

By: Bilal Mazhar

Outline

- 1. Introduction to Linux
- 2. Linux Installation
- 3. Directory Structure
- 4. Basic Commands
- 5. Administration
- 6. Linux Projects

Before we start

Some myths about Linux!

- Linux is not user friendly!
- Linux is hard to learn!
- Linux is not for home user!
- Linux is command line only!
- Linux is for Veterans only!



Introduction to Linux

Just like Windows, iOS, and Mac OS, Linux is an operating system. In fact, one of the most popular platforms on the planet, Android, is powered by the Linux operating system.

An operating system is software that manages all of the hardware resources associated with your desktop or laptop. To put it simply, the operating system manages the communication between your software and your hardware. Without the operating system (OS), the software wouldn't function.

Open source

Linux is also distributed under an open source license. Open source follows these key tenets:

- The freedom to run the program, for any purpose.
- The freedom to study how the program works, and change it to make it do what you wish.
- The freedom to redistribute copies so you can help your neighbor.
- The freedom to distribute copies of your modified versions to others.

Why Linux?

- Open Source
- Community support
- Customization
- Most of the server are using Linux
- DevOps Most of the tools are available for linux
- Automation
- Secure

Popular Linux distributions include:

- LINUX MINT
- MANJARO
- DEBIAN
- UBUNTU
- ANTERGOS
- SOLUS
- FEDORA
- ELEMENTARY OS
- OPENSUSE
- Red Hat Enterprise Linux
- Ubuntu Server
- Centos
- SUSE Enterprise Linux

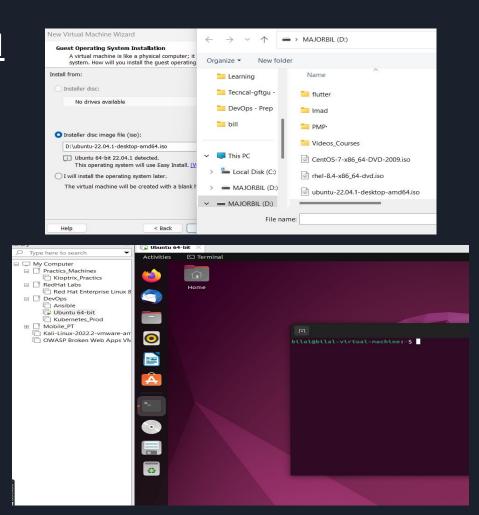
Most used Linux distros currently in IT industry

- RPM Based : RHEL & Centos
- Debian Based : Ubuntu Server

Installation Using VM



ubuntu-22.04.1-desktop-amd64.iso



<u>Installation Using Docker</u>

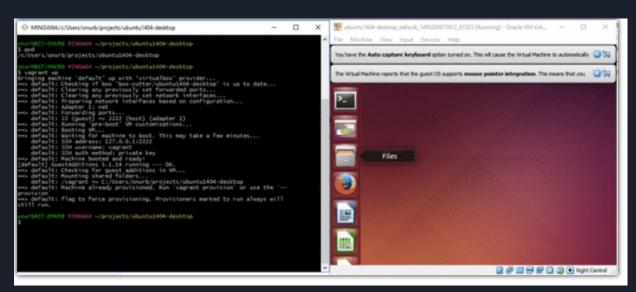
- 1. Go to https://hub.docker.com//debian
- 2. Search " **Linux** " ,
- 3. Install docker in your linux,
- 4. Type command " docker pull debian ".

```
Run 'docker COMMAND --help' for more information on a command.

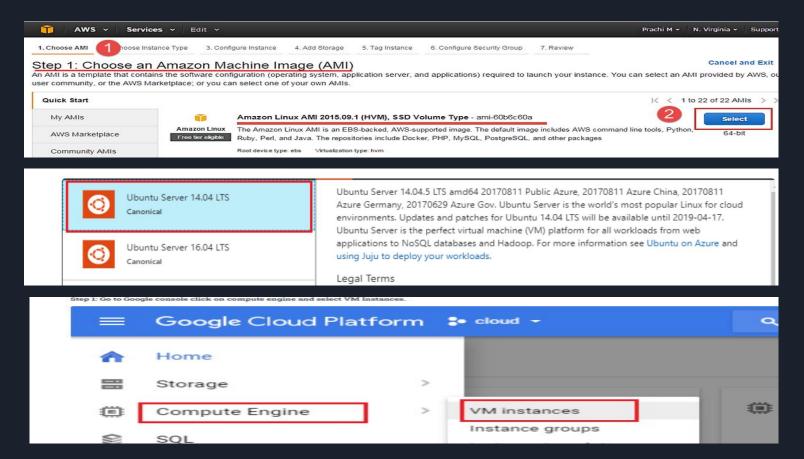
To get more help with docker, check out our guides at https://docs.docker.com/go/guides/
bilal@bilal-virtual-machine:~$ docker pull debian
Using default tag: latest
Got permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Post "http://%2Fvar%2Frun%2Fdocker.
sock/v1.24/images/create?fromImage=debian&tag=latest": dial unix /var/run/docker.sock: connect: permission denied
bilal@bilal-virtual-machine:~$ sudo docker pull debian
Using default tag: latest
latest: Pulling from library/debian
f2f58072e9ed: Downloading [======> ] 7.527MB/55.04MB
```

Installation Using Vagrant

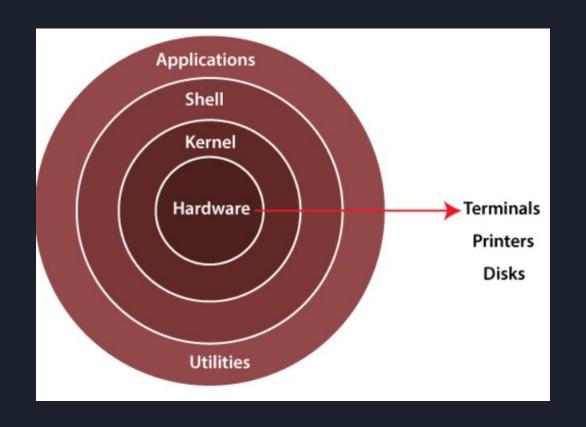
- 1. Create two directory "Project", "Ubuntu" in your linux environment,
- Navigate to the directory <u>Project /Ubuntu</u>,
- 3. Type these Commands
- vagrant init box-cutter/ubuntu1404-desktop
- vagrant up -provider virtualbox
- vagrant up



Installation in Cloud [AWS , Azure , GCP]



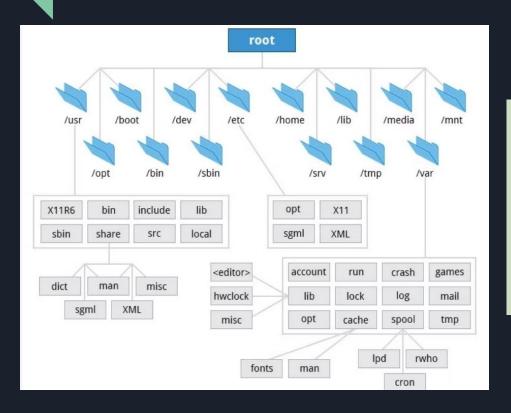
Architecture of Linux system



Architecture of Linux system

<u>Component</u>	<u>Description</u>
Kernel	The kernel is one of the core section of an operating system. It is responsible for each of the major actions of the Linux OS.
System Libraries	These libraries can be specified as some special functions. These are applied for implementing the operating system's functionality
System Utility Programs	It is responsible for doing specialized level and individual activities.
Hardware layer	Linux operating system contains a hardware layer that consists of several peripheral devices like 1. 1. CPU 2. HDD 3. RAM
Shell	It is an interface among the kernel and user

Directory Structure



Some Important Directories

- Home Directories: /root,/home/username
- User Executable: /bin, /usr/bin, /usr/local/bin
- System Executables: /sbin, /usr/sbin, /usr/local/sbin
- Other Mountpoints: /media, /mnt
- Configuration: /etc
- Temporary Files: /tmp
- Kernels and Bootloader: /boot
- Server Data: /var, /srv
- System Information: /proc, /sys
- Shared Libraries: /lib, /usr/lib, /usr/local/lib

Difference between Absolute and relative path

\rightarrow What is a path?

