INSTALL UBUNTU INTO RB-050

DMP Electronics Inc.
Robotic Division
March 2011

REQUIREMENTS

- Software
  - Ubuntu ISO file
    - Here, we use Ubuntu 9.04 for example
  - Oracle VirtualBox
  - Putty & Vncviewer
- Hardware
  - RoBoard RB-050
  - MicroSD card (≧4 GB)
    - Here, we use 8GB MicroSD card for example
  - MicroSD CardReader

DOWNLOAD UBUNTU INSTALLATION ISO

- Download Ubuntu-9.04-DESKTOP-I386.ISO file

  download web: http://releases.ubuntu.com/9.04/

Ubuntu 9.04 (Jaunty Jackalope)

This directory contains the most frequently downloaded Ubuntu images. Other images, including DVDs and source CDs, may be available on the cdimage serve

Select an image

Ubuntu is distributed on four types of images described below.

Desktop CD

The desktop CD allows you to try Ubuntu without changing your computer at all, and at your option to install it permanently later. This type of CD is what most
256MB of RAM to install from this CD.

There are two images available, each for a different type of computer:

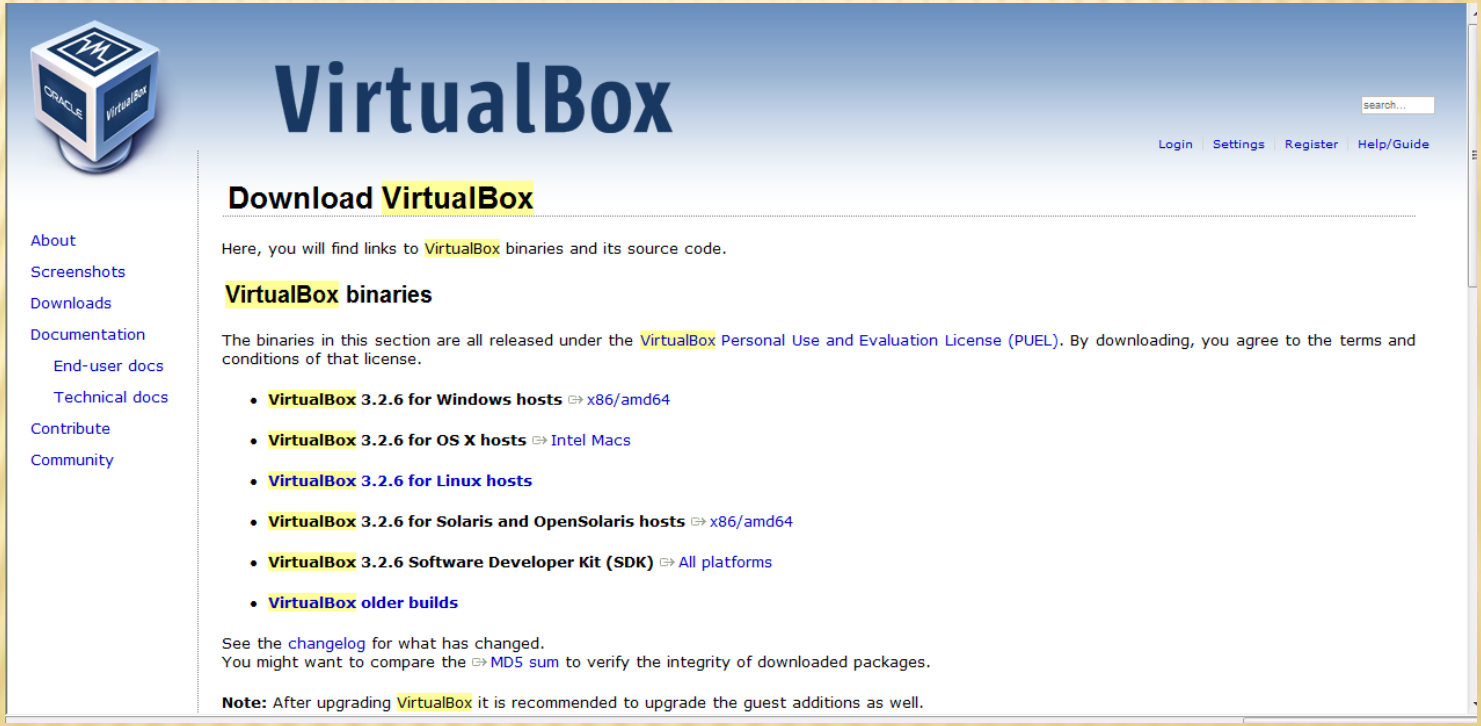
PC (Intel x86) desktop CD

For almost all PCs. This includes most machines with Intel/AMD/etc type processors and almost all computers that run Microsoft Windows, as well as
processors. Choose this if you are at all unsure.

DOWNLOAD VIRTUALBOX

- Download VirtualBox and install it into your computer

  download web: http://www.VirtualBox.org/wiki/downloads



DOWNLOAD PUTTY

- Download putty and install it into your computer

  download web:
  http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html

Binaries

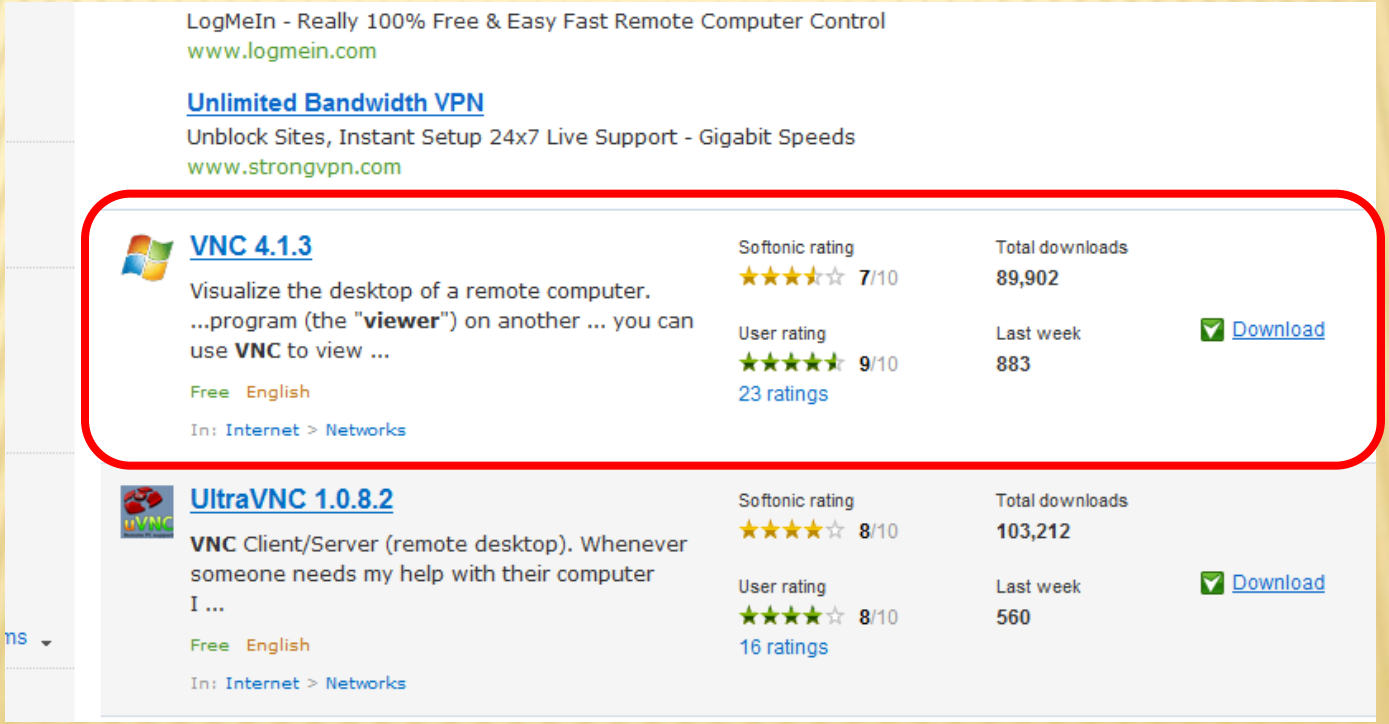
The latest release version (beta 0.60). This will generally be a version I think is reasonably likely to work development snapshot (below) to see if I've already fixed the bug, before reporting it to me.

For Windows on Intel x86

PuTTY:	putty.exe	(or by FTP)	(RSA sig)	(DSA sig)
PuTTYtel:	puttytel.exe	(or by FTP)	(RSA sig)	(DSA sig)
PSCP:	pscp.exe	(or by FTP)	(RSA sig)	(DSA sig)
PSFTP:	psftp.exe	(or by FTP)	(RSA sig)	(DSA sig)
Plink:	plink.exe	(or by FTP)	(RSA sig)	(DSA sig)
Pageant:	pageant.exe	(or by FTP)	(RSA sig)	(DSA sig)
PuTTYgen:	puttygen.exe	(or by FTP)	(RSA sig)	(DSA sig)

DOWNLOAD VNCVIEWER

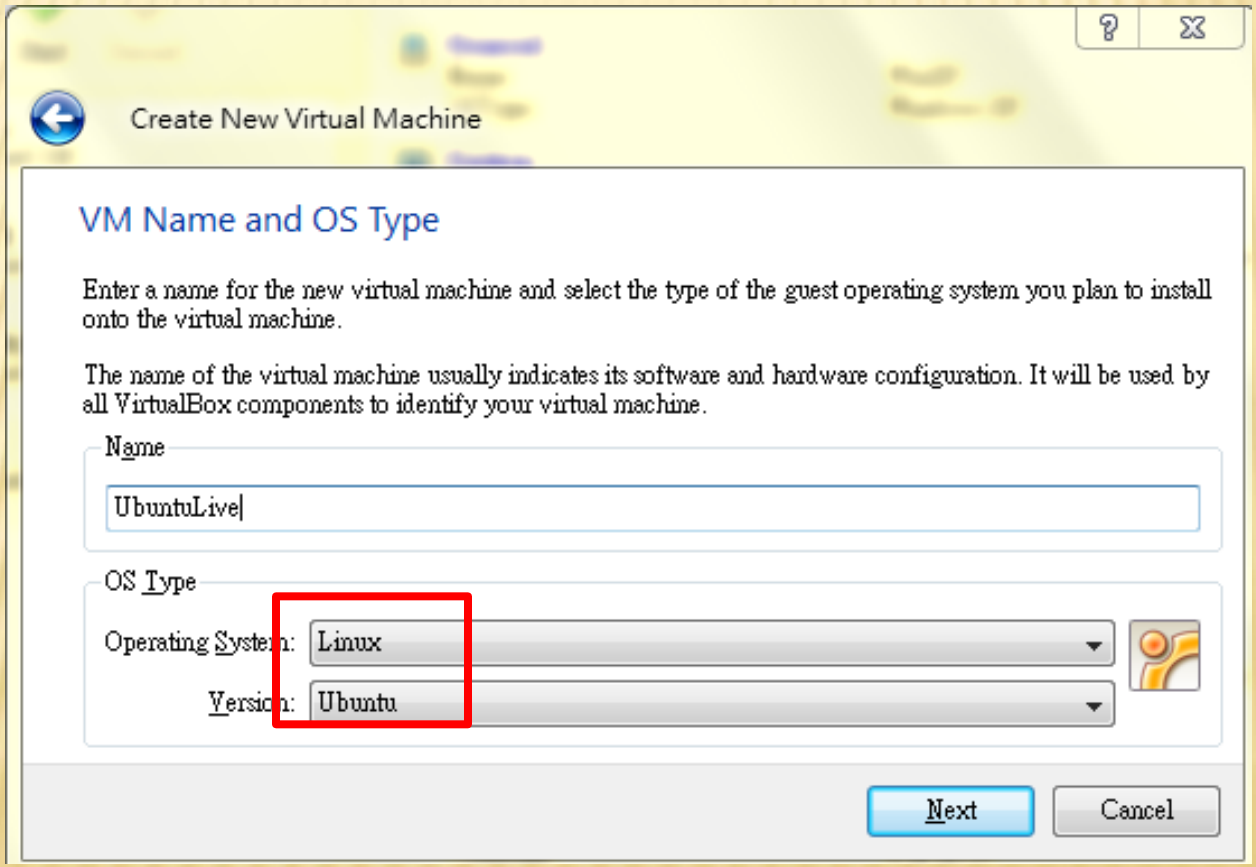
- Download vncviewer and install it into your computer download web: http://en.softonic.com/s/vnc-viewer



INSTALL UBUNTU FOR RB-050 USING VIRTUALBOX

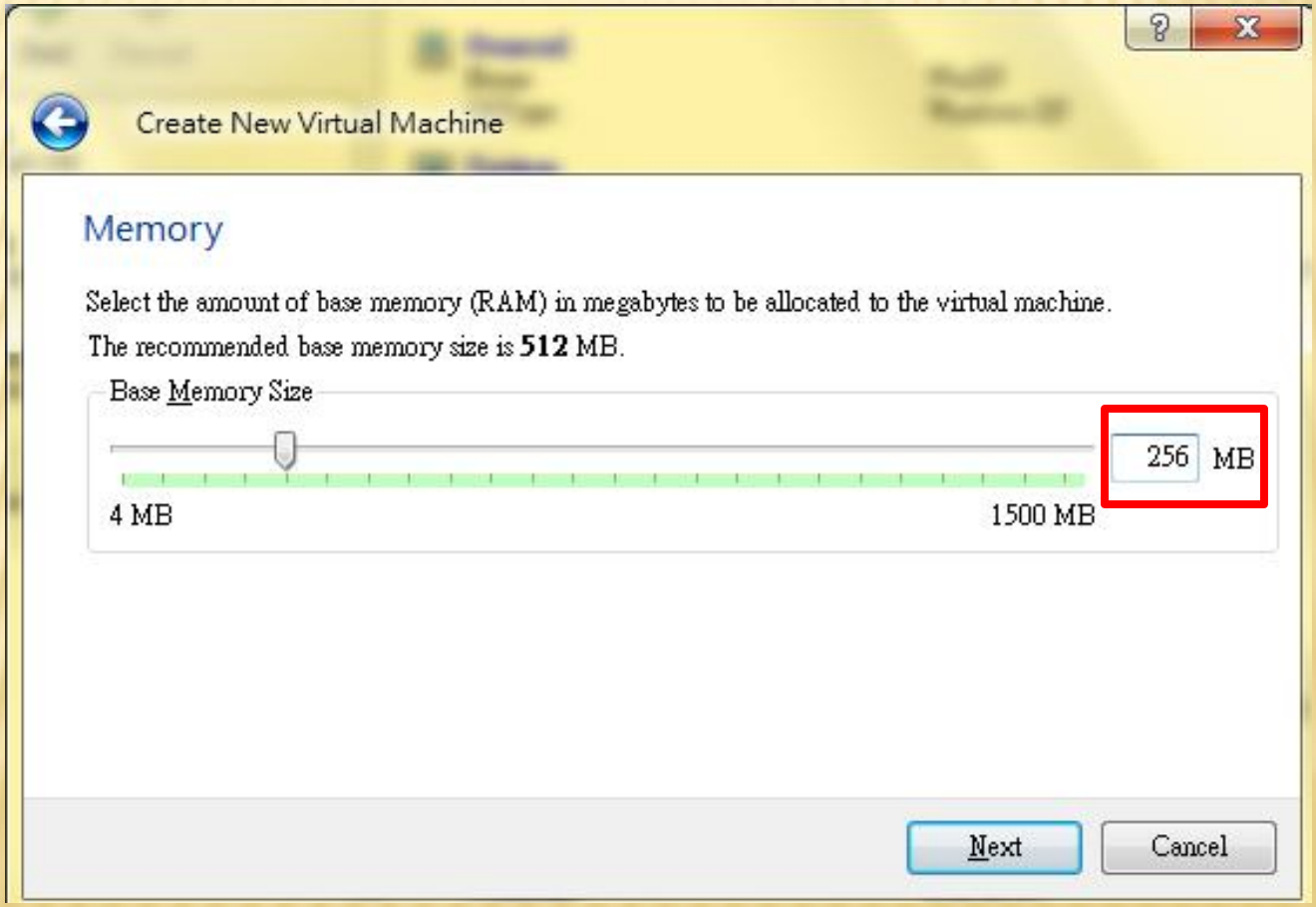
STEP1.

- Open VirtualBox and create a new Virtual Machine



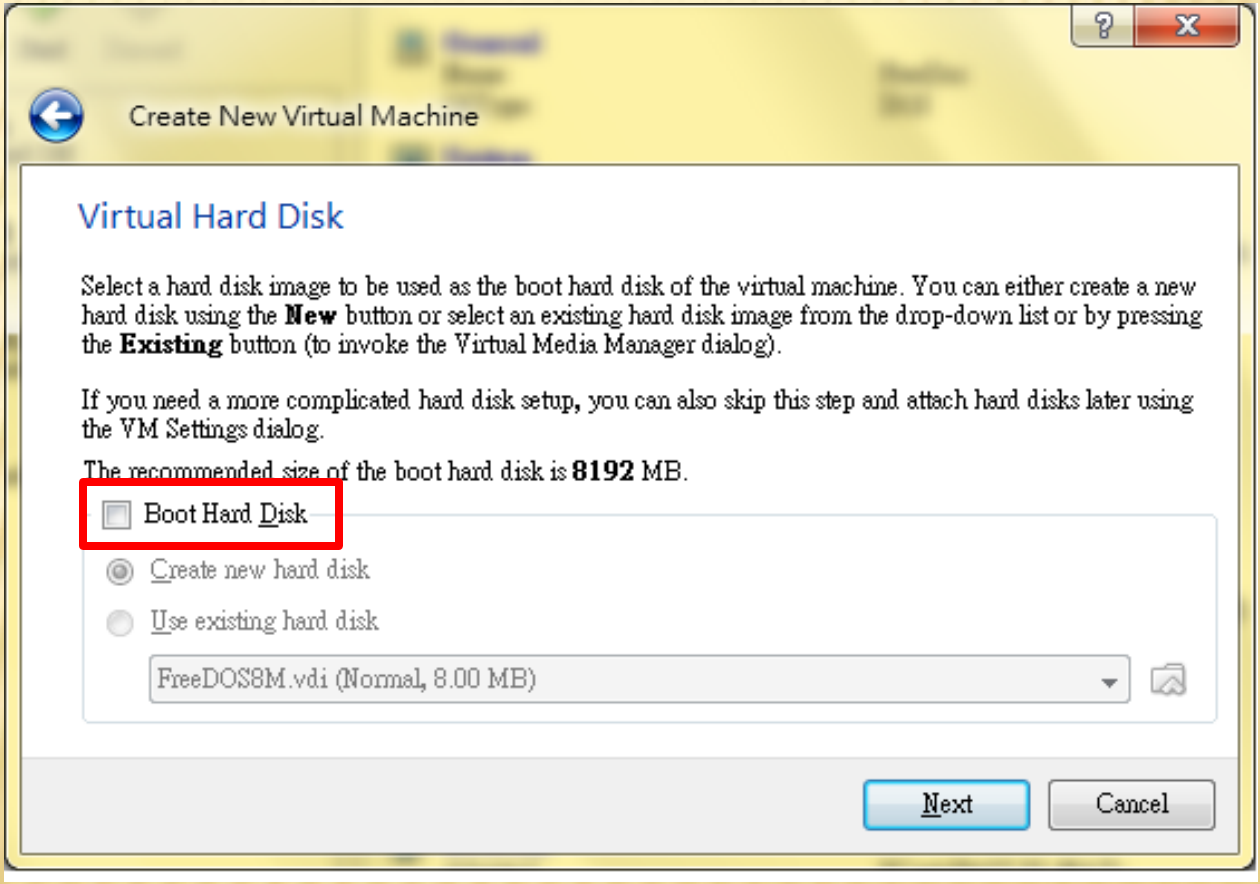
STEP2.

- Set memory size as 256MB (to match RoBoard RB-050)



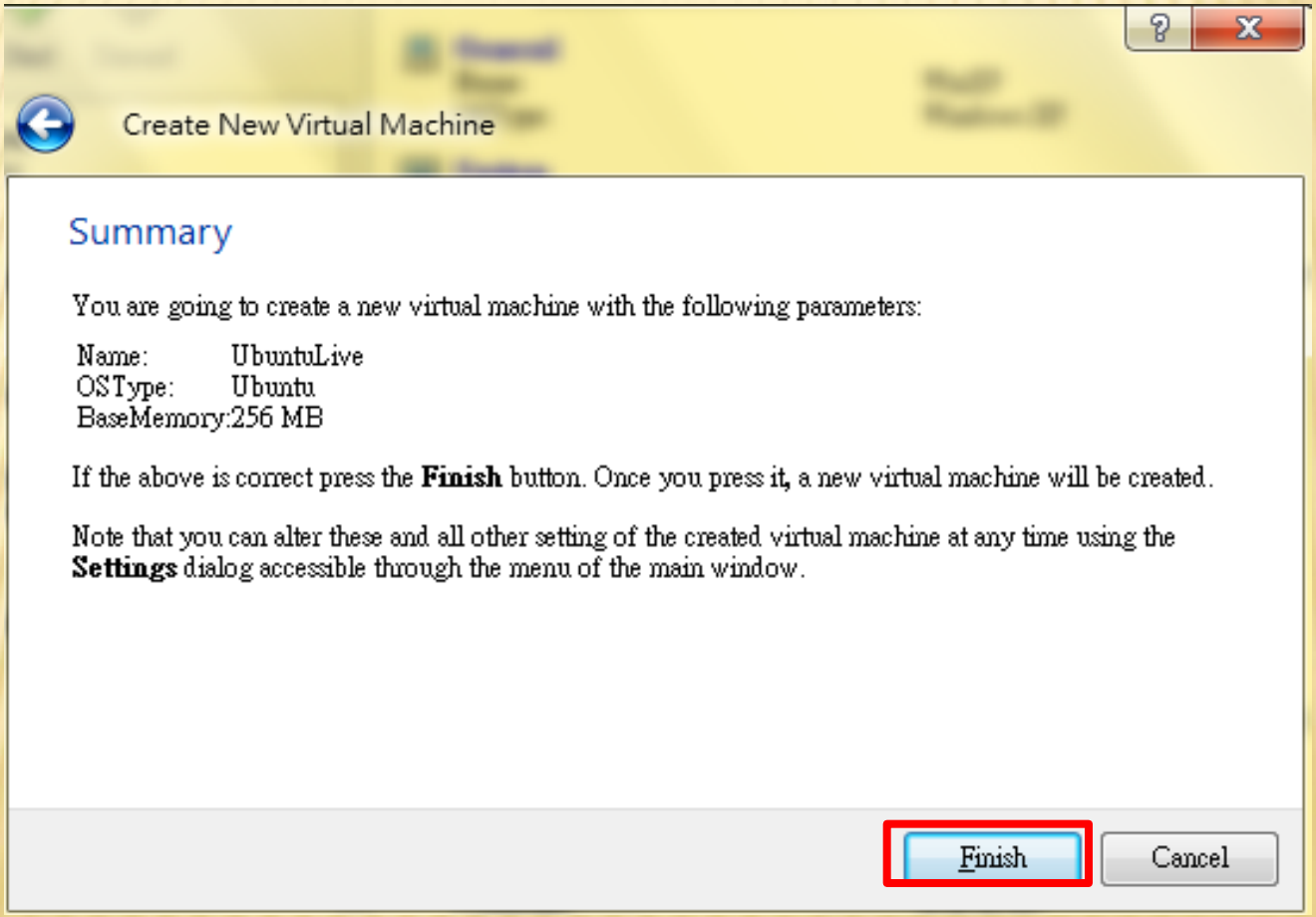
STEP3.

