WIPRO NGA Program – DC DWS Batch 7

Capstone Project Presentation – 4th and 5th Sept 2024

Project Title Here - CLOUD COMPUTING

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CLOUD COMPUTING

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What is Cloud Computing?

The cloud is a distributed collection of servers that host software and infrastructure, and it is accessed over the Internet. It allows businesses and individuals to use these resources on a pay-as-you-go basis, rather than investing in physical hardware and infrastructure. This model offers flexibility, scalability, and cost-efficiency.

Types of Cloud Services

- **Infrastructure as a Service (IaaS):** Provides virtualized computing resources over the internet, such as virtual machines and storage. Examples include Amazon Web Services (AWS) and Microsoft Azure.

- **Platform as a Service (PaaS):** Offers hardware and software tools over the internet, typically for application development. Examples include Google App Engine and Heroku.

- **Software as a Service (SaaS):** Delivers software applications over the internet, on a subscription basis. Examples include Google Workspace and Microsoft 365.

Cloud Deployment Models

- **Public Cloud:** Services are delivered over the public internet and shared across multiple organizations. Examples include AWS and Google Cloud.

- **Private Cloud:** Services are maintained on a private network and used exclusively by one organization, providing greater control and security.

- **Hybrid Cloud:** Combines public and private clouds, allowing data and applications to be shared between them for greater flexibility and optimization

Benefits and Challenges of Cloud Computing

- **Benefits :** Cloud computing offers benefits like cost efficiency through pay-as-you-go pricing, scalability to adjust resources based on demand, and accessibility for accessing applications and data from any location with an internet connection.

- **Challenges :** Cloud computing presents challenges such as security, which requires careful management to prevent data breaches and threats. Compliance with regulatory standards is also necessary, and there is a risk of downtime due to potential outages and service interruptions from providers.

OBJECTIVE

Understand the cloud computing Services.

Manage Services with Azure Portal.

Understand the Security , responsibility, and trust in Azure.

Apply and monitor infrastructure standards with Azure Policy.

Understand the cloud computing Services.

