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Lab Lecture 1 – Fall 2018
Introduction to Linux and VirtualBox
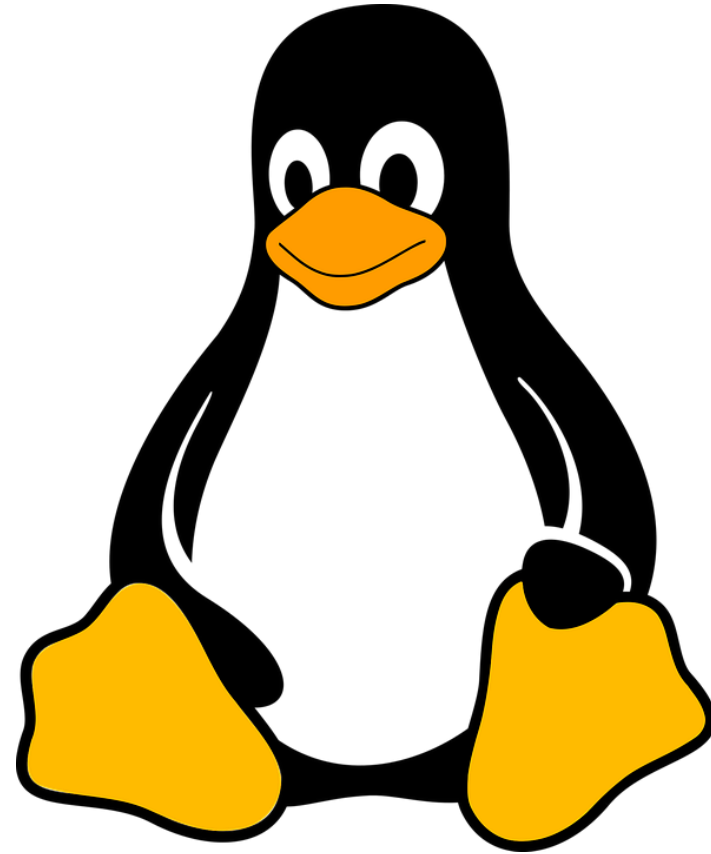
Intelligent Robotics Lab

Ph.D. Husnu Melih Erdogan – herdogan@pdx.edu

Lab Assistant

Any questions about the lab?

Introduction to Linux

What is Linux?

- Linux is an open source operating system.

- Just like any other operating system Linux is software that sits underneath all of the other software on a computer, receiving requests from those programs and relaying these requests to the computer's hardware.

- The code used to create Linux is free and available to the public to view, edit, and—for users with the appropriate skills—to contribute to.

https://www.linux.com/what-is-linux

What is Linux?

- Linux has been around since 1990's.

- Today Linux is everywhere. Cars, homes, smartphones, pc, robots etc.

- There are so many different distributions of Linux.

- It is free.

- Some Linux distributions such as Redhat / Novell provides additional Linux support, consultancy, bug fixing, and training for additional fees.

- Ubuntu Linux, Linux Mint, Arch Linux, Deepin, Fedora, Debian, openSUSE.

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Short history of Linux

- Linux was created in 1991 by Linus Torvalds, a then-student at the University of Helsinki. Torvalds built Linux as a free and open source alternative to Minix, another Unix clone that was predominantly used in academic settings.

- He originally intended to name it "Freax", but the administrator of the server Torvalds used to distribute the original code named his directory "Linux" after a combination of Torvalds' first name and the word Unix, and the name stuck.

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Why Linux?

- Open Source
- Secure
- It can be used with older computers
- Good for programmers
- Quick software updates
- Customization
- Many different distrubutions
- Large user community
- Free

Difference between Unix and Linux?

- You may have heard of Unix, which is an operating system developed in the 1970s at **Bell Labs** by **Ken Thompson, Dennis Ritchie**, and others.

- Unix and Linux are similar in many ways, and in fact, <u>Linux was originally created to be similar to Unix</u>. Both have similar tools for interfacing with the systems, programming tools, filesystem layouts, and other key components.

- **However, Unix is not free**.

