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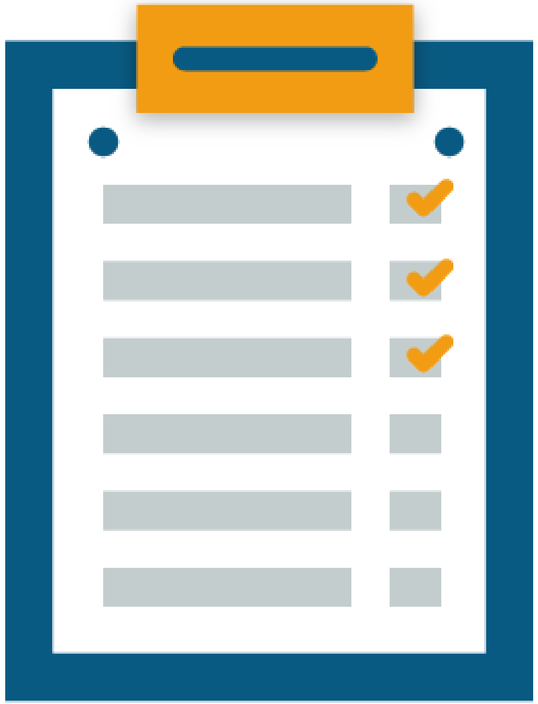
Linux Fundamentals

Topics

Following are the topics covered in this module:

- History of Linux
- Linux vs Unix
- Features of Linux
- Components of Linux OS
- Architecture of Linux OS
- Linux Distribution
- Shell Scripting
- User Interface in Linux
- Linux Commands



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Objectives

After completing this module, you should be able to:

- Understand the History of Linux
- Differentiate between Linux and Unix
- Learn the Architecture of Linux
- Choose the appropriate Linux Distribution
- Create a Shell Script
- Understand User Interface in Linux
- Implement basic and advance Linux Commands and Tools

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Facebook for Social Stability and Support

- Facebook’s platform is built on a modified version of CentOS, with certified support from Red Hat
- CentOS, Distribution of Linux, provides the stability to the company which deliver a consistent user experience, while Red Hat comes with proprietary software packages and enterprise support

DreamWorks for Rendering Movie Magic

- The production powerhouse behind hit films such as Madagascar, Kung Fu Panda and Shrek, the animation sensation that made the company a monster
- According to Red Hat, nearly every artist at DreamWorks use Linux on their desktop and server to help streamline production processes, increase efficiency and reduce cost

Google for Doing Google Stuff

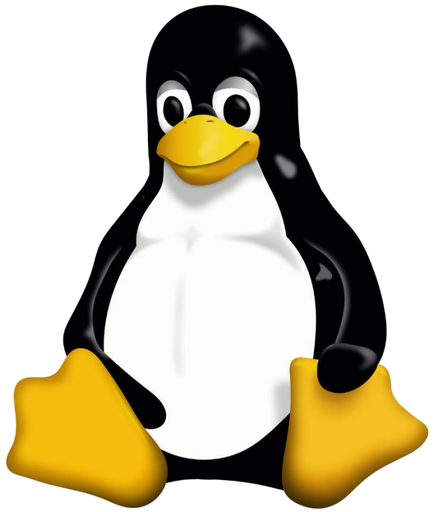
- Google has its own customized Linux distribution called **“Goobunta”**, which is modified version of Ubuntu
- **Goobunta** forms the core of the company’s search, advertising, and cloud computing platforms
- Google prefers Linux for its superior out-of-the-box security, remarkable performance, and unmatched flexibility

Munich for System Liberation

- The city of Munich(Germany) recently completed a 10-year project by migrating nearly 15,000 desktops on its network through **“LiMux”**, again a customized distro of Linux
- Linux makes an ideal solution with a secure architecture, cost effectiveness and flexibility that allows different offices to seamlessly share information

What is Linux ?

Linux is an **Open Source Operating System** modelled on **Unix,** and developed in C language



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Open Source

01 A software becomes open source if its source code is freely available

02 The free software movement was started in 1983 and 1998. Some developers coined the term “Open-Source” to make it less ambiguous and everyone adapted to it

03 Open source projects are generally a collaborative effort by multiple sets of developers to enhance the product and allow others to get benefit of it

04 The owner may put restrictions on usage, modification and distribution by various licensing, but it should be available to study for everyone

History of Linux

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History of Linux

1969 and 1970

Unix OS was conceived, implemented and released by Ken Thompson and Dennis Ritchie

1977

BSD (Berkeley software Distribution) contained Unix code that was developed by UC Berkeley

1983 and 1986

Stallman started a GNU project for Unix like OS, which was free for copying and modification.

In 1986, Maurice J published the design of Unix OS

1987

MINIX, which similar to Unix was developed by Andrew Tanenbaum, where copying of code was allowed

1991

Torvalds created a Linux Kernel in 1991. Linux Kernel along with GNU Tools became Linux Operating System

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Linux Vs Unix

Parameters	Linux	Unix
Cost	Free	Not Free Different vendors have different prices
Flexibility	Yes	Not Flexible Compatible with lesser hardware
Source Code	Available	Not available As it is not a freeware
Installation	Economical	Uneconomical Unix requires specific hardware
Community	Wide network of developers	Limited commercial developers
Support	Depends on forums and community for support	Vendors usually provide technical support for commercial Unix
Bug Fixes	Bug fixing is much faster in Linux than in Unix	

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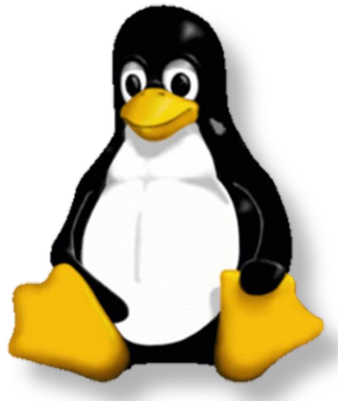
Features of Linux

It is **Reliable** as it runs smoothly and no need to reboot it repeatedly

Licensing freedom to re-use and re-publish the code

Huge base of developers that freely provide **support**

Can be **Customized** if you want to change your system's look



Significantly reduces the **monitory cost**

New **enhancements** happening and updates come frequently

Linux is **open-source**

More **Secure** than other Operating Systems

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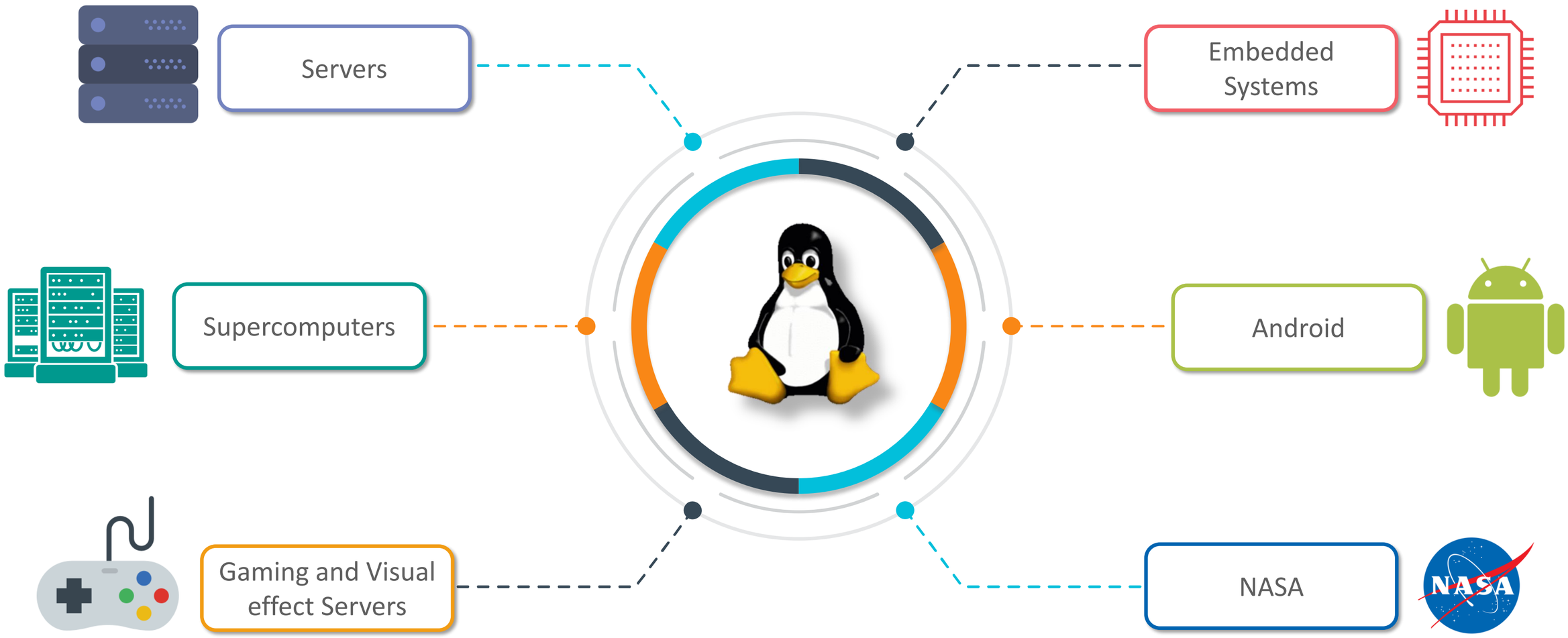
Where Linux is Used?



Components of a Linux OS

1. **Init Program: T**he first program, which is responsible for the initialization of the system. Ex: sysvinit, systemd
2. **Bootloader: A** program which loads the operating system when the system is turned on. Ex: GNU Grub, Syslinux
3. **Software Libraries:** Set of programming code used to develop and design software programs and applications.
4. **Package Management System:** A collection of tools for Installation, Deletion, Configuration, and Upgradation of software. Ex: dpkg, RPM
5. **Other Interface and application:** Various applications and interfaces are used for various task performed by user.

