Comparative Study of Cloud Services

[1]Meeka Gandham, [2]Akshay Kumar V, [3]Kishor D,
[4]Dr.Bhuvana J

[1,2,3]*Student, Jain (Deemed-to-be University), Bengaluru*
[4]*Associate Professor,Jain (Deemed-to-be University), Bengaluru*

ABSTRACT: The distribution of on-demand computer resources through the internet is referred to as cloud services, also known as cloud computing services. These resources, which are supplied by a third party supplier, may include processing power, storage, databases, software, and other services. With cloud services, people and companies may use computer resources on a pay-as-you-go basis, providing a flexible and scalable alternative to traditional on-premise computing. Cloud services have completely changed how people and organisations access and use computer resources, and they will probably continue to have a big impact on technology in the future. This paper focusses on the comparative study of cloud services.

KEYWORDS: Cloud services, Cloud computing, Reliability, Security.

I.   INTRODUCTION

A comparative study of cloud services entails assessing and contrasting various cloud service providers on a range of criteria, such as cost, features, performance, dependability, security, usability, and support. A growing number of people are using cloud services these days because of its affordability, adaptability, and scalability. As a result, there are now several cloud service providers, each with unique strengths and disadvantages, including Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform (GCP).

Individuals and companies may decide which provider is ideal for their particular needs by doing a comparative analysis of cloud services. Given the diverse features, services, and pricing that various suppliers provide, this kind of assessment is very crucial. Users may use the research to assess the degree ofassistanceprovided and discover potential security concerns and dependability problems linked to each provider. In general, a comparison of cloud service providers

can assist consumers in choosing one that delivers the most value for their money and satisfies their particular needs.

The number of cloud service providers in the market has increased along with the adoption of cloud computing. Because of this, it has become challenging for both organisations and individuals to select the finest cloud service provider for their requirements. Three of the most well-known cloud service providers—Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform—will be compared for their features and advantages.

II.   RELATED WORKS

J. Schaper et al [1],provides a good introduction to cloud services and their characteristics, as well as some of the benefits and challenges associated with them.The benefits of cloud services, including their greater scalability, cost savings, and flexibility, are then covered by the author. The study also discusses some of the difficulties with cloud services, such as vendor lock-in, security and privacy issues, and the possibility of service interruptions.

J. Peng et al [2],compares and contrasts Microsoft Azure, Google App Engine, and Amazon EC2. It contrasts each platform's performance and scalability as well as its deployment and pricing strategies. The article finds that Amazon EC2 offers the most flexible scaling choices, however readers should be mindful that since the paper was released in 2009, the data may be out of date.

Höfer et al [3], contrasts various cloud service providers including Amazon Web Services, Google App Engine, and Microsoft Azure based on their service offerings, pricing structures, security, and dependability. It also gives a taxonomy of cloud computing services based on their functional properties. The study comes to the conclusion that Amazon Web Services is the most complete supplier.

F. Fowley et al [4], examines several cloud service brokerage (CSB) designs based on

their functional and non-functional properties and suggests a paradigm for classifying CSB systems. The choice of CSB architecture depends on the unique demands of the organisation and its use of cloud services, the paper's conclusion states. Organisations may select the ideal CSB architecture with the use of the paper's framework.

A. S. Muhammed et al [5], provides a user-based comparison of Microsoft Azure, Amazon Web Services (AWS), and Google Cloud, three IoT platform providers. Based on their IoT-specific features and services, such as data management, security, and analytics, the three platforms are compared in this study. In addition, a poll of users of the three platforms is included in the study, with the findings showing that AWS is the most popular platform overall, followed by Microsoft Azure and Google Cloud.

Kumar et al [6] , suggests a fuzzy environment multi-criteria decision-making (MCDM) strategy for choosing cloud services. To prioritise the selection of cloud services, the strategy combines fuzzy sets, MCDM techniques, and quality of service (QoS) considerations. The findings of a case study used to test the suggested strategy shown that it may successfully prioritise the choice of cloud services. By presenting a thorough and useful method for choosing cloud services, the study makes a significant addition to the field of cloud computing.

