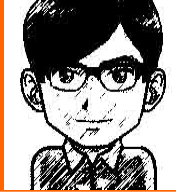

Android Porting

Android on PXA270 之操作步驟

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http://www.mask.org.tw

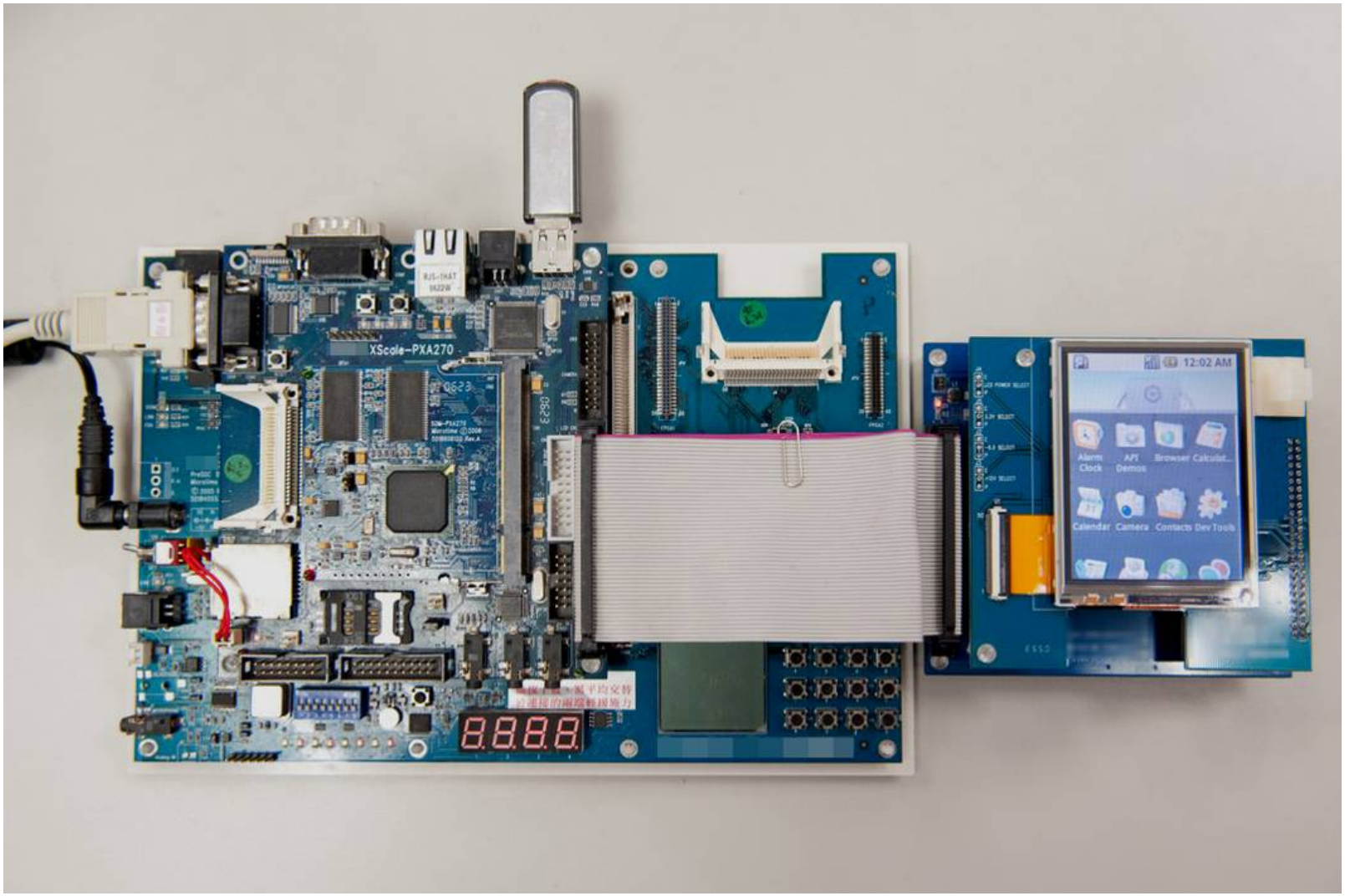
作者簡介

http://www.mask.org.tw

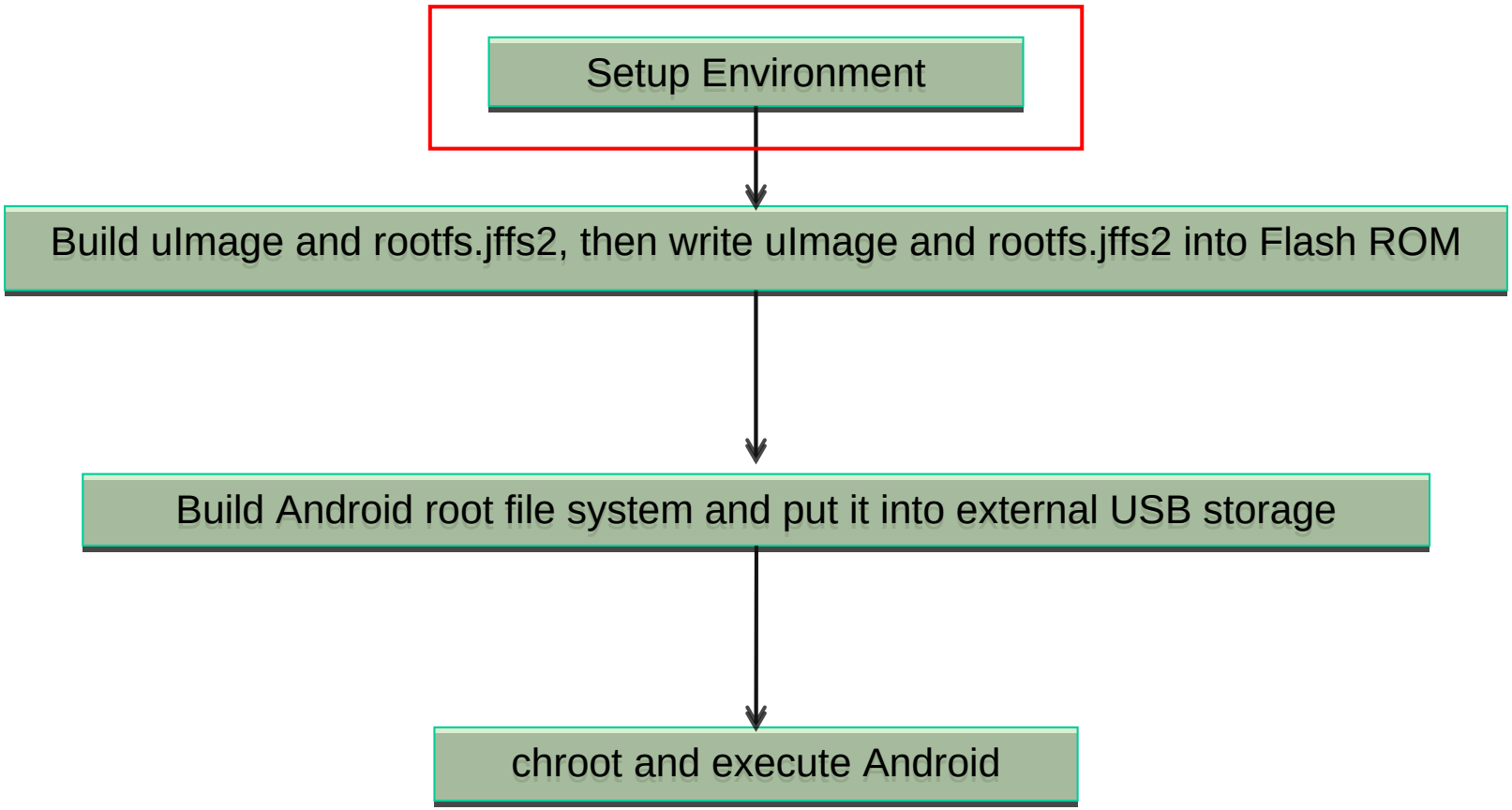
鍾文昌 Mask <cycdisk@gmail.com>

- 數年 Linux 及 Embedded Linux 相關開發經驗，開發產品包含 Set-Top-Box、手機及快速開機軟體等相關產品，接觸過 x86、MIPS 及 ARM platform，對 Linux kernel、Linux device driver、Shared Library、Application 等皆有所涉獵。
- 在 IC 廠完全沒有支援 Android 的情況下，獨立移植 Android 至 PXA270、OMAP3530 等硬體平台。
- 豐富的 Android Porting 授課經驗。

Android 1.0 on PXA270

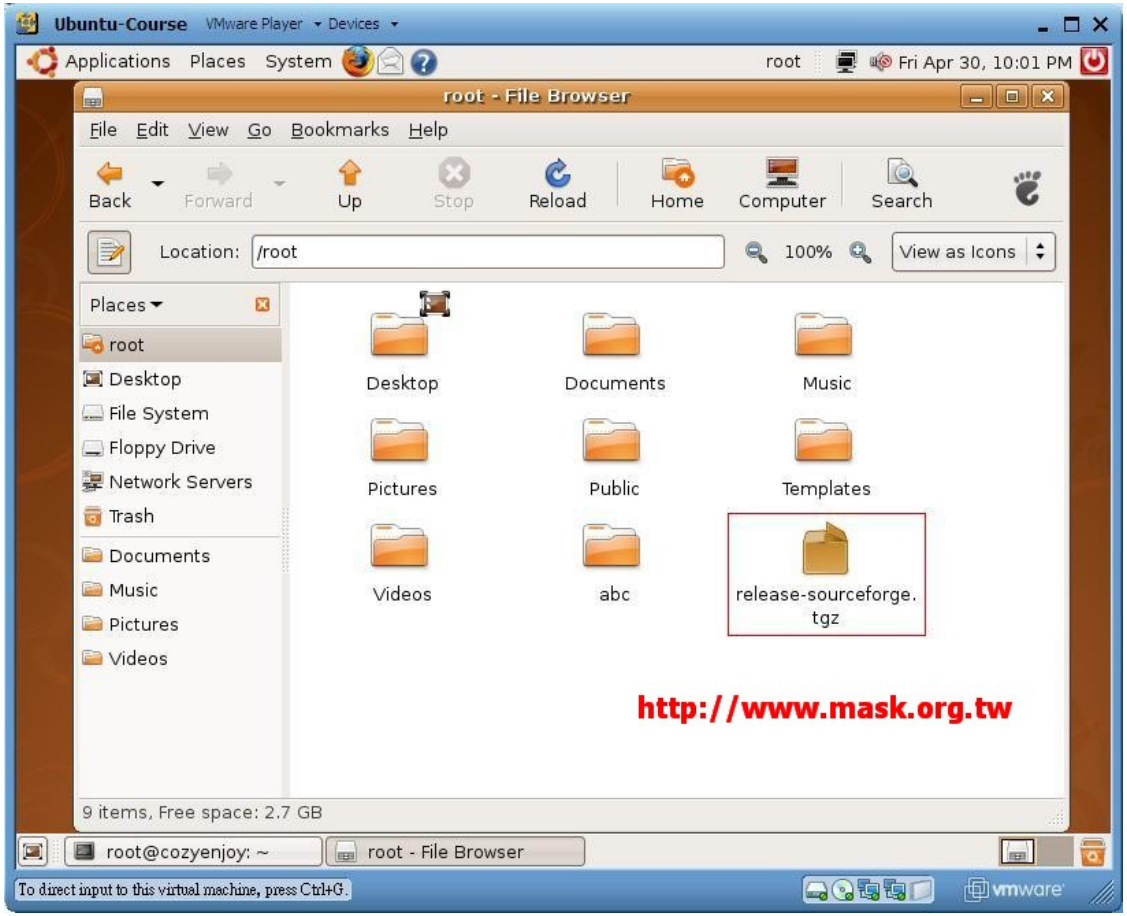


Bring Up Android on PXA270



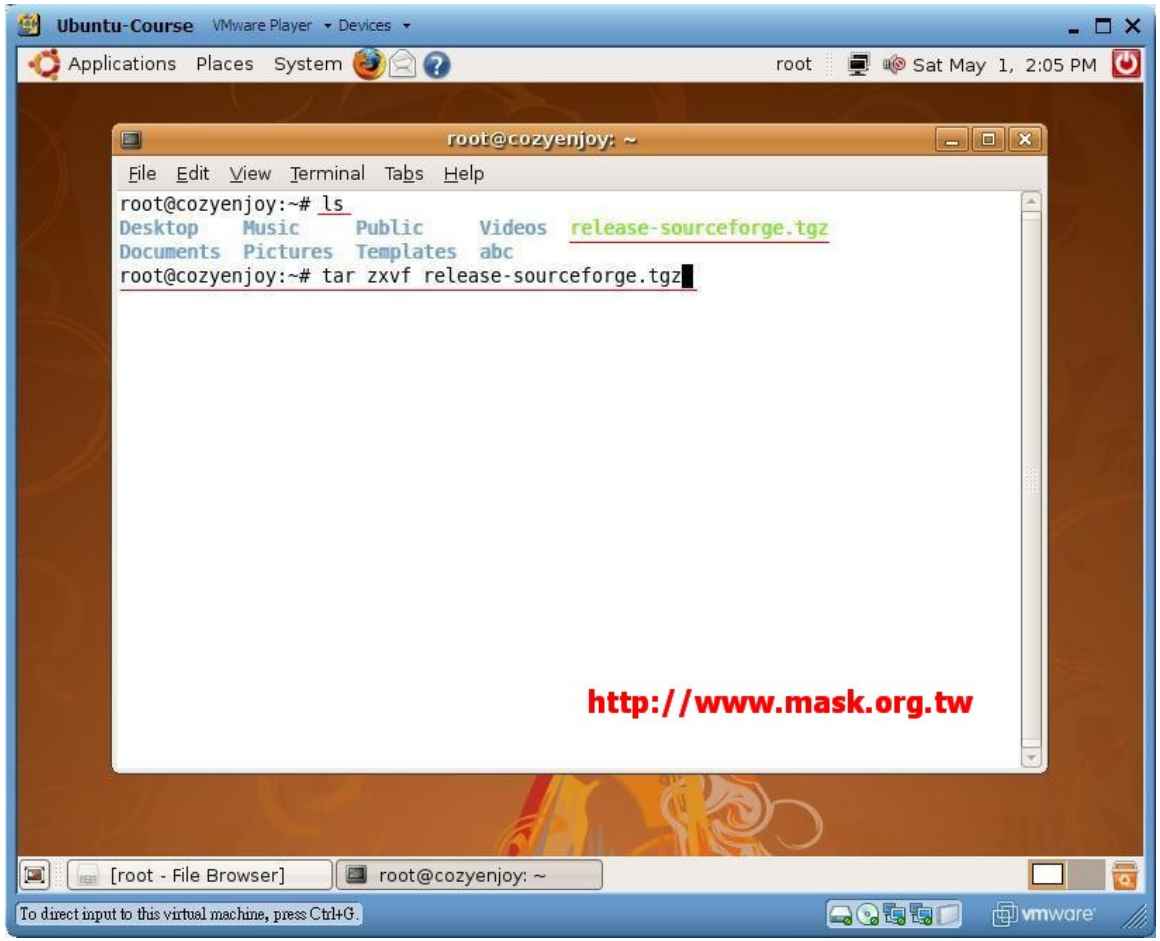
Download and Extract The Source Code

- http://www.mask.org.tw/data/release-sourceforge.tgz



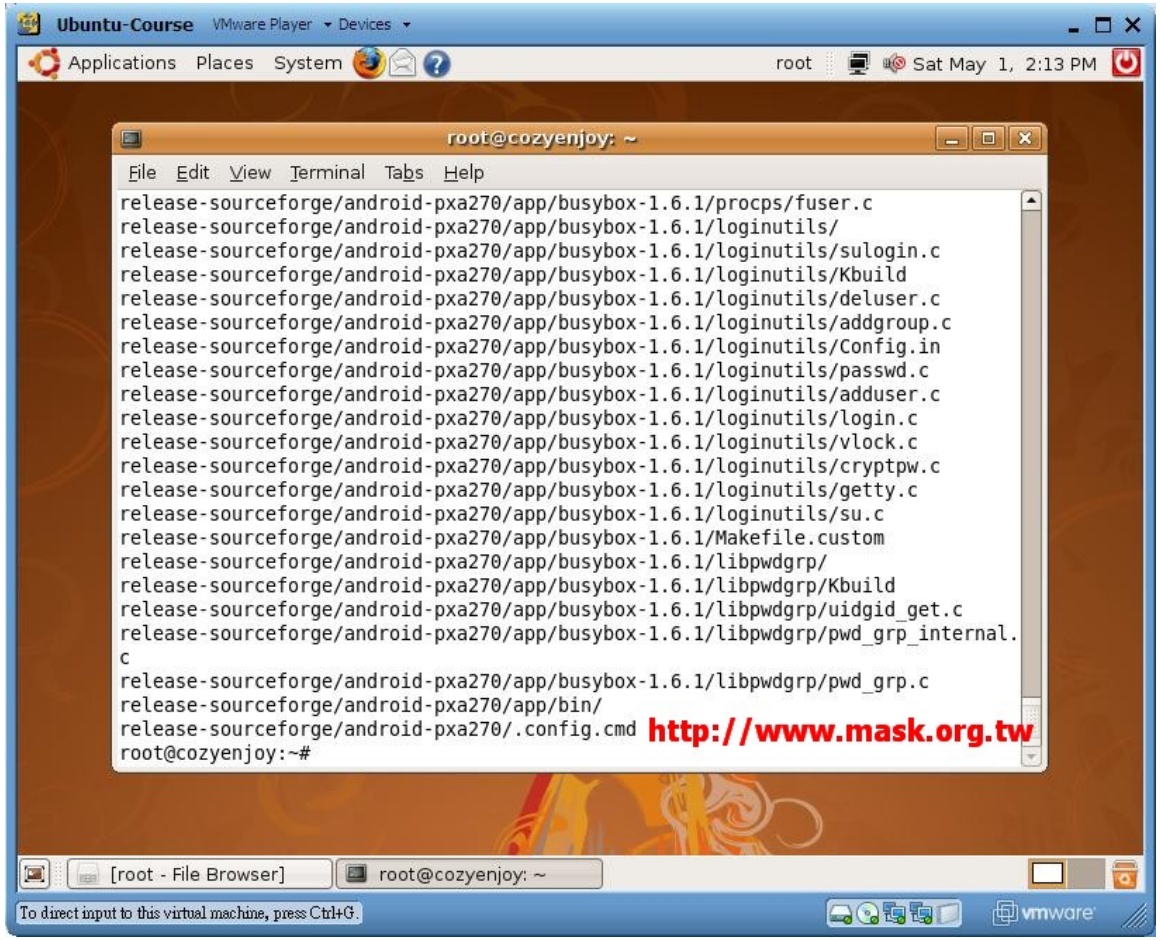
Download and Extract The Source Code (cont)

