

Cloud Computing's Transformative Power in Computing Environments

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This chapter offers an in-depth review of the revolutionary development of cloud computing, from its theoretical underpinnings to its current position as a vital component of modern infrastructure for information technology. The historical trends, significant turning points, and technological advancements in the discipline are reviewed in this chapter. It explores the beginnings of cloud computing, how service models have changed over time, the effects of virtualization, and how new technologies are being incorporated. Readers will gain a profound appreciation for how cloud computing has transformed the operations and innovation of organizations by comprehending the historical background and recent developments.

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The cloud computing era is currently in the IT industry. With its Internet-based foundation, cloud computing boasts the most potent processing architecture. Hardware, software, and internet infrastructure are all interconnected and integrated to form this system. It offers several advantages over grid computing and other computing systems. Cloud computing architecture is a fundamental framework that enables the delivery of various computing services over the Internet. This architecture comprises a front-end platform, back-end platforms, a cloud-based delivery model, and the network infrastructure that connects these components. The architecture is designed to provide scalable, flexible, and cost-effective solutions for a wide range of applications, from data storage and processing to software development and deployment. This chapter investigates the intricate details of cloud computing architecture, exploring its components

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This chapter provides a comprehensive overview of cloud deployment models, including public, private, hybrid, and community clouds, and their profound impact on modern IT infrastructure and the development of inclusive IoT smart systems. The selection of an appropriate cloud model significantly influences critical aspects such as data sovereignty, scalability, resource utilization, and crucially, the accessibility features for individuals with disabilities. We examine the distinct characteristics, advantages, and disadvantages of each model, highlighting how they cater to diverse organizational needs, from cost optimization and rapid provisioning in public clouds to enhanced security and control in private environments. The discussion also addresses the complexities and benefits of hybrid and community cloud approaches, emphasizing their role in enabling flexible, compliant, and collaborative computing solutions. Understanding these models is essential for making informed strategic decisions that foster innovation and ensure equitable access to technology.

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Cloud computing has revolutionized the way businesses access and utilize computational resources, providing unparalleled cost efficiency, scalability, and flexibility. Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) comprise the three primary cloud service models; this chapter offers a thorough examination of each. We explore the characteristics, use cases, advantages, and disadvantages of each model, emphasizing the varying degrees of control and responsibility that cloud providers and consumers share.

In addition, the chapter delves into significant future trends, such as the increased integration of Artificial Intelligence functionalities, the paramount importance of robust cloud security measures, the convergence of edge and cloud computing, advancements in resource optimization, and the increasing adoption of cloud-native and serverless architectures. It is imperative for organizations to comprehend these models and emergent trends in order to effectively leverage the transformative power of the evolving cloud landscape.

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Cloud computing is a primary driver for digital transformation, driving agility, scalability, and efficiency enhancements across industries. This chapter introduces cloud computing benefits such as flexibility, cost reduction, and accelerated innovation. Cloud strategies such as Hybrid, Multi-Cloud, and a Cloud-Native approach to fit the business needs will be explored. Some industry-specific impacts concerning healthcare, finance, and manufacturing processes will be vividly brought forth. While cloud adoption is a beneficial decision, it can also pose threats such as security, compliance, and integration challenges that will be addressed through mitigation strategies. The future trends in cloud computing that will be discussed include AI-driven cloud services, Edge computing, and Serverless architectures. Real-world case studies will fortify the argument on successful practical applications as effective references for businesses to leverage cloud computing.

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This chapter explores the key security threats and vulnerabilities at different levels, such as SaaS, PaaS and IaaS in cloud computing and provides their solutions. It will comprehensively analyze common security risks such as data breaches, unauthorized access and compliance issues. Discuss all security issues such as application security, data security, network security issues, authentication and authorization issues. It explains various data security techniques such as Cryptography, Steganography, Homomorphic cryptography, Quantum cryptography, DNA cryptography, Machine learning and Deep learning, Multi-factor authentication, and Blockchain to describe

which technique is suitable at which stage of data. It explains regulatory bodies such as GDPR (European Union), HIPAA (United States), CCPA (United States), DSL (China), CSL(China), IT Act, and PDPB (India) and case studies related to regulatory role in data privacy. It describes the role of AI and machine learning, zero-trust architecture in threat detection, and the future of cloud computing.

