

CONCEPTS OF CLOUD SERVICE MODEL ARCHITECTURE IN CLOUD COMPUTING

Amit Singla

Head, Deptt. Of Computer Science (CSE), Seth G.L. Bihani S.D. PG. College, Sri Ganganagar
(Raj.)

Abstract

Cloud computing is a computer model that makes use of the Internet to provide IT resources as a service, such as applications, infrastructure, and platforms. Cloud computing is a computer and processing infrastructure that has been developed to deal with huge amounts of data. The current Internet-based development has improved processing flexibility, capacity, and power. This technology has acknowledged the service-oriented idea and introduced a powerful system in the field of computer science as a result of its effect and benefits. We wish to identify the obstacles and issues that occur with cloud management in this research. We discovered a number of concerns with cloud data collecting, as well as a cloud interoperability issue that requires further analysis and improvement.

Key words: *Cloud computing, cloud technologies, computing resources, architecture.*

1. INTRODUCTION

Cloud computing is a model (for example, systems, servers, storage, applications, and associations) that may be swiftly provided and transferred with minimum association effort or master framework correspondence."

The concept of cloud computing is relatively new. It encompasses virtualization, utility computing, software-as-a-service (SaaS), infrastructure-as-a-service (IaaS), and platform-as-a-service (PaaS). The term "cloud" refers to an online location where computing has been pre-installed and is available as a service; data, working frameworks, programmes, and amassing & preparing power are all available and ready to be shared. Cloud computing is a Pay-per-Use-On-Demand service that allows clients to connect to share IT resources via the Internet. Where IT resources, such as structure, server, storage, application, and organisation, can be handed on with the least amount of organisation and, in addition, relationships with organisation providers, in a practical and easy manner. Cloud computing offers several advantages over previous computer architectures, including the capacity to open up IT resources and provide a variety of focal points. Clients can use the IT facility on a Pay-per-Use-On-Demand basis, saving money and eliminating the need to purchase physical resources that aren't being used.

1.1 Architectural Components

A cloud framework will commonly display **three** of cloud organisation models: SaaS, PaaS, and IaaS. The organisation model stacks could have more design: Figure 1 depicts a cloud reference plan.

