The Cloud: Features, Challenges and Scope

Aditya Chaturvedi S [1], Pooja Gupta [2]

[1]Student, Department of Information & Technology, Shri Govindram Seksariya Institute of Technology & Science, Indore, India.

[2]Assistant Professor, Department of Information & Technology, Shri Govindram Seksariya Institute of Technology & Science, Indore, India.

Corresponding Author: sheriadi00@gmail.com

Abstract: - Cloud in technology is the future. Basically, it provides and delivered many types of services over the internet. Services likes storage, networking, database management, hosting, developing etc. can be done over the Cloud. Cloud computing is the economic way which is considered by millions of people today for due its speed and efficiency. Cloud computing can be divided on the basis of majorly three terminologies, 1- Services 2- Deployment Model 3- Architecture. Also, India is among the most populated country hence they are millions of users using smartphone and laptops. Hence in this paper we will also elaborate the impact of Cloud in India hence most of the people is using the free Cloud (Public) services provided by the best companies like Google and Amazon.

Key Words: — *Cloud Computing, Public, Private, Hybrid, Deployment, Services.*

I. INTRODUCTION

Cloud computing is a way of providing different services (Fig:1) through the Internet. Today Big companies were using technology. Mainly this technology provides us the power of both hardware and application virtually.
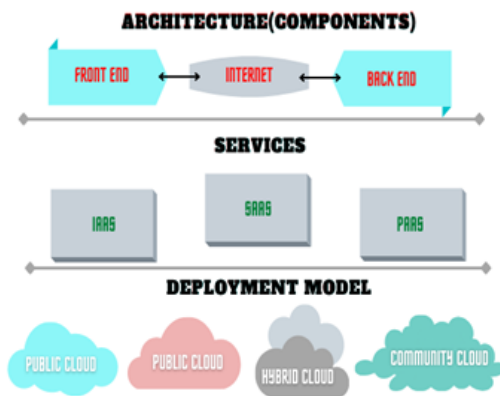

Fig.1. Basic Terminologies of Cloud Computing

Cloud computing is now everywhere due to performance, security, economic, increased productivity, speed and efficient. When the Covid-19 pandemic occurs across the globe, the

Cloud services help the student, teacher, IT specialist, business man etc. to perform their work and interact with each other easily. Basically, further we will study about the different terminologies of Cloud computing and pros & cons too [7][3][2].

II. ARCHITECTURE OF CLOUD COMPUTING

Cloud Computing architecture also referred as the components of Cloud computing. The Cloud computing architecture divided in two main categories- Front-End & Back-End. Both of these categories communicate with each other with a network generally Internet. The Front End consist of Client Infrastructure and while the Back End includes: -Application, Service, Cloud Runtime, Storage, Infrastructure, Management & Security. Fig 2 above tell us the basic architecture of the Cloud computing.
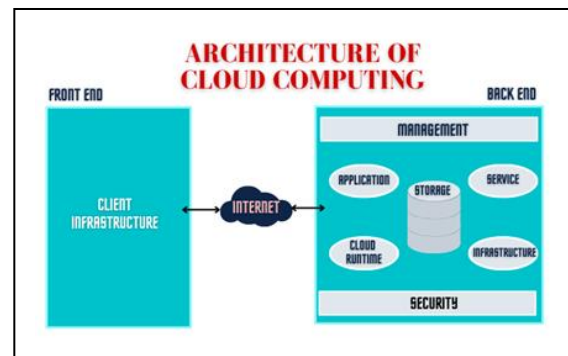

Fig.2. Architecture of cloud computing

A. Front End

The Front End of the architecture provides the interface and the tools & application which are mandatory for accessing the Cloud platform. It also provides GUI (Graphical User Interface) to the users to perform their respective task. Majorly it has client side's applications *i.e.,* Web Browser like Microsoft Edge, Google Chrome etc. Front End only have one component – Client Infrastructure.

Client Infrastructure:

It basically provides the GUI (Graphical User Interface) which useful for end user or client to understand things easily.

B. Back End

The Back End of the architecture is responsible for all the major tasks including the monitoring of the programs that run on the front-end. It consists of all the resources which are mandatory for the services of Cloud computing. The Back End consisting of various major components.