Architecture of Linux OS

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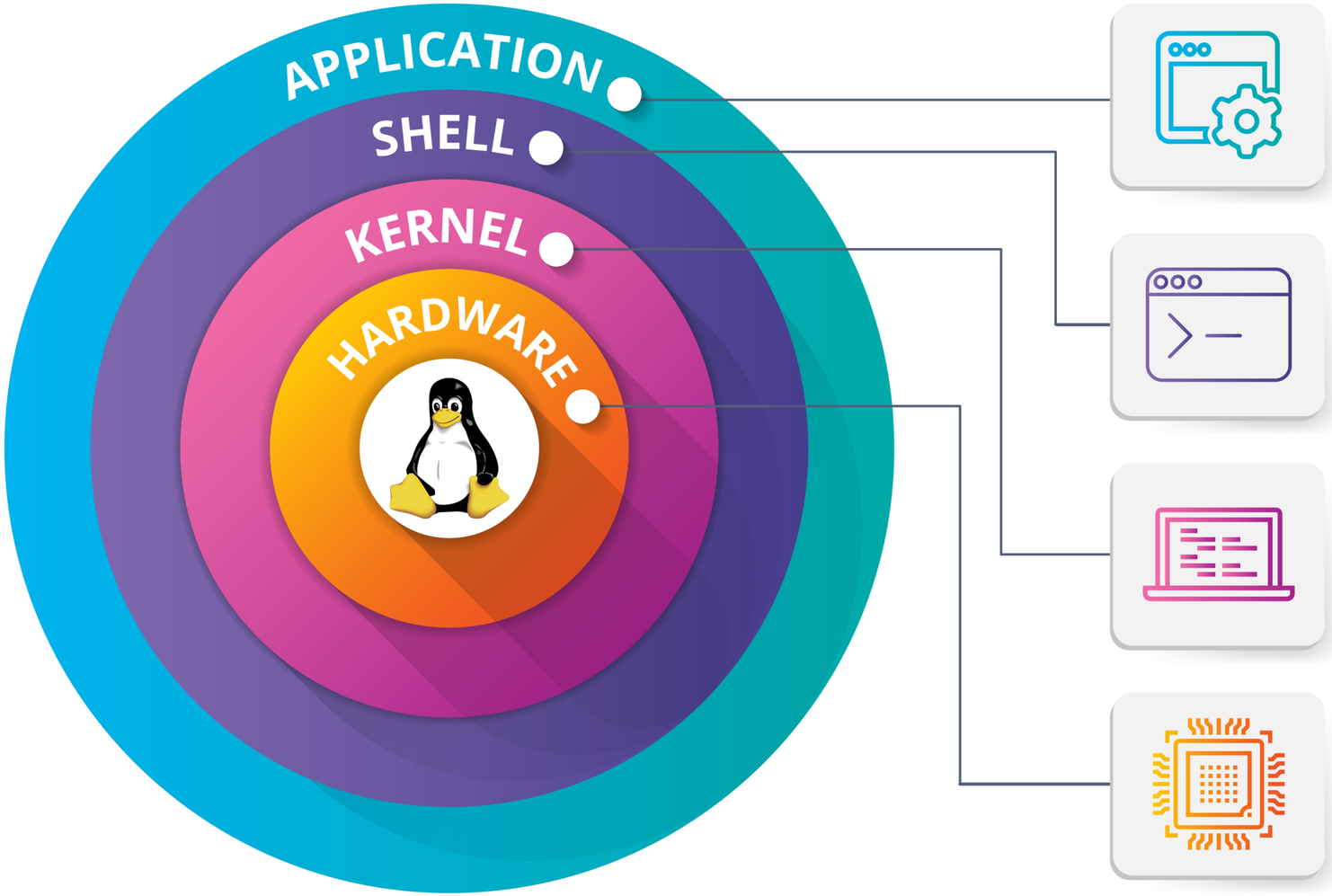
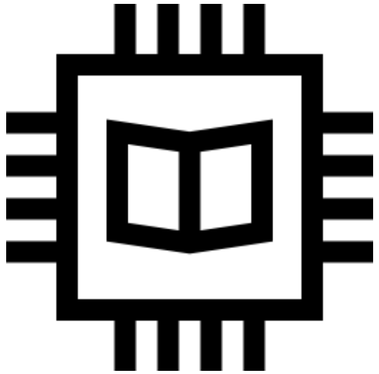
Architecture of Linux OS



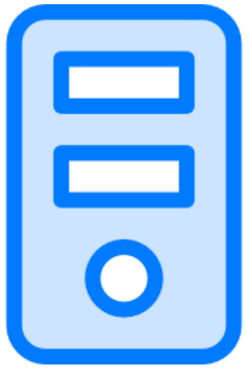
Hardware

Hardware part of architecture includes all the peripheral devices. For Example: CPU, RAM, Hard Disk Drive,etc



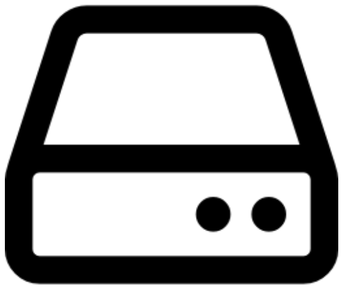
RAM

It is volatile memory space that stores the data which is directly accessed by CPU



CPU

It is a Electronic Component that carries out the instructions of computer program



Hard Disk Drive

It is non-volatile memory, where the Operating System is stored

Kernel

The kernel is the Interface between the Applications and the actual process done at the Hardware level

Tasks performed by the Kernel

Resource Allocation

Manage the computer's resources and allow other programs to run and use these resources

Security Management

Provides security and protection from faults and malicious behaviours

Process management

Allows the execution of applications and support them with features such as hardware abstraction

Device Management

Maintains a list of available devices and allow drivers to physically access their devices

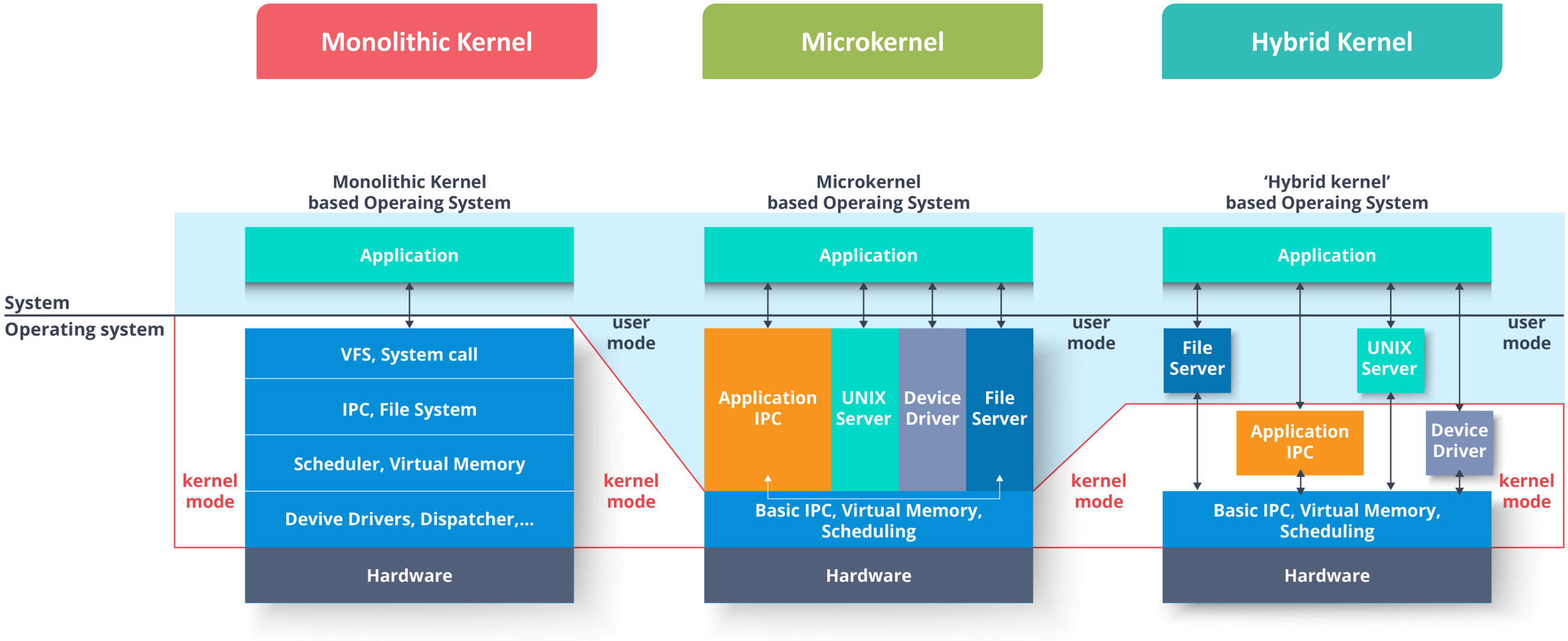
Scheduling

Gives every program specific amount of time and can switch from one process to another

Memory Management

Allows processes to safely access the memory according to their requirements

Types of Kernel



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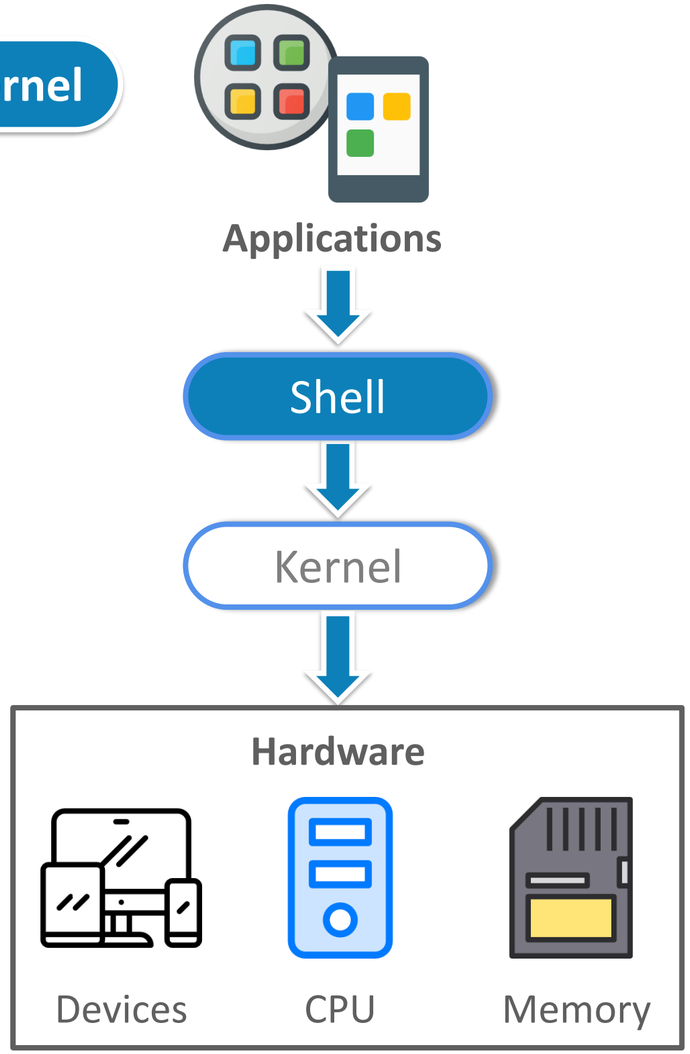
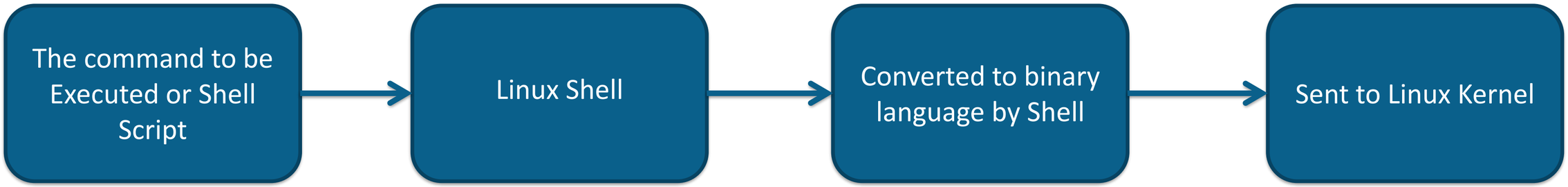
Shell

The shell is the **interface** which takes **user-command** and **sends** it to the **kernel**

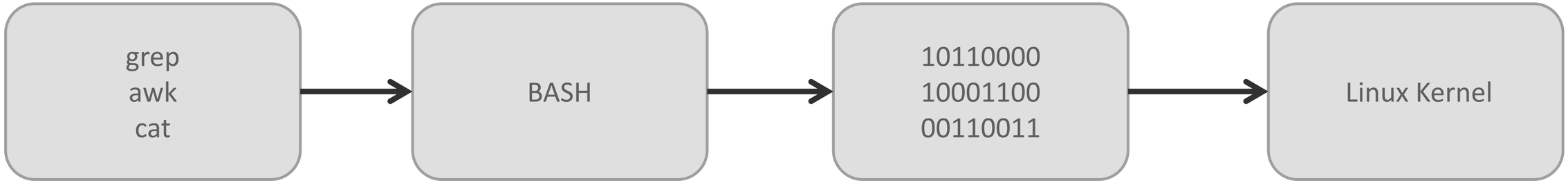
- Shell has got its own programming language and you can combine multiple commands in a single script
- The shell takes the command in human readable format and provides it to kernel in binary language
- The user generally interacts via shell, but direct interaction with hardware is also possible
- The first shell created was **sh** for Unix systems. Linux still provide support for **sh** shell, but bash is more popular within the Linux users



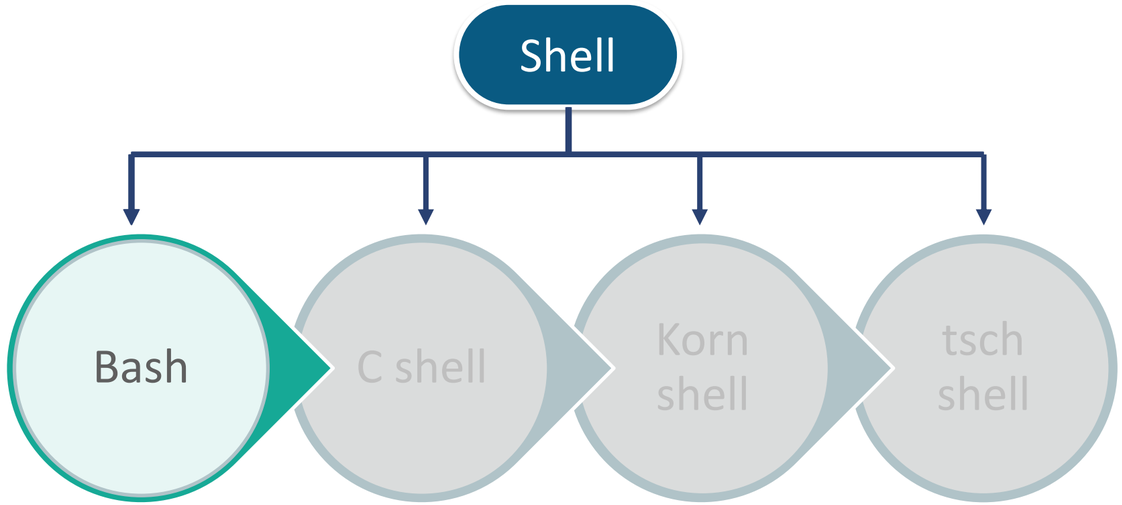
How Shell Works?



