RESEARCH ON THE MOTIVE FOR INCREASED CLOUD ADOPTION AFTER THE COVID-19 PANDEMIC AND FUTURE CHALLENGES

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ABSTRACT:
Many industries have been actively planning to migrate to the cloud and move their businesses to the cloud since the world entered the Covid-19 pandemic. There are many motives because the cloud is a compelling enabling technology that serves as the definite solution for accessing IT systems and software. It is the new imperative for companies seeking digital transformation. Remote work is now a prevalent situation in all IT companies in continuous operation. Covid-19 has made cloud adoption an essential priority rather than a steadily approaching future transformation. The advantage of the cloud is that the employees of a company, not the engineers, are no longer relied on closed, hardware-based IT infrastructures and therefore no longer must work in networked offices. This has created a high demand for trained cloud specialists who are experts to manage and support systems running in the cloud in different parts of the world. This study mentioned the motives in the back of the growth in cloud adoption after the Covid-19 pandemic and mentioned the demanding situations going through organizations.
Keywords: Covid-19, Cloud, Pandemic, Cloud Adoption, Cloud Migration.

Introduction:
Cloud computing has been round within side the IT enterprise for years, so it is now no longer a brand-new term, however what precisely are cloud computing and IT companies adopting cloud computing quicker than ever before? Why? Why have pandemics like Covid-19 pressured positive companies to remember and plan to undertake cloud computing? By making quite a few computing offerings, including storage, and community offerings to be had over the Internet, bendy access, fast innovation, decreased infrastructure costs, and the supply of end-person systems. It offers higher scalability and higher security. It additionally gets rid of the trouble of preserving on-premises infrastructure and pay-as-you-go together with an on-call for transport model.

Important Advantages of the Cloud during the Pandemic:
1. Remote Working Solution:
Remote work means you can work from anywhere. This practice has existed in some large companies for years, but with the Covid-19 pandemic in March 2020 and the imposition of lockdowns, employees around the world have been forced to stay at home. It's true merit and importance were realized when it was forced to do so. It seemed that it's the only way to control the virus spread. The corona virus during pandemic is affecting all aspects of life at all levels, and IT / any other domain corporate work cultures are no exception.
But companies with infrastructure based on cloud and skills have been able to sustain this dramatic shift in the workplace because they have solutions for remote work in the field.
Many businesses have started to reap the advantages of cloud adoption in this pandemic situation. [1].

2. Business Stability:
Businesses with sturdy cloud-primarily totally based IT infrastructures were capable of feature properly all through the pandemic that affected all corporations. Safe and rapid get admission to included information is a key component in retaining your commercial enterprise running. By storing your information within side, the cloud, it is constantly secure and stable any place you get admission to it.[2], diverse governments have begun imposing lockdown measures throughout cities Since March 2020 throughout cities and international locations because the pandemic spreads across the world. This has affected diverse corporations as their worker appearances are confined with some exceptions.

This has caused elevated use of digital gear and era to live linked to the commercial enterprise inside this quick timeframe. Various online conferencing systems along with Google Meet, Zoom, Microsoft Teams, and Webex have stated a surge in sales, with Zoom seeing a sales growth of over 100% because of the rise within side the use of the virtual digital era.[3]

3. Effective Collaboration:
Companies with more employees need to work together daily to operate as an efficient team. Instead, keeping the teams collaborates and connected during work hours is a top priority. The cloud has made this collaboration much easier in terms of the complications it offers. You can connect via video conferencing, share official content and information, and discuss securely in groups via cloud-based platforms. Collaboration might be possible without cloud computing solutions, but collaboration keeping it simple and seamless is a key factor when different

employees work in different locations. Cloud computing helps this collaboration easier. All the members in team can share the information and execute the work in collaborative way. Some cloud-based services provide social collaboration spaces to connect employees across the organization to increase their interest and engagement. Collaboration can be done without cloud computing solutions, but it is not as easy or effective as cloud-based solutions. All this will help to improve efficiency and performance.

