

A Brief Introduction to Cloud Computing

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Abstract - Cloud Computing is the method of providing computer system resources which include data storage, applications, computing storage, networking, development, and development platforms. Cloud computing provides service on demand to the clients. Cloud computing offers flexible and extendable computing environments for organizations. The advantages of this model are cost efficiency and easy usability. The main questions are aspects such as security and cloud management, but this model offers many more benefits. This paper provides a brief introduction to cloud computing and an understanding of the cloud computing model and available technology and infrastructure.

Key Words: Cloud Computing, Cloud Services, Software as a service, Platform as a service, Infrastructure as a service

1. INTRODUCTION

The next phase of the internet's progression is cloud computing. It provides the path through which everything from computing power to business processes to personal collaboration is delivered to you as a service whenever and wherever you need it.

Despite being a relatively new distributed computing model. Though it is not a new concept, it has recently gained popularity. "At the moment, computer networks are still in their infancy," L. Kleinrock prophesied in 1969. However, as they mature and become more powerful, we should expect to see the proliferation of computer utilities that, like current electric and telephone utilities, will support individual homes and offices across the country. His vision was the indication of today's utility-based computing model. Grid computing, which allowed users to acquire compute on-demand, was one of the first steps toward this utility-based future in the mid-1990s. The evolution of grid computing technologies might be considered as the origin of cloud computing.

"Cloud Computing," as the name suggests, is a type of computing that enables the sharing, processing, and serving of computing resources and software applications. In brief, the cloud is essentially a bunch of computers networked together in the same or different geographical locations, operating together to serve a number of consumers with different needs and workloads on-demand basis with the help of virtualization. The pay-as-

you-go business model is used to supply cloud services to cloud users as utility services. Cloud users take advantage of cloud providers' services to build and deliver their apps via the internet to their end-users. So cloud users don't have to bother about installing and maintaining hardware and software needed and they just pay as much as they use. As a result, cloud customers can save time and effort in the field of IT by employing cloud services rather than building their own IT infrastructure.

2. BASICS OF CLOUD COMPUTING

This is a method of providing a set of shared computing resources that includes applications, computing, storage, networking, development, and as well as business processes.

Let's start with a definition of cloud. It is not those pretty blue clouds you might be familiar with. So what is the cloud? When computer architects, system administrators, and computer technicians began setting up system diagrams, the symbol they used for the network was something like this. (Fig. 1)

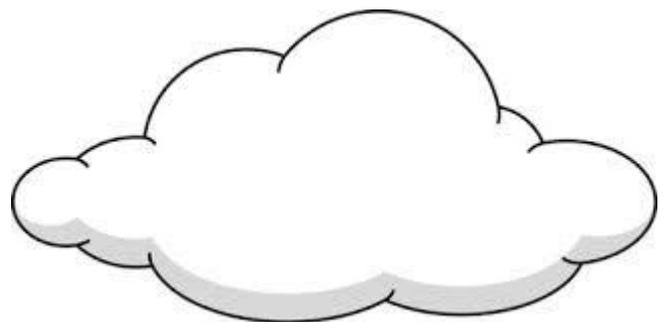


Fig -1: cloud

This is the symbol for a network, whether it is a network of a few computers in an office that share a common server or shared workgroups on a home computer system or the internet. So, when we talk about cloud computing, we're just referring to how we use our computers to share resources.

These resources can be hardware, such as a printer, or software that we share on a network with others. When we use cloud computing, we can share any or all of the following:

- Infrastructure
- Platform
- Software
- Storage
- Security
- Data
- Databases

In the workplace, we are likely sharing most, if not all, of these elements. We might have a keyboard and monitor at our workstation and all our data and software are on the network. We are working in the cloud. In technical words, we are cloud computing.

This computing method is used by enterprises of all sizes and implementations. When we use webmail, we are using a form of the cloud because our mail is on a server someplace else in the world and we are just logging into that server from our own computer. All data is stored on some sort of hard drive. The hard drive size on our computer grew and grew until it reached the realm of terabytes. Then suddenly netbooks started appearing with tiny little hard drives and tablets with small hard drives of 8 or 16 or 32 gigabytes. This was the first signal that people were finding other places to store their data. In technical words, people started using the cloud.