Example

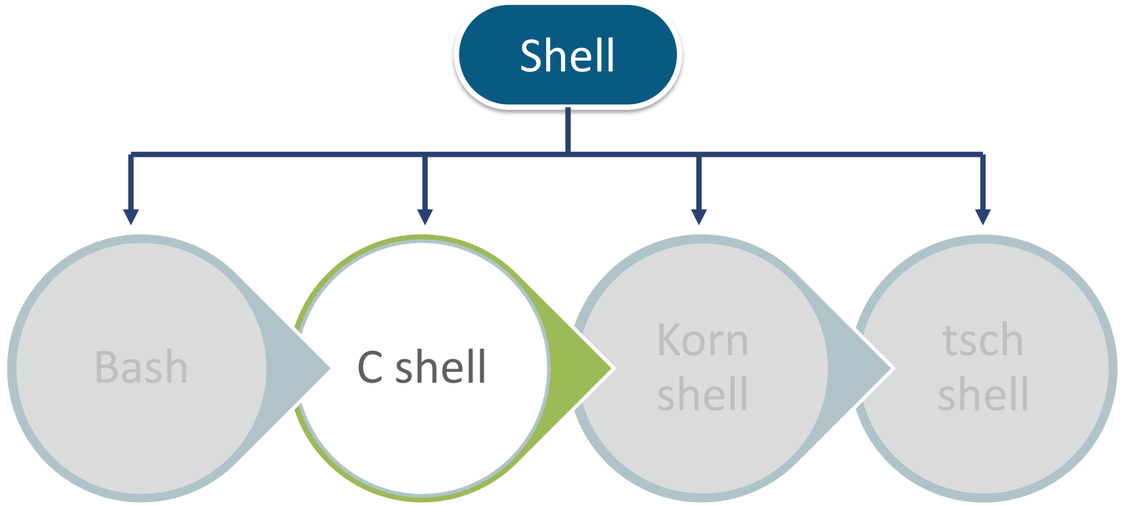


Types of Shell



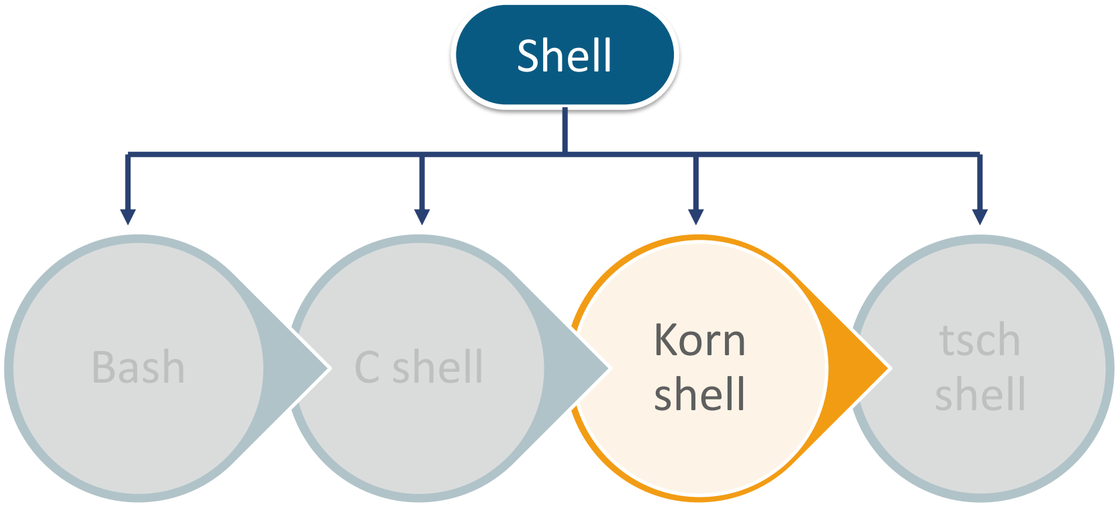
- Bourne-Again-shell was written as part of the GNU project to enhance the functionality of **sh** (Bourne-shell)
- Some enhancements like command completion and complete command history are done
- It supports all **sh** functionalities and has its own script for startup
- It can perform integral calculations without invoking any external process
- One can enter “#! /bin/bash” at the top of the file to tell Linux to run with bash interpreter

Types of Shell



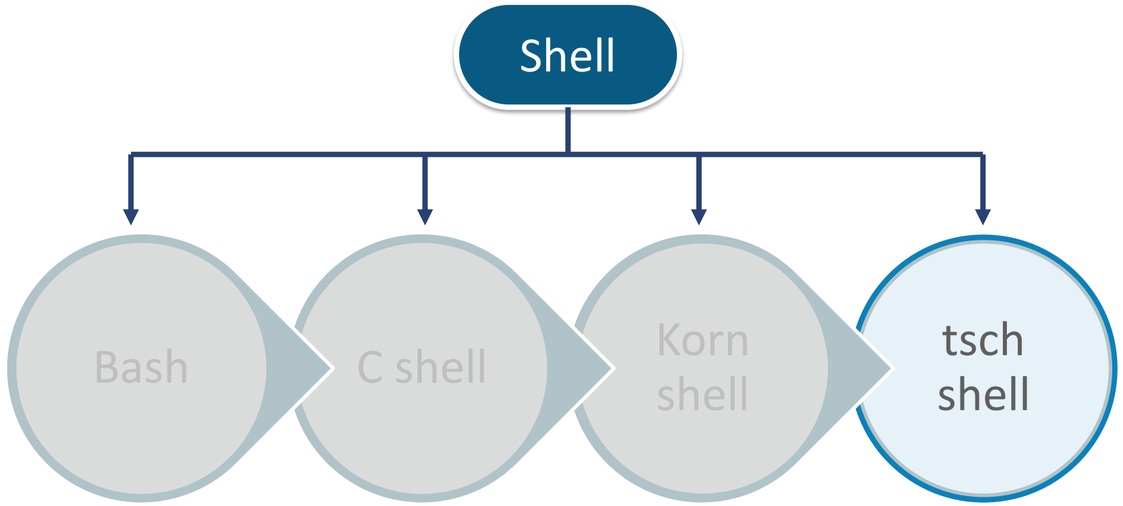
- It was written by Bill Joy and is widely distributed with BSD Unix
- Syntax and control statement are modeled and designed like C
- It is executed in a text window, which allow users to provide commands
- It can also read commands from the script
- It is linked to tcsh shell which is an improved version

Types of Shell



- Korn shell includes C shell's major advantages and its own features
- It has command line editing which allows you to use vi or Emac style editing commands
- It enables common programming tasks to be done cleanly without creating extra processes
- A feature like debugging primitive make it possible to write tools that help the programmer to debug their shell code

Types of Shell



- It is a native root shell of BSD based systems
- It is essentially a C shell with programmable command line completion, command line editing and other new features
- tsch is backward compatible with original C shell
- csh is actually a Tcsh shell on many systems such as Mac OS and Red Hat Linux

Linux Distribution

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What is Linux Distribution(Distro)?

It is an Operating System having Linux kernel and GNU tools packaged with some more applications

Ubuntu

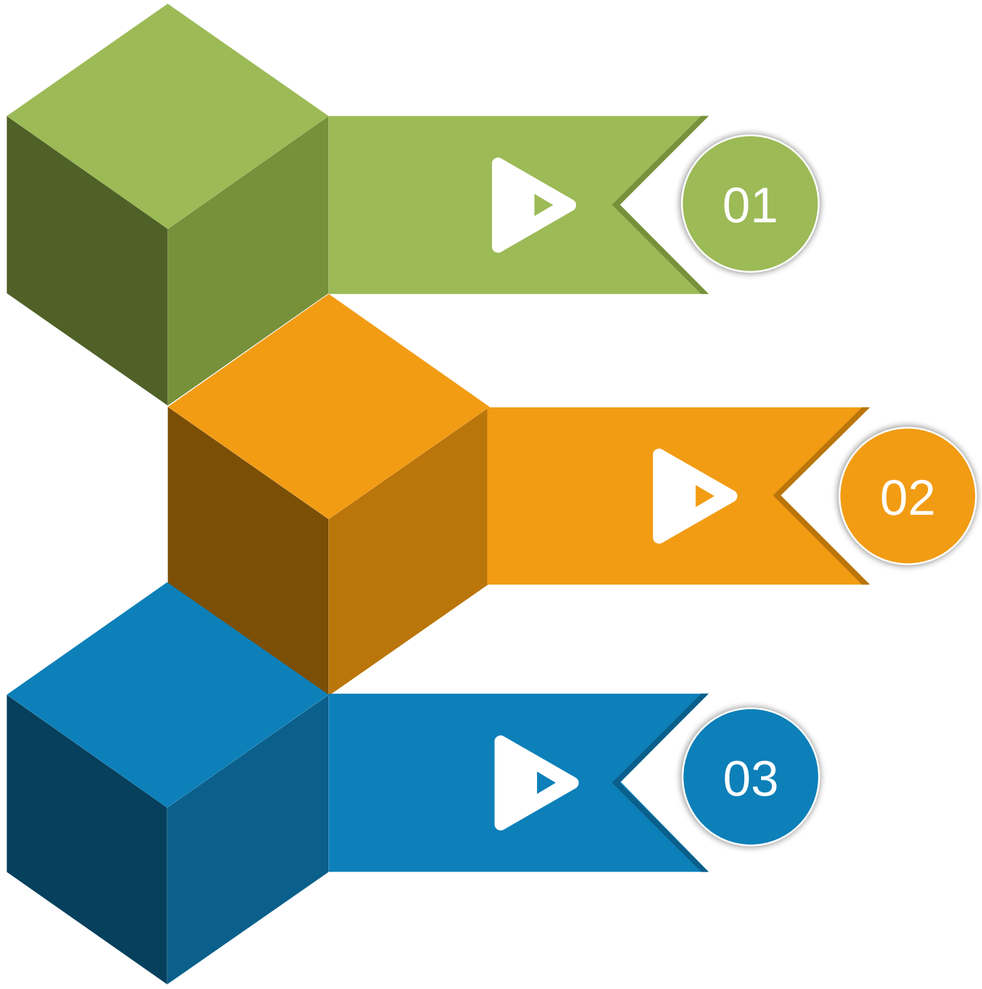
Debian

RedHat Linux

Fedora

- There are more than 600 distribution available based on:
  - The development group
  - Their specific requirement and
  - Customization
- They are community and commercial supported distros
- Some of the popular Linux Distros are Ubuntu, Fedora, RedHat, Debian, CentOS, etc.

