Cloud Computing: A Concise Overview of Features and Services

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Abstract

Cloud computing offers flexible, adaptable, and cost-effective service delivery methods, which this research shows may benefit both people and businesses. Aiming to explain the numerous applications, capabilities, and services of cloud computing, this article provides many instances of cloud services supplied by industry heavyweights like Amazon, Google, and Microsoft. Additionally, we have covered the advantages of cloud computing service models.

Key words

A few examples of important phrases are cloud computing, virtualization, data recovery, electronic government, and service provider.

I. INTRODUCTION

Cloud computing, or simply "the cloud," refers to the practice of storing and processing data and programmes on remote servers rather than on an individual's local workstation. As far as that is concerned, the cloud is same to the Internet. Typically, we use a graphical representation of the Figure showing the web as a cloud.
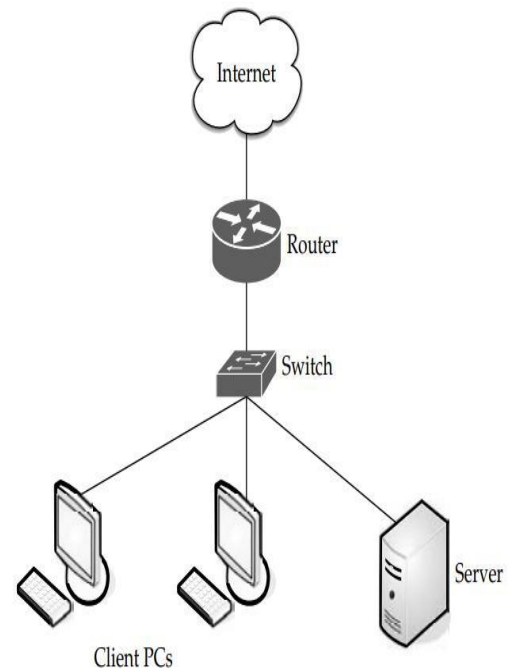

Fig1: Internet is depicted by a cloud in a network

Deploying software and associated hardware across a network, often the Internet, is what the phrase "cloud computing" refers to. Cloud computing makes it possible for any user, from any device with an Internet connection, to access their data and run their apps. Many companies provide cloud computing services; Gmail is only one example. Google is one of them.

(As per NIST's assessment) "The cloud" is a paradigm for low-cost, ubiquitous computing that enables users to tap into a shared pool of flexible computing resources (such as networks, servers, storage, applications, and services) via a network on demand with

Model	Scope	Managed by	Security Level
Public Model	General publicand industries	Cloud service providers	Low
Private Model	Single organization	Single organization	High
Community	Organizationshaving similar	Many organizationsor	High

Table 1: Comparison of Cloud Computing Service Models

minimal intervention or oversight from the service provider. There are four installation options, three different types of services, and five primary components to this cloud architecture. [1]

Cloud service providers (CSPs) include IT giants such as Microsoft, Amazon, and Google. Following a predetermined business model, their clients are free to make use of these assets and services whenever they see fit [2]. Data and software programmes are housed on servers in data centres and made accessible online via web browsers so that a range of businesses, including commerce, education, and government, may provide their services to consumers [3]. The advancements made by the IT industry are largely attributable to cloud computing. There has been a marked influence on the development of IT since its debut. It has been crucial in meeting the rising needs for living quarters and conveniences. The capacity to disperse resources, such software and hardware, over a network is what sets the cloud apart. In the cloud, you may use a variety of resources and pay for them as you go. It is possible to classify clouds into four broad categories:

Commonly known as "cloud computing," private clouds are used only by a single company or group. 2.Public cloudThe public clouds offered by large companies like Google, Amazon, Microsoft, and many more are accessible to anybody. As a service that is accessible over the internet,

services provided to individuals or communities, as well as the underlying infrastructure. Many individuals pool their resources, sometimes in the thousands. The first is what's known as the "community cloud," a virtual location where individuals may come together to share and use resources.

