

A Study of Cloud Computing

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Abstract: Cloud computing is an increasingly popular paradigm for accessing computing resources. It is the next generation network which is soon going to revolutionize the computing world. Such network communication is an Internet-based computing, where shared resources, software, and information are provided with computers and devices on-demand. Cloud is the backbone of the data-driven, app-based tech ecosystem that has been vital in helping to manage this change. Everything from contact tracing to home delivery services, remote medicine, and working (and playing) from home has been revolutionized by cloud services. Researchers have proposed many techniques to address the problems and challenges of cloud computing, such as security and privacy risks, through mobile cloud computing and cloud-computing governance. This paper reveals the current and future trends of cloud computing and exposes readers to the challenges and problems associated with cloud computing.

Keywords - Cloud computing, New trends in Cloud computing, Challenging features.

1. INTRODUCTION

Cloud computing is a way of referring to the use of shared computing resources, and it is an alternative to having local servers handle applications [1]. It is a modern emerging trend in distributed computing technology that is rapidly gaining popularity in the network communication field. Cloud Computing provides an alternative to the on-premises datacenter. Cloud Computing is considered as the first among the top 10 most important technologies and with a better prospect in successive years by companies and organizations [2,3]. With an on-premises datacentre, we have to manage everything, such as purchasing and installing hardware, virtualization, installing the operating system, and any other required applications, setting up the network, configuring the firewall, and setting up storage for data. Cloud computing marks the beginning of a new era in the field of information and communication technology as it brings with an evolution paradigm which has the potential to change the way in which computing was done. Users are still getting acquainted with this technology and a shift from conventional computing to cloud computing will happen but gradually. Owing to this

technology, developers with novel ideas about internet services will no longer need to expend large chunks of money in building their software and hardware infrastructural capabilities but rather they could focus on effective provisioning of utility services.[22] Cloud computing is an emerging distributed computing paradigm that promises to offer cost-effective scalable on demand services to users, without the need for large up-front infrastructure investments [13].After doing all the set-up, we become responsible for maintaining it through its entire lifecycle. But if we choose Cloud Computing, a cloud vendor is responsible for the hardware purchase and maintenance. They also provide a wide variety of software and platform as a service. We can take any required services on rent. The cloud computing services will be charged based on usage. The cloud environment provides an easily accessible online portal that makes handy for the user to manage the compute, storage, network, and application resources. The cloud computing provides different services, these services put forwarded three layers Infrastructure models which are infrastructure as Services (IaaS), Platform as Services (PaaS) and Software as Services (SaaS)[2]. -

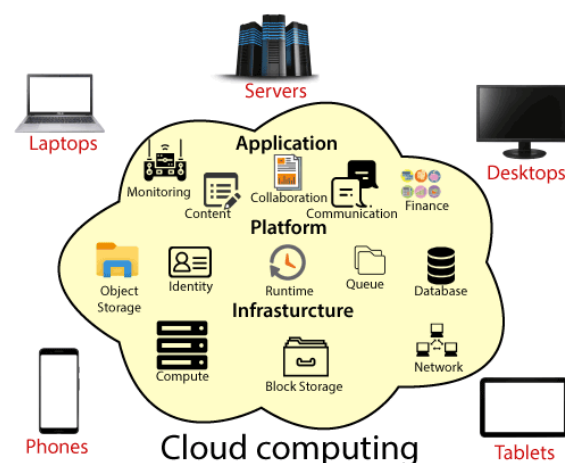


Figure 1: Cloud computing

Source: From javapoint.com-Introduction to cloud computing <https://www.javapoint.com/introduction-to-cloud-computing>.

IaaS Cloud computing providers offer physical, virtual computers and extra storage networking devices [4]. Example of IaaS vendor services includes Amazon Elastic Compute Cloud (EC2), GoGrid and Rackspace Cloud. (PaaS) involves providing Infrastructure as a Service plus operating systems and server applications such as web servers [5]. Example of PaaS vendor services includes Google App Engine, Force.com, Amazon Web Services Elastic Beanstalk, and the Microsoft Windows Azure platform. SaaS provides an application to customers either as a service on demand [6]. Example SaaS vendor services include Salesforce.com Customer Relationship Management (CRM), Google Docs and Google Gmail. Cloud computing mainly consists of two parts: the front end and back end. The front end is the client's computer or computer network at remote side. On the other side, back end includes the various computers, servers and data storage systems that makes the cloud for computing services [14]. Cloud computing has five major characteristics (Armbrust, Fox, Griffith, Joseph, Katz, Konwinski, & Zaharia, 2010): on-demand self-service; broad network access; resource pooling; rapid elasticity; and measured service.[7]

2. TRENDS IN CLOUD COMPUTING

Cloud computing has become a major asset for firms in vying to meet their clients' need and enhance their competitive status. Their mastery of efficient and effective data storage has promoted a need for greater storage space [7]. In the meantime, the maturity of the importance of information communication technology (ICT) in different sectors yielded of a lot of people want to toward accessing information easily at anytime, anywhere, this section introduces the role and effect of cloud computing technology in such fields.[8] The context focuses on Healthcare, banking and finance, education, library, and the Agriculture sectors, see figure 2.