Distinguishing Factors for Linux Distro



Enterprise users or home users

- Home user distro has user-friendly GUI and it is easy to use
- Enterprise edition gives more importance to performance

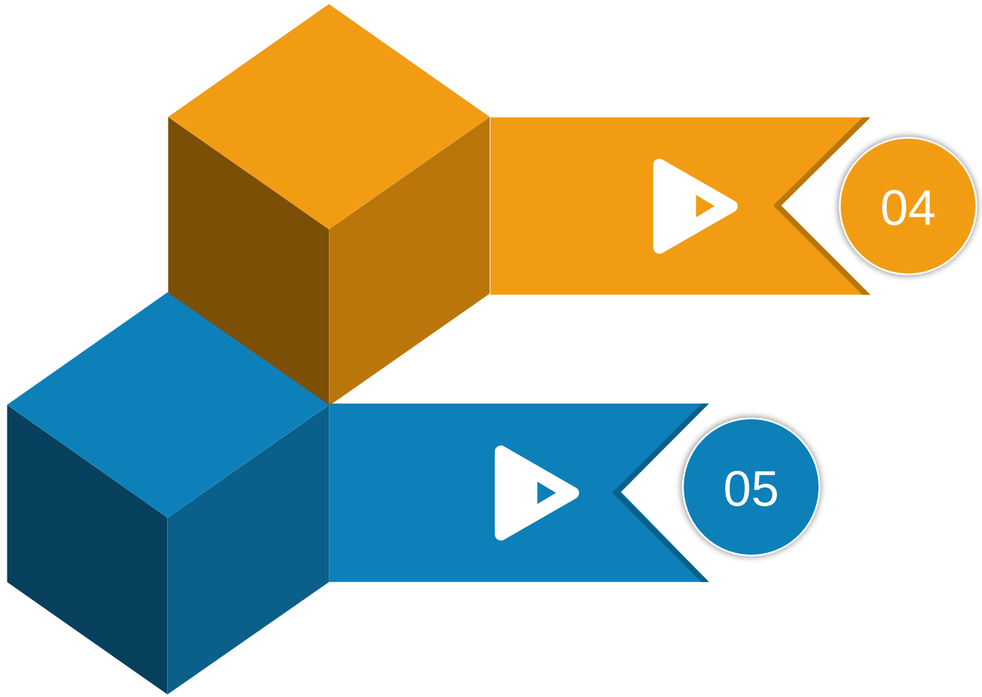
Hardware support

Most of the distros are portable to multiple hardware, but some of them are designed for specific vendors

Designed for Servers, Desktops and Embedded devices

- Server distro generally don’t have a GUI
- Some of the packages of server distro are different from desktop distro

Distinguishing Factors for Linux Distro



Targeted at a specific user community

Some may have enhanced firewall securities while some may be more dedicated towards scientific computing packages

Commercial

If it is to make available commercially or non-commercially

How to Choose Distro?

The distro should be chosen based on the requirement of the user

Purpose of Use - Personal or Professional?

Easy to Install - Configuration is done with default values or it is manually chosen?

Look and Feel - Graphical Interface or Command Line interface?

For this training, it is recommended to use Ubuntu

Ubuntu

- Most Popular Linux Distro
- Secure and reliable
- Multi-variant releases. Ex –Desktop, Server
- Frequent releases
- Easy to use
- It contains a wide range of software like LibreOffice, Thunderbird, etc. and also, games such as Sudoku and chess

Fedora

debian

- Latest technology having huge support base
- New releases frequently
- Easily customizable
- Can upgrade versions without reinstalling
- Stable and Reliable
- Easy to use

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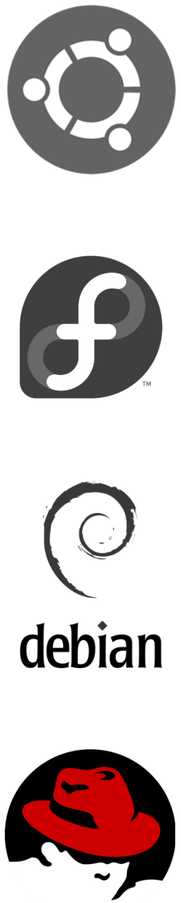
Debian

- One of the oldest community
- Multiple hardware support
- Access to online repositories that contain over 50,000 software packages
- Customized Packages
- New release in 2-3 years
- Stable and secure

RedHat Linux



- Mostly used for big Servers
- Has a maximum number of Hardware support
- Enterprise edition available with support
- Version 3.0.3 was one of the first Linux distribution
- New release in 2-3 years
- Secure and reliable

Miscellaneous Linux Concepts

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File

File

Run Level

Pipe

- You don’t need a command to check the CPU info, but can print the file *“/proc/cpuinfo”* like a simple plain text file
- There are some special files that represent hardware devices, system information, etc.
- The */proc* filesystem in Linux gives detail about the kernel’s run-time operations in form of plain text files

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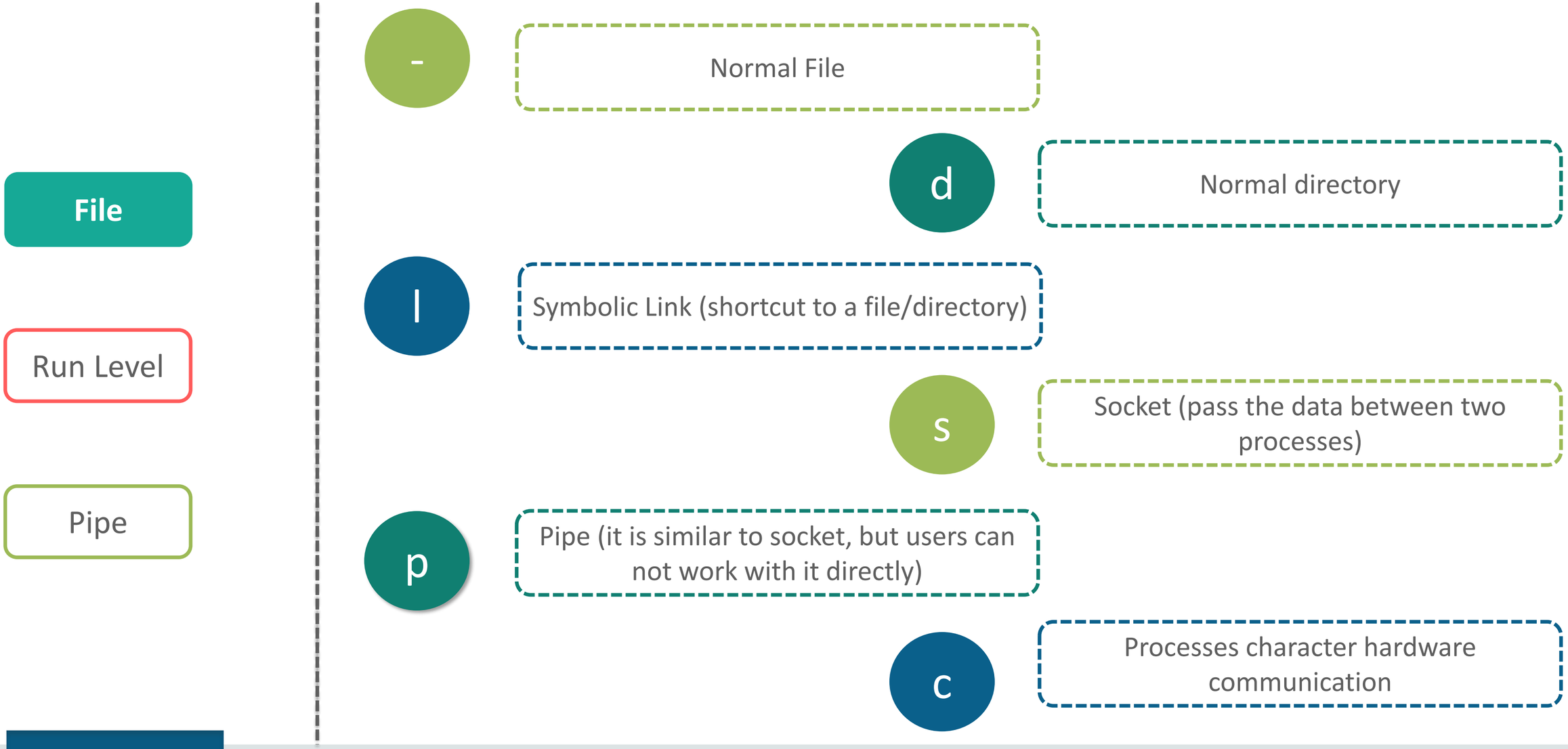
Types of File in Linux



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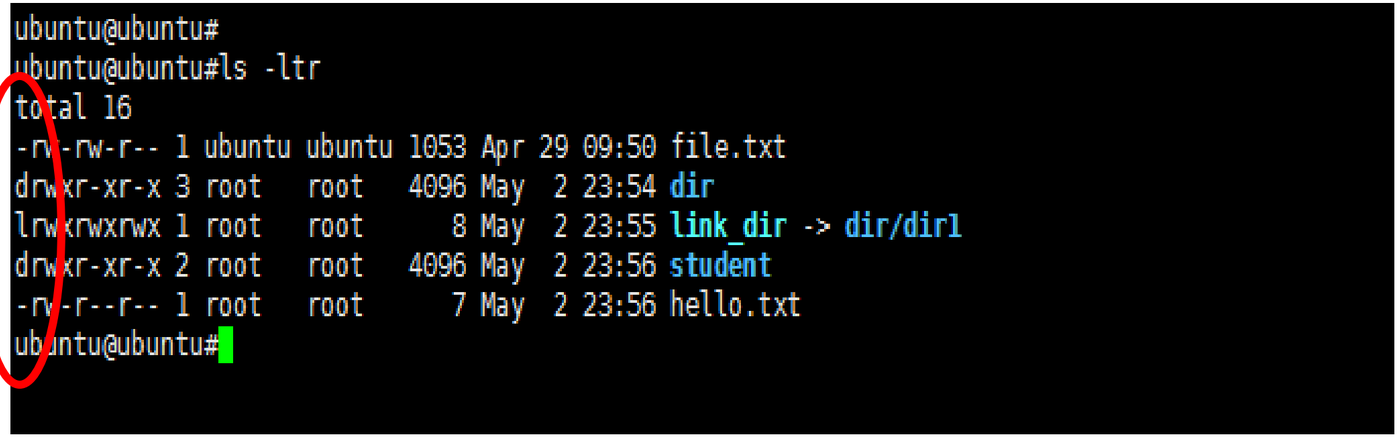
Demo – File Types

File

Run Level

Pipe

- Check the first letter which is describing the file type
- Based on the distro, each file type is assigned with different color code



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Run Levels

File

Run Level

Pipe

- The **init** figures out the default run-level to start the associated script with respect to the configured run level
- You can manually change the run level using the **telinit** command and superuser has permission to modify the run - level

It is an operational level which describes the current state of the system with respect to the services available

It is a single digit integer that defines the state of the system

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Run Level in Linux

File

Run Level

Pipe

0 Halt the system

1 Single User Mode

2 Multiple user mode with no network File system

3 Multiple user mode in CLI, but no GUI

4 User definable

5 Multiple user mode in GUI

6 Reboot

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Pipe

File

Run Level

Pipe

- Pipe represented as “|” is used to direct the output of one command to another
- It creates an internal connection between two or more commands
- The data is passed to other commands directly instead of using temporary text files
- The pipe is unidirectional and data flows from left to right
- Pipe along with grep is most commonly used
- Ex – *cat fil.txt | grep “Linux”*

