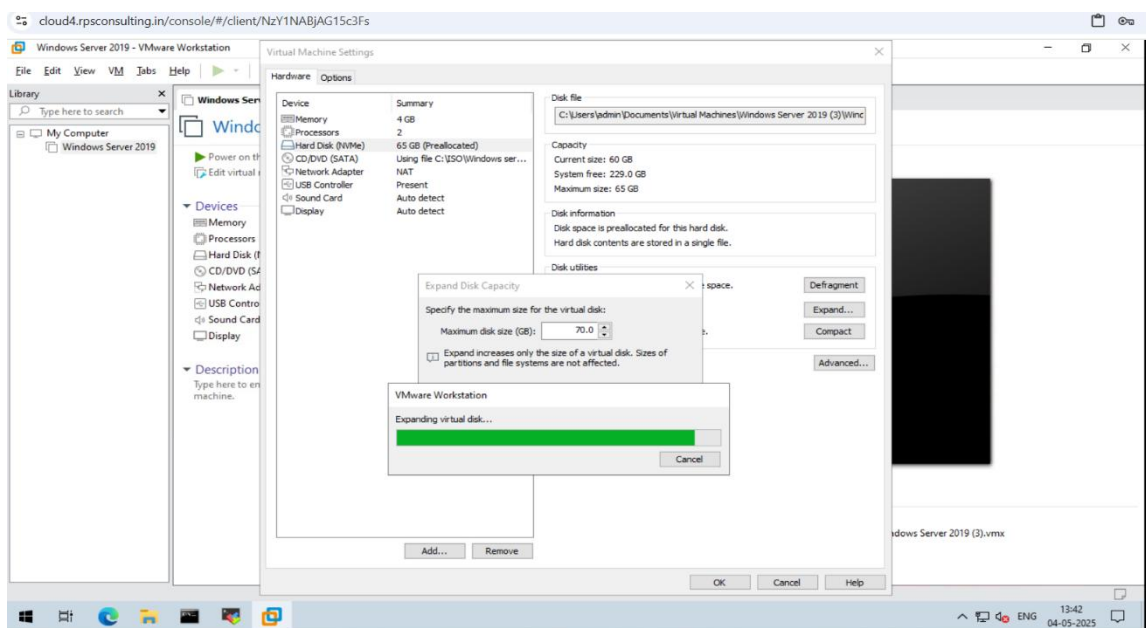## TITLE: EXPAND THE VOLUME OF DISK AND CREATE A NEW VOLUME, LOAD BALANCER AND SCALALING

➢ Expand the volume of disk and create a new volume, using VMware.

