SECP1513: Technology Information System

Mind Map Chapter 8

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Faculty of Computing

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Cloud Computing

Cloud Computing

Definition and Key Features

- Cloud computing refers to the on-demand delivery of IT resources over the internet, allowing users to access and utilize computing power, storage, and applications without needing physical hardware.
- The pay-as-you-go pricing model enables businesses to only pay for the resources they use, making it cost-effective.
- Example: Businesses leverage Amazon Web Services (AWS) for scalable storage and compute power, adapting to their needs without significant upfront investment.

Service Models

Types of Service Models in Cloud Computing

Cloud computing offers various service models that provide different levels of control and flexibility over IT resources, primarily categorized into IaaS, PaaS, and SaaS.

- Infrastructure as a Service (IaaS)
  - IaaS provides fundamental infrastructure resources such as virtual machines, storage, and networking.
  - Example: Amazon EC2 allows users to rent virtual servers to run applications, providing flexibility in resource management.
- Platform as a Service (PaaS)
  - PaaS simplifies the application development process by managing the underlying infrastructure, allowing developers to focus on coding and deployment.
  - Example: Google App Engine offers a platform for hosting web applications without the need for server management, streamlining the development workflow.
- Software as a Service (SaaS)
  - SaaS delivers fully managed applications to end users, eliminating the need for local installation and maintenance.
  - Example: Gmail provides email services without requiring users to manage the underlying servers or software, enhancing user convenience.

Deployment Models

Understanding Cloud Deployment Models

The deployment model of cloud computing defines how cloud resources are hosted and managed, with options including public cloud, hybrid cloud, and on-premises solutions.

- Public Cloud
  - In a public cloud model, resources are fully hosted in the cloud, allowing for broad accessibility and scalability.
  - Example: Netflix utilizes a public cloud infrastructure for global streaming services, ensuring high availability and performance.
- Hybrid Cloud
  - A hybrid cloud combines both cloud and local resources, allowing businesses to leverage the benefits of both environments.
  - Example: A company may sync its local databases with cloud analytics tools, enabling enhanced data processing and insights while maintaining local control.
- On-Premises
  - On-premises deployment involves hosting resources internally, often using virtualization tools to optimize resource usage.
  - Example: Banks may use private infrastructure for data security, ensuring compliance with strict regulatory requirements while maintaining control over sensitive information.

Major Cloud Providers

Overview of Leading Cloud Service Providers

The cloud computing market is dominated by several key providers, each offering unique features and capabilities to meet diverse business needs.

- Amazon Web Services (AWS)
  - AWS is a leader in the IaaS space, providing a wide range of services including computing power, storage, and databases.
  - Example: Amazon EC2 is a flagship service that allows users to run virtual servers in the cloud, offering flexibility and scalability.
- Microsoft Azure
  - Azure excels in hybrid cloud solutions and artificial intelligence, providing tools and services that integrate seamlessly with existing on-premises infrastructure.
  - Example: Azure AI services enable businesses to incorporate advanced machine learning capabilities into their applications.
- Google Cloud Platform (GCP)
  - GCP is known for its strengths in analytics and machine learning, offering powerful tools for data processing and analysis.
  - Example: BigQuery is a data warehouse solution that allows organizations to run complex queries on large datasets quickly and efficiently.

Challenges of Cloud Computing

Obstacles to Cloud Adoption

Despite its many benefits, cloud computing also presents challenges related to policy, technical issues, and legal considerations that organizations must navigate.

- Policy Issues
  - Vendor lock-in can restrict organizations from easily switching providers, leading to potential long-term dependencies on specific cloud services.
  - Example: Companies may find it difficult to migrate their data and applications to a different provider due to proprietary technologies.
- Technical Issues
  - Security concerns, such as data loss due to insecure APIs, can pose significant risks to organizations adopting cloud solutions.
  - Example: Inadequate security measures may lead to unauthorized access or data breaches, impacting business operations and reputation.
- Legal Issues
  - Jurisdiction disputes over data privacy can complicate cloud adoption, especially for organizations operating in multiple regions with varying regulations.
  - Example: A company may face compliance challenges due to regional data laws, necessitating careful planning and legal consultation.

Advantages of Cloud Computing

Key Benefits of Adopting Cloud Solutions

Cloud computing offers numerous advantages, including cost efficiency, scalability, and speed, making it an attractive option for businesses of all sizes.

- Cost Efficiency
  - By reducing the need for physical hardware and maintenance, cloud computing can significantly lower IT costs for organizations.
  - Example: Startups can minimize upfront investments by utilizing cloud services, allowing them to allocate resources more effectively.
- Scalability
  - Cloud solutions enable businesses to scale their resources quickly in response to changing demands, ensuring they can meet customer needs without delay.
  - Example: Companies can rapidly increase their cloud storage or computing power during peak times, such as holiday sales or product launches.
- Speed of Deployment
  - The cloud allows for faster deployment of applications and services, reducing time-to-market for new products and features.
  - Example: Developers can quickly provision resources in the cloud, facilitating agile development practices and rapid iteration.