

CLOUD COMPUTING

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Experiment No. 02:

TITLE:

1a) To install an Operating System (OS) using VirtualBox / VMware Workstation and add storage to create a new virtual disk.

1b) To deploy Virtual Machine (VM) on a hypervisor such as KVM or ESXi, take backup, and migrate them.

OBJECTIVES:

This experiment aims to familiarize students with hypervisors, storage allocation, VM lifecycle management, and backup/migration processes in cloud computing environments.

PROBLEM STATEMENT

The goal is to understand and implement virtualization concepts by:

1. Installing an operating system inside a virtual environment using VirtualBox or VMware Workstation.
2. Adding additional virtual storage to the VM by creating a new virtual disk.
3. Deploying a VM on a type-1 hypervisor (e.g., KVM or VMware ESXi).
4. Performing backup of the deployed VM and migrating it to another host or datastore.

THEORY:

1. Virtualization

Virtualization is the process of creating a virtual version of computing resources such as servers, storage devices, or operating systems. It allows multiple operating systems to run on a single physical machine, sharing its resources efficiently.

2. Hypervisors

A hypervisor is software or firmware that creates and manages virtual machines.

- Type 1 Hypervisors (Bare-metal): Run directly on hardware (e.g., VMware ESXi, Microsoft Hyper-V, KVM).
- Type 2 Hypervisors (Hosted): Run on top of an existing OS (e.g., VirtualBox, VMware Workstation).

3. VirtualBox / VMware Workstation

- VirtualBox: An open-source, cross-platform virtualization product.
- VMware Workstation: A commercial, feature-rich virtualization software.

Both allow creation, modification, and deletion of virtual machines.

4. Adding Storage

Virtual disks simulate physical hard drives inside VMs. Adding a new virtual disk expands available storage.

5. KVM (Kernel-based Virtual Machine)

- Built into Linux kernel, converting it into a bare-metal hypervisor.
- Supports VM management using virsh or GUI tools like virt-manager.

6. VMware ESXi

- Enterprise-grade bare-metal hypervisor.
- Managed via vSphere Client or web interface.
- Supports features like vMotion for migration.

7. Backup

VM backup involves saving VM disk files and configurations to prevent data loss.

8. Migration

VM migration transfers a running or powered-off VM between hosts or datastores:

- Cold Migration: VM is powered off.
- Live Migration (vMotion in VMware): VM remains running during migration.

PROCEDURE:

Part 1a: Install OS using VirtualBox / VMware Workstation and Add Storage

1. Install Hypervisor

- Download and install VirtualBox or VMware Workstation on your system.

2. Create New Virtual Machine

- Click New → Enter VM name, select OS type/version.
- Allocate RAM (e.g., 2GB for Linux, 4GB for Windows).
- Create initial virtual disk (VDI/VMDK format).

3. Attach Installation Media

- Load ISO file of desired OS (Linux/Windows).

4. Start VM and Install OS

- Follow OS installation wizard to complete setup.

5. Add New Virtual Disk

- Power off VM.
- Go to Settings → Storage → Add Hard Disk.
- Create a new virtual disk (e.g., 10GB).
- Boot VM and partition/format the new disk inside the OS.

Part 1b: Deploy VM on KVM / ESXi, Backup, and Migrate

A) Deployment on KVM

1. Install KVM on a Linux server (sudo apt install qemu-kvm libvirt-daemon-system virt-manager).
2. Open virt-manager and create a new VM.
3. Attach ISO file and install OS.

B) Deployment on VMware ESXi

1. Install VMware ESXi on bare-metal server.
2. Access ESXi web UI via browser.
3. Create a new VM → Select OS type → Attach ISO → Install OS.

C) Take Backup

- Shut down the VM.
- Export VM as **OVA/OVF** (in ESXi) or copy VM disk image (.qcow2 in KVM).