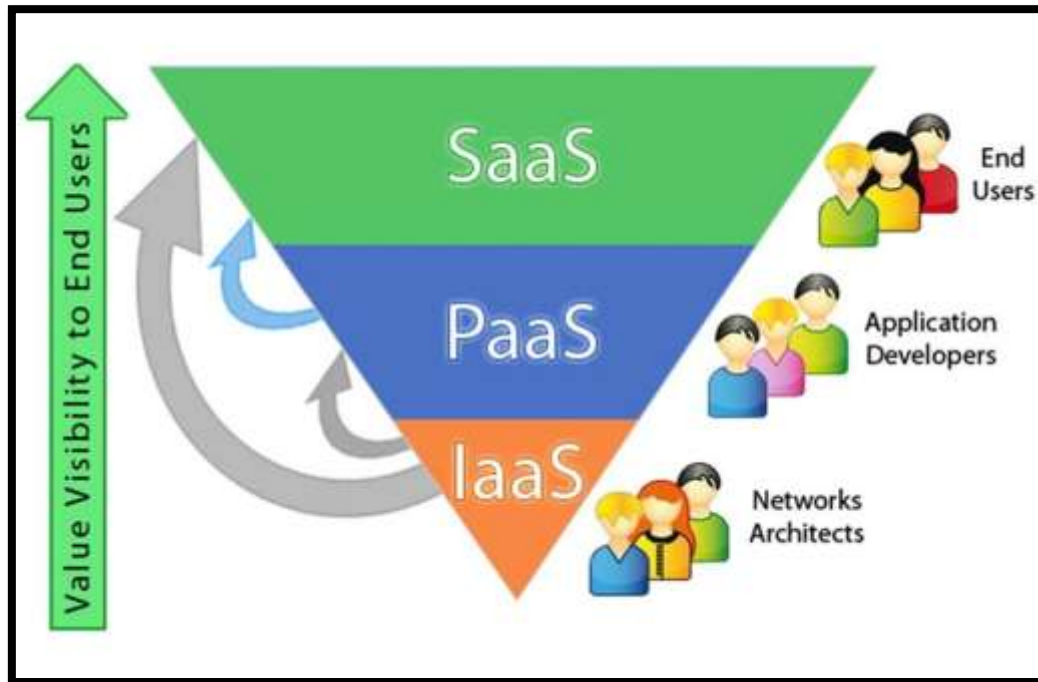


Figure: 1Cloud organisation models

A. Software as a Service (SaaS)

Cloud purchasers put their apps in a usable form that application consumers can access via frameworks from a range of clients (for example, an Internet programme, a PDA, and so on). Cloud customers have little influence over the cloud foundation, which often works with a multi-inhabitation structure to be specific, striking cloud customers' applications are constructed in a single legal condition in the SaaS cloud in order to obtain economies of scale and progress in terms of speed, security, accessibility, disaster recovery, and maintenance. Salesforce.com, Google Mail, and Google Docs are examples of SaaS events.

B. Platform as a Service (PaaS)

The PaaS model includes development tools, databases, web servers and execution environment. This model focuses on a profitable and efficient environment for the development of high value

applications. PaaS is computing platform that permit the design of web applications rapidly & simply and without the complexity of importing and maintaining the software and communications underneath it. Consumers obtain access to the platform and deploy them to their personal software in the cloud. Clients do not handle the OS & access of network, and there are some constraints by using applications can be deployed. PaaS shippers offer a change space to application engineers. The provider consistently makes tool compartment and standards for headway and channels for appointment and portion

C. Infrastructure as a Service (IaaS)

In the IaaS cloud, clients obviously use IT frameworks. (making do, scrounging, and other central computing resources) Virtualization is usually used in an IaaS cloud to meld/fall apart genuine resources in an amazingly efficient manner. Cloud buyers can make or contract resource interest in a certain approach. The most frequent approach of virtualization is to create free virtual machines (VMs) that are segregated from both vital data and other VMs. On the other hand, the multi-inhabitation paradigm aims to improve application programming planning so that numerous scenarios (from various cloud customers) can operate on the same application (for instance a similar methodology for thinking machine). Amazon's EC2 is an example of IaaS.

D. Data as a Service (DaaS)

With the rise of virtualized collection on demand, a new trend has emerged: new Cloud organization - information storage - has emerged. It's important to note that DaaS is a unique type of IaaS. The idea is that on-premise attempt data set structures are inextricably linked to a set price for the submitted server, programming grant, post-transport organizations, and in-house IT maintenance Consumers can pay for only the data they use using DaaS rather than the complete data collection, as opposed to the site grant. Despite the fact that most DaaS obligations provide standard gathering points of interaction, Some DaaS obligations provide table-style reflections that are proposed to scale out to store and recover a beast amount of information in an unfathomably compressed time span, which is ordinarily very large, an unreasonable measure of expensive, or illogically postponed for most business RDBMS to change as per, such as RDBMS and record structures. Amazon S3, Google Big Table, and Apache HB ase are examples of this type of DaaS.

2. LITERATURE REVIEW

Artan Mazreka et al (2016) Distributed figuring is one of the progressions with rapid improvement as of late where there is expanding interest in industry and the astute world. This advancement connects with different organizations and assets for end clients. With the ascending of cloud organizations number of affiliations that offer different organizations in cloud framework is stretched out, as required making a dispute on costs in the general market. Dispersed processing

suppliers offer more organizations to their clients going from establishment as an assistance (IaaS), stage as a help (PaaS), programming as an assistance (SaaS), accumulating as an assistance (STaaS), security as a help (SECaaS), test environment as a help (TEaaS). The motivation driving suppliers is to upgrade pay by their value plans, while the fundamental objective of clients is to have nature of organizations (QoS) at a sensible cost. The support for this paper is to contemplate and examine several models and evaluating plans from various Cloud Computing suppliers.

