



Cloud computing is a growing trend in information technology as organizations look for ways to save money and add flexibility to their operations. Cloud computing, while still an evolving service, provides on-demand network access to a shared pool of computing resources such as networks, servers, storage and applications. The pooling of resources allows the provider to rapidly scale to meet changing customer demands. The service is typically provided through a large data center. Cloud computing can be divided into three types: Software as Service, Platform as Service, and Infrastructure as Service.

Cloud Computing Basics

- Cloud separates application and information resources from the underlying infrastructure, and the mechanisms used to deliver.
- Cloud enhances collaboration, agility, scaling, availability, and provides the potential for cost reduction through optimized and efficient computing.
- Cloud describes the use of a collection of services, applications, information, and infrastructure comprised of pools of system, network, information, and storage resources. These components can be rapidly , provisioned, implemented and decommissioned, and scaled up or down; providing for an on-demand utility-like model of allocation and consumption.
- Cloud services can be described in three distinct services supported by four separate models. The Visual Model of NIST Working Definition of Cloud Computing provides additional detail on the specific services and types of clouds deployments.

Cloud Services & Deployments

Characteristics of Clouds

1. **On Demand/Self Service:** Consumer driven provisioning of computing capabilities.
2. **Broad network access:** Capabilities are available over the network and accessed through standard services (e.g., mobile phones).
3. **Resource pooling:** The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model,
4. **Rapid elasticity:** Capabilities can be rapidly and elastically provisioned, in some cases automatically, to quickly scale to requirements;
5. **Measured service:** Cloud systems automatically control and optimize resource usage by leveraging a metering capability providing transparency for both the provider and consumer of the service.

Cloud Services

- **Software as a Service (SaaS):** Provides ready for use web-based applications such as email that are maintained centrally by a provider (e.g., Gmail, Salesforce.com).
- **Platform as a Service (PaaS):** Provides programming languages and tools that can be used by application developers to create and deploy applications on the web.
- **Infrastructure as a Service (IaaS):** Provides computing resources, such as virtualized servers and storage, whose usage is rented from a provider (e.g., Amazon EC2, Windows Azure).

Cloud Deployment Types

- **Public Cloud:** The cloud infrastructure is made available to the general public , owned by an organization selling cloud services.
- **Private Cloud:** cloud infrastructure is operated solely for a single organization. May exist on-premises or off premises.
- **Hybrid Cloud:** The cloud infrastructure is a composition of two or more clouds (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology.
- **Community Cloud:** The cloud infrastructure is shared by several organizations and supports a specific community that has shared concerns.

Visual Model of NIST Working Definition of Cloud Computing

<http://www.csrc.nist.gov/groups/SNS/cloud-computing/index.html>



Top challenges / issues in leveraging Cloud solutions

Security Challenges

- Cloud solutions are complex networked systems, which are affected by traditional computer and network security issues such as the data confidentiality, data integrity, and system availability.
- Due to the unprecedented quantity and variety of customer data in cloud data centers. There is a higher degree of potential vulnerabilities requiring a higher degree of confidence and additional transparency that cloud providers keep customer data isolated and protected.
- Cloud users and administrators rely heavily on Web browsers and open internet connections; browser security failures can lead to cloud security breaches.

