

Cloud Computing in Smart Health Care

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Abstract: The concept of smart health care is rapidly increasing due to the advancement in technology. Smart Health care is defined as diagnosis the disease, improve the quality of patient's life and enhance the quality of service with the advancement features in Information and Communication Technologies. The technologies used for smart health care are Cloud Computing, Big Data, Internet of Things, Artificial Intelligence and Block Chain. The most acceptable technology for providing quality and enhanced service to the patients is the cloud computing. The impact of cloud computing is expected to be stronger and more positive in forthcoming years. This paper is aims to provide the importance of cloud computing in health care. First, the concept and the role of cloud in smart health are discussed. Then the benefits and the risks of cloud in health care are explained.

Keywords: Artificial Intelligence, Cloud, Information and Communication Technologies, Internet of Things and Smart Health Care.

I. Introduction

The influence of technologies in day to day life is rapidly increasing. With the advancement in ICT, traditional health care becomes the smart health care due to the improvement in quality of life and the way in which service provided to the patients. The smart health care can be defined as the important tool that provides the better diagnosis of disease, better treatment for patients and improves the quality of life of a patient. The key concepts of smart health care are electronic health and mobile health. Electronic Medical Records, Electronic Health Records. Electronic health is termed as e-health which describes the use of ICT in Health care. E-health also called as Health IT because of the impact of Information Technology in Health care is large. E-Health services are Electronic Medical Records (EMR), Electronic Health Records (EHR), Tele medicine and Tele Health and virtual health care. EMR is the digital form of clinical information stored in hospital. This is used to maintain the patient's information like medical history, treatment history and personal details. It has the digital form of paper information. EHR is used to maintain the entire medical history of a patient in detail. It maintains the information that is to be used for clinical purpose in many places and many situations. It takes care of patients' information. Because of aging populations, the demand for the health care services is increasing substantially. The pressure on every head is that to produce the quality work with reduced

cost and reduced time. The patients and the doctor's expectation from the health care services are better results and higher quality treatment. This creates the need for point-of-care access to medical data and the parallel evolution and adoption of mobile devices, both for medical staff and for patients, are forcing the need for IT systems to adapt new technology to implement the expectations. Here only, the role of cloud computing takes part in. All the information of a patient can be stored in a cloud and it can be accessed at any time from any place for medical diagnosis. The cloud computing is adopted in a wide spread manner. It's usage goes beyond the storage. Nowadays, the health care providers use the cloud for more efficiency in data maintenance, the low cost for maintaining and delivery. Also, the significant increase in digitization of medical records like EMR and EHR, the expected digital outputs from scanning and monitoring devices maximize the potential benefit of cloud solutions.

II. The Concept of Cloud Computing

In Simple terms, cloud computing is defined as on-demand computing services. The services like operating systems, applications, memory, processor etc, are provided based on demand and the user has to pay for the service based on what they used and how much time they used the service. The deployment models of cloud computing are categorized in the form of public cloud, private cloud and hybrid cloud.

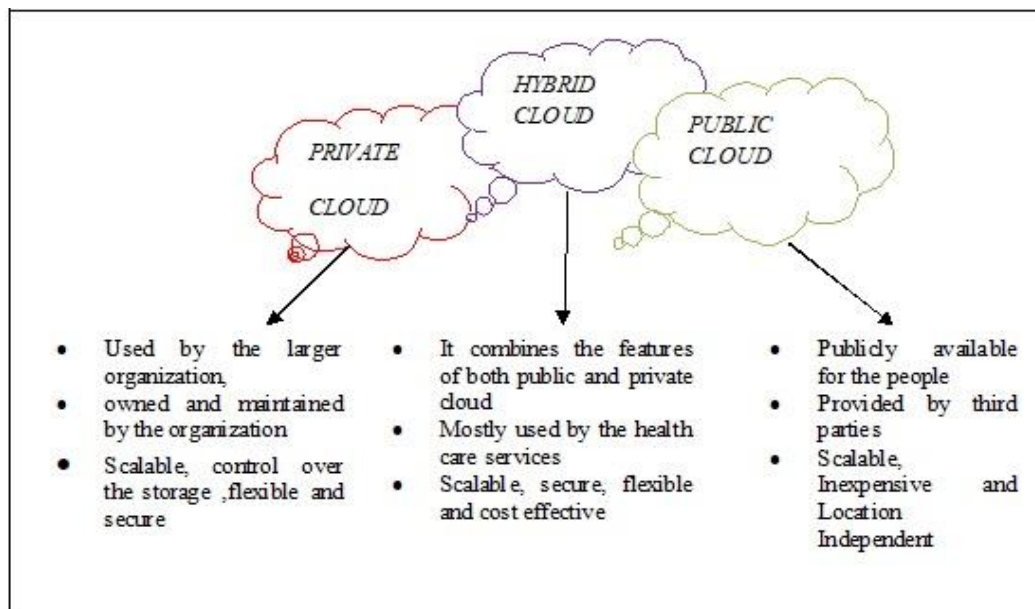


Fig 1: Types of Cloud Computing

The service models of cloud computing are classified as Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS).

