COURSE OUTLINE

UNIX Programming 2015 Fall by Euiseong Seo

Overview

- What this course is about
- Who teaches this course
- Why you have to take this course
- What you will learn in this course
- What you will earn in this course
- How to succeed in this course

What This Course is About

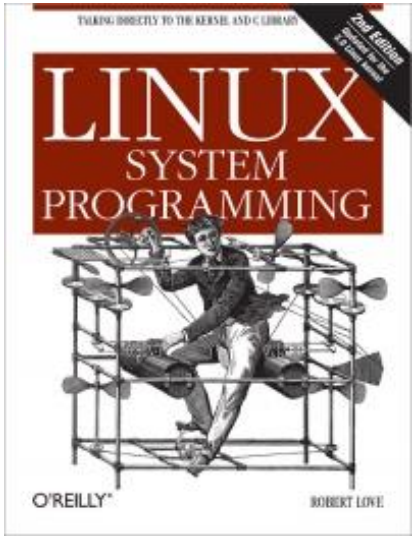
- UNIX programming + administration
- System administration
  - Booting and Halting
  - User and process management
  - File and file system management
  - Shell programming
- System development
  - Shell design and implementation
  - Server design and implementation
- Hackerism and jargon

Administrative Information

- Course Code
  - ICE2015
- Class Hour
  - Tuesday and Thursday
  - 12:00 PM ~ 13:15 PM
- Lecture Room
  - #26312 (located on 3F in Engineering Bldg. II)

Textbook

- Linux System Programming:
  Talking Directly to the Kernel and C Library (LSP)
  - 2nd Edition
  - Written by Robert Love
  - Published by O'Reilly Media
  - 2013



References

- Advanced Programming in the UNIX Environment (APU)
  - 3rd Edition
  - Written by W. R. Stevens and S. A. Rago
  - Addison-Wesley, 2013
- Unix and Linux System Administration Handbook (USAH)
  - 4th Edition
  - Written by E. Nemeth, G. Snyder, T. Hein and B. Whaley
  - Prentice Hall, 2010
- The Art of UNIX Programming (AUP)
  - Written by E. S. Raymond
  - Addison-Wesley, 2003

Course Components

- Class participation
  - 10% of total credit
  - No lateness is allowed
  - Up to four absences will be tolerated
- Exams
  - Mid and final
  - 50% of total credit
  - If you miss either one of both exams, you will fail
- Programming assignment
  - Shell lab
    - 20% of total credit
  - Server/client lab
    - 20% of total credit

Course Web Page

- http://csl.skku.edu/ICE2015F15
- Check the web site regularly
- Class material, project information and other useful things will be posted

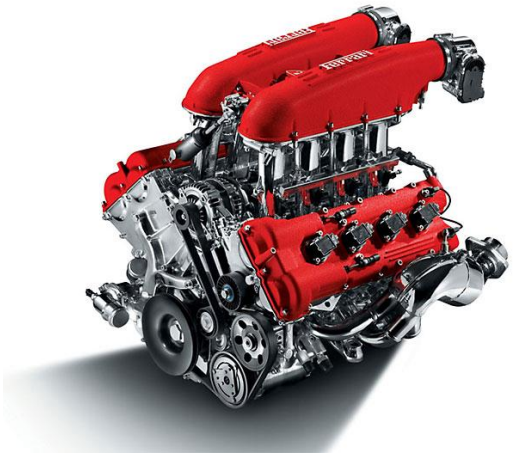
Ethical Code

- No academic misconduct will be tolerated
  - Zero-tolerance policy
  - One who is found guilty will be kicked out of my class immediately

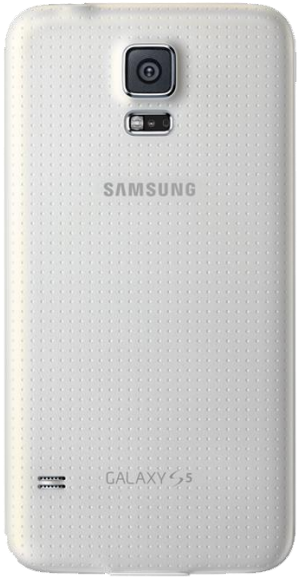
Lecturer

- Euiseong Seo
  - Associate professor, Software and Computer Eng. Dept.
  - E-Mail: euiseong (at) skku.edu
  - Office: #85564
  - Phone: (031) 299-4953

Why You Have to Take This Course



Why You Have to Take This Course



Why You Have to Take This Course

Google

BLIZZARD ENTERTAINMENT

Prerequisite

- Fluent literacy in C
- Prerequisite courses
  - System programming
  - Computer architecture
  - Operating systems (optional)

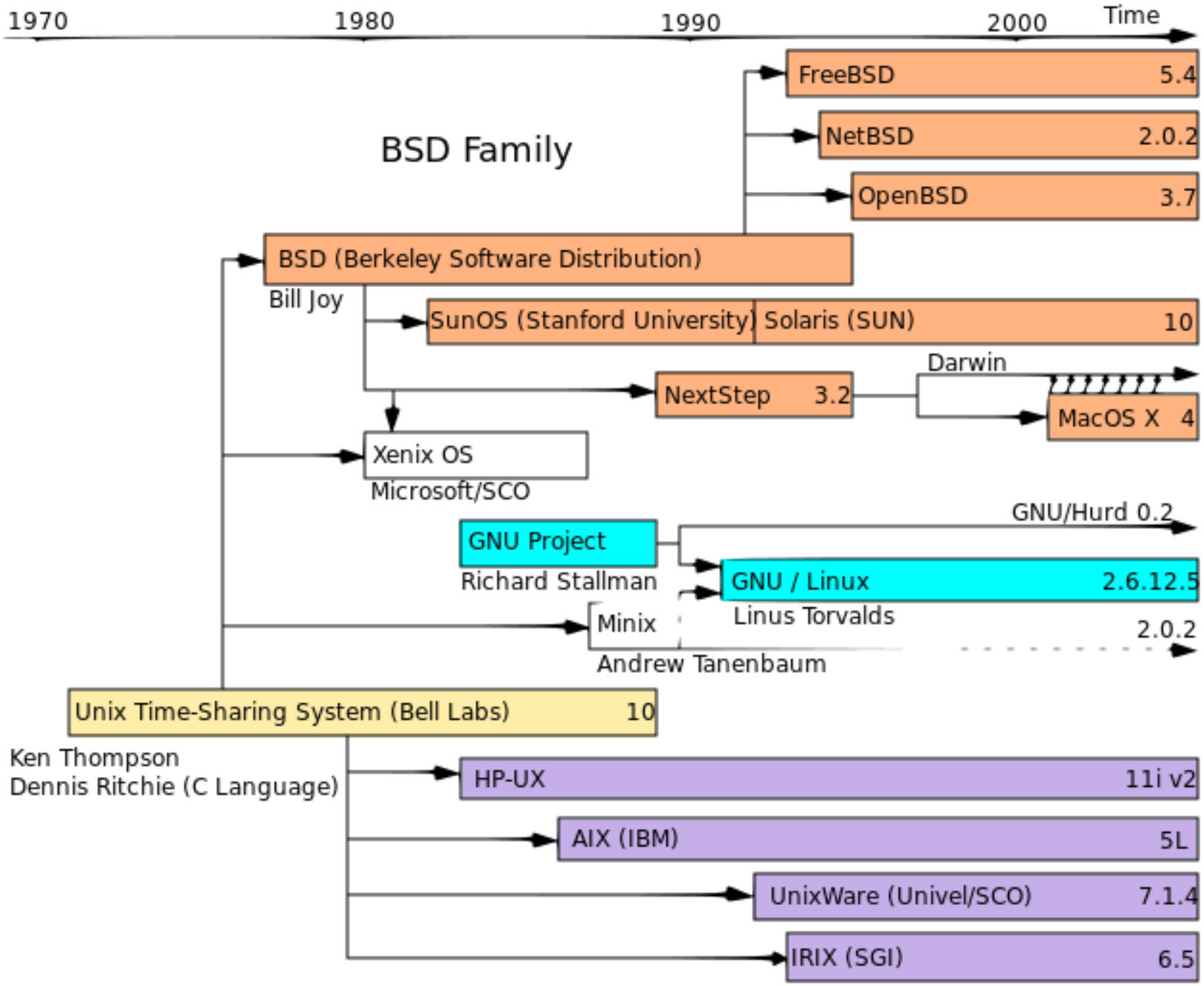
Keys to Success

- Think with your butt, not with your brain
- Read every reading assignment
- Do every homework assignment