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Shell Scripting

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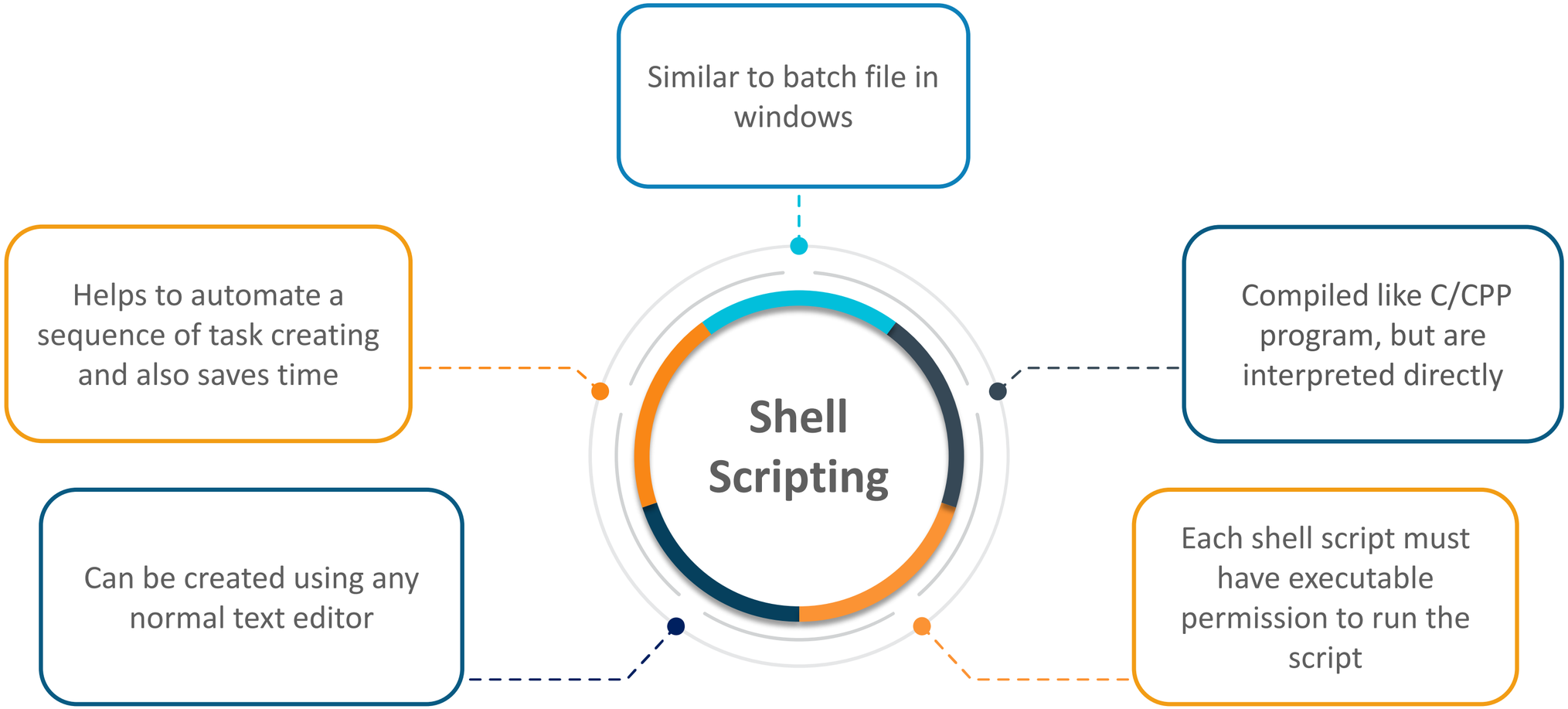
Shell Scripting

Shell Scripting is a series of shell commands arranged in a text file to be executed one after the other



Creating a Shell Script

To get into the root for execution
sudo -i
Create a text file and add the extension of the shell
 # vi script.sh

Enter some commands in the scripts to be executed

echo "My first Script"
echo $(date)

Change the permission of the script, give it executable permission and may also give read and execute permission for other users
 # chmod 755 script.sh

Run the script

 # ./script.sh
 # bash script.sh

Creating a Shell Script

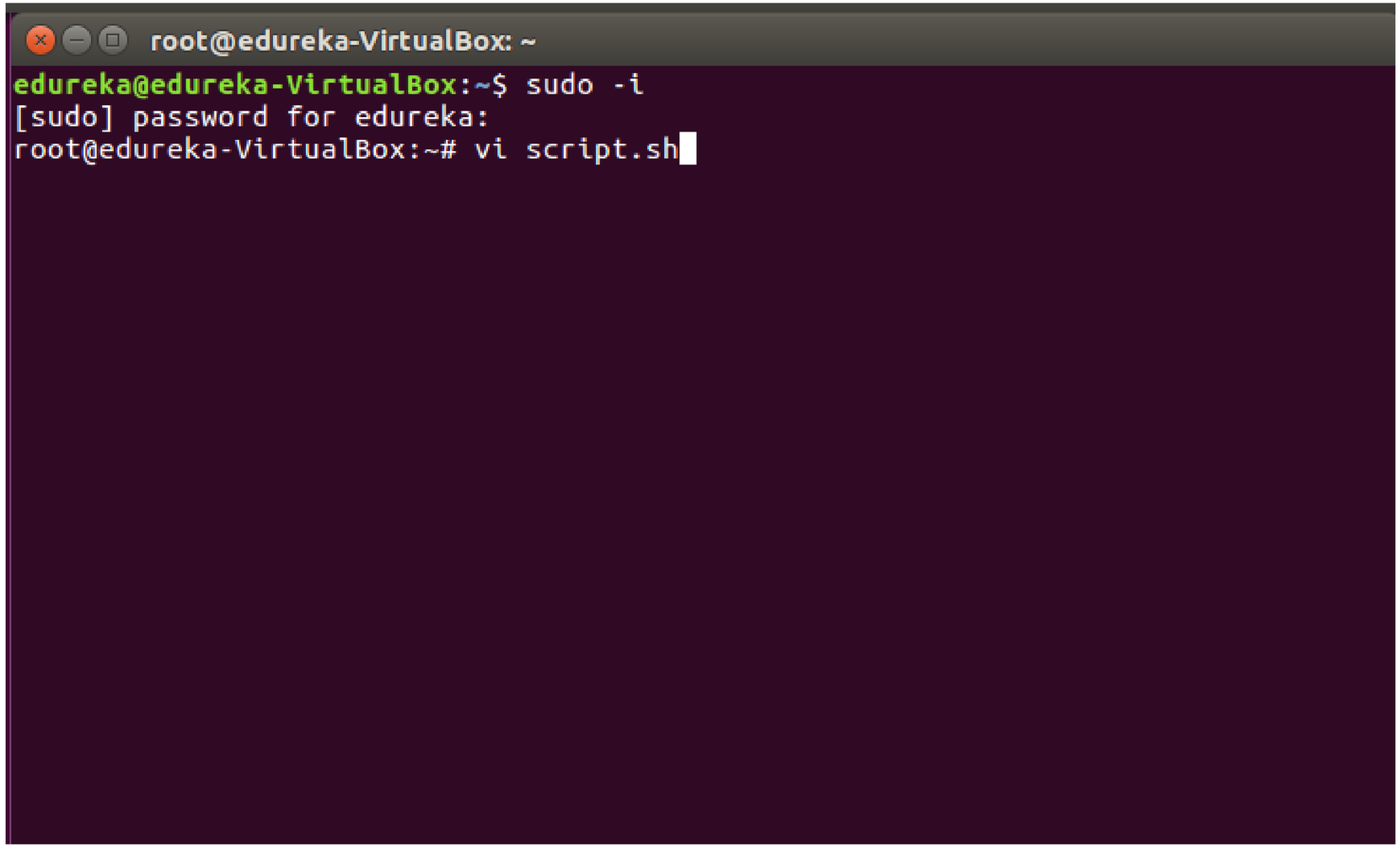
1

sudo -i
 # vi script.sh

echo “My first Script”
echo $(date)

 # chmod 755 script.sh

 # ./script.sh
 # bash script.sh



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Creating a Shell Script

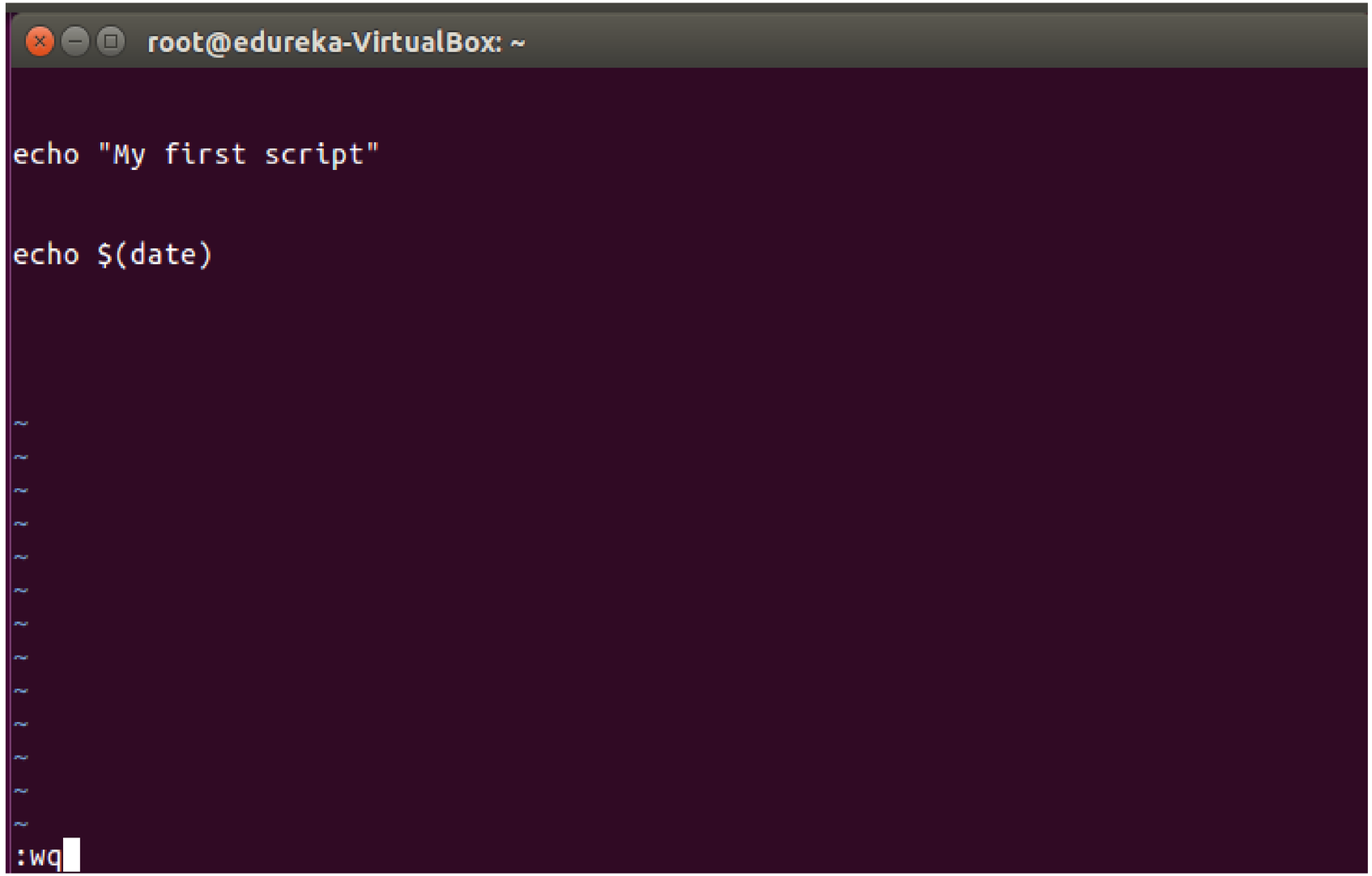
sudo -i
 # vi script.sh

2

echo “My first Script”
echo $(date)

