

LINUX SERVER

Fundamentals | Administration | Web Server

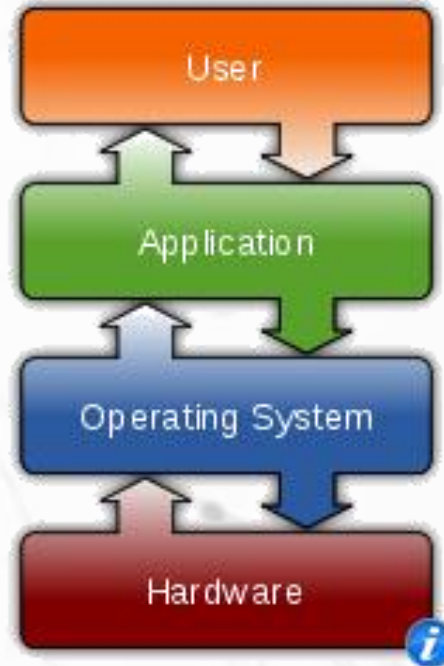
By Dr Nizam

About Linux

What is
Linux?

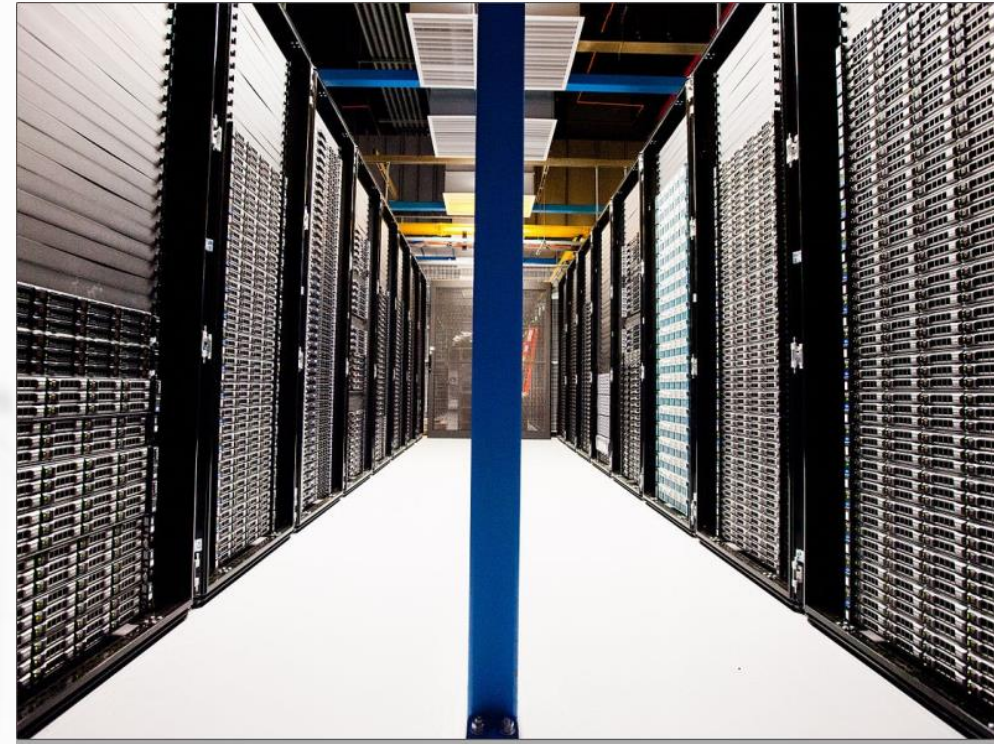
It's an Operating
System

Operating systems



Common features

- Process management
- Interrupts
- Memory management
- File system
- Device drivers
- Networking (TCP/IP, UDP)
- Security (Process/Memory protection)
- I/O



The Most Common
O/S Used By BU
Researchers When
Working on a Server
or Computer Cluster

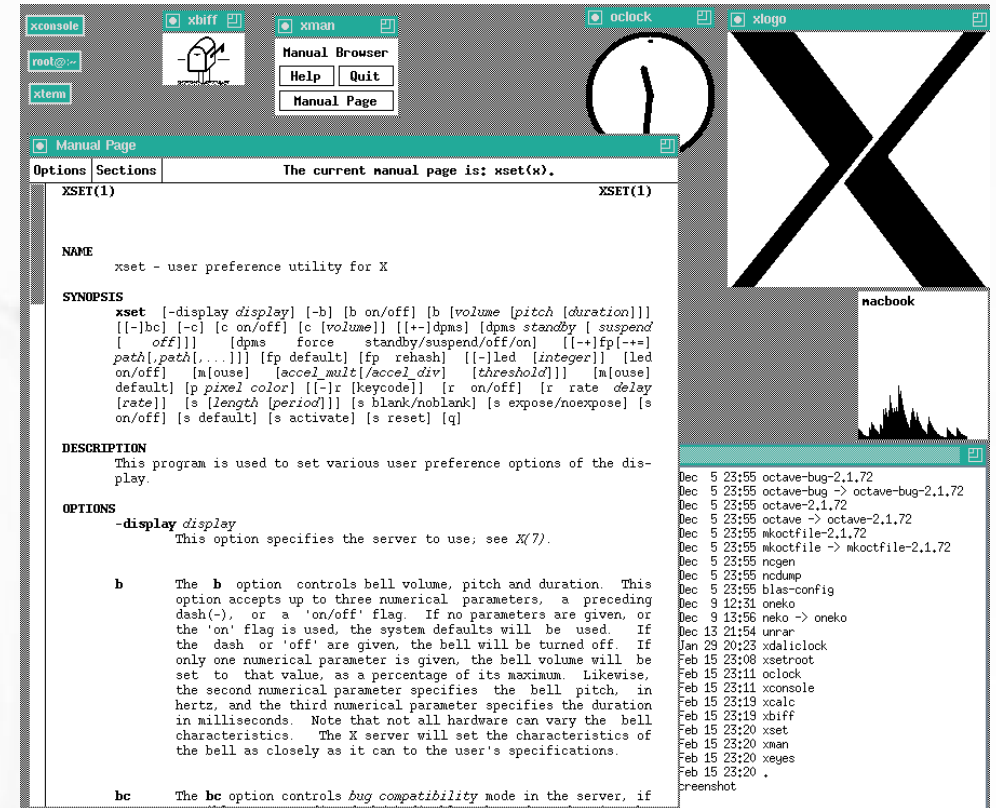
Operating System (OS)

- **Operating System:** Manages activities and resources of a computer.
 - software that acts as an interface between hardware and user
 - provides a layer of abstraction for application developers
- features provided by an operating system:
 - ability to execute programs (and multi-tasking)
 - memory management (and virtual memory)
 - file systems, disk and network access
 - an interface to communicate with hardware
 - a user interface (often graphical)
- **kernel:** The lowest-level core of an operating system.



Story About Linux

- **Linux is a Unix clone** written from scratch by Linus Torvalds with assistance from a loosely-knit team of hackers across the Net.
- Unix is a multitasking, multi-user computer operating system originally developed in 1969 by a group of AT&T employees at Bell Labs.
 - written in a high-level language (C)
 - virtual memory
 - hierarchical file system; "everything" is a file
 - lots of small programs that work together to solve larger problems
 - security, users, access, and groups
- Linux and Unix strive to be POSIX compliant.
- **Over 70%** of the world's servers run some variant of Unix or Linux. The Android phone and the Kindle run Linux.



The Founding Father

Linux + GNU Utilities = Free Unix



- Linux is an O/S core written by Linus Torvalds and others



"GNU's Not Unix!"



- a set of small programs written by Richard Stallman and others. They are the GNU utilities.

What is Linux?

- **Linux:** A kernel for a Unix-like operating system.
 - commonly seen/used today in servers, mobile/embedded devices, ...
- **GNU:** A "free software" implementation of many Unix-like tools
 - many GNU tools are distributed with the Linux kernel
 - E.g; date, gcc,
- **distribution:** A pre-packaged set of Linux software.
 - examples: Ubuntu, Fedora
- **key features of Linux:**
 - **open source software:** source can be downloaded
 - free to use
 - constantly being improved/updated by the community

Linux Has Many Distributions → Distros



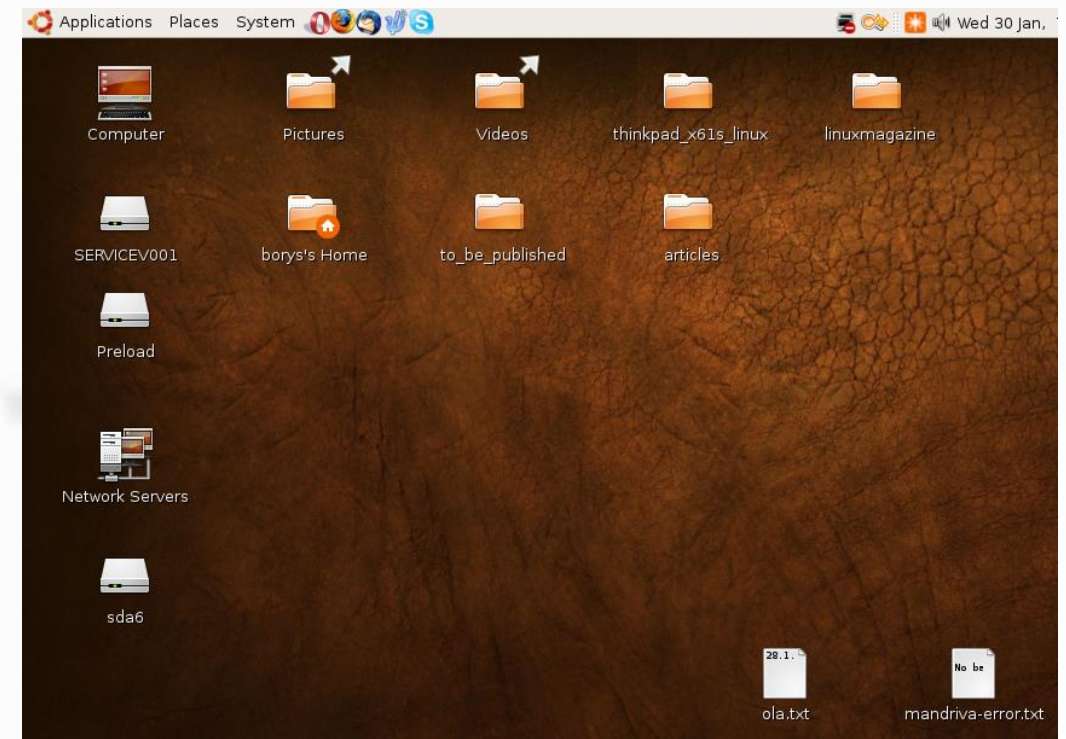
Linux Desktop

- X-windows
- window managers
- desktop environments
 - Gnome
 - KDE

Why should I learn to use a shell when GUIs exist?

Linux Shell

- **shell**: An interactive program/interpreter that uses user input to manage the execution of other programs.
 - A command processor, typically runs in a text window.
 - User types commands, the shell runs the commands
 - Several different shell programs exist:
 - bash : the default shell program on most Linux/Unix systems



```
baljit@baljit:~/shell_scripting$ ./first_script
-          2          4_read          D1          Q3          Q7
1          2_quoting    5_command_input    K20KK    Q4          Q8
1.1_variables  3_envir_var  6_ifelse          Q1          Q5          Questions
1_variables    4          7_for          Q2          Q6          array
Wed Oct 7 22:40:13 IST 2020
      October 2020
Su Mo Tu We Th Fr Sa
                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
```


The background of the slide features a light gray abstract network diagram. It consists of numerous circular nodes of varying sizes connected by thin, light gray lines. Some nodes are larger and more prominent, while others are smaller and less visible. The connections form a complex, interconnected web across the entire slide.

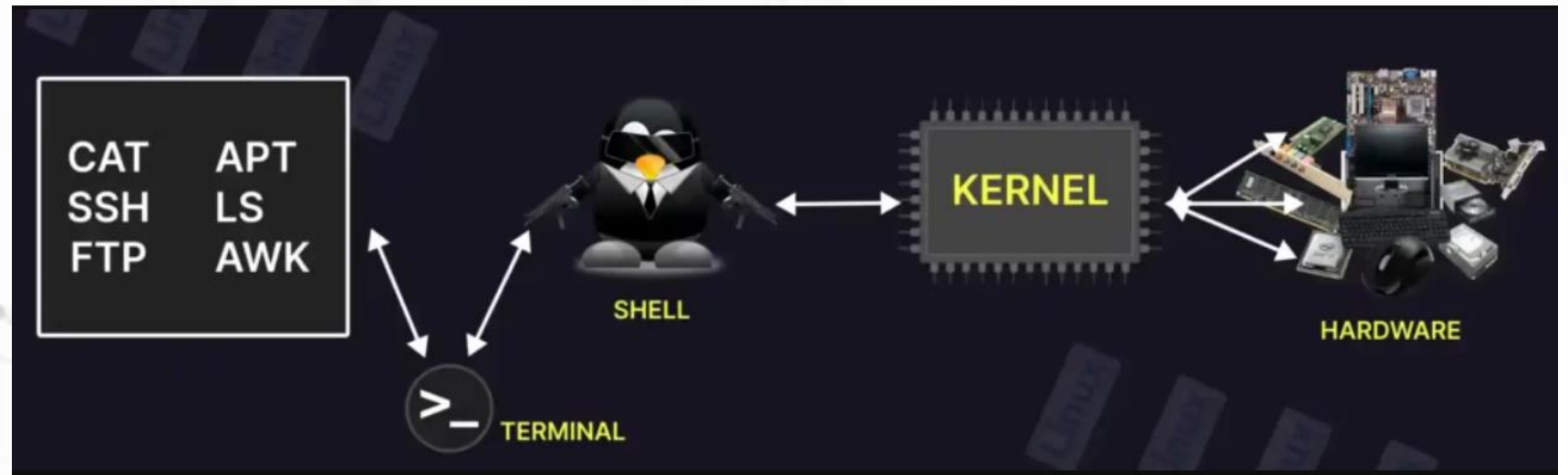
QUIZ!

Session 1

206.189.80.102

Why use a shell?

