

Installing Linux (Ubuntu) Desktop OS:

Step 1: Click New on Virtual Machine toolbar and add details about the new VM and required O.S.

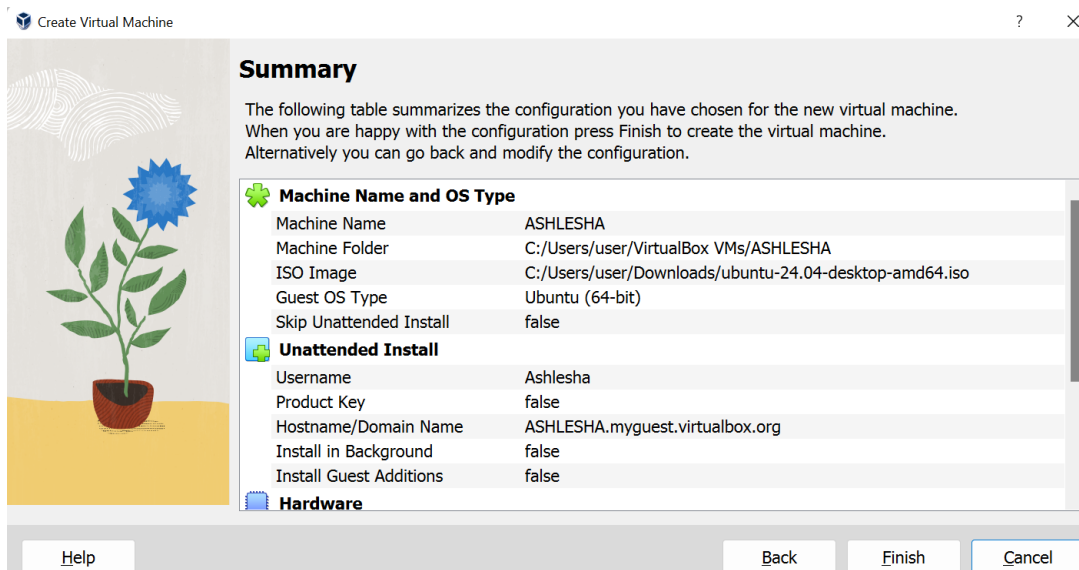


Fig1.5:Virtual Machine Toolbar

Step2:Select the Base Memory and Processors to be allocated to the Virtual Machines per your need.

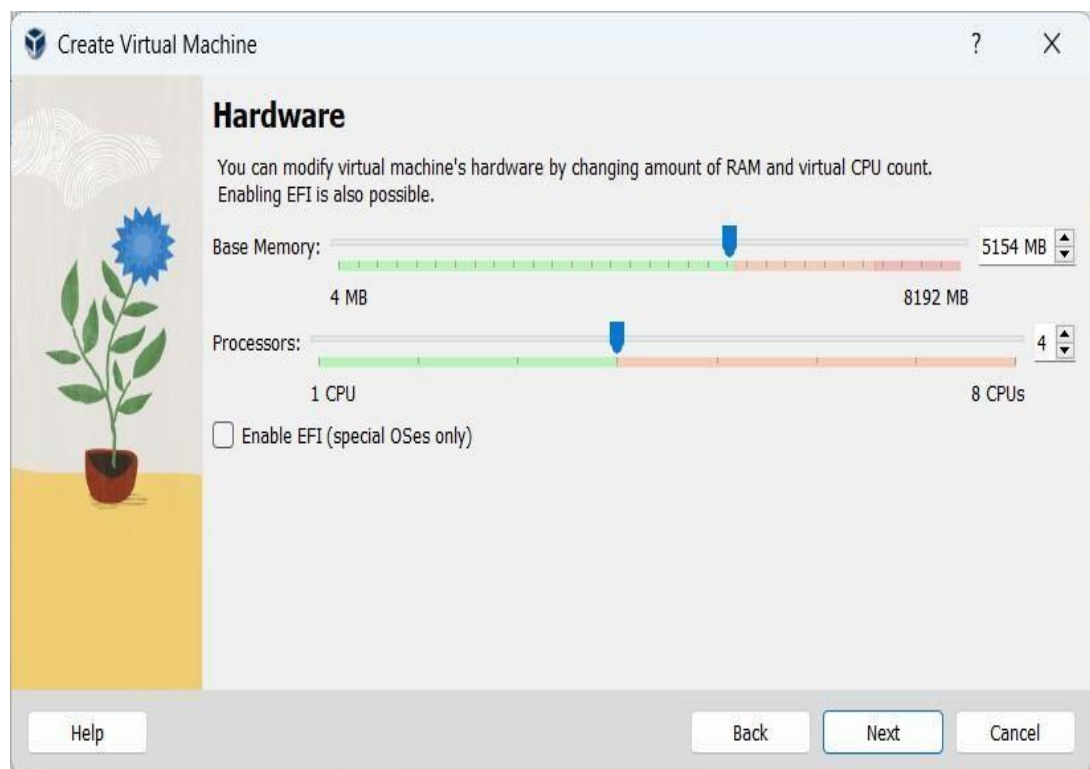


Fig1.6:Base Memory and Processor

OS Installation & Practice on Basic Networking Command

Theory:

Linux:

Linux is an open-source, Unix-like operating system kernel that serves as the foundation for a wide range of operating systems, collectively known as Linux distributions (e.g., Ubuntu, Fedora, Debian). It is renowned for its stability, security, and flexibility, making it a popular choice for servers, desktops, and embedded systems. Developed by a global community of contributors, Linux supports a vast array of hardware platforms and is widely used in various fields, from web servers to mobile devices. Its open-source nature allows users to freely modify and distribute the software.



Fig 1.0: Linux Logo

VirtualBox:

VirtualBox is an open-source virtualization software developed by Oracle, allowing users to run multiple operating systems simultaneously on a single physical machine. It supports a wide range of guest OS types and is available on various host platforms, making it a versatile tool for testing, development, and learning environments.