4. Distance Education:
The pandemic has forced various government to close all educational institutions and students are forced to study from home through online mode. Educators enabled online mode of solutions for all academic stakeholders such as students & teachers before the pandemic by deploying virtual solutions (Boukil and Ibriz, 2015) such as Microsoft Teams, which not only provide remote video lessons but also a platform for learning, sharing materials and homework by age group [4]. Through these platforms, teachers can develop close connections with their students. It is a easiest way to attend online classes from anywhere. With video-enabled online learning platforms, teachers and students stay engaged during lessons, and parents can check their kid's performance displayed when participating in online lessons (Craig, 2015).

5. Cyber security:
With cloud computing, the infrastructure is closely held and managed by the cloud supplier. Corporations or organizations that use the cloud invariably have some issues concerning the safety of their information and files, as they are doing not grasp wherever and the way the cloud provider secures their data. Public and personal organizations have endowed ample greenbacks in security merchandise, however, haven't tested the efficiency of these protections and therefore the individual's victimization the techniques. However, cloud service suppliers have verified that they unendingly monitor client information and files with the most recent security policies and services. With a shared responsibility caterpillar-tracked model within the cloud, it's important for businesses to monitor, identify, and right all possible threats and misconfigurations to equipped cloud resources.

6. Scaling:
Cloud-based infrastructure may be a nice answer for some corporate sectors because it permits them to scale up/downsize their IT resources expeditiously and quickly supported business desires. It's ideal for businesses with ever-changing needs. As demand grows, the cloud can offer mandatory infrastructure and services without concern regarding physical infrastructure. This cloud flexibility allows businesses to manage prices effectively while not deed any resources unused. Organizations adopting Cloud-based solutions are ideal for businesses with growing or unsteady information measure needs. If your business needs grow, you'll be able to simply expand your cloud capacity while not having to speculate in physical infrastructure. This level of flexibility will provide firms mistreatment cloud computing a true advantage over their challengers.

The cloud's auto-scaling/ alignment capabilities eliminate risks associated with on-premises infrastructure operations and maintenance issues. No upfront costs and controlled spending's are the biggest advantages of cloud-based business.

7. Endless advantages of Cloud adoption:
Apart from high availability, scalability, business continuity, disaster recovery, fault tolerance, and flexibility, there are several new awesome features and services has been seen over time with growing interest in cloud adoption by numerous companies. Initially, Amazon net Services emerged as a property cloud supplier, however these days there are a range of cloud suppliers together with Microsoft's Azure, Google Cloud, IBM Cloud, and Oracle. Every cloud provider has superiority over others in various areas such as networking, storage, security, computing, and availability.

Popular Cloud Services during Covid-19
Companies that use the cloud to host their applications and create them firmly accessible over the web employing a sort of cloud services. The table below in Figure no 1. shows the Cloud services that were used most by four completely different Organizations victimization AWS (Amazon net Services) because the Cloud supplier for his or her three applications.

S.No.	AWS Cloud Services	Service type
1.	S3	Simple Storage Service
2.	EC2	Virtual Machines
3.	Cloudfront	Global Content Delivery Service
4.	RDS	Relational Database Service
5.	SNS	Simple Notification Service
6.	IAM	Identity and Access Management
7.	VPC	Virtual Private Cloud
8.	AutoScaling	Scaling Service
9.	Elastic Load Balancers	Traffic Distribution Service
10.	Beanstalk	Platform as a Service
11.	Lambda	Serverless Computing Platform

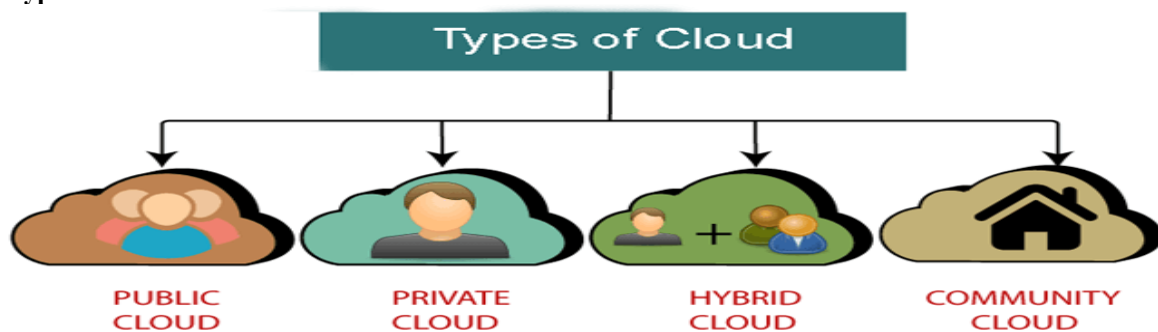**Figure 1. Popular AWS Cloud services**
Types of Clouds:

Figure 2. Types of Cloud

There are mainly 4 types of cloud as shown in above figure.
Public Cloud, Private Cloud, Hybrid Cloud, Community Cloud. These clouds differ from each other as per their deployment style.