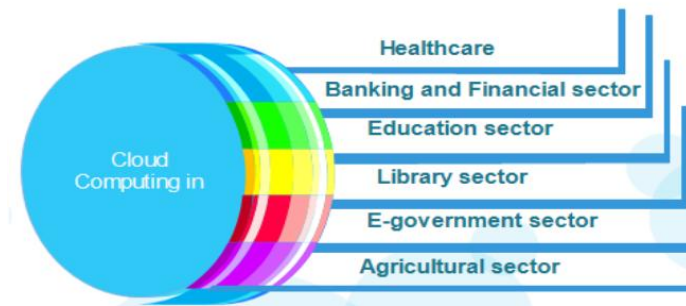
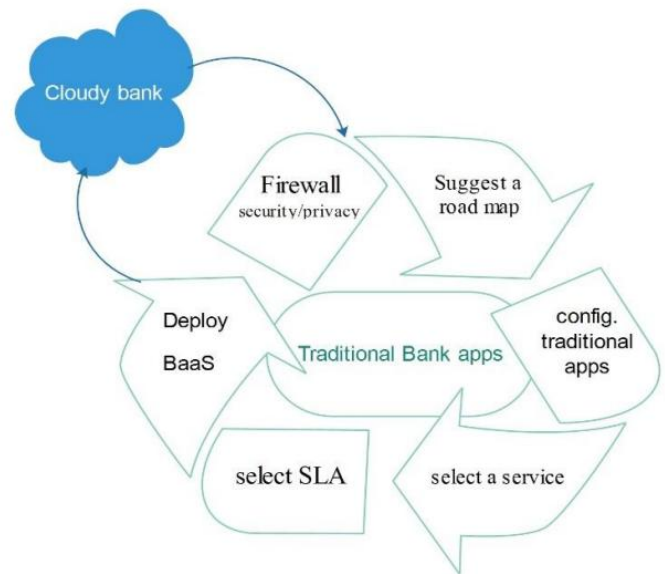


Figure 2 : Trends in Cloud computing

Source: From Recent Trends of Cloud Computing Applications and Services in Medical, Educational,

Financial, Library and Agricultural Disciplines- https://www.researchgate.net/publication/326415421_Recent_Trends_of_Cloud_Computing_Applications_and_Services_in_Medical_Educational_Financial_Library_and_Agricultural_Disciplines.

Accordingly, cloud computing can be exploited for moving healthcare information and present a new tendency of Healthcare Cloud Services Technology (HCST). This new delivery technology can make healthcare more efficient, effective, and reduce the cost to adopt the technology. It's worth noting there are numerous papers and articles introduced contributions to building an HCST environment [8,9]. Banks and financial communities may have many motives to move to cloud environment, however, the main motive is to create the cloud bank application (C-bank)[10]. The main problem facing the banks for investments in the new cloud technology has always been the migration process, expenditure, and multitude of applications. The migration process requires a new infrastructure and new deployment application platform.[8] Therefore, figure 3 shows many actions must be taken in order to guarantee a fully migration process.



As shown in figure 3, the migration process needs the following action listed as follow:-Configuration of traditional application of banks in scalable to a new environment.-Select an appropriate service with proven expertise in cloud services management- Suggest a road map to use cloud in the financial sector.

- Select a trust service level agreement (SLA) [11] in order to sign outsourcing contracts that use pay-per-use cloud

delivery models. - Construct a new cloud layer, Business as a Service (BaaS) layer. - Define the security precautions must be anatomy in order to understand data confidentiality and regulatory requirements which in turn to support the banks to keep sensitive data within firewalls.[8]. Currently, the big public cloud providers - Amazon, Microsoft, Google, and so on – take something of a walled garden approach to the services they provide. And why not? Their business model has involved promoting their platforms as one-stop-shops, covering all of an organization's cloud, data, and compute requirements. In practice, however, industry is increasingly turning to hybrid or multi-cloud environments, with requirements for infrastructure to be deployed across multiple models[12]