Back End Responsibility includes security mechanism, traffic control and various different protocols which are required to make devices connected and communicate with each other. Now let's study each component of back end in details in next section.[1][5][8]

Application:

The application component can be any application or a platform that clients want to use. Depending upon the type of application or platform the application will provide the result to the end user in the backend itself with all resources.

Service:

In the architecture service component is an essential one. The main task of this component to provide the utility to the architecture. Basically, there are three types of services which Cloud computing offers- Cloud Platform Service or SaaS, Cloud Platform Service or Paas, Cloud Infrastructure Service or IaaS. We study all these services in details in next section of Cloud computing terminology.

Runtime Cloud:

The fundamental task of this component is to provide the runtime environment to all the available virtual machines. The execution environment is also provided by this component only.

Infrastructure:

This is the core component since it includes hardware and software components like virtualization software, network devices, servers and many other resources required for the Cloud commuting architecture. It provides the services on the basis of -Host level, Application Level & Network Level.

Storage:

This component provides storage capacity and management of the data. The capacity depends upon the service providers. There are various types of different storage services providers are available in market like MS Azure Storage, Oracle Cloud Storage etc.

Management:

The main task of this component is to   maintain the coordination between all the other components. It allots specific task to a specific resource. Also, it helps to management of all the other components.

Security:

It is a core component which is used to provide the secure Cloud resource and other files to the end users. It implements the security mechanism over the back end including the Cloud server with providing firewalls to prevent the data loss.

III. CLOUD COMPUTING SERVICES

Cloud computing, now days is the backbone of all kinds of organizational setups whether big or small and through Cloud computing, organizations can share unlimited resources available in the Cloud.

The Cloud offers mainly three type of services- Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).

A. Infrastructure as a Service or IaaS

The Infrastructure as a Service or Cloud Infrastructure service, the providers or the vendors will provide – Networking, Virtualization, Storage & Servers. Hence the client or the end user manages the Application, Data, Hardware, OS and Middle ware. Hence user can purchase hardware according to their need. IaaS benefits those who are planning to migrate their organization to the Cloud. Also, here an IT tech. or you yourself have to manage and keep the application updated time to time. This Cloud Service generally used in Data Analytics, Date Warehousing, Testing & Development Environment etc. Also, some of the Big Providers of this service are- Cisco Metapod, Google Compute, AWS etc.[5] [2]

B. Platform as a Service or PaaS

In case of Platform as a Service or Cloud Platform service, the vendors or the providers will provide – Runtime Environment ,

OS, Virilization ,Servers ,Networking ,Storage. The end user or the client manages the application or the software. This Cloud platform services, generally used for development. One can easily develop and deploy the things using this service. Some of the providers are- Google Web Engine, Bean stalk, Open shift etc.[5][3]

C. Software as a Service or SaaS

In case of Platform as a Service or Cloud Platform service, the vendors or the providers will provide – Runtime Environment, OS, Virilization, Servers, Networking, Storage & Application The end user or the client just need to basically need a browser to login and everything is available in one click. Here user don't need to worry about any update of application. Everything is updated automatically. Cloud services were among the fastest growing technologies. SaaS provide the end user almost everything, just by using a simple web browser. [2][1][4]

Some of the providers are- AWS, MS Azure, Salesforce, WebEx by Cisco etc. Figure 3 below give us the comparison of all 3 services:
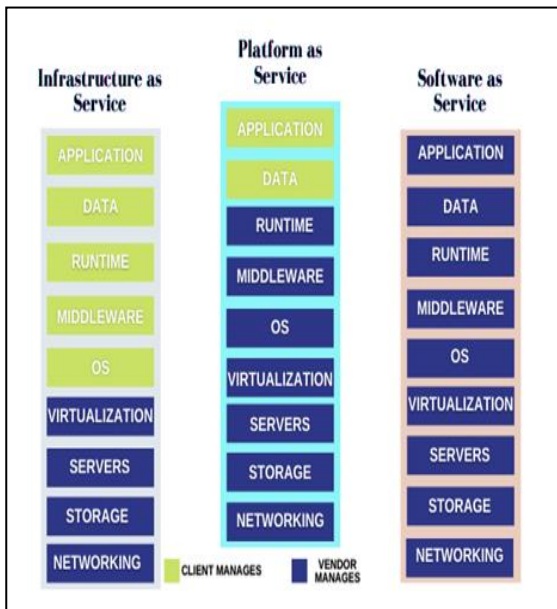

Fig.3. Cloud Computing Services Comparison

IV. CLOUD COMPUTING DEPLOYMENT MODELS

Here we will see how the Cloud is deployed and used in Different ways Also, how it is hosted, and who has access to Cloud platform. Cloud deployments operate and work on the same principle by – Virtualization, Software-driven apps which provide processing and storage capabilities over Cloud. There

are 4 models of Cloud computing– Public, Private, Hybrid & Community. [2][5].

