

TITLE: Creating and managing virtual machine using virtual box

1) OBJECTIVE:

1. To learn to create ,configure and manage the virtual machine(VMs) using virtual machine such as virtual box.
2. To understand the role of virtualization in modern computing.
3. To manage the virtual machine life cycle: start,stop,pause,clone , export and import.

2) THEORY

- **virtualization:**

Virtualization is a technology that allows a single physical machine to run multiple isolated operating systems (called virtual machines) at the same time. It creates a virtual version of computing resources like CPUs, storage, and network interfaces.

- **Virtual machine:**

A Virtual Machine is a software-based emulation of a physical computer. It runs its own operating system and applications just like a real computer, but it is hosted on a physical system called the host machine using virtualization software.

Each VM is isolated from the host and other VMs, making it safe environment for testing, development ,and learning.

Virtual machine(VMs) has:

- Its own operating system(called the guest os)
- Its own virtual hardware(RAM, CPU, DISK, etc)
- It runs independently from the host os.

- **Popular virtualization tools:**

1. QEMU(Quick Emulator):

QEMU is a free and open-source virtualization and emulation tool that allows users to run virtual machines of different operating systems and even different hardware architectures (like ARM, x86, RISC-V) on a single physical machine. It is widely used in development, testing, and embedded systems.

It integrates with the tools like KVM and libvirt for better performance and management

2. Virtual Box

Virtual box is a free and open-source virtualization software developed by oracle corporation. It allows users to run multiple operating systems (called guest OS) on a single physical machine (called host OS) at the same time. It supports Windows, Linux, macOS, and Solaris as both host and guest operating systems. It is free and cross platform. Virtual box offers snapshot and cloning feature backup and recovery.

3. VMware

VMware is a leading provider of virtualization and cloud computing software developed by VMware, Inc. It offers a range of professional-grade tools to create and manage virtual machines on desktop and server systems.

VMware provides high performance, stability, and advanced features such as snapshots, cloning, and seamless integration with the host system. It is widely used by professionals for software testing, server management, and enterprise-grade virtualization.

- **Uses cases:**

- ❖ Operating system testing.
- ❖ Software development and testing.
- ❖ Server network simulations.
- ❖ Safe environment for malware analysis
- ❖ Cloud and virtual desktop infrastructure(VAD).
- ❖ Server virtualization.

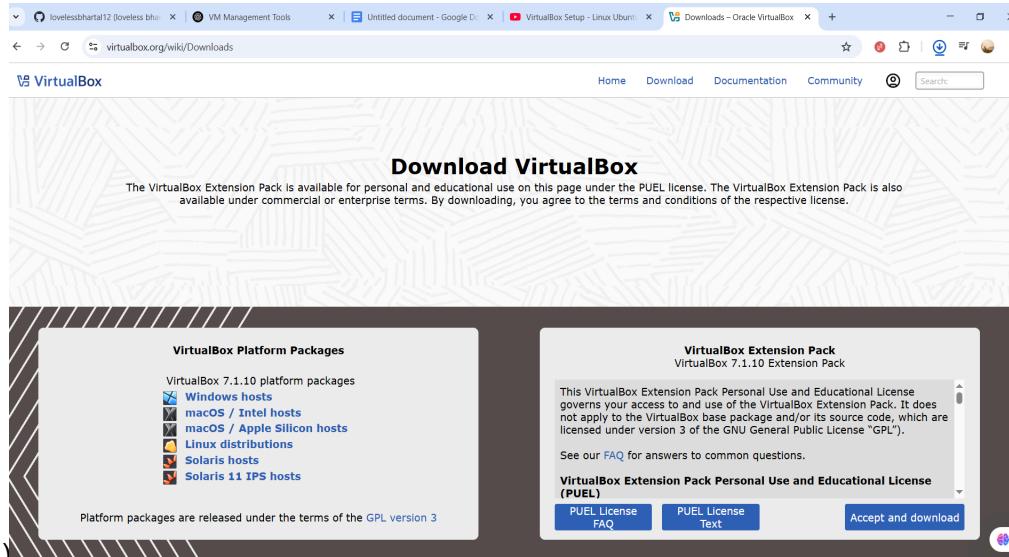
3) TOOLS AND REQUIREMENT:

- Host operating system(windows/linux/macos)
- VirtualBox(latest version)
- Zorin OS ISO file
- Minimum 4GB RAM, 25 GB disk space
- Internet connection