- tar zxvf release-sourceforge.tgz



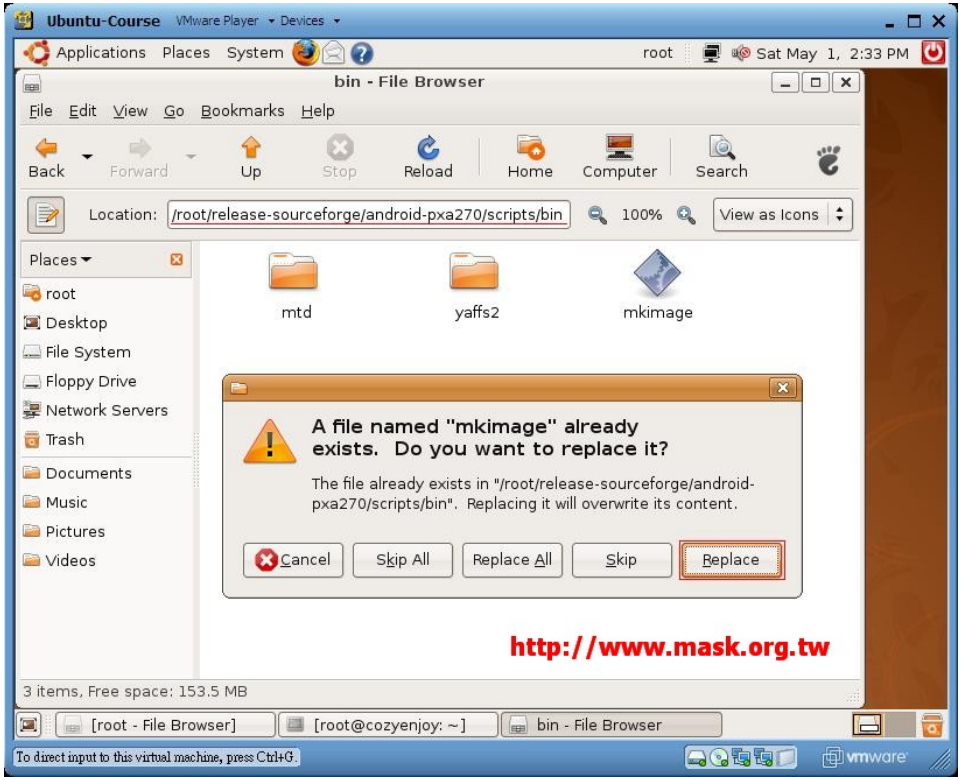
Download and Extract The Source Code (cont)

- Done



x86_32

- http://www.mask.org.tw/data/mkimage
- Replace release-sourceforge/android-pxa270/scripts/bin/mkimage



x86_32 (cont)

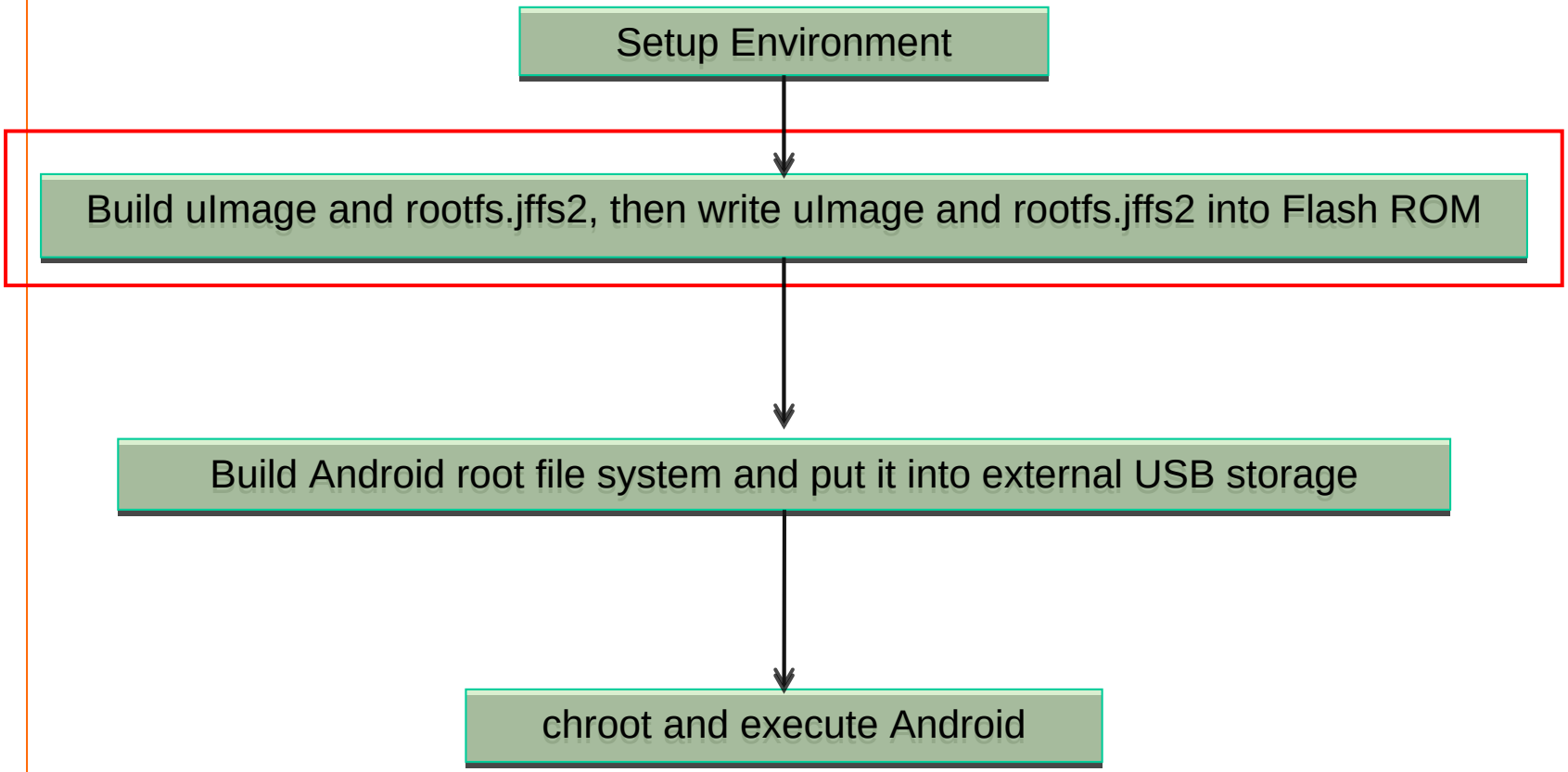
- chmod +x release-sourceforge/android-pxa270/scripts/bin/mkimage

Install Required Packages

- Install zlib1g, libssl and etc.

```
root@rex-desktop:/release-sourceforge/android-pxa270# apt-get install zlib1g-dev libssl-dev
```

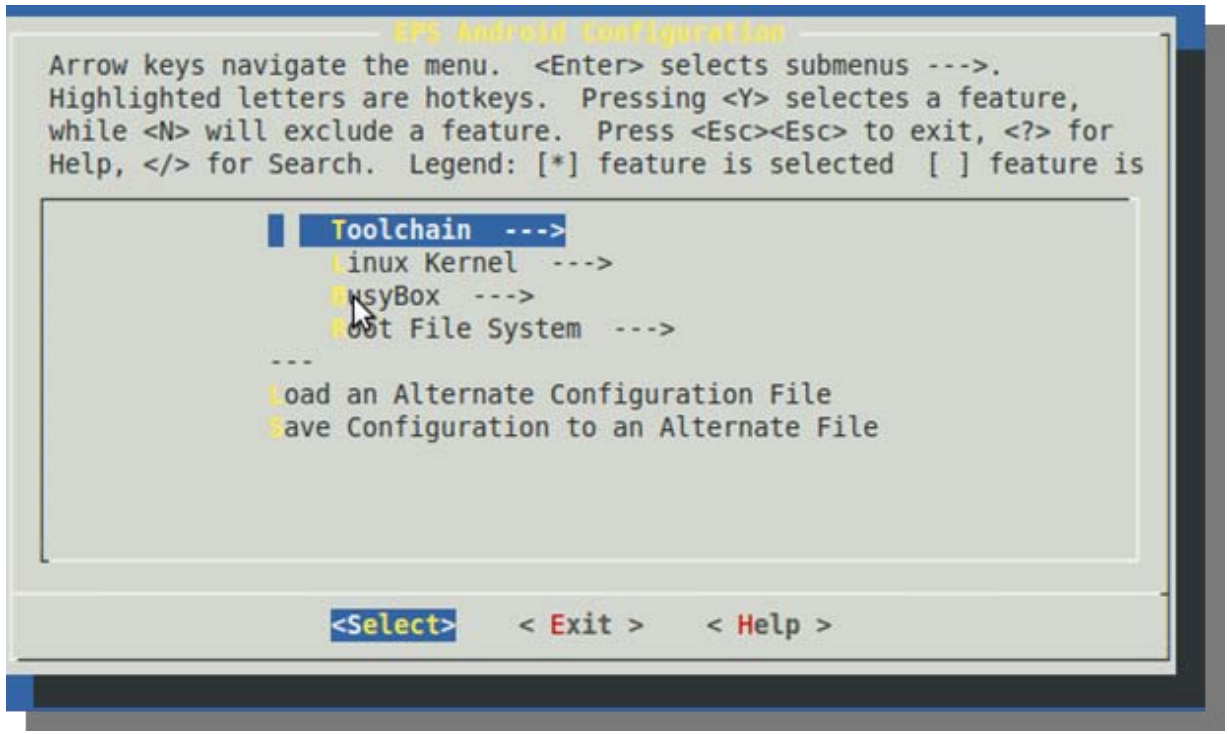
Bring Up Android on PXA270



Setup Compiling Options (This step could be ignored)

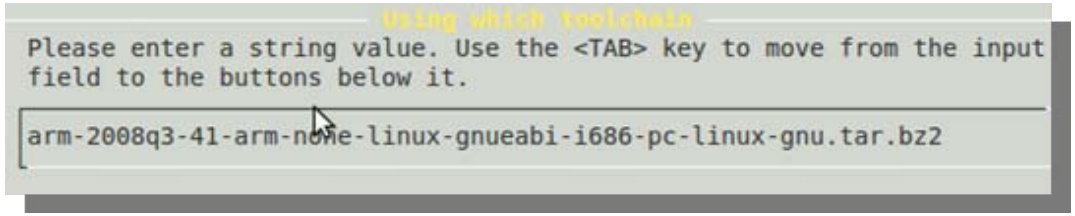
- "make menuconfig" under release-sourceforge/android-pxa270 directory

```
root@rex-desktop:/release-sourceforge/android-pxa270# make menuconfig
```

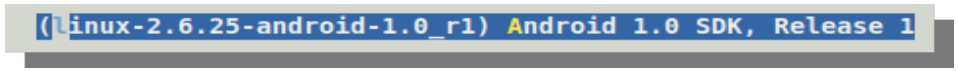


Setup Compiling Options (cont)

- Toolchain

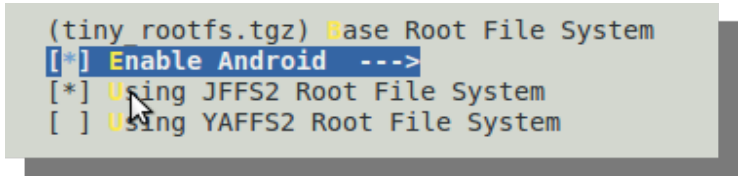


- Linux Kernel



- BusyBox

- Root File System



Setup Compiling Options (cont)

- Enable Android
  - Demo
    - Use our pre-build Android root file system directly

```
--- Enable Android
    Android version (Android Demonstration)  --->
```

  - Compile from our modified Android source code

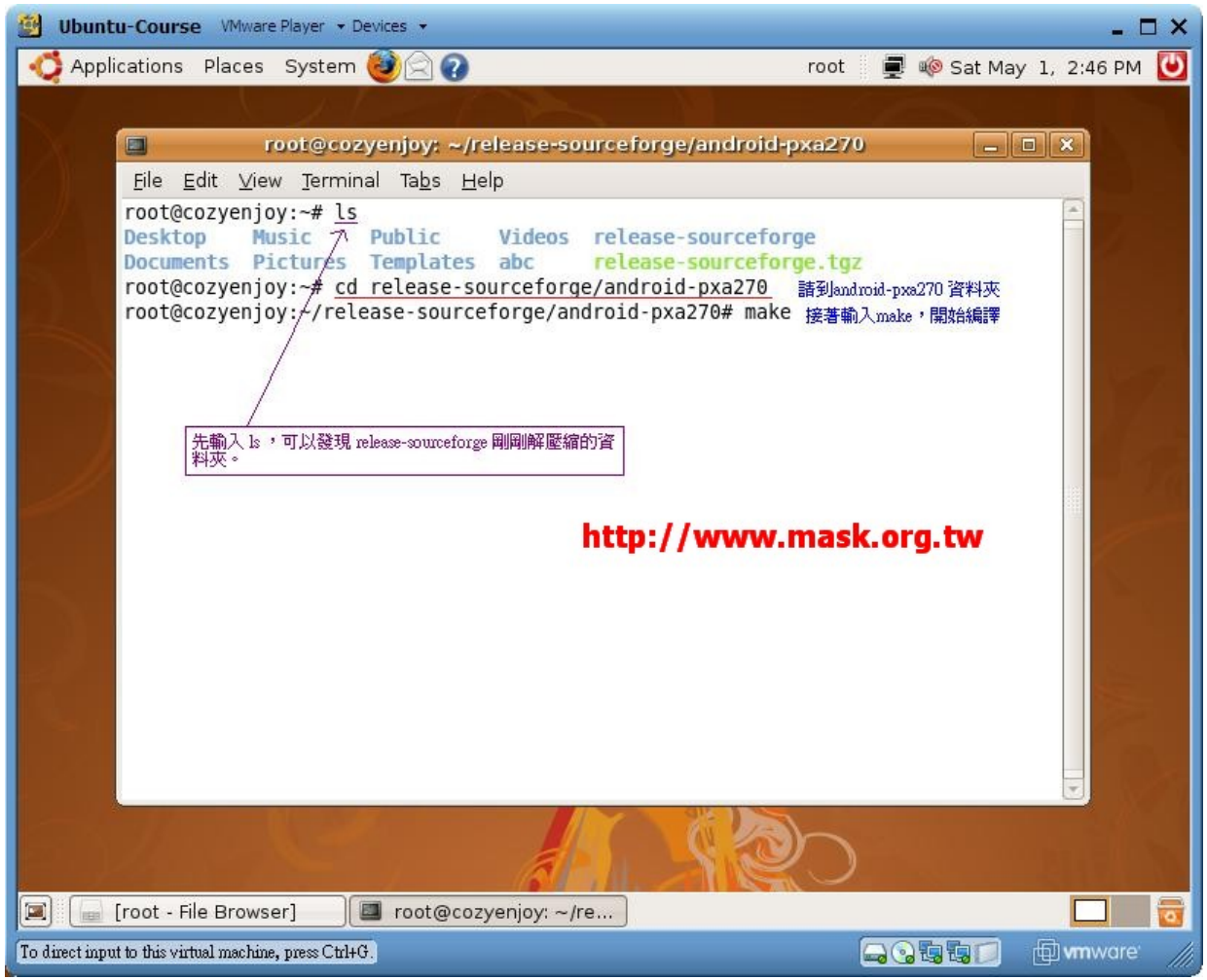
```
( ) Android Demonstration
(X) Compile from Android source
```

