

# Computer Operating Systems (OS)

How Stuff Works – Operating Systems

# Powering on the Computer

- first program loaded into memory is BIOS
  - basic input-output system
  - stored in ROM on the computer motherboard
- BIOS can communicate with connected devices
  - monitor
  - keyboard
  - storage
    - hard drives, CD/DVD ROMs, USB drives

# Loading an Operating System

- BIOS looks for a bootable device connected to the system
  - a bootable device has an operating system available for execution
  - usually the hard drive
  - could also be a CD, DVD, or USB
  - some computers will also boot over the network
- if a bootable device is detected by BIOS, it will load the operating system and run it
  - if multiple devices are found, they load in a predefined order, or the user chooses

# What is the Operating System?

- computers are a collection of very sophisticated electronic circuits and devices
- without proper instructions, a computer will not do anything useful
- the operating system, or OS, provides all of the programming required for basic functionality
- manage hardware and software
  - interact with the computer
  - launch other programs

# Operating System Interface

In the past...

- computer (CPU), keyboard, monitor
- almost all interfaces were text only
  - known as a terminal interface
- all commands and programs were typed
- minimal and poor graphics available
  - only on most powerful and expensive systems
- computer use required high-level of knowledge and understanding (expert users)

# Text-based Operating System

## MS-DOS (1981)

```
.          <DIR>          19-06-2009   8:36
..         <DIR>          04-06-2009   5:41
CARMEN     <DIR>          04-06-2009   9:40
GAMES      <DIR>          04-06-2009   9:41
LEMMINGS   <DIR>          04-06-2009   9:40
MAXIS      <DIR>          04-06-2009   9:40
MIDI       <DIR>          19-06-2009   9:04
SB16       <DIR>          04-06-2009   9:40
SB16W3X    <DIR>          04-06-2009   9:40
SC2000     <DIR>          04-06-2009   9:40
TIM        <DIR>          04-06-2009   9:40
WINDOWS    <DIR>          04-06-2009   9:40
```

```
AUTOEXEC BAT      210 04-
AUTOEXEC B~K      168 04-
CONFIG B~K         52 04-
CONFIG SYS        150 04-
    4 File(s)      580 Byt
    12 Dir(s)      110,540,800 Byt
```

```
C:\>cd window
Unable to change to: window.
```

```
C:\>cd WINDOWS
```

```
C:\WINDOWS>
```

```
MS-DOS Command release 1.00, version 1.19
Current date is Mon 7-27-2009
Enter new date:
Current time is 15:05:53.11
Enter new time:
```

```
C:\dir
```