    I.   Part 1 – Expand the volume of disk.
1. First Power off the VM.
2. Go to VM -> Settings -> Hard Disk.
3. Click Expand, then enter the **new size** (larger than the current one).
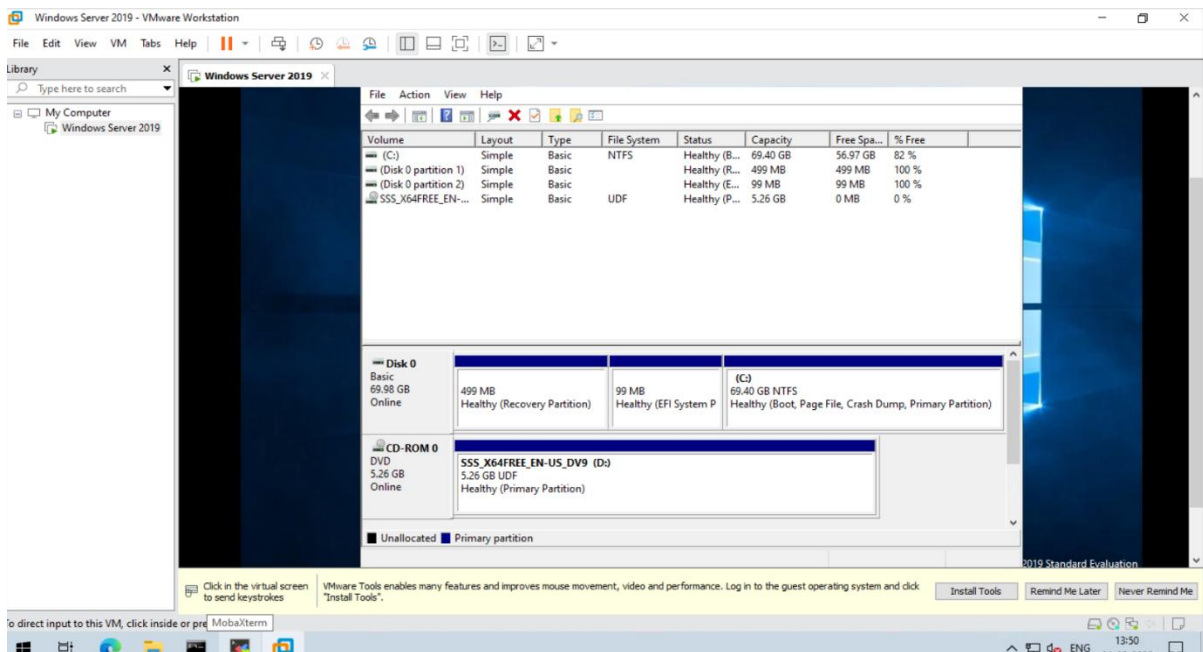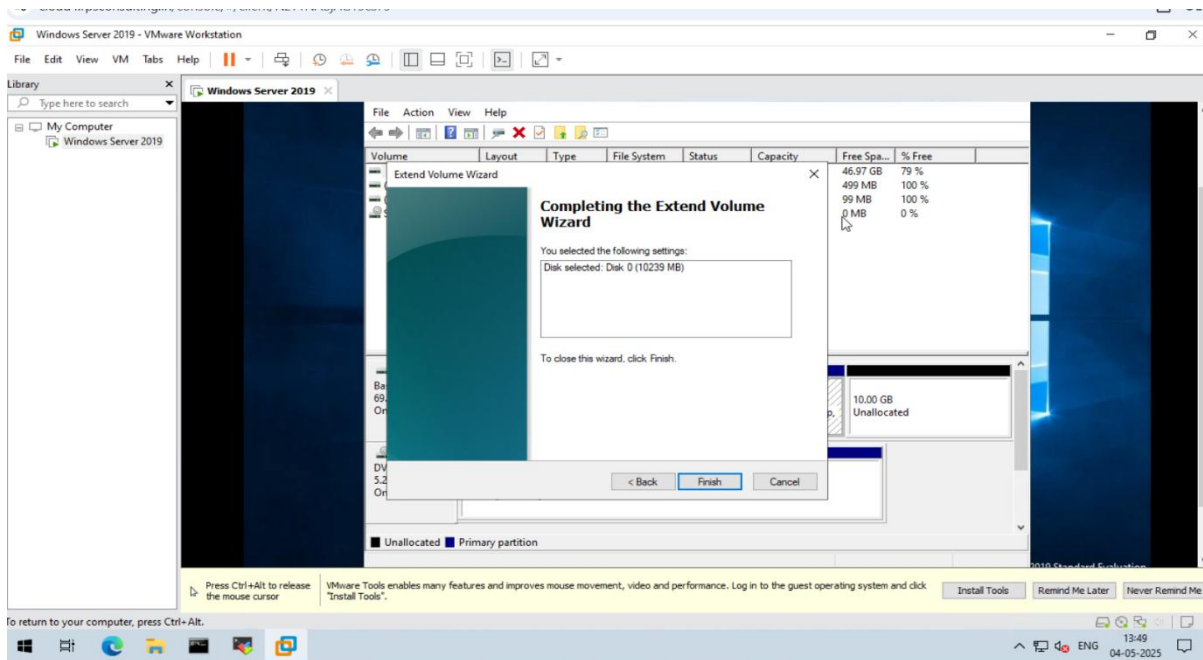4. Click **Expand**, then **Close** the settings.