IaaS

- It is the basic model of cloud computing
- Servers, networks, storage area are rented for organization
- It is the high level model among all the three models
- Start up companies can use this type of model for their application development
- They use the infrastructure and services of other companies and develop the application and have the full control over the application.

PaaS

- It is the next higher level of Cloud Computing
- Companies can use the platform services of other companies like Operating Systems, Database Management Systems and running environment of an application
- The computing environment is managed by the service providers
- The organization can develop their own application and can produce the product on top of the environment

SaaS

- Application of other organization is used by the people.
- It is based on a day to day basis.
- Part of the functionality of an application will be allowed for access based on the requirement of the user.
- The software and the operating system is not relevant to the end user

III. Role of Cloud Computing in Smart Health Care Access to health care

Access means ability to provide the services on time. The cloud computing is used to provide that type of access the data at any time from any place. It is provided with the help of Tele health and Virtual Care. Tele health combines the concept of e-health and telemedicine. Tele health is achieved with the help of the following technologies.

- **Live Video Streaming:** using the telecommunication technology, live video between the patients and the persons from the health care providers are achieved.
- **Asynchronous Video Storage:** the videos of the medical diagnosis can be recorded, stored and forwarded to the needed place with the help of Cloud Computing.
- **Remote patient monitoring:** the patient can be monitored remotely and it transmits the patient’s information through the internet to the needed person.
- **Mobile health:** the information about the virtual visit conducted via the mobile phone or PDA

Attachment towards Medication

With the cloud computing technology, the attachment towards the medication is increased because of the reminder capability and refill ordering. It is done by the storage of patients details in the cloud. It gives the reminder to the patients for taking medicine and it orders automatically when it needs to refill the medicine for the patients. It saves time and improves the quality of life by giving the information to the patients.

Anti Drug Theft

New medicines discovered can be taken by the other companies. Cloud computing based software implementation can avoid that theft and it monitors the

selling process of medicines and also is used to discover the expired machines based on the data stored in the cloud. For maintaining and providing this feature efficiently, all the information about the medicines to be stored in the cloud storage before the transportation of the medicines.

Efficient Resource Management

Each and every organization does not have the needed resource for running their application. Due to the cost of the resources, it may use the resources from the health care providers based on their needs for running their application. This is the major disadvantage of the health care industry. With the cloud technology, medical infrastructure, human resources and easy retrieval of patient information can be done in an efficient manner.

Data Security

The personal information about the patients are maintained with care and secured. Encrypted software is used for providing security to the details with the cloud computing. Using cloud-based solutions, the advanced security technologies in cloud is implemented to avoid any liability of an individual.

Medical Records Maintenance

The patient's information can be maintained with the help of EMR and EHR. During record maintenance, standard format is followed for storing the data in cloud for easy access. EMR and EHR data can be stored effectively with uniformity in data storage. The maintenance of good quality record is an important component of health care. To provide the better outcomes, it is necessary to maintain complete and accurate record.

IV. Benefits of Cloud Computing in Health Care

One of the main challenges of Health care industry is to provide better visualization of health care information. It needs the efficient process to manage patient's records, building the infrastructure that connects hospitals, doctors, clinics and patients. The power of cloud technology plays here only.

Minimized Cost

By using the cloud technology, the organizations have to pay for the service what they used for their organization. With the efficiency of cloud, the data can be processed and delivered in very fast manner. The analysis of data can be done for getting useful information for decision making.

Flexibility

Health care providers can scale up the resource or scale down the resource based on the needs of the organization. Real time access to the data is possible at any time from any place. It reduces the time for the deployment of any application.

Quality of Service

Every person wishes to extend their journey. It is rendered to the patients by displaying the data in the right place, at right time across the many geographic locations that are connected through internet. The possibility of giving this service to the patients without cloud is not possible. It is provided by the cloud computing with the unique infrastructure.

Collaborative Patient Care

Viewing and sharing of EHR are done easily by the doctors and viewed collaboratively for the medical diagnosis. The patient medical information provided from the different specialist can be viewed from the single place. The doctors with different specialization can communicate with each other for providing better diagnosis.

Data Interoperability

Nowadays It is mandatory for an organization to analyze the data from multiple devices, different applications and information stored in different files. Interconnection among these things can be done with the many components. But the cloud computing is the primary component for storage and management.

V. Challenges of Cloud Computing in Health Care

The Challenges of cloud computing are

- Security and privacy are the two primary issues when selecting a cloud based solution for the organization
- To overcome these issues, the organization should select the reliable service provider that follows the provisions of Health Insurance.
- The organization confirms that the selected cloud infrastructure provides the secured solution.
- Data breaches are avoided by maintaining the patient's details securely.

VI. Conclusion

The cloud computing and health care terms are made in heaven to improve the quality of life of a patient. With the rapid advancement in cloud technology, the health care system can provide the better solutions by integrating the many devices. The future of health care lies in the cloud because it continuously transforming the way of communication among the doctors, hospitals and the patients to provide the better outcomes for the patients. The cloud computing will move stronger and positive in forth coming years and it will make the future of the global health care industry.

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