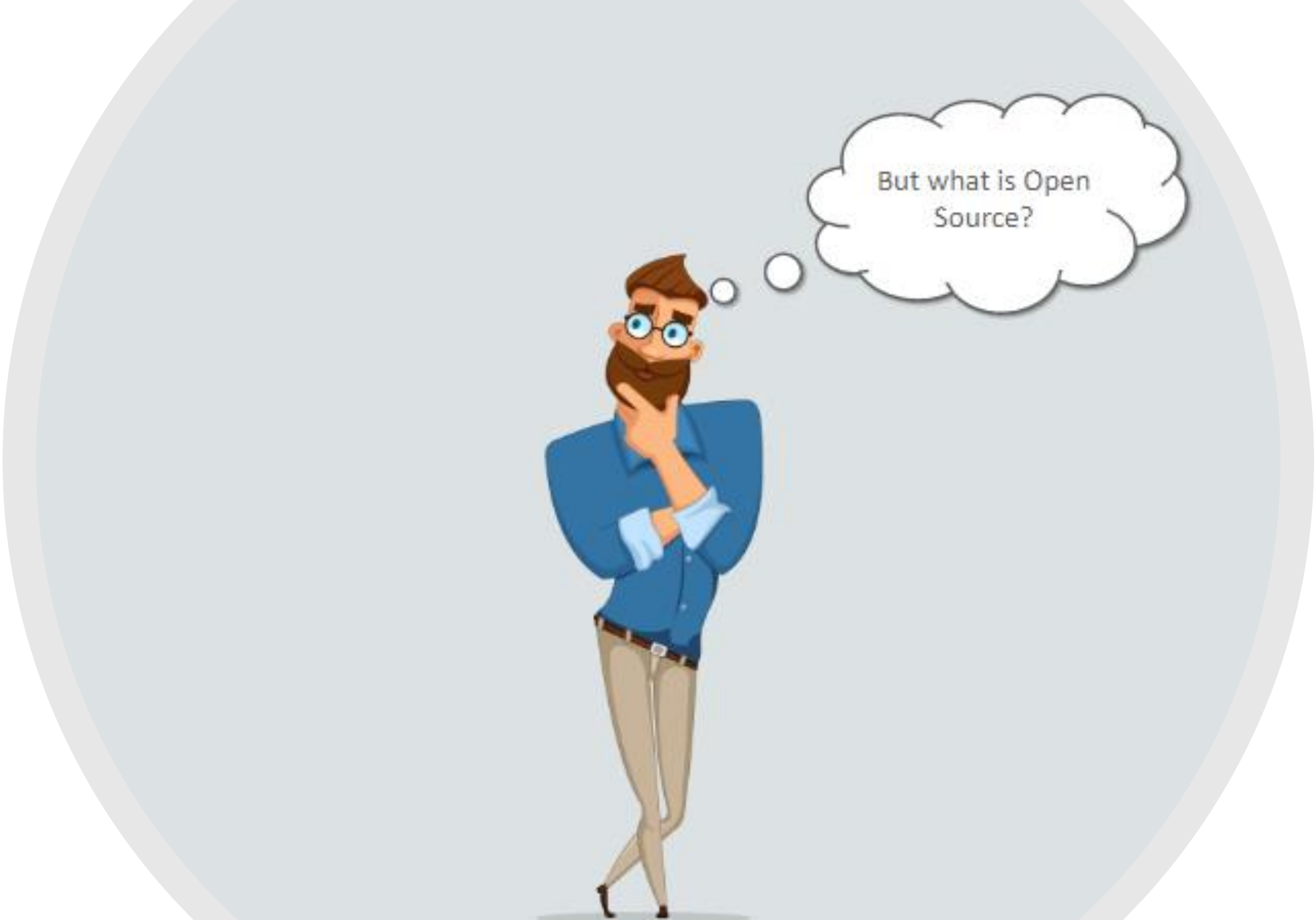
Linux Fundamentals

What will we Learn ?

1. Introduction to Linux
2. Architecture of Linux
3. Basic Linux Commands
4. Overview of Linux Distro
5. Overview to Shell
6. Overview to VIM editor
7. Overview of SSH

What Is Linux ?

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


But what is Open Source?

