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**The History of Cloud Computing: A Digital Revolution**

**Introduction**

Cloud computing, or simply ‘the cloud’, is one of the biggest changes in information technology that most of us are likely to live through. From its conception to its construction as a large-scale digital infrastructure, cloud computing has transformed the way businesses operate and the way services are delivered across the globe.

**Early Concepts and Foundations**

The idea of cloud computing dates back to the 1960s. The term is modern, but the conceptual precursors began with the pioneering computer scientist John McCarthy, when he wrote that ‘the economy of scale from centralisation of computing may in time lead to a natural monopoly’ and that ‘computation may someday be organized as a public utility’. In the 1970s and ’80s, the idea stayed on the back burner under the radar of the technology world – the actual hardware and software needed to make it work had yet to be created.

In these early days, the mainframe computers used by large institutions could be accessed via terminal interfaces. This setup, known as time-sharing, was an embryonic form of cloud computing. It allowed users to access a central computer through a client machine, sharing computational power and resources. This model laid the groundwork for the distributed computing that cloud computing would later require.

**Commercialization in the 1990s**

It was the commercialisation of the internet in the early 1990s that really set the scene for cloud computing. By then, there was the prospect that someone might be able to sell what had been ‘computing as a utility’ – the delivery of computing as a service. The term ‘cloud computing’ was first used in the modern sense in the late 1990s (in a Compaq internal document, according to one source).

At that time, telecommunications carriers, which had earlier provided only highly priced, leased, point-to-point dedicated data circuits, began offering VPN service with comparable quality of service but at a fraction of the earlier cost and with the ability for the carrier to shift traffic to balance the available utilization as desired. The service, as well as others that followed, revealed the practicality of delivering services over a network – one of the key architectural components of the future cloud.

**The 2000s: Cloud Platforms Emerge**

The real cloud computing kick-off began in earnest with the development of national platforms in the 2000s. AWS, Amazon’s set of cloud computing services including storage and computation, launched in 2002, thereby initiating the modern era of mass cloud computing services. Marking another key stage in cloud-computing history, Amazon’s Elastic Compute Cloud (EC2) — the service that offers users the ability to rent computers on which to run their own computer applications — was provided in 2006, making scalable computing available to small businesses as well as individuals. That’s really the genesis of what today we call the cloud computing paradigm, because it’s elastic and on-demand.

**The 2010s: Mainstream Adoption and Expansion**

By the 2010s, cloud computing was becoming mainstream. Almost all companies understood that, compared with investing in their own internal infrastructure, the cloud could be more scalable, efficient, and less costly. The biggest tech firms – Google, Microsoft, Amazon, Apple and Facebook – began to expand their cloud offerings and soon others like IBM, a relative cloud latecomer, played catch-up. The upshot was the rise of Software as a Service platforms such as Salesforce, which offers a host of software applications as a service over the internet. Without the need to invest in infrastructure, they allowed a company’s employees to access the applications online.

**Today: The Cloud Era**

Today, cloud computing is integral to the digital economy, underpinning the vast ecosystem of services that are part of our daily lives, from streaming entertainment to powering AI technologies. The cloud also supports the growth of the Internet of Things (IoT), big data, and machine learning applications, providing the backbone for these technologies.

**Conclusion**

Cloud computing’s history is one of continuous evolution and of invention. The future of cloud is likely to see even more pervasive services via innovations such as next-generation technologies that will also leverage its ubiquitous, flexible nature, including edge computing and quantum computing, thus solidifying cloud’s status as a pervasive utility that powers innovative next-generation services. Going from the days of time-shared mainframe to the cloud in every corner, over just a half-century, is an indicator of rapid technological advancement and how the dynamic nature of the tech industry impacts the world.

**References**

1. Corbató, F. J. (1962). *An experimental time-sharing system*. Proceedings of the AFIPS Fall Joint Computer Conference, 21, 335-344. Retrieved from https://dl.acm.org/doi/10.1145/1461518.1461532
2. Davidson, L., & Matela, R. (1997). *Virtual private networks*. McGraw-Hill.
3. Hamilton, J. (2008). On designing and deploying internet-scale services. In Proceedings of the 21st Large Installation System Administration Conference (LISA '07) (pp. 231-242). Retrieved from https://www.usenix.org/legacy/event/lisa07/tech/full\_papers/hamilton/hamilton\_html/index.html
4. Krol, E. (1992). *The whole internet user's guide & catalog*. O'Reilly Media.
5. Licklider, J. C. R. (1960). *Man-computer symbiosis*. IRE Transactions on Human Factors in Electronics, HFE-1(1), 4-11. Retrieved from<https://ieeexplore.ieee.org/document/4503259>
6. McCarthy, J. (1961). The economy of scale from centralisation of computing may in time lead to a natural monopoly and computation may someday be organized as a public utility. In Proceedings of the Western Joint Computer Conference (pp. 23-28). Retrieved from https://dl.acm.org/doi/10.1145/1459262.1459273
7. Leiner, B. M., Cerf, V. G., Clark, D. D., Kahn, R. E., Kleinrock, L., Lynch, D. C., ... & Wolff, S. (1997). A brief history of the Internet. ACM SIGCOMM Computer Communication Review, 39(5), 22-31. Retrieved from https://dl.acm.org/doi/10.1145/1629607.1629613
8. Barr, J. (2006). Amazon Web Services Blog. Retrieved from<https://aws.amazon.com/blogs/aws/>
9. Bezos, J. (2002). Letter to shareholders. Retrieved from https://www.sec.gov/Archives/edgar/data/1018724/000119312502054902/dex991.htm
10. Benioff, M., & Adler, C. (2009). *Behind the cloud: The untold story of how Salesforce.com went from idea to billion-dollar company—and revolutionized an industry*. Jossey-Bass.
11. Borgoni, G. (2023). The evolution of cloud computing: From the early ideas of John McCarthy to modern platforms. Elemento. Retrieved from<https://www.elemento.cloud/post/the-evolution-of-cloud-computing-from-the-early-ideas-of-john-mccarthy-to-modern-platforms>