- Save and exit

```
Do you wish to save your new EPS Android configuration?

< Yes >      <  No  >
```

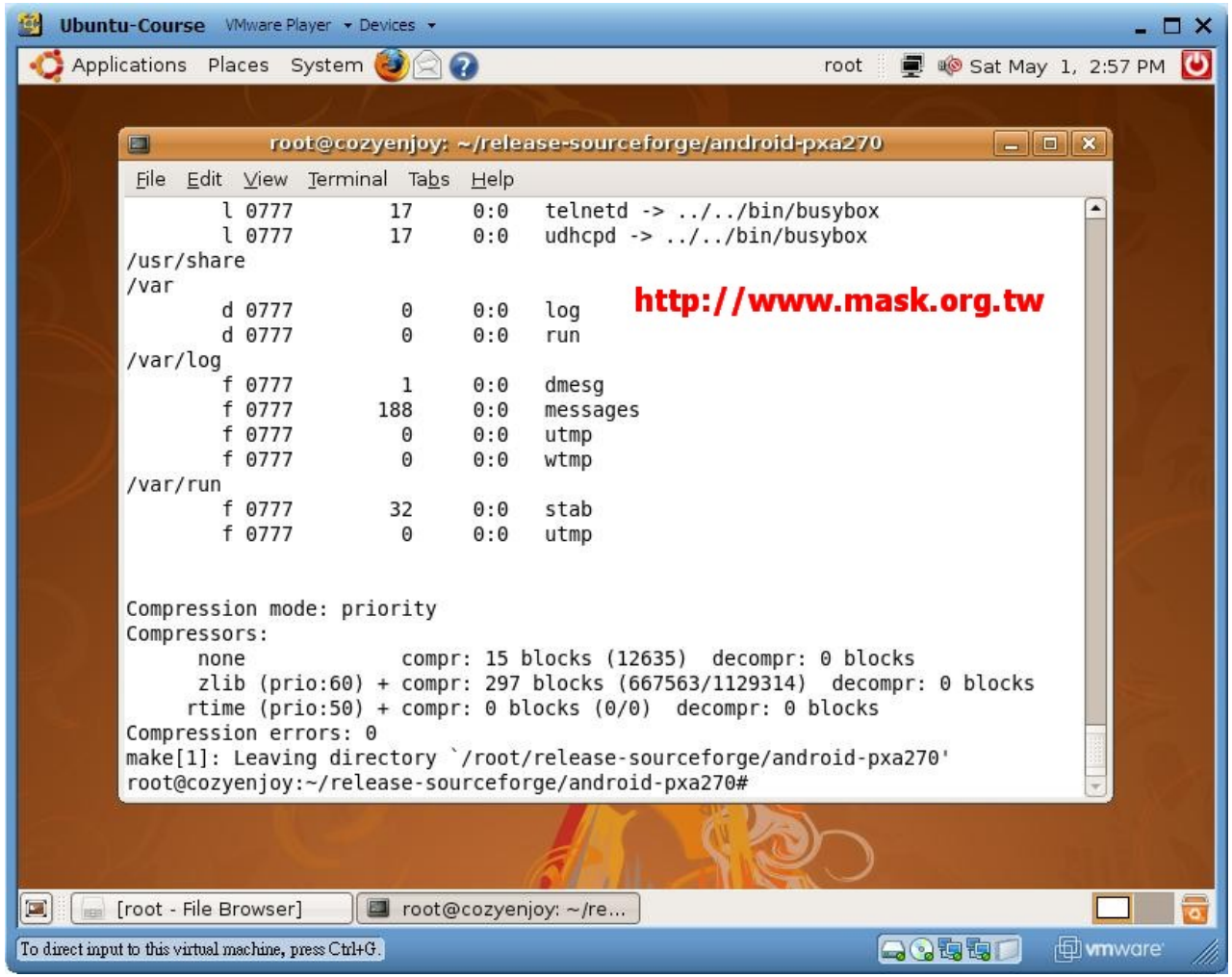
Build uImage and rootfs.jffs2

- sudo and "make"



Build uImage and rootfs.jffs2 (cont)

- Done

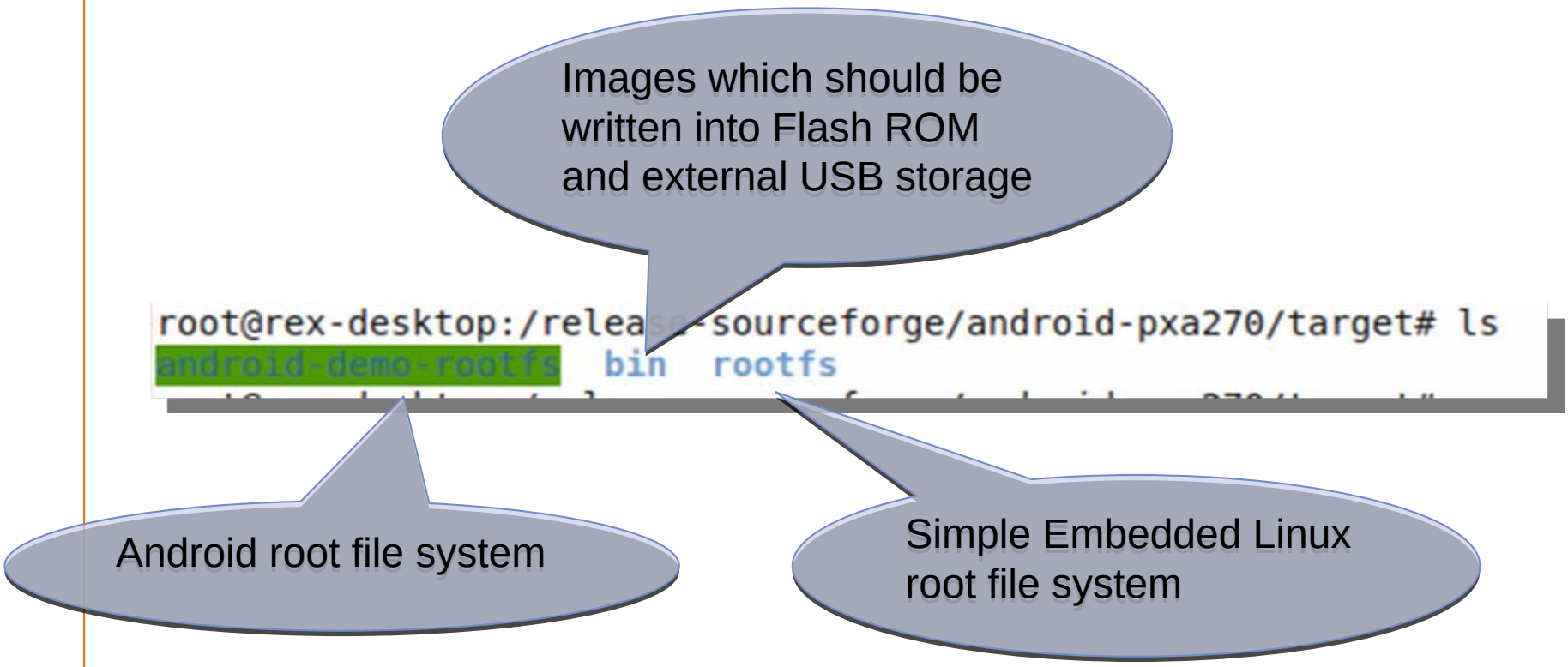


Build uImage and rootfs.jffs2 (cont)

- All generated files are under target directory

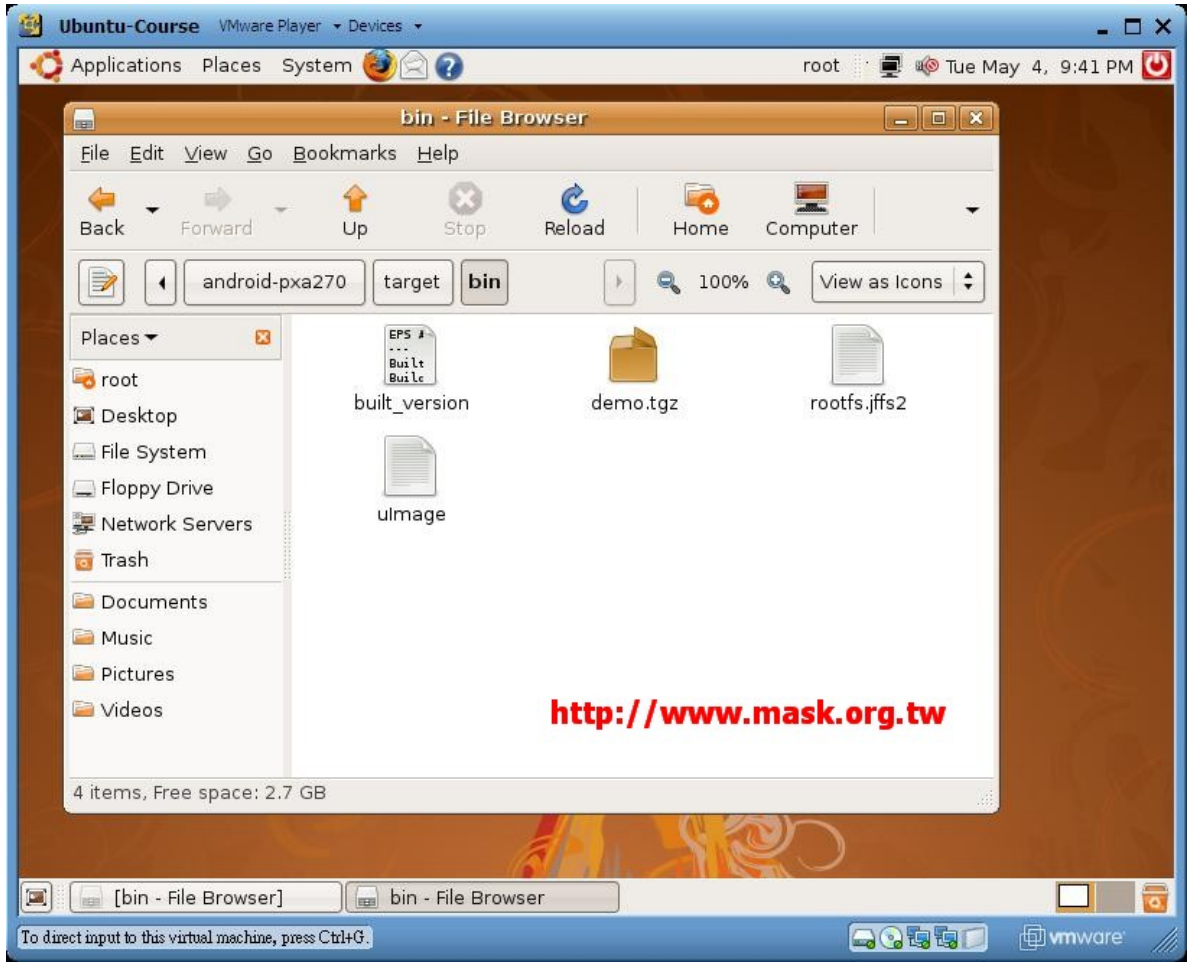
```
root@rex-desktop:/release-sourceforge/android-pxa270/target# ls
android-demo-rootfs  bin  rootfs
```

Build uImage and rootfs.jffs2 (cont)



Build uImage and rootfs.jffs2 (cont)

- Under target/bin directory

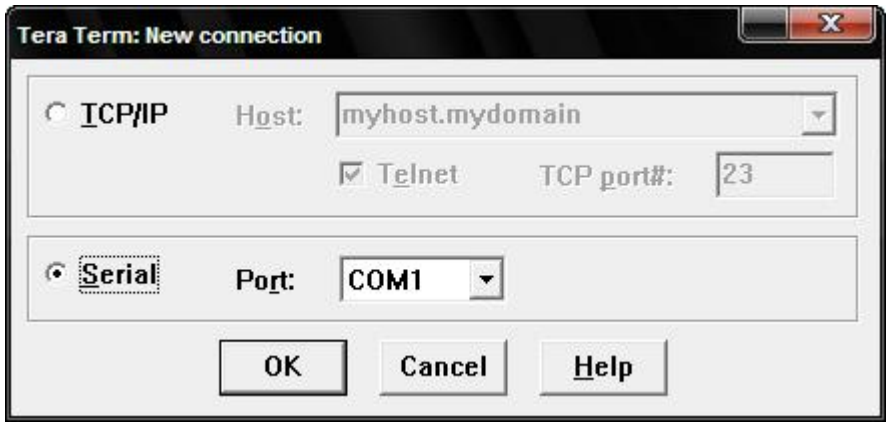


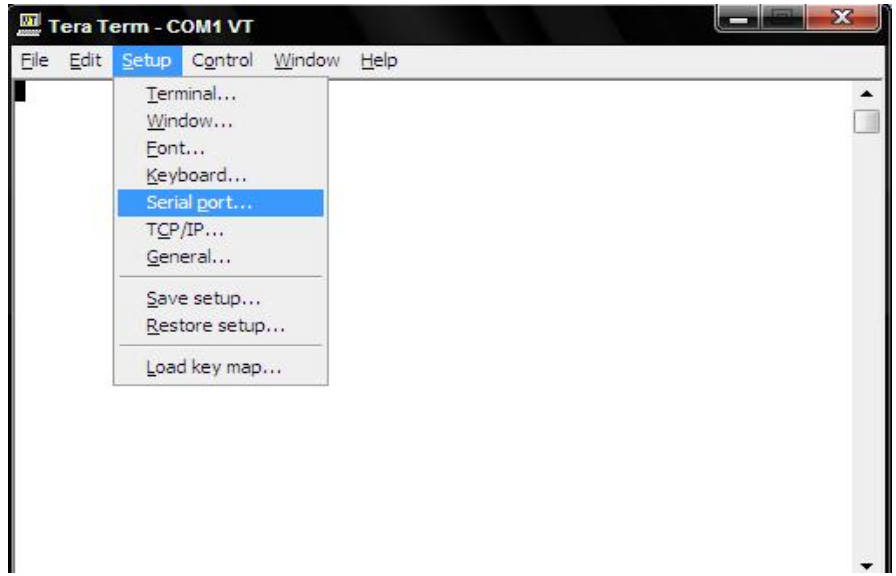
Build uImage and rootfs.jffs2 (cont)

- demo.tgz is a pre-build Android root file system which should be uncompressed into external USB storage
- rootfs.jffs2 is a simple embedded Linux root file system which should be written into Flash ROM
- uImage is a Linux kernel image which should be written into Flash ROM