A path is a unique location to a file or a folder in a file system of an OS. A path to a file is

a combination of / and alphanumeric characters

→ is an absolute path?

An absolute path is defined as the specifying the location of a file or directory from the root

directory(/). In other words we can say absolute path is a complete path from start of actual

filesystem from / directory

→ Some examples of absolute path:

- /home/imran/linux-practices/
- /var/ftp/pub
- /etc/samba.smb.conf
- /boot/grub/grub.conf

If you see all these paths started from / directory which is a root directory for every Linux/Unix machines.

Difference between Absolute and relative path

What is the relative path?

Relative path is defined as path related to the present working directory(pwd). Suppose I am located in /home/imran and I want to change directory to /home/imran/linux-practices. I can use relative path concept to change directory to linux-practices and also devops dir directory.

```
bilal@bilal-virtual-machine:~\$ pwd

/home/bilal
bilal@bilal-virtual-machine:~\$ cd bilal-linux/
bilal@bilal-virtual-machine:~\$ bilal-linux\$ pwd

/home/bilal/bilal-linux
bilal@bilal-virtual-machine:~\$ ls

'Practics - 1'
bilal@bilal-virtual-machine:~\$ bilal-linux\$ cd Practics\ -\ 1/
bilal@bilal-virtual-machine:~\$ ls

'Pracrtics - 1.1'
bilal@bilal-virtual-machine:~\$ bilal-linux\Practics - 1\$ pwd

/home/bilal\bilal-linux\Practics - 1\$
bilal@bilal-virtual-machine:~\$ bilal-linux\Practics - 1\$ pwd

/home/bilal\bilal-linux\Practics - 1\$
```

Root Directory (/)

The root directory, represented by a forward slash (/), stores all the directories in Linux. If you cd into this directory and use the Is command, you will find a list of all the directories on your machine. The absolute path of every file passes through the root directory as it is the parent to all other directories.

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

As you can see, the "/\$" sign indicates that you're in the root directory now.

/boot

The boot directory contains important files needed by the boot loader. The initial ram file system or initramfs is also stored here along with the kernel. You shouldn't tinker with this directory on your primary machine. If you wish to experiment, feel free to do so in a virtual machine.

```
boot dev home lib32 libx32 media opt root sbin srv sys usr
bilal@bilal-virtual-machine:/$ cd /boot/
bilal@bilal-virtual-machine:/boot$ ls
config-5.15.0-43-generic initrd.img
config-5.15.0-56-generic initrd.img-5.15.0-43-generic memtest86+.elf
efi initrd.img-5.15.0-56-generic memtest86+_multiboot.bin
grub initrd.img.old System.map-5.15.0-43-generic vmlinuz-5.15.0-56-generic vmlinuz-5.15.0-56-generic vmlinuz-5.15.0-56-generic bilal@bilal-virtual-machine:/boot$
```

/dev

Linux treats everything as a file, and hardware is not an exception to this rule. The /dev directory contains special, virtual files representing hardware components like a mouse, keyboard, storage devices, etc., connected to your system.

F				bilal@b	ilal-virtual-	machine: /dev
bilal@bilal-virt bin dev lib boot etc lib cdrom home lib bilal@bilal-virt bilal@bilal-virt /dev	libx32 32 lost+found 64 media ual-machine:/\$	opt ru proc sb cd /dev		p sys tmp pfile usr		
bilal@bilal-virt	ual-machine:/d	ev\$ ls				
autofs	loop1	rtc0	tty21	tty5	ttyS19	vcs5
	loop10	sda	tty22	tty50	ttyS2	vcs6
	loop11	sda1	tty23	tty51	ttyS20	vcsa
btrfs-control	loop12	sda2	tty24	tty52	ttyS21	vcsa1
	loop13	sda3	tty25	tty53	ttyS22	vcsa2
cdrom	loop14	sg0	tty26	tty54	ttyS23	vcsa3
	loop2	sg1	tty27	tty55	ttyS24	vcsa4
console	loop3	sg2	tty28	tty56	ttyS25	vcsa5
соге	loop4	shm	tty29	tty57	ttyS26	vcsa6
	loop5	snapshot	tty3	tty58	ttyS27	vcsu
cpu_dma_latency	loop6		tty30	tty59	ttyS28	vcsu1
cuse	loop7	sr0	tty31	tty6	ttyS29	vcsu2
	Loop8	sr1	tty32	tty60	ttyS3	vcsu3
	loop9	stderr	tty33	tty61	ttyS30	vcsu4

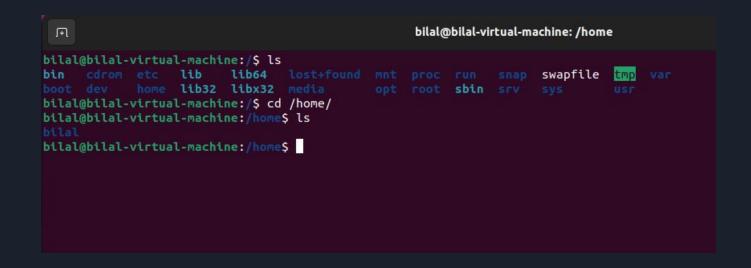
/etc

The /etc directory contains vital system configuration files such as startup scripts, networking files, user account-related files, etc. You have to edit configuration files in the /etc directory to make any system-wide changes

я.	bilal@bilal-virtual-machine: /etc					
bilal@bilal-virtual-machine:/\$ bin cdrom etc lib lib6 boot dev home lib32 libx bilal@bilal-virtual-machine:/\$ bilal@bilal-virtual-machine:/e	4 lost+found 32 media cd /etc	mnt proc run snap opt root sbin srv	THE RESIDENCE OF STREET STREET, STREET			
acpi adduser.conf alsa alternatives anacrontab apg.conf apm apparmor apparmor apparmor.d apport appstream.conf apt avahi	e2scrub.conf emacs environment environment.d ethertypes firefox fonts fprintd.conf fstab fuse.conf fwupd gai.conf gdb	kernel-img.conf kerneloops.conf ldap ld.so.cache ld.so.conf ld.so.conf libao.conf libaudit.conf libblockdev libnl-3 libpaper.d libreoffice	os-release PackageKit pam.conf pam.d papersize passwd passwd- pcmcia perl pki pm pnm2ppa.conf polkit-1	<pre>speech-dispatcher ssh ssl subgid subgid- subuid subuid- sudo.conf sudoers sudoers sudoers.d sudo_logsrvd.conf sysctl.conf sysctl.d</pre>		

/home

The /home directory stores an individual user's home directory. If you're switching from a Windows environment, you will find the /home directory akin to the C:/Users directory. It contains user-specific configurations inside each user's directory.



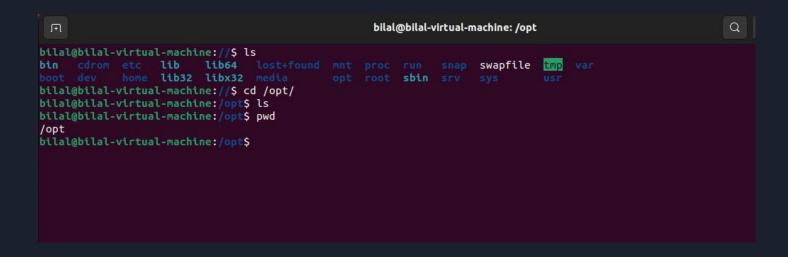
/bin

The /bin directory contains system commands and other executable programs. The ls command that you use to list out the subdirectories along with many other useful commands is located within the /bin directory.

