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Healthcare Management with QR Code using BlockChain

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Abstract - *The existing healthcare management system is heavily reliant on paper-based records and centralized databases. This makes it difficult to securely share patient data between healthcare providers, resulting in delays in treatment and potential errors in diagnosis. Furthermore, the current system is prone to cyber attacks and data breaches, putting patient privacy at risk. The lack of transparency also leads to distrust between patients and healthcare providers.*

A QR code or quick response code is a two-dimensional barcode that can be scanned by a smartphone or a qr code reader on the other hand blockchain technology provides an easy and efficient way to store and retrieve information a decentralized and transparent digital record and verification of transactions on multiple computers the integration of qr codes and blockchain technology in healthcare management offers several advantages firstly it improves the security and privacy of patient information by storing patient information in the blockchain which is resistant to untrusted qr codes and then patient information which ensures the integrity and authenticity of the information used to link to related notebook entries.

Secondly the use of qr code and blockchain technology increases the efficiency of the health care process for example when patients visit the clinic their code can be scanned to access their medical history allergies and other relevant information which eliminates the need for manuals documentation and reduce errors or possible errors of interpretation

Healthcare management is an important industry that requires the integration of qr codes and safe and efficient data management as well as technologies known for privacy and accessibility which can greatly improve qr code technology which is the key to the unique identification of blockchain technology for each be patient database provides an immutable and distributed transparent ledger that ensures the integrity of patient data2 this paper presents an application that uses two methods to safely manage patient data1 facilitates access to medical records and prescriptions1 that increases data availability and efficiency and improves patient privacy health management that emphasizes the need to fulfill obligations.

It is gaining attention and being explored for various apps. Here's an overview of how the existing system of healthcare management could leverage blockchain:

Patient Records Management: - Each patient would have their unique blockchain identifier, and their medical history, test results, prescriptions, and treatment plans could be securely stored in a blockchain.

Interoperability: - Healthcare blockchains can facilitate data interoperability by providing a standardized format for health data. The ability to access and update patient records seamlessly while maintaining data integrity would be made possible by this.

Key Words: - Patient health history, Healthcare card, Fraud prevention, Enhancing patient safety.

1.INTRODUCTION

Healthcare management is being reshaped by blockchain technology as it offers a secure and transparent framework for data management and patient care. Blockchain technology provides a secure storage solution for patient medical records, safeguarding data privacy and facilitating the effortless exchange of health information among various healthcare providers. It enhances clinical trial integrity, tracks drug supply chains, streamlines health insurance processes, and supports telemedicine while ensuring data authenticity. Furthermore, blockchain technology provides patients with greater autonomy in managing their healthcare data and consent. It holds the promise of transforming healthcare management through increased trust, improved data security, and a reduction in administrative inefficiency. This will eventually improve patient outcomes and make the entire healthcare ecosystem more effective. Discover the fundamentals of blockchain technology and how it may be applied to healthcare administration. Blockchain provides an immutable, trustless, and decentralized way to store and access data.

QR code-based blocking solutions can allow participants in the care process to continue using the patient information system during record exchange blockchain creates a single immutable source of truth public record this single source acts as a master record for all transactions containing information about every transaction that takes place think of each transaction as a change to a patient record that requires real-time data sharing between multiple parties lack of communication can lead to many directional problems automating the approval process can solve such problems blockchain is a great way to automate referrals because it allows secure real-time data transfer between parties reducing the possibility of errors conflicts and missed connections each key actor in the development process customers employees payers and maintenance team members has real-time information on locked scenarios

blockchain in healthcare helps share data easily and quickly qr codes can also be extended to make digital payments fast and secure in an industry where time is truly precious time-saving mechanisms like easy qr code generation and quick sharing can be an asset in addition the supply team can reduce network leakage because they have a better understanding of real-time routing

While blockchain solves the problem of denying delayed payment claims and sharing patient data there are still challenges to unlock healthcare but it has the potential to speed up the payment process between insurance companies and providers allowing insurance companies to automate more medical payments provide accurate and precise information to patients and insurers in a secure environment with secure communication between several parties on a distributed basis record blocks are recorded and visible to all parties eliminating the need for fax calls or manual searches in the healthcare industry and insurers can keep updated payment keys in the registration file and blockchain distributed ledger technology will reduce the need to store and record data on paper which can save patients medical data simplify data management and help the healthcare industry comply with government rules distributed paper and only authorized users can access doctors and insurance companies eliminating the need for paper-based contact manuals thus increasing information security for example when a doctor or patient scans a qr code it immediately reveals medical and health information.

