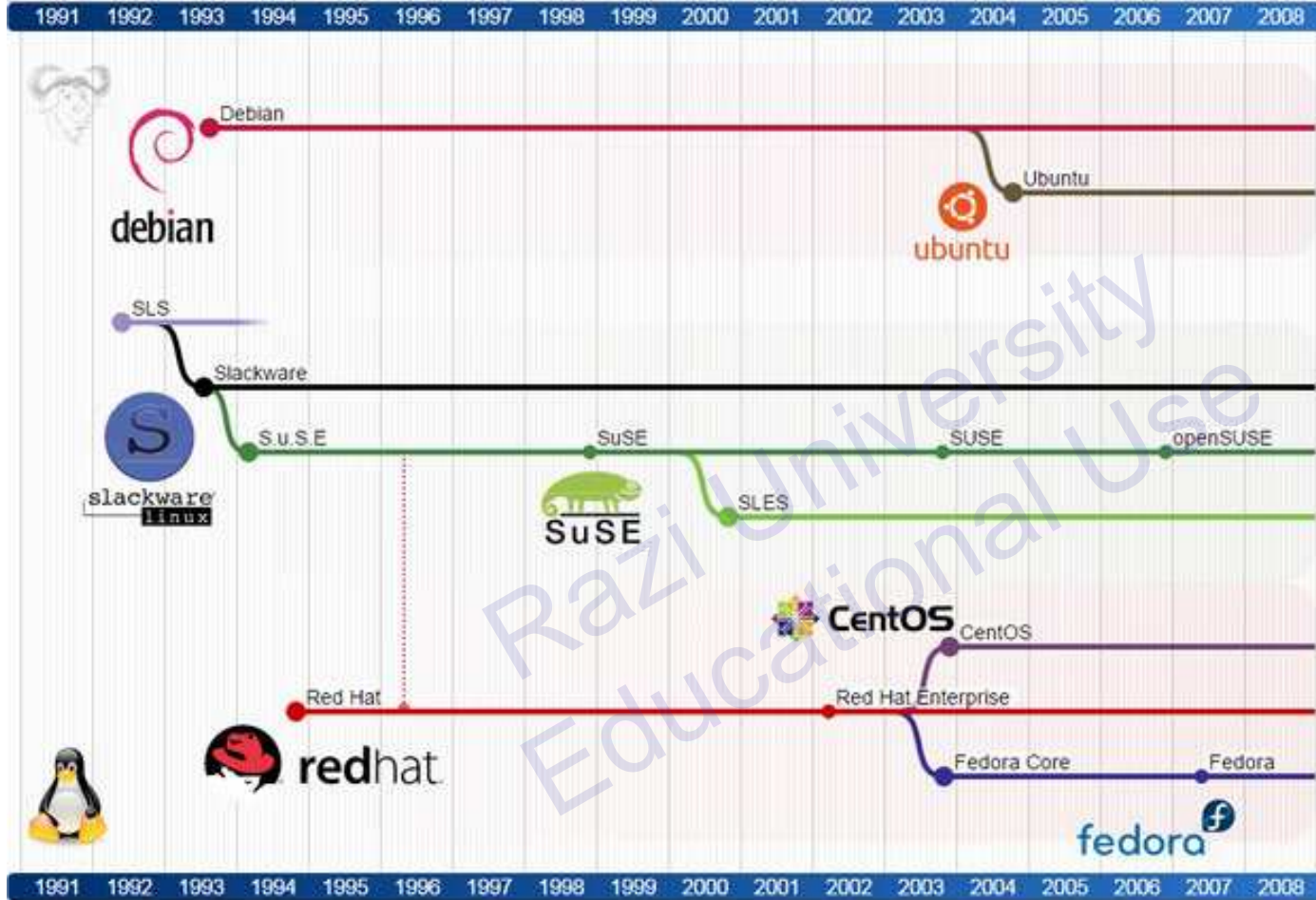# مبانی کامپیوتر و برنامه‌سازی

Linux Ubuntu

میثم سعیدی–استادیار گروه مهندسی مکانیک

Linux

✓ Linux is a family of open source Unix-like operating systems based on the Linux kernel, an operating system kernel first released on September 17, 1991, by Linus Torvalds.