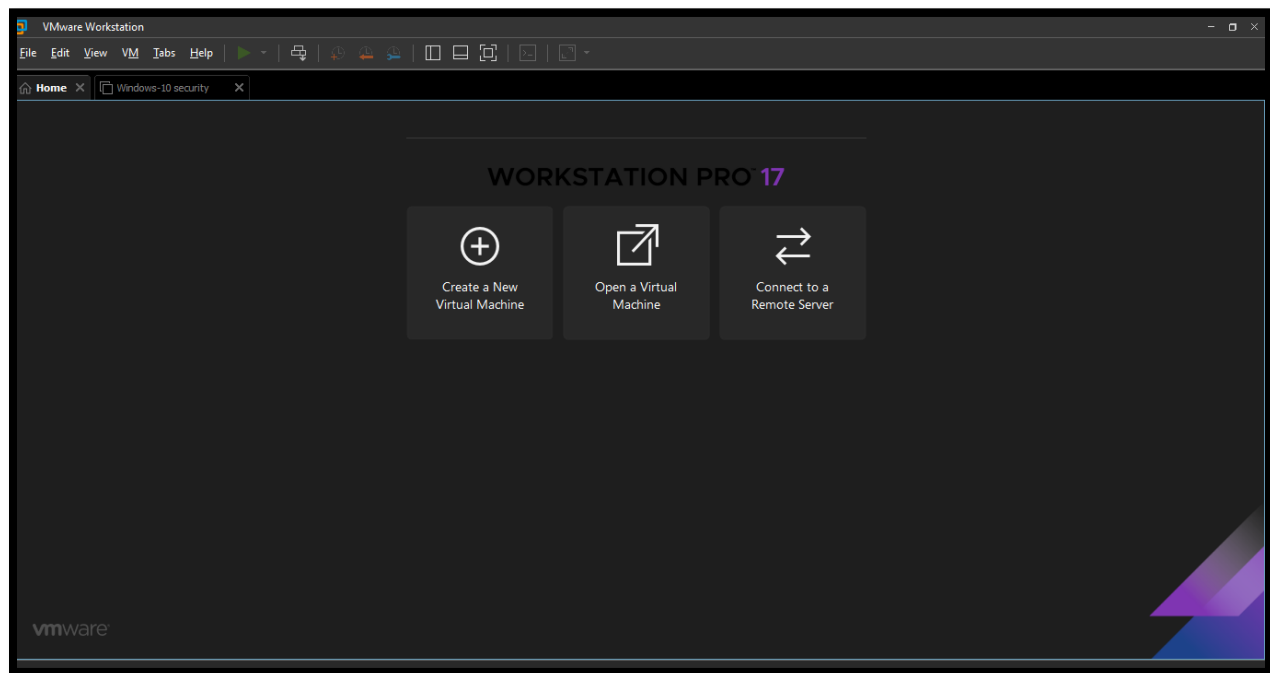
D) Migrate VM

- In ESXi: Use vSphere **Migrate** option (select target datastore or host).
- In KVM: Use virsh migrate command or copy disk image to another host.

