BLOCKCHAIN FOR HEALTHCARE SYSTEM

M Tech Project Proposal

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Under the guidance of

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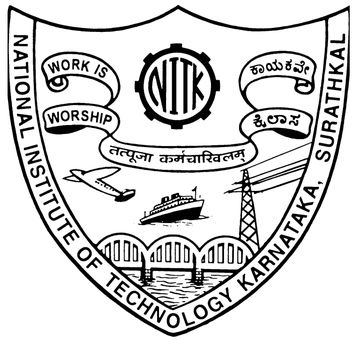

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Introduction

- Importance in modern healthcare - ensures secure data Management, accessibility, and transparency.
- Potential to Revolutionise by tackling data related challenges.
- Peer to peer transaction encourage automated trust-less services.
- Secure data sharing with patient consent in fragmented healthcare system.

Literature Review

Alex Roehrs (2019) : The study expanded on the OmniPHR model and evaluated its blockchain-based architecture and implementation in different health organisation scenarios.

Andrew J (2020) : The proposed framework enhances the security of blockchain by combating attacks such as selfish mining, double spending and eclipse attacks.

Anushree Tondon (2020) : The Research paper identified four thematic areas of research in the domain of blockchain in healthcare: conceptual evolution, technology enhancement, efficiency enhancement, and data management.

Abid Haleem (2021) : It is noted that blockchain can enable real time data gathering through wearable devices, which can update clinicians on the patient’s present stage and alert them to any emergencies

Pawan Hedge (2023): Amalgamation of Blockchain with resource- constrained IoT devices for healthcare applications - State of art, challenges and future directions.

Literature Review

Wided Molulahi (2023) : A Blockchain based federated learning mechanisms for privacy presentation IoT data

Mazin Abed Mohammad (2023) : Energy-efficient distributed federated offloading and scheduling healthcare system in blockchain based network.

Ashish Tomar (2023) : Blockchain-assisted authenticated key agreement scheme for IoT-based healthcare system

Ghassan Al-Sumaidaee (2022): Performance analysis of a private blockchain network built on hyper ledger fabric for healthcare.

Valeria Merlo (2022): On the exploitation of the blockchain technology in the healthcare sector: A systematic review

Motivation

- Blockchain in healthcare aims to enhance data security, streamlined record-sharing, ensure transparency, and enable tamper proof transactions.
- It’s Adoption streamlines process, improves efficiency, and enhances patient privacy in healthcare data management.
- The decentralised nature of blockchain empowers patients, fostering a more patient-centric approach.
- Potential benefit includes cost reduction, improved efficiency, and enhanced patient outcomes through blockchain implementations.

Preliminaries

- Traditional healthcare system had issues with centralised storage, risking breaches and unauthorised access.
- Data silos among providers caused inefficiencies in patient information sharing.
- Blockchain’s decentralised ledger enhances security and transparency in healthcare data storage.
- Encrypted, distributed storage reduces data tampering risk, boosting overall healthcare data security.
- Blockchain’s decentralised approach empowers patients by granting them greater control over their own medical data.

Objectives

- To create a private blockchain network that connects patients, insurance providers, hospitals, IT Companies, and anyone can ledge information at any time.

- Patient would not only have completely unique hash ID but also they have complete control over their own records and data.

- In order to get your information the institution would send a request you can confirm or deny the request. each patient would generate unique hash-ID using SHA-256 Algorithm

Architecture

Blockchain type and data structure

- Private blockchain with a limited participant base offers streamlined governance, enabling quick consensus and implementation of changes.
- Faster transaction processing and improved system performance result from the simplicity of private blockchain structures.
- Restricted access to authorised participants reduces regularity complexity and enhances privacy in private blockchains.
- Graph data structures aid in visualising and analysing complex relationship in patient data, facilitating better healthcare decision-making.

Architecture

Consensus Mechanism

Consensus mechanism for healthcare blockchains must prioritise security, privacy, and efficiency

Proof of Authority (POA) is suitable for healthcare networks, emphasising security and efficiency.