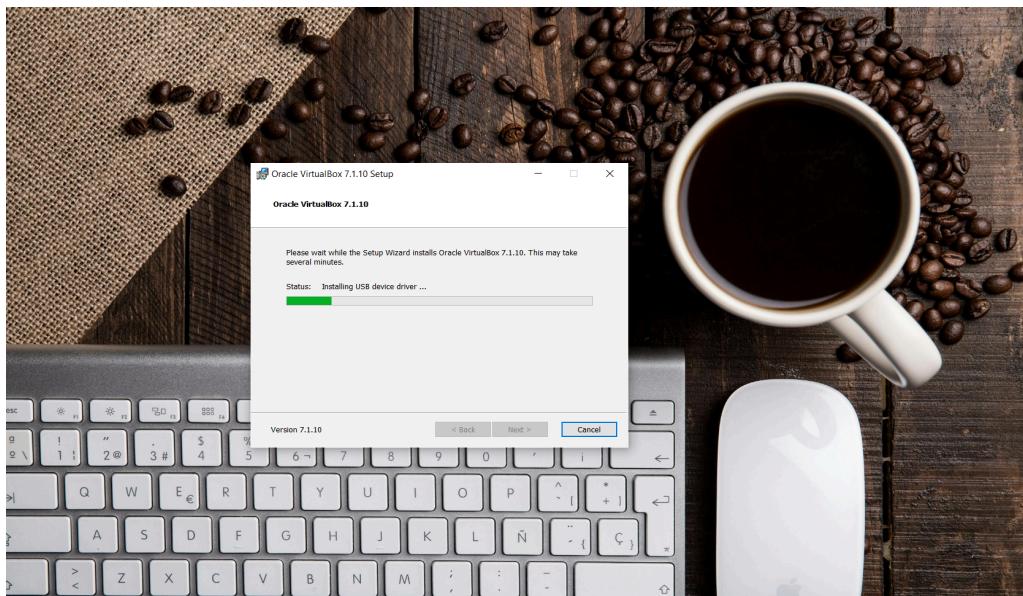
4) Procedure:

❖ Step 1:

I) Download the virtualBox from: <https://www.virtualbox.org/>



II) Install using the default setup wizard





III) Selection of os: I selected Zorin OS for this lab because it offers a user-friendly interface similar to Windows, making it ideal for beginners transitioning to Linux. Additionally, it is lightweight, fast, and based on Ubuntu, ensuring compatibility and ease of use in a virtualized environment.

❖ **Step 2:** Creating a new virtual machine.

At first the new option was selected then VM was named as NCE080BCT022 as shown in figure and ISO image. Other information automatically appears and next was pressed.

