

Cloud Computing in Healthcare Industry

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Abstract

The advent of technology has become inevitable in today's world, and every industry is on the frontline of incorporating the technology. The healthcare industry has not been an exception, as it has also integrated the essential components of technology into its functioning. Patient records are no longer stored manually but are instead stored electronically, and this has benefited the industry by increasing the productivity of patient care. It has also assisted healthcare in having easy accessibility and usage. The current technological innovation that has occurred in the health care industry is the innovation of cloud computing. However, there are many fears and various security measures that have come up in the health industry concerning patient records being stored remotely. Therefore, a person needs to understand what benefits are attached to the application of cloud computing in the health industry and the fears associated with the same. Besides, one also needs to be aware of both the merits and the disadvantages that are come in because of the newly invented technology. After a lot of advancements and developments, the usage of cloud computing has been increasing steadily. Therefore, cloud computing is the right time to explore the use of this technology to improve on the healthcare industry's services to the public. Lastly, the main purpose of the paper is to evaluate the various factors that healthcare organizations should consider when implementing cloud computing technology.

Keywords: Application, Benefits, Cloud computing, Service, Healthcare, Software, Security.

Introduction

Cloud computing has been termed as one of the most recent developments in technology. The areas of application of this technology have been increasing each day, and more and more industries are beginning to employ its usage. Today, cloud computing has grown so fast, and it has become widespread to the extent of being used in the healthcare industries. The rapid evolution of cloud computing in the health industry has seen most healthcare services moving to the cloud. Therefore, this has forced them to shift most of their attention to ensuring that they provide cost-effective health services that are also efficient to people worldwide [1]. So, what is cloud computing?

Cloud computing is the act of delivering various services via the internet. The resources are made up of tools and applications such as data storage and databases. Cloud computing is termed an infrastructure of "application-based software" that generally stores data over remote servers, and this data can be accessed from anywhere using the internet. Along with it delivers ample computing services such as servers, databases, networking, software, analytics, storage as well as intelligence on the internet. Overall, it offers flexible resources, fosters innovation, and economies of scale.

Cloud computing operates based on an electronic device having access to the web, which grants it access to the data and software programs [2]. Although there are beliefs that

claim that some specific boundaries and security issues related to the cloud might offer some difficulty when an organization attempts to shift, the health industry has taken the initiative to move to the cloud platforms despite those set challenges. The implementation of cloud computing technology helps healthcare organizations meet most of the problems faced in the provision of healthcare services. They also offer the healthcare sector opportunities to improve on the services they offer to their patients. It also enhances the easy sharing of information and cuts costs [3].

Key Issues

Cloud computing is revolutionizing the health care sector. It has created an environment where patients' information can be easily posted to the doctor through the cloud computing system where their information is sent to the doctors without much of paperwork and reduces the chances of errors. In a normal hospital, patients will have their health records written in forms that they carry around from one doctor's room to the other. At one point, they may lose just one page of their medical records, creating a loophole and an error occurring in the final stages of treatment [4]. It rarely occurs, but when it occurs, the consequences are fatal. Doctors can get to know the coming patient's condition even before the patient gets to the office for physical assessment and treatment. It has been one of the key achievements of the medical industry through the cloud computing system [5]. The exchange and transfer of data and information can be said to be effective since doctors, and other medical departments are in a position to access the patient's data and information earlier so that they can have a look and examine it even before the patient arrives in the doctors or any other medical practitioner's office. The faster transfer of data and information reduces the workload that later leads to congestion in the hospital [6]. There has been a key issue of the decongestion of the hospital via the new

technology since taking an example like the pharmacy department through cloud computing. There is a lot of packaging of drugs and other appliances to be used by the patient for treatment and recovery systems. They need to be packed and be ready when the client or the patient when he or she comes picking their prescriptions. Patients may cause some congestion in the pharmacy department if the section is not supplied with enough human resources. Through cloud computing, even with fewer human resources, they will be able to decongest the section to enhance the smooth running of activities and reduce the chances of patients confusing their drugs and recovery tools [7].