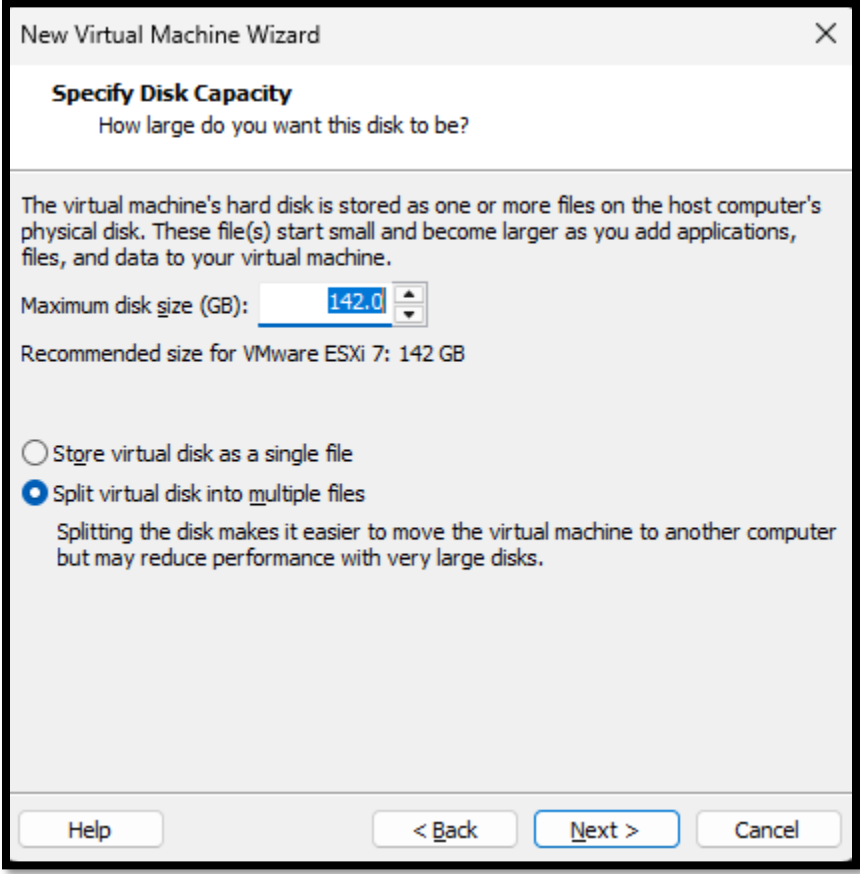
SCREENSHOTS:

- i) Install VMWare workstation. After that install an OS (here windows).

Home Page:



- ii) Click on create a **New Virtual Machine**. Click on custom, Select the OS you installed, Select the disk, Select the name and the Storage size.



The image shows a screenshot of the 'New Virtual Machine Wizard' window, specifically the 'Specify Disk Capacity' step. The window has a title bar with the text 'New Virtual Machine Wizard' and a close button (X). The main content area is titled 'Specify Disk Capacity' with the subtitle 'How large do you want this disk to be?'. Below this, there is a paragraph explaining that the virtual machine's hard disk is stored as one or more files on the host computer's physical disk. A text input field for 'Maximum disk size (GB):' is shown with the value '142.0' and a spinner control. Below the input field, it says 'Recommended size for VMware ESXi 7: 142 GB'. There are two radio button options: 'Store virtual disk as a single file' (unselected) and 'Split virtual disk into multiple files' (selected). A note below the selected option states: 'Splitting the disk makes it easier to move the virtual machine to another computer but may reduce performance with very large disks.' At the bottom of the window, there are four buttons: 'Help', '< Back', 'Next >', and 'Cancel'.

New Virtual Machine Wizard

Specify Disk Capacity
How large do you want this disk to be?

The virtual machine's hard disk is stored as one or more files on the host computer's physical disk. These file(s) start small and become larger as you add applications, files, and data to your virtual machine.

Maximum disk size (GB):