1.1 2. Methodology

Blockchain technology holds significant promise for transforming the healthcare industry, particularly in the realm of healthcare management. Blockchain, as a decentralized and secure digital ledger, offers several advantages in healthcare, including data security, interoperability, transparency, and efficiency. Through a thorough bibliometric study using bibliometric methods and techniques, the main goal of this work is to comprehend the intellectual knowledge structure, development patterns, and research focuses of the BC healthcare area.

We examined 626 documents extracted from the Web of Science (WoS) database, and through this analysis of published research spanning from 2023 to 2034, we assessed the knowledge framework and monitored the progression of blockchain (BC) research within the healthcare field. The findings of this research will hold significance and offer valuable insights for both researchers and practitioners engaged in the intersection of blockchain (BC) and healthcare.

This study will enrich the community with additional insights and a more refined understanding of the current research landscape and evolving trends. The effort put into this study has the potential to propel advancements in BC research, encourage broader practical applications, and shed light on new avenues for disseminating BC knowledge in the healthcare sector in the future. The absence of review papers employing bibliometric methods to examine the evolution of blockchain (BC) in healthcare literature represents an unexplored research avenue within the academic community. Utilizing text mining, it is viable to extract insights into the current research landscape, its progress, and emerging trends in a particular field, as well as to outline the intellectual framework of that discipline.

Unlike conventional and systematic reviews, bibliometric reviews have the potential to address challenges related to the restricted coverage of existing literature. While blockchain technology holds immense promise for healthcare management, there are also challenges to address, including regulatory hurdles, data standardization, and scalability concerns. However, with ongoing developments and collaborations within the healthcare industry. Blockchain has the potential to revolutionize healthcare management by enhancing security, efficiency, and patient-centricity. Because of the high expectations set by BCT, there has been an increase in the number of articles examining its significance in the field of healthcare. Consequently, for the academic audience, pinpointing the essential literature, prominent publication platforms, and influential scholars remains a challenging task.

A methodology statement for healthcare management using blockchain should include the following steps:

Identify the specific problem(s) that blockchain can be used to address. Develop a customized blockchain system that meets the specific requirements of the healthcare organization. Develop and test the blockchain solution. Deploy the blockchain solution and integrate it with the existing healthcare systems. Monitor the performance of the blockchain solution and adjust as needed.

Objectives

- The proposed application's goals are as follows:
- Help users to access the data easily
- Provide users with see the old dataset
- Create a healthcare card where whole medical record is store.
- Facilitate easy communication for individuals seeking help from you.

1.2 3. Literature Review

A. Karim Rejeb, Abderahman Rejeb, Horst Treiblmaier, and Suhaiza Zailani: A bibliometric review of blockchain research in healthcare, as well as current research trends. To guarantee that the gathered papers were conceptually relevant, the authors individually examined each document's title, abstract, and keywords. [1]

B. Kebira Azbeg, Ouail Ouchetto, Said Jai Andaloussi: BlockMedCare is a healthcare solution that uses IoT, Blockchain, and IPFS to secure data management. The distributed denial of service attack consists of disrupting the normal traffic of a service by flooding it with requests until not being able to receive further requests. [2]

C. Rachid Benlamri, Seyednima Khezr, Md Moniruzzaman, Abdulsalam Yassine, and Seyednima Khezr: Blockchain Technology in Healthcare: A Comprehensive Review and Future Research Directions. The blockchain's principal application is as a platform for documenting Bitcoin digital currency transactions, but it might also be utilized in the field of education. [3]