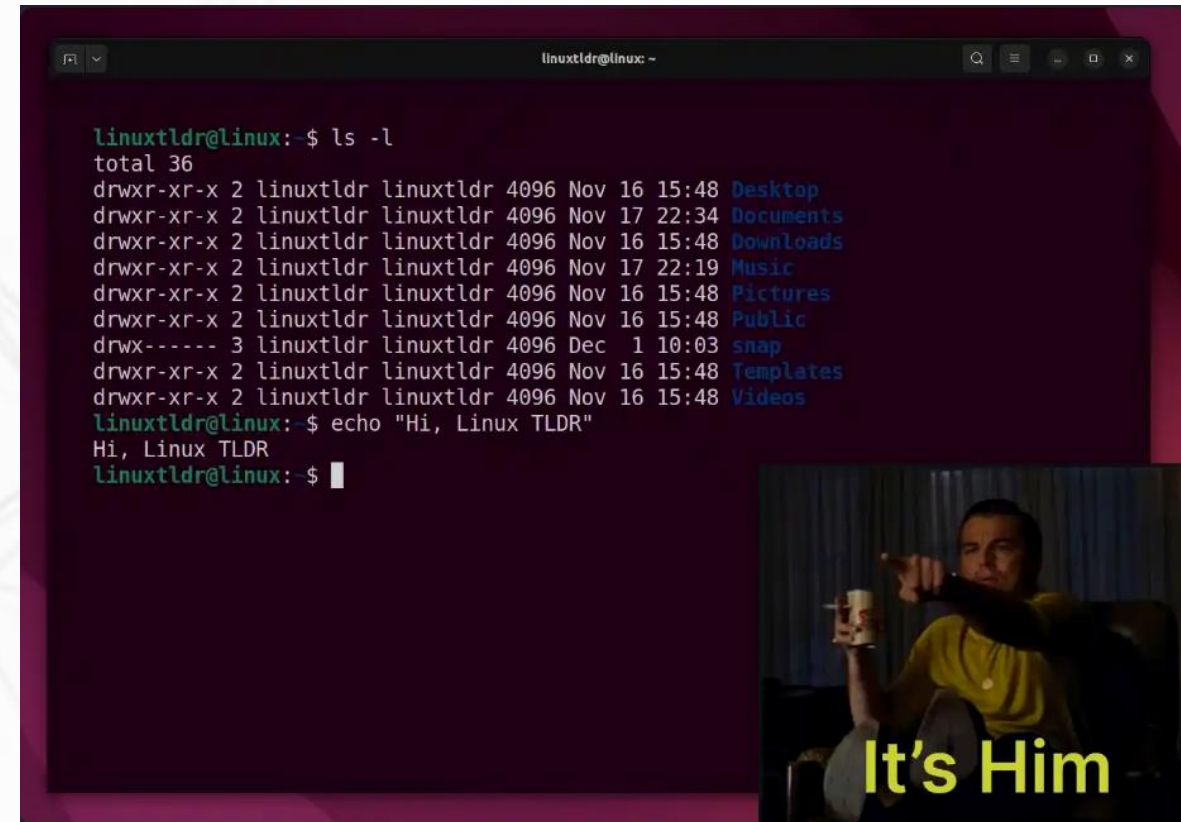
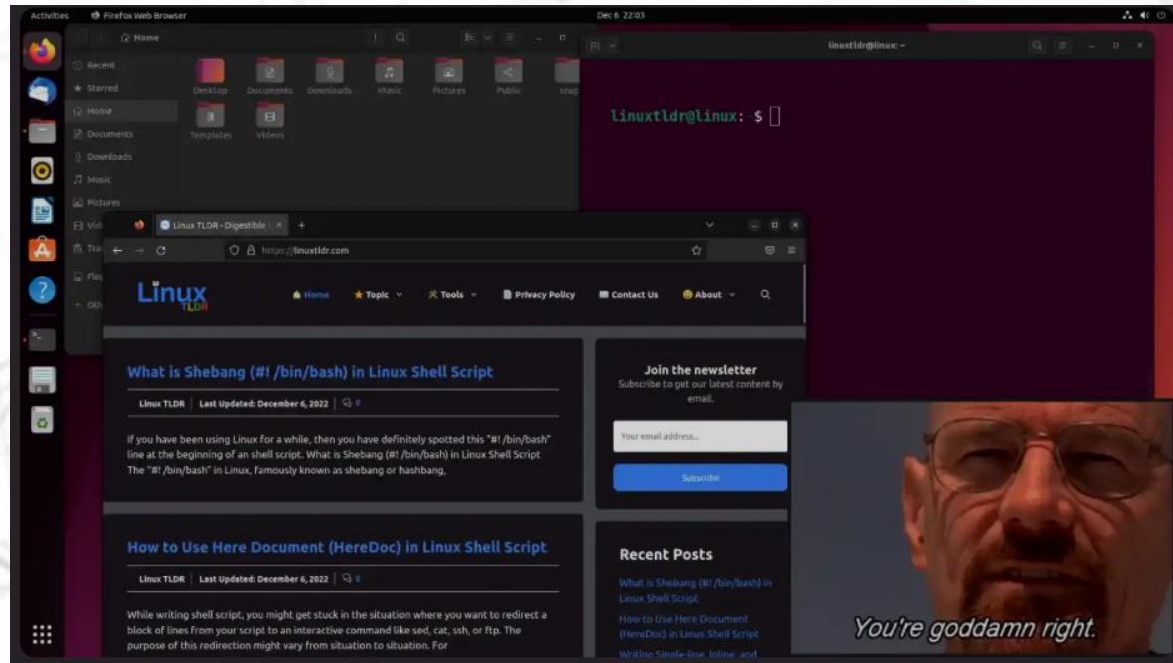
- Why should I learn to use a shell when GUIs exist?
 - faster
 - work remotely
 - programmable
 - customizable
 - repeatable



The shell is not all about commands!

Shell is divided into two categories:

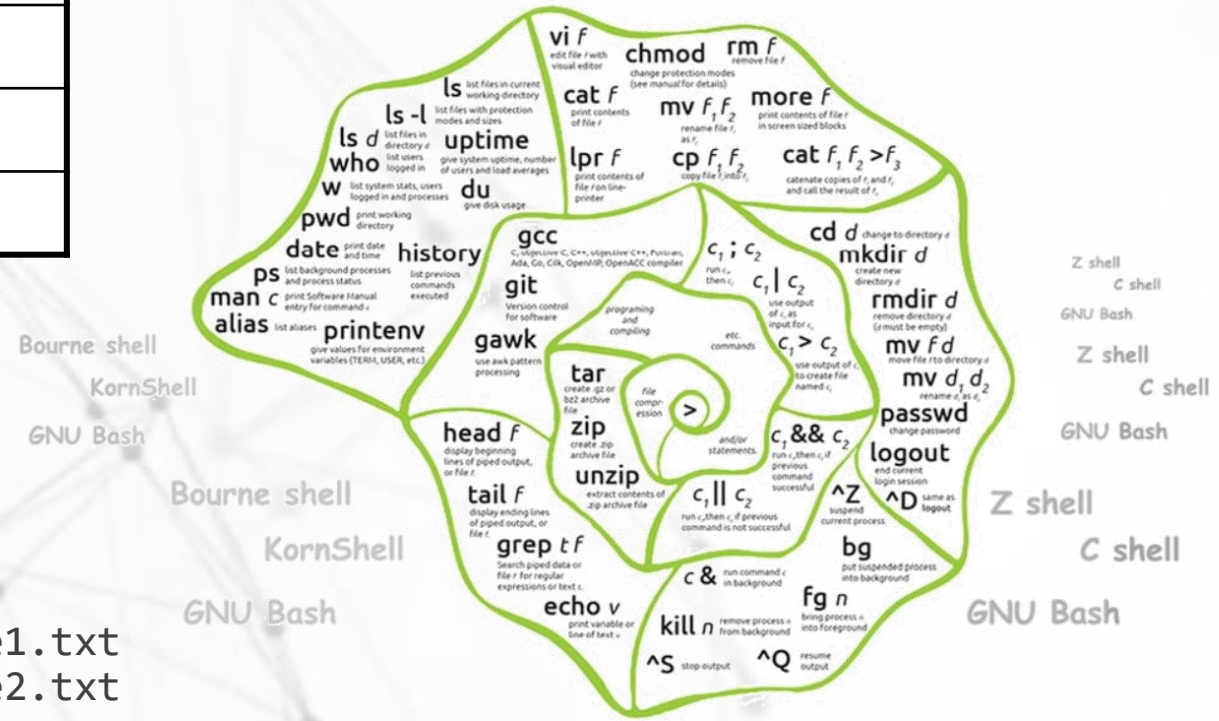
- Command-Line Shell
- Graphical Shell



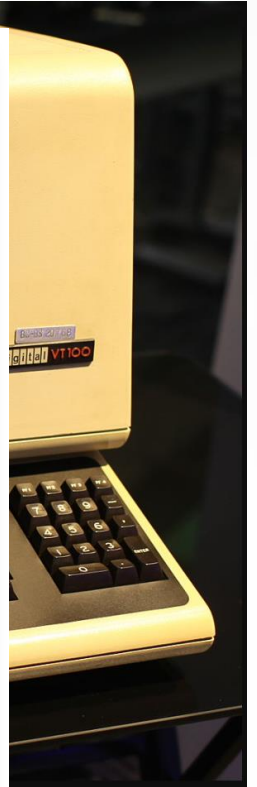
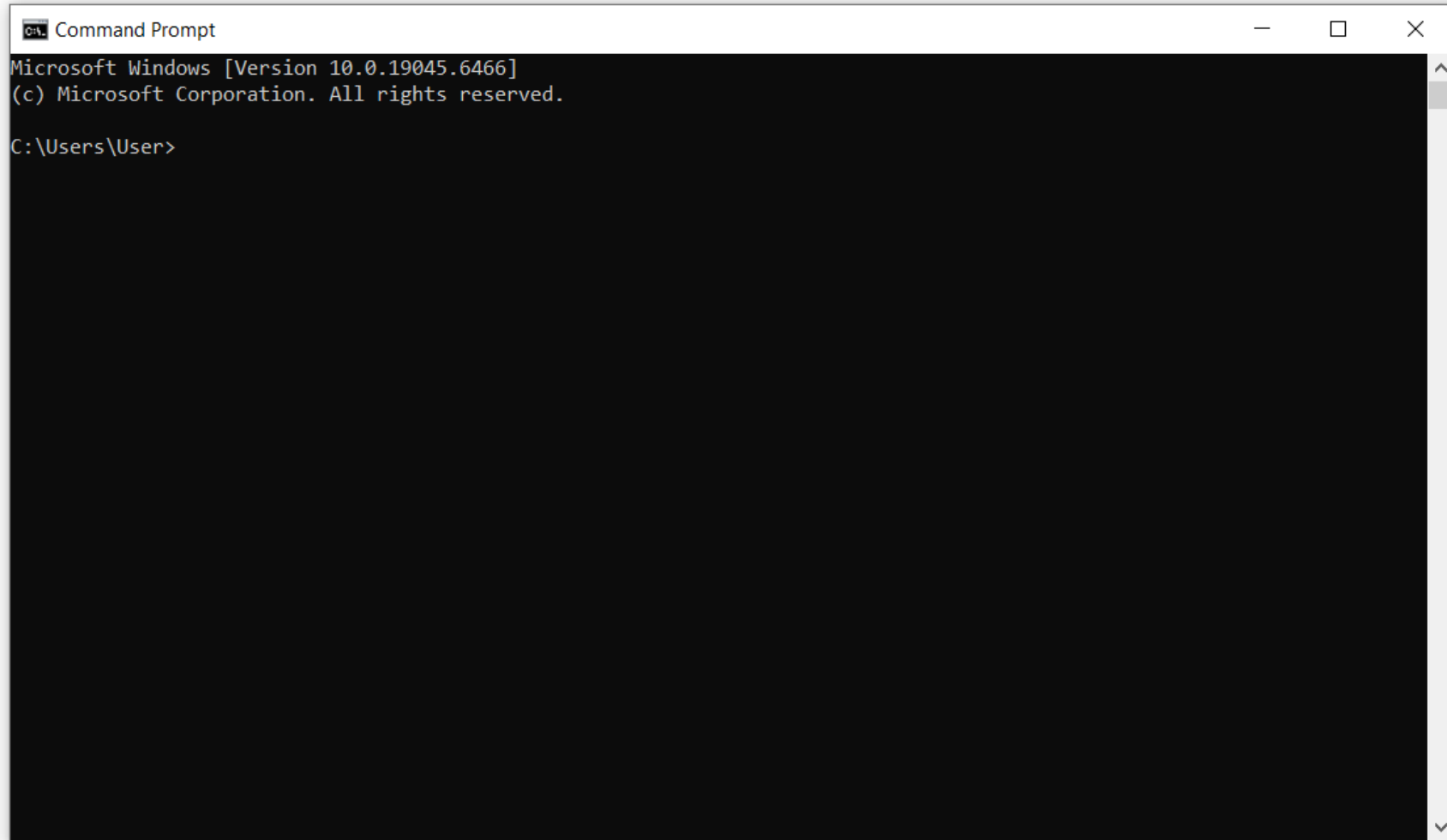
Shell commands

command	description
exit	logs out of the shell
ls	lists files in a directory
pwd	<u>p</u> rint the current <u>w</u> orking <u>d</u> irectory
cd	<u>c</u> hanges the working <u>d</u> irectory
man	brings up the manual for a command

```
$ pwd
/homes/iws/rea
$ cd CSE391
$ ls
file1.txt file2.txt
$ ls -l
-rw-r--r-- 1 rea fac_cs 0 2016-03-29 17:45 file1.txt
-rw-r--r-- 1 rea fac_cs 0 2016-03-29 17:45 file2.txt
$ cd ..
$ man ls
$ exit
```



Tools to Execute Shell Via CLI



... CLIENT!

What is SSH?

- SSH, or **Secure Shell**, is a protocol that allows users to securely connect to their remote servers over the internet.
- SSH service was developed as a replacement for the unencrypted **Telnet** protocol, using cryptographic techniques to ensure that all communication between the client and server happens in an encrypted manner.
- It provides a method for securely transferring inputs from a remote user, executing commands on the server, and relaying the outputs back to the user.
- **The default port for SSH is 22.**



SSH is a **remote administration protocol** that allows users to securely connect to their remote servers over the internet.

SSH service was developed as a replacement for the unencrypted **Telnet** protocol, using cryptographic techniques to ensure that all communication between the client and server happens in an encrypted manner.

It provides a method for securely transferring inputs from a remote user, executing commands on the server, and relaying the outputs back to the user.

SSH CLIENT

SSH SERVER



Hello !

y6uW\$i

Hello !