Fig 1.1: VirtualBox

VMware:

VMware is a top provider of virtualization solutions, offering tools like VMware Workstation and VMware vSphere. These products enable users to create and manage virtual machines on a single physical host, known for their robust performance and enterprise features. VMware is widely used in IT environments for server consolidation, application testing, and cloud computing.



Fig 1.2: VMware

Installing the Virtual Box:

Oracle VM Virtual Box is cross-platform virtualization software that allows users to run multiple operating systems including Microsoft Windows, Mac OS X, Linux, and Oracle Solaris, at the same time on a single physical machine as virtual machine. It is a versatile tool that can meet a wide range of virtualization needs.



Fig 1.3: VirtualBox Setup

Here, click on **Next** and proceed.

Once Virtual Box is installed then we can create, add or import new VMs using toolbar buttons.

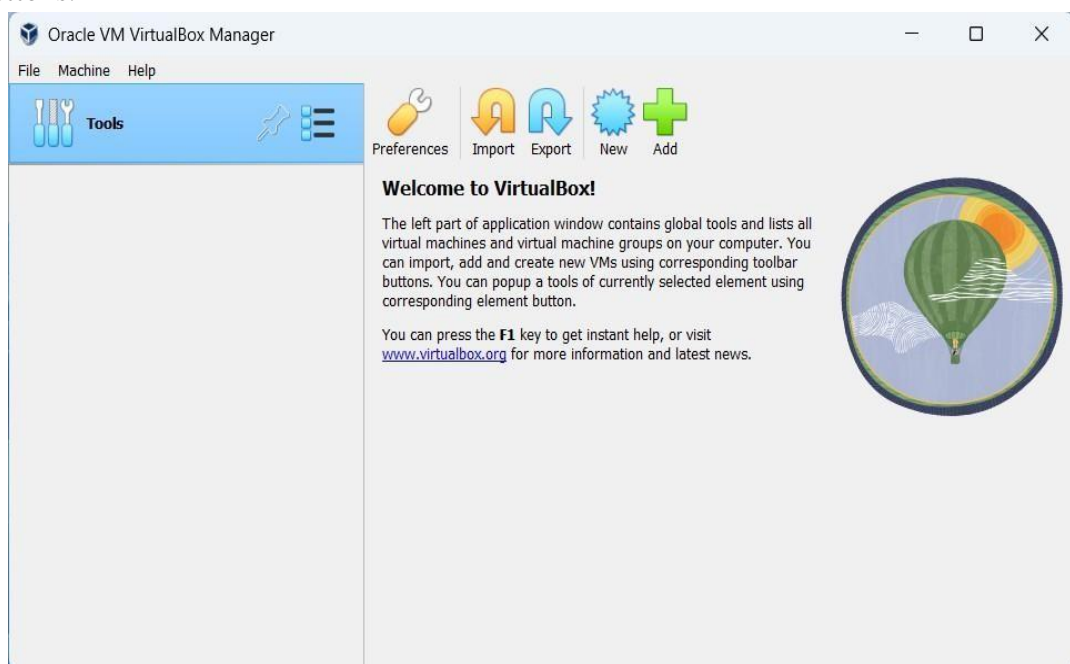


Fig 1.4: VirtualBox Manager

Step 3: Select the size of memory to be allocated for Virtual Hard Disk.



Fig 1.7: Allocate Memory Virtual Hard Disk

Step 4: This is the interface for the newly created Virtual Machine for Ubuntu Desktop OS. Select Server and click on **Start** to run the Virtual Machine

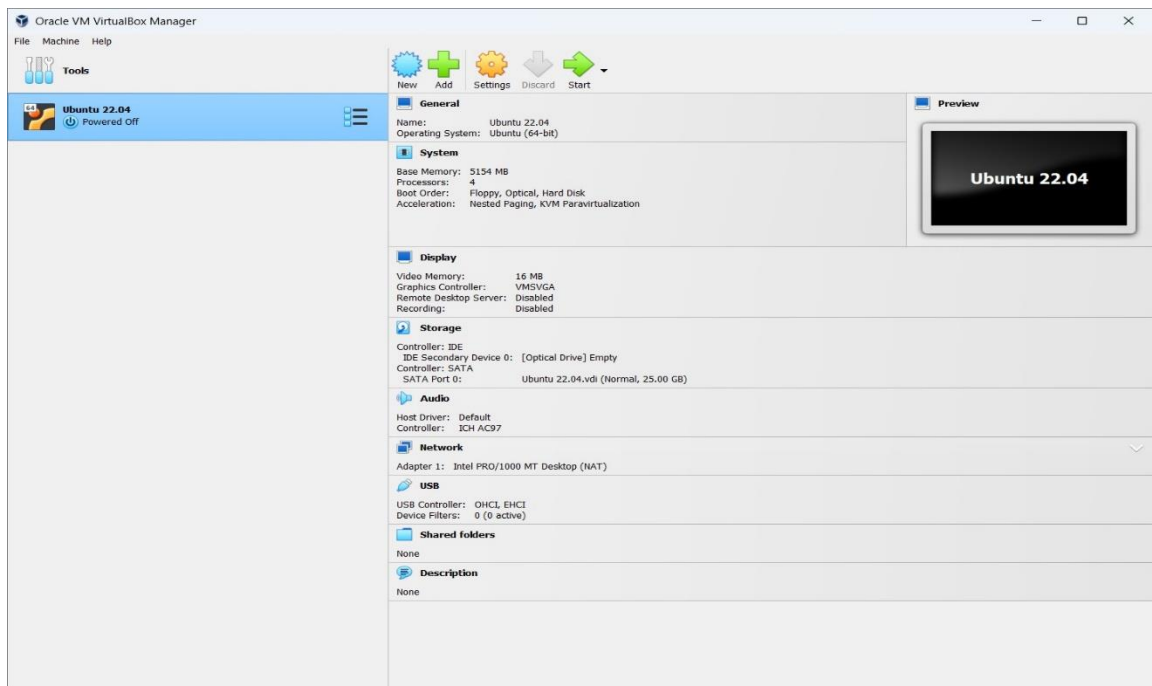


Fig1.8: Ubuntu VM Startup

Step 5: Select the preferred language and click on **Install Ubuntu**.

