



The Journey of Cloud Computing Service Models: Evolution and Trends

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ABSTRACT: The system in question is primarily the Internet, although not exclusively. The services provided encompass a range of functionalities including information, software, storage, security, among others. For instance, when we access a blog post using Gmail, watch a movie on YouTube, shop on Amazon, or exchange data using DropBox, we are utilizing cloud-based information (The Google Chrome Group, 2010). In this chapter, we will examine the evolution of Cloud Computing from its early roots in mainframe-based computing to the present day, and elucidate the various services offered by Cloud Computing in both commercial and personal computing contexts. This paper provides an overview of the history, deployment, and business models that have contributed to the development of cloud computing.

KEYWORDS: Cloud computing, service models, deployment

I. INTRODUCTION

Cloud computing is a type of web-based computing that allows users to access and use various resources, such as data, devices, and applications, on a pay-as-you-use basis. In cloud computing, the physical infrastructure is owned and managed by a third-party provider, and users rent the resources they need to perform their tasks. Service providers offer various services that are classified into three categories, which provide different levels of functionality.

The first category is Platform as a Service (PaaS), which provides all the tools and resources needed to develop and deploy applications without the need to install or manage software and hardware. PaaS services include development tools, application hosting, and security features, among others. The main advantage of PaaS is that it offers flexibility and scalability, allowing users to easily develop and deploy applications on different devices. However, PaaS services can be limited in terms of interoperability and mobility among different providers.

The second category is Software as a Service (SaaS), which provides access to various software applications, operating systems, and resources without the need to download or install them on the user's device. SaaS allows users to access a wide range of applications and services from anywhere with an internet connection, making it ideal for remote work and collaboration. However, SaaS services may have limitations in terms of customization and control over the software.

The third category is Infrastructure as a Service (IaaS), which provides virtualized computing resources, such as servers, storage, and networking, that enable users to build and manage their own virtual environment. IaaS allows users to have complete control over their infrastructure and software stack, making it ideal for businesses that require high levels of customization and security. However, IaaS services require more technical expertise and management compared to PaaS and SaaS services.

Cloud computing services are hosted on a network of servers that make up a data center. These servers are responsible for providing the necessary resources to users on-demand, and users can access these services through a web browser. The use of cloud computing has become increasingly popular due to its flexibility, scalability, and cost-effectiveness, making it a preferred choice for businesses and individuals alike.

II. HISTORY

The origins of cloud computing can be traced back to the concept of computer processing as a utility, which was first introduced by John McCarthy, a prominent computer scientist, in 1961. He proposed that if computers were to become powerful enough, computing could eventually be treated as a utility similar to electricity. He envisioned that computer processing could become an essential and distinct field.



In 1969, Leonard Kleinrock, a leading researcher of ARPANET, the precursor to the Internet, predicted that local area networks would evolve into a more advanced and widespread form of computing, which he referred to as "computer power utilities."

Since the mid-1990s, the concept of Internet-based computing has been widely used in various forms, such as search engines (Yahoo!, Google), email services (Hotmail, Gmail), public printing systems (MySpace, Facebook, YouTube), and social networking sites (Twitter, LinkedIn). These consumer-centric services have paved the way for the development of modern cloud computing.

Salesforce.com introduced the concept of remotely provisioned services into the enterprise in the late 1990s. In 2002, Amazon launched Amazon Web Services (AWS), which offers remotely provisioned storage, computing resources, and business functions.

The term "Cloud" or "Machine Cloud" appeared in the early 1990s in the networking industry, referring to an absorption layer in the flow of data across various local and semi-public bodies that were usually packet-switched, although mobile networks have also used the term "Cloud." The social media protocol has facilitated the transfer of information from one endpoint (local source) to the "Cloud" (large-scale network) and then further distributed to another designated endpoint. This challenge, still tackled by the networking industry, is considered an early adopter of the concepts underlying cloud computing.