F	bilal@bilal-virtual-machine: /bin					
ilal@bilal-virtual-m	achine://\$ ls					
in cdrom etc li						
oot dev home li	b32 libx32 media opt root sbin srv sys usr					
ilal@bilal-virtual-m	achine://\$ cd /bin					
ilal@bilal-virtual-m	achine:/bin\$ ls					
	gtk-update-icon-cache pydoc3.10					
aa-enabled	gunzip pygettext3					
aa-exec	gzexe pygettext3.10					
aa-features-abi	gzip python3					
aconnect	h2ph python3.10					
acpi_listen	h2xs python3-futurize					
add-apt-repository	hardlink python3-pasteurize					
addpart	hbpldecode pzstd					
airscan-discover	hciattach qpdldecode					
alsabat	hciconfig quirks-handler					
alsaloop	hcitool rbash					
alsamixer	hd rcp					
alsatplg	head rctest					
alsaucm	HEAD rdiffdir					
amidi	helpztags rdma					
amixer	hex2hcd readlink					
apg	hexdump realpath					
apgbfm	hipercdecode red					
aplay	host remmina					
aplaymidi	hostid remmina-file-wrapper					
apport-bug	hostname remmina-gnome					
apport-cli	hostnamectl rendercheck					
nnort-collect	hn-align renice					

/opt

The /opt directory contains optional software packages to facilitate better compatibility of certain applications. When you install a third-party application that is not available in the official distribution repository, its software code gets stored in the /opt directory.



/proc

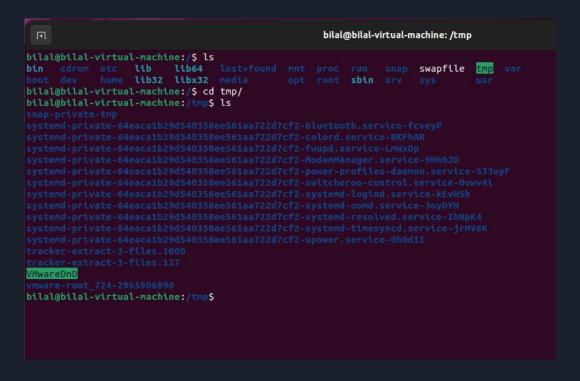
The /proc directory is a pseudo-filesystem containing information about processes and kernel parameters. It is populated with data during boot-up and is cleaned when you shut down your Linux machine.

The /proc directory is also home to system information such as memory usage, processor information, and so on.

Fl								bilal@	bilal-vi	rtual-m	achine: /proc			Q
	bilal	-virtu etc	al-mad								swapfile	tmp		
	dev bilal	home				media /proc/					sys	usr		
bilal	bilal	-virtu	al-mad	chine:	/proc\$	ls								
														self
													kallsyms	slabinfo
													kcore	softirqs
													keys	stat
											bootconf	ig	key-users	swaps
											buddyinfo	0	kmsg	
													kpagecgroup	sysrq-trigger
											cgroups		kpagecount	
											cmdline		kpageflags	thread-self
											consoles		loadavg	timer_list
											cpuinfo		locks	
											crypto		mdstat	uptime
											devices		meminfo	version
											diskstat	S	misc	version_signature
											dma		modules	vmallocinfo
													mounts	vmstat
														zoneinfo
											execdoma	ins	mtrr	
											fb		net	

/tmp

The /tmp directory is used by the system and its applications to store temporary files. You can also store temporary data in this folder, but remember that the data will be deleted upon rebooting your system.



/usr

The /usr directory contains most of the files, libraries, programs, and system utilities. The /bin folder is symbolically linked to /usr/bin. The same goes for the /sbin and /lib directories.

```
Æ
                                                    bilal@bilal-virtual-machine: /usr
bilal@bilal-virtual-machine:/$ ls
                                                                    swapfile
                          lib64
            home lib32 libx32 media
                                                        sbin srv
bilal@bilal-virtual-machine:/$ cd usr//
bilal@bilal-virtual-machine:/usr$ ls
bilal@bilal-virtual-machine:/usr$
```

/var

The /var directory is the storage space for system-generated variable files, and it includes logs, caches, and spool files. The data in /var isn't automatically deleted, so sysadmins can collect and investigate system logs if need be.

```
bilal@bilal-virtual-machine:/$ ls
bin cdrom etc lib lib64 lost+found mnt proc run snap swapfile two var
boot dev home lib32 libx32 media opt root sbin srv sys usr
bilal@bilal-virtual-machine:/$ cd var//
bilal@bilal-virtual-machine:/var$ ls
backups cache crash lib local lock log mail metrics opt run snap spool two
bilal@bilal-virtual-machine:/var$
```

/media

When you connect any removable media device such as a USB thumb drive, CD, or DVD, Linux creates a subdirectory under /media where the contents of the device are laid out. This is usually done automatically by the system as soon as you plug the device in. When you remove the device, the system deletes the corresponding subdirectory.



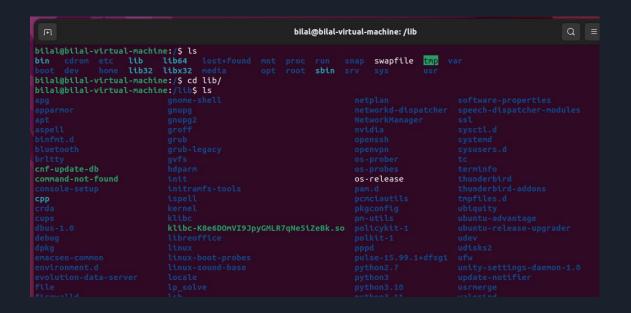
/mnt

The /mnt directory is used to mount storage devices in the system temporarily. However, some Linux distributions also use /mnt as a permanent storage solution. Unlike /media, the storage device isn't automatically mounted at /mnt by the system. Sysadmins have to manually mount a storage device and populate the file system table accordingly.

```
bilal@bilal-virtual-machine:/s ls
bin cdrom etc lib lib64 lost+found mnt proc run snap swapfile two var
boot dev home lib32 libx32 media opt root sbin srv sys usr
bilal@bilal-virtual-machine:/s cd mnt/
bilal@bilal-virtual-machine:/mnt$ ls
bilal@bilal-virtual-machine:/mnt$
```

/lib

A library is a collection of pre-compiled code that executable binaries can use. In Linux, the /lib directory serves as the storage space for all libraries needed by the binaries in the /bin directory.



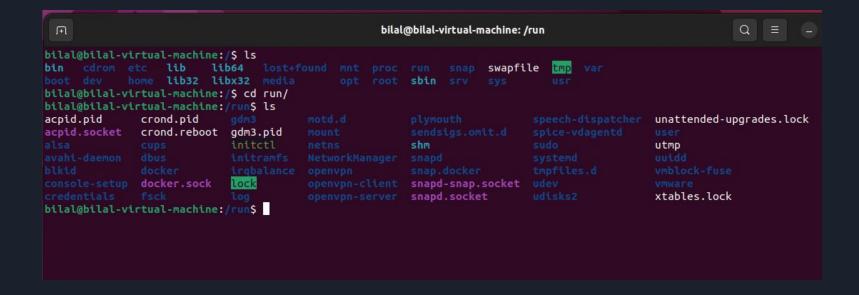
/sys

The /sys directory contains information about the various system components and drivers. It's akin to /proc but structured differently. Sysadmins use /proc and /sys interchangeably to collect data.

```
bilal@bilal-virtual-machine:/$ ls
bin cdrom etc lib lib64 lost+found mnt proc run snap swapfile tmp var
boot dev home lib32 libx32 media opt root sbin srv sys usr
bilal@bilal-virtual-machine:/$ cd sys/
bilal@bilal-virtual-machine:/sys$ ls
block bus class dev devices firmware fs hypervisor kernel module power
bilal@bilal-virtual-machine:/sys$
```

/run

The /run directory logs system information since boot time. You can find information about the daemons that are running, logged-in users, and more. The data stored in the /run directory can give you an idea of how the system resources are being utilized since startup.



