
Cloud Computing

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Background

- **2010** Working Group on IT Audit (WGITA) approved the cloud computing project with Supreme Audit Institution (SAI) USA as lead and Canada & India as members.
- **2011** A status report was presented, and comments requested.
- **2012** Final project description and common cloud computing risks were presented.
- Members requested that this work be augmented (greater value) with a cloud computing guide and audit handbook.
- Guide & handbook completed for Cloud Computing.
- **2013** Will be incorporated into the overall IT Audit Guide & Handbook in cooperation with INTOSAI Development Initiative (IDI).

What Is Cloud Computing?

- In general, cloud computing can be thought of as anything that involves delivering hosted services over the internet.
- According to National Institute of Standards and Technology (NIST), cloud computing is a model for enabling *ubiquitous* (*every where*), *convenient, and on-demand network access* to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

What It Provides?

- Cloud computing provides shared services as opposed to local servers or storage resources.
- Enables access to information from most web-enabled hardware.
- Allows for cost savings – reduced facility, hardware/software investments and support.

Characteristics

Five Characteristics as follows:

- *On-demand self-service*
  - A consumer can alone provide computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service provider.
- *Broad network access*
  - Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g., mobile phones, tablets, laptops, and workstations).

Source: NIST Special Publication 800-145

Characteristics

- *Resource pooling*
  - The provider's computing resources are pooled to serve multiple consumers.
  - Resources can be dynamically assigned and reassigned according to customer demand.
  - Customer generally may not care where the resources are physically located but should be aware of risks if they are located offshore.

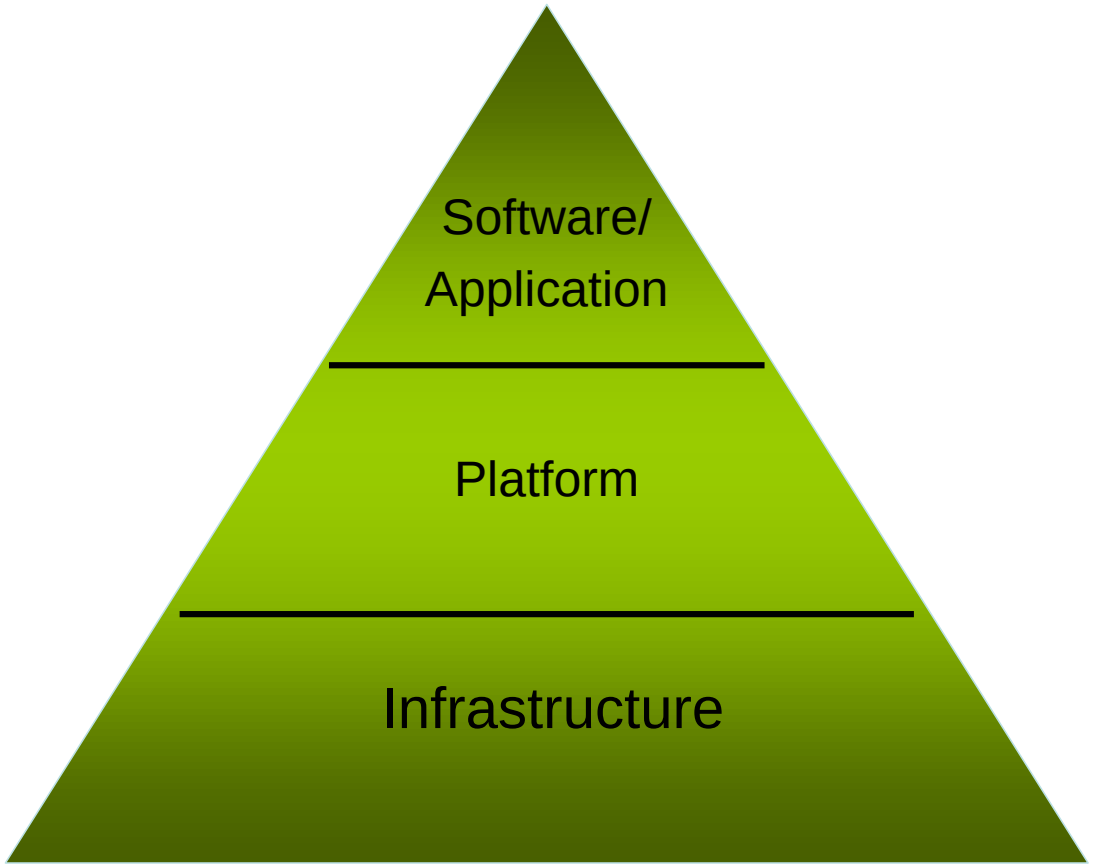
Source: NIST Special Publication 800-145