G. Tajadod et al[7], contrasts Microsoft and Amazon's approaches to cloud computing security by comparing their security features and methods,. It talks about their physical, network, and data security, as well as data encryption, backup and recovery, and compliance with industry standards and laws. It also talks about authentication and access control systems. The authors point out difficulties in assuring cloud computing security and the necessity for robust security measures to guard against online attacks. The study emphasises the significance of security in cloud computing and offers useful insights on the security aspects of two significant cloud service providers.

Shuai et al [8], contrasts cloud computing with grid computing, comparing their structures, traits, uses, benefits, and drawbacks. It examines the capabilities of resource sharing, scalability, performance, and fault tolerance as well as their prospects for the future. The authors come to the conclusion that while grid computing offers higher resource utilisation and performance, cloud computing offers more scalability, usability, and flexibility. The study offers crucial insights into the

two technologies and their future development possibilities.

TYPES OF CLOUD PROVIDERS

Modern corporate operations now rely heavily on cloud computing, which provides adaptable and scalable solutions to satisfy various objectives. To satisfy the various demands of clients, there are several kinds of cloud providers that provide various services, price structures, and features. The three primary categories of cloud providers—public, private, and hybrid clouds—will discussed. Public, private, and hybrid clouds each offer a variety of services, fee structures, and capabilities to meet a range of customer requests. Public cloud providers are great for businesses that need to scale up and down quickly, while private cloud providers are best for businesses that need a high level of data protection and control. Hybrid cloud providers blend public and private clouds, allowing businesses additional flexibility and agility. The specific needs of the business will guide the ultimate choice of a cloud provider.

Choice of a cloud provider.

Public Cloud Providers :The general public can access cloud services from public cloud providers online. These service providers offer services including infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS) and own and run their own data centres. Customers may rapidly and easily use the large-scale infrastructures of public cloud providers. They frequently offer pay-as-you-go pricing structures, which makes them particularly appealing to companies who need to swiftly scale up and down. Google Cloud, Microsoft Azure, and Amazon Web Services (AWS) are some of the biggest public cloud service providers. These service companies offer a wide range of solutions, including machine learning, analytics, computing, and storage. They provide variable pricing structures, which may be quite economical for companies that must manage massive operations.

Private Cloud Providers: Private cloud service companies only provide cloud services to a single company. These service providers work on-site or in a company-owned data centre. Businesses that need a high level of security and control over their data frequently employ private clouds. They might be pricey to set up and maintain, but they provide you more freedom over how you handle your data and applications. VMware, IBM, and Dell are some of the most well-liked private cloud service companies. These companies provide hardware and software for virtualization, allowing

companies to build private clouds using their own infrastructure. Private clouds are perfect for companies with specialised demands since they can be tailored to match those needs.

Hybrid Cloud Providers: Public and private clouds are combined in the services provided by hybrid cloud companies. These service providers enable businesses to use a private cloud for certain of their operations while using a public cloud for others. With this strategy, organisations have the flexibility to benefit from the scalability and affordability of public cloud providers while keeping control of sensitive data.The most well-known hybrid cloud service providers are Google Anthos, Azure Stack, and AWS Outposts. By enabling smooth workload transfers between public and private clouds, these providers give enterprises more flexibility and agility.

COMPARISON ON CLOUD PROVIDERS

Due to its many advantages, including scalability, flexibility, affordability, and accessibility, cloud computing has gained popularity among both organisations and people.As a result, the market is flooded by cloud providers who provide a wide range of cloud computing services. The three leading cloud service providers—Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform (GCP)—will be contrasted.

Taking into account on AWS which is one of the oldest and biggest cloud service companies available today. Cloud computing services provided by AWS include computation, storage, databases, networking, and analytics. Amazon Elastic Compute Cloud (EC2), Amazon Simple Storage Service (S3), Amazon Relational Database Service (RDS), and Amazon Virtual Private Cloud (VPC) are a few of the well-known services provided by AWS. AWS is a great option for organisations of all sizes because of its scalability and dependability. AWS also offers a pay-as-you-go pricing structure that enables companies to only pay for the services they really utilise.

