

RESEARCH ON CLOUD COMPUTING AND IT'S GROWTH IN FUTURE AND CHALANGES

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Abstract

The development of cloud computing is more recent. In 2006, Amazon launched the first cloud service of its kind. Hong Kong is a particularly ideal fit because of the astonishing amounts of data that are handled here every day across various industries, and despite a slow start in the early years, there are signs that local businesses' use of cloud services may soon fly to record-breaking heights. Cloud computing today easily leads any list of problems in computer science due to its extensive suggestion in many computing industries, particularly big data, which without cloud computing is at the great notion. Hong Kong is where Lenovo is now developing a significant cloud R&D cluster.

This is confirmed by Lenovo's recent establishment of a major cloud R&D center in Hong Kong (January 2015). The lifelong ambition of computing as a utility, cloud computing, has the power to transform a significant portion of the IT sector, increasing the appeal of software as a service and influencing the development and selection of IT hardware. New hardware investments and labour costs for operating Internet services are no longer necessary for developers of innovative new invention concepts.

They don't have to worry about over- or under-provisioning for a service whose demand turns out to be much higher or lower than expected, squandering expensive resources and maybe losing out on consumers and income. Also, since utilizing 1,000 servers for one hour costs the same as using one server for 1,000 hours, businesses with large batch-oriented operations can get results as quickly as their programs can scale. This elasticity of resources, which does not require paying a premium for an enormous scale, is unheard of in the history of IT.

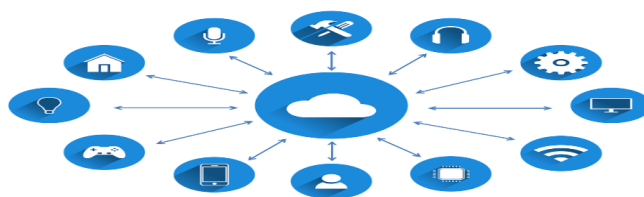
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Introduction

The use of the cloud by businesses and organizations worldwide has grown crucial. It offers a versatile and economical method of processing, storing, and gaining access to data, programs, and services over the internet. This research study seeks to give a general review of cloud computing, including its advantages, difficulties, and emerging trends.

In the 1960s, Joseph Carl Robnett Licklider pioneered cloud computing with his work on ARPSNET, enabling users to connect with others and data from any location at any time. In 1983, CompuServe gave its users a tiny amount of disc space to save any files they chose to upload. Cloud computing is the provision of computer services over the Internet (the "Cloud"), including servers, databases, networking, storage, software, analytics, and intelligence, in order to deliver quicker innovation, adaptable resources, and scale economies.

Cloud computing is the supply of computing services over the Internet, including servers, storage, databases, networking, software, analytics, and intelligence (Internet). The cloud offers an alternative to the on-premises data center. The mobility that cloud computing offers, both to the leisure user and to the commercial and business user, is one of the other major external uses of it. Many of us are already familiar with several Cloud Computing services, such as email services and Google Documents. AWS Elastic Compute, Google Cloud Engine, and AWS Lambda are the three most well-liked cloud computing platforms.



User of cloud services

Methods

A technology called cloud computing makes it possible to deliver computing resources over the internet. It gives users on-demand and as-a-service access to a large variety of resources, such as servers, storage, applications, and databases. Listed below are a few cloud computing techniques:

- **Infrastructure as a Service (IaaS):** In this method, the cloud provider delivers virtualized computing resources such as servers, storage, and networking over the internet.
- **Platform as a Service (PaaS):** This technique frees developers from having to worry about the underlying infrastructure as they create, test, and deploy apps on a cloud platform.
- **Software as a Service (SaaS):** This approach gives users online access to programmes and software. Users access the software through a web browser, which is hosted and managed by the cloud provider. Developers can create and execute apps using serverless computing without having to worry about maintaining infrastructure or servers. Server management and resource allocation are handled automatically by the cloud provider.
- **Hybrid Cloud:** This approach mixes private and public clouds to offer a scalable and adaptable computing environment. It allows enterprises to leverage both on-premise and cloud resources to satisfy their computing demands.
Using numerous cloud service providers, the multi-cloud approach distributes workloads among various clouds. It assists businesses in avoiding vendor lock-in and offers redundancy in the event that a cloud provider fails.
- **Edge computing:** This technique involves processing and analysing data at the network's edge, nearer the data's origin. Minimizing the quantity of data that needs to be sent to the cloud, lowers latency and boosts performance.

