

Revolutionizing IT with Cloud Computing Development

Piyush Soni¹, Dr. Vishal Shrivastava², Dr. Akhil Pandey³, Dr. Akhil Pandey⁴

¹B.TECH. Hosteler, ^{2,3}Professor, ⁴Assistant Professor

Computer Science & Engineering

Arya College of Engineering & I.T. India, Jaipur

sonipiyush436@gmail.com, vishalshrivastava.cs@aryacollege.in,

akhil@aryacollege.in, akhil@aryacollege.in

Abstract: Cloud computing is one of the fastest-growing techs today. It ranks high in many areas of computer science because it plays a big role in computing, like Big Data and Data Science. Cloud computing provides many services via the Internet, such as data storage, databases, platforms, infrastructure, and more. It is a mix of software, computation, data access, and storage services with on-demand resources. This paper gives a full view of Cloud Computing, its setup, along with different services it offers. This paper also talks about some of the pros and cons of cloud computing. The use of cloud computing grows quickly in many fields. Cloud Computing is smart and useful tech now. Many people and businesses use the cloud for reasons like efficiency, strong computing, security, high performance, more productivity, and saving costs

Keywords: Cloud, Architecture, IaaS, PaaS, SaaS, Private cloud, Public cloud, Hybrid cloud, Cloud Computing

I. INTRODUCTION

Clouds in the sky are groups of water drops, while in cloud computing, "cloud" means lots of networks. With cloud computing, users can use what they need whenever they want. Instead of setting up their own gear, users often go to a company that offers internet services. In the 1960s, Joseph Carl Robnett Licklider worked on ARPANET, allowing people to connect with each other and data from anywhere, anytime. In 1983, CompuServe let users keep files on a small space they could upload to. Cloud computing is about getting network use, computing power, databases, storage, applications, and more IT help via the internet, and you pay as you go. It involves storing and accessing data and programs online instead of on a device's hard drive. Cloud computing means apps are services over the web, and also the systems in data centers that offer these services. These services are named Software as a Service (SaaS), and sometimes IaaS (Infrastructure as a Service) or PaaS (Platform as a Service). The rise of cloud computing is due to its great benefits, like lower costs, easy user access, less upkeep, free services, and reliable use. Cloud services suit businesses with changing needs. When needs grow, it's easy to scale and use more cloud space, tapping into a provider's far-off servers.

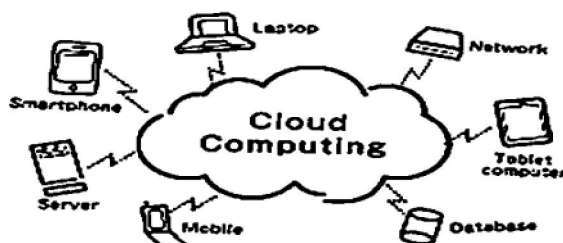


Fig.1 A Model of Cloud Computing [5]



II. CLOUD ARCHITECTURE

Fig.2 shows a basic design of cloud setup. It has lots of servers. This setup shows how the cloud works and how to use it. Virtual machines help servers use all of their power, fitting tasks to what the server can do. The setup has a simple front desk like a Portal where users can pick what they need from a list. [3]

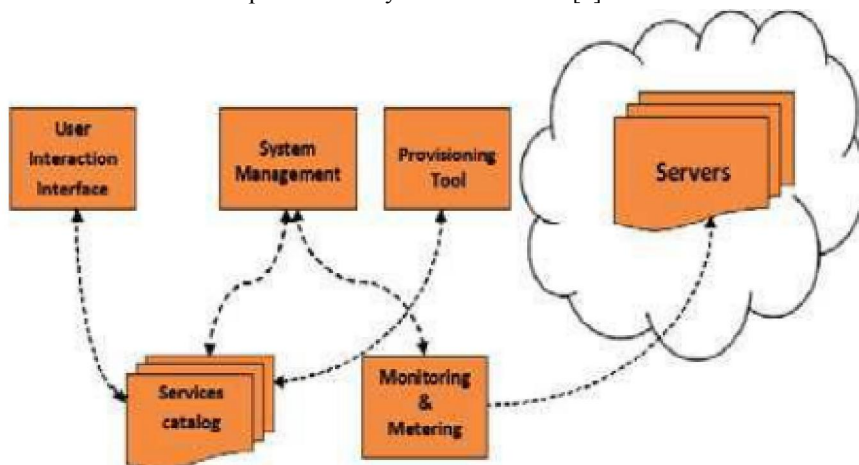


Fig.2 General cloud computing architecture [3]

Classifications of Cloud Computing: Cloud computing has four main types that are set up in different ways. Each type has its own traits and helps with the needs of services and users in special ways.