Write uImage into Flash ROM

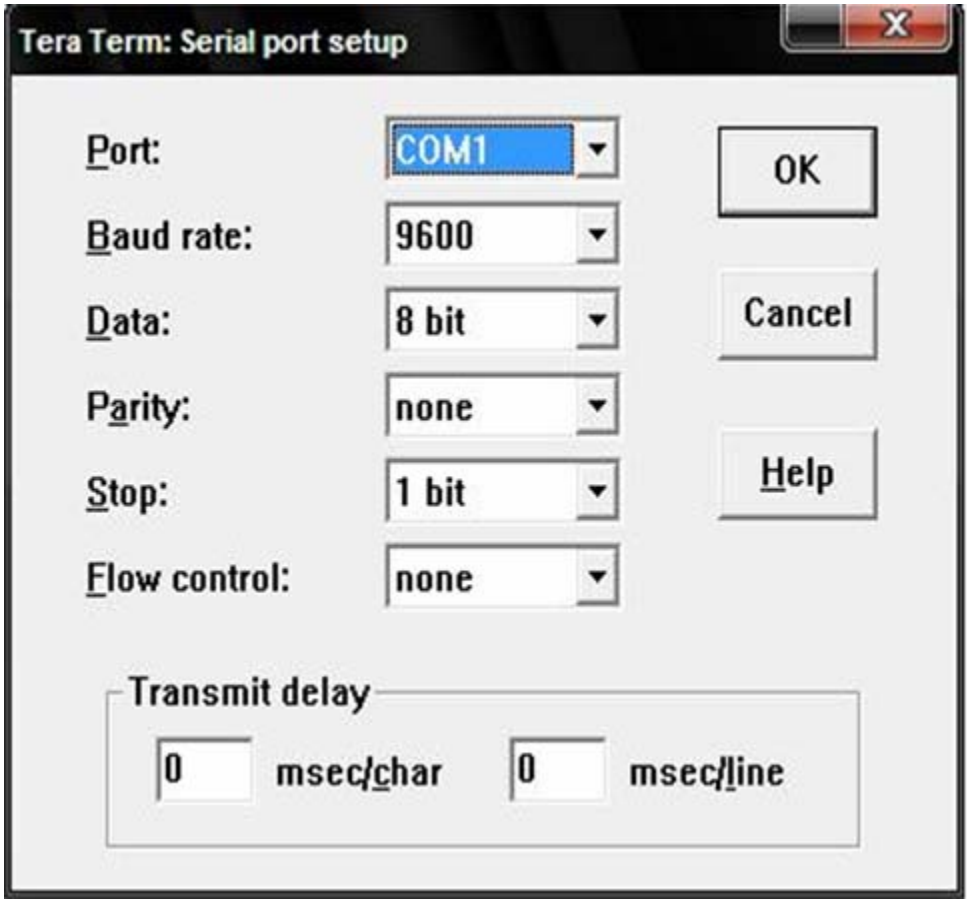
- Setup Tera Term





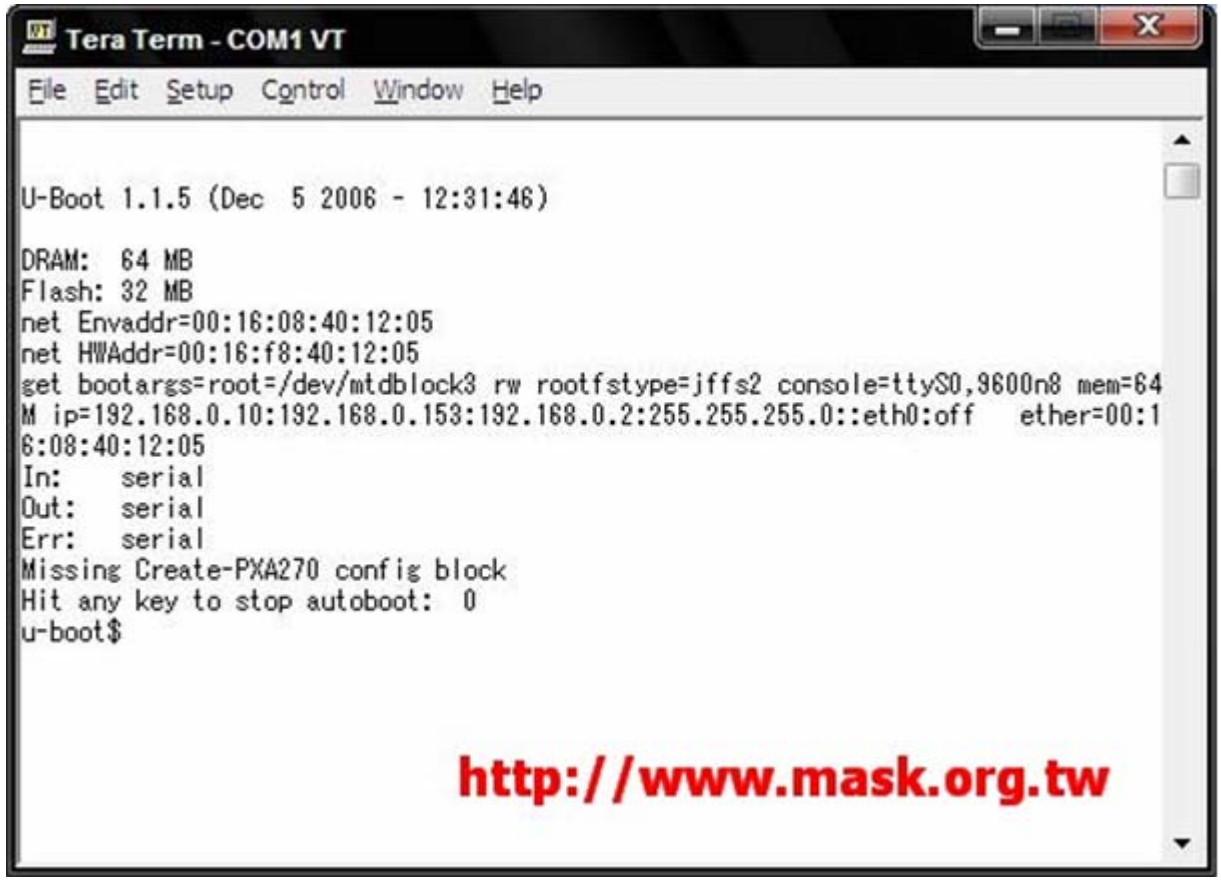
Write uImage into Flash ROM (cont)

- Serial port setting

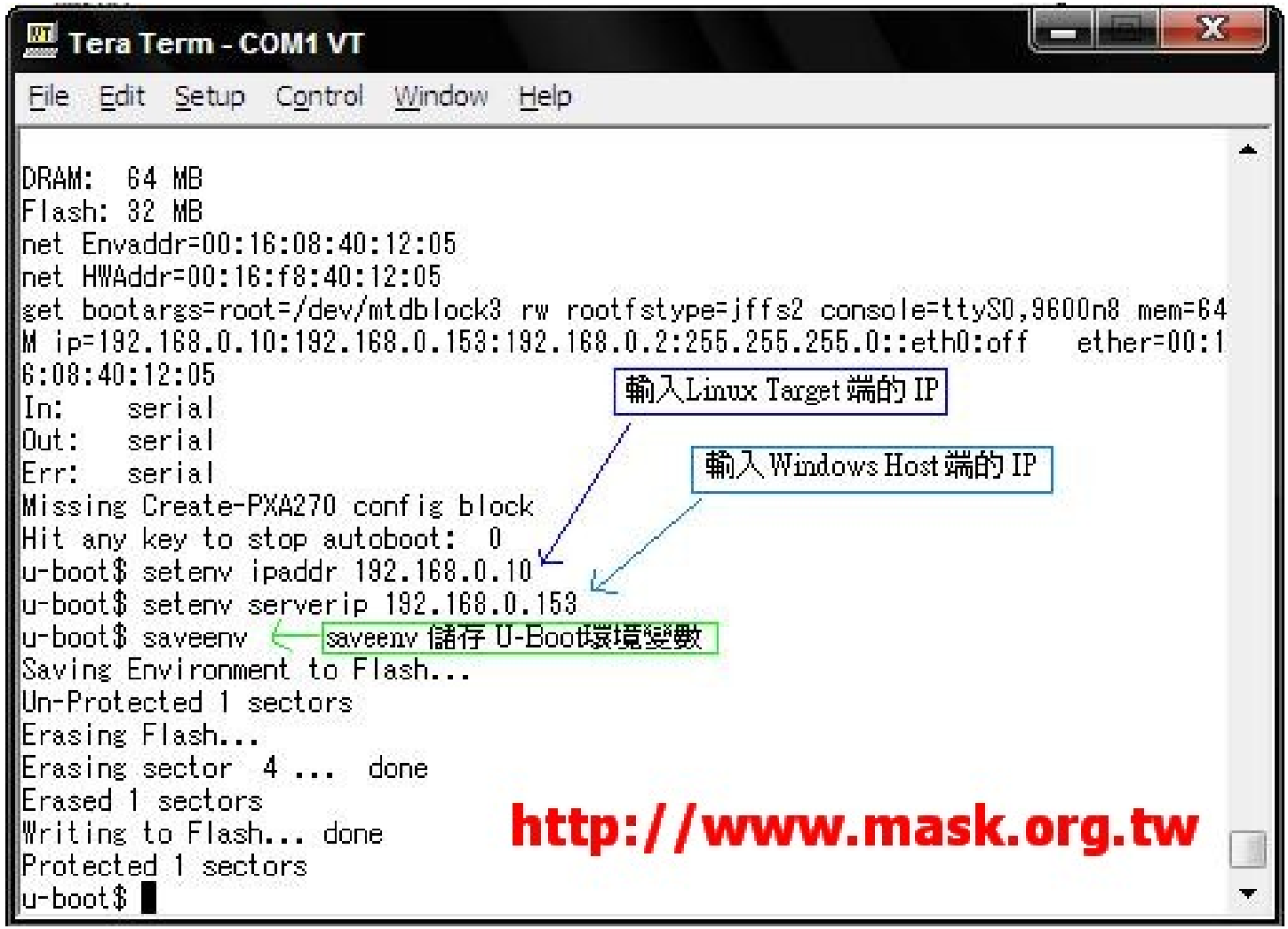


Write uImage into Flash ROM (cont)

- Power on PXA270 and press any key into u-boot environment

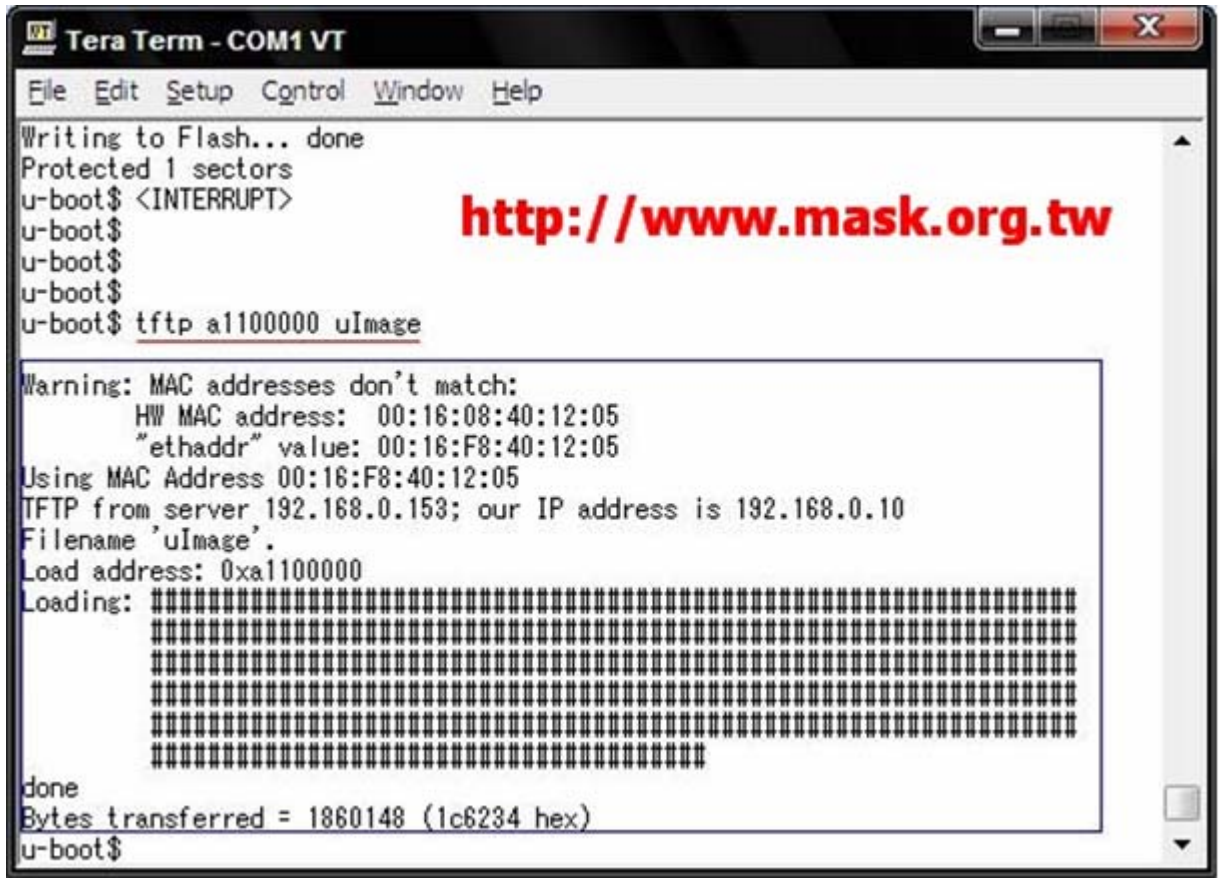


Write uImage into Flash ROM (cont)



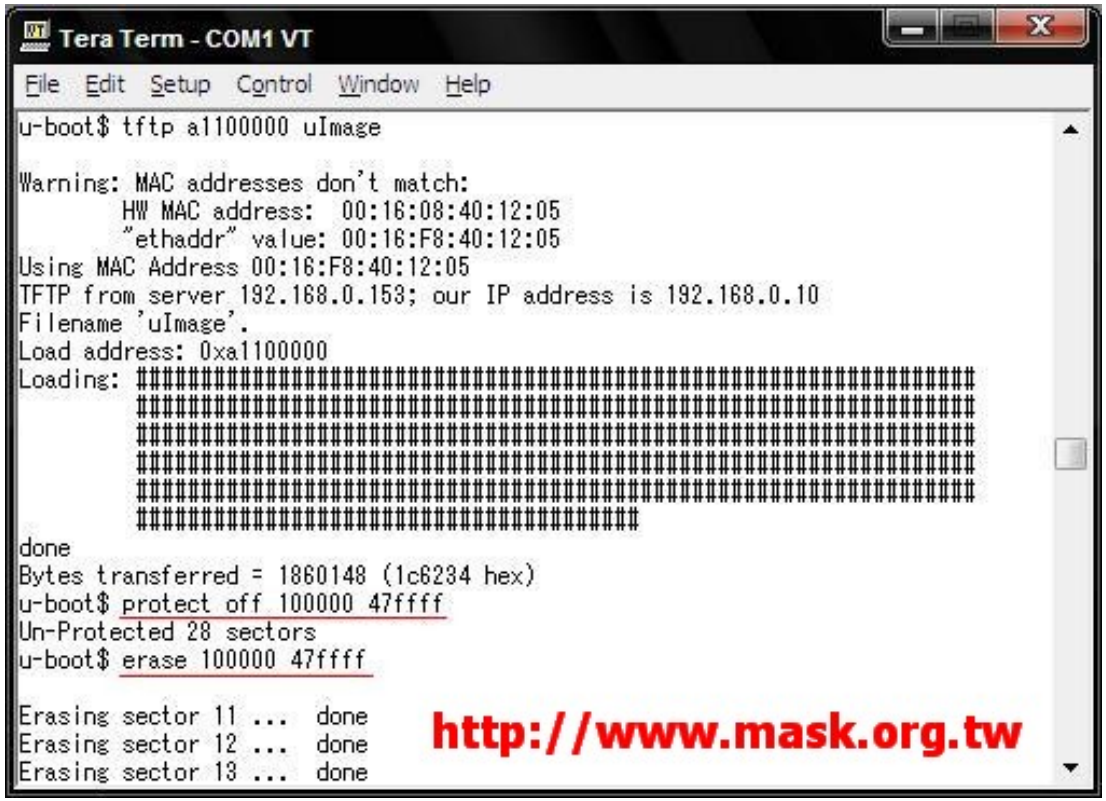
Write uImage into Flash ROM (cont)

- Download uImage into memory on PXA270
  - tftp a1100000 uImage



Write uImage into Flash ROM (cont)

- Erase NOR Flash
  - protect off 100000 47ffff
  - erase 100000 47ffff

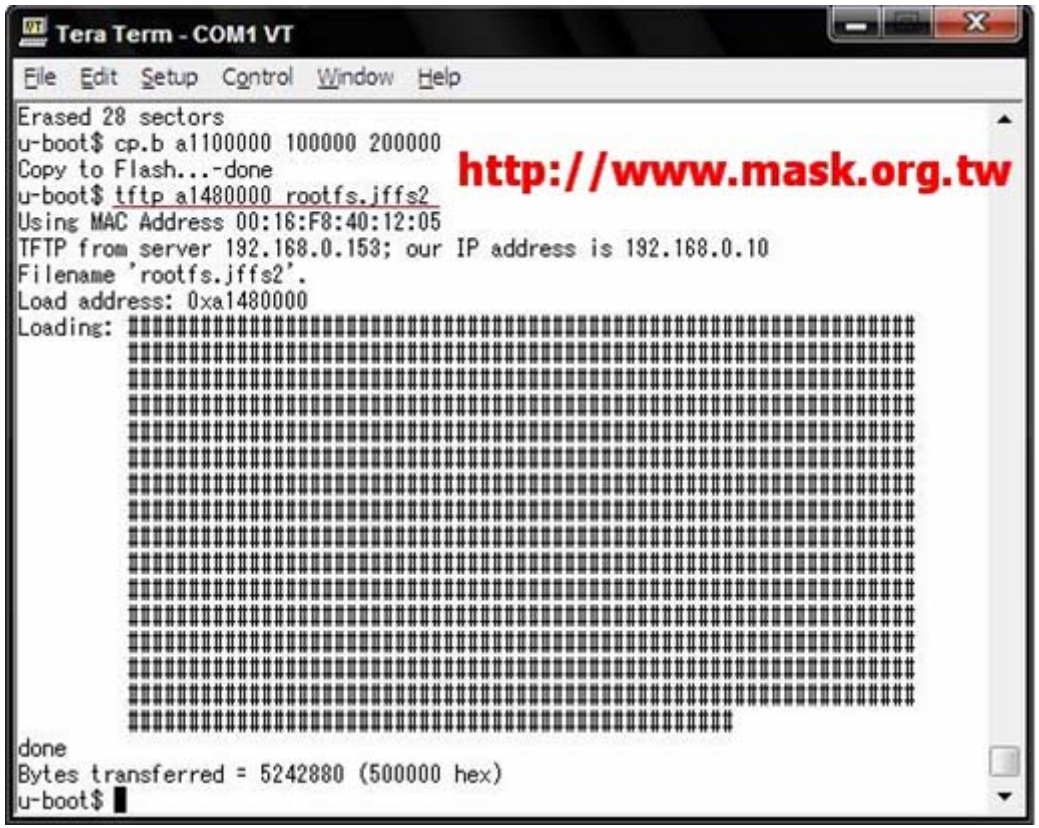


Write uImage into Flash ROM (cont)

