**Virtual Machines**

A Virtual Machine (VM) is a compute resource that uses software instead of a physical computer to run programs and deploy apps. One or more virtual “guest” machines run on a physical “host” machine. Each virtual machine runs its own operating system and functions separately from the other VMs, even when they are all running on the same host. This means that, for example, a virtual MacOS virtual machine can run on a physical PC.

Virtual machine technology is used for many use cases across on-premises and cloud environments. More recently, public cloud services are using virtual machines to provide virtual application resources to multiple users at once, for even more cost efficient and flexible compute.

**How do virtual machines work?**

The virtual machine runs as a process in an application window, similar to any other application, on the operating system of the physical machine. Key files that make up a virtual machine include a log file, NVRAM setting file, virtual disk file and configuration file.

**What are virtual machines used for?**

Virtual machines (VMs) allow a business to run an operating system that behaves like a completely separate computer in an app window on a desktop. VMs may be deployed to accommodate different levels of processing power needs, to run software that requires a different operating system, or to test applications in a safe, sandboxed environment.

**Key Use Cases of Virtual Machines**

* **Run different OS:** Useful when apps require a different operating system.
* **Test software:** Isolated environment for safe testing.
* **Legacy support:** Run old applications on modern systems.
* **Server virtualization:** Consolidate multiple servers on fewer machines.
* **Disaster recovery:** Easy to back up and restore.
* **Cloud computing:** Public clouds use VMs for scalable, cost-efficient compute.

**Types of Virtual Machines**

The two types of virtual machines Users can choose from two different types of virtual machines—process VMs and system VMs:

A **process virtual** machine allows a single process to run as an application on a host machine, providing a platform-independent programming environment by masking the information of the underlying hardware or operating system. An example of a process VM is the Java Virtual Machine, which enables any operating system to run Java applications as if they were native to that system.

A **system virtual** machine is fully virtualized to substitute for a physical machine. A system platform supports the sharing of a host computer’s physical resources between multiple virtual machines, each running its own copy of the operating system. This virtualization process relies on a hypervisor, which can run on bare hardware, such as VMware ESXi, or on top of an operating system.

**Virtualization**

Virtualization is the process of creating a virtual environment of something which may include hardware platforms, storage devices, OS, network resources, etc.

**Example:**

Virtual memory is a memory-management technique that enables an operating system to see and use non-contiguous segments of memory as a single, contiguous memory space.

**Types of Virtualization:**

**1. Application Virtualization**

* **What it does:** Runs apps on remote servers, accessed locally via internet.
* **Use case:** Run multiple versions of the same software.
* **Tech:** Hosted apps, packaged apps.

**2. Network Virtualization**

* **What it does:** Runs multiple virtual networks over one physical network.
* **Components:** Virtual switches, routers, firewalls, VPNs, load balancers.
* **Use case:** Isolated, flexible, fast-deployable networks for different teams.

**3. Desktop Virtualization**

* **What it does:** Access your desktop remotely from any device/location.
* **Use case:** Mobility, centralized OS management, patching.
* **Tech:** VDI (Virtual Desktop Infrastructure).

**4. Storage Virtualization**

* **What it does:** Combines multiple storage devices into one virtual pool.
* **Use case:** Simplified data management and scalability.
* **Benefit:** Continuous performance, high availability, fault tolerance.

**5. Server Virtualization**

* **What it does:** Splits one physical server into multiple virtual servers.
* **Use case:** Better resource use, cost efficiency, isolation.
* **Benefit:** Migration flexibility, energy savings, lower infrastructure cost.

**6. Data Virtualization**

* **What it does:** Creates a unified virtual view of data from multiple sources.
* **Use case:** Real-time data access without moving/storing data.
* **Benefit:** Easy integration, analytics, and access via cloud services.

**Hypervisor**

* A hypervisor is a form of virtualization software used in Cloud hosting to divide and allocate the resources on various pieces of hardware.
* The program which provides partitioning, isolation, or abstraction is called a virtualization hypervisor.
* The hypervisor is a hardware virtualization technique that allows multiple guest operating systems (OS) to run on a single host system at the same time.
* A hypervisor is sometimes also called a virtual machine manager (VMM).