GIV3R - THE DECENTRALIZED CHARITY PORTAL

MAIN PROJECT REPORT

SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE AWARD OF DEGREE OF

BACHELOR OF TECHNOLOGY

in

Computer Science and Engineering

of

APJ Abdul Kalam Technological University

by

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(AN ISO 9001:2015 CERTIFIED INSTITUTION)

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May 2024

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Certificate

This is to certify that the Main Project Phase 1 Report titled **"GIV3R - THE DECEN-TRALIZED CHARITY PORTAL"** is a bonafide record of the work carried out by **Rohit C (VAS20CS094)**, **Suryajit IS (VAS20CS117)**, **Sreenath MS (VAS20CS110)**, **Sudarsanan VP (VAS20CS114)** of Vidya Academy of Science & Technology, Thalakkottukara, Thrissur - 680 501 in partial fulfillment of the requirements for the award of **Degree of Bachelor of Technology** in **Computer Science and Engineering** of **APJ Abdul Kalam Technological University**, during the academic year 2023-2024.

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Undertaking

We,

Rohit C (VAS20CS094), **Suryajit IS (VAS20CS117)**, **Sreenath MS (VAS20CS110)**,
Sudarsanan VP (VAS20CS114) hereby undertake that the main project work entitled
"GIV3R - THE DECENTRALIZED CHARITY PORTAL", is carried out by us independently under the valuable guidance of **Dr Ramani Bai V**, Professor, Department of Computer Science and Engineering, Vidya Academy of Science and Technology, Thalakottukara, Thrissur in partial fulfillment of the requirements for the award of degree of **Bachelor of Technology in Computer Science and Engineering** of **APJ Abdul Kalam Technological University**, during the academic year 2023-2024.

Thrissur

May 2024

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Seventh Semester B.Tech (2020 Admissions)

Vidya Academy of Science and Technology,

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ABSTRACT

The philanthropic landscape has long been characterized by challenges in transparency, efficiency, and unified engagement. This project introduces a novel solution – a decentralized charity platform developed using Next.js for both frontend and backend, underpinned by the transformative capabilities of blockchain technology. Grounded in the mission to redefine charitable contributions, this platform embodies key features such as real-time tracking of fund utilization, streamlined fundraising campaigns, and a centralized space for volunteers and charity organizations.

Against the backdrop of a traditional and sometimes opaque charitable ecosystem, the platform seeks to empower donors with unprecedented transparency, allowing them to witness firsthand how their contributions impact meaningful causes. Simultaneously, it aspires to revolutionize the efficiency of fundraising campaigns, enabling charities to reach their targets swiftly and donors to experience a seamless contribution process. The platform's centralized hub for volunteers and charity organizations promises a paradigm shift in coordination, fostering collaboration and communication in pursuit of impactful initiatives.

By incorporating stringent charity organization verification processes, the platform aims to establish a foundation of credibility, ensuring users engage with legitimate entities. With a commitment to user feedback, security measures, and legal compliance, this project envisions not only a technically advanced decentralized charity platform but a catalyst for positive change in the broader charitable landscape.

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NGO   Non Governmental Organisation

API   Application Programming Interface

ETH   Ethereum Cryptocurrency

Chapter 1

INTRODUCTION

1.1 General

Within the philanthropic landscape, the amalgamation of technology and altruism is reshaping the dynamics of charitable contributions. This project unveils a cutting-edge decentralized charity platform leveraging the power of blockchain technology. Striving to overcome challenges inherent in traditional donation frameworks, the platform introduces innovative features to enhance transparency, streamline fundraising, and foster a unified space for volunteers and charity organizations.

1.2 Objectives of the Work

The primary objectives of this project revolve around creating a decentralized charity platform that redefines the philanthropic experience. Firstly, the platform aims to enhance transparency by leveraging blockchain technology to enable real-time tracking of fund utilization, providing donors with unprecedented visibility into the impact of their contributions. Secondly, it seeks to streamline fundraising processes, promoting efficiency and quicker campaign successes. Additionally, the project aims to establish a centralized space that unifies volunteers and charity organizations, fostering better coordination and communication for impactful initiatives. By incorporating features such as incentive mechanisms for volunteers and a robust verification process for charity organi-

zations, the platform strives to build trust and credibility within the charitable ecosystem. Overall, the objectives encompass not only technical advancements but also a profound impact on the way charitable contributions are made and experienced.

1.3   Motivation for this work

The motivation for undertaking this project stems from the recognition of persistent challenges within the traditional charitable landscape. There exists a crucial need to address issues of transparency, efficiency, and engagement in philanthropy. Donors often seek greater visibility into how their contributions are utilized, and charities grapple with the complexity of fundraising and volunteer coordination. The advent of blockchain technology provides a transformative opportunity to revolutionize these aspects, offering real-time tracking of fund utilization and secure, transparent transactions. This project is driven by the aspiration to empower donors with a tangible understanding of their impact, streamline the fundraising process for charities, and create a centralized platform that encourages seamless collaboration between volunteers and charitable organizations. By leveraging cutting-edge technology, this work aims to introduce a paradigm shift in the philanthropic experience, fostering a more transparent, efficient, and engaged approach to charitable contributions.

Chapter 2

Problem Definition

2.1   Problem Statement

In a world where charitable contributions are essential, the sector faces persistent challenges, including a lack of transparency in fund utilization and inefficient fundraising processes. Donors grapple with uncertainties regarding the impact of their contributions, while volunteering lacks a unified platform for coordination. To address these issues, a decentralized charity platform is proposed, leveraging blockchain technology for real-time tracking of fund utilization and streamlining fundraising campaigns. The goal is to establish a centralized hub for seamless volunteer engagement, enhancing transparency, efficiency, and collaboration in the charitable ecosystem. Traditional donation methods often lack transparency, emphasizing the need for a system that connects donors with a diverse range of charity organizations. The inadequacy of current systems in meeting evolving needs necessitates a technologically advanced solution.

2.2   Objectives

In this project, the aim is to develop a decentralized charity platform. The specific objectives that we aim to complete for this project are:

• Enhance transparency through real-time tracking of fund utilization.

• Streamline fundraising processes for quicker and more efficient campaign successes.

• Create a centralized platform for volunteers and charity organizations.

• Implement an incentive mechanism to motivate volunteers for increased engagement.

• Establish a robust verification process for charity organizations to build trust.

• Design an intuitive and user-friendly interface for an accessible user experience.

• There are two types of campaign creation methods:

   (a) **Direct Beneficiary Support Campaigns:** These campaigns provide direct financial assistance to verified beneficiaries, transferring funds transparently and impactfully to their web3 wallets.

   (b) **Community Relief Campaigns:** These campaigns aim for broader objectives like disaster relief or education, utilizing funds to procure goods and services through verified service providers.

• Facilitating beneficiaries to convert cryptocurrency and directly depositing the converted funds into their bank accounts.