SYSTEM INFORMATION

<u>Commands</u>	<u>Description</u>	<u>POC</u>
uname -a	Display Linux system information	bilal@bilal-virtual-machine: ~/Desktop Q
		bilal@bilal-virtual-machine:~/Desktop\$ uname -a Linux bilal-virtual-machine 5.15.0-56-generic #62-Ubuntu SMP I UTC 2022 x86_64 x86_64 x86_64 GNU/Linux bilal@bilal-virtual-machine:~/Desktop\$
uname -r	Display kernel release information	□ bilal@bilal-virtual-machine: ~/Desktop
		bilal@bilal-virtual-machine:~/Desktop\$ uname -r 5.15.0-56-generic bilal@bilal-virtual-machine:~/Desktop\$
cat /etc/redhat-rel ease	Show which version of Red Hat installed	/var/ttb/apkg/thro/ubuntu-retease-upgrader-gtk.massums bilal@bilal-virtual-machine:/etc\$ cat os-release PRETTY_NAME="Ubuntu 22.04.1 LTS" NAME="Ubuntu" VERSION_ID="22.04" VERSION="22.04.1 LTS (Jammy Jellyfish)" VERSION_CODENAME=jammy ID=ubuntu ID_LIKE=debian HOME_URL="https://www.ubuntu.com/"

<u>Commands</u>	<u>Description</u>	<u>POC</u>
uptime	Show how long the system has been running + load	Fl bilal@bilal-virtual-ma
		bilal@bilal-virtual-machine:/etc\$ uptime 01:43:02 up 14 min, 1 user, load average: 0.00, 0.12, 0.26 bilal@bilal-virtual-machine:/etc\$
hostname	Show system host name	F-1 b
		bilal@bilal-virtual-machine:-\$ hostname bilal-virtual-machine bilal@bilal-virtual-machine:-\$
hostname -I	Display all local IP addresses of the host.	F1 bilal
		bilal@bilal-virtual-machine:-\$ hostname -I 192.168.60.136 172.17.0.1 bilal@bilal-virtual-machine:-\$

<u>Commands</u>	<u>Description</u>	<u>POC</u>
last reboot	Show system reboot history	F1 bilal@bila
		bilal@bilal-virtual-machine:~\$ last reboot reboot system boot 5.15.0-56-generi Sun Dec 11 01:2 reboot system boot 5.15.0-56-generi Sat Dec 10 16:3 reboot system boot 5.15.0-56-generi Sat Dec 10 01:0
date	Show the current date and time	F
		bilal@bilal-virtual-machine:~\$ date 01:46:04 و PKT 2022 ت 11 فسمبر 12022 bilal@bilal-virtual-machine:~\$
cal	Show this month's calendar	「────────────────────────────────────
		دسمبر 2022 طت بين من بد جم جم عف 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

USER INFORMATION AND MANAGEMENT

<u>Commands</u>	<u>Description</u>	<u>POC</u>
id		<pre>bilal@bilal-virtual-machine:-\$ id uid=1000(bilal) gid=1000(bilal) groups=1000(bilal),4(adm) xd),135(sambashare) bilal@bilal-virtual-machine:-\$</pre>
last	Display the last users who have logged onto the system.	bilal@bilal-virtual-machine:-\$ last bilal tty2 tty2 Sun Dec 11 01:28 reboot system boot 5.15.0-56-generi Sun Dec 11 01:28 bilal tty2 tty2 Sat Dec 10 16:34 reboot system boot 5.15.0-56-generi Sat Dec 10 16:32 bilal tty2 tty2 Sat Dec 10 01:07 reboot system boot 5.15.0-56-generi Sat Dec 10 01:07
who	Show who is logged into the system.	bilal@bilal-virtual-machine:~\$ who bilal tty2 2022-12-11 01:28 (tty2) bilal@bilal-virtual-machine:~\$

<u>Commands</u>	<u>Description</u>	<u>POC</u>				
W	Show who is logged in and what they are doing.	bilal@bilal-virtual-machine:-\$ w 01:50:41 up 22 min, 1 user, load average: 0.00, 0.04 USER TTY FROM LOGIN@ IDLE JCPU bilal tty2 tty2 01:28 22:25 0.05				
groupadd test	Create a group named "test".	bilal@bilal-virtual-machine: ~/Desktop bilal@bilal-virtual-machine: ~/Desktop\$ groupadd test groupadd: group 'test' already exists bilal@bilal-virtual-machine:~/Desktop\$				
useradd -g "John Smith" -m john	Create an account named john, with a comment of "John Smith" and create the user's home directory.	bilal@bilal-virtual-machine:~/Desktop\$ sudo useradd -g "bilal" -m test [sudo] password for bilal: bilal@bilal-virtual-machine:~/Desktop\$				

<u>Commands</u>	<u>Description</u>		<u>POC</u>
userdel john	Delete the john account.	A	bilal@bilal-virtual-n
			l@bilal-virtual-machine:~/Desktop\$ userdel bilal del: user bilal is currently used by process 2065

FILE AND DIRECTORY COMMANDS

<u>Commands</u>	<u>Description</u>	<u>POC</u>
ls -al		bilal@bilal-virtual-machine:-/Desktop bilal@bilal-virtual-machine:-/Desktop bilal@bilal-virtual-machine:-/Desktop bilal@bilal-virtual-machine:-/Desktop bilal@bilal-virtual-machine:-/Desktop bilal@bilal-virtual-machine:-/Desktop\$
pwd	Display the present working directory	bilal@bilal- bilal@bilal-virtual-machine:~/Desktop\$ pwd /home/bilal/Desktop bilal@bilal-virtual-machine:~/Desktop\$
mkdir directory	Create a directory	bilal@bilal-virtual-machine:~/Desktop\$ mkdir bilal bilal@bilal-virtual-machine:~/Desktop\$ ls bilal

<u>Commands</u>	<u>Description</u>	<u>POC</u>
rm file	Remove (delete) file	→ bilal@bilal-virtual-machine: ~/Desktop
		bilal@bilal-virtual-machine:~/Desktop/bilal\$ rm bilal
rm -r directory	Remove the directory and its contents recursively	bilal@bilal-virtual-machine:~/Desktop bilal@bilal-virtual-machine:~/Desktop\$ ls abc 'bilal - Important' bilal@bilal-virtual-machine:~/Desktop\$ rm abc rm: cannot remove 'abc': Is a directory bilal@bilal-virtual-machine:~/Desktop\$ rm -r abc bilal@bilal-virtual-machine:~/Desktop\$

<u>Commands</u>	<u>Description</u>	<u>POC</u>
rm -rf directory	forcefully remove directory recursively	bilal@bilal-virtual-machine: ~/Desktop/abc bilal@bilal-virtual-machine: ~/Desktop/abc\$ ls
		bilal bilal_1 bilal@bilal-virtual-machine:~/Desktop/abc\$ rm -rf bilal bilal@bilal-virtual-machine:~/Desktop/abc\$ ls bilal_1 bilal@bilal-virtual-machine:~/Desktop/abc\$
cp file1 file2	Copy file1 to file2	bilal@bilal-virtual-machine:~/Desktop/abc\$ cat bilal_1 Bilal is learning bilal@bilal-virtual-machine:~/Desktop/abc\$ cp bilal_1 bilalmaz bilal@bilal-virtual-machine:~/Desktop/abc\$ cat bilalmaz Bilal is learning bilal@bilal-virtual-machine:~/Desktop/abc\$
cp -r source_directo ry destination	destination. If destination exists, copy source_directory into destination, otherwise create destination with the contents of	bilal@bilal-virtual-machine:-/Desktop/abc\$ cp -r bilal_1 bilal_2 bilal@bilal-virtual-machine:-/Desktop/abc\$ cd bilal_2 bilal@bilal-virtual-machine:-/Desktop/abc/bilal_2\$ ls bilal_1 bilal@bilal-virtual-machine:-/Desktop/abc/bilal_2\$