One great benefit of the cloud, if our computer crashed or got eaten by a virus, our data and pictures were safely somewhere else. Cloud computing has emerged in many minor forms, and it is now emerging as a massive solution to the problem of the rapidly changing and increasingly cyber environment in which we live and work. Fig 2 depicts a high-level overview of cloud computing. The figure shows the different sectors in which cloud computing is used.



Fig -2: Uses of cloud computing

3. CLOUD COMPUTING MODELS

Cloud computing is classified into three types. Software, platform, and infrastructure are the three models mentioned. In the technical world, these are known as:

- Software as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a Service (IaaS)

> Software as a Service (SaaS):

It's also known as "on-demand software," which implies the program you use is on a network and available whenever you need it. The service is delivered to various end-users through a single cloud instance. Customers save money since they don't have to invest in servers or software licensing upfront, while providers save money because just one application needs to be hosted and maintained. Companies such as Google, Salesforce, Microsoft, Zoho, and others now provide SaaS.

> Platform as a Service (PaaS):

You can utilize it as hardware and software, or as a computing platform given on a network. As the name suggests, it provides you with computing platforms that typically include an operating system, programming language execution environment, database, web server, etc. If you've used Google Apps, you've had access to a platform that provides you with everything you need to work on a project with others. The original goal of PaaS was to make the code-writing process easier for developers by letting the PaaS provider manage the infrastructure and operations. A PaaS provides a standardized collection of programming and middleware services that give developers a well-tested and well-integrated way to build cloud applications. Google's App Engine, Force.com, Windows Azure, etc are some of the examples of PaaS.

> Infrastructure as a Service (IaaS):

IaaS provides a basic setup for your work. This includes the servers and software and storage for the data. Examples of IaaS include Amazon Web Services, GoGrid, and 3Tera. There are both private and public versions of IaaS.

- **Private IaaS.** When you work in the cloud, you might be working in a private network such as your home network that only members of your household can access this is called a private cloud. Private clouds are also the type of shared network used by corporate organizations. You may check your email and access your files and other information from the workplace, at home, or on the road.

- Public IaaS.** A public cloud is typically a service open to the general public. The public cloud may be available only to specific members of the general public, or it may be available to anyone who wants to participate. The IT organization or an integrator constructs an architecture that allows internal users and partners to request resources on demand. Other cloud models rely on IaaS as a core component. To construct apps, some clients bring their own tools and software.

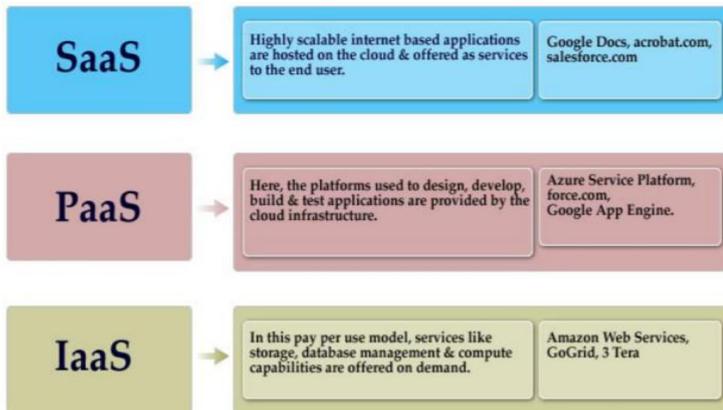


Fig -3: Cloud computing model

4. CLOUD COMPUTING FEATURES

Certain features of a cloud are essential to enable services that truly represent the cloud computing model and satisfy the expectations of consumers and cloud offerings:

1. Self Service:

Cloud service users expect near-instant access to resources on demand. To support this expectation, clouds must allow self-service access so that the customers can request, customize, pay and use services without the intervention of human operators.

