Cloud Computing in IT and How It's Going to Help United States Specifically

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Abstract

Cloud computing is amongst the leading and most promising set of IT services in the current era. There is no doubt that it has taken the computer society by a storm in recent years. What is so apparent with this system is the tremendous efforts made to ensure the computing resources come as a service. Cloud computing as a platform has an enormous potential of doing away with some previous expensive requirements for setting up computing infrastructure. This is a good move as it offers IT-based solutions that are optimal for use and other crucial services essential in the operations of the IT industry. Furthermore, Cloud computing shows promising signs of achieving a flexible IT infrastructure that can enable individuals with small portable devices to access it through the internet. The efficiency coupled with potential gains from the use of Cloud Computing resources (large bandwidth, ample storage space, and processing power) is attracting massive investment in various industries such as banking, education, and healthcare worldwide. This research paper will explore Cloud computing in IT and how it's going to help America specifically.

Keywords
Cloud Computing, Information Technology, Cloud Service, Internet.

I. INTRODUCTION

In recent periods, there has been a significant rise in the number of people using smartphones and computers globally (Fehske et al., 2011). The driving force behind the innovations and technologies in the IT industry comes in as an attribute of the internet (Vermesan & Friess, 2014). Precisely, Cloud computing continues to be the most trending headline in the world of IT. The above trend has, in one way or another, contributed to the ever-increasing worldwide competition over the need for some business entities to develop into new geographical locations for self-sustenance. According to Parthasarathy (2013), every organization strives towards achieving operational excellence, a requirement that is satisfactorily offered by Cloud computing resources. Its potential gains in terms of reducing the high costs of setting up an IT architecture and multiple benefits it provides to its users and providers makes it to be an outstanding innovation (Parthasarathy, 2013; Marston et al., 2011). Some of the pros associated with the use of

the Cloud computing system includes, Low hardware plus maintenance costs (Martens et al., 2011). The ease with which an individual or an organization can access it from place to place (Gupta et al., 2013). Its highly computerized processes add the dimension of flexibility; a customer does not need to develop any fear/concerns over the possibility of the need to upgrade the software (Martens et al., 2011). Considering the current developments in the IT industry and the need for innovation on a global basis, it is imperative that America, as a nation, adopts Cloud computing technology. Brem & Voigt (2009) claim that the stiff competition in the worldwide market associated with technological advancements, creativity, and innovation is changing how industries and businesses are operating. The shift towards a productive economy by America should be amongst the top priorities of the government. Over the past years, the world has witnessed tremendous changes in the field of IT (Arutyunov, 2012). What is so encouraging over these changes is how Cloud computing technology is positively impacting on the sectorial paradigm (Loukis et al., 2017). According to research studies, the taking on Cloud computing technology among the various business organizations has been steady for the last decade (Rittinghouse & Ransome., 2016). This paper will provide more insights concerning Cloud computing in IT and how it can successfully benefit the American nation.

II. LITERATURE REVIEW

A. Cloud Computing in IT

Currently, there is no single and accurate definition of Cloud computing (Garg et al., 2013). Every IT literature material on Cloud computing seems to have the meaning of this crucial technological platform. Generally, it is agreeable that Cloud computing is a model over which network access and configurable computing resources allow sharing of such resources between and among organizations with minimal interaction between the cloud service provider and the users (Chou., 2015; Hayes., 2008; Phaphoom et al., 2013). In other definitions, Cloud computing involves the integration of technology and platforms to provide compering and storage services on the internet (Armbrust et al., 2010). The cloud service provider owns the infrastructure of the Cloud computing. With configuration to Cloud computing, an individual can access its services from any position in the globe

(Wyld., 2010). The Cloud computing system is designed in a particular manner offering flexibility, multi-tenancy, and high scalability levels (Chou., 2015; Hayes., 2008; Phaphoom et al., 2013). The good thing with Cloud computing is that it can effectively monitor its system's performance and relocate some of its resources for smooth operations (Gupta et al., 2013). The Cloud computing system can also deploy and allocate resources such as ample storage space to meet the on-demand users' needs (Martens et al., 2011).