<u>Commands</u>	<u>Description</u>	<u>POC</u>
mv file1 file2	# Rename or move file1 to file2. If file2 is an existing directory, move file1 into directory file2	bilal@bilal-virtual-machine:~/Desktop/bilal - Important Q = × bilal@bilal-virtual-machine:~/Desktop/bilal - Important \$ mv bilal /Desktop mv: cannot move 'bilal' to '/Desktop': Permission denied bilal@bilal-virtual-machine:~/Desktop/bilal - Important \$ sudo mv bilal /Desktop [sudo] password for bilal: bilal@bilal-virtual-machine:~/Desktop/bilal - Important \$ ls jenktns.war bilal@bilal-virtual-machine:~/Desktop/bilal - Important \$
touch file	Create an empty file or update the access and modification times of file.	bilal@bilal-virtual-machine: ~/Desktop/abc bilal@bilal-virtual-machine: ~/Desktop/abc pwd /home/bilal/Desktop/abc bilal@bilal-virtual-machine: ~/Desktop/abc \$ touch bilal_1 bilal@bilal-virtual-machine: ~/Desktop/abc \$ ls bilal bilal 1
cat file	View the contents of file	bilal@bilal-virtual-machine:~/Desktop/abc\$ touch bilal_1 bilal@bilal-virtual-machine:~/Desktop/abc\$ ls bilal bilal_1 bilal@bilal-virtual-machine:~/Desktop/abc\$ cat bilal_1 Bilal is learning bilal@bilal-virtual-machine:~/Desktop/abc\$

<u>Commands</u>	<u>Description</u>	<u>POC</u>
less file	Browse through a text file	⊩ bilal@bilal-virtual-machine: ·
		Bilal is learning bilal 1 (END)
head file	Display the first 10 lines of file	bilal@bilal-virtual-machine:~/Desktop/abc/bilal_2\$ head bilal_1 Bilal is learning bilal@bilal-virtual-machine:~/Desktop/abc/bilal_2\$
tail file	Display the last 10 lines of file	Fl bilal@bilal-virtual-machine: ~/Desktop/abc/bilal_2
		bilal@bilal-virtual-machine:~/Desktop/abc/bilal_2\$ tail bilal1 Bilal is learning bilal@bilal-virtual-machine:~/Desktop/abc/bilal_2\$

<u>Commands</u>	<u>Description</u>	<u>POC</u>
tail -f file		bilal@bilal-virtual-machine: ~/Desktop/abc/bilal_2 Q = bilal@bilal-virtual-machine: ~/Desktop/abc/bilal_2\$ tail -f bilal_1 Bilal is learning

PROCESS MANAGEMENT

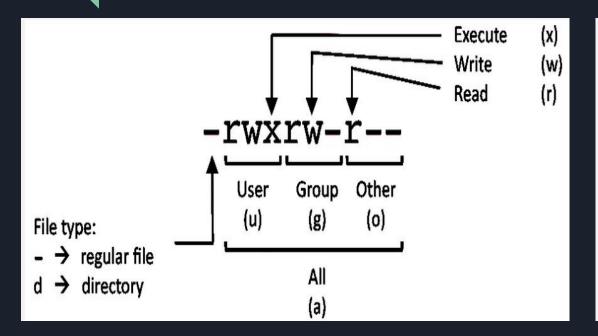
<u>Commands</u>	<u>Description</u>	<u>POC</u>
ps	Display your currently running processes	bilal@bilal bilal@bilal-virtual-machine:~\$ ps PID TTY TIME CMD 3668 pts/0 00:00:00 bash 4292 pts/0 00:00:00 ps bilal@bilal-virtual-machine:~\$

	<u>Commands</u>	<u>Description</u>	<u>POC</u>
	ps -ef	Display all the currently running processes on the system	bilal@bilal-virtual-machine:
	ps -ef grep processname	Display process information for processname	bilal@bilal-virtual-machine:-\$ ps -ef grep bash bilal 3668 3488 0 13:40 pts/0 00:00:00 bash bilal 4313 3668 0 14:00 pts/0 00:00:00 grepcolor=auto bash bilal@bilal-virtual-machine:-\$
	top	Display and manage the top processes	top - 14:01:26 up 55 min, 1 user, load average: 0.01, 0.02, 0.00 Tasks: 292 total, 1 running, 291 sleeping, 0 stopped, 0 zombie %Cpu(s): 0.2 us, 0.3 sy, 0.0 ni, 99.5 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st M1B Mem: 3889.8 total, 1183.4 free, 1202.9 used, 1503.6 buff/cache M1B Swap: 2140.0 total, 2140.0 free, 0.0 used. 2395.5 avail Mem PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND 2051 bilal 20 0 4163340 258896 119552 S 3.0 6.5 0:18.29 gnome-shel

<u>Commands</u>	<u>Description</u>	<u>POC</u>
htop	Interactive process viewer (top alternative)	
kill pid		bilal@bilal-virtual-machir bilal@bilal-virtual-machire:-\$ ps PID TTY TIME CMD 5102 pts/0 00:00:00 bash 5112 pts/0 00:00:00 ps bilal@bilal-virtual-machine:-\$ kill 5112 bash: kill: (5112) - No such process bilal@bilal-virtual-machine:-\$
killall process name	Kill all processes named processname	bilal@bilal-virtual-machine bilal@bilal-virtual-machine:~\$ ps PID TTY TIME CMD 5102 pts/0 00:00:00 bash 5125 pts/0 00:00:00 ps bilal@bilal-virtual-machine:~\$ kill bash

<u>Commands</u>	<u>Description</u>	<u>POC</u>
bg	Start program in the background	File Edit View Search Terminal Help naman@root:~\$ jobs naman@root:~\$ sleep 500 ^Z [1]+ Stopped sleep 500 naman@root:~\$ jobs [1]+ Stopped sleep 500
fg	Brings the most recent background job to foreground	File Edit View Search Terminal Help naman@root:~\$ fghelp fg: fg [job_spec] Move job to the foreground. Place the job identified by JOB_SPEC in the current job. If JOB_SPEC is not present, current job is used.
fgn	Brings job n to the foreground	File Edit View Search Terminal Help naman@root:~\$ fghelp fg: fg [job_spec] Move job to the foreground. Place the job identified by JOB_SPEC in the current job. If JOB_SPEC is not present, current job is used.