Cloud Computing Services

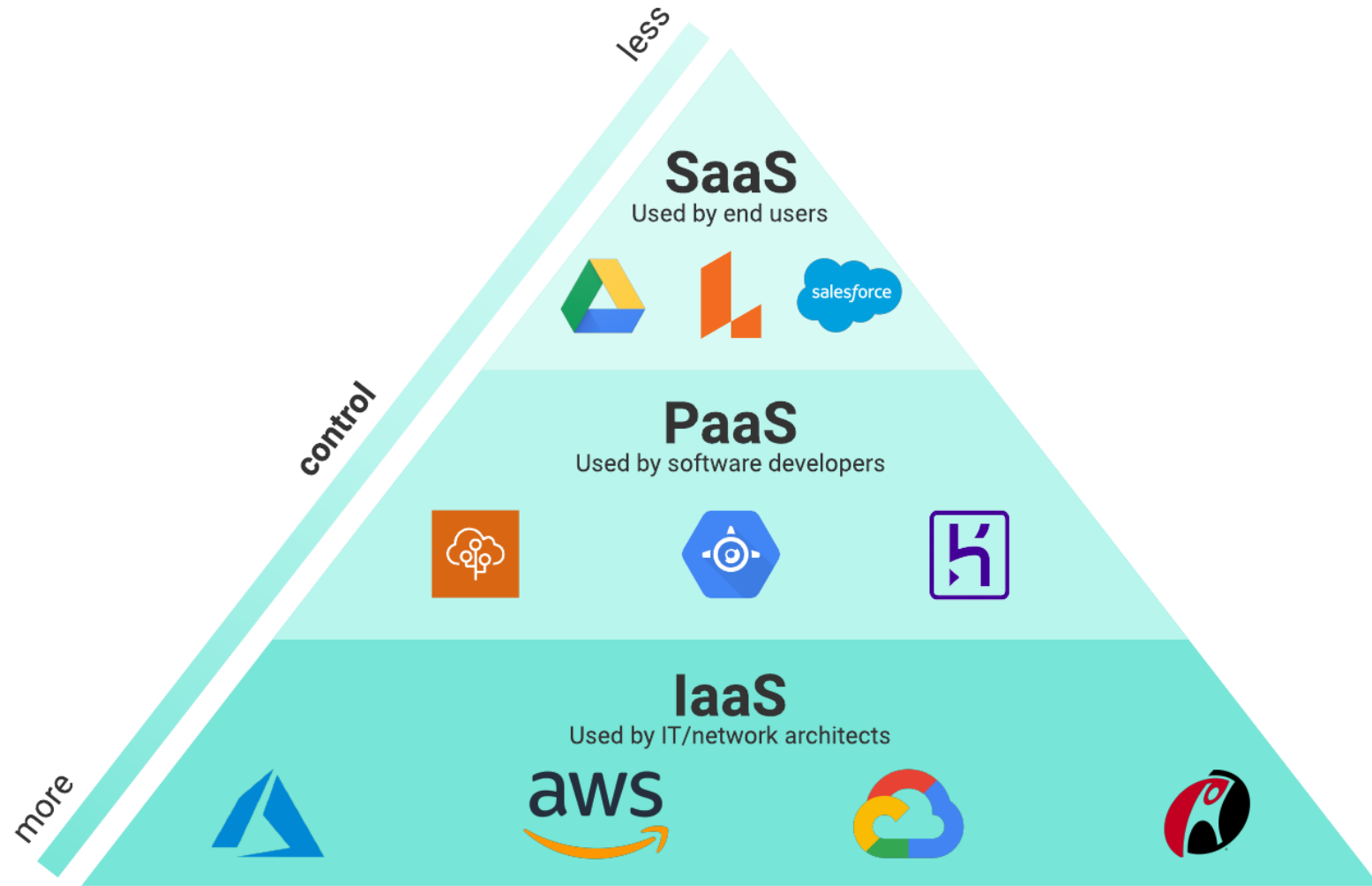Benefits of Cloud Computing Services

Challenges in Cloud Computing

Future of Cloud Computing Services

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Cloud Computing Services

Software as a Service (SaaS)

Platform as a Service (PaaS)

Infrastructure as a Service (IaaS)

Infrastructure as a Service (IaaS)

Definition: Cloud-based delivery of virtualized computing resources such as servers, storage, and networking, provided over the internet.

Key Features: Scalability, pay-as-you-go, virtualization, user-managed OS and applications. Examples: Amazon EC2, Microsoft Azure Virtual Machines.

Benefits/Use Cases: Cost-efficiency, flexibility, disaster recovery, development/testing environments.

Platform as a Service (PaaS)

Definition: Cloud-based platform that offers a framework for developers to build, run, and manage applications without needing to manage the underlying infrastructure.

Key Features: Integrated development tools, automatic updates, scalability, managed infrastructure. Examples: Google App Engine, Microsoft Azure App Services.

Benefits/Use Cases: Faster development, focus on coding, built-in integrations, cost management.

Software as a Service (SaaS)

Definition: Cloud-based software applications provided over the internet on a subscription basis, eliminating the need for local installation and maintenance.

Key Features: Accessibility, automatic updates, multi-tenancy, subscription pricing. Examples: Google Workspace, Salesforce, Microsoft Office 365.

Benefits/Use Cases: Convenience, cost savings, maintenance-free, scalable user and feature management.
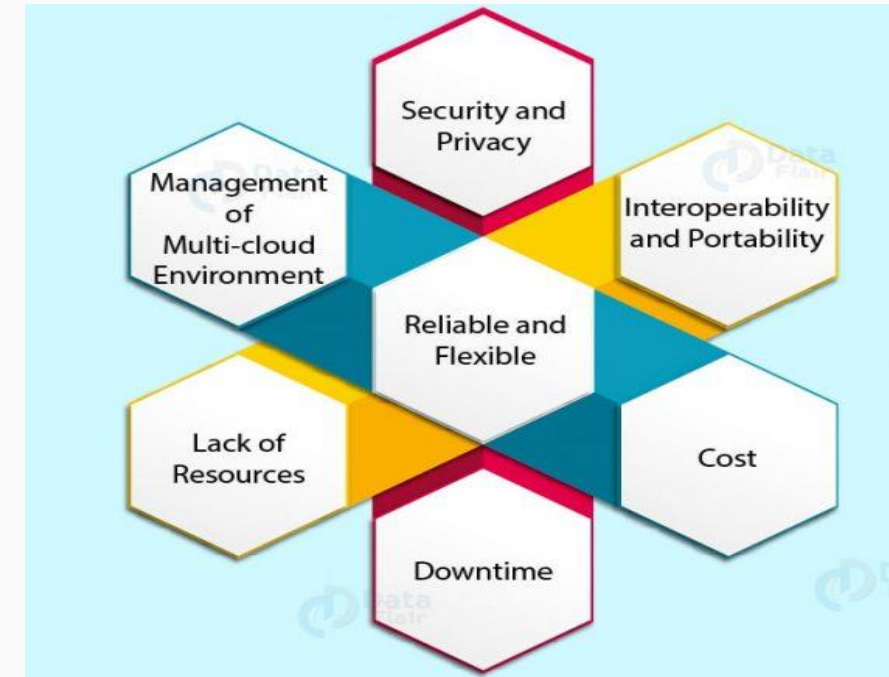
Benefits of Cloud Computing Services

