Flipkart

GRID 5.0

Problem Statement Title: : Grid Block Chain Based -PHR

Team Name: Phishers+ve

Team members details

Team Name	**Phishers +ve**		
Institute Name/Names	**Indian Institute of Information Technology Vadodara**		
Team Members >	**1 (Leader)**	**2**	**3**
Name	**Sanidhya Kumar**	**Samanway Maji**	**Riya**
Batch	**2021-25**	**2021-25**	**2021-25**

Deliverables/Expectations for Level 2 (Idea + Code Submission)

- Here's what we are submitting to Unstop-

  > This presentation (in PDF Format)
  > Another PDF named "Links" (Containing drive links for Demo Video and the entire code)

  IMP NOTE: We had to do so because Unstop allows zip files upto 50mb only and the size of zipped code base is over a GB!

  Video Demo Link:

  https://drive.google.com/drive/folders/1mZYHl2FN_Kt9-f7OXUCKW9vGVhg6hC61?usp=sharing

  Entire Code Link:

  https://drive.google.com/drive/folders/1mZYHl2FN_Kt9-f7OXUCKW9vGVhg6hC61?usp=sharing

Glossary

- Describe/ Expand abbreviations if you have used any in the slides below

  > **IPFS** - InterPlanetary File System
  > **EHR** - Electronic Health Record
  > **NFT** - Non-Fungible Token
  > **EMR** - Electronic Medical Record
  > **PHR** - Personal Health Record

Use-cases

- **Use Case Type 1 (High Impact)** -

1. Medical Records Management:

Efficiently manage and store electronic medical records (EMRs) on the blockchain, ensuring data integrity, security, and accessibility for authorized stakeholders.

2. Identity Management:

Utilize Aadhar and Abha ID for secure and reliable identity management, ensuring accurate attribution of medical records to patients and healthcare providers.

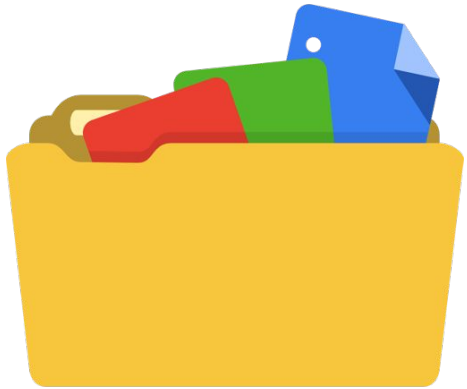
3. User Interface for Stakeholders:

Develop user-friendly interfaces tailored to different stakeholders, including clinics, hospitals, individual doctors, diagnostics centers, and patients, enhancing their engagement with the platform.

4. Integration with Health Stack:

Integrate the blockchain infrastructure with India's Health Stack, aligning the application with existing healthcare frameworks and interoperability standards.

- **Use Case Type 1 (Moderate Impact)** -



1. Document Search and Retrieval:

Enable quick and precise search and retrieval of relevant medical documents based on criteria such as date, doctor, document type, hospital name, and patient name.

2. Document Sharing:

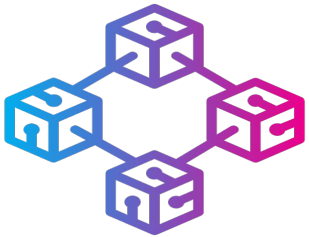
Facilitate secure and seamless sharing of medical documents in Various formats, such as images and PDFs, among authorized stakeholders.

3. Distributed Ledger Infrastructure:

Set up a blockchain infrastructure that ensures the secure storage and sharing of encrypted medical records, enhancing data integrity and reducing redundancy.

Solution statement/ Proposed approach

Blockchain and Phone-Number Authentication for data protection and security-



Challenge: Ensuring the protection of sensitive medical records from unauthorized access while upholding patient privacy.

Solution: Employ a decentralized ledger approach for data storage, harnessing the robust security attributes inherent in blockchain technology. Enhance data security by encrypting records using advanced encryption algorithms, thereby thwarting unauthorized access attempts. The user—be it a patient or an institution—must undergo a dual-layer authentication process:

- **Authorization by Contract Owner:** Institutions or users must validate their wallet's unique public key. This public key can be openly shared among stakeholders for streamlined data sharing and access.
- **OTP Authentication:** Following successful verification as a stakeholder, users are required to complete phone number verification each time they log into the application. This dual-layer process significantly enhances overall security.

It's important to note that the availability of free Aadhar Authentication APIs on websites has been limited, with many now operating on subscription-based models, making implementation challenging.

Solution statement/ Proposed approach

Digitizing Patient's Health Record-

Challenge: Digitize the Patients health records and ensuring a top notch security for the health records as well.

Solution: Digitizing doesn't just mean scanning the documents and uploading it to a database. The important thing is to ensuring its security as well. For that we have used **IPFS - InterPlanetary File System**

One of the major drawbacks of the current health system is using and sharing pape documents. These are not only inefficient ways considering the advancements human have made in tech, but it also contributes to damage to the planet. The Benefits of using IPFS are:

- **Decentralized Nature:** IPFS's decentralized architecture means data isn't stored in a single location. This reduces the risk of a single point of failure, enhancing data availability and security. It also aligns itself with the need of using blockchain, which is itself decentralized in nature

- **Enhanced Data Encryption:** IPFS allows for end-to-end encryption using the SHA 256 encryption, ensuring that even if data is intercepted, it remains unintelligible without the proper decryption key.