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

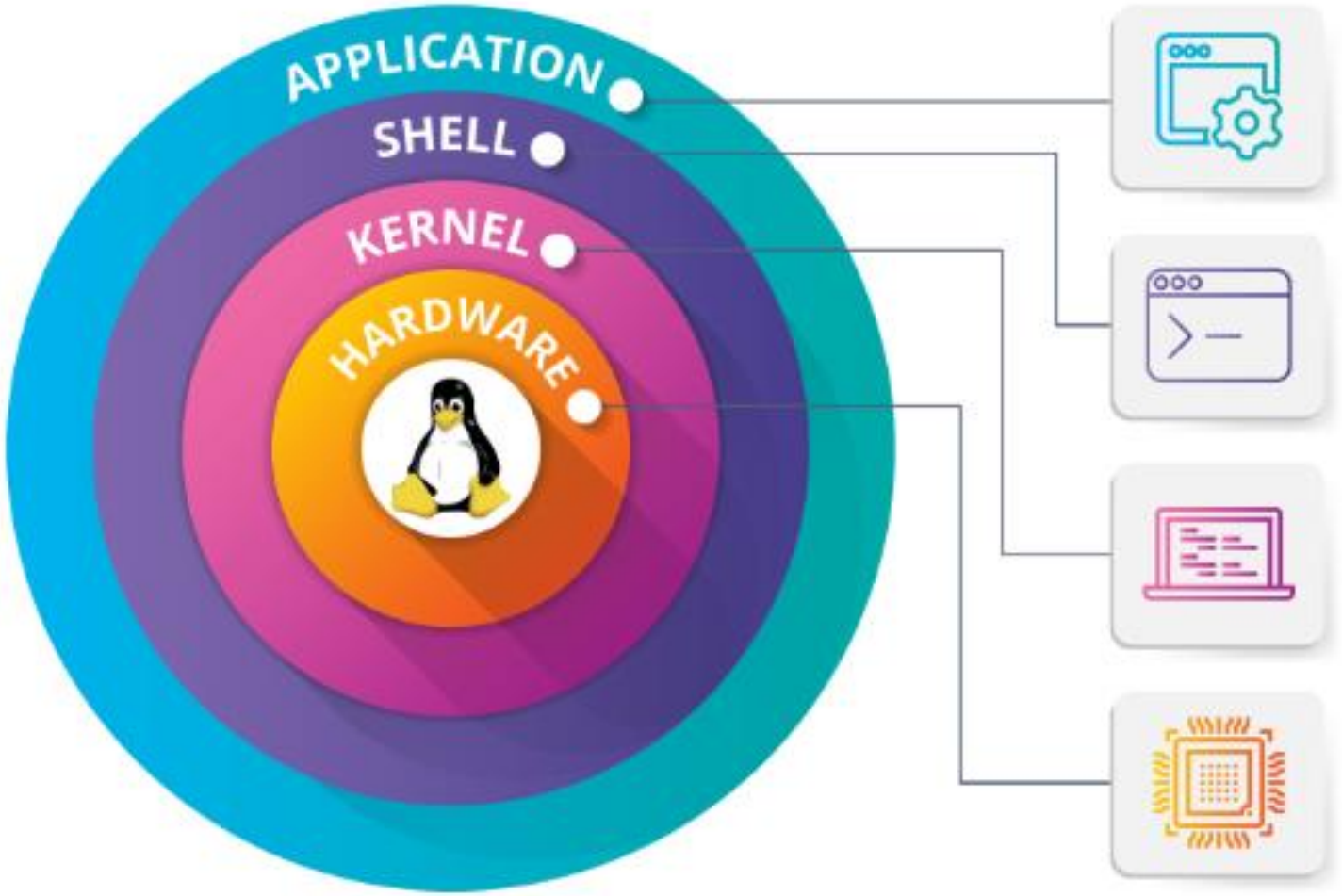
03 Open source projects are generally a collaborative effort by multiple sets of developers to enhance the product and allow others to get benefit of it

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

Features Of Linux

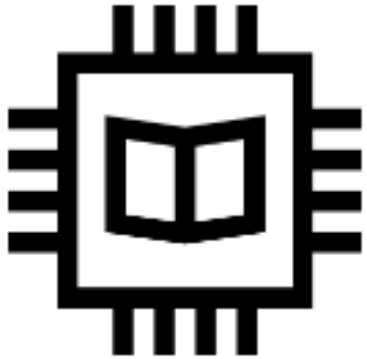
Where Is Linux Used?