- **Cost Efficiency -** Pay-as-you-go models, reduction in CapEx.

- **Scalability and Flexibility -** On-demand resource scaling.

- **Security -** Advanced security measures provided by cloud providers.

- **Accessibility and Collaboration -** Global access, supporting remote work.

- **Innovation and Agility -** Faster deployment, easier updates.

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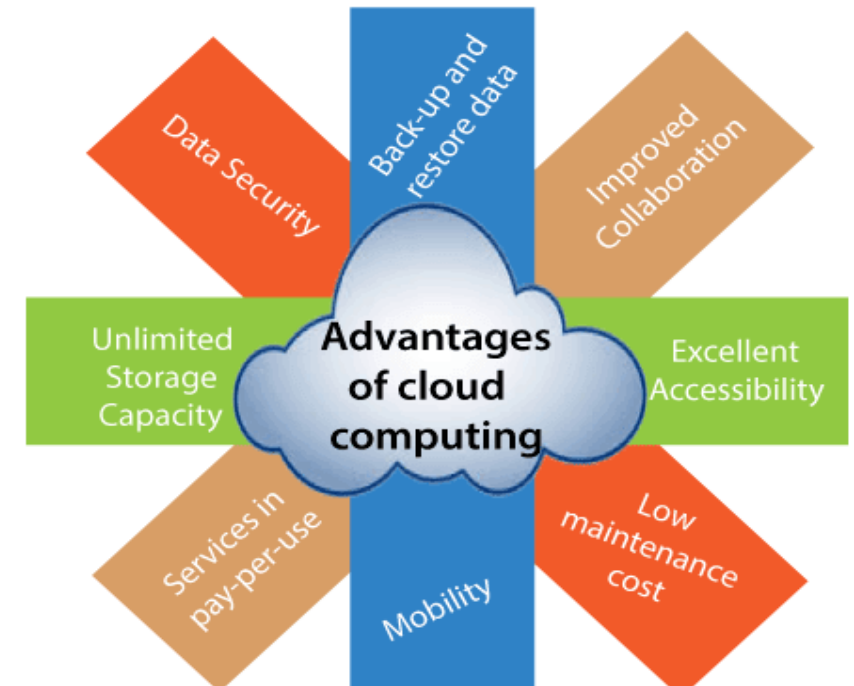
Challenges in Cloud Computing

- **Security and Privacy Concerns -** Data protection, compliance issues.

- **Vendor Lock-In -** Challenges in migrating between providers.

- **Downtime and Reliability -** Risk of service interruptions.

- **Cost Management -** Challenges in predicting and controlling costs.

Future of Cloud Computing Services

- **Integration with AI and Machine Learning**

 - How cloud services are advancing AI capabilities.

- **Edge Computing**

 -Moving data processing closer to the source.

- **Sustainability in Cloud Computing**

 - Green cloud solutions and reducing carbon footprints.

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Manage Services with Azure Portal

**Centralized Management Interface**

Challenges in Cloud Computing

Centralized Management Interface

- **Definition:** Unified platform for managing multiple systems/components within an organization.

- **Key Features:**

  - Single Dashboard: Centralized view of performance, alerts, and tasks.

  - Unified Controls: Streamlined configuration and administration.

  - Scalability: Efficient management of growing devices/applications.

  - Real-Time Monitoring: Immediate visibility into system status.

- **Benefits:**

  - Efficiency: Reduced admin overhead and quicker responses.

