**VIRTUAL MACHINES**

What is a Virtual Machine?

A **Virtual Machine** is a software-based simulation of a physical computer. It runs an **operating system (OS)** and applications just like a real computer, but it operates **inside a host machine** through virtualization software.

Here's a more detailed look:

* **Virtualization:**

VMs are created through a process called virtualization, where a software layer called a hypervisor manages and allocates resources (CPU, memory, storage, etc.) from the physical host machine to the virtual machines.

* **Isolation:**

Each VM operates independently, with its own operating system, applications, and resources, ensuring that one VM's issues don't affect other VMs running on the same host.

Why Use a Virtual Machine?

1. **Try a New Operating System**

* Safely explore and learn new OS (like Linux or older Windows versions) **without changing** your main setup.

1. **Test Applications Safely**

* Run untrusted or new software in an isolated VM to **protect your main system** from crashes or malware.

1. **Run Old Applications**

* Use software that only works on older OS versions by creating a VM with that **specific legacy system**.

Cloud Benefits:

In the cloud, VMs are crucial for:

* **Resource efficiency:** Multiple VMs can share a single physical server, optimizing hardware usage.
* **Flexibility and scalability:** VMs can be easily created, scaled up or down, and moved between different cloud environments.
* **Cost reduction:** VMs allow cloud providers to offer computing resources on a pay-as-you-go basis, leading to cost savings for users.
* **Disaster recovery and backups:** VMs can serve as quick backups of entire environments, enhancing system reliability and availability.

Popular Virtual Machine Software

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| Software | Description | OS Support |
| VMware Workstation / Player | Powerful VM software with good performance and features. | Windows, Linux |
| Oracle VirtualBox | Free, open-source, widely used for personal and testing use. | Windows, Linux, macOS |
| Microsoft Hyper-V | Built-in hypervisor in Windows Pro/Enterprise editions. | Windows |