Experiment - 1

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# Aim:

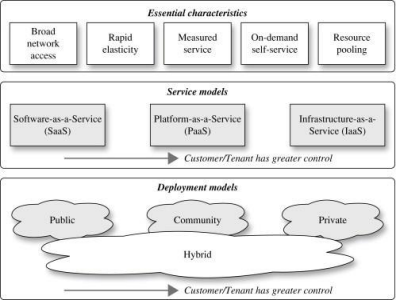
Study of NIST model of cloud computing.

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# Theory:

i. *Cloud Computing* – Cloud computing is the virtual management of central data center resources that are stored in software-defined pools. From applications to storage and processing power, cloud solutions can deliver on-demand computing services to entities over the internet. Cloud computing allows firms to avoid the upfront cost and complexity that comes with internally owning and maintaining their own IT infrastructure and data centers. It's much more efficient and cost-effective for the firm to simply pay for what they use when they want to use it.

ii. *NIST Model* – NIST (National Institute of Standards and Technology) developed practices for cloud computing and drafted them into a formal publication designed specifically for government use of cloud services. The NIST cloud computing program provides security assessments, procedures, and technical guidance for building and purchasing cloud services. Nist's definition identified self-service, accessibility from desktops, laptops, and mobile phones, resources that are pooled among multiple users and applications, elastic resources that can be rapidly reapportioned as needed, and measured service as the five essential characteristics of cloud computing. When these characteristics are combined, they create a cloud computing infrastructure that contains both a physical layer and an abstraction layer. The physical layer consists of hardware resources that support the cloud services (i.e., servers, storage, and network components). The abstraction layer consists of the software deployed across the physical layer, thereby expressing the essential characteristics of the cloud per the NISTs definition.



According to the NIST definition, cloud computing must have five key features:

Broad network access - The user can access the data of the cloud or upload the data to the cloud from anywhere just with the help of a device and an internet connection. These capabilities are available all over the network and accessed with the help of the internet

Rapid Elasticity - Rapid elasticity is the capacity of a cloud that helps clients and users automatically enlarge and compress the company’s resources. The process is done in a short period to manage the workload efficiently. It helps minimize the cost required to set up the company’s

infrastructure.

iii. *Measured service* – Cloud Computing resources are used to monitor and the company uses it for recording. This resource utilization is analyzed by supporting charge-per-use capabilities.

iv. *On-demand self-service* – It is one of the important and valuable features of Cloud Computing as the user can continuously monitor the server uptime, capabilities, and allotted network storage. With this feature, the user can also monitor the computing capabilities.

v. *Resource pooling* – It means that the Cloud provider pulled the computing resources to provide services to multiple customers with the help of a multi-tenant model. There are different physical and virtual resources assigned and reassigned which depends on the demand of the customer. It specifies four Deployment Types:

∙ Private: Private cloud computing is a deployment model that is purchased and dedicated to a single client or company in a single-tenant environment where the hardware, storage, and network assume the highest levels of security. Data that is stored in the private cloud data center cannot be accessed by anyone other than the client that owns it. This is a great solution for organizations that feel as though their data is too sensitive or valuable to put on a public, community, or hybrid cloud.

∙ Community: NIST defines a community cloud deployment model as one that is used exclusively by a specific community of consumers from organizations that have shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be owned, managed, and operated by one or more of the organizations in the community, a third party, or some combination of them, and it may exist on or off premises. This multi-tenant platform allows several companies to work on the same platform if they share similar needs and concerns. Community clouds allow companies to

collaborate on joint projects, applications, or research in a secure setting

∙ Public: A public cloud is a deployment model that is owned by cloud service providers and made available to the public. The vendor is then responsible for all the administration, maintenance, capacity planning, backups, and troubleshooting. Each public cloud can simultaneously

handle massive amounts of storage that allow businesses the ability to handle multiple projects and become more available to their users at a moment's notice. Many companies from Facebook to Google and mobile app developers use public clouds to effectively manage the flow of user data. With more users signing up for these services, companies have been pooling more of their resources into public

clouds as of late

∙ Hybrid: Hybrid cloud deployment models are a collaboration of private and public cloud models in a single environment. Hybrid clouds are parallel environments where applications can easily move between private and public clouds. Hybrid clouds are bound together by proprietary technology that enables data and application portability. Hybrid clouds offer IT, teams, more flexibility, portability, and scalability than other deployment models which is the main reason why 58% of global enterprises have integrated a hybrid cloud architecture into their IT infrastructure. Companies that are constantly transitioning between managing public cloud projects and building applications of a sensitive nature on their private cloud are likely to seek out a hybrid cloud solution And three Service Models:

a) Software as a Service (SaaS) – Software as a Service provides you with a completed product that is run and managed by the service provider. In most cases, people referring to Software as a Service are referring to end-user applications. With a SaaS offering, you do not have to think about how the service is maintained or how the underlying infrastructure is managed; you only need to think about how you will use that particular piece of software.

b) Platform as a Service (PaaS) – Platforms as a service remove the need for organizations to manage the underlying

infrastructure (usually hardware and operating systems) and allow you to focus on the deployment and management of your applications.

c) Infrastructure as a Service (IaaS) – Infrastructure as a Service contains the basic building blocks for cloud IT and typically provides access to networking features, computers (virtual or on dedicated hardware), and data storage space. Infrastructure as a Service provides you with the highest level of flexibility and management control over your IT resources.

# Conclusion:

NIST’s cloud computing definition allows organizations to compare various cloud services and deployment strategies. A deep understanding of this definition can help organizations better appreciate the benefits of this technology, implement NIST compliance best practices, and guide decision-makers to make optimal cloud investment decisions.