or wait until the end of the playing Exiting... (End of file)

4.1.19 USB Camera Testing

Presently only USB camera module Webcam C270 is supported by OKMX6UL-C3

1. to upload camera driver

```
root@freescale~$insmod
```

/lib/modules/3.14.38-6UL_ga+ge4944a5/kernel/drivers/media/v4l2-core/videobuf2-v
malloc.ko
root@freescale~$insmod
/lib/modules/3.14.38-6UL_ga+ge4944a5/kernel/drivers/media/usb/uvc/uvcvideo.ko

2. power on and run system, open hyper terminal, execute below command to check USB status

root@freescale ~$ lsusb
Bus 001 Device 001: ID 1d6b:0002
Bus 002 Device 001: ID 1d6b:0002
Bus 002 Device 002: ID 05e3:0608
Bus 002 Device 003: ID 0bda:0724
Bus 002 Device 005: ID 19d2:0117

3. connect the board with the above mentioned camera module, and execute below command again to check USB status, and you will get USB camera information as below

root@freescale ~$ lsusb
Bus 001 Device 001: ID 1d6b:0002
Bus 002 Device 001: ID 1d6b:0002
Bus 002 Device 002: ID 05e3:0608
Bus 002 Device 003: ID 0bda:0724
Bus 002 Device 004: ID 046d:0825
Bus 002 Device 005: ID 19d2:0117

4. execute below command to check USB camera node and you will get node video0

root@freescale ~$ ls /dev/video*
/dev/video /dev/video0 /dev/video1 /dev/video1 is the camera module

5. execute below command to check camera resolution and frame rate

root@freescale ~$ luvcview -d /dev/video1 -L
luvcview version v0.1
starting process
video /dev/video0
/dev/video0 does not support read i/o
{ pixelformat = 'YUYV', description = 'YUV 4:2:2 (YUYV)' }
{ discrete: width = 640, height = 480 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 160, height = 120 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 176, height = 144 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 320, height = 176 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 320, height = 240 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 352, height = 288 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 432, height = 240 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,

{ discrete: width = 544, height = 288 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 640, height = 360 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 752, height = 416 }
Time interval between frame: 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 800, height = 448 }
Time interval between frame: 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 800, height = 600 }
Time interval between frame: 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 864, height = 480 }
Time interval between frame: 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 960, height = 544 }
Time interval between frame: 1/15, 1/10, 1/5,
{ discrete: width = 960, height = 720 }
Time interval between frame: 1/10, 1/5,
{ discrete: width = 1024, height = 576 }
Time interval between frame: 1/10, 1/5,
{ discrete: width = 1184, height = 656 }
Time interval between frame: 1/10, 1/5,
{ discrete: width = 1280, height = 720 }
Time interval between frame: 1/10, 1/5,
{ discrete: width = 1280, height = 960 }
Time interval between frame: 2/15, 1/5,
{ pixelformat = 'MJPG', description = 'MJPEG' }
{ discrete: width = 640, height = 480 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 160, height = 120 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 176, height = 144 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 320, height = 176 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 320, height = 240 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 352, height = 288 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 432, height = 240 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 544, height = 288 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 640, height = 360 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 752, height = 416 }

Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 800, height = 448 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 800, height = 600 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 864, height = 480 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 960, height = 720 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 1024, height = 576 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 1184, height = 656 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 1280, height = 720 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,
{ discrete: width = 1280, height = 960 }
Time interval between frame: 1/30, 1/25, 1/20, 1/15, 1/10, 1/5,

6. execute below command to collect picture by YUV mode, and users could preview the picture on display

root@freescale ~$ luvcview -d /dev/video1 -f yuv -s 800x448 -i 25 (users could set image size according read condition)
luvcview version v0.1
size width: 800 height: 448
interval: 25 fps
starting process
video /dev/video0
get picture !
vinfo: xoffset:0 yoffset:0 bits_per_pixel:16 xres:800 yres:480

7. collect MJPEG picture by command, and users could preview the picture on display. In MJPEG mode, collected data is also recorded, and the recorded file is named as xxx.avi, save it in the appointed path, and this video file could be played by a general player

root@freescale ~$ luvcview -d /dev/video1 -f jpg -s 800x448 -i 30
luvcview version v0.1
size width: 800 height: 448
interval: 30 fps
starting process
video /dev/video0
recording to video.avi
kill her self ! Restart...
starting process
video /dev/video0
recording to video.avi

get picture !
vinfo: xoffset:0 yoffset:0 bits_per_pixel:16 xres:800 yres:480

4.1.20 SDHC/MMC Card Driver Testing

- Command line to test the SDHC/SDXC/MMC

SD card hot plug is supported by the single board computer iMX6. Once the SD card is plugged in, system will automatically mount it to directory of /media. Meanwhile SD card information will be printed on the terminal. Printed information may different for different SD cards.

root@freescale ~$mmc0: new high speed SDHC card at address aaaa
mmcblk0: mmc0:aaaa SS08G 7.40 GiB
mmcblk0: p1
FAT-fs (mmcblk0p1): Volume was not properly unmounted. Some data may be corrupt. Please runfsck.

To mount and check files in a general 8G SD card
root@freescale /$ ls /media
mmcblk0p1 mmcblk1p1 mmcblk1p2

to check files in SD card by below command
root@freescale /$ ls –l /media/mmcblk0p1
drwxr-xr-x 2 root root 4096 Jan 22 2016 bin
drwxr-xr-x 2 root root 4096 Feb 21 2016 system

4.1.21 Frequency Modulating Testing

1. cpufreq governor types available in kernel
root@freescale /$ cat /sys/devices/system/cpu/cpu0/cpufreq/scaling_available_governors
serial port will print below information
conservative ondemand userspace powersave interactive performance
userspace stands for user mode, in this mode, it allows other users to modulate CPU frequency
2. to check current CPU frequency by below command
root@freescale /$ cat /sys/devices/system/cpu/cpu0/cpufreq/scaling_available_frequencies
and serial port will output 198000 396000 528000
3. set it to be user mode, modulate frequency to be 198000
root@freescale /$ echo userspace > /sys/devices/system/cpu/cpu0/cpufreq/scaling_governor
root@freescale /$ echo 198000 > /sys/devices/system/cpu/cpu0/cpufreq/scaling_setspeed
4. to check current frequency
root@freescale /$ cat /sys/devices/system/cpu/cpu0/cpufreq/cpuinfo_cur_freq
and serial port will output 198000

4.1.22 ts_calibrate Testing

Before testing, please kill background QT programs, otherwise the testing is not valid
root@freescale ~$ killall fluidlauncher
root@freescale ~$ ts_calibrate to do calibration

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4.1.23 APP Testing

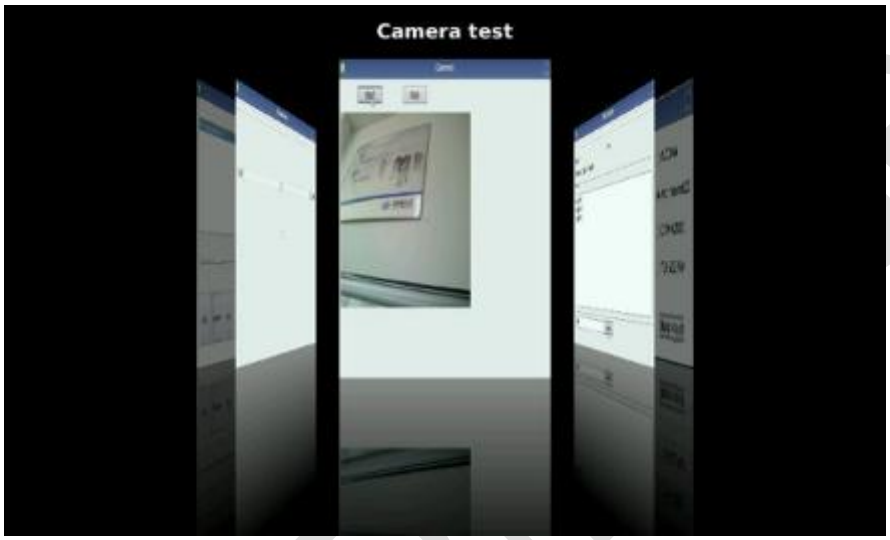
Before doing the previous calibration steps, please copy application fonts to /forlinx/test

root@freescale ~$ cd /forlinx/test

root@freescale ~$ ./fonts -qws

4.2 Interface Testing

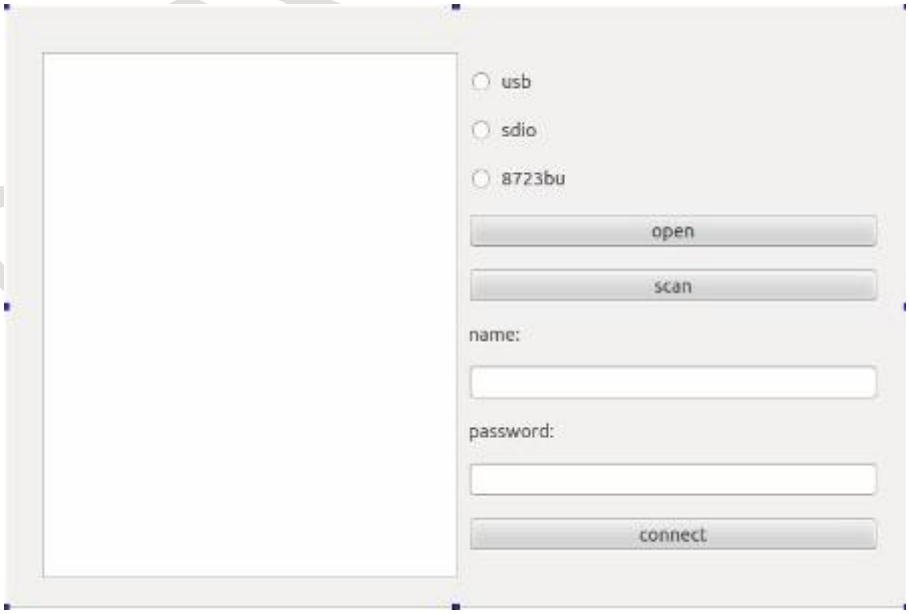
The QT interface is as below



(it is normal status if the screen becomes balck when displaying video or testing the scree, please press power key to wake up it)

4.2.1 WIFI Testing

Run the WIFI testing app and get into below interface



Click “open” the wifi node, and then click ‘scan’ to scan the accessable network, input the name and password, at last connect the network.

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4.2.2 NIC Settings

Run Network program to select the related access and make the settings, users could set the IP by this program as DHCP or static mode. Click Apply and Restart Network to make the settings valid.

DHCP is as below

Static IP is as below

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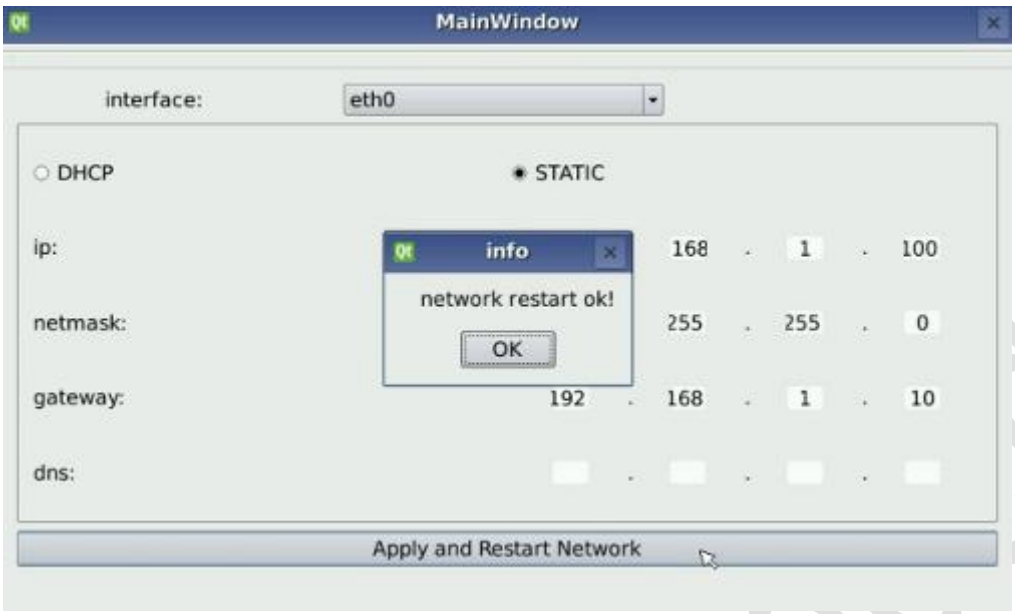

4.2.3 PING Testing

If use dual NIC to work at the same time and set them in the same network segment, please plug Ethernet cable to the appointed NIC by the route

```
root@freescale ~$ route
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
default         192.168.1.253   0.0.0.0         UG    0      0        0 eth1
192.168.1.0     *               255.255.255.0   U     0      0        0 eth1
192.168.1.0     *               255.255.255.0   U     0      0        0 eth0
root@freescale ~$
```

Run the PING program to get into below interface(please make sure the network settings are done)

Input the IP and domain name in the hostname bar, then click ping, below interface indicates the network testing is successful

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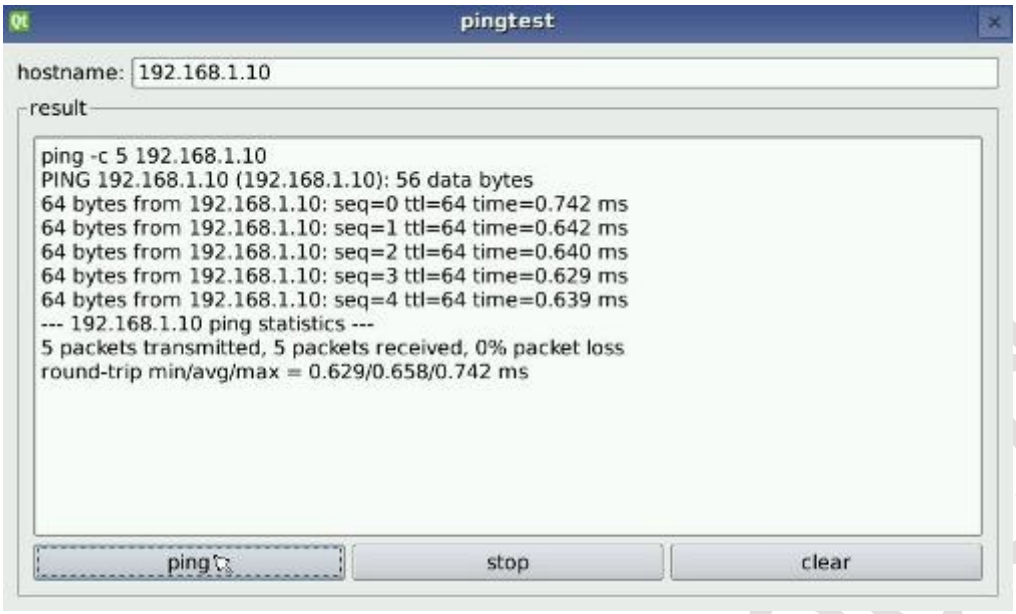

4.2.4 Watchdog Testing

Run the testing program to get below interface

Click open watchdog to get below interface

If users do not check feed dog selection when opening the dog, the system will restart after a minute

4.2.5 Audio Recording/Playing Testing

Run audio program to get into testing interface

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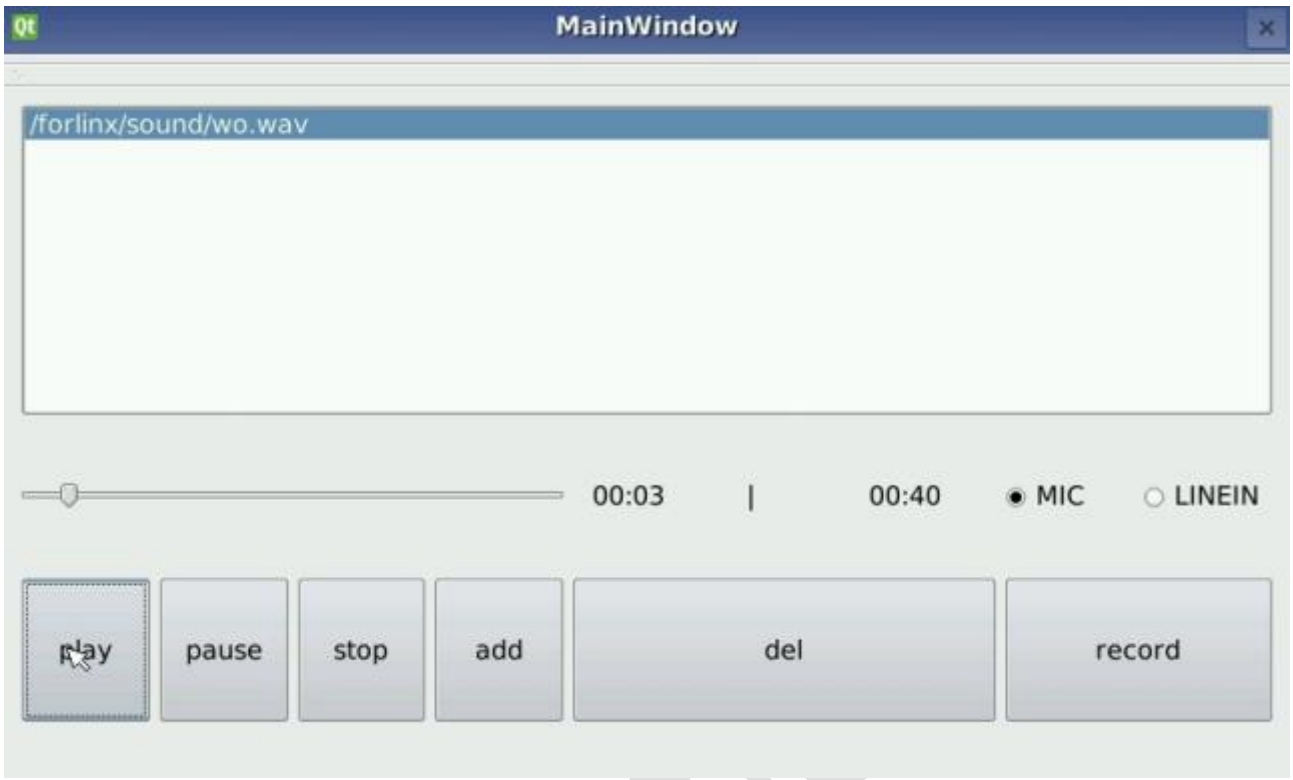
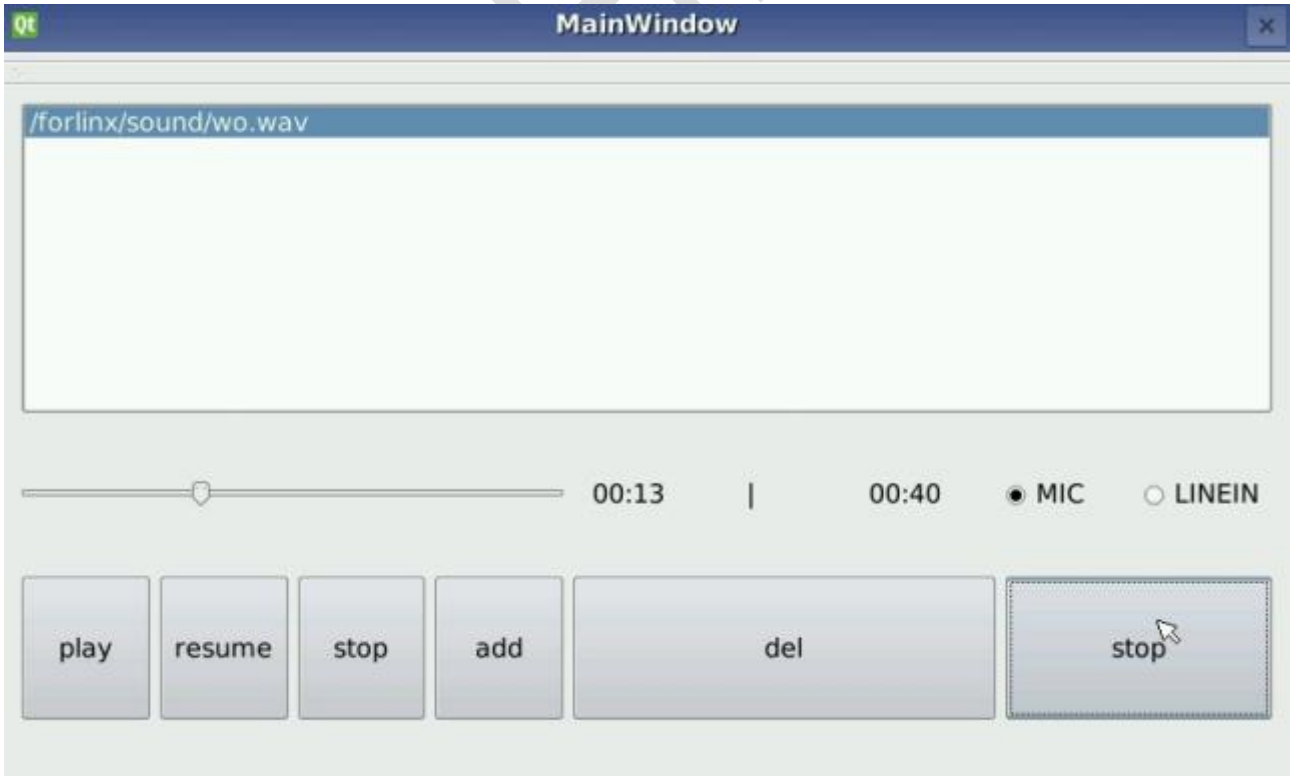
1. audio playing test: insert earphone to PHONE jack on OKMX6UL-C3, click play icon, if you can hear sound it approves that audio playing works well



2. MIC recording test: insert MIC to MIC hole on OKMX6UL-C3, click record icon, and speak toward MIC for seconds, and stop recording