These are only some of the techniques utilized in cloud computing. Building and managing cloud-based applications and infrastructure can be done using a wide range of various methods, equipment, and technology.

DISCUSSION

The way corporations and organizations handle and keep their data has been changed by cloud computing. It is a popular option for many businesses due to its many advantages, including scalability, cost-efficiency, flexibility, and accessibility.

One of the key benefits of cloud computing is that it makes it simple for organizations to scale up or down their computer resources in accordance with their demands. Businesses that encounter seasonal demand

changes will find this to be especially helpful. An e-commerce company, for instance, can swiftly scale up its processing capabilities to manage the additional traffic during high sales periods.

Because businesses no longer need to invest in pricey hardware and software infrastructure, cloud computing significantly reduces costs. Business organizations might instead sign up with a cloud service provider and only pay for the resources they really utilize. Businesses can minimize significant upfront expenditures by doing this and just spending what they actually need.

Cloud computing also has the benefits of flexibility and accessibility. With an internet connection, cloud-based applications can be used from any location. Due to the lack of -geographic restrictions, organizations can now have remote teams and employees can work from anywhere. Cloud computing raises a number of issues, including security and data privacy. The risk of data breaches and hacking increases as organizations keep their data on servers owned by other parties. To protect their data, companies must select a reliable cloud service provider and put in place suitable security measures.

Overall, cloud computing has changed the game for many businesses and organizations by providing a number of benefits that have aided in cost- and process-saving measures. Yet, companies must carefully weigh the possible risks and difficulties brought on by cloud computing, take the required precautions to protect their data, and make sure they are not tied to a single provider.

Organizations can take advantage of the cost reductions, scalability, and flexibility that cloud computing provides. By implementing cloud computing, however, enterprises must also deal with a number of difficulties. Some of the biggest difficulties are as follows:

- **Security and privacy** are two of the cloud computing industry's most important challenges. Organizations must make sure that their data is secure against cyberthreats and breaches when they move their data and apps to the cloud. Organizations must also make sure that they abide with privacy laws including the GDPR, CCPA, and HIPAA.
- **Compliance:** Companies that work in regulated sectors including healthcare, finance, and government are required to abide by a number of laws and norms. Organizations must make sure that their cloud provider is in accordance with the necessary laws and regulations because moving to the cloud can make it difficult to maintain compliance.
- **Performance and Availability:** The internet, which cloud computing depends on, can occasionally be problematic. To prevent downtime and performance difficulties, businesses must make sure that their cloud provider offers excellent performance and availability.

- Companies may encounter difficulties merging their current IT systems with cloud services. Organizations must make sure that their cloud provider delivers the appropriate integration tools and services because integration can be difficult and time-consuming.

ANALYSIS

The phrase "cloud computing" refers to the provision of computing resources, such as software, storage, and processing power, via the internet. The flexibility, scalability, and affordability of cloud computing have made it a preferred option for both enterprises and consumers. We will go deeper into the numerous facets of cloud computing in this research, including its advantages, difficulties, and potential in the future.

Benefits of Cloud Computing:

- **Cost Savings:** By removing the need for expensive hardware and software infrastructure, cloud computing can assist organisations in lowering their IT expenditures. This is so that businesses only pay for the resources they really utilise. Pay-as-you-go pricing is what cloud providers normally offer.
- **Scalability:** The flexibility of cloud computing to scale up or down in accordance with business needs is one of its main advantages. Businesses with varying workloads can simply alter their cloud resources as a result, which is especially advantageous.
- **Enhanced Collaboration:** Because cloud computing allows team members to access files and programmes from anywhere in the world, it also makes it easier for them to exchange information and collaborate on projects.
- **Improved Mobility:** Cloud computing makes it simpler for users to access programmes and data from any device with an internet connection, facilitating mobile or remote work for employees.
- **Improved Security:** To defend against cyber risks, cloud providers frequently incorporate advanced security measures like encryption, authentication, and access control.

Challenges of Cloud Computing:

- **Internet dependence:** One of the main issues with cloud computing is its reliance on the internet. The services offered by cloud providers may experience delays or pauses if the internet connection is slow or unstable.

- **Data privacy and security issues:** Despite the fact that cloud providers frequently employ top-notch security measures, there is still a chance that sensitive data will be compromised in data breaches. However, some companies could worry about the privacy of their data, particularly if they must comply with legal regulations.
- **Vendor lock-in:** Companies using cloud services risk becoming reliant on a single supplier, which makes switching to another one or a new platform challenging.
- **Minimal Control:** With cloud computing, companies have less power over the apps and infrastructure they use. Because of this, it could be challenging to modify and personalise services to address particular needs.