FILE PERMISSIONS



```
PERMISSION
                        EXAMPLE
                        chmod 777 filename
        rwx rwx rwx
                        chmod 775 filename
        rwx rwx r-x
                        chmod 755 filename
        rwx r-x r-x
        rw- rw- r--
                        chmod 664 filename
                        chmod 644 filename
# NOTE: Use 777 sparingly!
        LEGEND
        U = User
        G = Group
        W = World
        r = Read
        w = write
        x = execute
        - = no access
```

NETWORKING

<u>Commands</u>	<u>Description</u>	<u>POC</u>
ip a / If config	Display all network interfaces and IP address	bilal@bilal-virtual-machine: ~ >tlal@bilal-virtual-machine: ~
Hostname -i	Display eth0 address and details	bilal@bilal-virtual-machine:-\$ hostname -i 127.0.1.1 bilal@bilal-virtual-machine:-\$
ethtool eth0	Query or control network driver and hardware settings	bilal@bilal-virtual-machine: \$ ethtool eth0 netlink error: no device matches name (offset 24) netlink error: No such device netlink error: no device matches name (offset 24) netlink error: No such device

<u>Commands</u>	<u>Description</u>	<u>POC</u>
ping host	Send ICMP echo request to host	bilal@bilal-virtual-machine: ~ bilal@bilal-virtual-machine: ~ ping google.com PING google.com (142.250.201.142) 56(84) bytes of data.
		64 bytes from mct01s21-in-f14.1e100.net (142.250.201.142): s 64 bytes from mct01s21-in-f14.1e100.net (142.250.201.142): s 64 bytes from mct01s21-in-f14.1e100.net (142.250.201.142): s 64 bytes from mct01s21-in-f14.1e100.net (142.250.201.142): 65 bytes from mct01s21-in-f14.1e100.net (142.250.201.142):
		S bilal@bilal-virtual-machine:
whois domain	Display whois information for domain	No whois server is known for this kind of object. bilal@bilal-virtual-machine:-\$ whois google.com Domain Name: GOOGLE.COM Registry Domain ID: 2138514_DOMAIN_COM-VRSN Registrar WHOIS Server: whois markmonitor.com Registrar URL: http://www.markmonitor.com Updated Date: 2019-09-09715:39:04Z Creation Date: 1997-09-15704:00:00Z Registry Expiry Date: 2028-09-14T04:00:00Z
dig domain	Display DNS information for domain	bilal@bilal-virtual-machine: ~
		bilal@bilal-virtual-machine:~\$ dig google.com ; <<>> DiG 9.18.1-1ubuntu1.2-Ubuntu <<>> google.com ;; global options: +cmd ;; Got answer: ;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 29423 ;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADD: ;; OPT PSEUDOSECTION: ; EDNS: version: 0, flags:; udp: 65494 ;; QUESTION SECTION:

<u>Commands</u>	<u>Description</u>	<u>POC</u>
host domain	Display DNS IP address for domain	₱ bilal@bilal-virt
		<pre>pilal@bilal-virtual-machine:~\$ hostname pilal-virtual-machine pilal@bilal-virtual-machine:~\$</pre>
hostname -i	Display the network address of the host name.	F bilal@bilal-virtual-m
		bilal@bilal-virtual-machine:~\$ hostname -i 127.0.1.1 bilal@bilal-virtual-machine:~\$
hostname -I	Display all local IP addresses of the host.	■ bilal@bilal-virtual-macl
Trostrianic 1	Bispiay an issuit in addresses of the host.	<pre>vilal@bilal-virtual-machine:-\$ hostname -l nostname: invalid option 'l' Jsage: hostname [-b] {hostname -F file} hostname [-a -A -d -f -i -I -s -y] hostname {yp,nis,}domainname {nisdomain -F file} {yp,nis,}domainname</pre>

<u>Commands</u>	<u>Description</u>		<u>POC</u>	
wget http://domain. com/file	Download http://domain.com/file	2023-01-08 Resolving www 81:face:b00c Connecting to d. HTTP request Location: ht2023-01-08 Connecting to	virtual-machine:-\$ wget ww 14:46:08 http://www.fa w.facebook.com (www.facebo	icebook.com/ pok.com) 157.240.227.35 icebook.com) 157.240.227.3 . 301 Moved Permanently following acebook.com/
netstat -nutlp	Display listening tcp and udp ports and corresponding programs	<pre>bilal@bilal-virtual-machine:-\$ netstat -ntlp (Not all processes could be identified, non-owned process will not be shown, you would have to be root to see it a Active Internet connections (only servers)</pre>	non-owned process info e root to see it all.) rs) Foreign Address 0.0.0.0:*	

INSTALLING PACKAGES

<u>Commands</u>	<u>Description</u>	<u>POC</u>
yum search keyword	Search for a package by keyword.	bilal@bilal-virtual-machine:-\$ apt search httpd Sorting Done Full Text Search Done axhttpd/jammy 2.1.5+ds-1build2 amd64 Highly configurable client/server TLSv1.2 library (web server) ccze/jammy 0.2.1-6 amd64 robust, modular log coloriser elpa-simple-httpd/jammy,jammy 1.5.1-4 all pure elisp HTTP server
Yum / snap/apt install package	Install package.	bilal@bilal-virtual-machine: - bilal@bilal-virtual-machine: \$ sudo apt install pip [sudo] password for bilal: Reading package lists Done Building dependency tree Done Reading state information Done Note, selecting 'python3-pip' instead of 'pip' The following packages were automatically installed and libflashrom1 libftdi1-2 'N' NO 'package's TOUNG bilal@bilal-virtual-machine: \$ apt show E: No packages found bilal@bilal-virtual-machine: \$
yum info package	Display description and summary information about package.	

SSH LOGINS

<u>Commands</u>	<u>Description</u>	<u>POC</u>
ssh host	Connect to host as your local username.	bilal@bilal-virtual-machine:~\$ ssh localhost bilal@localhost's password: Welcome to Ubuntu 22.04.1 LTS (GNU/Linux 5.15.0-57- * Documentation: https://help.ubuntu.com * Management: https://landscape.canonical.com * Support: https://ubuntu.com/advantage
ssh user@host	Connect to host as user	bilal@bilal-virtual-machine:~ bilal@bilal-virtual-machine:~\$ ls bilal bilal.pub Documents index.html Pictures snap bilal-linux Desktop Downloads Music Public Templa bilal@bilal-virtual-machine:~\$ pwd /home/bilal bilal@bilal-virtual-machine:~\$
ssh -p port user@host	Connect to host using port	bilal@bilal-virtual-machine:~ bilal@bilal-virtual-machine:~\$ ls bilal bilal.pub Documents index.html Pictures snap bilal-linux Desktop Downloads Music Public Templa bilal@bilal-virtual-machine:~\$ pwd /home/bilal bilal@bilal-virtual-machine:~\$

DISK USAGE

<u>Commands</u>	<u>Description</u>	<u>POC</u>
df -h	Show free and used space on mounted filesystems	bilal@bilal-virtual-machine: ~ bilal@bilal-virtual-machine: \$ df -h Filesystem Size Used Avail Use% Mounted on tmpfs 389M 2.1M 387M 1% /run //dev/sda3 20G 13G 6.1G 6.7% / tmpfs 1.9G 0 1.9G 0% /dev/shm tmpfs 5.0M 4.0% 5.0M 1% /run/lock //dev/sda2 512M 5.3M 507M 2% /boot/efit tmpfs 389M 4.7M 385M 2% /run/user/1000 //dev/sr0 127M 127M 0 100% /media/bilal/CDROM //dev/sr1 3.6G 3.6G 0 100% /media/bilal/Ubuntu bilal@bilal-virtual-machine: \$
df -i	Show free and used inodes on mounted filesystems	
fdisk -l	Display disks partitions sizes and types	bilal@bilal-virtual-machine: ~ ***lial@bilal-virtual-machine: ~ \$ sudo fdisk -l sudo] password for bilal: ***isk /dev/loop0: 55.58 MiB, 58281984 bytes, 113832 sectors **Jnits: sectors of 1 * 512 = 512 bytes **Jector size (logical/physical): 512 bytes / 512 bytes **Journal of the following

<u>Commands</u>	<u>Description</u>	<u>POC</u>
du -ah	Display disk usage for all files and directories in human readable format	bilalgbilal-virtual-machine: \$ du -ah 4.0K ./.groovy/grapes 8.0K ./.groovy 4.0K ./.fontconfig/2bd0278d-49c2-4c8c-9eea-32d695b22756-le64.cache-7 4.0K ./.fontconfig/CACHEDIR.TAG 12K ./.fontconfig 0 ./.sudo_as_admin_successful 388K ./.cache/gstreamer-1.0/registry.x86_64.bin
du -sh	Display total disk usage off the current directory	bilal@bil bilal@bilal-virtual-machine:~\$ du -sh 500M . bilal@bilal-virtual-machine:~\$

