Cloud Computing

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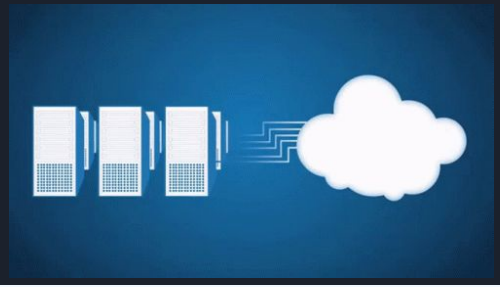
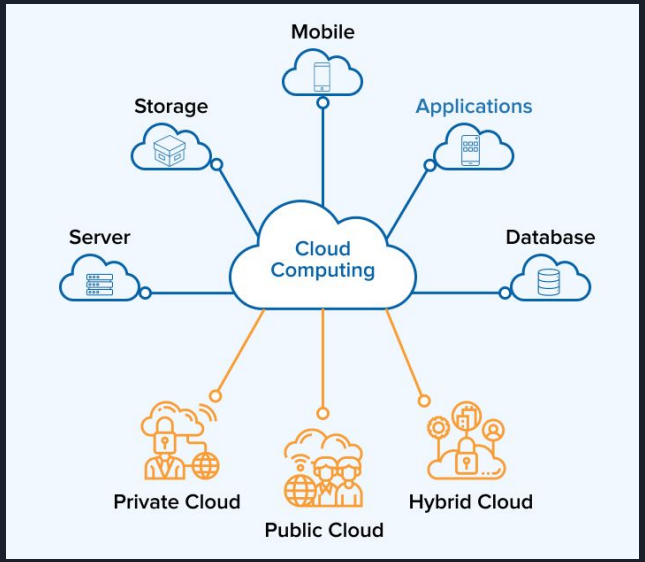
Introduction to Cloud Computing

Definition:

- Technology that enable access to computing resources, such as servers, storage, and applications over the internet.
  - Drives agility and innovation in a digital world.
  - Eliminates the burden of needing external devices for storage





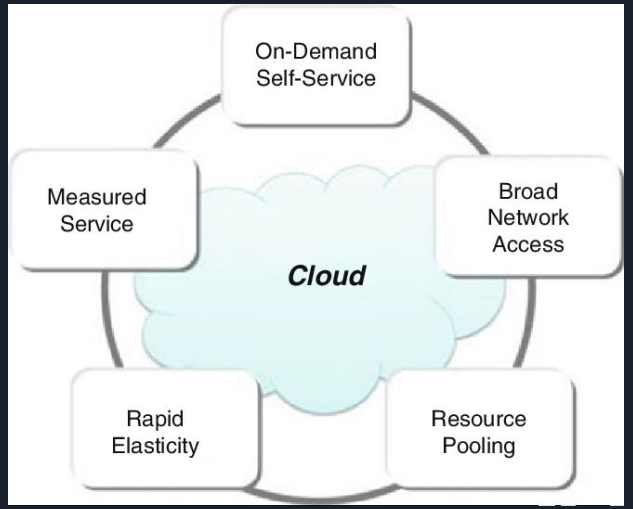
Where Did Cloud Computing Come From?

- Modern era of clouding computing can be traced back to the launch of Amazon Web Services (AWS) in 2006. It offered computing power, storage, and database services over the internet.

- Microsoft and Google followed shortly in the cloud computing market
    - Microsoft Azure launched in 2010
    - Google Cloud Platform (GCP) launched in 2011

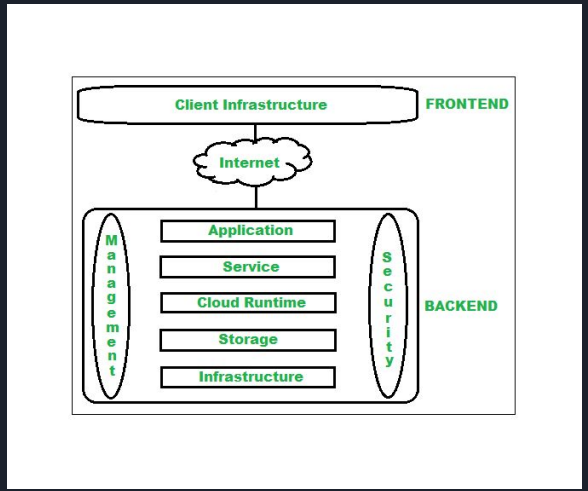
Key Characteristics of Cloud Computing

- **On-Demand**:
  - Get resources when needed without human intervention from service provider
- **Broad Access**:
  - Accessible via the internet.
- **Resource Pooling**:
  - Shared resources for efficiency.
- **Rapid Elasticity**:
  - Scales up or down quickly.
- **Measured Service**:
  - Pay for what you use.