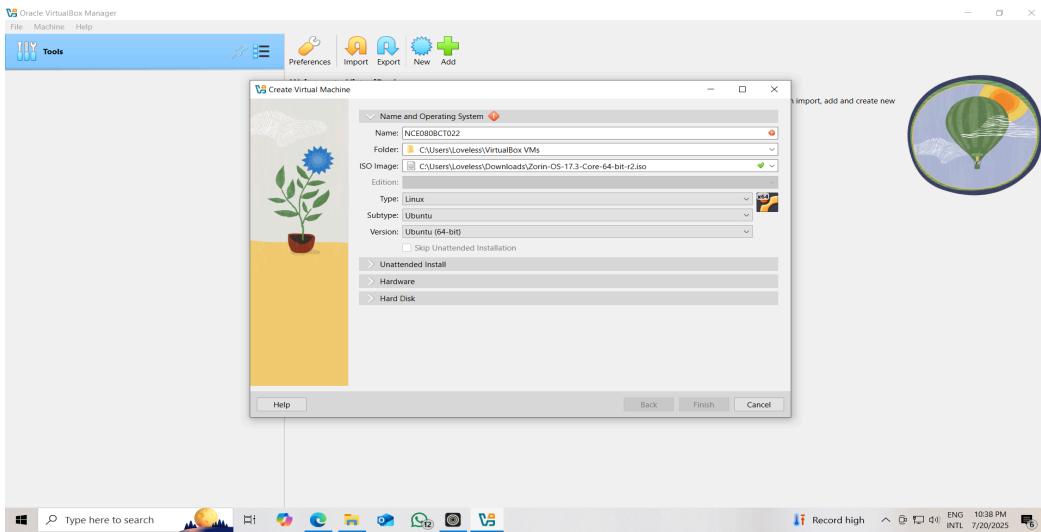


Fig: Naming the virtual machine and adding zorin iso file

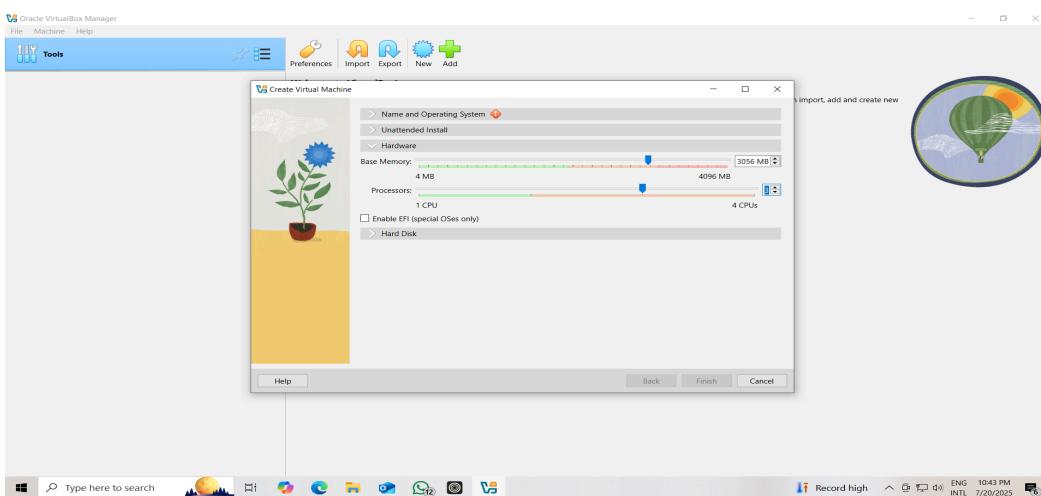


Fig: memory and processor allocation

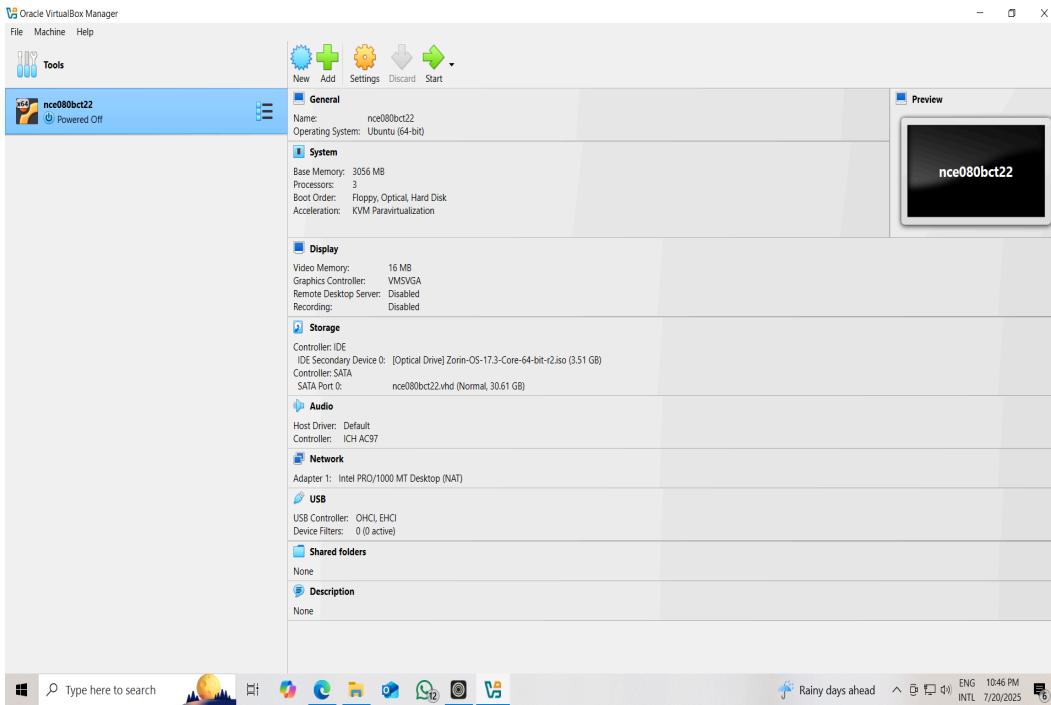
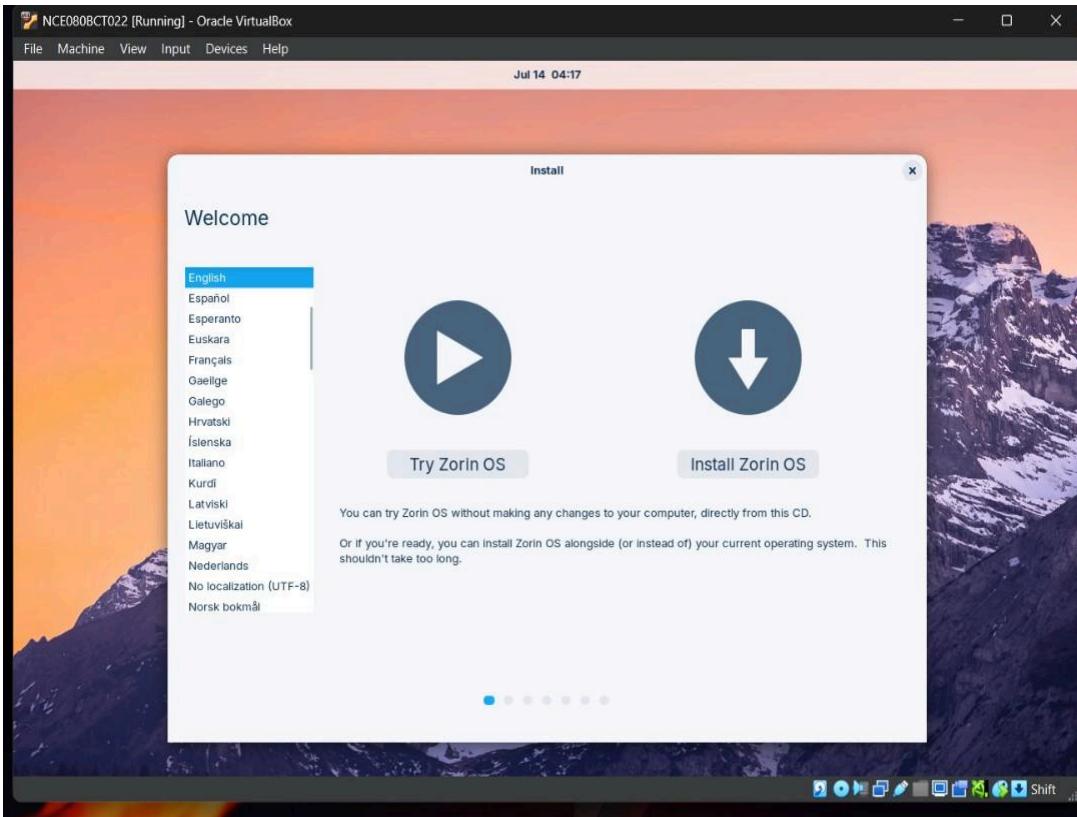


Fig: overall view of the virtual machine

❖ Step 3: Installing the zorin os.



