

# A Systematic Review on Block chain Technology in Cloud Computing

M. Tech. Scholar Shashi Kumar, Professor Dr. Varsha Namdeo

Department of Com. Sc. & Engg.  
RKDF Institute of Science and Technology, Bhopal, M.P (India)  
shashimggupta@gmail.com, varsha\_namdeo@yahoo.com

**Abstract-** A health care cloud is a cloud computing service used by health care providers for storing, maintaining and backing up personal health information (PHI) . Transforming healthcare via the cloud is about more than just the delivery of medical information from multiple computers at anytime, anywhere, and on any mobile device. It's also about the benefits of being able to connect medical centers and cloud users for the purpose of sharing patients' health data over the Internet. In this paper a blockchain based concept used to maintain healthcare data Blockchain can help protect the healthcare network. Cloud computing is the delivery of computing and storage space as a service to a distributed community of end users. The schema/model of Cloud computing is, all the servers, networks, applications and other elements related to data centers are made available to end users. Cloud computing is growing now-a-days in the interest of technical and business organizations but this can also be beneficial for solving social issues. Cloud computing refers to manipulating, configuring, and accessing the applications online. It offers online data storage, infrastructure and application.

**Keyword-** Cloud Computing , mobile device , healthcare network etc.

## I. INTRODUCTION

One particular trend observed in healthcare is the progressive shift of data and services to the cloud, partly due to convenience (e.g. availability of complete patient medical history in real-time) and savings (e.g. economics of healthcare data management). There are, however, limitations to using conventional cryptographic primitives and access control models to address security and privacy concerns in an increasingly cloud-based environment.

This includes not only clinical errors but also administrative errors, such as the National Health Service (NHS) recently failing to invite nearly 50,000 women for cervical screening [4]. Blockchain is a decentralized online ledger (database) that was first implemented as cryptography Bit coin [3] to store a growing record of all transactions. It can verify the transaction using a computational (encrypted) certificate to replace a trusted third-party signatory of the transaction (in financial situations, usually an "intermediary" provider, such as Visa).

This verification is performed by a network of users ("full nodes") that collectively adhere to the previously agreed rules implemented by the software. This method not only saves brokerage costs (because blockchain does not involve brokers), but also saves the costs associated with canceling transactions when a dispute arises because blockchain transactions are in themselves irreversible. Transaction registers are grouped into blocks, and each

block is locked to the next using a cryptographic hash. After registration, the data in a given block cannot be changed without changing all subsequent blocks (because the hash value of each block depends on the last one) or without the consent of most network members. In addition to financial services, distributed big-bit technology has also been used in manufacturing to track goods in the supply chain [4] reconciliation and public records in government and unmediated goods in the retail trade and allow more complex loyalty packages .

The system is also flexible enough to add arbitrary logic to process, verify and access data. This is achieved through business logic components called smart contracts, which are placed on the blockchain and synchronized between all nodes. A smart contract is a strict computer code that is executed as long as certain conditions are met to ensure security and authorized access rights [5]. The ability to create smart contracts makes blockchain suitable for healthcare because strict rules regulate how sensitive data is used [6].

The exchange of information through smart contracts is transparent and conflict-free and eliminates the need for intermediaries because blockchain performs data sharing according to the predetermined conditions of the contract [7]. Data ownership and privacy are important issues that blockchain can solve. It is currently being debated whether the healthcare provider or the patient owns the healthcare data related to the patient (although the patient has the absolute right to access the data. In addition to property issues, with the introduction of the General Data

Protection Regulation (GDPR) in the European Union, it is also important for patients to understand how they handle their personal information. The smart contract implemented by blockchain will simplify the consent process for physicians to access data. The current consent process has not been standardized or personalized, making it difficult for patients to formulate themselves through access control policies, which may involve, for example, choosing access to specific experts.[8] Another problem with medical records is the current cost of transferring records between locations. Repeated imaging studies due to inability to achieve previous results are dangerous in terms of delay in treatment and financially. Sending data via e-mail is considered a security risk [9] and there is obviously an inefficiency problem when transmitting digital assets to optical media that can only be read once at the receiving site a system that integrates the patient's consent and contact with authorized staff saves these costs.[10]

### 1. Interoperability:

Health data is dynamic and scalable, and it would be beneficial to seamlessly exchange health data across health information systems. Since it is unrealistic to copy all health records to any computer in the blockchain network in terms of speed, storage capacity or sustainability [11], we advocate the use of blockchain as administrative access control (and methods of smart contract management). By systematically saving all users' health records and related metadata catalogs.