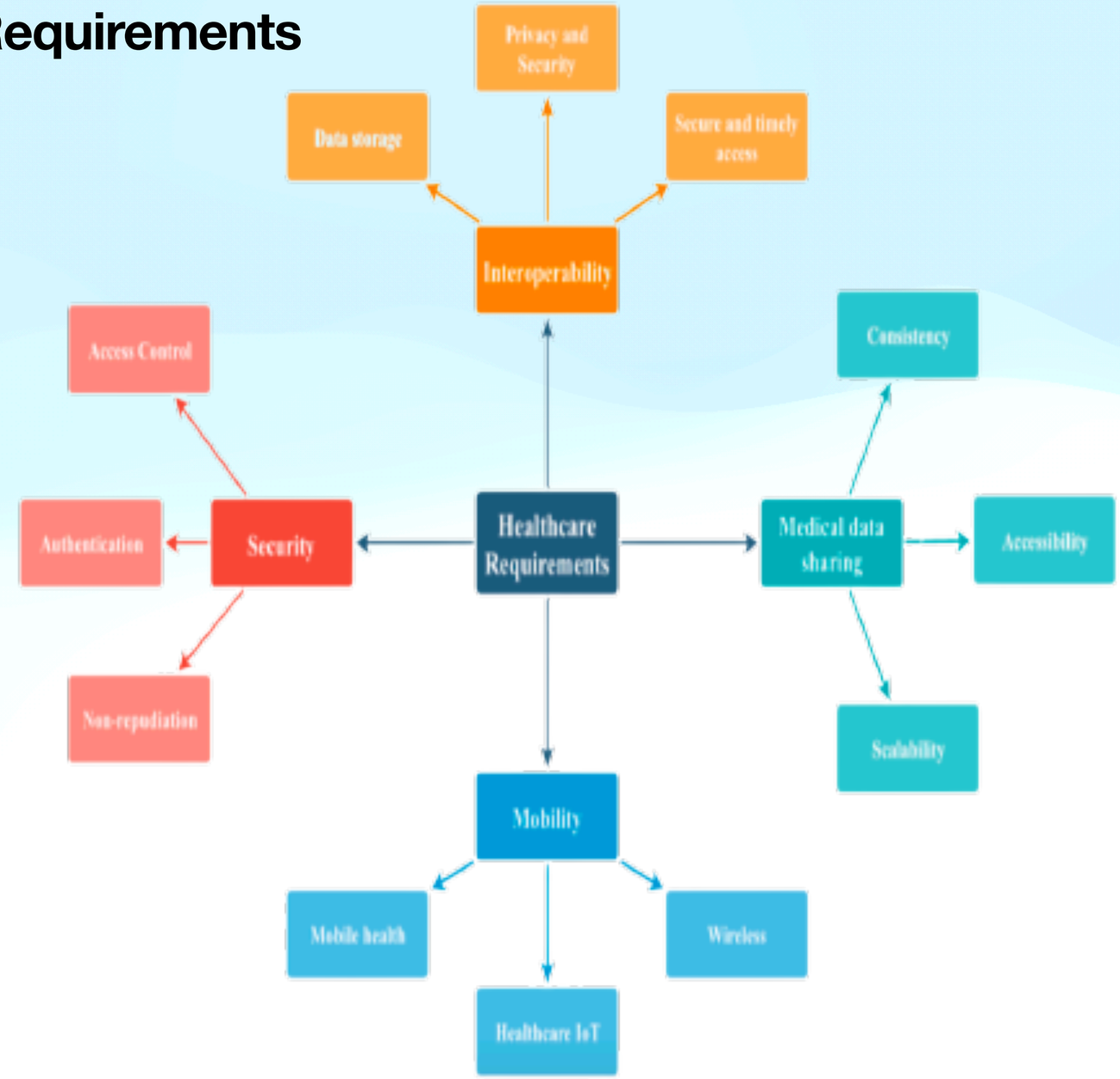
POA, with central authority-approved validators, ensures only trusted entities validate transactions, enhancing overall security in patient data storage.

Architecture

Coding language and platforms

- Hyperledger fabric is permissioned private blockchain framework that is well suited for enterprise applications, including those in the healthcare sectors.
- It offers features such as scalability, privacy, and modular architecture making it a viable option for implementing a secure and scalable healthcare blockchain network.
- Solidity is popular programming language used for writing smart contracts on the ethereum blockchain.
- It Makes suitable for developing decentralised applications (DApps) and Implementing specific functions within the blockchain systems.