Then you will say a new file in the file list, and you can click play it

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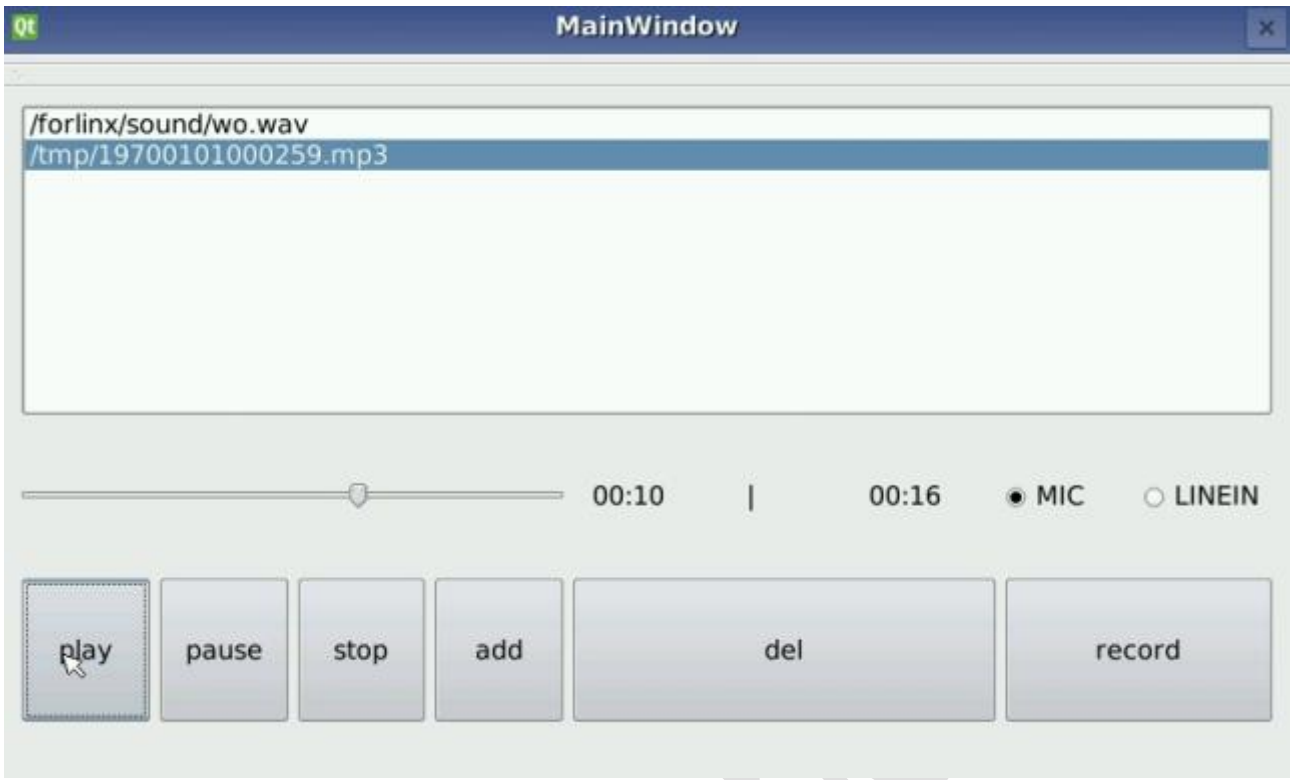
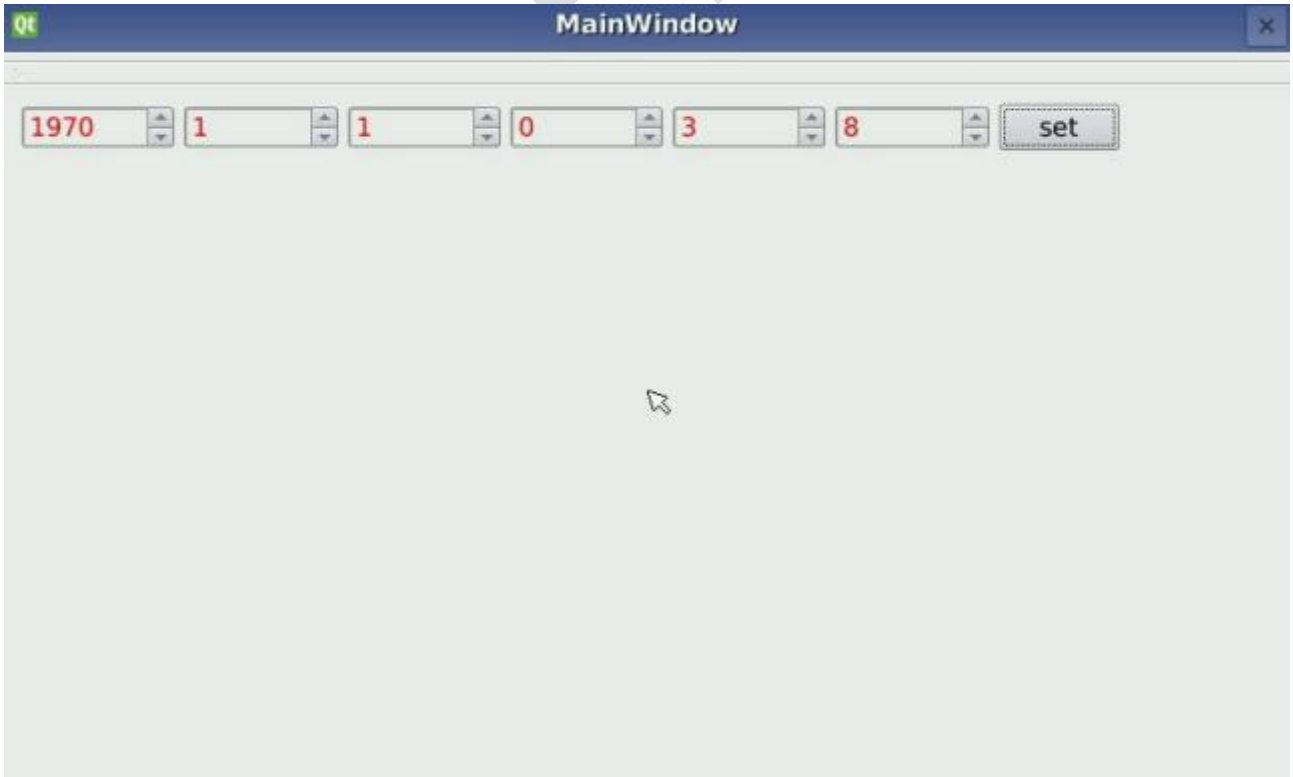


4.2.6 RTC Testing

Set RTC by software, power off the board and then restart the board to run the program again to check RTC updates (please make sure the board is with the RTC battery before testing)

Run RTC program to get below interface



Set time as below

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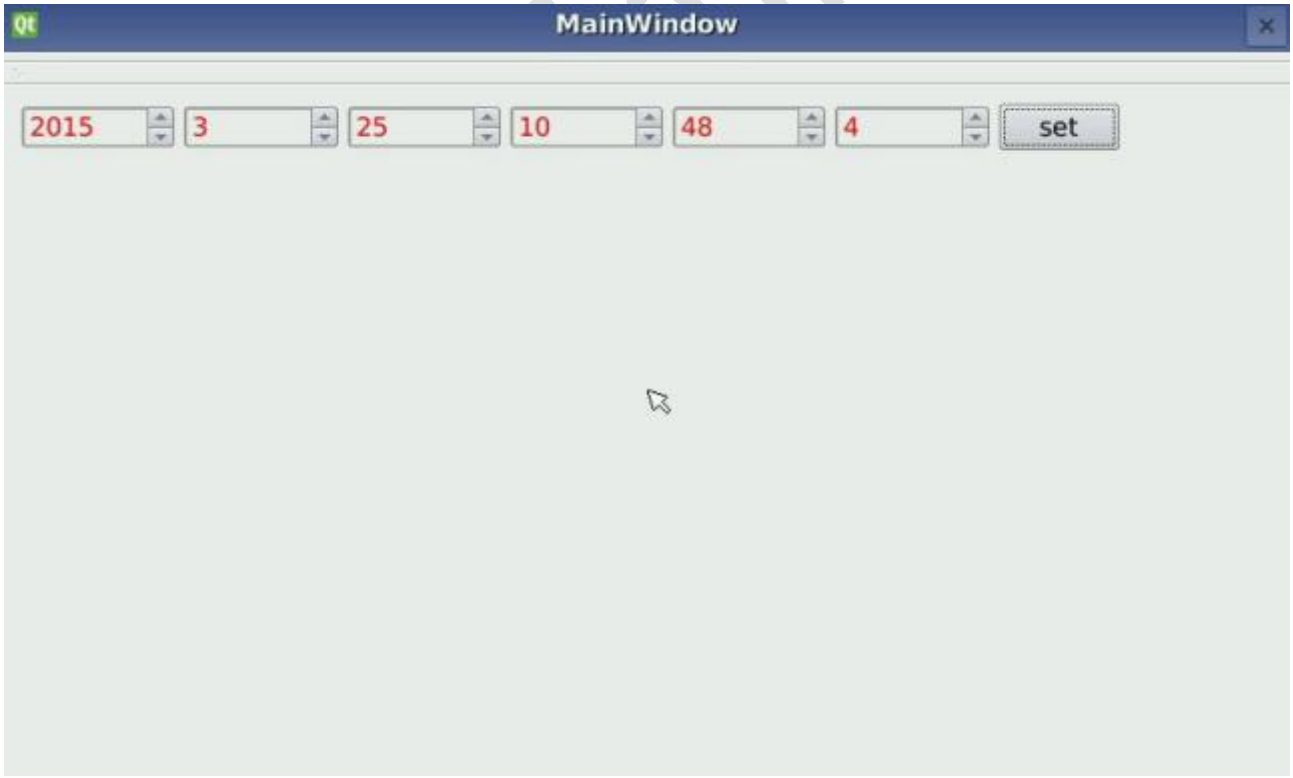
Save the settings, power of f the board, several minutes later power on it again and run RTC testing program to read the updated time



4.2.7 3G Testing

3G module: ZTE MD210 with China Union SIM card. Run the testing program to get below interface

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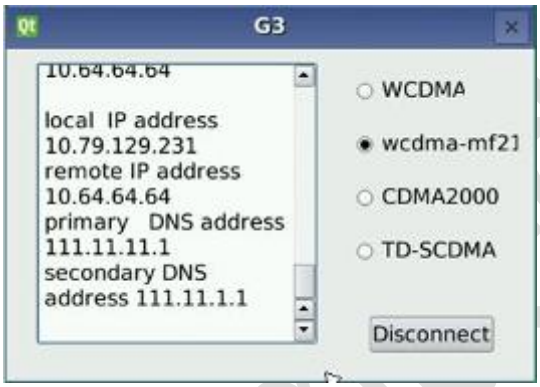
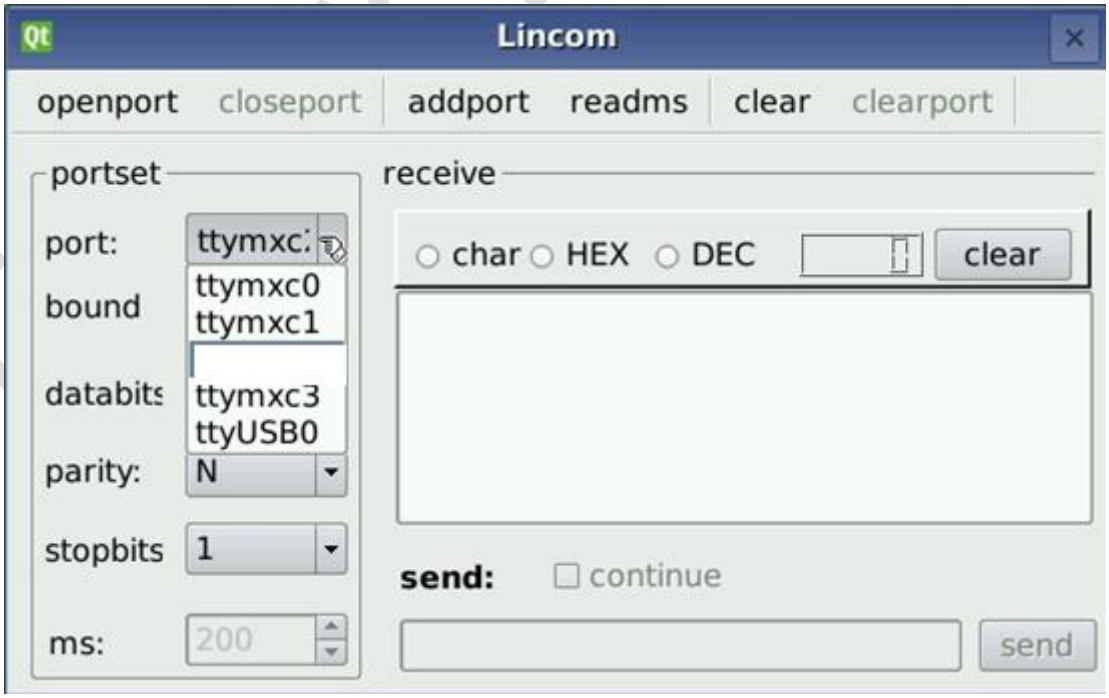
Select wcdma-mf210 and click connect, below allocated IP indicates the board is connected to network



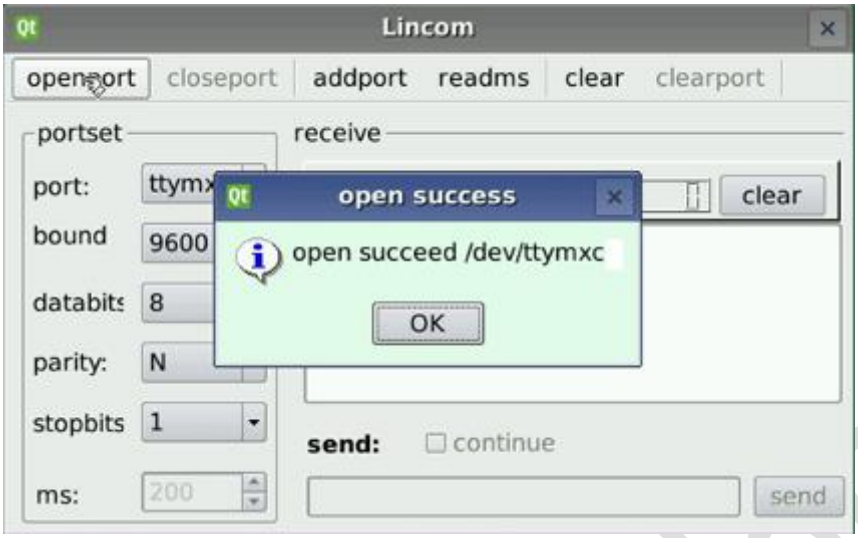
4.2.8 Serial Port Testing

In this part, a TTL to RS232 expand module will be used.

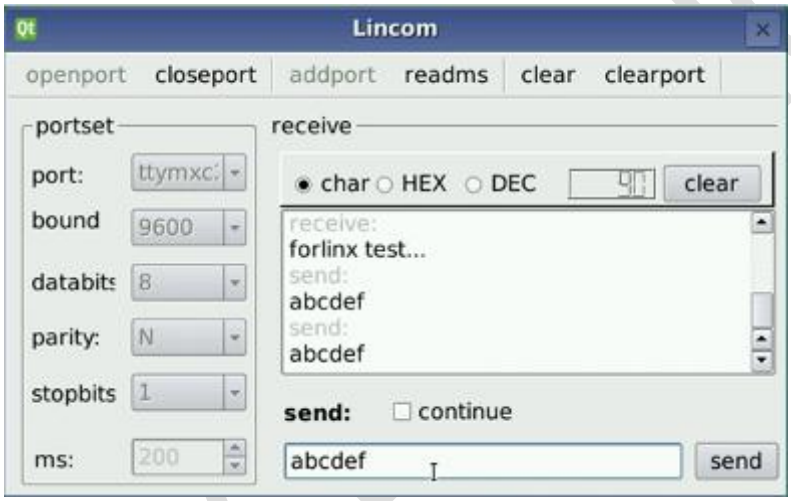
Please connect a RS232 module to reader port on OKMX6UL-C3, and match it with ttymxc1, power on board and run system, run serial port testing program lincom and select port as below



Click openport



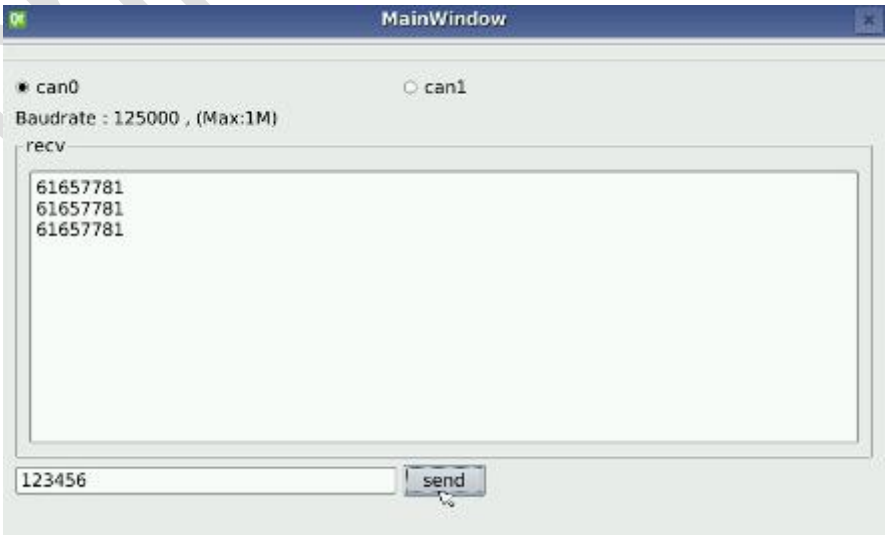
Type in message in send column, and then click send, then you will get this message on the other terminal



4.2.9 FlexCAN Testing

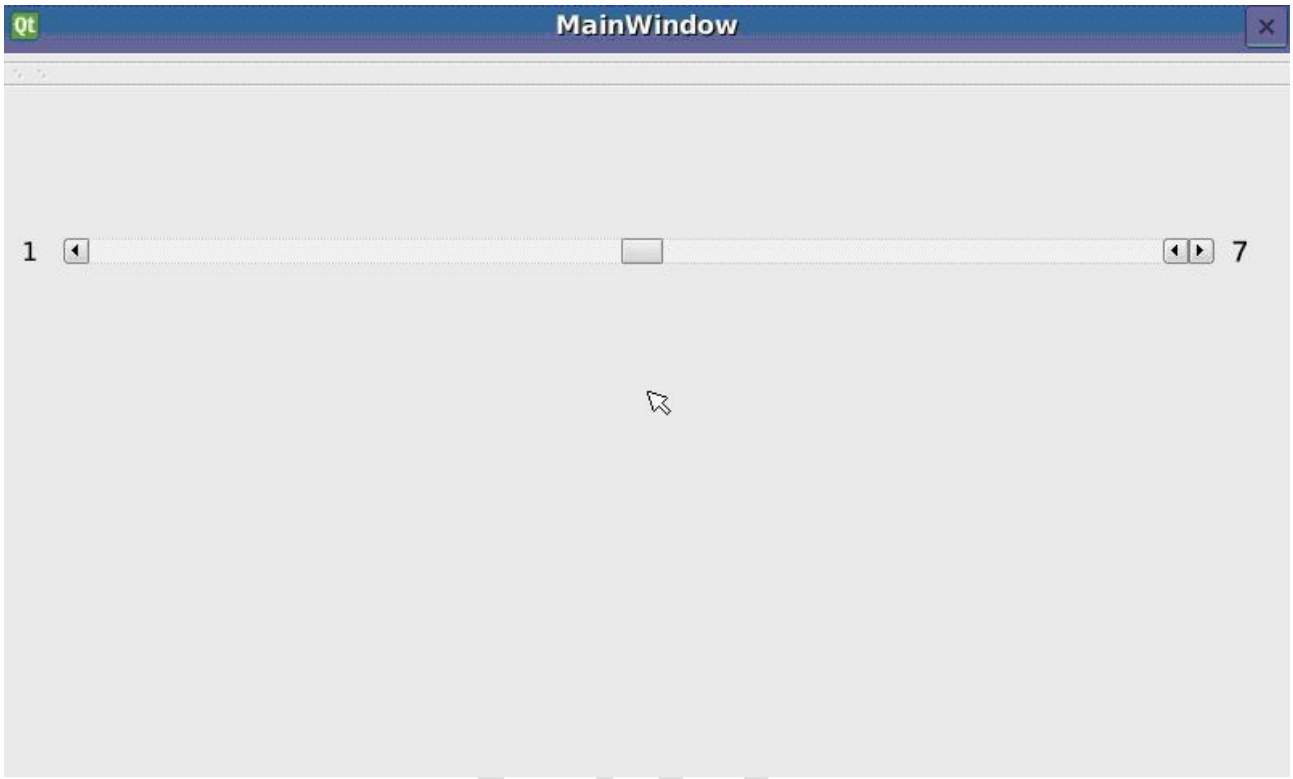
Connect two CAN devices as H header to H header and L header to L header

Run CAN testing program, click send, and you will get message on the receiving terminal



4.2.10 RGB LCD Backlight Testing

Run Backlight program to adjust backlight value



4.2.11 Running Testing Programs Separately

Users could use below command to test qt programs separately

root@freescale ~$ /opt/ QT4.8.6/apps/lincom –qws

if fail to run the program, please re-configure your variable

root@freescale ~$ source /etc/rc.d/qt_env.sh

and then run your qt program by the above command

4.2.12 Add LED to Main Interface

1. to add led program, please modify opt/QT4.8.6/demos/embedded/fluidlauncher/config.xml

At the end of <example filename="../../../apps/backlight" name="backlight test" image="screenshots/apps/backlight.png"/> please add below information

<example filename="../../../apps/led" name="LED test" image="screenshots/apps/led.png"/>

2. add led.png to opt/ QT4.8.6/demos/embedded/fluidlauncher/screenshots/apps as the led program which is available for main interface
3. add users' executable led file in opt/ QT4.8.6/apps

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Chapter 5 Linux Compiling

5.1 Version

System: Ubuntu12.04 64-bit
Cross tool chain: arm-fsl-linux-gnueabi-gcc-4.6.2
Bootloader: u-boot-2015.04
Kernel: linux-3.14.38

5.2 Compiling Environment

Linux PC: install ubuntu12.04 for PC as a compiling host to make the compiling fast and stable.
Vmware8.0+ubuntu12.04: install virtual machine in XP and compiling in the virtual machine. Set up of compiling environment in one PC to make the compiling and flashing in one PC, but it makes the compiling too slow, and causes network unstable.

