Department of Computer Science & Engineering

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Course Code – CSE 410
Section – B2

Project Report

Project title: *Helpseekers-a blockchain based crowdfunding dapp*

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Introduction

In an ever-changing digital environment, blockchain technology's power has transcended traditional bounds and now finds a fascinating use in the crowdfunding sector. Presenting "HelpSeekers," a state-of-the-art decentralized application (DApp) that aims to transform the way that charitable individuals and those in need are matched globally.

The dynamic, secure, and transparent "HelpSeekers" platform makes use of the revolutionary potential of blockchain technology to empower people to really improve the lives of others. Our mission is to bridge the gap between those who are in need of help and those who are willing to provide it, all the while maintaining the highest standards of transparency, accountability, and trust. We are not just another crowdfunding site.

- **Novelty of this work:** There is no web3 dapp similar to our project. Most similar dapps are auctioning asset for their project or the project itself.
- **Project related issues:** Our project uses Ethereum. Thus, the impact on environment is heavily reduced compared to other crypto currencies. Our project does not negatively impact the society or has any safety concern.
- **GitHub Link:** https://github.com/gold-4N/Help-helpseekers-web3

Background study

The blockchain-based crowdfunding DApp project employed a robust technology stack to provide users with a seamless and safe experience. Solidity, the preferred programming language, was utilized to develop smart contracts, which provide transaction dependability and transparency. The IPFS API integration allowed for decentralized and efficient data storage, which improved the DApp's dependability. Users can easily link their wallets through the MetaMask interface, increasing interaction security and trust.Next.js provided the DApp's frontend with an easy-to-use and aesthetically pleasing user interface.

In addition, we configured Hardhat to streamline smart contract deployment and
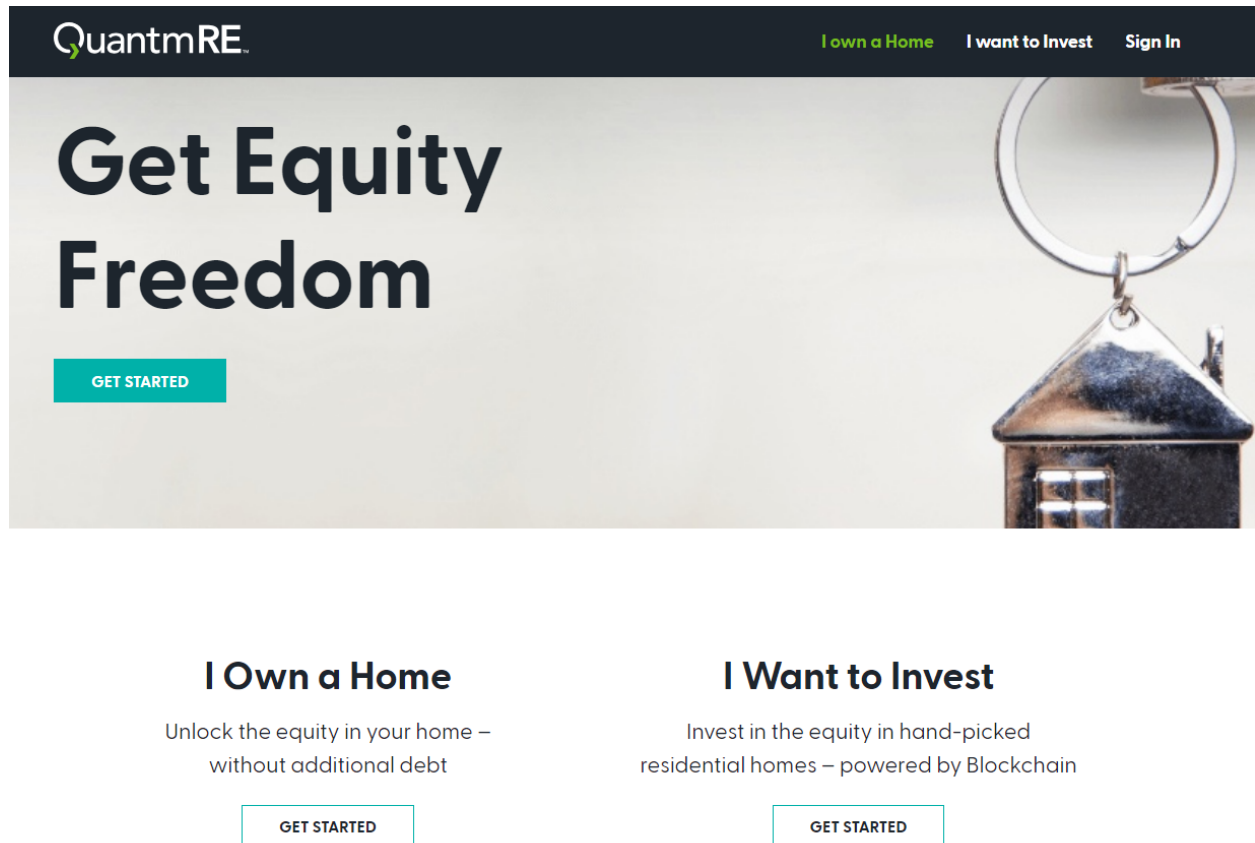
testing, while the use of the Polygon Testnet allowed for cost-efficient and scalable transactions. This intricate technological ensemble represents our commitment to creating a secure, accessible, and highly functional Web 3.0-based crowdfunding platform.