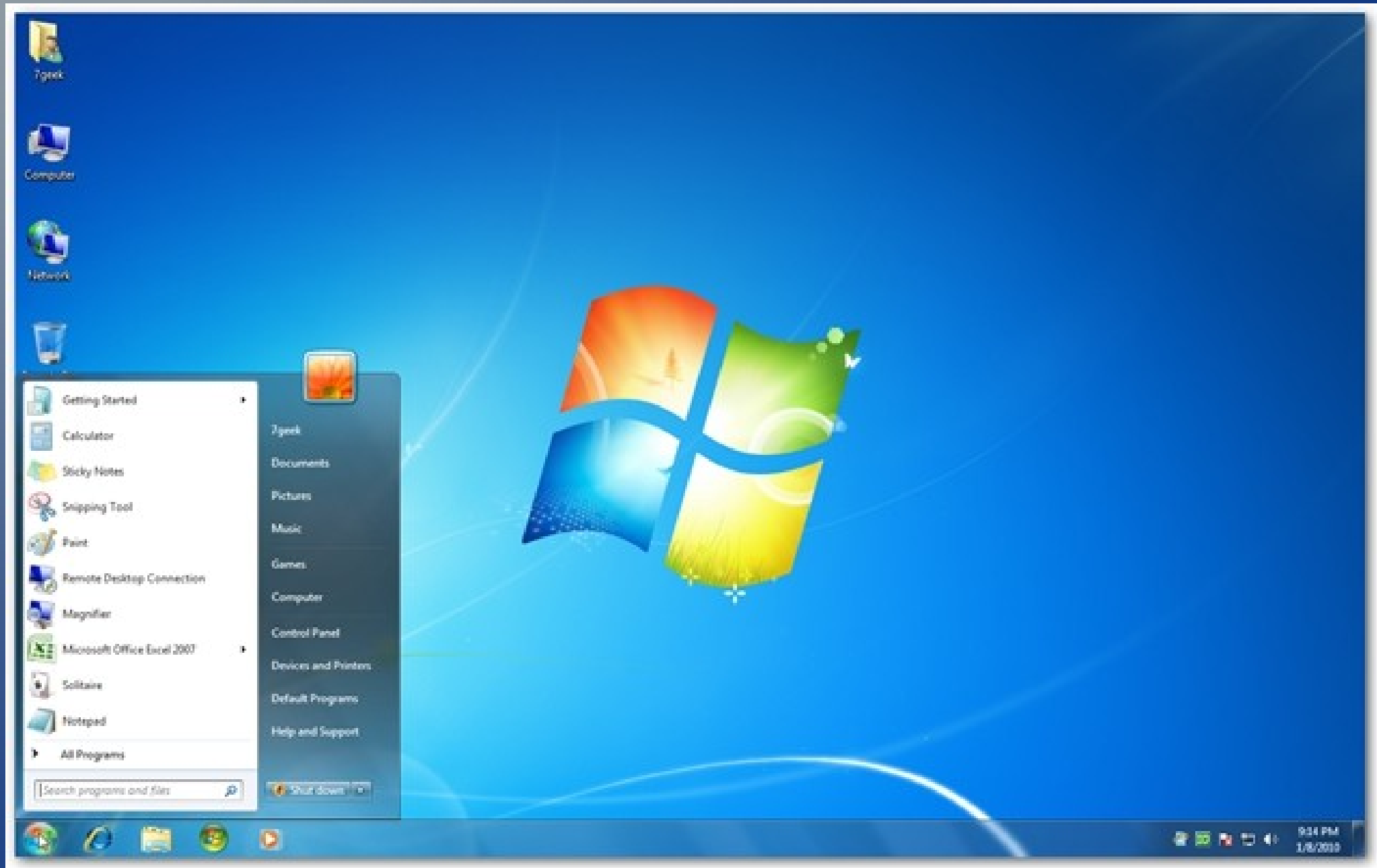
COMMAND	COM	4986	1-18-84	2:01p
SYS	COM	914	1-18-84	2:50p
CHKDSK	COM	1754	8-16-83	12:56p
CONFIGUR	COM	19724	5-03-84	10:33a

# Operating System Interface

Present day...

- most interfaces are graphical
  - graphic user interface (GUI)
  - high quality on almost all computers
- "point-and-click" using mouse or touchscreen
- many devices may be used and controlled
  - keyboard, mouse, monitor, camera, speakers, touchpad, joystick/controller, scanner

# Microsoft Windows 7 (basic)





# Microsoft Windows 8

Start


Ben  
Martens 

Sanjay Jacob  
RE: Let's go see a movie this weekend?  
Sounds like a good plan to me. I don't ...

Mail 8


Cricket team practice  
The Field  
4:30 PM - 7:00 PM

8  
Friday







Internet Explorer




Store

Unmanned commercial rocket v  
the International Space Station




  
Roxanne Kenison also  
commented on Lesley  
Allan's post.