The second important thing to remember is that a hybrid cloud combines the best of public and private cloud computing. The clouds have certain similarities, but they also keep their own qualities, which allows them to be used in many different ways.

mmon Cloud Hosting Providers

The first is Google Drive, which hosts the web-based office suite Docs, Sheets, and Slides. Gmail, Calendar, Maps, Picasa, Analytics, and most of Google's other products may really be classified as cloud computing.As a second point, iCloud is a cloud service that Apple offers for archiving, restoring, and synchronizing your electronic calendar, mail, and other compatible data. Data accessibility on any platform has not been compromised.Thirdly, if you own MP3s that you bought from Amazon and have an unlimited amount of space for images with Amazon Prime, then Amazon Cloud Drive is the way to go for storing your media. The cloud storage that comes with Amazon Prime is perfect for keeping any digital material that you buy from the firm.

I.   Using the Internet as a Server

Unlike a microprocessor or a mobile phone, cloud computing is not a stand-alone device. It's more of a system, in the mainresources.

Cloud computing makes it possible for businesses to make use of services provided by independent providers. The use of cloud computing platforms in industry and academia has matured the most. Cloud computing allows businesses to save costs on the gear and software that are necessary for certain functions to execute smoothly [5].
Using cloud computing, businesses may expand their IT capabilities without spending money on new hardware, software, employees, or training.

Models for Cloud-Based Computing Services XI
Some basic models of cloud computing are as follows: Think about "IaaS" (Infrastructure as a Service) as one possibility.
Infrastructure as a Service (IaaS) relies on a variety of virtualized hardware and software components made available by cloud computing service providers. Infrastructure as a service (IaaS) uses virtualization technologies to let users provision and release resources as needed [6]. Cloud servers offered by Rackspace, Google, Amazon Web Services (EC2), IBM, and Verizon are among the many large companies that provide IaaS.

A) *Advantages of IaaS-Based Services*
B) *Users just pay for the services they use, lowering the total cost of ownership.*
• *Use of state-of-the-art computing facilities and hardware.Users have the freedom to increase or decrease the allocated resources as needed.*
) Simply stated, "Platform as a Service"
This sort of cloud computing is more involved. With Platform as a Service (PaaS), the supplier of cloud computing handles the provisioning, operation, and maintenance of the operating system and other computing resources. A PaaS provider's services cover the whole app lifecycle. Additional services include collaboration, database integration, scalability, and integration with online services. The onus of purchasing and maintaining one's own hardware and software, or employing experts in this field, is lifted off the users. The PaaS is scalable, and you get to pick and choose whatever apps run on your computer. The inability to move or integrate with other platforms is a big problem with PaaS.
using terms like "platform as a service," "software as a service," and "infrastructure as a service," or IaaS, SaaS, and PaaS, respectively.

Cloud computing is becoming more and more important for IT companies as a means to access various IT resources, such as servers, storage, software, and hardware.
Customers that buy into the platforms may deploy

their own software and applications in the cloud. Platform as a service (PaaS) examples include Rackspace Cloud Sites, Google App Engine, Microsoft Azure, and Salesforce.com's Force.com.

The Advantages of PaaS Solutions for the Community - Building cloud applications in a PaaS environment often requires a group of people working together. A robust community will be developed, which will aid your development team.
Updating foundational IT systems is no longer a need for companies. Rather, the responsibility for software updates, repairs, and routine maintenance lies with the PaaS provider.
Businesses may lessen their financial risk by avoiding the upfront expenses of software and hardware. The team may put more effort into developing the cloud software and less into setting up the testing and deployment infrastructure, which simplifies deployment.
Service-based software delivery (SaaS)
In this setup, cloud service providers are in charge of managing infrastructure and tools including operating systems and application software. When it comes to the user experience, the SaaS model looks like any other web-based application interface where services are delivered over the internet and accessible using a web browser. Devices such as smartphones, computers, and tablets may all access the hosted apps like Gmail and Google Docs. SaaS is preferable to conventional software since the user is relieved of the burden of software ownership and management. In addition to these benefits, it is also multitenant efficient, highly configurable, and scalable [8].