Existing Simillar Projects

While standard web 2.0 crowdfunding/fundraising websites like GoFundMe exist, there isn't a project specifically designed for web 3.0 that facilitates crowdsourcing. GoFundMe is among the most well-known and frequently utilized crowdfunding websites worldwide. Since its establishment in 2010, it has assisted in raising funds for a range of humanitarian causes, crises, urgent medical needs, and private causes. People can create their own campaign pages using the GoFundMe platform, which allows them to share their stories and financial goals (typically with photos and videos). It encourages social sharing and simplifies the donation process for backers in order to reach a wider audience. GoFundMe has played a significant role in uniting individuals and helping them to support causes and projects that are meaningful to them.
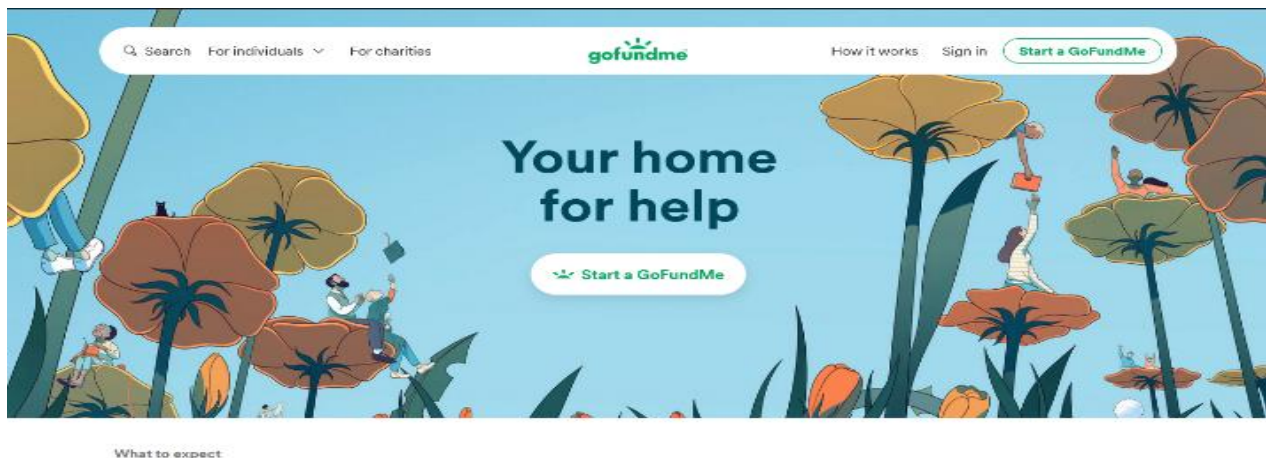
There are websites such as QuantmRE which is a crowdfunding platform but specializes in real estate. This project allows investors to build their own portfolio of assets based on micro-investing crypto in return for property equity.

