HealthKard - A Digital Decentralized Health Identity
B. Tech Project

- Group ID: 3
- Group Members:
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- Guide: Professor Era Johri

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Motivation - Why This Project?

- No framework in India which facilitates the storage of health records of all citizens
- Private companies/hospitals solve this problem to some extent by providing e-health record services, that only cater their own customers
- Need to develop the foundations necessary for supporting digital health infrastructure to maintain health data in a decentralized and secure way
- Major advantages to this project will be ease of access, user consent for every sophisticated transaction and portability across national borders

Problem Definition

HealthKard aims to implement the following modules:

- Creation of a unique Health ID using Aadhaar Number
- Storage of Electronic Health Records (EHRs) mapped to Health Identity in the blockchain
- Integration of different sectors in medical industry
- Encourage better administration of the health sector by utilising health data analytics

Module 1 - NFT-based unique health identity

- Create and Read Health Card
- NFT-based unique identity for every individual that gives a better sense of ownership due to the nature of NFTs
- This identity is tamper-proof, trusted, secure and easy to verify
- Consist of user details and a unique identifier that will bind all the information with this identity

Literature Review

- The authors present the effectiveness of using blockchain technology for safe storage and transmission of Health Information [1]
- In this paper authors aims to implement and evaluate a secure Digital Health Passport (DHP) using blockchain technology [2]
- This paper presents a state-of-the-art design using blockchain technology to address health identity, EHRs and privacy [3]
- This proposed system is aimed at a scenario when a doctor wants to access a patient's EHR data [4]
- This paper present a blockchain-based decentralized identity management system that allows patients and healthcare providers to identify and authenticate themselves transparently and securely across different eHealth domains [5]

Literature Review

- This paper explores the likelihood of representing medical records to make sure data privacy, data accessibility, and data interoperability for the healthcare-specific scenario [6]
- The proposed work is to frame an architecture for the Electronic Health Record (EHR) using blockchain technology [7]

Software Requirement Specification

SRS Document

➔ Functional Requirements

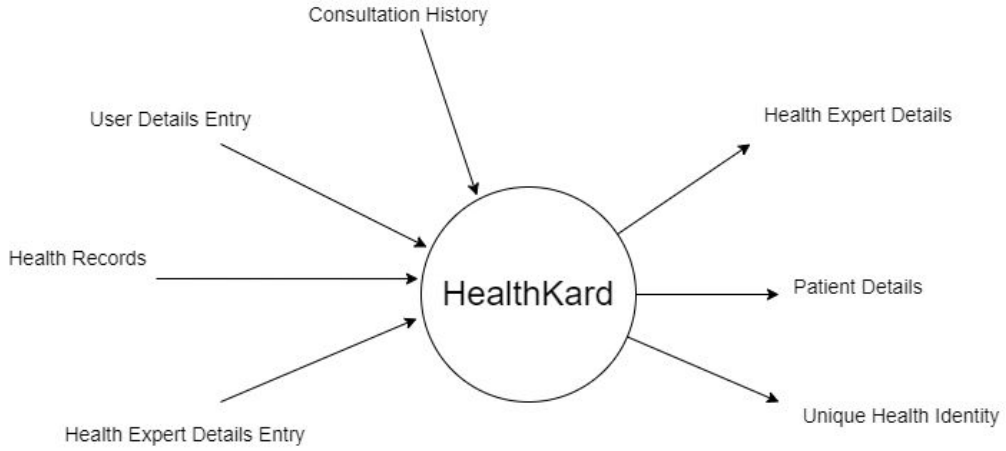
- Metamask Authentication for authenticating user
- Unique Health ID generation and record maintenance
- Health and Consultation History in blockchain