Recommended size for VMware ESXi 7: 142 GB

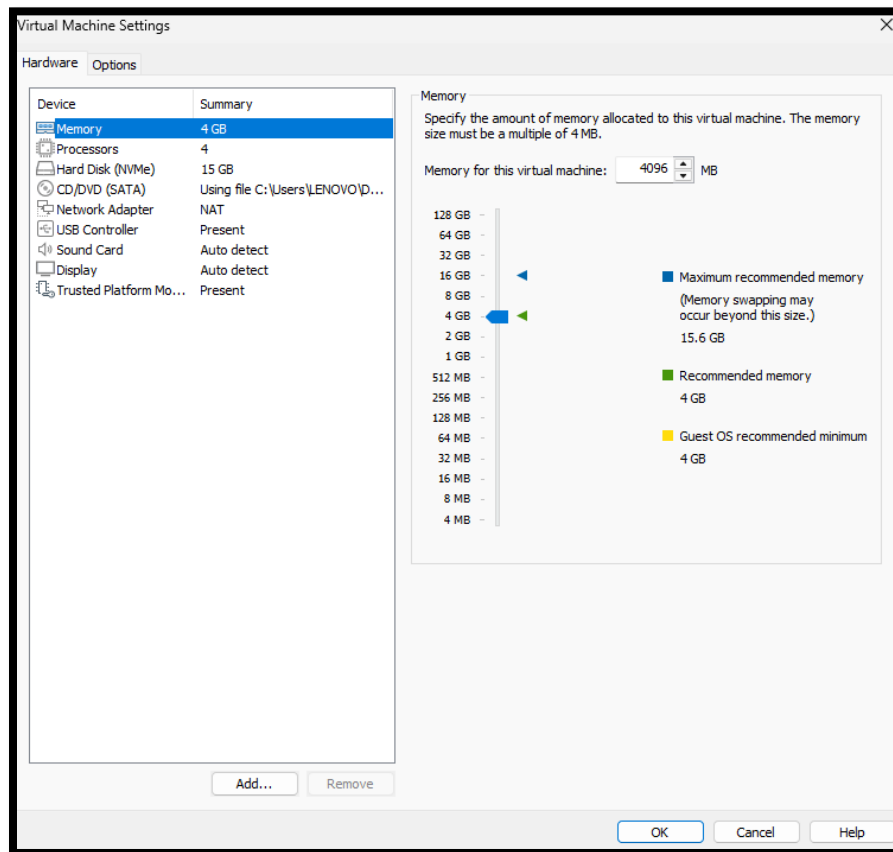
☐ Store virtual disk as a single file

☒ Split virtual disk into multiple files

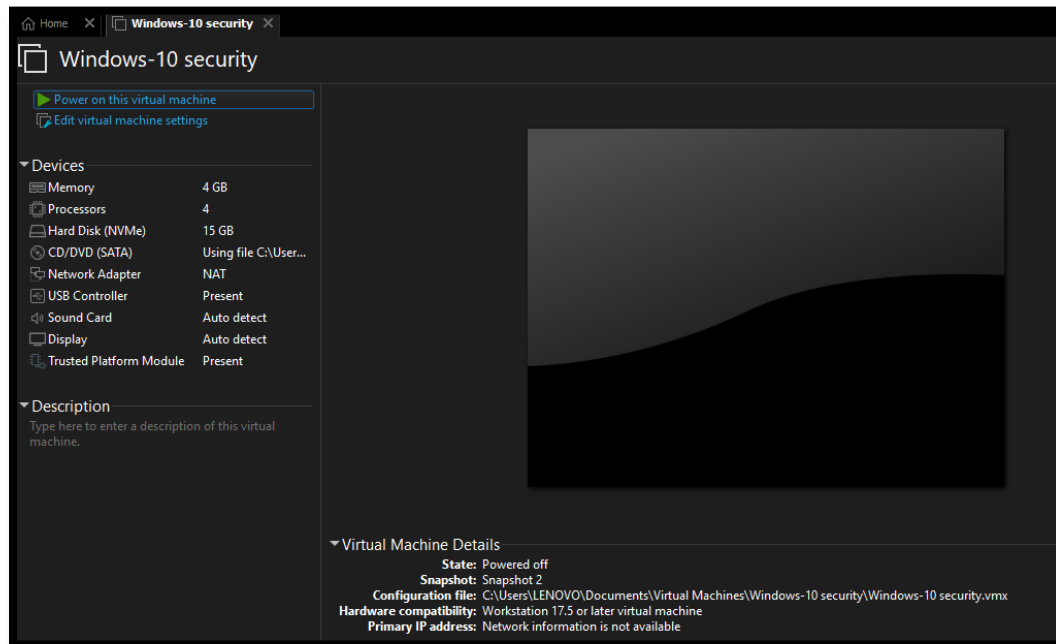
Splitting the disk makes it easier to move the virtual machine to another computer but may reduce performance with very large disks.

