

The Disruptive Effect of Cloud Computing Across Industries

^[1]Shiny Mathews^[1]KristuJayanti College, Bengaluru^[1]shinymathews@kristujayanti.com**Article Info**

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Abstract

Cloud computing continues to transform how companies operate. They now prefer outsourcing their requirements from those providing the services they need at much cheaper costs and in more effective and efficient manner. Cloud computing can be described as the delivery of services like data storage, servers, databases, networking, and software over the internet. This paper aims to present an overview of how cloud computing has disrupted industries and point to what the future holds.

Index Terms; Cloud computing, software, Amazon, Google, Microsoft, disruption

I. INTRODUCTION

Disruptive innovation refers to technology whose application has significantly affected the way a market or industry functions. One of such disruptive innovation is “cloud computing.” Cloud computing provides different services through the internet, which helps in managing, monitoring and processing data through remote servers. Cloud computing enables customers to rent computing horsepower rather than investing in their own. There are mostly two models in cloud computing - service models and deployment models.

Service models provide three types of services to the user.

- Infrastructure-as-a-service (IaaS): IaaS is often known as the most basic form of cloud computing and allows companies to subscribe to the IT infrastructure they require. This would include servers, storage, networks, and operating systems and pay for what they use.
- Platform-as-a-Service (PaaS): PaaS involves the provision of an on-demand environment for developing, testing, and delivering software

applications. The aim is to help developers create apps (web or mobile) quickly without needing to invest in IT infrastructure of their own.

- Software as a service (SaaS): SaaS refers to the delivery of software apps on-demand over the internet and as a subscription. Cloud platform companies are responsible for hosting and managing the software application as well as the entire back-end infrastructure, including security. These services are available to users on a device of their choice over the Internet.

In terms of deployment, there are three types:

- Public cloud: The most commonly used form of deploying cloud computing is the public cloud. In this format, the cloud vendor owns and operates the servers and storage and delivers services over the internet.
- Private cloud: Private cloud is a type of deployment where all computing power or resources are made available exclusively for one organization. However, the physical location of the cloud can be on-site or hosted by a cloud vendor. The servers and infrastructure are always on a private network

exclusive to the particular organization.

- Hybrid cloud: A combination of on-premise infrastructure (private cloud) and public clouds is known as hybrid cloud deployment. Organizations get the benefit of both and can seamlessly move between private and public clouds based on the type of data and operation. For example, sensitive and critical services can be done on a private cloud while others on a public cloud.

Companies rely on cloud platforms such as those offered by Amazon for their IT needs with the aim of increasing their efficiency and profitability. Cloud services provide cost-effective, scalable, and efficient services for all types of business. Companies are saved from the need to spend their resources, time and energy, managing their IT infrastructure and can focus on their core business.

Based on the need, a business can opt for any service provided by the cloud service providers. The top two cloud service providers are Amazon web services (AWS) and Microsoft Azure.

II. STATEMENT OF THE PROBLEM

Some of the companies and sectors, especially the IT departments are hesitant to adopt cloud services because of various threats like Data security, confidentiality, hacking, and data loss. Also, the services by the cloud can be affected by poor connectivity, server downtime and bugs in large distributed systems.

On the other hand, across industries, organizations that fail to tap into the promise that cloud computing offers and risks losing out to competition.

III. OBJECTIVES OF THE STUDY

1. To understand the disruptive effect of cloud technologies on various businesses around the world.
2. Overview of the cloud vendor ecosystem
3. The future of cloud computing

IV. RESEARCH METHODOLOGY

Secondary data: The data collected for this paper are from various websites and journals, studied and analyzed.

Area of the study: The study covers the companies on a global level who have adopted cloud computing services.

Period of the study: The study mainly covers the period from 2018- 2022. Data have been analyzed and included from 2018 onwards.