➔ Non - Functional Requirements

- Usability
- Correctness
- Maintainability
- Security
- Legal

Software Design

SDD Document



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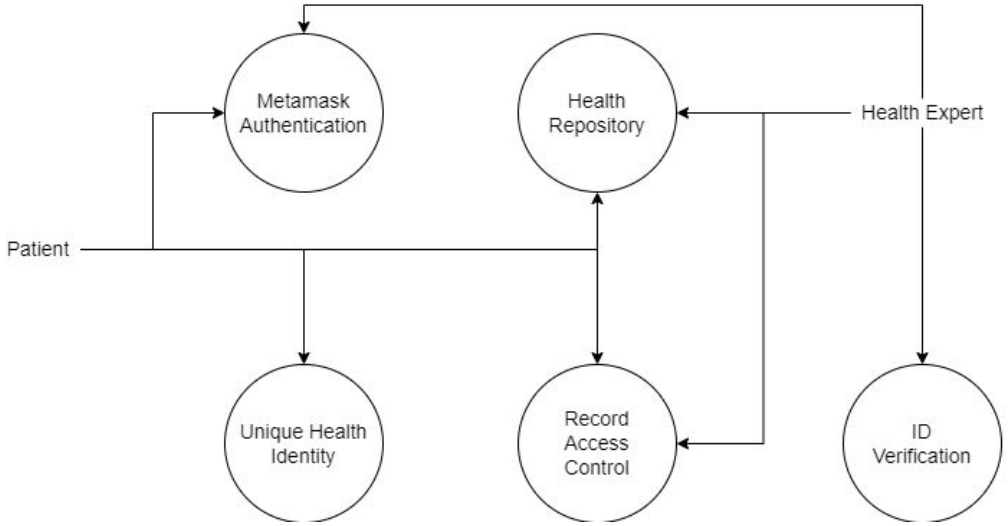
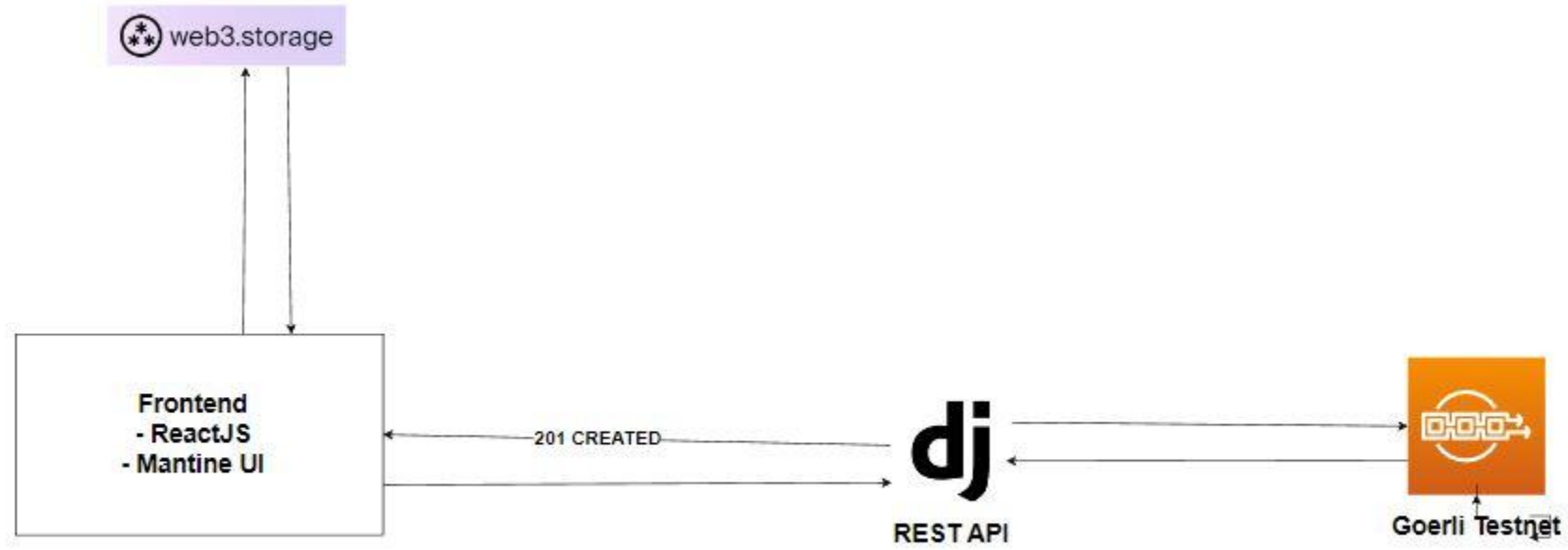