A. Public Cloud

Public Cloud Deployment model tell us about the IT services that we use and which are there by hosted and delivered by a third party. One can access whenever he wants. These Services are made for the Public to use. The Public Cloud is Versatile in nature & it follows the "Pay as You Go" which allows the customers. Fig: 4 below tell us the working of Public Cloud. The main drawback is that the vendor has full control over the infrastructure. And the users have to follow the guidelines given by the providers. If the Service provider faced downtime for their data center or for any reasons some changes were made then the user need to accept that changes   Also there is the risk vulnerability in the Cloud & exposing customers to risk. Some of the biggest providers are- Google, Amazon & Microsoft [2][6][8].
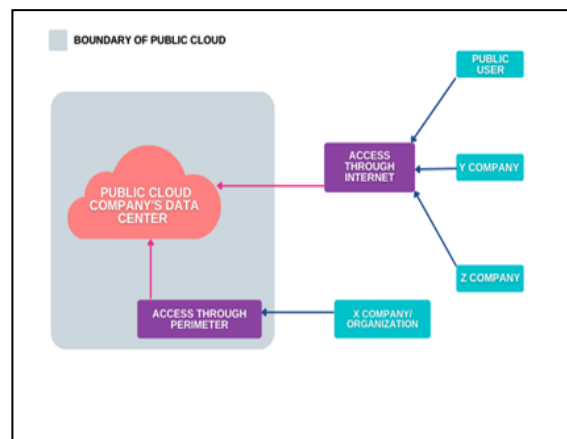

Fig.4. Working of Public Cloud Deployment Model

B. Private Cloud

In the Private Cloud deployment model, platform is not shared with other any other companies or organizations. It has multiple parts or companies which lies within the organization. The extra control offered by this.

Fig: 5 tell us the working of Private Cloud. Private Cloud model lacks the versatility of Public Cloud model. Private Cloud model can only be expanded by buying more physical computer and storage capacity. In Private Cloud deployment model, a user can deploy their own structure & his own applications into their own data center. Some of the biggest providers are- VM Ware & Cisco Cloud.[3][1][4].
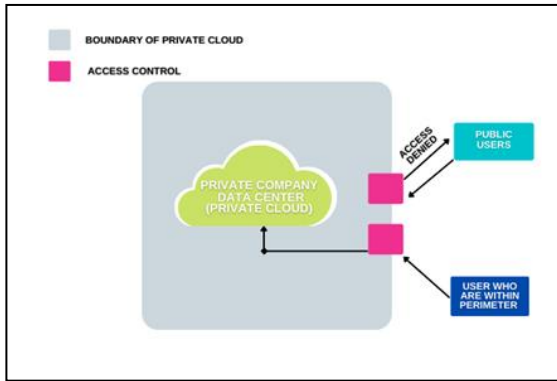
Fig.5. Working of Private Cloud Deployment Model

C. Community Cloud

Community Cloud Deployment model (refer Fig 6) is generally like an organization having many small companies for different purposes.

Here the parent organization provide its access of the data center to all those companies lies within. They can access the same within the perimeter of the organization or via internet also. Hence it is very useful for organization which very big. [1][5][7].

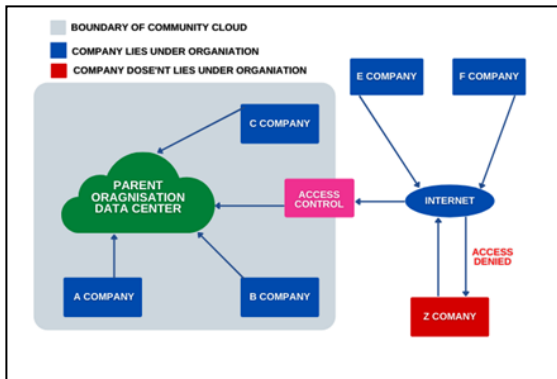Some of the provider of this model are: VM Ware & Cisco Cloud.