There is also another website titled [GameFi](#) which was created by the company that brought us Red Kite Launchpad, GameFi is one of the crypto landscape's biggest Initial Game Offering development platforms.

GameFi is a comprehensive space that can help generate funding for Web3 games in various ways. Not only can investors purchase tokens in an IGO project, but they can also buy in-game assets for the projects that inspire them the most.
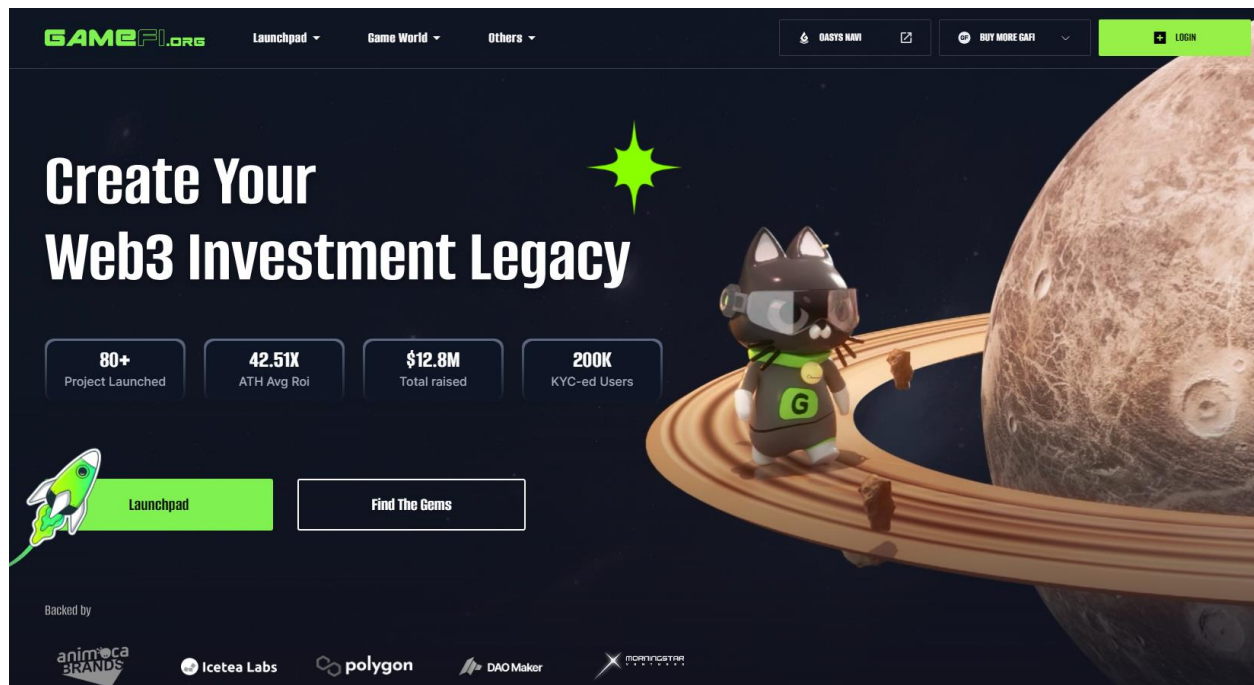
Shortcoming of existing similar projects

The popular crowdsourcing platform GoFundMe has several notable shortcomings. First and foremost, the platform charges fees, which comprise costs associated with processing payments as well as a percentage of the money made. These expenses have a significant impact on the overall amount of money that finally reaches the campaign organizers and may deter potential contributions.

A second concern is one of trust and accountability. While GoFundMe has implemented transparency protections, fraudulent or misleading campaigns have occurred. This has raised questions about the platform's ability to monitor the

integrity and responsible use of funds.