5. Power on VM.
6. Open Disk Management in Windows
→ You will see Unallocated space (as shown in your screenshot).

7. Right-click on C: (or another volume) → Click "Extend Volume…"
→ This step uses the unallocated space to increase the size of the C: drive.
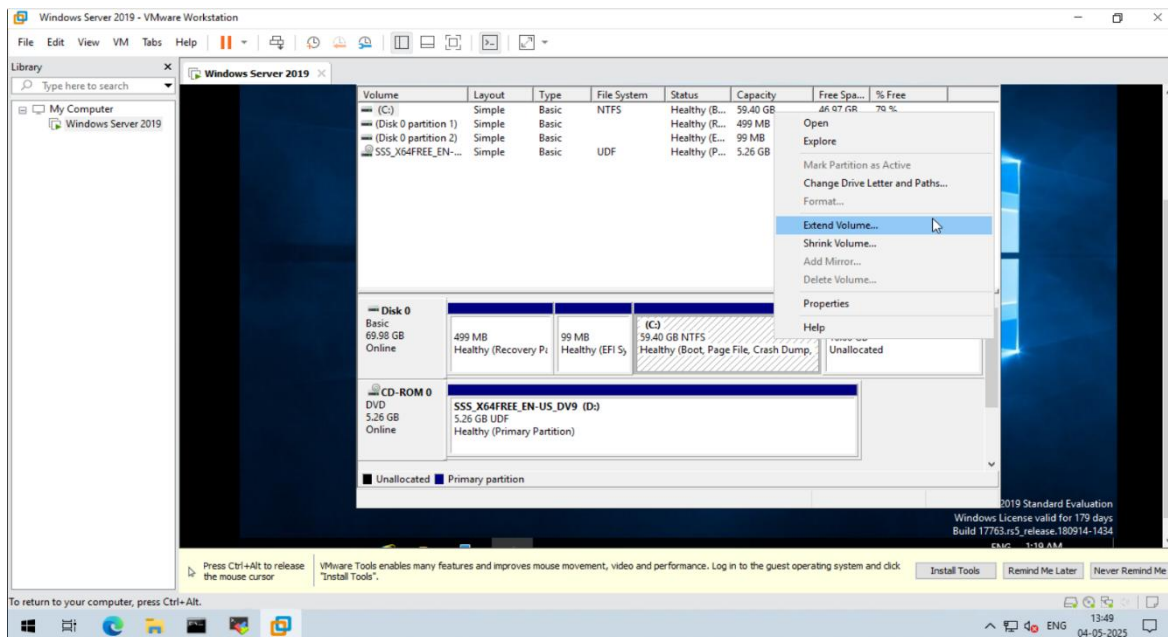
8. Click Next ->Finish.