Solution statement/ Proposed approach

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Storing the file on IPFS, also massively reduces the cost of uploading a file in the blockchain. Also uploading a file, might lead to slower transaction rates, IPFS covers that too, by just storing the hash, basically a string of the uploaded file in blockchain.

Digitization is therefore achieved using IPFS and Blockchain. Although the vision should always exceed than what we are trying to achieve. So Digitization covers that as well considering our dear environment in mind.

- **Addressing Inefficiencies**: Moving away from paper-based records addresses inefficiencies in the current health system. It streamlines access to information, reducing administrative bottlenecks and improving patient care.
- **Environmental Considerations**: Digitization is not only about efficiency; it's also about sustainability. By reducing reliance on paper documents, we're contributing to environmental preservation by minimizing waste and resource consumption.

Solution statement/ Proposed approach

Document Search and Retrieval-

Problem: Enabling stakeholders to efficiently search and retrieve specific medical records based on various criteria.

Solution: In our application, we've taken into account the preferences of the older age group. Recognizing that a simple sorting or filtering button might not cater to everyone's needs, we've implemented an intuitive folder-type structurization within the app.

- **Streamlined File Organization:** This approach allows users to categorize and upload their files into distinct tabs, making the process of uploads and retrievals remarkably straightforward.
- **Clear Visual Guidance:** The folder-type structure offers a visual cue to users, guiding them to upload their files in specific tabs. This clarity eliminates any confusion, ensuring an effortless user experience.

By tailoring our app's navigation to suit the preferences of older users, we're committed to enhancing usability and making the digitization process not just efficient, but also inclusive and accessible to everyone.

Solution statement/ Proposed approach

Document Sharing and Consensus Management-

Problem: Enabling stakeholders like hospital to send a request to the patient to enable access of data for further diagnosis.

Solution: To address this challenge, we have implemented a robust and secure system to facilitate document sharing and consensus management while maintaining patient privacy and data security.

Here is its key components:

- **Patient Consent Management:** Patients are given control over their data by granting explicit consent for data sharing. An institution after achieving the patient's user id, will first request the user, who can decide whether to give access or not. For sending request, Firebase has been used, to send the request along with institution's public key. The user on accepting the request, adds the institutions public key, to its approved Institution list.

Limitations

1. **Blockchain Gas Fees**:

   While using IPFS can save on gas fees for storing data off-chain, certain blockchain transactions, such as creating links to IPFS hashes or managing access controls, might still incur gas fees

2. **Acceptance**:

   Stakeholders, especially those less familiar with blockchain and IPFS, might face a learning curve when using the application due to the introduction of new technologies and concepts. Also big healthcare institutions who have followed the legacy systems, wouldn’t easily switch to newer systems. Also, it requires adoption of crypto, which is again an entirely new concept, that would take time to settle in

3. **Network Latency**:

   Depending on the geographic distribution of IPFS nodes and the user's location, network latency might impact the time it takes to access and retrieve documents.

4. **Immutable Nature**:

   While immutability is a strength, it can also be a limitation. Incorrect data entries or errors made during data entry could become permanently recorded on the blockchain.

Future Scope

1. **Integration with AI and Analytics**:

   Incorporate artificial intelligence and analytics tools to derive insights from aggregated and anonymized medical data, enabling healthcare providers to make data-driven decisions.

2. **Telemedicine Integration**:

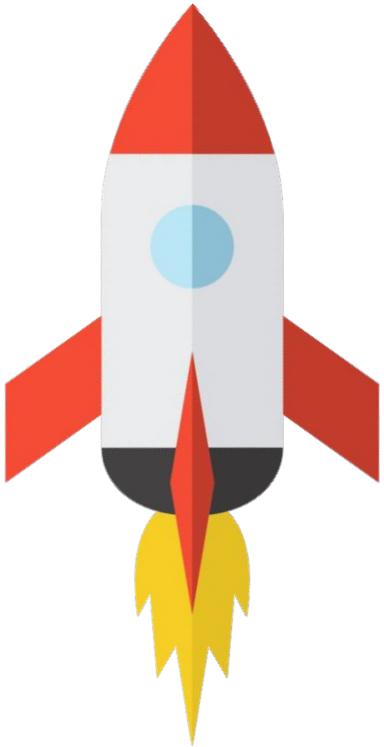
   Integrate telemedicine features within the application, enabling virtual consultations between doctors and patients while seamlessly accessing relevant medical records.

3. **Machine Learning-based Search**:

   Implement machine learning algorithms for intelligent document search, providing users with more accurate and relevant search results.

4. **Blockchain Governance Models**:

   Develop and implement decentralized governance models for the blockchain network, involving stakeholders in decision-making processes and ensuring long-term sustainability.



How MedDec can help Flipkart Health+?

1. **Secure Document Management**:

   Prescriptions and Diagnostic Requests: Flipkart Health+ users not only purchase medicines but also upload medical prescriptions and request diagnostic tests. An EHR system enhances security for these documents, safeguarding sensitive medical information from unauthorized access.

2. **Efficient User Experience**:

   Streamlined Record Access: An EHR system grants users easy access to their medical records, enabling them to view prescriptions, diagnostic requests, and other health-related documents whenever needed.

3. **Comprehensive Healthcare Support**:

   Holistic Care Management: Integrating EHRs allows Flipkart Health+ to offer a comprehensive healthcare ecosystem. Users can not only purchase medicines and request tests but also maintain a digital record of their health-related interactions.

4. **Empowering Users**:

   Access to EHRs empowers users to take charge of their health management. They can make informed decisions, track their medical history, and share relevant information with healthcare professionals as needed.

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Thank You