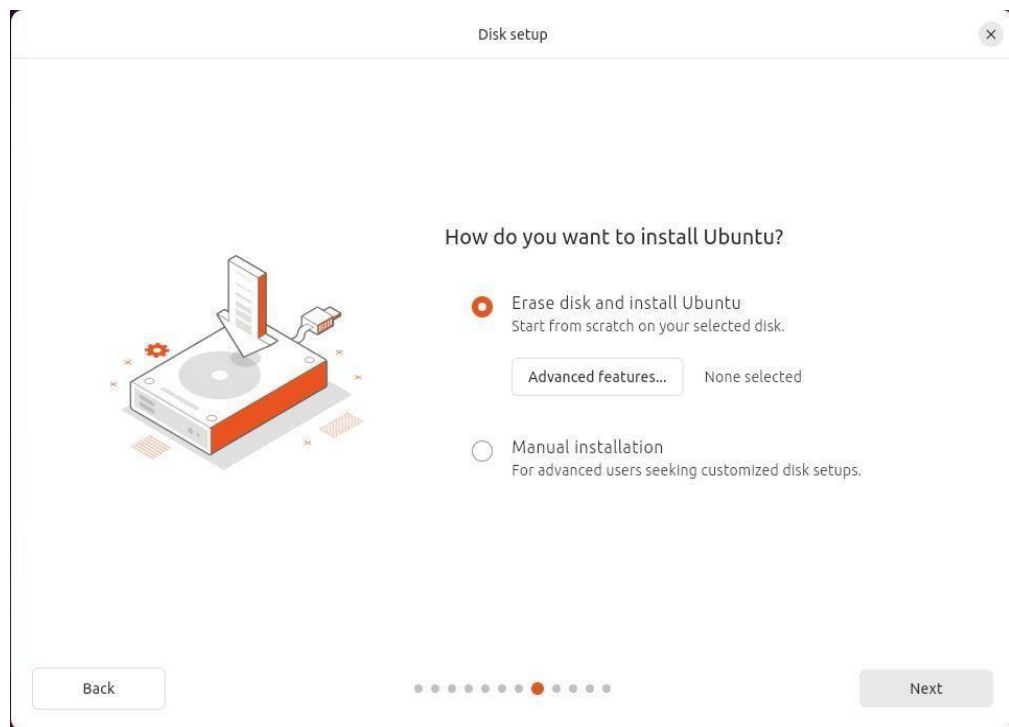


Fig 1.9: Select Language Install Ubuntu

Step 7: It will prompt us to choose updates and other software to install alongside Ubuntu. We choose the options and click on **Continue**.

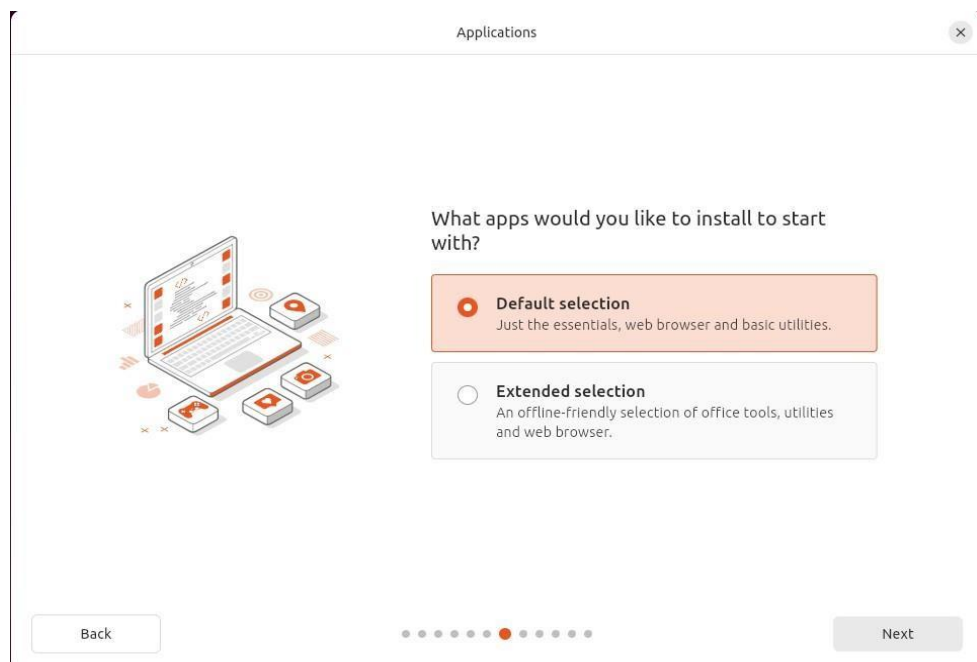


Fig 2.0: Choosing Updates and Other Software

Step 8: We will be asked to choose the Installation type. Once selected we can press **Enter**. We will be informed about the partitions being formatted or changed. If it's okay we press on **Continue** and proceed.