- Over the years, a number of different operating systems have been created that attempted to be "unix-like" or "unix-compatible," but Linux has been the most successful, far surpassing its predecessors in popularity.

https://opensource.com/resources/linux

Basic parts of a Linux System

- **The bootloader:** The software that manages the boot process of your computer.

- **The kernel:** This is the one piece of the whole that is actually called "Linux". The kernel is the core of the system and manages the CPU, memory, and peripheral devices. The kernel is the "lowest" level of the OS.

- **Daemons:** These are background services (printing, sound, scheduling, etc) that either start up during boot, or after you log into the desktop.

- **The Shell:** Linux command line. This is the shell – a command process that allows you to control the computer via commands typed into a text interface.

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Basic parts of a Linux System

- **Graphical Server:** This is the sub-system that displays the graphics on your monitor. It is commonly referred to as the X server or just "X".

- **Desktop Environment:** This is the piece of the puzzle that the users actually interact with. There are many desktop environments to choose from (Unity, **GNOME**, Cinnamon, Enlightenment, KDE, XFCE, etc). Each desktop environment includes built-in applications (such as file managers, configuration tools, web browsers, games, etc).

- **Applications:** Desktop environments do not offer the full array of apps. Just like Windows and Mac, Linux offers thousands upon thousands of high-quality software titles that can be easily found and installed.

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Linux Layers
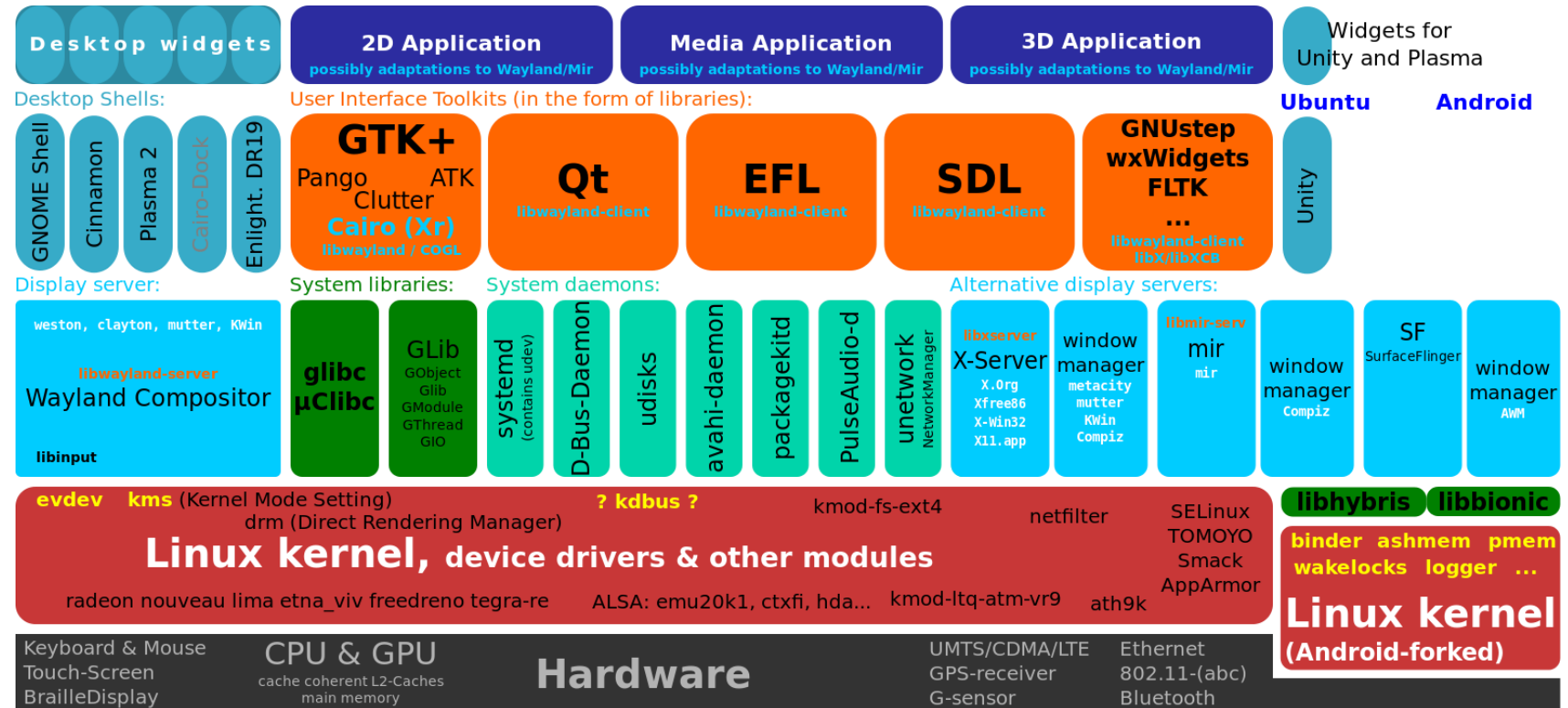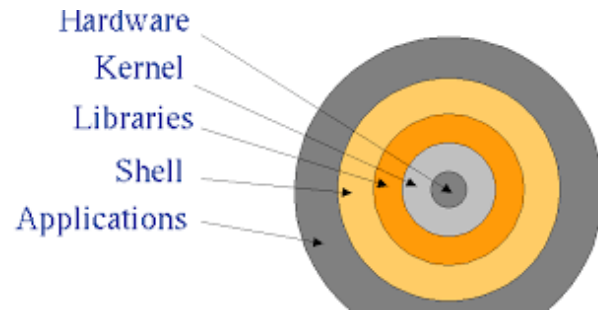
What is terminal?