Chapter 3

LITERATURE REVIEW

3.1 LITERATURE SURVEY

3.1.1 SmartCon: A Blockchain-Based Framework for Smart Contracts and Transaction Management

- **Authors** : Muhammad Muneeb , Zeeshan Raza , Irfan Ul Haq , Omair Shafiq

- **Source** : IEEE

- **Year** : 2021

Transactions are registered with a hash called an immutable cryptographic signature. Smart contracts are self-executing contracts deployed on the blockchain and include agreement terms between two or more entities.. There are two separate blockchains for smart contracts and transactions. One is used to store/deploy the smart contracts(SBlockchain) , and the other to store the transactions(TBlockchain). Compare the hash of the contract file (delivered to the user) to the hash of the contract on SBlockchain. In case of success, the contract executes. Several transactions are generated on contract execution, signed using the contract deployer key, and added to the TBlockchain after the PoW mining process. Anyone can track TBlockchain and SBlockchain and access the transactions and smart contracts. There are two modes of execution of smart contracts.

3.1.2 Recent Advances in Smart Contracts: A Technical Overview and State of the Art

- **Authors** : Kemmoe, V. Y., Stone, W., Kim, J., Kim, D., Son. J

- **Source** : IEEE

- **Year** : 2020

Smart contracts operate through a systematic process that begins with developers crafting the contract's code, followed by compilation and transformation into corresponding bytecode. Subsequently, the compiled smart contract is published and stored within the blockchain, where its accessibility is contingent on the platform's nature—whether it is read-only or modifiable. To interact with a smart contract, users and developers employ an address or identifier, acquired during the contract creation phase. This identifier becomes crucial for initiating transactions related to the smart contract.

Once a transaction is initiated, it becomes part of the blockchain platform's pool of transactions awaiting execution and validation. This pool serves as a repository for pending transactions within the blockchain network. When the time comes for execution and validation, the blockchain platform, employing a consensus mechanism, selects a set of transactions from this pool. Nodes within the network then collectively undertake the responsibility of executing and validating these chosen transactions, thereby ensuring the integrity and security of the smart contract ecosystem. This seamless and decentralized process underscores the efficiency and reliability of smart contracts in blockchain technology.

3.1.3 Aid, Charity and Donation Tracking System Using Blockchain

- **Authors** :Aashutosh Singh, Rohan Rajak, Harsh Mistry, Prachi Raut.

- **Source** : Information Technology St. Francis Institute of Technology Mumbai

- **Year** : 2020

The proposed system takes the form of a website, designed to facilitate a fully transparent transaction process, enhancing accountability and trust within the ecosystem. Users, categorized into donors, non-government organizations (NGOs), and government entities, can seamlessly execute actions aligned with their respective roles.

Specifically, the government, acting as a overseeing authority, is empowered to grant permission for the needs put forth by NGOs and can meticulously monitor the entire transactional landscape. The pivotal feature of the system lies in its capability to enable users to acquire tokens by exchanging them for ether, with the token's value set at 0.001 ether.

The website prominently displays a comprehensive list of donor transactions, providing intricate details about the recipients, including their names, the quantity of tokens donated, and the unique transaction hash associated with each interaction. This hash value serves as an unequivocal identifier for every transaction, ensuring its privacy while maintaining an immutable record.

The transparent nature of this transaction system fosters a heightened sense of trust among donors, as they can witness the traceability and accountability embedded in every transaction. Such transparency acts as a catalyst, encouraging donors to contribute more, as they are assured of the integrity and openness of the entire donation process. This web-based platform stands as a testament to the transformative power of transparency in fostering trust and stimulating increased participation in philanthropic endeavors.

Chapter 4

USE CASE DIAGRAM

The use case diagram for the decentralized charity platform provides a high-level visual representation of the system's functionality by illustrating various interactions between actors and the system. In the context of this project, the use case diagram serves as a pivotal tool to outline the different ways in which users, including donors, charity organizations, and volunteers, interact with the platform. It encapsulates key functionalities and scenarios, highlighting the system's capabilities in facilitating transparent and efficient philanthropic activities. This diagram not only showcases the primary actors involved but also delineates the specific use cases or functionalities they engage in, such as registering on the platform, creating or contributing to campaigns, and participating in volunteer activities. The use case diagram, therefore, acts as a visual roadmap, offering a clear and concise overview of how different users interact with the decentralized charity platform to achieve their respective goals and contribute to the overarching mission of supporting charitable causes.

4.1 User Registration

The registration process is essential for identifying and verifying users according to their roles.

1. **Donor Registration:** Donors sign up by providing personal information and setting up their digital wallet.
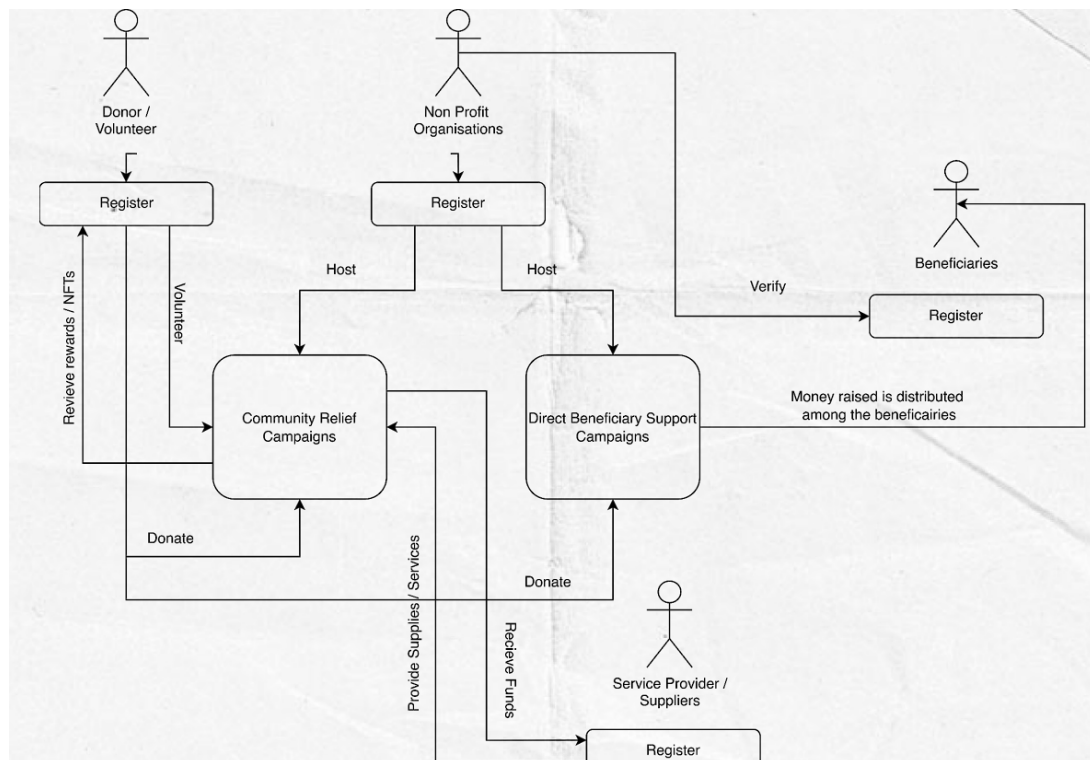
Figure 4.1: Use case Diagram

2. **Volunteer Registration:** Volunteers provide similar personal information, skills, and availability.