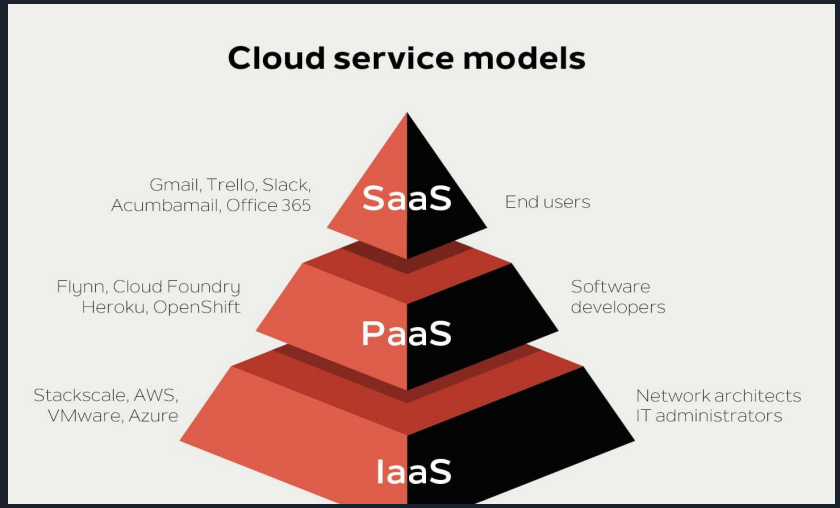
Cloud Computing Architecture

- **Front-end and back-end components**
  - **Front-end**: web browsers and mobile apps interacting with the cloud services
  - **Back-end**: responsible for processing user requests, managing data, executing business logic
- **Virtualization**: creating virtual version of something such as operating systems, service, storage device, or network resources
- **Containers**: encapsulates an app and its dependencies into a single unit (e.g., Docker, Kubernetes)



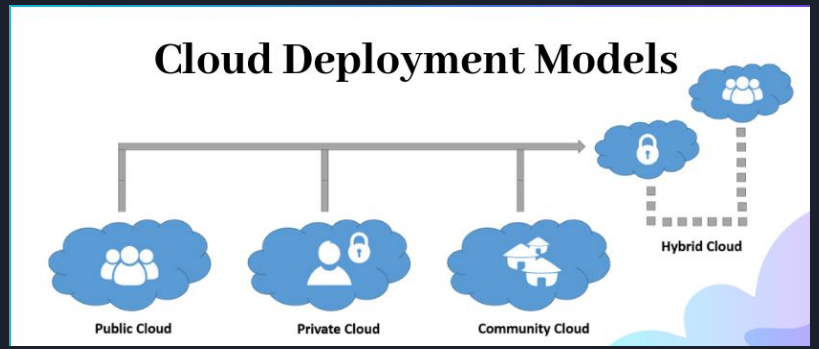
Cloud Service Models

- **Infrastructure as a Service** (IaaS): "Virtualized computing resources."
  - Renting VMs, storage, etc
- **Platform as a Service** (PaaS): "Platform for app development."
  - Focus on coding without dealing with complex infrastructures
- **Software as a Service** (SaaS): "Software delivered online."
  - Software ready to use



Cloud Deployment Models

- **Public Cloud**:
  - Shared resources over the internet.
- **Private Cloud**:
  - Exclusive resources for one organization.
- **Hybrid Cloud**:
  - Mix of public and private.
- **Community Cloud**:
  - Shared resources for specific groups.



Cloud Services and Offerings

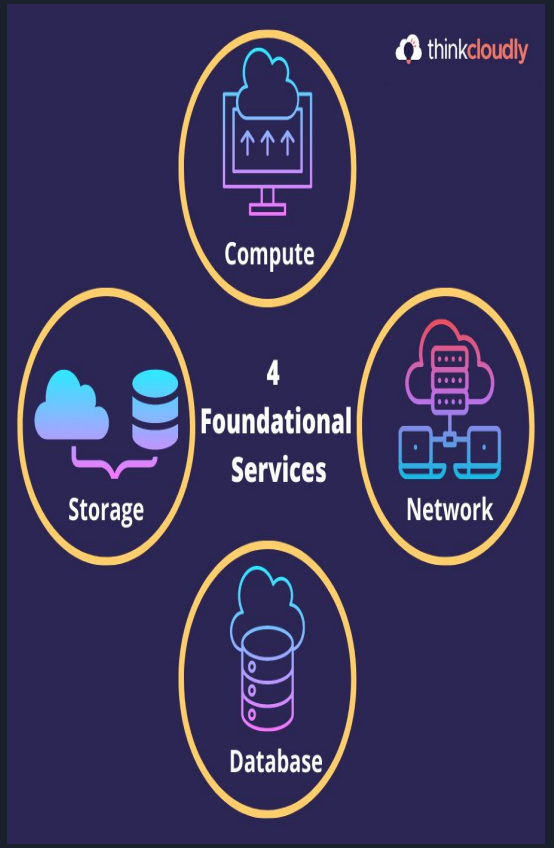
- **Storage Services**

  -Enables storing data and files on the internet through a cloud computing provider that you access either through the public internet or a dedicated private network connection.