- Don’t click **Boot Hard Disk**



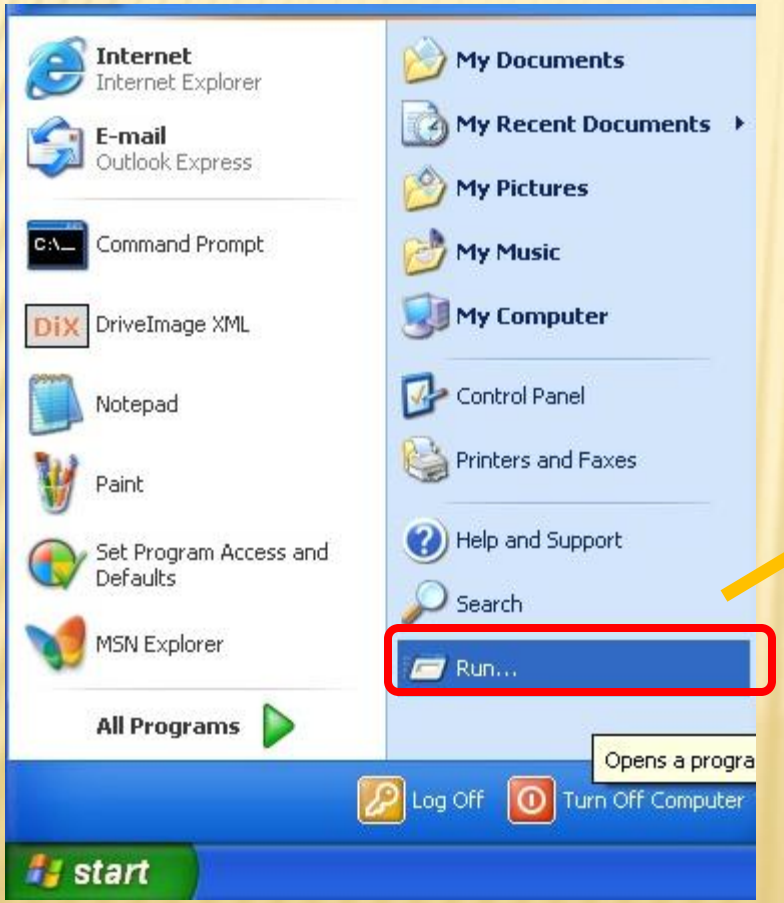
STEP4.

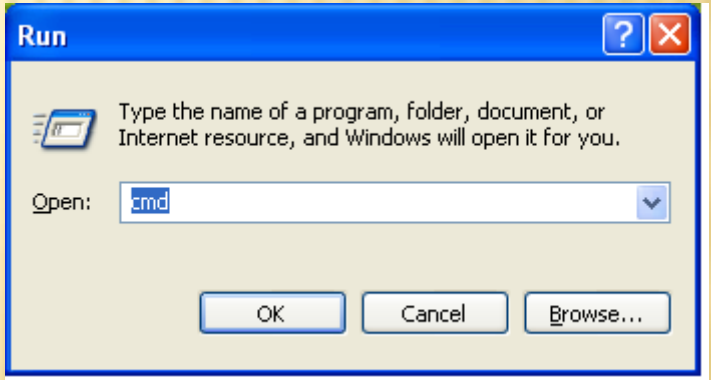
- Click **Finish**



STEP5. (IF YOUR OS IS WINXP)

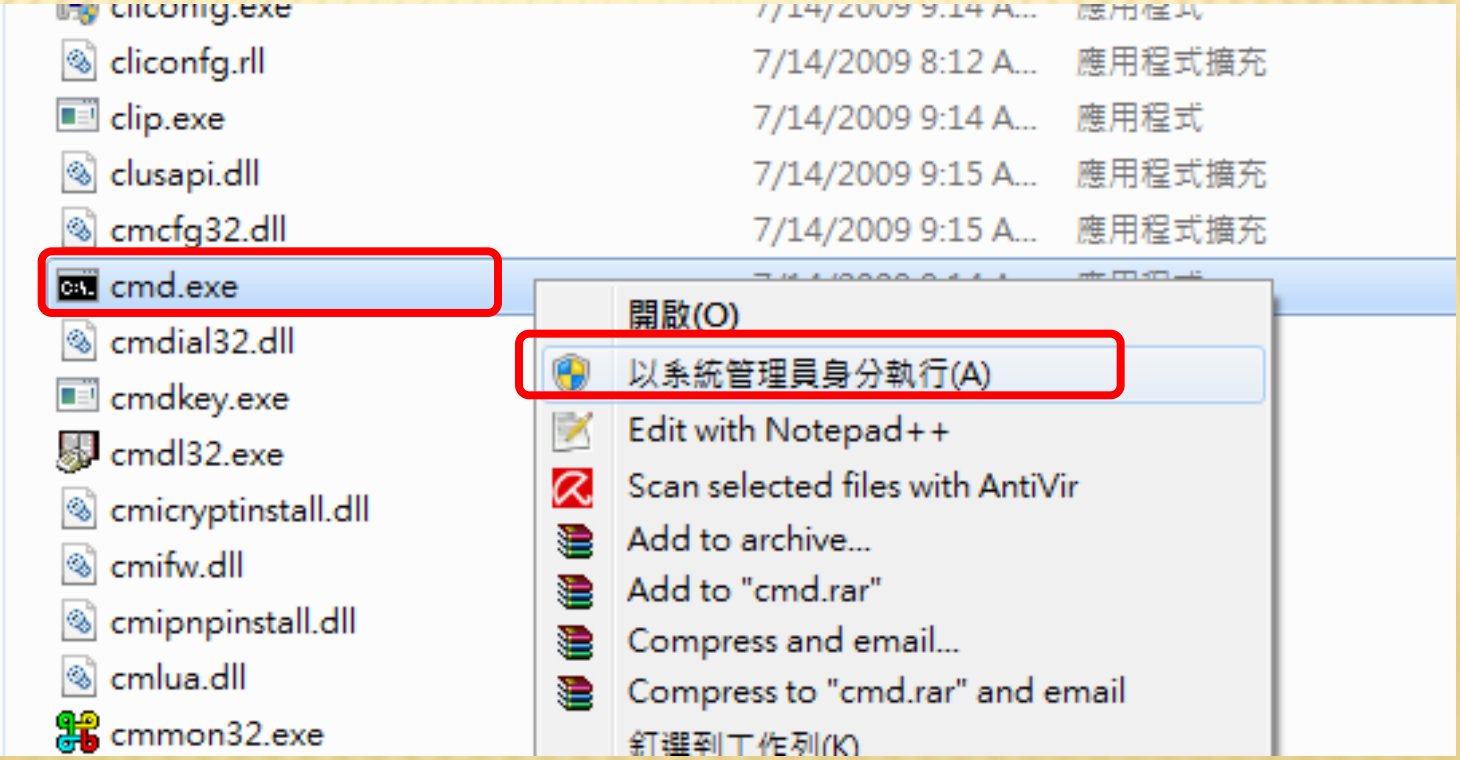
- Open a MS-DOS Prompt
  - Click **Start Menu** → Click **Run** → Type **cmd**





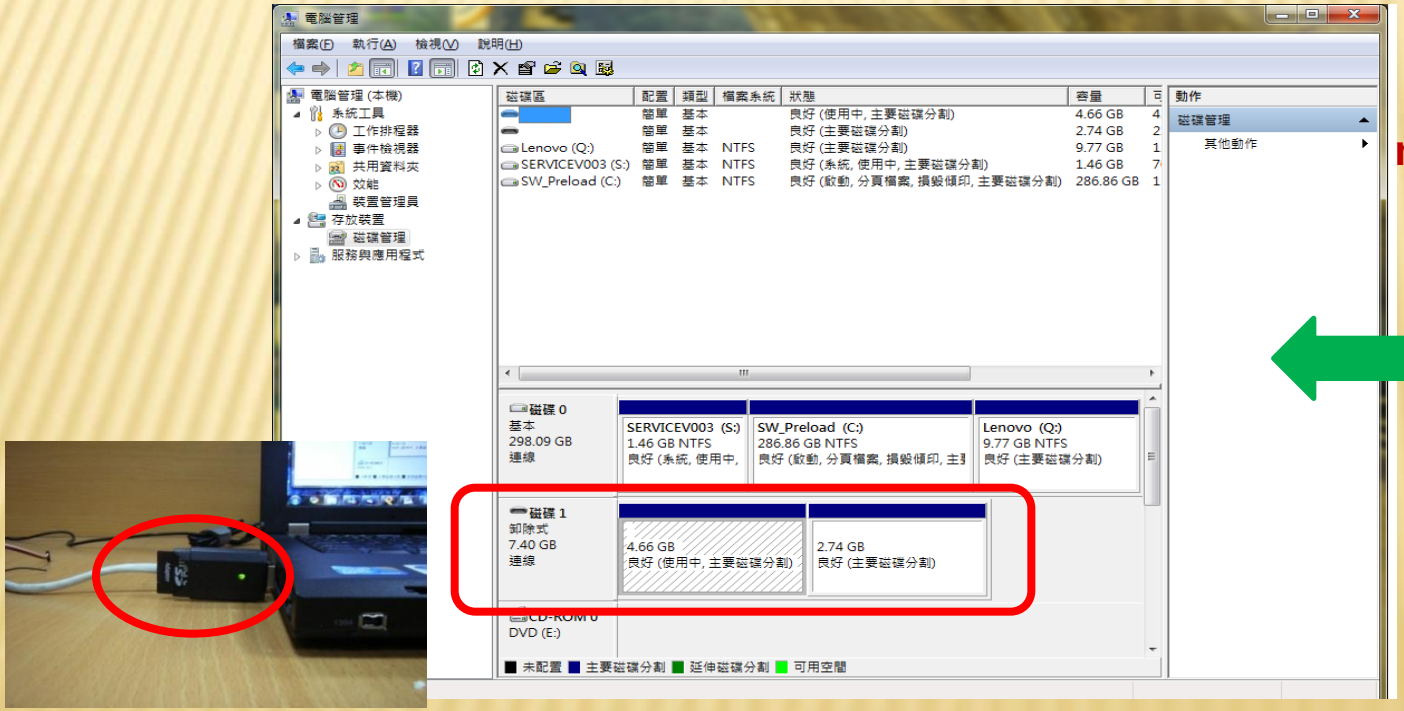
STEP5. (IF YOUR OS IS VISTA OR WIN7)

- Open a MS-DOS Prompt
  - Find the **cmd.exe**
  - Right click on “cmd.exe” and choose run as **Administrator**



STEP6.

- Plug the card reader with the MicroSD card into your computer
  - In this example, the USB card reader is numbered as Disk 1



See the disk number as follows:

(right click on)
My Computer
↓
Manage
↓
Disk Management

STEP7.

- In the MS-DOS Prompt, change the directory to the VirtualBox directory
  - In this example, VirtualBox is installed in **`C:\Program Files\Oracle\Virtualbox`**

```
Microsoft Windows [版本 6.1.7600]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Users\Hung-Wen>cd c:\program files\oracle\virtualbox
```

STEP8.

- Mount the USB device as a VirtualBox raw disk
  - Type in the MS-DOS Prompt:

    vboxmanage internalcommands createrawvmdk
    -filename <Absolute Path to output file>
    -rawdisk <Drive Specification> -register
  - In this example,
    - the path to output file is "**c:\users\hung-wen\.virtualbox\usb.vmdk**"
    - the drive specification of the USB device is "**\\.\physicaldrive1**" **(since it is numbered as Disk 1)**

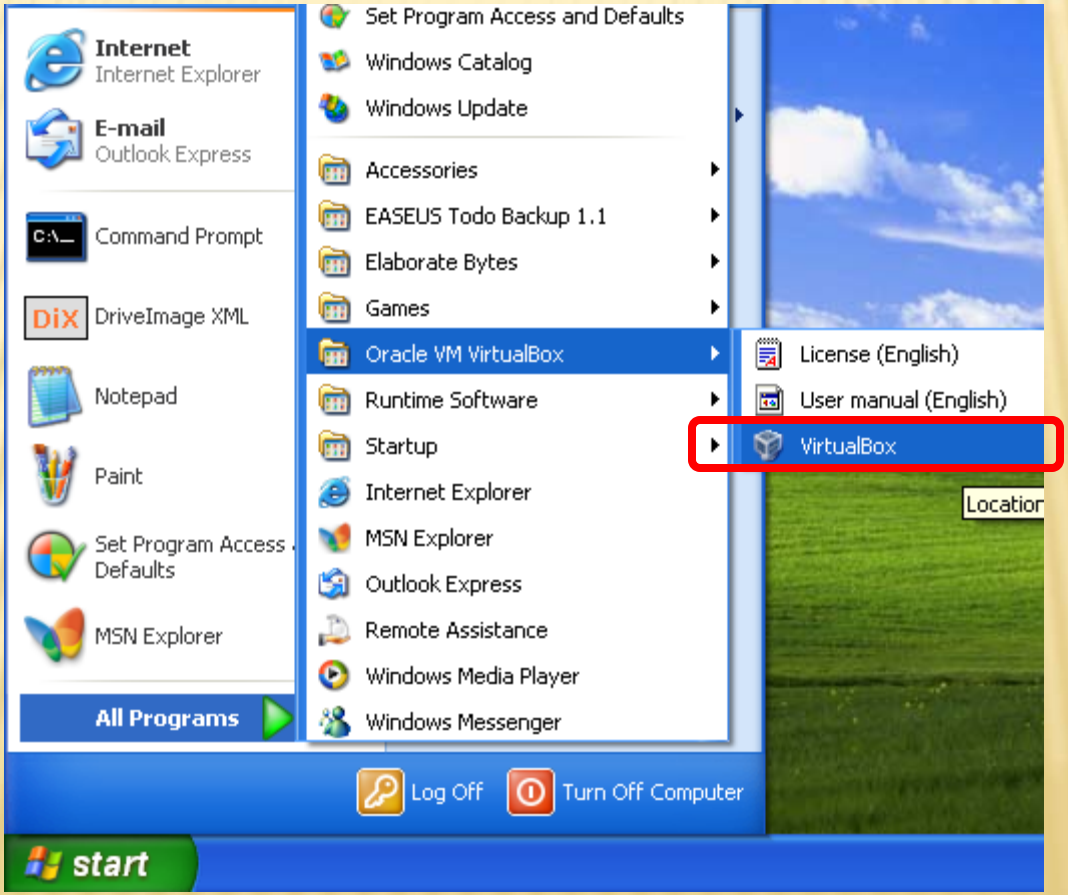
```
c:\Program Files\Oracle\VirtualBox>vboxmanage internalcommands createrawvmdk -fi
lename c:\users\hung-wen\.virtualbox\usb.vmdk -rawdisk \\.\physicaldrive1 -regis
ter
Oracle VM VirtualBox Command Line Management Interface Version 3.2.6
(C) 2005-2010 Oracle Corporation
All rights reserved.

RAW host disk access VMDK file c:\users\hung-wen\.virtualbox\usb.vmdk created su
ccessfully.

c:\Program Files\Oracle\VirtualBox>
```

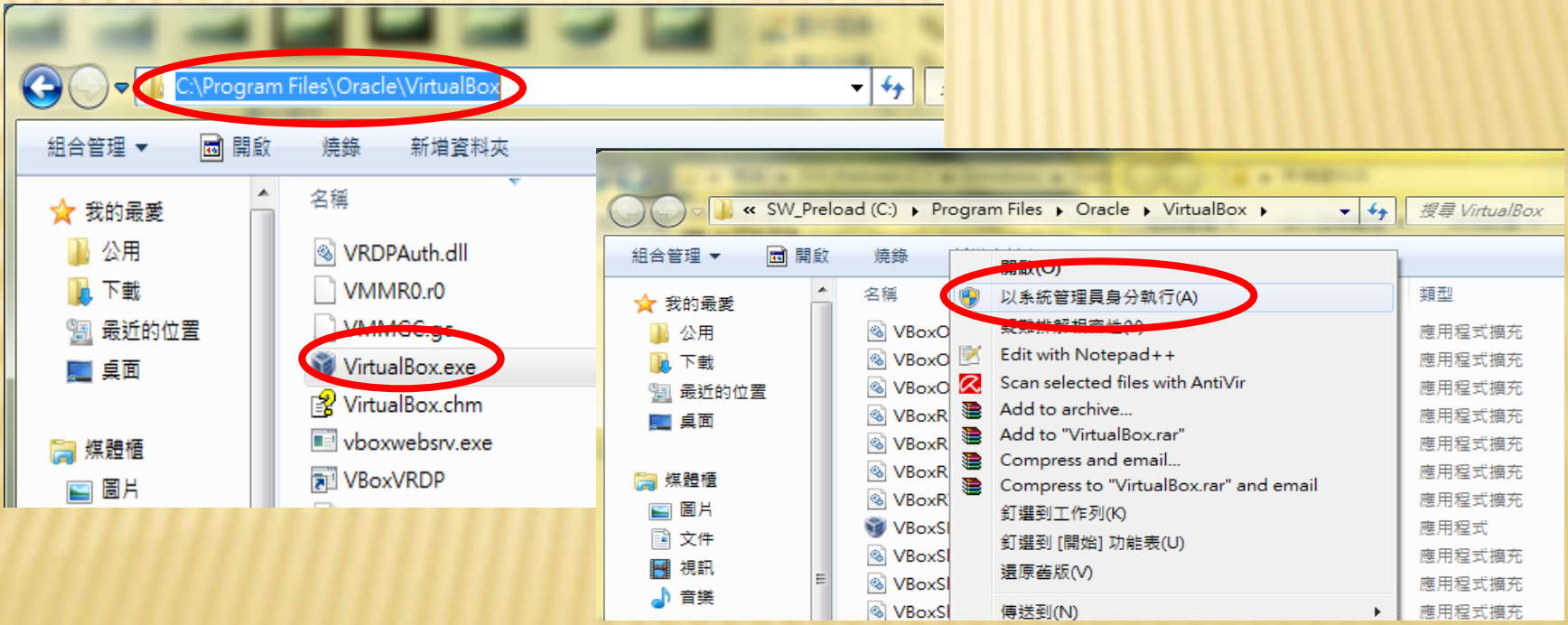
STEP9. (IF YOUR OS IS WINXP)

- Launch VirtualBox



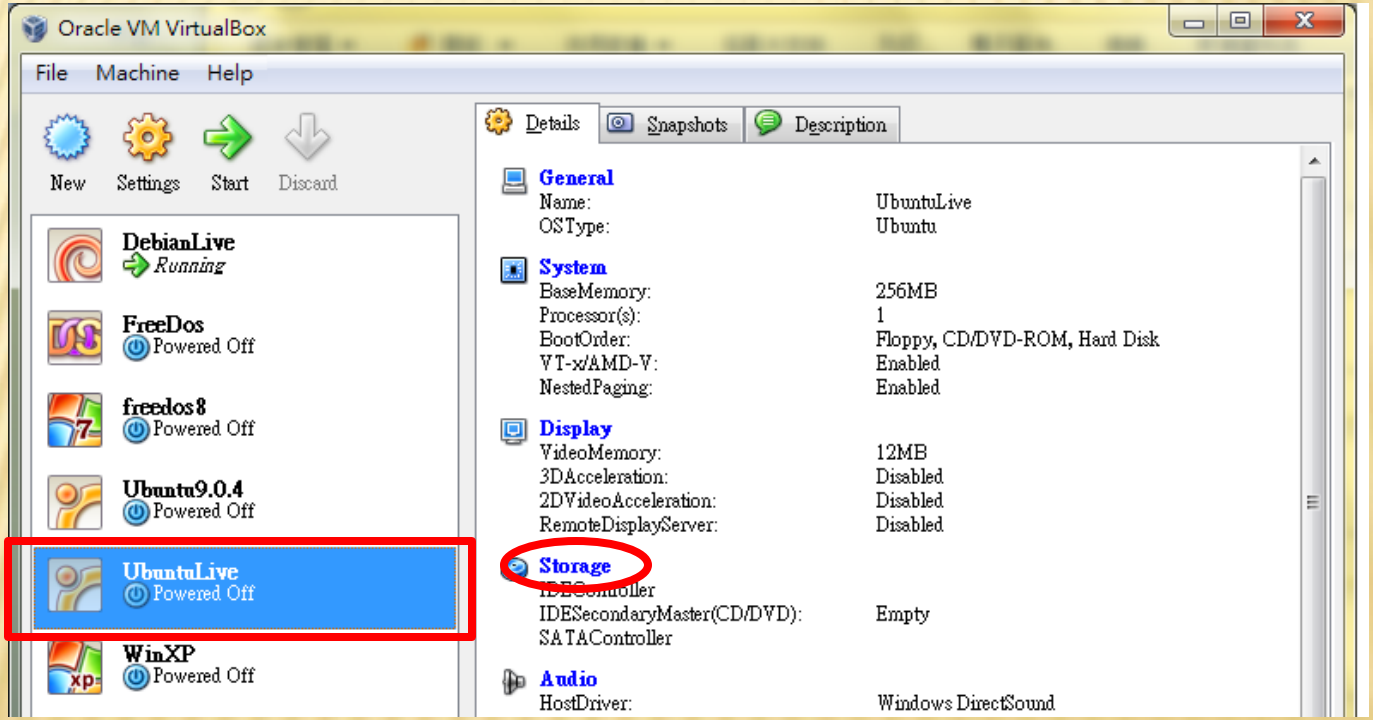
STEP9. (IF YOUR OS IS VISTA OR WIN7)

- Launch VirtualBox
  - Find the **VirtualBox.exe**
  - Right click on **VirtualBox.exe** and choose run as **Administrator**



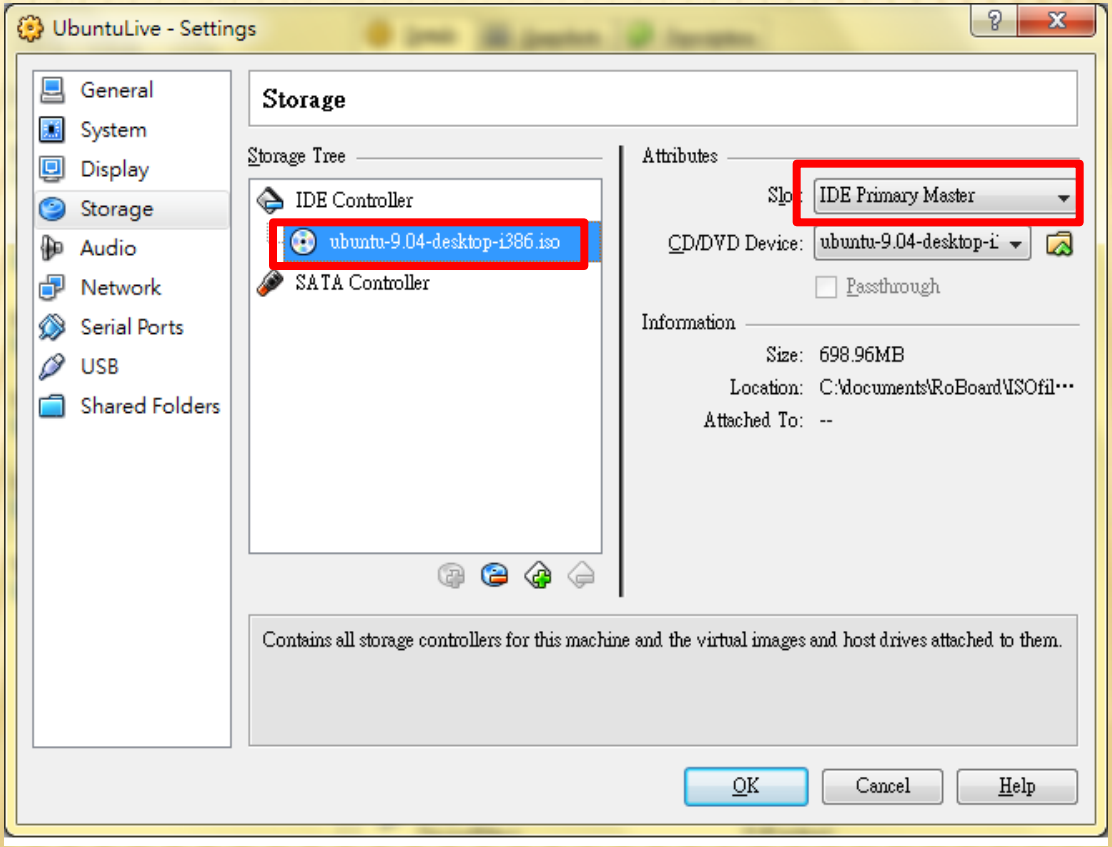
STEP10.