Benefits

Cloud computing allows for safe storage of data and information. Several patients may be having some chronic diseases which require frequent visits to the hospital. The patient information should then be stored in a safe and private section with minimum distortion and extortion of information. Therefore, the hospital needs to develop and establish systems that should ensure the safety of the patients' records [8]. Using cloud computing in healthcare offers a flexible solution that allows the hospitals and healthcare professionals to support a network based on "remotely accessible servers". As in hospitals, there is a need to store a huge amount of data and files, so cloud computing is perfect for storing large volumes of files and data securely, which IT professionals maintain.

Therefore, it reflects that cloud computing has the answer to the security and privacy aspect of medical records, information, and data. During the patient's next visit, the doctor will easily retrieve the patient's medical records for further treatment and assessment. The records will be stored electronically, and hence, there will be no chances of error in patient handling, assessment, and treatment process [9].

The benefits of using the patient's guardian or the hospital administrator can upload the prescription to the mail ID pharmacy resulting in less waiting time for the patient to receive the medicine. Along with the patient can avail of a discount or cashback in a wallet which can be later redeemed on the next purchase [10]. This helps in cost-cutting for the prescribed medicine with a hassle-free payment process. And if there is any conjunction in the server for which it is problematic to place the order, then one can easily place the order over the phone. The most perfect utilization over online is that the doctor over the internet can easily examine the patient. Though it's not that effective, the patient can still be advised by the doctor remotely. It allows the storage of sample data of patients with ease, including his/her past medical history records and along with these files would be safe that no others can get through it. On requiring the data, the user can easily retrieve it with zero loss. The cause of the disease can be easily figured out, and the patient's health status can be easily analyzed [11].

Cloud computing also has another key aspect and element of development and revolution in the health and medical industry. Software development is one of the vital roles played by cloud computing. The healthcare sector has developed through software development that can be used to scan and determine certain ailments and medical challenges in the body [12]. Through rubbing the skin surface with oil, and by the usage of such software, the doctor can determine the level of damage caused by a certain condition and, at the same time, analyze the recovery process or the progress being made by the patient. It is through such kind of software that doctors can predict and be able to handle any issue that may be arising from the situation [13]. They will also be able to administer a new prescription depending on the results indicated by the software. It should be noted that the scan is in the form of a video; hence one can decide to view the situation from

various angles for one to be sure of the condition [14].

1. Push notification should be turned on, and SMS token code should be enabled.
2. OTP or the one-time password should be opted in.
3. secure the ID with a strong combination of numerals alphabets as well as with special characters) this method can help in cloud authentication storage.

All these methods ensure the user secure their storage from malware and various viruses attacks. Entering passwords to unlock is quite common nowadays, so scanning with fingerprints along with it makes it more secure than before. If anyone logs in to one's account, then it can easily be traced, including the location and IP address [15].

Through the software, doctors can determine the gender of the unborn child, which is a great milestone in the medical sector and helps the couple and the family prepare for the birth of the unborn. It has helped the family in other issues like child naming since it is now easier for the family to name the child earlier enough since they already understand and know the gender of the child. Cloud computing has helped the healthcare sector in lowering their costs. The work done by the cloud computing software can be handled by a huge human resources resource operating in the areas covered or substituted by the software [16].

On using cloud computing services, there is no need of maintaining patients' data physically using pen and paper. Instead, all the records are being stored in the cloud, which ensures security and is easily accessible remotely from anywhere. All the records can be maintained or modified online. Moreover, paperless records are possible through it. All the records and transactions would be seamless and virtually. No unauthorized person can access the files, and the authorized users would have access to them [17].

Hospitals will need to hire various professionals who should carry out activities

computerized in real life. The activities like accounting have been a challenge where the hospital will need a good number of accountants who will work at ease and with the required speed and workload to ensure the activities' efficiency in the finance section. But the cloud computing software would require two or three operation professionals to handle the payments, which are made electronically, which will help reduce the congestion in that department. With the development of cloud computing, patients need to deposit their payments, and the computer-generated program will automatically produce their receipts of payment [18].

Hence, the human resource task force will be reduced, saving a lot on the costs involved in the hospital or the healthcare operations. For example, a hospital would consist of three employees in every department. The introduction of the cloud computing will help reduce the human task force in the various sections to a minimum of two per section, hence cutting down a significant amount of costs. It would be easier to maintain the software than remunerating the employees every month until their contracts expire [19]. Several health care parameters are there (Reproductive outcomes, Identification of death causes for increasing life, determining the quality of life). Data related to one's health conditions, clinical metrics with the socioeconomic, environmental, and living standards are included here. The information that one's suffering regarding health consists within this section [20].