9. Space is allocated and completed the expansion of disk.

II. Part 2 - Create a New Volume.
- ➢ Open VM->Go to settings->open hard disk->
  Add new hard disk size ->choose option SCSI->
  Click ok.
- ➢ Go to Tools -> Computer management->disk
  management.
- ➢ See the added size is allocated, if not right click
  on it to bring online and again right click to
  initialize.
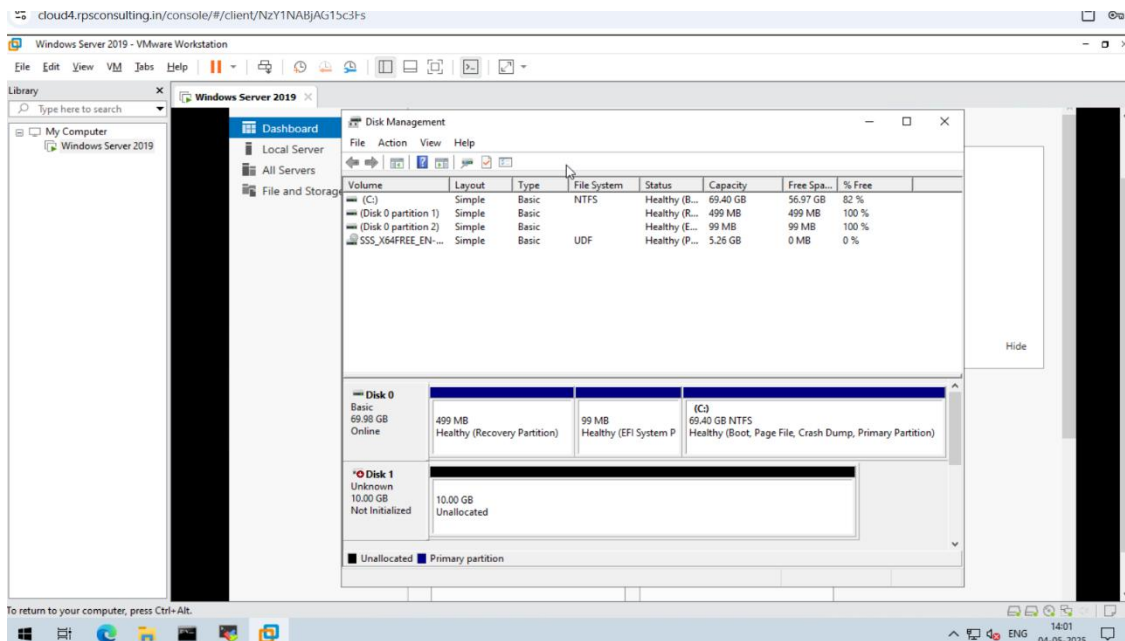
- ➢ Then Right click on unallocated and click on
  New simple volume.
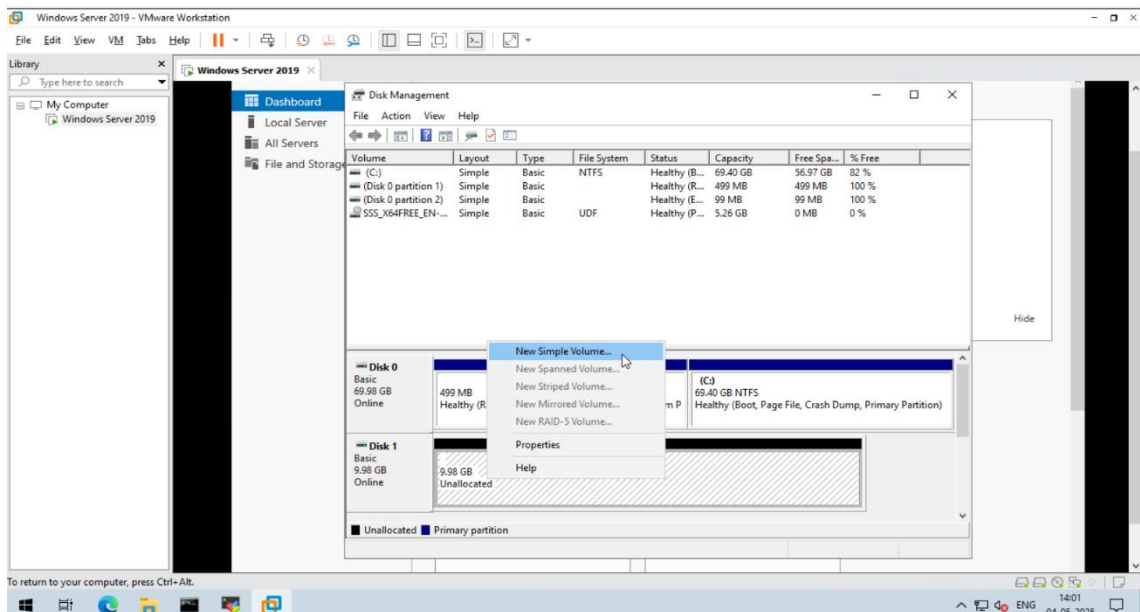