- Choose the virtual machine built in STEP 1 and click **Storage**



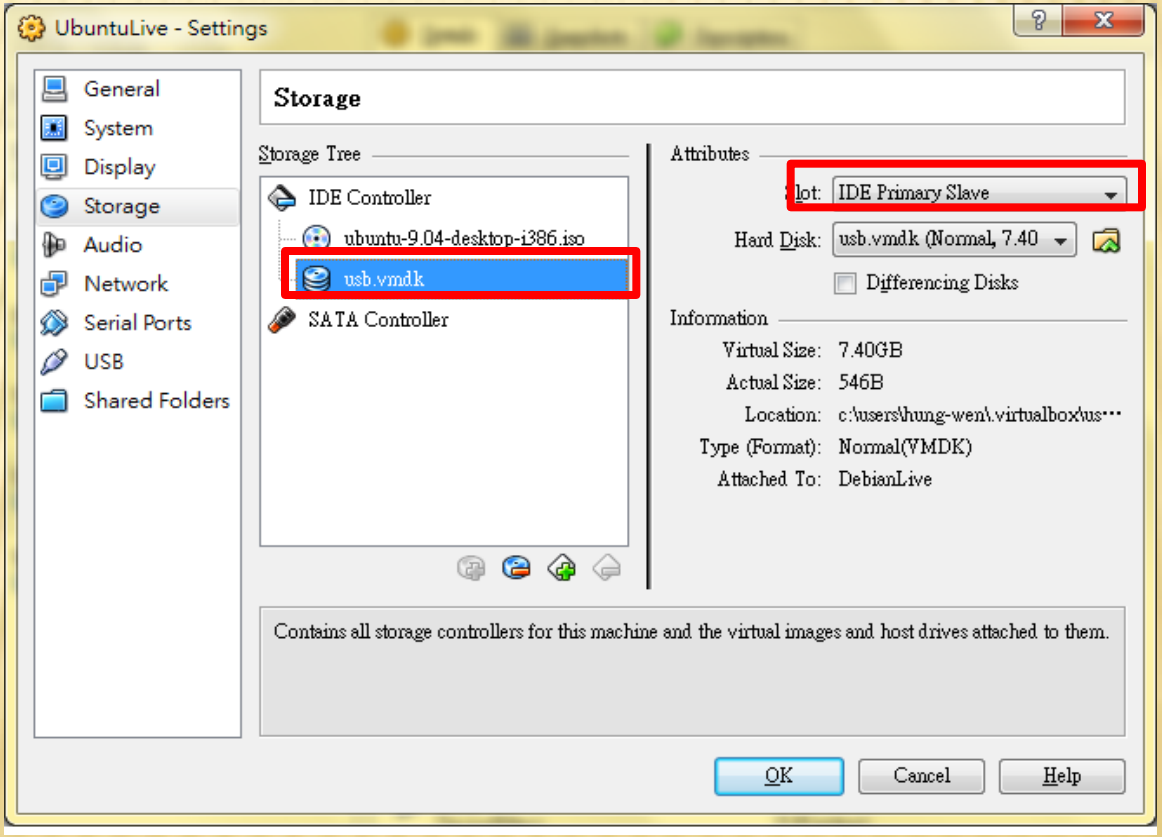
STEP11.

- Mount Ubuntu 9.04 ISO file and set it as **IDE Primary Master**



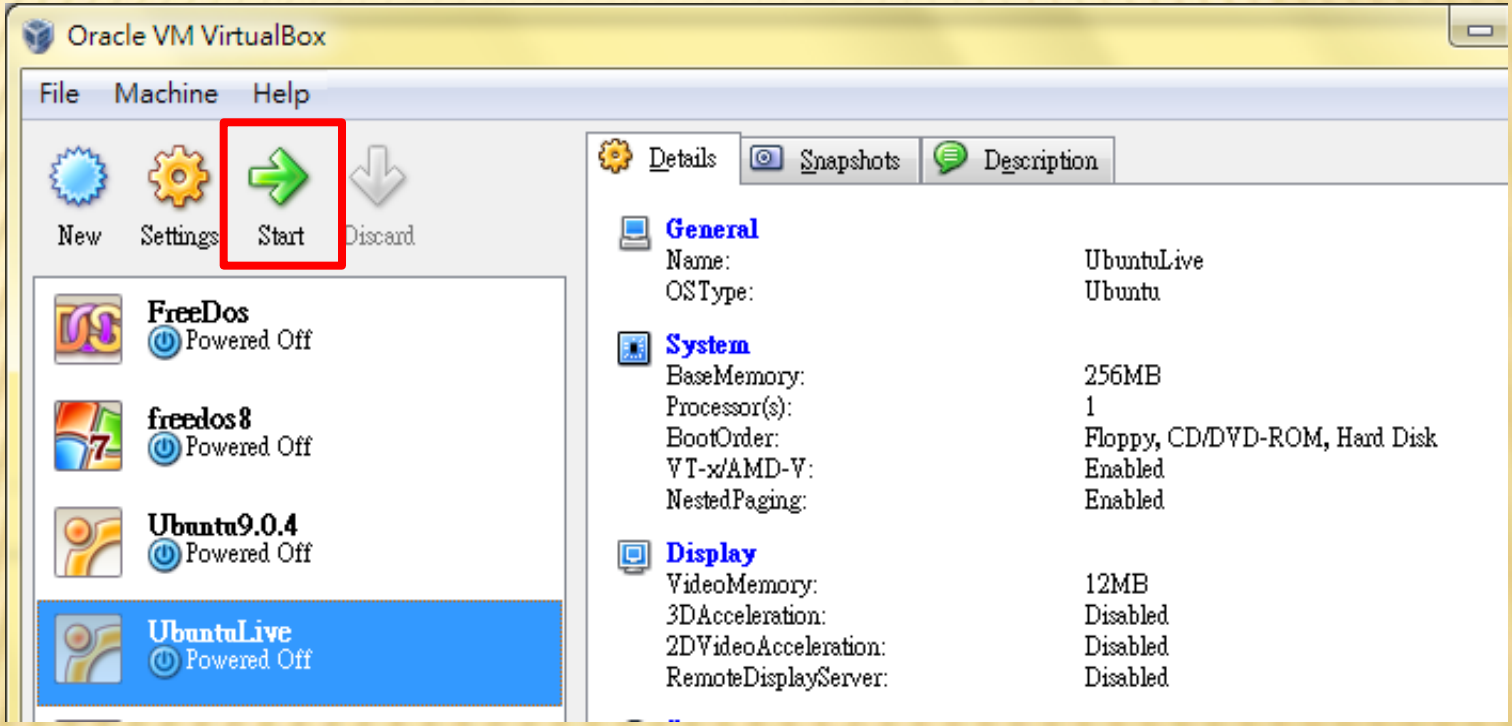
STEP12.

- Mount the **usb.vmdk** file created in STEP 8 and set it as **IDE Primary Slave**



STEP13.

- Click **Start**

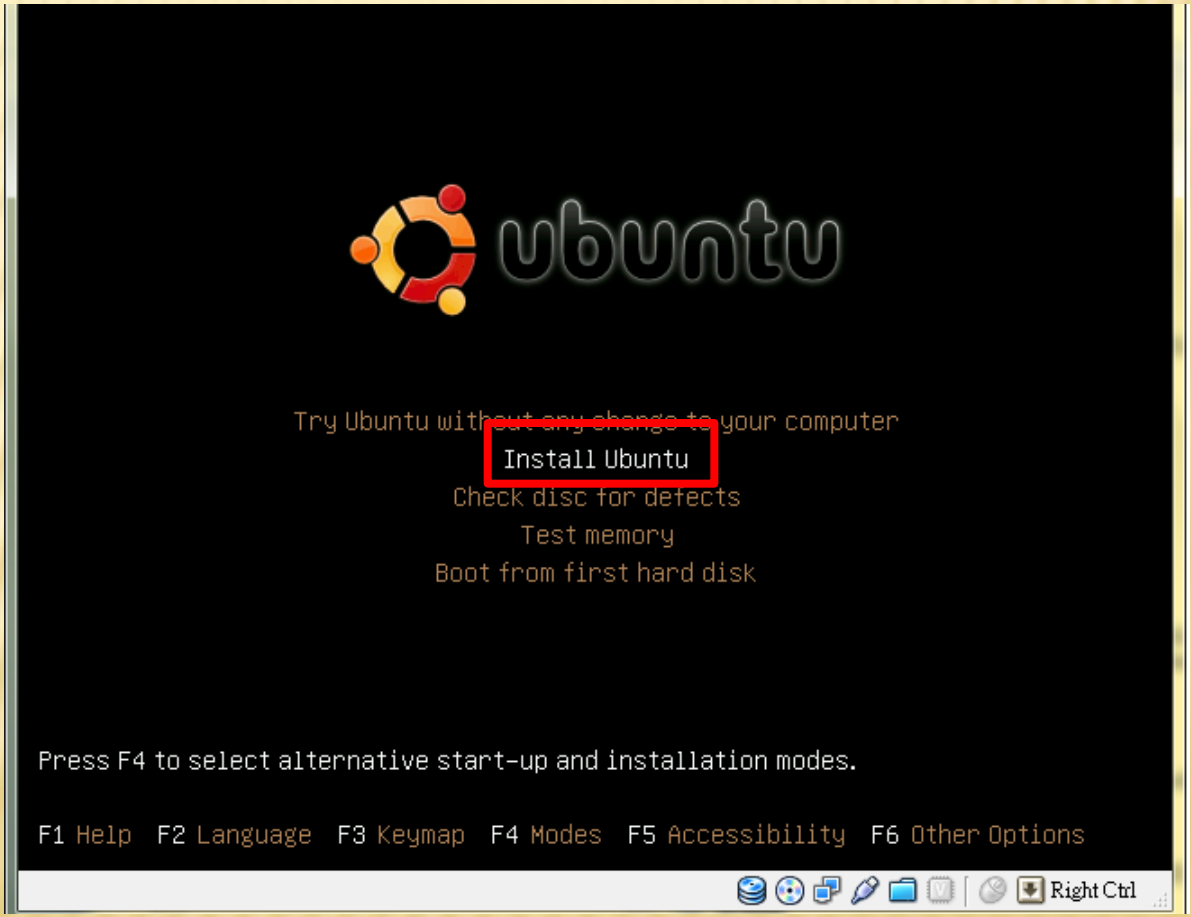


STEP14.

- VirtualBox will boot into the Ubuntu installation ISO
- Choose the language for installation process

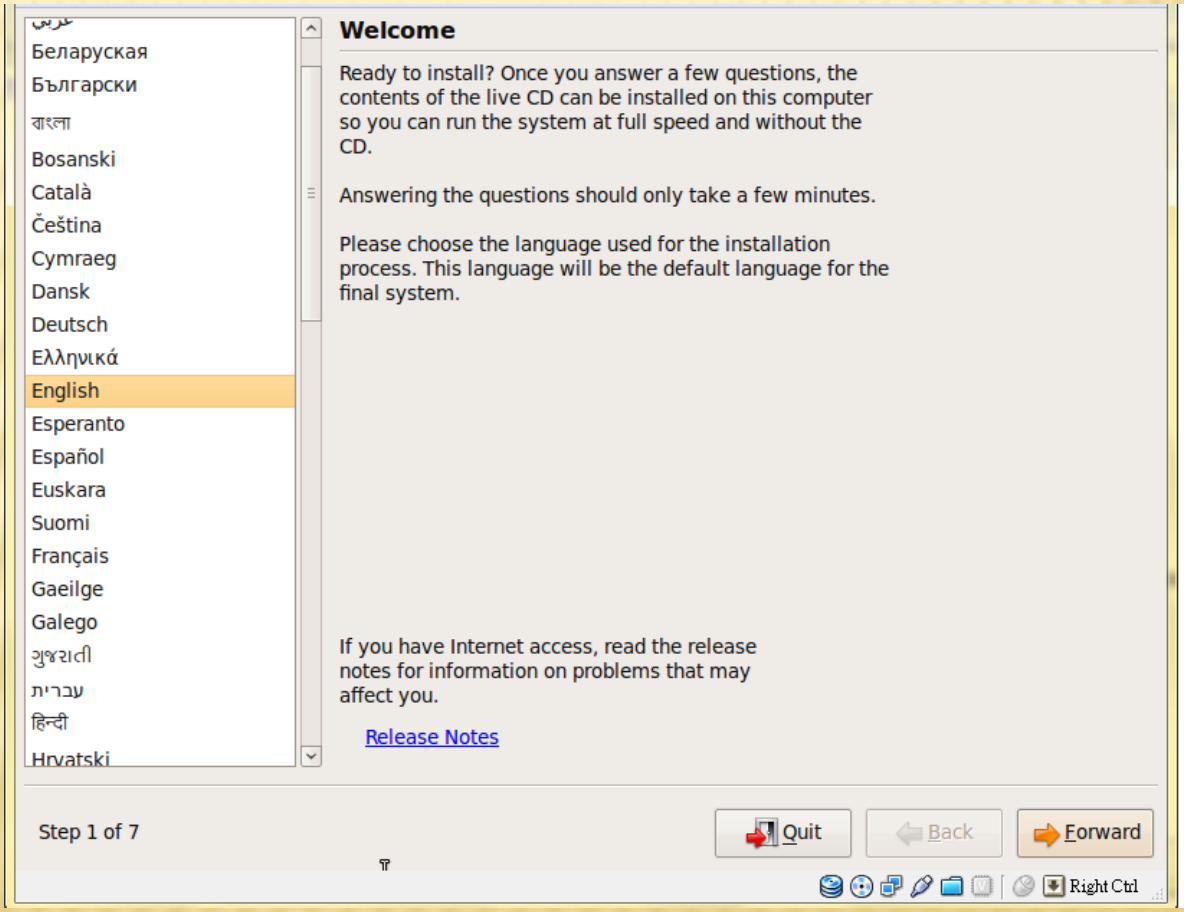
STEP15.

- Choose **Install Ubuntu**



STEP16.

- Choose **installation language**

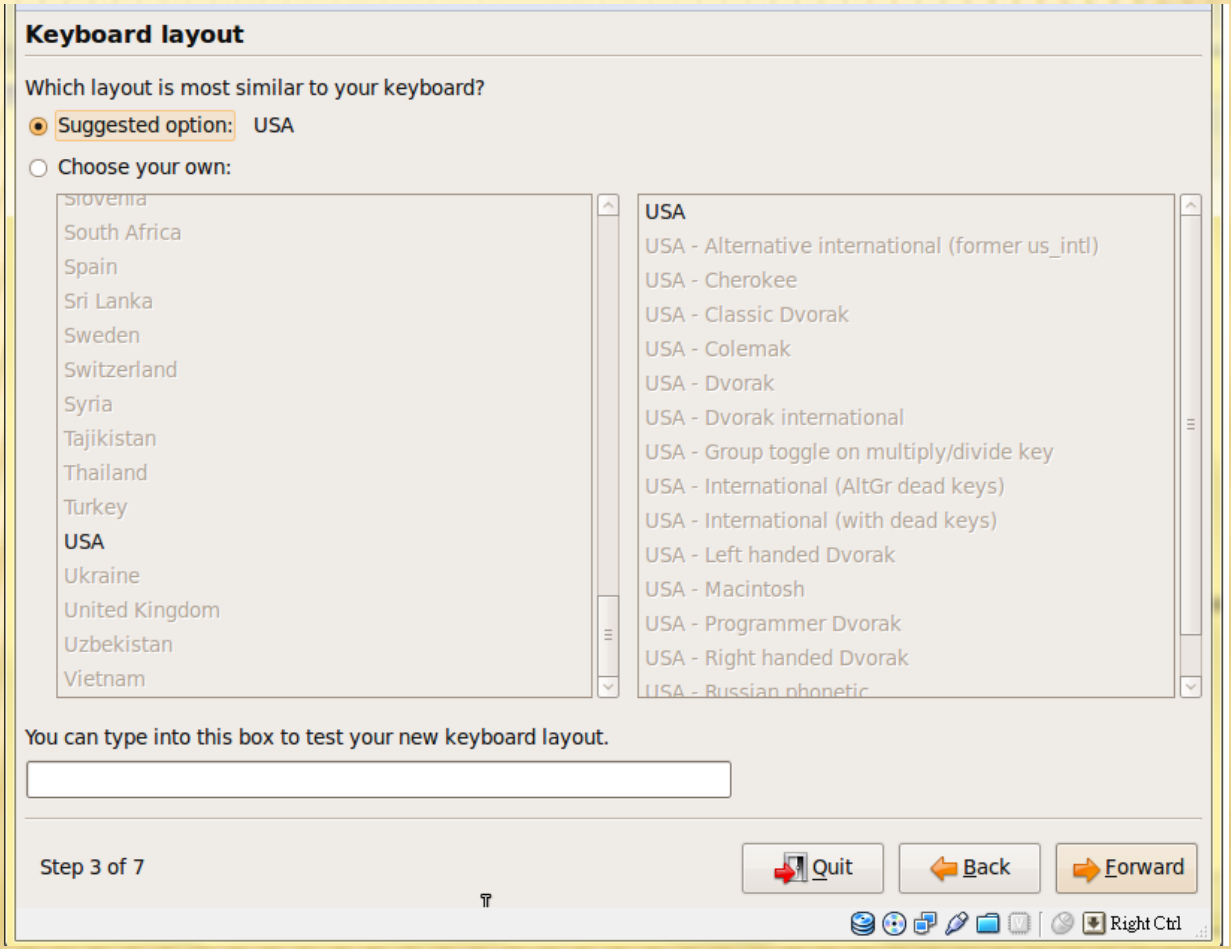


STEP17.

- Choose **Region and City**

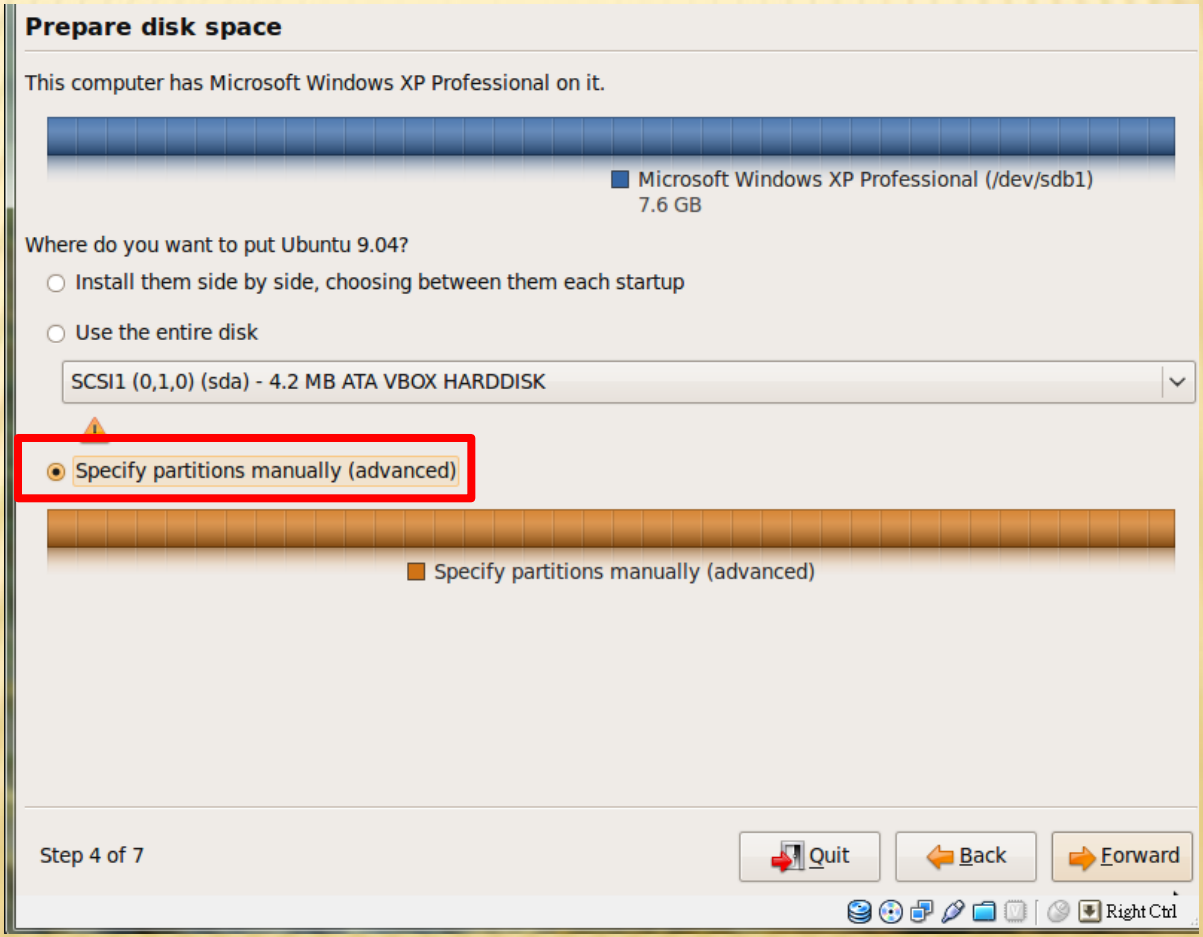
STEP18.