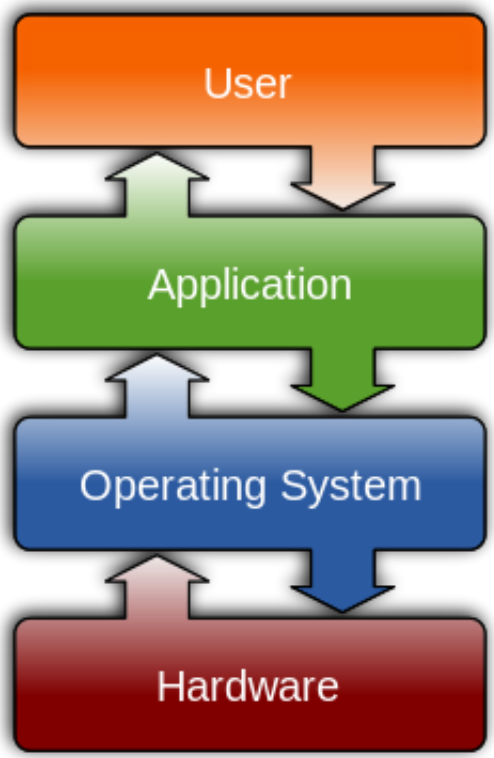
UNIX Overview

Brief History

- Multics
  - A time-sharing OS by MIT, AT&T Bell Lab. and GE
  - Too complex
- Written by Ken Thompson and Dennis Ritchie (1969)
  - Both were working at Bell Lab.
  - Thompson developed ‘B’
  - Ritchie enhanced ‘B’ to ‘C’ and helped develop ‘UNIX’
- Lots of offspring variants


1970
1980
1990
2000
Time
BSD Family
FreeBSD 5.4
NetBSD 2.0.2
OpenBSD 3.7
BSD (Berkeley Software Distribution)
Bill Joy
SunOS (Stanford University)
Solaris (SUN) 10
Darwin
NextStep 3.2
MacOS X 4
Xenix OS
Microsoft/SCO
GNU/Hurd 0.2
GNU Project
Richard Stallman
GNU / Linux 2.6.12.5
Linus Torvalds
Minix
2.0.2
Andrew Tanenbaum
Unix Time-Sharing System (Bell Labs) 10
Ken Thompson
Dennis Ritchie (C Language)
HP-UX 11i v2
AIX (IBM) 5L
UnixWare (Univel/SCO) 7.1.4
IRIX (SGI) 6.5
System III & V Family

What Does UNIX Do?



POSIX

- Portable Operating System Interface
  - Name suggested by Richard Stallman
- An IEEE standard, IEEE 1003, for UNIX-like Oses
  - First released in 1988
  - APIs
  - command-line shell and utility interfaces

Linux

- A UNIX-like mostly-POSIX-compliant OS
- First released on 5 October 1991 by Linus Torvalds
  - Hello everybody out there using minix - I'm doing a (free) operating system (just a hobby, won't be big and professional like gnu) for 386(486) AT clones. This has been brewing since april, and is starting to get ready. I'd like any feedback on things people like/dislike in minix, as my OS resembles it somewhat (same physical layout of the file-system (due to practical reasons) among other things). I've currently ported bash(1.08) and gcc(1.40), and things seem to work. This implies that I'll get something practical within a few months, and I'd like to know what features most people would want. Any suggestions are welcome, but I won't promise I'll implement them ☺
    Linus (torvalds@kruuna.helsinki.fi)
    PS. Yes – it's free of any minix code, and it has a multi-threaded fs. It is NOT portable (uses 386 task switching etc), and it probably never will support anything other than AT-harddisks, as that's all I have :-(.

Linux

- Open-source development during 1990s and 2000s
- Linux foundation takes control of the Linux kernel
- Distributions
  - Slackware
  - Red Hat
  - SUSE
  - Debian
  - Ubuntu
- We’re gonna use Ubuntu for this course

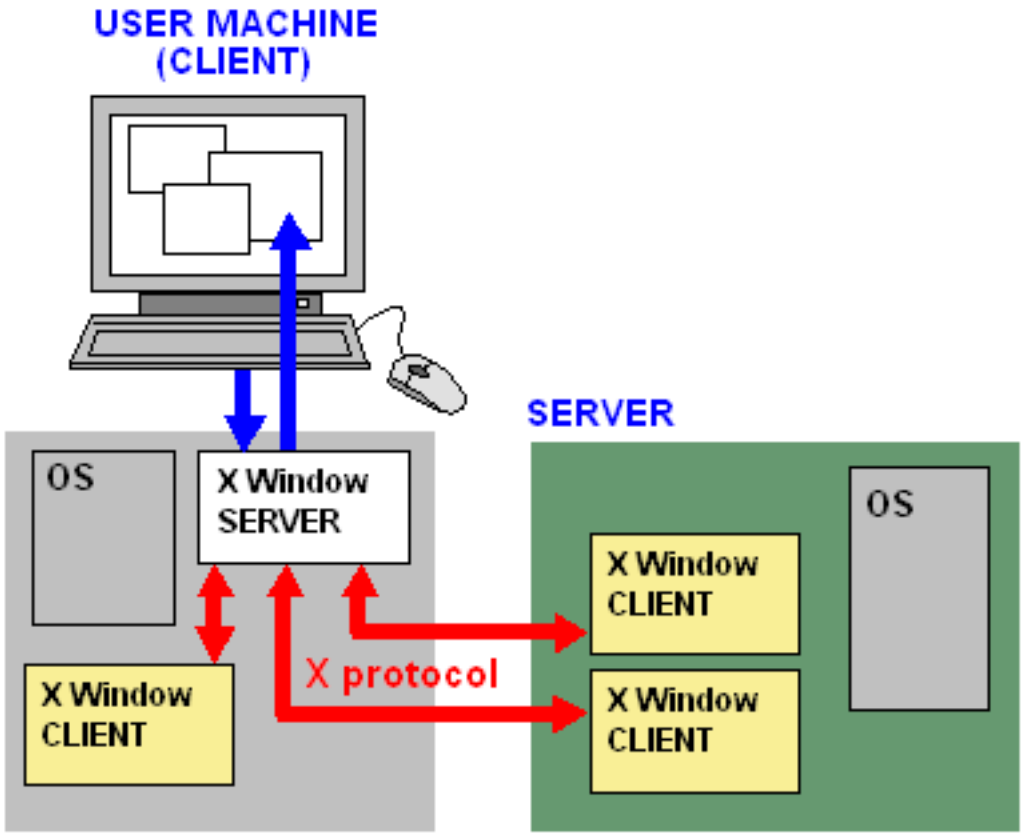
CLI and GUI

- Command-line interface
  - Through text terminal
  - Difficult to learn
  - Handy to use
  - Still popularly used by hackers

