Perspective study of Public Cloud: A highly scalable Cloud deployment model

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Abstract— this study paper deals with various Cloud computing and deployment models provided by the Cloud. Cloud computing is the combination of two words, the term Cloud is just an Internet because with the internet we use different type of resources or services like storage, database, networking and server then the term *computing* is the data processing, storage over the Internet, so Cloud computing is basically the use of different types of services over the internet by individual or by the organization. We can say that the *"Cloud computing"* is a set of different types of hardware and software that work collectively to deliver many aspects of computing to the end user as online services. Cloud computing is an approach defined as internet based computing where virtual shared servers provide software, infrastructure, platform devices, and other resources and hosting to customers on a pay-as-use basis. These services are offered by shared network and other relevant IT resources on Private, Public, Hybrid and community Cloud models.

Index Terms— *Cloud computing, Infrastructure, Public Cloud, Cloud Deployment Model, Cloud Service Providers.*

I. INTRODUCTION:

Cloud computing is the delivery of hosting resources and services that are provided to a client using Internet. Any user can store, access and share multiple resources as per their need on pay per use basis policy. It enables the user to access large scale services without provisions, maintenance and upfront investments for any hardware and software they needed. Any type of digital information provided as the services in the Cloud computing model for the user, user can access these hosted digital services available on the *"Cloud"* without any worry regarding how to manage and maintain various hardware, software involved. Thus, by using this technology user can focus on their business police rather than spending lots of time and money to needed to manage their business process [7]. Cloud computing model act as a virtual computing system that offers a choice of *deployment model* according to how much data customers want to store, access and make process on that data. To ensure that how and what services users will use as per their need and requirement from the Cloud service provider, without worrying how to manage and maintain infrastructure involved. This means that users are only focuses on their business policies rather than spending their cost and time.

II. PROBLEM WITH TRADITIONAL ARCHITECTURE:

IT infrastructure which we have traditionally used so far is about the combination of different application software solution, networking hardware, storage resources, servers, and data centers, different useful hardware and software components. There are some technical issues make lots of problem while we have to do our IT related business tasks. These problems are as follows.

- Customer has to pay the rent for the data center
- Users has to pay for power supply, cooling, maintenance
- As per the need adding and replacing hardware takes time and also.
- Location bounded and hence Scaling is limited,
- Company management has to hire a team to monitor the infrastructure
- Very complex task to deal with disaster such as fire, earthquake.

III. WHAT IS CLOUD COMPUTING?

Cloud computing is the delivery of resources and services already hosted on the data center server. Cloud computing includes various *IT infrastructure*, so that it can be pooled and divided irrespective of physical hardware boundaries. These servers can be effectively managed by data centers, and hence any user cans this technology without any physical boundary. i.e. services offered by Cloud service providers can be used from anywhere, anytime and heterogeneous digital devices [8].

Fig: 1- Cloud computing with heterogonous digital devices.

IV. WHY CLOUD COMPUTING TECHNOLOGY:

Highly Scalable:
Any customer can increase or decrease their business operation and storage capacity needed for their related tasks required. Rather than purchasing or provisioning the expensive upgrades yourself, your Cloud service provider can handle all this for you as per the need and uses.

More Flexible:
Flexibility makes our task more easy, the Cloud offers businesses more flexibility overall versus hosting on a local server. And when we need extra bandwidth then Cloud based service help us to meet up our requirements, therefore no need to update and expense on infrastructure.

Reduced Infrastructure Cost:
Acquiring the Cloud services may reduce the cost of managing and maintaining your IT systems with business policies. We don't need to purchase needed equipment to do our business tasks, because now it's all the responsibility of our service providers.
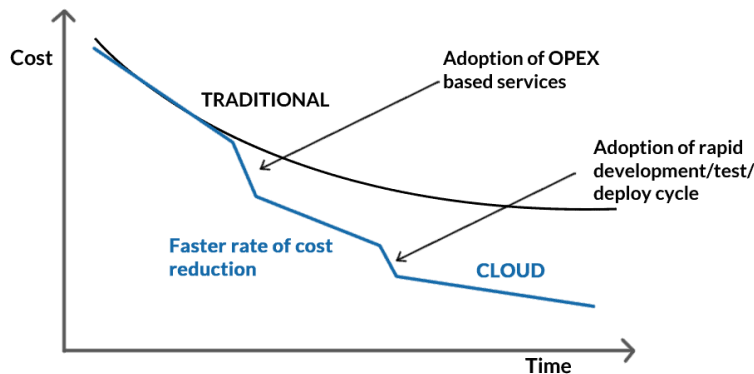

Fig.2 - Traditional and Cloud technology cost and time analysis.

