Unit-2: Virtualization and Resource Management

Virtual Machine (VM) Migration

Definition:

Virtual Machine (VM) migration is a process in which a running virtual machine is moved from one physical host to another. It is an essential technique in cloud computing and virtualization, enabling resource optimization, fault tolerance, and load balancing

Types of VM Migration

Cold Migration

- A method of migrating a Virtual Machine (VM) where the VM is powered off before the migration process begins.

- The VM's configuration files, storage, and other associated data are moved to the destination host.

Key Points

- Requires downtime since the VM is not operational during migration.

- Suitable for scenarios where downtime is acceptable (e.g., planned maintenance).

Advantage

- Simple to implement, low network overhead.

Disadvantage

- Not suitable for high-availability systems due to service disruption.

Suspended Migration

- Suspended Migration in cloud computing refers to a temporary halt or pause in the migration process. This can occur for various technical, strategic, or operational reasons.

- Unlike a failed migration, where the process ends unsuccessfully, a suspended migration indicates that the migration has been intentionally paused or delayed, with plans to resume later.

Reasons for Suspended Migration

Technical Issues

- Incompatibility between the current system and the target cloud environment.

- Unexpected errors during data transfer or application migration.

- Insufficient bandwidth or performance bottlenecks.

Resource Constraints

- Lack of skilled personnel to manage the migration.

- Limited financial resources to proceed with the next stages.

- Insufficient cloud infrastructure in the target environment.

Business Priorities

- Changes in organizational priorities or strategies.

- The need to focus on urgent business operations before continuing the migration.

Compliance and Security Concerns

- Issues related to data privacy, security regulations, or compliance requirements.

- Concerns about data integrity during migration.

Testing and Validation

- The need to perform extensive testing to ensure system stability.

- Delays in validating migrated workloads before proceeding further.

Dependencies

- Waiting for updates, fixes, or readiness of other systems or applications that are interconnected.

- Dependencies on third-party tools, services, or approvals.

Live Migration

- A method of migrating a running VM from one host to another with minimal disruption to the VM's operations.

- The VM's memory, CPU state, and device states are transferred while the VM continues to run. Network redirection is updated after the migration is complete.

Key Points

- Ensures minimal downtime, often in the order of milliseconds.

- Suitable for high-availability systems where continuous operation is critical (e.g., cloud data centers).

Advantage

- High availability, seamless user experience.

Disadvantage

- Complex to implement and requires significant network bandwidth.