

# **FAST**

**National University of Computer and  
Emerging Sciences Peshawar**

**Lecture # 02**

**DEPARTMENT OF COMPUTER SCIENCE**

# **Operating System**

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# Linux

- Developed in 1991 by a University of Finland student **Linus Torvalds**.
- Basically a kernel, it was combined with the various software and compilers from GNU Project to form an OS, called **GNU/Linux**.
- Linux is a full-fledged OS available in the form of various **Linux Distributions**.
- **RedHat, Fedora, SuSE, Ubuntu, Debian** are examples of Linux distros.
- Linux is supported by big names as IBM, Google, Sun, Novell, Oracle, HP, Dell, and many more.



# Linux Short History

- Inspired by the UNIX OS, the Linux kernel was developed as a clone of UNIX.
- GNU was started in 1984 with a mission to develop a free UNIX-like OS.
- Linux was the best fit as the kernel for the GNU Project.
- Linux kernel was passed onto many interested developers throughout the Internet.
- Linux today is a result of efforts of thousands of individuals, apart from Torvalds.



# GNU Project

- Established in 1984 by Richard Stallman, who believes that software should be free from restrictions against copying or modification in order to make better and efficient computer programs.

## Richard Stallman: How he started the GNU project





# GNU Project...

- GNU is a recursive acronym for “GNU's Not Unix” .
- Aim at developing a complete Unix-like operating system which is free for copying and modification.
- Companies make their money by maintaining and distributing the software, **e.g.** optimally packaging the software with different tools (Redhat, Slackware, Mandrake, SuSE, etc).
- Stallman built the first free GNU C Compiler in 1991. But still, an OS was yet to be developed.



# LINUX-Free Software

Free software, as defined by the FSF (Free Software Foundation), is a "matter of liberty (the quality or state of being free), not price."

To qualify as free software by FSF standards, you must be able to:

- Run the program for any purpose you want to, rather than be restricted in what you can use it for.
- View the program's source code.
- Study the program's source code and modify it if you need to.





# LINUX-Free Software...

- Share the program with others.
- Improve the program and release those improvements so that others can use them.



# What is significant?

- **Growing popularity**
- **Powerful**
  - Runs on multiple hardware platforms
  - Users like its speed and stability
  - No requirement for latest hardware



# What is significant?...

- It's "free"
  - Licensed under GPL
  - Vendors are distributors who package Linux.



# Well known users

## ○ Google

- Google is the world's largest search engine. It runs on Linux.

## ○ Amazon

- Amazon is the world's largest internet bookshop. Amazon.com switched much of its massive internal network to Linux in 2000. By the third quarter of 2001, the company reported saving \$17 million, slashing nearly a quarter of its tech expenses.



# Well known users...

## ○ Akamai

- Akamai has the world's largest content delivery network. They use Linux servers.
- Akamai Technologies, Inc. is a global content delivery network, cybersecurity, and cloud service company, providing web and Internet security services. Akamai's Intelligent Edge Platform is one of the world's largest distributed computing platforms.



# Linux on servers and supercomputers

- Linux is the most used OS on servers.
- 5 out of 10 reliable web hosting companies use Linux.
- Linux is the cornerstone of the **LAMP** server-software combination (Linux, Apache, MySQL, Perl/PHP/Python) which has achieved popularity among developers.
- Out of top 500 supercomputers, Linux is deployed on 426 of them.

## Linux on servers and supercomputers...

- LEMP **L** stands for Linux, **E** is for Nginx (engine-x), **M** is for MariaDB or MySQL, and **P** stands for PHP, it can be Perl or Python also.



# Linux on Embedded Systems

- 16.7% of smartphones worldwide use Linux as OS
- Linux poses a major competition to the most popular OS in this segment – Symbian
- Nokia, Openmoko supply Linux on their select smartphones







# Linux on other devices

- Linux can be used on a wide range of electronic devices, like PC, PDAs, Smartphones, iPods, MP3 Players, PlayStation 2 & 3, mission critical servers and so on...



# Why we should use Linux

- No threat of viruses.
- Linux systems are extremely stable.
- Linux is Free.
- Linux comes with most of the required software pre-installed.
- Update all your software with minimum fuss.
- Linux never gets slow.
- Linux can even run on oldest hardware
- Adding more software is a matter of a few clicks.



# Why we should use Linux...

- Most Windows-only apps have their either their native version or alternatives for Linux.
- With Linux, you get the highest degree of possible customizability.
- It is possible to install/run Windows software on Linux.



# Linux

- ❖ There are different operating system available for the Linux but we will use Ubuntu OS.
- ❖ You can install Ubuntu on virtual box or VMware.



# VirtualBox

- VirtualBox is open-source software for virtualizing the x86 computing architecture. It acts as a hypervisor, creating a VM (virtual machine) where the user can run another OS (operating system).
- The operating system where VirtualBox runs is called the "host" OS.
- The operating system running in the VM is called the "guest" OS.
- VirtualBox supports Windows, Linux, or macOS as its host OS.



# VMware

- VMware is a desktop virtualization software platform that is developed by VMware.
- It is hypervisor software that is placed on a physical server that allows us to run multiple operating systems on a single server.
- All the resources used by the physical server are used by all servers.



# Linux Commands

❖ pwd:

```
muhammad@muhammad-VirtualBox:~$ pwd
/home/muhammad
muhammad@muhammad-VirtualBox:~$
```



# Linux Commands

- ❖ `cd /` : will change to root directory.

```
muhammad@muhammad-VirtualBox:~$ pwd
/home/muhammad
muhammad@muhammad-VirtualBox:~$ cd /
muhammad@muhammad-VirtualBox:/$
```

- ❖ Again `pwd`:

```
muhammad@muhammad-VirtualBox:~$ pwd
/home/muhammad
muhammad@muhammad-VirtualBox:~$ cd /
muhammad@muhammad-VirtualBox:/$ pwd
/
muhammad@muhammad-VirtualBox:/$
```





# Linux Commands

❖ ls command:

```
muhammad@muhammad-VirtualBox:/$ ls
bin    dev    lib    libx32  mnt    root   snap   sys    var
boot  etc    lib32  lost+found  opt    run    srv    tmp
cdrom  home   lib64  media    proc   sbin   swapfile  usr
muhammad@muhammad-VirtualBox:/$
```

# THANK YOU