5.3 Install Dependent Pack

Install Linux lib pack in ubuntu12.04 32 bit, please make sure network is available
Step 1: copy setup_env.sh to Ubuntu
OKMX6UL-C3\ tool\setup_env.sh
Step 2: add executable authority to setup_env.sh
#chmod u+x setup_env.sh
Step 3: #./setup_env.sh
Step 4:

```
Note! This command requi
on your host.
Press return to continue
```

if this appears, just press Enter key

```
Do you want to continue [Y/n]? Y
```

input “y” and then press Enter key

5.4 Compiling Environment Setting Up

Step 1: copy gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12.tar.gz to Ubuntu
OKMX6UL-C3\Tools \gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12.tar.gz
Step 2: create a new terminal (ctrl+alt+t) in Ubuntu, input below command to install cross compiler
#cd (step into main directory)
#mkdir -p /opt/freescale/usr/local (create directory, if there already exist a directory, then it will indicate errors, just skip it)
#tar jxvf gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12.tar.gz -C /opt/freescale/usr/local (extract the compiler to /opt/freescale/usr/local)
Step 3: to check whether gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12 is extracted correctly
#ls -l /opt/freescale/usr/local
Step 4: add variables to Profile, execute command to open and compile Profile, then restart the computer

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#gedit /etc/profile

Add below information at the last line

export ARCH=arm

export CROSS_COMPILE=/opt/freescale/usr/local/gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12/fsl-linaro-toolchain/bin/arm-none-linux-gnueabi-

export PATH=/opt/freescale/usr/local/gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12/fsl-linaro-toolchain/bin:$PATH

Save and quit, input command in hyper terminal to restart Ubuntu

#reboot

Step 5: input below command in hyper terminal to check whether the compiler is installed successfully

#arm-fsl-linux-gnueabi-gcc -v

Below image indicates the compiler is installed correctly

Press Enter key, and then users could start to compile Uboot code and kernel code

Notice: all the above steps are operated as a root user, the modified files are only invalid to current users, if you switch user in terminal, then all above files are invalid to the new user.

5.5 Compiling

Before this, please set up of development environment according to chapter 5.

5.5.1 Compile U-boot

U-boot is not open to users, but we kindly provide u-boot.imx which is saved in

i.MX6UL-C3\linux\image\u-boot.imx

If necessary, we kindly provide uboot source code to users after evaluation according users' read condition, if you get the source code, please do compiling according to below steps

Step 1: extract uboot source code by command of #tar xvf uboot-2015-04.tar.bz2

Step 2: compile emmc uboot

#cd uboot-2015-04

./build.sh emmc

After compilation, a binary file named 'u-boot.imx' will be generated in 'uboot-2015-04', and this file is the U-boot image that to be flashed to Emm, and DDR is 512M

Compile nand uboot

#cd uboot-2015-04

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./build.sh nand 256m

After compiling, there will be a binary file of u-boot.imx generated in uboot-2015-04, flash it to NAND, the DDR is 256M

Compile Uboot (OKMX6UL-C3\Linux\image\uboot\sd-bin)

#cd uboot-2015-04

./build.sh sd （emmc）或者./build.sh sd 256m(nand)

After compiling, there will be a binary file of uboot.imx generated in uboot-2015-04, and the corresponding DDR could be 512M or 256M.

Notice: if users want to change u-boot.imx saved in sd-bin, users should have to create a new SD card to flash image, because bin/u-boot.imx should be flashed to a fixed position of SD card.

5.5.2 Compile Linux-3.14.38

Copy 'linux-3.4.18.tar.gz' pack to your working directory and exact it by below command:

#tar zxvf linux-3.14.38.tar.bz2

OKMX6UL-C3\linux\src\kernel\linux-3.14.38.tar.bz2

compile NAND kernel by ./build_nand.sh

and compile **eMMC** kernel by ./build_emmc.sh

kernel image path: Linux-3.14.38/arch/arm/boot/zImage

Linux-3.14.38/arch/arm/boot/dts/imx6ul-14x14-evk.dts is used for generating dtb and its device tree is iomuxc

Compile and generate device tree of imx6ul-14x14-evk.dtb

We also additionally provide some compiled device tress saved in

Linux-3.14.38/arch/arm/boot/dts/imx6ul-14x14-evk-*.dts is compiled based on imx6ul-14x14-evk.dts to generate device tree imx6ul-14x14-evk-*.dtb

About name of dts

iomuxc—control GPIO by/sys/class/gpio

gpio—control by /dev/gpio

gpio gpmi—supports nand

Compile zImage

#make ARCH=arm CROSS_COMPILE=arm-fsl-linux-gnueabi- zImage

```
  SHIPPED arch/arm/boot/compressed/hyp-stub.S
  AS      arch/arm/boot/compressed/hyp-stub.o
  SHIPPED arch/arm/boot/compressed/lib1funcs.S
  AS      arch/arm/boot/compressed/lib1funcs.o
  SHIPPED arch/arm/boot/compressed/ashldi3.S
  AS      arch/arm/boot/compressed/ashldi3.o
  SHIPPED arch/arm/boot/compressed/bswapsdi2.S
  AS      arch/arm/boot/compressed/bswapsdi2.o
  LD      arch/arm/boot/compressed/vmlinux
  OBJCOPY arch/arm/boot/zImage
  Kernel: arch/arm/boot/zImage is ready
```

Compile dtb

#make ARCH=arm CROSS_COMPILE=arm-fsl-linux-gnueabi- dtbs

```
  DTC     arch/arm/boot/dts/imx6ul-14x14-evk.dtb
```

Other dts will be generated as arch/arm/boot/dts/imx6ul-14x14-evk-*.dtb

5.5.3 Make rootfs

Step 1: copy file system source file 'rootfs.tar.bz2' by mkdir command

OKMX6UL-C3\linux\image\rootfs. tar.bz2 it is Linux Console file system

OKMX6UL-C3\linux\ image\rootfs.qt4-emmc.tar.bz2 file system for QT of OKMX6UL-C3 with eMMC

OKMX6UL-C3\ linux\image\rootfs.qt4-nand.tar.bz2 file system for QT of OKMX6UL-C3 with NAND

here we take rootfs.tar.bz2 for example

Step 2: extract file system source file by below command

#tar xvf rootfs.tar.bz2

Step 3: start to make rootfs by below command:

#cd rootfs

#./pack-rootfs.sh

```
root@develop:/diske1/dongyulong/source/freescale/rootfs/rootfs-cmdline#
root@develop:/diske1/dongyulong/source/freescale/rootfs/rootfs-cmdline#
root@develop:/diske1/dongyulong/source/freescale/rootfs/rootfs-cmdline#
root@develop:/diske1/dongyulong/source/freescale/rootfs/rootfs-cmdline#
root@develop:/diske1/dongyulong/source/freescale/rootfs/rootfs-cmdline#
root@develop:/diske1/dongyulong/source/freescale/rootfs/rootfs-cmdline# ./pack-rootfs.sh
```

The finally generated rootfs.tar.bz2 is the file system image which could be downloaded to emmc or NAND Flash of single board computer.

5.5.4 Compile Executable Binary File

Execute below command in hyper terminal to test whether you are succeed to install the cross compiler

#arm-fsl-linux-gnueabi-gcc –v

Below picture indicates the cross compiler is installed

```
root@develop:/diske1/dongyulong/source/freescale/linux/linux-3.0.35# arm-fsl-linux-gnueabi-gcc -v
Using built-in specs.
COLLECT_GCC=arm-fsl-linux-gnueabi-gcc
COLLECT_LTO_WRAPPER=/opt/freescale/usr/local/gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12/fsl-linaro-toolchain/
/arm-fsl-linux-gnueabi/4.6.2/lto-wrapper
Target: arm-fsl-linux-gnueabi
Configured with: /work/build/.build/src/gcc-linaro-4.6-2011.06-0/configure --build=i686-build_pc-linux-gnu --h
inux-gnu --target=arm-fsl-linux-gnueabi --prefix=/work/fsl-linaro-toolchain-2.13 --with-sysroot=/work/fsl-lina
rm-fsl-linux-gnueabi/multi-libs --enable-languages=c,c++ --with-pkgversion='Freescale MAD -- Linaro 2011.07 --
0 09:20' --enable-__cxa_atexit --disable-libmudflap --disable-libgomp --disable-libssp --with-gmp=/work/build/
x-gnueabi/build/static --with-mpfr=/work/build/.build/arm-fsl-linux-gnueabi/build/static --with-mpc=/work/buil
nux-gnueabi/build/static --with-ppl=/work/build/.build/arm-fsl-linux-gnueabi/build/static --with-cloog=/work/b
-linux-gnueabi/build/static --with-libelf=/work/build/.build/arm-fsl-linux-gnueabi/build/static --with-host-li
bgcc -Wl,-Bstatic,-lstdc++,-Bdynamic -lm -L/work/build/.build/arm-fsl-linux-gnueabi/build/static/lib -lpwl' --
x --enable-target-optspace --enable-plugin --enable-multilib --with-local-prefix=/work/fsl-linaro-toolchain-2.
ueabi/multi-libs --disable-nls --enable-c99 --enable-long-long --with-system-zlib
Thread model: posix
gcc version 4.6.2 20110630 (prerelease) (Freescale MAD -- Linaro 2011.07 -- Built at 2011/08/10 09:20)
root@develop:/diske1/dongyulong/source/freescale/linux/linux-3.0.35#
```

Press Enter key to compile a binary file by the compiler

Here we take app-wdt.c for example

1. copy app-wdt.c to any path of ubuntu for example /home/work
2. get into /home/work and start compiling

#cd /home/work

arm-linux-gcc app-wdt.c –o app-wdt –lpthread

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3. copy the compiled app-wdt to OKMX6UL-C3 (eg. /Forlinx) by U-disk, execute below command

cd /forlinx

#cp /media/sda1/app-wdt ./

4. test

Time out and restart

./app-wdt /dev/watchdog settimeout 30 &

If watchdog testing program is running, the board will automatically reset after 30 seconds if without any operation to keyboard. During program running mode, users could press any key except ESC to close watchdog.

Feed the dog regularly by below command

./app-wdt /dev/watchdog keepalive 10 &

Once watchdog testing program runs, if without any operation to keyboard, system will automatically feed the dog every 10 seconds. During program running mode, users could press any key except ESC to close the dog.

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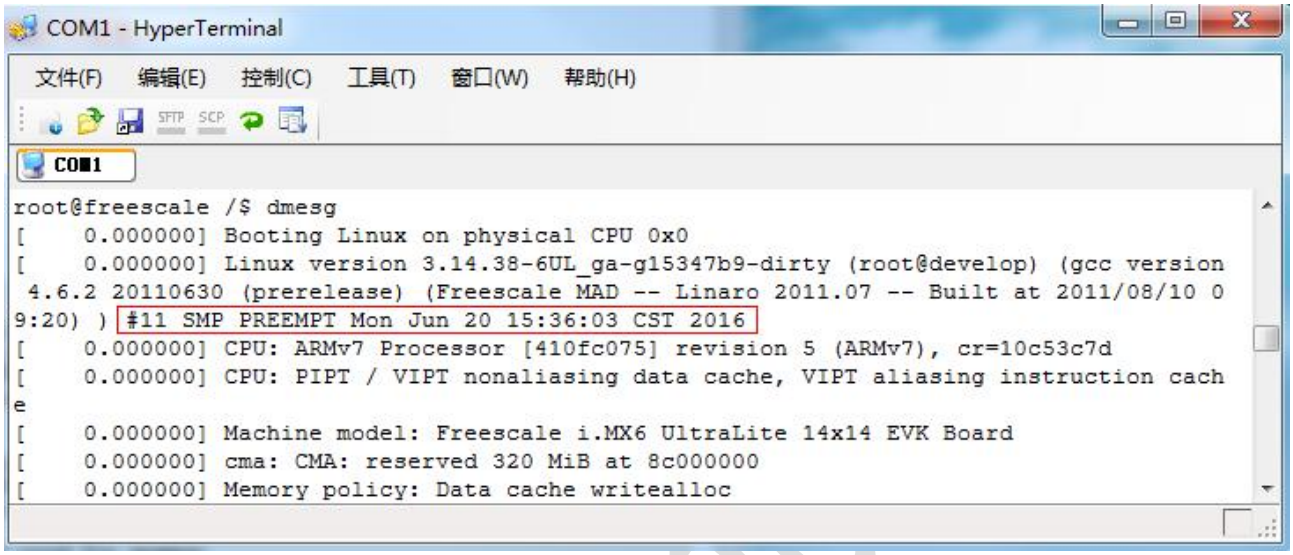
Chapter 6 Appendix

6.1 How to Check Linux Compiling Time

Execute below command in command line

root@freescale /$ dmesg



The above red circled is the compiling time

6.2 How to Check Ubuntu Bit

Execute command of uname-a to check Ubuntu bit

64-bit

root@develop:~# uname -a

Linux develop 3.2.0-23-generic #36-Ubuntu SMPTue Apr 10 20:39:51 UTC 2012 x86_64 x86_64 x86_64 GNU/Linux

root@develop:~#

32-bit

root@ubuntu:/files/qt_creator# uname -a

Linux ubuntu 3.2.0-23-generic-pae #36-Ubuntu SMPTueApr 10 22:19:09 UTC 2012 i686 i686 i386 GNU/Linux

root@ubuntu:/files/qt_creator#

note: X86_64 indicates 64-bit system while i686 presents 32-bit system

6.3 How to Check File Bit

Input file file_name (the real file name) to check file bit, take Qt Creator installation file for example

file qt-creator-linux-x86-opensource-2.6.2.bin

qt-creator-linux-x86-opensource-2.6.2.bin: ELF 32-bit LSB executable, Intel 80386, version 1 (SYSV), dynamically linked (uses shared libs), for GNU/Linux 2.6.15, BuildID[sha1]=0x4e61600ab98950c8bb4086022db27ecda60cf95c, not stripped

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6.4 How to Skip LCD Calibration Step

System will jump to calibration interface when it's running for the first time, to skip it, users should have to do setting to uboot as below

1. run serial port debug terminal, power on the board and run system, press space key to get into menu option

```
Hit any key to stop autoboot:  0
---------------MAIN MENU---------------
1. Screen Type Menu
2. Change The Calibrate
0. Exit To Boot Shell
Enter your number:
:
```

2. type in 2 to go forward to next step

```
---------------MENU OF CALIBRATION---------------
1. Calibrate
2. Not Calibrate
0. return
:
```

Type in 1 to choose go forward to calibration interface with system running, and type in 2 to skip calibration, and then type in 0 to quit. Restart the board to get settings valid.

6.5 Touch and Mouse Mode Switch

Touching is available in Linux by default, to switch to mouse mode, uses should have to change settings to etc/rc.d/qt_env.sh, users could do this setting in hyper terminal or by modifying files system source code, recreate file system image to get it valid permanently.

Execute below command in hyper terminal

root@freescale ~$ vi /etc/rc.d/qt_env.sh

modify below part

#export QWS_MOUSE_PROTO=mouseman:/dev/input/mice

export QWS_MOUSE_PROTO=tslib:/dev/input/event1

to

export QWS_MOUSE_PROTO=mouseman:/dev/input/mice

#export QWS_MOUSE_PROTO=tslib:/dev/input/event1

Save and quit, then restart the board to get into mouse input mode

To switch to touching mode, users just need modify this part back and restart the board.

6.6 Booting to Run QT

Desktop application fluidlauncher will run with Linux QT, to change it to other QT application, users should have to execute below command in hyper terminal (here we suppose it to be new_app saved in /opt/qt4.8.5/apps)

root@freescale /$ vi /etc/rc.d/apps.sh

modify to below content

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```
#!/bin/sh
#app
#cd /opt/qt4.8.5/demos/embedded/fluidlauncher
#./fluidlauncher -qws &
Cd /opt/qt4.8.5/apps
./new_app -qws &
#apps
```

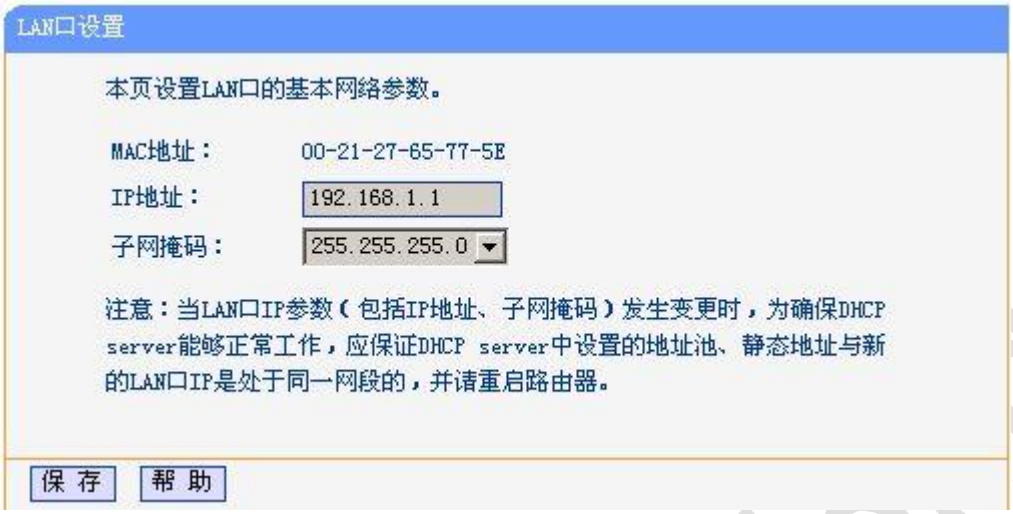
Save and restart the board and you will get your application booted with system. Users could also make it by modifying etc/rc.d/apps.sh in file system source code according the above steps, and then recreate file system to flash it to the board.

6.7 Router Settings

6.7.1 DHCP Settings

Step 1: run DHCP

Step 2: native LAN settings



Step 3: settings of WAN

6.7.2 Encoding Settings of Wireless port WEP/WPA2-PSK AES

Single board computer wep encoding connection

Single board computer WPA2-PSK encoding connection

Chapter 7 How to Port QT4.8.5 to OKMX6UL-C3

Notice:

1. if you are going to develop QT application, you can skip this chapter and go forward to Chapter 8 about QT application development environment settings
2. OS Linux is provided with QT lib, users could run QT application. QT version: QT4.8.5

VM ware environment: ubuntu12.04 32bit /64bit

Targeting platform: OKMX6UL-C3

Cross compiler: gcc gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12

File system: rootfs (from Forlinx)

7.1 Install Cross-compiler

7.1.1 Install cross-compiler

Copy gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12.tar.gz from tool to /work/imx6

root@forlinx:/work/imx6/qt4.8.5# tar xvf gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12.tar.gz -C/usr/local/arm

notice: this operation is done in 32bit ubuntu12.04, if you want to do it in 64bit ubuntu12.04, please execute sudo apt-get install ia32-libs libc6-i386, install it to lib of 32bit program in 64bit ubuntu12.04

root@forlinx:/work/imx6/qt4.8.5#/usr/local/arm/gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12/fsl-linaro-toolchain/bin/arm-linux-gcc -v

```
root@forlinx:/work/imx6/qt4.8.5--log# /usr/local/arm/gcc-4.6.2-glibc-2.13-linaro-
multilib-2011.12/fsl-linaro-toolchain/bin/arm-linux-gcc -v
Using built-in specs.
COLLECT_GCC=/usr/local/arm/gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12/fsl-linar
o-toolchain/bin/arm-linux-gcc
COLLECT_LTO_WRAPPER=/usr/local/arm/gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12/f
sl-linaro-toolchain/bin/../libexec/gcc/arm-fsl-linux-gnueabi/4.6.2/lto-wrapper
Target: arm-fsl-linux-gnueabi
Configured with: /work/build/.build/src/gcc-linaro-4.6-2011.06-0/configure --buil
d=i686-build_pc-linux-gnu --host=i686-build_pc-linux-gnu --target=arm-fsl-linux-g
nueabi --prefix=/work/fsl-linaro-toolchain-2.13 --with-sysroot=/work/fsl-linaro-t
oolchain-2.13/arm-fsl-linux-gnueabi/multi-libs --enable-languages=c,c++ --with-pk
gversion='Freescale MAD -- Linaro 2011.07 -- Built at 2011/08/10 09:20' --enable-
__cxa_atexit --disable-libmudflap --disable-libgomp --disable-libssp --with-gmp=/
work/build/.build/arm-fsl-linux-gnueabi/build/static --with-mpfr=/work/build/.bui
ld/arm-fsl-linux-gnueabi/build/static --with-mpc=/work/build/.build/arm-fsl-linux
-gnueabi/build/static --with-ppl=/work/build/.build/arm-fsl-linux-gnueabi/build/s
tatic --with-cloog=/work/build/.build/arm-fsl-linux-gnueabi/build/static --with-l
ibelf=/work/build/.build/arm-fsl-linux-gnueabi/build/static --with-host-libstdcxx
='-static-libgcc -Wl,-Bstatic,-lstdc++,-Bdynamic -lm -L/work/build/.build/arm-fsl
-linux-gnueabi/build/static/lib -lpwl' --enable-threads=posix --enable-target-opt
space --enable-plugin --enable-multilib --with-local-prefix=/work/fsl-linaro-tool
chain-2.13/arm-fsl-linux-gnueabi/multi-libs --disable-nls --enable-c99 --enable-l
ong-long --with-system-zlib
Thread model: posix
gcc version 4.6.2 20110630 (prerelease) (Freescale MAD -- Linaro 2011.07 -- Built
 at 2011/08/10 09:20)
root@forlinx:/work/imx6/qt4.8.5--log#
```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7.1.2 Variable Settings to Cross-compiler

gedit /etc/profile

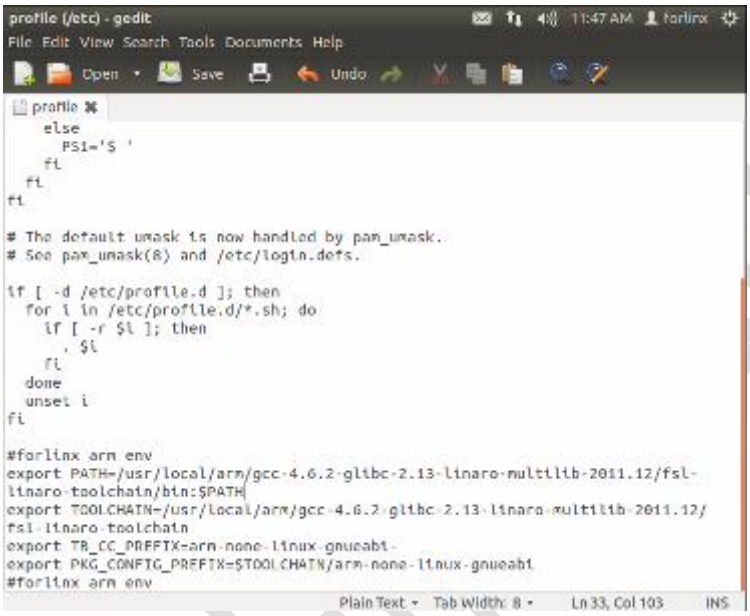
Add below variables at the end of file:

export PATH= /usr/local/arm/gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12/fsl-linaro-toolchain/bin:$PATH

export TOOLCHAIN= /usr/local/arm/gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12/fsl-linaro-toolchain

export TB_CC_PREFIX=arm-none-linux-gnueabiexport

PKG_CONFIG_PREFIX=$TOOLCHAIN/arm-none-linux-gnueabi



7.1.3 Import variables

source /etc/profile

arm-linux-gcc –v