DFD 1

Architecture

SDD Document



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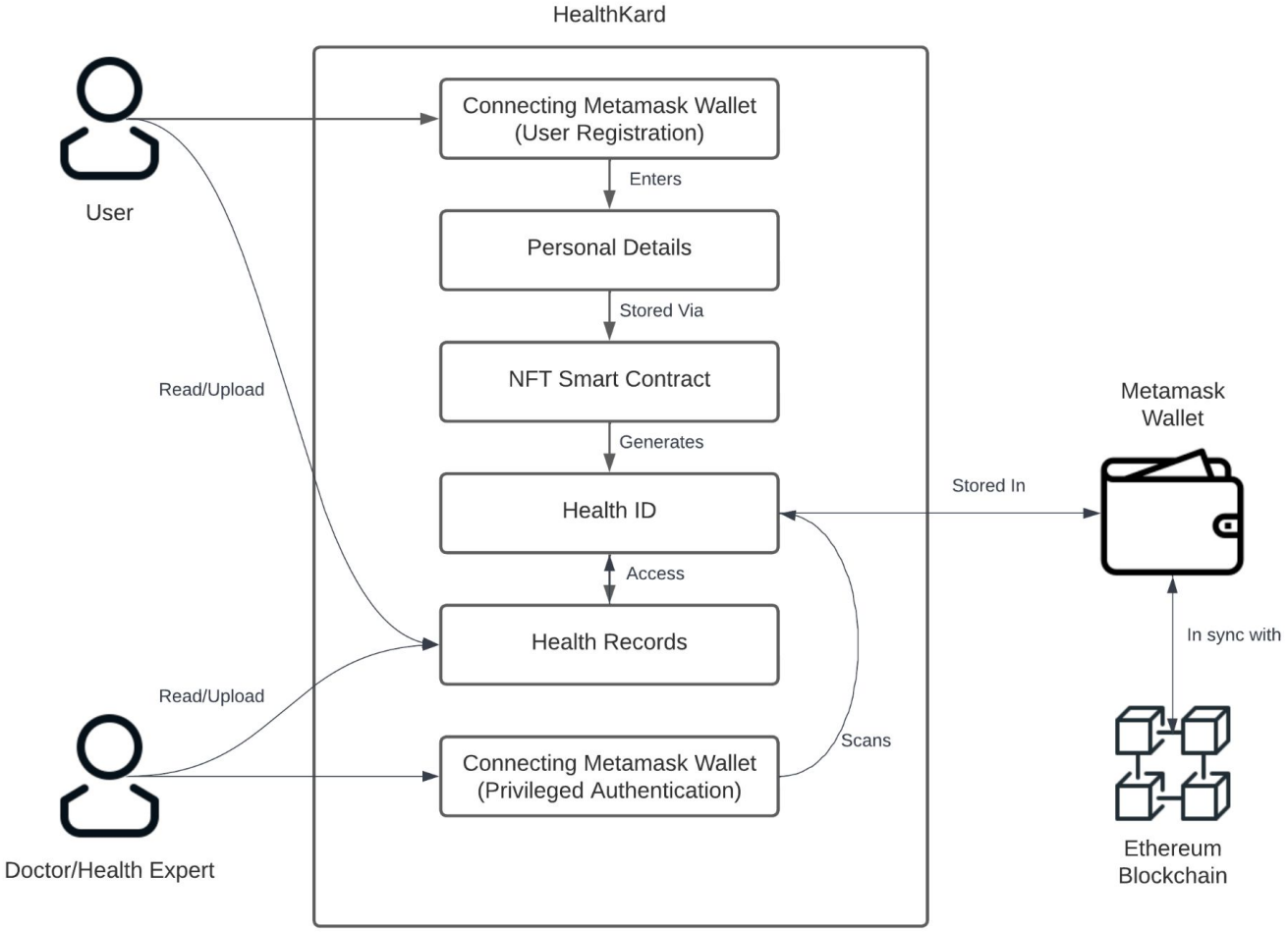
Implementation Overview