Higher Security:
Security is major concern for many customers. Users will buy more than in traditional Infrastructure systems, based on their need and status for their integrity, confidentiality, and resilience, and the safety services of their providers.

No Location Constraints:
Any user acquired Cloud services can also connect their virtual offices and as needed very easily and quickly, when they are offsite. In today's scenario every organization has the requirement to access their own data from anywhere in the world. So they have the ability to access their data from home, office or from any other location.

High Availability:
The term High Availability refers to a system that is designed to avoid loss of service by reducing or managing failures and minimizing planned downtime. The system is expected to be highly available when life, health, educational, economical and well-being are the important.
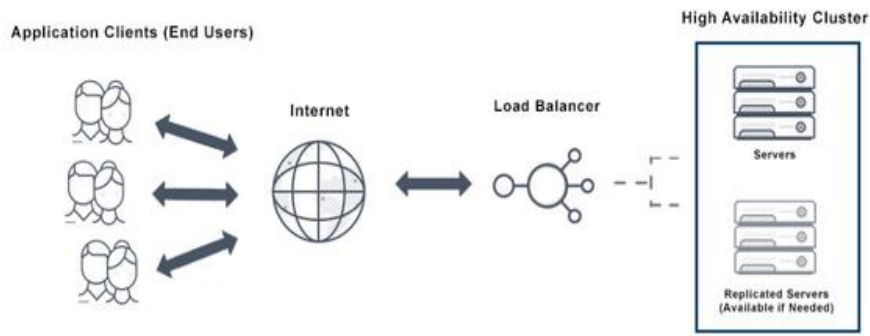
Fig. 3- High availability services system of Cloud technology.

Disaster Recovery:
Since business data and relevant information are key assets of any organization, so controlling the resources is should be the main factor. Cloud services provide quick data recovery for all kinds of emergency scenarios, from natural disasters to power failure.

V. WHAT IS CLOUD DEPLOYMENT MODEL?

Our main focus of this work is to analytical study of the Cloud deployment model which represents the particular category of Cloud environment based on who controls security for the business data, required data is accessible for which person or user, and whether the resources and dedicated services are shared. These models are also defines the purpose and nature of Cloud environment. Each Cloud deployment model can satisfy different needs of the organization [6]. Any of these model acts as a virtual computing environment that offers a choice of deployment model according to how much data users want to store and who will have access.
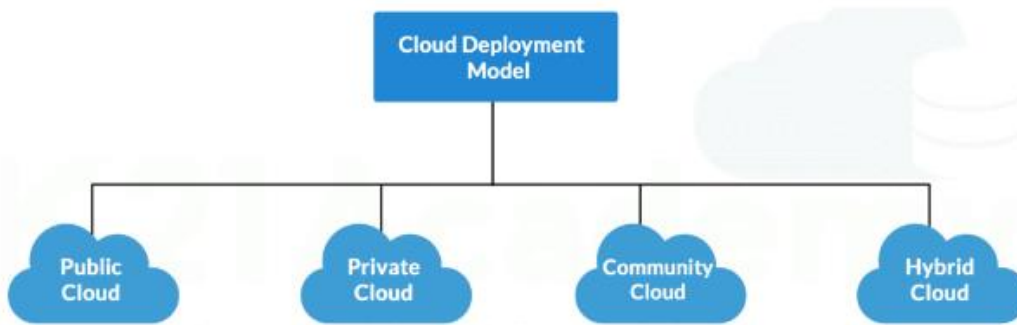

Fig. 4- Different Cloud deployment model

Public Cloud Model:
A public Cloud uses the tradition scenario of Cloud computing with the capability to use the resources from anywhere in the world with internet. The public Clouds can be used in a pay per use basis, meaning that just the resources that are being used will be paid by transaction fees [11]. Today the public Cloud is a very popular technology for huge amount of data storage purposes because data stored on it can be backed up and accessible from any location.