 4



Photos




Maps




SkyDrive

  
68°  
Sydney, Australia  
Sunny 51° / 65°


Weather





Desktop




Messaging

  
Now playing  
Extreme paragliding on the  
south coast of Australia





Music



Xbox LIVE Games



Camera

# Microsoft Windows 10

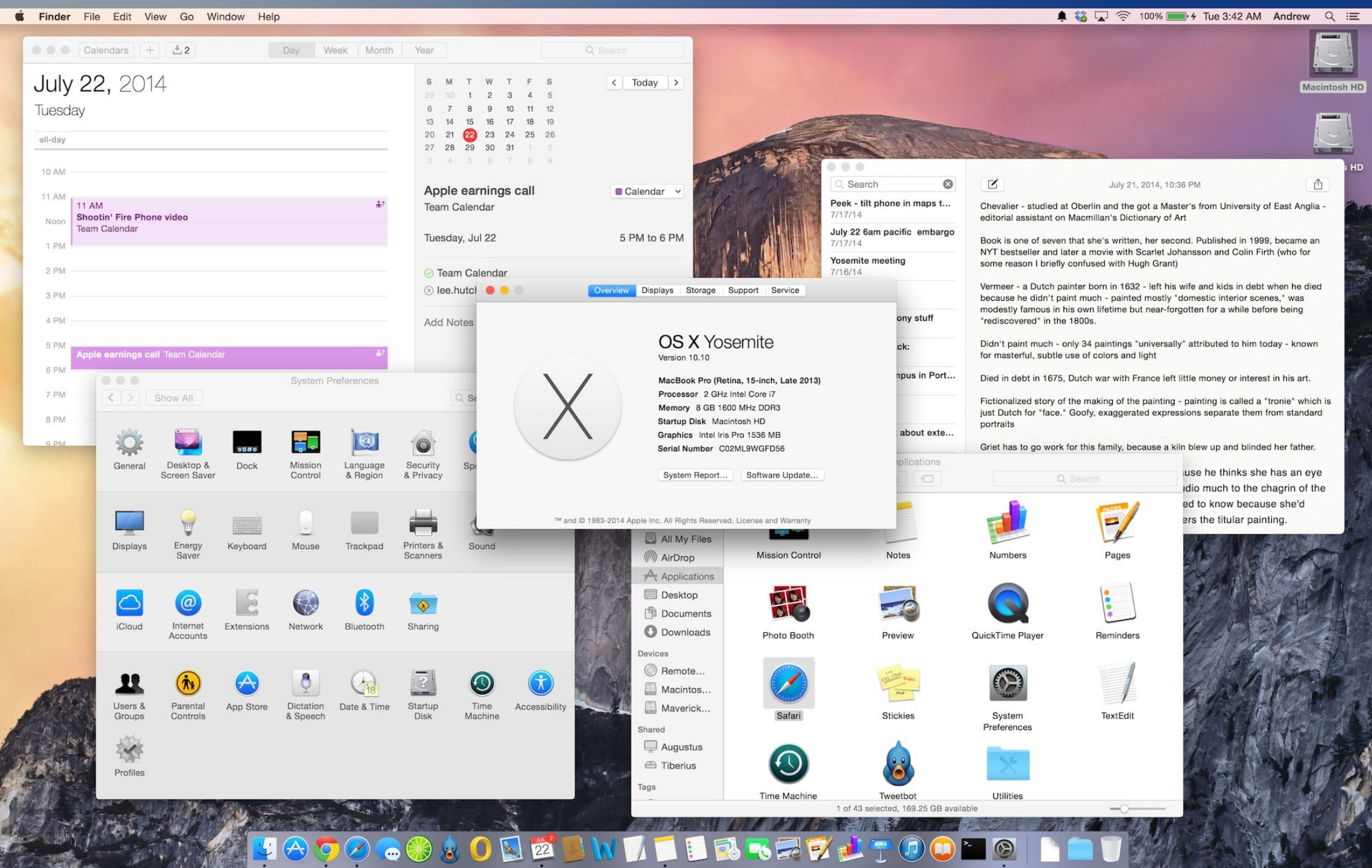


# Apple OS X Lion

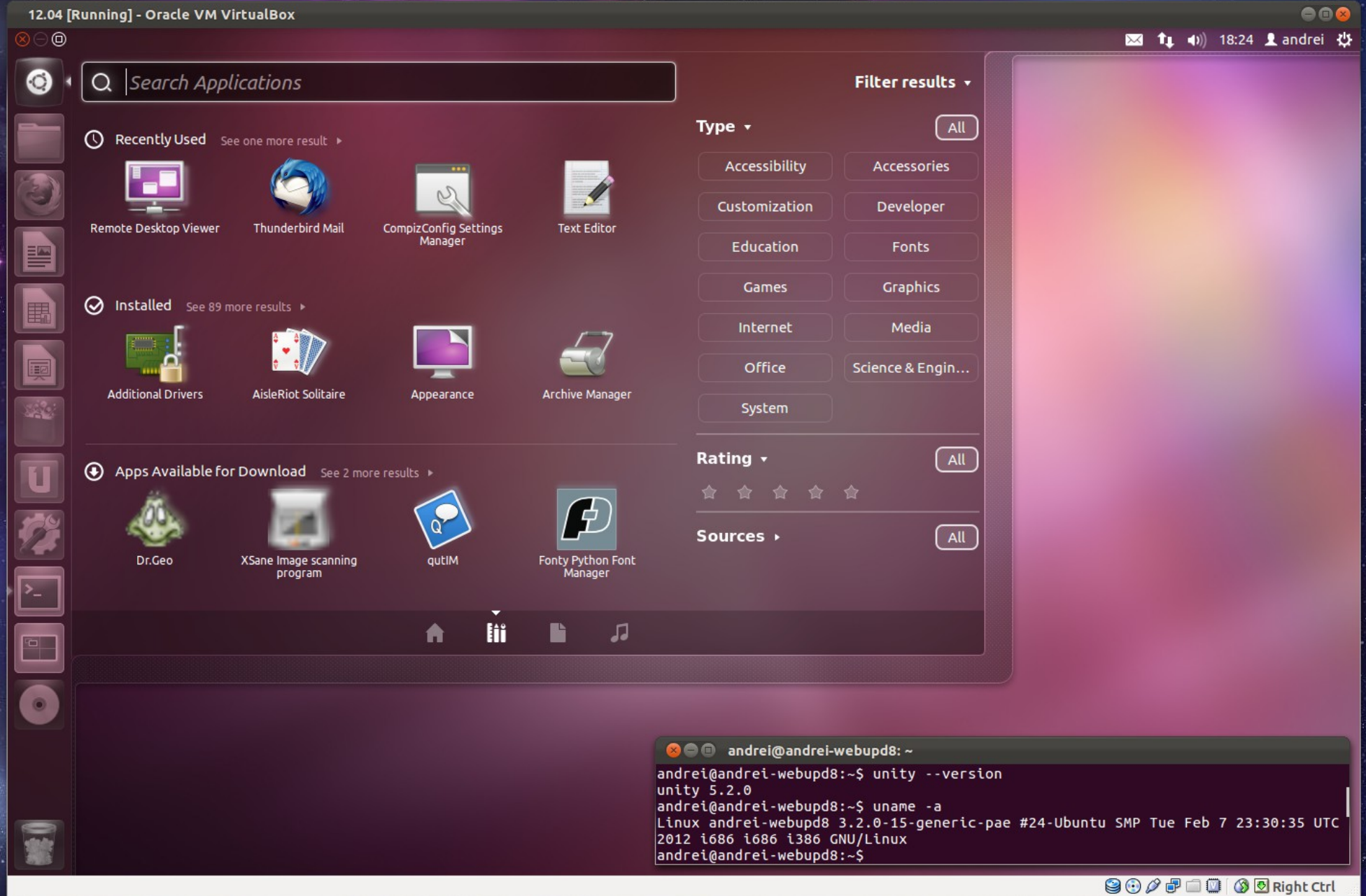




# Apple OSX Yosemite



# Ubuntu Linux (basic)





# Windows Phone



# Apple iOS



# Android Phone





# Ubuntu Touch Phone



Ubuntu Touch Phone  
...Craigtut

# Resource Management

- the most important resources are:
  - CPU usage
  - memory (RAM) allocation
- every program that runs on the computer requires processing (from the CPU) and a place to store data (in memory)
- when program run, they must be loaded from storage to memory
  - if programs do not fit in memory, pieces must be swapped between storage and memory

# Multitasking

- very old computers would perform one task at a time
  - usually a single program loaded into RAM
- operating systems allow the user to choose which program to run
  - the operating system itself is a program, so at least two programs are running
- modern operating systems allow multiple programs to run at the same time
  - operating systems must be very complex and efficient to allow this to work properly