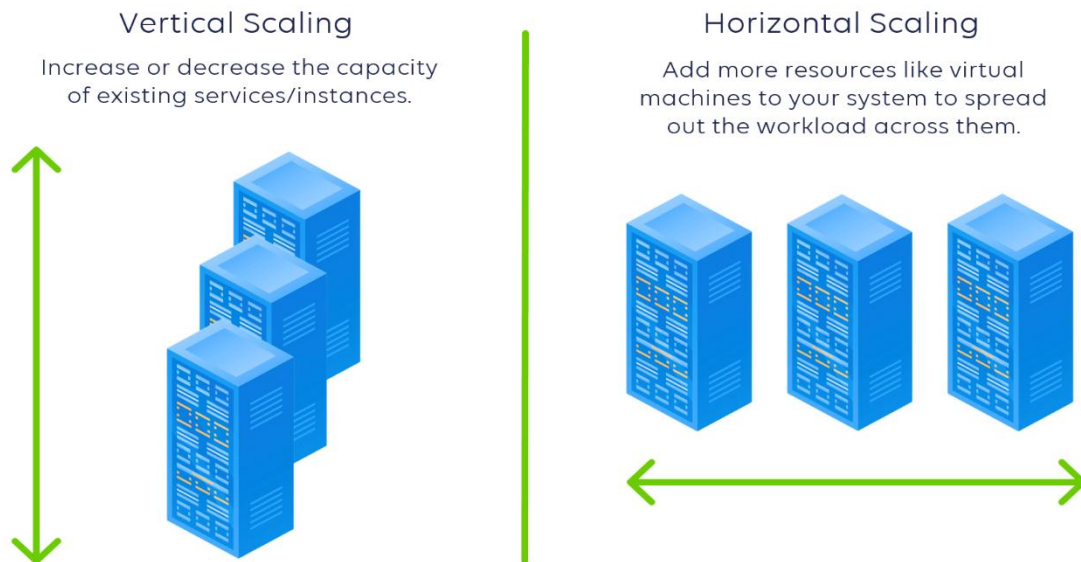> ➢ Give the name and click ok. Successfully we created the new volume.
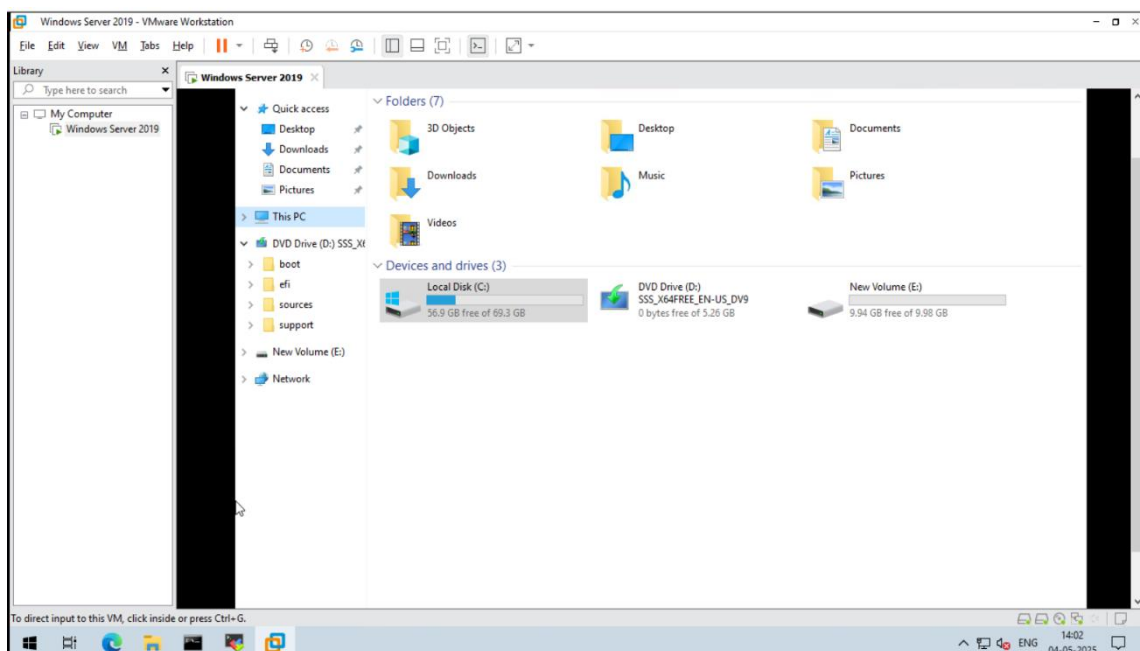
> ➢ **Scaling** in networking refers to the ability of a network to adapt and expand to handle increasing demands, such as more users, devices, or data traffic, without compromising performance or stability.
> ➢ **Horizontal (Scaling Out) and vertical scaling (Scaling Up)** are two distinct methods for increasing a system's capacity and