 # chmod 755 script.sh

 # ./script.sh
 # bash script.sh



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Creating a Shell Script

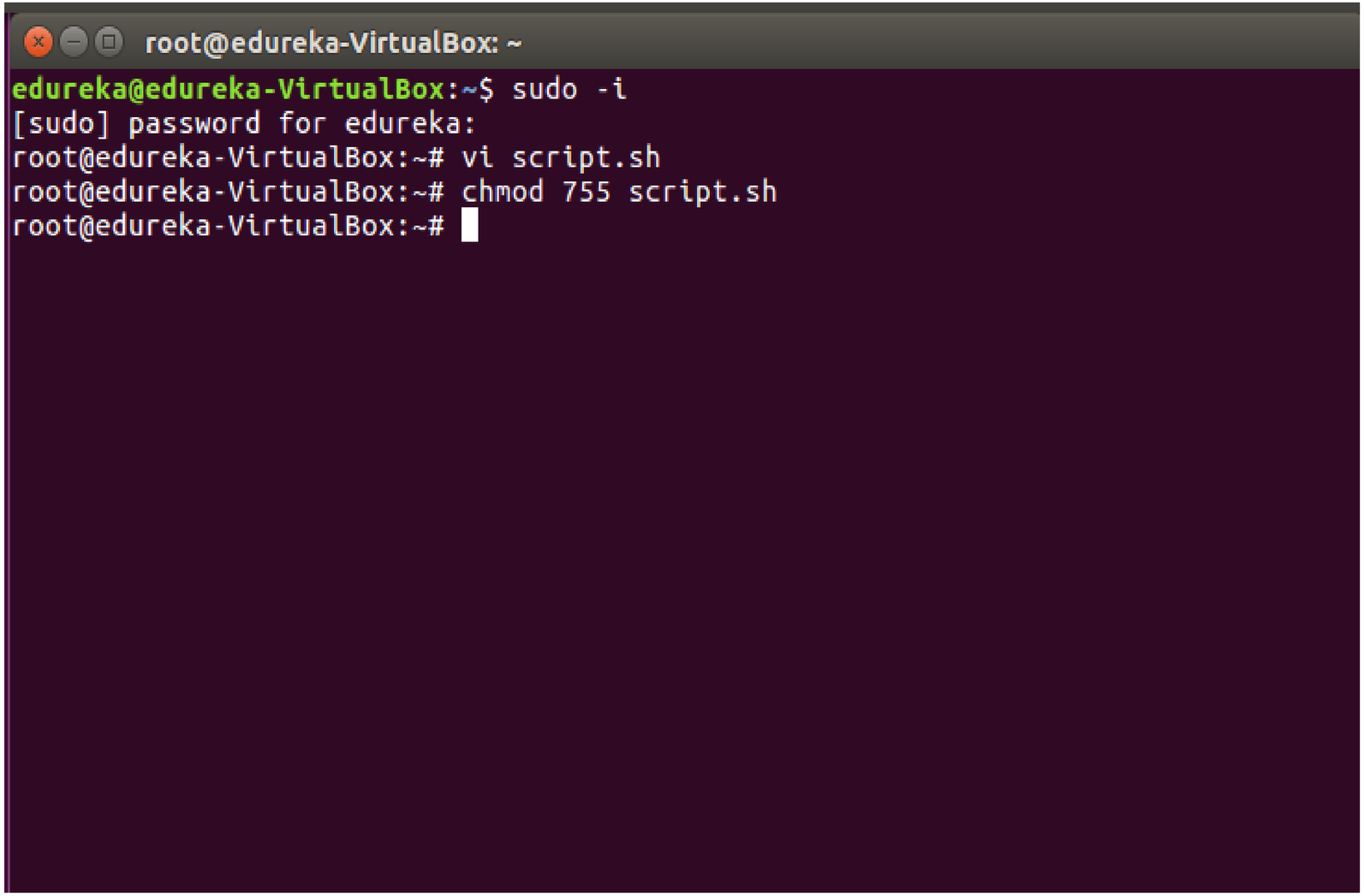
sudo -i
 # vi script.sh

echo “My first Script”
echo $(date)

3

 # chmod 755 script.sh

 # ./script.sh
 # bash script.sh



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Creating a Shell Script

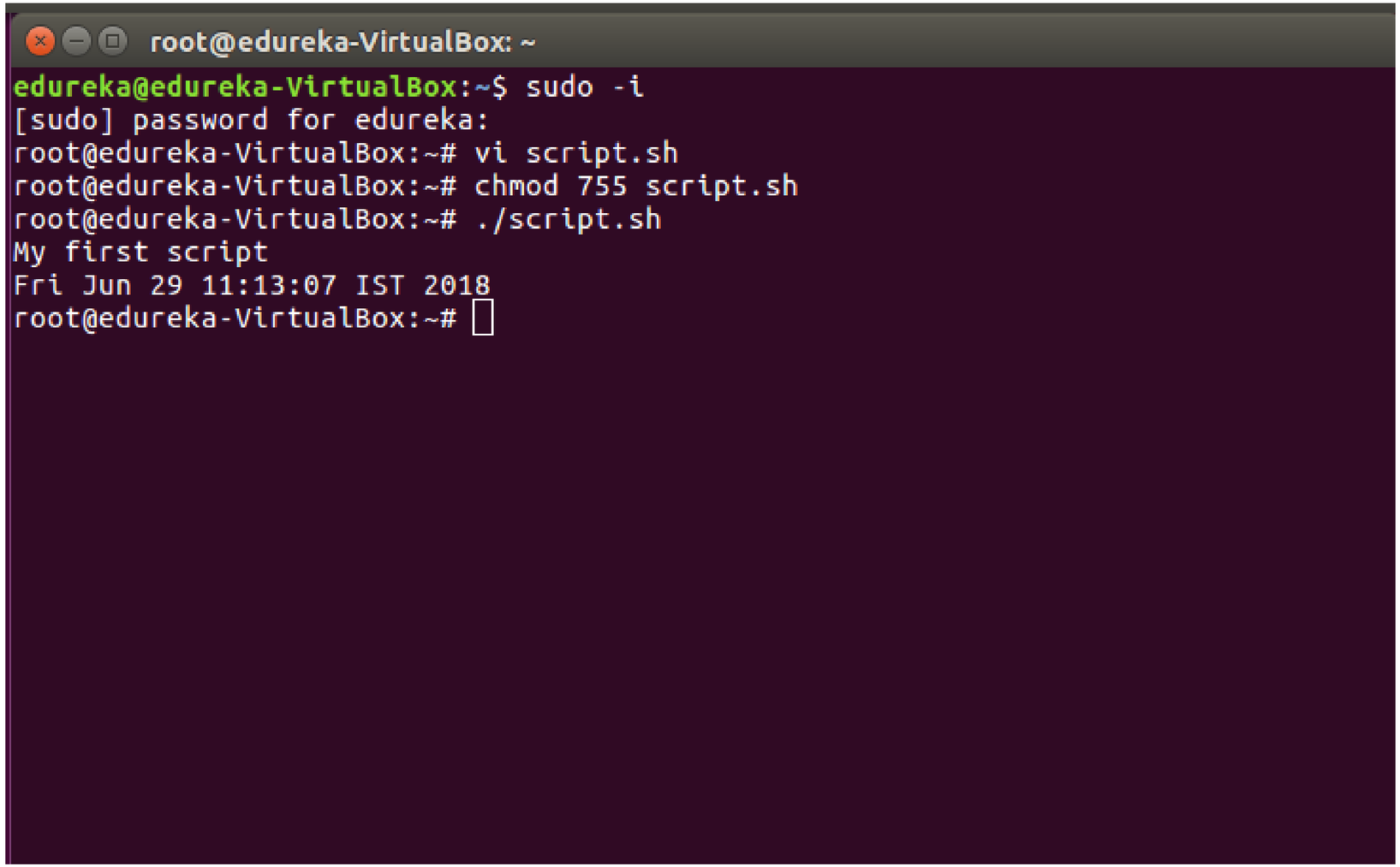
sudo -i
 # vi script.sh

echo “My first Script”
echo $(date)

 # chmod 755 script.sh

4

 # ./script.sh
 # bash script.sh



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Practical Uses of Shell Scripting

- Data backup at regular interval of time in the background
- To find out the number of users and their details
- Find details about various processes and sorting them based on CPU usage, runtime, memory usage, users, etc.
- To append each file with a signature, date, etc.
- For scheduling tasks to be done at network servers
- Creating new users by providing permissions just by entering username

User Interface

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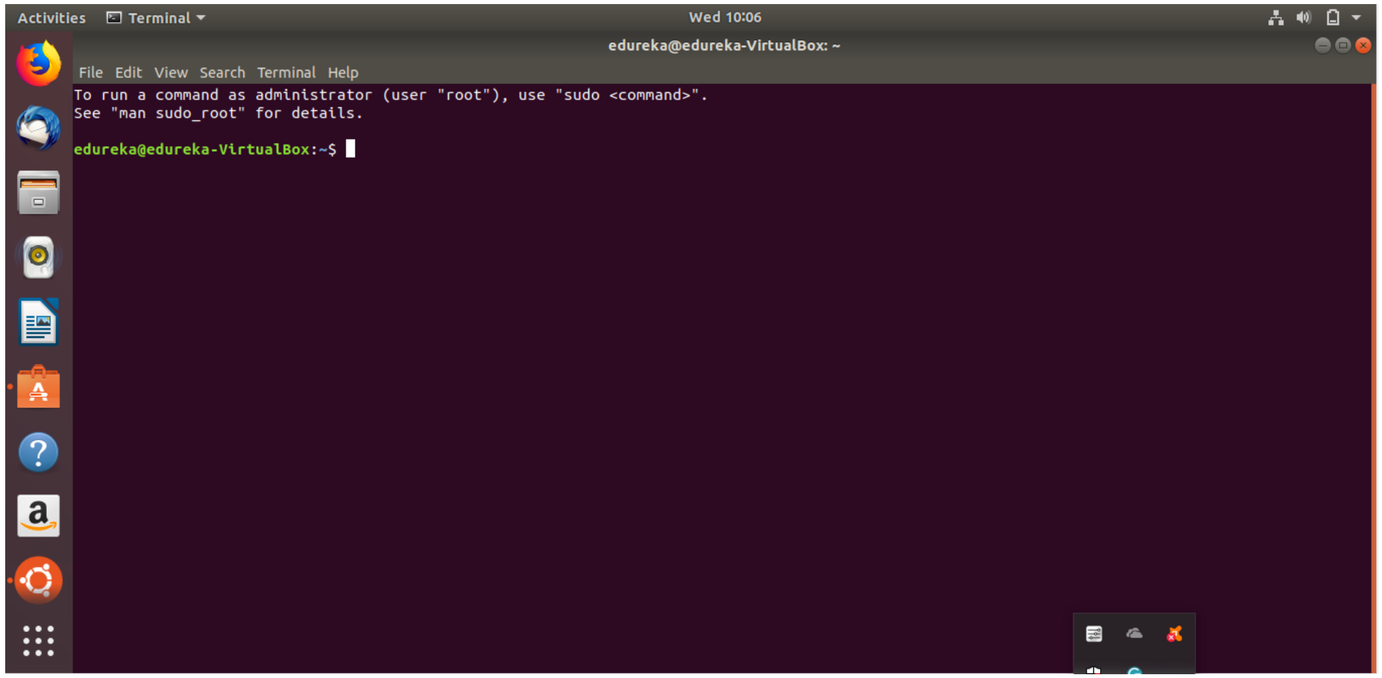
User Interface In Linux

User Interface is a visual part of Operating System through which a user interacts with a computer or a software

Command Line Interface(CLI)

- Command Line Interface give commands in the form of lines of text to the program
- The program which handles it is called a command language interpreter



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User Interface In Linux

- Graphical user interface interacts with users with icons, folders, wallpapers, widgets and visual indicators to make it easier for the user to access the program
- For Linux, desktop environments are KDE, GNOME, CINNAMON, MATE, etc.