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

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

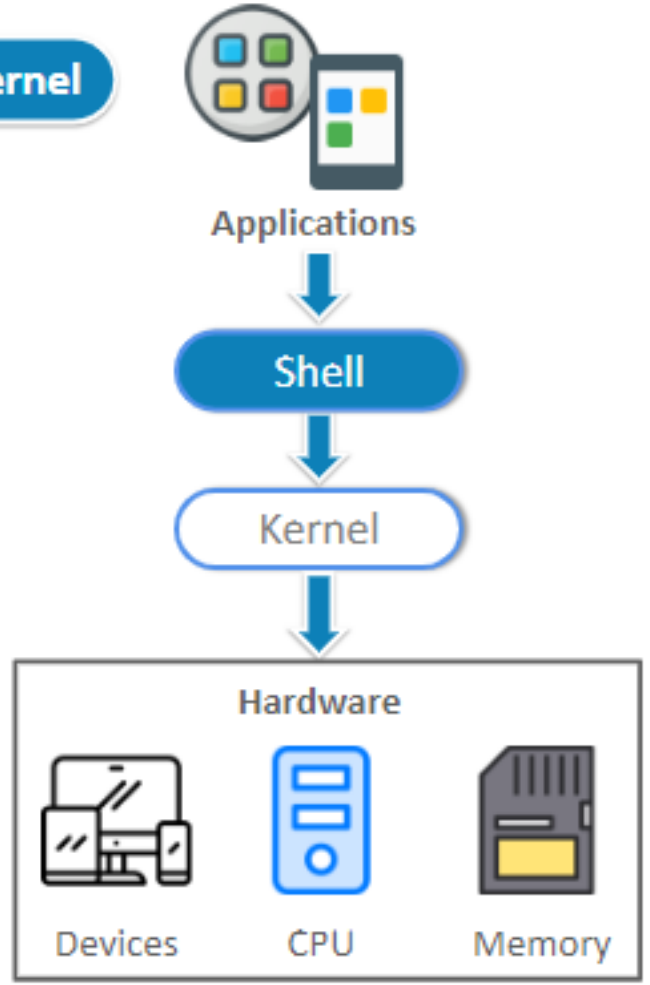
Fedora

- 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.