V. DATA ANALYSIS AND INTERPRETATION

Market size

Initial cloud growth was primarily driven by businesses that hadn't spent much on in-house IT departments. Start-ups quickly moved to the cloud, helping Amazon's cloud unit, known as AWS, achieve early success. Financial services and other highly-regulated sectors have been reluctant to move to the cloud over apprehensions about storing data in servers owned and run by vendors. Some others are held back by challenges specific to the sector where they operate. Take for example, the oil and gas sector where it can be difficult to connect remote extraction sites. Gartner estimates reveal that the global public cloud services market will reach \$214.3 billion in 2019, an increase of 17.5 percent from 2018.

In the public cloud services market, the segment with the fastest growth is Infrastructure as a Service, which is forecast to grow 27.5 percent in 2019 to reach \$38.9 billion. The next highest growth rate of 21.8 percent is for cloud application infrastructure services, or platform as a service (PaaS). Organizations need cloud-related services to get onboard onto public clouds and to transform their operations as they adopt public cloud services.

Figure 1: Revenue of Global Public Cloud Services, Gartner Forecast



Competitive landscape

The global market for cloud computing services is intensely competitive with the world's largest technology going against each other. Take for instance, the litigation around the award of a USD 10 billion contract to Microsoft by the Pentagon. Following several rounds of bidding and a legal challenge, the contract was awarded to Microsoft over Amazon and other vendors.

Figure 2: Overview of major cloud vendors

Provider	Services	Analyst positioning
AWS	IaaS+PaaS, EC2, Storage services, Docker container services, Serverless computing	Forrester: Leaders Gartner: Leaders
Microsoft Azure	IaaS+PaaS, Azure virtual machines, Multitenant block and file storage, CDN, Object storage, Docker based container service, Serverless computing, Batch computing services (Azure Batch)	Forrester: Strong performers Gartner: Leaders
Google Cloud	IaaS, PaaS, object storage, Docker container services, Serverless computing	Gartner: Leaders Forrester:
Alibaba Cloud	IaaS+PaaS, Elastic compute service with cloud disks, Object storage, CDN, Docker based container service, Private cloud infrastructure, Family and database services	Forrester: Contender Gartner: Niche player
Oracle	Offerings paid by the hour, KVM virtualized VM's, Object storage, Oracle fast connect	Forrester: Strong performer Gartner: Niche player

Source: Gartner Report: Magic Quadrant for Cloud Infrastructure as a Service, Worldwide (2019). Gartner Magic Quadrant is the brand name for a series of market research reports published by Gartner Inc, a US-based research and advisory firm.

The Forrester Wave™: Full-Stack Public Cloud Development Platforms, North America, Q2 2018. Forrester Wave is acknowledged as a guide for buyers considering their purchase options in a technology marketplace. It uses methods to compare players in software, hardware or service market.

VI. FINDINGS AND SUGGESTIONS

a) Cloud computing is transforming industries

Cloud computing is already changing the way IT and business services are delivered and managed. Cloud computing has radically transformed the technology sector which is evident in the way we store, access and use data. With more services being delivered over the Internet, new business models will evolve and change how individuals and organizations access or provide services and manage information.

b) Healthcare

Healthcare services involve giving the best care facilities to the patients and has the responsibility of maintaining records of the patients digitally. It can be a challenging task for healthcare sectors to maintain and manage millions of electronic patient records and an infrastructure that connects hospitals, surgeries, clinics, and trusts. Cloud computing has taken off the burden and is changing how hospitals, doctors, nurses are delivering quality and cost-effective services to the patients.

Healthcare organizations need to pay only for the cloud services that they use, such as storage, applications and infrastructure service. In the past, healthcare had to acquire and maintain hardware, software, and staff, whether it was utilized to its full capacity or not. Cloud computing also offers flexibility as resources can be scaled up/down as per

the need.

The need to transit to cloud computing arises mainly to cut costs and to improve the quality of the care given to the patients.

c)Retail

Cloud computing has helped a retailer be a better retailer than to focus on maintaining the hardware/software infrastructure as it takes care of all IT related needs. Cloud computing in retail does not require dedicated employees, maintenance and infrastructure. The services of cloud can be used as per the size of the business. The age we live in today is fast-paced where customers don't want to wait for long to make payment. Cloud computing offers various payment options through a card, QR code reader, NFC (Near field communication) and so on.