Linux Distributions

Windows Vs. Linux File System

✓ In Microsoft Windows, files are stored in folders on different data drives like C: D: E:

✓ But, in **Linux, files are ordered in a tree structure starting with the root directory**.

✓ This root directory can be considered as the start of the file system, and it further branches out various other subdirectories. The root is denoted with a forward slash '/'.

✓ A general tree file system on your UNIX may look like this.

```
                    / (Root)
   _____|_____
   |        |        |        |        |
  etc      bin      usr      tmp      dev
```
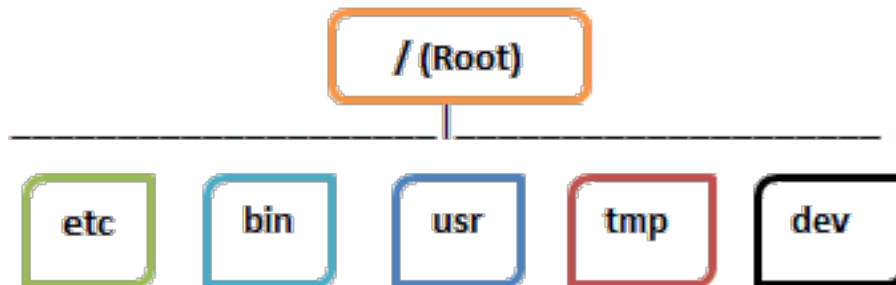
Types of Files

✓ In Linux and UNIX, everything is a file. Directories are files, files are files, and devices like Printer, mouse, keyboard etc. are files.

✓ Let's look into the File types in more detail.

✓ **General Files**

✓ General Files also called as Ordinary files. They can contain image, video, program or simply text. They can be in ASCII or a Binary format. These are the most commonly used files by Linux Users.

✓ **Directory Files**

✓ These files are a warehouse for other file types. You can have a directory file within a directory (sub-directory). You can take them as 'Folders' found in Windows operating system.

Types of Files

✓ **Device Files:**

✓ In MS Windows, devices like Printers, CD-ROM, and hard drives are represented as drive letters like G: H:. In Linux, there are represented as files. For example, if the first SATA hard drive had three primary partitions, they would be named and numbered as /dev/s*da1*, /dev/sda2 and /dev/sda3.

✓ **Note**: All device files reside in the directory /dev/

✓ All the above file types (including devices) have permissions, which allow a user to read, edit or execute (run) them. This is a powerful Linux/Unix feature. Access restrictions can be applied for different kinds of users, by changing permissions.

Windows Vs. Linux: Users

1. Regular

2. Administrative (root)

3. Service

✓ **Regular User**

✓ A regular user account is created for you when you install Ubuntu on your system. All your files and folders are stored in /home/ which is your home directory. As a regular user, you do not have access to directories of other users.

Windows Vs. Linux: Users

✓ **Root User**

✓ Other than your regular account another user account called root is created at the time of installation. The root account is a **superuser** who can access restricted files, install software and has administrative privileges. Whenever you want to install software, make changes to system files or perform any administrative task on Linux; you need to log in as a root user. Otherwise, for general tasks like playing music and browsing the internet, you can use your regular account.

Windows Vs. Linux: Users

✓ **Service user**

✓ Linux is widely used as a Server Operating System. Services such as Apache, Squid, email, etc. have their own individual service accounts. Having service accounts increases the security of your computer. Linux can allow or deny access to various resources depending on the service.

✓ Note:

✓ You will not see service accounts in Ubuntu Desktop version.

✓ Regular accounts are called standard accounts in Ubuntu Desktop

File Name

✓ In Windows, you cannot have 2 files with the same name in the same folder.