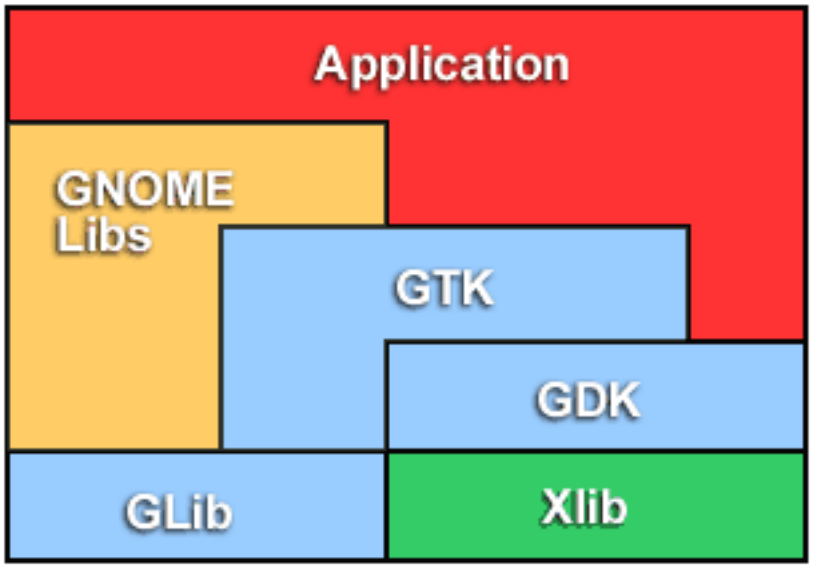
- Graphic user interface
  - No standard GUI for Linux
  - Basically, GUI shell desktop environment on top of X window-based GUI libraries
    - KDE, Gnome, Xfce and so on

X Window Structure

From Computer Desktop Encyclopedia



Gnome Structure



Setting Up a Ubuntu VM

VirtualBox

Download VirtualBox

Here, you will find links to VirtualBox binaries and its source code.

VirtualBox binaries

By downloading, you agree to the terms and conditions of the respective license.

- **VirtualBox platform packages**. The binaries are released under the terms of the GPL version 2.
  - **VirtualBox 4.3.14 for Windows hosts** x86/amd64
    If you run into problems with the Windows package, please refer to the forum, it has a link to a build with some fixes and additional information. Please provide a detailed problem description if you think your case isn't covered yet.
  - **VirtualBox 4.3.14 for OS X hosts** x86/amd64
  - **VirtualBox 4.3.14 for Linux hosts**
  - **VirtualBox 4.3.14 for Solaris hosts** amd64
- **VirtualBox 4.3.14 Oracle VM VirtualBox Extension Pack** All supported platforms
  Support for USB 2.0 devices, VirtualBox RDP and PXE boot for Intel cards. See this chapter from the User Manual for an introduction to this Extension Pack. The Extension Pack binaries are released under the VirtualBox Personal Use and Evaluation License (PUEL).
  Please install the extension pack with the same version as your installed version of VirtualBox!
  *If you are using **VirtualBox 4.2.26**, please download the extension pack **here**.*
  *If you are using **VirtualBox 4.1.34**, please download the extension pack **here**.*
  *If you are using **VirtualBox 4.0.26**, please download the extension pack **here**.*
- **VirtualBox 4.3.14 Software Developer Kit (SDK)** All platforms

See the changelog for what has changed.
You might want to compare the

- SHA256 checksums or the
- MD5 checksums

to verify the integrity of downloaded packages.
The SHA256 checksums should be favored as the MD5 algorithm must be treated as insecure!

Note: After upgrading VirtualBox it is recommended to upgrade the guest additions as well.

User Manual

The VirtualBox User Manual is included in the VirtualBox binaries above. If, however, you would like to take a look at it without having to install the whole thing, you also access it here:

- User Manual (HTML version)
- French User Manual

You may also like to take a look at our frequently asked questions list.

VirtualBox older builds

The binaries in this section for VirtualBox before version 4.0 are all released under the VirtualBox Personal Use and Evaluation License (PUEL). As of VirtualBox 4.0, the Extension Pack is released under the VirtualBox Personal Use and Evaluation License and the other packages are released under the terms of the GPL version 2. By downloading, you agree to the terms and conditions of the respective license.

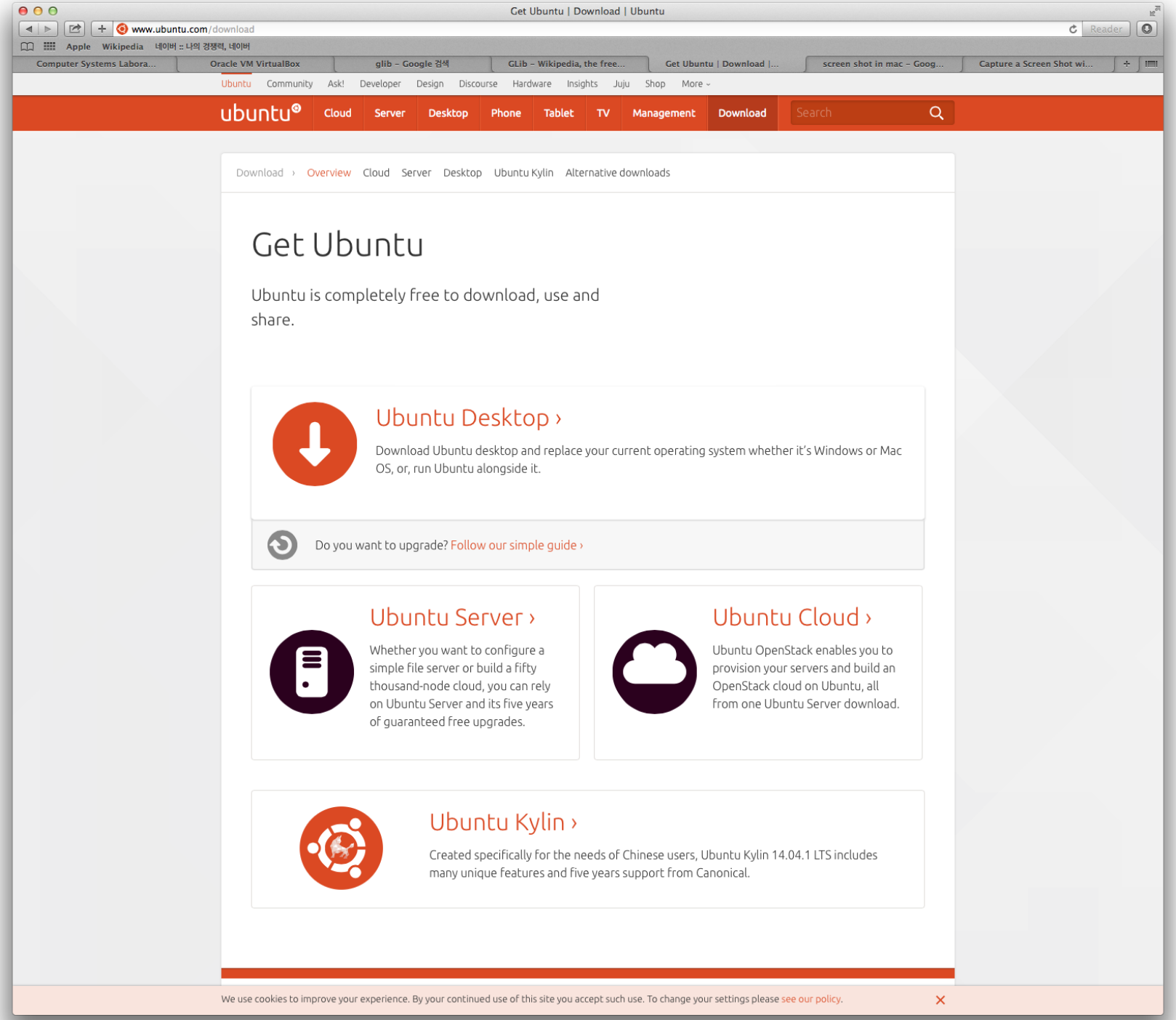
- **VirtualBox older builds**

VirtualBox Sources

The **VirtualBox** sources are available free of charge under the terms and conditions of the GNU General Public License, Version 2. By downloading from the below links, you agree to these terms and conditions.