- Write uImage into NOR Flash on PXA270
  - cp.b a1100000 100000 200000

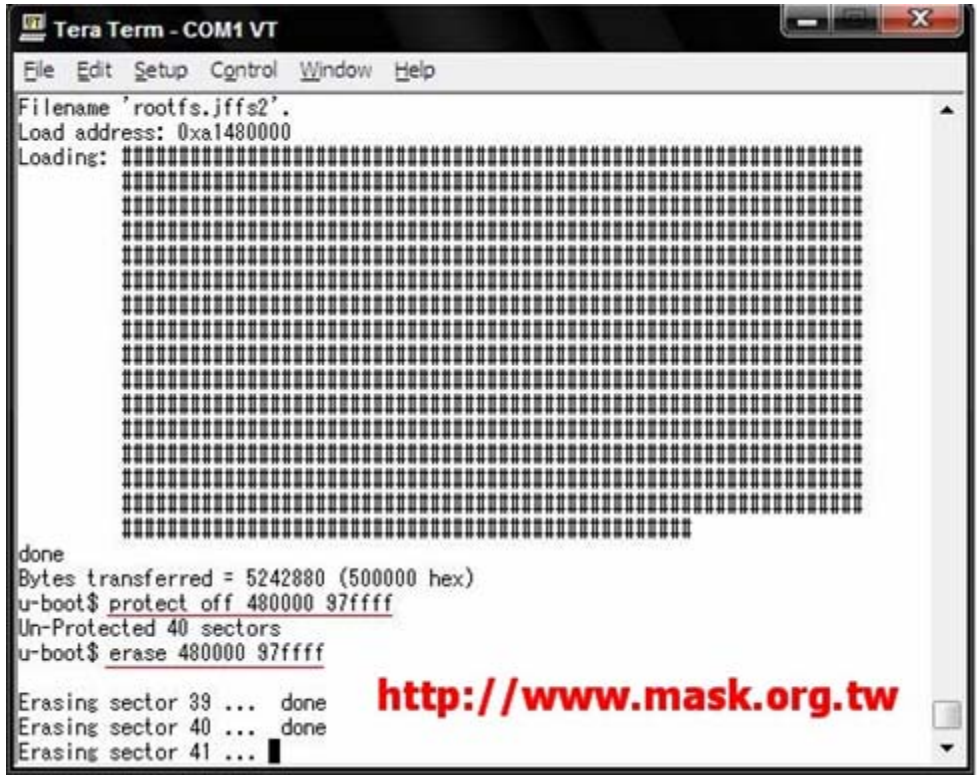
Write rootfs.jffs2 into Flash ROM

- Download rootfs.jffs2 into memory on PXA270
  - tftp a1480000 rootfs.jffs2



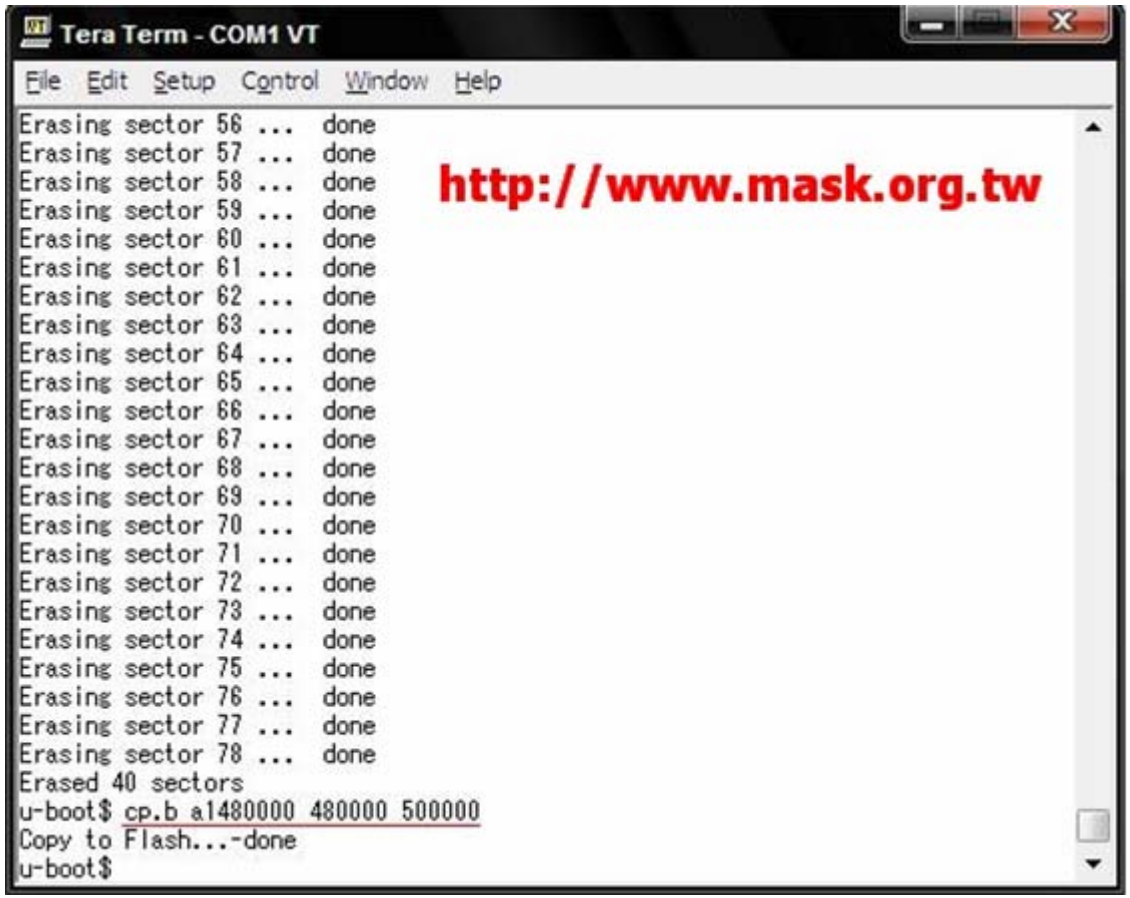
Write rootfs.jffs2 into Flash ROM (cont)

- Erase NOR Flash
  - protect off 480000 97ffff
  - erase 480000 97ffff



Write rootfs.jffs2 into Flash ROM (cont)

- Write rootfs.jffs2 into NOR Flash on PXA270
  - cp.b a1480000 480000 500000



Boot

Tera Term - COM1 VT

File Edit Setup Control Window Help

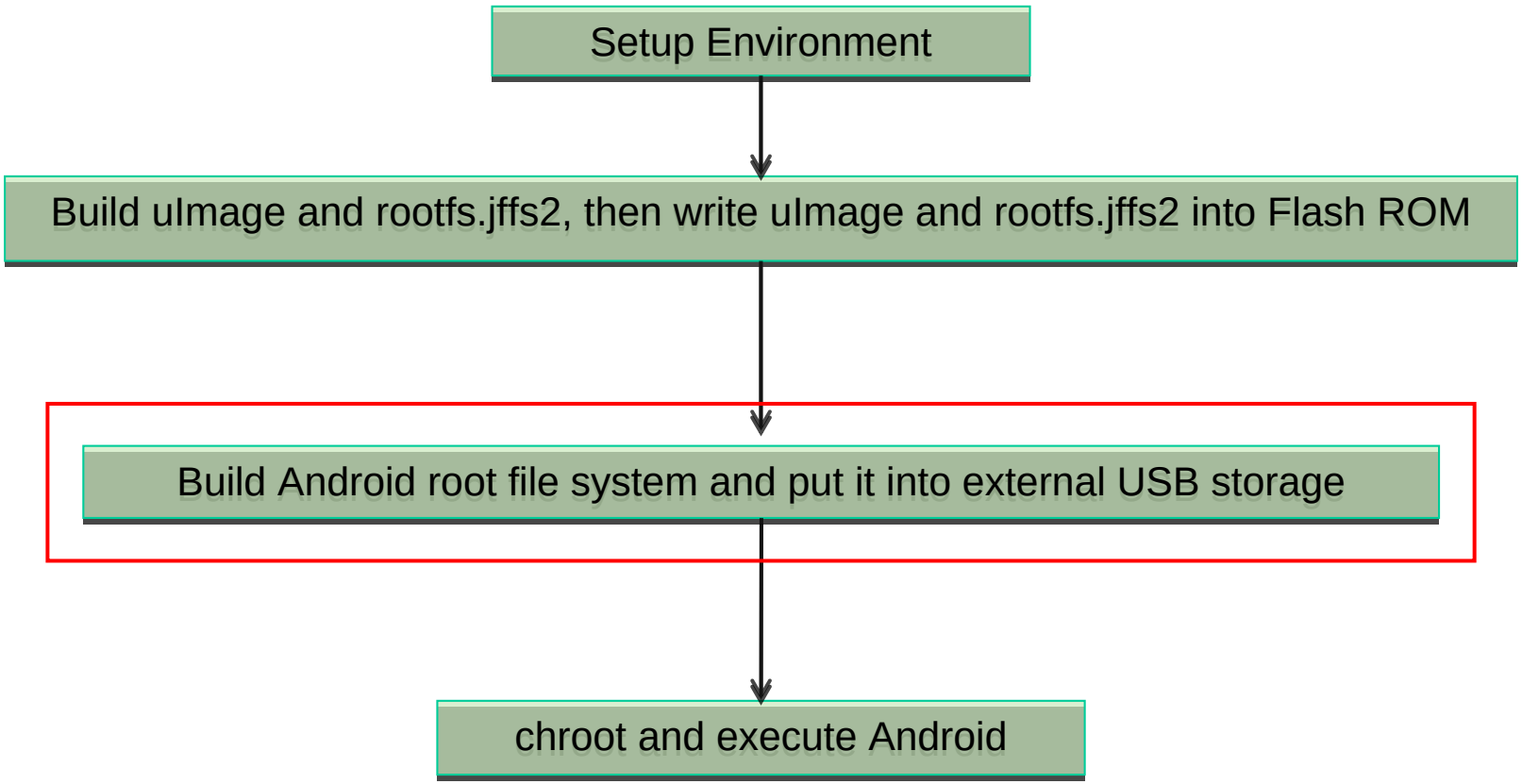
```
Bluetooth: BNEP (Ethernet Emulation) ver 1.2
Bluetooth: BNEP filters: protocol multicast
Bluetooth: HIDP (Human Interface Emulation) ver 1.2
RPC: Registered udp transport module.
RPC: Registered tcp transport module.
ieee80211: 802.11 data/management/control stack, git-1.1.13
ieee80211: Copyright (C) 2004-2005 Intel Corporation <jketreno@linux.intel.com>
XScale iWMMXt coprocessor detected.
eth0: link down
IP-Config: Complete:
     device=eth0, addr=192.168.0.10, mask=255.255.255.0, gw=192.168.0.2,
     host=192.168.0.10, domain=, nis-domain=(none),
     bootserver=192.168.0.153, rootserver=192.168.0.153, rootpath=
eth0: link up, 100Mbps, full-duplex, lpa 0x45E1
VFS: Mounted root (jffs2 filesystem).
Freeing init memory: 104K
init started: BusyBox v1.13.2 (2010-04-27 17:23:22 CST)
starting pid 848, tty '': '/etc/init.d/rcS'
starting pid 858, tty '': '-/bin/sh'
```



```
BusyBox v1.13.2 (2010-04-27 17:23:22 CST) built-in shell (ash)
Enter 'help' for a list of built-in commands.


Processing /etc/profile... Done
[root@Android /]#
```

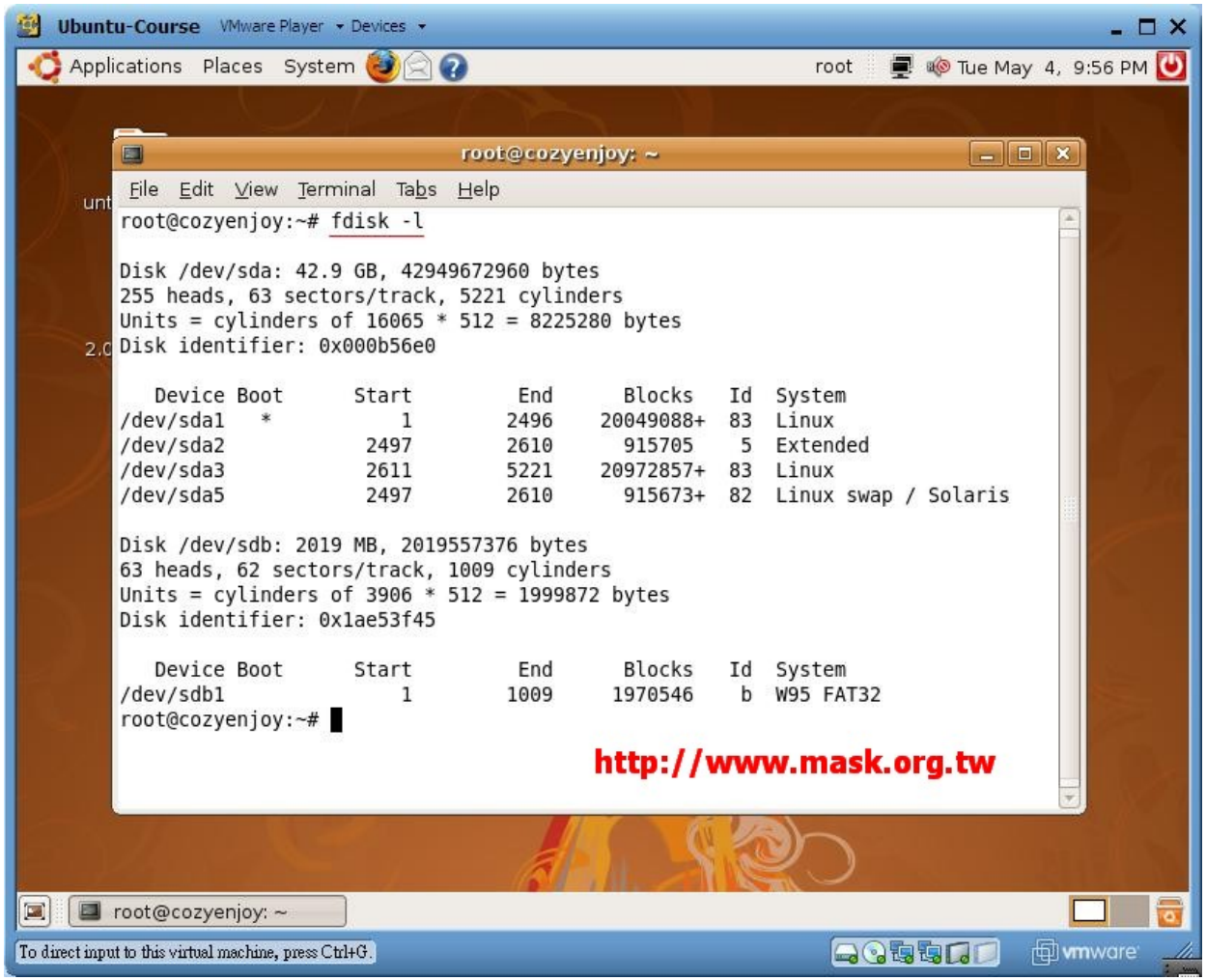
Boot Successfully

Bring Up Android on PXA270



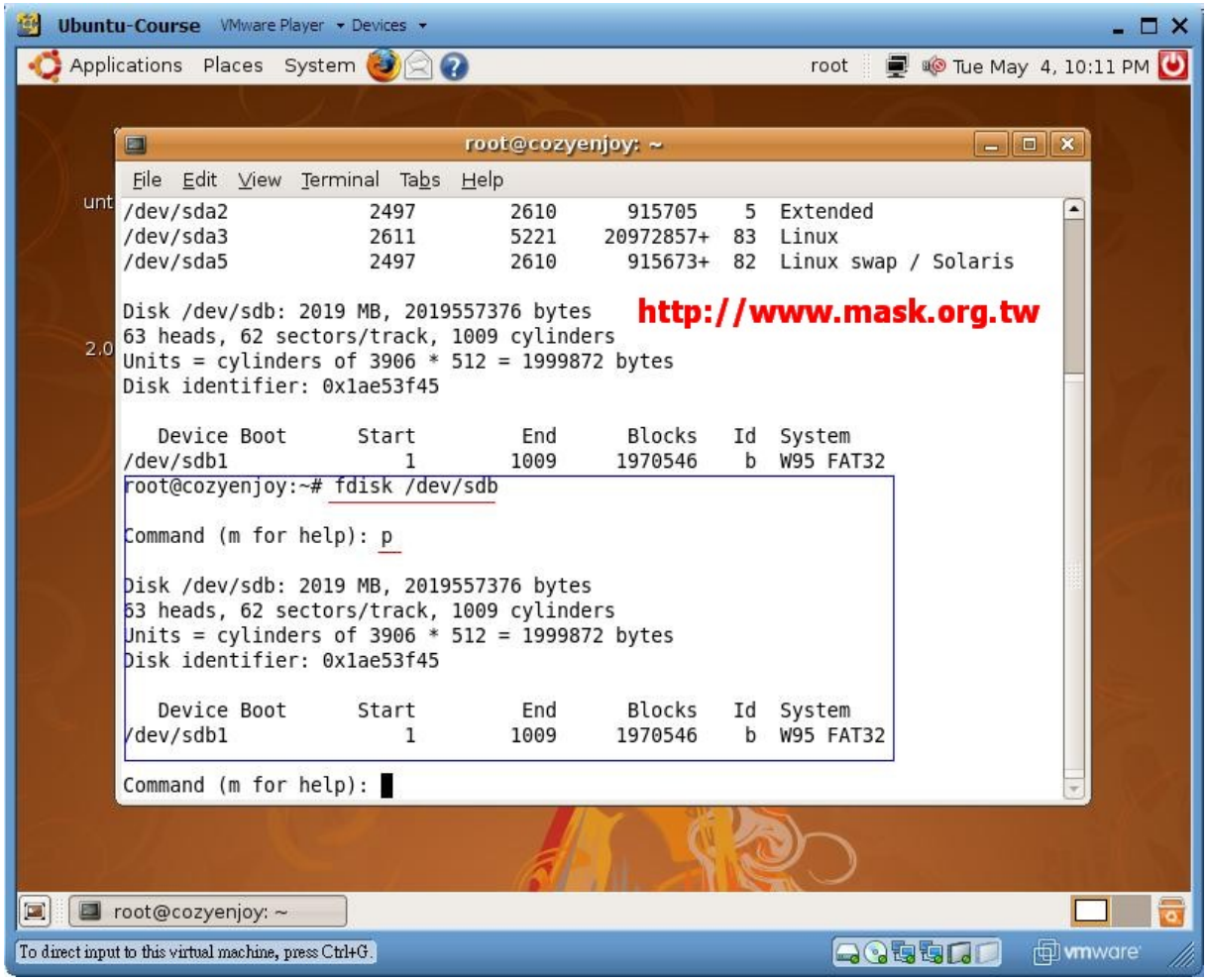
Prepare External USB Storage for Android Root File System

