AMRITA VISHWA VIDYAPEETHAM
DEEMED TO BE UNIVERSITY

Introduction to Cloud Computing

Cloud Native Application development

AMRITA VISHWA VIDYAPEETHAM DEEMED TO BE UNIVERSITY

Cloud-Native Application Development

Refers to the approach of designing, building, and deploying applications that fully exploit the benefits of cloud computing environments.

Key Characteristics:

1. Microservices Architecture:

Microservices : Applications are broken down into small, independent services that can be developed, deployed, and scaled independently.

Inter-Service Communication: Microservices communicate with each other through APIs.

AMRITA VISHWA VIDYAPEETHAM
DEEMED TO BE UNIVERSITY UNDER SECTION 3 OF UGC ACT 1956

Cloud-Native Application Development

Key Characteristics:

2. Containerization:

Containers: Cloud-native applications are often deployed in containers (e.g., Docker), which package the application code along with its dependencies.

This ensures consistency across different environments, from development to production.

Orchestration: Tools like Kubernetes manage containerized applications, handling tasks like deployment, scaling, and load balancing.

AMRITA VISHWA VIDYAPEETHAM
DEEMED TO BE UNIVERSITY UNDER SECTION 3 OF UGC ACT 1956

Cloud-Native Application Development

Key Characteristics:

3. DevOps and CI/CD:

DevOps: Cloud-native development encourages close collaboration between development and operations teams. DevOps practices automate and streamline the software development lifecycle (SDLC).

Continuous Integration/Continuous Deployment (CI/CD): Automated pipelines are used to continuously integrate code changes and deploy them to production, allowing for frequent and reliable updates.

AMRITA VISHWA VIDYAPEETHAM
DEEMED TO BE UNIVERSITY UNDER SECTION 3 OF UGC ACT 1956

Cloud-Native Application Development

Key Characteristics:

4. Serverless Computing:

Serverless Architecture: In some cases, cloud-native applications are built using serverless computing platforms like AWS Lambda or Azure Functions, where developers write and deploy code without managing the underlying infrastructure

Event-Driven: These applications often respond to specific events, such as API calls, file uploads, or database changes, and are automatically scaled based on demand.

AMRITA VISHWA VIDYAPEETHAM

Cloud-Native Application Development

Key Characteristics:

5. Scalability and Resilience:

Auto-Scaling: Designed to scale automatically to handle varying loads, ensuring that resources are used efficiently.

Fault Tolerance: These applications are built to withstand failures, often using redundancy and distributed architectures to ensure high availability.

6. APIs and Services:

APIs: Rely heavily on APIs for communication between services, integration with third-party services, and interaction with cloud services.

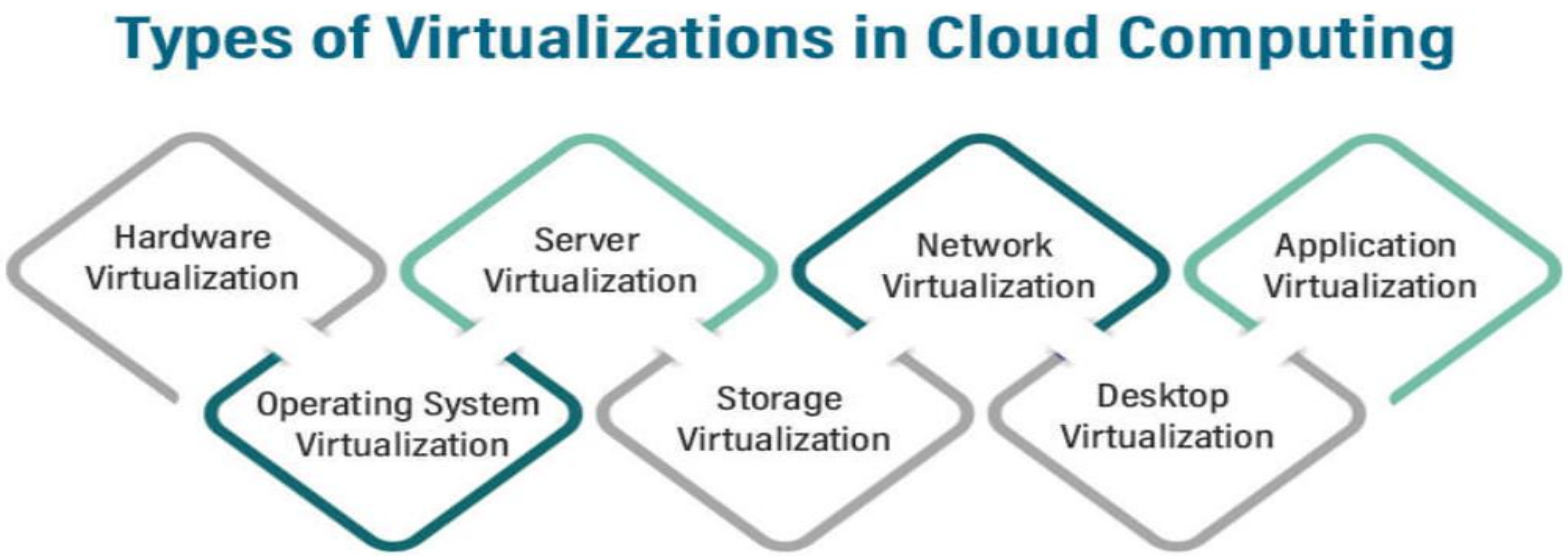
Managed Services: Developers often use managed cloud services (like databases, storage, and messaging services) to offload infrastructure management and focus on application logic.