Future of Cloud Computing:

In the upcoming years, cloud computing is anticipated to expand and change even more. The following are some of the major trends that will probably influence how cloud computing develops:

Edge computing: Edge computing is the processing of data at the network's edge, nearer to the data source. By doing so, latency can be decreased and cloud service performance can be enhanced.

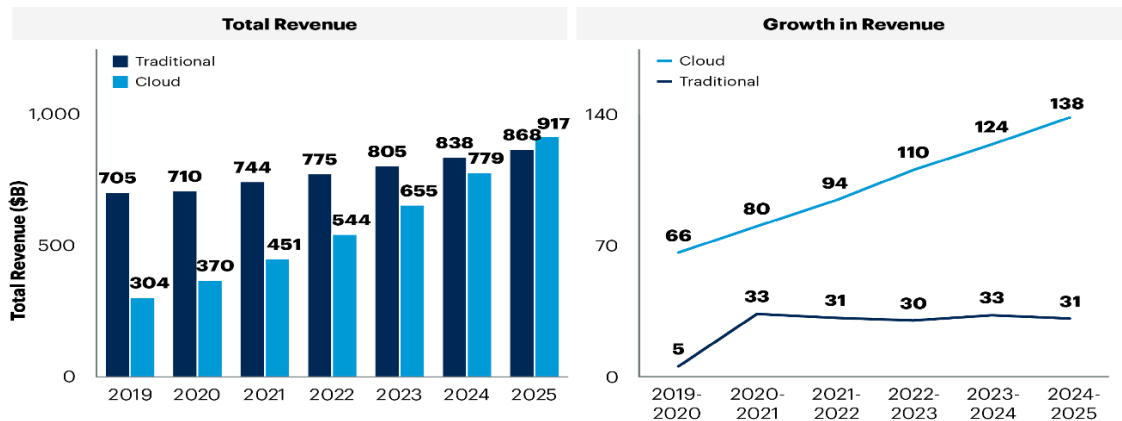
Hybrid Cloud: Using a hybrid cloud entail combining services from both public and private clouds. Businesses may benefit from having more flexibility and control over their cloud resources as a result.

Multi-Cloud: Using numerous cloud providers for various services or workloads is known as multi-cloud. Businesses can increase resilience and avoid vendor lock-in by doing this.

Serverless Computing: Running programmes without the use of server infrastructure is known as serverless computing. Costs can be brought down, and scalability can be increased.

Ultimately, cloud computing is a potent technology that gives people and businesses a number of advantages, such as cost savings, scalability, and enhanced collaboration. But it also has its own set of drawbacks, such as a reliance on the internet, worries about data privacy, and a lack of control. Even so, trends like edge computing, hybrid cloud, multi-cloud, and serverless computing are anticipated to spur innovation and expansion in the field of cloud computing.

Global Cloud Shift and Sizing, 2019–2025



Throughout the last ten years, cloud computing has grown significantly, and this trend is anticipated to continue in 2023, the market for public cloud services is expected to increase by 68.55% and reach \$917 billion in 2025 from \$544 billion which was figure in 2022. The proliferation of mobile devices and the need for data access from anywhere are some of the factors that have contributed to the growth of cloud computing. Other contributing factors include the rise of big data and the need for scalable and affordable solutions to store and process this data, as well as the increasing importance of digital transformation in organisations.

Furthermore, the COVID-19 epidemic has sped up the adoption of cloud computing because it forced many firms to move to remote work and necessitated cloud-based solutions to offer remote access to apps and data. Public cloud services are not the only type of cloud computing. In addition to growing in popularity, private cloud and hybrid cloud solutions give businesses more flexibility and control over their IT infrastructure. Overall, it is anticipated that the rise of cloud computing will continue as more companies come to understand the advantages of cloud-based solutions and as technological developments like 5G, edge computing, and AI continue to fuel innovation in the cloud computing sector.

CONCLUSION

In conclusion, cloud computing has revolutionised company operations and is now a crucial component of the technological landscape. Cloud computing has made it simpler for organisations to innovate, compete, and win in today's fast-paced world by supplying scalable, adaptable, and cost-effective computing resources. With continuing development and innovation in fields like hybrid cloud, serverless computing, multi-cloud, artificial intelligence, and edge computing, the future of cloud computing appears promising.

We may anticipate even more developments and chances for growth and success as companies continue to use cloud computing.

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