- fdisk -l



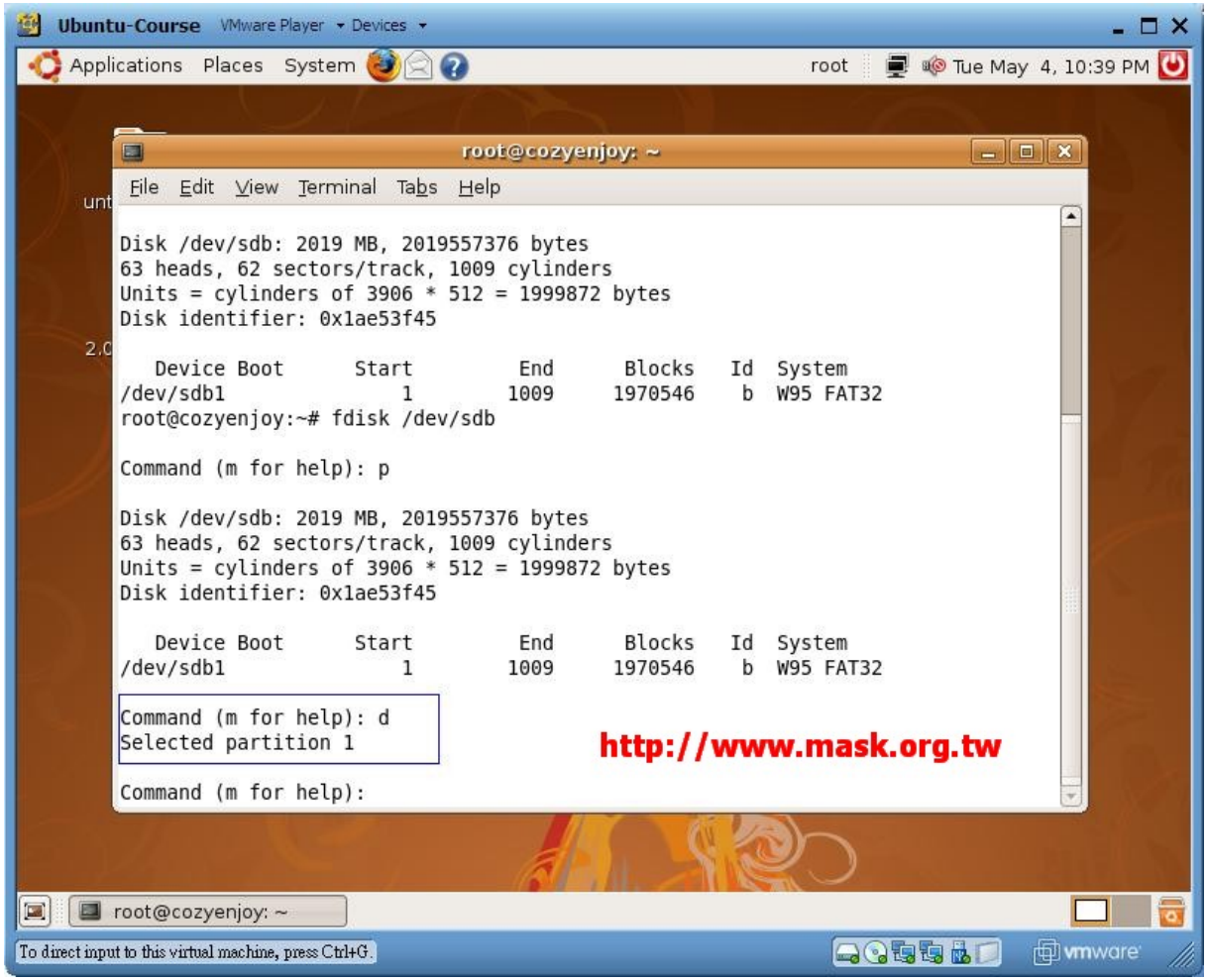
Prepare External USB Storage for Android Root File System (cont)

- fdisk /dev/sdb



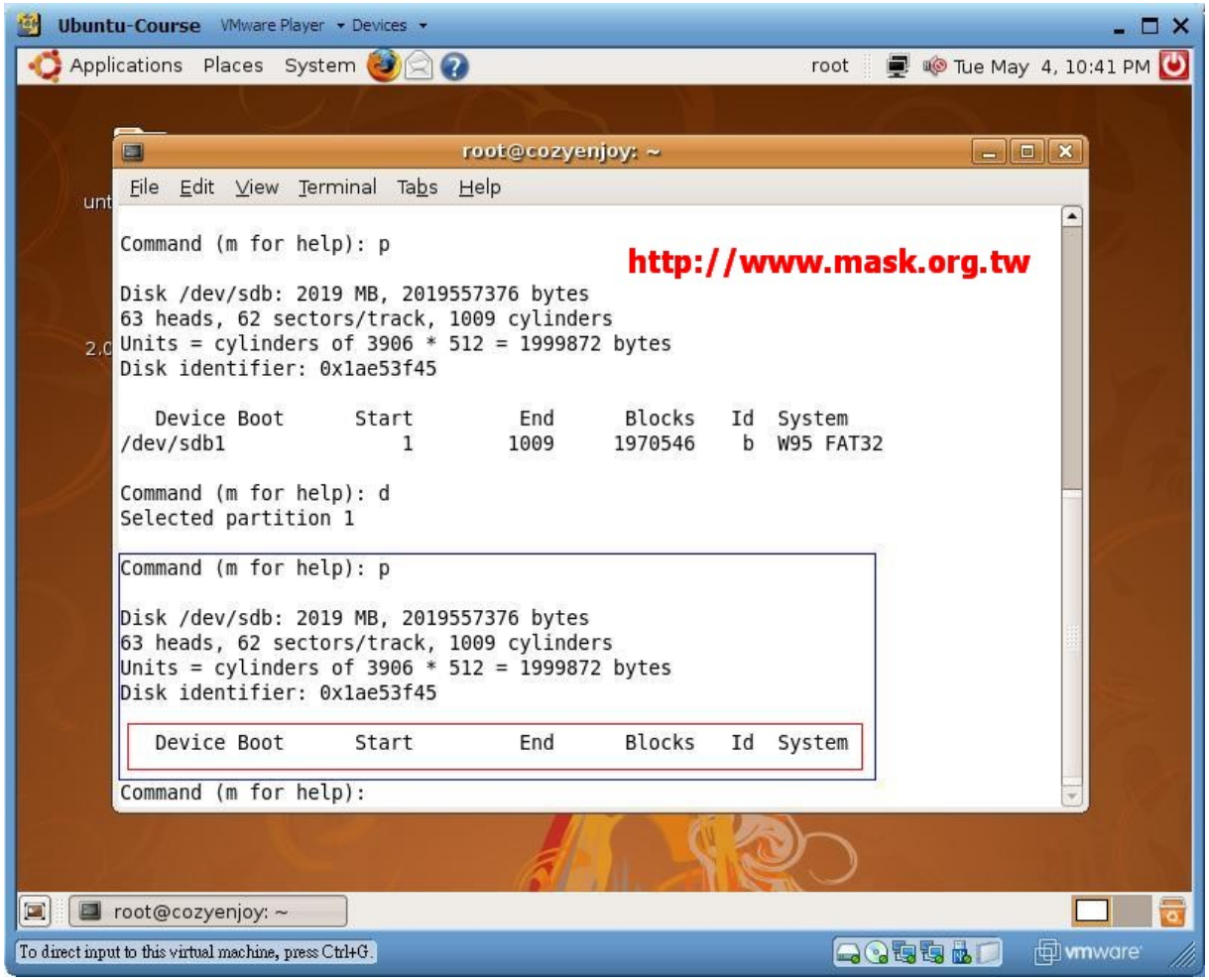
Create An Ext3 Partition

- Command (m for help)：d

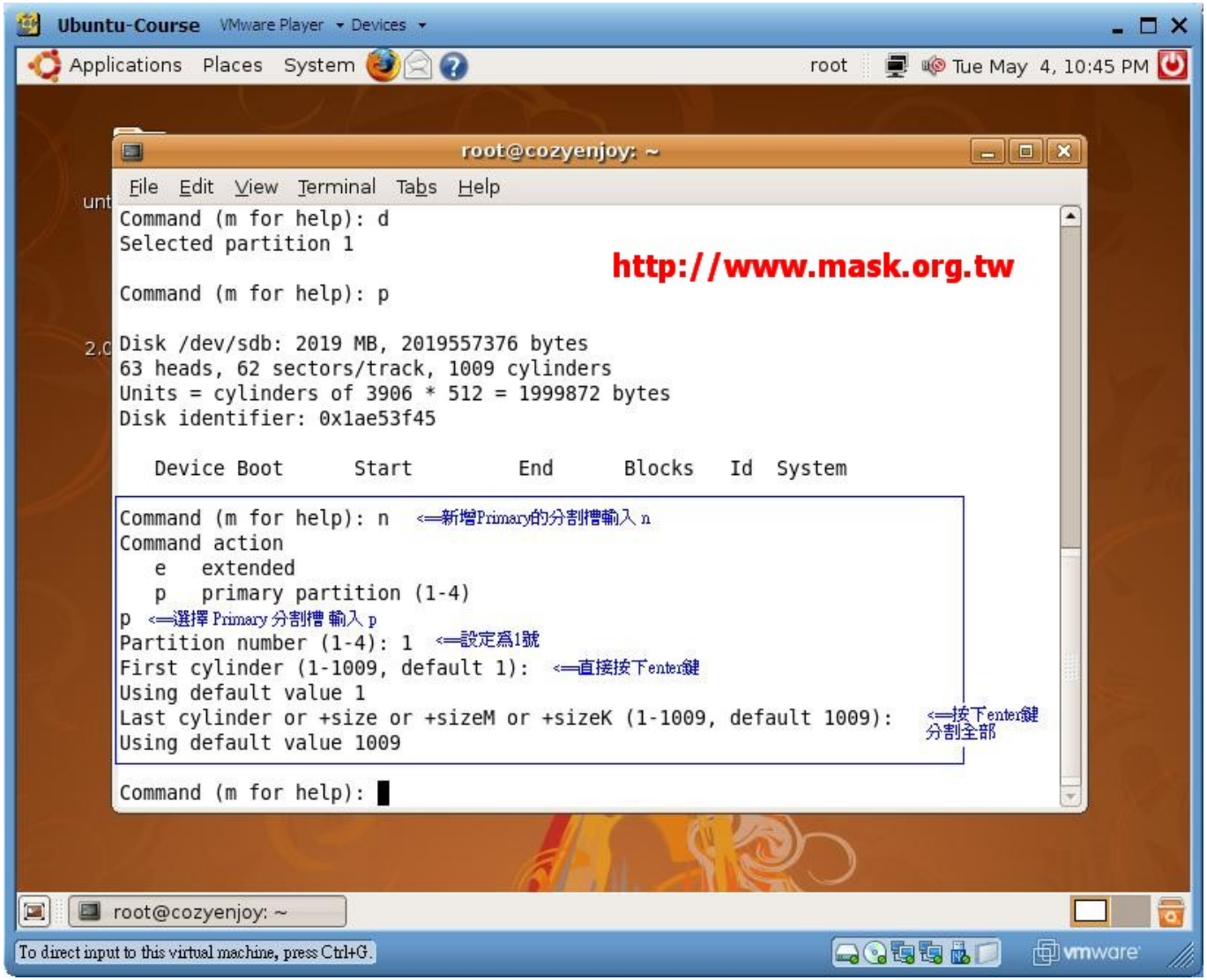


Create An Ext3 Partition (cont)

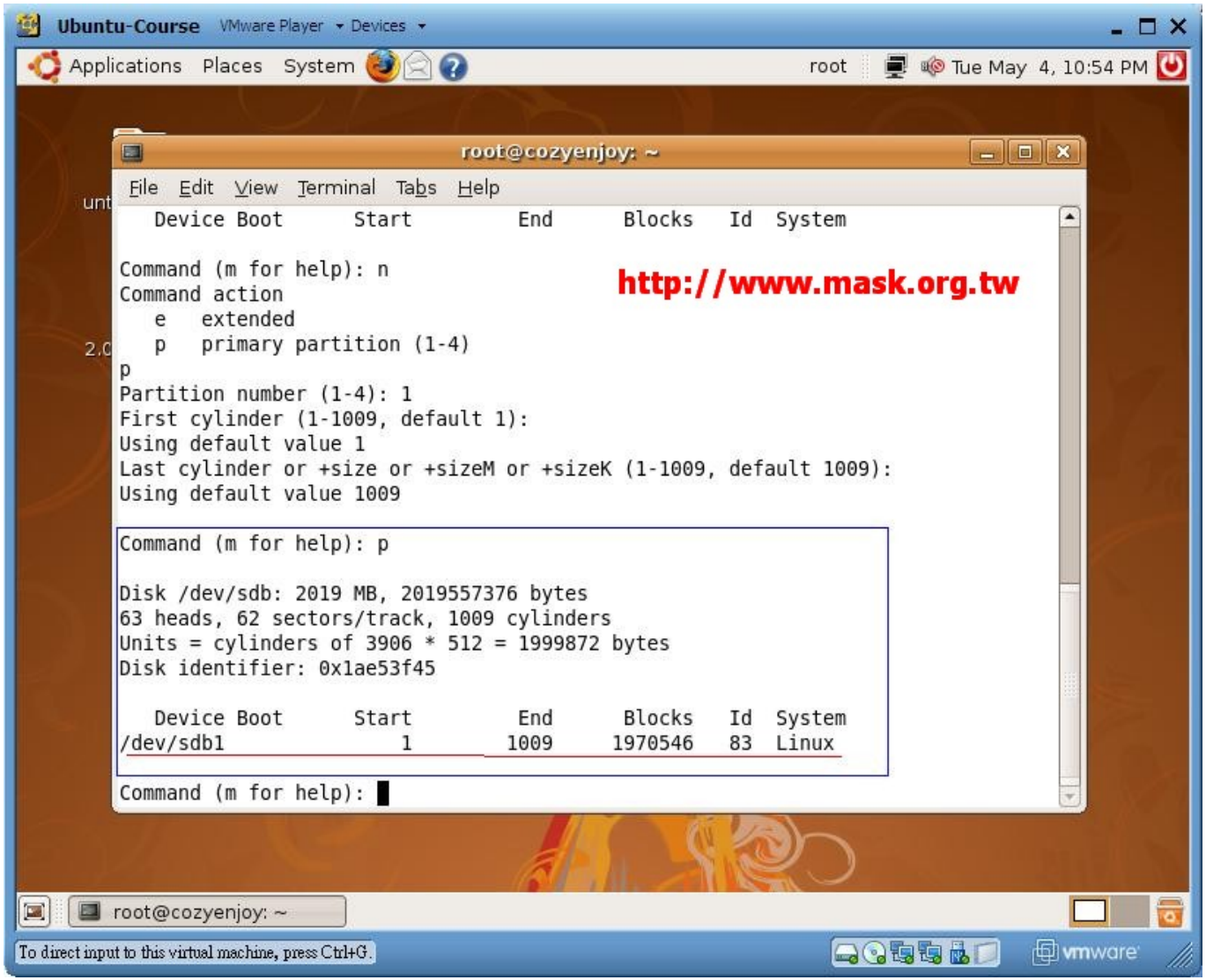
- Command (m for help)：p



Create An Ext3 Partition (cont)