Automated Cloud Orchestration And Optimization: *Cloud platforms will keep on creating automated cloud orchestration and optimization as the multifaceted nature of overseeing both the quality and quantity of interconnected services across applications overpowers even the savviest of IT companies. Automated service and performance management must be one of the main parts of picking a cloud provider in 2021, as organizations may need to deal with a hundred or more services from a single cloud provider.*[15] **Cyber security:** As the adoption of Cloud Computing systems increases, so do security issues. This is both an essential and delicate point that requires the utmost attention (both from providers and from companies that use their systems). With the introduction of GDPR (General Data Protection Regulation) in the European Union, cybersecurity has become even more urgent. This is no small matter. According to a recent Commwault survey, for example, only 12% of IT organizations really understand how GDPR will affect their cloud services. Again, there is a clear need to rely on professional Cloud Computing service providers who are up to date with the latest regulations, software updates, and security features. **More of us will be working on Virtual Cloud Desktops:** This is basically where the entire environment of our workstation is delivered as a managed cloud service to our laptop or desktop screen where we work. This means that organizations can take advantage of by-the-hour subscriptions for the time their employees spend working at their machines, eliminating the cost of hardware updates and the need to dispose of redundant technology[12]. **Data Security:** Security strategies for data in motion are exemplified by software-defined perimeters, which orchestrate public key access with encryption while “opening up a safe UDP port, briefly, to frame an application-level connection, and afterward it disappears. Automation capabilities for container platforms resolve multi-cloud access “so companies have a compelling way how they can characterize, for various cloud suppliers or for various infrastructure or various sorts of cloud, policies in an automated way.[15]

Hybrid and Multi-cloud: the hybrid cloud is a Cloud Computing environment that exploits both public and private clouds as well as some third-party tools. In this way, the logic of on-demand, pay-per-use, and Software as a Service (SaaS) are exploited simultaneously, all in an enhanced way.[16]

3. CHALLENGES IN CLOUD COMPUTING

The Cloud Computing is getting implemented in almost all companies as the companies are in need to store the data. A tremendous amount of data generate and store by the companies. So there are lots of security issues faced by them. To improve the cloud computing management the companies can include establishment to simplify and automate the process.[17]. Every coin has two sides so thus every field of technology that has one face that leads to prosperity and another one rises to challenges. Cloud computing also promotes some challenges 18][19]. **Data recovery:** the cloud stores data in a distributed manner that the segmentation complicates the back-up management over several platforms; **Service interoperability:** cloud computing lacks in gaining the communication between services of different service platforms that emerges as a big challenge in the transpiring technology;

Data location restrictions: each user accesses different locations in the cloud to pursue work over the recommended applications, whether it is about to access infrastructure or to store data over the cloud it requires different location needs to adapt and use according to the restrictions or regulations defined; **Data access and storage model:** the big vendors adapt different usage scenarios for data storage models due to diversity in users' need. Thus the flexibility provided by the vendors leads to encryption and DLP capabilities that are complicated to achieve; **Data security and privacy protection:** securing the data in the cloud is the point of major concern where no loopholes are expected as cloud stores the huge amount of personal and confidential data. The increase in data over the cloud demands more powerful security measures and tools to provide access authorization to the users; **Lack of standards and vendor:** most of the vendors have defined their own standards for the cloud architectures, but as the complexity increasing day by day thus now new budding service.[21] Cloud computing has many challenges that further opens a mighty research area for the researchers and developers to work over the vast field.[20] **The data store in the cloud must secure and provide full confidentiality.** The customers rely on the cloud provider so much. This means that the cloud provider should take necessary security measures to secure the data of the customers. Securities are also the responsibility of the customer as they should provide a strong password, should not share the password with anyone, and regularly change the password when we did. If the data is outside the firewall there may be some issues which can eliminate by the cloud provider. Hacking and malware are also one of

the major problems as it can affect multiple customers. Hacking can lead to data loss; disrupt the encrypted file system and many other problems. Lack of resources and expertise is also one of the major challenges faced by the cloud industry and many companies are hoping to overcome this challenge by hiring more workers which are more experienced. These workers will not only help to eliminate the challenges of the companies but also they will train existing staff to benefit the company. Today many IT workers are working to boost the cloud computing expertise and CEO of the company is finding it difficult as the workers are not much skilled. It believes that workers with knowledge of the latest development and the technologies related to it will become more valuable in business.[17]. Cloud computing is becoming more robust: cloud computing is a growing field that attracts researchers to take an interest in this field. This is making this technology full-flavored and strong enough to sustain a longer life.

4. CONCLUSION

This paper gives a brief study of Cloud computing and its features. It also defines types of cloud computing. For cloud providers, profitability lies in economies of scale with higher profitability as the user base grows and the ability of the service provider to multiplex among a broad base of users. The new trends of Cloud computing are defined. The Challenging features of cloud computing make it more efficient among users. Cloud computing as a recent technology is still at a nascent stage of its development and there is still so much potential which can be realized owing to ongoing research and development in this regard.

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