- Choose **Keyboard layout**



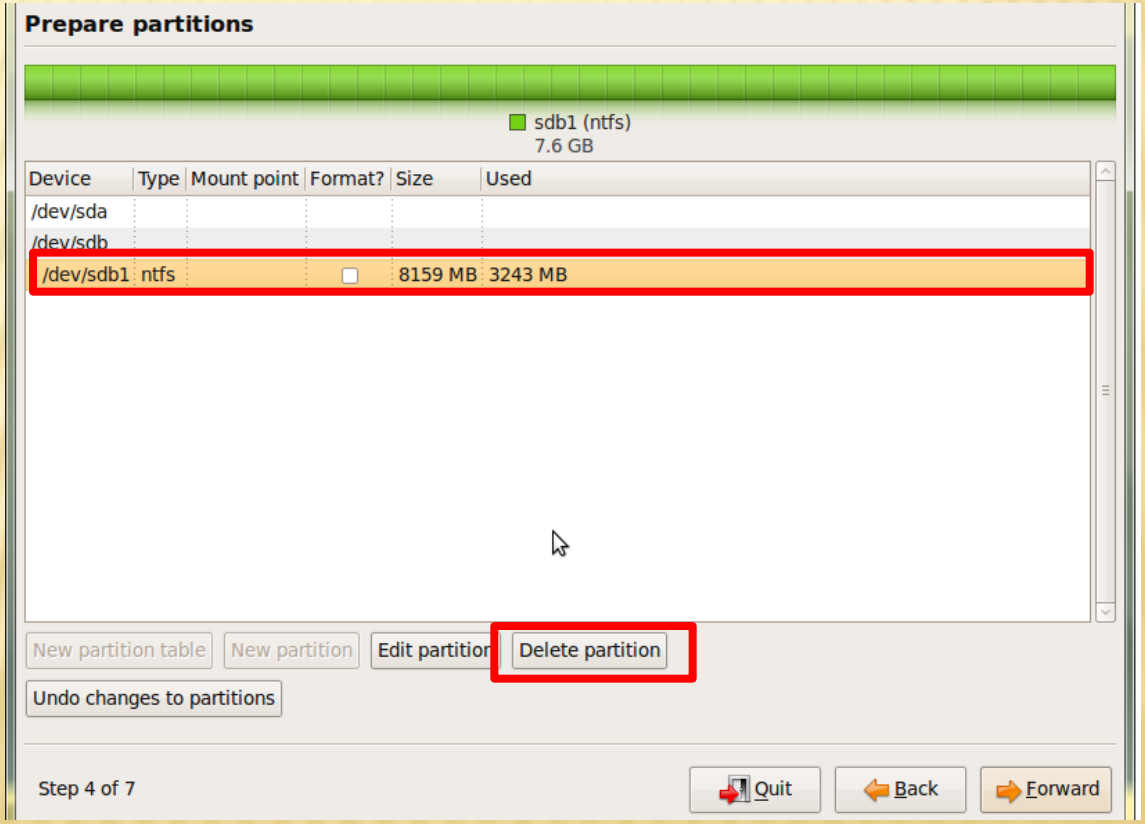
STEP19.

- Choose **Specify partitions manually (advancecd)**



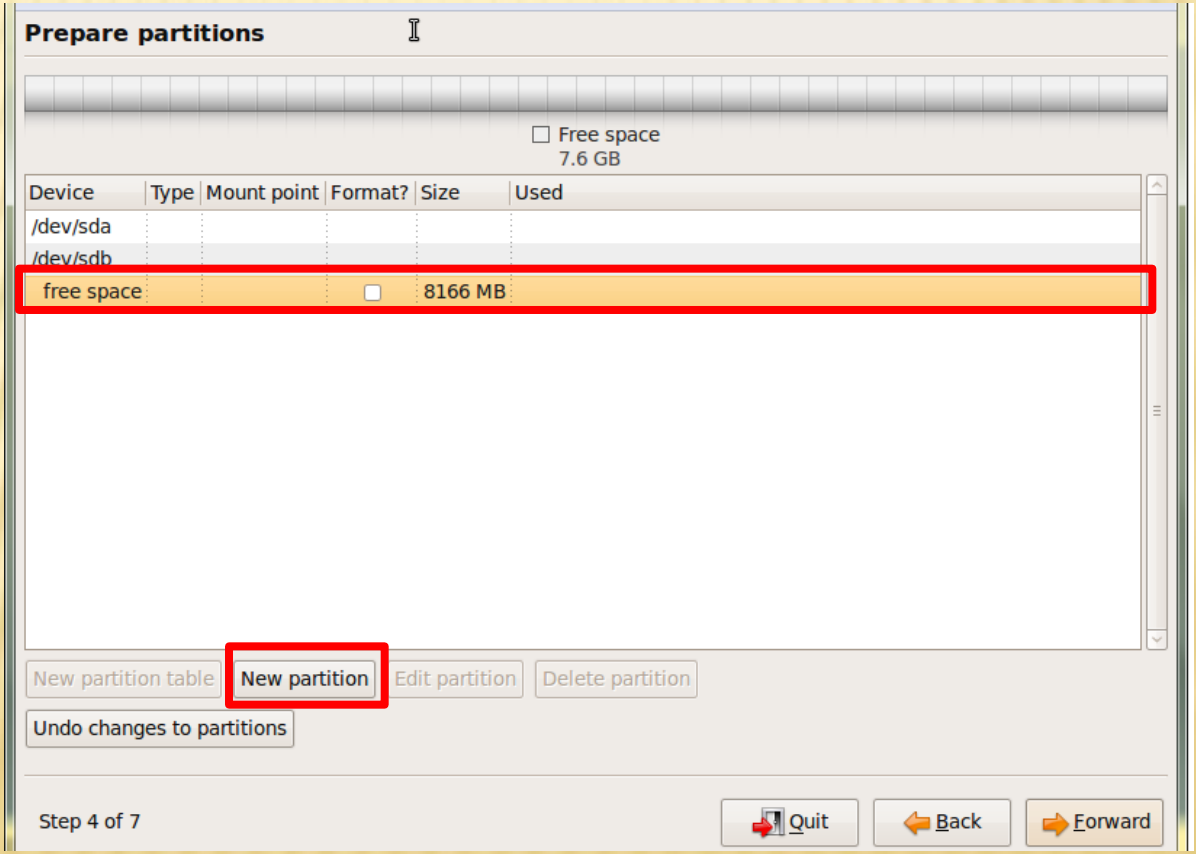
STEP20. [OPTION]

- Repartition the USB raw disk
  - 1. Delete the original partitions of **usb.vmdk** if they exist



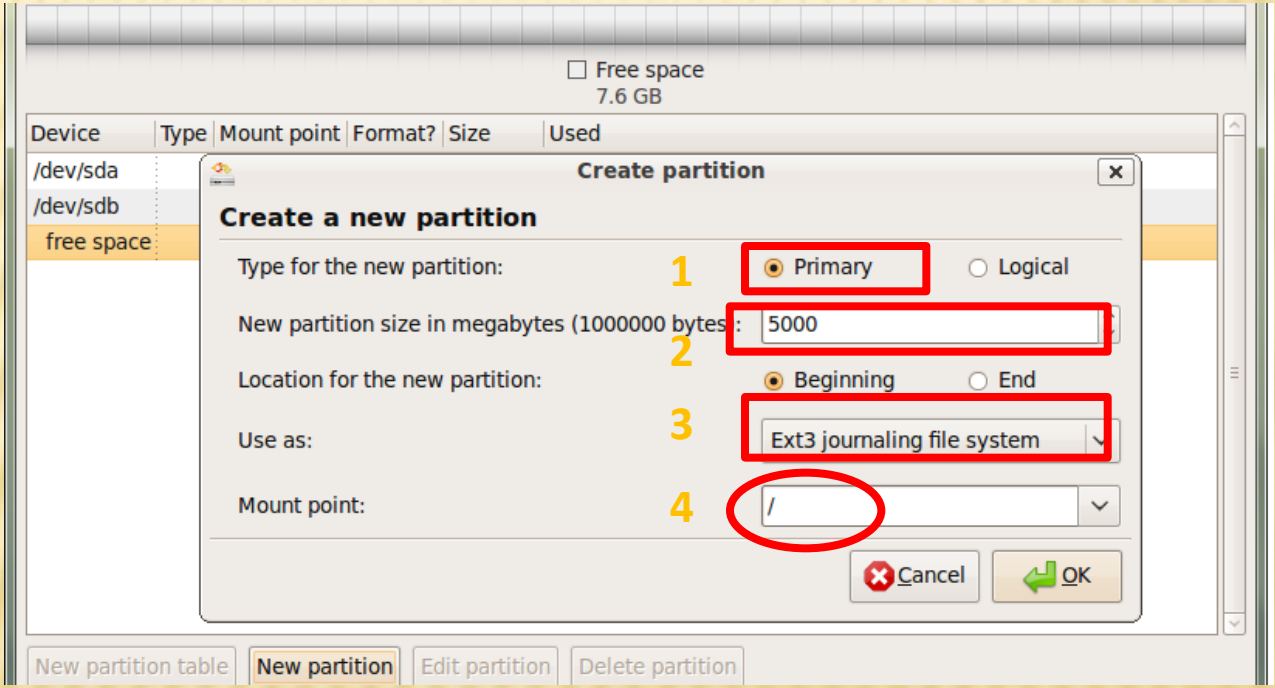
STEP20. [OPTION]

- Repartition the USB raw disk (cont.)
  - 2. Create new partitions



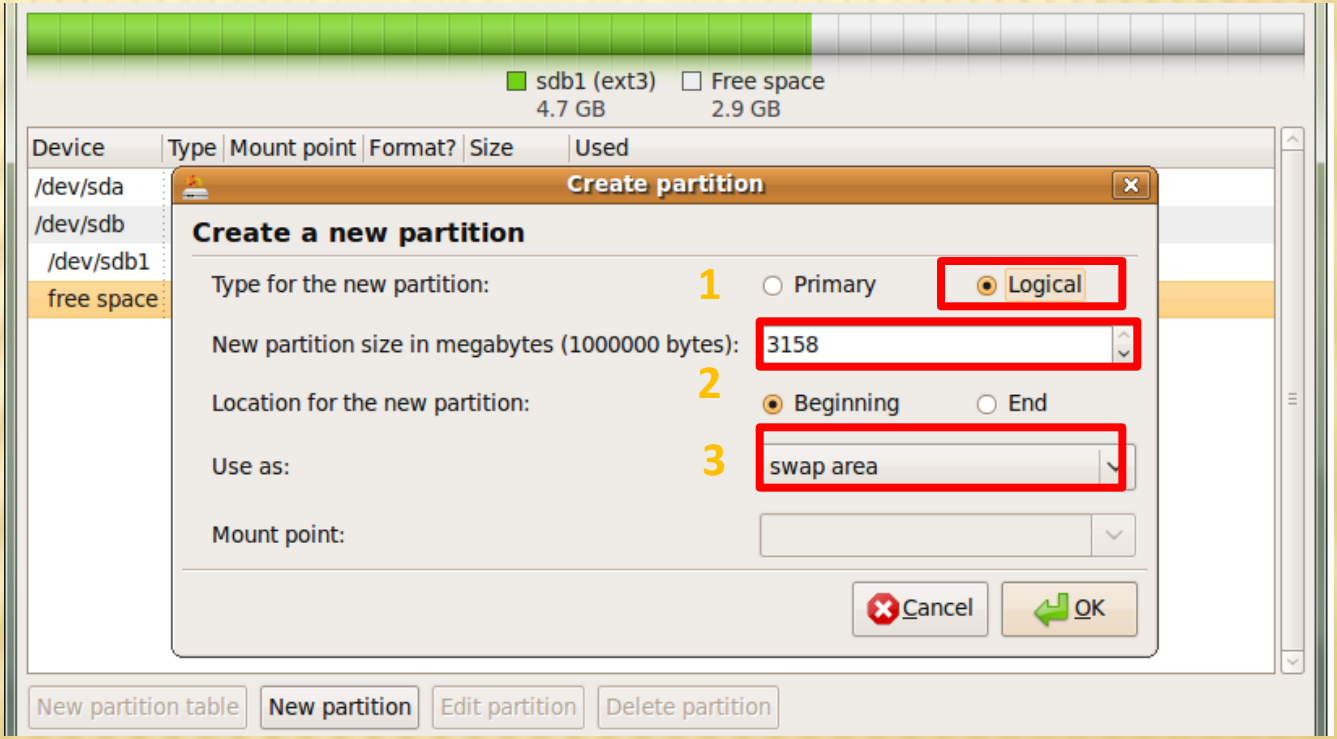
STEP20. [OPTION]

- Repartition the USB raw disk (cont.)
  - 3. Set the Primary partition



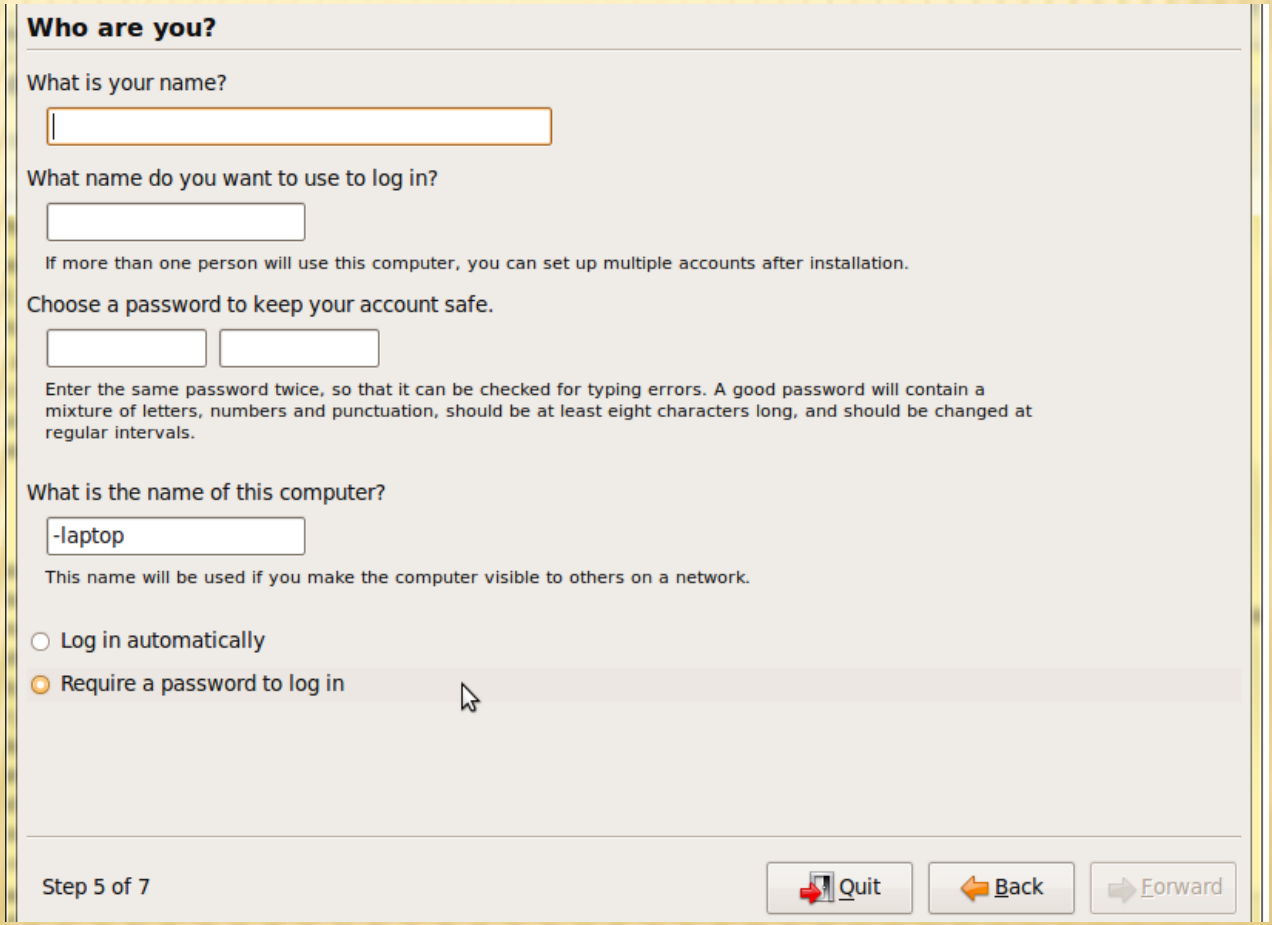
STEP20. [OPTION]

- Repartition the USB raw disk (cont.)
  - 4. Set the Logical partition



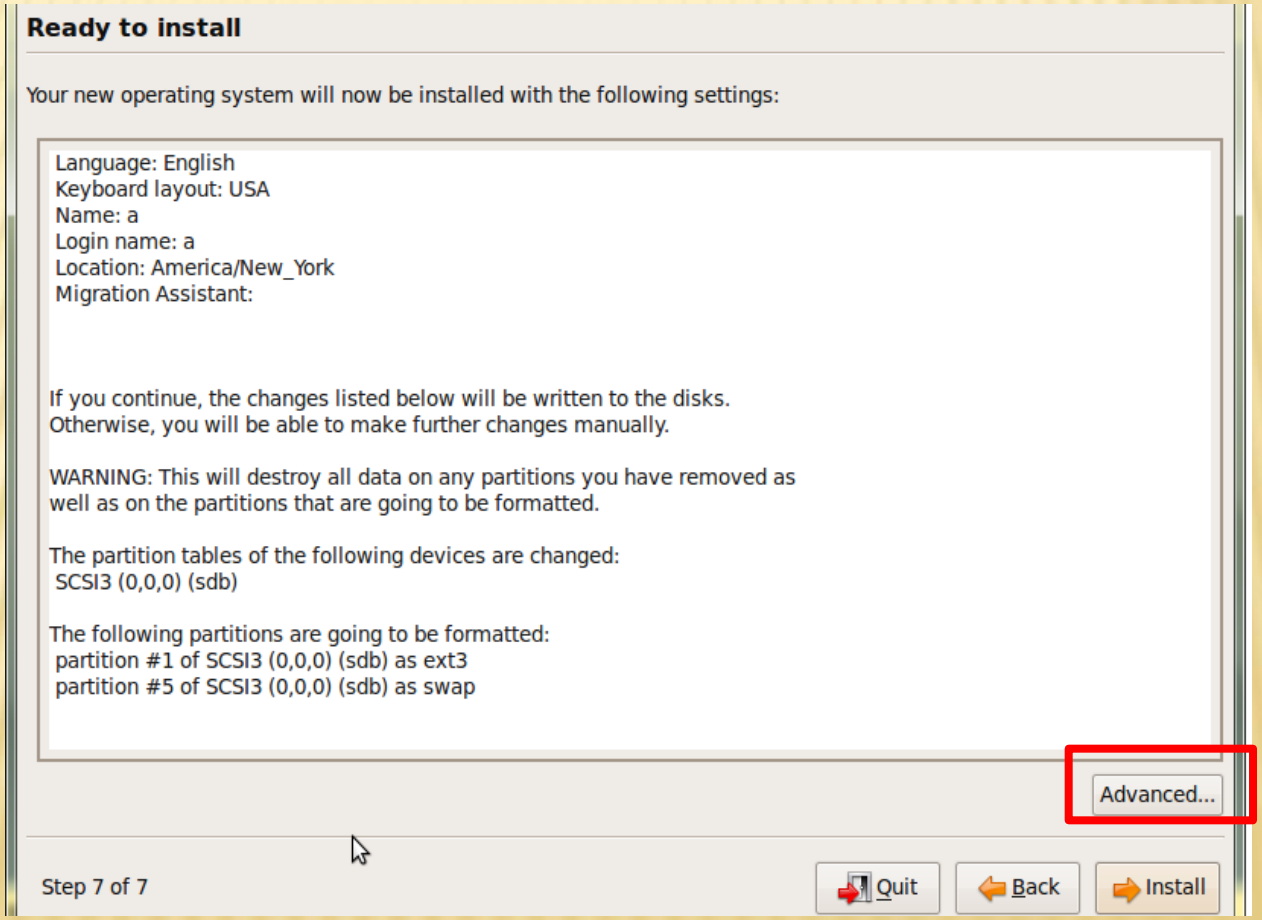
STEP21.

- Set **username** & **password**



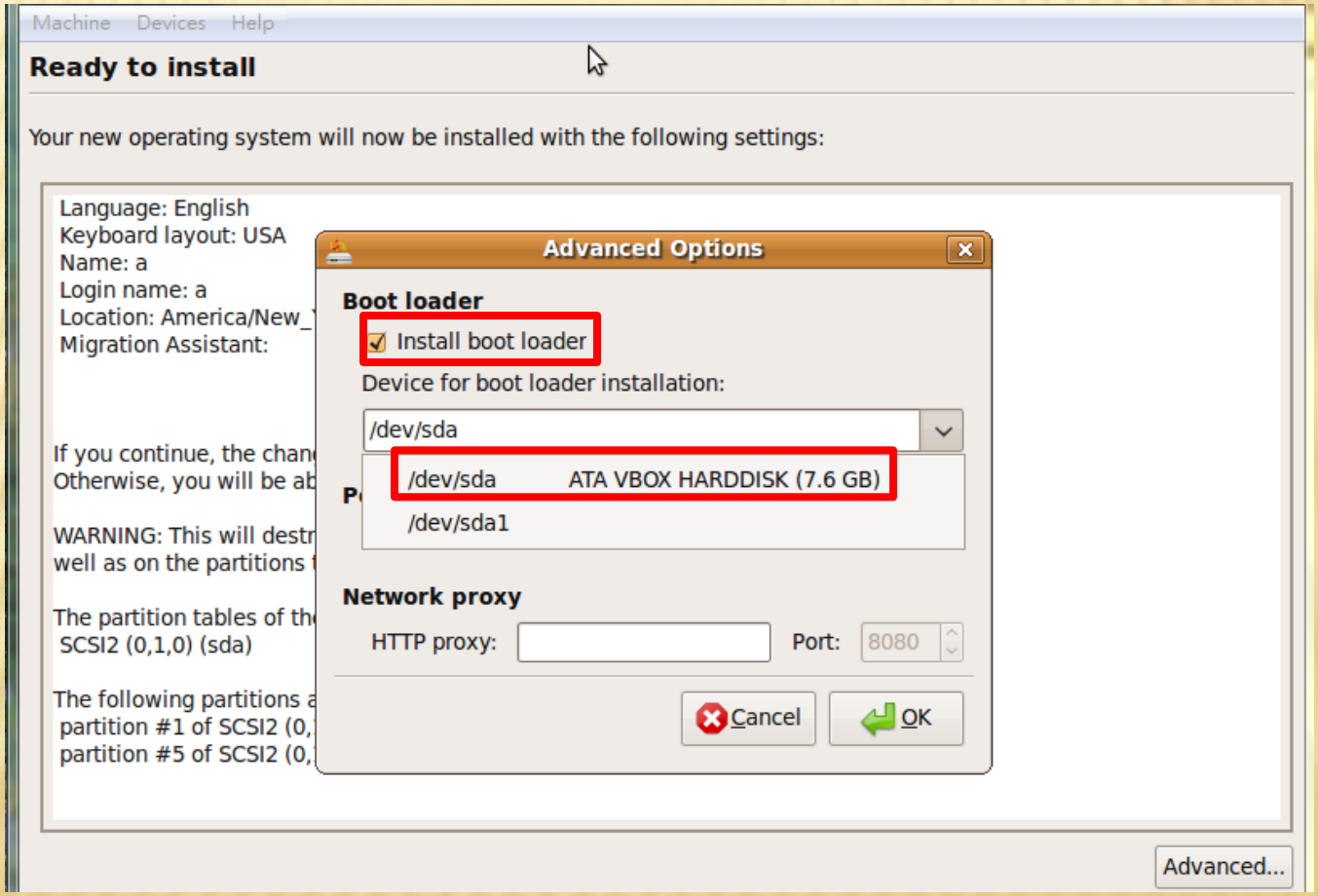
STEP22.

