

# Survey on Patients Information Storage in Cloud

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**Abstract-** Healthcare information storage is emphasized on the storage of structured and unstructured data in cloud with effective database. Healthcare data are unique and has few characters in particular such as healthcare data tend to reside in multiple places, the data stored can be either in structured or unstructured format, the healthcare data are complex so it must be evaluated in such a way that data access is efficient and can be done at any time. This paper presents a survey on various technique that can be used to store and retrieve the healthcare data efficiently and it is also made sure that the healthcare records are highly secured. NoSQL document based database is considered as the effective one to store the healthcare data, the current state and trends in healthcare domain, strategic value of implementing the cloud computing solutions in hospital based on the Balanced Scorecard Approach. The paper also presents the strategy map and the KPIs that were used by the hospital and a framework for storing the health records and accessing them by patients and physicians as authorized by key control scheme has been discussed.

**Keywords-** Cloud Computing, Security of Data, Healthcare

## I. INTRODUCTION

Cloud Computing is the technology which uses the internet and central remote servers to maintain data and other applications. Cloud computing allows commercial traders and consumers to use the applications with internet access without installing and accessing their files in any computer. A deployment model represents specific type of cloud environment, primarily distinguished by ownership, size and access. There are many uses in cloud computing. Some of the uses are create new application and services, store, backup and recover data., deliver software on demand and analyse data for patterns and make predictions. Most cloud computing services are broadly classified into three categories. They are Infrastructure as a Service(IaaS), Platform as a Service(PaaS),and Software as a Service(SaaS).

### Infrastructure as a Service(IaaS):

The most basic category of cloud computing service is IaaS. It is an instant computing infrastructure which is

provisioned and managed over the Internet. It quickly scales up and down based on the demand of the user. Platform as a Service(PaaS).

Platform as a Service(PaaS) refers to cloud computing services that supply an on-demand environment for developing, testing, delivering and managing software applications. PaaS is designed to make it easier for developers to quickly create web or mobile applications without worrying about setting up or managing the underlying infrastructure of servers, storage, network and databases needed for development.

### Software as a Service(SaaS)

Software as a Service is a method for delivering software applications over the Internet, and the demand is based on subscription basis. With SaaS, cloud providers host and manage the software application and underlying infrastructure and handle any maintenance like software upgrades and security patching.

Four common types of cloud deployment models are public cloud, community cloud, private cloud and hybrid cloud.

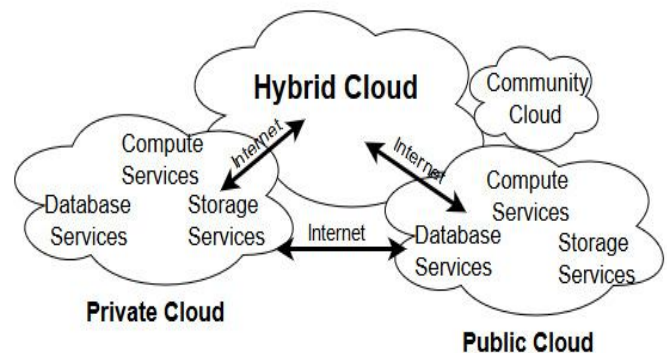


Figure 1. Deployment Model Diagram

### Public Cloud

A cloud is a “public cloud” when the services are rendered over network that is open for public use. Services of public cloud may be free. There may be little or no difference between architecture of public and private cloud. Public cloud service providers such as Amazon Web Services (AWS), Microsoft and Google own and the infrastructure is operated at

their data center and access is via the Internet. AWS and Microsoft offers services such as “AWS Direct Connect” and “Azure Express Route” respectively.

### Community Cloud

Community cloud shares infrastructure between various organization from specific community with common concerns such as security, compliance, jurisdiction etc whether managed internally or by third-party.

### Private Cloud

Private cloud is cloud infrastructure which is operated solely for single organization, whether managed internally or by third party. When private cloud project are undertaken it requires a significant level and degree of engagement to virtualize the business environment as well as to reevaluate decisions about existing resources.

### Hybrid cloud

Hybrid cloud is a composition of two or more clouds that remain distinct entities offering the benefits of multiple deployment models. It also means the ability to connect collocation, managed or dedicated services with cloud resources.

Previously, SQL database was used. It is a predefined schema with structured data and performs complex queries. Specifically MySQL database which is a flavor of SQL database, can be replicated across multiple nodes. MySQL has large number of positive reviews that is why it is preferred by community in large scale even though it is old. NoSQL is designed to access and analysis unstructured and also remote data. It solves the problem of scalability and performance which is found in SQL databases. Recently, NoSQL databases has been used increasingly in real time applications. It is a dynamic schema with unstructured data. Simple queries are performed at higher speed. Mongo DB database is a flavor of NoSQL database. It enables horizontal scalability. In Mongo DB, developers and administrators have the flexibility to evolve the data schema. In healthcare industry, there is a continuous requirement of innovation in storage, access and computation of data in the form of records.

## II. LITERATURE REVIEW

A lot of research has been down in healthcare industry. Zohreh Goli-Malekabadi, Morteza Sargolzaei-Javan and Mohammad Kazeem Akbari [1] has aimed at presenting the model based on NoSQL databases for the storage of

healthcare data. Despite different types of NoSQL databases document-based databases were selected by the survey on the nature of health data. The presented model was implemented in the Cloud environment for accessing the distribution properties. Then, the data were distributed on database by applying the shared property. Jesus Zambrano and Sanjay P. Ahuja [2] has proposed a work in which current state and trends of cloud computing in healthcare has been explored. This paper also address the issue in healthcare industry. Fawaz Alharbi and Anthony Atkins [3] work discusses the strategic value of implementing the cloud computing solutions in Saudi hospital based on the Balanced Scorecard Approach. This paper also presents the strategy map and the KPIs that were used by the hospital. The result of this paper could act as guidelines for similar projects and similar organizations, while taking into consideration the uniqueness of each organization. Dhivya P, Roobini S and Sindhuja A [4] proposed work is symptoms based treatment by secure Personal Health Record in cloud storage when applying the proposed encryption algorithm. Pradeep Deshmukh [5] has proposed a framework for storing the health records and accessing them by patients and physicians as authorized by key control scheme. Johannes Schubert, Sarfaraz Ghulam, Lisardo Prieto-González [6] explains the OPSIT approach of the integrated cloud system targeting the health care facilities and their care staff. Main objective is providing a platform that integrates that integrates different smart items in order to support care processes.

## III. RESULTS AND DISCUSSIONS

From this paper, a survey on various technique a survey on various technique that can be used to store and retrieve the healthcare data efficiently and it is also made sure that the healthcare records are highly secured. With the use of mongo and PHP the performance of the query retrieval is more fast and efficient.

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