It wasn't until 2006 that the term "cloud computing" appeared in the enterprise sector with Amazon's introduction of Elastic Compute Cloud (EC2), which allowed businesses to "rent" computing capacity and processing power to run their applications. In that same year, Google Apps began offering browser-based enterprise features, and three years later, Google App Engine was launched and quickly became a widely recognized platform.

III. SERVICE MODELS

As quickly as a cloud is actually created, precisely how its own cloud computing carriers are actually released in regards to solution formats can quickly identify depending upon requirements. The significant solution versions being introduced (view Level 1) are routinely contacted.

- Software as a Service (SaaS)-- Folks get the ability to acquire availability to and take advantage of a procedure or even solution that is hosted in the cloud. A step case of this is actually Salesforce.com, as examined over the last, where particulars for the interaction between the consumer along with the solution occupy as a component of the company in the cloud.

In addition, Microsoft has made a significant expense around, and likewise as an aspect of the cloud processing choice for Microsoft ® Office 365, its office collection comes as a subscription via its cloud-based Online Firms.

Platform as a Service (PaaS)-- Customers have access to the platforms, enabling every one of them to deploy their software application and also utilize in the cloud. The operating systems and additionally system availability are undoubtedly neglected due to the client, together with there could be restrictions including which applications may be set up. Instances include Amazon.com Web Solutions (AWS), Rackspace, and Microsoft Azure.

Infrastructure as a Service (IaaS)-- Customers administration and also care for the systems among the system plan demand, components, storing, and system link, having said that, carry out certainly not by themselves moderate the cloud office platform.

Likewise, various component ranges of these models can be associated with a specific market or industry. Communications as a Service (CaaS) is one such component type capitalized on to provide managed Internet Protocol telephone services. Along with the move to CaaS is a change to more IP-centric communications and



more SIP trunking applications. With Internet Protocol and SIP in place, it can be as simple to have the PBX in the cloud as it is to have it on the property. In this case, CaaS could be considered as an aspect of SaaS .

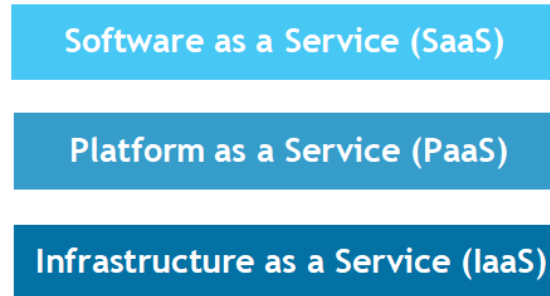


Figure 1: Service Model Types

IV. DEPLOYMENT MODELS

Creating cloud computing might contrast depending on demands, and also the following 4 release kinds have been learnt, each with specific qualities that help the criteria of the business and customers of the clouds especially signifies.

- Private Cloud-- The cloud platform has been developed and is consistent and compatible with a particular organization. The operation might be internal or with a third party on the premises.
- Community Cloud-- The cloud stores are shared among several agencies with the same interests and requirements. This may help constrain the capital spending rates for its own business as the costs are shared among the organizations. The operation may be internal or in addition to a third party on the premises.
- Public Cloud-- The cloud design is easily accessible to the public in an office manner with a cloud provider. This allows a buyer to develop and set up a solution in the cloud with little financial investment compared to the capital expenditure requirements usually associated with other deployment options.
- Hybrid Cloud-- The cloud resources include multiple clouds of any type, but the clouds have the ability and their interfaces to allow files and/or applications to be moved from one cloud to another. This could be a combination of private and public clouds that maintain the standards to keep some information in a provider, and the need to deliver services in the cloud.