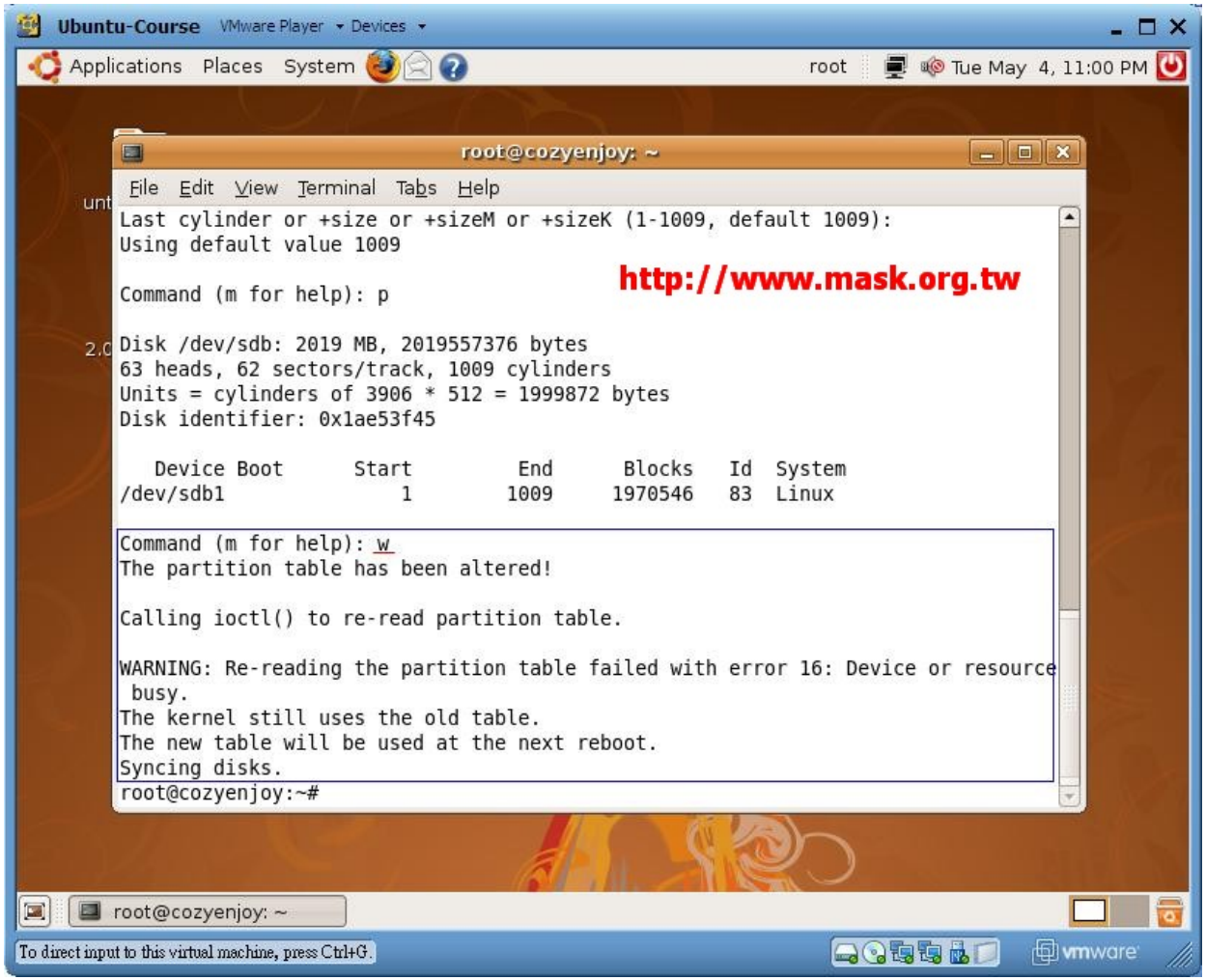


Create An Ext3 Partition (cont)



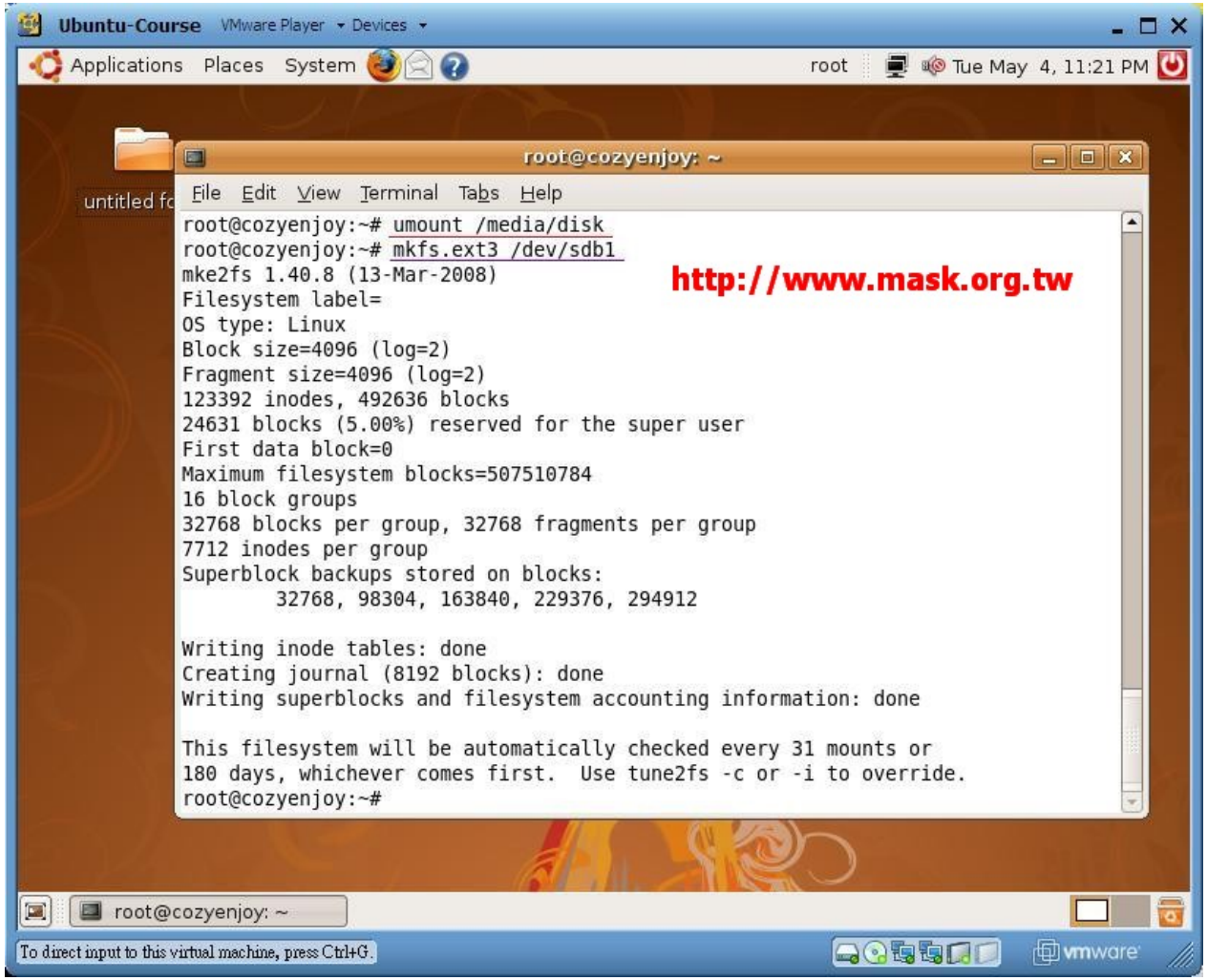
Create An Ext3 Partition (cont)

- Command (m for help)：w



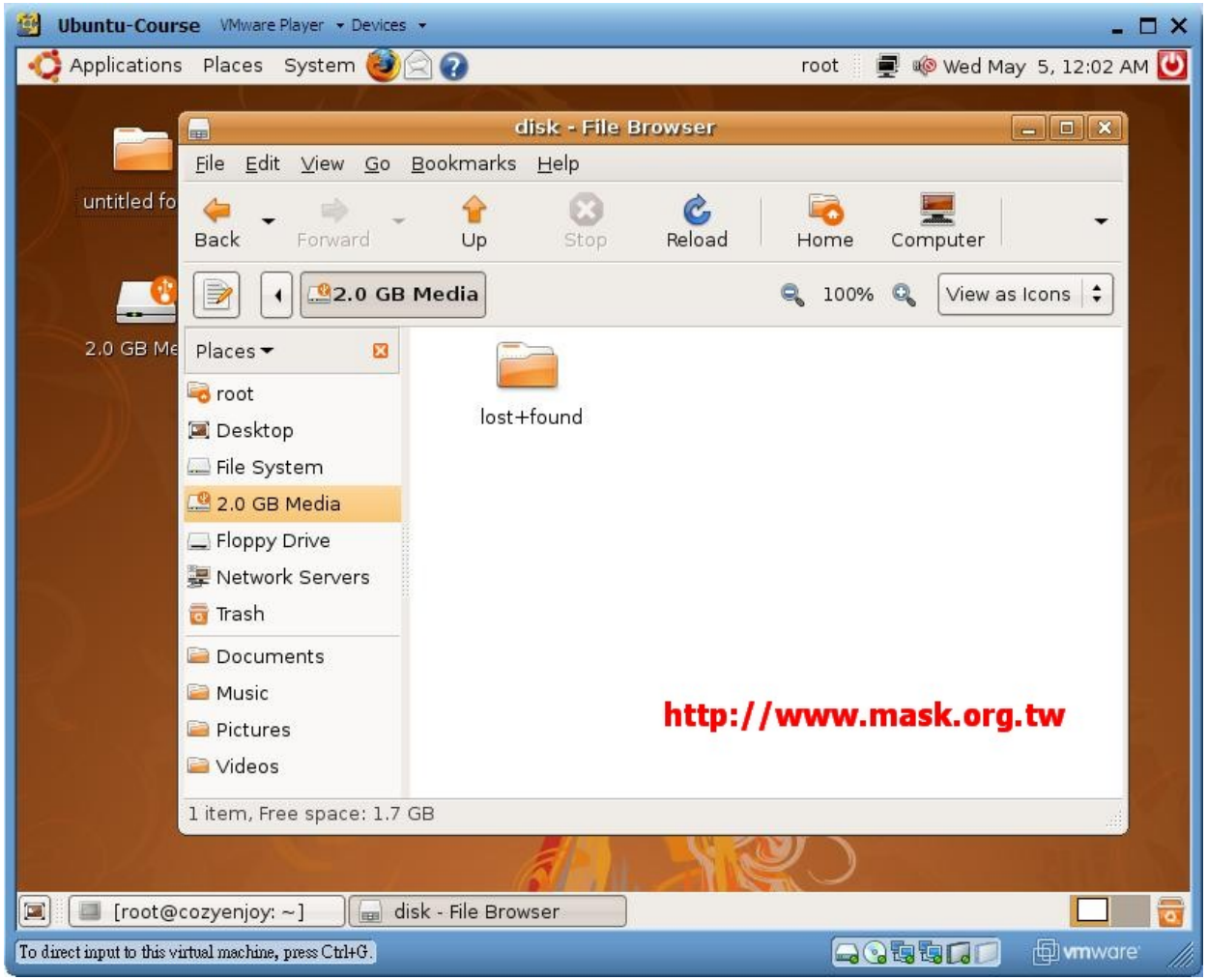
Format USB to Ext3

- mkfs.ext3 /dev/sdb1



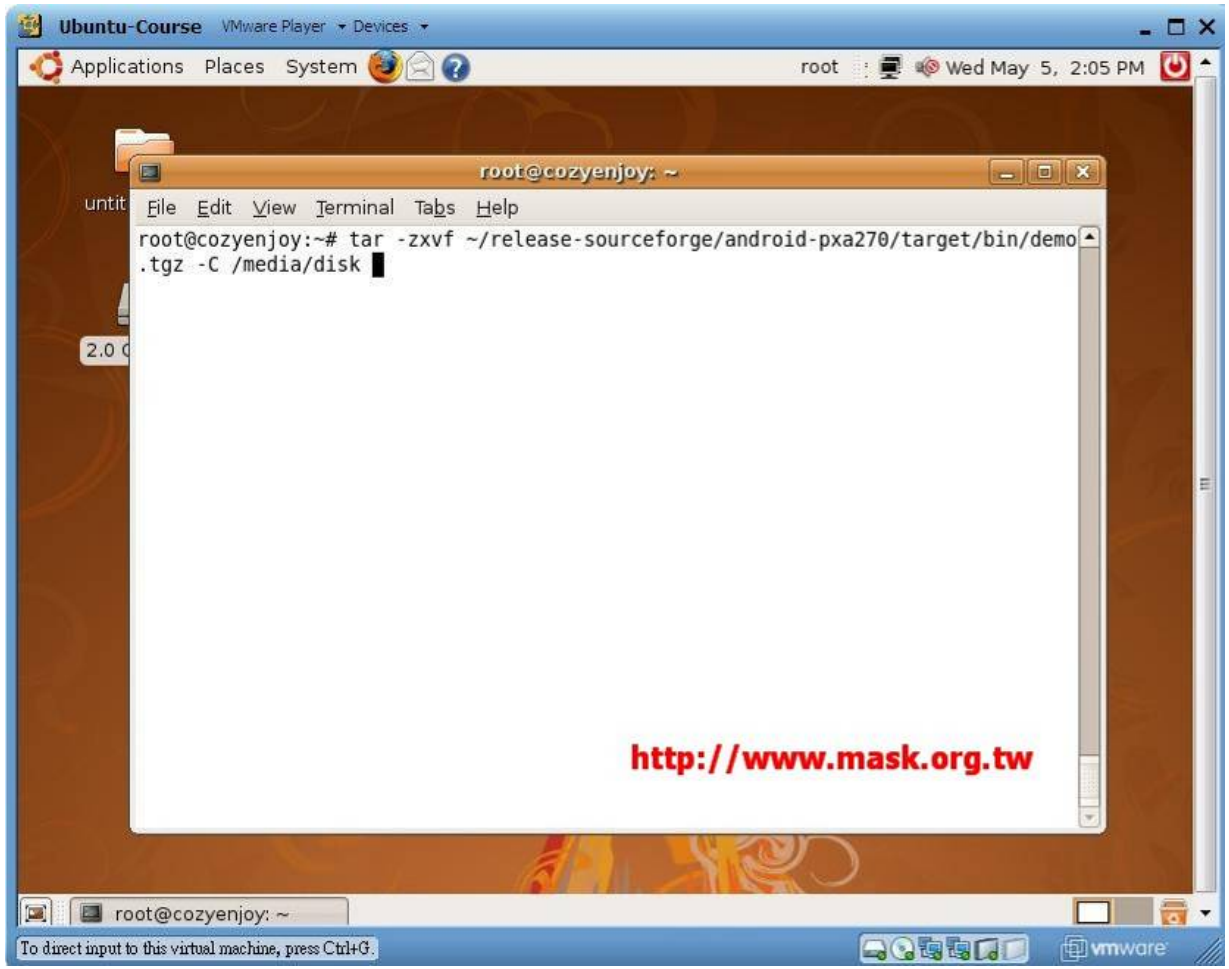
Extract Pre-build Android Root File System into USB

- Mount USB



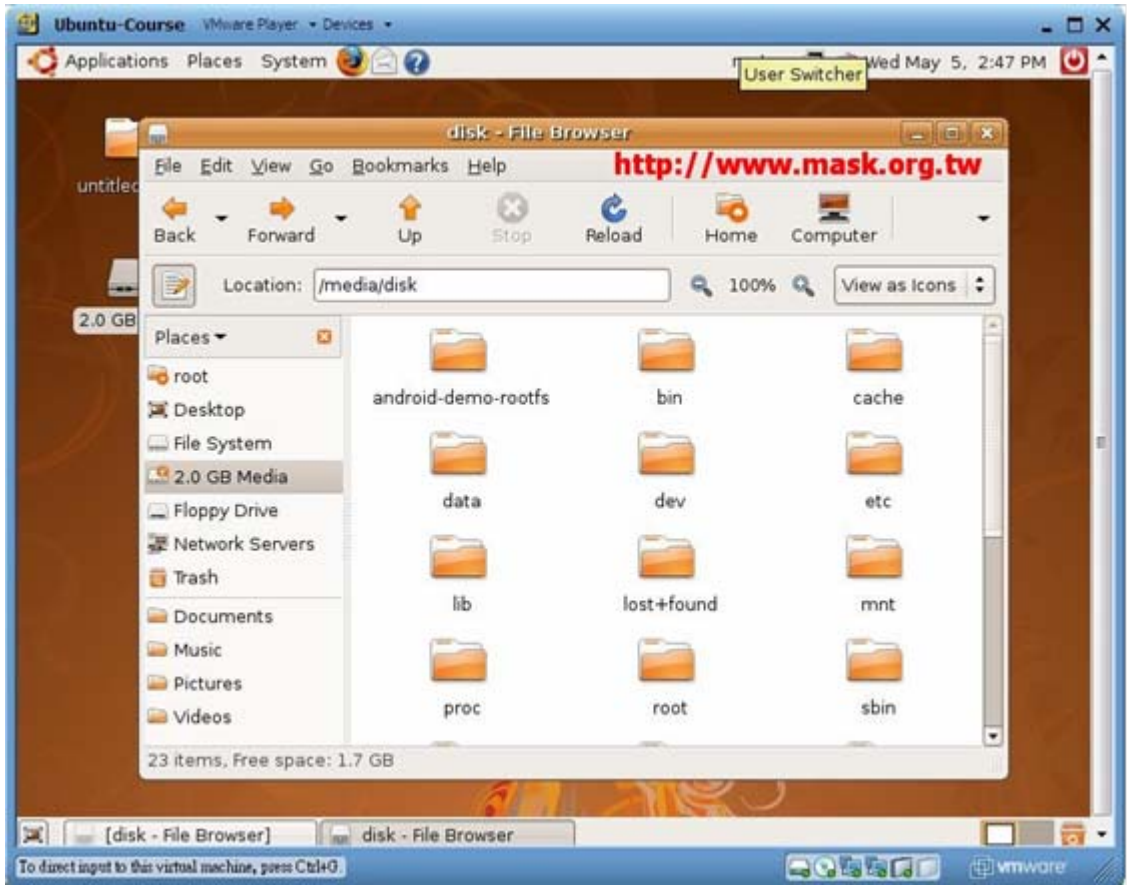
Extract Pre-build Android Root File System into USB (cont)