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Blockchain technology has shown promise to improve security across several industries, including cloud data storage. The integration of blockchain technology with safe cloud data storage solutions is examined in this chapter. Data integrity, secrecy, and authentication in cloud storage systems can be greatly enhanced by utilizing the decentralized and immutable nature of blockchain. Important ideas about cloud data security are covered, including distributed consensus, smart contracts, and cryptographic hashing. The chapter also explores the difficulties, advantages, and potential avenues for future research in applying blockchain technology to improve cloud data storage security.

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Smart Clouds: Integrating AI, Machine Learning, and Blockchain for Next-Gen Analytics..... 255
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 K. Sakthivel, Hindustan Institute of Technology and Science, India

This study explores the transformative integration of AI, Machine Learning (ML), and Blockchain within cloud computing to address the growing demand for secure, scalable, and real-time data-driven solutions across industries. The primary objective is to present a comprehensive framework for smart cloud platforms by combining AI and ML-driven analytics with Blockchain-as-a-Service (BaaS) for enhanced data security, transparency, and decision-making. The research targets professionals in IT, academia, and enterprises seeking innovative cloud solutions. Methodologically, the study leverages architectural models, real-world case studies, and a detailed analysis of current industry trends to propose best practices for implementation. Key findings reveal significant improvements in organizational insights, secure transactions, and operational efficiency through integrated cloud ecosystems. The study concludes by highlighting future trends such as quantum computing and AI-driven blockchain models, emphasizing their implications for business innovation and policy development.

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Blockchain is a decentralized and distributed digital ledger that records transactions across multiple computers. It consists of a continuously growing list of blocks, where each block contains a set of transactions and a reference to the previous block. The blockchain ensures the immutability and integrity of the recorded transactions by using cryptographic hashes and consensus mechanisms. Cloud computing is a service available over the network. Users can access and store data and applications remotely rather than on local servers or personal computers. Cloud computing offers resource pooling by letting users share the same physical resources dynamically according to their demands, often through virtualization. Cloud computing offers flexible, scalable resources, it can address blockchain's limitations in scalability and transaction speeds by act as a backup for blockchain data, enabling faster recovery and reduced latency. Synergy between cloud computing and blockchain offers significant potential for innovation across numerous sectors

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The main idea of cloud computing is being widely promoted as the solution to current ongoing IT problems. In recent years the approach towards IT investment and management is constantly changing. At the same time, cloud computing has developed as a foundation of the contemporary technologies which enables the users

to receive the necessary amount of such resources and services without any delays. The research paper delves into the transformative landscape of 5G networks, focusing on the fusion of edge and cloud computing. This fusion represents a paradigm shift in network architecture, promising enhanced performance, scalability, and innovation. Edge computing, characterized by real-time processing and low-latency applications, complements cloud computing's scalable resources for data storage and processing. Despite these challenges, the fusion of edge and cloud computing enables improved performance, scalability, and innovation, driving digital transformation and competitive advantage in the digital economy.

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In this chapter, the convergence of IoT and Cloud Computing are discussed with an emphasis on scalability, elasticity, real-time processing, cost-effectiveness, resource optimization, and security. Giant amounts of data are generated by IoT networks; hence the role cloud computing can play in efficient data storage and management becomes critical. In addition, it discusses the importance of disaster recovery, fault tolerance, global access, and management in the cloud-enabled IoT ecosystem. Finally, the authors present the future trends highlighting the advancements that will drive the IoT and cloud computing integration. The research gives insight on how cloud computing support IoT applications to help companies build strong, scalable, secure systems-all with resource efficiency and operational costs in check.

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Wireless Sensor Networks are integral to a wide array of smart applications, including environmental supervision, healthcare, and manufacturing automation. However, the

operation of sensor nodes is often constrained by limited energy resources. Efficient wireless energy harvesting (WEH) is a promising solution that can extend the operational lifetime of these nodes. Managing cloud services on sensor nodes plays a critical role in optimizing energy consumption and ensuring effective integration of WEH technologies.

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Load balancing is vital in cloud computing for efficiently distributing workloads and preventing resource bottlenecks. This review explores using Genetic Algorithms (GAs), known for their optimization strength, to improve load balancing by minimizing task execution times and boosting resource utilization. The GA-based approach adapts to changing tasks and conditions, evolving solutions through iterative natural selection processes. This paper examines the key principles and real-world applications of this method, showing its potential to transform traditional load balancing and enhance cloud system performance and scalability.