V. CHALLENGES & ISSUES

In this area, our company illustrates the hurdles and issues that shadow computing must experience. As a large quantity of business economics is hooked up to this field, it is going to be much better if these concerns are taken care of as early as possible. Figure 2 emphasizes the rundown of the research conducted by our carrier on the typical concerns of cloud processing. The consumer's main concern is taken into account. Therefore, only the percent of 4, 5 is being shown. The management is the problems that a cloud computing environment must still look after:

A. Security:

When using cloud-based services, one is entrusting their information to a third-party for hosting and security. Can one assume that a cloud-based service will safeguard and secure one's information (Cloud computing gives certain concerns to privacy and security. Back it up, seek document errors, prevent security breaches) if one is using their services at a very low-cost? Or even free? When data is entrusted to a cloud-based service, which third-parties do they share the details with? Cloud-sourcing requires using multiple suppliers, and many cloud-based firms provide services to each other, and therefore, cloud-based points could need to disclose your information to third parties if they are involved in processing or transferring your significant information. They may share your information with marketers at once. Security shows an actual risk to the cloud.



B. Cloud computing experiences major functionality issues. The cloud business must ensure that the performance of the service being used remains the same throughout. There may be peak potential breakdowns, internal problems, and technical grabs appearing. Load balancer, data replicators, high-end servers must be installed when needed.

C. Availability:

Although cloud guarantees to become a 24X7X365 service, cloud outages occur regularly. Interruptions can be planned or unscheduled. Table 1 offers information concerning the downtime in hours and the practical impact of cloud power outages of several cloud providers from 2007 to 2012.

D. Cost:

Cloud computing may have higher costs due to its requirements for every "always on" connection, along with using significant amounts of data back internal.

E. Bandwidth, quality of service, and data limitations:

Cloud processing requires "broadband of substantial speed." While many websites are functional on non-broadband links or slow broadband connections, cloud-based use is generally not practical. Connection speed in Kilobyte per second (or MB/s and GB/s) is required for the use of cloud computing service. Also important are Quality of Service (QoS); signals for that include the amount of time the connections are dropped, activity time (ping), and the size of the delays in the processing of system information (latency) and also loss of data (packet loss).

F. Major vendors:

Only a handful of suppliers are currently available, which is still holding back many SMEs to join a cloud.

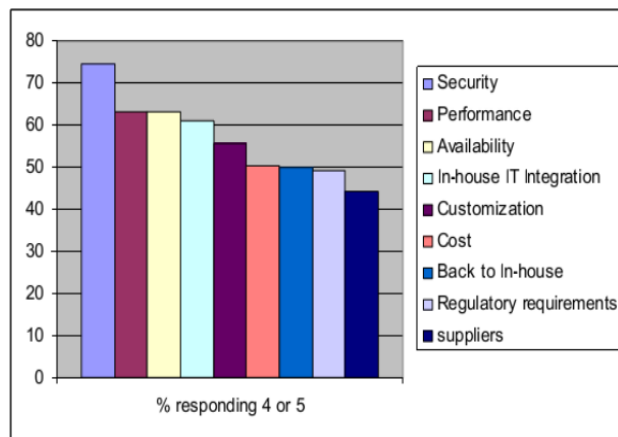


Figure 2: Graph depicting the concerns of clients on cloud computing issues

	Total (Hour)	Average (Hour)	Availability	Cost (USD)
Amadeus	1	0.167	99.998	89,000
Facebook	3	0.500	99.994	600,000
ServerBeach	4	0.667	99.992	400,000
Paypal	5	0.833	99.990	1,125,000
Google	5	0.833	99.990	1,000,000
Yahoo!	6	1.000	99.989	1,200,000
Twitter	7	1.167	99.987	1,400,000
Amazon	24	4.000	99.954	4,320,000
Microsoft	31	5.167	99.941	6,200,000
Hostway	72	12.000	99.863	7,200,000
BlackBerry	72	12.000	99.863	14,400,000
Navisite	168	28.000	99.680	16,800,000
OVH	170	28.333	99.667	17,000,000
Total	568	94.667	99.917	71,734,000

Table 1: Economy Impact Table Due To Cloud Outages



VI. THE EVOLUTION OF CLOUD COMPUTING

The adjective "Cloud" in Cloud Computing refers to the system made the most of for company provisioning. In designs highlighting cloud-based solutions, the cloud is commonly actually explained as the review of a hand-drawn cloud theoretically. Utilizing cloud-like forms in pictures uncovering units like the Internet profits years and is a staple of mainstream message publications and articles on data communication systems. The ailment "Cloud Processing," though, is pretty brand-new. To a lot much better comprehend this attractive inceptive expertise, let us get back in computing record and examine earlier models of provisioning remedies over a communications unit, i.e., the prototypes of present Cloud Processing.