Asniar Tj and Reza Budiawan (2016) People have built SOA (Service Oriented Architecture)-based applications in cloud computing research, which is a different approach to streaming computing. This is a significant advancement that ought to be acknowledged, particularly in front of the camera. This paper looks at the need for and viability of cloud computing in front-line preparation, and then proposes an Indonesian cloud computing organisation model for front-line management that might be used to support academic activities. The research hypothesis for a proposed cloud computing paradigm in cutting-edge planning is a creation exploration. Finally, cloud computing organisations such as SaaS and IaaS have been recommended for use in Indonesia's forward planning, with cloud cream being one such organisation type.

J. Antony John Prabu (2015) Cloud Computing is potentially the fundamental zones in the ongoing IT organizations. It gives different sort of organizations (SaaS, PaaS, and IaaS) dependent upon the clients' necessities. Rather than buying, introducing and keeping up programming in IT associations can utilize Cloud figuring. In this paper, necessities of ACID properties for cloud informational indexes, benefits and deterrents of cloud informational collections are talked about. It besides picture the basic issues and difficulties of Database Architectures and Data Transaction Management in Cloud Environment. There are various methods used to deal with the data, yet all of them has its own blocks in cloud climate. At long last this paper gives an intensive evaluation on Transaction Processing System, Cloud DataBase as a Service (DBaaS), Cloud RDBMS and Cloud data stores to plan a unique arrangement for cloud informational indexes with the help of standard ACID properties.

Usman Namadi Inuwa (2015) Cloud computing is a computing innovation expecting to share storage, calculation, and services straightforwardly among a gigantic clients. Current cloud computing systems present genuine constraint to ensuring the secrecy of client data. Since the data share and put away is introduced in decoded structures to distant machines claimed and worked by outsider service suppliers regardless of it affectability (model contact address, sends), the dangers of uncovering client classified data by service suppliers might be very high and the danger of assaulting cloud storage by outsider is likewise expanding. The motivation behind this examination is to survey investigates done on this innovation, recognize the security hazard and investigate a few strategies for shielding users' data from aggressors in the cloud.

Azim et al (2014) Cloud computing has arisen as an effective worldview for web application deployment. Economies-of-scale, flexibility, and pay-per use valuing are the greatest guarantees of cloud. Database management systems serving these web applications structure a basic part of the cloud environment. To serve thousands and an assortment of applications and their immense measures of data, these database management systems should not just scale-out to groups of product servers, yet in addition act naturally overseeing, issue open minded, and profoundly accessible. In this paper we review, investigate the presently applied transaction management methods and we propose a worldview as indicated by which, transaction management could be portrayed and dealt with.

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Ting Chen et. al.(2012)Cloud computing is another method that has seen rapid growth in recent years. In any event, security issues have had a significant impact on the evolution and spread of cloud computing, and their importance and centrality should not be overlooked. This study examines cloud computing's core security challenges and proposes a cloud computing security architecture that can successfully address these difficulties. It also demonstrates that simply addressing security concerns will not prevent cloud computing from expanding indefinitely, and the application will be dynamically changed in general.

2.1 Deployment Models

The establishment of its own Cloud organisation - an information gathering organisation - has emerged from the expansion of virtualized on-demand collection. It's important to note that DaaS is a distinct sort of IaaS. The motivation stems from the fact that on-guarantee experience data set frameworks are typically related with significant upfront costs in submitted server, post-transport organisations, programming licences, and in-house IT assistance. Instead of paying for a site authorization for the complete data base, DaaS allows customers to pay just for what they use. Table style considerations are made to scale out to store and recover a large portion of data in a strikingly condensed period of time near traditional gathering points of interaction, such as RDBMS and record frameworks, which are all around excessively vast, pointlessly expensive, or perhaps ridiculously deferred for some business RDBMS to direct. Cloud computing may have them as

well, or it may need additional time from you. As a result, cloud computing gives you access to programmes, a search framework, and the capacity to share information. Cloud computing, like its work zone brethren, offers a vast number of "standard" applications; nevertheless, how you engage with those applications will be unique to you. There are four fundamental cloud game-plan models in the Cloud society:

- **Private cloud:**

Regardless of whether it's a scheduled or impromptu presentation, the cloud foundation is managed wholly within the alliance, as well as by the party or possibly an untouchable. The desire to build a unique cloud within a company can come from a variety of places. After then, security issues include information security and trust Private Cloud have potential for many enterprises. Third, migrating data [eight] from a local IT infrastructure to a Public Cloud continues to be prohibitively expensive. Fourth, groups require unlimited oversight of fundamental actions that occur behind their walls. Last but not least, academics frequently create private clouds in order to study and prepare for exams. Solitary clouds, on the other hand, bear a wide range of responsibilities. Instead of using an external cloud provider, on-premises IT is in charge of managing the single cloud. Private cloud options, in this way, give the same personnel, executives, maintenance, and capital requirements as traditional data centre ownership. Virtualization, cloud government equipment, and cloud programming are all unique cloud services.

- **Community cloud:**

Local area clouds are a collection of various private clouds that have been gathered and configured specifically for a social gathering. These social requests are comparable to cloud requests, and one of their key goals is to collaborate to achieve their business goals. Regardless of the arrangement leased, network clouds are frequently constructed for associations and affiliations performing research, building apps, or forming joint ventures, and they feature a central cloud computing location for generating, executing, and controlling such operations. Various organisations collaborate to develop and test a huge cloud architecture that includes methods, features, needs, and concerns. The cloud network is divided into a level of balance and a cash-related limit based on the great majority rule. The cloud foundation could be powered by a third collection transporter or one of the organization's partnerships.

- **Public cloud**

This is a type of existing Cloud computing training game-plan concept employed by the broad public cloud. Clients hold full responsibility for open cloud, including costing, benefit, respect, and charging approach, in comparison to cloud service providers. Amazon EC2, Google App Engine,

S3, and Force.com are only a handful of the open cloud services accessible, and they are just two or three of the most well-known cloud companies.

- **Hybrid cloud**

The cloud framework is made up of two or more clouds (private, gathering, or open) that operate independently but are linked by a defined or directed improvement that permits data and application mobility (e.g., cloud affecting for load changing between clouds). Organizations use the hybrid cloud type to work from anywhere. on their data to expand their centre boundaries by margining the outside business constraints onto the cloud while directing spotlight rehearsals on premise through valuable cloud. Mix cloud has worked on issues like association and cloud interoperability, which will most likely be covered in greater depth in future parts. Surprisingly, Amazon Web Services has recognised Virtual Private Cloud (VPC), a safe and secure interface between an organization's existing IT architecture and the Amazon open cloud (AWS).

3. PROPOSED METHODOLOGY

3.1 Popular Cloud Computing Platforms



Figure: 2 Cloud Computing Platforms

A. Abicloud

Abi cloud is a cloud computing platform that may be used to create web applications, choreograph, and administer open clouds in similar conditions as private clouds. Clients can use Abi cloud to pass on and interact with the server without leaving a trace, for example, by storing construction blueprints, apps, and virtual devices. The remarkable electronic association point of constraint and middle epitome method distinguish Abi cloud from other cloud computing stages. Clients can do one last work using Abi cloud by dragging a virtual computer with their mouse. Other cloud computing stages that transport new corporations via bearing lines are generally easier and more adaptable.

Abi cloud can be used to pass on and execute private cloud in the same way as cross variety cloud, as evidenced by the cloud providers' referring and strategy. The show's specifications reveal that it can also manage EC2. Furthermore, a complete Abi cloud orchestrate can be pressed and re-deployed to a distinct Abi cloud sort out employing Abi cloud. This is a big competitive advantage in the workplace, and it will considerably improve the user-friendliness and adaptability of the cloud sending procedure.