B. Essential Characteristics of Cloud Computing

Several features explicitly characterize Cloud Computing, and they include:

Broad network access: Cloud computing has a platform that can successfully support multiple connections and network access using smartphones, laptops, or personal digital assistants at the same time by the use of standard mechanisms (Srinivas et al., 2012).

Ability to pool resources for sharing purposes: The Cloud computing system has a multi-tenant feature that enables the pooling of computing resources to allow many users to share cloud-based resources. Furthermore, cloud computing can work uninterruptedly to assign and reassign resources such as whenever possible to meet the user's demands (Pius et al., 2014).

Elasticity: The Cloud computing system is flexible enough to scale both in and out to provide the essential services to the users such processing of data (Sakr et al., 2011) successfully.

The on-demand service: With cloud computing, the user can successfully use cloud-based resources and services automatically without the need of him/her having to interact with a vendor who is responsible for providing the cloud-based services (Cubo et al., 2014).

Ability to measure the cloud service: The Cloud computing system has a leverage mechanism that enables it to measure the levels over which cloud resources are in use. The inbuilt monitoring and control features enhance the transparency of its use between the vendor and the client utilizing the cloud-based resources (Chard et al., 2010).

C. Cloud Computing Models

The demand for a particular cloud service such as storage, networking, software infrastructure, and the platform is the primary determinant of a cloud deployment model (Cubo et al., 2014). Generally, there are four primary types of Cloud computing models descriptively:
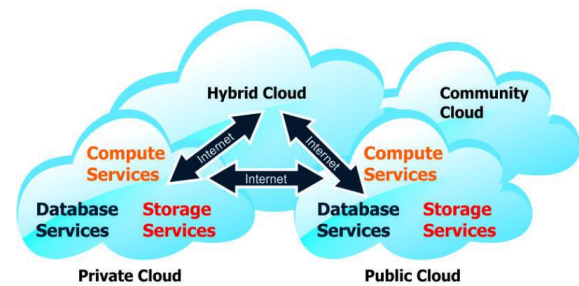

Fig 1 Cloud deployment models

2.3.1 Public cloud: This model of Cloud computing enables the public to enjoy self-service while using the scalable resources of the cloud over the internet. This model of Cloud computing usually functions similarly to the prepaid electricity token, which uses the pay-per-use principle (Boopathy & Sundaresan, 2014). This cloud computing model is much more susceptible to security threats than the private cloud as some applications accessed on public clouds usually pose malicious attacks whenever accessing data (Wyld., 2010). Google App Engine serves as the most exceptional example of a public cloud model.

2.3.2 Private cloud: As its name suggests, this type of Cloud computing model uses a private network to provide some essential services. A core enterprise datacentre identified within an organization's proximity is where the cloud set-up takes place (Jadeja & Modi, 2012). All the virtual applications and scalable resources are then integrated into one to enable the sharing of resources. The private cloud usually functions like an intranet whereby an organization has total control over the use of virtual applications and resources (Boopathy & Sundaresan, 2014). This type of cloud has specific internal exposure features that offer further security to the cloud. With a private cloud, only the organization and other authorized personnel can have access to its virtual applications and resources (Wyld., 2010). The Eucalyptus system offers a classic example of a private cloud model.

2.3.3 Hybrid cloud: A hybrid cloud is a form of a private cloud that works from a single and centrally managed unit link to either one or more external cloud services (Jadeja & Modi, 2012). The integration of public and private clouds in this model helps deliver virtual IT solutions (Jadeja & Modi, 2012). The hybrid cloud system is much more secure than private and public clouds and has interface features that allow for coordination and working of other management systems (Wyld., 2010). Amazon Web Services is an excellent example of a Hybrid cloud model.

2.3.4 Community cloud: As the name suggests, this model of cloud computing is shared by more than

two entities, specifically for a pooled cause. A community cloud is usually managed by all the entities sharing the scalable resources or by a cloud service provider who has to be a third party (Jadeja & Modi, 2012). Before setting-up this cloud, the organizations intending to share the services of community cloud have to strike an agreement between and among themselves, e.g., education and banking entities (Jadeja & Modi, 2012). Facebook offers an excellent example of a Community cloud model.