3. **Charity Organization Registration:** Charity organizations submit detailed information and legal documents for verification.

4. **Beneficiary Registration:** Beneficiaries, through NGO sponsorship, submit necessary identification details for verification.

4.2   Campaign Hosting

After registration, organizations can create and host campaigns.

4.2.1   Campaign Creation

1. **Direct Beneficiary Support Campaigns:** Specific campaigns for direct financial assistance to verified beneficiaries.

2. **Community Relief Campaigns:** Broader campaigns such as disaster relief, education, or medical assistance.

4.2.2 Campaign Approval

All campaigns are scrutinized and approved by the platform to prevent fraud and ensure alignment with mission standards.

4.3 Donation Process

This process builds trust and encourages generosity among donors.

1. **Choosing a Campaign:** Donors select campaigns based on type, location, or theme.

2. **Making a Donation:** Donations are made using digital wallets through blockchain transactions.

3. **Tracking Contributions:**

   (a) Donors can track their contributions until they are confirmed to have been received by the beneficiary.

   (b) Donors can see updates on how their contributions are being used by service providers.

4.4 Volunteering

Volunteers are matched with opportunities that suit their skills and availability.

1. **Finding Opportunities:** Volunteers search for opportunities posted by NGOs.

2. **Applying for Opportunities:** Applications are submitted directly through the platform.

3. **Approval Process:** NGOs review applications and select suitable candidates.

4.5   Transparency Measures

The platform implements several measures to ensure transparency.

1. **Real-time Updates:** Financial transactions and fund usage are visible to donors.

2. **Volunteer Feedback:** Volunteers provide feedback on their experiences.

3. **Beneficiary Feedback:** Beneficiaries provide feedback and updates on their situation.

4.6   Continuous Engagement

The platform encourages ongoing interaction and improvement.

1. **User Surveys and Feedback:** Regular surveys gather user experiences and suggestions.

2. **Performance Analytics:** Analytics monitor engagement, campaign success rates, and overall performance.

4.7   Beneficiary Payout Conversion

1. **Currency Conversion Accessibility:**This emphasizes the feature of allowing beneficiaries to convert cryptocurrency into their local currency.

2. **Direct Deposit Assurance:** This emphasizes the direct deposit of converted funds into beneficiaries' bank accounts.

Chapter 5

SYSTEM DESIGN

The decentralized charity platform is designed with simplicity and effectiveness in mind. The backend, responsible for core functionalities, manages user authentication, campaign processes, and interactions with the blockchain network. Smart contracts on the blockchain handle critical aspects like campaign details, fund utilization, and transaction recording. The database stores essential data such as user and campaign information.

On the frontend, the user-friendly interface seamlessly integrates with the backend through API routes, providing easy navigation for users through campaigns, volunteer opportunities, and transaction tracking. An incentive system, driven by smart contracts, ensures active volunteer participation by recording and distributing rewards. The system prioritizes security measures for user data integrity, and its modular structure, coupled with load balancing, supports scalability to accommodate a growing user base. Community engagement is fostered through features like forums and social sharing, creating a dynamic and collaborative environment within the decentralized charity platform.
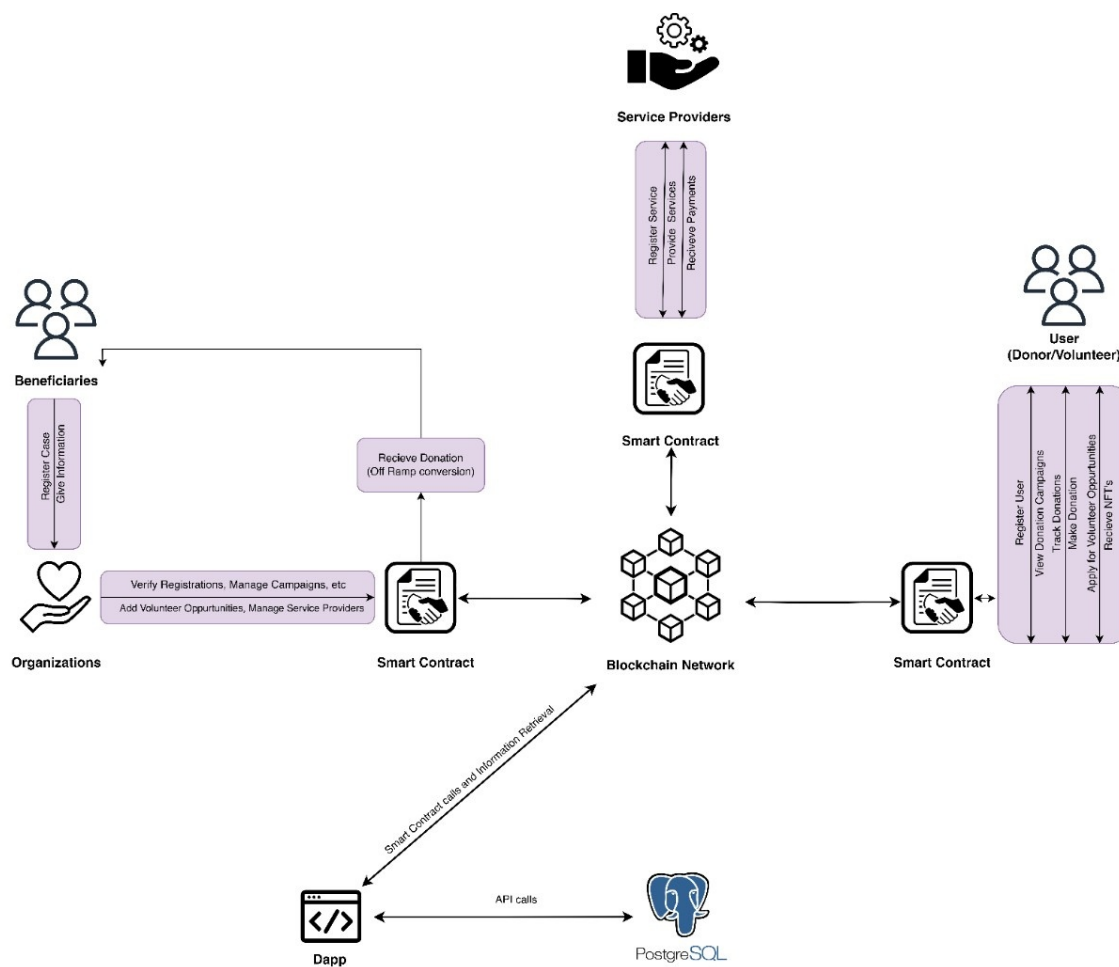
Figure 5.1: System Architecture

5.0.1 Backend Architecture

The backend, driven by Next.js, constitutes the core engine of the platform. Beyond facilitating standard backend functionalities, it plays a pivotal role in user authentication processes, orchestrating the entire campaign lifecycle, and ensuring fluid interactions with the underlying blockchain network. This encompasses not only the initiation and conclusion of campaigns but also the real-time tracking of fund utilization and the secure recording of transactions. The adoption of Next.js brings a level of versatility and efficiency to backend operations, contributing to a robust and dynamic foundation for the decentralized charity platform.