- English language is chosen as a default language and local network was set according to the connected network. Press the install Zorin OS for the installation of the Zorin OS.
- Then the partitioning for the Zorin OS starts.

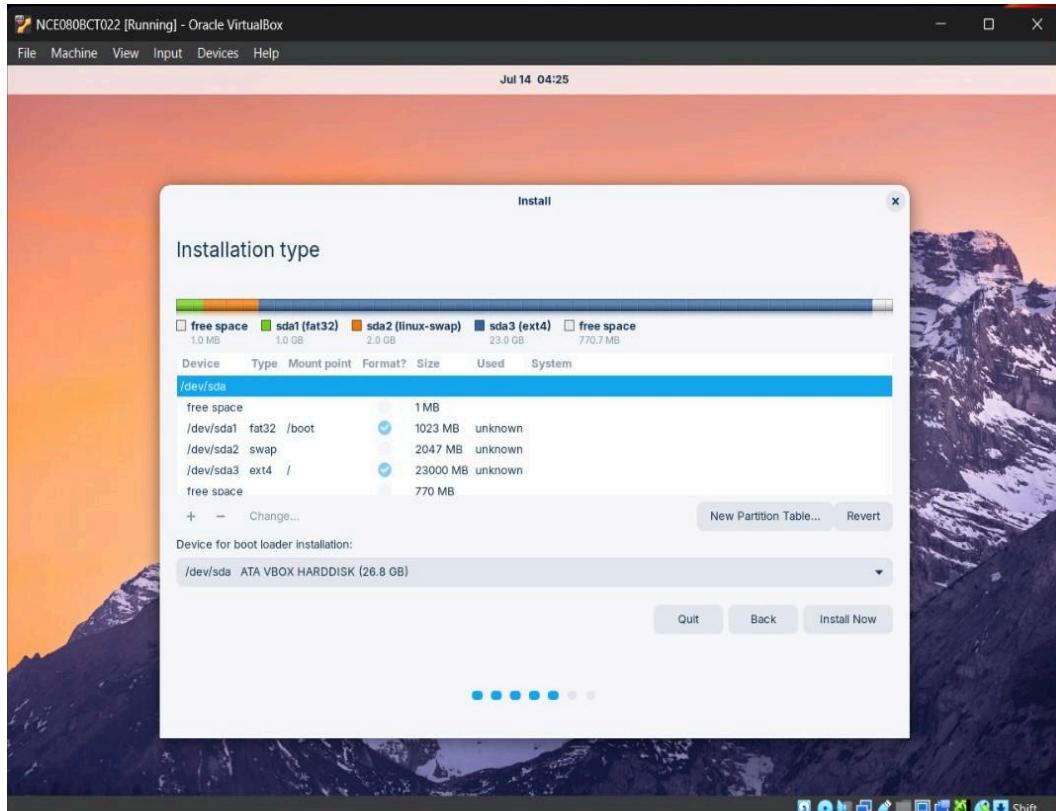
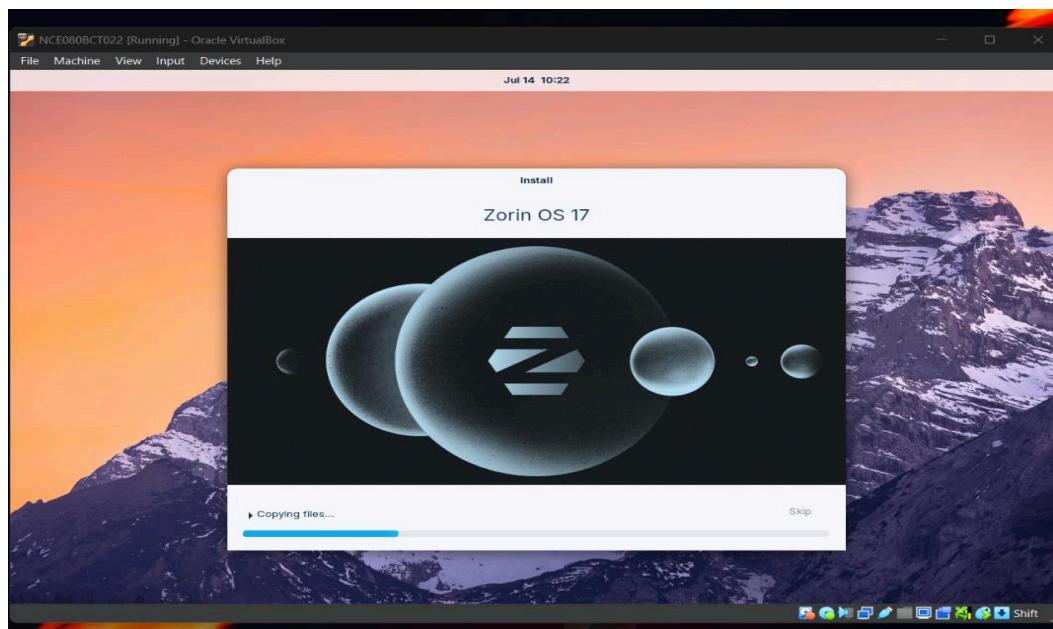


Fig: partitioning for Zorin OS.