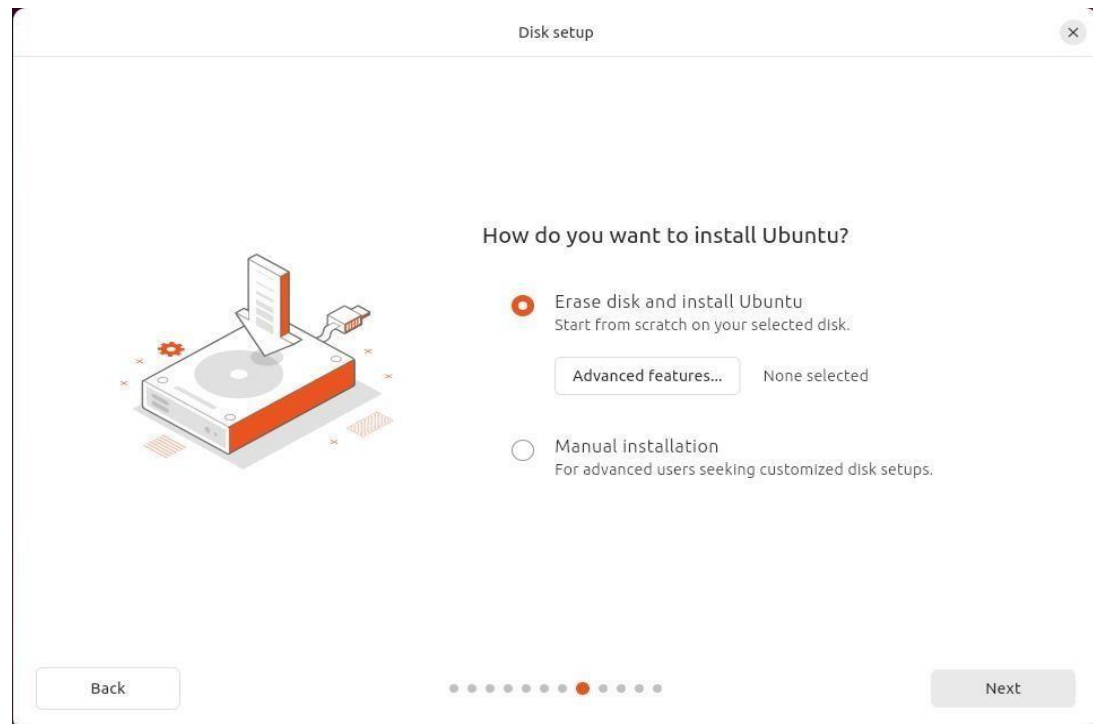


Fig 2.1: Choose Installation Type

Step 9: Select the location and press **Continue**.

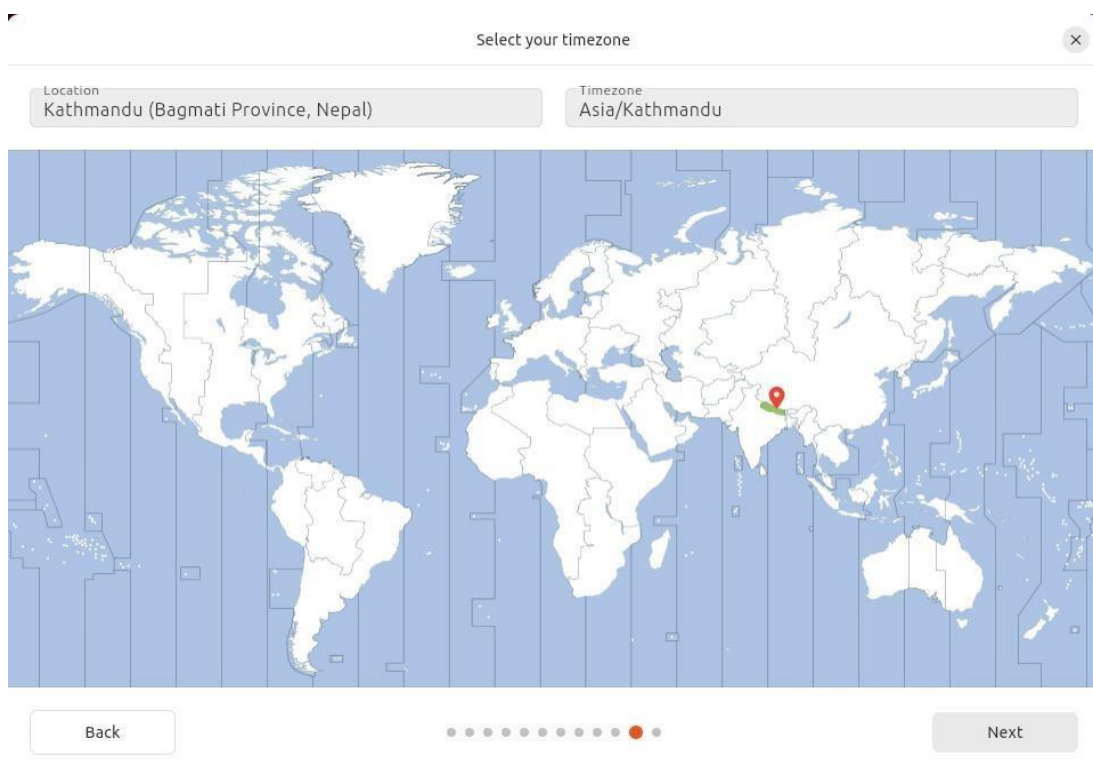


Fig 2.2: Select Location

Step 10: Setup the profile for the user that includes username, password, computer's name etc., once finished press **Enter**.

