

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

DIPLOMA WALLAH

UNIT 05 :- INTRODUCTION TO CLOUD COMPUTING

Introduction to Cloud Computing

Definition:

Cloud computing is a transformative technology that allows users to access and store data, applications, and services over the internet, rather than relying on local servers or personal devices. This model provides on-demand access to computing resources, enabling scalability, flexibility, and cost-efficiency. Users can leverage cloud services for various purposes, including data storage, application hosting, and computational tasks, without the need for extensive on-premises infrastructure.

Explanation:

- **On-Demand Self-Service:** Users can provision and manage resources as needed, without human intervention from the service provider.
- **Broad Network Access:** Services are accessible over the network through standard mechanisms, promoting use by heterogeneous thin or thick client platforms.
- **Resource Pooling:** Providers pool computing resources to serve multiple consumers using a multi-tenant model.
- **Rapid Elasticity:** Resources can be elastically provisioned and released to scale rapidly, commensurate with demand.
- **Measured Service:** Cloud systems automatically control and optimize resource use by leveraging a metering capability.
- **Cost Efficiency:** Reduces the need for significant capital investment in hardware and software.
- **Accessibility:** Enables access to applications and data from anywhere with an internet connection.

Cloud Deployment Models

Definition:

Cloud deployment models define the specific configuration, management, and delivery framework used to provide cloud computing services. These models determine how cloud services are made available to users and how infrastructure is managed.

Explanation:

- **Public Cloud:** Services are delivered over the internet and shared across multiple organizations.
- **Private Cloud:** Services are maintained on a private network, offering more control and security.
- **Hybrid Cloud:** A combination of public and private clouds, allowing data and applications to be shared between them.
- **Community Cloud:** Shared infrastructure for a specific community with common concerns.

Cloud Service Models

Definition:

Cloud service models provide different levels of control, flexibility, and management. They determine the type of services available, how much infrastructure you manage, and what level of responsibility the cloud provider assumes.

Explanation:

- **Infrastructure as a Service (IaaS):** Provides virtualized computing resources over the internet.
- **Platform as a Service (PaaS):** Offers hardware and software tools for application development.
- **Software as a Service (SaaS):** Delivers software applications over the internet on a subscription basis.
- **Container as a Service (CaaS):** Manages and orchestrates containers using container-based virtualization.

Introduction to Containers

Definition:

Containers are lightweight, portable units that package an application and its dependencies, ensuring consistent performance across different computing environments.

Explanation:

- **Isolation:** Each container runs in its own environment, ensuring that applications do not interfere with each other.

- **Portability:** Containers can run consistently across various platforms, from a developer's local machine to production environments.
- **Efficiency:** They share the host system's kernel, making them more resource-efficient than traditional virtual machines.
- **Scalability:** Containers can be easily scaled up or down to meet demand.
- **Microservices Architecture:** Facilitates the development of applications as a collection of loosely coupled services.
- **DevOps Integration:** Supports continuous integration and continuous deployment (CI/CD) practices.
- **Security:** Provides a level of isolation, enhancing security by limiting the scope of potential vulnerabilities.

Cloud-Native Application Development

Definition:

Cloud-native application development is an approach to building and running applications that fully exploit the advantages of cloud computing. It involves designing applications to be scalable, resilient, and manageable in cloud environments.

Explanation:

- **Microservices Architecture:** Breaks down applications into smaller, manageable services that can be developed, deployed, and scaled independently.
- **Containers:** Packages applications and their dependencies, ensuring consistency across different environments.
- **Orchestration:** Uses tools like Kubernetes to manage the deployment, scaling, and operation of containerized applications.
- **DevOps Practices:** Integrates development and operations teams to improve collaboration and productivity.
- **Continuous Delivery:** Enables frequent and reliable delivery of application updates.
- **Resilience:** Designs applications to handle failures gracefully and recover quickly.
- **Scalability:** Builds applications that can scale horizontally to handle increased load.

