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Interoperability of Electronic Health Record

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Abstract: ***Healthrecord of an patient to be clinically significant it needs to be from birth, not less than. As one progresses through one's life, every record of every clinical encounter represents a health associated event in one's life. Each of these records may be important or not at all required depending on the current problems that the person is suffering from. Thus, it becomes necessary that these records be available, arranged as a when person visit doctor, and be clinically relevant to provide a summary of the various healthcare events in the life of a person. An Electronic Health Record (EHR) is a digital version of patient's medical records that get generated during any clinical encounter and make information available instantly . In this paper we present interoperability of EHR without affecting privacy of individual.***

Keywords: HealthRecord, Interoperability, Medical

I. INTRODUCTION

From the perspective of Indian Medical care system, patients visit several doctors, throughout their life time right from visiting a primary health center to community health. Health records get generated with every clinical meet during the inpatient or emergency visits. However, as it is paper based most of the health records are either lost by the patients or remain in the supervision of health care providers and gets destroyed. As per the maintenance period of medical records generally followed by hospitals is 5 years for out-patient records and 10 years for in patient records. Medical records are however retained permanently. In India we have some intention of EHR. But there are certain barriers to it. The idea behind any technology or a invention is to make things simple and easy for everyone.

To Store the health record of patients to digital system and accessing the record whenever required.So simple that even peoples in rural area can run it and to achieve interoperability of that record without affecting the security and privacy of the user.

II. METHODOLOGY

A. MongoDB

MongoDB is a free and open-source cross-platform document-oriented database program. It is classified as NoSQL database, It uses JSON like structure with schemas.

Healthcare provider chains have huge amount of patient data. it is a challenge to store style of structured and unstructured information that is needed, ranging from basic patient info and medical histories to science laboratory results and MRI pictures. ahead, the shortage of centralization makes it difficult for health professionals and patients for accessing right info at the correct time. victimisation MongoDB, aid suppliers will produce an application that gives 360 degree read of the patient, doctor, procedures and alternative sorts of information during a lone data store.

and conjointly aid supplier chains will serve additional patients in minimum time. Features of mongoDB

1) *Ad hoc queries:* MongoDB supports field, regular expression searches , vary queries,. Queries can return us specific fields of documents and conjointly embody user-defined javascript functions. Queries may be organized to come back a random sample of results of a given size
2) *Indexing:* Fields in an exceedingly MongoDB document will be indexed with primary and secondary indices
3) *Replication:* MongoDB provides high accessibility with duplicate sets. a duplicate set consists of 2 or additional copies of the info. every duplicate set member could act within the role of primary or secondary duplicate at any time. All writes and reads ar done on the first duplicate by default. Secondary replicas maintain a duplicate of the info of the first victimisation integral replication. once a primary duplicate fails, the duplicate set mechanically conducts AN election method to seethat secondary ought to become the first. Secondary's will optionally serve browse operations, however that information is barely eventually consistent by default.
4) *Load balancing:* MongoDB scales horizontally victimization sharding. The user chooses a sherd key, that determines however the information in an exceedingly assortment are distributed. the information is split into ranges (based on the sherd key) and distributed across multiple shards. (A sherd could be a master with one or a lot of slaves.). as an alternative, the sherd key is

hashed to map to a sherd – facultative a fair information distribution. MongoDB will run over multiple servers, equalization the load or duplicating information to stay the system up and running just in case of hardware failure.

5) *File storage:* MongoDB is used as a classification system with load equalization and information replication options over multiple machines for storing files.This perform, known as grid classification system, is enclosed with MongoDB drivers. MongoDB exposes functions for file manipulation and content to developers. GridFS is employed in plugins for Nginx and lighttpd. GridFS divides a file into elements, or chunks, and stores every of these chunks as a separate document.
6) *Aggregation:* Map Reduce may be used for back processing of data and aggregation operations.
The aggregation frame work permits users to get the type of results that the SQL cluster BY clause is employed. Aggregation operators may be set up along to create a pipeline – analogous to UNIX pipes. The aggregation framework includes the $lookup operator which might be part of documents from multiple documents, moreover as applied mathematics operators like variance.
7) *Server-side JavaScript execution:* JavaScript may be employed in queries, aggregation functions (such as Map Reduce), and sent on to the information to be dead.
8) *Capped collections:* MongoDB supports fixed-size collections known as capped collections. this kind of assortment maintains insertion order and, once the desired size has been reached, behaves sort of a circular queue.
9) *Transactions:* The current stable unleash doesn't support transactions, however transactions are scheduled to be on the market in a very new major unleash.