Time-Sharing on Data CPU Computers:

The early 1950s noticed the advancement of provider "data central processing unit" home computers containing the IBM 701. These computers were single-user, non-shareable, one-job-at-a-time devices and were leased by means of the firm for around \$25,000 a month. Countless coders joined, on a first-come-first-served manner, for "operations" on a mainframe where each treatment was a block of your opportunity devoted to refining an unique "venture" (i.e., a program). Each programmer took roughly 5 minutes to set up his/her work, including arriving at in at a technical possibility clock, hanging a magnetic tape, loading a punched card deck, and also pushing a "loads" modification to start activity processing (Chunawala, n.d.). Inadequateness in the course of an outcome of severe hands-on help led to a lot of thrown out regulating time as well as work was queued and often delayed.

To enhance operation efficiency, General Motors (GM) and also N. American Airfare (NAA) (today, part of Boeing) developed an operating system, the GM NAA I/O (Input/Output) body and positioned it right into progression in 1956 (Chunawala, n.d.). This trumpeted the introduction of "batch processing" where multiple jobs may be produced during well as each visit completion without hands-on disturbance ("Batch Processing," n.d.). Further improvements were determined alongside the introduction of the IBM Tool 360 data central processing unit in 1964 which broke down I/O tasks arising from the PROCESSOR (Processor) and planted these out to an I/O sub-system, freeing up the PROCESSOR to perform computations needed along with a sideline when another activity was interrupted for I/O components. Batch processing provided numerous benefits: Specific jobs in a set could be processed at different times based on resource availability, the system still time was reduced, device usage rates were accumulated, and per-job processing costs were reduced.

Together with batch processing, a computer system's time is considered precisely better than a human's, and specific work is scheduled around the machine's schedule. Conversely, "interactive computing" considers an individual's time as being the better and views a computer only as a trained "assistant." Early applications of interactive computing credit the IBM 601 that made it possible for a single user interactive use at a time. However, allowing one user to monopolize a scarce resource also resulted in a significant waste of resource utilization. Alternatively, providing many interactive users relatively concurrent use will result in far better use of the digital assistant ("Interactive Computing," n.d.). In 1961, MIT used the world's first time-sharing Operating System, the Compatible Time-Sharing System (CTSS). Eventually, IBM offered a Time Sharing Option (TSO) in the System Software 360 operating system used in the IBM System/360. Time sharing introduced more processing efficiencies over batch processing. Rather than processing a job in its entirety, time sharing would allocate a short period of time to processing a task and then move on to devoting similar attention to another task. The CPU therefore switches quickly from task to task that it appears to every user that his/her job has the full and complete attention of the CPU-- a personal experience with no apparent delays.

A natural follow-up of interactive computing was the remote access to a computer system using terminals. Many terminals were "multiplexed" over telephone lines using special modems to connect users to a single mainframe. Shared mainframe interactive access and usage via multiplexed terminals allowed several users to access the same mainframe at the same time.

VII. CONCLUSION

Various forms of cloud deployment versions come to assist in making pertinent information available to the customers, yet each has its own market value depending on the choice and who is going to use it. Therefore, the security of the implementation versions also differs accordingly. Table 1 specifies the range and security of the implementation styles. Having said that, due to the joint nature and the diverse environment of the cloud, many



security and privacy issues are major concerns in the cloud. This paper provides an overview of the past, deployment, and service models towards the evolution of cloud computing.

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