Private Cloud Model:
Private Clouds are normally datacenters that are used in a private network and hence it is restricted to public access the data which is used by any particular organization or business company. It is more secure technology for the users than the public Cloud technology. But companies that uses private Cloud technology for their business policies are always have to worry about data center management and maintenance, building purchase and other costs also for the system [11].

Community Cloud Model:
As the name implies community Cloud is owned and managed by a group of organizations that have same policies. This Cloud technology is very good and useful for all such companies that have the same application and hardware and software resources requirements and like to cost to be shared among them [4].

Hybrid Cloud:
As name implied Hybrid Cloud referred to an environment which includes computing, storage and several services. It combines the features of both Public and Private Cloud services. We can say in other word that, Hybrid Cloud is a Cloud computing model which combines at least one Private Cloud and at least one Public Cloud to ensure flexibility, scalability and data security issues. This Cloud provides high security and can be scaled up and down based on demand [10].

VI. PUBLIC CLOUD DEPLOYMENT MODEL:

Public Cloud is an IT model and as the name indicates, the public Cloud is available for the general public who want to use computing resources such as software and hardware over the internet. "Public Cloud is a very flexible model of Cloud system; through this model computing resources are owned and operated by a service provider via the Internet."

While using public Cloud service, there is no need to manage these resources as Cloud computing providers configure and manage these services. Major uses of public Cloud are for software testing and application development. It has a strong characteristic that is it provides a reliable and secure data storage center compare to other storage methods. These services may be free or sold on demand where customers need to pay as per the usage of storage, CPU cycles and bandwidth utilization [8].
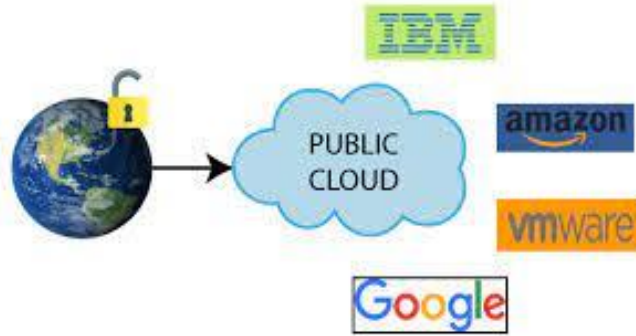

Fig. 5- Various public Cloud service providers

Examples of top Public Cloud service Providers:

- Amazon Web Services (AWS)
- Google Cloud Platform (GCP)
- Microsoft Azure
- IBM Cloud
- Oracle Cloud
- CloudFlare

VII. WHY PUBLIC CLOUD:

Today several organization uses the public Cloud to scale of IT resources without worried to expanding physical resources and IT infrastructure. There are lots of benefits of using public Cloud; any organization can save their money and cost with following manner:

- *Maintenance cost is very less:* Since maintenance task of very cost effective and complex task, with public Cloud-based services, the cost of maintaining IT equipment is also passed on to the Cloud service provider.
- *Equipment purchase cost is less:* with public Cloud we have to no worry about purchase of different equipment needed. Because user can access and pay for Cloud-based resources only when they need them, using public Cloud–based applications is often less expensive than managing different software packages and other related IT equipment [3].

VIII. ADVANTAGES OF PUBLIC CLOUD:

On demand, self-service, resource pooling, rapid elasticity are some key features of public Cloud but it has some other advantages. We here depict these major benefits of public Cloud.
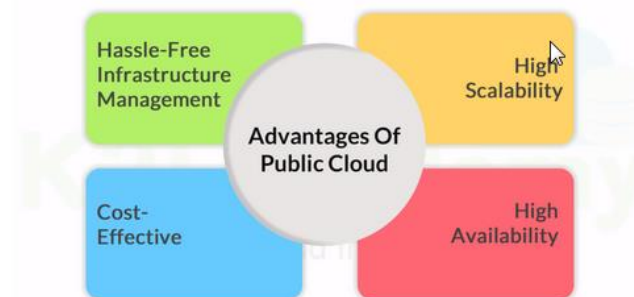

Fig.6- Major advantages of public Cloud.