AMRITA VISHWA VIDYAPEETHAM
DEEMED TO BE UNIVERSITY UNDER SECTION 3 OF UGC ACT 1956

Virtualization

Virtualization

- The process of creating a virtual version of something, such as hardware platforms, storage devices, or network resources.
- Enables resource sharing, efficiency, scalability, and flexibility, allowing multiple users or applications to utilize a single physical infrastructure efficiently.



AMRITA VISHWA VIDYAPEETHAM

Virtualization

❖ Hardware virtualization :

Definition: Refers to the creation of virtual machines that act like real computers with their own operating systems. The process involves abstracting the physical hardware of a computer system to create virtual versions of the hardware components, such as CPUs, memory, and storage. A hypervisor (also known as a Virtual Machine Monitor or VMM) sits between the hardware and the operating systems, allowing multiple operating systems to run concurrently on a single physical machine.

Why it is used: It maximizes the utilization of physical resources, reduces costs, and simplifies management.

Where it is used: It is commonly used in cloud computing, data centers, and enterprise environments where multiple operating systems and applications need to run independently on the same physical hardware.

Virtualization

❖ Server virtualization :

Definition: Server virtualization specifically refers to the process of dividing a physical server into multiple virtual servers, each of which can run its own operating system and applications. This type of virtualization focuses on optimizing the use of server resources.

Why it is used: Maximize hardware utilization, reduce hardware costs, provide independent environments, dynamic resource allocation.

Where it is used: Data centers, development and testing, education and training, small and medium sized businesses, disaster recovery

Virtualization

❖ Network virtualization :

Definition: This type of virtualization abstracts physical networking resources, creating virtual networks that can be managed like software. It allows multiple virtual networks to run on a single physical network.

Why it is used: Enables more flexible, scalable, and manageable network configurations.

Where it is used: In cloud services, software-defined networking (SDN) environments, and virtual private networks (VPNs).

Virtualization

❖ Operating System virtualization :

Definition: Also known as containerization, this type allows multiple isolated user-space instances (containers) to run on a single OS kernel. Each container shares the same OS but operates independently.

Why it is used: It's lightweight, with minimal overhead compared to full VMs, and is ideal for microservices and applications that need to be deployed rapidly.

Where it is used: Popular in DevOps environments and cloud platforms using Docker and Kubernetes.

Virtualization

❖ Storage virtualization :

Definition: Storage virtualization abstracts the physical storage devices to appear as a single storage pool, which can be managed centrally. It allows for more efficient storage allocation and management..

Why it is used: Enhances storage utilization, simplifies backup and recovery, and allows for dynamic allocation of storage.

Where it is used: Used in SAN (Storage Area Network) environments and cloud storage services like Amazon S3.

Virtualization

❖ Desktop virtualization :

Definition: Desktop virtualization allows users to run a desktop environment on a virtual machine hosted on a central server. Users access their desktops remotely, from any device.

Why it is used: Facilitates remote work, simplifies desktop management, and improves security.

Where it is used: Used in virtual desktop infrastructure (VDI) solutions like VMware Horizon and Citrix.

Hypervisors

Hypervisors

Hypervisors are crucial for enabling virtualization, which allows multiple virtual machines (VMs) to run on a single physical machine. There are two main types of hypervisors used:

- **Type 1 Hypervisor (Bare-Metal):**

This hypervisor runs directly on the physical hardware of the host machine, without requiring a base operating system. It is called "bare-metal" because it interacts directly with the hardware to manage the guest operating systems (VMs).

Examples: Microsoft Hyper-V, XEN, KVM (Kernel-based Virtual Machine)

AMRITA VISHWA VIDYAPEETHAM

DEEMED TO BE UNIVERSITY UNDER SECTION 3 OF UGC ACT 1956

Hypervisors

❖ Type 2 Hypervisor (Hosted):

This hypervisor runs on top of an existing operating system, which in turn runs on the physical hardware. The hypervisor then manages the guest VMs.

Examples: VMware Workstation, Oracle VirtualBox, Parallels Desktop, Vmware Fusion

Comparison of Type 1 and Type 2 Hypervisors

Performance: Type 1 hypervisors typically offer better performance and are more suited for high-demand environments, whereas Type 2 hypervisors might have more overhead but are easier to set up and manage.

Scalability: Type 1 hypervisors are generally more scalable and are used in large-scale cloud deployments, while Type 2 hypervisors are better suited for smaller environments or individual users

Thank You

AMRITA
VISHWA VIDYAPEETHAM
DEEMED TO BE UNIVERSITY