B. Eucalyptus

Eucalyptus (Elastic Utility Computing Architecture for Linking Your Programs to Useful Systems), an open-source private cloud architecture, was used. Eucalyptus is an open-source foundation that makes use of adaptability, utility, cloud computing, and a superb computing standard built on a helper through packs or workstation execution. Featuring an even out presentation that allows clients to calculate their rent plan limit Eucalyptus is now compatible with Amazon's EC2, allowing it to support a wide range of clients indefinitely with minimal adjustment.

C. Nimbus

Quality is a collection of open instruments as well as an IaaS cloud computing platform. Clients can rent resources from afar and develop the necessary content. To build a computing environment, virtual machines are utilised. There are three types of adapting compositions in this collection. For example, client reinforced modules are used to help a big number of cloud customers. Setting client modules, cloud client modules, reference client modules, and EC2 client modules are all included in this category. The second sort of component is cloud orchestrates organization-managed modules, and it provides a wide range of cloud services. The package includes a web organisation resource structure module, an EC2 WSDL module, and a remote interface module. The third type of part is the foundation resource the board modules, which include the work area pilot module, work area resource the directors module, and work area regulator. On the cloud computing stage, they are frequently used to manage a wide range of actual resources.

D. Open Nebula

Another open source cloud management solution is Open Nebula. It allows clients to send and manage virtual computers across physical resources, as well as set up client data centres and meetings on a dynamic virtual base that adapts to the demands of the organisation Open Nebula does not support EC2 or WSRF, which allows the client to manage all security-related issues. The virtual reality environment Open Nebula is both open and configurable. The authority's instrument for synchronising the breaking point, structure, and virtual systems, as well as allowing clients to send benefits on a regular basis, as indicated by the cycle structures for information concentration

and remote cloud resources. Clients can easily pass across such clouds using inner interaction points and the Open Nebula information centre condition.

Table 1: The Comparison of Server Cloud Computing Platforms

-	Abicloud	Eucalyptus	Nimbus	Open Nebula
Cloud Character	Public/private	Public	Public	Private
Scalability	Scalable	Scalable	Scalable	Dynamic, Scalable
Clouds form	IaaS	IaaS	IaaS	IaaS
Compatibility	Not support EC2	Support EC2, S3	Support EC2	Open, multi-platform
Deployment	Pack and redeploy	Dynamical deployment	Dynamical deployment	Dynamical deployment
Deployment Manner	Web interface drags	Command line	Command line	Command line
Transplant-ability	Easy	Common	Common	Common
VM support	Virtual Box, Xen, VMware, VM	Xen, VMware, KVM	Xen	Xen, VMware
Web interface	Libvirt	Web service	EC2, WSDL, WSRF	Xen, VMware
Structure	Open platform encapsulates cor	Module	Lightweight components	Module
Reliability	-	-	-	Rollback host and VM
OS support	Linux	Linux	Linux	Linux
Development language	Ruby, c++, python	Java	Java, python	Java