```
root@forlinx:/work/imx6/qt4.8.5--log# /usr/local/arm/gcc-4.6.2-glibc-2.13-linaro-
multilib-2011.12/fsl-linaro-toolchain/bin/arm-linux-gcc -v
Using built-in specs.
COLLECT_GCC=/usr/local/arm/gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12/fsl-linar
o-toolchain/bin/arm-linux-gcc
COLLECT_LTO_WRAPPER=/usr/local/arm/gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12/f
sl-linaro-toolchain/bin/../libexec/gcc/arm-fsl-linux-gnueabi/4.6.2/lto-wrapper
Target: arm-fsl-linux-gnueabi
Configured with: /work/build/.build/src/gcc-linaro-4.6-2011.06-0/configure --buil
d=i686-build_pc-linux-gnu --host=i686-build_pc-linux-gnu --target=arm-fsl-linux-g
nueabi --prefix=/work/fsl-linaro-toolchain-2.13 --with-sysroot=/work/fsl-linaro-t
oolchain-2.13/arm-fsl-linux-gnueabi/multi-libs --enable-languages=c,c++ --with-pk
gversion='Freescale MAD -- Linaro 2011.07 -- Built at 2011/08/10 09:20' --enable-
__cxa_atexit --disable-libmudflap --disable-libgomp --disable-libssp --with-gmp=/
work/build/.build/arm-fsl-linux-gnueabi/build/static --with-mpfr=/work/build/.bui
ld/arm-fsl-linux-gnueabi/build/static --with-mpc=/work/build/.build/arm-fsl-linux
-gnueabi/build/static --with-ppl=/work/build/.build/arm-fsl-linux-gnueabi/build/s
tatic --with-cloog=/work/build/.build/arm-fsl-linux-gnueabi/build/static --with-l
ibelf=/work/build/.build/arm-fsl-linux-gnueabi/build/static --with-host-libstdcxx
='-static-libgcc -Wl,-Bstatic,-lstdc++,-Bdynamic -lm -L/work/build/.build/arm-fsl
-linux-gnueabi/build/static/lib -lpwl' --enable-threads=posix --enable-target-opt
space --enable-plugin --enable-multilib --with-local-prefix=/work/fsl-linaro-tool
chain-2.13/arm-fsl-linux-gnueabi/multi-libs --disable-nls --enable-c99 --enable-l
ong-long --with-system-zlib
Thread model: posix
gcc version 4.6.2 20110630 (prerelease) (Freescale MAD -- Linaro 2011.07 -- Built
 at 2011/08/10 09:20)
root@forlinx:/work/imx6/qt4.8.5--log#
```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7.2 Port Tslib

Tslib is a software lib for a display with resistive touch panel for filtering, delay and calibration.

7.2.1 Install autoconf, automake and libtool lib

sudo apt-get install autoconf #tslib lib
sudo apt-get install automake #tslib lib
sudo apt-get install libtool #tslib lib
sudo apt-get install g++ #tslib lib
sudo apt-get install libc6-dev:i386 #qt4.8.5 lib
#sudo apt-get install build-essential #qt4.8.5 lib
#sudo apt-get install gcc-multilib #qt4.8.5 lib

7.2.2 Copy compressed file

Copy tslib-1.4-src.tar.bz2 from src to /work/imx6
tar -xvf tslib-1.4-src.git.tar.bz2
cd tslib
./tslib.sh # compiled script provided by Forlinx, it will be installed in /usr/local/arm/tslib

7.2.3 Port tslib to OKMX6UL-C3

Here we suppose root file system path as /work/imx6/rootfs
Execute below command
cd /usr/local/arm/tslib
cp -ar lib/* /work/imx6/rootfs /usr/lib
cp -ar bin/*/work/imx6/rootfs/usr/bin
vi etc/ts.conf #delete preceding not of module_raw input #, please delete space also, set module full out
cp -ar etc/* /work/imx6/rootfs /etc

7.2.4 Export tslib variables

cd /work/imx6/rootfs
vi etc/rc.d/qt_env.sh
Add with below variables
export TSLIB_TSDEVICE=/dev/input/touchscreen0
export TSLIB_CONFFILE=/etc/ts.conf
export TSLIB_PLUGINDIR=/usr/lib/ts
export POINTERCAL_FILE=/etc/pointercal
export TSLIB_CALIBFILE=/etc/pointercal
export TSLIB_CONSOLEDEVICE=none
export TSLIB_FBDEVICE=/dev/fb0
about < tslib variables
TSLIB_CONFFILE // configure file name
TSLIB_PLUGINDIR //plug file directory

POINTERCAL_FILE： //appointed file for calibration cursor
TSLIB_TSDEVICE //touch screen device file name
TSLIB_CALIBFILE //calibration file, generated by ts_calibrate
TSLIB_CONSOLEDEVICE //console device name
TSLIB_FBDEVICE //device name

7.2.5 Test tslib in OKMX6UL-C3

Boot OKMX6UL-C3 by new file system, get into shell and execute below command
#source /etc/rc.d/qt_env.sh
ts_calibrate
ts_test

7.3 Port QT4.8.5

7.3.1 Copy compressed file

Copy qt-everywhere-opensource-src-4.8.5.tar.gz from to /work/imx6
We did necessary settings to QT, the configuration path is /work/imx6, if your Ubuntu is without this path, please execute below command to create path of /work/imx6
#mkdir /work/imx6
Execute below command to decompress QT source code file
tar xvfj qt-everywhere-opensource-src-4.8.5.tar.gz
#tar xvfj linux-imx6-g++.tar.bz2
#cp –fr linux-imx6-g++ qt-everywhere-opensource-src-4.8.5/mkspecs/qws/ linux-imx6-g++
#cp qteverywhere.sh qt-everywhere-opensource-src-4.8.5/
cd qt-everywhere-opensource-src-4.8.5
#export PATH=$PATH: /usr/local/arm/gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12/fsl-linaro-toolchain/bin/
Add –lts to qt-everywhere-opensource-src-4.8.5/mkspecs/common/linux.conf,pthread
#make confclean
#make clean
./qteverywhere.sh ##compiled script provided by Forlinx, execute it to install qt to /usr/local/arm/qt4.8.5
#make
#mkdir –p /usr/local/freescale/qt4.8.5
#make install
#/usr/local/freescale/qt4.8.5/bin/qmake －v #tocheck whether it’s installed

```
root@forlinx:/work/imx6# /usr/local/freescale/qt4.8.5/bin/qmake -v
QMake version 2.01a
Using Qt version 4.8.5 in /usr/local/freescale/qt4.8.5/lib
root@forlinx:/work/imx6#
```

7.3.2 Port QT4.8.5 to OKMX6UL-C3

cd /usr/local/freescale/qt4.8.5/
cp -ar lib/libQt* lib/fonts/ /work/imx6/rootfs/opt/forlinx_qt4.8/lib
cp -ar demos/embeddeddialogs/embeddeddialogs /work/imx6/rootfs/opt/forlinx_qt4.8/bin

Notice: if opt/forlinx_qt4.8 {lib,bin} does not exist, please create one by yourself, it could also be other directories

7.3.3 Export QT variables

```
# cd /work/imx6/rootfs
# vi etc/rc.d/qt_env.sh

export QTDIR=/opt/qt4.8.5
export PATH=$QTDIR/bin:$PATH
export LD_LIBRARY_PATH=$QTDIR/lib:$LD_LIBRARY_PATH
export QT_PLUGIN_PATH=$QTDIR/plugins
export QT_QWS_FONTDIR=$QTDIR/lib/fonts

export QWS_MOUSE_PROTO=tslib:/dev/input/event2
export QWS_DISPLAY="linuxfb:mmWidth50:mmHeight130:0"
export QWS_SIZE=800x480
```

About QT variables

LD_LIBRARY_PATH: to appoint QT lib path
QT_QWS_FONTDIR：appoint font path for qt
QWS_SIZE：set display size
QWS_DISPLAY：appointed display type and frame zone
QWS_MOUSE_PROTO: appoint touch device

The above variables are depend on your real condition, please make sure the device nodes are matched with device nodes in /dev of your board.

Booting programs are saved in /etc/rc.d/apps.sh

```
#!/bin/sh
#apps
cd /opt/qt4.8.5/demos/embedded/fluidlauncher
./fluidlauncher - - qws &
#apps
```

To run program manually

```
#source /etc/rc.d/qt_env.sh
cd /opt/qt4.8.5/demos/embedded/fluidlauncher
./fluidlauncher - -
```

7.3.4 Test QT4.8.5 in OKMX6UL-C3

Start the board with new ported files system, get into shell and execute below command