Encrypt

Decrypt



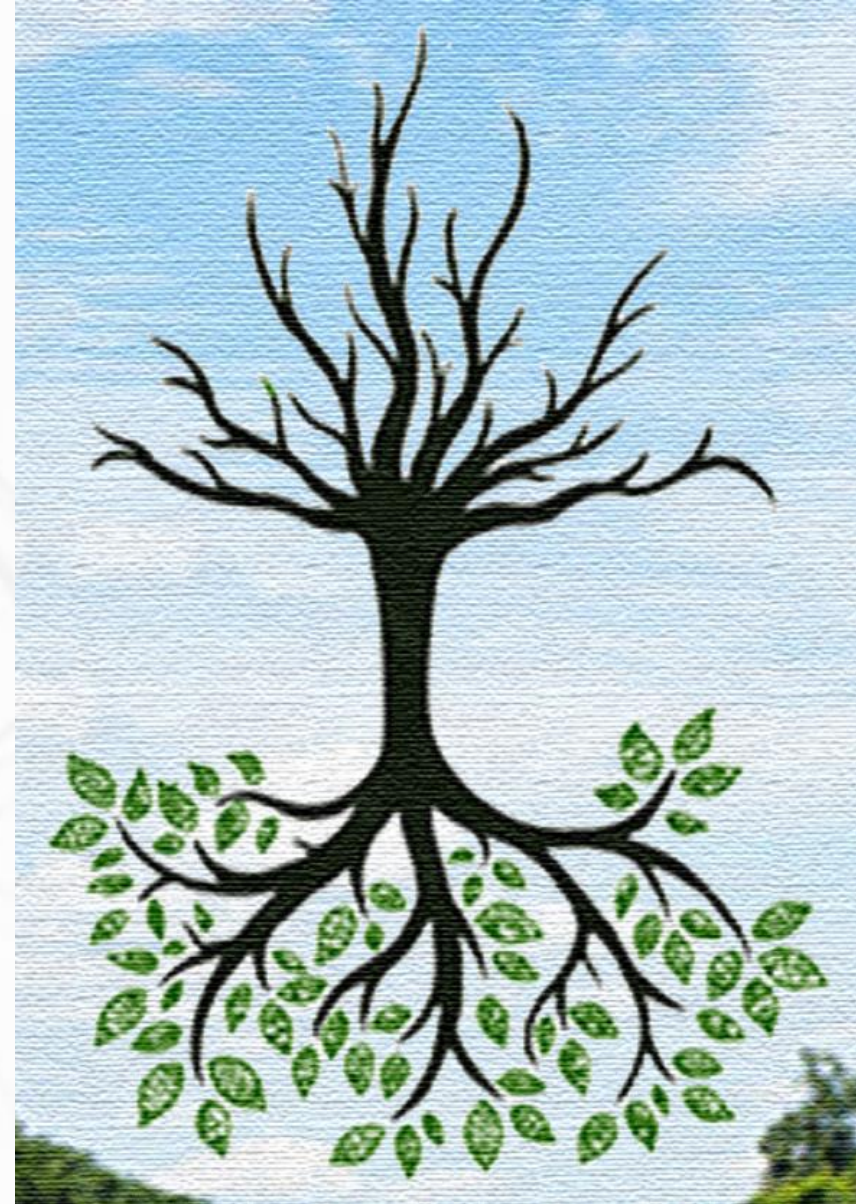
Public Key Exchange

What SSH Do?

- **Secure Communication:** A client and a server can communicate securely thanks to SSH. To prevent unwanted access to the data, it encrypts all information sent over the network, including passwords, usernames, and other private data.
- **Authentication:** SSH offers methods for confirming the legitimacy of the client and server. To confirm the parties' identities, it makes use of cryptographic keys. Only authorized users and servers can access the system thanks to this authentication procedure.
- **Data Transfer via Encryption:** SSH encrypts all data transferred between the client and server to prevent bad actors from listening in on it or altering it. The confidentiality and integrity of the data being transferred are guaranteed by this encryption.
- **Remote Access:** SSH is primarily used to enable safe remote access to computers, servers, and other resources. With SSH, users can safely run remote commands or access a server's command-line interface from a distance.
- **File Transfer:** SSH facilitates safe file transfers between computers by using programs such as Secure Copy Program (SCP) and SSH File Transfer Protocol (SFTP). With the help of these tools, users can safely move data between two remote servers or between a local computer and a distant server.
- **Tunneling:** The ability to build secure channels for the transmission of other network protocols over SSH is made possible by the functionality for tunneling provided by SSH. Services that might not be immediately accessible via the network, such as web servers, databases, and email servers, can now be accessed securely thanks to this capability.

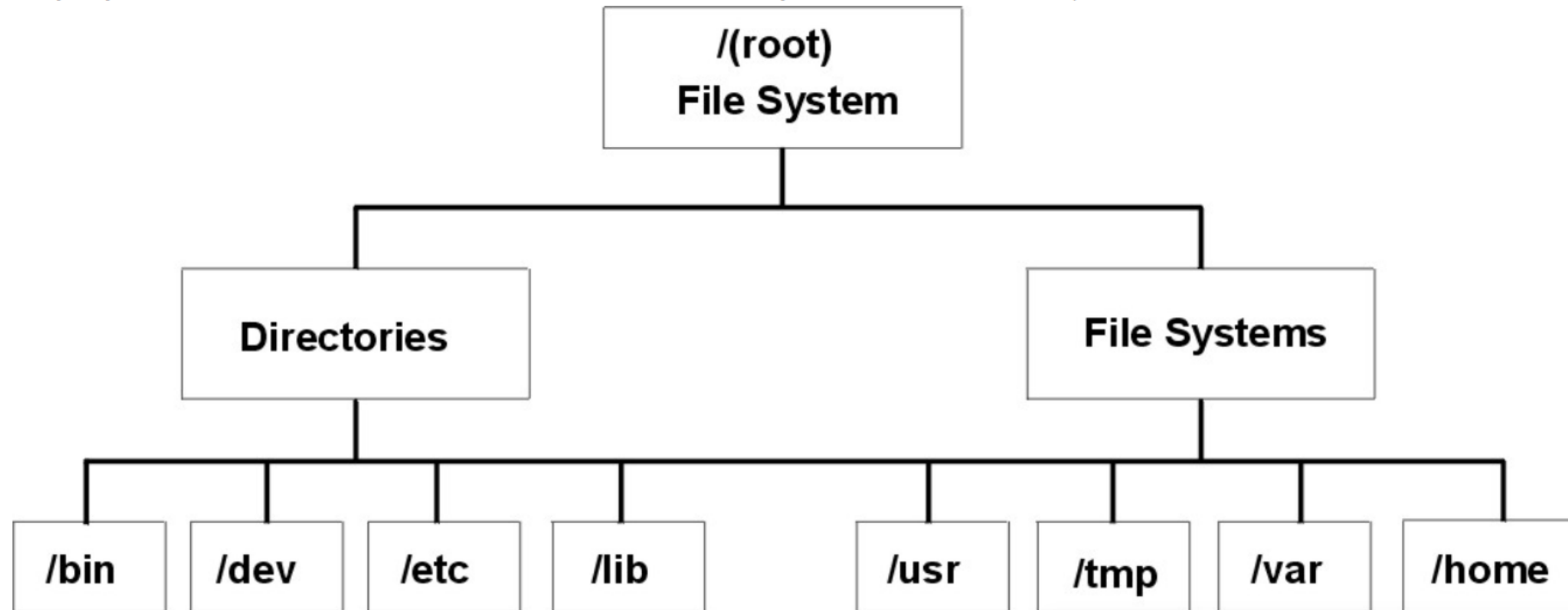
The Linux File System

- The *Nix (Unix or Linux) file system is a hierarchical directory structure
- The structure resembles an **upside down tree**
- Directories are collections of files and other directories. The structure is recursive with many levels.
- Every directory has a parent except for the root directory.
- Many directories have children directories.
- Unlike Windows, with multiple drives and multiple file systems, a *Nix system only has ONE file system.
- The Linux Standard Base (LSB) specifies the structure of a Linux file system.



File System & Directory Structure

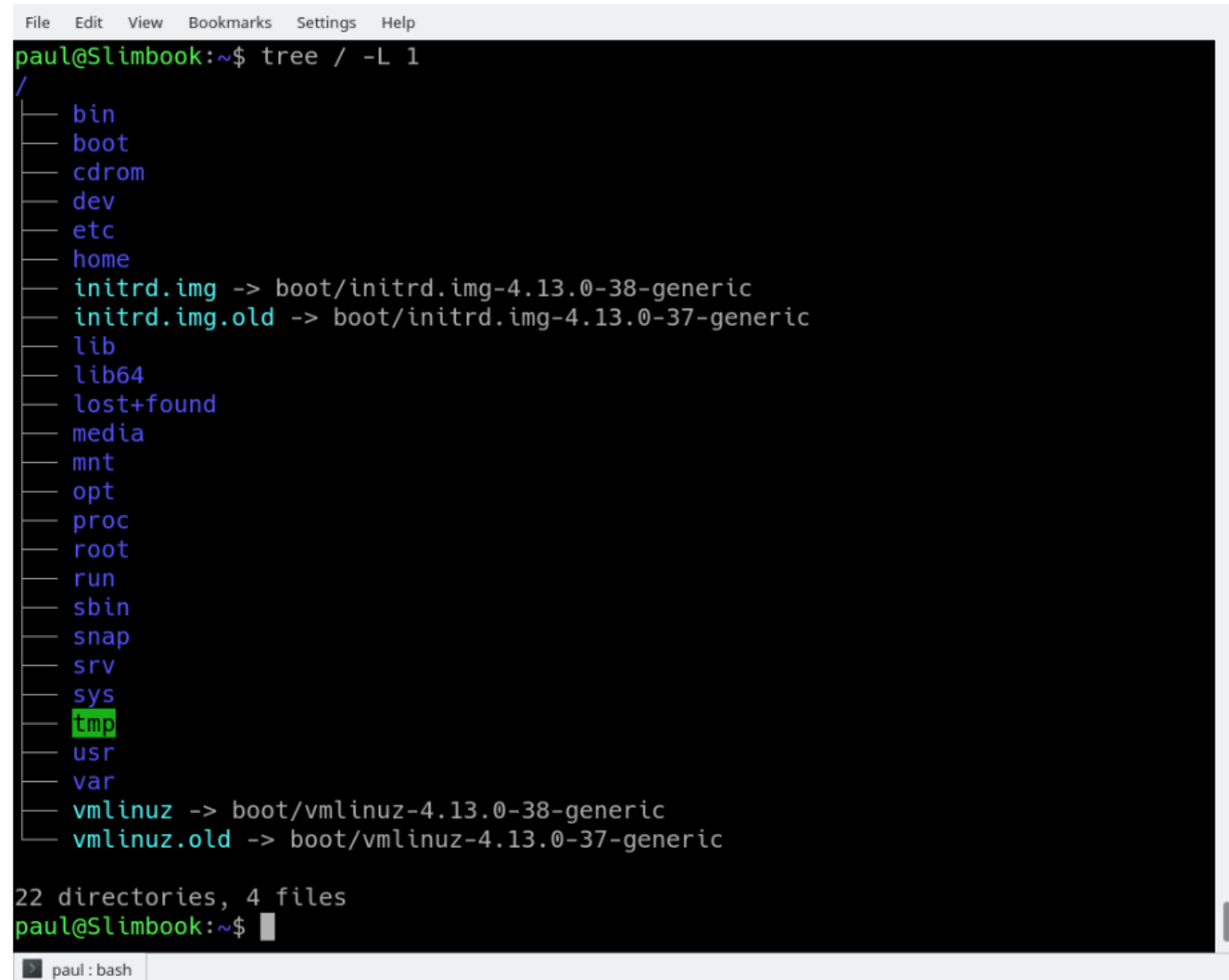
Figure 1. / (root) File System Tree. This tree chart shows a directory structure with the / (root) file system at the top, branching downward to directories and file systems. Directories branch to /bin, /dev, /etc, and /lib. File systems branch to /usr, /tmp, /var, and /home.



The directories on the right (/usr, /tmp, /var, and /home) are all file systems so they have separate sections of the hard disk allocated for their use. These file systems are mounted automatically when the system is started, so the end user does not see the difference between these file systems and the directories listed on the left (/bin, /dev, /etc, and /lib).

`tree -L 1 /`

And you should see what is shown in Figure 1.



```
File Edit View Bookmarks Settings Help
paul@Slimbook:~$ tree / -L 1
/
├── bin
├── boot
├── cdrom
├── dev
├── etc
├── home
├── initrd.img -> boot/initrd.img-4.13.0-38-generic
├── initrd.img.old -> boot/initrd.img-4.13.0-37-generic
├── lib
├── lib64
├── lost+found
├── media
├── mnt
├── opt
├── proc
├── root
├── run
├── sbin
├── snap
├── srv
├── sys
├── tmp
├── usr
├── var
├── vmlinuz -> boot/vmlinuz-4.13.0-38-generic
└── vmlinuz.old -> boot/vmlinuz-4.13.0-37-generic

22 directories, 4 files
paul@Slimbook:~$
```

paul : bash

A faint, light gray background graphic consisting of a network of interconnected nodes and lines, resembling a molecular structure or a data network. The nodes are represented by circles of varying sizes, and the lines are thin and gray.

QUIZ!