- **Public Cloud:** Cloud service companies own the public cloud. Clients can't control the cloud; they just use its services. It feels like all runs smoothly on their computers because of cloud virtualization. Users don't need to buy hardware, software, or supporting tools; these are owned and managed by providers with public cloud services. Cloud computing is often shared by many organizations. Google, Amazon, Yahoo, and SUN are examples of public cloud providers.

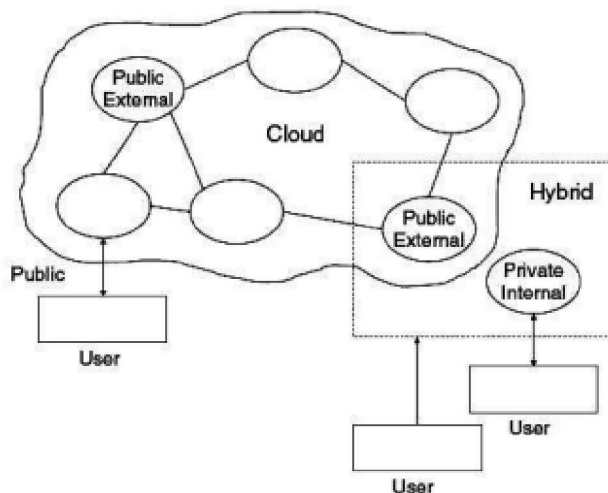


Fig.3 Cloud Models [3]

- **Private Cloud:** A private cloud is owned by a company or hosted by a third party. It is used by that company's different units and groups. Private clouds cost more than public clouds. There are two kinds: on-premise and externally hosted. Both serve one company, but an externally hosted private cloud is run by another group with lots of cloud knowledge. On-premise private clouds cost more than externally hosted ones.



- **Hybrid clouds:** Hybrid clouds mix public and private clouds. A customer makes a cloud this way to fit what they need. For instance, a company might make a hybrid cloud using a CRM system from Sales-Force.com on a public cloud and an ERP system on their own private cloud.
- **Community cloud:** A community cloud setup is used by a few groups. It helps serve a group with shared goals like safety needs, school, rules, and such. The cloud can be run by the groups or another company, and it can be on-site or off-site.

III. CHARACTERISTIC OF CLOUD

1. On demand access.
2. No up-front commitments.
3. Pay-per-use model.
4. Nice Pricing.
5. Efficient resource allocation.
6. 24/7 hours available.
7. Easily manageable, flexible and scalable.
8. Energy efficiency.
9. Increased agility.
10. Service orientation.
11. Security.
12. High performance and reliability.
13. Accessible from anywhere. [2]

IV. CLOUD COMPUTING SERVICES

Cloud computing lets people get IT services online when they need them. It has three main types: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), and Software-as-a-Service (SaaS).

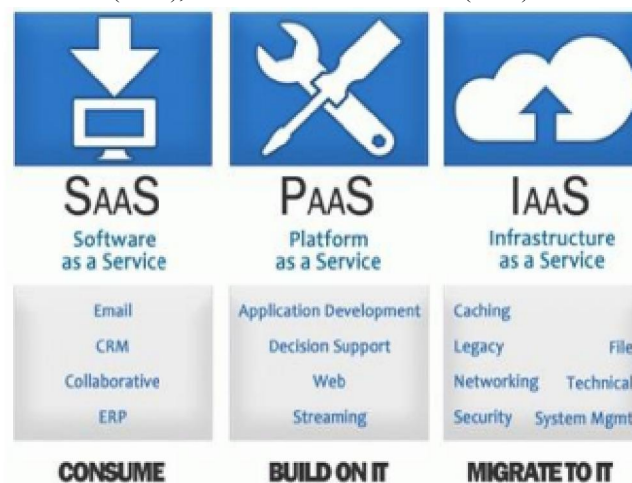


Fig.4 Cloud Services [8]

• Software as a Service (SaaS):

SaaS sits at the top in cloud service layers. In this plan, users do not have to install software on their PC. They also avoid high costs for buying software and licenses upfront. Users place their apps in a host environment. Access is through networks from different devices like browsers and PDAs. Users do not control the cloud setup. It often uses a multi-user system, where apps from several users are in one logical space. This setup maximizes speed, safety, availability, recovery after failed, and upkeep. SaaS examples are Salesforce.com, Google Mail, Google Docs, etc.