- **Source code**
- Browse the source code repository
  This is the current development code, which is not necessarily stable.
- View the latest source code changes
- Download the VirtualBox OSE about logo in higher resolutions: 1024x768, 1600x1200.
- **Checking out from our Subversion server.**

```
svn co http://www.virtualbox.org/svn/vbox/trunk vbox
```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Reader
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Wikipedia
네이버 :: 나의 경쟁력, 네이버
Computer Systems Labora...
Oracle VM VirtualBox
glib – Google 검색
GLib – Wikipedia, the free...
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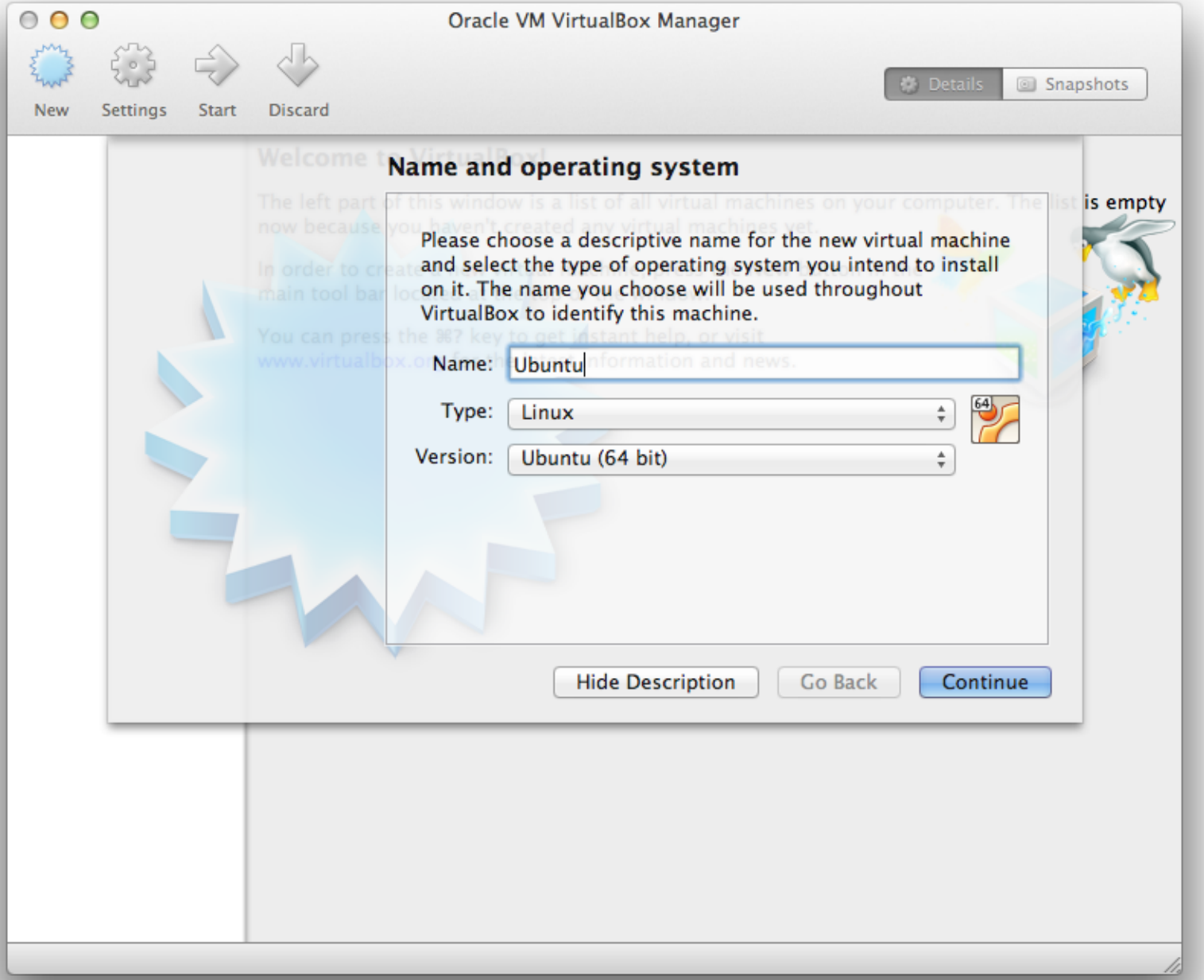
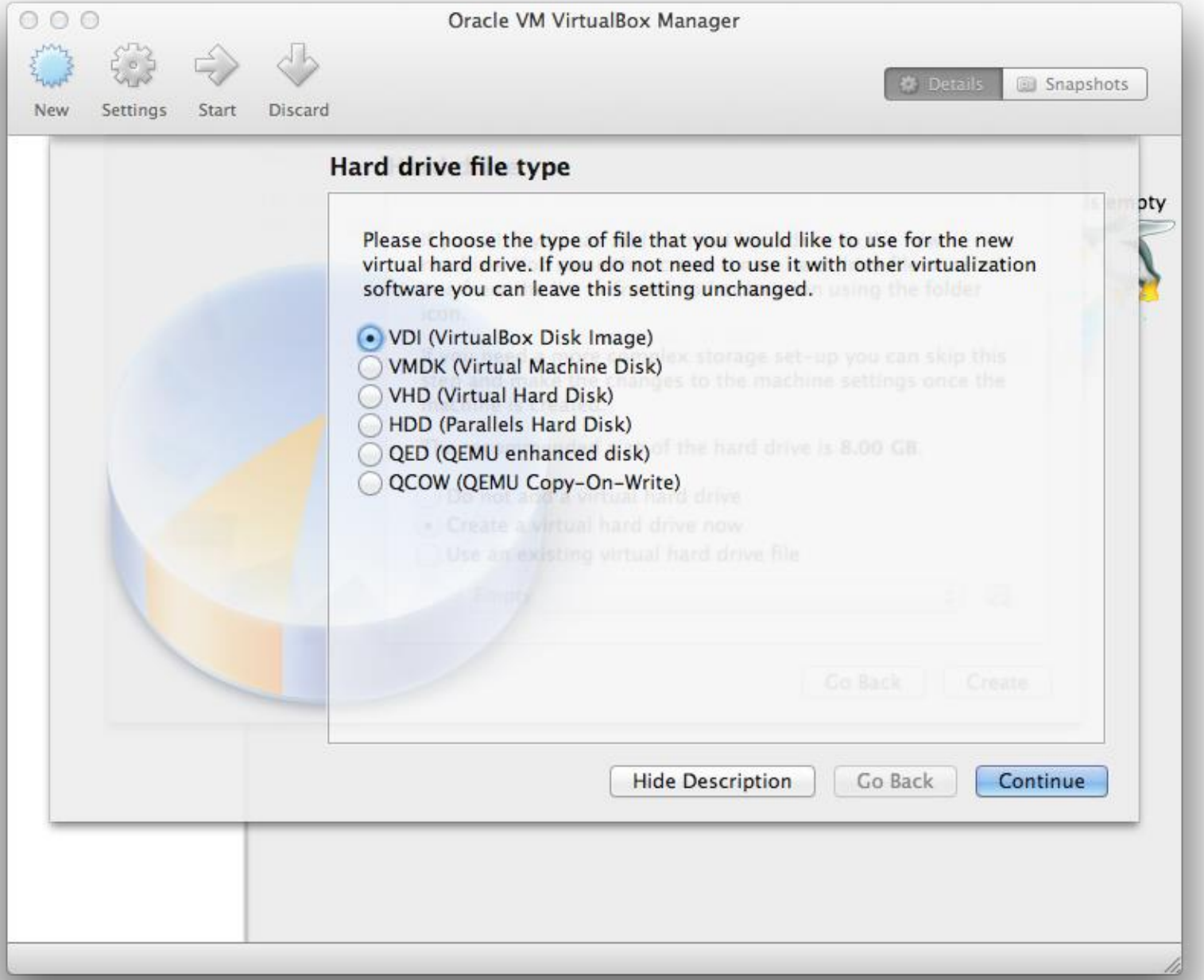
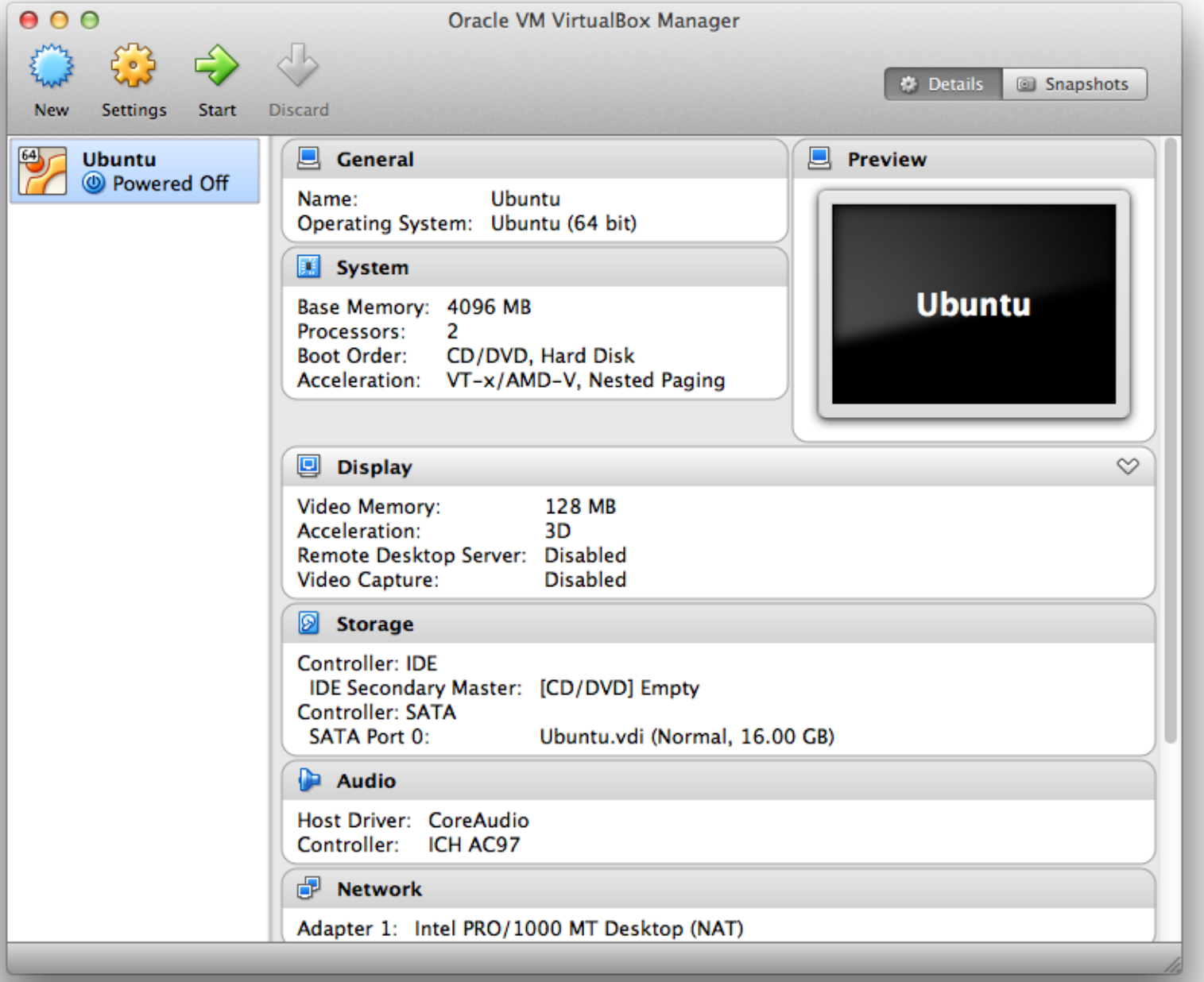
Capture a Screen Shot wi...
Ubuntu
Community
Ask!
Developer
Design
Discourse
Hardware
Insights
Juju
Shop
More
ubuntu
Cloud
Server
Desktop
Phone
Tablet
TV
Management
Download
Search
Download › Overview Cloud Server Desktop Ubuntu Kylin Alternative downloads
Get Ubuntu
Ubuntu is completely free to download, use and share.
Ubuntu Desktop ›
Download Ubuntu desktop and replace your current operating system whether it's Windows or Mac OS, or, run Ubuntu alongside it.
Do you want to upgrade? Follow our simple guide ›
Ubuntu Server ›
Whether you want to configure a simple file server or build a fifty thousand-node cloud, you can rely on Ubuntu Server and its five years of guaranteed free upgrades.
Ubuntu Cloud ›
Ubuntu OpenStack enables you to provision your servers and build an OpenStack cloud on Ubuntu, all from one Ubuntu Server download.
Ubuntu Kylin ›
Created specifically for the needs of Chinese users, Ubuntu Kylin 14.04.1 LTS includes many unique features and five years support from Canonical.
We use cookies to improve your experience. By your continued use of this site you accept such use. To change your settings please see our policy.