2. Per-Usage Metering and Billing:

Users don't have to commit to anything upfront with cloud computing because they may simply request and utilize what they need. Short-term pricing is required for services, allowing customers to surrender resources as soon as they are no longer required. For those reasons, clouds must implement features to allow efficient trading of services such as pricing, accounting, and billing. Metering should be done accordingly for different types of service and usage promptly reported, thus providing greater transparency.

3. Elasticity:

Cloud computing creates the illusion of boundless computer resources at your fingertips. Therefore users

expect clouds to rapidly provide resources in any quantity at any time. In particular, it is expected that the additional resources can be provisioned, possibly automatically, when an application load increases and released when the load decreases.

4. Customization:

In a multi-tenant cloud, a great disparity between user needs is often the case. As a result, cloud-based resources must be very configurable. In the case of infrastructure services, customization means allowing users to deploy specialized virtual applications and to be given privileged access to the virtual servers. Other service classes offer less flexibility and are not suitable for general-purpose computing, but should still provide some degree of customization.

5. APPLICATION OF CLOUD COMPUTING

The possibilities for cloud computing are endless. A cloud computing system might run anything from basic word processing software to customized computer applications built for a specific company. Some applications of cloud computing are as below.

➤ Cloud computing system in education

Once any computer system connected to the internet gets started, then it will direct the student, teacher, or in better words a whole institute to the cloud. Both students and teachers must log in with their own IDs in the cloud, where the first best feature is the ability to track teacher and student attendance, and the second-best feature is the ability for students to view both live and recorded lectures. The finest feature of this service is that it allows students from any school to take tutorials from highly qualified staff at the same time. Third, the entire testing procedure has been altered, with exams now taking place on the cloud and the results of each exam being sent straight to the appropriate authority. With this new system, parents can be able to monitor their ward attendance and their growth in the session. This new system also allows students to better prepare for upcoming competitive tests such as NTSE, IIT, JEE, AIEEE, PET, and PMT, and to avoid the trend of enrolling in large coachings.

➤ Cloud Computing in Healthcare

For decades, the healthcare industry has used technological advancements to give patients with higher-quality care. Computed Tomography (CT) scanners, Diagnostic Sonographic Scanners, Magnetic Resonance Imaging (MRI) scanners, remote monitoring devices, health, and wellness-check devices, and other medical technology-based devices and equipment have aided in the diagnosis of health problems, obviating the need for costly and dangerous surgeries. The most important advantages of cloud computing in healthcare are.

- A cloud-based online health monitoring system.
- Patient care can be improved by providing this service through the cloud faster and more efficiently.
- The cloud allows providers to gain access to specialized professionals to manage and maintain their systems.
- Patients are treated and cared for by healthcare professionals.
- Health Information Exchange (HIE) between physicians, hospitals, and other health care organizations.
- Health care data security is improved.

Electronic Medical Records (EMR) hospitals and physicians are starting to see cloud-based medical records and medical images achieving services coming online.

➤ Manufacturing and Automation

The cloud increases the productivity, quality, efficiency, flexibility, and versatility of almost all automation systems. Below is a list of potential benefits:

Manufacturing and Automation as services over the cloud

- Facilitate small shops bidding on jobs and also let shops rent out idle equipment.
- Reduce design and prototype time.
- Better connection to consumers and suppliers.

Personalized and customized products

- Small firms can quickly establish themselves by using online customer evaluations and feedback systems.
- Enabling new technologies such as 3D printing and mobile phones in medical markets, fashion items, etc.

Production capacity /resources sharing

- Higher utilization of the equipment.
- Reduction of capital investment.
- Easier management.

Optimized complexity

- Improved globalization and complexity management.
- Because of the complicated manufacturing network, there is less impact on quality.

➤ Mechanical Engineering

Mechanical design platform program that measures specific product development in the engineering cloud. This mechanical design platform software is based on

virtual product software (VPS) technology. VPS technology allows the user to quickly and easily use 3D data throughout, data overall life cycle of the product. VPS has been distributed to internal and external users and has been well welcomed as a user-friendly tool that allows the mechanical 3D data.

➤ GIS applications

Geographic Information System (GIS) is used for taking high-quality satellite photos. These photos have rising requirements. Computational power and high-quality data storage were required for these high-quality images.