❖ Step 4: post installation configuration

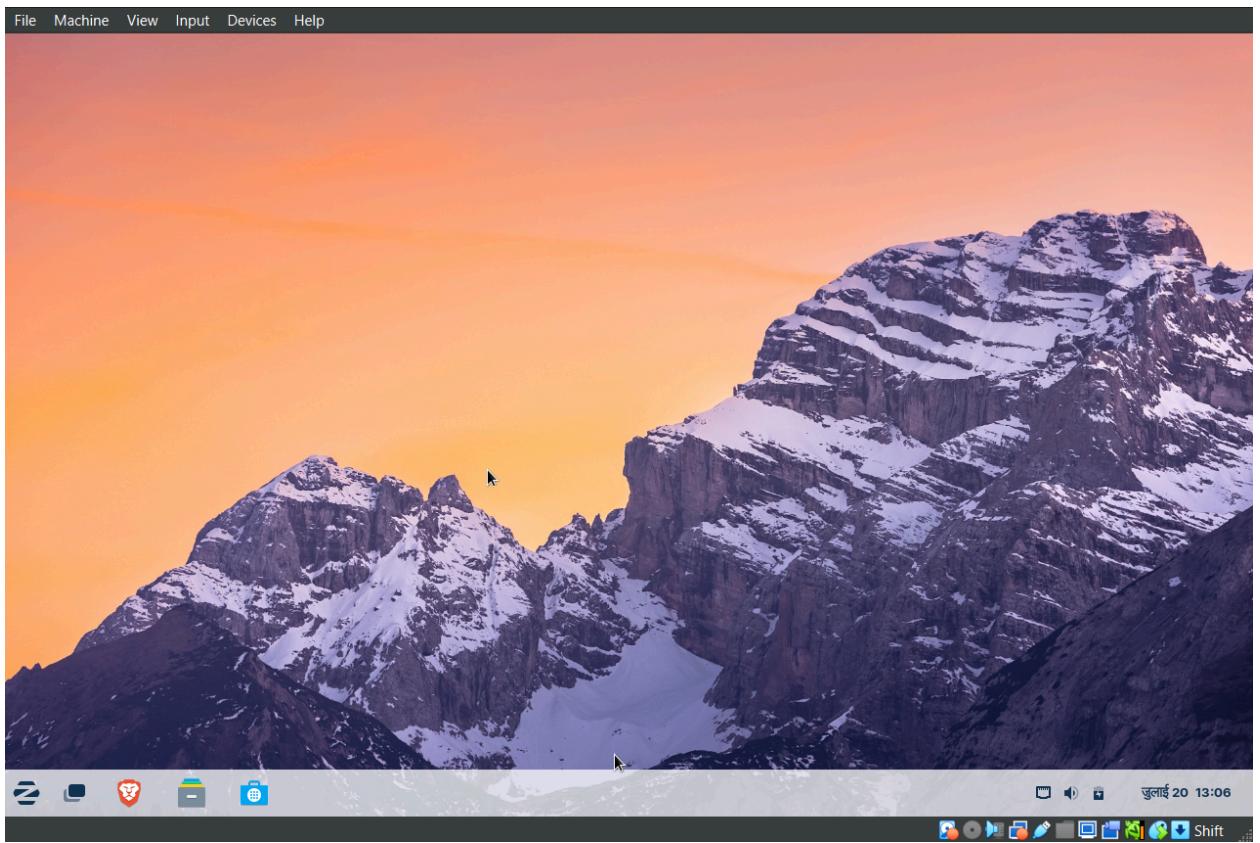
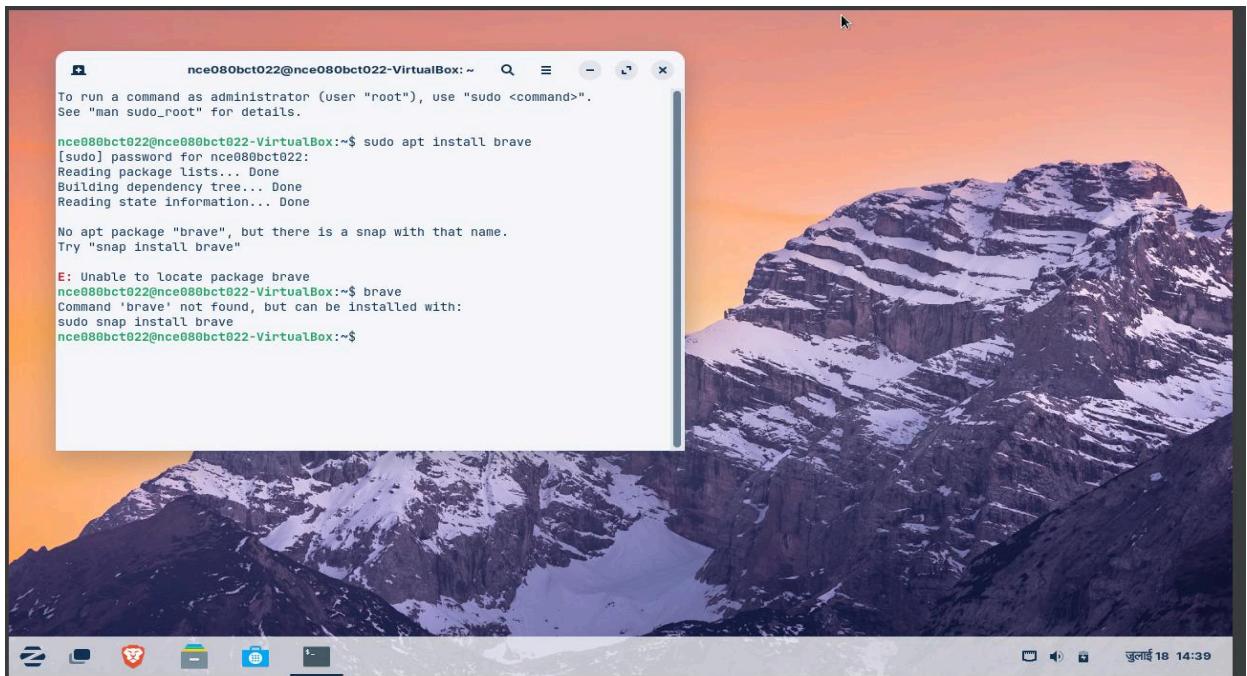