Commands and vim Editor

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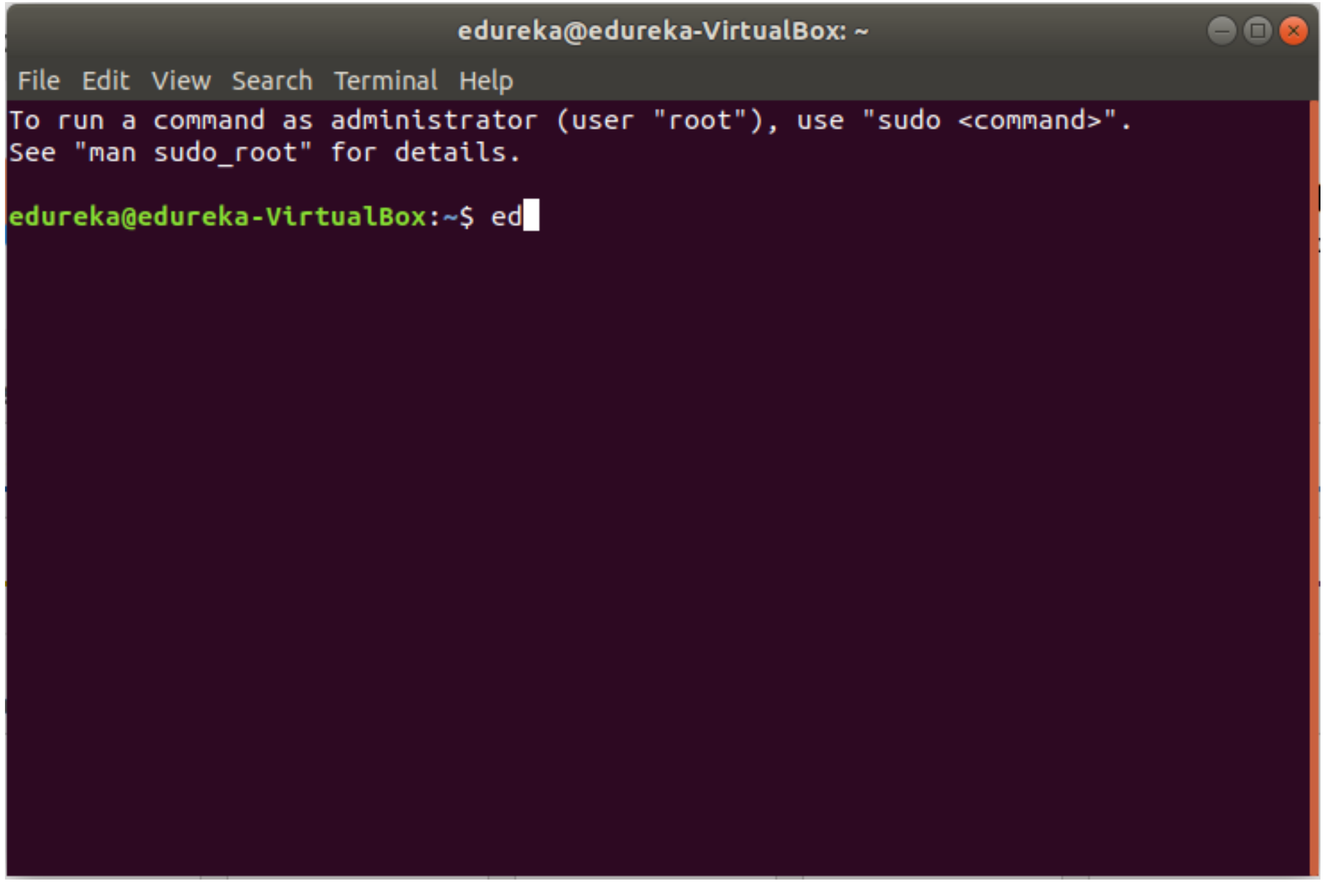
Command Execution

- One needs a terminal (CLI) to execute the command
- Multiple commands can be executed sequentially by adding “;” in between them

SYNTAX

Command <option> <arguments>



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Help and Manual Command

Command Help

- To know how to use a particular command, use “command --help”
- For Example: *# grep –help*

Syntax

```
command --help
```

Manual Page

- One can use “man command” to get the manual of the command

Syntax

```
man command
```

To use <Option> and <argument> along with the command is not mandatory and can be used based on the execution of the command

Basic Linux Commands

ls	Lists down the content of a directory
mkdir	Creates a directory
mv	Moves or renames a file/directory
pwd	Shows the present working directory
rm	Removes a file/directory
cd	Enter a directory
whoami	Tell the current logged-in user
clear	Clear the screen

More Linux Commands

cat	Displays the text of a file
tail	Displays the last few lines of the file
echo	Prints a line of text
cp	Copy a file/directory
touch	Creates a file
df	Shows the available disk space
du	Shows disk space consumed by the directory and files

Demo – Linux Commands

```
ubuntu@ubuntu#apt-get --help
apt 1.2.15 (amd64)
Usage: apt-get [options] command
       apt-get [options] install|remove pkg1 [pkg2 ...]
       apt-get [options] source pkg1 [pkg2 ...]

apt-get is a command line interface for retrieval of packages
and information about them from authenticated sources and
for installation, upgrade and removal of packages together
with their dependencies.

Most used commands:
  update - Retrieve new lists of packages
  upgrade - Perform an upgrade
  install - Install new packages (pkg is libc6 not libc6.deb)
  remove - Remove packages
  purge - Remove packages and config files
  autoremove - Remove automatically all unused packages
```

Demo – Linux Commands

```
edureka@edureka-VirtualBox:~$ ls
Desktop  Documents  Downloads  examples.desktop  filename  Music  new  Pictures  Public  Templates  Videos
edureka@edureka-VirtualBox:~$ mkdir EDUREKA
edureka@edureka-VirtualBox:~$ ls
Desktop  Documents  Downloads  EDUREKA  examples.desktop  filename  Music  new  Pictures  Public  Templates  Videos
edureka@edureka-VirtualBox:~$ mv EDUREKA edureka123
edureka@edureka-VirtualBox:~$ ls
Desktop  Documents  Downloads  edureka123  examples.desktop  filename  Music  new  Pictures  Public  Templates  Videos
edureka@edureka-VirtualBox:~$ pwd
/home/edureka
edureka@edureka-VirtualBox:~$ rm -r edureka123
edureka@edureka-VirtualBox:~$ ls
Desktop  Documents  Downloads  examples.desktop  filename  Music  new  Pictures  Public  Templates  Videos
edureka@edureka-VirtualBox:~$ cd Downloads
edureka@edureka-VirtualBox:~/Downloads$ mkdir LINUX
edureka@edureka-VirtualBox:~/Downloads$ ls
LINUX
edureka@edureka-VirtualBox:~/Downloads$ cd
edureka@edureka-VirtualBox:~$ whoami
edureka
edureka@edureka-VirtualBox:~$ clear
```

Demo – Linux Commands

```
edureka@edureka-VirtualBox:~$ touch FILE
edureka@edureka-VirtualBox:~$ ls
Desktop  Documents  Downloads  examples.desktop  file  FILE  filename  Music  new  Pictures  Public  Templates  Videos
edureka@edureka-VirtualBox:~$ vi FILE
edureka@edureka-VirtualBox:~$ cat FILE
Hi
This is a File
edureka@edureka-VirtualBox:~$ echo "hello,Edureka"
hello,Edureka
edureka@edureka-VirtualBox:~$ cp FILE Desktop
edureka@edureka-VirtualBox:~$ ls
Desktop  Documents  Downloads  examples.desktop  file  FILE  filename  Music  new  Pictures  Public  Templates  Videos
edureka@edureka-VirtualBox:~$ ls Desktop
FILE
edureka@edureka-VirtualBox:~$ vi FILE
edureka@edureka-VirtualBox:~$ tail FILE
R
S
T
U
V
W
X
Y
Z
```

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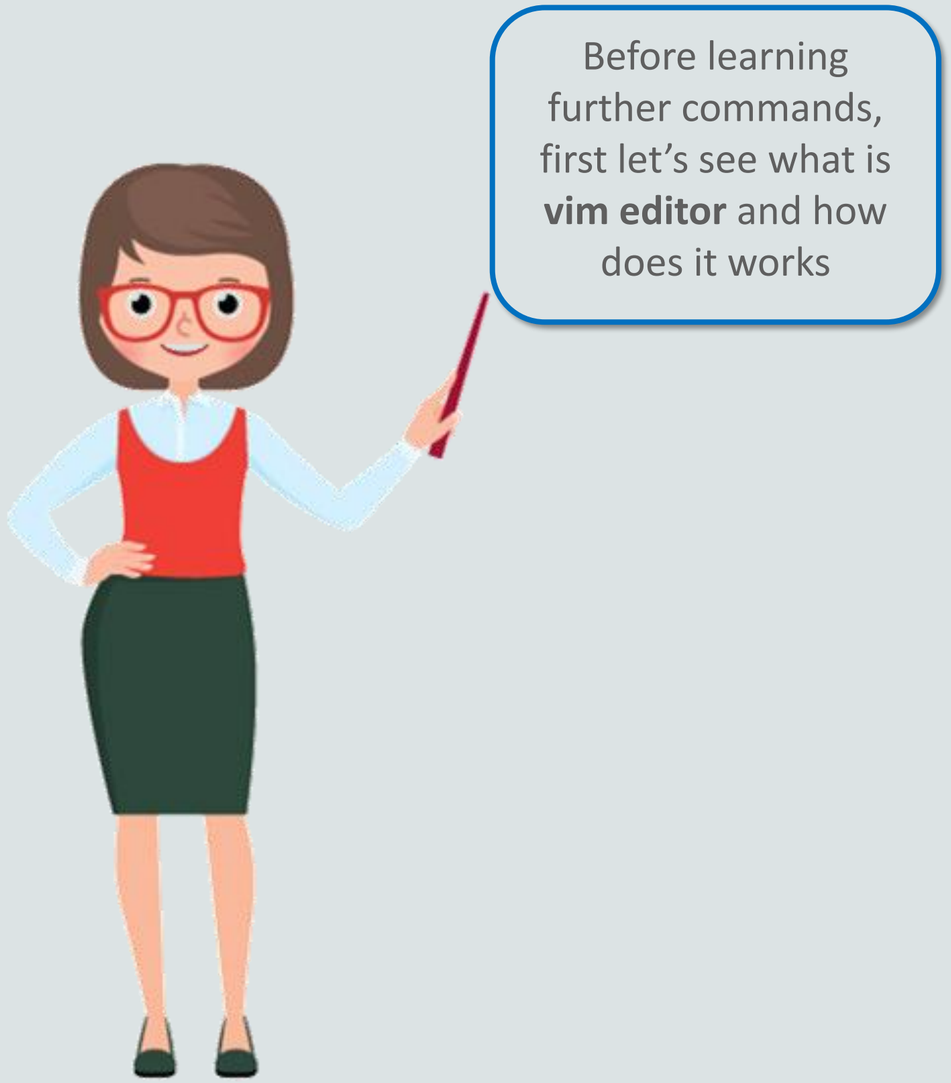
Demo – Linux Commands

```
edureka@edureka-VirtualBox:~$ df
Filesystem     1K-blocks    Used Available Use% Mounted on
udev              991168       0    991168   0% /dev
tmpfs             204116    1528    202588   1% /run
/dev/sda1       10253588 5607996   4105024  58% /
tmpfs            1020564       0   1020564   0% /dev/shm
tmpfs               5120       4      5116   1% /run/lock
tmpfs            1020564       0   1020564   0% /sys/fs/cgroup
tmpfs             204112      28    204084   1% /run/user/120
/dev/loop0         88704   88704         0 100% /snap/core/4486
/dev/loop1        143488  143488         0 100% /snap/gnome-3-26-1604/59
/dev/loop2          1664    1664         0 100% /snap/gnome-calculator/154
/dev/loop3         12544   12544         0 100% /snap/gnome-characters/69
/dev/loop4         21504   21504         0 100% /snap/gnome-logs/25
tmpfs             204112      56    204056   1% /run/user/1000
/dev/loop5          3456    3456         0 100% /snap/gnome-system-monitor/36
/dev/loop6         89088   89088         0 100% /snap/core/4917
/dev/loop7          2432    2432         0 100% /snap/gnome-calculator/180
/dev/loop8          3840    3840         0 100% /snap/gnome-system-monitor/51
/dev/loop9         13312   13312         0 100% /snap/gnome-characters/103
/dev/loop10        14848   14848         0 100% /snap/gnome-logs/37
/dev/loop11       144384  144384         0 100% /snap/gnome-3-26-1604/70
```