In addition, the platform's dispute resolution and refund processes can be complex and occasionally unsatisfactory for donors. Disputes between donors and campaign organizers can be challenging to resolve, and the platform's refund policies may not consistently align with donors' expectations, potentially leading to dissatisfaction. Furthermore, GoFundMe is subject to international restrictions and varying regulations. This can limit the availability and functionality of the platform in different regions, affecting its accessibility and usability for individuals and organizations outside of specific geographic areas.

And of course, GoFundMe lacks the characteristics of a web 3.0-based platform that would employ blockchain technology to improve safety, transparency, and decentralization. As a result, it lacks the security and dependability provided by blockchain-based crowdfunding systems.

GameFi and QuantumRE are two innovative platforms that aim to create new opportunities for gamers and homeowners, respectively. However, they also face some challenges and limitations that may affect their adoption and performance. Some of the shortcomings of GameFi are:

- The lack of regulation and standardization in the blockchain gaming industry, which may expose players to fraud, hacking, or unfair practices.
- The high entry barriers and technical complexity of using cryptocurrencies, NFTs, and blockchain technology, which may deter some potential users or investors.
- The volatility and unpredictability of the crypto market, which may affect the value and liquidity of the gaming assets and tokens.
- The ethical and social implications of gamifying finance, such as addiction, exploitation, or inequality.

Some of the shortcomings of QuantumRE are:

- The limited availability and eligibility of the home equity agreement product, which may exclude some homeowners or properties from accessing the service.
- The trade-off between equity and debt, which may result in homeowners losing a significant portion of their home value appreciation or facing a higher buyback cost in the future.
- The uncertainty and complexity of the tax and legal implications of the home

equity agreement, which may vary depending on the jurisdiction and situation of each homeowner.

- The lack of transparency and accountability of the blockchain-powered real estate marketplace, which may raise questions about the security, reliability, or fairness of the platform.

Problem Definition

The project needs to leverage blockchain technology for enhanced security and transparency. Minimize fees to ensure a larger portion of funds reach campaign organizers. Facilitate global accessibility while fostering a decentralized and trusted environment for crowdfunding initiatives.

Methodology

Object-Oriented Design, Object Modeling Technique, and Object-Oriented Software Engineering are the three object-oriented notations that comprise UML. It builds on the advantages of these three methodologies to give a more unified, understandable framework for designing and documenting a wide variety of software and business system modeling components.

Use case diagram
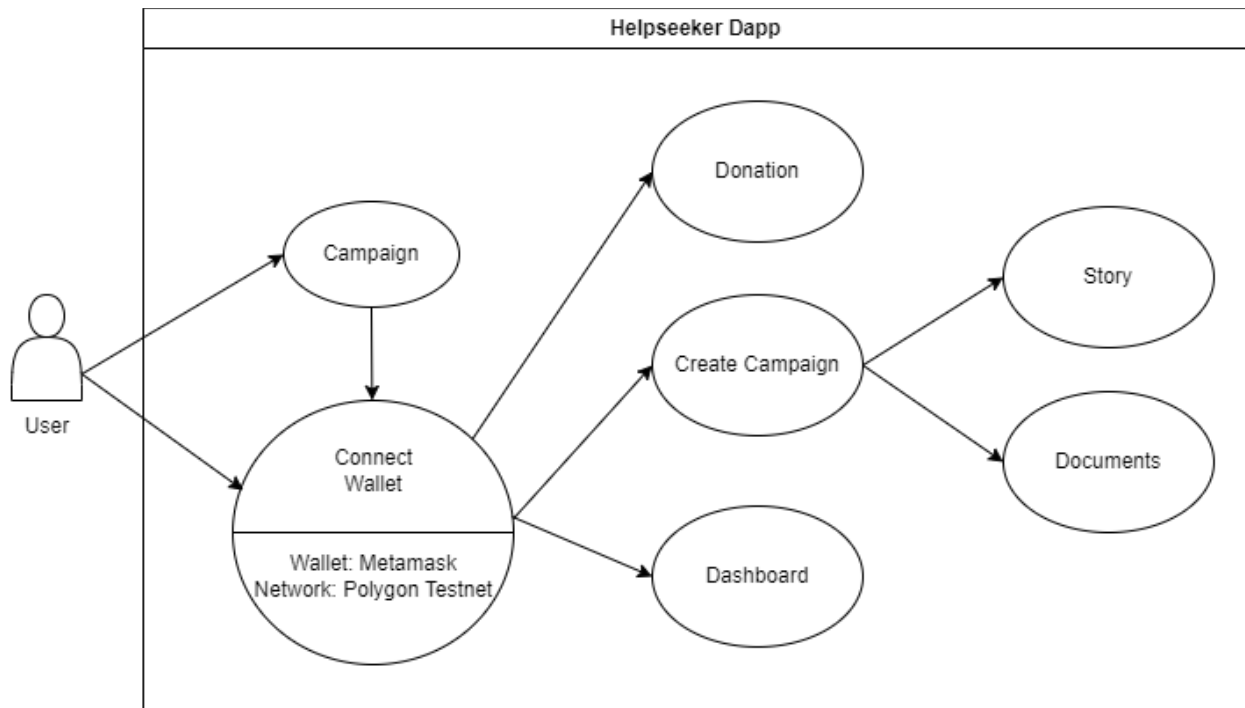
The diagram shows the following:

- **Helpseeker Dapp**: A decentralized application that helps users create campaigns, donate, and view stories and documents related to social causes.

- **Wallet**: A software that allows users to connect to the Polygon Testnet and manage their cryptocurrency transactions.

- **Campaigns**: User-generated projects that seek donations for a specific cause or issue. Users can create campaigns by filling a form and submitting it to the Dapp.

- **Donations**: User-made contributions to a campaign using cryptocurrency. Users can donate by selecting a campaign and sending funds to its address.

- **Stories and Documents**: User-shared narratives and files that provide information or evidence about a campaign or a cause. Users can view stories and documents by browsing the Dapp's database.

ERD

An Entity-Relationship Diagram (ERD) is a diagram that shows the relationships and key elements in a database. Entities, properties, and the relationships between them make up the majority of it. Entities are anything that pertains to the database, including persons, locations, and things. These entities' traits or qualities are represented by their attributes. Relationships define relationships such as one-to-one, one-to-many, or many-to-many and illustrate how entities are related to one another. ERDs are a useful tool in database design that aids in the understanding of the database's structure and data organization by designers and stakeholders.
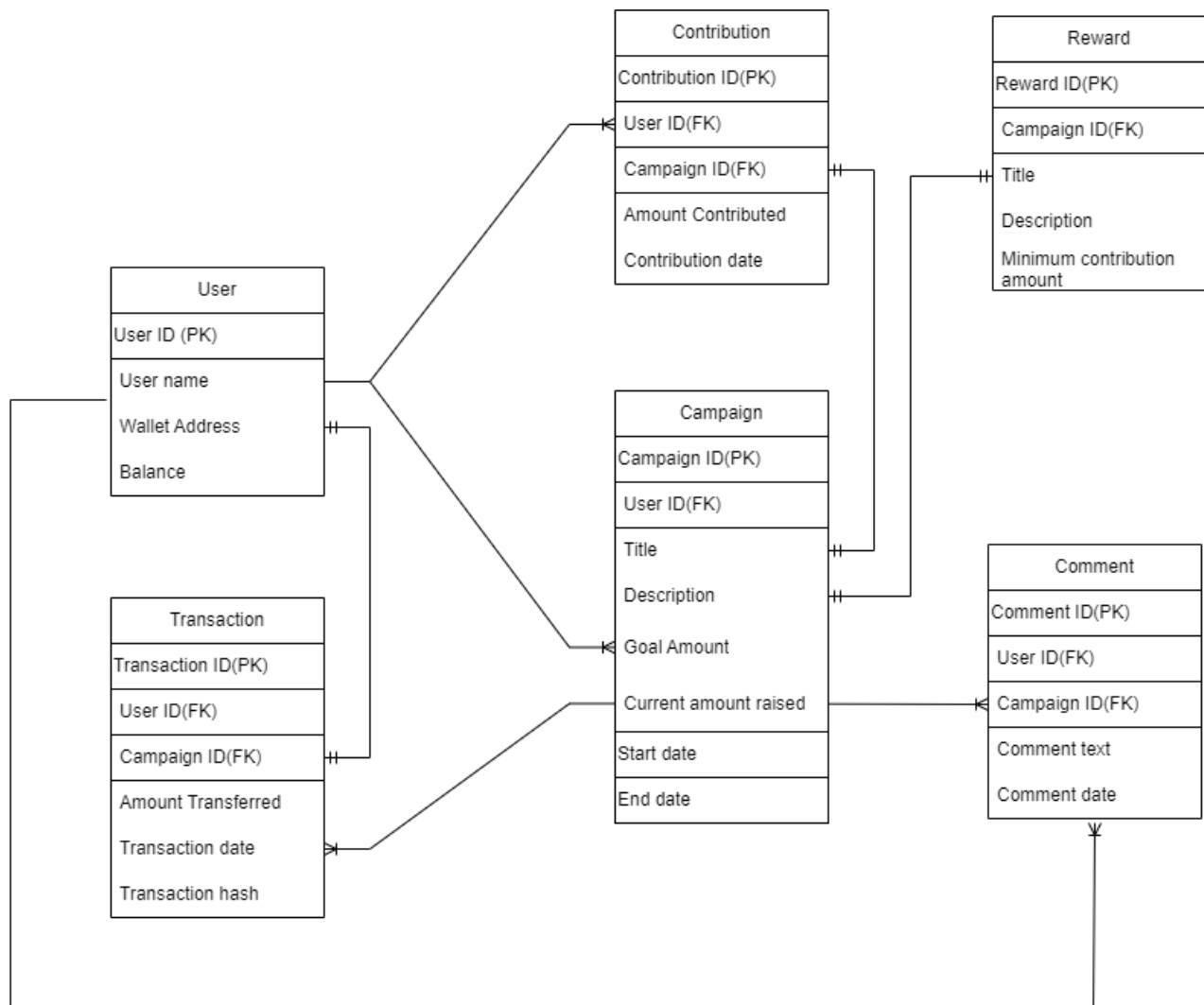
Here, user interacts with the campaign page, a contributor can see the campaigns and a campaigner can post for donation, contributor can contribute and go through

transaction section, make donations and leave comments. Campaigns get donations via transaction as the reward and can receive comments. Contributors can see their contributions on different posts.

Class Diagram

A class diagram is a fundamental UML (Unified Modeling Language) visual representation that shows the interactions and organization of classes inside a system or software program. It is used in software engineering. It offers a high-level overview of the object-oriented architecture of the system, emphasizing the classes, their properties, and their methods. Classes are usually shown as boxes in a class diagram, with the class name at the top, the attributes in the center, and the methods at the bottom.