D. Jain Y. Jain H. Dhingra D. Saini M.C. Taplamacioglu M. Saka: Web based emergency health card utilizing Quick Response Code. The Systematic Literature Review (SLR) is being conducted to comprehend and analyze the most recent advances in QR code recognition and pre-processing. [4]

E. Untung Rahardja, Melani Rapina Tangkaw, Nuke Puji Lestari Santoso, Alfiah Khoirunisa, Qurotul Aini: Including a Blockchain Technology Pattern in the QR Code for Authentication. This research methodology utilizes a SWOT analysis, which involves assessing the study's strong points, areas of improvement, potential advantages, and possible challenges. One of its strengths is decentralization. [5]

F. Yadav Nikhil Kumar: Quick Response Code-based emergency health card on the web. In order to authenticate the user into his personal account, where he enters all of his personal information and medical record information, we are developing an Android application that uses a login form. [6]

G. Kebira Azbeg, Ouail Ouchetto, Said Jai Andaloussi: QR Code-Based BlockChain Inventory Management Using Open CV. Blockchain is intended to work in a decentralized way while the databases are constantly brought together. [7]

H. BIN YU, ZHENGXIN FU, AND SIJIA LIU: Hamming Code-Based Rich QR Codes with Three-Layer Information. With the advent of the mobile internet era, the development of the information industry driven by ``Internet C'' has made a major breakthrough. [8]

I. Afshaun Azad, Harry O. Orlans, and D. Alistair H. Laidlaw: Utilizing QR codes on smartphones to enhance patient connection and information dissemination. In most cases, patients only remember around 50% of the information given to them during consultations, and some even claim that no information was ever presented to them. [9]

J. Sapna Radia and Shima Sharara: Quick Response (QR) codes are used to transmit patient information: a digital advancement made during the coronavirus outbreak. Data that investigated the use of QR codes in orthodontics are limited. We are aware of a small number of research that examined patient usage of QR codes. [10]

K. Rachid Benlamri, Seyednima Khezr, Md. Moniruzzaman, Abdulsalam Yassine: A Comprehensive Review of Blockchain Technology in Healthcare and Future Research Directions. The blockchain's main use is as a system for keeping track of Bitcoin transactions, however this system might also be applied to the field of education [11].

L. M. Indiramma and Bindu Koravatti: Utilizing QR codes on smartphones to enhance patient connection and information dissemination. Medical advice is made more challenging in certain hospitals because hospitals alone manage electronic health records (EHRs), not patients. [12]

M. Tran Le-Nguyen: Healthcare Blockchain: A New Technology That Benefits Patients and Physicians. With the underlying technology of Bitcoin or other crypto-currencies and its rapid growth nowadays, many places have begun accepting Bitcoin payments in hot debate. [13]

N. Alaa Haddad, Md. Rafiqul Islam, Mohamed Hadi Habaebi, and Suriza Ahmad Zabidi: Medical Records Management System with Sharing and Control using Blockchain for Healthcare. After medical data has been preserved, data exchange and dependability become a concern. This situation can benefit from the application of blockchain technology. Utilizing consensus-based blockchain technology ensures both the integrity of data and the security of transactions. [14]

2. Existing system:

Examining the current healthcare management system and identifying its limitations and challenges. The existing healthcare management system is heavily reliant on paper-based records and centralized databases. This makes it difficult to securely share patient data between healthcare providers, resulting in delays in treatment and potential errors in diagnosis [16]. Furthermore, the current system is prone to cyber attacks and data breaches, putting patient privacy at risk. The utilization of consensus-based blockchain technology is advantageous in this scenario, as it guarantees the data's integrity and transaction security. It could totally change healthcare by making it easier and more transparent how healthcare data is stored, shared, and managed. Without transparency, people don't trust healthcare providers and patients. Here's an overview of how the existing system of healthcare management could leverage blockchain:

Management of Patient Records: Each patient would have their unique blockchain identifier, and their medical history, test results, prescriptions, and treatment plans could be securely stored in a blockchain.