✓ While in Linux, you can have 2 files with the same name in the same directory, provided they use different cases.

✓ Linux is case sensitive!

HOME Directory

✓ For every user in Linux, a directory is created as **/home/**

✓ Consider, a regular user account "Tom". He can store his personal files and directories in the directory "/home/tom". He can't save files outside his user directory and does not have access to directories of other users. For instance, he cannot access directory "/home/jerry" of another user account "Jerry".

✓ The concept is similar to C:\Documents and Settings in Windows.

✓ When you boot the Linux operating system, your user directory (from the above example /home/tom) is the **default working directory**. Hence the directory "/home/tom is also called the **Home directory** which is a misnomer.
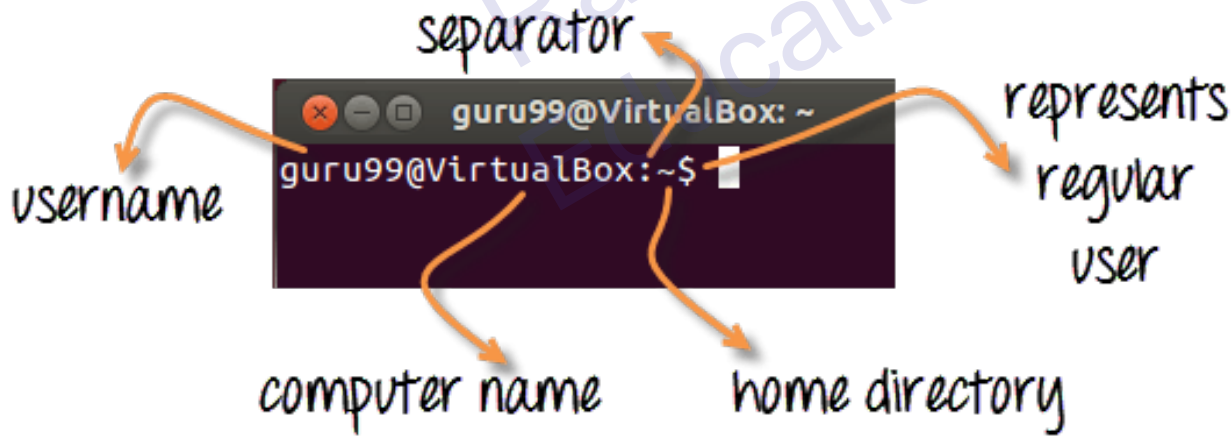
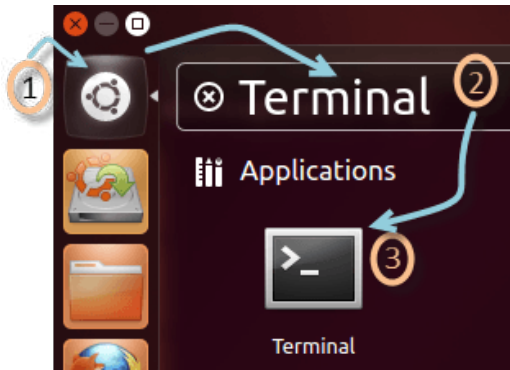# Other Directories

✓ In Windows, System and Program files are usually saved in C: drive. But, in Linux, you would find the system and program files in different directories. For example, the boot files are stored in the /boot directory, and program and software files can be found under /bin, device files in /dev. Below are important Linux Directories and a short description of what they contain.

Other Directories

Common
Programs
bin

User's Home Directory
home

Add-on
Software Packages
opt

Linux Security
Files
selinux

Log files
and others
var

Boot Files
boot

Shared Libraries
lib

System Status
Files
proc

Data for Services by
the system
srv

Optical Drive Files
cdrom

Damaged Files
lost+found

Root User
Home Directory
root

System Files
sys

Device Files
dev

Removable
Media Files
media

Running
Applications Files
run

Temporary Files
tmp

Configuration Files
etc

Manually
Mounted file systems
mnt

System Admin
Programs
sbin

User/s Utilities and
Applications
usr

13

CLI

separator

represents regular user

username

computer name

home directory

Basic commands

- ✓ pwd   present working directory?