Operational Models of Cloud computing:
Figure 3. Below shows different Cloud Service Models have different level of administration and the type of user responsible for managing the administration.
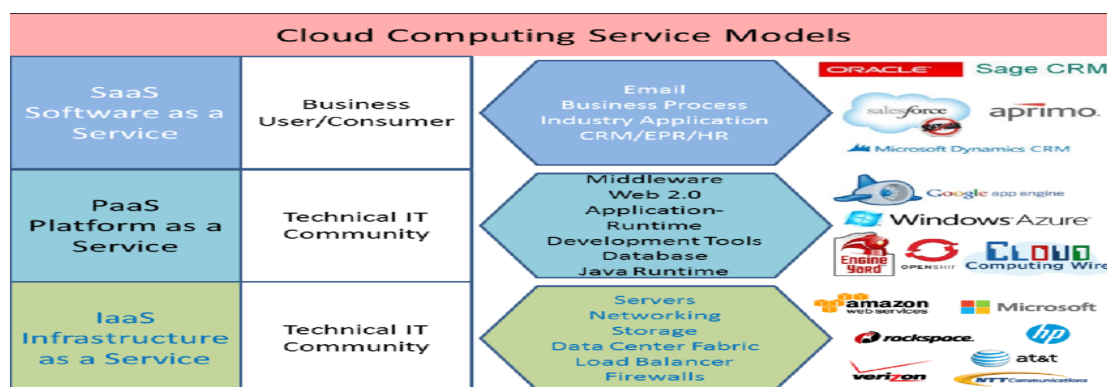

Fig.3 Cloud Computing Service Models

There are mainly 3 cloud computing service models namely SaaS, PaaS & IaaS. These 2 models differ as per their way of service they provide. The diagram shows the end user community, types of services they provide and examples of some services from each category. Apart from these 3 main services, there are Cloud vendors such as Database as a Service provide many other services, Network as a service, Storage as a service etc.

Cloud is the new normal:

Cloud computing evolves rapidly much in last 10-12 years. The company's claims to security and resilience were established time and time again once his JEDI value $10 billion, one of the United States Department of Defense's biggest projects, was bagged by Microsoft's Azure. Cloud adoption has many advantages. It's proved that the cloud can become the enterprise technology infrastructure of the future, and almost every organization ought to adopt the cloud slowly. However, the use of cloud has declined since the Covid-19 pandemic began in March 2020. Many Corporate sectors have already experienced and recognized the ability and advantages of the cloud for creating their business operations additional resilient and available. Cloud computing plays a more and more necessary role in guaranteeing the smooth delivery of services. This is evident throughout the Covid-19 pandemic, opening opportunities to seamlessly deliver additional new services. In April 2020, in response to Covid-19, Google have its own on-line meeting platform Google Meet free for the primary sixty minutes in this free version of the SaaS application. The employment of the many different video conferencing tools has conjointly redoubled dramatically since the covid-19 outbreak.

Since then, its daily user count on Microsoft Teams and Zoom has grown, and Google Meet is no exception. Its daily usage of video conferencing tools for such SaaS applications is 30 times what it was pre-Covid-19. According to the study, IT professionals such as computer scientists, architects, programmers, and developers fall into the lowest risk percentages of 0-20%.