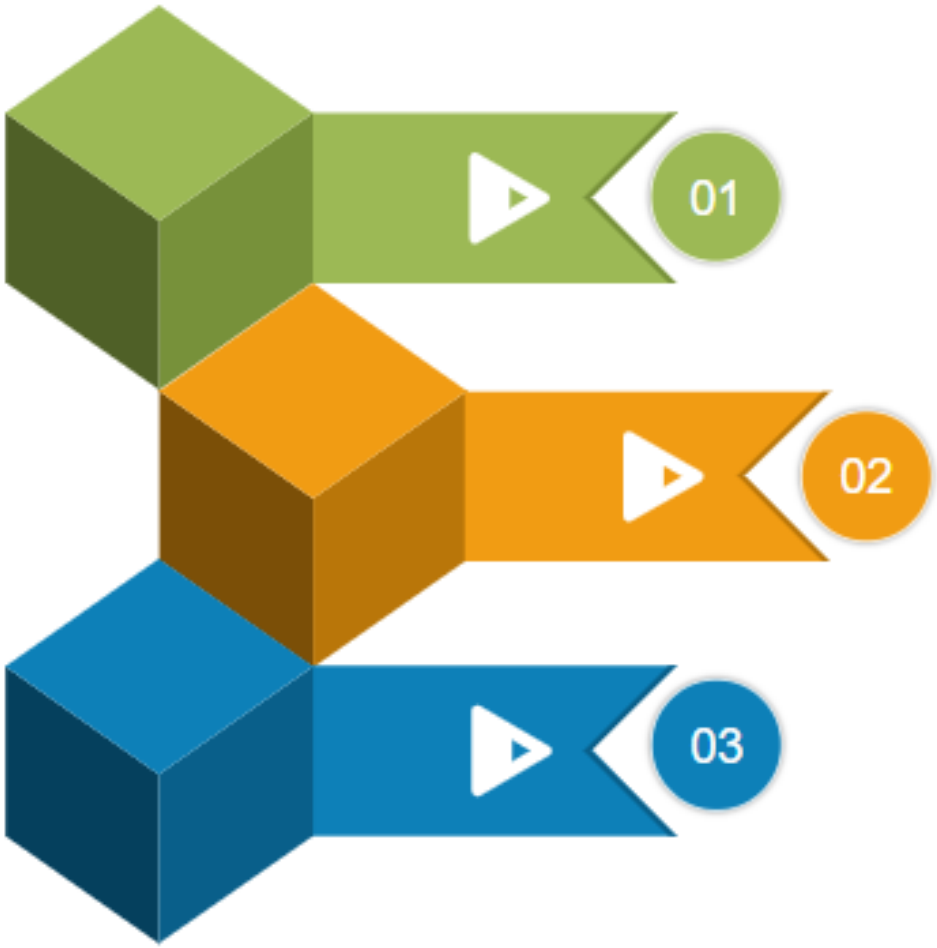
Shell

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



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

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

Creating A Shell Script

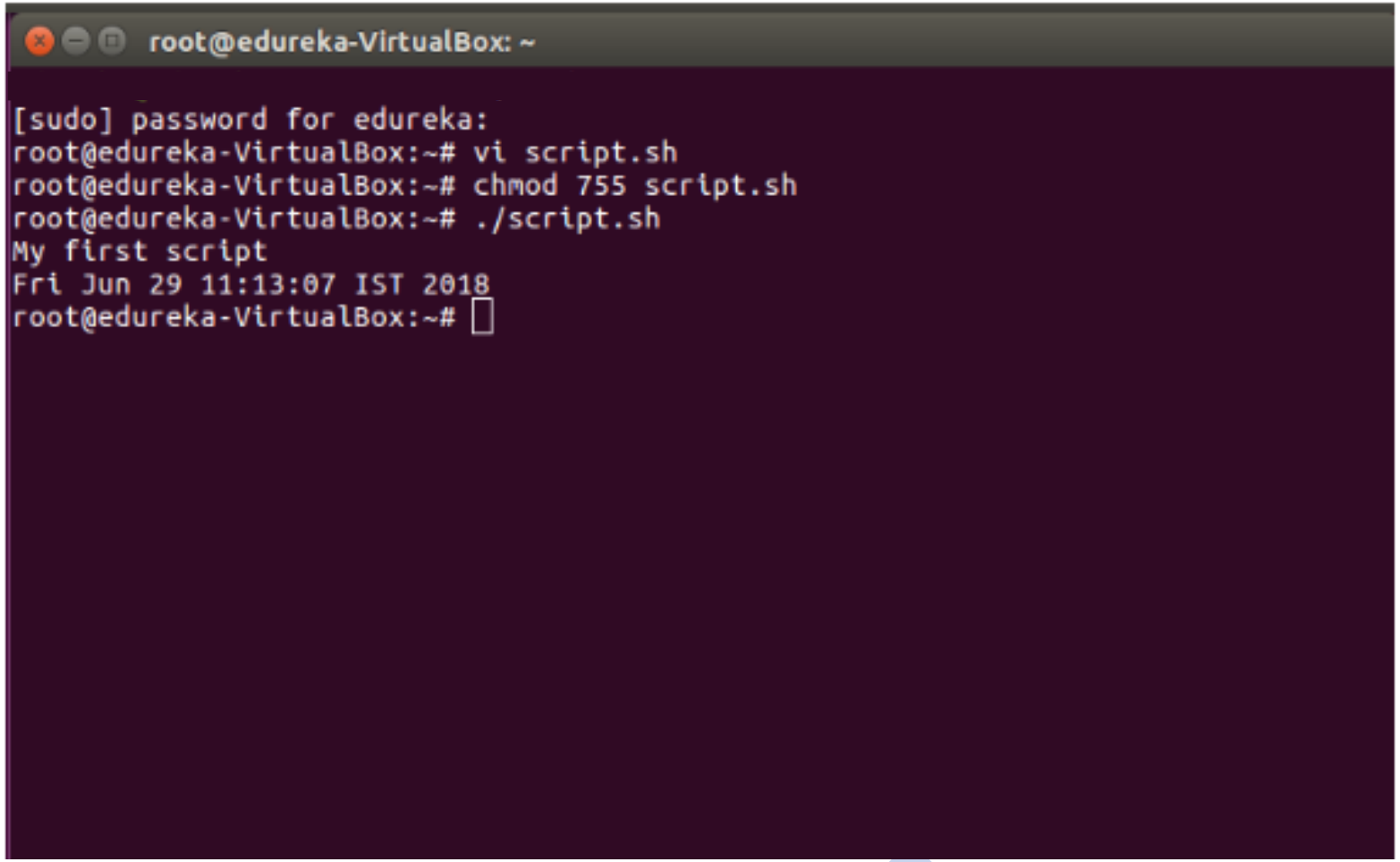
sudo -i
 # vi script.sh

echo "My first Script"
echo $(date)

 # chmod 755 script.sh

4

 # ./script.sh
 # bash script.sh



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	Change 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

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

SSH

Secure shell is a cryptographic protocol to secure data over a network.

A password sniffing attack led to development of initial version of SSH.

There is cryptographic integrity check via md5, sh1 keyed hash algorithms.

It allows users to securely login in an unsecure network and execute commands.

It is free for non-commercial use.

It has client-server communication over TCP and provides authentication and encryption.

It only supports the known port numbers.

SSH Session

A client-server model is used during establishment of connection between two parties and encrypt the data between them

Syntax

ssh <username>@<server_ip_address>

Example :
ssh ubuntu@10.1.10.123

- A SSH session works in two stages:
  - To sync the encryption to be used for any further communication
  - To authenticate the user for access rights to be given
- The server waits on the configured port for connections
- The client initiates the TCP handshake with the server


THANK
YOU