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OVERVIEW AND COMPARISON OF CLOUD SERVICE MODELS

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The architecture and approaches of cloud computing involve the systems architecture of software systems used in delivering cloud services. Typically, this architecture includes multiple cloud components that communicate with each other using loose coupling mechanisms, such as messaging queues. The concept of elastic provision involves intelligent usage of tight or loose coupling mechanisms and other techniques.

The main architecture of cloud computing can be categorized as follows:

A. Essential Characteristics of Cloud Computing:

- On-demand self-service: Users can provision computing resources without the need for human intervention.

- Broad network access: Services are accessible over a network through various devices.

- Resource pooling: Computing resources are pooled together and shared among multiple users, leading to efficiency and optimization.

- Location independence: Users can access cloud services regardless of their geographical location.

- Measured service: Cloud usage is monitored, controlled, and reported, allowing for transparent and metered billing.

B. Cloud Service Models:

- Software as a Service (SaaS): Users can utilize applications provided by the cloud service provider over a network.

- Platform as a Service (PaaS): Users can deploy their own applications onto the cloud infrastructure provided by the service provider.

- Infrastructure as a Service (IaaS): Users can rent processing power, storage, and network capacity from the service provider.

C. Cloud Deployment Models:

- Public Cloud: Infrastructure is owned and operated by a cloud service provider and is available to the general public.

- Private Cloud: Infrastructure is owned or leased by a single enterprise and is dedicated to its specific needs.

- Hybrid Cloud: Combination of public and private clouds, allowing for flexibility and customization.

- Community Cloud: Shared infrastructure designed for a specific community or group with common requirements.

These architecture and deployment models provide different options for organizations to choose from based on their specific needs, preferences, and security requirements.

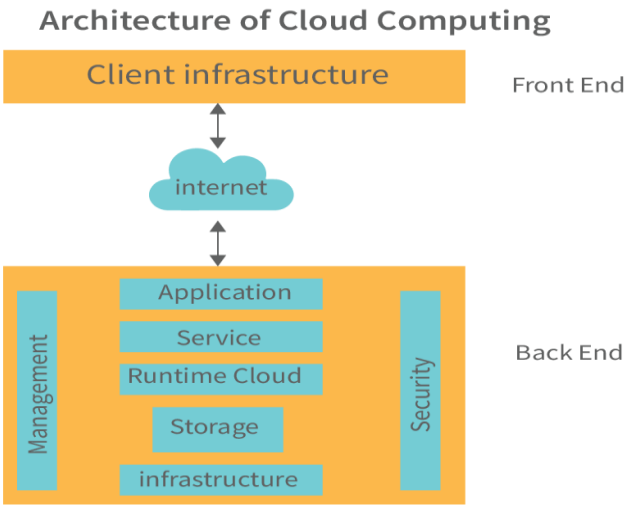

Figure 1. Architectures of Cloud Computing

Cloud computing exhibits several key characteristics that differentiate it from traditional IT environments:

- On-demand self-service: Consumers can autonomously provision computing resources, such as server time and network storage, without requiring direct interaction with each service provider. This enables users to quickly obtain the resources they need without manual intervention.

- Broad network access: Cloud capabilities are accessible over the network and can be utilized through standard mechanisms, allowing for seamless usage across various client platforms, including mobile devices, tablets, laptops, and workstations.

- Resource pooling: Cloud providers consolidate their computing resources into a shared pool to serve multiple consumers in a multi-tenant model. Physical and virtual resources are dynamically assigned and reassigned based on consumer demand. While consumers may not have direct control or knowledge of the exact resource location, they can specify higher-level preferences such as the country, state, or datacenter.

- Rapid elasticity: Cloud services can quickly scale up or down to meet changing demands. Resources can be provisioned and released elastically, often automatically, allowing for rapid scaling in response to fluctuations in demand. From the consumer's perspective, the cloud appears to offer unlimited resources that can be allocated in any quantity and at any time.

- Measured service: Cloud systems have built-in mechanisms to monitor, control, and optimize resource utilization. Metering capabilities enable the measurement of resource usage, such as storage, processing power, bandwidth, and active user accounts. This measurement facilitates transparent and granular billing, often on a pay-per-use or charge-per-use basis. Both providers and consumers have visibility into the resources being utilized and their associated costs.

- These characteristics collectively contribute to the flexibility, scalability, and cost efficiency of cloud computing, providing users with on-demand access to a wide range of computing resources while optimizing resource allocation and consumption.

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