```
# cd /opt/forlinx_qt4.8/bin/
# ./embeddeddialogs -qws&
```

Notice: to set the interface displaying vertically, users just need add -display "Transformed:Rot90"

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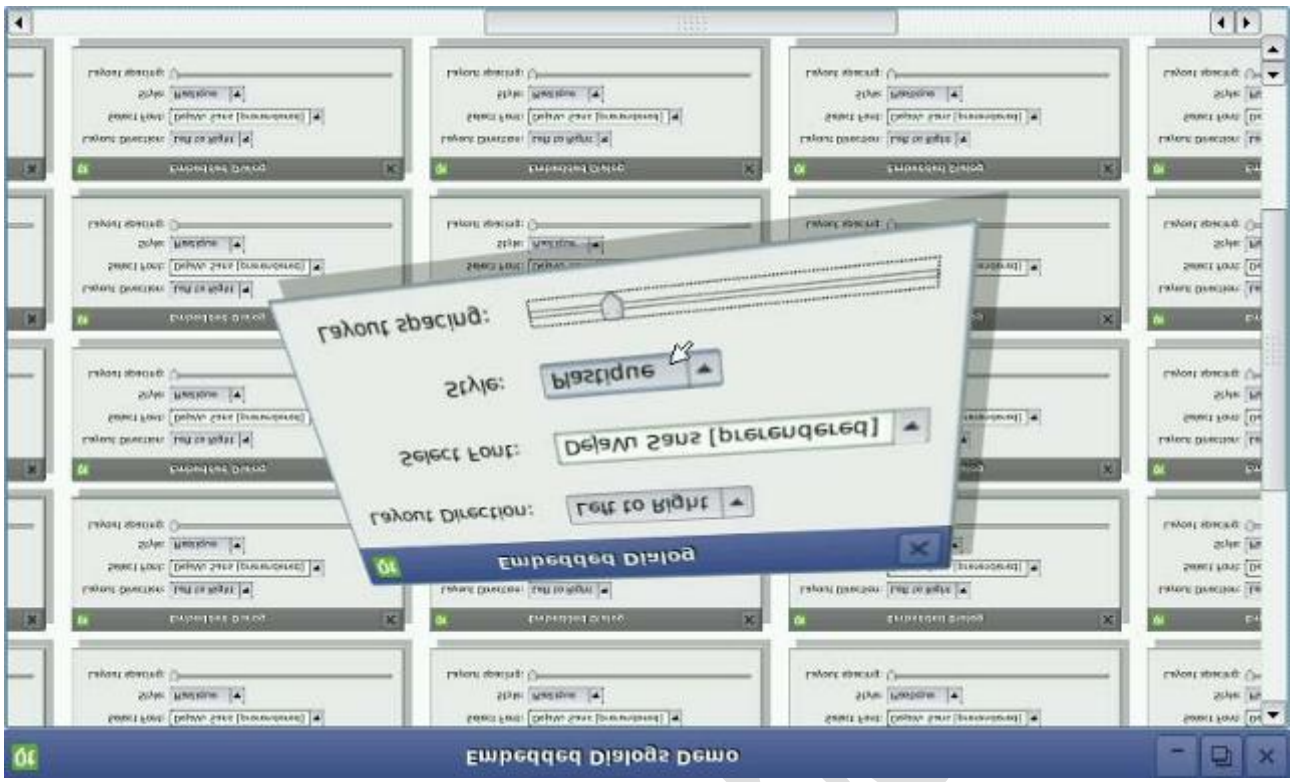


Chapter 8 QT Application Development

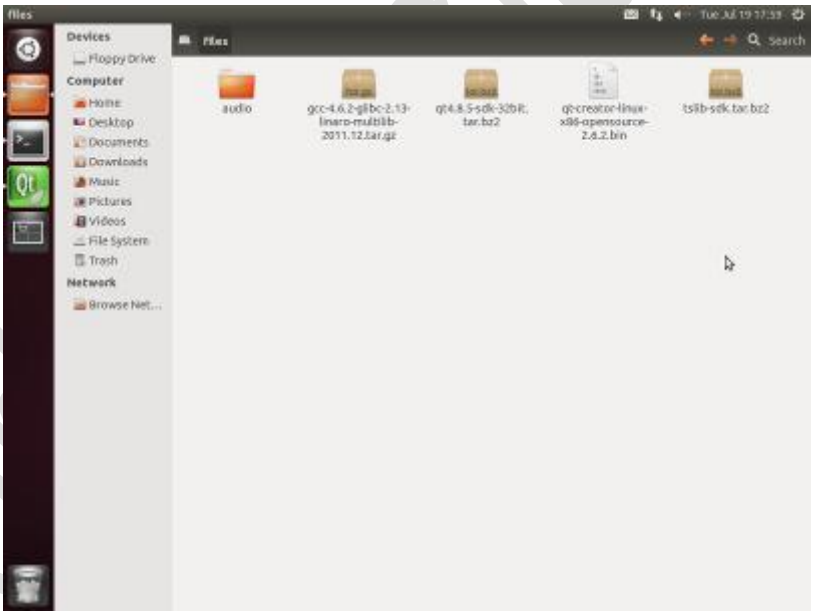
Ubuntu: Ubuntu12.04 32bit
Application development tool:Qt Creator2.6.2 32bit
Qt sdk version: qt4.8.5 32bit
Cross-compiler version: gcc 4.6.2
Tslib version: tslib 1.4
Targeting platform: OKMX6UL-C3

8.1 Install QT Creator

8.1.1 Preparation

1. cross compiler: OKMX6UL-C3\ Tools\gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12.tar.gz
2. QT sdk: OKMX6UL-C3 \Linux\src\qt4.8.5-sdk-32bit.tar.bz2
3. Tslib file: OKMX6UL-C3 \Linux\ src\tslib-sdk.tar.bz2
4. QT Creator pack: OKMX6UL-C3 \Tools\qt-creator-linux-x86-opensource-2.6.2.bin
5. audio testing program source code: OKMX6UL-C3 \ Linux\Test\test.rar, it will be test\gui\audio after it's decompressed

run Ubuntu Terminal and execute command of mkdir files
copy targeting files to folder of files



8.1.2 Install Cross-compiler

cd /files/
cp gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12.tar.gz /usr/local/arm
cd /usr/local/arm
tar xvfz gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12.tar.gz

8.1.3 Install QT sdk

cd /files/
mkdir /usr/local/freescale
cp qt4.8.5-sdk-32bit.tar.bz2 /usr/local/freescale/
cd /usr/local/freescale/
tar jxvf qt4.8.5-sdk-32bit.tar.bz2

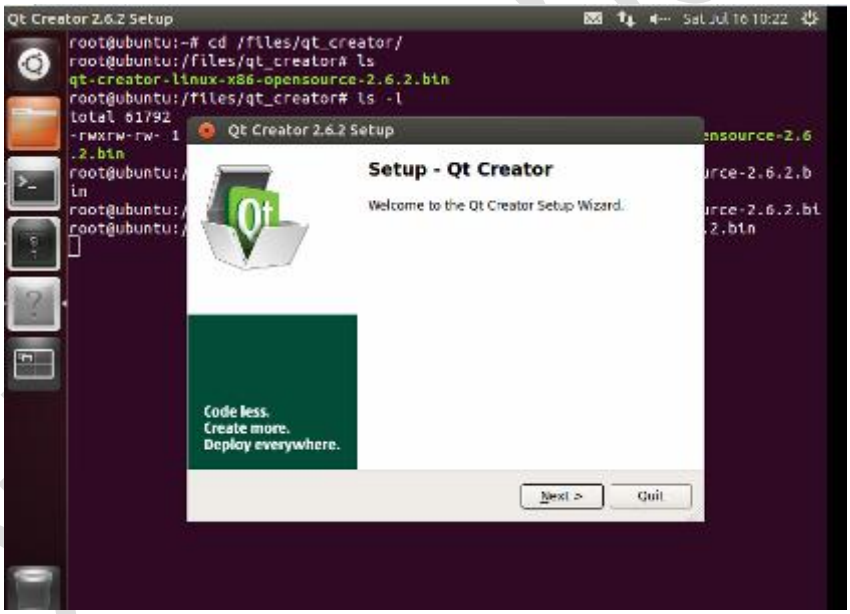
notice: there will be a folder named /freescale/qt4.8.5 in /usr/local after the above step, please make the file names comply with each other do not do any change to them

8.1.4 Install Tslib

cd /files/
cp tslib-sdk.tar.bz2 /usr/local/arm
cd /usr/local/arm
tar jxvf tslib-sdk.tar.bz2

8.1.5 Install QT Creator2.6.2

cd /files/
chmod 777 qt-creator-linux-x86-opensource-2.6.2.bin
./qt-creator-linux-x86-opensource-2.6.2.bin



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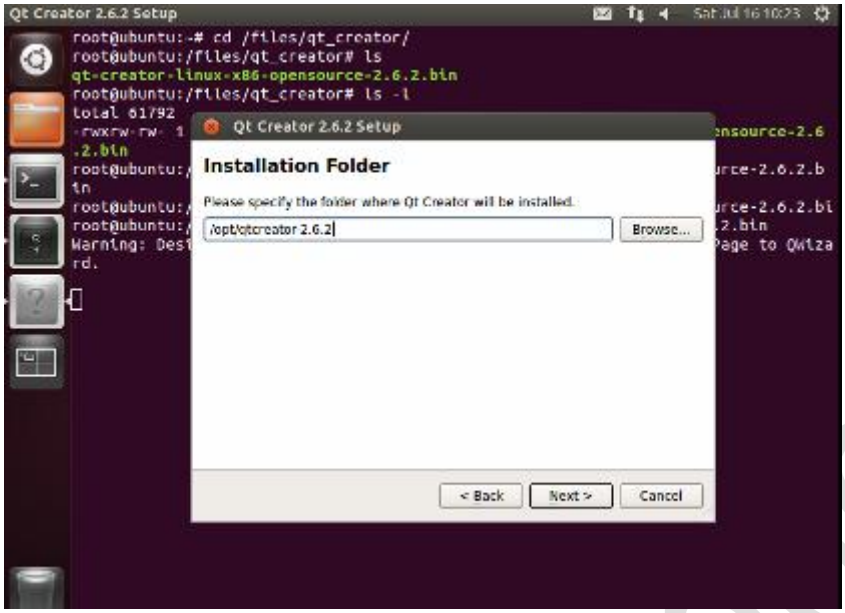
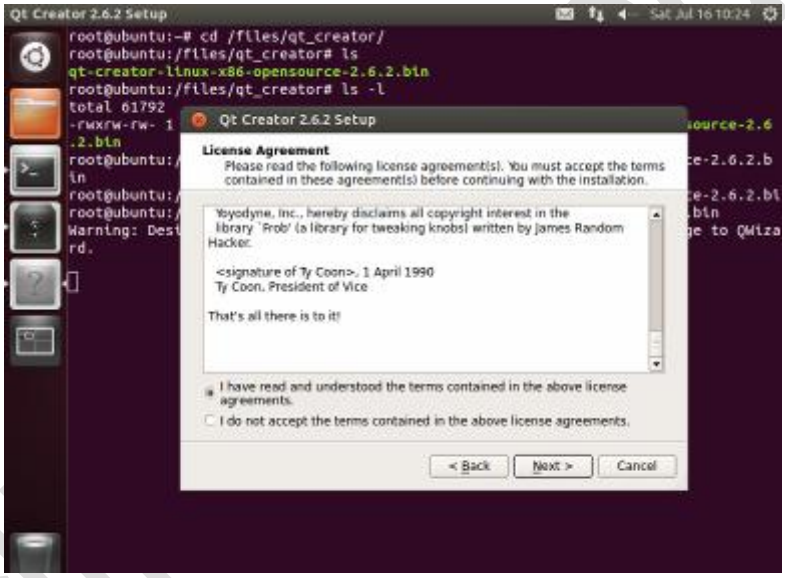
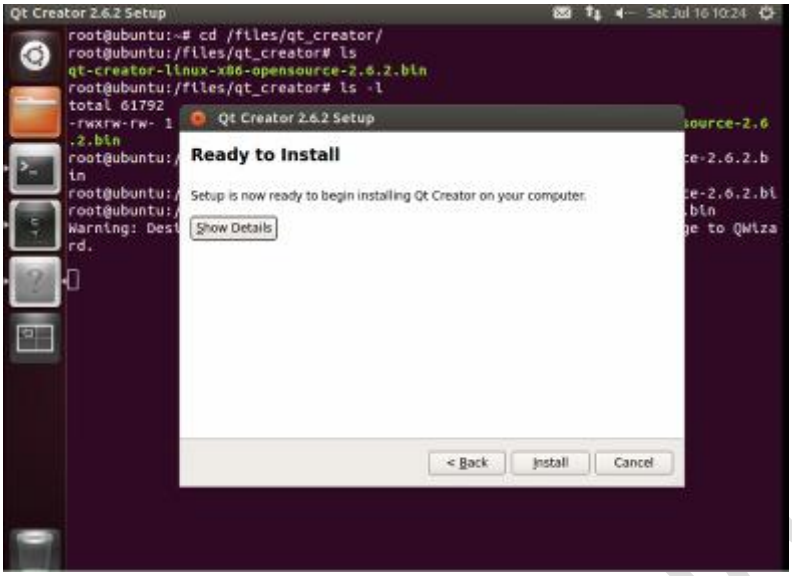


Skip install path setting and click “Next”



Select “I have read and ...” and click “Next”



Click Install

Click “ Finish” to complete installation

Execute below command to open QT creator

cd /opt/qtcreator-2.6.2/bin/

./qtcreator &

8.3 Variable Settings

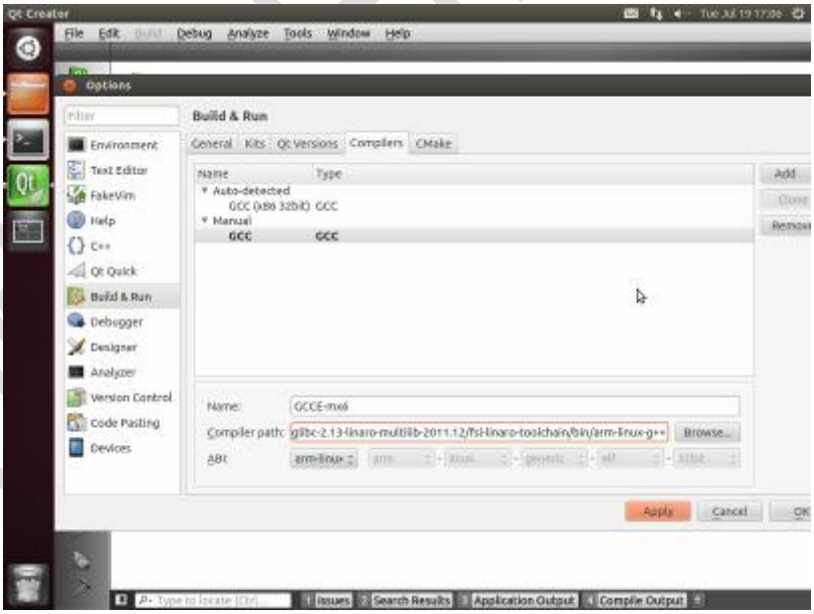
8.3.1 Settings to cross-compiler

Click QT creator-> Tools ->Options->Build & Run->Compilers, and then Add ->GCC

Set name to GCCE-mx6

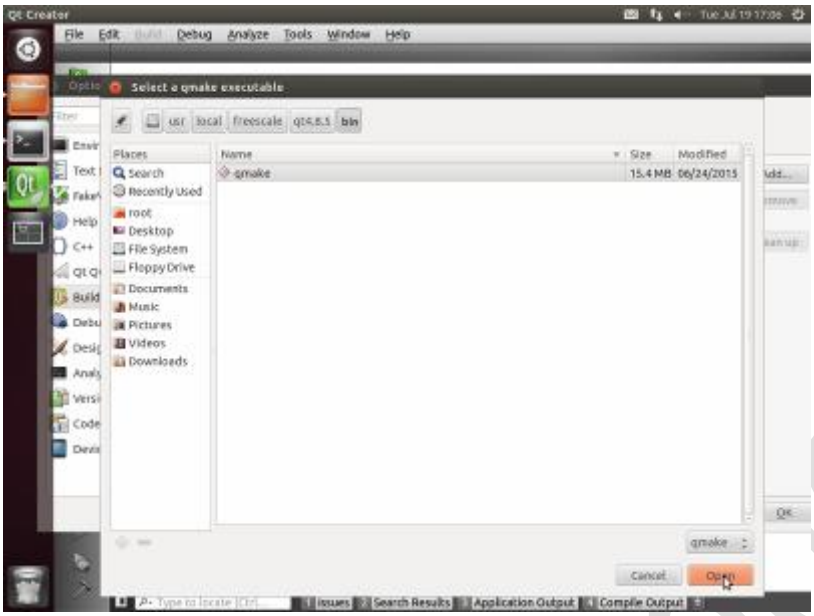
Click Browse for Compiler Path

/usr/local/arm/gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12/fsl-linaro-toolchain/bin/arm-linux-g++

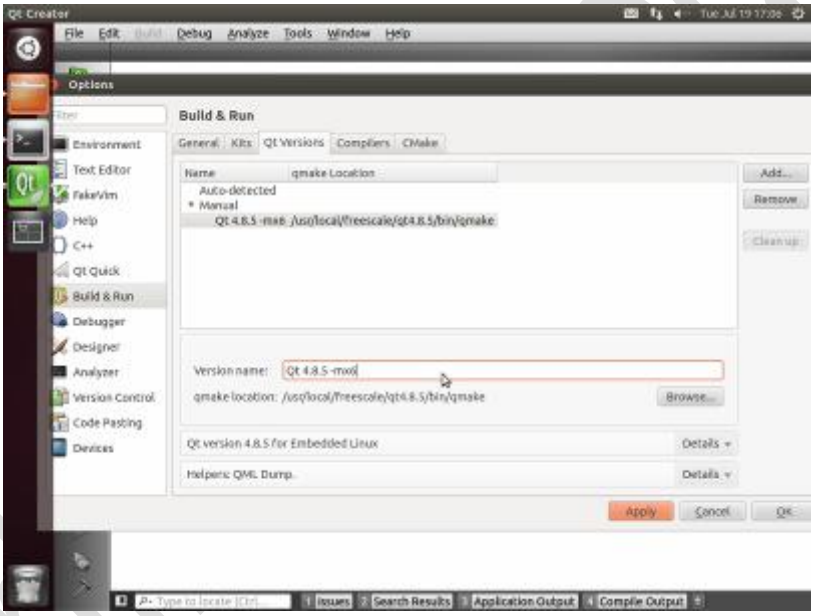


8.3.2 QT Versions Setting

Qt Creator-> Tools ->Options->Build & Run->Qt Versions, and then click Add, it will prompt file of /usr/local/freescale/qt4.8.5/bin/qmake, click open to add



Back to QT Version setting interface

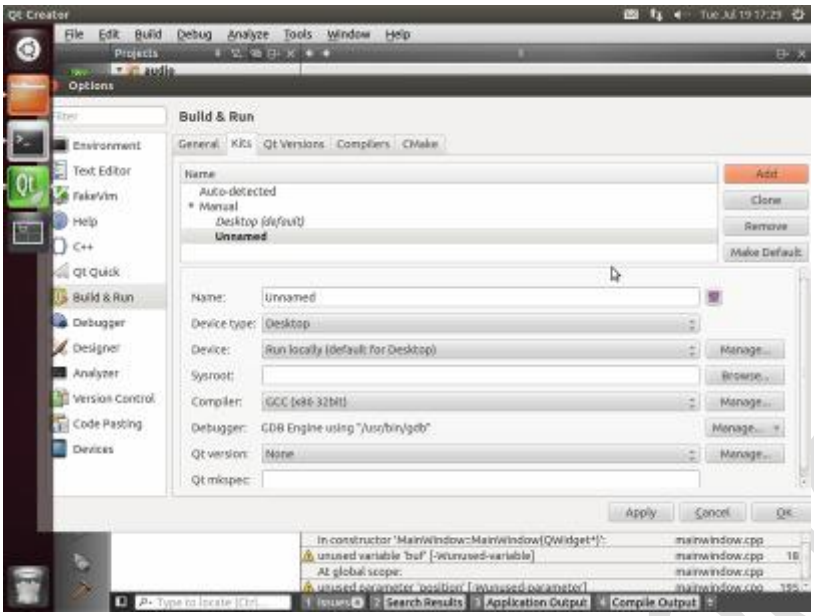


Set Version name as Qt 4.8.5-mx6

And then click Aplly-> OK

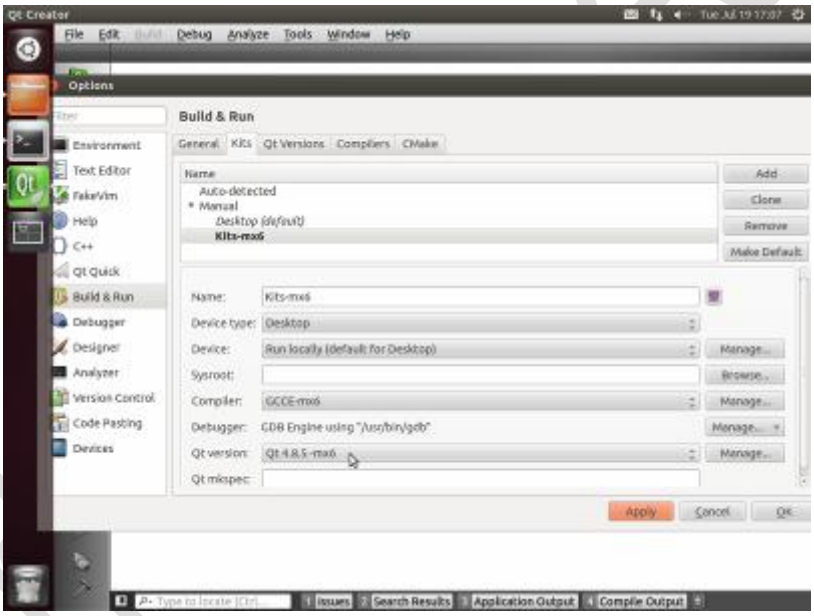