Fig: Boot after installation



❖ **Step 5: managing the virtual machine**

1) pause/start/stop VM

This can be simply done by selecting the machine and choosing what you want to do as shown figure below:

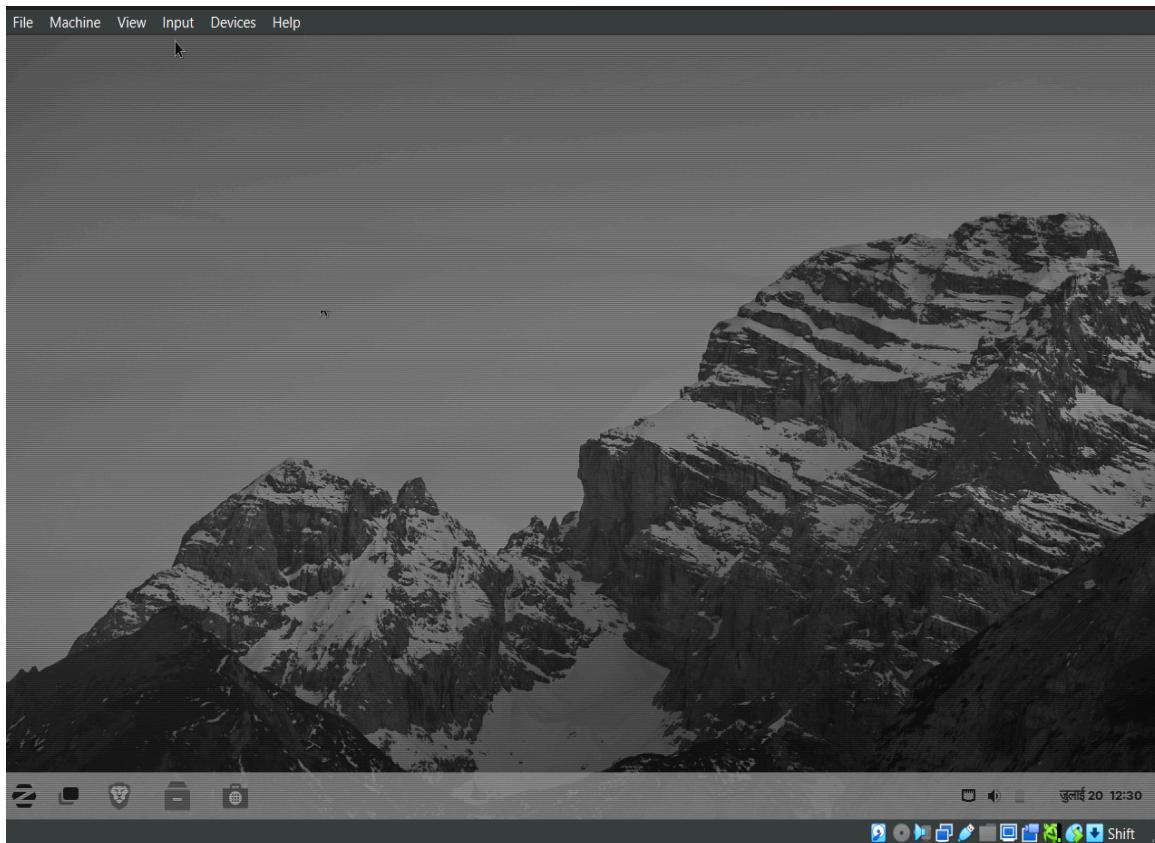


Fig: paused the virtual machine.

2) Snapshot

A snapshot in VirtualBox is a saved state of a virtual machine at a specific point in time. It allows you to revert the VM back to that exact state later — useful before making risky changes or updates. To take a snapshot, open VirtualBox Manager, right-click on the VM, select Snapshots, then click Take. Give it a name and description, and click OK. The VM's current state — including memory, settings, and disk — will be saved instantly.

3) Clone

A clone in VirtualBox is a complete copy of an existing virtual machine, including its settings, virtual disk, and current state. Cloning is useful when you want to create a backup or make a duplicate for testing without affecting the original VM. To clone a VM, open VirtualBox Manager, right-click the VM you want to copy, and select Clone. Choose Full Clone for an independent copy or Linked Clone which shares disk space with the original, then give it a name and complete the wizard. The new VM will appear as a separate machine in the list.