performance. Horizontal scaling (scaling out) involves adding more servers to the system, while vertical scaling (scaling up) involves upgrading the resources of existing servers.

Vertical Scaling
Increase or decrease the capacity of existing services/instances.

Horizontal Scaling
Add more resources like virtual machines to your system to spread out the workload across them.

> **What is a Load Balancer?**
> A **load balancer** distributes incoming network or application traffic across multiple servers to:
> Improve performance, increase availability and fault tolerance and Ensure reliability.

Clients   Servers

Internet   Load Balancer
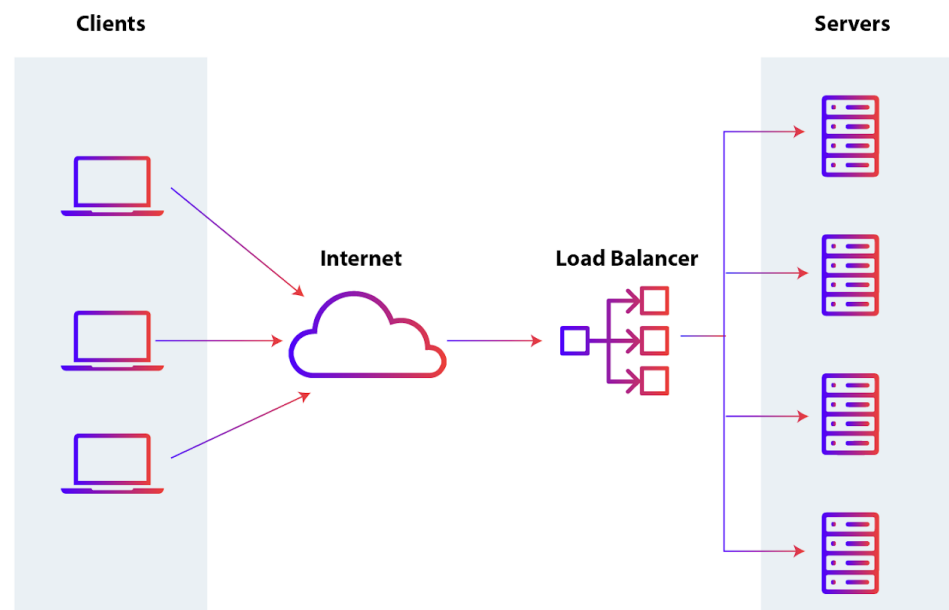
Types of Load Balancers

1. Application Load Balancer (ALB)

Works at the Application Layer (Layer 7) of the OSI model.

- Features: Content-based routing (URL, headers, cookies, etc.)

Used for HTTP/HTTPS traffic

Supports path-based and host-based routing

- Example:

Route api.example.com to one backend and web.example.com to another.

- Used in:

Web apps, REST APIs, microservices

- AWS Equivalent: Elastic Load Balancer (ALB)

2. Network Load Balancer (NLB)

Works at the Transport Layer (Layer 4) of the OSI model.

- Features: Very high performance and low latency, Routes based on IP address and port (TCP/UDP) and doesn't inspect the content
- Example: Ideal for gaming servers, real-time applications
- AWS Equivalent: Elastic Load Balancer (NLB)

3. Elastic Load Balancer (ELB)

A term used mainly in cloud platforms (like AWS/Azure) to describe scalable, managed load balancers.

- Types of ELB (in AWS):

ALB – Application Load Balancer (L7)

NLB – Network Load Balancer (L4)

CLB – Classic Load Balancer (older, supports both L4 & L7)

- Key Feature: Auto-scaling support, Integrated with cloud services.

➢ **Which is better vertical or horizontal load balancing?**
  - **Horizontal Load Balancing (in most cases)**
    i. Scalability: You can keep adding servers as demand grows.
    ii. High availability: If one node fails, others keep serving.
    iii. Elasticity in cloud: Works perfectly with AWS, Azure, etc.
    iv. Load distribution: Great for handling large user bases.

- **When Vertical Load Balancing is Used:**
  i. Small-scale applications
  ii. Budget or architectural limitations
  iii. When software doesn't support clustering or replication.