Session 2

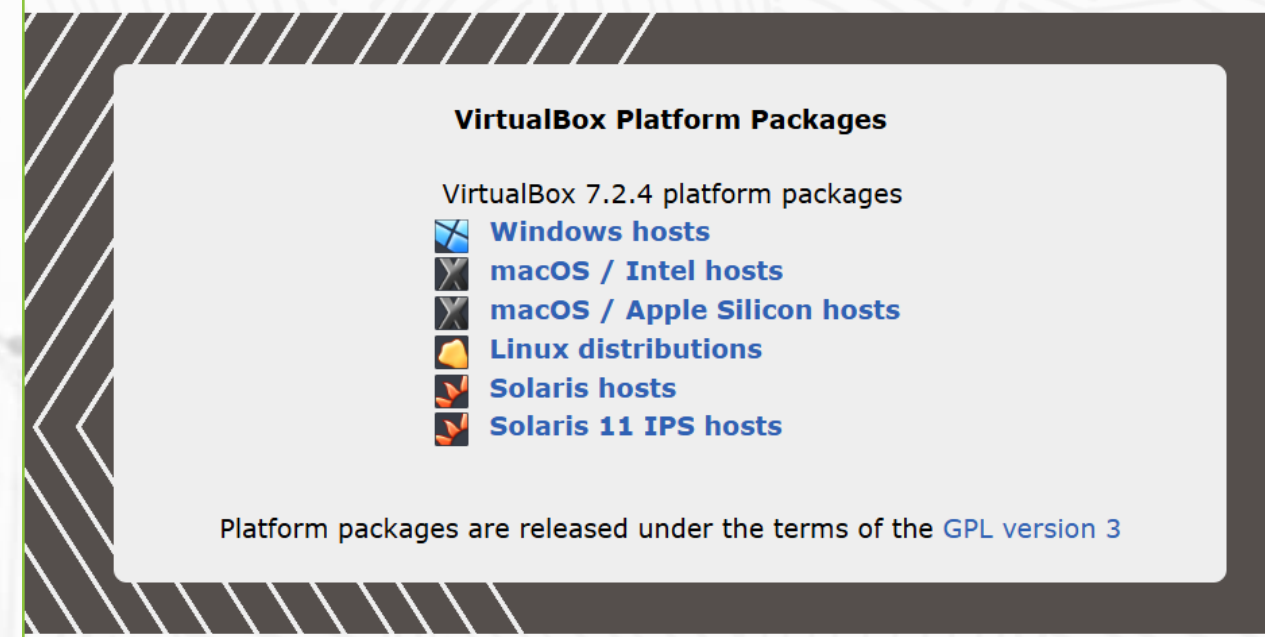
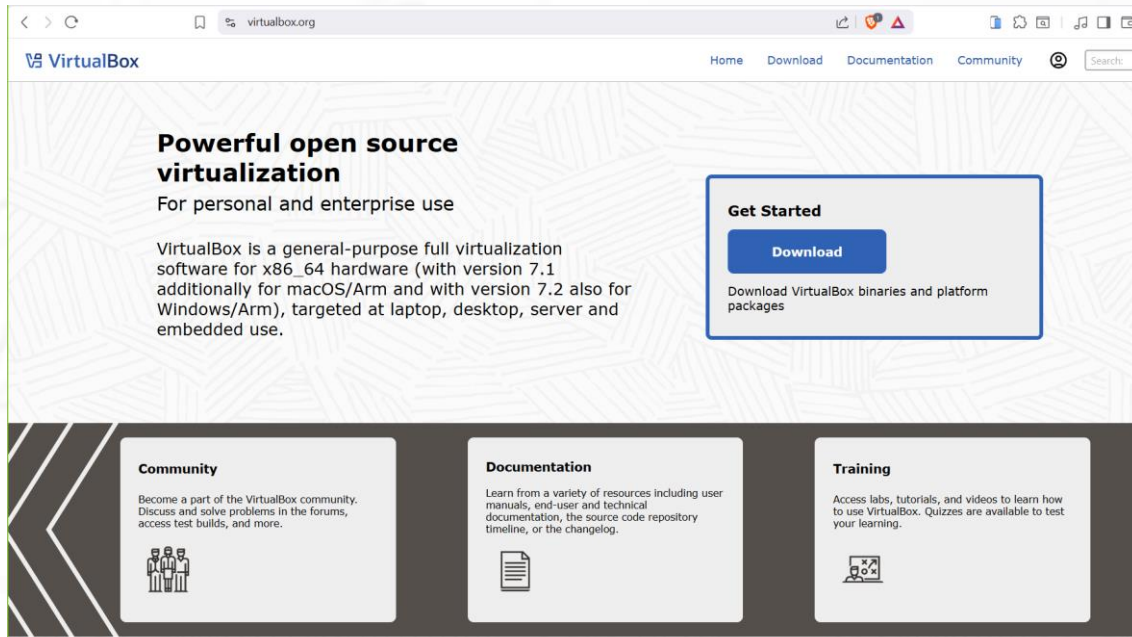
206.189.80.102

The background of the slide features a light gray abstract network diagram. It consists of numerous circular nodes of varying sizes, some of which are highlighted with a thicker border. These nodes are interconnected by thin, light gray lines, creating a complex web-like structure that spans the entire background.

Linux Installation

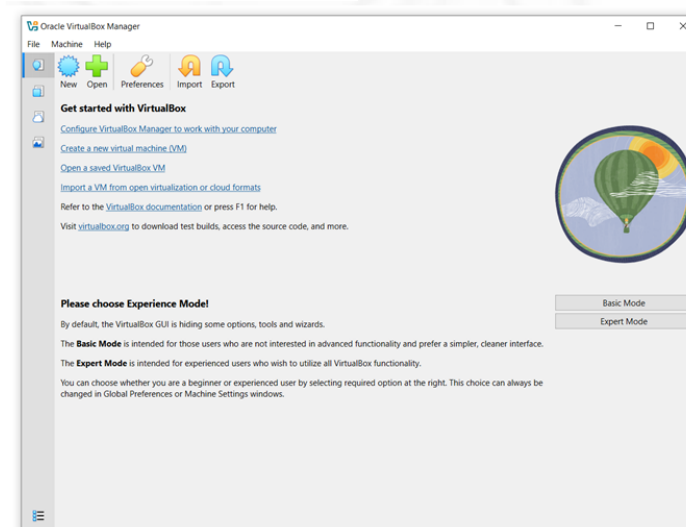
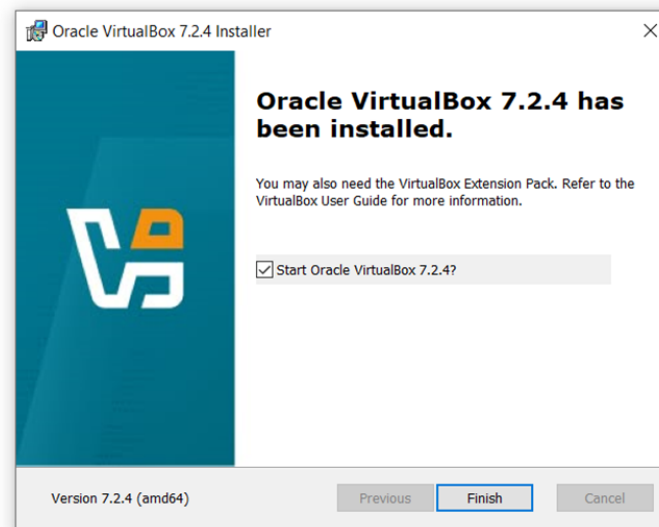
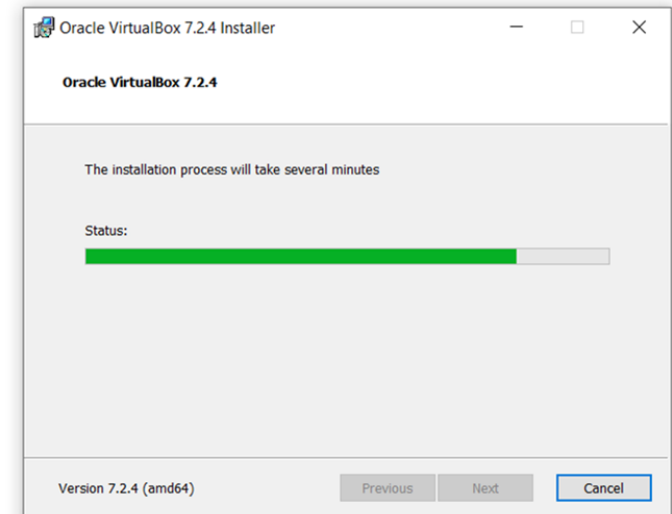
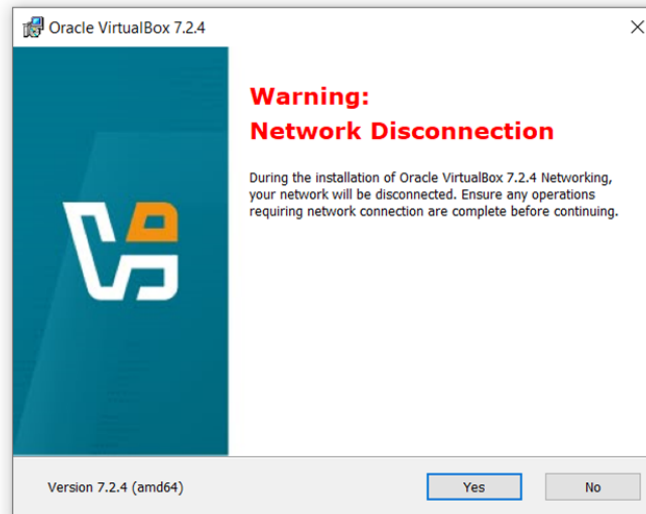
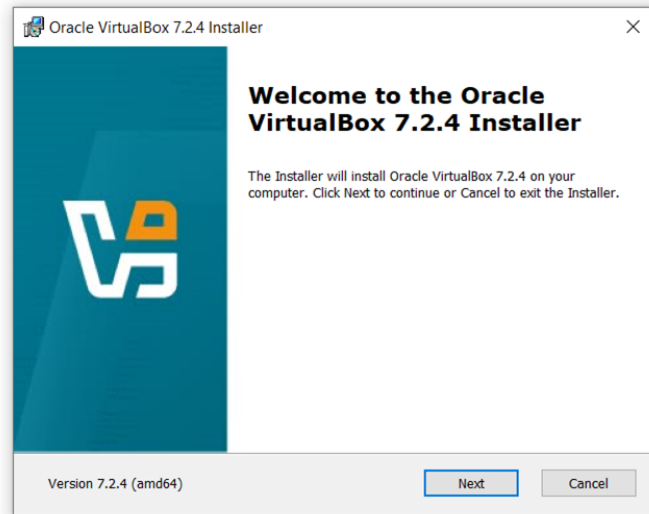
Server Editions/Virtual Machine

Download – Virtualization Tools

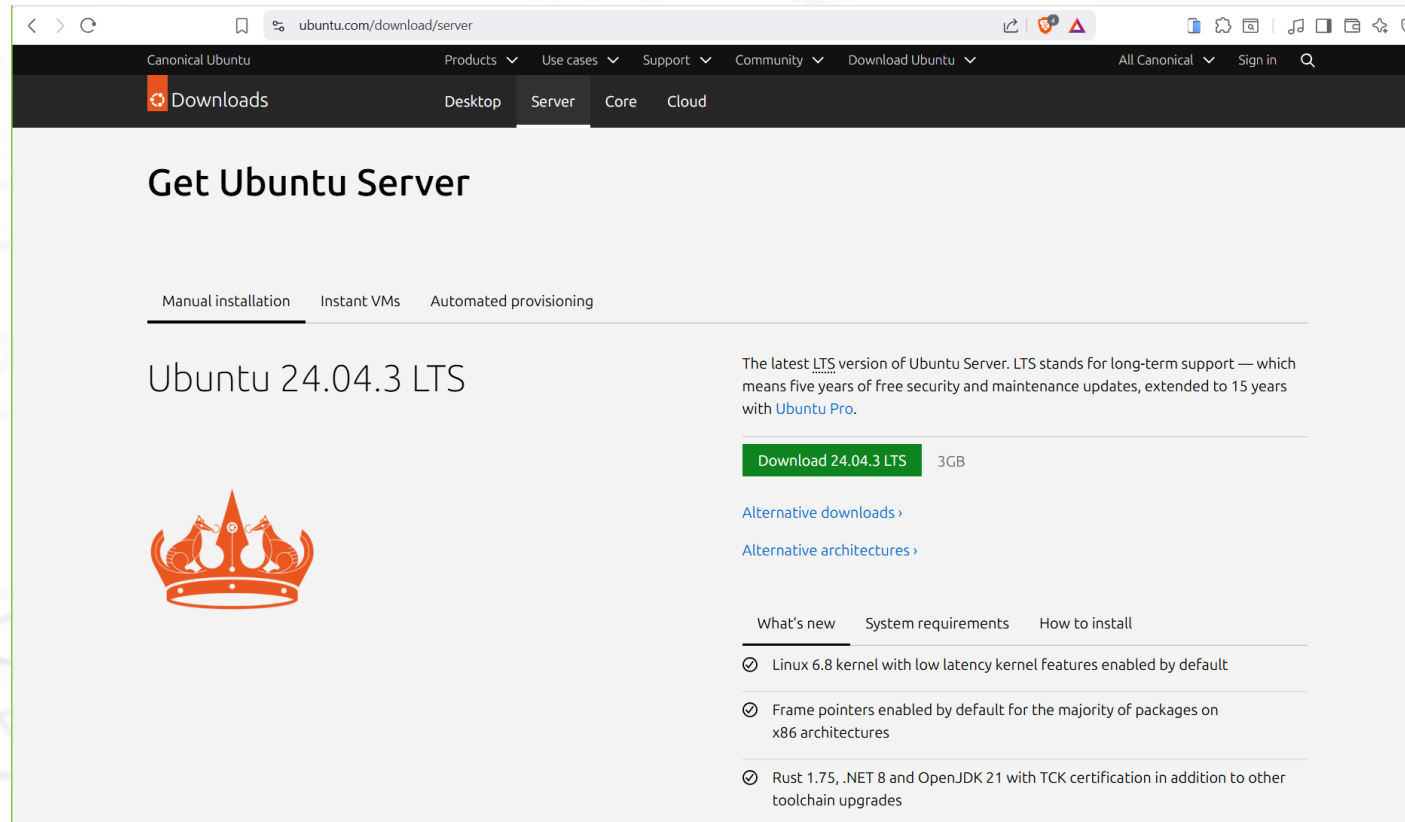


<https://www.virtualbox.org/>

Install – Virtualization Tools



Download – Linux OS (Ubuntu Server 24.04.3 LTS)



The screenshot shows the Ubuntu website's download page for the Server edition. The browser address bar shows 'ubuntu.com/download/server'. The navigation bar includes links for Canonical Ubuntu, Products, Use cases, Support, Community, Download Ubuntu, All Canonical, and Sign in. Below the navigation bar, there are tabs for Downloads, Desktop, Server (selected), Core, and Cloud. The main heading is 'Get Ubuntu Server'. Underneath, there are three tabs: Manual installation (selected), Instant VMs, and Automated provisioning. The version 'Ubuntu 24.04.3 LTS' is prominently displayed next to the Ubuntu logo. To the right, a green button labeled 'Download 24.04.3 LTS' is shown next to '3GB'. Below this, there are links for 'Alternative downloads' and 'Alternative architectures'. Further down, there are tabs for 'What's new', 'System requirements', and 'How to install'. The 'What's new' tab is active, showing a list of updates: Linux 6.8 kernel with low latency kernel features enabled by default, Frame pointers enabled by default for the majority of packages on x86 architectures, and Rust 1.75, .NET 8 and OpenJDK 21 with TCK certification in addition to other toolchain upgrades.


Canonical Ubuntu Products Use cases Support Community Download Ubuntu All Canonical Sign in

Downloads Desktop **Server** Core Cloud

Get Ubuntu Server

Manual installation Instant VMs Automated provisioning

Ubuntu 24.04.3 LTS



The latest LTS version of Ubuntu Server. LTS stands for long-term support — which means five years of free security and maintenance updates, extended to 15 years with [Ubuntu Pro](#).