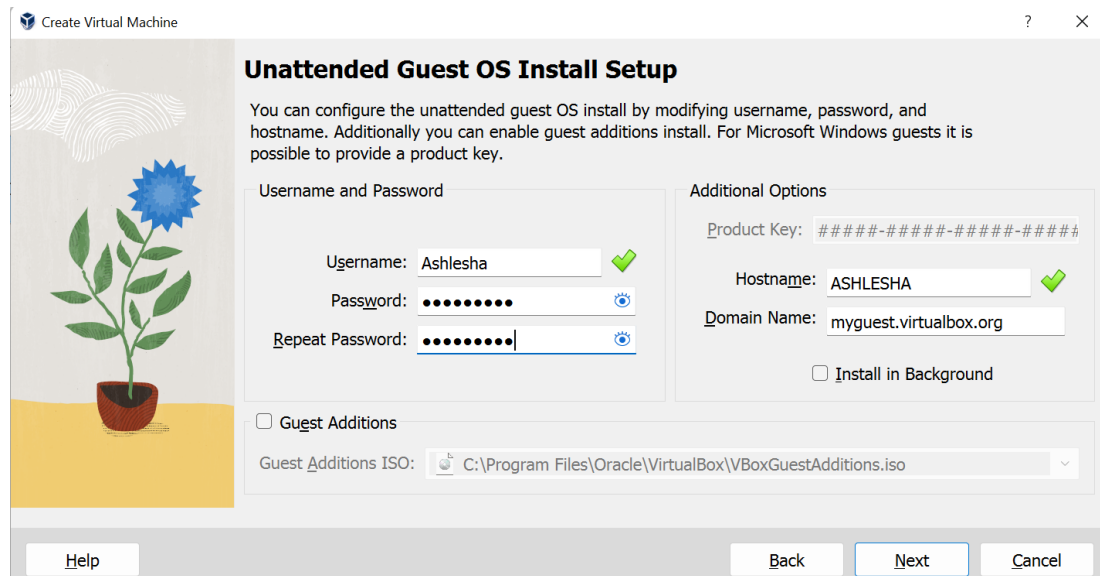


Fig 2.3: Setting up User Profile

Step 11: At this point, choices have been reviewed. It is possible to go back to make changes if needed or proceed by clicking the "Install" button to start the installation process.

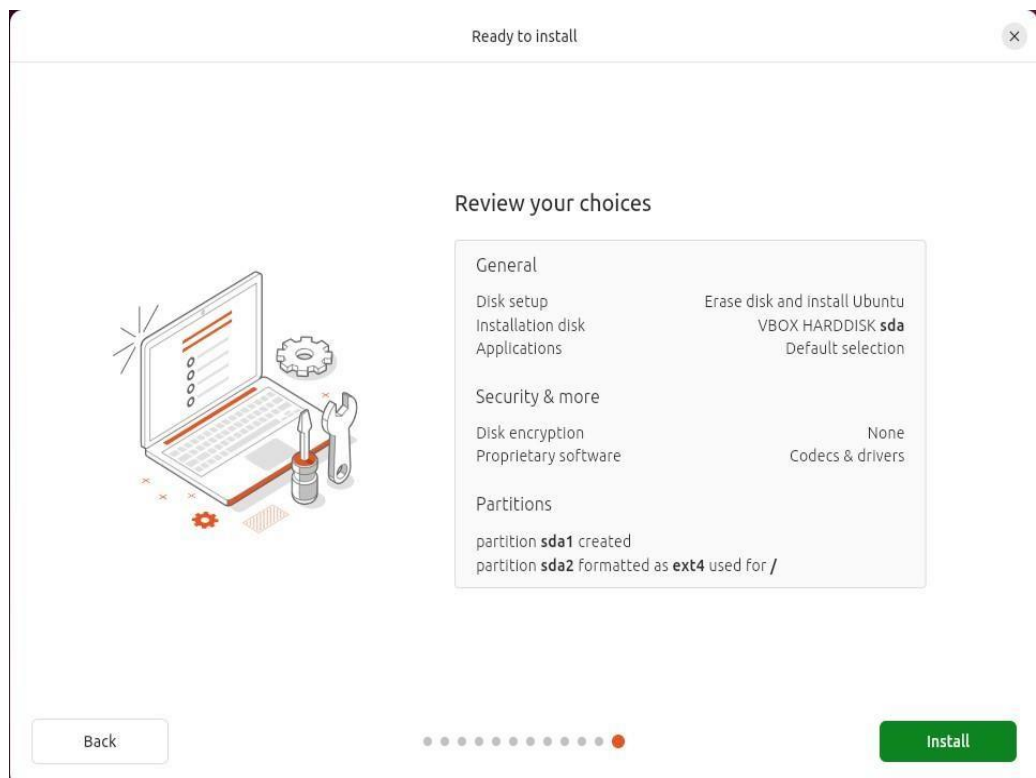


Fig. 2.4: Review Choices

Step 12: Now enter the Login details on the screen and press **Enter** to login into the system.

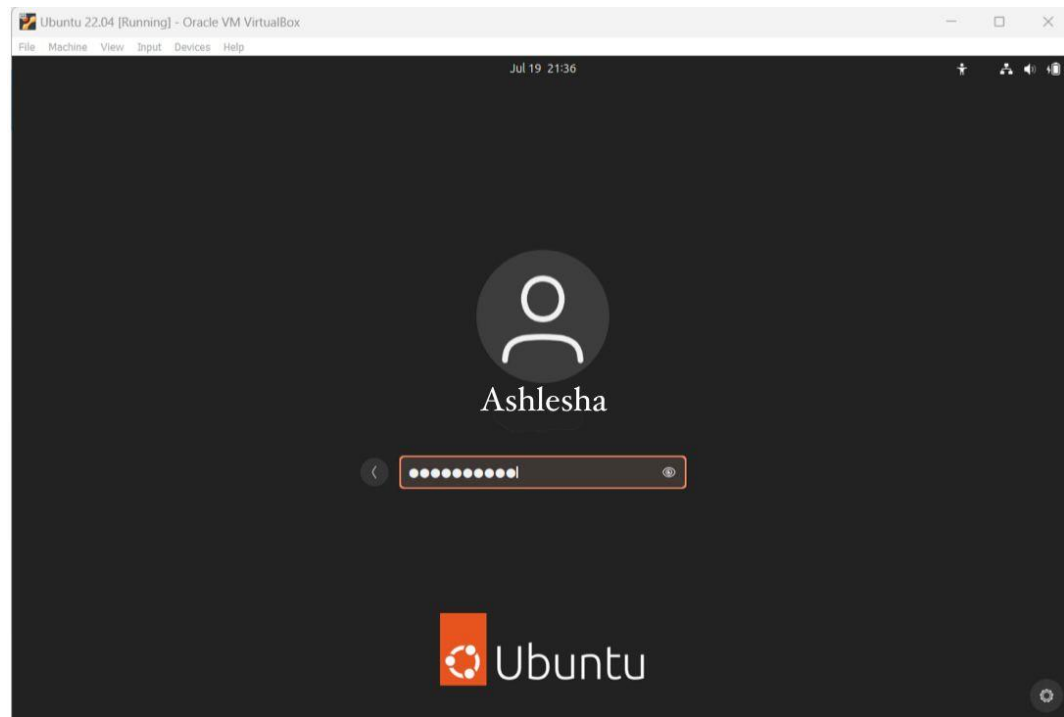


Fig.2.5: Login in Screen

Step 12: Now our system is ready and Ubuntu is installed completely.