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Enhancing Supply Chain Efficiency and Decision-Making With Cloud-Based

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Malaysia

This chapter explores how cloud-based predictive analytics is transforming supply chain management by improving efficiency, accuracy in demand forecasting, and strategic decision-making. It discusses the benefits of integrating cloud computing with advanced analytics to enhance real-time data visibility, streamline operations, and enable proactive decision-making across the supply chain. Through detailed use cases, the chapter explains the practical applications of predictive and prescriptive analytics for optimizing inventory levels, forecasting demand fluctuations, and

mitigating risks. The chapter highlighting the increasing significance of artificial intelligence, IoT integration, and edge computing

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The construction industry, an important sector of the global economy, with large data generation and huge employment opportunities, requires automation for enhanced productivity and contribution to the Gross Domestic Products (GDP). The integration of Cloud Computing (CC) with Building Information Modelling (BIM), however cannot deliver the future construction, hence, the need to explore the other specialised Emergent Technologies (ET). In this chapter, critical appraisal of existing literature to identify the application domain, problem areas and intersections between CC and ET were carried out. Case studies were cited to demonstrate the benefits of the adoption of CC and ET such as, BIM, Internet of Things (IoT) and Intelligent Analytics. The reluctance of this industry was also identified and some suggestions were proffered to mitigate the potential risks. However, the adoption is believed to have the potential to open up issues. Hence, the adoption is conjectured to be viewed as an asset.

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Preface

In the past decade, cloud computing has transitioned from a disruptive technology to a foundational infrastructure that underpins nearly every sector of our digital society. As organizations increasingly seek flexible, scalable, and efficient computing solutions, cloud computing has emerged as the driving force behind innovation, operational agility, and digital transformation. This edited volume, *Cloud Computing's Transformative Power in Computing Environments*, is a comprehensive collection of research contributions that explore the evolving architecture, deployment strategies, and applications of cloud technologies while addressing the ethical, security, and integration challenges posed by emerging technologies such as AI, blockchain, IoT, and edge computing.

The goal of this book is twofold: first, to present readers with foundational and technical insights into cloud computing; and second, to explore its strategic application across industries and disciplines. Each chapter delves into specific aspects of cloud computing, from architectural frameworks to AI-integrated solutions, providing a multidisciplinary perspective that bridges theory and practice. The book brings together researchers, technologists, and academics from diverse regions and disciplines to provide a truly global and contextualized exploration of cloud computing's transformative power.

CHAPTER OVERVIEW

Chapter 1: Essential Concepts in Cloud Computing

Fatima Ahmed Abdalla and Noor Asiah Rashid present a historical and conceptual overview of cloud computing, tracing its roots, technological evolution, and foundational models. This chapter serves as a springboard for understanding subsequent discussions.

Chapter 2: Cloud Computing Architecture

This chapter, also authored by Fatima Ahmed Abdalla and Noor Asiah Rashid, dives into the structural design of cloud computing, detailing its front-end and back-end components and the internet infrastructure that links them, while discussing advantages over legacy systems.

Chapter 3: Cloud Deployment Models

Azana Hafizah Mohd Aman and her co-authors explore public, private, hybrid, and community clouds. The chapter focuses on strategic decision-making, particularly regarding accessibility, scalability, and compliance in enterprise and IoT contexts.

Chapter 4: Cloud Service Models

This chapter outlines the core service models - SaaS, PaaS, and IaaS- while forecasting emerging trends like AI integration and serverless architecture. It equips organizations to choose appropriate service models for their evolving needs.

Chapter 5: Cloud Computing's Role in Digital Transformation

Salaheldin Edam illustrates how cloud adoption accelerates innovation across industries, including healthcare and manufacturing. He presents real-world cases and forecasts trends such as edge computing and AI-enabled services.

Chapter 6: Cloud Security and Privacy

Rubi Kadyan and her co-authors address the pressing issues of data protection, regulatory compliance, and multi-layered security using modern techniques like quantum cryptography, machine learning, and blockchain.

Chapter 7: Blockchain-Based Security for Cloud Data Storage

Mamoon Saeed and colleagues examine how blockchain can be harnessed to secure cloud data, using mechanisms like smart contracts and distributed consensus to strengthen integrity, confidentiality, and transparency.

Chapter 8: Smart Clouds: Integrating AI, ML, and Blockchain

C.V. Suresh Babu and Sakthivel K. present an integrated framework for intelligent cloud platforms that combine analytics, blockchain, and automation to meet the growing demand for secure and data-driven cloud services.