- Click **Advanced...**



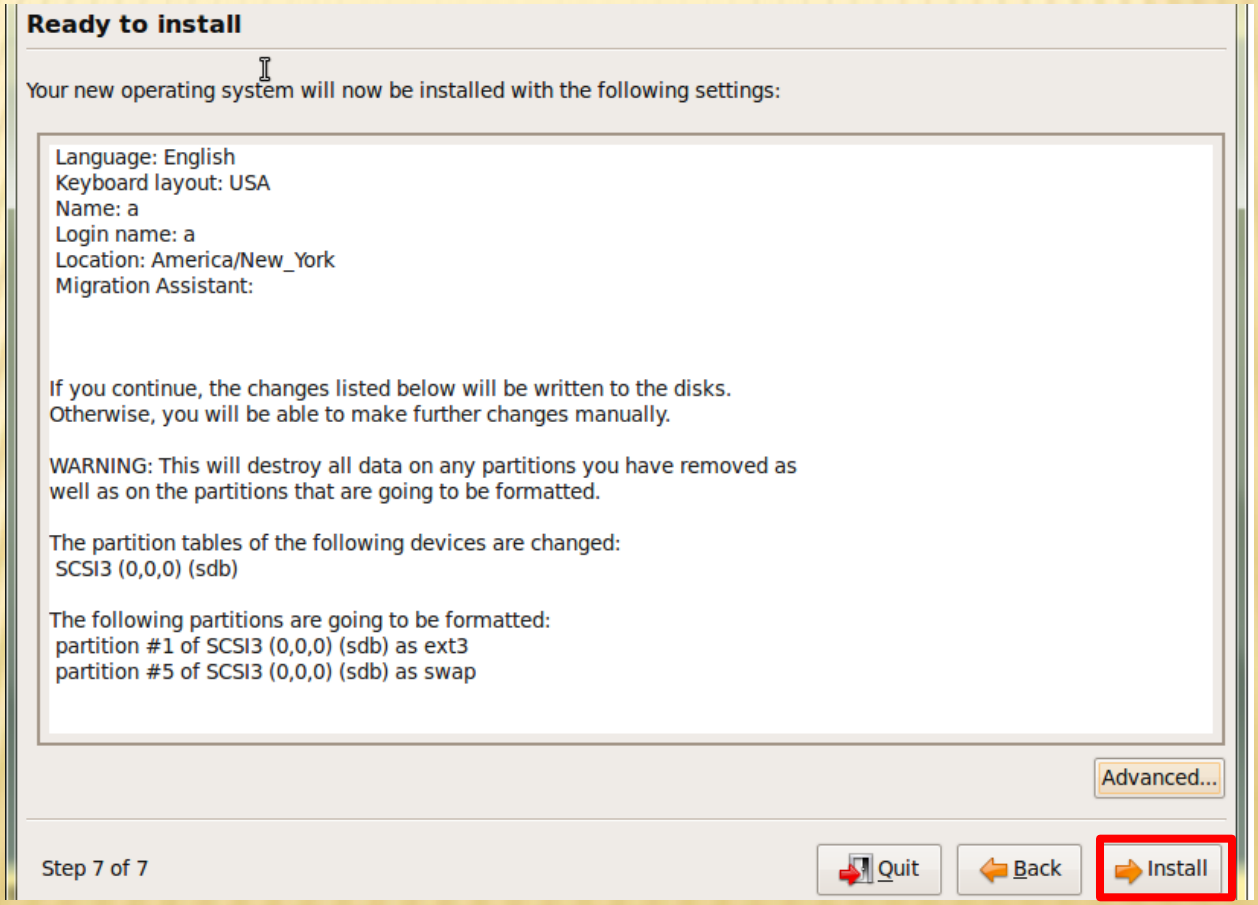
STEP23.

- Click **install boot loader** and choose the USB raw disk



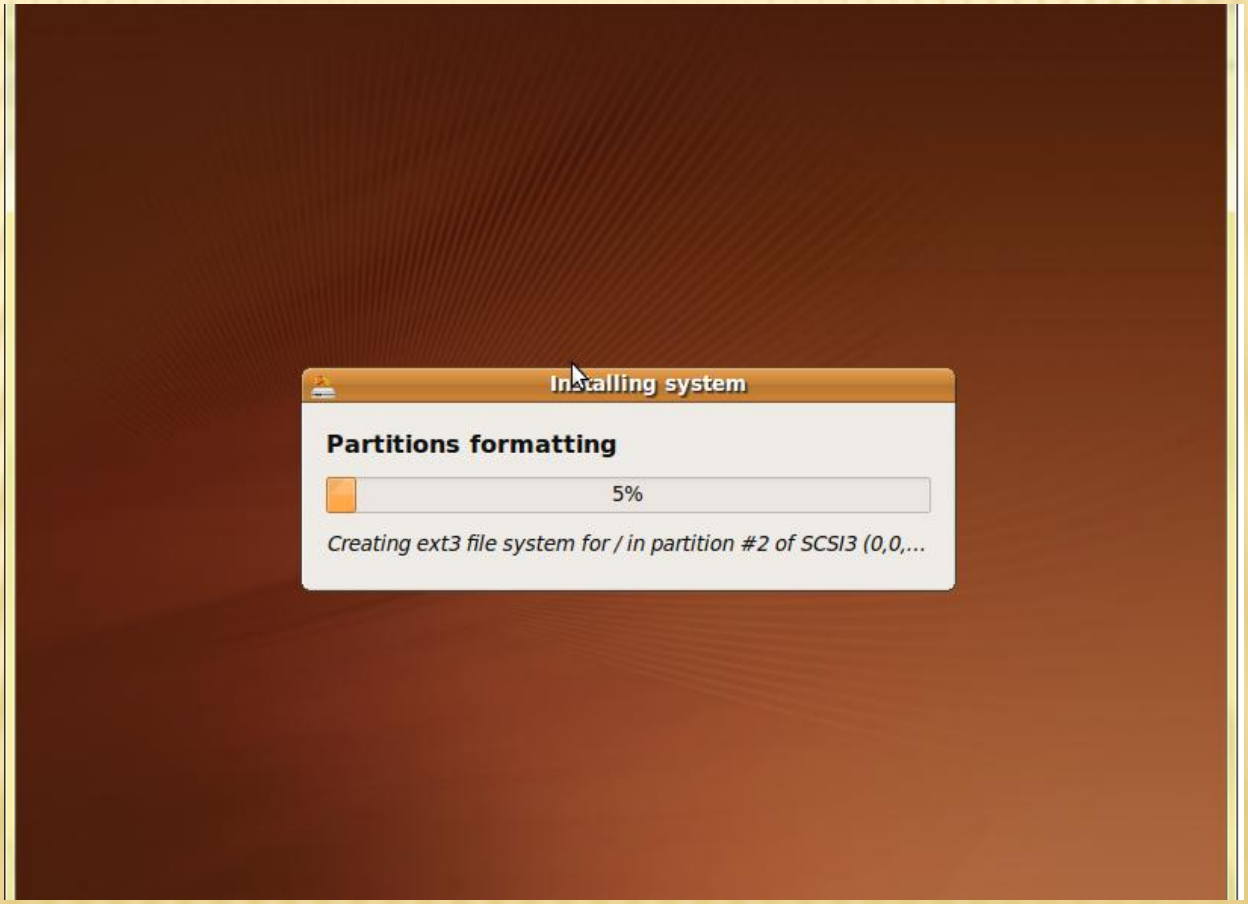
STEP24.

- Click **Install**



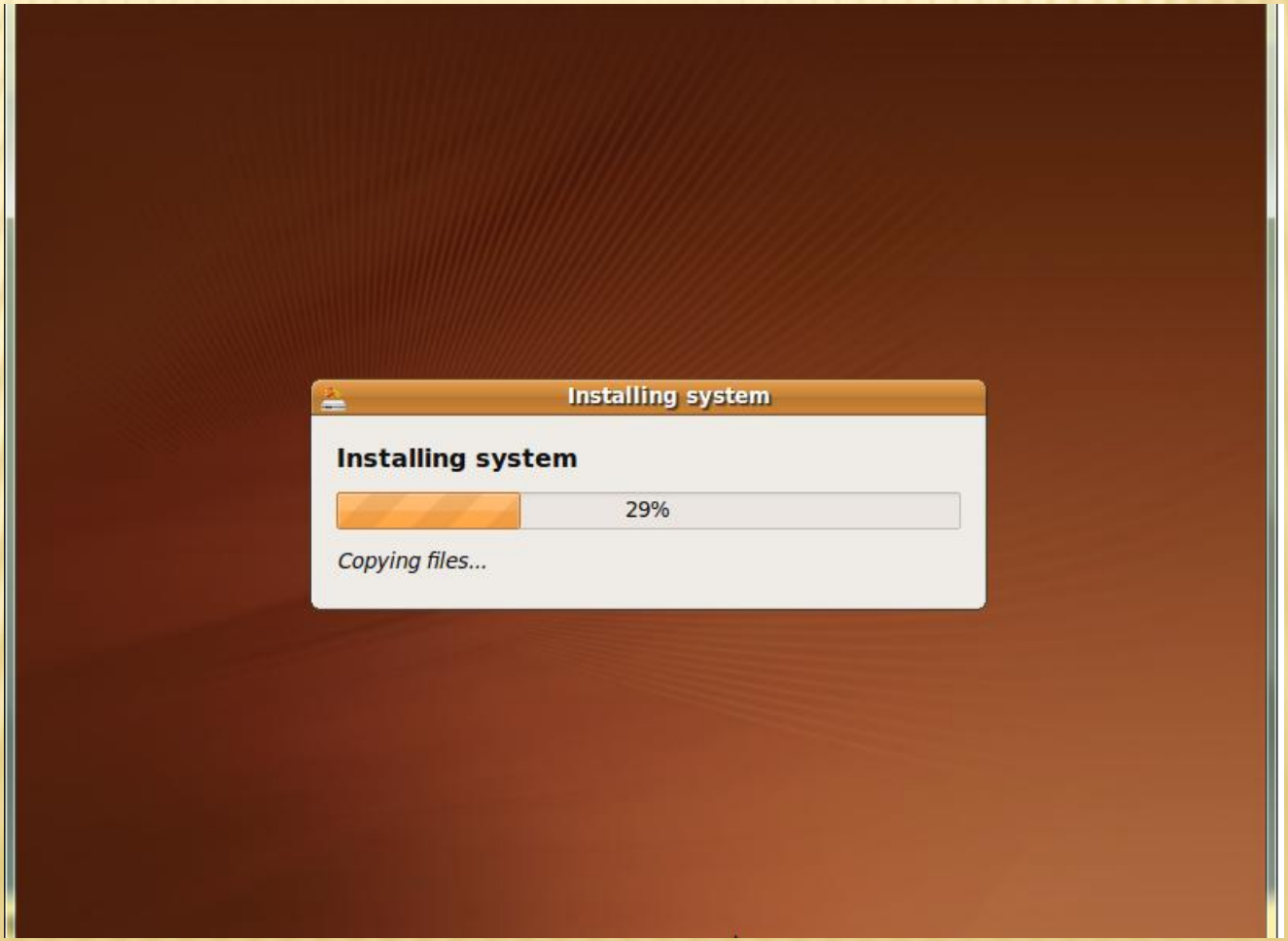
STEP25.

- Partitions formatting…



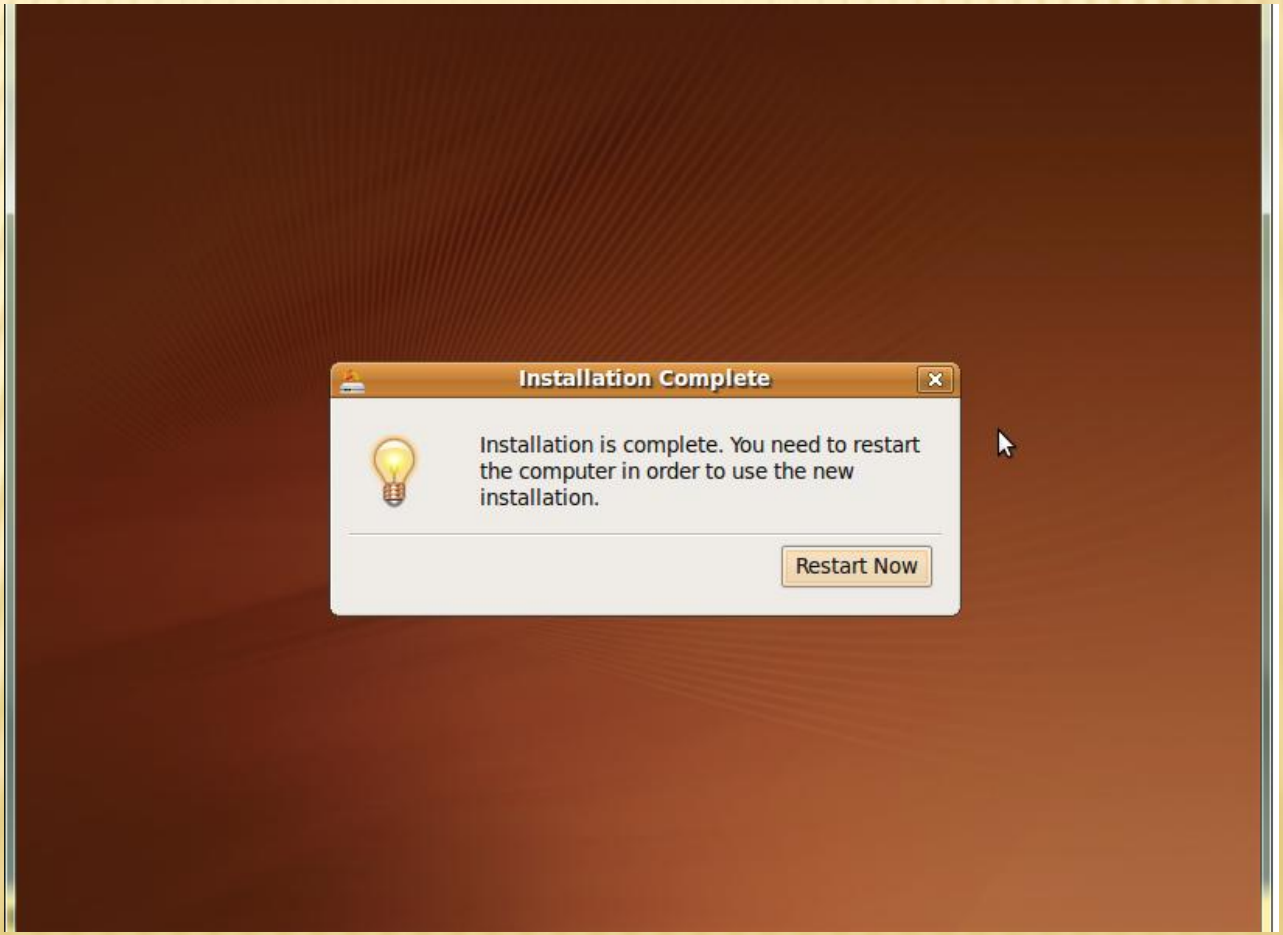
STEP26.

- Installing system…



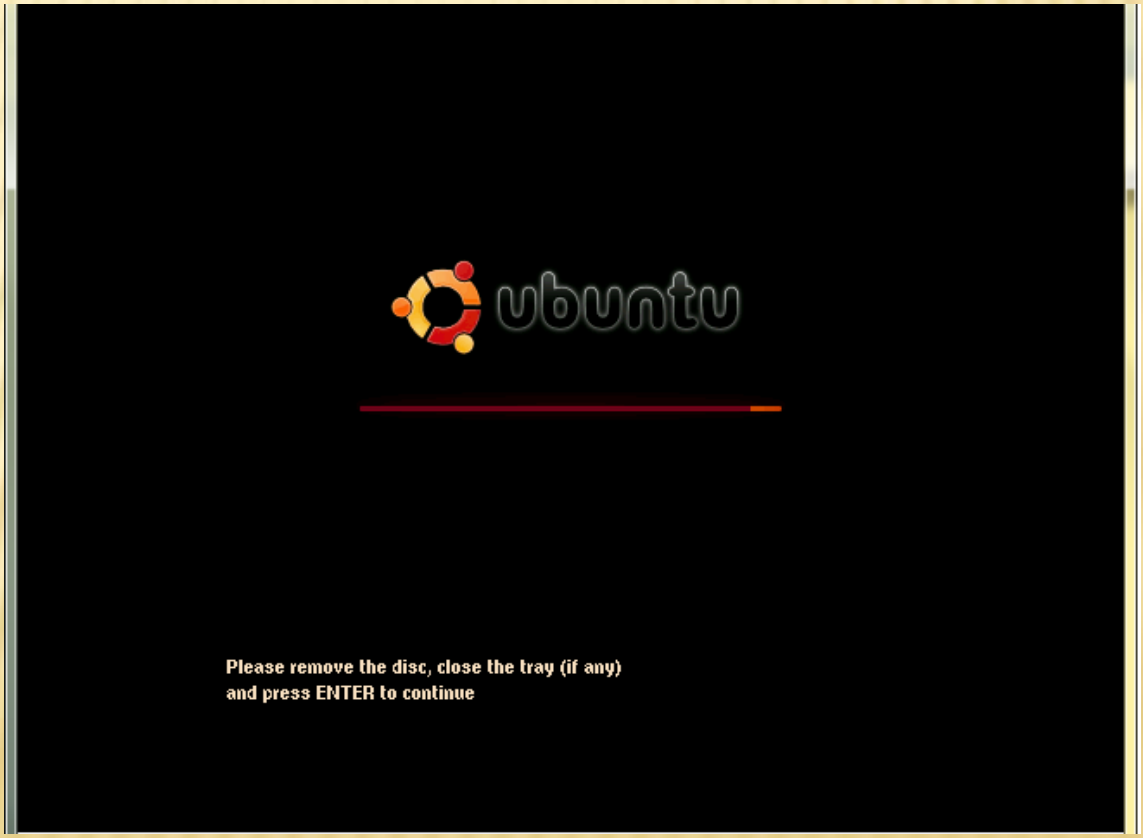
STEP27.

- Click **Restart Now**



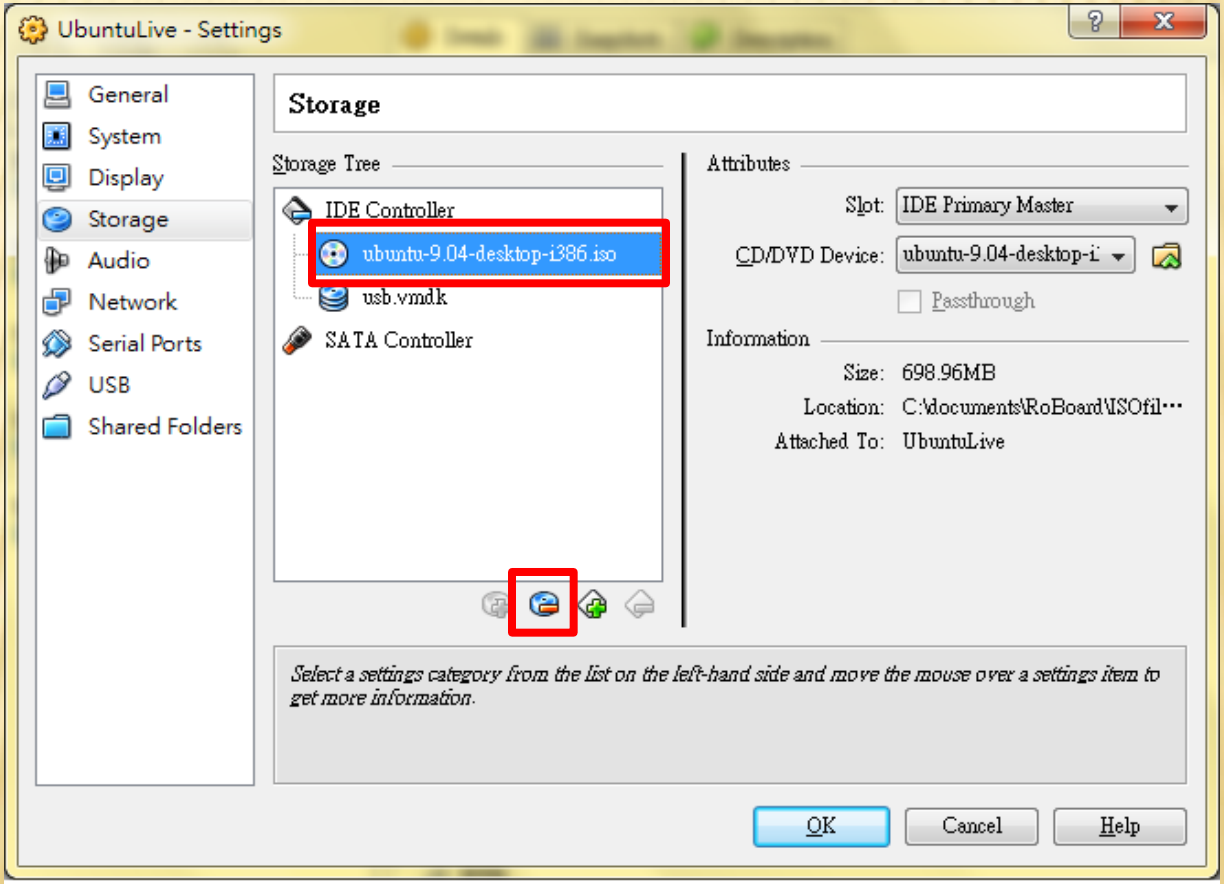
STEP28.