➤ Military Intelligence Fusion (MIF)

The process of military intelligence data fusion is known as MIF. MIF is a method for obtaining precise target position, state estimate, and identification validation by altering, merging, and incorporating information and data from multiple sources into a unified expression. Cloud computing allows for dynamic access to a pool of cognitive resources.

➤ Banking Sector

Using cloud computing in the banking sector gets more beneficial compared to the traditional network. Cloud computing provides a centralized server for the employer and customer. Cloud computing sole the software problem to install in each computer for any application software and manage the individual computer.

➤ E-Governances

E-Governance is a process of government work, sharing pieces of information internet-connected and delivering services to the client. Various types of E-Governance applications are as follows.

Government to Government: To complete the task, many government functions collaborate. Administration, enterprise and control monitor and distribution, and so on.

Government to Enterprise: Government-controlled corporations, such as water boards and electrical companies, must respond rapidly to government initiatives.

Government to Business: The government is involved in a variety of business activities, including tax collection, contract management, and so on.

Government to Consumer: The government provides numerous services to its citizens.

➤ Project Planning

The act of planning, coordinating, and managing resources to ensure the successful achievement of certain project objectives is known as project management. Participants in the project work in various fields and in various locations. A web-based programme, of course, allows participants in different places to access the same master files. Using a web browser, users can view files from any internet-connected machine.

6. BENEFITS OF CLOUD COMPUTING

- Back-up recovery is very easy in Infrastructure as a Service (IaaS) providers, hence there is efficient incident response whenever data needs to be recovered.
- This environment can be adopted by small enterprises as well as the IT industry.
- Considering cloud computing from the aspects of power management, it serves as a virtual server that is easy to implement as compared to physical servers. Hardware management issues can also be easily identified and corrected.
- Reducing setup costs can be seen as a major advantage of cloud computing. The cost of setting up a data center is not that high.
- Various data centers are spread throughout the country and thus it makes it easy for a business to use preferred sites.
- The assessment of data can be done at a time and is highly beneficial for the IT industry in reducing workloads.
- Automatic Software Integration
- Information is easily accessible. You may access your information from anywhere with an internet connection once you've registered in the cloud.
- Almost Unlimited Storage.

7. DRAWBACK OF CLOUD COMPUTING

- The main drawback of cloud computing is that it is maintained and monitored by third parties. Therefore, confidentiality and security measures are less secure.
- In a cloud environment, the data is not specifically segregated. It is dispersed over the cloud network, causing issues when specific data must be separated.
- This is dispersed throughout the cloud network, causing issues when certain data needs to be

isolated. A reliable service provider providing the desired quality of service may be difficult to source and the process set-up could turn out to be time-consuming.

- Another significant disadvantage is that it is reliant on network connectivity. Network failure can result in a loss to the company by causing extensive time delays.
- Storing information in the cloud can make your business vulnerable to external hacks and threats. As you know, nothing on the Internet is completely secure, and there are always opportunities to steal sensitive information.

8. CONCLUSION

For organizations, cloud computing is the way of the future. If you decide to move your business into the cyber world, go slow. Like many business decisions, you need to have a plan in place. You need to know what software is essential to your business. If you have a mission-critical program, you should investigate whether it could be replaced by a cloud-based application. If not, you must decide whether moving to a cloud provider is worth the effort or developing or improving your in-house network. Or if, possibly, you can move most of the operations to the cloud.

This is also a good time to determine what software you need and determine if you can start with just the cloud services you need and then add more later if necessary. If you own a small business, you may be familiar with the difficulty of the firm growing and making haphazard decisions. Moving to the cloud will involve careful consideration.

This may appear to be a daunting chore, but it may be really beneficial. Streamlining your business can help you save money, eliminate waste, and position your business for future success and growth. Writing policies may seem intimidating. It doesn't have to be a huge project. You can summarise everything by identifying the roles of the people who have access to all or parts of the material, or none at all. You can also choose who has access to specific aspects of the business. In a world where computers have shrunk from big old desktops to laptops to netbooks to tablets, people have so much more freedom to move around and work from anywhere. The future belongs to cloud computing.

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