Chapter 9: Synergizing Cloud and Blockchain Architectures

Sheraz Maki Mohd Ahmed and collaborators explore the complementarity of cloud scalability and blockchain immutability. The chapter provides insights into how this synergy can transform sectors like healthcare, finance, and governance.

Chapter 10: Integrated 5G and Edge Computing Framework

Ashok P. and a multidisciplinary team discuss how the convergence of 5G, edge computing, and cloud can address latency-sensitive IoT applications. This chapter highlights innovations that redefine network performance and resource management.

Chapter 11: Enhancing IoT through Cloud Computing

Salaheldin Edam and co-authors examine how cloud computing enhances IoT through efficient data handling, global scalability, and real-time analytics, paving the way for resilient and intelligent ecosystems.

Chapter 12: Managing Cloud Services on Sensor Nodes for Wireless Energy Harvesting

Muhammed Zaharadeen Ahmed and colleagues highlight the importance of energy-aware cloud service management on sensor nodes. The chapter focuses on integrating wireless energy harvesting to extend the lifespan of smart applications.

Chapter 13: Load Balancing in Cloud Computing with Genetic Algorithms

Abhipsha Das and her co-authors delve into optimization techniques, especially Genetic Algorithms, for efficient load balancing. This chapter proposes an adaptive and scalable approach for handling dynamic cloud workloads.

Chapter 14: Cloud-Based Predictive Analytics in Supply Chains

Rehab Ibrahim Ahmed Omer presents the transformative role of predictive analytics in supply chain optimization. Through cloud integration, companies gain real-time visibility and improved decision-making capabilities.

Chapter 15: Unbundling Cloud Computing in the Construction Industry

Sururah Bello and co-authors analyze the interplay of cloud computing and emergent technologies such as BIM and IoT in the construction sector. This chapter provides a roadmap for digital transformation within one of the world's largest and most traditional industries.

As we navigate an era defined by digitization and rapid technological evolution, this book offers a timely, essential resource for students, professionals, and decision-makers. We invite readers to explore the nuanced intersections of cloud computing with emerging technologies, security challenges, and real-world applications—and to envision the future of computing shaped by the cloud.

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Chapter 1

Essential Concepts in Cloud Computing

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ABSTRACT

This chapter offers an in-depth review of the revolutionary development of cloud computing, from its theoretical underpinnings to its current position as a vital component of modern infrastructure for information technology. The historical trends, significant turning points, and technological advancements in the discipline are reviewed in this chapter. It explores the beginnings of cloud computing, how service models have changed over time, the effects of virtualization, and how new technologies are being incorporated. Readers will gain a profound appreciation for how cloud computing has transformed the operations and innovation of organizations by comprehending the historical background and recent developments.

INTRODUCTION TO CLOUD COMPUTING

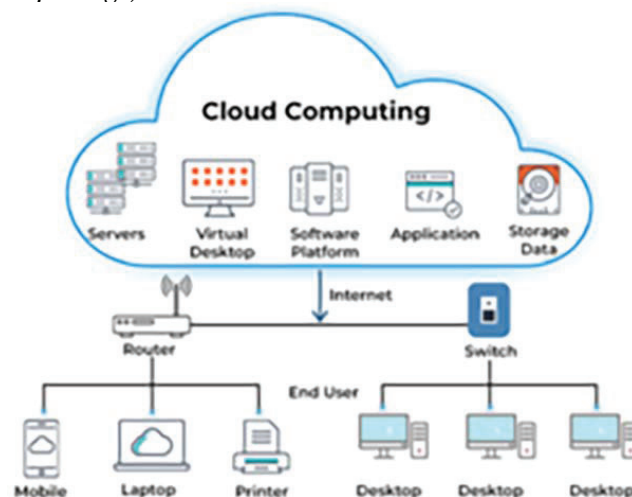
By understanding these fundamental concepts, readers can grasp the essentials of cloud computing and its potential to transform their business or personal computing experiences. Several concepts and definitions can aid our understanding of cloud computing. The key concepts include the basic definition of cloud computing, service models, deployment models, essential characteristics, and future cloud computing evolution, so this chapter discusses all the mentioned topics and discusses the root

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of cloud computing. The two primary justifications for using cloud computing CC are dependability and convenience. Cloud services are delivered via the Internet, so privacy and security must be the priority (Shahab Shamsirband et. Al. 2020). The main characteristics of Cloud Computing are categorized by the following elements:

- On-demand self-service: Consumers can automatically request the service based on their needs, without interacting with the service provider.
- Easy-to-access standardized mechanisms: Access to the service should always be possible from the Internet when policies permit.
- Resource pooling and multi-tenancy: sharing resources among multiple tenants can increase utilization and reduce operational costs.
- Rapid elasticity: the ability to scale resources in and out provides flexibility to provision resources on demand.
- Measured service: monitoring service conditions and measuring them enables resource optimisation.
- Auditability and certifiability: services should provide logs and trails that allow the traceability of policies to ensure their correct application is enforced (Radošević & Hongyu Pei-Breivold, 2014). Figure 1 shows the visual representation of Cloud Computing.

