

A Study of Public, Private, Hybrid and Community Cloud Models in Cloud Computing

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Abstract

The Cloud Computing has mainly four type of Cloud Models which is related to each other but have a few difference between them. In this paper we have discussed about Public, Private, Hybrid and Community Cloud Models and also its benefit, disadvantages and issues.

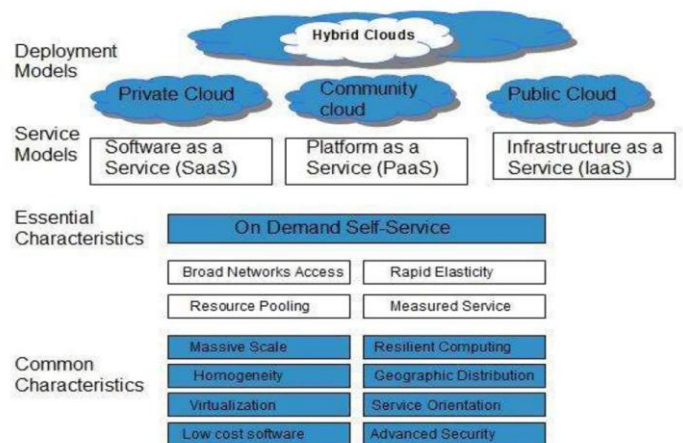
I. INTRODUCTION

A. What Is Cloud Computing?

Cloud computing ('cloud') is an evolving term that describes the development of many existing technologies and approaches to computing into something different. Cloud separates application and information resources from the underlying infrastructure, and the mechanisms used to deliver them. Cloud enhances collaboration, agility, scaling, and availability, and provides the potential for cost reduction through optimized and efficient computing. More specifically, cloud describes the use of a collection of services, applications, information, and infrastructure comprised of pools of compute, network, information, and storage resources. These components can be rapidly orchestrated, provisioned, implemented and decommissioned, and scaled up or down; providing for an on-demand utility-like model of allocation and consumption. From an architectural perspective; there is much confusion surrounding how cloud is both similar to and different from existing models of computing; and how these similarities and differences impact the organizational, operational, and technological approaches to network and information security practices. [1]

II. Characteristics of Cloud Computing

There are four key characteristics of cloud computing. They are shown in the following diagram: [2]



A. On-Demand Self-Service

A consumer can unilaterally provision computing capabilities such as server time and network storage as needed automatically, without requiring human interaction with a service provider. [1]

B. 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, laptops, and PDAs) as well as other traditional or cloud based software services. [1]

C. Resource pooling

The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. There is a degree of location independence in that the customer generally has no control or knowledge over the exact location of the provided resources, but may be able to specify location at a higher level of abstraction (e.g., country, state, or datacenter). Examples of resources include storage, processing, memory, network bandwidth, and virtual machines. Even private clouds tend to pool resources between different parts of the same organization. [1]

D. Rapid elasticity

Capabilities can be rapidly and elastically provisioned—in some cases automatically—to quickly scale out; and rapidly released to quickly scale in. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be purchased in any quantity at any time. [1]

E. Measured service

Cloud systems automatically control and optimize resource usage by leveraging a metering capability at some level of abstraction appropriate to the type of service (e.g., storage, processing, bandwidth, or active user accounts). Resource usage can be monitored, controlled, and reported—providing transparency for both the provider and consumer of the service. It is important to recognize that cloud services are often but not always utilized in conjunction with, and enabled by, virtualization technologies. There is no requirement, however, that ties the abstraction of resources to virtualization technologies and in many offerings virtualization by hypervisor or operating system container is not utilized. Further, it should be noted that multi-tenancy is not called out as an essential cloud characteristic by NIST but is often discussed as such. Please refer to the section on multi-tenancy featured after the cloud deployment model description below for further details. [1]