[Download 24.04.3 LTS](#) 3GB

[Alternative downloads](#)

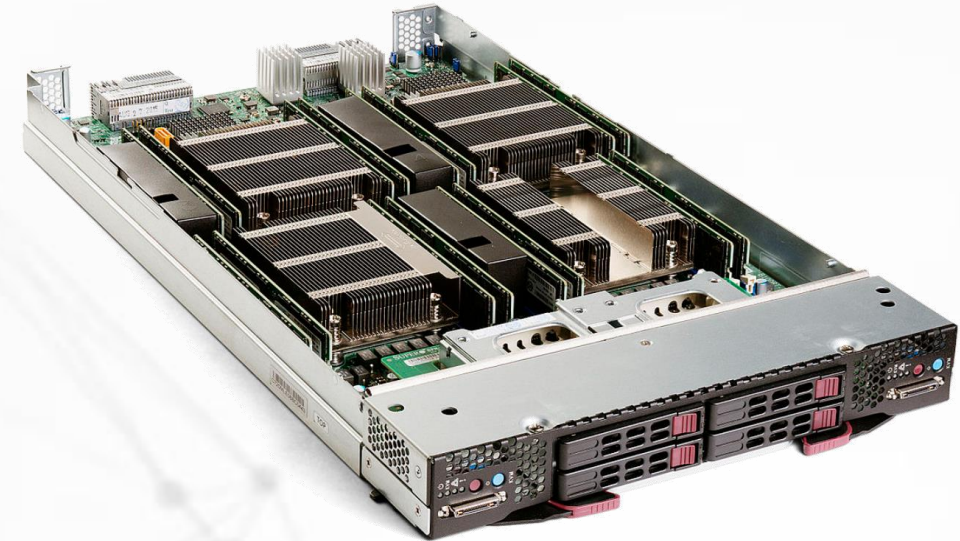
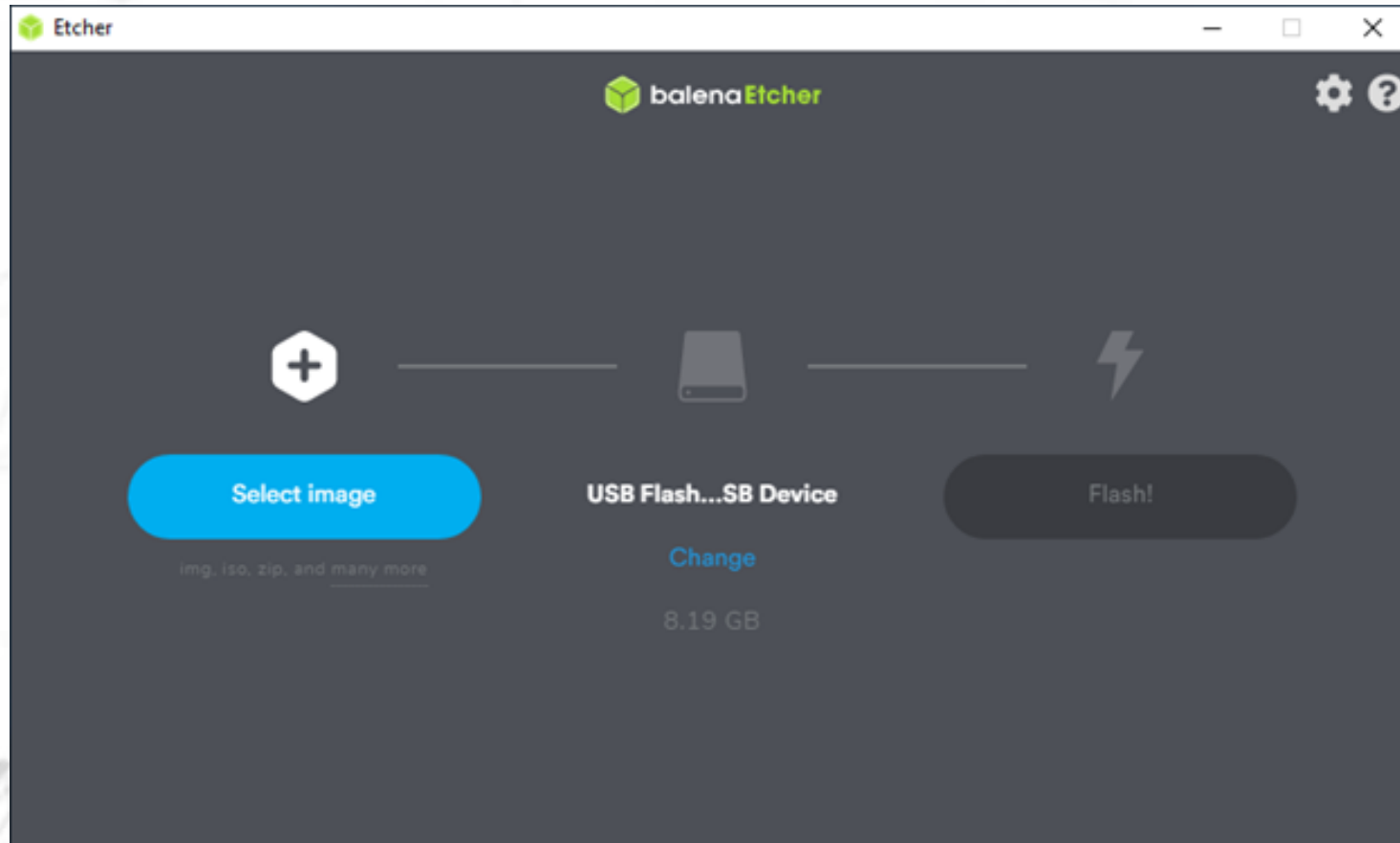
[Alternative architectures](#)

What's new System requirements How to install

- ✓ Linux 6.8 kernel with low latency kernel features enabled by default
- ✓ Frame pointers enabled by default for the majority of packages on x86 architectures
- ✓ Rust 1.75, .NET 8 and OpenJDK 21 with TCK certification in addition to other toolchain upgrades

<https://ubuntu.com/download/server>

Install Linux on a physical blade server via USB drive



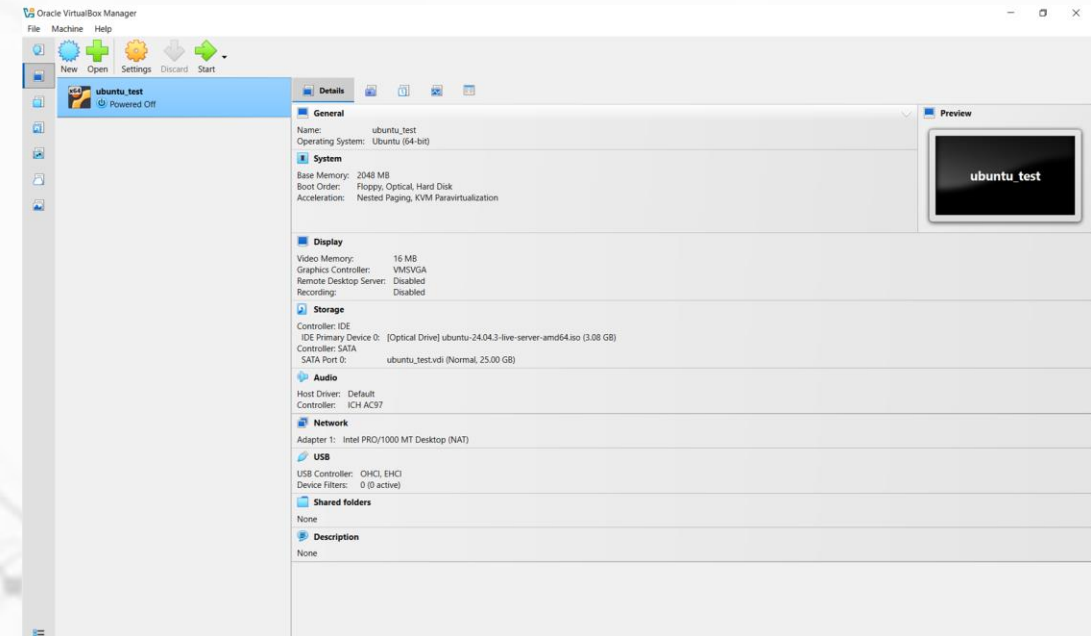
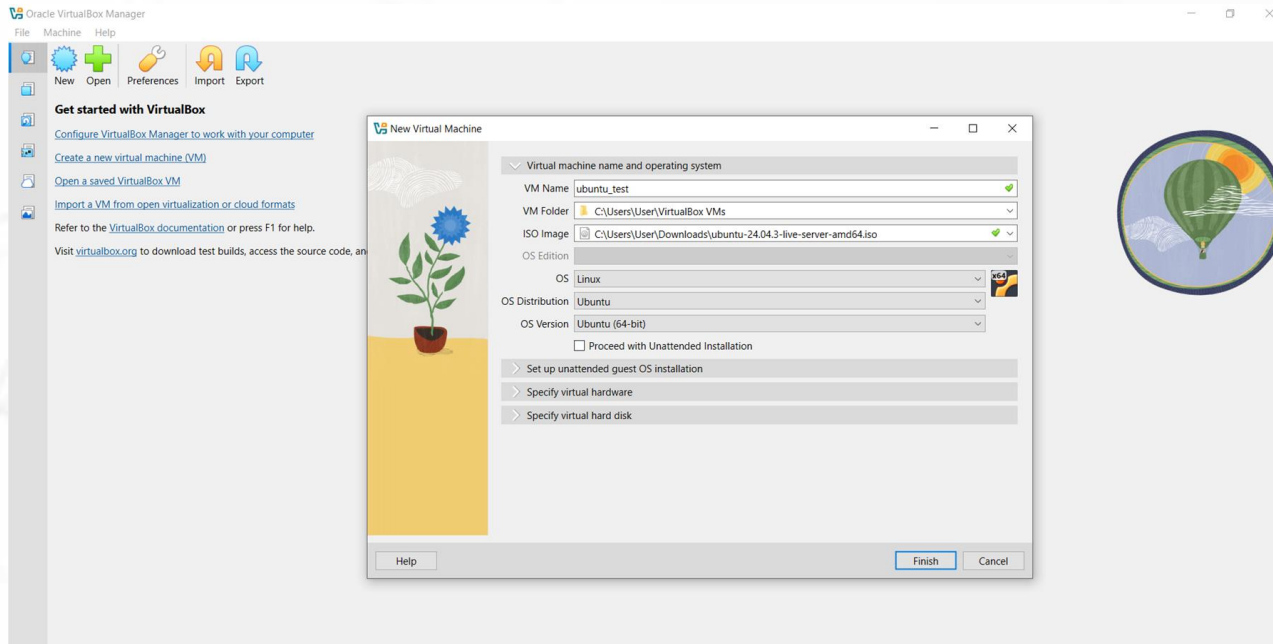
<https://etcher.balena.io/>

The background of the slide features a light gray abstract network diagram. It consists of numerous circular nodes of varying sizes, some of which are highlighted with a thicker border. These nodes are interconnected by thin, light gray lines, creating a complex web-like structure that spans the entire width of the slide. The overall aesthetic is clean and modern, typical of a technical presentation.

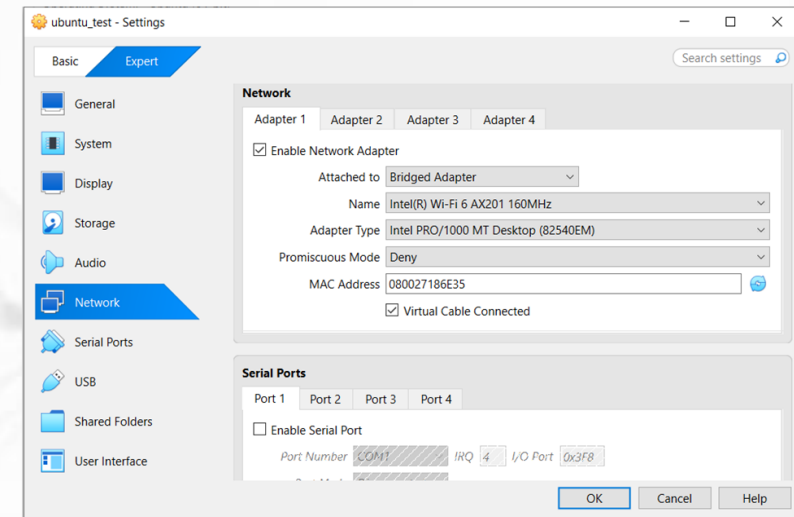
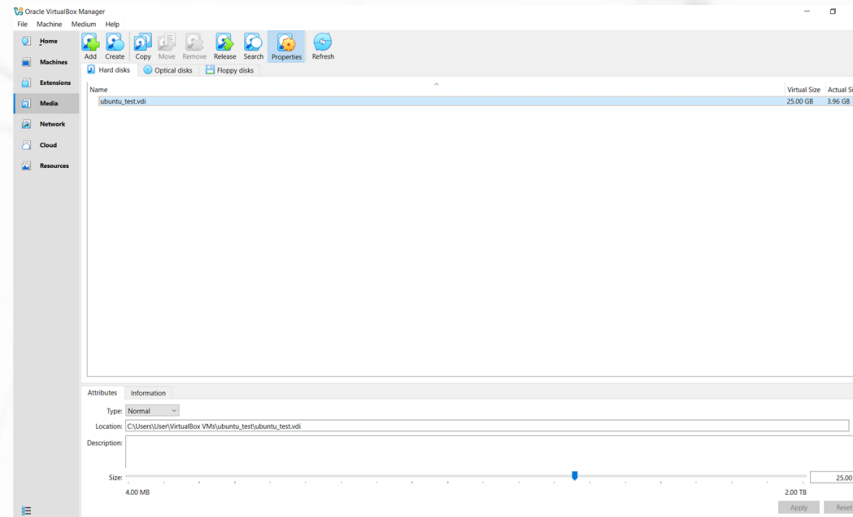
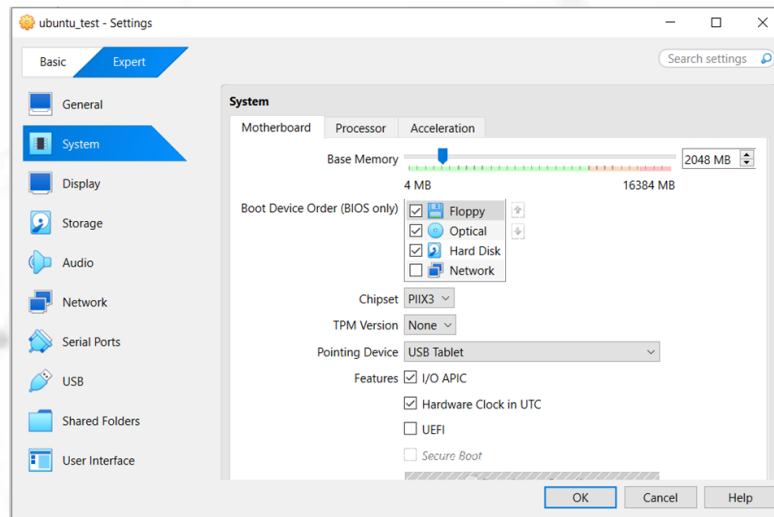
Build your own VM!