This is clearly due to the remote working capabilities provided by the IT infrastructure most companies use. Further increases in digital transformation and cloud adoption can further reduce the risk factor caused by Covid-19 infection. This is a signal to prepare for future pandemic situations.
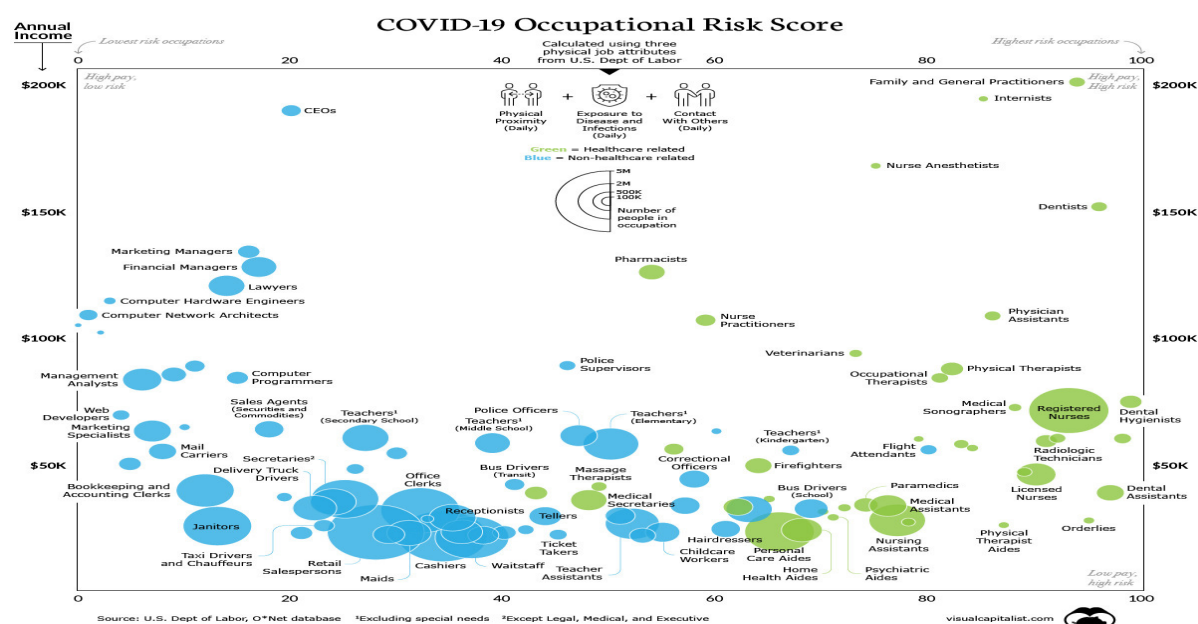

Figure 3. Risk Score of Various Occupations

Challenges:

Challenges always come along with the benefits. Few challenges faced by cloud user are as given below,

1. Data Securities and Protection:

The means to ensure the security of the data and how the data is accessed should be clearly defined by the service provider and communicated to the organization (Grover and Johari, 2018. Data in transit, data in rest both should encrypted, and the level of encryption can be determined collectively (Jian, 2015). Data security in cloud environments is more complex than data security in on-premises or traditional information systems because data is spread across different locations on different devices.

2. Data Location:

Many countries have data privacy and security laws, so it is important to know where your data is physically located. Data may need to reside on multiple continents for high data availability (Sun, Zhang, Xiong, and Zhu, 2014)

3. Skills shortage:

To recruit & retain people with good cloud skills is difficult during cloud adoption. Having skilled cloud-certified professionals at intervals your organization is dominant to start the method of your cloud journey, and if you have shortage of such engineers then it will be a major challenge to continue this journey.

Conclusion:

During Covid-19, the cloud will enable remote access to data, storage of data, and execution of operations from remote locations to ensure business continuity process and risk mitigation of operational systems. is clearly essential to It also shows that organizations with strong cloud capabilities have performed much better during these pandemic times compared to those with on-premises infrastructure. It is accelerated migration faster than ever before.

The Covid-19 experience provides the value of cloud as a key factor in reducing enterprise risk. In addition to providing continuity of service, it has enabled enterprise remote work capabilities and eliminated the need to be physically present at an office workstation. Many giant and medium-sized businesses believe the cloud it's seen as a crucial process factor, that is why we are reviewing our strategy for future work. The cloud comes with specific new responsibilities to suits local privacy and security laws (Khan,2014) and guarantee appropriate security mechanisms, including coding and vulnerability management. Due to some known challenges, the current pandemic situation makes the longer term of business continuity additional unsure and unstable, thus avoid adopting cloud for new comes and relocation of legacy applications (Gokarna and Mayank, 2016).

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