Crucial functions are carried out through the implementation of smart contracts on the chosen blockchain network, whether it be Ethereum or Binance Smart Chain. These
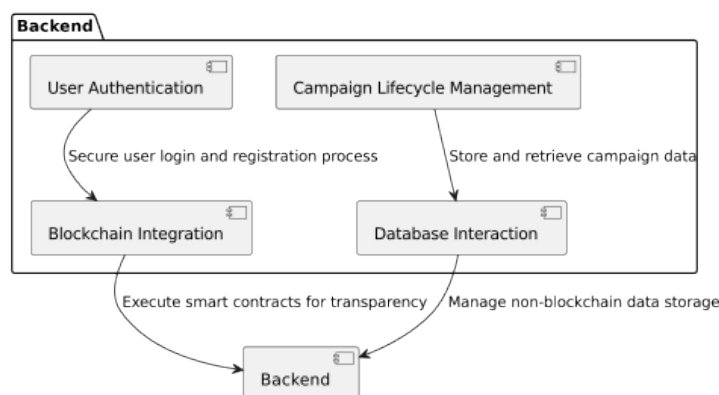
Figure 5.2: Backend

smart contracts govern key aspects such as campaign details, transparent fund utilization, and the immutable recording of transactions. By leveraging blockchain technology, the backend establishes a secure and decentralized framework, enhancing trust and ensuring the integrity of critical processes, ultimately contributing to a transparent and accountable charitable ecosystem.

5.0.2 Database Management

At the heart of non-blockchain data management lies the database, with options including PostgreSQL. This repository efficiently stores user profiles, campaign details, and other non-blockchain data, optimizing data retrieval processes. The choice of database is instrumental in ensuring the seamless communication between frontend and backend components, fostering a smooth user experience. This section of the architecture underscores the importance of an optimized and well-managed database in supporting the overall functionality and performance of the decentralized charity platform.
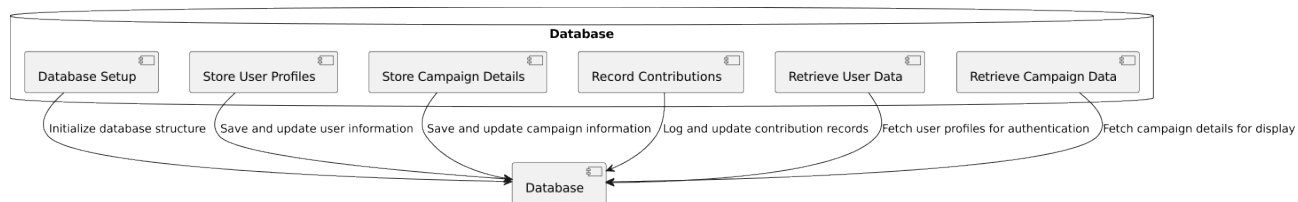
Figure 5.3: Database

5.0.3 Frontend Design

The frontend, crafted for optimal responsiveness using Next.js, is the user's gateway to the platform. Beyond aesthetics, it aims to provide an intuitive and seamless navigation experience. By integrating seamlessly with the backend through API routes, it ensures a cohesive user journey. The frontend's responsiveness is not just about aesthetics; it directly contributes to the overall user experience, ensuring that users can easily navigate campaigns, volunteer opportunities, and transaction tracking. This emphasis on a user-centric design is essential for creating an engaging and accessible platform.
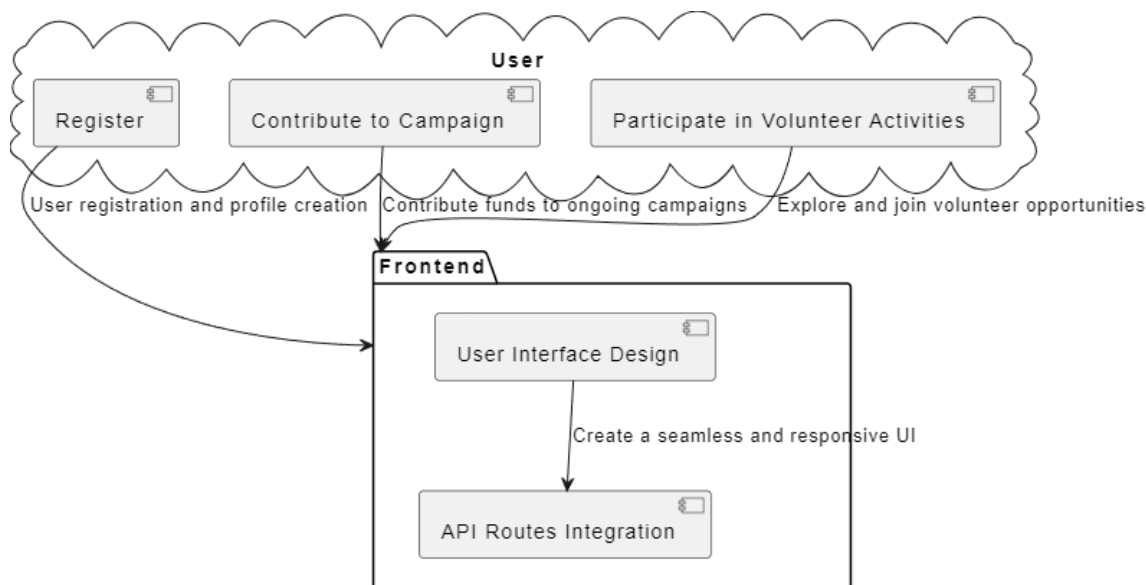