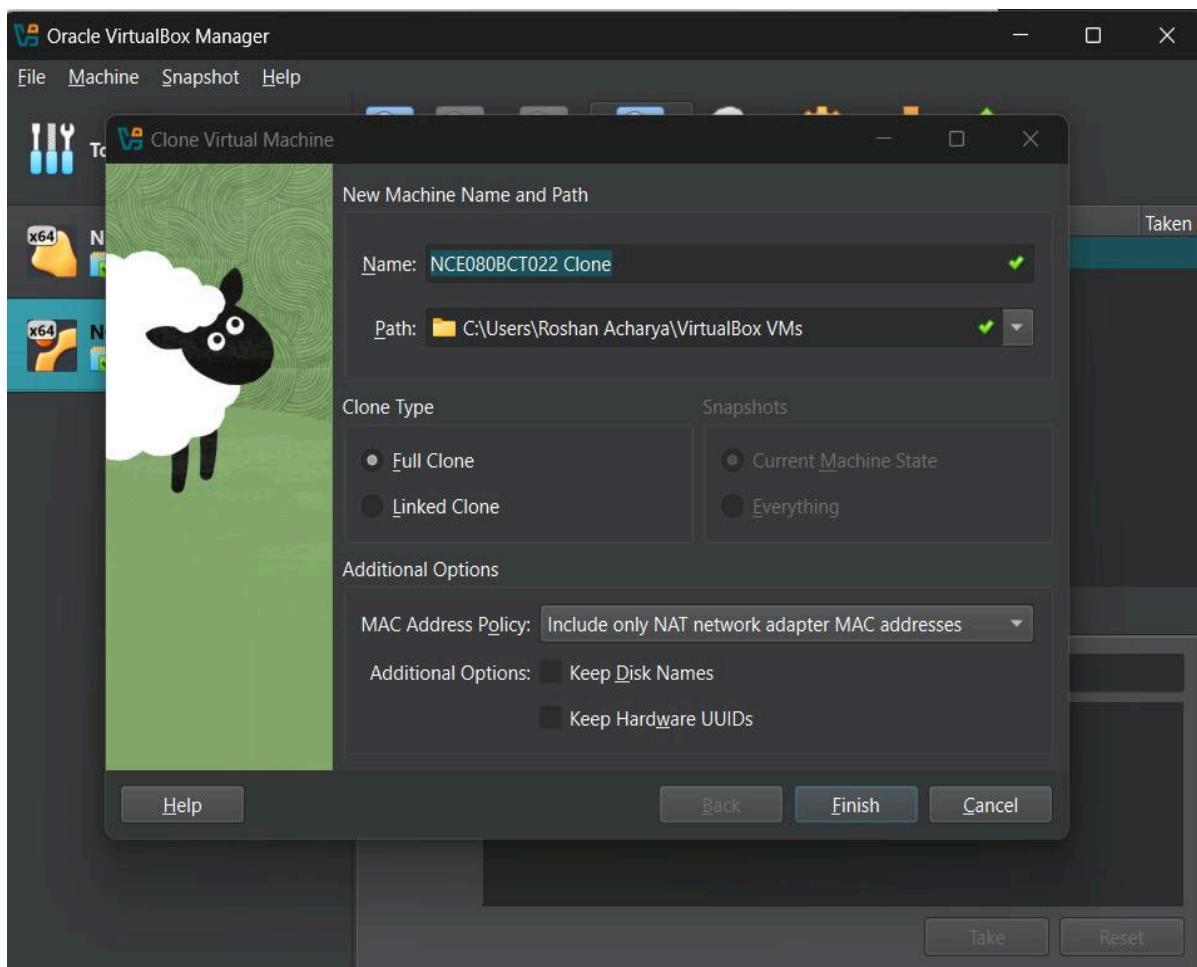
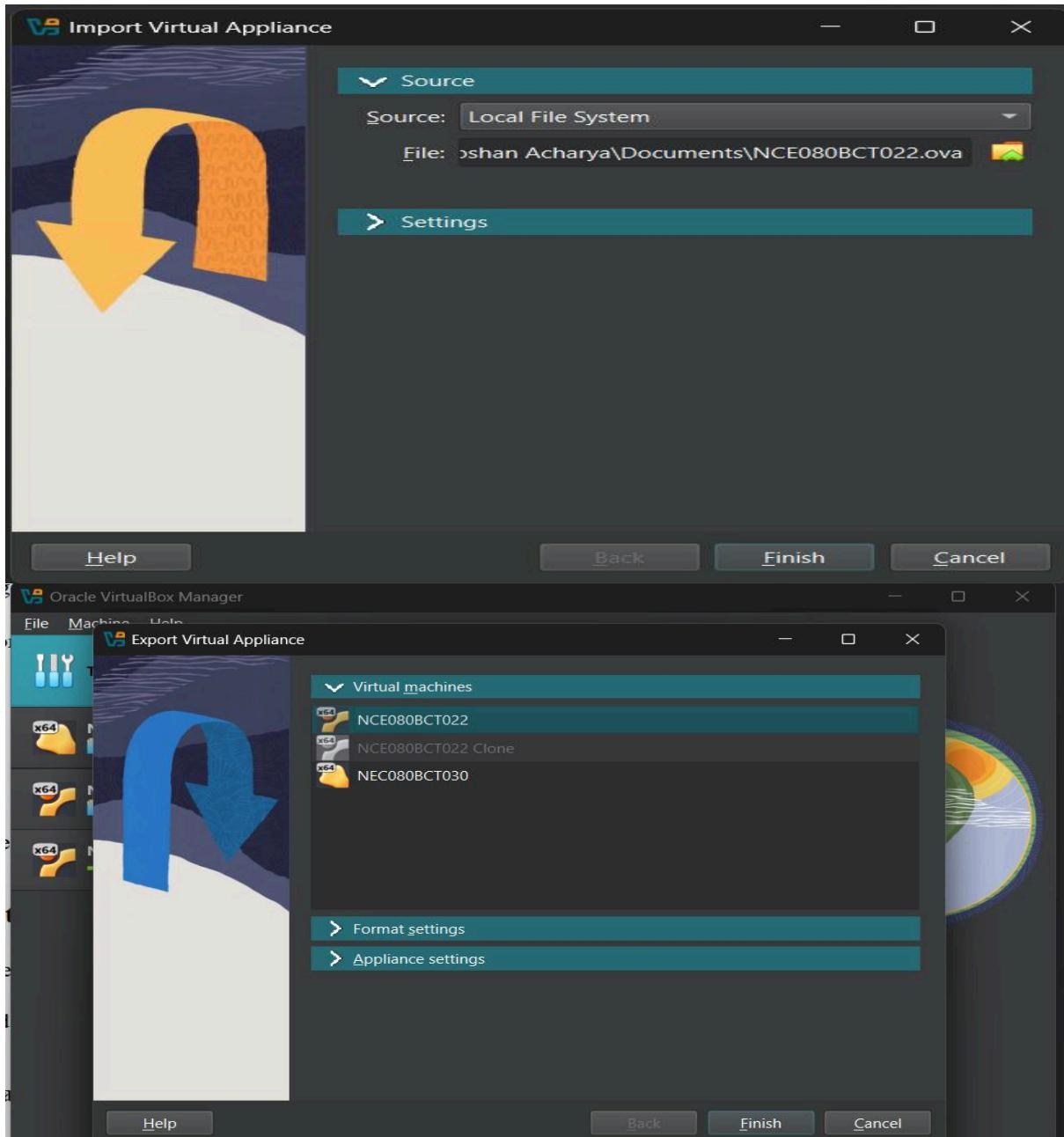