Demo – Linux Commands

```
edureka@edureka-VirtualBox:~$ du
4       ./Templates
4       ./.gnupg/private-keys-v1.d
16      ./.gnupg
4       ./Music
4       ./Documents
132     ./Pictures
4       ./.config/gnome-session/saved-session
8       ./.config/gnome-session
84      ./.config/pulse
12      ./.config/nautilus
4       ./.config/update-notifier
8       ./.config/ibus/bus
12      ./.config/ibus
12      ./.config/dconf
8       ./.config/gtk-3.0
4       ./.config/goa-1.0
16      ./.config/evolution/sources
20      ./.config/evolution
176     ./.config
8       ./Desktop
292     ./.local/share/gnome-software
76      ./.local/share/gvfs-metadata
8       ./.local/share/icc
12      ./.local/share/keyrings
1084    ./.local/share/app-info/xmls
1088    ./.local/share/app-info
4       ./.local/share/applications
36      ./.local/share/xorg
8       ./.local/share/gnome-shell
4       ./.local/share/ibus-table
4       ./.local/share/sounds
```



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vim Editor

- **vi** which stands for “Visual Instrument” is a screen editor
- **vim** is the improved version of **vi** editor, which is most commonly used in Linux
- It is pre-installed with Linux

STEP 1: vi <filename> - Open a file/ or create if it is not present

STEP 2: Press ‘i’ to go into the insert mode. It helps to insert text in the file

STEP 3: Press “Escape” button to exit the insert mode

STEP 4: Enter ‘: q’ to quit without saving

STEP 5: Enter ‘: wq’ to save and quit

Demo – vim Editor

In this demo, first the file is created using **vim editor** and then text is inserted in the file. Later the file as well as content of file are checked using **cat** and **ls** command

```
ubuntu@ubuntu#
ubuntu@ubuntu#ls
dir  hello.txt  link_dir  new.txt  student
ubuntu@ubuntu#
ubuntu@ubuntu#vi file.txt
ubuntu@ubuntu#
ubuntu@ubuntu#ls
dir  file.txt  hello.txt  link_dir  new.txt  student
ubuntu@ubuntu#
ubuntu@ubuntu#cat file.txt
hi,
this is a file.
ubuntu@ubuntu#
```

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Demo – vim Editor

STEP 1 : vi file.txt

STEP 2 : Press ‘I’

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Demo – vim Editor

STEP 3 : Insert Text
STEP 4 : Press ‘Escape’
STEP 5 : Enter ‘:wq’ to save and exit

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Advanced Linux Commands

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grep

- **grep**
- sed
- awk
- alias
- history

- The command prints the lines matching with the pattern which is passed
- When a match is found, the line is copied to standard output or mode requested
- It has no restriction on the input line length other than the available memory size
- Since the new line acts as a separator so it can't be passed as a pattern to be matched
- grep has some specifications from POSIX and GNU

Syntax

grep <options> <pattern> <filename>

Example

 # grep "hello" file.txt

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grep Command – Options

- **grep**
- sed
- awk
- alias
- history

-c	Counts the number of matching lines
-n	Shows the matching line and its number
-i	Matches irrespective of case (upper or lower)
-H	Prints the file name for each match
-v	Displays line that do not match the string
-r	Recursively search in directories

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Demo – grep

- **grep**
- sed
- awk
- alias
- history

grep command is printed on the display screen and then again in the text file

```
ubuntu@ubuntu#cat file.txt
hello, this is a file
this is 2nd line.
This will be 3rd line.
end of file
ubuntu@ubuntu#grep "file" file.txt
hello, this is a file
end of file
ubuntu@ubuntu#grep "file" file.txt > output.txt
ubuntu@ubuntu#cat output
output1.txt  output.txt
ubuntu@ubuntu#cat output.txt
hello, this is a file
end of file
ubuntu@ubuntu#
```

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sed

grep

sed

awk

alias

history

- sed is a stream editor for basic text transformations on an input stream
- sed do not require any input file and can work on input stream via piping
- sed can have one or more command combined together with -e or -f
- Example: *sed 's/hello/world/' file.txt > output.txt*

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sed Command – Options

- grep
- **sed**
- awk
- alias
- history

-f	Add the contents of script file to the commands for execution
-e	Add the script to the commands to be executed
-r	Use extended regular expressions in the script
-z	Separate lines by NULL characters
-n	Suppress automatic printing of pattern space
-s	Consider filing as separate rather than a single continuous long stream

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Demo – sed

- grep
- **sed**
- awk
- alias
- history

Reading from a file and sending output to a file

```
ubuntu@ubuntu#
ubuntu@ubuntu#cat file.txt
hello, this is a file
ubuntu@ubuntu#sed 's/hello/world/' file.txt > output.txt
ubuntu@ubuntu#cat output.txt
world, this is a file
ubuntu@ubuntu#
```

Reading the output from an input stream and sending output to a file

```
ubuntu@ubuntu#cat file.txt | sed 's/hello/world/' - >output1.txt
ubuntu@ubuntu#cat output1.txt
world, this is a file
ubuntu@ubuntu#
```

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awk

grep

sed

awk

alias

history

- It is mostly used for pattern scanning and processing
- Using this command you can split each line into multiple variables
- It performs a set of actions on the matched lines
- It is useful to create reports or transform the data files
- awk commands are easy to program as it performs with set of rules and actions

Syntax
awk ‘program’ <filename>

Example
awk ‘{print}’ file.txt

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awk Command – Options

grep

sed

awk

alias

history

-F fs

To specify a file separator.

-f file

To specify a file that contains an **awk** script

-v var=value

To declare a variable

$0

For whole line

$1

For first field

$n

For nth field

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Demo – awk

- grep
- sed
- **awk**
- alias
- history

In the first command awk divides each line as a set of variables and then prints the value of variable 1 and 4 from each line and in the second command it prints all lines having text file

```
ubuntu@ubuntu#awk '{print $1,$4}' file.txt
hello, a
this line.
This 3rd
end
ubuntu@ubuntu#awk '/file/ {print}' file.txt
hello, this is a file
end of file
ubuntu@ubuntu#
```

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alias

grep

sed

awk

alias

history

- alias tells Linux to replace one string with another string while executing a command
- It is used to provide a short name of the frequently used commands
- It can be defined by adding it in the shell's .rc file
- Don't add space between string and equal sign
- Reload bash to activate the alias

Syntax

alias
<string>='<command>'

Example

 # alias lk='ls –ltr'

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Demo – alias

- grep
- sed
- awk
- **alias**
- history

The demo of alias command is as shown below

```
ubuntu@ubuntu#
ubuntu@ubuntu#tail -3 ~/.bashrc
#if [ -f /etc/bash_completion ] && ! shopt -oq posix; then
#    . /etc/bash_completion
#fi
ubuntu@ubuntu#
ubuntu@ubuntu#vi ~/.bashrc
ubuntu@ubuntu#
ubuntu@ubuntu#tail -3 ~/.bashrc
#    . /etc/bash_completion
#fi
alias lk='ls -lrt'
ubuntu@ubuntu#
ubuntu@ubuntu#lk
lk: command not found
ubuntu@ubuntu#
ubuntu@ubuntu#bash
ubuntu@ubuntu#
ubuntu@ubuntu#lk
total 12
-rw-rwxr--+  1 ubuntu ubuntu    7 Apr 29 13:57 file.txt
-rwxr-xr-x   1 root   root     37 May  2 23:40 script.sh
drwxr-xr-x  11 root   root   4096 May  3 00:45 new
ubuntu@ubuntu#
```

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Command history

- grep
- sed
- awk
- alias
- **history**

01 In a shell, “history” command keeps record of all the commands used in the particular tab

02 You can give a number ‘n’ to print the last ‘n’ commands

03 You can get the list of a particular command executed along with a grep command
history | grep ls

04 You may clear the history with the appending –c
history –c

05 You can use up and down arrow keys to select previously executed commands

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Demo – history

- grep
- sed
- awk
- alias
- **history**

The demo of history command is as shown below

```
ubuntu@ubuntu#history 5
 2011  vi new.txt
 2012  ls
 2013  cd student/
 2014  cd ..
 2015  history 5
ubuntu@ubuntu#ls
dir  file.txt  hello.txt  link_dir  new.txt  student
ubuntu@ubuntu#history 5
 2013  cd student/
 2014  cd ..
 2015  history 5
 2016  ls
 2017  history 5
```

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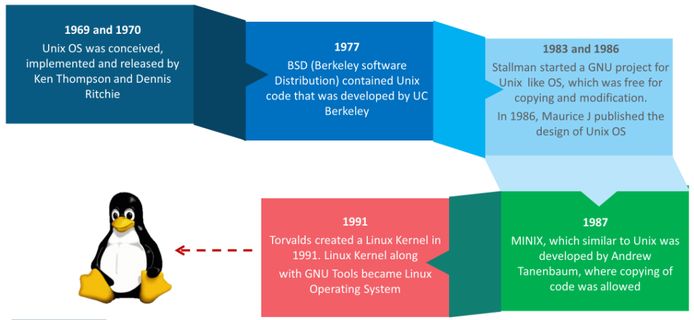
Summary

History Of Linux



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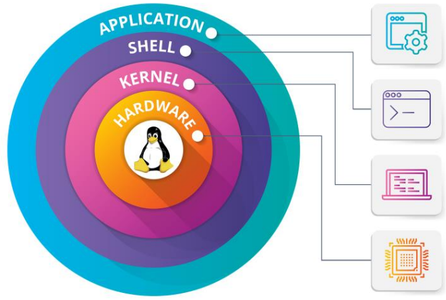
Architecture Of Linux OS



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What Is Linux Distribution(Distro)?

It is an Operating System having Linux kernel and GNU tools packaged with some more applications

Ubuntu | Debian | RedHat Linux | Fedora

- There are more than 600 distribution available based on:
  - The development group
  - Their specific requirement and
  - Customization
- They are community and commercial supported distros
- Some of the popular Linux Distros are Ubuntu, Fedora, RedHat, Debian, CentOS, etc.

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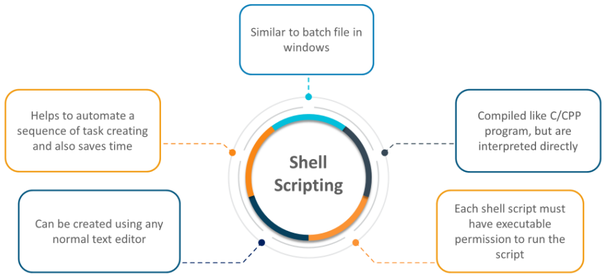
Shell Scripting

Shell Scripting is a series of shell commands arranged in a text file to be executed one after the other



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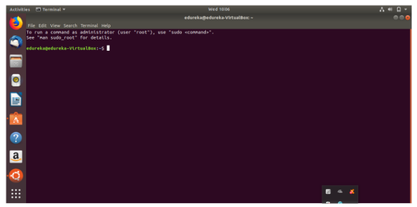
User Interface In Linux

User Interface is a visual part of Operating System through which a user interacts with a computer or a software

- Command Line Interface give commands in the form of lines of text to the program
- The program which handles it is called a command language interpreter

Command Line Interface(CLI)



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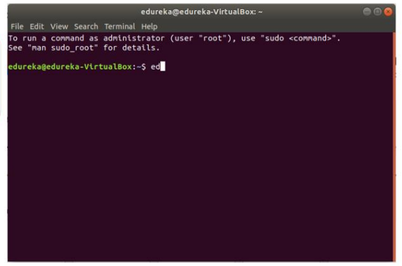
Command Execution

- One needs a terminal (CLI) to execute the command
- Multiple commands can be executed sequentially by adding ";" in between them

SYNTAX

Command <option> <arguments>



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Thank You

For more information please visit our website
www.edureka.co