- A terminal emulator is a program that allows the use of the shell in a graphical environment.

- The use of a terminal emulator is a necessity for most Linux users.

- Here are some free, commonly-used terminal emulators by operating system:
  - **Mac OS X**: Terminal (default), iTerm 2
  - **Windows**: Command Prompt, PuTTY
  - **Linux**: Terminal, KDE Konsole, XTerm

https://www.digitalocean.com/community/tutorials/an-introduction-to-the-linux-terminal

Linux – Useful Linux Commands

- ls : Lists the content of the current directory
- cd : Changes the current directory to the one specified
  - **cd home/pictures**
- pwd: Displays the name of the current working directory
  - **pwd**
    - **Exemple result : home/pictures**
- mkdir: Makes a new directory
  - **mkdir melih**
- rmdir: Remove empty directories
  - **rmdir melih**
- nano: starts nano text editor editor
 - **nano new.txt**

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Linux – Useful Linux Commands

- rm: Removes the specified file
  - **rm: sample.txt**
- cp: Makes a copy of a file and places it at the specified location
  - **cp sample.txt home**
- chmod : Normally used to change the permissions for a file
  - **chmod u=rwx,g= rx,o=r code.py**
  - **chmod o+w code.py**
- mv: Moves a file and places it at the specified location
  - **mv my.txt /home**
- man : manual for commands
  - **man ls**

Linux – Useful Linux Commands

- ssh: Secure shell. Connect to another computer using an encrypted network connection
  - **ssh test@192.168.0.100**
  - **setting ssh service up**
    - **sudo apt-get install openssh-server**
    - **sudo service ssh restart**
- sudo: Run a command as a superuser, or another user.
- unzip : Extracts the files from a compressed zip file.
- ifconfig : Displays the network configuration details for the interfaces on the current system when run without any arguments
- sudo shutdown –h
  - **sudo shutdown –h now**