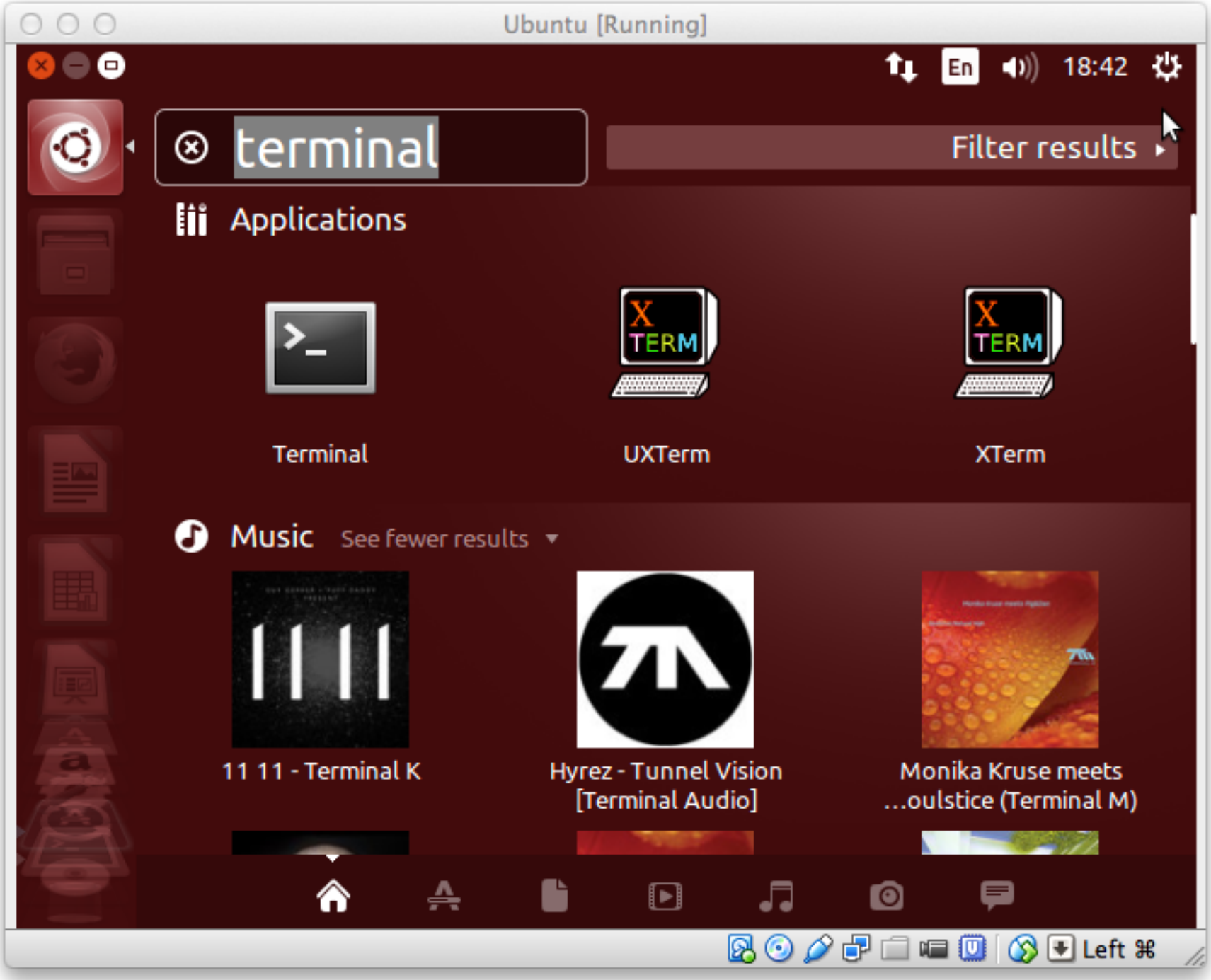

Install Oracle VM VirtualBox
Welcome to the Oracle VM VirtualBox Installer
Introduction
Destination Select
Installation Type
Installation
Summary
Oracle VM VirtualBox for Mac OS X
Welcome to Oracle VM VirtualBox 4.3.14 for Mac OS X! This installer will guide you through the installation process. In a minute from now, you will be able to execute virtual machines running different operating systems on your desktop. You will find that VirtualBox delivers a great feature set and excellent performance.
Go Back
Continue

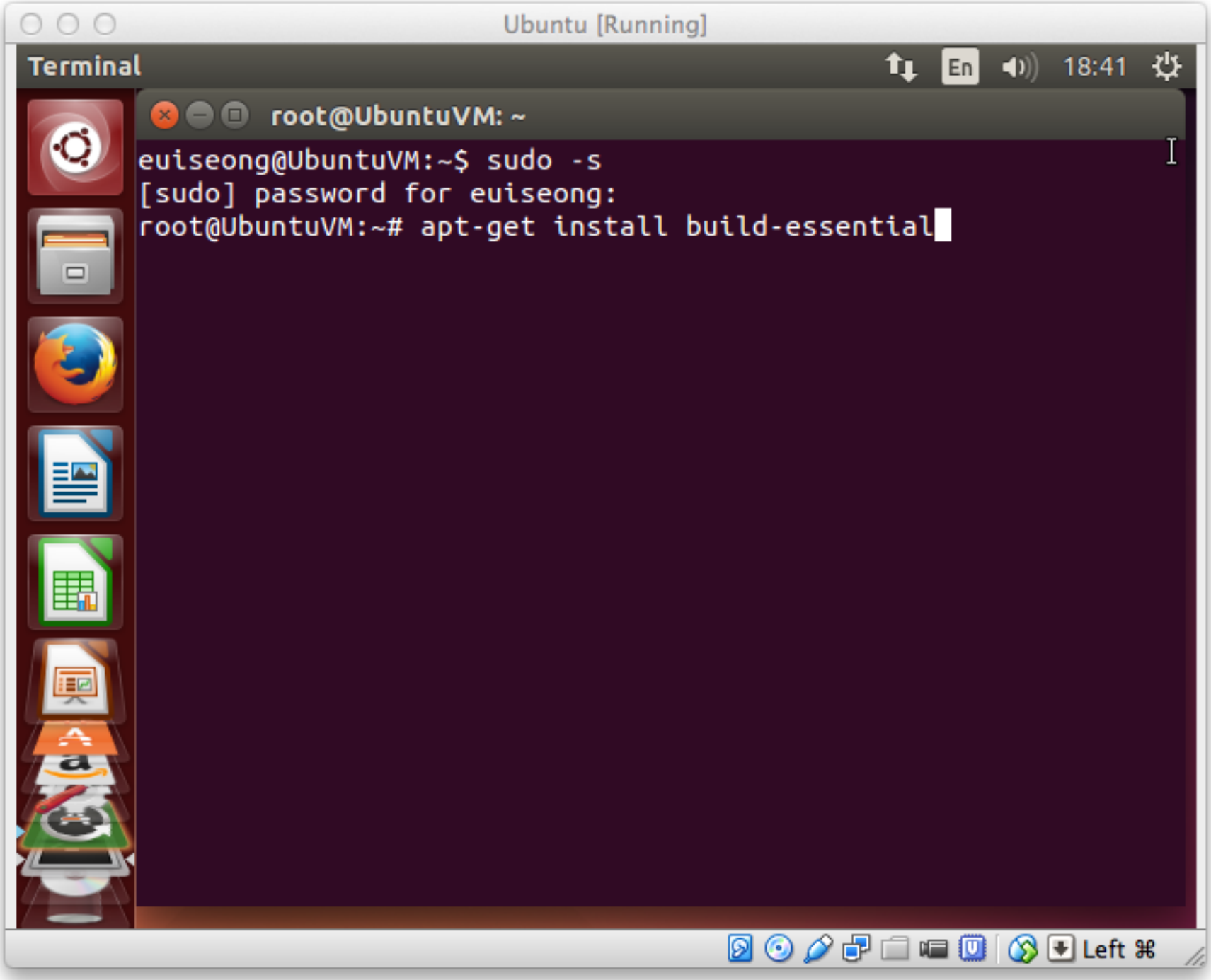

Oracle VM VirtualBox Manager
New
Settings
Start
Discard
Details
Snapshots
Name and operating system
Please choose a descriptive name for the new virtual machine and select the type of operating system you intend to install on it. The name you choose will be used throughout VirtualBox to identify this machine.
Name: Ubuntu
Type: Linux
Version: Ubuntu (64 bit)
Hide Description
Go Back
Continue