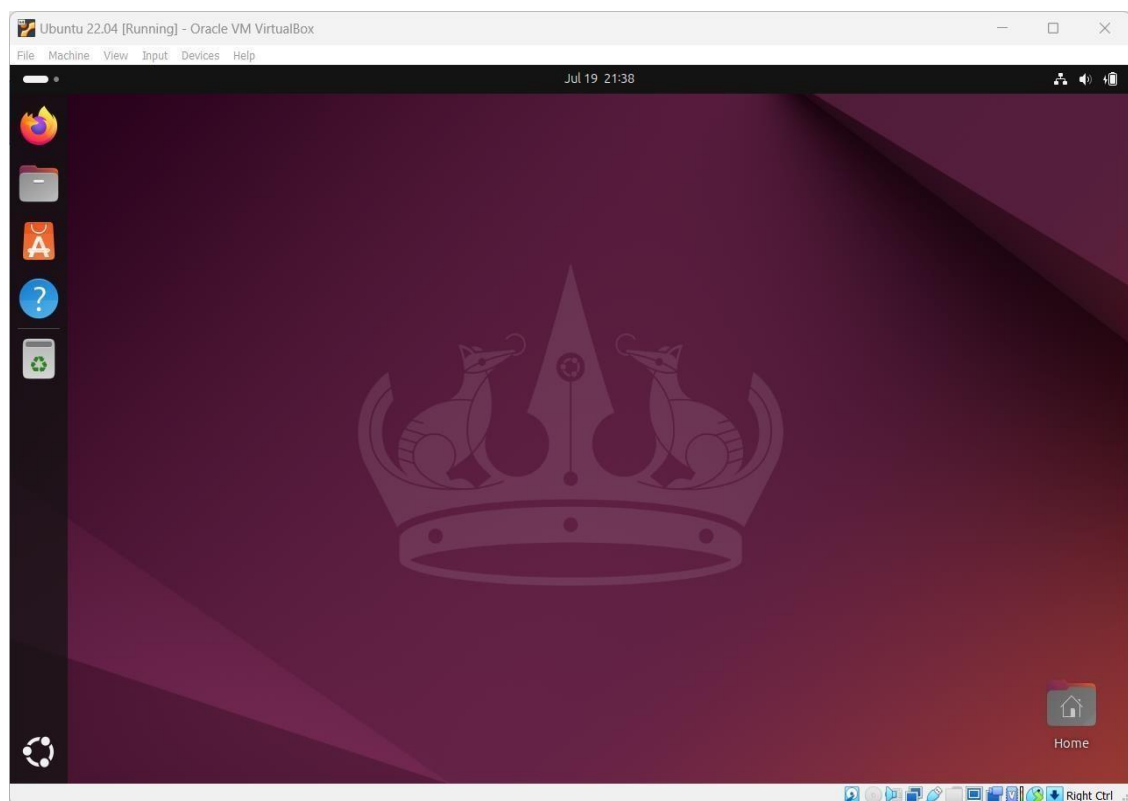


Fig.2.6: Ubuntu Home Screen

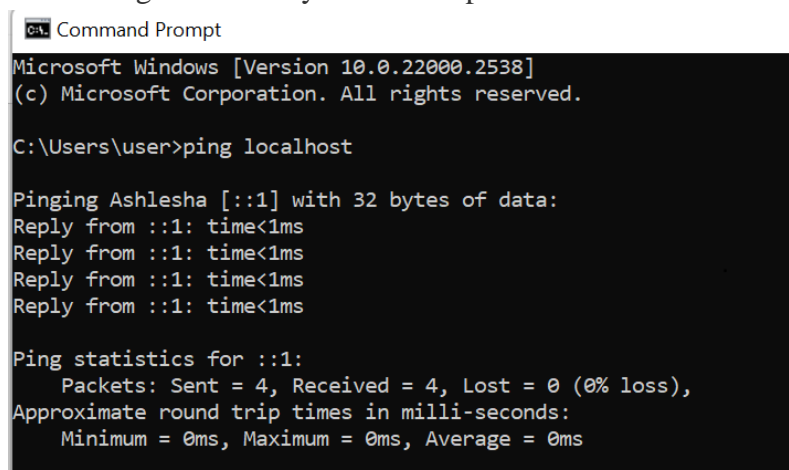
Basic Networking Commands

1.PING

Ping (Packet Internet Groper) is a command-line utility used to test network connectivity between two hosts by sending ICMP echo request packets and waiting for ICMP echo reply packets.