Help < Back Next > Cancel

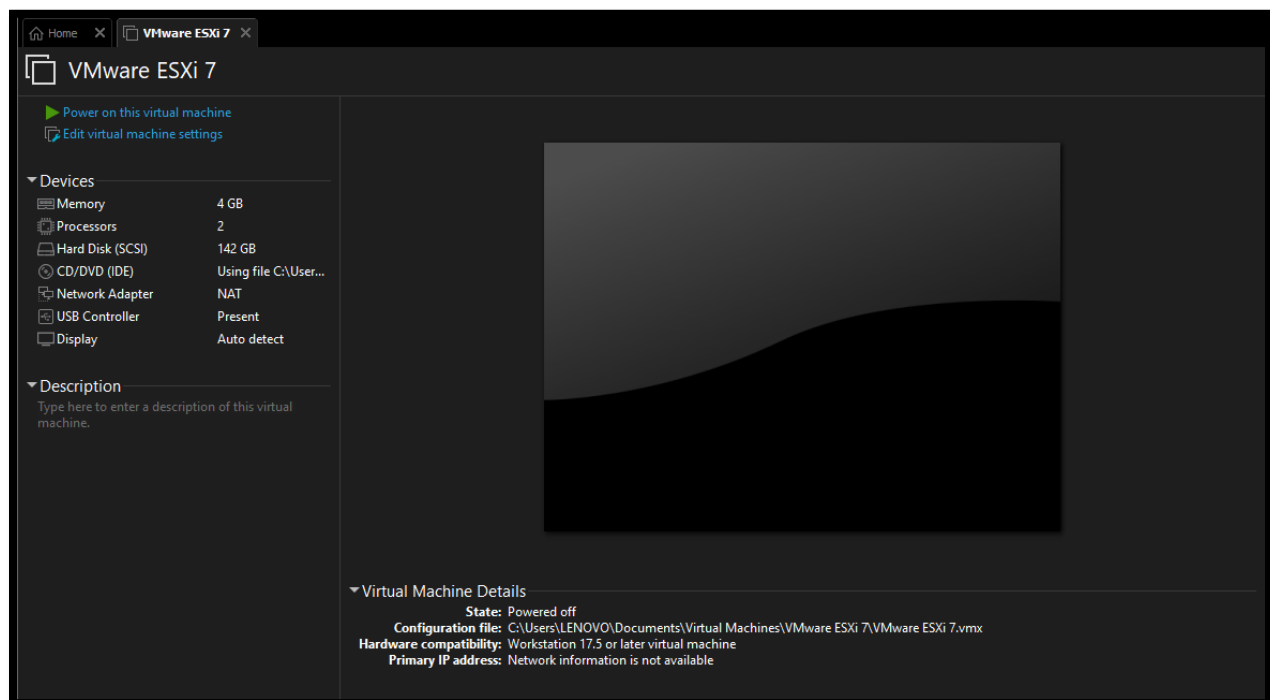
- iii) Click on finish. The virtual machine should be now visible in library. Now click on Edit Virtual Machine Settings.



Now you can **run the Virtual Machine**.



- iv) Install a hypervisor such as **ESXI 7**. Then do the same steps as done before but select ESXI 7 as the hypervisor.



CONCLUSION:

In this experiment, we successfully installed an operating system inside a VM using VirtualBox/VMware Workstation, added additional storage, and deployed a VM on enterprise-grade hypervisors such as KVM and ESXi. We also learned how to take VM backups and migrate them between hosts or datastores. These skills are fundamental in cloud computing environments where virtualization, high availability, and disaster recovery are critical.