D. Cloud Computing Service Models

Based on scholarly sources, there are three main types of Cloud computing services namely: Software as a Service (SAAS), Platform as a Service (PAAS), and Infrastructure as a Service (IAAS) (Patidar et al., 2012). All these three service models form the layers of Cloud computing. The Infrastructure as a Service is the innermost/base layer that delivers the architectural support service (Manvi & Shyam, 2014). Platform as a Service forms the middle layer of the Cloud computing service model. It is responsible for rendering the system focused on services and provisioning of an enabling setting where the operator's applications usually become hosted (Boniface et al., 2010). Software as a Service is the outermost layer that hosts all the relevant user applications.

2.4.1 Software as a Service (SAAS): As its name suggests, Software as a Service provides several user applications on the internet. With this service, there is no need for a client to install some of the apps on his/her PC. With this service, a customer is greatly relieved of the burden of software maintenance since it directly reduces loads on the applications (Patidar et al., 2012). A vendor dealing in Software as a Service is the one who deploys and manages the IT infrastructure such as the servers, databases, and network access plus cloud processes such as backups (Tsai, 2010). Google Apps offers a classic example of Software as a Service.

2.4.2 Platform as a Service (PAAS): This is the service responsible for providing a computing platform and a stack of solutions (Boniface et al., 2010). It has a well-integrated infrastructure accountable for carrying out tests on cloud applications for implementation purposes (Patidar et al., 2012). The user of this platform has no control over its infrastructure but can manage some of the configuration settings and applications deployed by the vendor (Boniface et al., 2010). Google App Engine serves as an exceptional example of Platform as a Service.

2.4.3 Infrastructure as a Service (IAAS): This service consists of hardware resources that use virtualization tools to provide essential services backups (Manvi & Shyam, 2014). The primary purpose of this service is availing the necessary resources used by applications and operating systems,

i.e., network and storage backups (Manvi & Shyam, 2014). This service offers an avenue for interface connections with routers, hosts, switches, etc. A client using this service can only control the storage space, the operating system, and a few installed applications (Patidar et al., 2012). The housing, administration, and sustaining of this service lies in the hands of the service provider. GoGrid and Amazon S3 offer an excellent example of this kind of service.
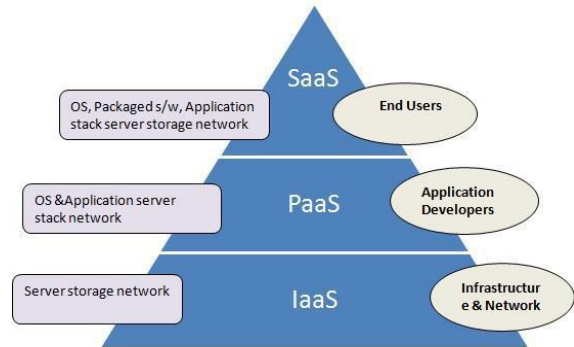

Fig 2 Shows Cloud Service Models

E. The architecture of Cloud Computing

From an overview position, cloud computing has two general sets: the user and the provider. Usually, the connection between a user and cloud services is through the internet. In some cases, a user can use an intranet to connect to cloud services using an organization's private cloud (Tsai, 2010). The working mechanism of cloud computing is that the user has to send a specific request to the cloud before it can render that particular service requested (Tsai, 2010). A central server is usually located within the cloud and is responsible for running the operating system.
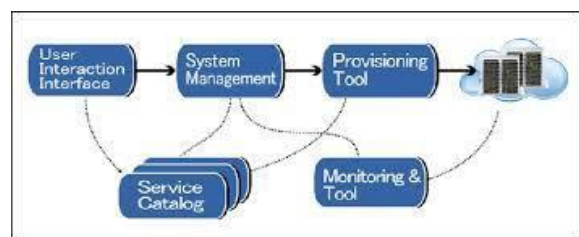

Fig 3 Shows Structure of Cloud Computing

F. The Entities in Cloud Computing

Primarily, cloud computing has two significant entities that are cloud providers and consumers in the business market. Recently, service brokers and resellers have emerged and usually deal with cloud services at various level entities (Tsai, 2010).