3.2. Applications

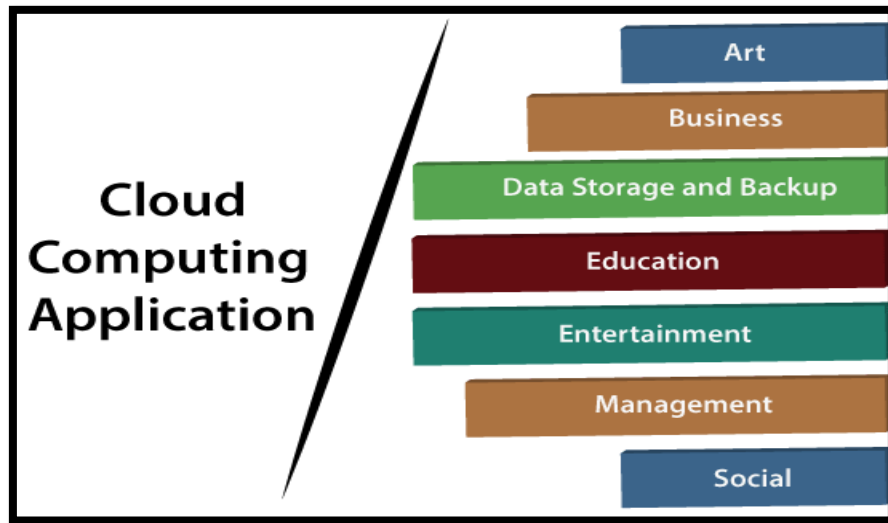


Figure: 3 Application of cloud computing

There are several cloud computing applications to consider:

- 1) Cloud computing focuses on delivering secure and reliable data storage.
- 2) Cloud computing enables data sharing across many types of devices.
- 3) Thanks to the cloud, clients have virtually unlimited alternatives for accessing the internet.
- 4) Cloud computing is simple to use and eliminates the requirement for high-quality client equipment.

3.3 Issues in Cloud Computing

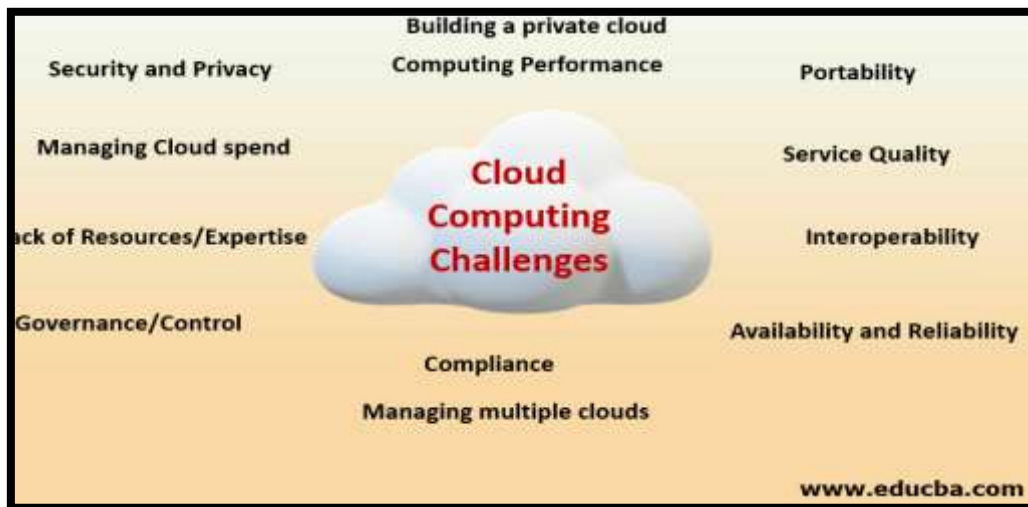


Figure: 4 Challenges of Cloud Computing

Concerns about cloud security are growing as more personal and business data is housed there. The following are some of the challenges with cloud computing:

A. Privacy

Instead of remaining indistinguishable actual data, clients' valuable information can be dispersed in distinct virtual data tanks. It can create a flexible virtual basis for clients' information centres or meetings that may adapt as the organization's load changes, and it can run machines on actual resources. Glean, unlike Open Nebula, provides a remote interface vulnerable to EC2 or WSRF through which the client can manage any security issues. Open Nebula is also a virtual framework that may be used to synchronise the cutoff, arrange, and virtual methods, as well as enabling clients to gradually incorporate them. As evidenced by executing methodologies for information concentration and remote cloud resources, send benefits on a sporadic basis. Using internal APIs and the Open Nebula information centre condition, clients can simply pass on such clouds. When the chance arises, clients might release restricted data to cloud computing companies. Aggressors can dismantle the basic assignment using the computing task that the customers have constructed jointly.

B. Reliability

Excursions and log sticks happen on cloud servers just like they do on our computers' local servers.

C. Legal Issues

Security precautions and full classification of persons based on authority levels remain a subject of concern.