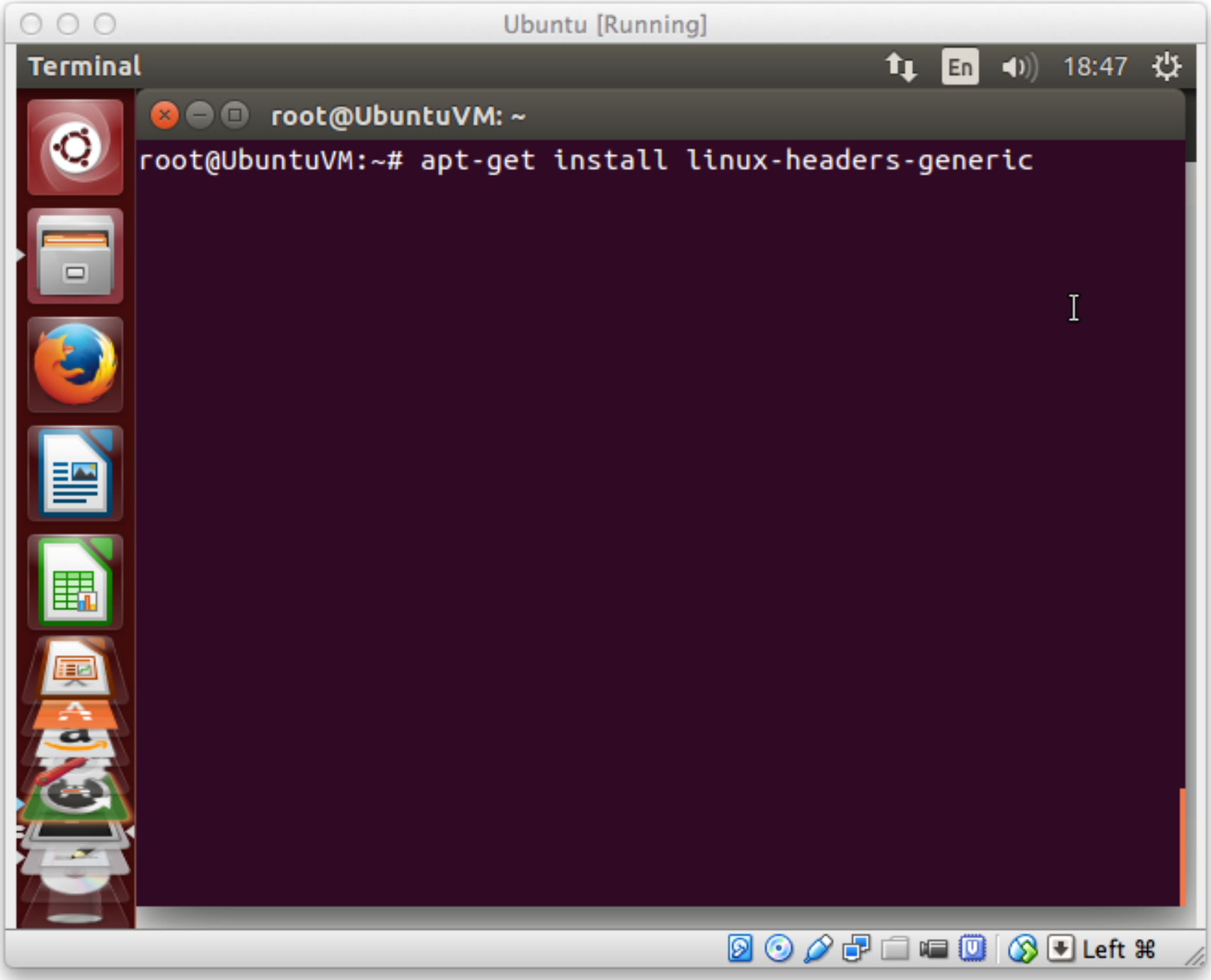

Oracle VM VirtualBox Manager
New
Settings
Start
Discard
Details
Snapshots
Hard drive file type
Please choose the type of file that you would like to use for the new virtual hard drive. If you do not need to use it with other virtualization software you can leave this setting unchanged.
VDI (VirtualBox Disk Image)
VMDK (Virtual Machine Disk)
VHD (Virtual Hard Disk)
HDD (Parallels Hard Disk)
QED (QEMU enhanced disk)
QCOW (QEMU Copy-On-Write)
Hide Description
Go Back
Continue


Oracle VM VirtualBox Manager
New
Settings
Start
Discard
Details
Snapshots
Ubuntu
Powered Off
General
Name: Ubuntu
Operating System: Ubuntu (64 bit)
System
Base Memory: 4096 MB
Processors: 2
Boot Order: CD/DVD, Hard Disk
Acceleration: VT-x/AMD-V, Nested Paging
Preview
Ubuntu
Display
Video Memory: 128 MB
Acceleration: 3D
Remote Desktop Server: Disabled
Video Capture: Disabled
Storage
Controller: IDE
IDE Secondary Master: [CD/DVD] Empty
Controller: SATA
SATA Port 0: Ubuntu.vdi (Normal, 16.00 GB)
Audio
Host Driver: CoreAudio
Controller: ICH AC97
Network
Adapter 1: Intel PRO/1000 MT Desktop (NAT)

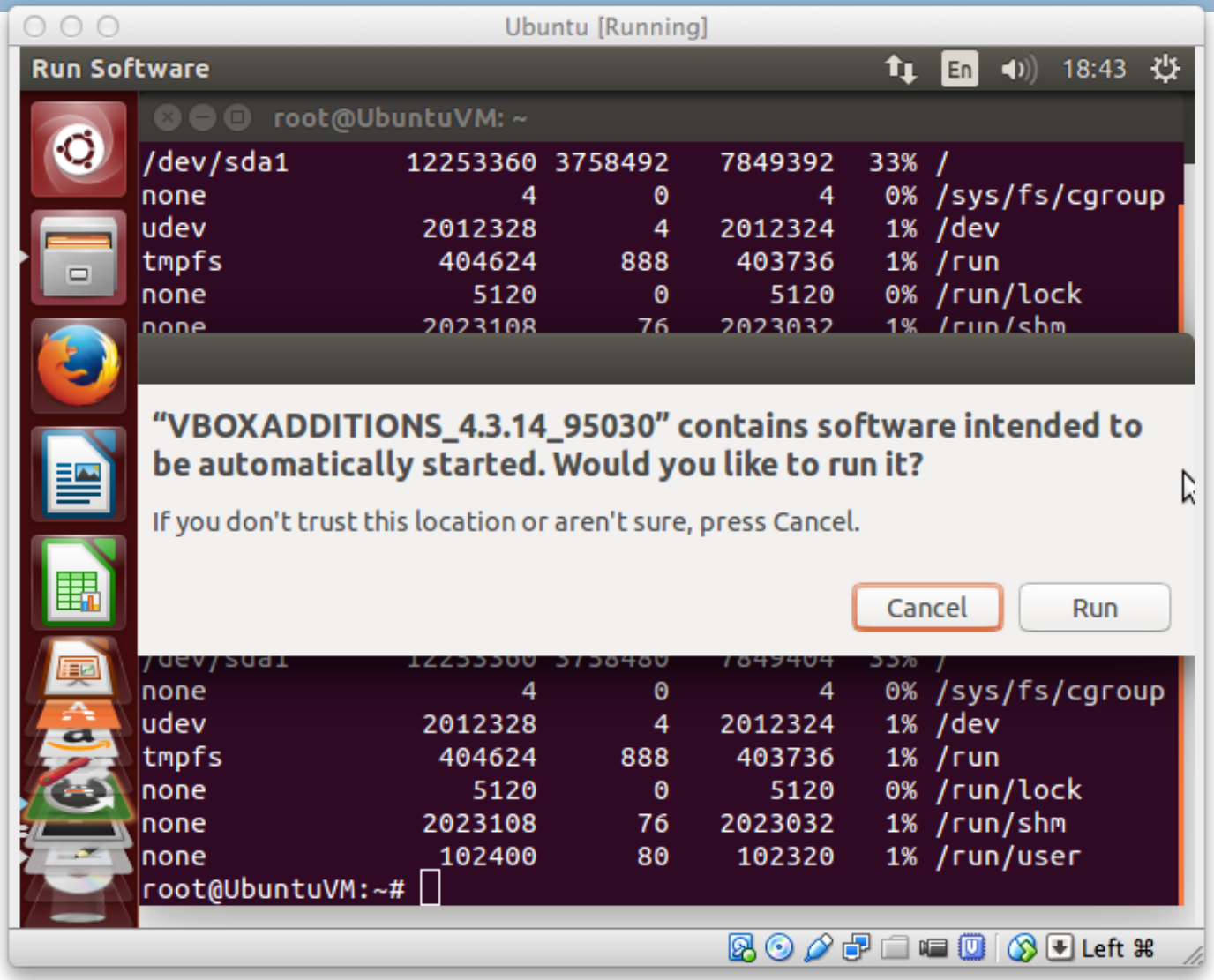
Ubuntu [Running]
En
Install
Welcome
Bahasa Indonesia
Bosanski
Català
Čeština
Cymraeg
Dansk
Deutsch
Eesti
English
Español
Esperanto
Euskara
Français
Gaeilge
Galego
Hrvatski
Íslenska
Try Ubuntu
Install Ubuntu
You can try Ubuntu without making any changes to your computer, directly from this CD.
Or if you're ready, you can install Ubuntu alongside (or instead of) your current operating system. This shouldn't take too long.
You may wish to read the release notes.
Left ⌘


Ubuntu [Running]
En
18:42
terminal
Filter results
Applications
Terminal
UXTerm
XTerm
Music
See fewer results
11 11 - Terminal K
Hyrez - Tunnel Vision [Terminal Audio]
Monika Kruse meets ...oulstice (Terminal M)
Left ⌘