Figure 5.4: Frontend

5.0.4 Blockchain Integration

The integration with a blockchain network is a defining feature of the platform, leveraging the decentralized and transparent nature of smart contracts. These contracts, ex-

ecuted on either Ethereum or Binance Smart Chain, govern critical functionalities such as fundraising campaigns, fund utilization transparency, and the immutable recording of transactions. This integration ensures that the decentralized charity platform operates on a foundation of security, transparency, and trust. It positions the platform at the forefront of technological advancements, showcasing the transformative potential of blockchain in redefining charitable contributions.
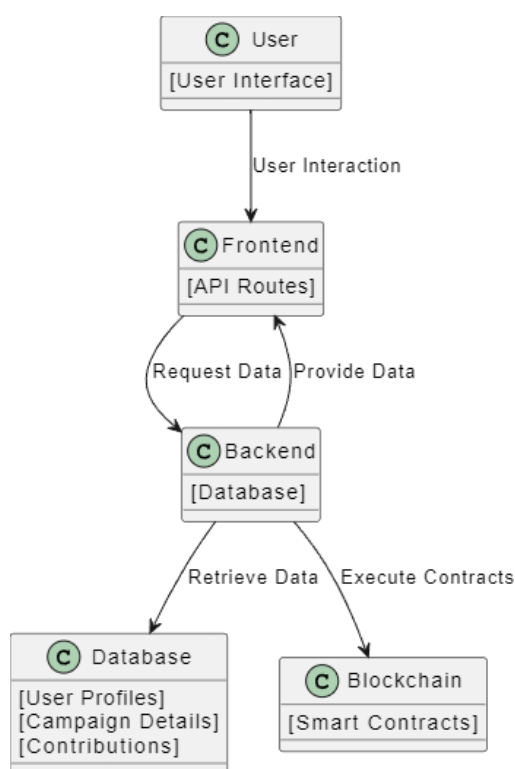
5.1 Data Flow Diagram

Figure 5.5: Data Flow Diagram.

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A Data Flow Diagram (DFD) for the decentralized charity platform offers a visual representation of the flow and transformation of data within the system. At its core, the DFD illustrates how information moves between different components, shedding light on the interactions between users, the platform's backend, the blockchain network, and the database. This graphical representation serves as a powerful tool to comprehend the intricacies of data movement and processing within the decentralized charity ecosystem.

Chapter 6

METHODOLOGY

The methodology section serves as the foundational framework detailing the systematic approach undertaken to conceptualize, develop, and implement the decentralized charity platform. This crucial section provides insights into the organized sequence of steps and processes employed throughout the project's lifecycle, outlining the specific strategies and tools used to achieve key milestones. From requirement analysis to deployment and beyond, the methodology section serves as a roadmap, guiding the reader through the intricacies of decision-making, technology selection, and the practical steps taken to bring the vision of a decentralized and transparent charity platform to fruition. The methodologies employed in backend development, blockchain integration, database implementation, frontend design, and other critical facets are elucidated, offering a comprehensive understanding of the systematic and strategic nature of the project's execution.

6.1   Backend Development

In the realm of backend development, a pivotal aspect is the implementation of secure user authentication processes utilizing Next.js. This entails the creation of robust mechanisms for user registration, login, and profile management, fostering a secure and personalized experience for platform users. Simultaneously, emphasis is placed on the development of functionalities for managing the complete lifecycle of fundraising campaigns. This involves the creation, monitoring, and closure of campaigns, encompassing tasks

such as setting campaign goals, real-time progress tracking, and effective handling of contributions. The objective is to create a backend infrastructure that seamlessly accommodates user interactions and ensures the dynamic management of charitable initiatives.

6.1.1 Blockchain Integration

Within the Blockchain Integration module, the focus shifts to the development of smart contracts on the chosen blockchain, be it Ethereum or Binance Smart Chain. These smart contracts play a critical role in executing crucial functionalities related to campaign management. They encapsulate the logic for managing campaign details, ensuring transparent fund utilization, and recording immutable transactions. Subsequently, the backend is integrated with the blockchain network through technologies like Web3.js or Ethers.js. This integration facilitates seamless communication between the platform and the blockchain, enabling the execution of smart contracts and ensuring the transparent and secure orchestration of charitable operations.

6.1.2 Database Implementation

In the Database Implementation phase, the initial step involves setting up the selected database system (PostgreSQL). This includes the creation of tables and indexes tailored to the platform's requirements, with a keen focus on optimizing data retrieval efficiency. The subsequent step revolves around the implementation of backend logic for database interaction. This encompasses the storage and retrieval of crucial non-blockchain data, such as user profiles and campaign details. The database becomes a cornerstone for the platform, providing a robust foundation for efficient data management and retrieval.

6.1.3 Frontend Development

The Frontend Development segment is centered on creating an engaging and user-friendly interface using Next.js. The design and implementation of the frontend are meticulously executed to ensure an intuitive and visually appealing user experience. Special attention is given to responsiveness, ensuring a consistent and seamless interaction across

various devices. Concurrently, API routes are established to connect the frontend with the backend, facilitating a cohesive data flow and interaction between the user interface and backend functionalities. This section aims to deliver a compelling and accessible frontend interface that enhances the overall user journey within the decentralized charity platform.