- It provides hassle-free Infrastructure management. We sit and need to focus on our business tasks and operation. We don't have to purchase, manage and maintain user full hardware and software resources needed. Our Cloud Service Providers are the responsible for everything and does it for us.
- Public Cloud provides high scalability to its users, as you can scale up and down the resources as per the requirement.
- Using the services of Public Cloud is a cost-effective way in which you only pay for the resources you use.
- Cloud computing providers promise 99.99% availability of your infrastructure.

IX. COMPARATIVE ANALYSIS OF CLOUD DEPLOYMENT MODELS:

Following table describe the performance of different available Cloud model; we have tried to represent main deployment models with an overview of what each model can do for opted users.

Important Factors to Consider	Public	Private	Community	Hybrid
Ease of use	Easy	Need IT experts	Need IT experts	Need IT experts
Data Security	Less	High	Very High	High
Scalability and flexibility	High	High	Fixed	High
Cost effective	Most affordable	Most expensive	Depends upon number of members	Cheaper than private but more expensive than public
Reliability	Less	High	Higher	High
Demand for in-house hardware	No	In-house hardware is not a must but is preferable	No	In-house hardware is not a must but is preferable
Ownership	CSP	Single organization	Several organization	Organization Cloud Service Provider
Location	Off premise	Off or on premise	Off or on premise	Off or on premise

Table: 1. Comparative study of different Cloud deployment models
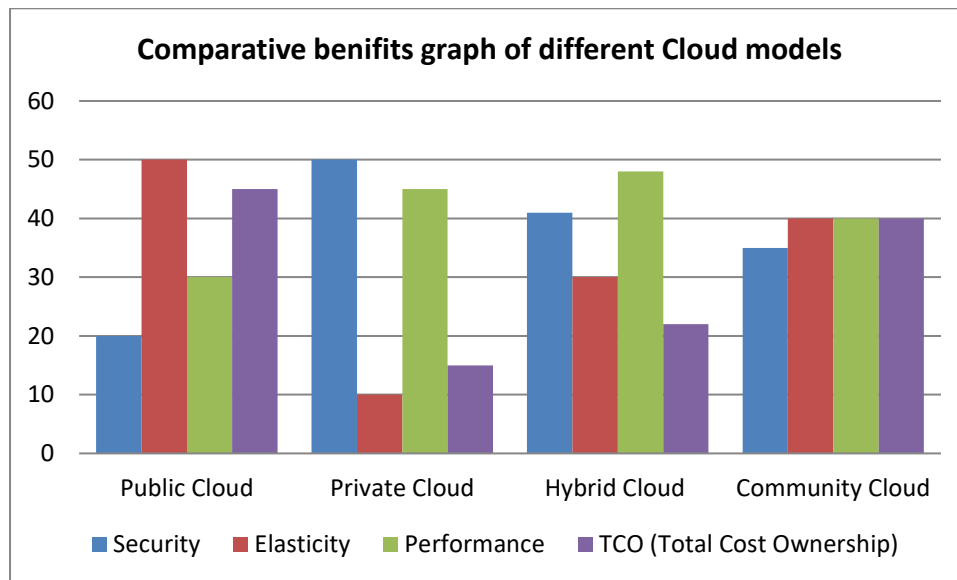
Graph: 1. Comparative benefits graph of different Cloud deployment models.

CONCLUSION:

In this era of computing, the scopes of Cloud technologies continue to expand across different sectors. Today, with the help of cloud services, users are able to access; share their IT resources across the world. To sum up Cloud computing is very broad research area of study, which motivates many researchers to do research works. In 2022 and beyond public cloud will accelerate growth across every segments of IT applications. This research paper mainly focuses the study of cloud deployment models, specially "Public Cloud". There are several types of users of cloud services as public, private, hybrid and community. From above study, we can reach to the result as Public cloud services are more flexible, scalable and cost effective than all other types of deployment models. But as it is provided services with less data security, if anyone has the security as main concern, then they have to choose another available model as private or hybrid.

During last year's (2020-21) pandemic situation in India, many academicians, researchers and IT experts had given their reports over cloud services and IT service providers which collectively stated that Public cloud services will take a key focus for the global businesses with its benefits of improved "flexibility, scalability and cost efficiency" for IT and web based application across the world. In future cloud computing will continue to be remote workforce and an essential target for several organizations looking for the business benefits as scalability, flexibility, continuity, cost efficiency and economic expansion in upcoming years.

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