  - Consistency: Uniform application of policies/settings.

  - Reduced Complexity: Simplified management through one interface.

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Simplified Resource Deployment

- **Definition:** Efficient provisioning and management of IT resources.

- **Key Features:**

  - Automation: Rapid deployment using tools.

  - Templates: Predefined setups for quick deployment.

- **Benefits:**

  - Speed: Faster deployment.

  - Consistency: Uniform configurations.
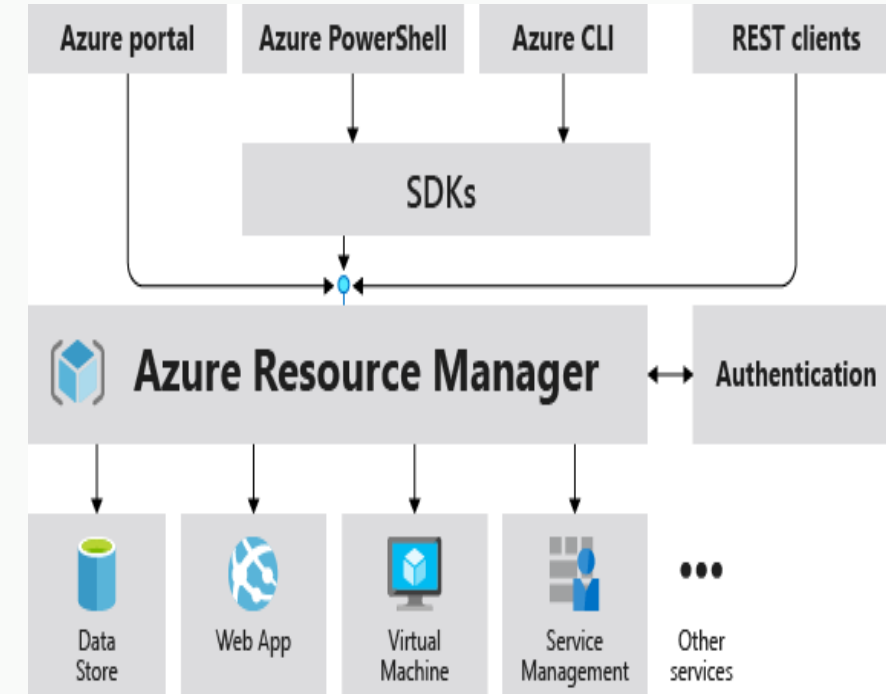
Understand the security, responsibility, and trust in Azure

Compliance and Trust

Shared Responsibility Model

Compliance and Trust

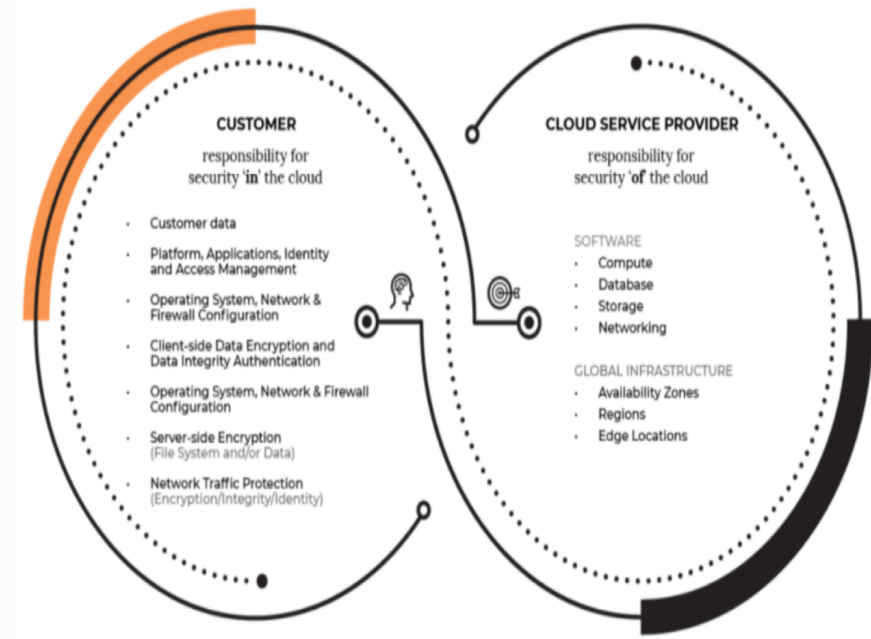- **Definition:** Adhering to laws, regulations, and internal policies.