8.3.3 Kits Settings

Qt Creator-> Tools ->Options->Build & Run->Kits， then click Add



Set Name as Kits-mx6

Select GCCE-MX6 for Compiler, and Qt 4.8.5-mx6 for QT version



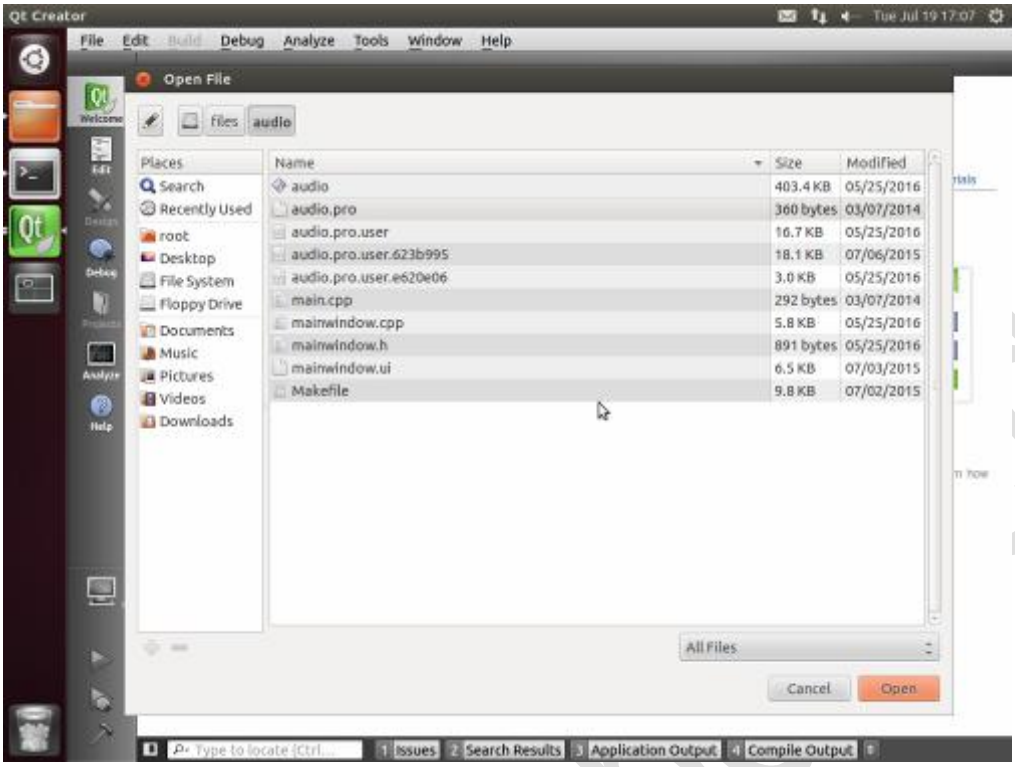
Click Apply-> OK

8.4 Application Compiling and Running

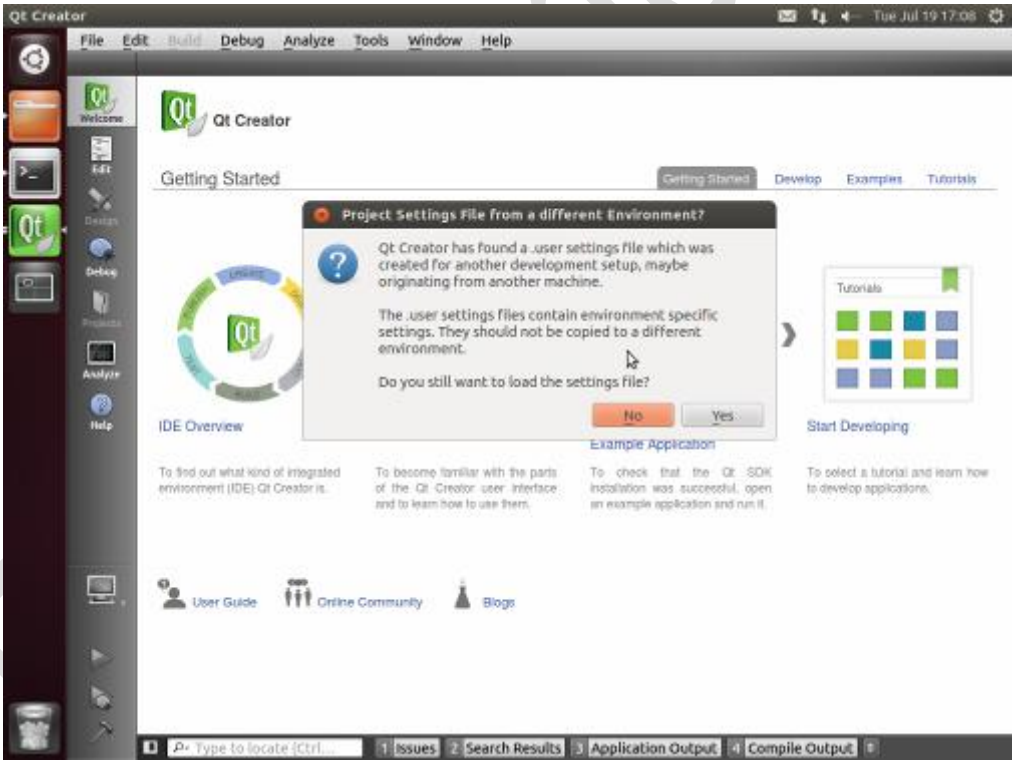
8.4.1 Compile application

Qt Creator-> File->Open File or Project, it will prompt a menu, please select /files/audio/audio.pro

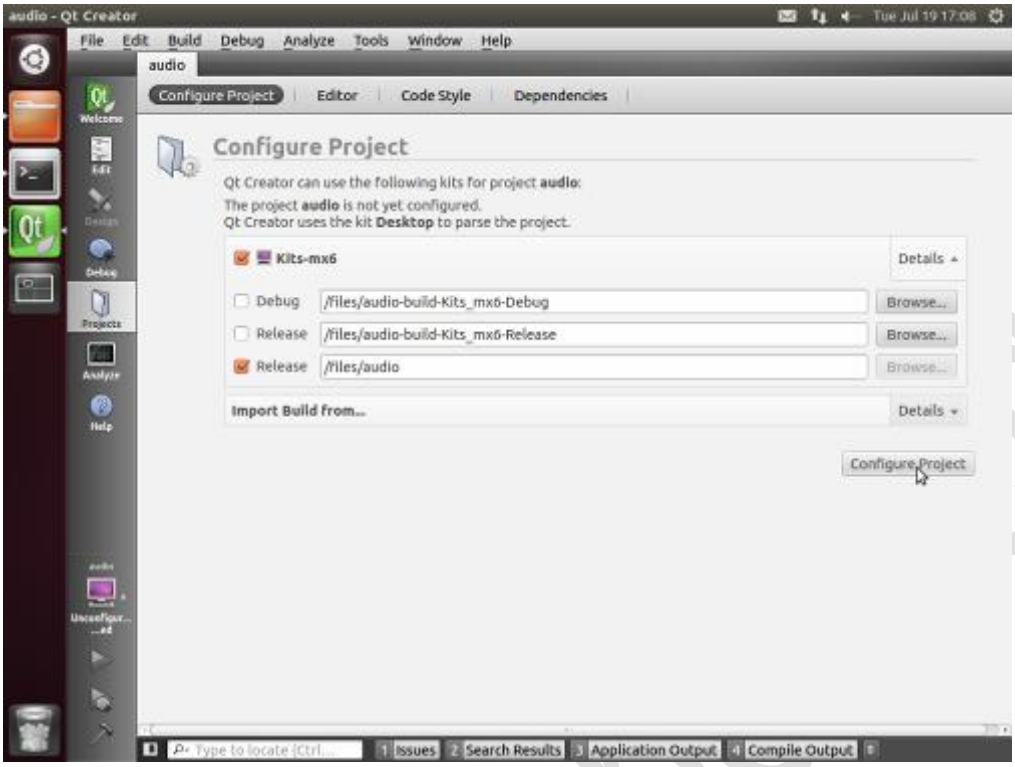
Type in project name and appoint path as below



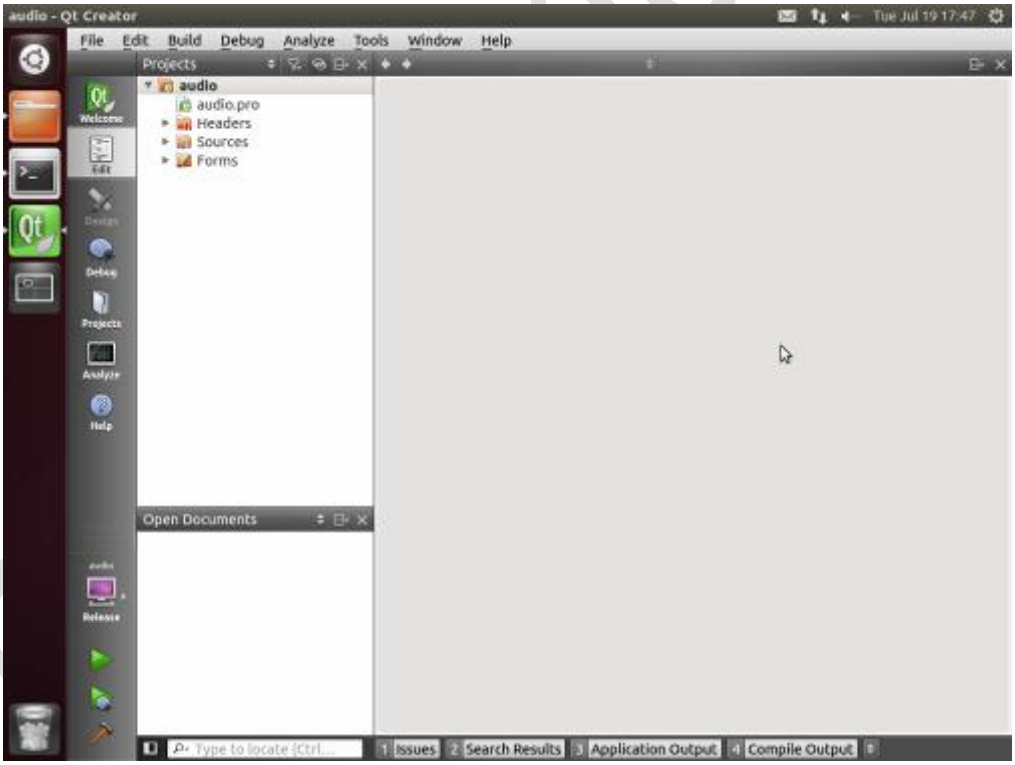
Click open, it will prompt Do you still want to load the setting file, please select NO



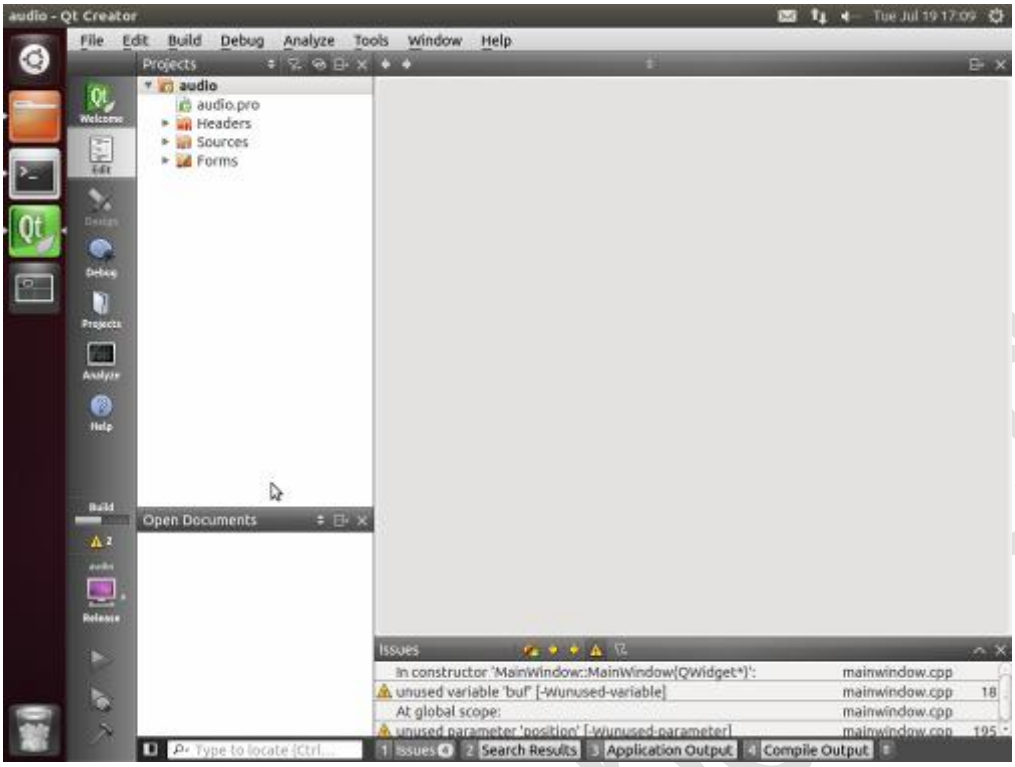
Configure Project as below



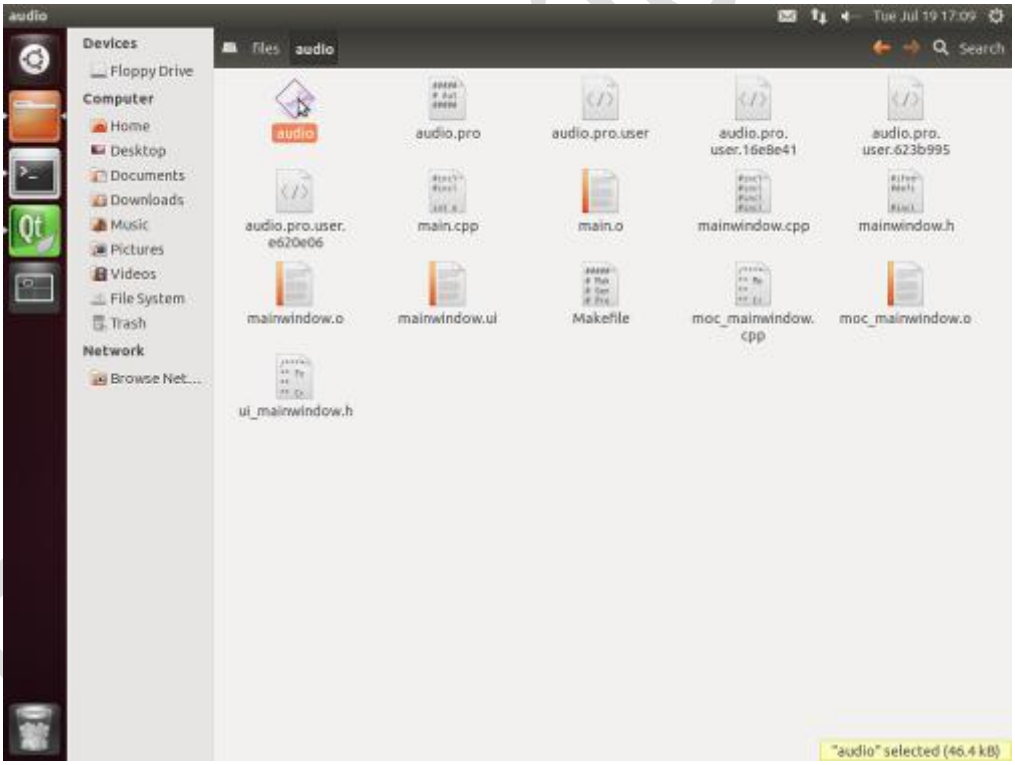
Click Configure Project



Build->Clean All, and then Build->Build All to start compiling



Ater compiling, it will generate a binary file named audio in /files/audio/



8.4.2 Run application

Step 1: flash OS image to OKMX6UL-C3 and run Linux QT

Step 2: copy the compiled audio in chapter 4.1 to SD card, and insert the SD card to OKMX6UL-C3

Step 3: execute below command to copy audio to the relevant directory to replace the former audio program, and restart the board

root@freescale /$ cd /opt/qt4.8.5/apps/
root@freescale /opt/qt4.8.5/apps$ mv audio audio_old
root@freescale /opt/qt4.8.5/apps$ cp /media/mmcblk1p1/audio ./
root@freescale /opt/qt4.8.5/apps$ sync
root@freescale /opt/qt4.8.5/apps$ reboot

step 4: after Linux QT booted, run audio test, if it can play audio files, it indicates the new compiled QT application is workable, and your QT application variable settings are correct

8.5 to download 64-bit QT creator by below link

https://www.qt.io/

8.6 FAQ

Q 1:: Qt version is not properly installed,please run make install or
the qmake command "/usr/local/freescale/qt4.8.5/bin/qmake"was not found or is not extcutable

A1: you may not add correct qt sdk version for Kits of QT Creator, or your qt sdk or saving path is not correct

Q2: can not find -lts
A2: tslib file name or saving path is not correct

Q3: No compiler can produce code for this Qt version.Please define one or more compilers.
A3: Qt Creator settings are not correct

Chapter 9 VMWare and Ubuntu Installation and Settings

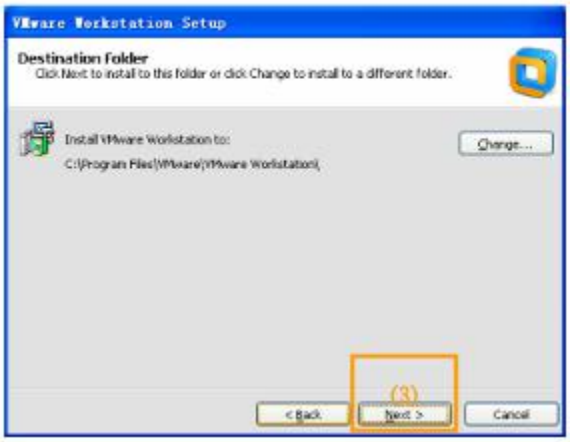
9.1 Install VMWare

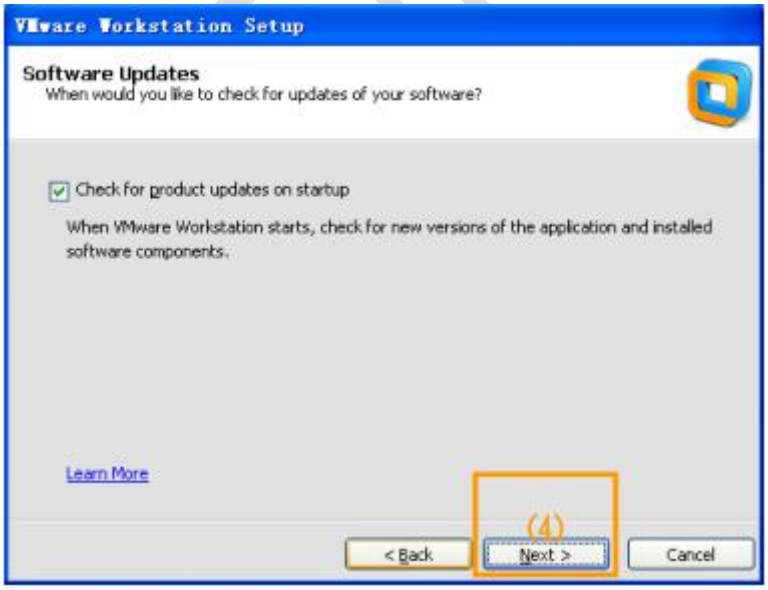
9.1.1 Preparation

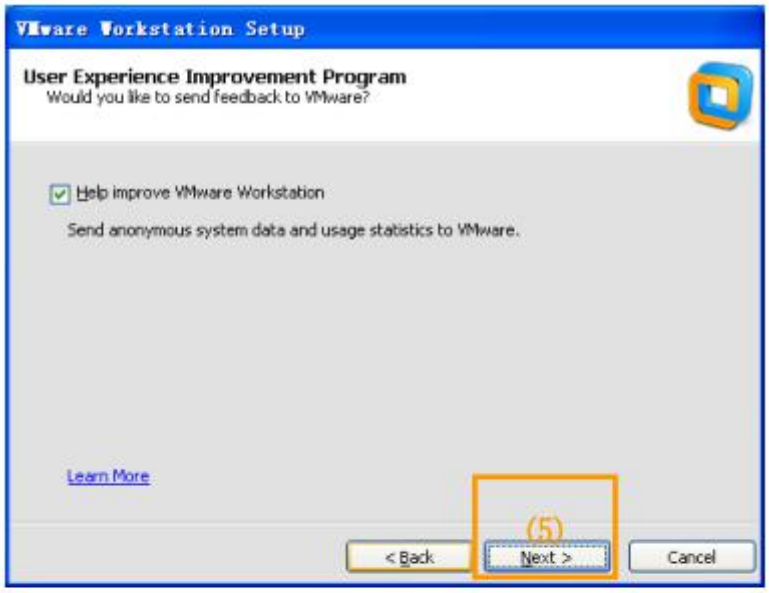
Necessary packs
VMware-8.0.2-591240.exe
ubuntu-12.04_32bit.iso or ubuntu-12.04_64bit.iso

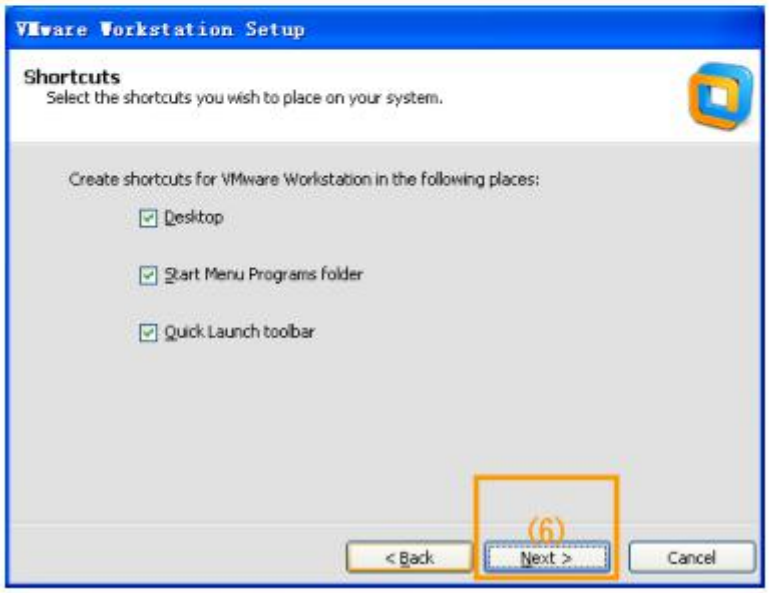
9.1.2 Install VMWare

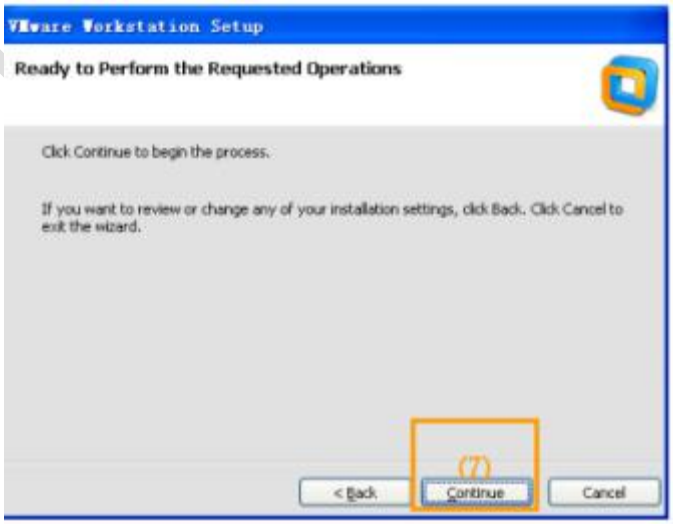
Step 1: run VMware-8.0.2-591240.exe
Step 2: then do according to below pictures

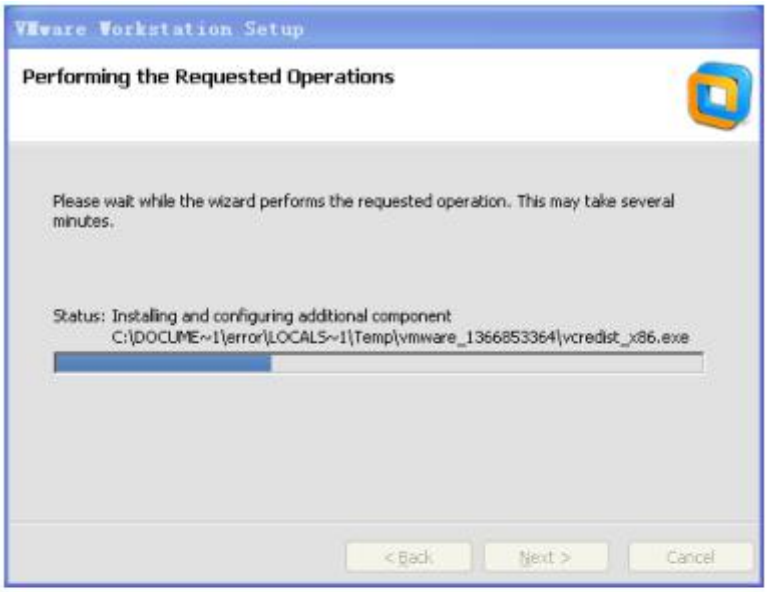


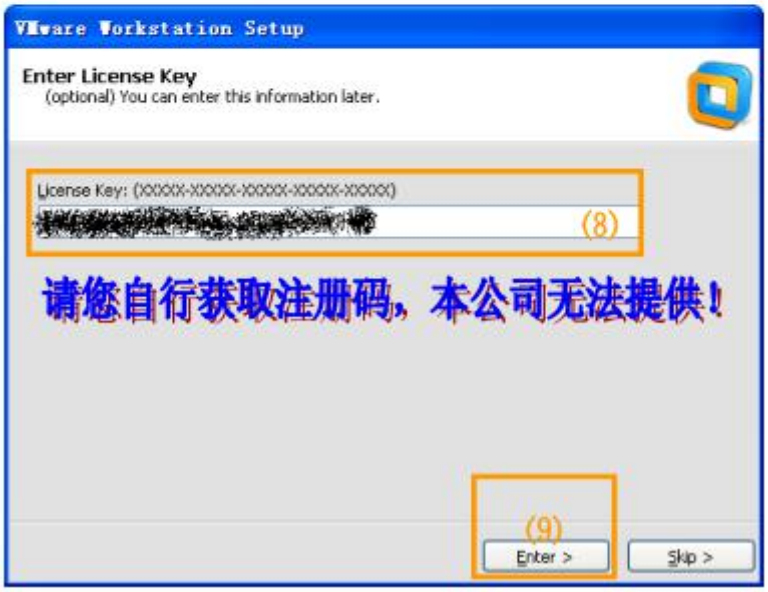



VMware Workstation Setup
User Experience Improvement Program
Would you like to send feedback to VMware?
Help improve VMware Workstation
Send anonymous system data and usage statistics to VMware.
Learn More
(5)
< Back
Next >
Cancel

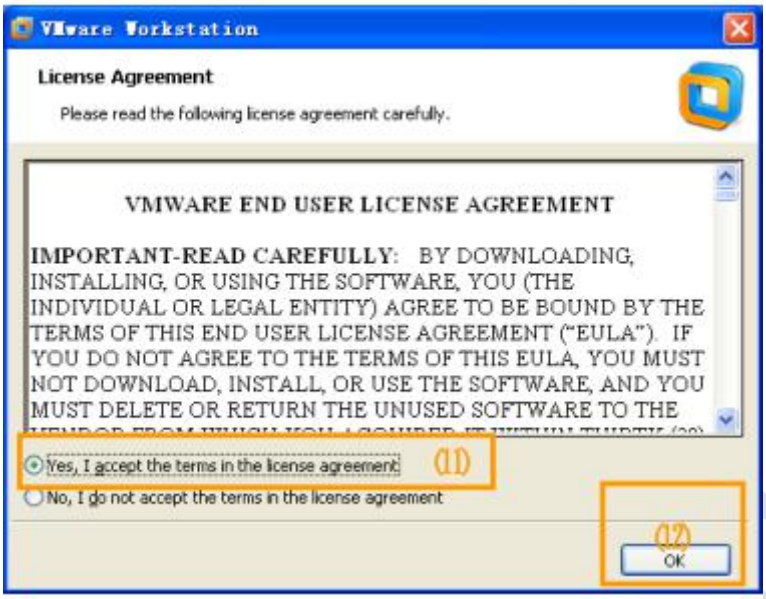

VMware Workstation Setup
Shortcuts