Each time a physician or patient (from a mobile app or portable sensor) adds data to the EHR, a marker containing metadata pointing to that data is added to the blockchain while the data is stored securely in the cloud [12]. The complete index of a particular patient's records and related metadata is stored somewhere no matter where the medical data is located. Blockchain with this secure postal index then directs authorized personnel to cloud-based data, allowing instant exchange of information between authorized professionals while maintaining a constant ledger for these readers. The fact that blockchain is based on open source software also has potential benefits because

Health Trust can use open application programming interfaces to integrate data as needed, allowing them to access accurate information in a format they can use in a timely manner. The pursuit of interoperability is also an important function of the Economic and Clinical Health Information Technology Act, meaning that since 2011, U.S. healthcare providers have received financial incentives to demonstrate their effective use of electronic medical records.

### 2. Blockchain technology:

Challenge Blockchain technology has been realized or realized as a network currency and has actually been used. However, be aware that various security issues have been reported in blockchain protocols, transactions, wallets, and software. This article examines trends in security issues raised so far and the current level of security for blockchain. We think this experiment is very important because the results can be used as basic data to develop future blockchain technology and complement security. Transaction security As the script used in input and output is a flexible programming language, this language can be used to create different types of transactions.

Bitcoin contract is a method of applying Bitcoin to existing approval and financial services. One widely used method involves creating contracts using scripts that include a multisignature technology called multiuser. Although scripts are used to solve various Bitcoin problems as the complexity of scripts increases, the possibility of misconfigured transactions increases. Bitcoin coins that use an incorrectly configured lock script are discarded because no one can use it because the unlock script cannot be generated. For this reason, some studies suggest using the Bitcoin contract transaction model to verify the accuracy of the script used in the transaction.

## II. RELATED WORK

**Zulqarnain Rashid et.al.** Due to the increase in the elderly population and the decline in the birth rate, the daily health care industry is flourishing. Due to the lack of doctors, medical treatment has become a major problem. Because of these problems, there is a paradigm shift from demand-based health monitoring to preventive health monitoring services. With this situation in mind, we have developed a ubiquitous healthcare system that can help users stay healthy and prevent users from falling ill. The various components of the system communicate via web services. Web services can help users maintain their health records remotely and access health parameters around the world. Use of web services also provides feedback and consultation. Imagine all these web services being hosted on cloud services. The central database is also available on the cloud service. The system is developed using modern design patterns and complete object-oriented concepts.

Unnati Dhanaliya et.al. needs to strengthen the health care system for economic, technological and social development in any country. The development of healthcare does not require much manpower, especially when patients need ongoing monitoring. The power of information and communication technology provides effective solutions for healthcare. Using the Internet of Things (IoT), the patient's condition can be monitored remotely. In this article, we introduce the electronic medical system using cloud computing and web services. Using cloud computing enables remote monitoring and

control. It provides automatically updated patient measurement parameters and sends alarm emails using Simple Mail Transfer Protocol (SMTP).

**Nimmy John et.al.** Since the advent of information technology in the healthcare field, the healthcare industry has far surpassed hospital information systems (HIS), electronic medical records (EMR) for computer-assisted surgery and external patient care. With the development of information technology, healthcare in different markets is becoming more digital, more collaborative, more patient-centered and more data-driven. It is designed to access information anytime, anywhere. The traditional technical infrastructure in the healthcare sector will not be able to accommodate the large amount of data generated and the various healthcare services to be provided to patients. Cloud computing is a rapid development that includes a variety of services, all of which are delivered on-demand via the Internet in an on-demand payment model.

It is expected to increase the speed of implementation of applications and reduce costs. Cloud computing can play a key role in managing current trends in digital data growth and delivering medical services anytime, anywhere. Cloud computing can also make important contributions to controlling the cost of integrating healthcare, optimizing resources and creating a new era of healthcare innovation. This article briefly analyzes some of the digital data challenges facing the healthcare industry. This article describes a system that can provide various medical services using cloud computing. This article also describes the implementation of a service provided as part of the system.

**Al-Khanjari, et.al.** today, cloud-based electronic health records are used in medical institutions to minimize problems and limitations in paper-based activities. However, due to many reasons, such as security issues, understanding of the cloud and maintenance costs, it has not yet realized its benefits. But in the next generation, because cloud users have many benefits, it may become the first choice. In my research, a cloud-based healthcare system was implemented to store, retrieve, and update patient survey records from a central cloud database server (Dive HQ). All hospitals use the common middleware platform in remote hospitals to store patient data in this central cloud database server. The authentication server can also be used to filter out unauthorized users to access the site and grant access to the authorized users. To develop my system I have used Net Beans IDE, MySQL, Apache Tomcat and other tools to develop the system. This article also briefly introduces the benefits of cloud for medical institutions. Personal health information services can help patients store and control their health information through the cloud. Many users, such as doctors, healthcare providers, and family members, can access this data through the Internet.