- **Key Points:**

  - Regulatory adherence (e.g., GDPR, HIPAA)

  - Regular audits and training

  - Benefits: Risk mitigation, operational integrity

- **Trust:**

  - Definition: Confidence in system reliability and security.

  - Key Points:

  - Transparency and strong security measures

  - Reliable performance and accountability

Shared Responsibility Model

- **Definition:** Division of security and compliance duties between cloud providers and customers.

- **Key Components:**

  - Provider: Infrastructure security.

  - Customer: Data protection and access control.

- **Benefits:**

  - Clarity: Clear responsibility division.

  - Enhanced Security: Joint security efforts.

Shared Responsibility Model

CUSTOMER
responsibility for
security 'in' the cloud

- Customer data
- Platform, Applications, Identity and Access Management
- Operating System, Network & Firewall Configuration
- Client-side Data Encryption and Data Integrity Authentication
- Operating System, Network & Firewall Configuration
- Server-side Encryption (File System and/or Data)
- Network Traffic Protection (Encryption/Integrity/Identity)

CLOUD SERVICE PROVIDER
responsibility for
security 'of' the cloud

SOFTWARE
- Compute
- Database
- Storage
- Networking

GLOBAL INFRASTRUCTURE
- Availability Zones
- Regions
- Edge Locations

Apply and Monitor Infrastructure Standards with Azure Policy.

Continuous Compliance Monitoring

Policy Enforcement
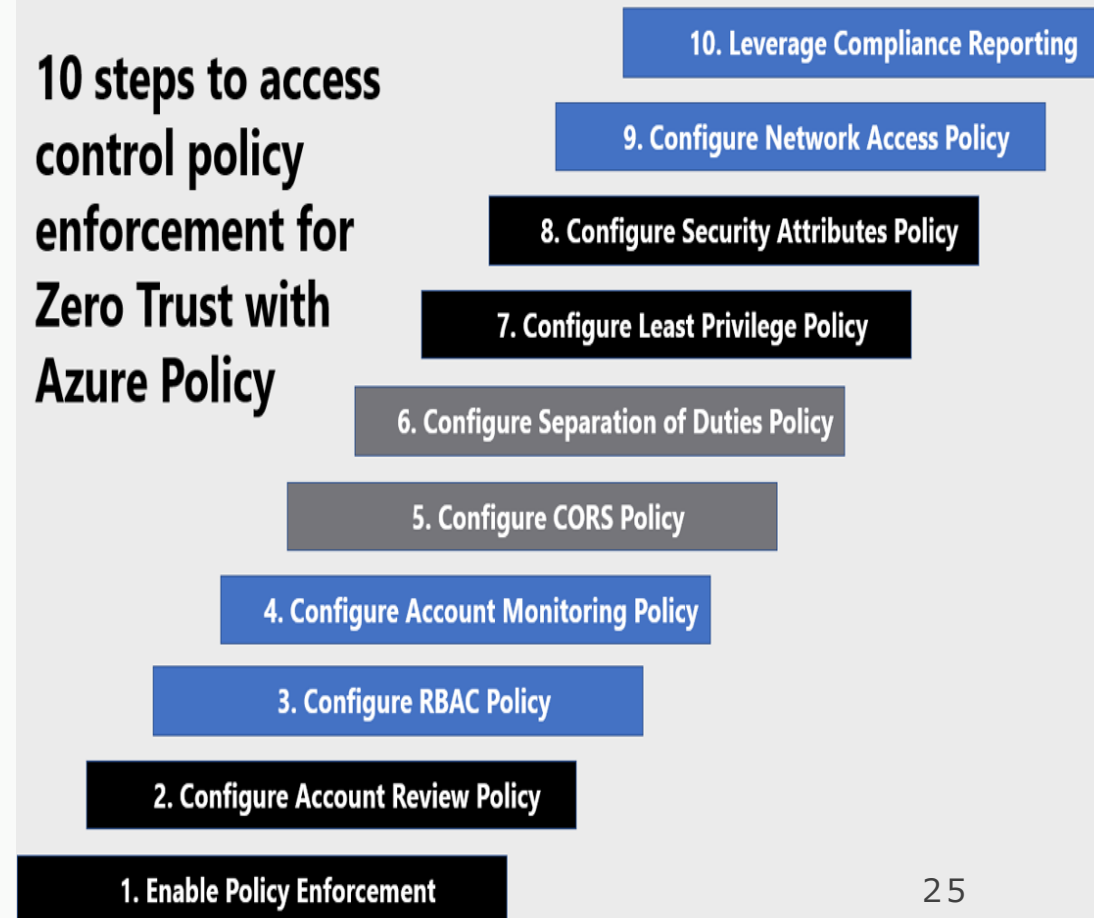
Continuous Compliance Monitoring