Benefits of SaaS Solutions
- Rapid Scalability
- Accessibility from any location with Internet
- Eliminates infrastructure concerns
- Custom levels of service offerings
- Bundled maintenance and Support

"RaaS" stands for "Recovery as a Service."
Companies may replace their backup, archiving, disaster recovery, and business continuity solutions with a single, unified platform provided by Recovery as a Service (RaaS) providers. Data centers, servers (including operating system, applications, configuration, and data), and database files may all be recovered with the assistance of RaaS providers.Businesses may lessen the blow of interruptions caused by natural catastrophes and
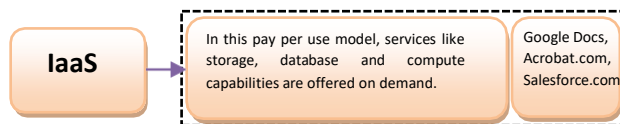
other similar events with the use of RaaS. RaaS is also known as DRaaS (Disaster Recovery as a Service) and is offered by a variety of businesses such as WindStream Business and Geminare, among many others.

Advantages of RaaS Solutions • Protecting vital business information against accidental or malicious deletion.
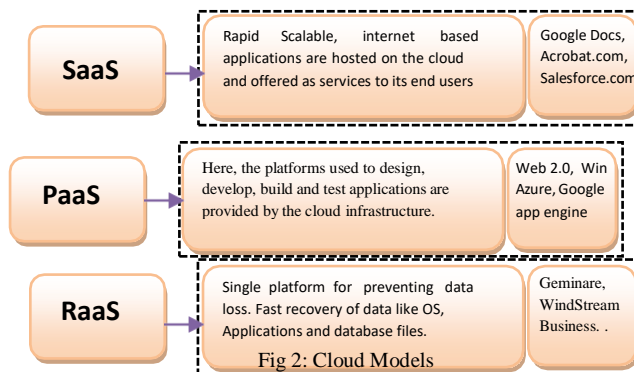
Prevents irreparable damage to the physical and digital infrastructure.

• Allows for speedier recovery without sacrificing accuracy; • Reduces the overall cost of data recovery.

• Provide more options for the backup strategy (primary vs. secondary).

Cloud services may help businesses save money and increase productivity. Different businesses may embrace different cloud services, business processes,

IaaS	→	In this pay per use model, services like storage, database and compute capabilities are offered on demand.	Google Docs, Acrobat.com, Salesforce.com

and areas of expertise based on their own unique goals. Any IT project considering migrating to cloud services should first engage in thorough planning and preparation.

SaaS	→	Rapid Scalable, internet based applications are hosted on the cloud and offered as services to its end users	Google Docs, Acrobat.com, Salesforce.com
PaaS	→	Here, the platforms used to design, develop, build and test applications are provided by the cloud infrastructure.	Web 2.0, Win Azure, Google app engine
RaaS	→	Single platform for preventing data loss. Fast recovery of data like OS, Applications and database files.	Geminare, WindStream Business. .

Fig 2: Cloud Models

XI. TRAITS THAT MAKE CLOUD COMPUTING UNIQUE There are a number of exciting aspects of cloud computing that should contribute to the growth of IT initiatives in the future. In accordance with NIST guidelines, we list the following five characteristics of cloud computing systems [9]:

Cloud computing allows for the on-demand provisioning of resources (data storage, networks, servers, apps, etc.) with little to no interaction from the service provider.

The services provided by cloud providers are very inexpensive, if not free. The need to spend money on expensive infrastructure up front is removed by pay as you go, which also reduces operating expenditures in the long run.

Users have the freedom to access their cloud resources from any location at any time using any Internet-connected device, such as smartphones, laptops, or personal digital assistants.

The term for how the cloud uses its physical and virtual computing resources is "resource pooling." Location is meaningless as the customer has no control over or access to these resources' precise whereabouts.

Elasticity allows for the rapid and flexible allocation and release of computing resources in response to changes in user demand. In the minds of the average population, these resources are instantly available for purchase in an infinite quantity.

"Measured Services" CSPs monitor, manage, and enhance their clients' cloud-based resource and service performance using a pay-as-you-go methodology. Users interact with these services in the same way they do with more conventional utilities, such as electricity, water, and gas. (15, 16) The following are some more characteristics of cloud computing: • Multitenancy, which allows a cloud to support several clients simultaneously. Users have full independence inside their own virtual application instances, even if they share the same cloud-based network, host, and application resources.