Virtual Machine – Oracle VirtualBox

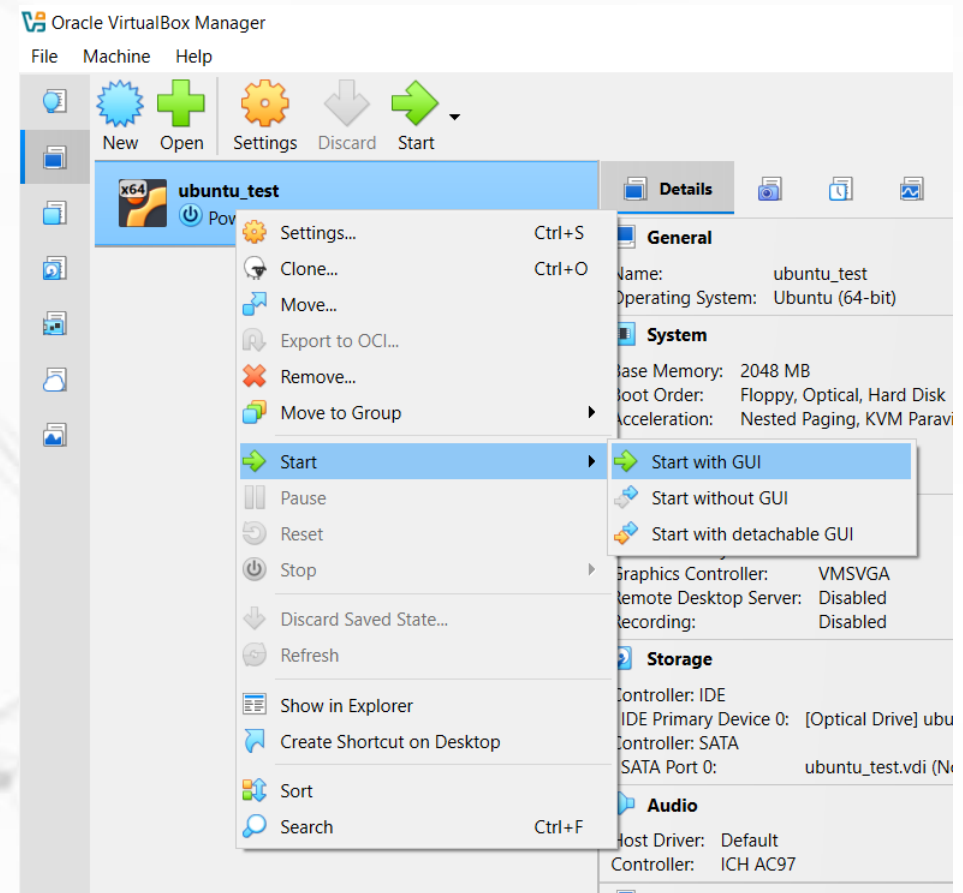
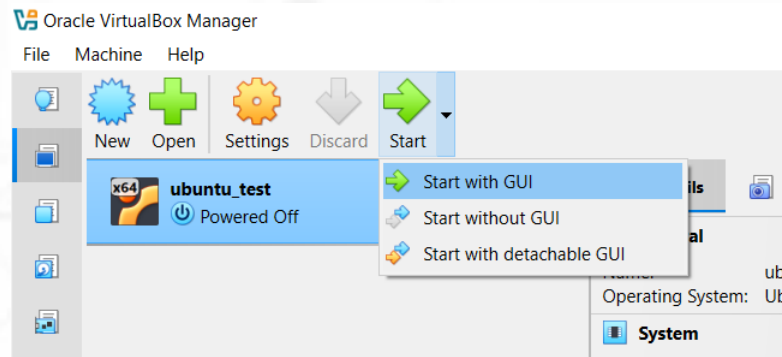
Install Ubuntu on Virtual Machine



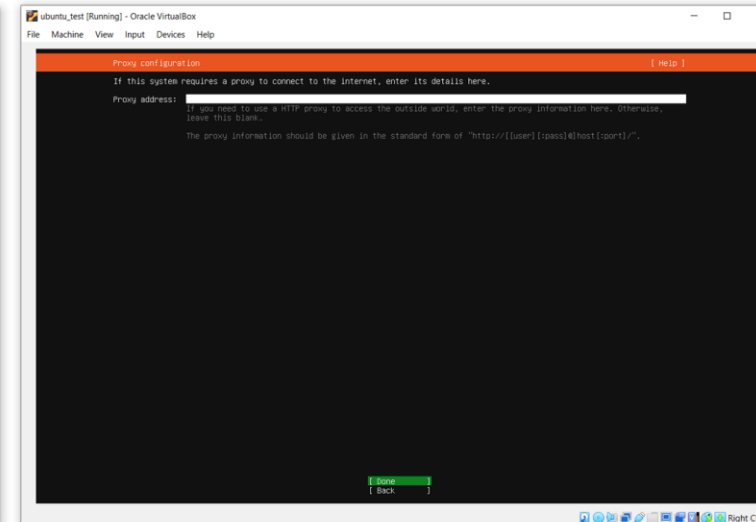
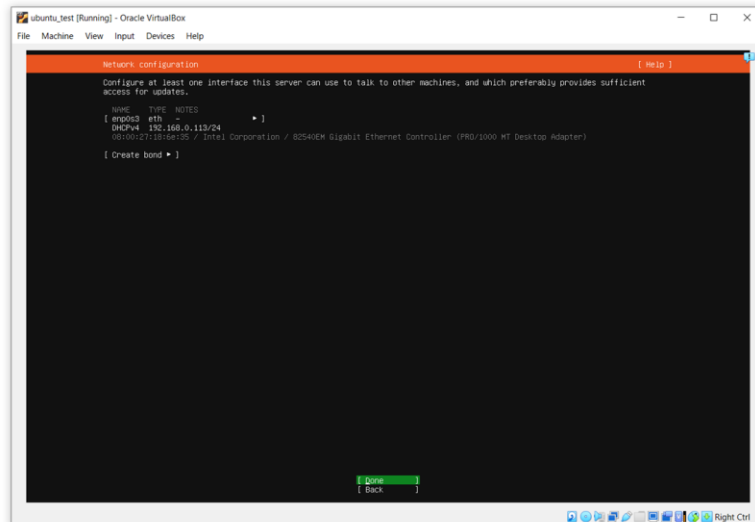
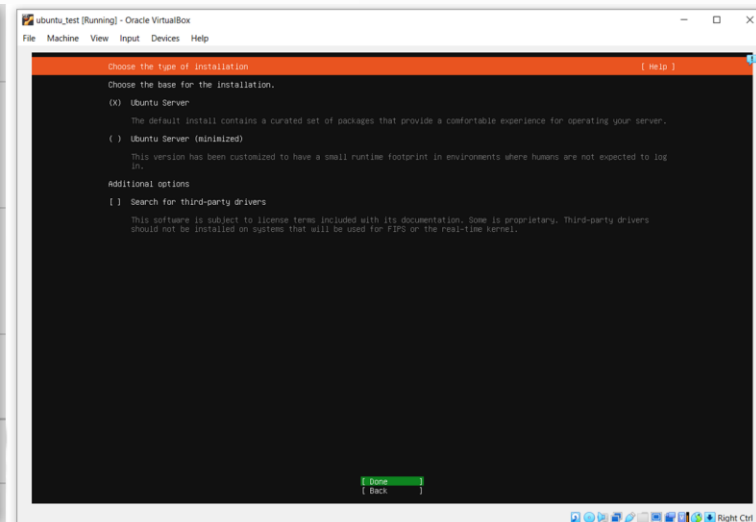
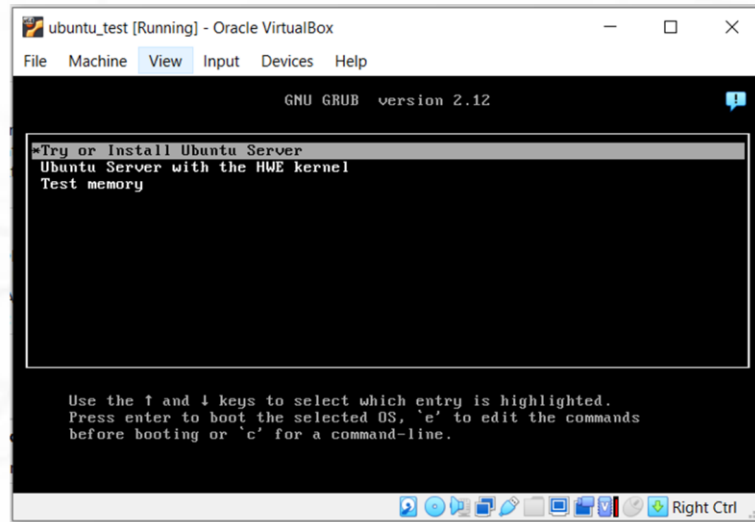
Configure – Hardware, Storage & Network



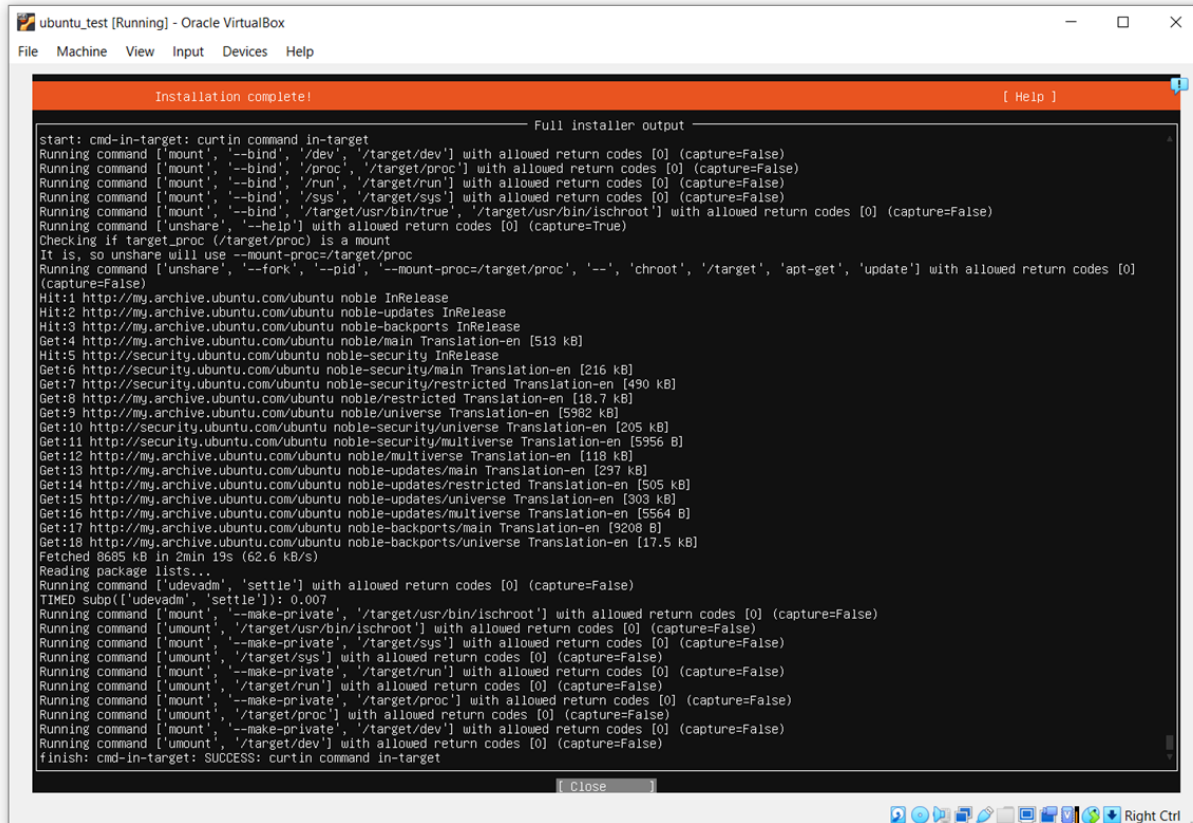
Start!



Installation step...