Syntax: ping [options] hostname or IP address

Uses: Used for checking whether any network is present and if a host is attainable.



```
Command Prompt
Microsoft Windows [Version 10.0.22000.2538]
(c) Microsoft Corporation. All rights reserved.

C:\Users\user>ping localhost

Pinging Ashlesha [::1] with 32 bytes of data:
Reply from ::1: time<1ms
Reply from ::1: time<1ms
Reply from ::1: time<1ms
Reply from ::1: time<1ms

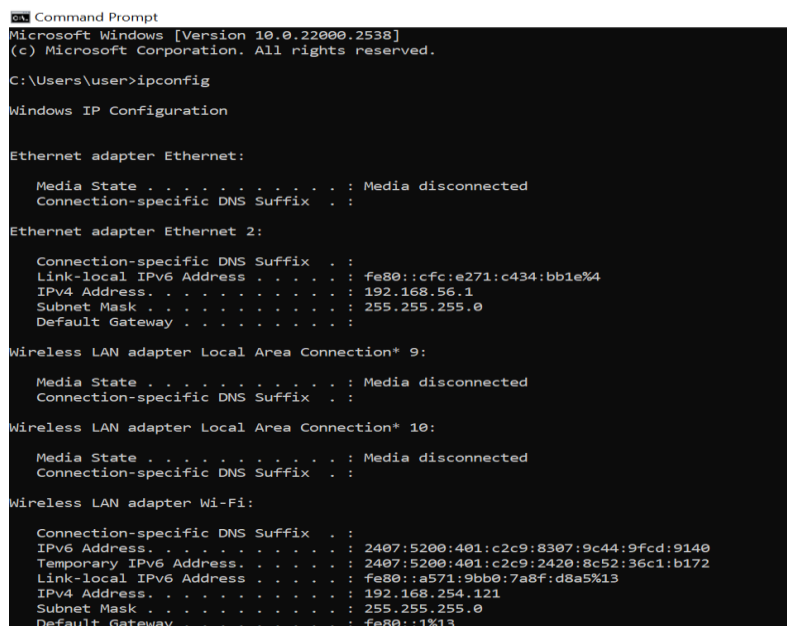
Ping statistics for ::1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Fig.2.7 Packet Internet Groper (PING)

2.IPCONFIG

This command displays all current TCP/IP network configuration values and refreshes Dynamic Host Configuration Protocol (DHCP) and Domain Name System (DNS) settings.

Uses: They are used to view and manage network configuration settings, renew DHC Pleases, flush DNS cache, and configure network interfaces.



```
Command Prompt
Microsoft Windows [Version 10.0.22000.2538]
(c) Microsoft Corporation. All rights reserved.

C:\Users\user>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

Ethernet adapter Ethernet 2:

    Connection-specific DNS Suffix  . :
    Link-local IPv6 Address . . . . . : fe80::cfc:e271:c434:bb1e%4
    IPv4 Address. . . . . : 192.168.56.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . :

Wireless LAN adapter Local Area Connection* 9:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

Wireless LAN adapter Local Area Connection* 10:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix  . :
    IPv6 Address. . . . . : 2407:5200:401:c2c9:8307:9c44:9fcd:9140
    Temporary IPv6 Address. . . . . : 2407:5200:401:c2c9:2420:8c52:36c1:b172
    Link-local IPv6 Address . . . . . : fe80::a571:9bb0:7a8f:d8a5%13
    IPv4 Address. . . . . : 192.168.254.121
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : fe80::1%13
```

Fig.2.8 IPCONFIG

3.GETMAC

MAC address is the physical address, which uniquely identifies each device on a given network. To make communication between two networked devices, we need two addresses: **IP address and MAC address**. It is assigned to the NIC (Network Interface card) of each device that can be connected to the internet.

Syntax: getmac

Purpose: Retrieves the MAC (Media Access Control) address of a network adapter.

Uses: Commonly used in troubleshooting network problems and for network security purposes.

```
C:\Users\user>getmac

Physical Address    Transport Name
=====
28-00-AF-D1-5E-BF   Media disconnected
6C-F6-DA-90-19-C3   Media disconnected
6C-F6-DA-90-19-BF   \Device\Tcpip_{7C305CB7-06B1-4A17-9501-342FD40FE757}
0A-00-27-00-00-04    \Device\Tcpip_{1223A054-0634-4745-8716-F8E5FBA257D6}

C:\Users\user>
```

Fig.2.9 GETMAC

4.HOSTNAME

Hostname is a command-line utility used to display or set the name of the computer or device within a network. It can be accessed without using a particular IP address.

Syntax: hostname

Uses: Used to display the system name.

```
C:\Users\user>hostname
Ashlesha
```

Fig.3.0 HOSTNAME

5.NSLOOKUP:

Nslookup is a command-line tool used to query DNS servers to obtain domain name or IP address mapping, DNS records (such as MX records), and other DNS-related information.

Syntax: nslookup

Uses: It is used for troubleshooting DNS issues, verifying DNS records, testing DNS configurations, and performing reverse DNS lookups.

```
C:\Users\user>nslookup google.com
Server:    UnKnown
Address:   fe80::1

Non-authoritative answer:
Name:      google.com
Addresses: 2404:6800:4002:823::200e
           142.250.194.14
```

Fig.3.1 NSLOOKUP

6. TRACERT

Traceroute (Unix/Linux) or tracert (Windows) is a command-line utility used to trace the route that packets take across an IP network to a specified destination, showing each hop and round-trip time (RTT).

Syntax: traceroute [OPTION...] HOST

Uses: Traces the route packets take to reach a network host.

The following command traces the path to the local host.

```
C:\Users\user>tracert localhost

Tracing route to Ashlesha [::1]
over a maximum of 30 hops:

 1    <1 ms    <1 ms    <1 ms  Ashlesha [::1]

Trace complete.
```

Fig.3.2 TRACERT

7. NETSTAT

Netstat is a command-line network utility used to display active TCP connections, listening ports, routing tables, and network interface statistics.

Syntax: netstat

Uses: It is used for monitoring network connections, identifying open ports, troubleshooting network performance issues, and analyzing network traffic.