Interoperability: Healthcare blockchains can facilitate data interoperability by providing a standardized format for health data. This would make it easier for different health care providers to get their hands on patient records and keep them up-to-date while still keeping the data secure.

2. Proposed Solution:

The proposed solution is a mobile application that would help users manage their health records as shown in fig 1. The application would include the following features:

- A login page and verification system to protect user privacy
- Healthcare Card is made in which whole medical of patient is there.
- Pdf is generated after scanning qr code.
- Doctor suggestions and contact information for users who need professional help.

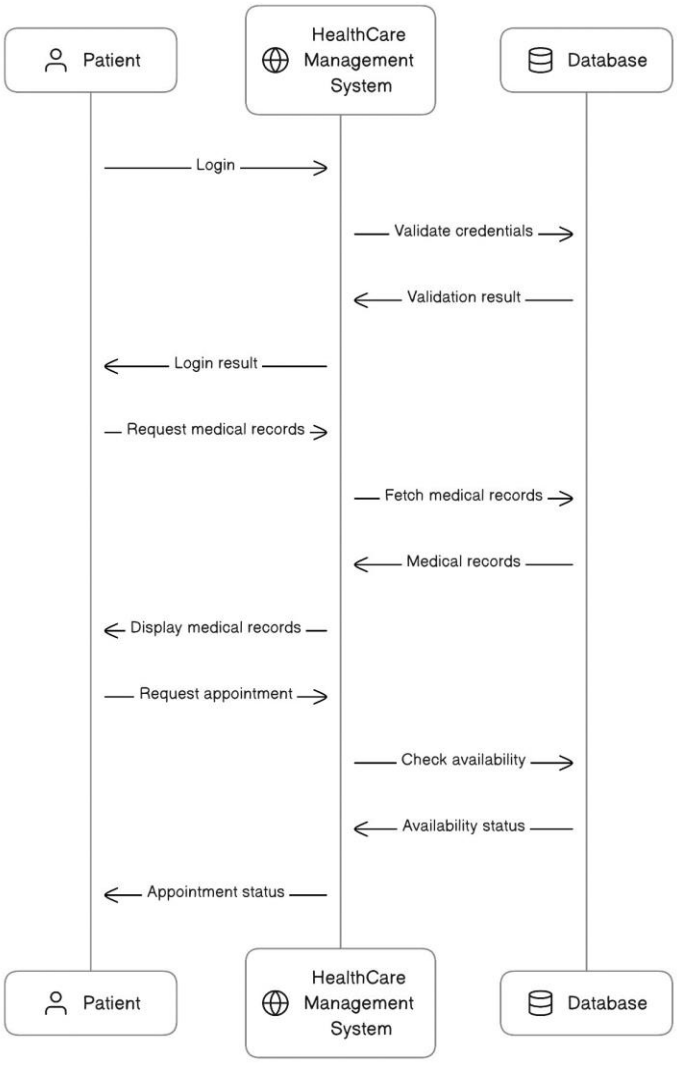

Fig. 1. Sequence Diagram

3. System Design:

The proposed application would be a mobile application that would be available on both Android and iOS devices as shown in fig 2. The application would be divided into four main sections:

- Login and verification: Users would need to create an account and verify their identity before they could use the application.
- Healthcare Card: This section would allow users and patient to access whole medical record.
- QR code pdf generation: The pdf is generated after scanning qrcode.

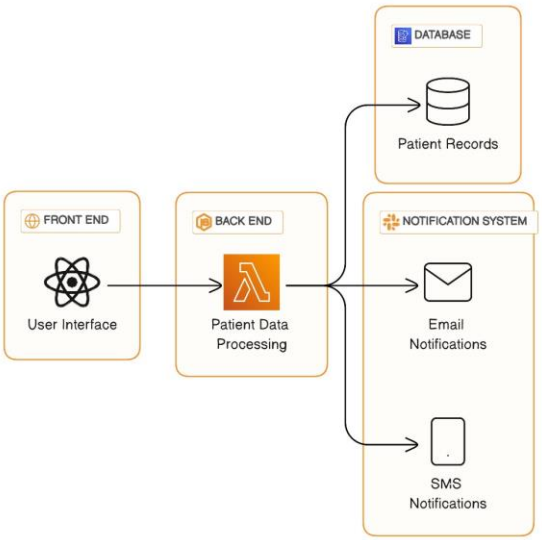

Fig-2: Cloud Architecture

4. Implementation:

The proposed application would be implemented using a variety of technologies as shown in fig 3, including:

- Visual Studio.
- SQL.
- Github.
- Blockchain.