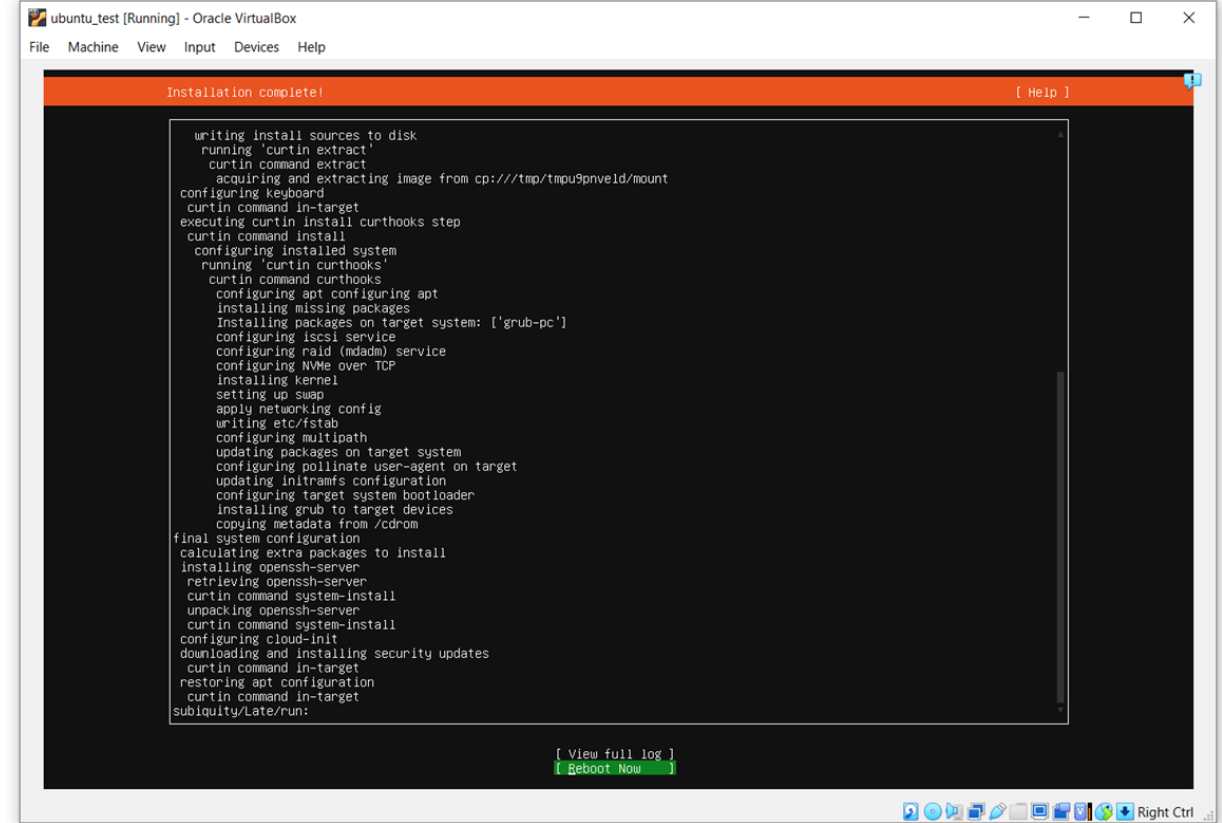
Installation complete!



```
Installation complete! [ Help ]

Full installer output

start: cmd-in-target: curtin command in-target
Running command ['mount', '--bind', '/dev', '/target/dev'] with allowed return codes [0] (capture=False)
Running command ['mount', '--bind', '/proc', '/target/proc'] with allowed return codes [0] (capture=False)
Running command ['mount', '--bind', '/run', '/target/run'] with allowed return codes [0] (capture=False)
Running command ['mount', '--bind', '/sys', '/target/sys'] with allowed return codes [0] (capture=False)
Running command ['mount', '--bind', '/target/usr/bin/true', '/target/usr/bin/ischroot'] with allowed return codes [0] (capture=False)
Running command ['unshare', '--help'] with allowed return codes [0] (capture=True)
Checking if target_proc (/target/proc) is a mount
It is, so unshare will use --mount-proc=/target/proc
Running command ['unshare', '--fork', '--pid', '--mount-proc=/target/proc', '--', 'chroot', '/target', 'apt-get', 'update'] with allowed return codes [0] (capture=False)
Hit:1 http://my.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://my.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://my.archive.ubuntu.com/ubuntu noble-backports InRelease
Get:4 http://my.archive.ubuntu.com/ubuntu noble/main Translation-en [513 kB]
Hit:5 http://security.ubuntu.com/ubuntu noble-security InRelease
Get:6 http://security.ubuntu.com/ubuntu noble-security/main Translation-en [216 kB]
Get:7 http://security.ubuntu.com/ubuntu noble-security/restricted Translation-en [490 kB]
Get:8 http://my.archive.ubuntu.com/ubuntu noble/restricted Translation-en [18.7 kB]
Get:9 http://my.archive.ubuntu.com/ubuntu noble/universe Translation-en [5982 kB]
Get:10 http://security.ubuntu.com/ubuntu noble-security/universe Translation-en [205 kB]
Get:11 http://security.ubuntu.com/ubuntu noble-security/multiverse Translation-en [5956 B]
Get:12 http://my.archive.ubuntu.com/ubuntu noble/multiverse Translation-en [118 kB]
Get:13 http://my.archive.ubuntu.com/ubuntu noble-updates/main Translation-en [297 kB]
Get:14 http://my.archive.ubuntu.com/ubuntu noble-updates/restricted Translation-en [505 kB]
Get:15 http://my.archive.ubuntu.com/ubuntu noble-updates/universe Translation-en [303 kB]
Get:16 http://my.archive.ubuntu.com/ubuntu noble-updates/multiverse Translation-en [5564 B]
Get:17 http://my.archive.ubuntu.com/ubuntu noble-backports/main Translation-en [9208 B]
Get:18 http://my.archive.ubuntu.com/ubuntu noble-backports/universe Translation-en [17.5 kB]
Fetched 8685 kB in 2min 19s (62.6 kB/s)
Reading package lists...
Running command ['udevadm', 'settle'] with allowed return codes [0] (capture=False)
TIMED sub(['udevadm', 'settle']): 0.007
Running command ['mount', '--make-private', '/target/usr/bin/ischroot'] with allowed return codes [0] (capture=False)
Running command ['mount', '--make-private', '/target/sys'] with allowed return codes [0] (capture=False)
Running command ['mount', '--make-private', '/target/run'] with allowed return codes [0] (capture=False)
Running command ['mount', '--make-private', '/target/proc'] with allowed return codes [0] (capture=False)
Running command ['mount', '--make-private', '/target/dev'] with allowed return codes [0] (capture=False)
Running command ['mount', '--make-private', '/target/dev'] with allowed return codes [0] (capture=False)
finish: cmd-in-target: SUCCESS: curtin command in-target
```

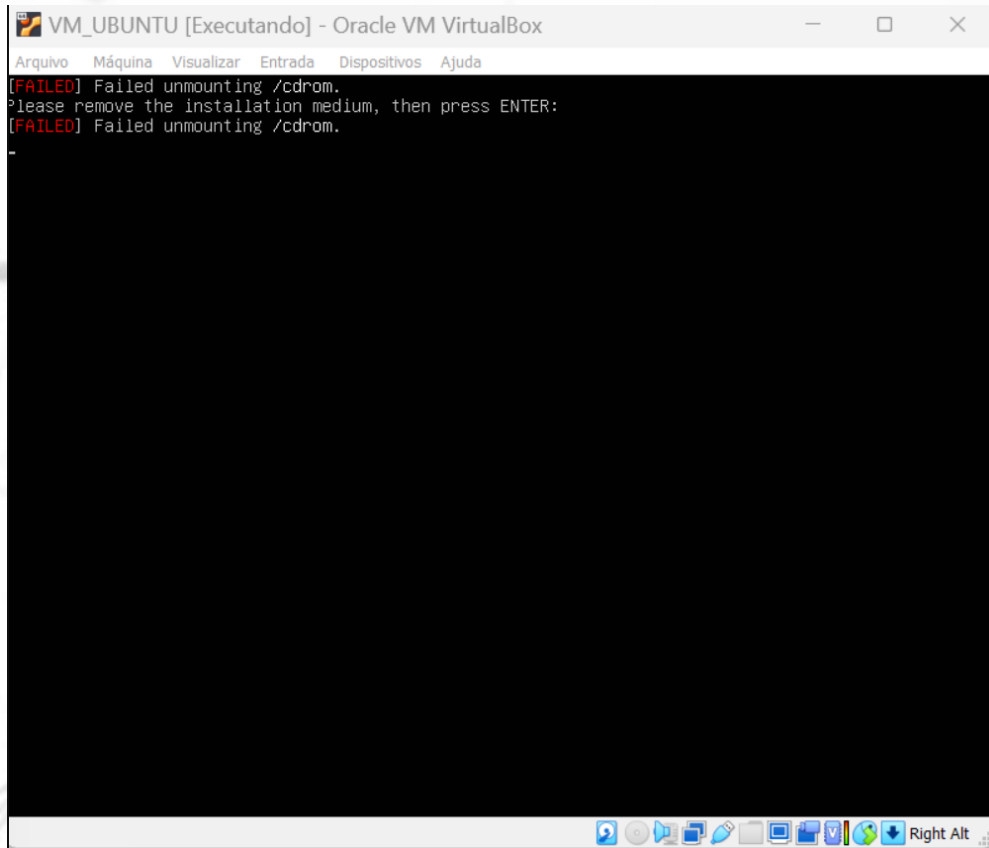


```
Installation complete! [ Help ]

writing install sources to disk
running 'curtin extract'
curtin command extract
acquiring and extracting image from cp:///tmp/tmpu9pnvld/mount
curtin command in-target
executing curtin install curthooks step
curtin command install
configuring installed system
running 'curtin curthooks'
curtin command curthooks
configuring apt configuring apt
installing missing packages
installing packages on target system: ['grub-pc']
configuring iscsi service
configuring raid (mdadm) service
configuring Nvme over TCP
installing kernel
setting up swap
apply networking config
writing etc/fstab
configuring multipath
updating packages on target system
configuring collinate user-agent on target
updating intramfs configuration
configuring target system bootloader
installing grub to target devices
copying metadata from /cdrom
final system configuration
calculating extra packages to install
installing openssh-server
retrieving openssh-server
curtin command system-install
unpacking openssh-server
curtin command system-install
configuring cloud-init
downloading and installing security updates
curtin command in-target
restoring apt configuration
curtin command in-target
subiquity/Late/run:

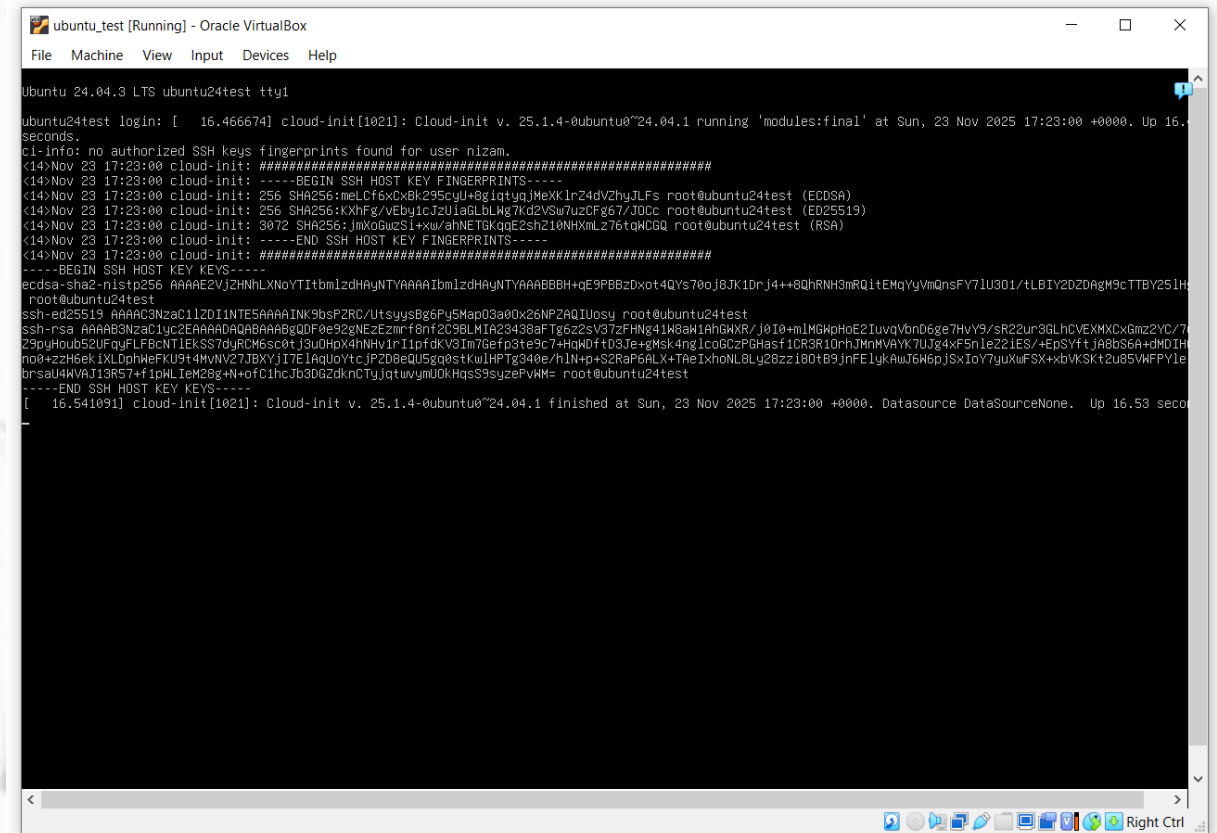
[ View full log ]
[ Reboot Now ]
```

Reboot!



```
VM_UBUNTU [Executando] - Oracle VM VirtualBox
Arquivo  Máquina  Visualizar  Entrada  Dispositivos  Ajuda
[FAILED] Failed unmounting /cdrom.
Please remove the installation medium, then press ENTER:
[FAILED] Failed unmounting /cdrom.
-
```

Just press 'ENTER'



```
ubuntu_test [Running] - Oracle VirtualBox
File  Machine  View  Input  Devices  Help
Ubuntu 24.04.3 LTS ubuntu24test tty1
ubuntu24test login: [ 16.466674] cloud-init[1021]: Cloud-init v. 25.1.4-0ubuntu0~24.04.1 running 'modules:final' at Sun, 23 Nov 2025 17:23:00 +0000. Up 16.
seconds.
cl-info: no authorized SSH keys fingerprints found for user nizam.
<14>Nov 23 17:23:00 cloud-init: #####
<14>Nov 23 17:23:00 cloud-init: ----BEGIN SSH HOST KEY FINGERPRINTS-----
<14>Nov 23 17:23:00 cloud-init: 256 SHA256:meLcf6xCx8k295cuU+8giqtgqjMeXK1r24dvZhyJLFs root@ubuntu24test (ECDSA)
<14>Nov 23 17:23:00 cloud-init: 256 SHA256:KXhFg/vEby1cJzu1aGLWg7kd2Vsu7uzCFg67/J0cc root@ubuntu24test (ED25519)
<14>Nov 23 17:23:00 cloud-init: 3072 SHA256:jmXoGwzSi+xw/ahNETGKqE2sh210NHXmLz76tqWCGQ root@ubuntu24test (RSA)
<14>Nov 23 17:23:00 cloud-init: ----END SSH HOST KEY FINGERPRINTS-----
<14>Nov 23 17:23:00 cloud-init: #####
----BEGIN SSH HOST KEY KEYS-----
ecdsa-sha2-nistp256 AAAAE2VjZHNhLXNoYTItbmlzdHAyNTYAAAAIbmlzdHAyNTYAAABBBH+qE9PB8zDxot4QYs70oJ8JK1DrJ4++8QhRNH3mRQ1tEMqYyVmQnsFV7IU301/tLBIY20ZDagH9cTTBY251H
root@ubuntu24test
ssh-ed25519 AAAAC3NzaC1lZD11NTE5AAAAINK9bsP2RC/UtsyusBggPy5Map03a00x26NP2AQIUosy root@ubuntu24test
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQGDf0e92gNEzEzmrf8nf2C98LMIA23438afTg6z2sV37zFHWg41W8aH1AhGNVR/j010+m1MGHoHoE2IuvqVbnD6geThvY9/sR22un3GLhCvEXMXCg6mz2VC/7
29puHoub52UFqyFLFbcNTIEkSS7duRCM6sc0tJ3u0Hpx4hNHv1rI1pfdkV31m76fep3te9c7+hQKdftD3Je+8MskdnglcoGC2PGHasf1CR3R10rhJmMVAYK7UJ84xf5nle22IES/+EpsYftJA8bS6A+dMDIH
no0+zzH6ekIXLDphWfKU9t4MvNV27JBXYI7E1AqUoYtcJPZ08eQU5gqstkwLHPTg340e/hIN+p+S2RaP6ALX+TaeIxoNL8Ly28zz180tB9JnFElyKawJ6W6pJSxIoY7yuxwFSX+xbVKSkt2u85VWFPY1e
brsaU4KVAJ13R57+f1pKLIem28g+N+ofC1hcJb3DG2dknCTYjqtwyymUOKHqsS9syzePVM= root@ubuntu24test
----END SSH HOST KEY KEYS-----
[ 16.541091] cloud-init[1021]: Cloud-init v. 25.1.4-0ubuntu0~24.04.1 finished at Sun, 23 Nov 2025 17:23:00 +0000. DataSource DataSourceNone. Up 16.53 sec
```