When it comes to Microsoft Azure, which is a cloud computing platform that Microsoft provides. A comprehensive range of services, including computing, storage, databases, networking, and artificial intelligence, are available through Azure. Azure also provides a hybrid cloud option that enables companies to link Azure to their on-premises infrastructure. Azure's well-known services, like as Azure Virtual Machines, Azure Blob Storage, Azure SQL Database, and Azure Virtual Network, are just a few. Azure is renowned

for its compatibility with other Microsoft goods like Windows Server and Active Directory. Azure also offers a pay-as-you-go pricing structure that enables companies to only pay for the services they really utilise.

Lastly Google Cloud Platform (GCP) is a platform for cloud computing that Google provides. A variety of services, including computing, storage, databases, networking, and machine learning, are available through GCP. Google Compute Engine, Google Cloud Storage, Google Cloud SQL, and Google Cloud Virtual Network are some of the well-known services that GCP provides. GCP is renowned for its creativity and innovative use of cutting-edge technology like machine learning and artificial intelligence. Furthermore, GCP offers a pay-as-you-go pricing structure that lets companies to only pay for the services they really utilise.

There are a few things to take into account when contrasting various cloud service providers, including cost, performance, features, and support. First off, AWS and Azure have comparable pricing structures, although GCP is a little more expensive. However, other services, including Google BigQuery and Google Kubernetes Engine, are only offered by GCP and are not offered by AWS or Azure. Second, all three cloud service providers provide great performance and dependability. The fact that AWS is the largest and oldest cloud provider, however, provides it an advantage over Azure and GCP in terms of scalability and dependability. The three cloud service providers all provide good customer care, but AWS has a larger community and more resources available to consumers.

The main cloud providers on the market, including AWS, Azure, and GCP, provide a variety of cloud computing services. Businesses must take into account aspects including cost, performance, features, and support when selecting a cloud provider. AWS has the advantage in terms of scalability and stability due to its size and experience, even though all three cloud providers provide great performance and dependability. On the other hand, GCP provides cutting-edge technology like artificial intelligence and machine learning, while Azure offers good interaction with Microsoft products. Ultimately, each business's unique demands and requirements will choose which cloud provider to use.

ROLE OF CLOUD PROVIDERS

The way companies and organisations function today has been completely transformed by cloud computing. Cloud service providers are essential to this change. Companies that provide

cloud computing services to clients, such as companies, people, and governments, are known as cloud providers. Customers may access a variety of services from cloud providers online, including networking, computation, and storage. This following research seeks to examine the function of cloud service providers in contemporary corporate environments. Cloud service providers have significantly changed the technology environment, enabling companies of all sizes to acquire cutting-edge tools and stay competitive. Businesses have been able to take use of the cloud's advantages, including increased scalability, flexibility, and cost savings, thanks to their knowledge, infrastructure, and experience. Working with cloud providers does present certain difficulties, though, including vendor lock-in, security issues, and data protection. Therefore, companies must carefully consider their alternatives and select a cloud provider that satisfies their unique needs and demands.

Provision of Infrastructure: To enable people and organisations to store and access their data and applications in the cloud, cloud providers provide a variety of infrastructure services, including servers, storage, and networking. The scalable and adaptable infrastructure provided by the cloud providers may be tailored to the demands of their clients. This makes it simpler for businesses to have the infrastructure they need without having to pay for ongoing maintenance and infrastructure upgrades.

Software provision: To allow businesses to use these services in the cloud, cloud providers supply a variety of software services, including email, document management, and customer relationship management (CRM). The software services are typically provided on a subscription basis, which makes it simpler for businesses to use them without having to pay for the maintenance and updating of the programme.

Security: Cloud service providers are essential to maintaining the privacy and security of the information, programmes, and services maintained in the cloud. They offer a range of security features, including encryption, access restrictions, and threat detection, to safeguard the information and applications from hacker assaults and unauthorised access. To maintain the security of the data of their clients, cloud providers also make sure that their platform and infrastructure complies with numerous security standards and laws.

Cost savings: Organisations may obtain the essential infrastructure, platform, and software services through cloud providers at a reasonable price. This is due to the fact that pay-as-you-go cloud providers allow businesses to only pay for the services they really utilise. This makes it simpler for businesses to control their IT spending and steer clear of costs related to infrastructure maintenance and improvement.