3.4 Issues in Cloud Interoperability

a. Intermediary Layer

Interoperability is being addressed in several ongoing researches by building an intermediary layer between cloud clients and cloud-unambiguous services (for example VM).

b. Open Standard

Normalization appears to have all of the characteristics of a viable interoperability solution. In any case, the terrible arrangement of huge industry cloud vendors has yet to develop since cloud computing tackles the interoperability issue.

3.5 Challenges on Cloud Adoption Perspective Based On A Survey Conducted By Idc in 2008

A. Security

Simple security problems like data catastrophe, phishing, and botnets (a network of machines) are well-known hazards to the data and programming of a connection. Cloud computing has introduced new security issues due to the multi-residency paradigm and pooled computer resources. For example, shared resources (hard circle, information, VM) on a comparable physical machine provide spectacular side channels between a hazardous resource and a standard resource. Furthermore, the problem of "notoriety destiny sharing" will significantly harm the reputation of other notable Cloud "occupants" who unintentionally share computing resources with a controversial client with a bad reputation. Because their framework addresses are almost identical, every negative lead will be linked to each of the clients, easily distinguishing true sub vergers from ordinary clients.

B. Costing Model

Customers who use the cloud should consider the tradeoffs between calculating, communicating, and coordinating. While moving to the Cloud saves infrastructure costs, it increases data communication costs.

C. Security and Privacy Issue

Cloud computing's great flexibility allows it to deliver limitless computing resources on demand, removing the need for cloud expert associations to forecast equipment provisioning. When it comes

to establishing cloud computing frameworks and expanding their companies to service a larger number of consumers, different collaborations, such as those involving Amazon, Google, and Microsoft, move at different speeds.

This study investigates the security and protection strains of to and fro development cloud computing structures given by a number of affiliations. Cloud computing refers to both the programmes that run unnoticed on the Internet and the underpinnings (i.e., data centre equipment and programming) that allow those enterprises to operate.

D. Security on Demand

Apps that run on cloud computing foundations via an internal framework or the World Wide Web are known as cloud companies. Service providers can quickly build, implement, and run programmers thanks to cloud computing. All while putting no burden on the qualities and zones of the concealed foundations (adaptability), working fast (execution), and never (or at least rarely) biting the dust (consistent quality). Cloud computing structures can accomplish the following three goals:

1) Availability

Users should be able to access cloud computing (both apps and foundations) at any time and from any location. Because of the web-neighborhood nature of cloud computing, customers can access the system (e.g., apps, organisations) from any location. This is true for all types of cloud computing architectures (e.g., DaaS, SaaS, PaaS, IaaS, etc.). Cloud computing design, which is anticipated to be accessed at any time, should provide clients with all of the best open doors. (State that it is adaptable for a variety of clients.) The most typical processes used to improve the accessibility of the cloud structure or the apps that use it are state establishment and overt repetition.

2) Confidentiality

Client data questions should be saved in cloud architecture, according to the report. Cloud computing companies achieve this assurance through two basic methods of reasoning (real partition and cryptography), all of which are comprehensively obtained.

3) Data respectability

Data security is a goal of the cloud architecture (i.e., not misplaced or altered by unauthorised clients). Because information is the foundation, maintaining data validity is a critical duty for cloud computing companies such as Data as a Service, Software as a Service, and Platform as a Service.

4. Conclusion

Cloud computing is becoming a common practise in many businesses throughout the world. Cloud computing has the potential to deliver significant benefits to firms that use it to construct and maintain IT for business processes. Cloud computing services are being used by a wide range of enterprises, from accountancy firms to scientific institutions. Every day, millions of people utilise online cloud-based services like Apple iCloud, Gmail, and Cloud storage across platforms and devices. Competition between cloud and external service provider providers is heating up as new start-ups enter the \$80 billion global cloud computing market. Cloud computing is expected to grow, so developers should plan properly. Regardless of whether a virtual appliance sells services at a low or high level of concept, we believe that compute, storage, and networking should all focus on batch processing of server virtualization rather than single node performance.

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