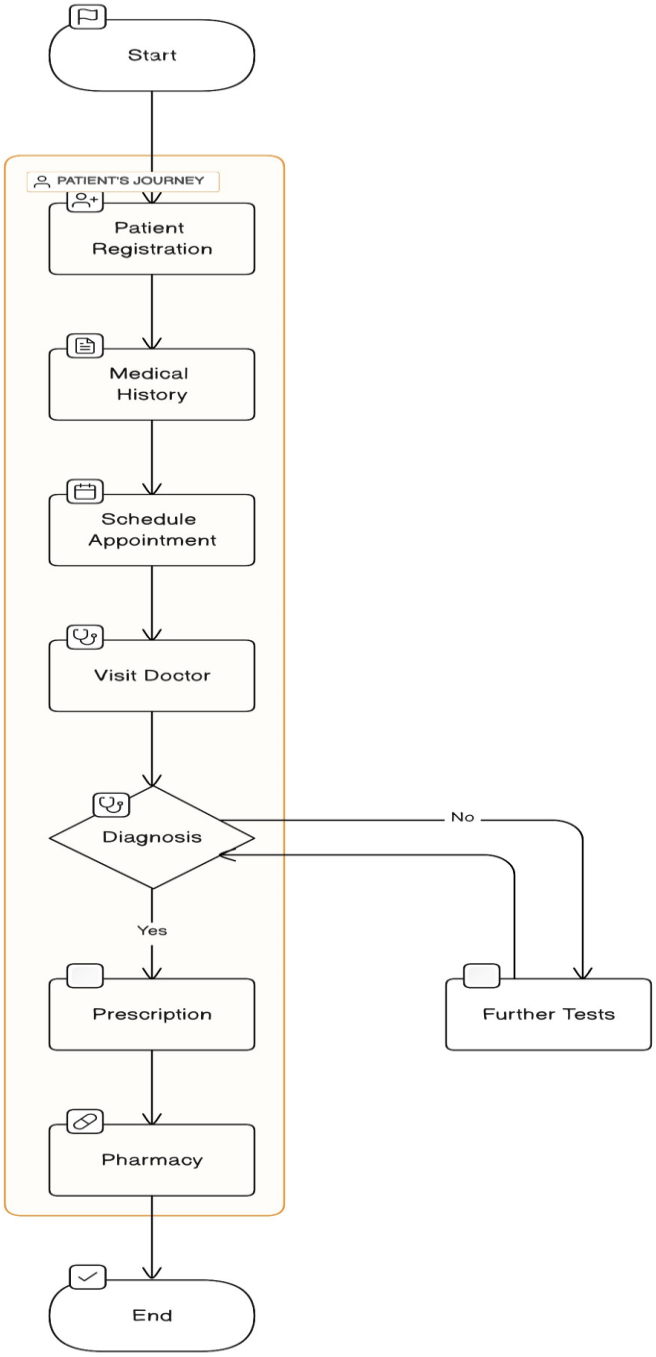

Fig. 3. System Flowchart

5. CONCLUSIONS

In conclusion, the combination of QR Code and Blockchain technologies can significantly enhance healthcare management by ensuring data security, improving accessibility, and promoting efficiency. However, it's important to remember that while these technologies offer numerous benefits, they must be implemented responsibly to ensure patient privacy and compliance with healthcare regulations

In a future work, we aim to extend this work by implementing our solution using the Hyperledger Blockchain and compare it with the current solution based on Ethereum. We plan also to integrate into our system to make it smarter and add more features.

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