Figure 1. Cloud Computing Visual (<https://www.spiceworks.com/tech/cloud/articles/what-is-cloud-computing/>)



a) Definition and Overview

According to Mell and Grance (2011), and this is the most accepted definition of Cloud computing, cloud computing is a paradigm that enables users to access and store data and applications on distant servers instead of local hardware. According to Armbrust et al. (2010), this technology offers flexibility, scalability, and cost-effectiveness by allowing users to access computational resources via the Internet. However, the most adopted definition of cloud computing is by Mell and Grance (2011) in academia. Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) are the three paradigms into which cloud services are commonly divided (Zhang, Cheng, & Boutaba, 2010). IaaS enables companies to scale their infrastructure up or down in response to demand by providing virtualized computer resources via the Internet. PaaS offers a platform that lets users create, execute, and oversee applications without having to deal with the hassle of constructing and maintaining the supporting infrastructure. SaaS makes high-quality software available to a large audience by delivering software programs over the Internet on a subscription basis (Mell & Grance, 2011; Zhang, Cheng, & Boutaba, 2010).

b) Historical Context and Evolution

The concept of cloud computing has evolved significantly over time. Its roots can be traced back to the 1960s when computer scientist John McCarthy opined that “computation may someday be organized as a public utility” (McCarthy, 1961). The advent of the internet in the 1990s and advancements in virtualization technologies in the 2000s propelled the development of cloud computing (Foster et al., 2008). In the early stages, companies like Google and Amazon began to harness the power of distributed computing to manage their vast amounts of data and traffic, paving the way for the modern cloud computing landscape (Armbrust et al., 2010). This transformation was driven by a need for greater efficiency, flexibility, and cost savings in managing IT resources (Buyya et al., 2009).

Cloud computing has transformed the way individuals and organizations access and utilize technology. This chapter delves into the evolution of cloud computing, tracing its origins from early computing concepts to its status as a cornerstone of modern IT infrastructure. The evolution of a data center into a private cloud is a transformation of the business process streamlining with IT operation from a data center to the cloud, where the user discovers the operation much more effectively and efficiently. Cloud computing is slowly becoming the Internet's lifeblood. Most Internet users use popular but common websites like Facebook, LinkedIn, and Twit-

ter, all of which rely on cloud computing. In addition to this, individuals use cloud storage-dependent apps like YouTube, Gmail, and others. (Rafat Ara, et.al 2020).

c) Early Concepts and Foundations (1960s-1990s)

When we consider the cloud, we often fail to recall the times before the 21st century. Given everything, it has indeed been an absurd decade or so during which the concept truly began to shape into the colossal, universal, and astonishing behemoth we recognise today. However, the foundational ideas of the cloud have existed for many years and, believe it or not, can be traced back to the 1950s with centralised computing. In those early days, centralised computing systems were massive machines and, remarkably, quite expensive, far too costly to even contemplate acquiring and maintaining one for every single employee (Babita Bhagat et al., 2021).

As stated above, the origins of cloud computing can be found in the 1960s, a time when networking and computer technology advanced significantly. Future advancements in networking and computing were made possible by the concepts put out by visionaries such as J.C.R. Licklider regarding a worldwide computer network that would enable users to access data and programs from any location.

d) ARPANET and Networking Innovations

To get to the origins of the Internet, we must go back in time to 1957. You may not recall, but it was the International Geophysical Year, a year dedicated to gathering information about the upper atmosphere during a period of intense solar activity. Eisenhower announced in 1955 that, as part of the activities, the USA hoped to launch a small satellite into Earth orbit. The Kremlin announced that it hoped to do likewise. Planning in America focused on a sophisticated three-stage rocket, but in Russia, they took a more direct approach. Strapping four military rockets together, on 4 October 1957, the USSR launched Sputnik I (a 70 kgs beeping sphere the size of a medicine ball) into Earth orbit (Kirstein, 1999).