Characteristics

- *Rapid elasticity (flexibility)*
  - Capabilities can be expanded or released automatically (i.e., more CPU power, or ability to handle additional users).
  - To the customer this appears seamless, limitless, and responsive to their changing requirements.
- *Measured service (Computing services as a utility)*
  - Customers are charged for the services they use and the amounts.
  - There is a metering concept where customer resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service.

Source: NIST Special Publication 800-145

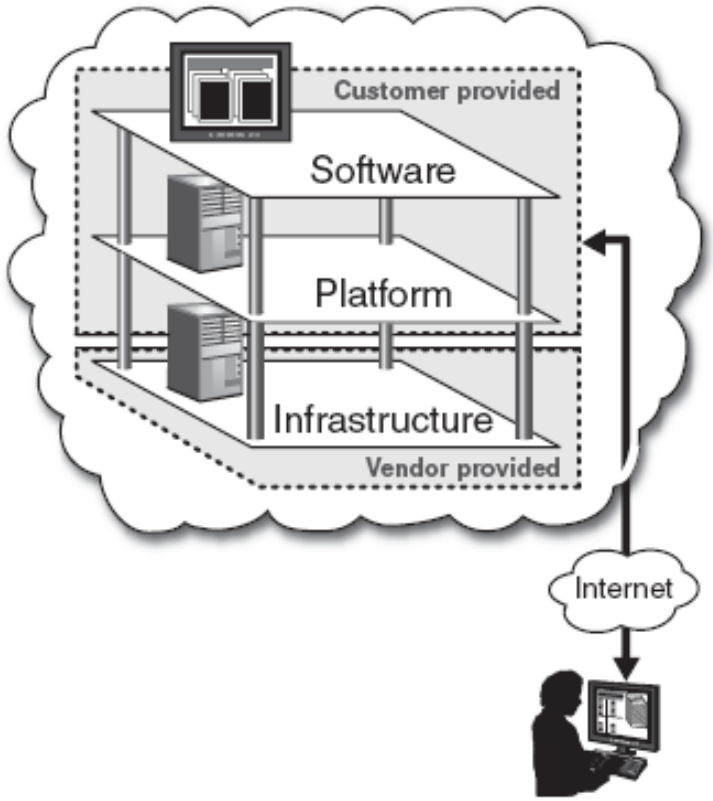
Service Models



Service Models

Infrastructure-as-a-Service (IaaS)