However, there are issues with privacy related to data leakage and data leakage, which poses risks to patients' lives. Encryption technologies such as public key encryption are used, but apart from scalability issues, they are not very efficient and very complicated. This article discusses various multi-government attributes based on the function of encryption solutions that can protect the privacy of electronic health records after they are divided into private and public domains.

**Xiaodan Zheng et.al.** With the growing demand for personal health care, continuous monitoring of patients' health parameters is important to make a correct diagnosis. The traditional health care system is inefficient, not timely and faces serious challenges. How to design a seamless wireless communication framework and an efficient computer platform for medical services is essential. In this article, we propose a new cloud-based service network infrastructure, including BSN, WLAN and 3G / 4G mobile networks, and design local mobile switching centers with different access points in the same subnet to help different APs Smooth handover between 3G / 4G and WLAN, and when the patient switches between 3G / 4G and WLAN, the delayed timestamp data transfer mechanism is adopted, and the performance of the proposed network and handover program is simulated. The results show that the medical data can be recovered well.

**Sunil Kumar Chowdhary et.al.** cloud computing is the next generation concept in the field of computing with three main units, namely software, hardware and network. Cloud computing technology is designed to increase capacity or add new features to existing systems without the need to invest in new infrastructure, train new staff or license new software. Today, the cloud is becoming a new part of larger companies around the world. They help provide platforms and services globally to support different infrastructures. Currently, cloud computing is in the early stages of development and a lot of research has been done in this field. Existing e-health practices face many challenges from development to implementation. This article analyzes cloud computing and examines its application in e-health to provide the best medical treatment.

**S. Jarecki, et.al.** Outsourcing is the process of contracting an existing business process, previously carried out internally by an organization, to an independent organization, and the process is purchased as a service. The data owner activates the SSE plan and outsources the document or file collection to an external server in encrypted form. The data owner also authorizes the customer (third party) to search the learning database. The remote server still does not understand the data or query values in the basic SSE settings. We have extended the OXT protocol from Cash et al. Supports arbitrary Boolean queries in all of the above models while carrying

conflicting non-conflicting servers (data owners and remote servers) and arbitrary malicious clients to maintain the excellent performance of the protocol

**S. Kamara et.al.** , Searchable Symmetric Encryption (SSE) enables clients to encrypt data in a specific way so that they can later generate search tokens sent to storage services as queries. We propose the first SSE scheme that satisfies all attributes, such as sub-linear search time. The inverted index method has been expanded in several non-trivial ways, and new technologies have been introduced for the design of the Shanghai Stock Exchange. We carry out our plan and conduct performance evaluations and show that our method is effective and implementable.

### III. PROPOSED APPROACH

Achieving interoperability depends on the patient checking the data and deciding how to use the data, which is an essential function of the blockchain. Although the transfer of data ownership from governments and companies to patients requires a large-scale redesign of the inherited system to introduce blockchain, it will contribute data to achieve the best treatment, thereby encouraging patients to become their own proactive means. Blockchain will also give patients the right to authorize access to different providers' data at their discretion eliminate delays associated with current bureaucracies and ensure patient privacy.

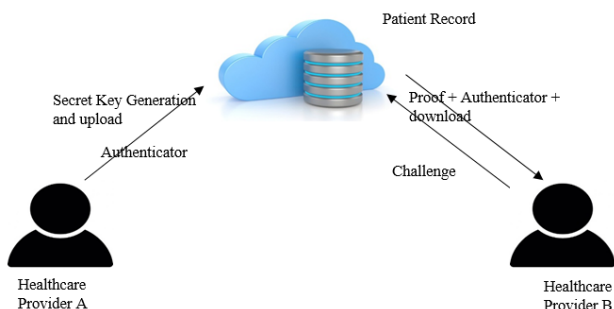


Fig.1 Architecture Diagram.