Chapter 7

RESULTS

The implementation of the decentralized charity platform is expected to yield a transformative and transparent philanthropic environment. Donors will experience heightened confidence through blockchain-driven transparency, tracking fund utilization seamlessly. Campaign management for charity organizations will be streamlined, fostering efficient goal setting, progress tracking, and contribution handling. Robust user authentication processes will ensure a secure and personalized experience, while an incentivized system will boost volunteer participation. Community engagement features like forums and social sharing will contribute to a collaborative ecosystem. Real-time tracking and reporting will grant donors immediate visibility into their contributions' impact, enhancing satisfaction. The scalable and responsive platform, with a user-friendly Next.js interface, is poised to accommodate growing user engagement. The verification process for charities enhances trust, while iterative updates based on feedback ensure continuous improvement. Overall, the platform aims to deliver a credible, efficient, and user-centric solution for decentralized philanthropy, documented comprehensively for future reference.
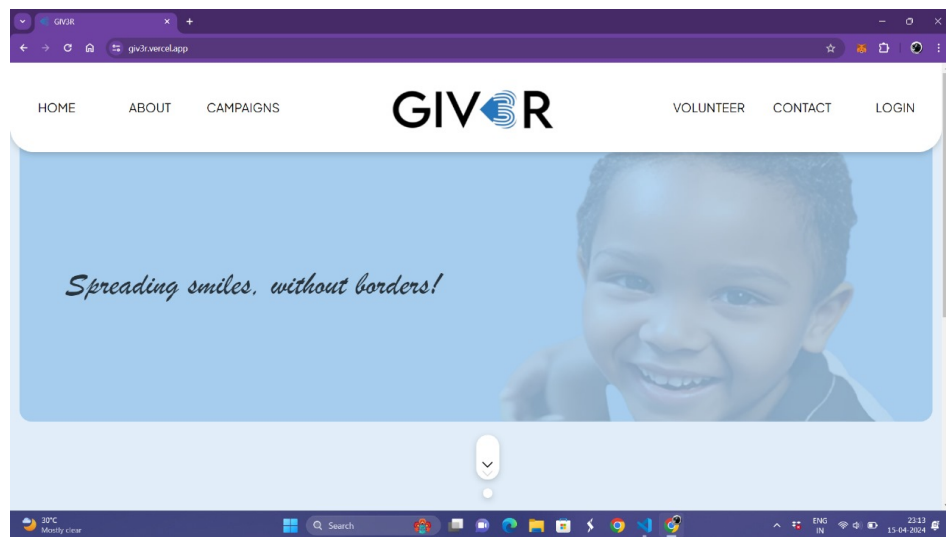
Figure 7.1: Home page of the Decentralized Charity Portal.
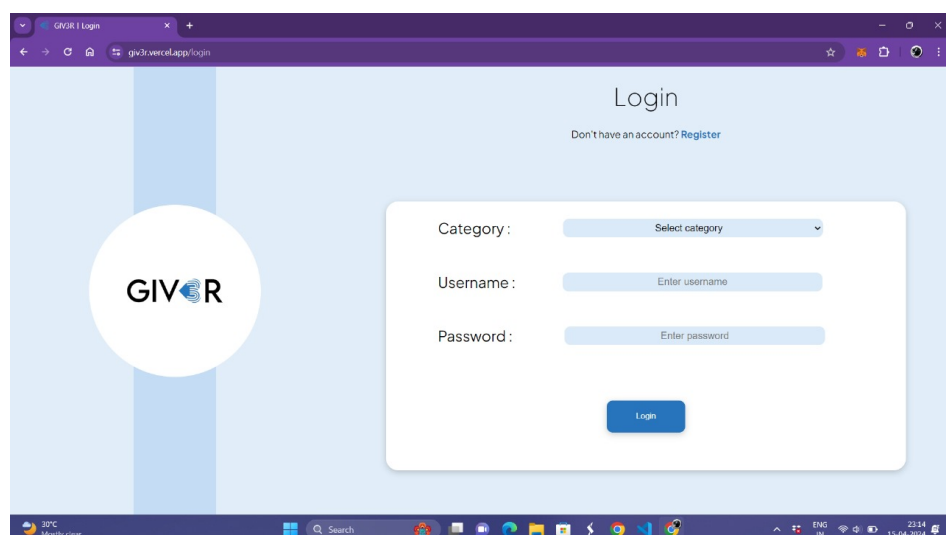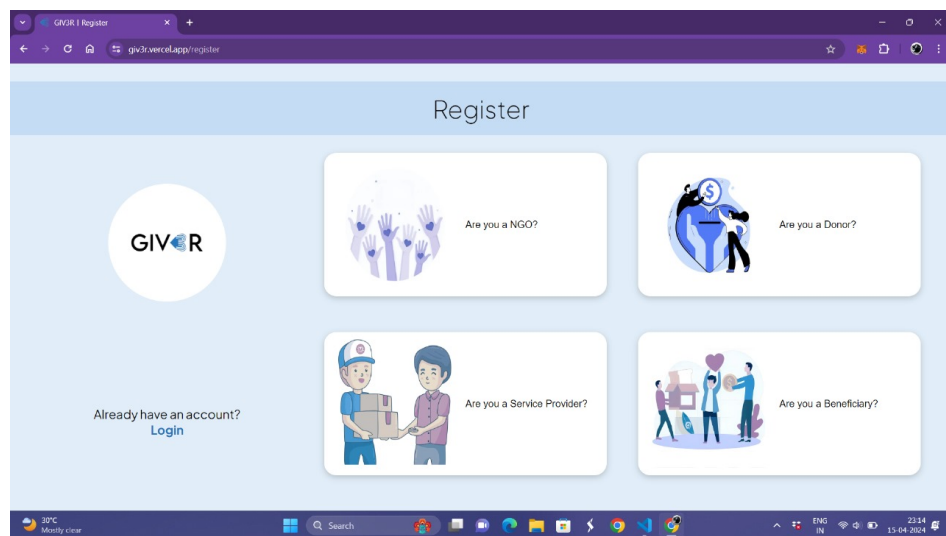

Figure 7.2: Login Page

Figure 7.3: Registration page where users can sign up as an NGO, donor, service provider, or beneficiary.
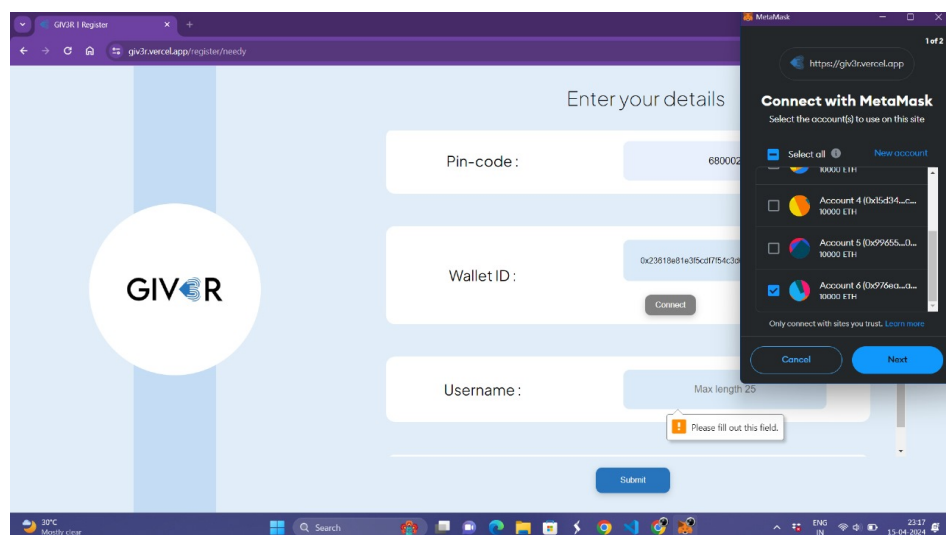