2.6.1 Cloud Providers: As the name provider suggests, these are individuals or organizations that provide telecommunication and internet services (Patidar et al., 2012). Other companies that host data centers and offer cloud services also fall under this category.

2.6.2 Cloud Service Brokers: This entity consists of registered agents, some technology consultants, and other professional service organizations. They mainly offer instructions regarding a particular type of cloud computing model and services that fit the organization's needs (Patidar et al., 2012). Furthermore, the brokers and agents bridge the relationship between customers and cloud service providers.

2.6.3 Cloud Resellers: Cloud resellers are mainly firms or an agent offering cloud services from the parent cloud computing organization (Patidar et al., 2012). They are mostly used by parent organizations to resell their cloud products in new business markets/regions.

2.7 Cloud Computing in IT and its Potential in Unlocking the America's Sectors

According to Wyld (2010), the benefits of using Cloud computing are so compelling. They can be vital in driving and accelerating economic growth and innovations in the major sectors of America, as discussed below:

2.7.1 Cloud Computing in the Business Industry

Generally, the bottom line for any business entity seeking to incorporate an appropriate technology to its operations is whether such technology offers the value for money, has the perfect implication of meeting the set targets and objectives plus, and whether it can have a good return on investment (Marston et al., 2011). The solution to the above business concerns is Cloud computing. The business industry in America can boom and enjoy great benefits stemming from the use of Cloud computing in the following ways:

Smart Manufacturing: Manufacturing as a form of business entity can enjoy operational efficiency through a Cloud computing system. The manufacturers can use data analytics to develop better intelligence on how best to manage their businesses from the Cloud (Georgakopoulos et al., 2016). Furthermore, the use of Cloud computing can help in scaling up and down the manufacturing process, depending on the shift of the workload and demand of products. Another crucial benefit that America's manufacturing companies will benefit from using cloud computing is the integration of the supply chain in the manufacturing process through the use of the Cloud's production resources and services (Georgakopoulos et al., 2016).

Improved Strategic Competitive Advantage: According to Berman et al., (2016) the instant instincts (online applications) of Cloud computing with virtually zero timing in its deployment can help businesses organizations in America to develop a competitive advantage over those of other nations who still lag in use of this technology.

Quality Control: The Cloud computing system provides a central avenue for storing all the relevant documents, information, or data of a business entity. Access to a common set of data by the managers of an organization can significantly assist in sustaining the stored data, reducing human errors, and having an excellent backup to all the relevant information and updates (Georgakopoulos et al., 2016). The above aspect demonstrates how America's businesses can benefit from data efficiency.

Flexibility in Working: Flexibility in any business organization is pertinent in determining how the employees carry on with their duties. Use of Cloud computing can enable employees of an organization to work remotely through accessing the files online without needing to be in the office, which economizes on working space. Furthermore, Cloud computing provides a platform over which employees and their employers can effectively share the synchronized files between them through web-enabled devices and online conferencing tools, an aspect that increases the overall efficiency of a business organization (Alshamaila et al., 2013).

Cost savings: The pay-as-you-go system of Cloud computing enables many business organizations to reduce their operational costs (Caroll et al., 2011). The ample storage space that comes with cloud computing can allow America's business entities to cut down on storage costs. Its resources are enough to service all the relevant stakeholders and customers.

Improved Security: The stringent security regulations governing cloud computing can protect many businesses from security issues such as hacking and data breaching (Caroll et al., 2011). The added features in the Cloud, such as firewall and configuration settings, enable enterprises to maintain high secrecy levels to their confidential information.

Mobility: Given that some of America's business organizations deal with distant customers/clients, the adoption of cloud computing in such entities can enable employees and managers to keep in touch with their clients conveniently through the use of web-devices over the internet (Baltzan et al., 2008). Cloud computing also offers mobility by ensuring that no relevant stakeholder is left out of the organization's working loop.