• Businesses may easily adapt to their expanding needs using cloud computing since its infrastructure is very scalable. There is no need to modify the cloud's fundamental software and architecture in order to accommodate the addition of more nodes and servers.
• Cloud computing enhances dependability by using numerous redundant sites. Disaster recovery and other mission-critical processes are perfect fits for the cloud due to its high availability.
• Economical scalability: customers may

take advantage of economies of scale by making clouds as large as feasible. Additionally, location is considered; the cloud is located on cheap real estate and close to cheap power plants.
• Flexibility to meet unique requirements: the cloud's hardware and software may be modified to suit the demands of any user. By making sure resources are available for precisely the amount of time needed, they may be used efficiently.
• Virtualization allows services to be portable, so customers may access their cloud-based apps from any device. It makes advantage of resources available in the cloud rather than a physical server. Everything is possible with only a mobile device, an internet connection, and a laptop or desktop computer. The process is straightforward and safe, so users may access it or share it whenever they choose. What would normally require a cluster of computers to do may be done by users.

CLOUD COMPUTING USE CASES

Cloud computing has swiftly risen to prominence as a key paradigm in the field of computers due to its ease of use in combining and organizing various internet resources. This means that cloud computing is very useful for the following industries:

Government agencies may be able to simplify their processes by using cloud computing. Government agencies may improve the quality and efficiency of their service delivery in this way. Thanks to cloud computing, maintaining software installations and keeping them up to date is a thing of the past.

As an acronym, ERP stands for "enterprise resource planning."

Enterprise resource planning (ERP) solutions hosted in the cloud are quickly gaining popularity among growing enterprises. Payroll, human resources, and application management all become into labor-intensive and time-consuming chores. Service companies may avoid these problems by installing ERP on the

cloud.

Table 2: Different applications of cloud computing.

Application	Service Delivered
E-Learning	E-mail, simulation tools, files broadcasting, class recording, virtual classrooms, virtual labs, surveys, education forums etc.
E-governance	Complaint resolution system, employee management system, E-police, E-Tendering, E-court, payment and tax system, agricultureand food, industry and energy etc.
ERP Cloud	Supply chain and vendor, project and HR Management, customer Relationship management, financeand accounting etc.

XIX. PROBLEMS IN THE CLOUD

Despite the growing popularity of cloud computing, there are still concerns about the technology. Among these challenges are:
1) Security and Privacy
Prioritizing information security is essential at all times. Organizations are wary of shelling out cash for vendor assurances that would keep their private data safe. The concern

letting other firms access our data or having the personal information of our customers stolen. Since the true location of storage is often concealed, organizational security is already a concern. Presently, firewalls between different data centers managed by enterprises protect this kind of sensitive data. The security precautions implemented by service providers are crucial for businesses using the cloud model.
• All company software has service level agreements (SLAs) in place to ensure data accessibility and recovery. When it comes to managing service level agreements and application runtime governance, operational teams are essential. In "live" environments, operations personnel may help with:
• Monitoring the Duplicating Data System (Transactions, Logs, etc.) The right clustering and fail-over techniques

Preparing for the unexpected
Management of Runtime Environments
Performance and Capacity Management
Data disaster might ensue if a cloud service isn't up to snuff with any of those qualities.
B) Ability to Manage Efficiently
Cloud services have been around for a while, but platform and infrastructure management is still in its early stages of development. Dynamic scalability and resource allocation are two examples of the advanced capabilities that many firms want. Plenty of space for improvement exists in the present load balancing and scalability solutions.
Part B: Limitations Compliance and Regulation
Certain European governments have passed laws making it illegal to store personal data of its residents in data centers located in other nations or states. For cloud services to meet these expectations, they need to set up a data center or storage facility inside the country. Maintaining such a system on a continuous basis is challenging for cloud service providers.
The new focal point with cloud computing is the interaction between service providers and different categories of service customers. Cloud services are difficult and need understanding of distributed services, procurement, risk assessment, and service negotiation, all of which many firms lack.

SUMMARY AND FUTURE STUDIES;
You may provide a broad variety of services and apps on the Cloud because of its many intriguing features, capabilities, and applications. We have covered a few of these features, offers, and applications in this paper, and we expect many more to come. Our findings provide light on the ways in which cloud services and applications will influence the operations of many enterprises and individuals across various industries. Concerns about data privacy and security have been the main obstacle to cloud computing's broad adoption. Undoubtedly, addressing the current security issues with cloud computing will be the primary focus of future research. Our long-term goal is to mitigate the risks associated with cloud computing by developing a framework and security model to address the challenges of this technology.

XXI. REFERENCES

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