Figure 7.4: You can connect your wallet using the wallet ID, and we support the Meta-Mask wallet.
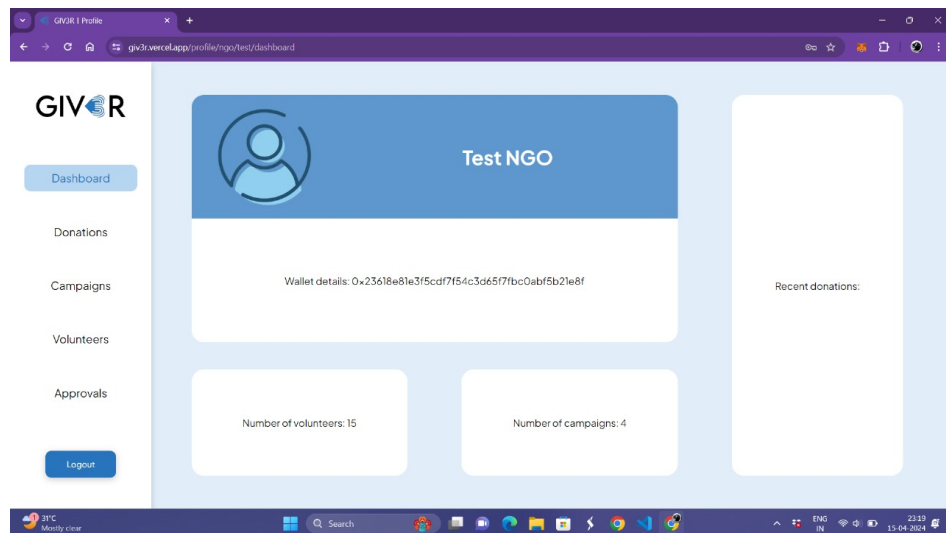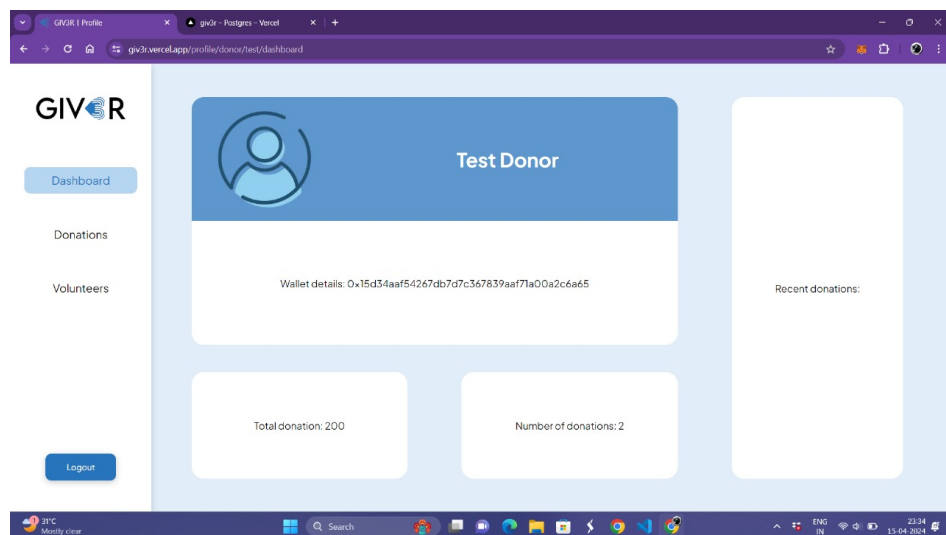
Figure 7.5: NGO Dashboard
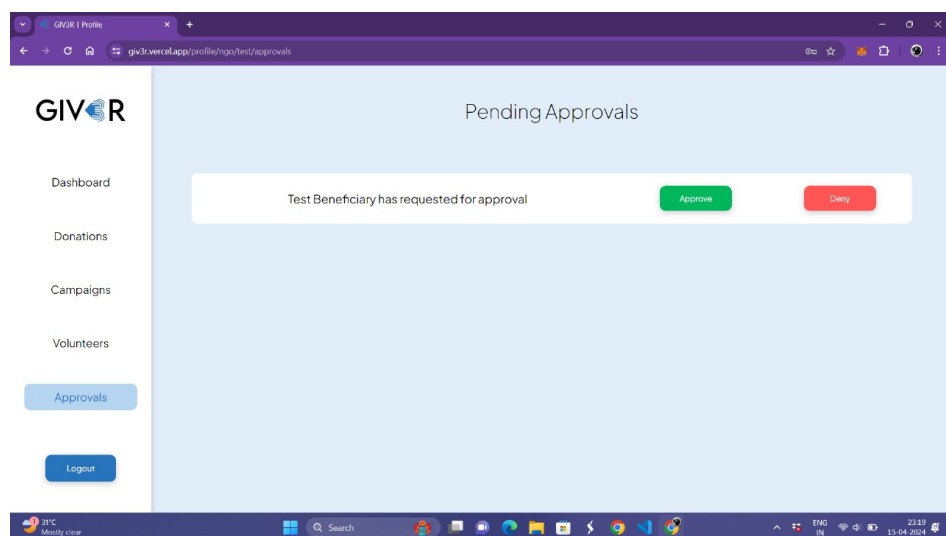

Figure 7.6: Donor Dashboard

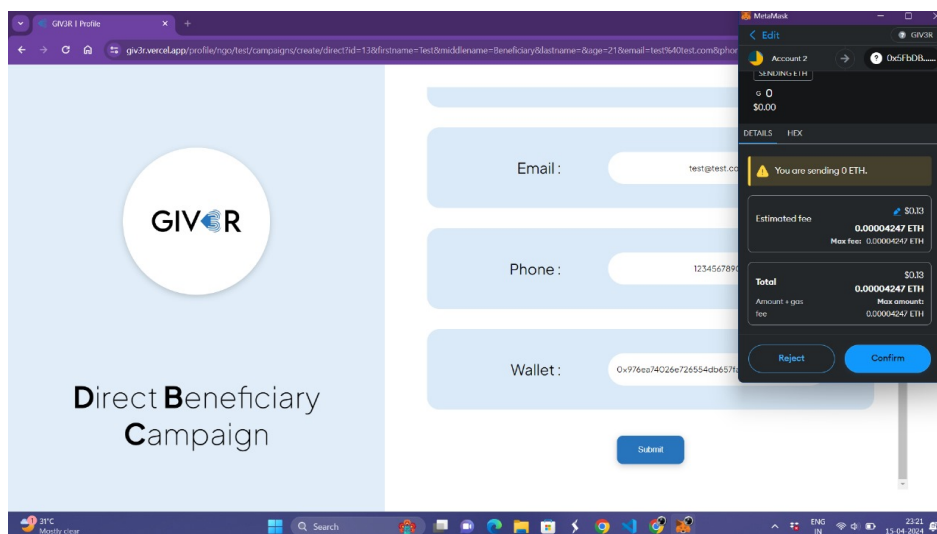Figure 7.7: The pending beneficiary request is approved by the NGOs.

Figure 7.8: This is the campaign creation page where you can create a campaign by providing the necessary details.
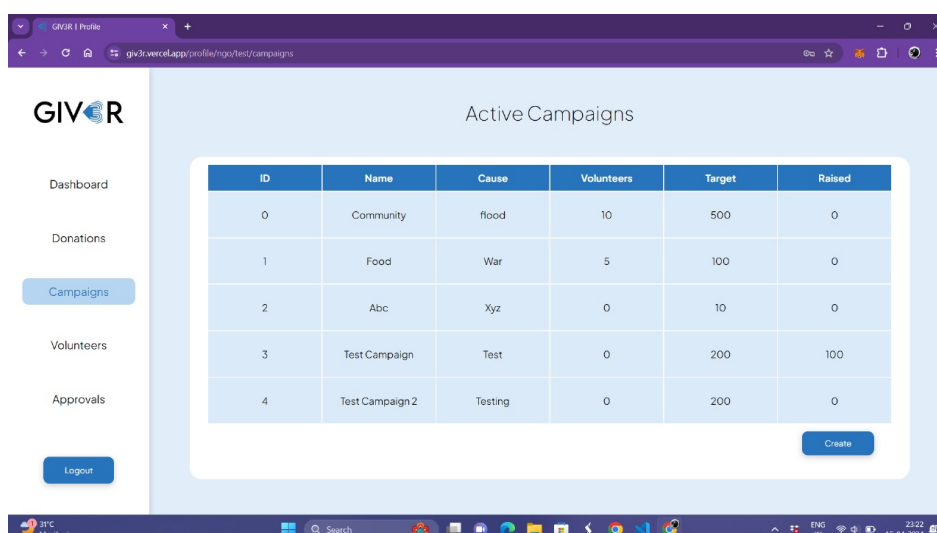