Fig.6. Working of Community Cloud Deployment Model

D. Hybrid Cloud

In Hybrid Cloud Deployment Model, a user can use different types of cloud for different purpose. Say a user use private cloud to store sensitive data and simultaneously uses public cloud for hosting the front end application. So overall the Hybrid Cloud is the formation or combination of two or more than two different deployment models. Some of the biggest

providers are -Amazon, MS, Google. Fig 7 show us the working of Hybrid Cloud   [5][1]
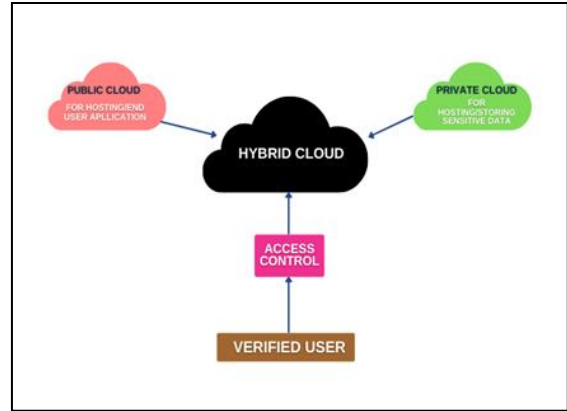

Fig.7. Working of Hybrid Cloud Deployment Model

How these Deployment models depend on Services of Cloud computing?

All the different deployment of the Cloud depends upon the different services and use different services. The IaaS generally is related to the Public Cloud Private Cloud & Community Cloud. Not for the Hybrid Cloud. The PaaS is related to - Public Cloud, Private Cloud & Hybrid Cloud. Not for the Private Cloud. Just like that the SaaS is related to the Private Cloud, Community Cloud & Hybrid Cloud. The Fig 8 above show us how all 3 services are related to the different deployment models.
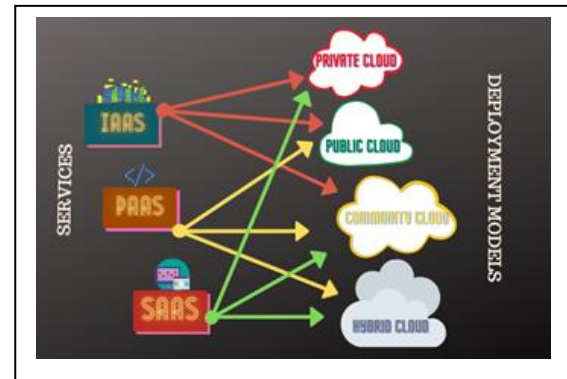

Fig.8. Service's & Deployment Models

V. Cloud Usage For Digital Growth In India

India is among the developing countries whom is moving toward a rapid digital growth. India is now the home of many digital devices and services. As the population of India is more than 138 crores, and estimation of citizens using digital services

can be more than 80 Crores as we have around 56-60 Crore users of Internet in India.

Hence this is the reason why many big Cloud leaders like Amazon and Google found their users in India. Majority of Users in India Using Google as the Public Cloud platform and during the time of Covid-19 pandemic to till now Cloud computing is the solution for variety of major activities from Education to Work. Also Figure 9 tell us how Cloud is used in different ways in India.
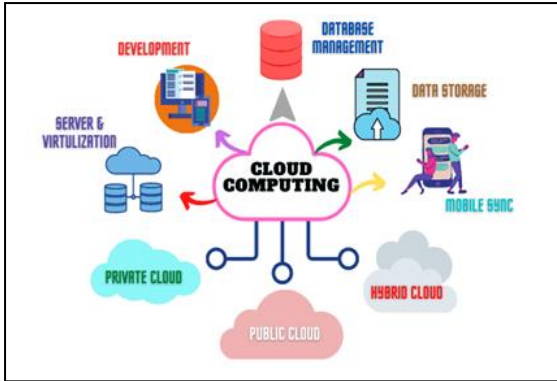