Oracle VM Virtual Box Manager
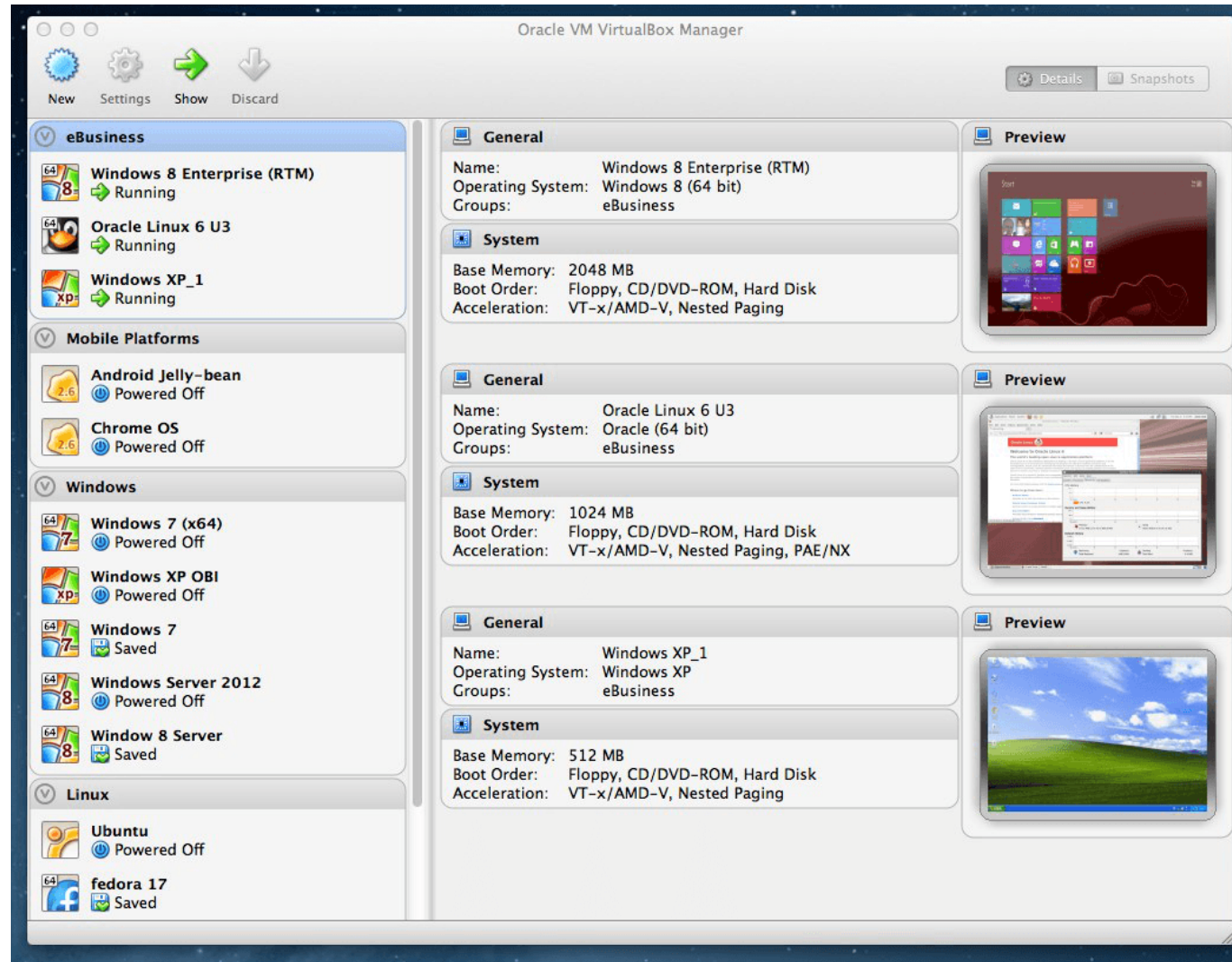
What is VirtualBox?

- VirtualBox is a cross-platform virtualization application.

- It runs on your existing Intel or AMD-based computers. It works on Windows, Mac, Linux or Solaris operating systems.

- It extends the capabilities of your existing computer so that it can run multiple operating systems (inside multiple virtual machines) at the same time.

- You can run Windows and Linux on your Mac via versa.

- You can install and run as many virtual machines as you like -- the only practical limits are disk space, memory and CPU.