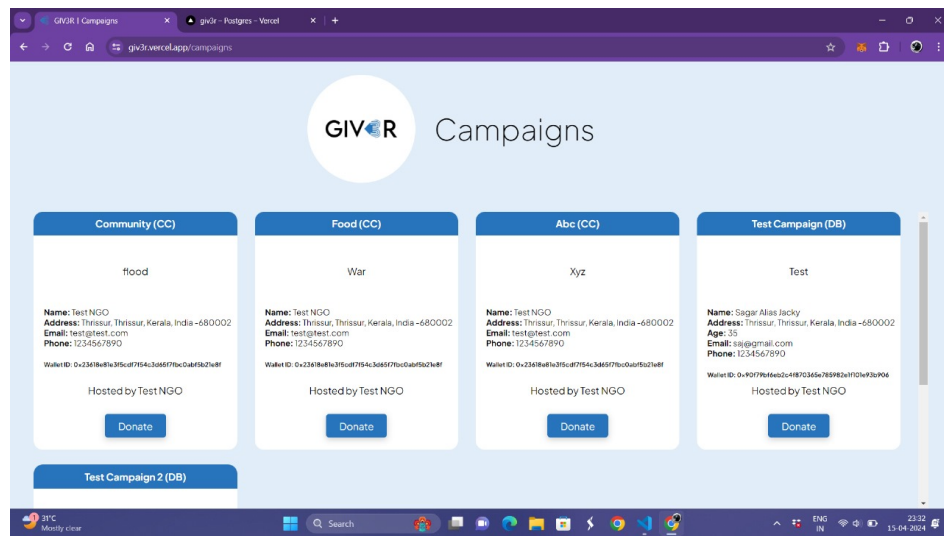Figure 7.9: All the active campaigns can be viewed by the NGOs

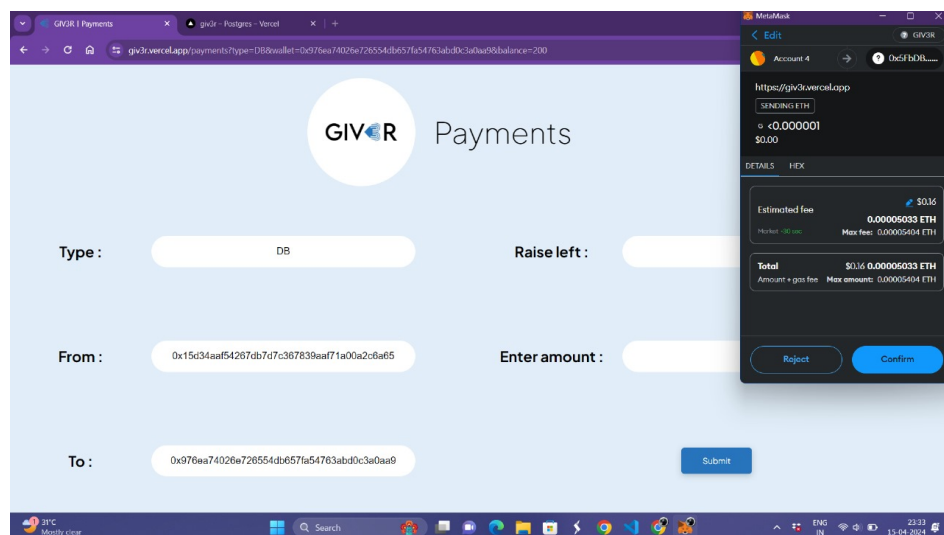Figure 7.10: Page where all campaigns can be viewed.

Figure 7.11: Payments can be made by entering the corresponding wallet address and the amount to be donated.
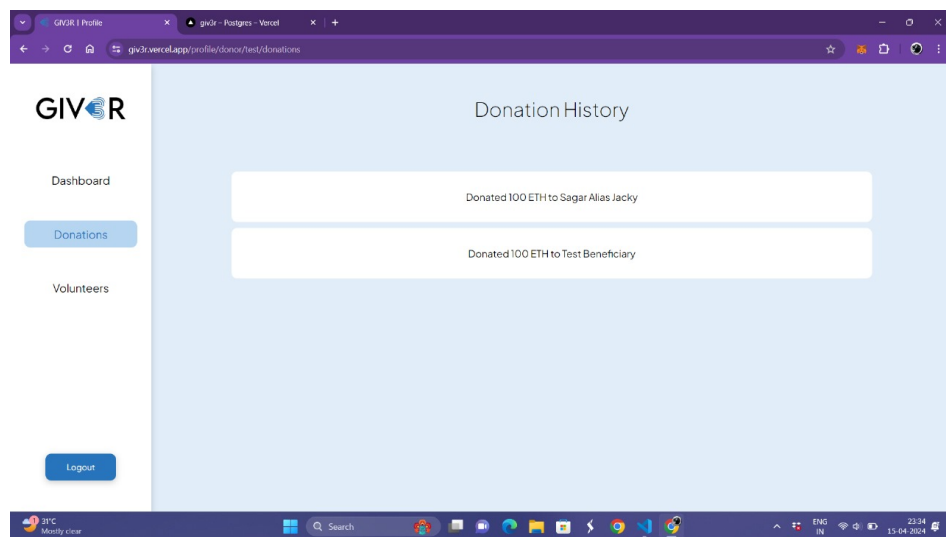
Figure 7.12: Each payment made can be tracked using blockchain technology.

Chapter 8

CONCLUSION

In conclusion, the development of the decentralized charity platform represents a significant leap towards revolutionizing philanthropy through transparency, efficiency, and user engagement. The implementation of secure user authentication, streamlined campaign management, and blockchain-driven fund transparency ensures a robust and trustworthy platform. The incentivized system encourages active volunteer participation, fostering a vibrant and collaborative community. Features like forums and social sharing contribute to an interactive ecosystem, enhancing the overall user experience. Real-time tracking and reporting provide donors with immediate insights, promoting accountability. The scalable and responsive architecture, coupled with a user-friendly Next.js interface, positions the platform for sustainable growth. The verification process for charities instills trust, and iterative updates based on user feedback ensure continuous refinement. In essence, the decentralized charity platform aims to reshape charitable contributions, making philanthropy more accessible, accountable, and impactful for all stakeholders involved.

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