Through cloud computing, hospitals have been able to access high-powered analytics, which is used in the patients' treatment process. When a patient has been diagnosed with a certain condition, it automatically clicks that there is something wrong with their body organs and functions. Patients are sent to the laboratory sections in the healthcare sector, where samples of their blood, urine, stool, and cough matter are collected for further analysis.

In the hospital laboratory, high-definition powered analytics software's are being used to get and help produce the best and correct prediction for the patient's situation [22]. The material that is being analyzed is subjected to high definition and algorithms that have been configured to produce such a prediction whenever a certain matter is realized from the samples. High powered analytics reduces the margin of error and gives the correct prediction concerning the patient's conditions. It has helped in overcoming some of chronic diseases like cancer and diabetes. The laboratory analysis can help in predicting the level of damage caused by the condition. It will also help the doctors come up with the right decision by getting to understand their chances of survival. It is one of the ways that have helped the industry and helped the family, friends, and relatives of the patient make a sober and right decision on behalf of their relatives [18].

Lastly, cloud computing has helped to increase telemedicine capabilities. Many patients may be strong and maybe in a position to recover from home. Through the telemedicine capabilities, the patient is receiving medical care and attention straight from his or her bedroom in the house. The doctor can rely on cloud computing software to handle different patients at a different location at the same time. The patients require to have access to the internet and the cloud computing software to follow the doctor's instructions wherever the location they are. They need not be in the same location as the doctor to access the medical attention they require. Most of the hospitals and healthcare sectors have applied the technological advancements in improving their services and operations, enhancing reliability and effectiveness hence a greater recovery of the patients [21].

Challenges

Despite the cloud computing having all those achievements, there are a couple of challenges associated with the technological

advancements. Too much-developed technology can be good and worse at the same time. The biggest concern of cloud computing is the privacy and security of the healthcare industry [25]. Technology is a result of man, and hence there may be those individuals who are ill-minded. They can use the information for the wrong purpose if they bypass the program's security features [16]. Some individuals may wish to make money out of the system. This can be noted through accounting or any other department in the healthcare system. They may decide to interfere with the system and distort the running of the program. It is one of the security concerns that most of patients are usually worried off [24].

Data and information encryption is the other challenge bothering the patients and other individuals, almost everyone who uses cloud computing services. The encryption worries the patients that if a single doctor were not able to interpret correctly that which has been configured, it would be a disaster for the patient. Therefore, it is one of the challenges and fears that the patients should be made aware of for their lives. At the same point, there is the challenge of insecurity, which arises when such a cloud of computer-generated rays scan through the patient's body [17]. The patient may wonder what other forms of effects the rays may introduce to their bodies. Will the situation or the condition worsen due to the introduction of rays into their bodies? Some patients may fear for their lives when such matters are being used to assess their bodies.

Another challenge associated with the healthcare system's cloud computing services is the downtime of the systems. Anything that is operated via the machine can face some technical hiccups, which are normal. But the worst fear is being on a life-supporting machine controlled by cloud computing features, and the system experiences some downtime in the process [26]. It would be a challenge to the hospital since the failure of the cloud computing software would translate that the

hospitals should deploy their human resource or their human workforce to assume the services which were being undertaken by the system. It would prove to be a challenge since the system may experience some downtime at a specific time. The required task force or the workforce may not be readily available to assume the system's roles and functions. It would lead to a state of confusion. The room for making an error would be very high since the experts would require quite a good time to familiarize themselves with the hospital system after a while since the cloud computing system earlier assumed their roles. Therefore, it would be a challenge for the healthcare sector to catch up with what the system helped the doctors and other medical players in the field [4].