Fig: cloning the VM

4) Import and export VM

Import and export in VirtualBox allow you to move virtual machines between systems easily. Exporting a VM creates an .ova file (Open Virtual Appliance), which packages the VM's settings and virtual disk into a single file. To export, go to File > Export Appliance, select the VM, and follow the steps. To import, use File > Import Appliance, then select the .ova file and load it into VirtualBox. This feature is useful for sharing VMs or creating backups for deployment on other machines.



5) Observations/ Results

Zorin OS 16.3 Core was successfully installed on a virtual machine using VirtualBox. The VM was configured with 3056 MB of RAM, 3 virtual CPUs, and a 25 GB dynamically allocated virtual hard disk. The display controller was set to VBoxVGA and EFI (Extensible Firmware Interface) was enabled to support modern boot mechanisms and enhance compatibility with Zorin OS.

Several issues were encountered during the installation process. Firstly, there was a noticeable mouse integration lag, which was resolved by installing VirtualBox Guest Additions, improving pointer responsiveness and display scaling. Secondly, the VM experienced slow boot times, which were mitigated by increasing the allocated memory from 2 GB to 4 GB. Another critical issue occurred during installation: the EFI boot partition could not be created initially, which caused the installer to fail. This was resolved by manually creating an EFI partition of at least 100 MB and ensuring it was correctly flagged as an EFI System Partition before proceeding with the installation.

After resolving these issues, the virtual machine ran smoothly, and all core functionalities of the Zorin OS environment were operational.

6) Advantage of virtualization observed

- **Efficient resource utilization:** Allocated 3056 MB RAM and 3 processors without affecting the host system's overall performance. This shows how virtualization allows optimal use of hardware.
- **Isolation and safety:** Installing and running the Zorin OS in a virtual environment ensures system changes, crashes, or errors do not affect the host system.
- **Testing and flexibility:** With the ISO mounted and 25 GB virtual hard disk, you can test operating systems and software freely without needing a dedicated physical machine.

- **Snapshot and Cloning Capability:** VirtualBox allows taking snapshots and cloning the VM—helpful for backup, rollback, or creating multiple similar setups quickly.
- **Hardware Abstraction:** Features like virtualized audio (ICH AC97), graphics (VMSVGA), USB, and network adapters (Intel PRO/1000 in NAT mode) show how virtualization abstracts hardware and allows cross platform support.
- **Easy Networking Setup:** NAT configuration lets the virtual machine access the internet using the host's connection without complex setup—ideal for downloading packages or updates.
- **No Physical Partitioning Needed:** OS installation and testing is done in a virtual disk file without partitioning or altering the host's hard drive.

7) Conclusion

Through this lab report, I learned how to set up and manage a virtual machine using VirtualBox. Installing Zorin OS provided hands-on experience with Linux in a safe virtual environment. This activity improved my understanding of virtualization technology and VM lifecycle management. This experience demonstrated how virtualization enables the running of multiple operating systems on a single physical machine, reduces the need for separate hardware, and provides a safe platform for testing and development. Overall, the activity enhanced both theoretical understanding and practical knowledge of virtualization and virtual machine management.