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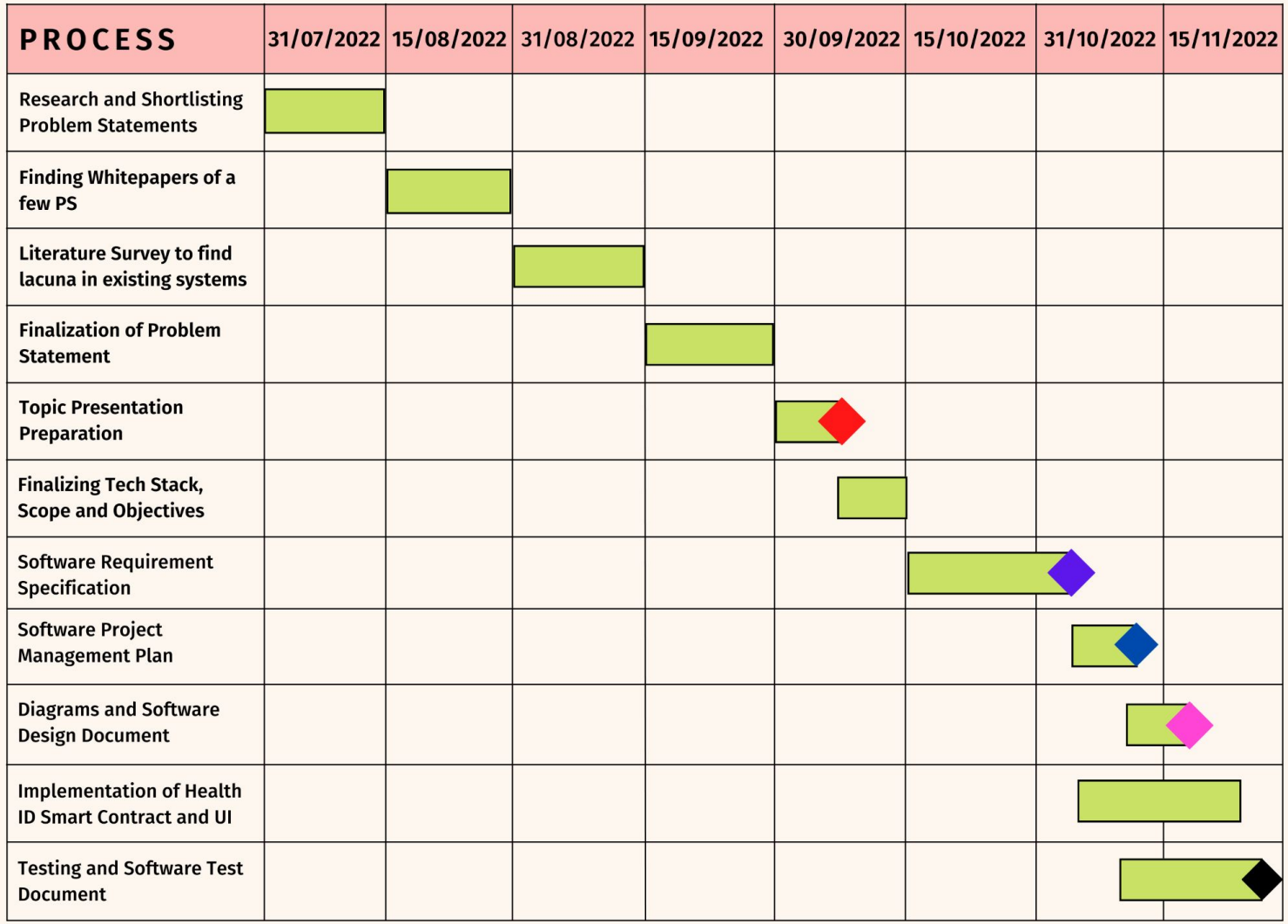
Implementation Schedule

SPMP Document

- Milestone 1 - Survey and Topic Finalization
- Milestone 2 - Requirement Gathering and Specification
- Milestone 3 - Project Management Plan
- Milestone 4 - Software Design Document
- Milestone 5 - Module 1 Implementation (Health Card)