  -Cloud storage removes the need to buy and manage your own data storage infrastructure, giving you agility, scalability, and durability, with any time, anywhere data access.

- **Compute Services**
  - Allow user to run application on VMs
- **Database Services**

  -Help organize, store, and manage data within an organization.
- **Networking Services**
  - Load Balancing
- **Analytics and Machine Learning Services**



Advantages of Cloud Computing

Why use it?

- Cost Savings:
  - No upfront investment.
  - Reduced maintenance costs
- You no longer need to worry about running out of capacity.
- Scalability:
  - Flexibility to scale.
  - Able to perform well under an increased or expanding workload.
- Accessibility:
  - Access from anywhere, with any device, with internet connection.

    in each branch or office across various states or countries.
  - The improved accessibility doesn't just impact employees; clients and customers can also log in to an account and access their information as well. And

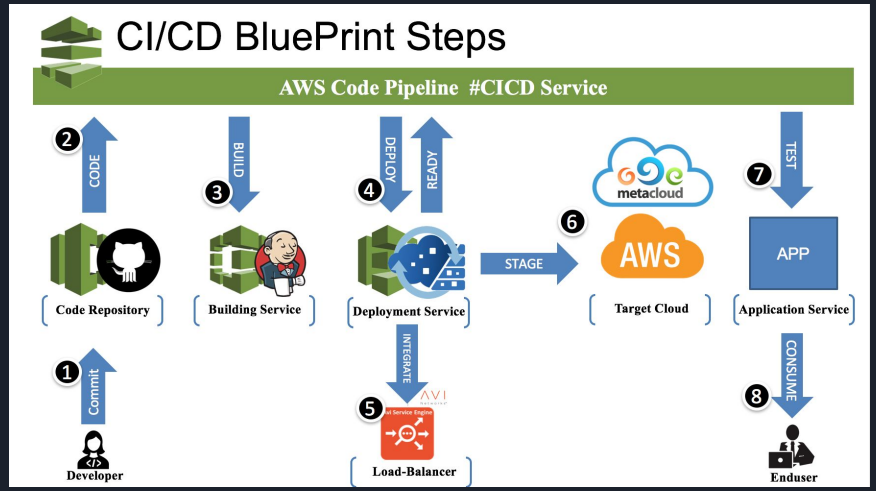
    This ensures everyone has up-to-date information whether they're at the office or on the go.
- Automatic Updates:
  - Maintenance handled by provider.
- Disaster Recovery:
  - Built-in backup and recovery.

DevOps and CI/CD

DevOps and Cloud Computing are closely intertwined

DevOps (Development Operations) is a development approach to improve collaboration and communication between software development and IT operations. It streamlines development lifecycle, enhance efficiency, and delivers software faster.

- Continuous Integration (CI): software development practice where code changes from multiple contributors are automatically integrated into a shared repository.
- Continuous Deployment/Delivery (CD): allows software to be reliably delivered to any environment. Automatically deploy changes to production.



Challenges and Concerns

- **Security**:
  - Breach in a shared infrastructure can affect multiple users
- **Privacy**:
  - Concerns about personal information.
- **Compliance**:
  - Must comply with regulations and legal requirements
- **Downtime**:
  - May face downtime if provider experiences technical difficulties

Cloud Security Measures

- **Encryption**:
  - Protects data with codes.
- **Identity and Access Management**:
  - Controls user access.
  - Multi-factor authentication (MFA)
  - Monitor user activities to detect suspicious behavior
- **Audits**:
  - Identify and address vulnerabilities
  - Ensuring compliance with regulations

Popular Cloud Service Providers

- **Amazon Web Services (AWS)**:
  - Leading cloud services.
- **Microsoft Azure**:
  - Microsoft's comprehensive platform.
- **Google Cloud Platform (GCP)**:
  - Known for analytics and ML.
- **IBM Cloud**:
  - Hybrid cloud solutions.

Future & Trends in Cloud Computing

- **Edge Computing**:
  - Faster processing near data source. Reduces latency and improve real-time processing for apps.
- **Serverless Computing:**
  - Focus on writing code, not infrastructure. Provider handles scaling and execution of functions
- **AI and ML**:
  - Easy integration without managing complex infrastructure
  - Advanced data analysis and automation.

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Q&A