- ✓ ls   what files are there?

- ✓ cd   move to directory.

- ✓ cd ..   one directory backwards

- ✓ cp   copy a file

- ✓ mv   move a file

- ✓ rm   delete a file

- ✓ mkdir/rmdir   make/remove a directory

Ubuntu is Free

✓ Because Ubuntu and many of the applications it runs are free, millions of people wherever they are in the world are able to use affordable computers that run not just an efficient OS, but also properly-developed applications. Many schools can't afford Windows computers can easily resort to the beautiful open-source Linux distro without the fear of losing productivity, beauty, or efficiency

Ubuntu is Completely Customizable

✓ Have you tried theming Windows before? Was it an enjoyable experience? **Windows 10** does a better job at customization than its predecessors but even at that, you can only personalize certain components.

✓ Ubuntu is customizable from the moment you install it. The latest version uses the **GNOME** desktop environment which allows you to personalize virtually every single element of your UI/UX, from your notification sounds, popup style, fonts, system animations, and workspaces.

Ubuntu is More Secure

✓ some of the reasons Ubuntu hasn't had that many cases of security bridges and viruses include the fact that it hasn't been much of a target given its market share, and its users are more often than not, tech-savvy. And although Windows 10 has seen a good amount of security improvements, it is not yet immune to some stubborn trojans and malware.

✓ Ubuntu is not immune to security flaws but it is built from its kernel up with more emphasis on operating techniques to cover for the *recklessness* of her not so tech-inclined users; allowing them to be a lot more generous with their portable storage devices and accessories.

Ubuntu Runs Without Installing

✓ That's right! You don't need to wait through a whole installation process because you can run Ubuntu as **Live** directly from a pen drive.

✓ This means that you can carry your OS along with your work files, boot it on another person's workstation and carry on working as if the PC is yours. If this isn't a plus then I don't know what is.

Better Suited for Development

✓ A clean Ubuntu installation comes with out-of-the-box support for programmers to get straight to work on development projects with their machine. After a clean Windows install, you will need to install an office suite, a text editor, Python, Ruby, Java, etc. before you can have a good-enough working environment.

✓ I understand that Windows ships as a multi-purpose, multi-user product, and so is packaged like a skeleton; but Ubuntu has the advantage of providing its users with an office suite, a text editor, and a variety of other productivity apps from the get-go. This saves a lot of time.

Ubuntu's Command Line

✓ Talk to any developer who uses Windows and I doubt they can deny that Bash is awesome. Ubuntu comes with default support for Bash in its command line along with a variety of other commands that make working on servers, development environments, and local files a lot easier.

Update Without Restarting

✓ It might not be a big of an issue to you if you spend long periods away from your computer but imagine what it will cost you if, for example, you are paid per hour and your PC needs close to 30 minutes to install updates. Mind you, it takes longer in some places with slower Internet speeds.

✓ Ubuntu is capable of installing its updates in the background and you will seldom need to be distracted from your work. This is one of the reasons why Windows OSes are seldom used for services that need to be always reading e.g. serving web pages.

Ubuntu is Open-Source

✓ You can go through Ubuntu's source code and make the best contributions you can to it which in turn will allow you to be innovative while you learn about the inner workings of a cool OS. The same can neither be said about Windows nor macOS.

Ubuntu is More Resource-Friendly

✓ Ubuntu can run on older hardware far better than Windows. Even Windows 10 that is said to be more resource-friendly than its predecessors doesn't do as good of a job compared to *any* Linux distro.

✓ Customers who might not be able to afford high-end laptops and desktops can, therefore, install Ubuntu on their old workstations with the assurance that they will be able to deliver their work with little to no hiccups along the way.

✓ There are other advantages Ubuntu has over Windows like being more accommodating of other Operating Systems (since you can select the amount of memory storage you want it to use during setup); and better integration with administrative tools.