Just press 'ENTER'

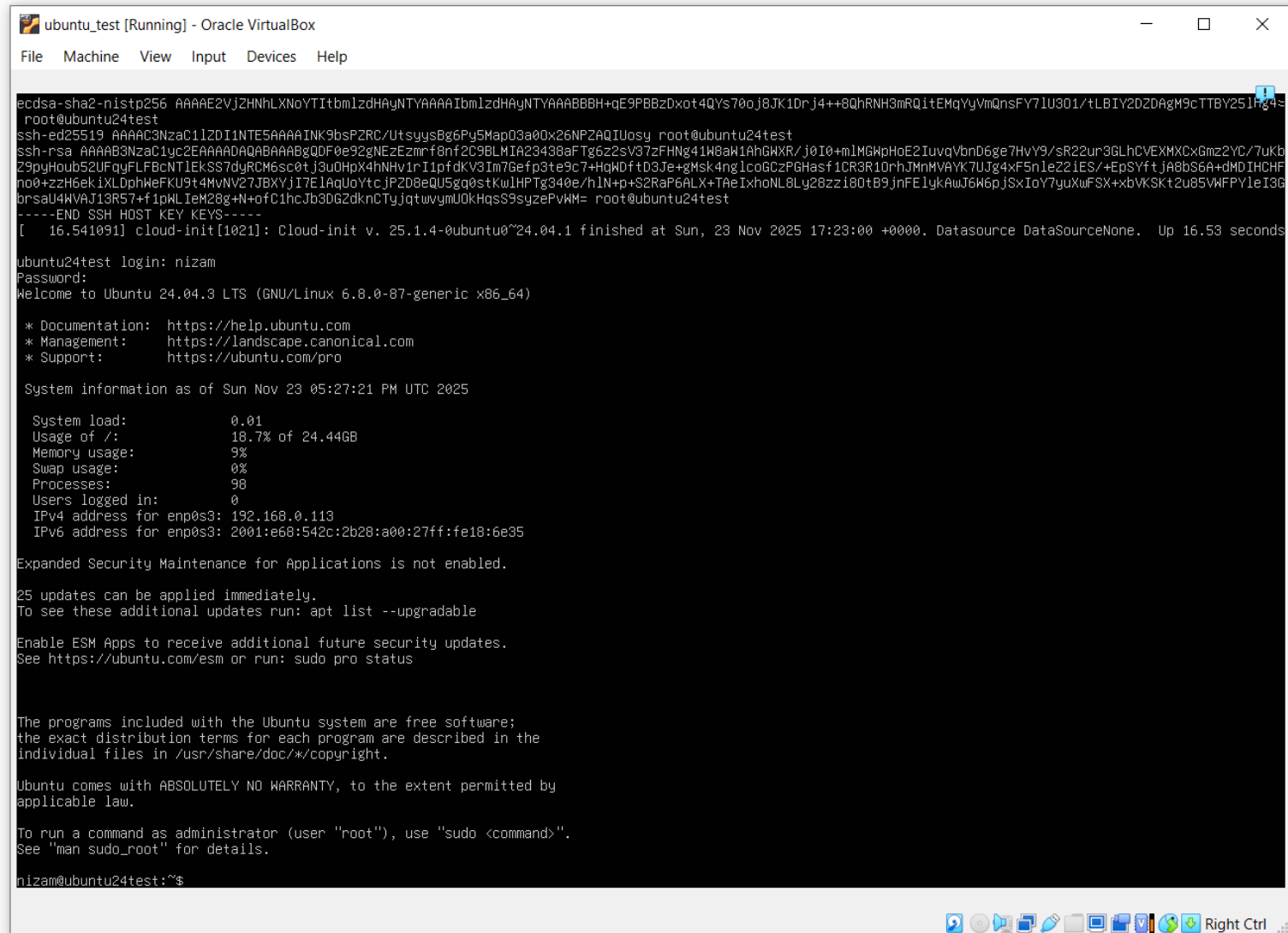
Login

```
ubuntu_test [Running] - Oracle VirtualBox
File Machine View Input Devices Help

Ubuntu 24.04.3 LTS ubuntu24test tty1

ubuntu24test login: [ 16.466674] cloud-init[1021]: Cloud-init v. 25.1.4-0ubuntu0~24.04.1 running 'modules:final' at Sun, 23 Nov 2025 17:23:00 +0000. Up 16.
seconds.
ci-info: no authorized SSH keys fingerprints found for user nizam.
<14>Nov 23 17:23:00 cloud-init: #####
<14>Nov 23 17:23:00 cloud-init: -----BEGIN SSH HOST KEY FINGERPRINTS-----
<14>Nov 23 17:23:00 cloud-init: 256 SHA256:meLCf6xCxBk295cyU+8giqtqjMeXKlR24dVZhyJLFs root@ubuntu24test (ECDSA)
<14>Nov 23 17:23:00 cloud-init: 256 SHA256:KXhFg/vEbyicJzUiaGLbLWg7Kd2VSu7uzCFg67/J0Cc root@ubuntu24test (ED25519)
<14>Nov 23 17:23:00 cloud-init: 3072 SHA256:jmXoGwzSi+xw/ahNETGKqQe2shZ10NHxMz76tqWCGQ root@ubuntu24test (RSA)
<14>Nov 23 17:23:00 cloud-init: -----END SSH HOST KEY FINGERPRINTS-----
<14>Nov 23 17:23:00 cloud-init: #####
-----BEGIN SSH HOST KEY KEYS-----
ecdsa-sha2-nistp256 AAAAE2VjZHNhLXNoYTItbmlzdHAyNTYAAAAIbmlzdHAyNTYAAABBBH+qE9PBbZDxot4QYs70qj8JK1Drj4++8QhRNH3mRQitEMqYyVmQnsFY7lU301/tLBiY2DZDagM9cTTBY251H
root@ubuntu24test
ssh-ed25519 AAAAC3NzaC11ZDI1NTE5AAAAINK9bsPZRC/UtsyysBg6Py5Map03a00x26NPZaQIUosy root@ubuntu24test
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQGDQF0e92gNEzEzmrF8nf2C9BLMIA23438aFTg6z2sV37zFHNg41W8aW1AhGWXR/j0I0+m1MGWpHoE2IuvqVbnD6ge7HvY9/sR22ur3GLhCVEXMXcXGmz2YC/7
Z9pyHoub52UfgyFLf8CNTlEkSS7duRCM6esc0tj3u0HpX4hNHv1rI1pfdkV3Im706f3p3te9c7+HqH0f1D3Je+gMsk4nglco8CzPGHasf1DR3R10rhJmMVAyK7UJg4xF5nle22IES/+EpSYftja8bS6A+dMDIH
no0+zzH6ekiXLDphwFKU9t4MvNV27JBXYJI7E1AqUoYtcJP2D8eQU5gq0stKw1HPTg340e/h1N+p+S2RaP6ALX+TaeIhoNL8Ly28z2i80tB9jnFElykAwJ6W6pJsXIoY7yuXwFSX+xbVKSkt2u85VWFPYle
brsaU4WVAJ13R57+fpMLIeM28g+N+ofC1hcJb3DG2dknCTyjqtuwymU0KHqsS9syzePvWM= root@ubuntu24test
-----END SSH HOST KEY KEYS-----
[ 16.541091] cloud-init[1021]: Cloud-init v. 25.1.4-0ubuntu0~24.04.1 finished at Sun, 23 Nov 2025 17:23:00 +0000. Datasource DataSourceNone. Up 16.53 sec
ubuntu24test login: _
```


Success!



```
ecdsa-sha2-nistp256 AAAAE2VjZHNhLXNoYTItbmlzdHAyNTYAAAAIbmlzdHAyNTYAAABBBH+qE9PBBzDxot4QYs70oj8JK1DrJ4++8QhRNH3mRQ1tEMqYyVmQnsFY7lU301/tLBiY20ZDAgM9cTTBY25lAqS
root@ubuntu24test
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAINK9bsPZRC/UtsyysBg6Py5Map03a0Dx26NPZAQIUosy root@ubuntu24test
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQgQDF0e92gNEzEzmrF8nf2C9BLMIA23438aFTg6z2sV37zFHNg41W8aH1AhGwXR/j0I0+mLMGwP0E2IuvqVbnD6ge7HvY9/sR22ur96LhCVEXMXCxBmz2YC/7uKb
Z9pyHoub52UFqyFLFBcNTIEkSS7dyRCM6sc0tj3u0HpX4hNHv1r11pfdKV3Im7Gefp3te9c7+HqWdftD3Je+gMsk4nglcoGCzPGHaf1CR3R10rhJmMvAYK7UJg4xF5n1e22IES/+EpSYftJA8bS6A+dMDIHCHF
mo0+zzH6ekIXLDphWFKU9t4MvNV27JBXYJ7E1AQUoYtcJP2D8eQU5gq0stkWlHPTg340e/hIN+p+S2RaP6ALX+TAeIXhoNL8Ly28zz180tB9jnfE1ykAwJ6W6pJ5X1oY7yuXwFSX+xbVKSKt2u85VMFPY1e13G
brsaU4WVAJ13R57+fpKL IeM28g+N+ofC1hcJb3DG2dknCTyjqtwymU0kHqsS9syzePvMM= root@ubuntu24test
-----END SSH HOST KEY KEYS-----
[ 16.541091] cloud-init[1021]: Cloud-init v. 25.1.4-0ubuntu0~24.04.1 finished at Sun, 23 Nov 2025 17:23:00 +0000. Datasource DataSourceNone. Up 16.53 seconds

ubuntu24test login: nizam
Password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.8.0-87-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:        https://ubuntu.com/pro

System information as of Sun Nov 23 05:27:21 PM UTC 2025

System load:          0.01
Usage of /:            18.7% of 24.44GB
Memory usage:         9%
Swap usage:           0%
Processes:            98
Users logged in:      0
IPv4 address for enp0s3: 192.168.0.113
IPv6 address for enp0s3: 2001:e68:542c:2b28:a00:27ff:fe18:6e35

Expanded Security Maintenance for Applications is not enabled.

25 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

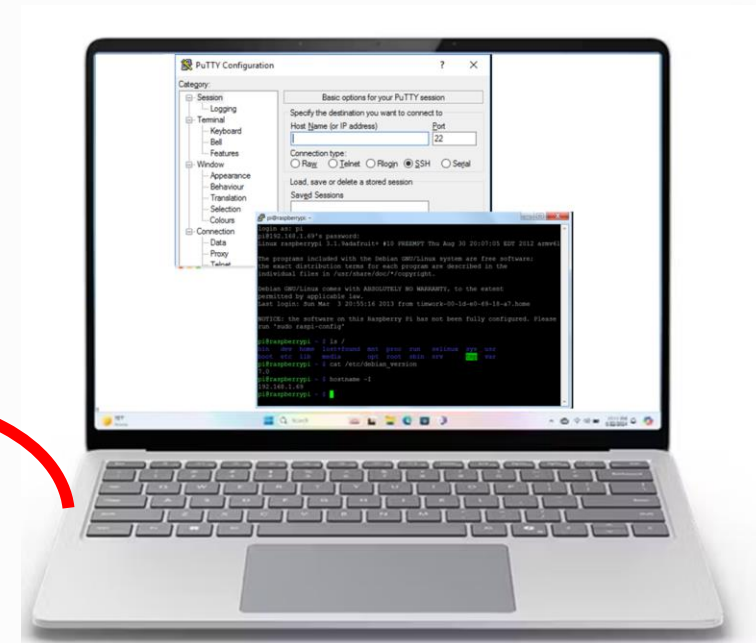
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

nizam@ubuntu24test:~$
```

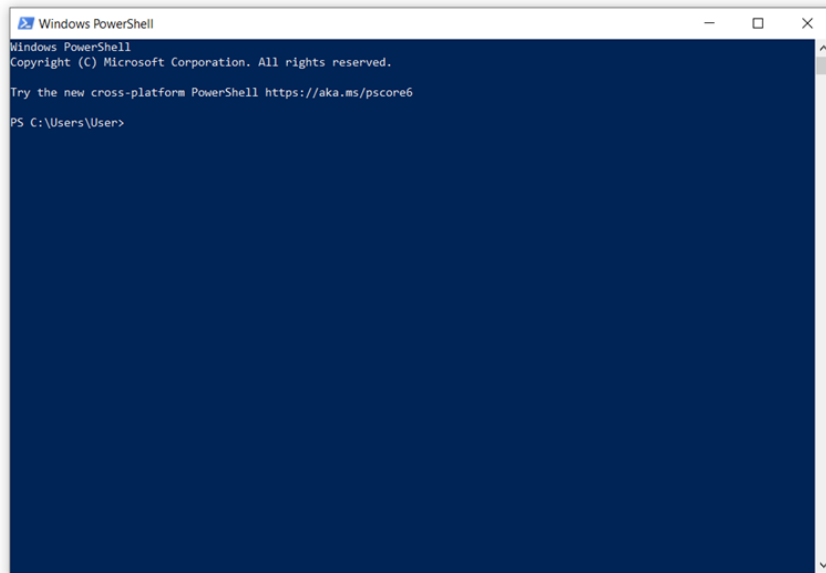
SSH to your....

Virtual Machine | Server

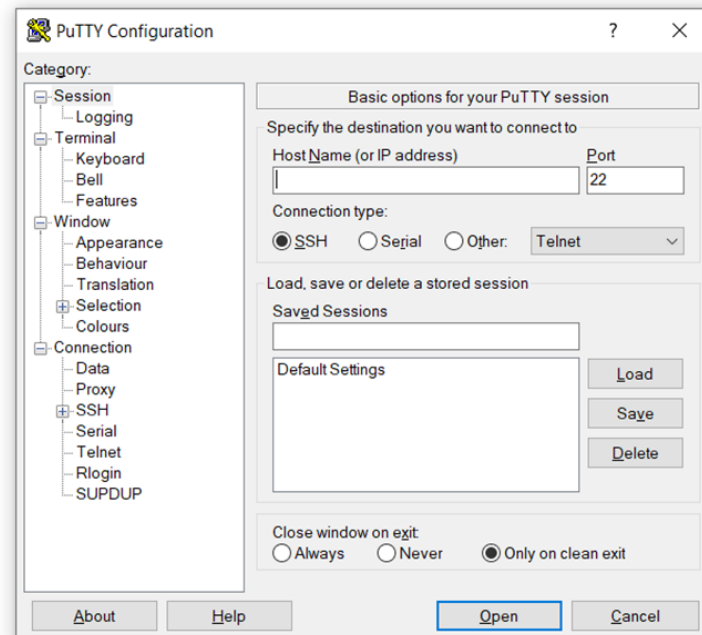


3 Famous tools

PowerShell



Putty



MobaXterm