The evolution of the Internet began with the launch of Sputnik I in 1957, which prompted the U.S. to establish the Advanced Research Projects Agency (ARPA). ARPA initiated pioneering computing research, leading to the concept of computer networking. Key contributors such as John Licklider and Leonard Kleinrock envisioned a “Galactic Network,” where messages were divided into packets for flexible, secure transmission. This vision culminated in the 1969 launch of ARPANET, connecting UCLA and Stanford. ARPANET quickly expanded to link multiple universities, marking the dawn of true computer networking (Jacksi & Abass, 2019).

During the 1970s and early 1980s, networking advanced significantly. Innovations like email, host-to-host communication, and TCP/IP protocols made the system more powerful and scalable. By adopting TCP/IP in 1982, ARPANET laid the groundwork for what would become the Internet. Government-funded networks like NSFNet expanded access across educational institutions, while open protocols encouraged global collaboration and technological innovation. Meanwhile, private and academic sectors began developing new services and networking tools, leading to increasing international adoption and the birth of early internet services like Usenet and Bitnet (Schafer & Serres, 2016).

The final transformation occurred with the World Wide Web, proposed by Tim Berners-Lee at CERN in 1989. The introduction of HTTP, HTML, and web browsers like Mosaic revolutionised how users accessed and shared information. What had been a tool for scientists became a mainstream platform for communication, commerce, and content. Commercial web activity surged as user-friendly interfaces, improved infrastructure, and widespread PC use drove explosive growth. By the mid-1990s, the Web expanded rapidly, with millions of hosts and websites, ushering in the digital age and fundamentally reshaping global society (The National Science and Media Museum, 2025).

e) Virtualization and Time-Sharing

The advent of virtualization technology in the 1970s made it possible for several users to share a primary computer's resources. This resource sharing was made possible by IBM's virtual machine operating system, which offered separate environments for various users. The future of cloud computing was greatly influenced by this time-sharing concept, which emphasised effective resource use. Mobile cloud computing (MCC), a new computing paradigm that is significant today, allows mobile devices to offload computations to the remote cloud, thereby reducing their limits (Shahab Shamshirband, et al. 2022).

f) The Birth of the World Wide Web

The early 1990s marked a significant turning point with the advent of the World Wide Web. This innovation revolutionised how data could be accessed and shared globally, creating a fertile environment for cloud computing to emerge. Companies like Salesforce began offering Software as a Service (SaaS), which allowed users to access applications over the Internet rather than installing them locally (Devadiga et al., 2021).

g) The Emergence of Cloud Computing (2000-2011)

In the early 2000s, the term “cloud computing” became well-known as businesses realised how scalable and affordable it might be. Amazon Web Services (AWS) and Elastic Compute Cloud: In 2002, Amazon introduced AWS, which offers core cloud services like computing and storage. The 2006 launch of Elastic Compute Cloud (EC2), which enables users to rent virtual servers on demand, was especially revolutionary. This signaled a dramatic change away from more rigid IT infrastructure paradigms and towards more adaptable cloud-based solutions. Because these services allow businesses to rent storage and processing capacity on demand, they set the groundwork for scalable, cost-effective infrastructure.

h) Google’s Contributions

Google also significantly advanced cloud computing. With the release of Google App Engine in 2008, programmers could create and host apps on Google's infrastructure. This further proved that cloud platforms are a viable option for hosting services and apps. Because cloud computing makes it possible to access computer services globally through the internet, it has revolutionized data access and storage. Databases, networking, servers, software, storage, analytics, AI, ML, and BI are some of these services. Pay-as-you-use mechanisms in its design facilitate cost effectiveness, scalability, and innovation. Third-party providers, including Google Cloud Platform (GCP), Microsoft Azure, and AWS, offer cloud services. In addition to highlighting current market trends and opportunities, this study investigates these suppliers (Borra, 2024).

i) The Rise of Public Cloud Services

By 2011, the term “cloud computing” was well-known and widely used in a variety of sectors. A proliferation of cloud service providers resulted from organisations embracing public cloud services due to their cost-effectiveness, scalability, and flexibility. When cloud providers introduced cutting-edge services like machine learning, big data analytics, and IoT (Internet of Things) support, the potential applications for cloud computing expanded (Hassan et al., 2022).

j) Cloud Model Evolution (2012-Present)

Several service models were developed as cloud computing advanced to accommodate a range of business requirements. As mobile devices become more and more common in daily life, Mobile Cloud Computing (MCC) has become a paradigm to