Environment Friendly: The adoption of Cloud computing in business organizations can help America to reduce the carbon footprint to a greater extent. The use of Cloud technology is a proactive way of businesses supporting the environment. It reduces wastefulness across the organization and replaces the physical elements such as hardware with virtual services that do not pollute the environment (Gupta et al., 2013).

Business Insights: Cloud computing can help America's Accounting industry to shift from conventional traditional methods that were once over-relied on for financial planning to using new insightful forecasts that are in line with the current situation. This lies in the fact that cloud computing can predict the upcoming conditions accurately, a factor that brings about some form of assertiveness,

flexibility, and relative stability in business operations (Georgakopoulos et al., 2016).

2.7.2 Cloud Computing in Healthcare Industry

There is a higher increment in the number of people seeking various health services from current America's healthcare statistics, a factor compounded by aging populations, comorbidities, and the emergence of chronic ailments (Murray et al., 2015). Considering the need to offer the best healthcare services, the need to reduce the medical costs and the need to overcome the pressure from the high population seeking high-quality treatment, the adoption of IT and Cloud computing is the best way forward (Murray et al., 2015). The adoption of Cloud computing solutions can have substantial benefits to the healthcare industry in America as follows:

Improved population health management: America can benefit significantly from using Cloud computing, whereby; the cloud services can use big data to identify hotspot zones with diseases (Lo'ai et al., 2016). After identifying such areas, the use of cloud tools such as GIS can map that area from which the Ministry of Health can inform the citizens where risks exist. Tracking of such regions using Cloud computing enables the healthcare field to prepare for medical attention and solutions wherever possible adequately (Lo'ai et al., 2016).

Enhanced Collaboration: Better collaboration in the healthcare field is instrumental in America, providing high-quality treatment services to its citizens. By using Cloud computing technology, medical specialists (surgeons, physicians, clinicians, and nurses) in America can store data and access it remotely, which is crucial in delivering timely medical care (Fabian et al., 2015). Cloud computing offers a platform over which conferencing activities can take place, which in turn provides up-to- second updates on the developments regarding patient conditions. This factor is essential in saving one's life care (Fabian et al., 2015).

Improved healthcare information storage at a lower cost: Cloud computing offers an ample space necessary for the storage of healthcare information at a cost-effective price. Given that America has both well established and small hospitals, the use of Cloud computing in the healthcare field makes room for the small hospitals also to access relevant information intended for providing the best medical care without worrying about the need to cut some of their revenue to cater for the operational costs (Lo'ai et al., 2016).

Integration of big data in the treatment of patients: With Cloud computing being able to store large sets of data, the doctors in America can successfully use such data to narrow down the conditions of their patients (Lo'ai et al., 2016). From that point, they can compare it with others to have an accurate assessment of their ailments. Developing analytical insights into healthcare's big data can substantially

minimize room for errors when providing treatment services in America (Lo'ai et al., 2016).

Improved medical research: Considering that medical research forms a key proponent in improving the healthcare system globally, the use of Cloud Computing in America can speed up the process through storage and sharing of data. With Cloud computing, it is possible to collect data from multiple fields and condense it into relevant results, giving room for medical researchers to draw mechanistic insights on possible remedy or vaccine to a particular disease (Fabian et al., 2015).

Improved remote patient care: Considering that America has a large population seeking medical services such as the aging group, the use of Cloud computing can benefit such people. For instance, the use of cloud services enables a patient to transmit his/her conditions to a medic or seek advice on health issues on standby (Lo'ai et al., 2016). Thus, the system allows the doctor to track the progress of such a patient.

Superior reach in the medical field: In a scenario involving a surgeon with slight experience in surgery, the healthcare field can use Cloud computing to offer on real-time-guidance to such a doctor from an experienced specialist performing a field surgery (Fabian et al., 2015). The transmission of real-time information between the two via the cloud can enhance better working outcomes in the healthcare field (Fabian et al., 2015).