- tar zxvf target/bin/demo.tgz –C /media/disk



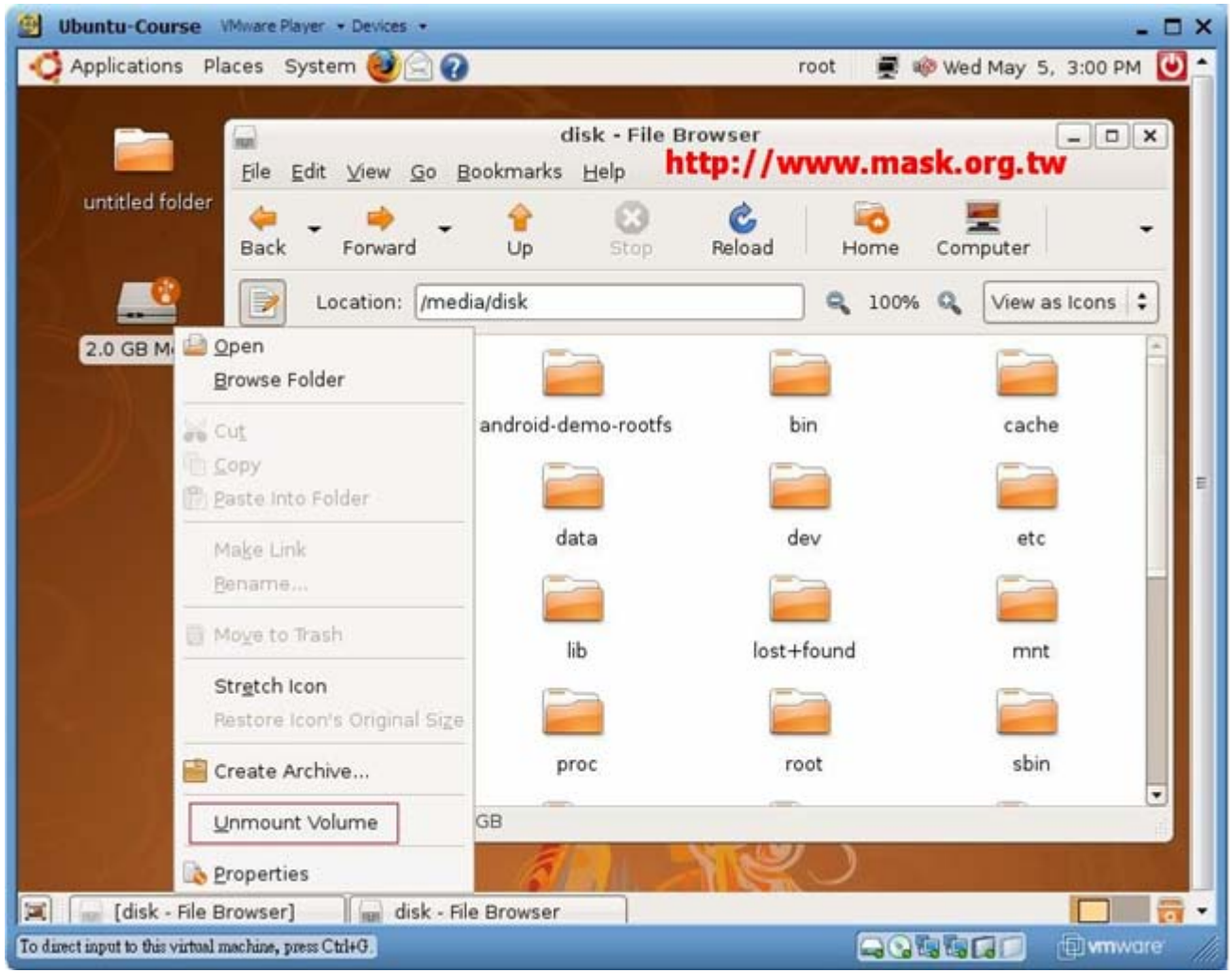
Extract Pre-build Android Root File System into USB (cont)

- cd /media/disk
- mv android-demo-rootfs/* .

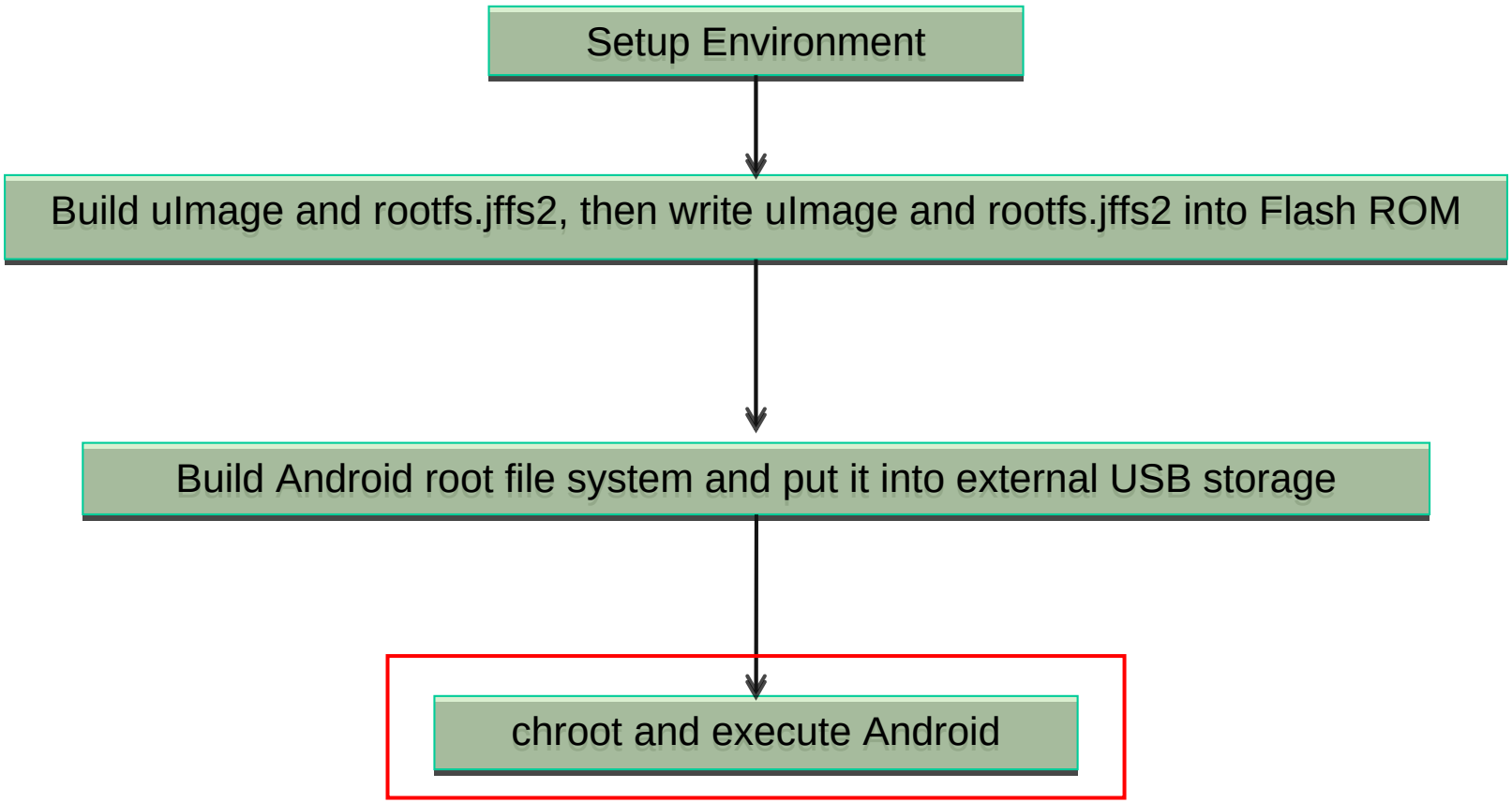


Extract Pre-build Android Root File System into USB (cont)

- Umount USB



Bring Up Android on PXA270



Insert External USB Storage on PXA270

Tera Term - COM1 VT

File Edit Setup Control Window Help

```
Freeing init memory: 104K
init started: BusyBox v1.13.2 (2010-04-27 17:23:22 CST)
starting pid 848, tty '': '/etc/init.d/rcS'
starting pid 858, tty '': '-/bin/sh'
```

http://www.mask.org.tw

```
BusyBox v1.13.2 (2010-04-27 17:23:22 CST) built-in shell (ash)
Enter 'help' for a list of built-in commands.


Processing /etc/profile... Done
[root@Android /]#usb 1-1: new full speed USB device using pxa27x-ohci and addres
s 2
usb 1-1: configuration #1 chosen from 1 choice
scsi0 : SCSI emulation for USB Mass Storage devices
scsi 0:0:0:0: Direct-Access     JetFlash Transcend 2GB    8.07 PQ: 0 ANSI: 2
sd 0:0:0:0: [sda] 3944448 512-byte hardware sectors (2020 MB)
sd 0:0:0:0: [sda] Write Protect is off
sd 0:0:0:0: [sda] Assuming drive cache: write through
sd 0:0:0:0: [sda] 3944448 512-byte hardware sectors (2020 MB)
sd 0:0:0:0: [sda] Write Protect is off
sd 0:0:0:0: [sda] Assuming drive cache: write through
 sda: sda1
sd 0:0:0:0: [sda] Attached SCSI removable disk
sd 0:0:0:0: Attached scsi generic sg0 type 0

[root@Android /]#
```

在這個地方會停住，請按下Enter鍵。

Execute Android

- cd /tmp
- mkdir usb
- mount /dev/sda1 ./usb
- cd usb
- chroot .
- ./init

Execute Android (cont)

Tera Term - COM1 VT

File Edit Setup Control Window Help

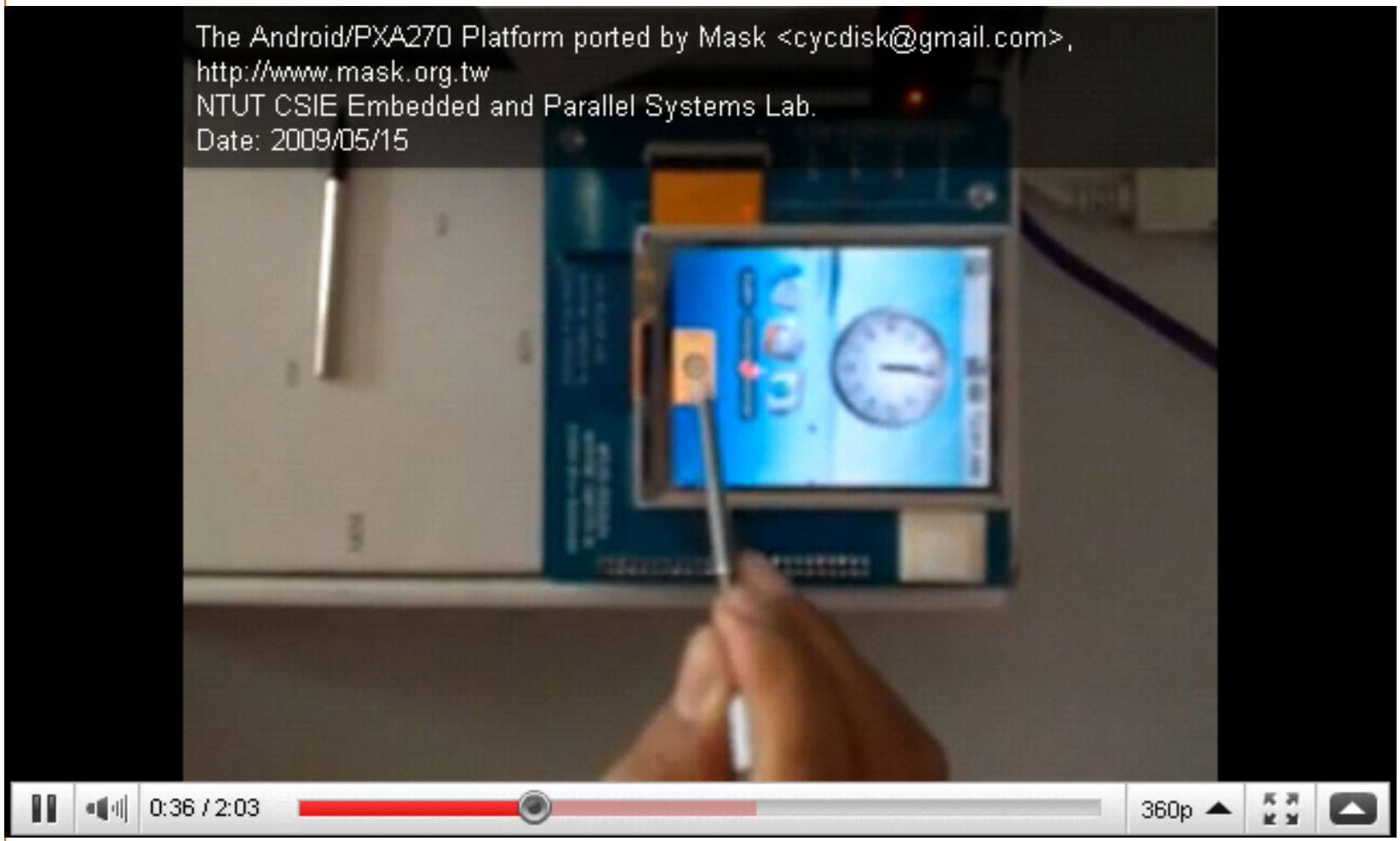
```
Enter 'help' for a list ofsd 0:0:0:0: [sda] Assuming drive cache: write through
 built-in commands.
```

http://www.mask.org.tw

```
Processing /etc/profile...  sda:Done
[root@Android /]# sda1
sd 0:0:0:0: [sda] Attached SCSI removable disk
sd 0:0:0:0: Attached scsi generic sg0 type 0

[root@Android /]#cd /tmp
[root@Android /tmp]#mkdir usb
[root@Android /tmp]#mount /dev/sda1 ./usb
kjournald starting.  Commit interval 5 seconds
EXT3 FS on sda1, internal journal
EXT3-fs: recovery complete.
EXT3-fs: mounted filesystem with ordered data mode.
[root@Android /tmp]#cd usb
[root@Android usb]#chroot .


BusyBox v1.13.2 (2009-03-03 01:05:13 CST) built-in shell (ash)
Enter 'help' for a list of built-in commands.

[root@Android /]#./init
init: cannot open '/initlogo.rle'
init: cannot find '/system/bin/playmp3', disabling 'bootsound'
sh: can't access tty; job control turned off
# warning: `app_process' uses 32-bit capabilities (legacy support in use)
```

Execute Android (cont)

- http://www.youtube.com/watch?v=lYzRSNuUsIw



Keypad Layout

1 (KEY_BACK)	2 (KEY_UP)	3 (KEY_RESERVED)	A (KEY_MENU)
4 (KEY_LEFT)	5 (KEY_RESERVED)	6 (KEY_RIGHT)	B (KEY_HOME)
7 (KEY_RESERVED)	8 (KEY_DOWN)	9 (KEY_RESERVED)	C (KEY_BACKSPACE)
* (KEY_LEFTSHIFT)	0 (KEY_RESERVED)	# (KEY_RESERVED)	D (KEY_SPACE)

Reference

- 2009/7, Android 1.0 source code for PXA270
  - http://www.mask.org.tw/data/release-sourceforge.tgz
- Wen-Chang Chung, "The Study and Implementation of Operating System Porting for Android", NTUT CSIE, 2009
  - http://www.mask.org.tw/data/Android_Porting.pdf

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Q & A