B. NoSQL

A NoSQL information provides a mechanism for storage and retrieval of data that's shapely in suggests that apart from the tabular relations employed in relative databases. Such databases have existed since the late Sixties, however didn't obtain the "NoSQL" nickname till a surge of recognition within the early ordinal century, triggered by the requirements of internet two.0 firms like Facebook, Google, and Amazon.com. NoSQL knowledge bases a more and more employed in massive data and time period internet applications. NoSQL systems are typically referred to as "Not solely SQL" to emphasise that they will support SQL-like question languages
Electronic Health Record (EHR) systems supply important edges for health care. The improved accessibility of health care data from multiple locations contributes to the accuracy and timeliness of care, and may cause overall improved quality of supplying. sensible expertise and relevant analysis demonstrate that there are several technological problems that require to be addressed for contemporary health care systems to be effective in sharing EHRs because the structure and size of the health care knowledge have modified significantly over time. Recent literature shows that the rising NoSQL databases have important benefits like simple and automatic scaling, higher performance and high accessibility that address the constraints of relative databases in distributed health care systems. during this paper we tend to reviewed EHRs and also the key options of NoSQL databases. we tend to then evaluated the suitableness of NoSQL databases in meeting the wants of national EHR systems in sharing EHRs in a very distributed system surroundings.

III. LITERATURESURVEY

A. Mehmet Ercan, Michael Lane December 2014: An Evaluation of NoSQL Databases for Electronic Health Record Systems.

Electronic Health Record (EHR) systems offer significant benefits for healthcare. The improved availability of healthcare information from multiple locations contributes to the accuracy and timeliness of care, and should lead to overall improved quality of healthcare delivery. Practical experience and relevant research demonstrate that there are many technological issues that need to be addressed for modern healthcare systems to be effective in sharing EHRs as the structure and size of the healthcare data have changed considerably over time. Recent literature shows that the emerging NoSQL databases have significant advantages such as easy and automatic scaling, better performance and high availability which address the limitations of relational databases in distributed healthcare systems. In this paper we reviewed EHRs and the key features of NoSQL databases. We then evaluated the suitability of NoSQL databases in meeting the requirements of national EHR systems in sharing EHRs in a distributed system environment.

B. Indian Journal of Science and Technology, Vol 9(3), DOI: 10.17485/ijst/2016/v9i3/86391, January 2016: Implementation of Cloud based Electronic Health Record (EHR) for Indian HealthcareNeeds

EHR means the digital version of the patients medical report, in store the data in real time, it contains medication and treatment history which includes the broader view of patients care and it also contains patients medical history, diagnosis, medications,

treatment plans, immunization data, allergies, radiology images, laboratory and test results.[1] Methods/Statistical Analysis: The main intention of EHR is to have access to evidence based tools that health providers can make use to make decision and disease diagnosis about the patientscaredelivery.[1]

C. *Ariel Ekblaw , Asaph Azaria, John D. Halamka, MD , Andrew Lippman, MIT Media Lab, Beth Israel Deaconess Medical Center August 2016: A Case Study for Blockchain in Healthcare: "MedRec" prototype for electronic health recordsandmedical researchdata*

A long-standing focus on compliance has traditionally constrained development of fundamental design changes for Electronic Health Records (EHRs)[2][5]. We now face a critical need for such innovation, as personalization and data science prompt patients to engage in the details of their healthcare and restore agency over their medical data. In this paper, we propose MedRec: a novel, decentralized record management system to handle EHRs, using block chain technology. Our system gives patients a comprehensive, immutable log and easy access to their medical information across providers and treatment sites. Leveraging unique block chain properties, MedRec manages authentication, confidentiality, accountability and data sharing—crucial considerations when handling sensitive information. A modular design integrates with providers' existing, local data storage solutions, facilitating interoperability and making our system convenient and adaptable. We incentivize medical stakeholders (researchers, public health authorities, etc.) to participate in the network as block chain "miners". This provides them with access to aggregate, anonym zed data as mining rewards, in return for sustaining and securing the network via Proof of Work. MedRec thus enables the emergence of data economics, supplying big data to empower researchers while engaging patients and providers in the choice to release metadata. The purpose of this paper is to expose, in preparation for field tests, a working prototype through which we analyze and discuss our approach and the potential for block chainin health IT and research[3][5]