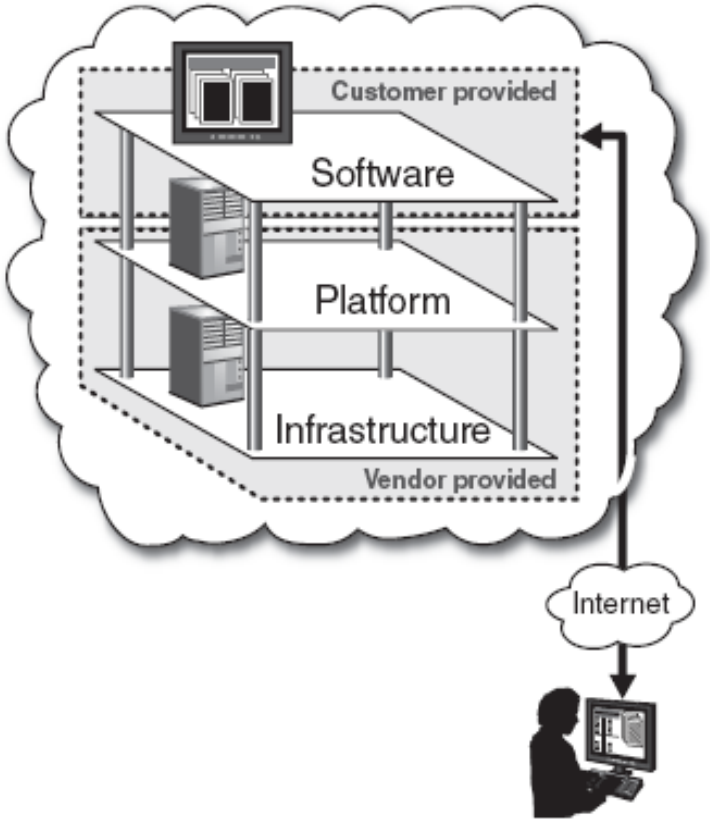
- A service model that involves outsourcing the basic infrastructure used to support operations--including storage, hardware, servers, and networking components.
- The service provider owns the infrastructure equipment and is responsible for housing, running, and maintaining it. The customer typically pays on a per-use basis.
- The customer uses their own platform (Windows or Unix), and applications.



Service Models

Platform-as-a-Service (PaaS)

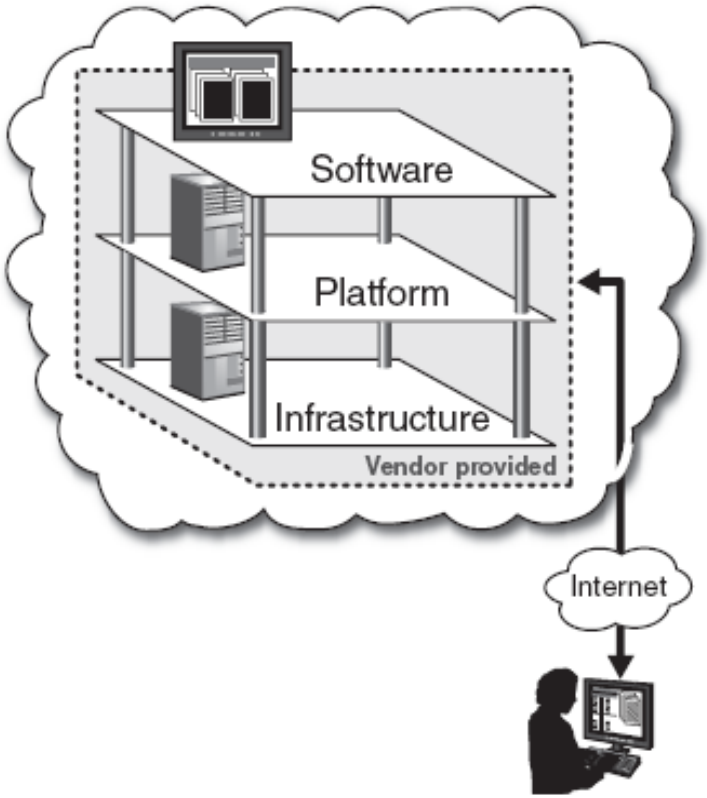
- A service model that involves outsourcing the basic infrastructure and platform (Windows or Unix).
- PaaS facilitates deploying applications without the cost and complexity of buying and managing the underlying hardware and software where the applications are hosted.
- The customer uses their own applications.



Service Models

Software-as-a-Service (SaaS)

- Also referred to as “software on demand,” this service model involves outsourcing the infrastructure, platform, and software/applications.
- Typically, these services are available to the customer for a fee, pay-as-you-go, or a no charge model.
- The customer accesses the applications over the internet.



Where Is My Data?

- Data resides on servers that the customer cannot physically access.
- Vendors may store data anywhere at lowest cost if not restricted by agreement.