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Team Responsibilities

Group Member (Roll No.)	Roles and Responsibilities
Umang Chander Thadani (1914061)	Blockchain (Web3) Developer, Backend Developer
Anurag Sanjay Singh (1914058)	Blockchain (Web3) Developer, Frontend Developer
Dhruv Rakesh Solanki (1914059)	Backend Developer, Frontend Developer
Aayush Vivek Kapoor - (1914066)	Frontend Developer, UI/UX Developer

Test Cases

STD Document

Test Case ID	Module Name	Input	Expected Output	Actual Output	Status (Pass/-Fail)
1	Metamask Authentication	User Wallet Address	• Ensure that Metamask is connected without any issues	Metamask is successfully connected	Pass
3	Health ID Generation	• Name • Date of Birth • Blood Group • Gender • Aadhar Number • Phone Number • E-Mail • Photo	• NFT must be generated when the user creates his/her profile • The details are not editable and NFT must be tamper-proof	NFT is generated and cannot be tampered	PASS

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Test Logs

STD Document

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Sr. No	Test Performed	Input	Expected Output	Actual Output	Pass/ Fail	Date/ Time	Measures
1	GUI Screen is Displayed	Run Command & URL Triggered	GUI is displayed properly	GUI is displayed properly	Pass	02/11/2022 18:06	—
2.	Image is Uploaded	Image of User	Image gets uploaded to IPFS	No Image in IPFS	Fail	10/11/2022 15:34	Reconfigure environment Variables
3	Image is Uploaded	Image of User	Image gets uploaded to IPFS	Image gets Uploaded to IPFS	Pass	10/11/2022 16:22	—
4.	Correct User Data is Added	User Data	Token is generated successfully	Token is generated successfully	Pass	10/11/2022 16:44	—
5.	Incorrect Aadhar is added	User Data	Validation Error	Validation Test Passes	Fail	10/11/2022 17:15	Check Regex for Aadhar
6.	Incorrect Aadhar is added	User Data	Validation Error	Validation Error	Pass	10/11/2022 17:23	—

Sr. No	Test Performed	Input	Expected Output	Actual Output	Pass/ Fail	Date/ Time	Measures
7	Duplicate data is added for same Aadhar	User Data	User Already Exists	Creates a new Token	Fail	13/10/2022 21:32	Add a check in the backend
8	Duplicate data is added for same Aadhar	User Data	User Already Exists	User Already Exists	Pass	13/10/2022 22:14	—

References

[1] S. P. Novikov, O. D. Kazakov, N. A. Kulagina and N. Y. Azarenko, "Blockchain and Smart Contracts in a Decentralized Health Infrastructure," 2018 IEEE International Conference "Quality Management, Transport and Information Security, Information Technologies", 2018

[2] A. Bandi and A. Fellah, "An Implementation and Evaluation of Blockchain-based Digital Health Passports," 2022 International Conference on Inventive Computation Technologies (ICICT), 2022

[3] Y. Liang, "Identity Verification and Management of Electronic Health Records with Blockchain Technology," 2019 IEEE International Conference on Healthcare Informatics (ICHI), 2019

[4] D. Peralta-Velecela, M. C. Cáceres-Salamea and V. Morocho, "Digital Identity Proposal for Unified Medical Record using Blockchain technology," 2021 IEEE Fifth Ecuador Technical Chapters Meeting (ETCM), 2021

[5] Javed IT, Alharbi F, Bellaj B, Margaria T, Crespi N, Qureshi KN. Health-ID: A Blockchain-Based Decentralized Identity Management for Remote Healthcare. Healthcare (Basel). 2021 Jun 10

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[6] V. B, S. N. Dass, S. R and R. Chinnaiyan, "A Blockchain based Electronic Medical Health Records Framework using Smart Contracts," 2021 International Conference on Computer Communication and Informatics (ICCCI), 2021

[7] N. Poonguzhali, S. Gayathri, A. Deebika and R. Suriapriya, "A Framework For Electronic Health Record Using Blockchain Technology," 2020 International Conference on System, Computation, Automation and Networking (ICSCAN), 2020

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Thank You!