These benefits provided by blockchain enable patients to control their own data, which is a new expectation in an era where the mutually beneficial and consumer-doctor relationship becomes the norm. Patients can also choose to use blockchain to share data with researchers to achieve greater scientific value or to enable them to conduct research according to their unique circumstances. The system will ensure their consent, which is a key factor in establishing autonomy and patient-centered care. The latest example of patient autonomy in relation to health data is 23andMe, where 80% of users choose to give their genomic data to researchers. This shows that if patients benefit, they will be happy to share data for research. In an open and secure way of blockchain, patients will allow direct participation in controlling the use of their records increase the use of such platforms and

possibly improve health. Data sharing can be done through a trusted system, but as an added incentive, there is an idea to "reward" patients for healthy behaviors, such as lower insurance premiums this and other similar ideas need to be tested to determine how effectively they will overcome this challenge

### IV. CONCLUSION

This study shows that efforts to use blockchain technology in the healthcare sector are growing exponentially. Certain areas of the healthcare sector can be severely affected by blockchain technology. Blockchain can create a mechanism to manage access to EHRs stored in the cloud. Using blockchain can improve interoperability while maintaining data protection and security. It contains inherent integrity and complies with strict laws and regulations. Improved interoperability will benefit health. Although most people currently do not know the technology, investing in creating a sufficiently user-friendly interface and educating users on how to best use it will improve health. The proposed system will be maintained and process the data securely. It will be provides the more accurate search result, provide high search Efficiency. Reduce search delay of the scheme is proportional to the size of the database. It will be suitable for the large scale databases.

### REFERENCES

- [1] M. Li et al., "Scalable and Secure Sharing of Personal Health Records in Cloud Computing Using Attribute-Based Encryption," IEEE Transactions on Parallel and Distributed Systems, vol. 8, no. 3, 2016, pp. 2084–2123.
- [2] F. Tschorsch and B. Scheuermann, "Bitcoin and Beyond: A Technical Survey on Decentralized Digital Currencies," IEEE Communications Surveys & Tutorials, vol. 18, no. 3, 2016, pp. 2084–2123.
- [3] A. Azaria et al., "MedRec: Using Blockchain for Medical Data Access and Permission Management," Proceedings of the 2nd Int'l Conference on Open and Big Data (OBD 16), 2016, pp. 25–30.
- [4] J. Zhang, N. Xue, and X. Huang, "A Secure System for Pervasive Social NetworkBased Healthcare," IEEE Access, vol. 4, 2016, pp. 9239–9250.
- [5] J. McKinlay et al., "Blockchain: Background, Challenges and Legal Issues," DLA Piper
- [6] Abayomi-Alli, AA, Ikuomola, AJ, Robert, IS & Abayomi-Alli, OO 2014, 'An Enterprise Cloud-Based Electronic Health Records System', Journal of Computer Science, vol. 2, no. 2, pp. 21-36.
- [7] Abolfazli, S, Sanaei, Z, Tabassi, A, Rosen, S, Gani, A & Khan, SU 2015, 'Cloud Adoption in Malaysia: Trends, Opportunities, and Challenges', Cloud Computing, IEEE, vol. 2, no. 1, pp. 60-8, viewed 10 December 2015,



- [8] AbuKhoua, E, Mohamed, N & Al-Jaroodi, J 2012, 'e-Health cloud: opportunities and challenges', United Arab Emirates University, Future Internet, vol. 4, no. 3, pp. 621-45, viewed 10 March 2016,
- [9] Adams, K, Non-functional Requirements in Systems Analysis and Design, vol. 28, Springer International Publishing, Switzerland, Cham. 2015
- [10] Adueni, IA-B, Hayfron-Acquah, JB &Panford, JK 2016, 'Developing a common cloud platform to manage Ghana's healthcare system. Case study: Ghana Health Service (GHS)', Journal of Communications Technology, Electronics and Computer Science, vol. 4, pp. 6-10, viewed 24 March 2016,
- [11] Ahuja, SP, Mani, S & Zambrano, J 2012, 'A survey of the state of cloud computing in healthcare, Network and Communication Technologies', vol. 1, no. 2, p. 12, viewed 12 April 2015,
- [12] Akanbi, MO, Ocheke, AN, Agaba, PA, Daniyam, CA, Agaba, EI, Okeke, EN &Ukoli, CO 2012, 'Useof electronic health records in sub-Saharan Africa: progress and challenges', Journal of medicine in the tropics, vol. 14, pp. 1-6, viewed 5 January 2016
- [13] Al-Khanjari, Z, Al-Ani, A & Al-Hermizy, S 2014, 'A Proposed Security Architecture for Establishing Privacy Domainisin E-Health Cloud', European Scientific Journal, vol. 2, pp. 322-30.
- [14] Allie , C, 'Australia to bring citizens' health records online', viewed 22 September 2016
- [15] Arpacı, I, 'Understanding and predicting students' intention to use mobile cloud storage services', Computers in Human Behavior, vol. 58, pp. 150-7. 2016
- [16] Arpitha, S &Kavitha , G, 'Cloud computing: A boon to healthcare', International Journal of Combined Research and Development, vol. 2, no. 3, pp. 58-62, viewed 10 April 2016, 2014