Fig.5 SaaS Services [2]

• **Platform as a Service (PaaS):**

PaaS is a platform that helps build and run apps from start to finish. It lets users make apps on the cloud, like SaaS. The key difference is that SaaS holds ready-to-use apps, while PaaS lets you create and host both finished and in-progress apps.

Users make their apps without worrying about the hardware, whether physical or virtual, or about servers, storage, operating systems, and other basic services. This means cloud computing is used at a higher level, but it may limit the user in some ways. The user works in a more controlled setting. PaaS often supports many coding languages like Python and Java (e.g., Google AppEngine), .NET languages (e.g., Microsoft Azure), and Ruby (e.g. Heroku). Force.com or Salesforce.com has its own coding language, Apex, and an Excel-like query language, offering more simple access to main features. The most widely used is Microsoft Windows Azure, offering a full framework for building service-oriented cloud apps using .NET technology, all hosted at Microsoft centers.



Fig.6 PaaS Services [2]

• **Infrastructure as a Service:**

IaaS is the lowest layer that gives needed parts on request, like virtual storage, networking, virtual machines, and hardware. It provides changeable setups when users ask the IaaS provider. The provider makes one or more virtual machines as the client wants. [2] Cloud users use IT setups directly (like processing, storage, networks, and other key resources) in the IaaS cloud. In IaaS, they use virtualization a lot to mix or split physical resources as needed to manage rising or falling resource needs from cloud users. This way is not like the multi-tenancy model, which changes software so many users can use the same app logic at once in different instances. A known example of IaaS is Amazon's EC2. [1] Public cloud vendors like Amazon, GoGrid, Joyent, Rightscale, Terremark, Rackspace, ElasticHosts, and Flexiscale offer IaaS services. They have large data centers and let you rent their computing setups. [2]





Fig.7 IaaS Services [2]

IV. ADVANTAGES & DISADVANTAGES OF CLOUD :

Advantages of Cloud:

- **Cost Saving:** In cloud computing, people pay only for what they use. Maintenance costs are low because they don't buy the infrastructure.
- **Better Performance:** In cloud use, programs run on servers in the cloud. Users do not have to put big software on their own slow machines. This makes their computers faster on their end.
- **Flexibility:** Cloud can change size fast. When business moves quick, you might need to switch tools fast. Cloud gives this ease to deal with those shifts.
- **Back-up and bring back information** Once the data is deposited in the cloud, it is calmer to get back-up and return that data using the cloud.[6]
- **Universally Availability of the Data:** Using cloud services lets you get to your data from any place whenever you want. All you need to do is sign into your cloud account where your data is kept.
- **Unlimited Storage Capacity:** With cloud help, the client can use endless space from the cloud provider. When the client needs more space, they just pay more to use the big cloud storage because setting up big storage costs more than renting space.
- **Reduced IT Infrastructure Cost:** Cloud services offer infrastructure to users. This helps cut costs for setup. Clients pay only when the server is set up.

Disadvantages of Cloud:

- **Need for Always-On Internet:** Cloud services need a nonstop internet link. If the internet is down, cloud services can't be used offline. [7]
- **Internet Connectivity:** In cloud computing, all data (pictures, sound, video) is kept in the cloud. We access this data from the cloud using the internet. [6]
- **Limited Control:** Cloud systems are fully owned, managed, and supervised by the service provider, so users have less control over the way services run within the cloud. [6]
- **Lower Security:** The Public cloud often has lower security because it is open to everyone. Hackers from the public can harm or misuse the data. [7]

V. CONCLUSION

Cloud computing is a rising tech where users run apps in a shared space, growing fast. Users run apps and software in a virtual space without installing them on their computers. Cloud computing gives advanced tools on-demand, with updates and no need to buy or keep up the hardware. Cloud computing is great smart tech today. Now, IT firms move their work to cloud setup because it offers real hardware to make an app. Many people and firms use cloud services for



many reasons like saving money, high speed, strong power and safety, more output, and good work. Cloud computing has a big effect on work and community.

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