Select the shortcuts you wish to place on your system.
Create shortcuts for VMware Workstation in the following places:
Desktop
Start Menu Programs folder
Quick Launch toolbar
(6)
< Back
Next >
Cancel


VMware Workstation Setup
Ready to Perform the Requested Operations
Click Continue to begin the process.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
(7)
< Back
Continue
Cancel

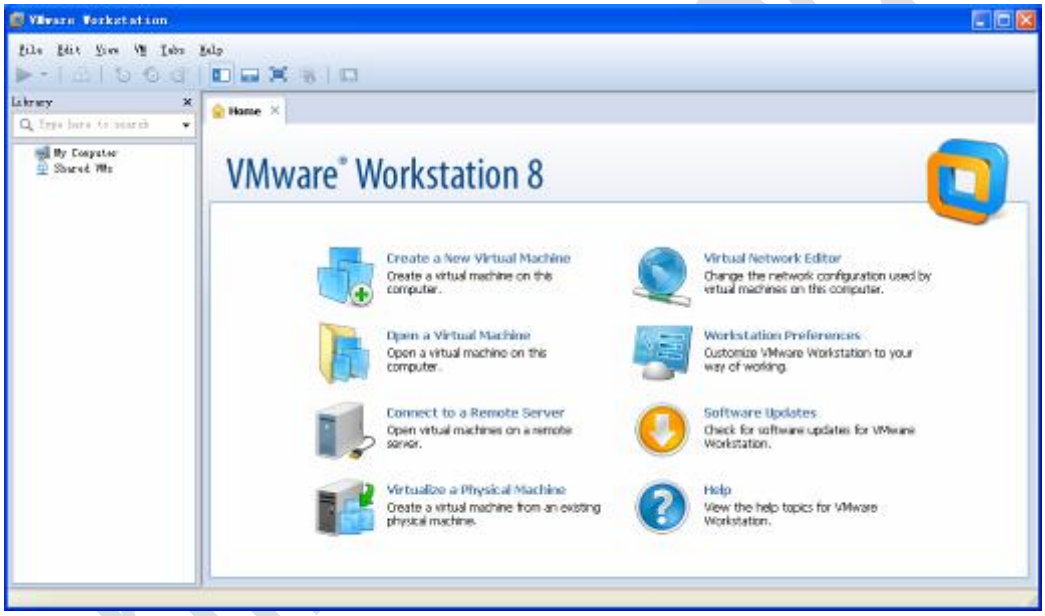

VMware Workstation Setup
Performing the Requested Operations
Please wait while the wizard performs the requested operation. This may take several minutes.
Status: Installing and configuring additional component
C:\DOCUME~1\error\LOCALS~1\Temp\vmware_1366853364\vcredist_x86.exe
< Back
Next >
Cancel


VMware Workstation Setup
Enter License Key
(optional) You can enter this information later.
License Key: (XXXXX-XXXXX-XXXXX-XXXXX-XXXXX)
(8)
请您自行获取注册码，本公司无法提供！
(9)
Enter >
Skip >


VMware Workstation Setup
Setup Wizard Complete
The setup wizard has successfully completed its operations related to VMware Workstation. Click Finish to exit the wizard.
VMware®
Workstation 8
(10)
Finish



Step 3: run the installed VMWare

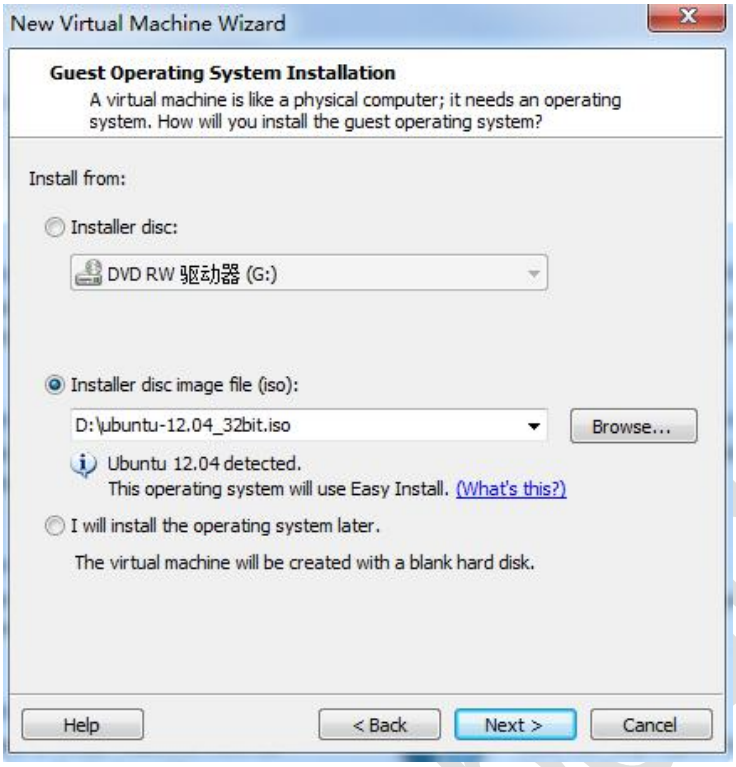


9.1.3 Add new virtual machine and install Ubuntu

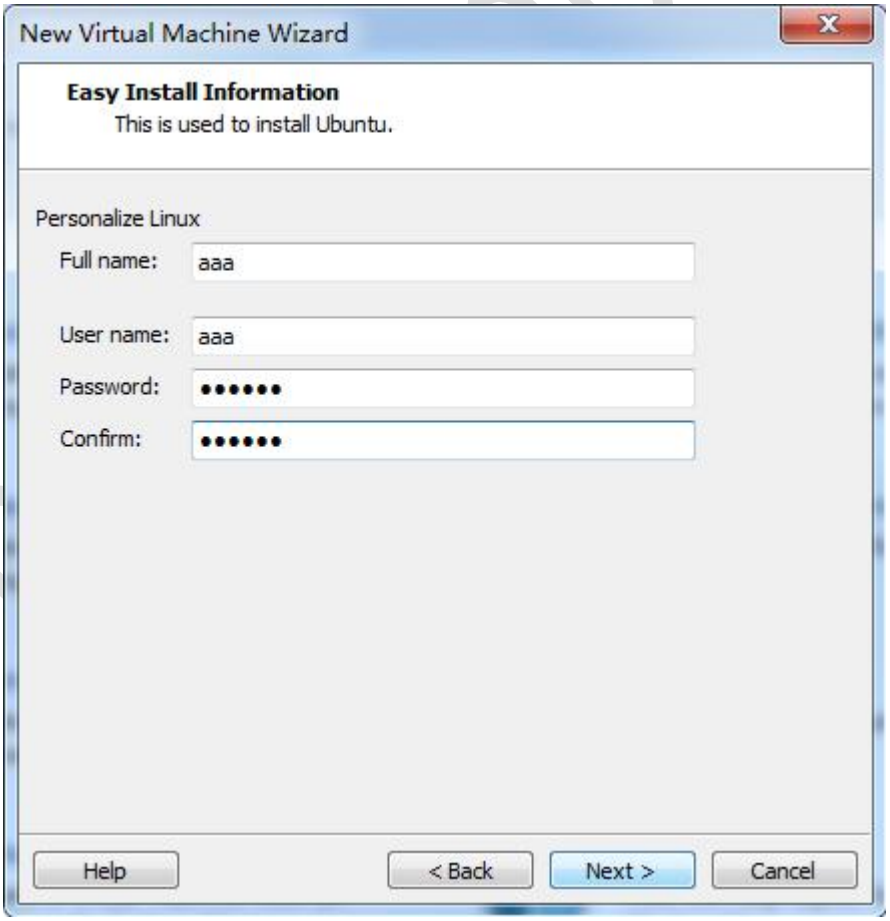
create a new virtual machine

Select typical and then go to next

Select path of iso, eg. D:\ubuntu-12.04_32bit.iso



Set name and code



Install a virtual machine named ubuntu-test, path: E:\linux-32 bit

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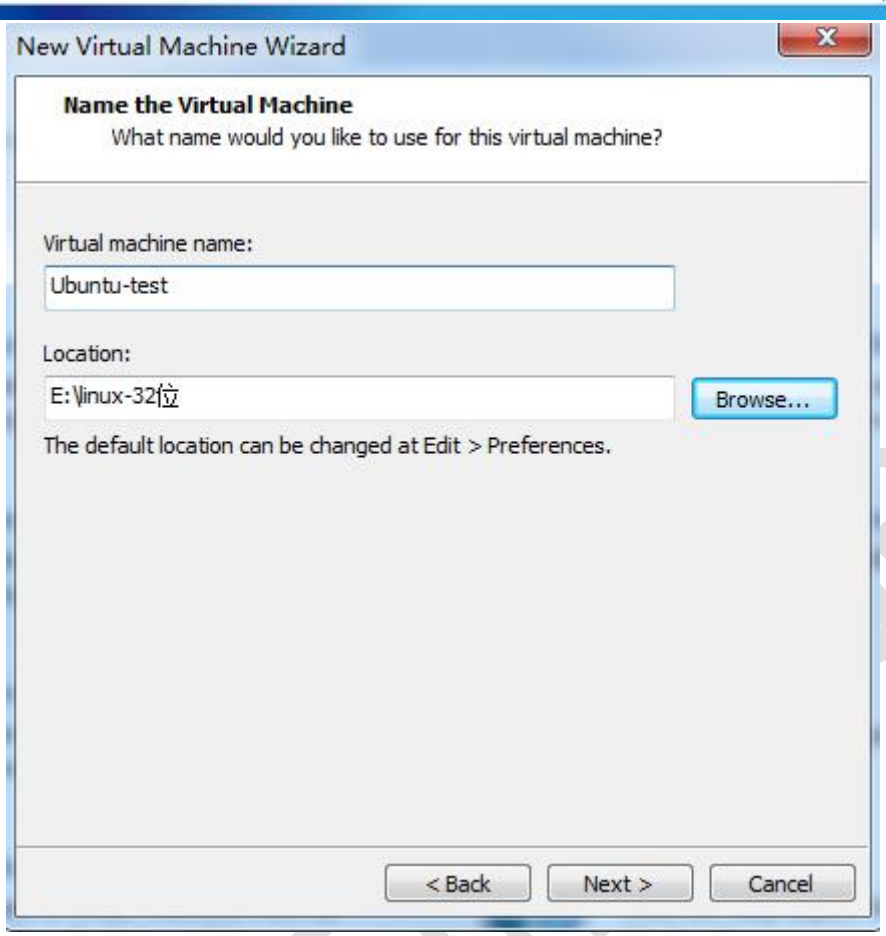
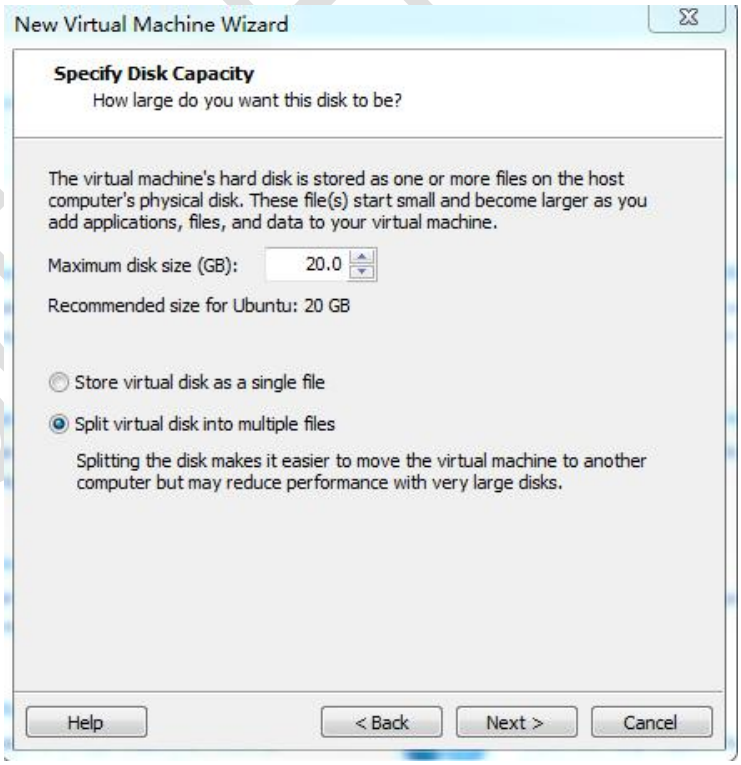
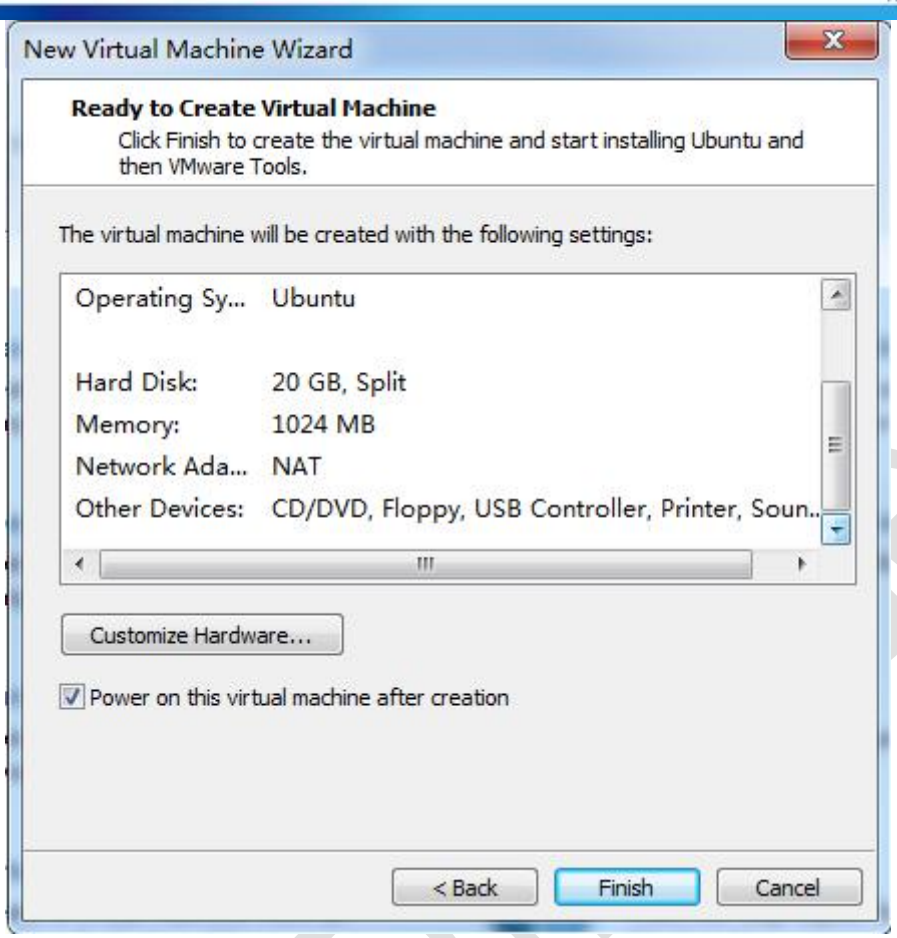


Capability of virtual machine is 20G



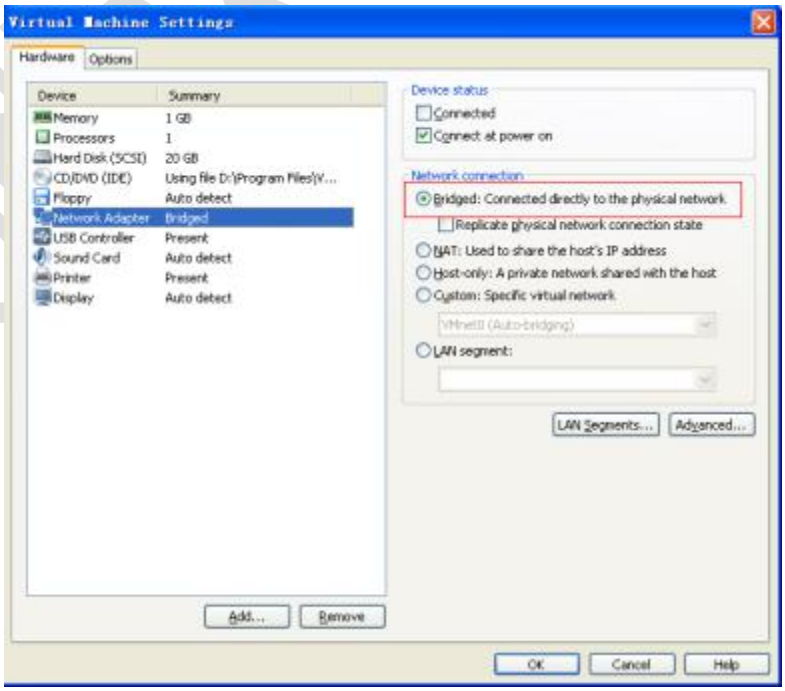
Check all information and then click Finish, install Ubuntu, it will take some time to install it, detailed steps please refer to chapter 9.2



9.1.4 Set Static IP for VMWare

The VMWare will share on IP with host OS but without an individual IP, here firstly we need set this VMWare network type as bridge connection.

Step 1: select Setting under VM menu, and set in dialogue as below



Step 2: select Bridge

Step 3: set network according to chapter 9.2.4

9.2 Installation and Settings about Ubuntu

Overview of Ubuntu Linux

Ubuntu is a Linux system mainly for desk application. Compared with other Linux versions, Ubuntu has many advantages. First, it's easy to install with less settings. Second, it is with a human graphical interface that simulate the shortcut key of XP. Third, users could install and upgrade the program via network and automatically install dependent pack by system.

This manual is based on the testing of Ubuntu-12.04. Other version may cause gcc compiler and libfile problems.

Ubuntu official: 129H http://www.ubuntu.org

Ubuntu official forum: 130H http://forum.ubuntu.org

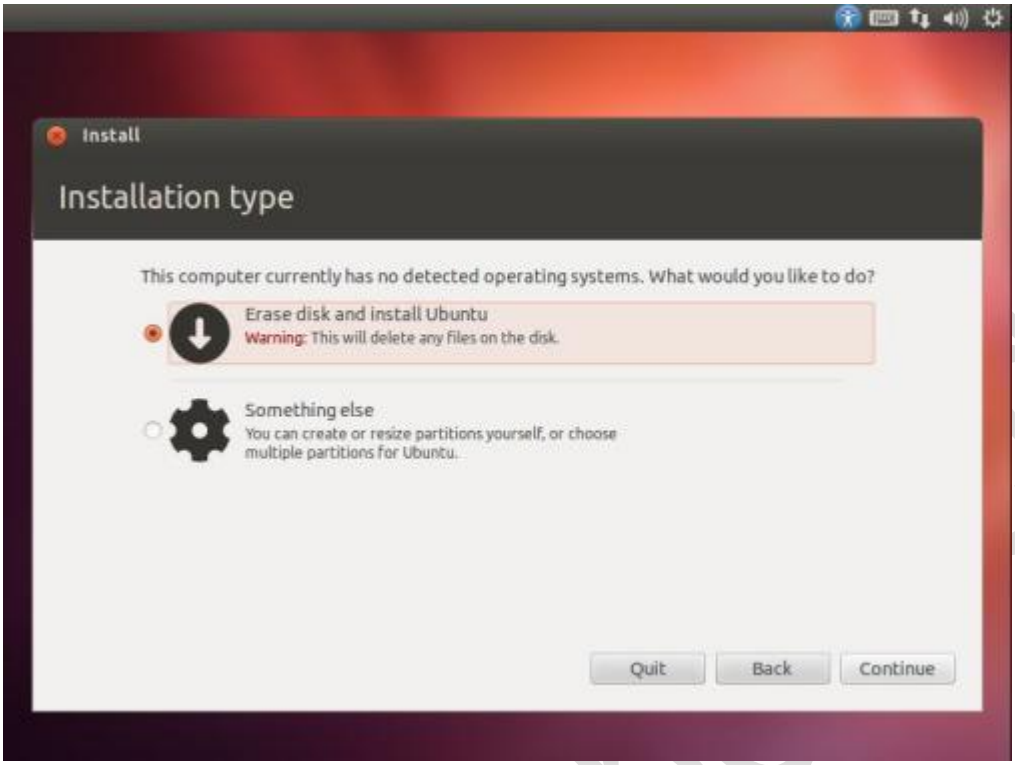
9.2.1 Install Ubuntu

Step 1: prepare one CD for Ubuntu12.04 installation. Inset the CD to disk driver, and set PC booting type in bios as disk driver booting, then run the PC

Step 2: run PC and it will prompt installation language. Selection the language for installation process by PC keyboard. Here we select English->>> Install Ubuntu