- **Definition:** Ongoing checks to ensure adherence to policies.

- **Key Features:**

  - Compliance Dashboard: Real-time compliance status.

  - Remediation: Automated correction of issues.

- **Benefits:**

  - Proactive Management: Early issue detection.

  - Efficiency: Reduced manual oversight.

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Policy Enforcement

- **Definition:** Applying rules to ensure compliance with standards.

- **Features:**

    - Built-in and Custom Policies: Standard and tailored rules.

- **Benefits:**

    - Consistency: Uniform standards application.

    - Governance: Automated policy enforcement.

10 steps to access control policy enforcement for Zero Trust with Azure Policy

10. Leverage Compliance Reporting

9. Configure Network Access Policy

8. Configure Security Attributes Policy

7. Configure Least Privilege Policy

6. Configure Separation of Duties Policy

5. Configure CORS Policy

4. Configure Account Monitoring Policy

3. Configure RBAC Policy

2. Configure Account Review Policy

1. Enable Policy Enforcement

PROJECT SCOPE

Explain in detail Core Cloud Services.

Understand the Azure Compute Options.
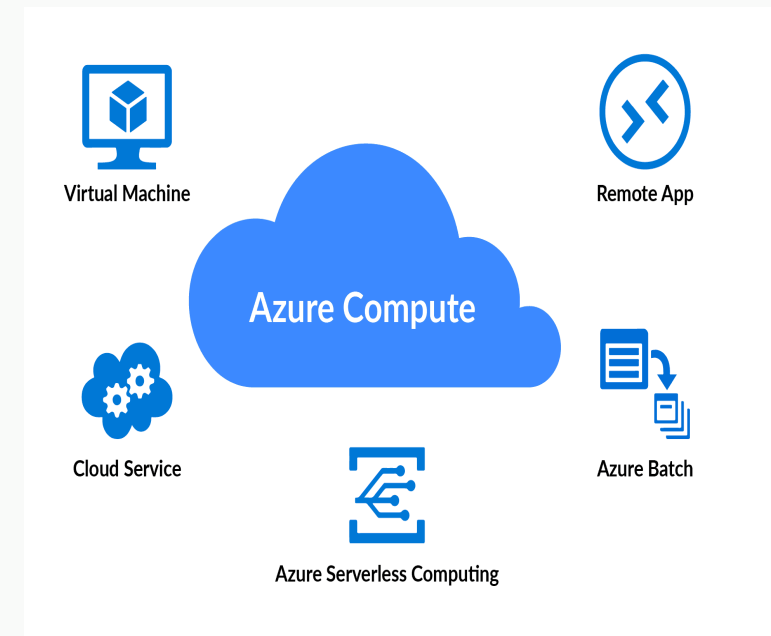
Coud Vs On Premise.

Explain in detail Core Cloud Services

- **Compute Services:** Provide the necessary processing power to run applications, including virtual machines, containers, and serverless options, allowing for scalable, on-demand computing.

- **Storage Services:** Offer secure and scalable storage solutions, such as Azure Blob Storage and Azure File Storage, ensuring data accessibility, redundancy, and backup.

- **Networking Services:** Connect and route traffic securely between cloud resources using services like Azure Virtual Networks, load balancers, and VPN gateways.