Protection Procedures on Cloud

Encryption ensures SP or service providers along with their administrators and third parties, do not have access to one's private information. What one does is opt-in for the after steps of a form. So, the user must be aware of reading each and every word or line thoroughly before signing or preceding through a form. The privacy settings must be re-configuring every month to avoid leakage of personal credentials. Two-Factor authentication is very vital to make the profile secure from fraud and unauthorized access. Moreover, an antivirus is quite the essential part of resolving these issues and getting rid of them

Passwords must always contain a mixture of alphabets, numerals, and special characters. If anyone tries to get access to a PC or someone's cloud storage, then it is advisable to check in for two-factor authentication. It helps a user to get the stranger's IP address and location. Personal information is always sensitive so the more one keeps it secret the more benefits one is supposed to achieve. Installing a genuine version of malware software or antivirus that can assists in unwanted files to enter into the system and corrupts one's personal data.

Methodology, Summary, and Discussion

Healthcare is the backbone of any activity that is being undertaken by humans. It is easier to develop and innovate great things with proper health, which may even affect our lives and health positively. In various laboratories globally, artificial intelligence and machine learning have started to take course in the healthcare sector as they did in the manufacturing sector. Machines are fed with the required algorithms that are supposed to be used in a particular way and give results that have been trained effectively to ensure that they achieve what they are meant to achieve. Using the healthcare laboratories, some small amounts of matter and substance are required to give desired results. With the use of naked eyes, human beings are not able to measure and mix such matters and chemicals with efficiency. Therefore, it is the point where machine learning and artificial intelligence get in to help humans get the right proportions [19]. Across worldwide, there is a vast usage of AI (Artificial Intelligence) as well as machines that can diagnose patient disease along with its remedy and required medicine. Moreover, AI and other machines have learned the mixture of two or more compositions of medicine accurately, which is not exactly possible for humans to do. There are certain algorithms required to make these machines execute programs that are required and provide distinct reports. So, it has proven a huge positive impact in the medical sector.

In summary, the advantages brought about by cloud computing into the healthcare industry and the sector is far much ahead of the challenges experienced in the whole medical process. As we all know, machines are used to make work easier. Still, in the healthcare sector, they make work easier, but they also increase the level of accuracy of the intended results of a particular activity. The cloud computing software has also enabled the success of complex surgical operations like heart

transplant, kidney transplant, among other successful operations that are being conducted [27].

Results

Cloud computing is the act of delivering various services via the internet. Now, the resources are made up of tools and applications such as data storage and databases. After that, cloud computing provides more advantages to the healthcare industry, and the sector gets more experienced to use this type of technology. Using the healthcare laboratories, some small amounts of matter and substance are required to give desired results.

Conclusion

In conclusion, technology is evolving and developing day by day. Therefore, it is important to note that technology should be used for our good and not for the worse. Almost every sector of life has been computerized, and hence the healthcare sector has not been left behind in terms of technological advancements in the sector. I would recommend for more extensive and expansive research be carried out in all the healthcare sections to ensure that every department has a technological backup that can function even better than the human workforce [6].

With every new day, technology is also improving hugely. It is giving society a new phase with its evolving innovations. The user must utilize it to the best and for good purpose. Nowadays, almost all sectors such as banking, offices, shops, etc. have been made computerized. So do the hospitals. It is also no longer manually operated. By doing so, there are noticeably fewer blunders.

There is no doubt that the technology or the online methodology is being applied all over the hospital sectors, but it shouldn't pause over here. More research should be carried out to improvise the healthcare departments. Along with the development of technologies, it ensures technical backup functions better than

hospital staff and employees. Government should show interest and assist in working beside scientists and medical experts to modify more upgraded machines to save more people's lives. Training should be more extensive for the health care units resulting in minimizing any errors for the workers and staff.

Therefore, it is the role of various governments to collaborate with scientists and medical experts to help develop and innovate even more machines that can be used in the medical sector to help in saving and protecting life. Lastly, there needs to be a lot of training of the medical personnel entitled to the cloud computing software's management and operations. The machines' attendants should be well equipped with every bit of information involved with the medical software's hence increasing the chances of survival and hence improved life expectancy [9].

Conflict of Interest

In the interest, cloud computing involves on the entity process, and machines of the

healthcare system are involved in the cloud computing system. The privacy system of the machines has been provided through the technologies of software management. After that, the machine-learning program has included in medical products, and it helps to increase the efficiency of all products. The laboratory analysis can help in predicting the level of damage caused by the condition. The products are protected with artificial intelligence systems, and the human workforce system also gets advantages through cloud computing programs.

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