- Press **ENTER** to continue
- Then turn off the VirtualBox virtual machine



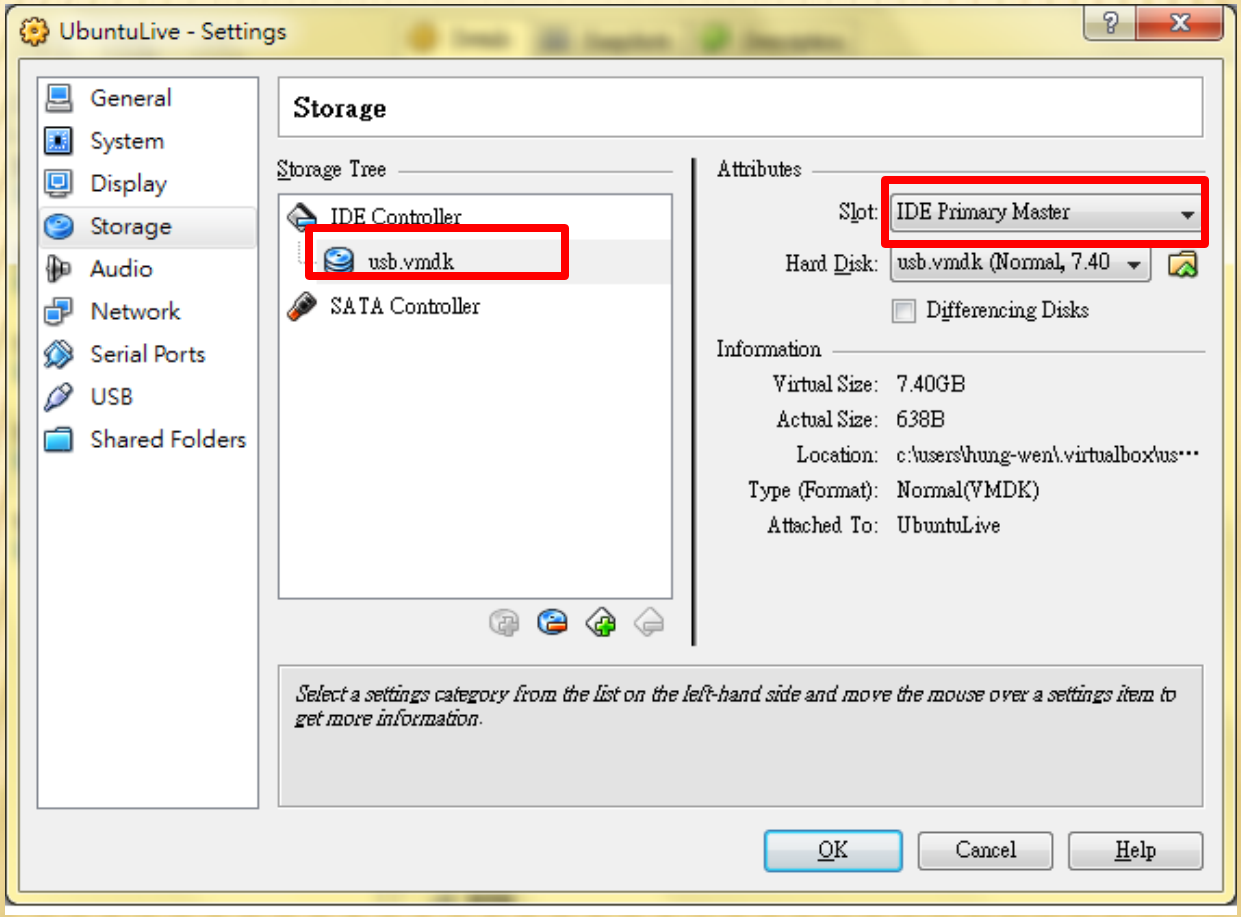
STEP29.

- Remove the Ubuntu 9.04 ISO file



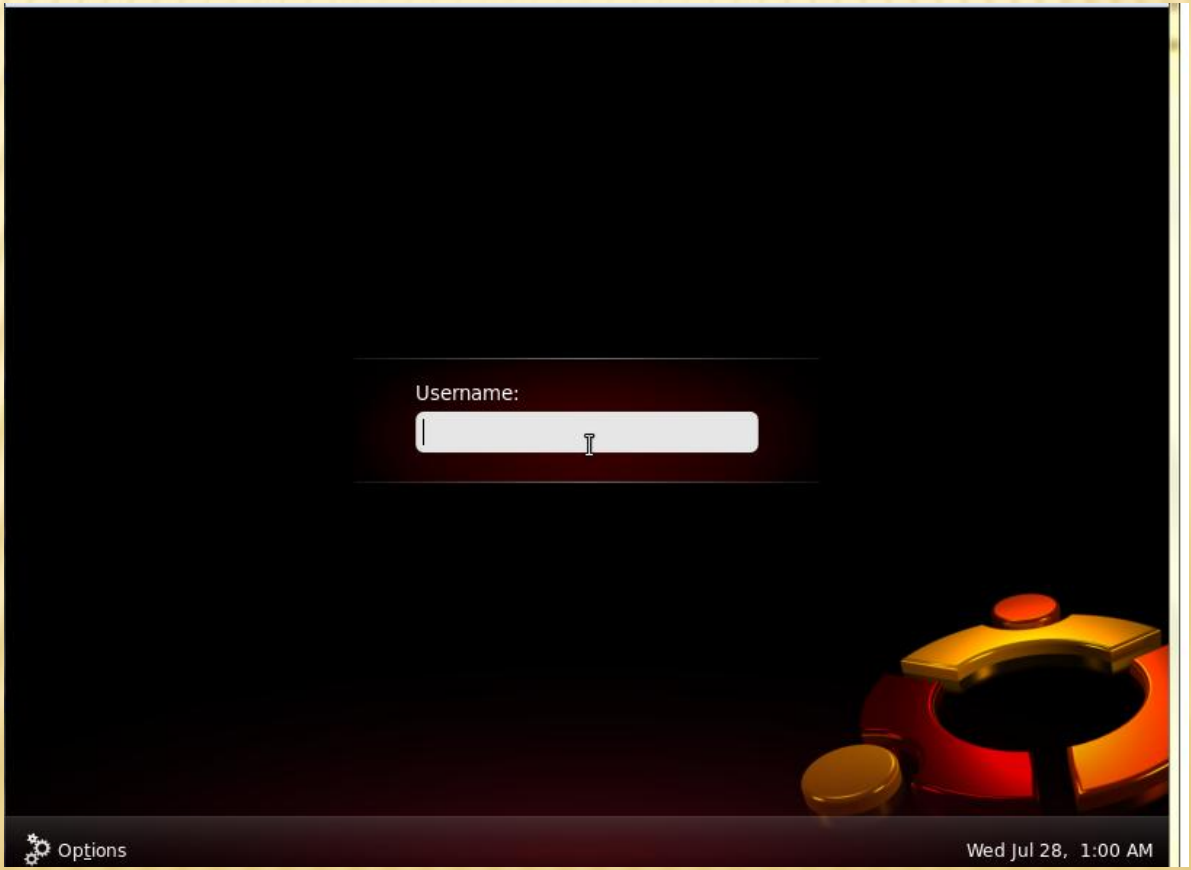
STEP30.

- Set the **usb.vmdk** as **IDE Primary Master**



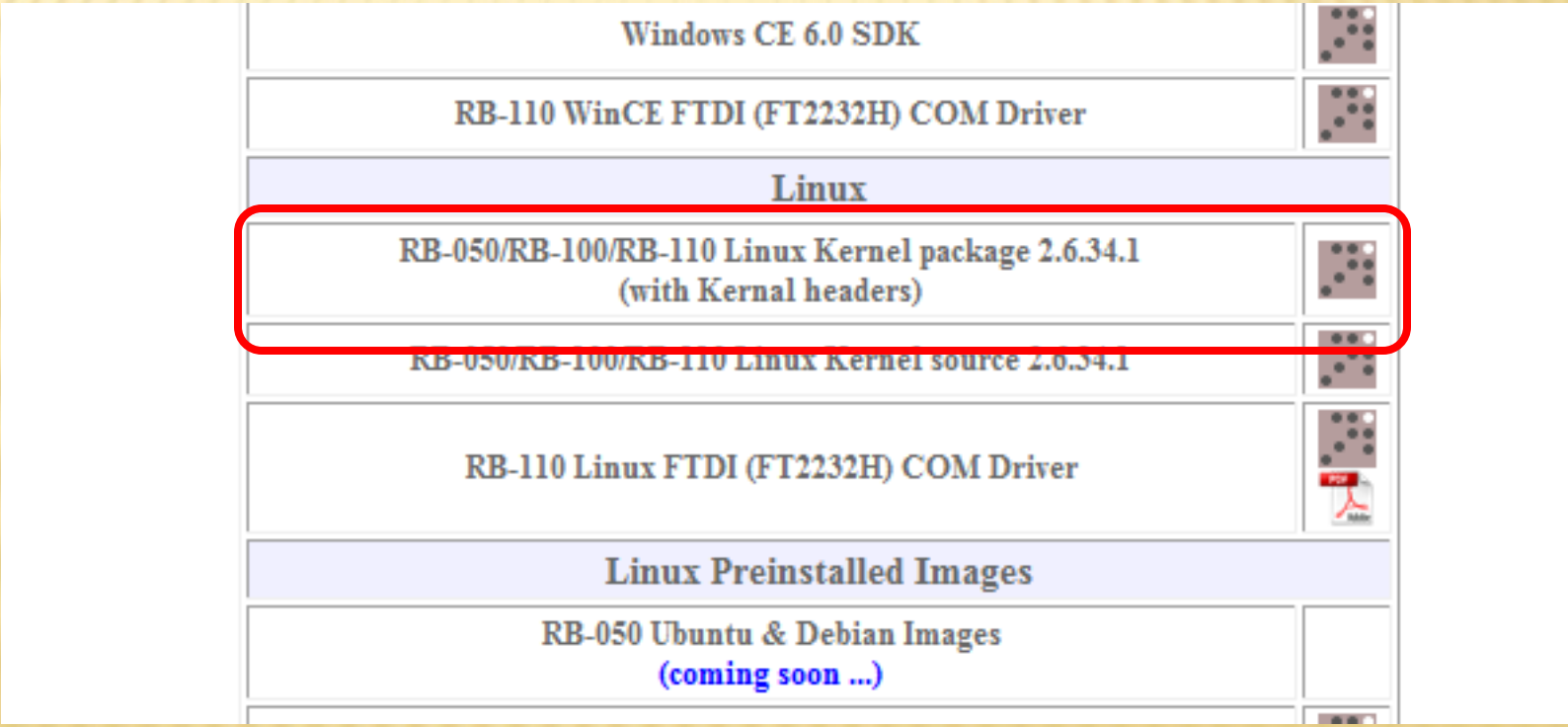
STEP31.

- Start the VirtualBox virtual machine again
  - You will boot into Ubuntu 9.0.4 GUI



STEP32.

- In the virtual machine, download the RoBoard Linux kernel package from `http://www.roboard.com/download_ml.htm`



Windows CE 6.0 SDK	
RB-110 WinCE FTDI (FT2232H) COM Driver	
Linux	
RB-050/RB-100/RB-110 Linux Kernel package 2.6.34.1 (with Kernal headers)	
RB-050/RB-100/RB-110 Linux Kernel source 2.6.34.1	
RB-110 Linux FTDI (FT2232H) COM Driver	
Linux Preinstalled Images	
RB-050 Ubuntu & Debian Images (coming soon ...)	

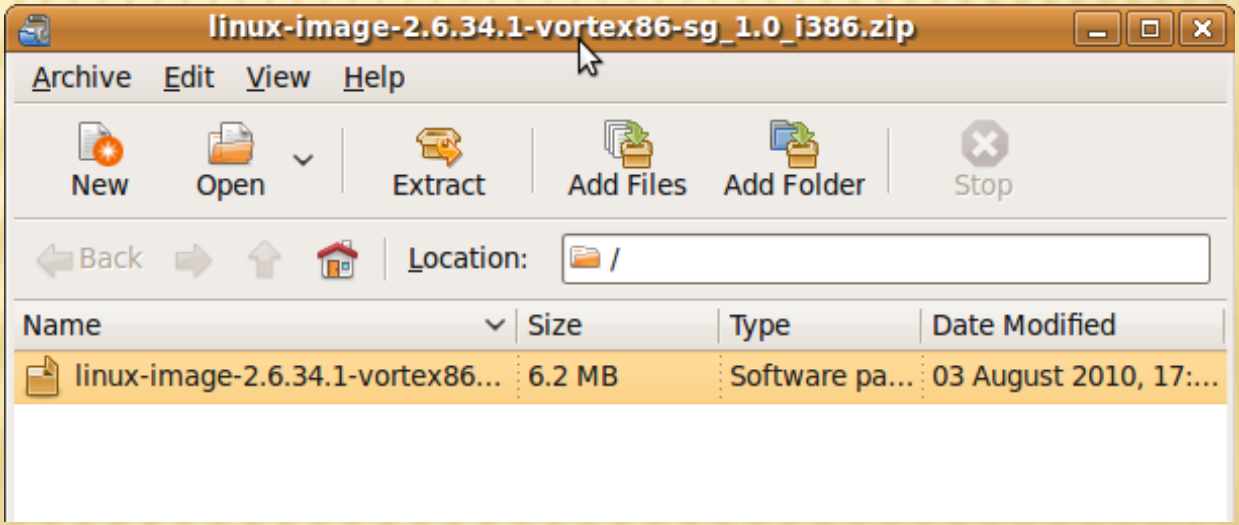
STEP33.

- Extract the kernel package in Ubuntu
  - In this example, the package is

    `linux-image-2.6.34.1-vortex86-sg_1.0_i386.zip`

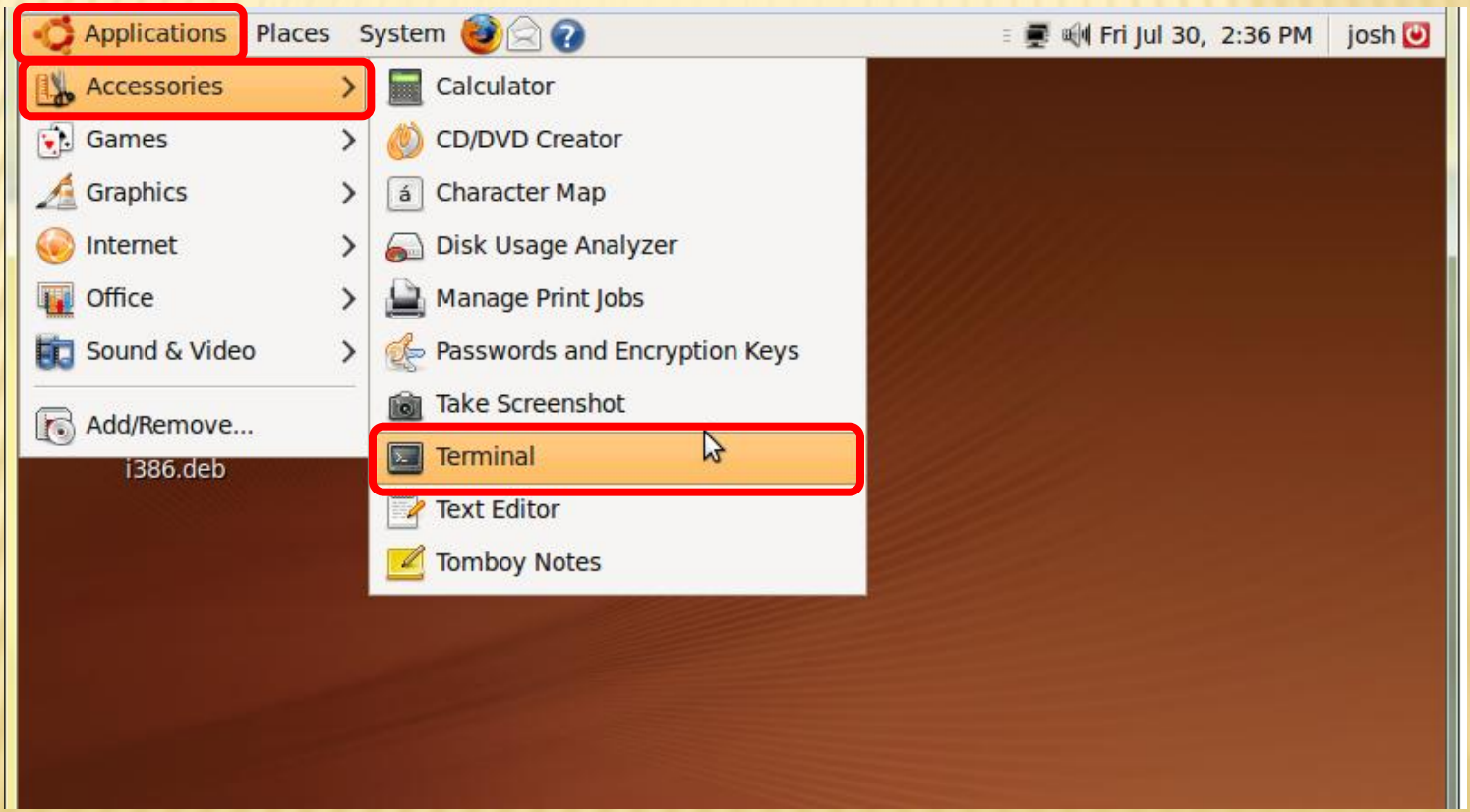
    Extracting it, we get

    `linux-image-2.6.34.1-vortex86-sg_1.0_i386.deb`



STEP34.

- Open a Terminal window



STEP35.

- Type **`sudo -i`**

```
File  Edit  View  Terminal  Help
a@a-laptop:~$ sudo -i
[sudo] password for a:
root@a-laptop:~#
```

STEP36.

- Type **dpkg -i <RoBoard Linux kernal package path>**
  - In this example, the path is **/home/a/Desktop/linux-image-2.6.34.1-vortex86-sg_1.0_i386.deb**

```
File  Edit  View  Terminal  Help
a@a-laptop:~$ sudo -i
[sudo] password for a:
root@a-laptop:~# dpkg -i /home/a/Desktop/linux-image-2.6.34.1-vortex86-sg_1.0_i386.deb
Selecting previously deselected package linux-image-2.6.34.1-vortex86-sg.
(Reading database ... 102544 files and directories currently installed.)
Unpacking linux-image-2.6.34.1-vortex86-sg (from .../Desktop/2.6.34.1-vortex8
eb) ...
```

STEP37.

- Type **`update-initramfs -k 2.6.34.1-vortex86-sg -c`**

```
Found kernel: /boot/vmlinuz-2.6.28-11-generic
Found kernel: /boot/memtest86+.bin
Replacing config file /var/run/grub/menu.lst with new version
Updating /boot/grub/menu.lst ... done


root@a-laptop:~# update-initramfs -k 2.6.34.1-vortex86-sg -c
```

STEP38.

- Type **update-grub**

```
root@a-laptop:~# update-initramfs -k 2.6.34.1-vortex86-sg -c
update-initramfs: Generating /boot/initrd.img-2.6.34.1-vortex86-sg

root@a-laptop:~#
root@a-laptop:~# update-grub
Searching for GRUB installation directory ... found: /boot/grub
Searching for default file ... found: /boot/grub/default
Testing for an existing GRUB menu.lst file ... found: /boot/grub/menu.lst
Searching for splash image ... none found, skipping ...
Found kernel: /boot/vmlinuz-2.6.34.1-vortex86-sg
Found kernel: /boot/vmlinuz-2.6.28-11-generic
Found kernel: /boot/memtest86+.bin
Replacing config file /var/run/grub/menu.lst with new version
Updating /boot/grub/menu.lst ... done
```

- Now it’s complete to install Ubuntu on the MicroSD card

SETUP SERIAL CONSOLE OF UBUNTU (IN THE VIRTUAL MACHINE) FOR RB-050

STEP1.

- In this example, we setup **RB-050 COM1** for serial console
  - Note that in the STEP, we still run Ubuntu on the virtual machine.
- Type **`vi /etc/event.d/ttyS0`** to create a new file

```
root@a-laptop:~#
root@a-laptop:~#
root@a-laptop:~# vi /etc/event.d/ttyS0
```

STEP2.

- Edit the file **`/etc/event.d/ttyS0`** as below, and then save & exit

File Edit View Terminal Help

```
# ttyS0 - getty
#
# This service maintains a getty on ttyS0 from the point the system is
# started until it is shut down again

start on runlevel 2
start on runlevel 3
start on runlevel 4
start on runlevel 5

stop on runlevel 0
stop on runlevel 1
stop on runlevel 6

respawn
exec /sbin/getty -L 115200 ttyS0 vt102
~
~
~
```

STEP3.

- Type **`vi /boot/grub/menu.lst`**

```
root@a-laptop:~#
root@a-laptop:~# vi /etc/event.d/ttyS0
root@a-laptop:~# vi /boot/grub/menu.lst
```

STEP4.

- In **/boot/grub/menu.lst**, add the following lines

```
# You can specify 'saved' instead of a number. In this case, th
# is the entry saved with the command 'savedefault'.
# WARNING: If you are using dmraid do not use 'savedefault' or
# array will desync and will not let you boot your system.
default         0

## timeout sec
# Set a timeout, in SEC seconds, before automatically booting t
# (normally the first entry defined).
timeout         3
```

```
# array will desync and will not let you boot your system.
default         0

# Enable console output via the serial port
serial --unit=0 --speed=115200 --word=8 --parity=no --stop=1
terminal --timeout=1 serial console

## timeout sec
```

STEP5.