- **Database Services:** Manage relational and NoSQL databases, like Azure SQL Database and Azure Cosmos DB, providing scalable environments for data storage and retrieval.
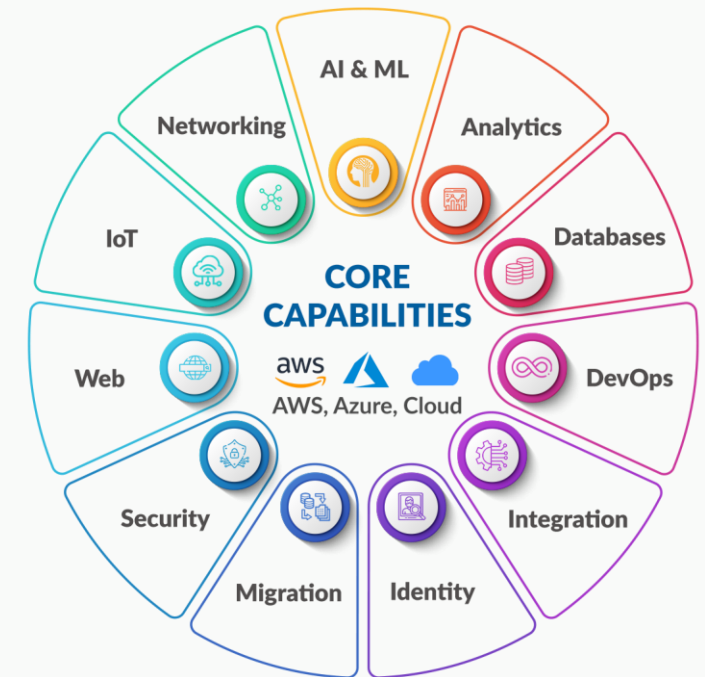
Understand the Azure Compute Options

- **Virtual Machines (VMs):** On-demand, scalable computing resources that emulate physical computers, offering full control over OS, software, and networking, ideal for legacy or custom environments.

- **Azure App Service (PaaS):** A fully managed platform for building and scaling web apps and APIs, allowing developers to focus on code without handling infrastructure.

- **Azure Kubernetes Service (AKS):** A managed service for deploying, managing, and scaling containerized applications using Kubernetes, ideal for microservices and dynamic scaling needs.

- **Azure Functions (Serverless):** A serverless compute service that runs event-driven code, scaling automatically with demand, perfect for cost-efficient, sporadic workloads.

Virtual Machine

Remote App

Azure Compute

Cloud Service

Azure Batch

Azure Serverless Computing

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Coud Vs On Premise

- **Cost Efficiency:** Cloud operates on a pay-as-you-go model, reducing CapEx and offering significant savings, while on-premise requires substantial upfront investment with fixed costs.

- **Scalability:** Cloud provides virtually unlimited scalability, adjusting resources automatically, whereas on-premise scalability is limited and requires additional hardware.

- **Maintenance and Management:** Cloud infrastructure is managed by the provider, allowing organizations to focus on core activities, while on-premise requires dedicated IT staff for maintenance.

- **Security:** Cloud security is a shared responsibility between provider and customer, offering advanced features, while on-premise security is fully managed by the organization, requiring more control and resources.

- **Flexibility:** Cloud offers high flexibility with various deployment options and rapid resource deployment, whereas on-premise has limited flexibility, requiring significant infrastructure changes for new capabilities.

On-premise   VS   Cloud

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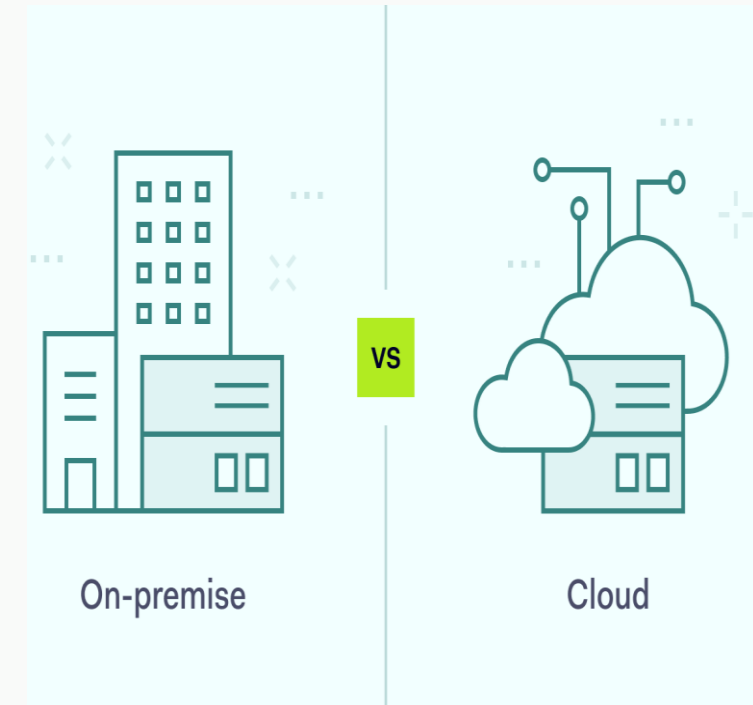
PREREQUISITES & PROJECT REQUIREMENTS

Knowledge of Cloud.