DIRECTORY NAVIGATION

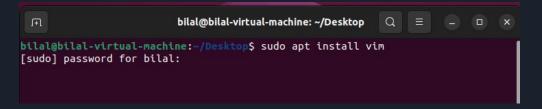
<u>Commands</u>	<u>Description</u>	<u>POC</u>
cd	into the parent un ectory.	bilal@bilal-virtu pilal@bilal-virtual-machine:~\$ pwd /home/bilal pilal@bilal-virtual-machine:~\$ cd pilal@bilal-virtual-machine:/home\$ pwd /home pilal@bilal-virtual-machine:/home\$
cd	Go to the \$HOME directory	bilal@bilal-virtu bilal@bilal-virtual-machine:-/Desktop\$ pwd /home/bilal/Desktop bilal@bilal-virtual-machine:-/Desktop\$ cd bilal@bilal-virtual-machine:-\$ pwd /home/bilal bilal@bilal-virtual-machine:-\$
cd /etc	Change to the /etc directory	bilal@bilal-virtual-machine:/home\$ cd \bilal bilal@bilal-virtual-machine:~\$ pwd /home/bilal bilal@bilal-virtual-machine:~\$

Projects

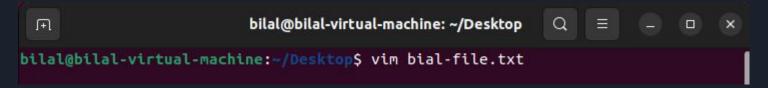
- **Project 1** → Working with Vim editor
- **Project 2** → install Apache server in Ubuntu
- **Project 3** → Configure Firewall
- **Project 4** → Wordpress Installation

Project 1: Create test file in linux

 \rightarrow Install Vim editor



→ File Create



Project 2: Install Apache server in Ubuntu

→ First, we need to update our system by using the below command:

Project 2: Install Apache server in Ubuntu

→ After updating the system, we need to run the following command:

```
bilal@bilal-virtual-machine: ~
bilal@bilal-virtual-machine:~$ sudo apt-get install apache2
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
 libflashrom1 libftdi1-2
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
 apache2-bin apache2-data apache2-utils libapr1 libaprutil1
 libaprutil1-dbd-sqlite3 libaprutil1-ldap
Suggested packages:
  apache2-doc apache2-suexec-pristine | apache2-suexec-custom www-browser
The following NEW packages will be installed:
 apache2 apache2-bin apache2-data apache2-utils libapr1 libaprutil1
 libaprutil1-dbd-sqlite3 libaprutil1-ldap
O upgraded, 8 newly installed, O to remove and 24 not upgraded.
Need to get 1,916 kB of archives.
After this operation, 7,706 kB of additional disk space will be used.
Do you want to continue? [Y/n]
```

Project 2: Install Apache server in Ubuntu

→ Start Apache Server

```
bilal@bilal-virtual-machine:~$ sudo systemctl start apache2
bilal@bilal-virtual-machine:~$
```

 \rightarrow We can also see the status of whether Apache has been enabled using the command:

```
bilal@bilal-virtual-machine: ~

bilal-virtual-machine
State: running
Jobs: 0 queued
Failed: 0 units
Since: Sun 2023-01-08 13:06:16 PKT; 2h 32min ago
CGroup: /

-1661 bpfilter_umh
-user.slice
-user-1000.slice
```

 \rightarrow By default, the iptables is installed on most of the Linux distros. We can use the following command to ensure that iptable is available on our system

```
bilal@bilal-virtual-machine:-$ sudo apt-get install iptables

Reading package lists... Done

Building dependency tree... Done

Reading state information... Done

iptables is already the newest version (1.8.7-1ubuntu5).

iptables set to manually installed.

The following packages were automatically installed and are no longer required:

libflashrom1 libftdi1-2

Use 'sudo apt autoremove' to remove them.

0 upgraded, 0 newly installed, 0 to remove and 24 not upgraded.

bilal@bilal-virtual-machine:-$
```

→ List the iptables current rules

```
bilal@bilal-virtual-machine:~$ sudo iptables -L

# Warning: iptables-legacy tables present, use iptables-legacy to see them
Chain INPUT (policy ACCEPT)
target prot opt source destination

Chain FORWARD (policy ACCEPT)
target prot opt source destination

Chain OUTPUT (policy ACCEPT)
target prot opt source destination

bilal@bilal-virtual-machine:~$
```

→ Simply put, iptables is a firewall program for Linux. It will monitor traffic from and to your server using tables. These tables contain sets of rules, called chains, that will filter incoming and outgoing data packets.

When a packet matches a rule, it is given a target, which can be another chain or one of these special values:

- → **ACCEPT** will allow the packet to pass through.
- → **DROP** will not let the packet pass through.
- → **RETURN** stops the packet from traversing through a chain and tell it to go back to the previous chain.

It will alert iptables that you are adding new rules to a chain. Then, you can combine the command with other options, such

```
→ -i (interface)
```

→ -p (protocol)

 \rightarrow -s (source)

 \rightarrow -dport

 \rightarrow -j (target)

```
sudo iptables -A <chain> -i <interface> -p  -protocol (tcp/udp) > -s
<source> --dport <port no.> -j <target>
```

- → Enabling Traffic on Localhost
 - → To allow traffic on localhost, type this command:

sudo iptables -A INPUT -i lo -j ACCEPT

For this iptables tutorial, we use lo or loopback interface. It is utilized for all communications on the localhost. The command above will make sure that the connections between a database and a web application on the same machine are working properly.

→ Enabling Connections on HTTP, SSH, and SSL Port

we want http (port 80), https (port 443), and ssh (port 22) connections to work as usual. To do this, we need to specify the protocol (-p) and the corresponding port (-dport). You can execute these commands one by one:

```
sudo iptables -A INPUT -p tcp --dport 22 -j ACCEPT
sudo iptables -A INPUT -p tcp --dport 80 -j ACCEPT
sudo iptables -A INPUT -p tcp --dport 443 -j ACCEPT
```

→ It's time to check if the rules have been appended in iptables:

sudo iptables -L -v

```
0 0 ACCEPT tcp -- any any anywhere anywhere tcp dpt:ssh
0 0 ACCEPT tcp -- any any anywhere anywhere tcp dpt:http
0 0 ACCEPT tcp -- any any anywhere anywhere tcp dpt:https
```

→ Filtering Packets Based on Source

Iptables allows you to filter packets based on an IP address or a range of IP addresses. You need to specify it after the -s option. For example, to accept packets from 192.168.1.3, the command would be:

You can also reject packets from a specific IP address by replacing the ACCEPT target with DROP.

sudo iptables -A INPUT -s 192.168.1.3 -j DROP

If you want to drop packets from a range of IP addresses, you have to use the -m option and iprange module. Then, specify the IP address range with -src-range. Remember, a hyphen should separate the range of ip addresses without space, like this:

```
sudo iptables -A INPUT -m iprange --src-range 192.168.1.100-192.168.1.200 -j DROP
```

→ Dropping all Other Traffic

It is crucial to use the DROP target for all other traffic after defining –dport rules. This will prevent an unauthorized connection from accessing the server via other open ports. To achieve this, simply type:

sudo iptables -A INPUT -j DROP

→ Deleting Rules

If you want to remove all rules and start with a clean slate, you can use the -F option (flush):

sudo iptables -F

→ Persisting Changes

sudo /sbin/iptables-save

- → You need to install apache2 and apache2 status can be found using the following command
- → Commands : sudo apt-get install apache2