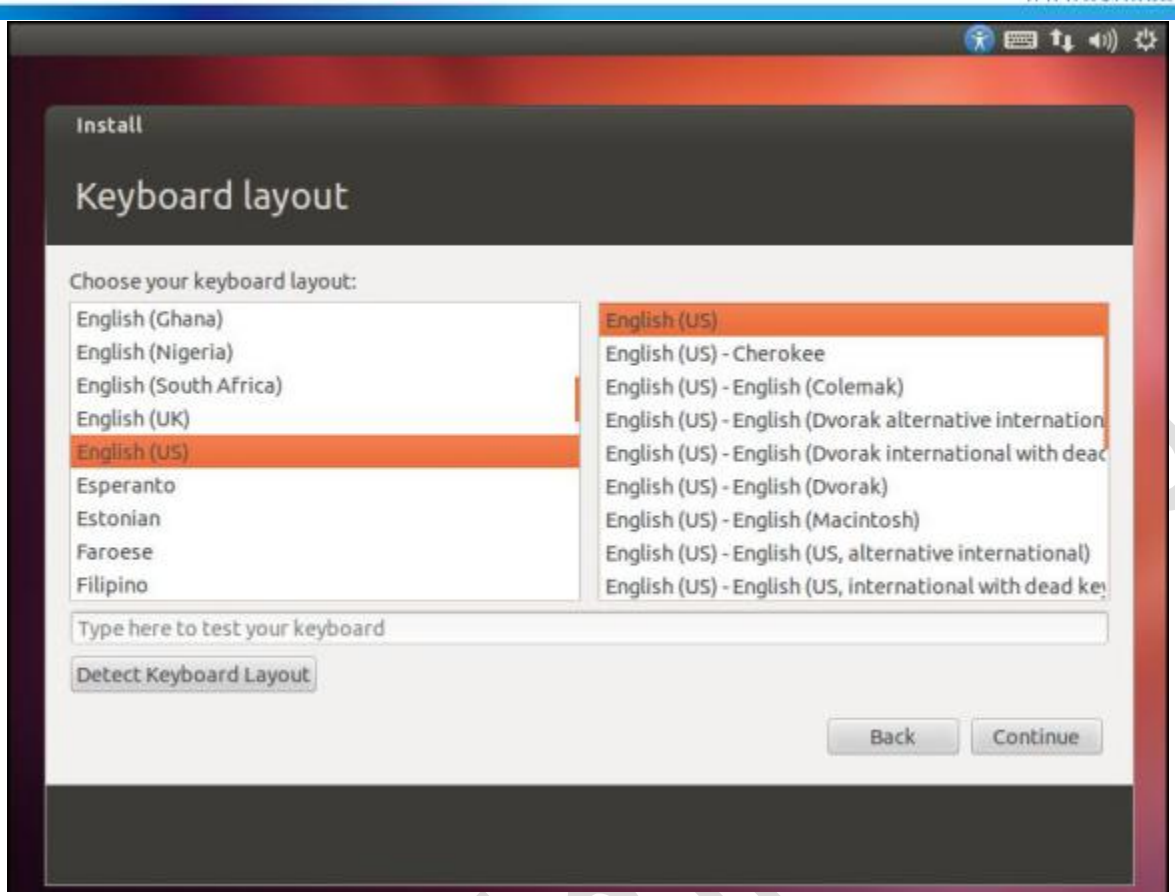
Step 3: select as "Erase disk and install Ubuntu">>"Continue"

(notice: non-VM ware may format your hardware disk, please be careful)



Step 4: as for the hardware disk space and mounting point allocation, please keep it as default. Of course you could do settings as you like. Then click " Install Now"

Step 5: select keyboard layout, just keep it by default, then click "Continue"



Step 6: Select location, here we make it Shanghai, then click “Continue”

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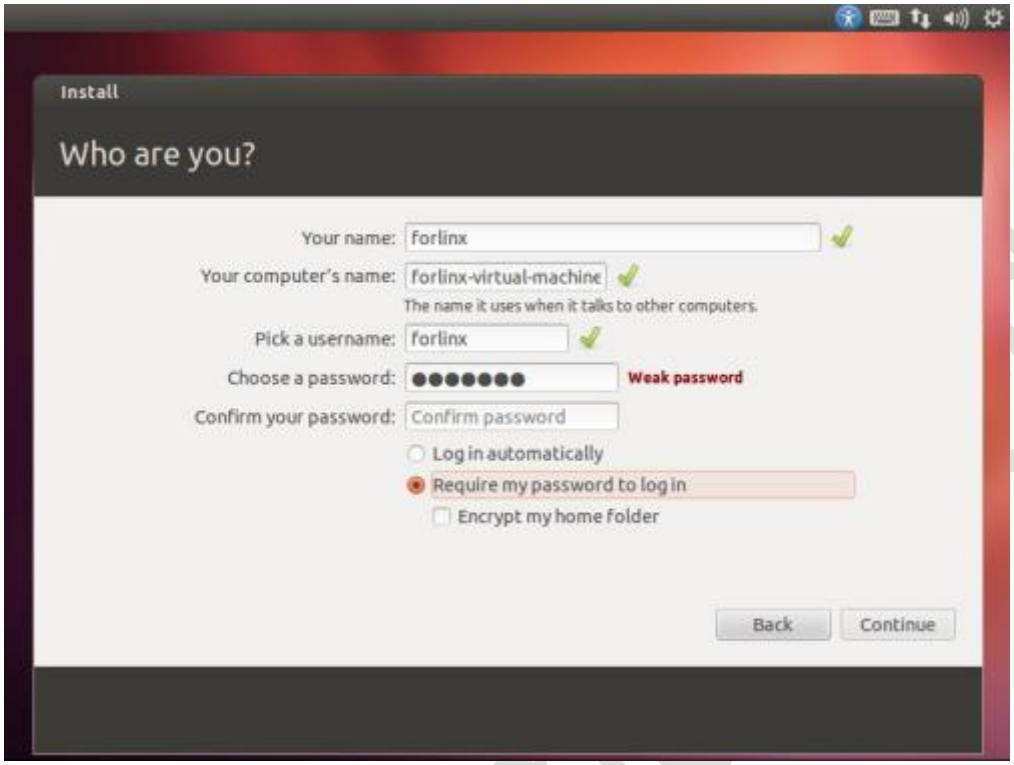
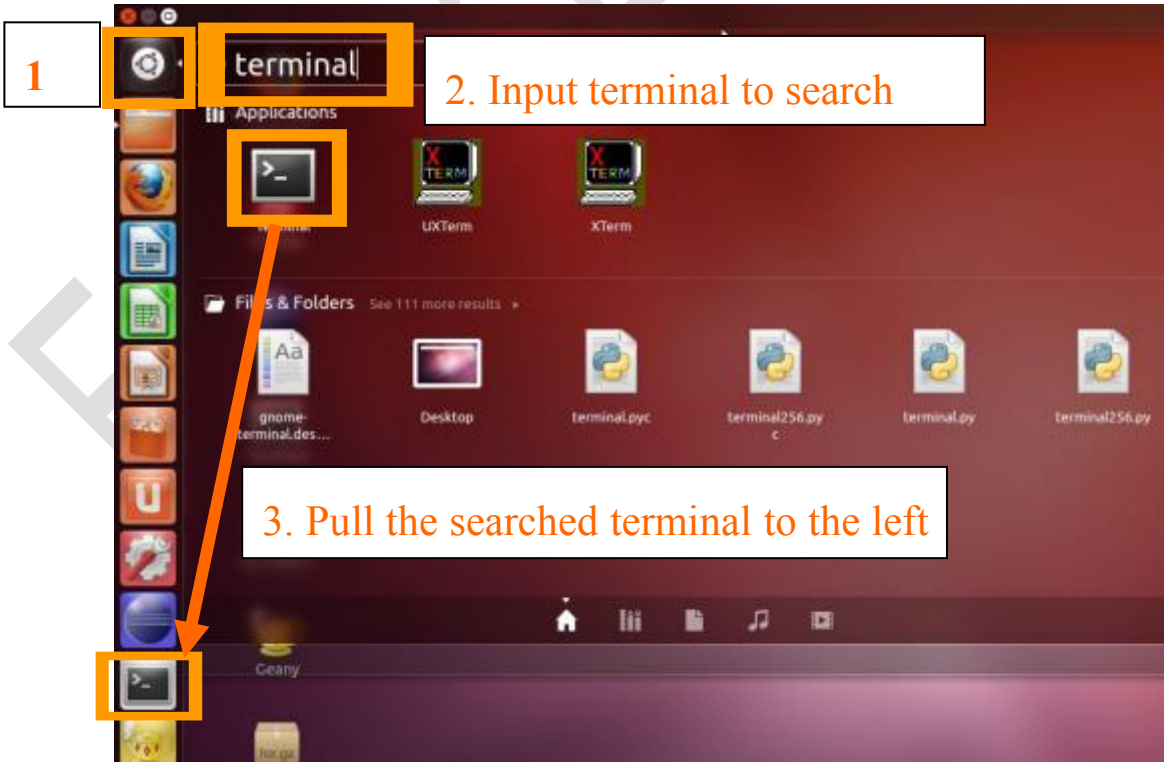
Step 7: input user name and pass code, here the user name is “forlinx”, code is 123456. Then click “Continue” to finish installation automatically.



Notice: here the user name is a general one without root authority.

9.2.2 Linux Terminal

Do steps as below



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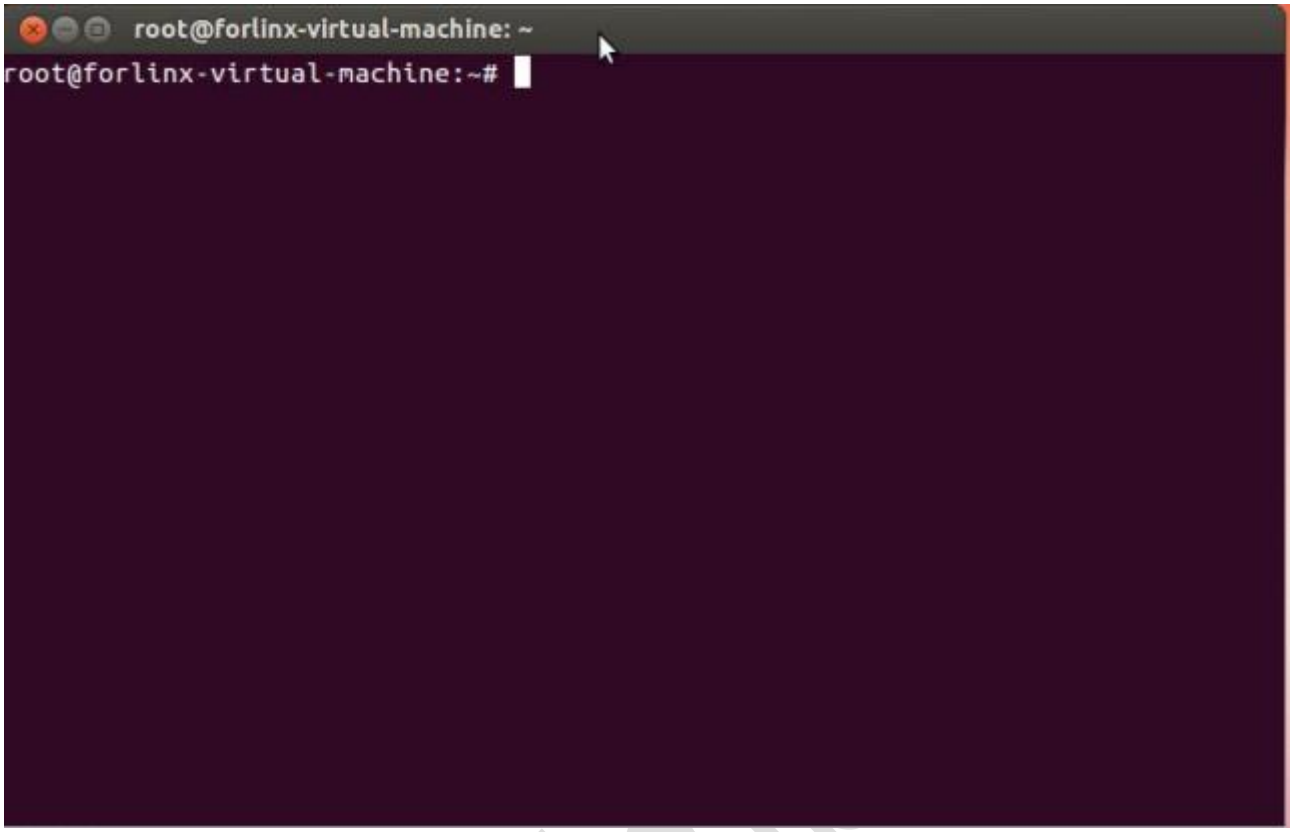
Then users just need click this icon to run the terminal



9.2.3 Ubuntu 12.04 Root Settings

The ubuntu12.04 could not be signed in by root by default, users could only see general user and visitor logging in. Please log in Ubuntu as a general user to do some modification.

Step 1: log in as a general, switch to hyper user mode to modify system configuration files, input command in terminal and then press enter key

#sudo -s

Step 2: input pass coded that set when installing Ubuntu12.04 to step into root user mode

Step 3: execute below command in terminal

#gedit /etc/lightdm/lightdm.conf

Step 4: delete all the existing information and then stick below 7-line information

[SeatDefaults]
allow-guest=false
autologin-user=root
autologin-user-timeout=0
autologin-session=lightdm-autologin
user-session=ubuntu
greeter-session=unity-greeter

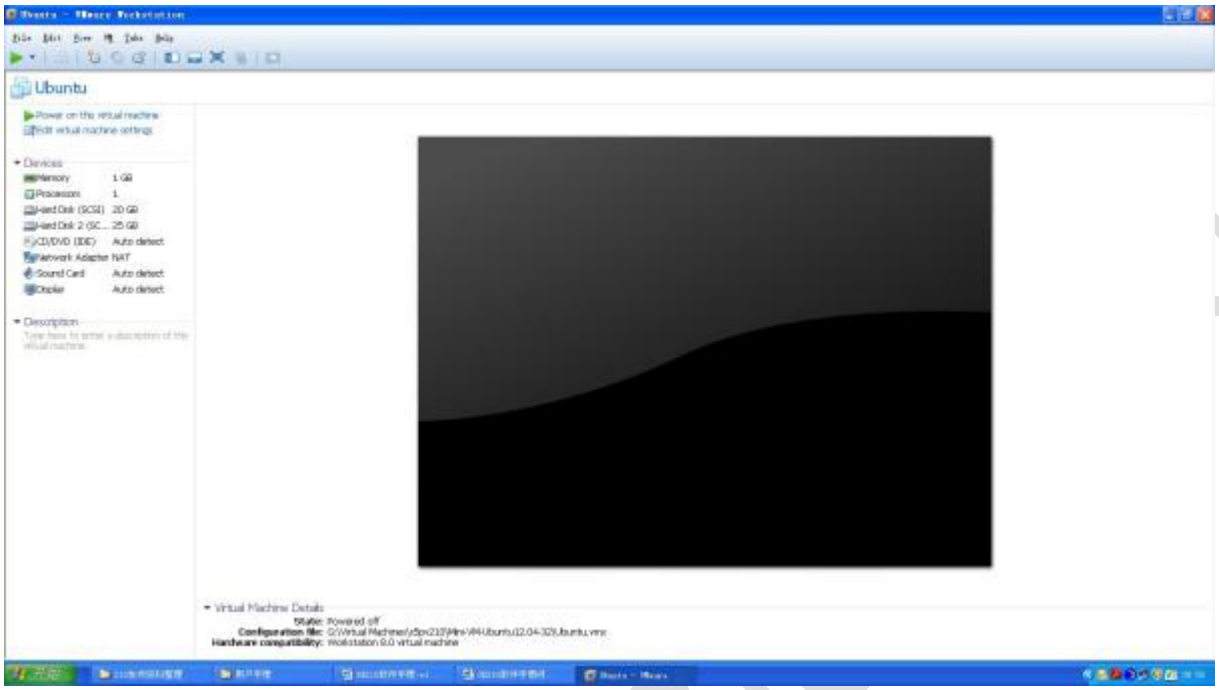
Step 5: boot root account

sudo passwd root

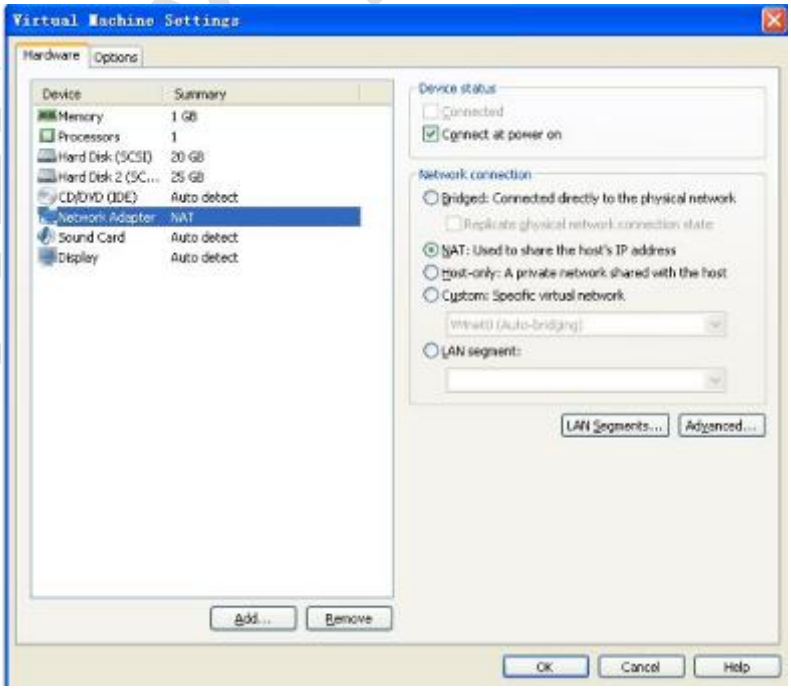
Step 6: input root account pass code as prompted(notice: the the code could not be seen)

Step 7: restart ubuntu but no need input root name and pass code, the system will automatically step into root user mode

9.2.4 Ubuntu Network Settings



Select nat



After above settings, users do not need set IP in VMware.

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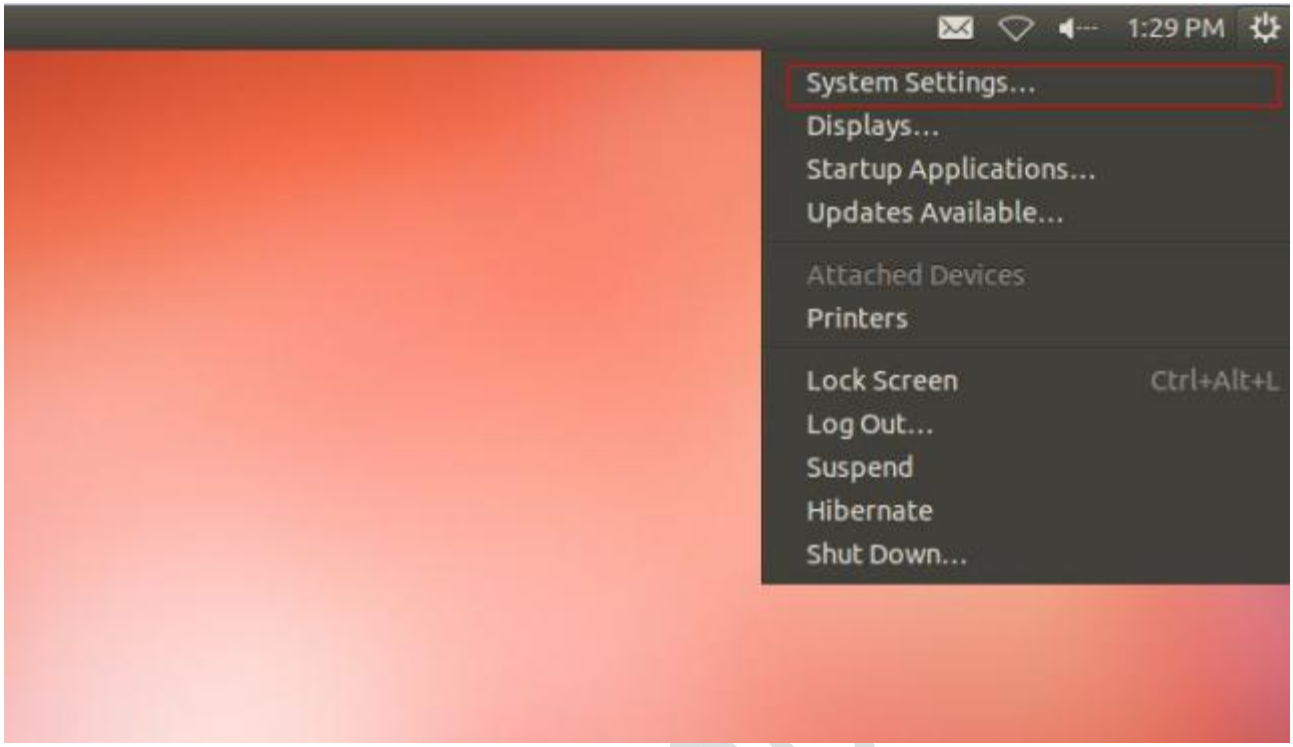
Step 1: run Ubuntu., log in as root user, click icon  to get below option.



Step 2: select System Settings, double clicking Network to step into network settings interface

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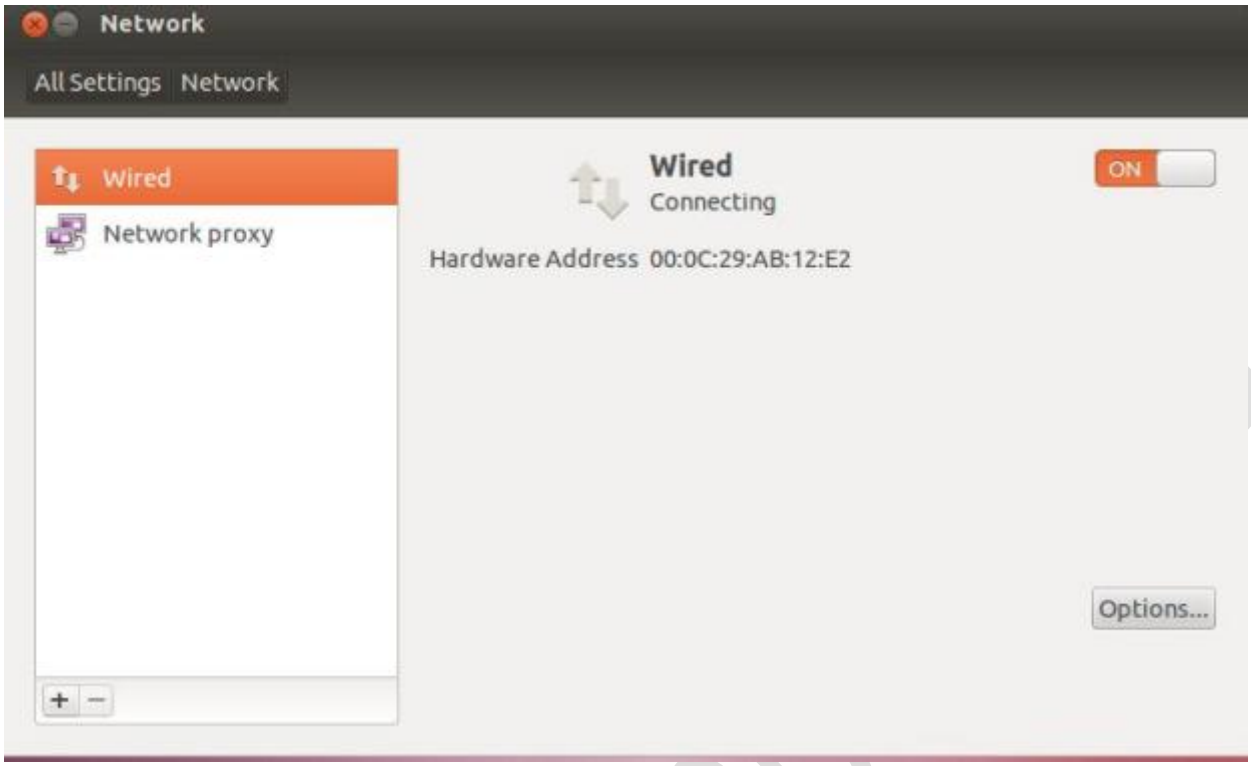
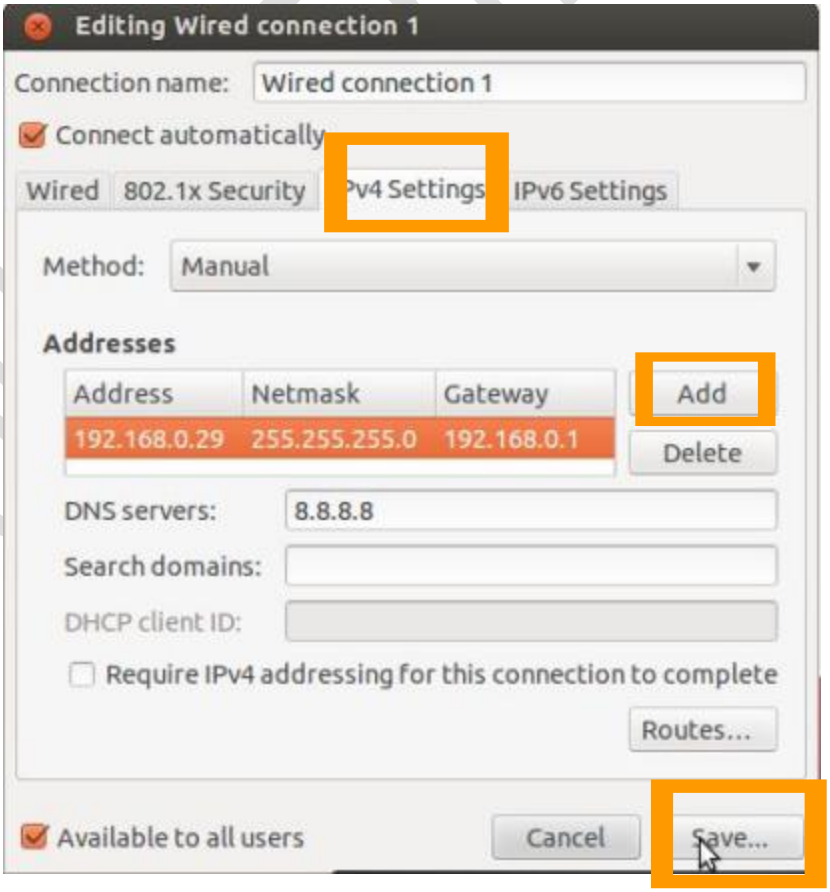
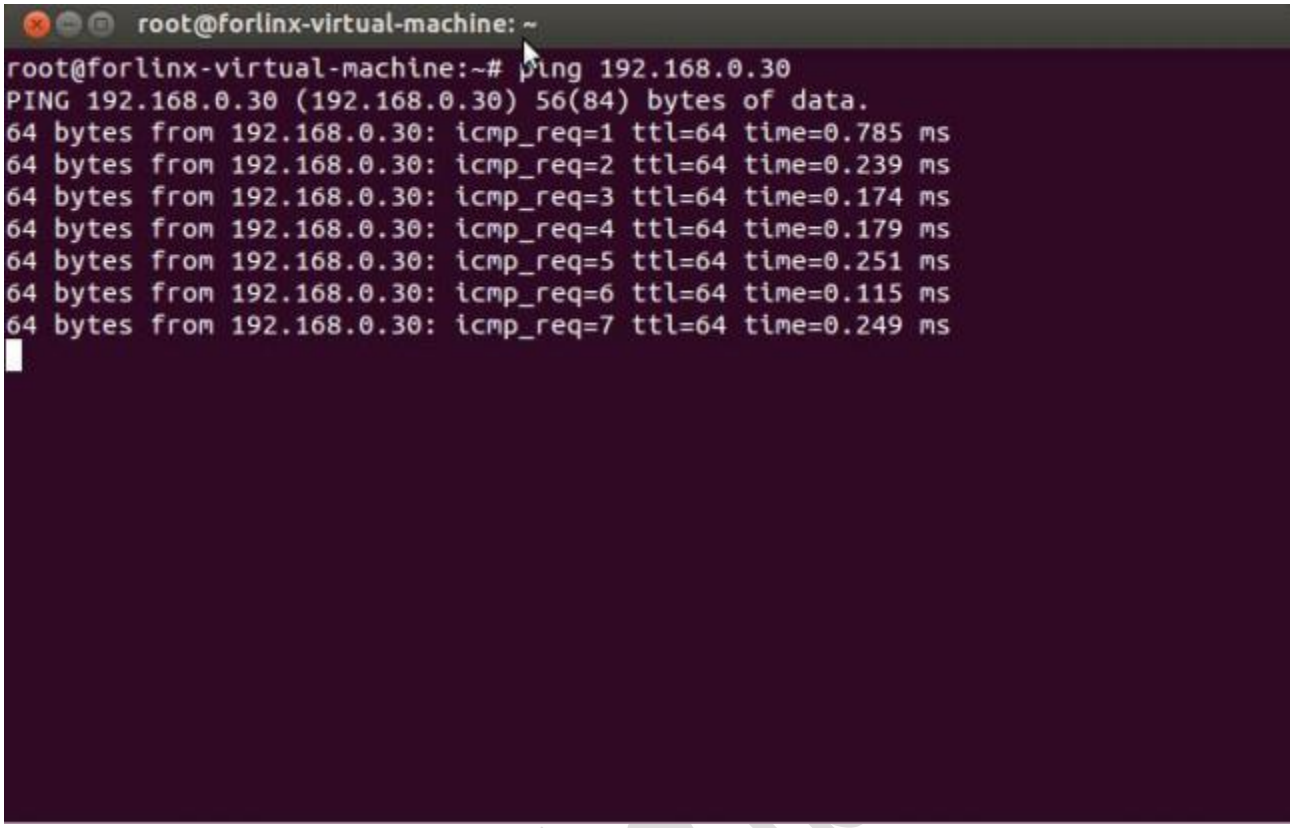
Step 3: click Options



Step 4: select IPV4, input your IP address, subnet mask, gateway, DNS, and then click Save... To finish the network settings.



Step 5: test it, here we test it by IP 192.168.0.30, and ping the host machine by VMware



Above image indicates the network settings are all correct

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