III. CLOUD MODELS

A. Public Cloud Models

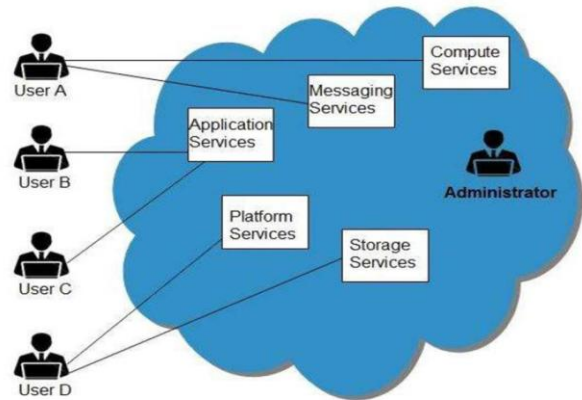
Cloud computing services from vendors that can be accessed across the internet or a private network using one or more data centers, shared among multiple customers with varying degrees of data privacy control. Public clouds are run by third parties, and applications from different

customers are likely to be mixed together on the cloud's servers, storage systems, and networks. Public clouds are most often hosted away from customer premises, and they provide a way to reduce customer risk and cost by providing a flexible, even temporary extension to enterprise infrastructure. [3]

Public Cloud allows systems and services to be easily accessible to general public. The IT giants such as Google, Amazon and Microsoft offer cloud services via Internet. The Public Cloud Model is shown in the diagram below. [2]

Fig. 2 Public Cloud Model [2]

Benefits:



There are many benefits of deploying cloud as public cloud model. The following diagram shows some of those benefits: [2]

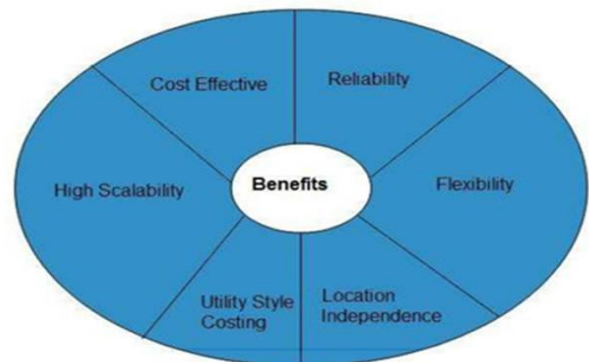


Fig. 3 Benefits of Public Cloud Model [2]

Cast Effective:

Since public cloud shares same resources with large number of customers it turns out inexpensive. [2]

Reliability:

The public cloud employs large number of resources from different locations. If any of the resources fails, public cloud can employ another one. [2]

Flexibility:

The public cloud can smoothly integrate with private cloud, which gives customers a flexible approach. [2]

Location Independence:

Public cloud services are delivered through Internet, ensuring location independence. [2]

Utility Style Costing:

Public cloud is also based on pay-per-use model and resources are accessible whenever customer needs them. [2]

High Scalability:

Cloud resources are made available on demand from a pool of resources, i.e., they can be scaled up or down according to the requirement. [2]

DISADVANTAGES:

Here are some disadvantages of public cloud model:

(i) Low Security

In public cloud model, data is hosted off-site and resources are shared publicly, therefore does not ensure higher level of security.

(ii) Less Customizable

It is comparatively less customizable than private cloud. [2]

B. Public Cloud Models

Private clouds are built for the exclusive use of one client, providing the utmost control over data, security, and quality of service. The company owns the infrastructure and has control over how applications are deployed on it. Private clouds may be deployed in an enterprise datacenter, and they may also be deployed at a co-location facility. Private clouds can be built and managed by a company's own IT organization or by a cloud provider. In this "hosted private" model, a company such as Sun can install, configure, and operate the infrastructure to support a private cloud within a company's enterprise datacenter. This model gives companies a high level of control over the use of cloud

resources while bringing in the expertise needed to establish and operate the environment. [3]

Private Cloud allows systems and services to be accessible within an organization. The Private Cloud is operated only within a single organization. However, it may be managed internally by the organization itself or by third-party. The private cloud model is shown in the diagram below. [2]