It facilitates enterprises in transforming digitally across logistics and delivery to digitizing in-store and improving customer experience. For example, China's Alibaba cloud provides retailers of all sizes on demand and flexibility in accessing the resources that they need to develop and transform their business.

d)Financial services

The rising popularity of cloud services has impacted the financial sector mainly banking and insurance. Financial services organizations continue to adopt cloud services to gain competitive advantage. Research by PWC estimates that public cloud will become the dominant infrastructure model in Fintech by 2020.

Cloud services have proved to be an advantage for financial sectors in many ways. Few of them are listed below:

e)Scalability- In financial areas cloud computing helps in meeting the demand and helps banks quickly scale their services to fix the problem.

f)Cost-effective- By adopting cloud services, banks

can cut down on their costs to maintain and manage their IT infrastructure. World Bank was able to cut the annual costs of running their email from \$12 million to \$6 million by switching over to Microsoft office 365.

g)Security- The financial sector is subject to stringent data security requirements, and they need to exercise extreme caution when outsourcing their information to a cloud service provider. Cloud computing especially in financial sectors provide high security and goes through regular security checks.

h)Storage- Unbelievable amounts of data of millions of card transactions, stock market transactions, loans, and insurance payments and documents need to be stored daily which cloud does efficiently.

i)Public services

The adoption of cloud computing by government agencies across the world is not always as rapid as other countries given the unique challenges around data storage and use. However, this is changing. Governments are increasingly looking at cloud computing to deliver services efficiently and achieve cost savings. Gartner predicts double-digit growth in government use of public cloud services, with spending projected to grow at an average of 17 percent each year through 2021.

Agencies are shifting to the cloud to gain agility, lower costs and be able to innovate faster. Digital transformation through cloud technology enables state and local government agencies to rapidly modernize their systems, taking advantage of infinite resources while ensuring the best use of time and budget.

VII. REVIEW OF LITERATURE

Cusumano, Michael A (2019) , the author presents his thoughts on how cloud computing and cloud-based services have become a platform for designing and building software applications. Topics covered include the growth of the cloud computing industry,

competition between technology companies Microsoft and Amazon, and the information technology market.

Ashraf Darwish, Aboul Ella, Hassanien Mohamed Elhoseny, Arun Kumar Sangaiah, Khan Muhammad (2019) , the authors present a CloudIoT health paradigm that includes the integration of cloud computing and the Internet of Things for applications in healthcare. It addresses the challenges and future directions for research around this topic.

SurendraYadav, RohitMaheshwari and ParthVidyarthi (2019) , the authors highlight how cloud computing is used to improve quality of teaching in by enabling high quality IT infrastructure and services in a cost-effective manner. They suggest using cloud-based architectures to improve teaching methods and satisfy rising student expectations.

AbhayUpadhyay, HukumSaini and Manish Khandelwal (2019) , this review paper highlights how cloud computing continues to influence business decisions and operations from inception until now.

VIII. CONCLUSION - A STEP INTO THE FUTURE

While cloud computing will continue to be a vital component of every business strategy, the promise of edge computing is expected to take it to the next level. Edge computing refers to an open and distributed that leverages decentralized processing power and acts as an enabler for mobile and Internet of Things (IoT) technologies. Here, data is processed by the device without having to be sent to a datacentre. Gartner believes that “edge computing will become a dominant factor across virtually all industries and use cases, as the edge is empowered with increasingly more sophisticated and specialized computer resources and more data storage. Complex edge devices, including robots, drones, autonomous vehicles, and operational systems, will accelerate

this shift.”

It is often said that cloud computing and edge computing compliment each other rather than compete or be mutually exclusive. Organizations that use them together will benefit from the synergies of solutions that maximize the benefits of both centralized and decentralized models. There is a definite need for continued research in understanding how the move towards edge computing will impact industries and the role that cloud computing will play

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