 \rightarrow Install mariaDB

```
bilal@bilal-virtual-machine: ~

bilal@bilal-virtual-machine: ~

sudo apt install mariadb-server
sudo mysql_secure_installation
```

 \rightarrow To enable the service

```
bilal@bilal-virtual-machine: ~ Q = - - ×

bilal@bilal-virtual-machine: -$ sudo systemctl is-enabled mariadb.service enabled bilal@bilal-virtual-machine: -$
```

 \rightarrow To ensure installation of Mysql

```
enabled
bilal@bilal-virtual-machine:-$ sudo mysql_secure_installation

NOTE: RUNNING ALL PARTS OF THIS SCRIPT IS RECOMMENDED FOR ALL MariaDB
SERVERS IN PRODUCTION USE! PLEASE READ EACH STEP CAREFULLY!
```

→ Connect with Database

```
bilal@bilal-virtual-machine:-$ sudo mysql -u root
Welcome to the MariaDB monitor. Commands end with ; or \g.
Your MariaDB connection id is 51
Server version: 10.6.11-MariaDB-Oubuntu0.22.04.1 Ubuntu 22.04

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]>
```

→ Install PHP libraries

```
Try: sudo apt install <deb name>
bilal@bilal-virtual-machine:-$ sudo apt install php libapache2-mod-php php-mysql
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
php-mysql is already the newest version (2:8.2+93+ubuntu22.04.1+deb.sury.org+2).
The following additional packages will be installed:
   libapache2-mod-php8.2 php8.2 php8.2-cli php8.2-common php8.2-curl php8.2-gd php8.2-im
   php8.2-mbstring php8.2-mysql php8.2-opcache php8.2-phpdbg php8.2-readline php8.2-xml |
Suggested packages:
```

→ Install php

```
bilal@bilal-virtual-machine:~ Q = - - ×

pilal@bilal-virtual-machine:~$ sudo apt install php -y
[sudo] password for bilal:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Shp is already the newest version (2:8.2+93+ubuntu22.04.1+deb.sury.org+2).

Dupgraded, 0 newly installed, 0 to remove and 39 not upgraded.

Dilal@bilal-virtual-machine:~$
```

→ Install wget

```
bilal@bilal-virtual-machine:~$ sudo apt install wget -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
wget is already the newest version (1.21.2-2ubuntu1).
0 upgraded, 0 newly installed, 0 to remove and 39 not upgraded.
bilal@bilal-virtual-machine:~$
```

→ Download wordpress

```
bilal@bilal-virtual-machine: ~
rilal@bilal-virtual-machine:~$ wget https://worpress.org/latest.zip
-2023-01-13 21:21:55-- https://worpress.org/latest.zip
lesolving worpress.org (worpress.org)... 198.143.164.151
Connecting to worpress.org (worpress.org)|198.143.164.151|:443... connected.
ITTP request sent, awaiting response... 301 Moved Permanently
ocation: https://wordpress.org/ [following]
-2023-01-13 21:21:57-- https://wordpress.org/
lesolving wordpress.org (wordpress.org)... 198.143.164.252
connecting to wordpress.org (wordpress.org) | 198.143.164.252 | :443... connected.
ITTP request sent, awaiting response... 200 OK
.ength: unspecified [text/html]
aving to: 'latest.zip'
.atest.zip
                                                                                              1 116.42K
!023-01-13 21:21:59 (125 KB/s) - 'latest.zip' saved [119212]
```

→ copy wordpress file /var/www/html

```
bilal@bilal-virtual-machine: /var/www/html
bilal@bilal-virtual-machine:~/Downloads/wordpress$ sudo mkdir /var/www/html
mkdir: cannot create directory '/var/www/html': File exists
bilal@bilal-virtual-machine:~/Downloads/wordpress$ sudo cp -r * /var/www/html
bilal@bilal-virtual-machine:~/Downloads/wordpress$ ls
index.php
                                                                          wp-stanup.php
                                                         wp-load.php
                                                                          wp-trackback.php
license.txt
                wp-blog-header.php
                                      wp-cron.php
                                                         wp-login.php
                wp-comments-post.php wp-includes
                                                         wp-mail.php
                                                                          xmlrpc.php
readme.html
wp-activate.php wp-config-sample.php wp-links-opml.php wp-settings.php
bilal@bilal-virtual-machine:~/Downloads/wordpressS cd /var/www/html/
bilal@bilal-virtual-machine:/var/www/htmlS ls
                                wp-comments-post.php
                                                                         wp-mail.php
index.html readme.html
                                                                                           xmlrpc.php
index.php
            wp-activate.php
                                wp-config-sample.php
                                                      wp-links-opml.php
                                                                         wp-settings.php
info.php
                                                      wp-load.php
                                                                         wp-signup.php
license.txt wp-blog-header.php wp-cron.php
                                                      wp-login.php
                                                                         wp-trackback.php
```

→ library installation

```
bilal@bilal-virtual-machine: /var/www/html
ilal@bilal-virtual-machine:/var/www/html$ sudo apt install php-mysql php-cqi php-cli php-qd -y
eading package lists... Done
uilding dependency tree... Done
eading state information... Done
hp-qd is already the newest version (2:8.2+93+ubuntu22.04.1+deb.surv.orq+2).
hp-mysql is already the newest version (2:8.2+93+ubuntu22.04.1+deb.sury.org+2).
he following additional packages will be installed:
php8.2-cqi
uggested packages:
php-pear
he following NEW packages will be installed:
php-cgi php-cli php8.2-cgi
upgraded, 3 newly installed, 0 to remove and 39 not upgraded.
eed to get 1,844 kB of archives.
fter this operation, 11.2 MB of additional disk space will be used.
et:1 https://ppa.launchpadcontent.net/ondrej/php/ubuntu jammy/main amd64 php8.2-cgi amd64 8.2.1-2+ubuntu
04.1+deb.sury.org+1 [1,828 kB]
1% [1 php8.2-cgi 950 kB/1.828 kB 52%]
```

→ restart apache2

```
Processing triggers for man-dD (2.10.2-1) ...

Processing triggers for php8.2-cgi (8.2.1-2+ubuntu22.04.1+deb.sury.org+1) ...

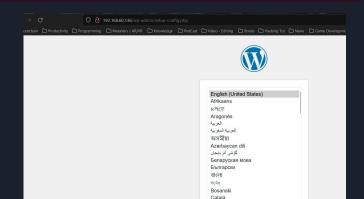
bilal@bilal-virtual-machine:/var/www/html$ sudo systemctl restart apache2

bilal@bilal-virtual-machine:/var/www/html$
```

 \rightarrow Change permission

```
chown: invalid group: 'www-data:ww-data'
bilal@bilal-virtual-machine:/var/www/html$ sudo chown -R www-data:www-data /var/www/
bilal@bilal-virtual-machine:/var/www/html$
```

- → Check your IP: ip a or ifconfig
- \rightarrow open Browser \rightarrow ip/wp-admin/setup-config.php



\rightarrow login to mysql

```
valid_lft forever preferred_lft forever
bilal@bilal-virtual-machine:/var/www/html$ sudo mysql -u root -p
Enter password:
Welcome to the MariaDB monitor. Commands end with ; or \g.
Your MariaDB connection id is 67
Server version: 10.6.11-MariaDB-Oubuntu0.22.04.1 Ubuntu 22.04
Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
MariaDB [(none)]>
```

→ Create Database

```
MariaDB [(none)]> create database wordpress;
ERROR 1007 (HY000): Can't create database 'wordpress'; database exists
MariaDB [(none)]>
```

\rightarrow Create user

→ Grand privileges

```
server version for the right syntax to use near 'privilleges on wordpress.*
MariaDB [(none)]> grant all on wordpress.* to "wordpress@123";
Query OK, O rows affected (0.001 sec)

MariaDB [(none)]>
```

- → add detail in wordpress wizard
- → begin installation



→ We made it !!