Innovation: The cloud computing sector is heavily dependent on cloud providers to drive innovation. In order to provide new services, features, and capabilities that satisfy their consumers' shifting demands, they make significant investments in research & development. Organisations may take use of the newest services and technology thanks to this without having to spend money on costly research and development projects.

AVAILABLE CLOUD PROVIDERS

Companies known as cloud providers make computer resources like servers, storage, and apps available online. Customers may use these resources on a pay-as-you-go basis, which means they only pay for the services they really utilise. Infrastructure-as-a-service (IaaS), platform-as-a-service (PaaS), and software-as-a-service (SaaS) are the three primary categories of cloud providers.

Infrastructure-as-a-Service (IaaS): IaaS is the most fundamental kind of cloud service, giving users online access to resources for virtualized computing. Customers that utilise IaaS are in charge of maintaining their own storage, networking, and virtual machine infrastructure. They have total control over their infrastructure as a result, but they also need to be technically skilled to manage and maintain it. IaaS providers include, for instance, Microsoft Azure and Amazon Web Services (AWS),Google Cloud Platform.

Platform-as-a-Service (PaaS): PaaS is a more advanced version of cloud computing that frees users from worrying about maintaining the infrastructure on which their applications are running. In order to build, test, and deploy applications, PaaS providers provide a variety of tools and services, including databases, development frameworks, and application servers. For developers who like to concentrate on creating apps rather than managing infrastructure, PaaS is an excellent choice. PaaS companies like Heroku, Microsoft Azure, and Google App Engine are examples.

Software-as-a-Service (SaaS): SaaS provides consumers with online access to software programmes and is the most user-friendly sort of cloud service. Customers merely access the programmes through a web browser or a mobile app hosted and maintained by SaaS providers. SaaS is the perfect solution for companies who wish to

utilise well-known software programmes like email, customer relationship management (CRM), or accounting software without having to handle the infrastructure or software themselves. Salesforce, Microsoft Office 365, and Google Workspace are a few SaaS vendors.

There is a substantial degree of variance across cloud providers in terms of their features and capacities. Like its Elastic Compute Cloud (EC2) virtual machines, Simple Storage Service (S3) storage service, and Lambda serverless computing service, AWS is renowned for its broad range of services and features. On the other hand, Microsoft Azure is renowned for its compatibility with the company's line of business software programmes, including Microsoft Office and Microsoft Dynamics. The BigQuery data warehousing service and the Tensorflow machine learning framework are two features of the Google Cloud Platform that are well-known for their machine learning and data analytics capabilities.

Cloud service providers frequently give a variety of price options, including as pay-as-you-go pricing, reserved instances, and spot instances. The most popular pricing model is pay-as-you-go, which lets customers only pay for the resources they actually use. Reserved instances, on the other hand, let users pay in advance at a discounted cost for a set quantity of computing resources. Users can bid on idle computing resources using spot instances, which gives them access to resources at a lesser cost but with less dependability.

III. CONCLUSION

In conclusion, it is critical for businesses and people to evaluate different cloud service providers in order to choose the best one for their needs. A comparison of the services and features provided by the largest cloud providers, such as Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform, and IBM Cloud, was the main emphasis of the many studies examined in this research. The research compared the cloud providers using various approaches and criteria, including security, performance, cost, and scalability. According to the surveys, AWS and Azure are the top cloud service providers in terms of market share, services provided, and client happiness. IBM Cloud and Google Cloud Platform are both gaining popularity, with Google Cloud Platform being the most popular choice for big data analytics and machine learning. Enterprises, on the other hand, choose IBM Cloud for its hybrid cloud options.All cloud service providers provide strong security features and adhere to industry norms and laws in terms of security. The most secure cloud

platforms are AWS, Azure, and Google Cloud Platform, in that order. The cloud service providers provide numerous pricing models and packages that are tailored to different demands and price ranges when it comes to pricing. Pay-as-you-go and reserved instance pricing models are available from AWS and Azure, while per-second payment is available from Google Cloud Platform.

In conclusion, while choosing a cloud service, businesses and individuals must take into account their unique requirements and top objectives. When comparing cloud providers, consumers may gain useful information that can help them make decisions and choose the one that best meets their needs.

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