- And then also add the following line
- Save & exit **/boot/grub/menu.lst**

```
## ## End Default Options ##

title           Ubuntu 9.04, kernel 2.6.34.1-vortex86-sg
uuid            6b36dc9a-ea50-4a45-b28b-4a329ae9fcd6
kernel          /boot/vmlinuz-2.6.34.1-vortex86-sg root=UUID=6b36dc9a-ea50-4a45-
b28b-4a329ae9fcd6 ro quiet splash
initrd          /boot/initrd.img-2.6.34.1-vortex86-sg
quiet
```

```
## ## End Default Options ##

title           Ubuntu 9.04, kernel 2.6.34.1-vortex86-sg
uuid            6b36dc9a-ea50-4a45-b28b-4a329ae9fcd6
kernel          /boot/vmlinuz-2.6.34.1-vortex86-sg root=UUID=6b36dc9a-ea50-4a45-
b28b-4a329ae9fcd6 ro quiet splash console=ttyS0,115200n8 console=tty0
initrd          /boot/initrd.img-2.6.34.1-vortex86-sg
quiet
```

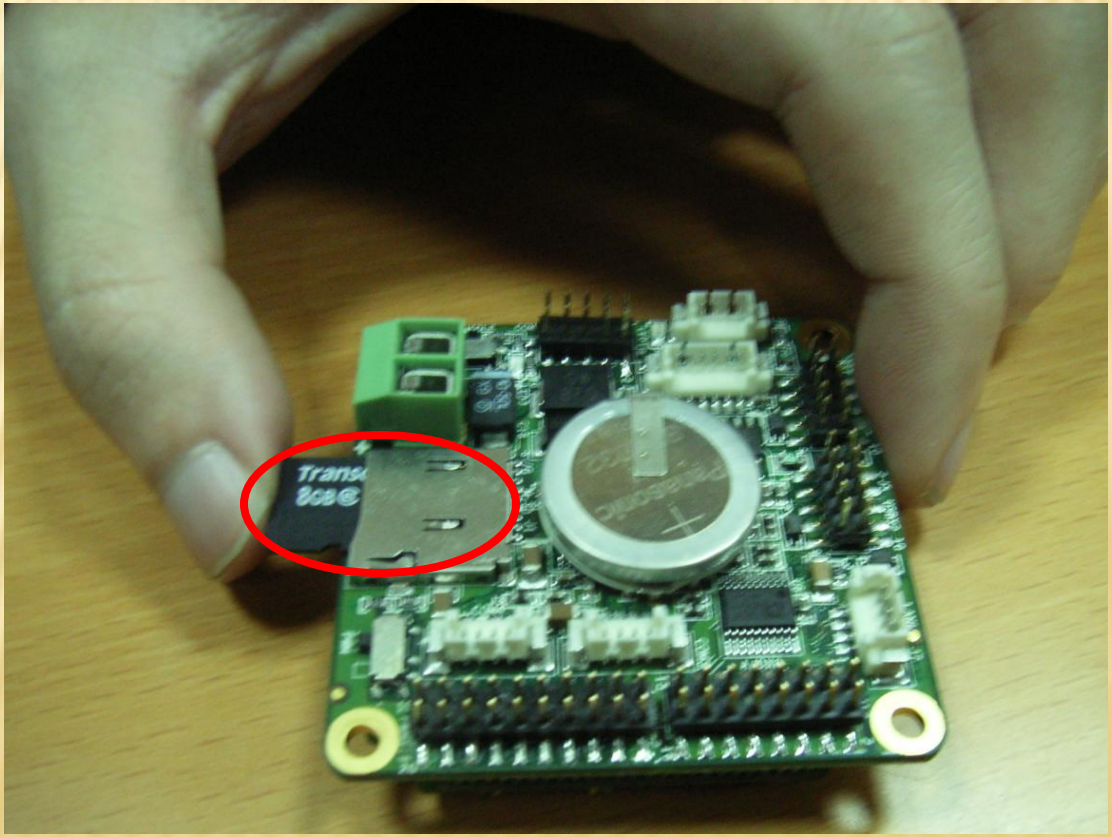
STEP6.

- Type **`poweroff`**
- Then turn off the VirtualBox virtual machine

```
root@a-laptop:~# vi /boot/grub/menu.lst
root@a-laptop:~# vi /boot/grub/menu.lst
root@a-laptop:~# poweroff
```

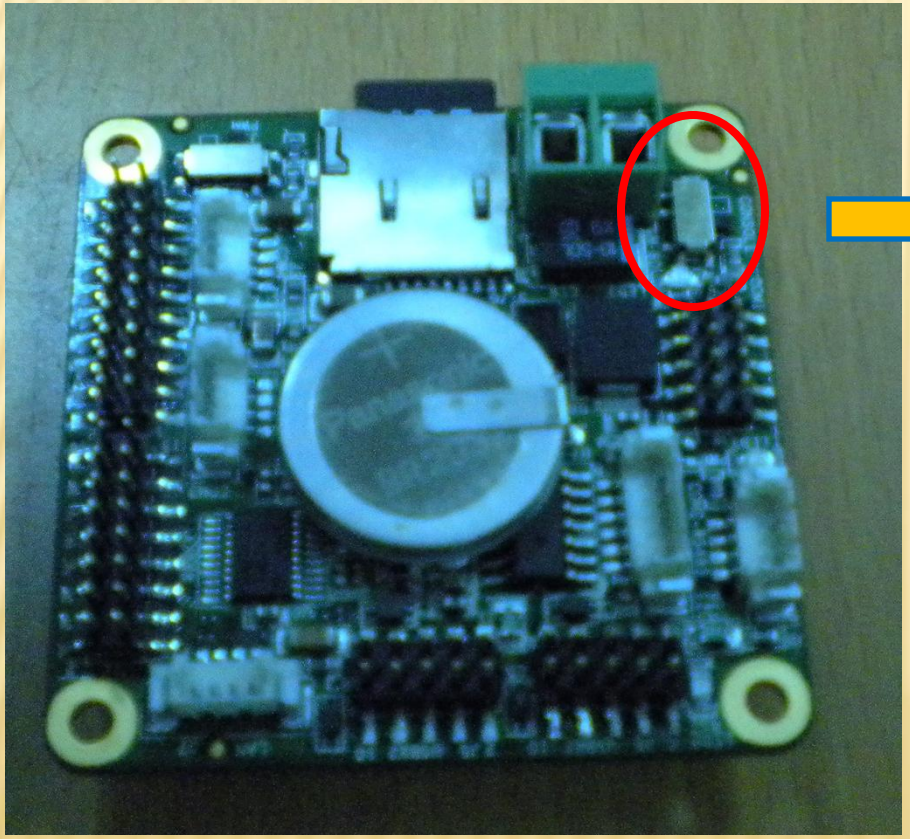
STEP7.

- Remove the MicroSD card from your computer
- Plug the MicroSD card into your RoBoard RB-050



STEP8.

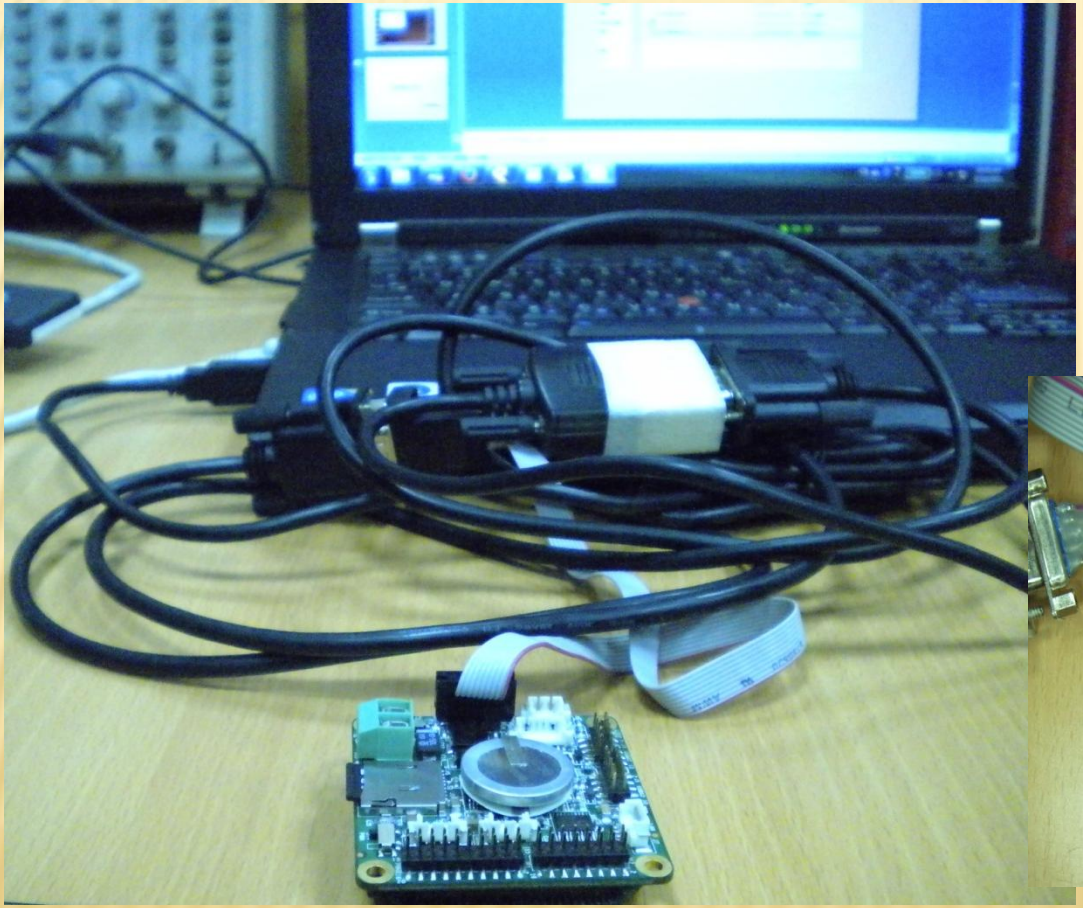
- Turn Console Redirection switch to “Console Redirection enable”

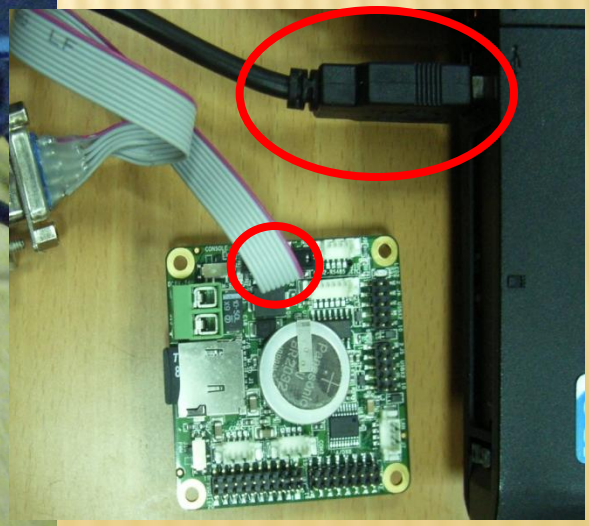


Console enable

STEP9.

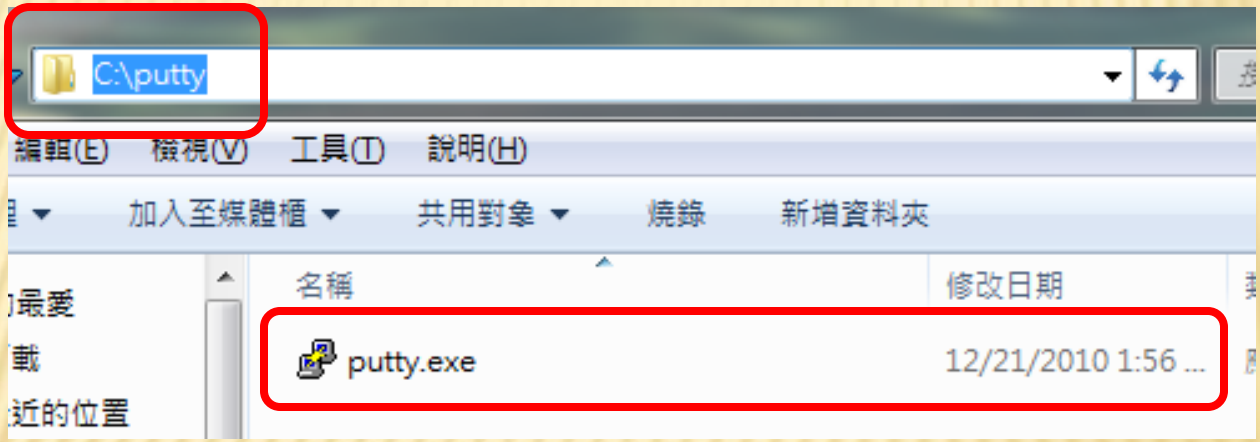
- Connect RB-050's COM1 to the serial port of your computer





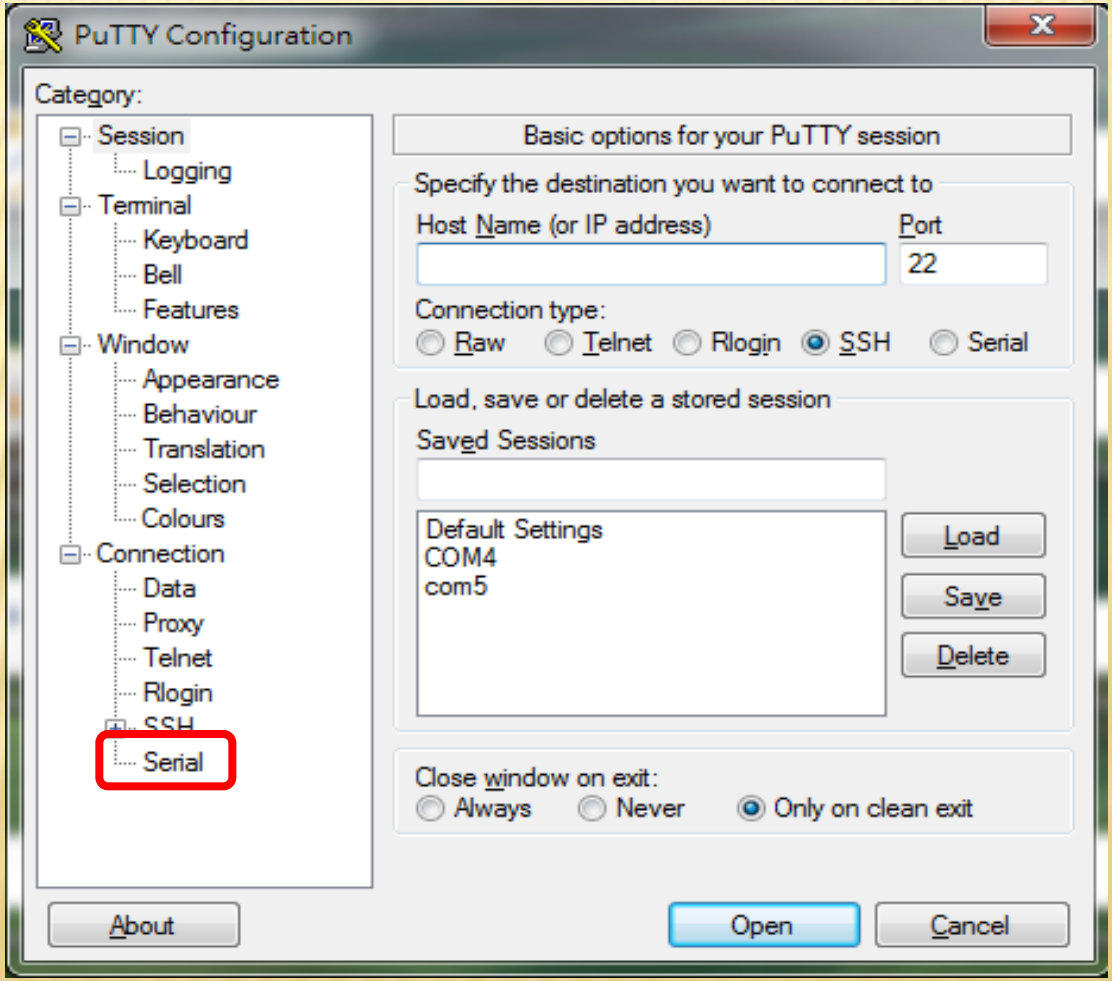
STEP10.

- Launch **putty** on your computer



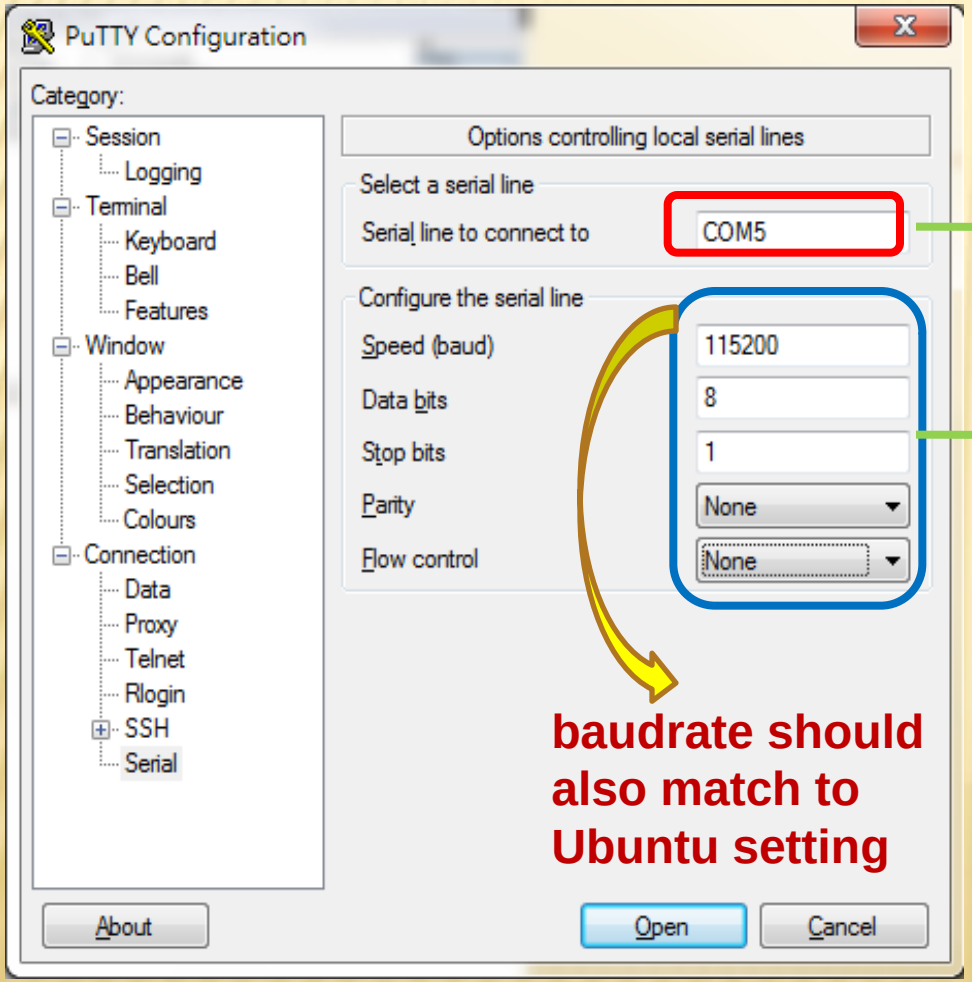
STEP11.

- Click **Serial**



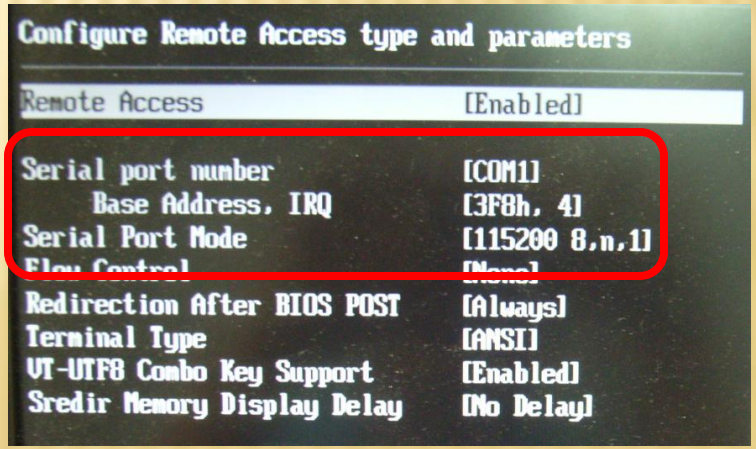
STEP12.

- Setup as below



PC's serial port

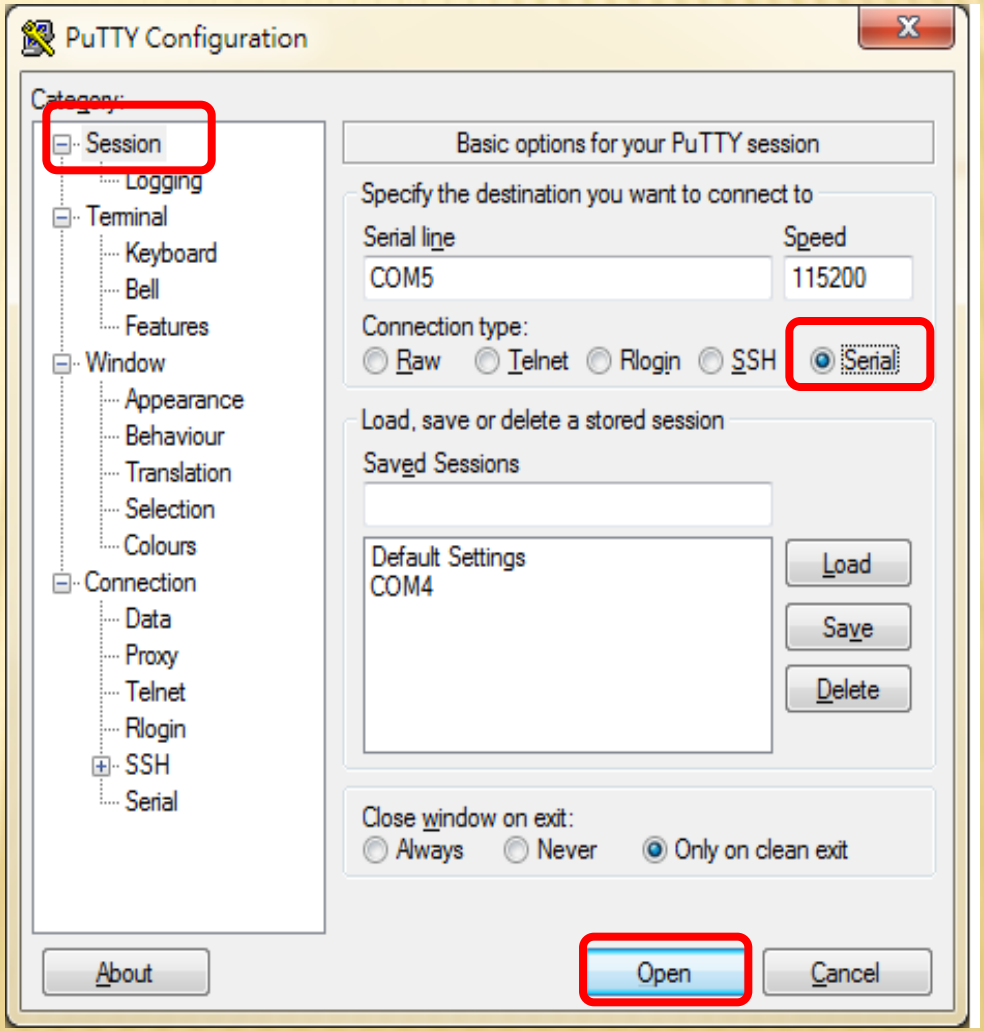
RB-050 BIOS setting



baudrate should also match to Ubuntu setting

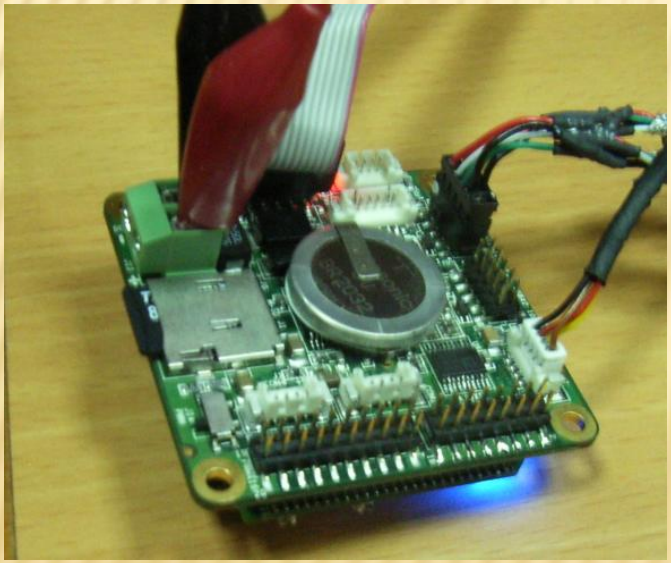
STEP13.