Fig.9. Cloud Computing Utilization in India

Acc. to a report by "Statista" in year 2017 the Public Cloud market has around the value of **141768** million Rupees. And the same was increased to **2,48,387** million Rupees in 2019 and **3,13,560.2** million Rupees in Oct 2020. Using mathematic calculation and if we consider the digital growth due to COVID 19 pandemic then in the year 2022, the Public Cloud market will be around **4,87,209.11** million Rupees in India. This growth can be have further estimated growth to **5,97,072.86** million Rupees in year 2023 *refer Figure:10* .So, we can clearly see that our country India will be the soon the one of the Greatest competitors of Public Cloud in the market.
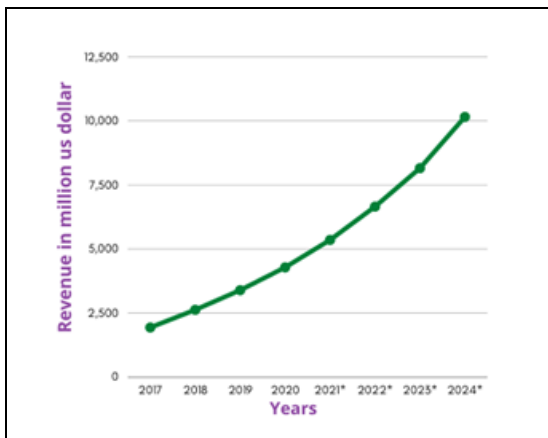

Fig.10. Market of Public Cloud in India

VI. CONCLUSION

In this paper we saw what are different Cloud computing terminologies and also the Cloud utilization in India. Cloud is the present and definitely is the future technology. Many different organization weather govt or private using the Cloud according to their needs. The Cloud make possible to study and work even in the hardest time like Covid-19 Pandemic. Also, across the globe the rapid growth was seen in digital devices due to the pandemic last year which also results to increase the growth in Cloud technology. This technology is a very optimized but it has some security concern. Big companies like AWS and Google working on the issues and vulnerabilities in Cloud computing. In India also security concern is one of the greatest challenges to be seen in near future.

REFERENCES

[1]. Haji, A., Ben Letaifa, A., & Tabbane, S. (2010, October). Cloud Computing: Several Cloudoriented Solutions. In ADVCOMP 2010, the Fourth International Conference on Advanced Engineering Computing and Applications in Sciences (pp. 137-141).

[2]. Chong, Ngo Yang (2019). Cloud Computing Challenges in a General Perspective, University of Warwick Journal of computing and management studies.

[3]. Singh, Sukhpal Gill (2019).The Future of Cloud Computing: Opportunities, Challenges and Research Trends, University of London

[4]. Majdalawi, Yousef (2019). Cloud Computing of E-commerce, University of Jordan.

[5]. Thakur, Manisha (2019). Cloud Computing & Security Issue, Bahra University International Journal of Computer Science and Mobile Computing.

[6]. S. Patidar, D. Rane and P. Jain, "A Survey Paper on Cloud Computing," 2012 Second International Conference on Advanced Computing & Communication Technologies, Rohtak, Haryana, 2012, pp. 394-398.

[7]. S. Namasudra, P. Roy and B. Balusamy, "Cloud Computing: Fundamentals and Research Issues," 2017 Second International Conference on Recent Trends and Challenges in Computational Models (ICRTCCM), Tindivanam, 2017, pp. 7-12.

[8]. Saravanan and R. Sridhar, "Software as a Service by Interoperating in a Multi-Cloud Environment," 2018 International Conference on Advances in Computing, Communications and Informatics (ICACCI), Bangalore, 2018, pp. 300-306.

[9]. S. S. Qureshi, T. Ahmad, K. Rafique and Shuja-ul-islam, "Mobile cloud computing as future for mobile applications - Implementation methods and challenging issues," 2011 IEEE

International Conference on Cloud Computing and Intelligence Systems, Beijing, 2011, pp. 467-471.

[10]. G. Mangal, P. Kasliwal, U. Deshpande, M. Kurhekar and G. Chafle, "Flexible Cloud Computing by Integrating Public-Private Clouds Using OpenStack," 2015 IEEE International Conference on Cloud Computing in Emerging Markets (CCEM), Bangalore, 2015, pp. 146-152.