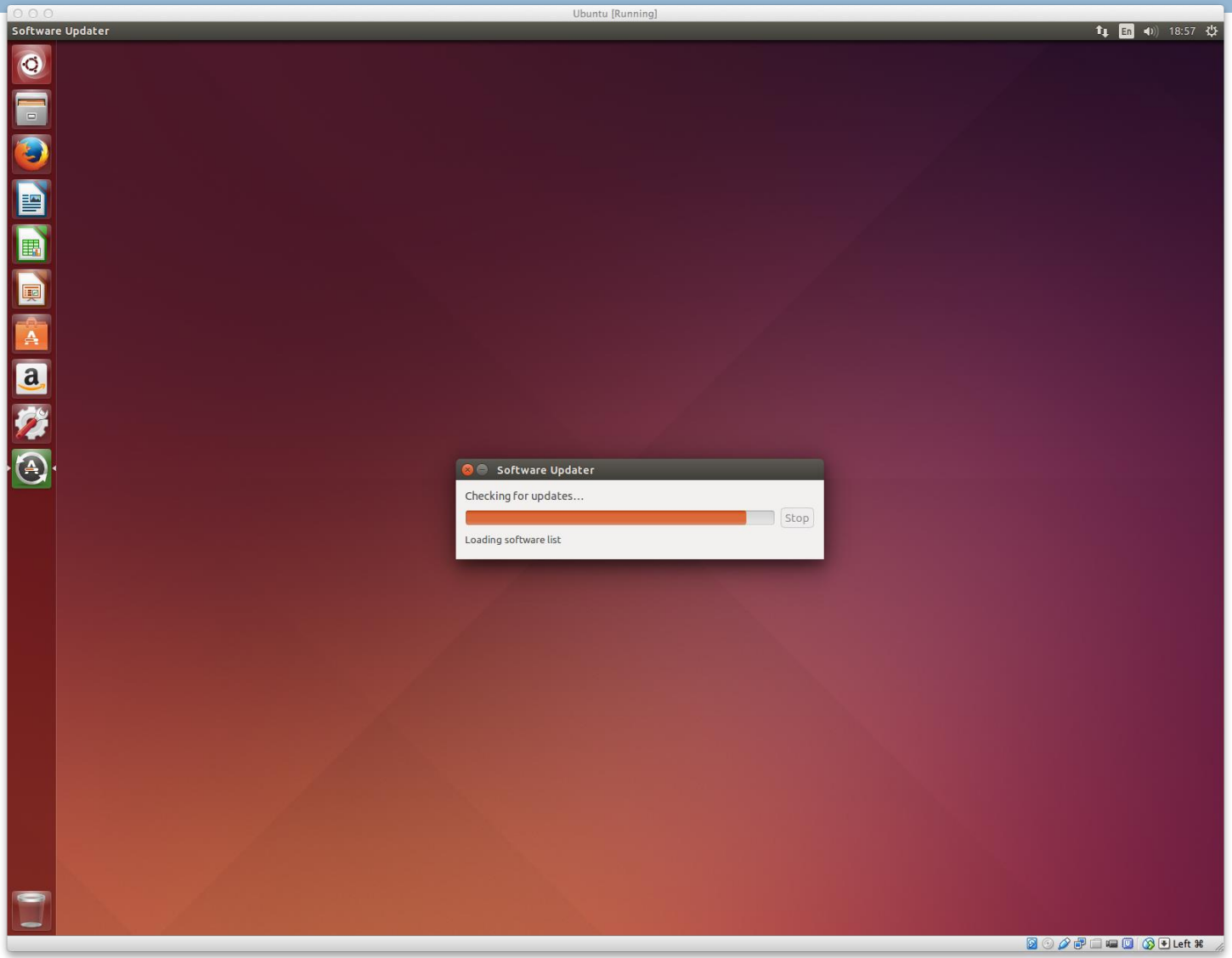

Ubuntu [Running]
Terminal
En
18:41
root@UbuntuVM: ~
euiseong@UbuntuVM:~$ sudo -s
[sudo] password for euiseong:
root@UbuntuVM:~# apt-get install build-essential
Left ⌘

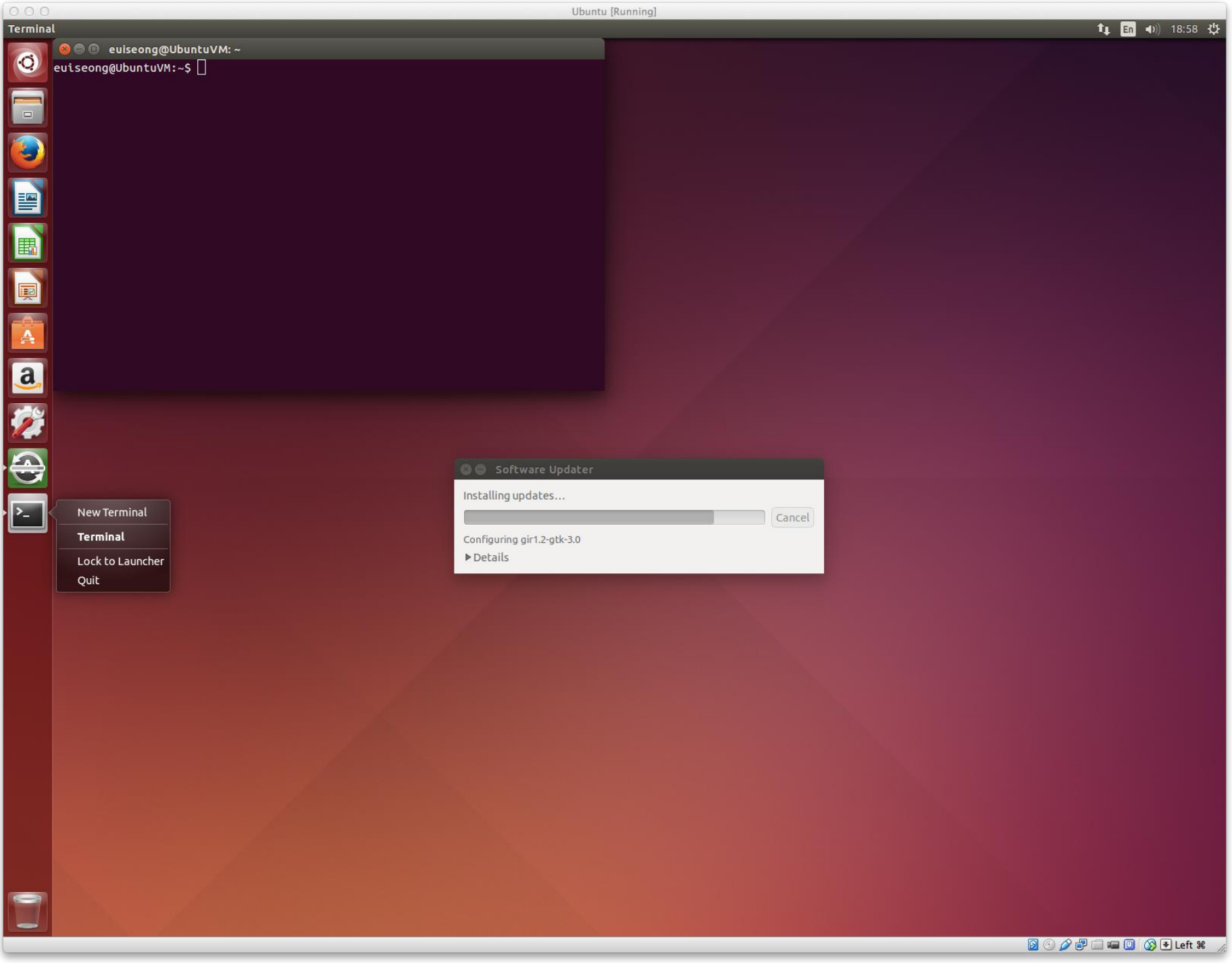

Ubuntu [Running]
Terminal
En
18:47
root@UbuntuVM: ~
root@UbuntuVM:~# apt-get install linux-headers-generic
Left ⌘

Insert Guest Additions CD



After Rebooting




Ubuntu [Running]
Terminal
En
18:58
euiseong@UbuntuVM: ~
euiseong@UbuntuVM:~$
New Terminal
Terminal
Lock to Launcher
Quit
Software Updater
Installing updates...
Cancel
Configuring gir1.2-gtk-3.0
Details
Left ⌘