Generic Patient-Centered Blockchain-Based EHR Management System

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By: Haddad, A (Haddad, Alaa) [1] ; Habaebi, MH (Habaebi, Mohamed Hadi) [1] ; Suliman, FEM (Suliman, Fakher Eldin M.) [2] ; Elsheikh, EAA (Elsheikh, Elfatih A. A.) [2] ; Islam, MR (Islam, Md Rafiqul) [1] ; Zabidi, SA (Zabidi, Suriza Ahmad) [1]

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Abstract:

Accessing healthcare services by several stakeholders for diagnosis and treatment has become quite prevalent owing to the improvement in the industry and high levels of patient mobility. Due to the confidentiality and high sensitivity of electronic healthcare records (EHR), the majority of EHR data sharing is still conducted via fax or mail because of the lack of systematic infrastructure support for secure and reliable health data transfer, delaying the process of patient care. As a result, it is critically essential to provide a framework that allows for the efficient exchange and storage of large amounts of medical data in a secure setting. The objective of this research is to develop a Patient-Centered Blockchain-Based EHR Management (PCEHRM) system that allows patients to manage their healthcare records across multiple stakeholders and to facilitate patient privacy and control without the need for a centralized infrastructure by means of granting or revoking access or viewing one's records. We used an Ethereum blockchain and IPFS (inter-planetary file system) to store records because of its advantage of being distributed and ensuring the immutability of records and allowing

for the decentralized storage of medical metadata, such as medical reports. To achieve secure a distributed, and trustworthy access control policy, we proposed an Ethereum smart contract termed the patient-centric access control protocol. We demonstrate how the PCEHRM system design enables stakeholders such as patients, labs, researchers, etc., to obtain patient-centric data in a distributed and secure manner and integrate utilizing a web-based interface for the patient and all users to initiate the EHR sharing transactions. Finally, we tested the proposed framework in the Windows environment by compiling a smart contract prototype using Truffle and deploy on Ethereum using Web3. The proposed system was evaluated in terms of the projected medical data storage costs for the IPFS on blockchain, and the execution time for a different number of peers and document sizes. The findings of the study indicate that the proposed strategy is both efficient and practicable.

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Author Keywords: patient-centered; IPFS; blockchain; privacy; health record

Author Information

Corresponding Address: Habaebi, Mohamed Hadi (corresponding author)

Int Islamic Univ Malaysia, Dept Elect & Comp Engn, IoT & Wireless Commun Protocols Lab, Kuala Lumpur 53100, Malaysia

Addresses:

[1] Int Islamic Univ Malaysia, Dept Elect & Comp Engn, IoT & Wireless Commun Protocols Lab, Kuala Lumpur 53100, Malaysia

[2] King Khalid Univ, Coll Engn, Dept Elect Engn, Abha 61421, Saudi Arabia

E-mail Addresses: habaebi@iium.edu.my

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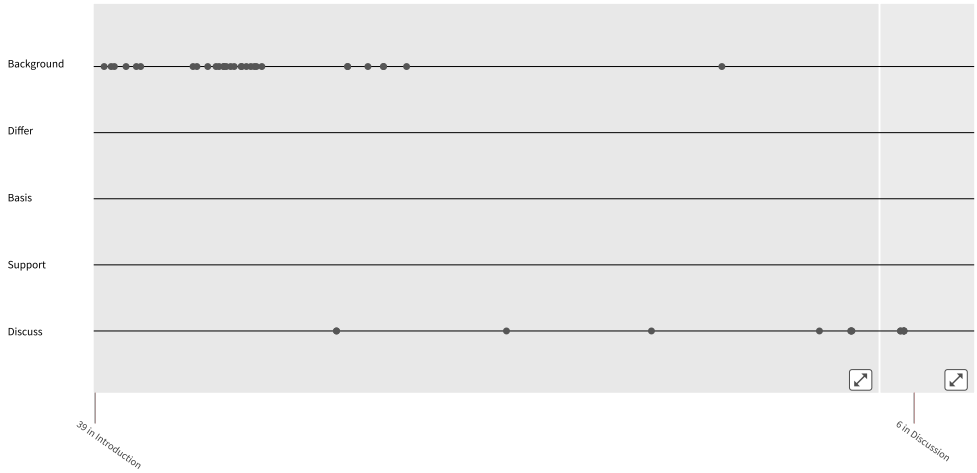

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