Healthcare Industry Requirements



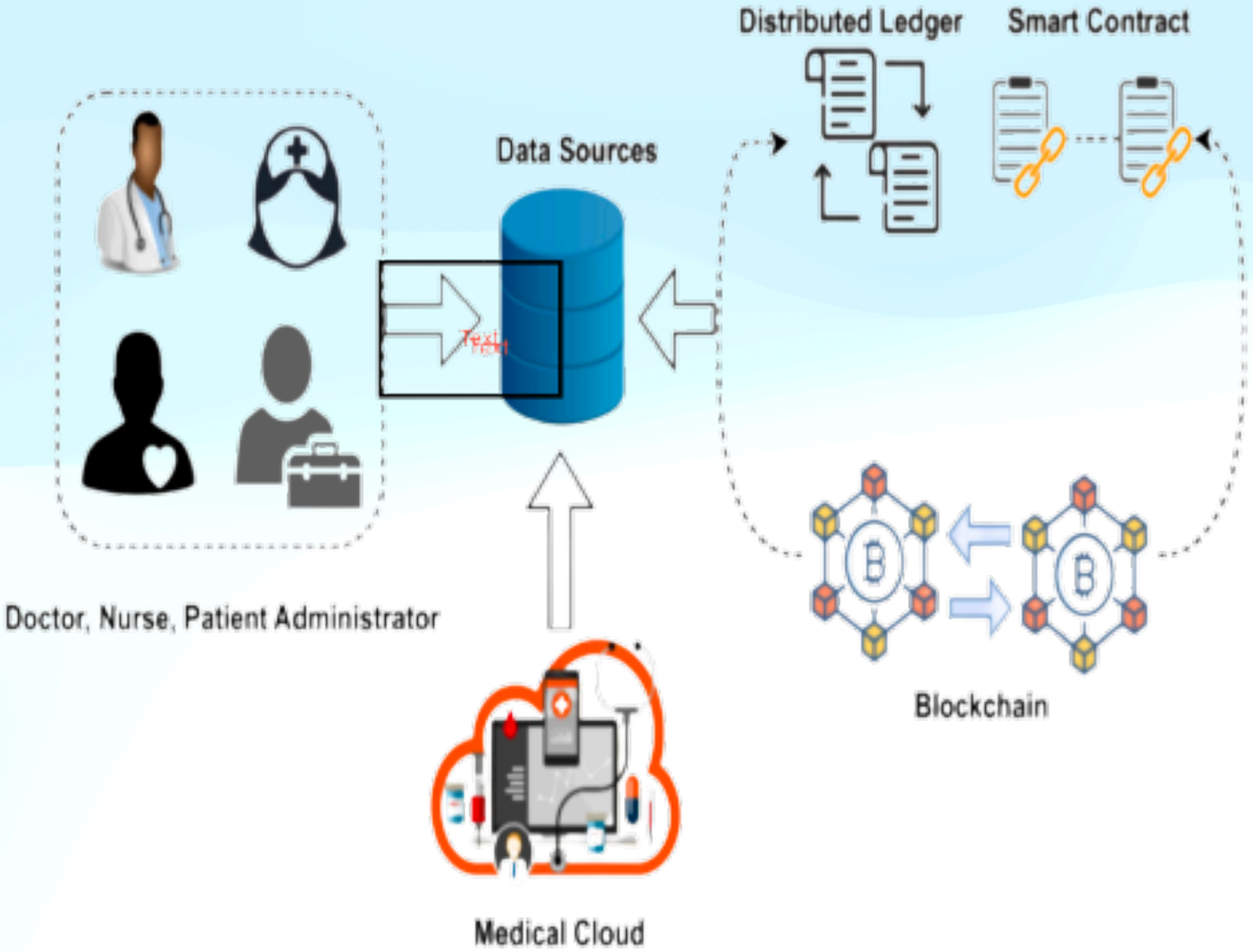
Methodology

- The proposed system architecture employs a layered approach: application, data model, consensus, and network layer.
- The application layer offers a graphical user interface for user interaction.
- The execution layer ensures deterministic and fast execution of smart contracts and chain code.
- The data model layer defines the structure of blockchain-stored data, emphasising immutability and transparency.
- The consensus layer facilitates communication between nodes in the blockchain network.

Methodology

- It ensures the execution of contracts at runtime, promoting trust and transparency in drug and device procurement process
- The consensus layer verifies and interlinks blocks, ensuring the accepted sequence of transactions is added to the ledger.
- The network layer enables communication between nodes, ensuring transaction dissemination and asset ledger maintenance, addressing scalability and reliability challenges.

Overview of Blockchain Technology for healthcare



Conclusion and Future Work

- Blockchain technology in healthcare addresses key issues through it’s explored Applications: security, integrity, decentralisation, availability, and authentication principles.
- The Healthcare industry faces challenges adapting to a tech infrastructure with internet enabled devices, IoT, and smart sensing gadgets.
- Blockchain’s integration facilitates personalised treatment options, improves pharmaceutical supply chain management, and automates healthcare processes for increased efficiency and reduced administrative costs.