```

C:\Users\user>netstat
Active Connections

Proto Local Address           Foreign Address         State
TCP   127.0.0.1:49676          Ashlesha:49677         ESTABLISHED
TCP   127.0.0.1:49677          Ashlesha:49676         ESTABLISHED
TCP   127.0.0.1:49679          Ashlesha:49680         ESTABLISHED
TCP   127.0.0.1:49680          Ashlesha:49679         ESTABLISHED
TCP   127.0.0.1:49701          Ashlesha:49702         ESTABLISHED
TCP   127.0.0.1:49702          Ashlesha:49701         ESTABLISHED
TCP   192.168.254.121:49408    20.198.118.190:https   ESTABLISHED
TCP   192.168.254.121:49686    relay-f2a0407b:https   ESTABLISHED
TCP   192.168.254.121:49978    20.212.88.117:https    ESTABLISHED
TCP   192.168.254.121:50101    152.195.38.76:http     CLOSE_WAIT
TCP   192.168.254.121:50127    104.208.16.89:https    ESTABLISHED
TCP   192.168.254.121:50142    104.208.16.91:https    TIME_WAIT
TCP   [2407:5200:401:c2c9:2420:8c52:36c1:b172]:49409 [2603:1040:a06:6::]:https ESTABLISHED
TCP   [2407:5200:401:c2c9:2420:8c52:36c1:b172]:49814 g2600-140f-2e00-038d-0000-0000-4106:https CLOSE_WAIT
TCP   [2407:5200:401:c2c9:2420:8c52:36c1:b172]:50082 [2001:b28:f23f:9::852:437]:https ESTABLISHED
TCP   [2407:5200:401:c2c9:2420:8c52:36c1:b172]:50100 g2600-140f-2e00-0385-0000-0000-0000-0057:https CLOSE_WAIT
TCP   [2407:5200:401:c2c9:2420:8c52:36c1:b172]:50131 g2600-140f-0005-0000-0000-0000-17d9-6ed8:https CLOSE_WAIT
TCP   [2407:5200:401:c2c9:2420:8c52:36c1:b172]:50132 g2600-140f-0005-0000-0000-0000-17d9-6ed8:https CLOSE_WAIT
TCP   [2407:5200:401:c2c9:2420:8c52:36c1:b172]:50133 [2603:1046:700:5c::2]:https ESTABLISHED

```

Fig.3.3 NETSTAT

8. ARP

Displays the ARP (Address Resolution Protocol) table, which shows the mapping of IP addresses to MAC addresses.

Syntax: arp

Uses: Used to view and manipulate the ARP cache, which maps IP addresses to MAC addresses.

```

C:\Users\user>arp -a

Interface: 192.168.56.1 --- 0x4
    Internet Address      Physical Address        Type
    192.168.56.255        ff-ff-ff-ff-ff-ff      static
    224.0.0.22             01-00-5e-00-00-16      static
    224.0.0.251            01-00-5e-00-00-fb      static
    224.0.0.252            01-00-5e-00-00-fc      static
    239.255.255.250        01-00-5e-7f-ff-fa      static

Interface: 192.168.254.121 --- 0xd
    Internet Address      Physical Address        Type
    192.168.254.254        f0-2f-a7-9a-3d-26      dynamic
    192.168.254.255        ff-ff-ff-ff-ff-ff      static
    224.0.0.22             01-00-5e-00-00-16      static
    224.0.0.251            01-00-5e-00-00-fb      static
    239.255.102.18         01-00-5e-7f-66-12      static
    239.255.255.250        01-00-5e-7f-ff-fa      static
    255.255.255.255        ff-ff-ff-ff-ff-ff      static

```

Fig.3.4 Address Resolution Protocol (ARP)

9. SYSTEMINFO

Systeminfo is a command-line utility on Windows systems used to display detailed configuration information about the computer's operating system, hardware resources, and network settings.

Syntax: systeminfo

Uses: Used to displays detailed configuration information about a computer and its operating system.

```

Total Physical Memory: 7,877 MB
Available Physical Memory: 2,280 MB
Virtual Memory: Max Size: 10,693 MB
Virtual Memory: Available: 3,025 MB
Virtual Memory: In Use: 7,668 MB
Page File Location(s): C:\pagefile.sys
Domain: WORKGROUP
Logon Server: \\ASHLESHA
Hotfix(s): 6 Hotfix(s) Installed.
           [01]: KB5030650
           [02]: KB5030842
           [03]: KB5011048
           [04]: KB5012170
           [05]: KB5031358
           [06]: KB5031591
Network Card(s): 4 NIC(s) Installed.
                 [01]: Realtek PCIe GbE Family Controller
                   Connection Name: Ethernet
                   Status: Media disconnected
                 [02]: Bluetooth Device (Personal Area Network)
                   Connection Name: Bluetooth Network Connection
                   Status: Media disconnected
                 [03]: Intel(R) Wi-Fi 6E AX211 160MHz
                   Connection Name: Wi-Fi
                   DHCP Enabled: Yes
                   DHCP Server: 192.168.254.254
                   IP address(es)
                   [01]: 192.168.254.121
                   [02]: fe80::a571:9bb0:7a8f:d8a5
                   [03]: 2407:5200:401:c2c9:2420:8c52:36c1:b172
                   [04]: 2407:5200:401:c2c9:8307:9c44:9fcd:9140
                 [04]: VirtualBox Host-Only Ethernet Adapter
                   Connection Name: Ethernet 2
                   DHCP Enabled: No
                   IP address(es)
                   [01]: 192.168.56.1
                   [02]: fe80::cfc:e271:c434:bb1e
Hyper-V Requirements: A hypervisor has been detected. Features required for Hyper-V will not be displayed.

```

Fig.3.5 SYSTEMINFO

10. PATHPING

Pathping is a command-line network utility that combines features of both ping and traceroute, providing information about the path packets take to a destination and measuring packet loss at each hop.

Syntax: pathping

Uses: It combines PING and TRACERT to show path and packet loss information.

```

C:\Users\user>pathping localhost

Tracing route to Ashlesha [::1]
over a maximum of 30 hops:
  0  Ashlesha [::1]
  1  Ashlesha [::1]

Computing statistics for 25 seconds...

```

Hop	RTT	Source to Here Lost/Sent = Pct	This Node/Link Lost/Sent = Pct	Address
0				Ashlesha [::1]
1	0ms	0/ 100 = 0%	0/ 100 = 0%	Ashlesha [::1]

```

Trace complete.

```

Fig.3.5 PATPATHPING

Conclusion:

The installation of Linux through Oracle VM VirtualBox and the experimentation with basic networking commands, including nslookup, tracert, netstat, arp, systeminfo, and pathping, underscored their pivotal role in root cause analysis and system information gathering. These tools proved essential in promptly identifying and addressing technical issues, ensuring the reliability and efficiency of system operations. This hands-on experience highlighted the critical importance of meticulous system setup and proactive network management for seamless functionality and optimal performance.