D. *Kevin Peterson, Rammohan Deeduvanu, Pradip Kanjamala, and Kelly Boles Mayo Clinic: A Blockchain-Based Approach to HealthInformationExchangeNetworks*

Sharing healthcare data between institutions is challenging. Heterogeneous data structures may preclude compatibility, while disparate use of healthcare terminology limits data comprehension. Even if structure and semantics could be agreed upon, both security and data consistency concerns abound [2][3][5]

Centralized data stores and authority providers are attractive targets for cyber-attack, and establishing a consistent view of the patient record across a data sharing network is problematic. In this work we present a Block chain-based approach to sharing patient data. This approach trades a single centralized source of trust in favor of network consensus, and predicates consensus on proof of structural and semantic interoperability.[3]

IV.PROPOSEDSYSTEM

The proposed system diagram for the storing and accessing data represented by Fig.1

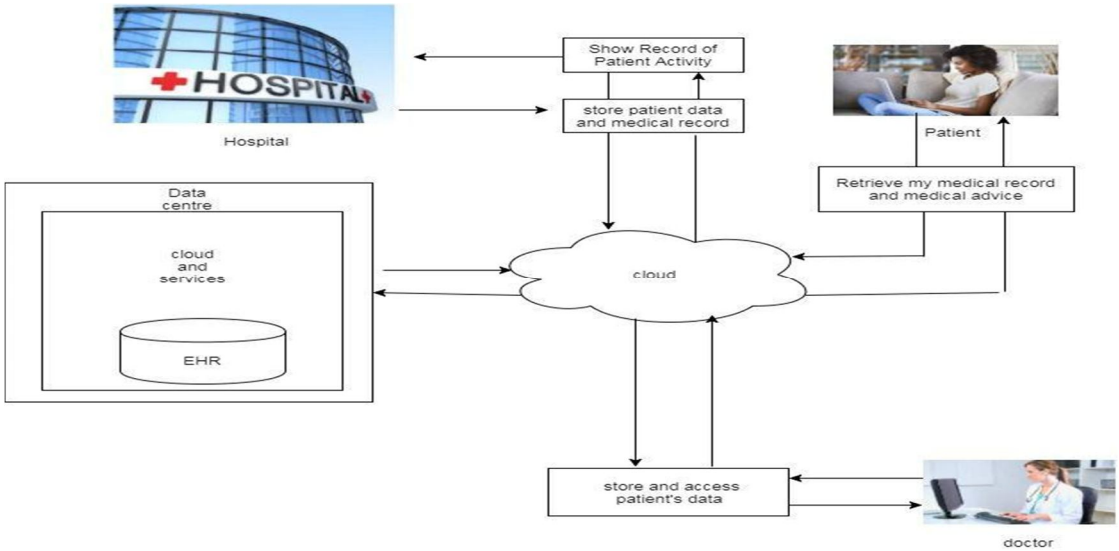

Fig.1EHRsystemarchitecturediagram.

The system has three modules patient , doctor and hospital namely. The patient module is used to collect personal information and store it in the data storage. The Doctor module takes data and store and upload reports. After uploading reports patient can access . The data will be on your fingertips to savetime.

V.RESULTS

So after studying about various methods of gaining interoperability of EHR. It is clear that mongoDB will provide horizontal scalability as healthcare data increases over time it also allows unstructured data and semi-structured data to be stored easily as heterogeneity in healthcare is essential, As healthcare data should always be accessible to the health experts it provides high availability due to its distributed nature. It also provides high performance as in healthcare data sharing requires access to EHRs from multiple locations.