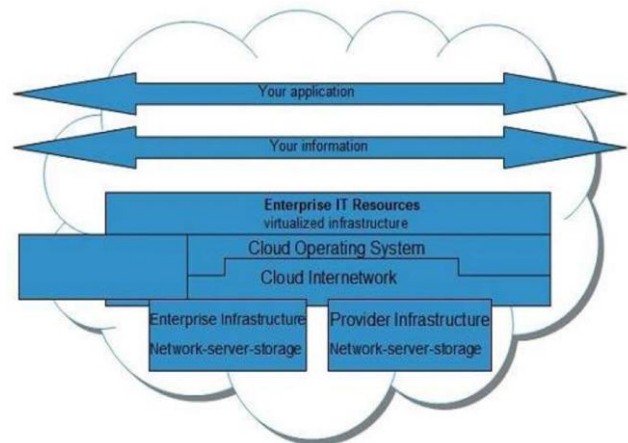


Fig. 4 Private Cloud Model [2]

Benefits:

There are many benefits of deploying cloud as private cloud model. The following diagram shows some of those benefits:

(i) High Security and Privacy:

Private cloud operations are not available to general public and resources are shared from distinct pool of resources. Therefore, it ensures high security and privacy.

(ii) More Control:

The private cloud has more control on its resources and hardware than public cloud because it is accessed only within an organization.

(iii) Cost and Energy Efficiency:

The private cloud resources are not as cost effective as resources in public clouds but they offer more efficiency than public cloud resources. [2]

DISADVANTAGES

Here are the disadvantages of using private cloud model:

(i) Restricted Area of Operation

The private cloud is only accessible locally and is very difficult to deploy globally.

(ii) High Priced

Purchasing new hardware in order to fulfill the demand is a costly transaction.

(iii) Limited Scalability

The private cloud can be scaled only within capacity of internal hosted resources.

(iv) Additional Skills

In order to maintain cloud deployment, organization requires skilled expertise. [2]

C. Hybrid Cloud Models

Hybrid clouds combine both public and private cloud models. They can help to provide on-demand, externally provisioned scale. The ability to augment a private cloud with the resources of a public cloud can be used to maintain service levels in the face of rapid workload fluctuations. This is most often seen with the use of storage clouds to support Web 2.0 applications. A hybrid cloud also can be used to handle planned workload spikes. Sometimes called “surge computing,” a public cloud can be used to perform periodic tasks that can be deployed easily on a public cloud. Hybrid clouds introduce the complexity of determining how to distribute applications across both a public and private cloud. Among the issues that need to be considered is the relationship between data and processing resources. If the data is small, or the application is stateless, a hybrid cloud can be much more successful than if large amounts of data must be transferred into a public cloud for a small amount of processing. [3]

Hybrid Cloud is a mixture of public and private cloud. Non-critical activities are performed using public cloud while the critical activities are performed using private cloud. The Hybrid Cloud Model is shown in the diagram below. [2]

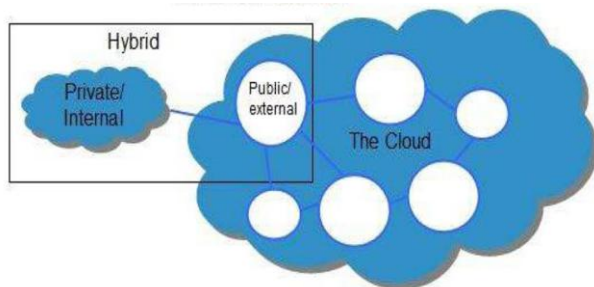


Fig. 5 Hybrid Cloud Model [2]

Benefits:

There are many benefits of deploying cloud as hybrid cloud model. The following diagram shows some of those benefits:

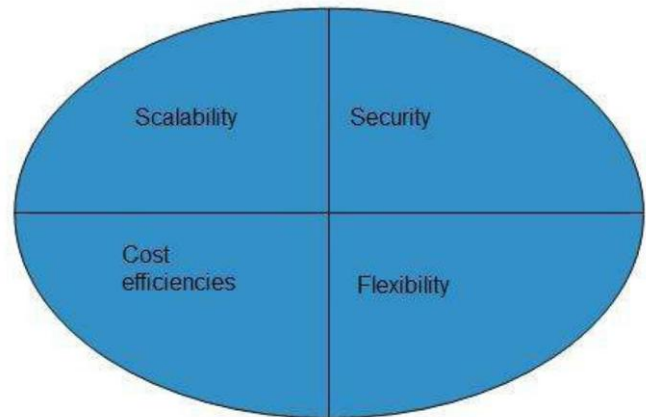


Fig. 3 Benefits of Hybrid Cloud Model [2]

(i) Scalability

It offers features of both, the public cloud scalability and the private cloud scalability.

(ii) Flexibility

It offers secure resources and scalable public resources.

(iii) Cost Efficiency

Public clouds are more cost effective than private ones. Therefore, hybrid clouds can be cost saving.

(iv) Security

The private cloud in hybrid cloud ensures higher degree of security. [2]

DISADVANTAGES

(i) Networking Issues

Networking becomes complex due to presence of private and public cloud.

(ii) Security Compliance

It is necessary to ensure that cloud services are compliant with security policies of the organization.

(iii) Infrastructure Dependency

The hybrid cloud model is dependent on internal IT infrastructure, therefore it is necessary to ensure redundancy across data centers. [2]

D. Community Cloud Model

Community Cloud allows system and services to be accessible by group of organizations. It shares the infrastructure between several organizations from a specific community. It may be managed internally by organizations

or by the third-party. The Community Cloud Model is shown in the diagram below. [2]

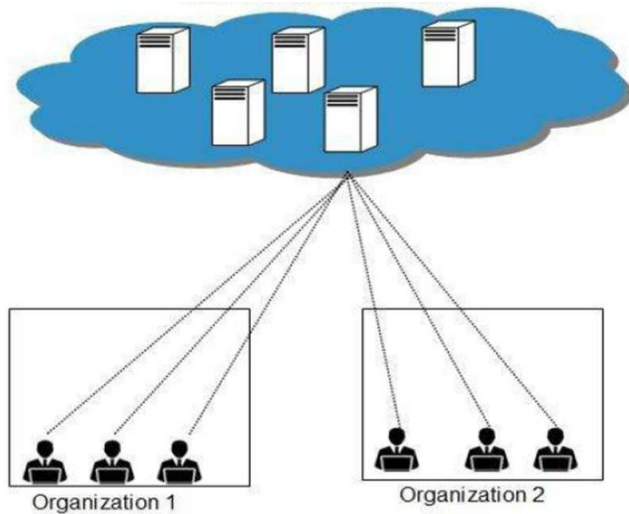


Fig. 6 Community Cloud Model [2]

Benefits:

There are many benefits of deploying cloud as community cloud model.



Fig.7 Benefits of Community Cloud Model

(i) Cost Effective

Community cloud offers same advantages as that of private cloud at low cost.

(ii) Sharing Among Organizations

Community cloud provides an infrastructure to share cloud resources and capabilities among several organizations.

(iii) Security

The community cloud is comparatively more secure than the public cloud but less secured than the private cloud. [2]

Issues:

- Since all data is located at one place, one must be careful in storing data in community cloud because it might be accessible to others.
- It is also challenging to allocate responsibilities of governance, security and cost among organizations. [2]

Conclusion

The study of Cloud Models in Cloud Computing we can know that how many type of Cloud Models and providing a services for general people, Government organization or any private organization. It also provides an advantage to choose which type of Cloud Models is suitable for your works or according to any organization requirement.

References

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- [3] A Study of Cloud Computing Towards Rural Education by Mrs. Mili Patel, Rakesh Patel, Department of Information Technology of Kirodimal Institute of Technology Raigarh (C.G.), India and Anupam R. Chaube Faculty, GH Raisoni College of Engineering, Nagpur (Maharashtra), India.
- [4] Cloud Architecture Patterns by Bill Wilder, 2012-09-20 First release, by O'Reilly Media, Inc.