- Click **Session**
- Click **Serial** & press **Open**



STEP14.

- Power on RB-050, and then you will boot into RoBoard BIOS and Ubuntu 9.04 via serial console



```
AMIBIOS(C)2011 American Megatrends, Inc.
BIOS Date: 02/23/2011 Robort 050RD A6
CPU : Vortex86DX A9121
Speed : 800MHz

Press DEL to run Setup (F4 on Remote Keyboard)
Press F11 for BBS POPUP  (F3 on Remote Keyboard)
Initializing USB Controllers .. Done.
256MB OK
USB Device(s): 1 Keyboard
```

BIOS screen

```
Boot from (hd0,1) ext3   6b36dc9a-ea50-4a45-b28b-4a329ae9fcd6
Starting up ...
[    0.000000] CPU: vendor_id 'Vortex86 SoC' unknown, using generic init.
[    0.000000] CPU: Your system may be unstable.
[   22.158965] usbfs: unrecognised mount option "mode=0666" or missing value

Ubuntu 9.04 a-laptop ttyS0

a-laptop login:
```

Linux screen

SETUP COM3 & COM4 OF RB-050 IN UBUNTU

STEP1.

- Type **`sudo apt-get install setserial`**
  - Note: ensure that the network is connected

```
a@a-laptop:~$ sudo apt-get install setserial
[sudo] password for a:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  setserial
```

- Type **`sudo vi /boot/grub/menu.lst`**

```
a@a-laptop:~$ sudo vi /boot/grub/menu.lst
```

STEP2.

- Add the following lines, and save & exit

```
## ## End Default Options ##

title           Ubuntu 9.04, kernel 2.6.34.1-vortex86-sg
uuid            6b36dc9a-ea50-4a45-b28b-4a329ae9fcd6
kernel          /boot/vmlinuz-2.6.34.1-vortex86-sg root=UUID=6b36dc9a-ea50-4a45-
b28b-4a329ae9fcd6 ro quiet splash console=ttyS0,115200n8 console=tty0
initrd          /boot/initrd.img-2.6.34.1-vortex86-sg
quiet
```

```
uuid            6b36dc9a-ea50-4a45-b28b-4a329ae9fcd6
kernel          /boot/vmlinuz-2.6.34.1-vortex86-sg root=UUID=6b36
b28b-4a329ae9fcd6 ro quiet splash 8250.nr_uarts=4 console=ttyS0,1
=tty0
```

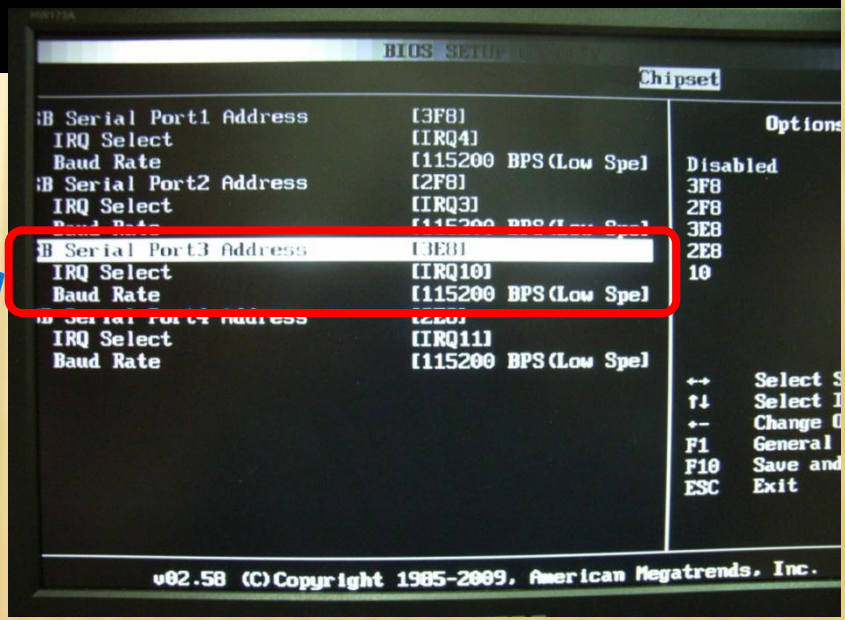
- Type **`sudo reboot`**

```
"/boot/grub/menu.lst" 175 lines, 5680 characters written
a@a-laptop:~$ sudo reboot
```

STEP3.

- After reboot, type **`sudo setserial /dev/ttyS2 irq 10 port 0x03e8 uart 16550A`**
  - Note: the irq number and base address should match the RB-050 BIOS COM3 setting

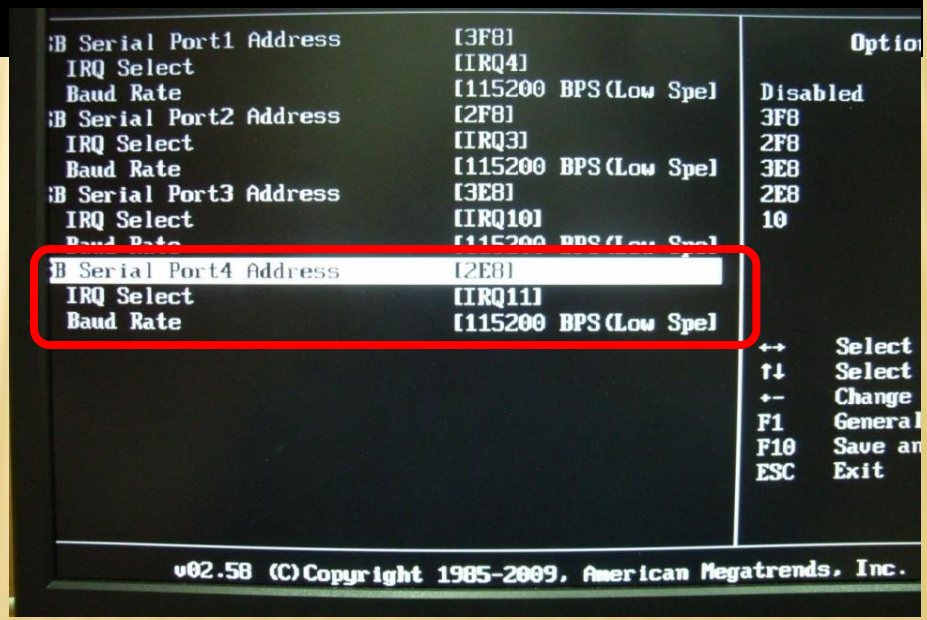
```
a@a-laptop:~$ sudo setserial /dev/ttyS2 irq 10 port 0x03e8 uart 16550A
a@a-laptop:~$ sudo setserial /dev/ttyS3 irq 11 port 0x02e8 uart 16550A
a@a-laptop:~$
```



STEP4.

- Type **`sudo setserial /dev/ttyS3 irq 11 port 0x02e8 uart 16550A`**
  - Note: the irq number and base address should match the RB-050 BIOS COM4 setting

```
a@a-laptop:~$ sudo setserial /dev/ttyS2 irq 10 port 0x03e8 uart 16550A
a@a-laptop:~$ sudo setserial /dev/ttyS3 irq 11 port 0x02e8 uart 16550A
a@a-laptop:~$
```



STEP5.

- Type **`sudo vi /etc/serial.conf`** and edit as below

```
a@a-laptop:~$ sudo setserial /dev/ttyS2 irq 10 port 0x03e8 uart
a@a-laptop:~$ sudo setserial /dev/ttyS3 irq 11 port 0x02e8 uart
a@a-laptop:~$ sudo vi /etc/serial.conf
```

```
/dev/ttyS0 uart 16550A port 0x03f8 irq 4 baud_base 115200 spd_normal
/dev/ttyS1 uart 16550A port 0x02f8 irq 3 baud_base 115200 spd_normal
/dev/ttyS2 uart 16550A port 0x03e8 irq 10 baud_base 115200 spd_normal
/dev/ttyS3 uart 16550A port 0x02e8 irq 11 baud_base 115200 spd_normal
~
```

- It is complete to setup **COM 3** & **COM 4** of RB-050 in Ubuntu

SETUP REMOTE DESKTOP OF UBUNTU ON RB-050

STEP1.

- Type **`apt-get install ssh`**
  - Note: ensure that the network is connected

```
The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted
applicable law.

To access official Ubuntu documentation, please visit:
http://help.ubuntu.com/

296 packages can be updated.
348 updates are security updates.

a@a-laptop:~$ sudo apt-get install ssh
```

STEP2.

- Type **sudo apt-get install vnc4server**

```
..
Selecting previously deselected package ssh.
Unpacking ssh (from .../ssh_1%3a5.1p1-5ubuntu1_all.deb)
Processing triggers for ufw ...
Processing triggers for man-db ...
Setting up openssh-server (1:5.1p1-5ubuntu1) ...
Creating SSH2 RSA key; this may take some time ...
Creating SSH2 DSA key; this may take some time ...
 * Restarting OpenBSD Secure Shell server sshd
   ...done.

Setting up ssh (1:5.1p1-5ubuntu1) ...

a@a-laptop:~$ sudo apt-get install vnc4server
```

STEP3.

- Type **`vncserver :0 -geometry 1024x768 -depth 16`**
- Set the login password

```
0 upgraded, 0 newly installed, 0 to remove and 290 not upgraded.
a@a-laptop:~$ vncserver :0 -geometry 1024x768 -depth 16

You will require a password to access your desktops.

Password:
Password must be at least 6 characters - try again
Password:
Verify:
xauth:  creating new authority file /home/a/.Xauthority

New 'a-laptop:0 (a)' desktop is a-laptop:0
```

STEP4.

- Type **`vncserver -kill :0`**

```
New 'a-laptop:0 (a)' desktop is a-laptop:0

Creating default startup script /home/a/.vnc/xstartup
Starting applications specified in /home/a/.vnc/xstartup
Log file is /home/a/.vnc/a-laptop:0.log

a@a-laptop:~$ vncserver -kill :0
Killing Xvnc process ID 4713
a@a-laptop:~$
```

STEP5.

- Type **vi /home/a/.vnc/xstartup**

```
Creating default startup script /home/a/.vnc/xstartup
Starting applications specified in /home/a/.vnc/xstartup
Log file is /home/a/.vnc/a-laptop:0.log

a@a-laptop:~$ vncserver -kill :0
Killing Xvnc process ID 4713
a@a-laptop:~$ vi /home/a/.vnc/xstartup
```

STEP6.

- Edit **`/home/a/.vnc/xstartup`** as below
- Save & exit

```
#!/bin/sh

# Uncomment the following two lines for normal desktop:
# unset SESSION_MANAGER
# exec /etc/X11/xinit/xinitrc

[ -x /etc/vnc/xstartup ] && exec /etc/vnc/xstartup
[ -r $HOME/.Xresources ] && xrdb $HOME/.Xresources
xsetroot -solid grey
vncconfig -iconic &
xterm -geometry 80x24+10+10 -ls
twm &
~
~
```

```
# Uncomment the following two lines for normal
# unset SESSION_MANAGER
# exec /etc/X11/xinit/xinitrc

gnome-sesion &

[ -x /etc/vnc/xstartup ] && exec /etc/vnc/xsta
[ -r $HOME/.Xresources ] && xrdb $HOME/.Xresou
```

STEP7.

- Type update-rc.d –f gdm remove

```
~
~
~
".vnc/xstartup" 14 lines, 351 characters written
a@a-laptop:~$ update-rc.d -f gdm remove
```

- Type **sudo vi /etc/rc.local**

```
~
a@a-laptop:~$ update-rc.d -f gdm remove
 Removing any system startup links for /etc/init.d/gdm ...
   /etc/rc0.d/K01gdm
update-rc.d: unlink: Permission denied
a@a-laptop:~$ sudo vi /etc/rc.local
```

STEP8.

- Edit `/etc/rc.local` as below
- Save & exit

```
#
# rc.local
#
# This script is executed at the end of each multiuser runlevel.
# Make sure that the script will "exit 0" on success or any other
# value on error.
#
# In order to enable or disable this script just change the execution
# bits.
#
# By default this script

exit 0
~
```

```
#
# In order to enable or disable this script just
# bits.
#

su a -c "vncserver :0"

exit 0
~
~
```

STEP9.

- Type **`ifconfig`** to find the IP address
  - In this example, the IP address is 192.168.0.166

```
~
~
"/etc/rc.local" 16 lines, 331 characters written
a@a-laptop:~$ ifconfig
eth4      Link encap:Ethernet  HWaddr 00:1b:eb:74:00:22
          inet addr:192.168.0.166  Bcast:192.168.127.255  Mask:255.255.128.
          inet6 addr: fe80::21b:ebff:fe74:22/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
```

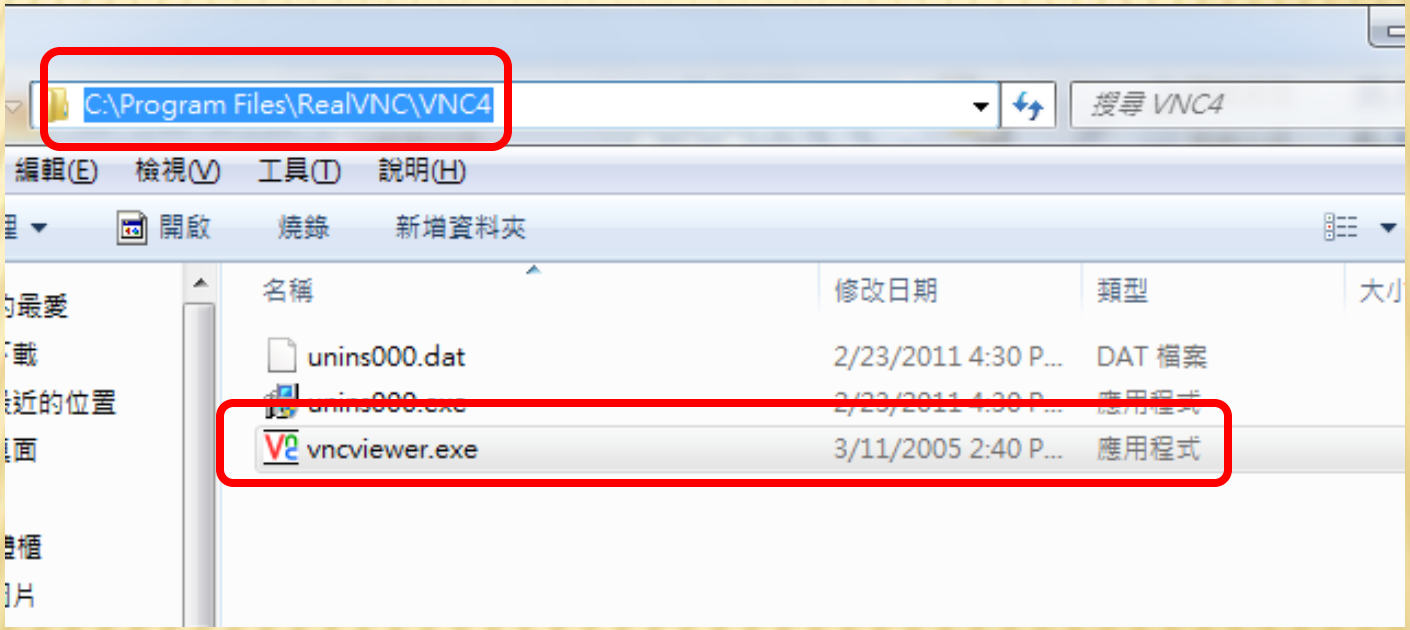
- Type **`sudo reboot`**

```
          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)

a@a-laptop:~$ sudo reboot
```

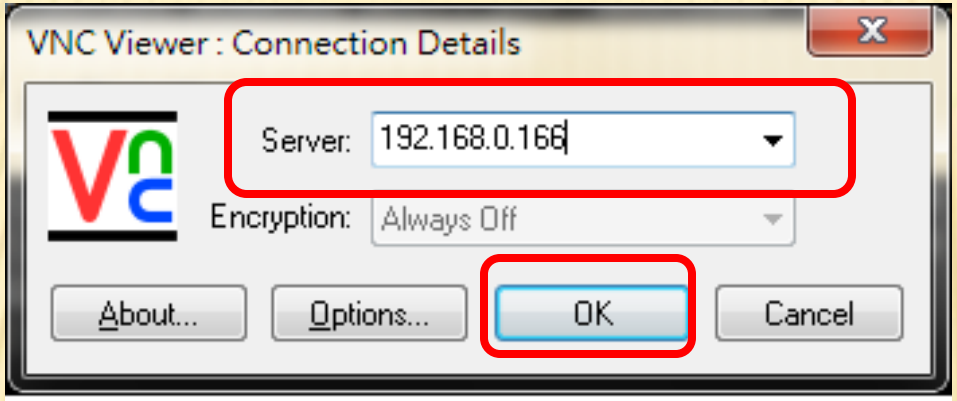
STEP10.

- Launch **vncviewer** on your computer

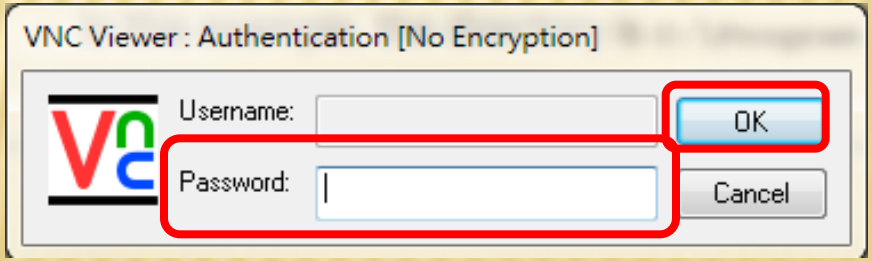


STEP11.

- Type RoBoard IP address (refer to STEP 9) & press **OK**

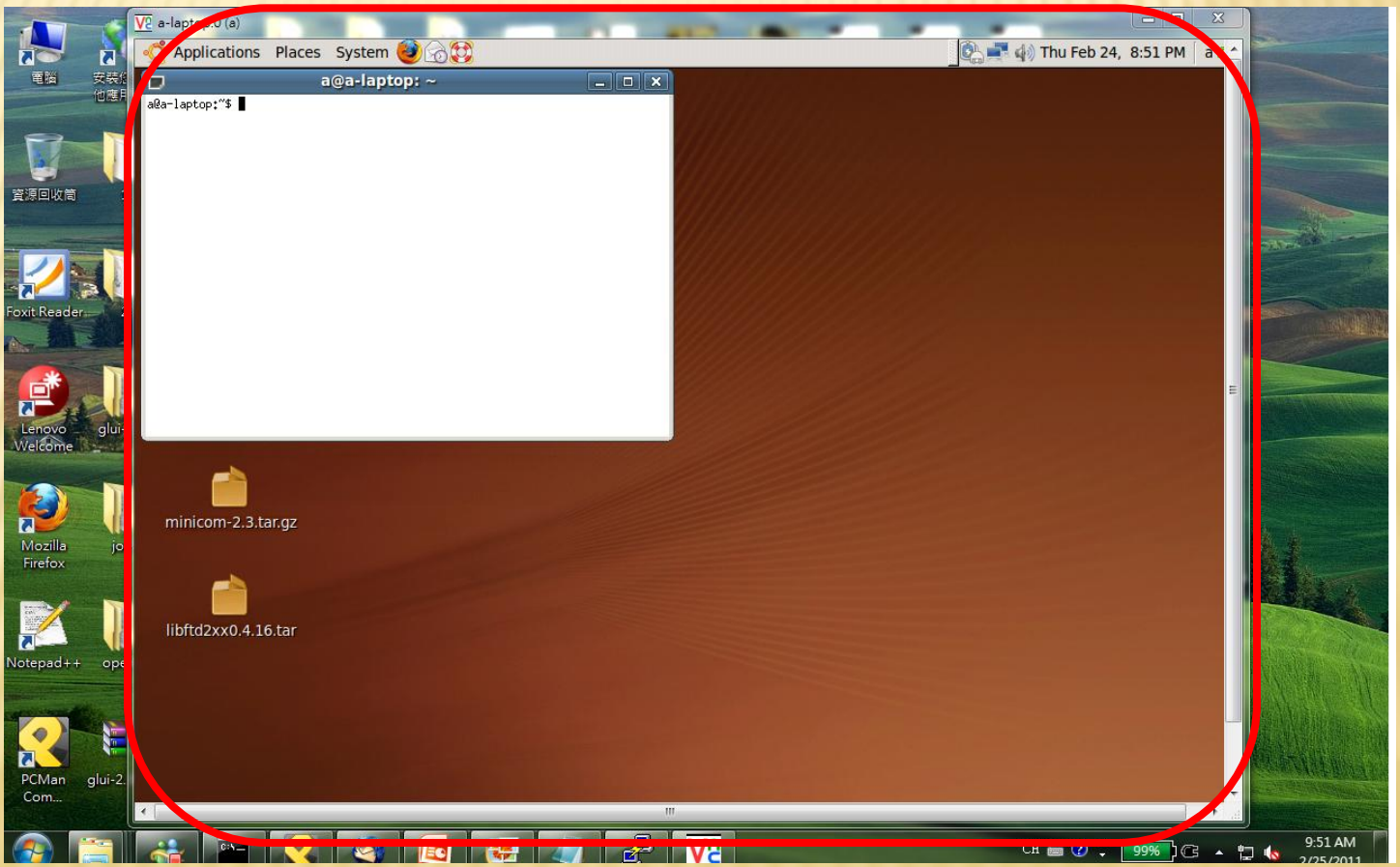


- Type the vncserver password (refer to STEP 3) & press **OK**



STEP12.

- Now you can connect to RB-050 via remote desktop.



THANK YOU

tech@roboard.com
http://www.roboard.com