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Linux Ubuntu 18.04

- https://www.ubuntu.com/download/desktop
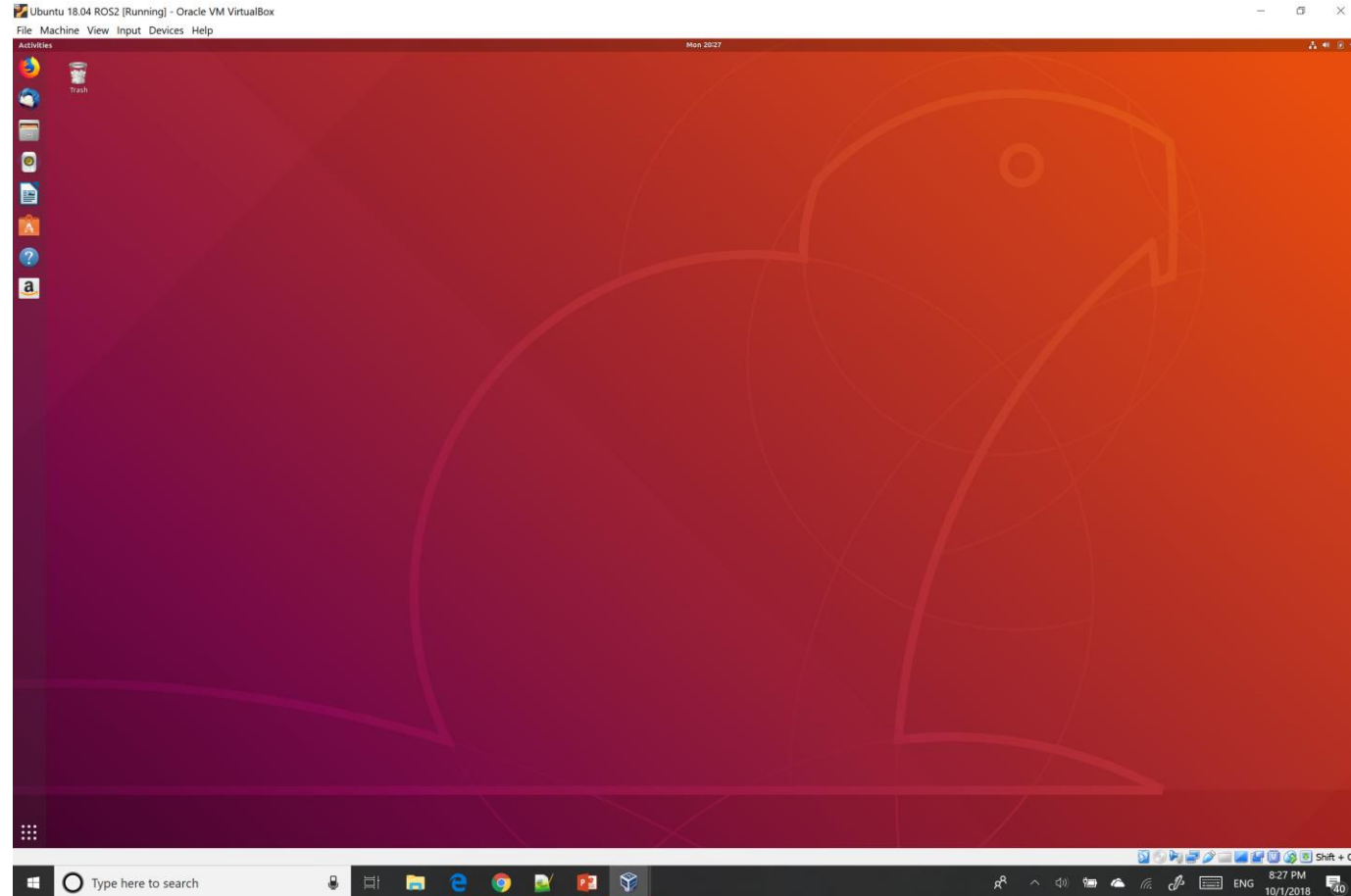
Ubuntu Setup Instructions

- A helpful YouTube video

- **https://www.youtube.com/watch?v=5yJ1d7HhB0s**

- On virtual box when you choose the operating system and version, if you can't find 64 bit version Ubuntu, you have to change your bios settings.

- Reboot your system and start bios. Try to find a setting called Virtual Technology, and if it is disabled, enable it. Save the changes and reboot the system again. Now you should be able to see 64 bit version of operating systems. Different PCs might have different Bios versions, so the location of this setting can be different.

- If this doesn't help, go to turn windows features on or off window and uncheck the Hyper-V feature.

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Bios and Windows Features Settings