VI.CONCLUSION

The proposed system is to make things simple and easy for everyone. So sharing of patient's health record considering the drawbacks of existing systems(PHR, EHR,Paper based) like centralized, storage, availability and security so we are coming up with interoperability of electronic health record to overcome the issues of existing system. Starting with the conversion of centralized system to decentralized system and the entire patient records will be stored in a cloud based system that provides better security. And the entire data will be at your fingertips resulting in savingy our time and money.

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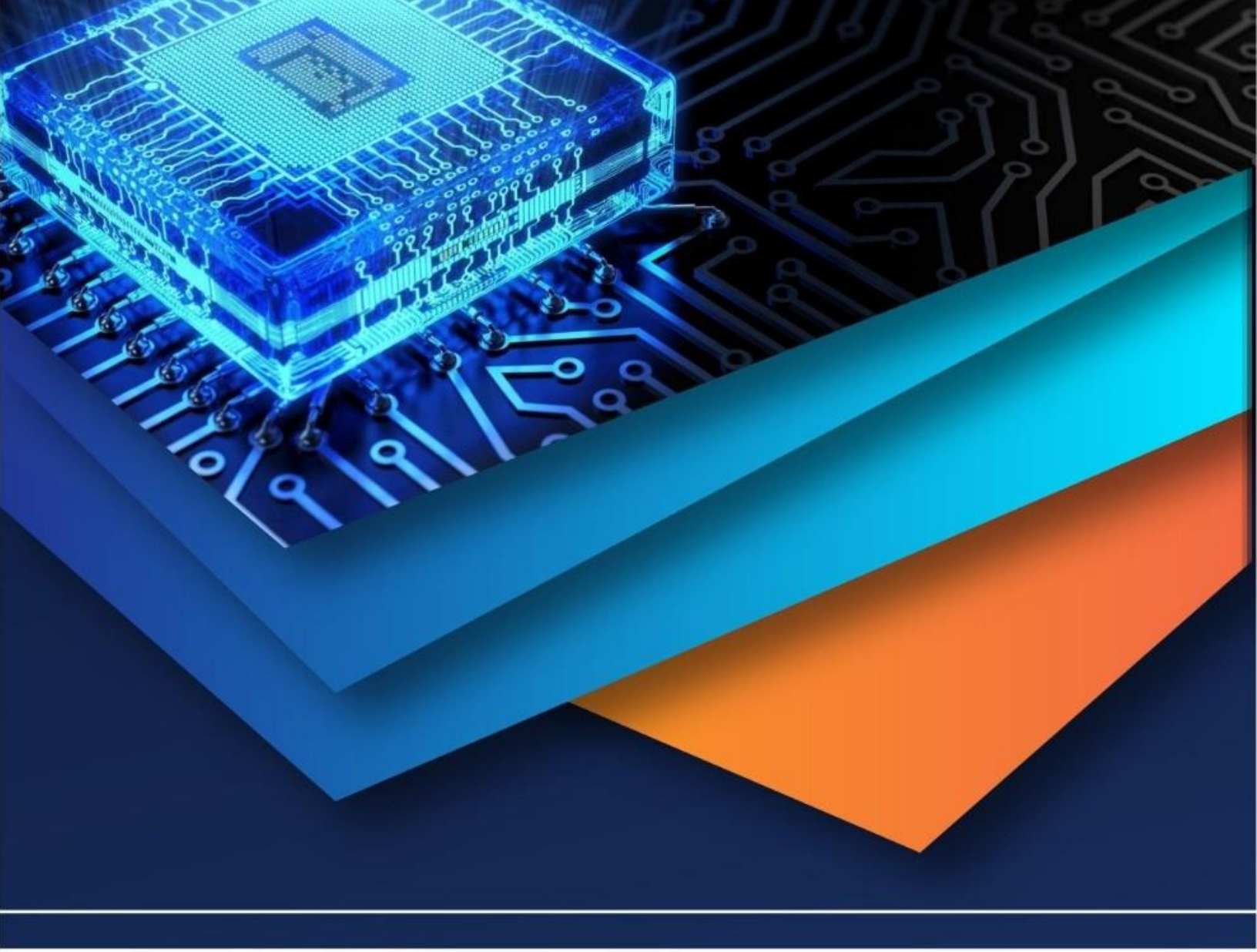

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