2.7.3 Cloud Computing in the Education Industry

Like any other nation, education in America is the route to achieving personal goals in society. The use of Cloud computing in schools, colleges, and universities is key to America's amassing its productivity and creativity in the workforce and human welfare development (Collins & Halverson, 2018). As a nation, America can continue to be leading at the frontline when it comes to matters of innovation as Cloud computing has the more significant potential of imparting and instilling relevant skills from the various training programs. Today, a good education is the one that meets the demands and expectations of the Networked World (Robinson & Aronica, 2016). By adopting Cloud computing in education, America will benefit in the following ways:

Improved Accessibility to Educational Services: The use of Cloud computing in education settings enables all students to have access to academic services. Since not all students can be in a position to attend classes or lectures, cloud computing offers an avenue for distance-learning where such students can use Cloud's virtualization tools to access the lectures (Collins & Halverson, 2018). Adoption of Cloud computing can also take the E-learning services of America to greater heights. To outdo conventional learning methods such as the exchange of handwritten notes, Cloud computing enables students

to share notes and lecture materials with ease over the internet (Collins & Halverson, 2018). Furthermore, teachers in America can significantly benefit from Cloud Computing. They can search for educational resources such as books and journals online and use the researched content to plan, prepare, and implement their lesson plans (Collins & Halverson, 2018).

A New Approach to Learning: From the fact that America is a developed nation, the use of Cloud computing in education set-up can modernize their approaches to learning. With cloud computing, educators in America can use the course management software i.e., Moodle, to create an effective and efficient online learning platform (Robinson & Aronica, 2016). When it comes to students, they can benefit by accessing materials such as discussion forums and literature resources from the Cloud's hosting platforms (Robinson & Aronica, 2016). Cloud computing can add the dimension of modern learning by replacing the physical filing system in schools to store relevant documents and data efficiently. Generally, the adoption of Cloud computing in the education sector can significantly ease both educators' and students' experience and associated costs.

Improved Collaborative Learning: Cloud computing offers an excellent platform over which learning activities such as streamed lectures, virtual labs, online assessment, and live chats all occur (Robinson & Aronica, 2016). The above online learning activities are crucial in increasing collaboration and engagement between educators and students. Furthermore, Cloud computing can significantly benefit America's students' undertaking group projects. They can easily use the platform to assign themselves different duties, track how far they are with the project's work, and monitor the outcomes lectures (Collins & Halverson, 2018).

2.8 Cloud Computing Issues and Challenges
Despite the multiple benefits associated with the use of Cloud computing, it has still some critical issues and challenges that require further addressing as discussed below:

2.8.1 Security issues: Concerns over hacking, data breaches, hijacking of accounts, wrecked authentication, and compromising of credentials remain significant issues, and challenges are facing Cloud computing (Signh et al., 2016). To overcome this challenge, the user must have a secure authentication and access control tools. The organization using cloud services has to have a recommendable user identity management mechanism in place.

2.8.2 Challenges of data protection and compliance: Issues to do with data protection and compliance result from cloud storage services and the use of backups (Gou et al., 2017). It is usually challenging

to comply with the industry's regulations when an organization transfers its internal data to the cloud. Therefore, it is a practical move when an organization sources for a vendor that can offer compliance and the standards required.

2.8.3 Governance and control issues: Currently, the IT industry does not have an appropriate mechanism to control cloud-based operations. As a result of this, Cloud computing experiences challenges in managing data quality and other essential services (Signh et al., 2016). To overcome this issue, the organization must implement the agreed-upon standards when using Cloud-based services.

2.8.4 Shortage of Cloud Computing resources and expertise: Considering the enormous workload that organizations are placing on the cloud-based resources, it is becoming hard for some of them to cope with the cloud tools (Signh et al., 2016). Experts on Cloud computing aspects are also a few currently. Training of IT staff offers the perfect solution to these challenges.

3.0 CONCLUSION
Cloud Computing has an array of benefits ranging from setting up of infrastructure and platform to providing software with many more services. Considering that it is an emerging digital technology, there is no doubt that it can be vital to unlocking creativity, innovation, and economic development of America as a nation. This research paper has given a prior indication of how the integration of Cloud computing in the industries such as business, healthcare, and education can positively impact and bring tremendous changes to the Americans. The diverse services of Cloud computing offer useful functionality that can meet the nation's expectations and demands. Therefore, all sectors and industries in America must embrace this technology to better their performance and grow the nation's economy.

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