Basic understanding of Azure.

Understanding of Cloud platform and its services.

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Knowledge of Cloud

- **Cloud Basics:** Understanding of distributed computing and its advantages.

- **Types of Cloud:** Familiarity with public, private, and hybrid cloud models.

- **Cloud Services:** Awareness of core services like compute, storage, and networking.

- **Cost Efficiency:** Understanding of pay-as-you-go models and cost management in the cloud.

Basic understanding of Azure

- **Azure Overview:** Knowledge of Azure as a leading cloud platform by Microsoft.

- **Key Services:** Familiarity with Azure's primary services, such as VMs, App Services, and Azure Functions.

- **Azure Portal:** Experience navigating and managing resources through the Azure portal.

- **Security and Compliance:** Basic understanding of Azure's security measures and compliance certifications.

Understanding of Cloud platform and its services

- **Cloud Infrastructure:** Understanding of the infrastructure as a service (IaaS) and its components.

- **Platform as a Service (PaaS):** Awareness of PaaS offerings for developing and deploying applications.

- **Software as a Service (SaaS):** Familiarity with cloud-based software solutions and their benefits.

- **Service Models:** Understanding of different service models (IaaS, PaaS, SaaS) and their use cases.

DELIVERABLES

Deliver and opt the Cloud services.

Control and organize Azure resources with Azure Resource Manager.

Apply and monitor infrastructure standards with Azure Policy.

Estimate, predict costs and optimize spending for Azure.

Deliver and opt the Cloud services

- **Service Selection:** Choose the appropriate cloud services based on business needs.

- **Deployment:** Implement cloud services efficiently to meet project goals.

- **Optimization:** Continuously optimize the use of cloud services for performance and cost-effectiveness.

- **Scalability:** Ensure that the selected services can scale according to demand.

Control and organize Azure resources with Azure Resource Manager

- **Resource Groups:** Use Azure Resource Manager to group and manage related resources.

- **Templates:** Deploy and manage infrastructure as code with ARM templates.

- **Access Control:** Implement role-based access control (RBAC) to secure resources.

- **Resource Consistency:** Maintain consistency across deployments using Azure Blueprints.

Apply and monitor infrastructure standards with Azure Policy

- **Policy Creation:** Define and enforce organizational standards using Azure Policy.

- **Compliance Tracking:** Monitor compliance of resources with set policies.

- **Remediation:** Automatically correct non-compliant resources to adhere to policies.

- **Policy Enforcement**: Use Azure initiatives to enforce multiple policies across resources.

Estimate, predict costs and optimize spending for Azure

- **Cost Estimation:** Use Azure pricing calculators to estimate costs for services.

- **Cost Management:** Implement tools and strategies to monitor and manage cloud spending.

- **Cost Optimization:** Identify opportunities to reduce costs and maximize cloud investment.

- **Budgeting:** Set budgets and alerts to prevent overspending on cloud services.

Summary

Comprehensive Cloud Computing Knowledge: The project aims to impart a deep understanding of core cloud services and Azure-specific architecture, emphasizing service guarantees and security.

Practical Management Skills: It includes hands-on management of cloud resources using the Azure Portal, along with monitoring and applying infrastructure standards to ensure compliance.

Cost and Resource Optimization: Focuses on strategies for optimizing costs, managing resources effectively, and understanding the trade-offs between cloud and on-premise solutions.

Conclusion

This project provides a thorough understanding of cloud computing, with a particular focus on Azure services.

Students will gain both theoretical knowledge and practical skills, making them proficient in managing cloud resources and ensuring security and compliance.

The deliverables ensure that students are prepared to apply cloud computing in real-world scenarios, optimizing both cost and performance within an organizational context..

THANK YOU

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