Explore AI (ML and DL) Services Across Public Cloud Platforms

Definition:

AI services in the cloud provide machine learning (ML) and deep learning (DL) capabilities, enabling developers to build intelligent applications without extensive expertise in AI. These services offer pre-built models, tools, and infrastructure for AI development.

Explanation:

- **Pre-trained Models:** Access to models trained on large datasets, ready for use in various applications.
- **Custom Model Training:** Tools to train models on your own data to meet specific needs.
- **Scalability:** Cloud infrastructure allows for the scaling of AI workloads as needed.
- **Integration:** Easy integration with other cloud services for data storage and processing.
- **Cost Efficiency:** Pay-as-you-go pricing models reduce the cost of AI development.
- **Security:** Cloud providers implement robust security measures to protect data and models.
- **Accessibility:** Makes advanced AI capabilities accessible to developers without deep AI expertise.

👉 Serverless Services

Definition:

Serverless computing allows developers to build and run applications without managing servers, automatically scaling based on demand.

Explanation:

- **Event-Driven:** Functions are triggered by events, such as HTTP requests or database changes.
- **Automatic Scaling:** The cloud provider automatically scales the application based on the number of incoming requests.
- **Cost Efficiency:** Pay only for the compute time consumed by your code.

- **Simplified Management:** No need to manage server infrastructure or capacity planning.
- **Rapid Development:** Focus on writing code without worrying about the underlying infrastructure.
- **Integration:** Easily integrates with other cloud services for data storage and processing.
- **Flexibility:** Supports a variety of programming languages and frameworks.

Major Cloud Service Providers

Definition:

Major cloud service providers offer a wide range of cloud computing services, including computing power, storage, and AI tools.

Explanation:

- **Amazon Web Services (AWS):** Offers a comprehensive suite of cloud services with a global reach.
- **Microsoft Azure:** Integrates well with Microsoft products and provides a broad set of services.
- **Google Cloud Platform (GCP):** Known for its strengths in data analytics and machine learning services.
- **IBM Cloud:** Provides enterprise solutions with a focus on AI and blockchain technologies.
- **Oracle Cloud:** Specializes in database services and enterprise applications.
- **Alibaba Cloud:** Offers cloud services with a strong presence in Asia and emerging markets.
- **Salesforce:** Provides cloud-based customer relationship management (CRM) services.

Virtualization

Definition:

Virtualization involves creating virtual versions of physical resources, such as servers, storage devices, and network resources, enabling multiple virtual systems to run on a single physical system.

Explanation:

- **Resource Efficiency:** Maximizes the utilization of physical hardware by running multiple virtual systems.
- **Isolation:** Each virtual machine operates independently, preventing interference between applications.
- **Flexibility:** Allows for the creation and management of virtual environments tailored to specific needs.
- **Scalability:** Easily scale resources up or down by adjusting virtual machine configurations.
- **Disaster Recovery:** Facilitates backup and recovery processes by allowing virtual machines to be moved or replicated.
- **Cost Savings:** Reduces the need for physical hardware, leading to cost savings.
- **Security:** Provides a level of isolation, enhancing security by limiting the scope of potential vulnerabilities.

Exploring a Public Cloud Platform: Getting Started

Getting to Know the Cloud Platform:

1. **Sign Up:** Create an account on a chosen cloud platform (e.g., AWS, Azure, GCP).
2. **Explore Console:** Familiarize yourself with the cloud provider's management console.
3. **Navigate Services:** Browse through available services like compute, storage, and networking.
4. **Access Documentation:** Utilize the platform's documentation and tutorials to learn about various services.
5. **Join Community:** Participate in forums and communities to learn from other users' experiences.

Creating an Account:

1. **Registration:** Provide necessary details, including email and payment information.
2. **Verification:** Confirm your identity through email or phone.

3. **Access:** Once registered, log in to the console to start using cloud services.
4. **Free Tier:** Many providers offer a free tier with limited resources to get started without incurring costs.
5. **Billing:** Understand the billing model to manage costs effectively.

This guide provides a comprehensive overview of cloud computing and related concepts. If you need further details or assistance with specific topics, feel free to ask! Diploma Wallah

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