Here, a user can create one to multiple campaigns. A campaign can contain zero to multiple comments. Campaign has zero or more contributions, each contribution processes exactly one transaction and gets one reward. A user can be a contributor or a campaigner.
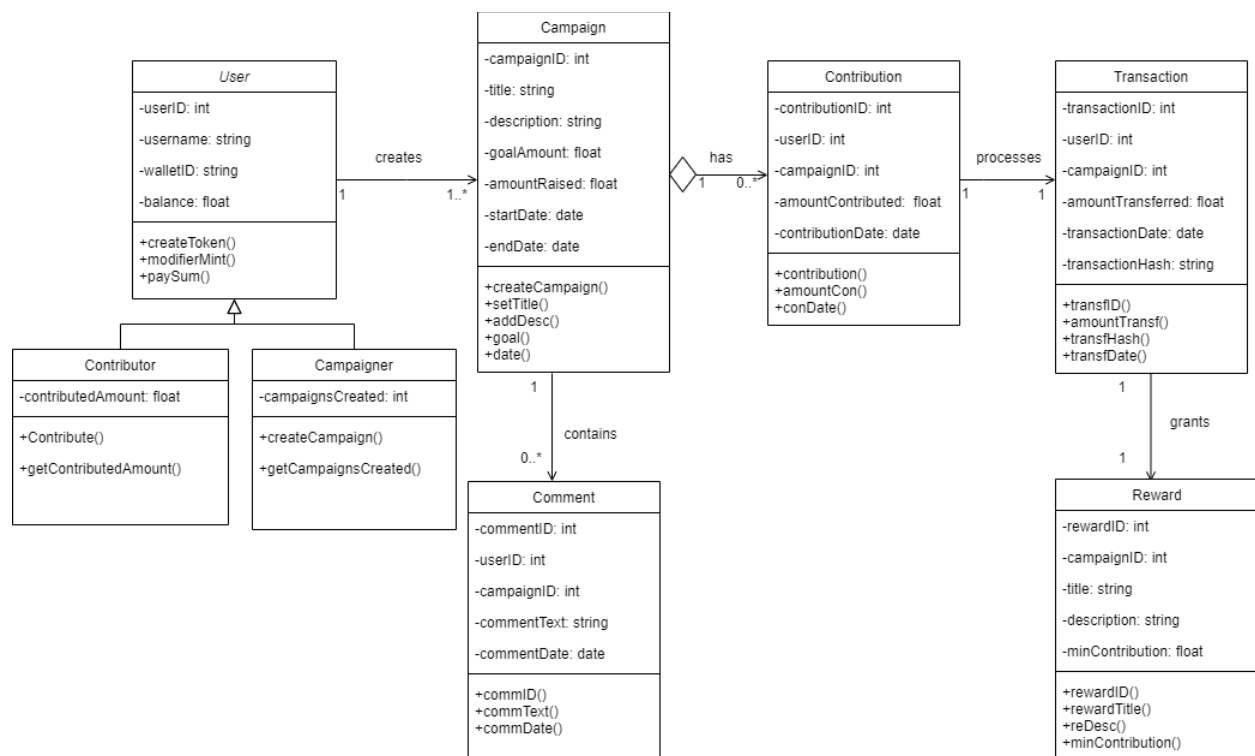
Cost analysis:

			Year 0	Year 1	Year 2	Year 3	Year 4	Total
Benefit		Advertisement	0	85,000	150,000	200,000	250,000	685,700
		Total Benefit	*0*	*85,000*	*150,000*	*200,000*	*250,000*	*685,000*
COST	**Development Costs**	Site Development & Publishing	40,000	0	0	0	0	20,000
		Server Hosting	0	20,000	20,000	20,000	20,000	80,000
		Maintenance Cost	0	25,000	25,000	25,000	25,000	100,000
		Total Development cost	*40,000*	*45,000*	*45,000*	*45,000*	*45,000*	*200,000*
	Operational Costs	Advertisement	0	70,000	60,000	50,000	40,000	200,000
		Management	0	40,000	50,000	60,000	70,000	170,000
		Total Operational Cost	*0*	*110,000*	*110,000*	*110,000*	*110,000*	*440,000*
	Total Costs		40,000	155,000	155,000	155,000	155,000	640,000
Net Benefits = Total benefits - Total cost			[40,000]	[70,000]	5,000	45,000	95,000	45,000
Cumulative Net Cash Flow			[40,000]	[110,000]	[105,000]	[60,000]	35,000	
Return on Investment (ROI)			**7.03% (55,700 / 490,000) *100%**					
Break-even Point (BEP)			**2.5 years [2 years + (95,000 - 45,000) / 95,000]**					

Setup:
- Language: CSS, JavaScript, Solidity
- Framework: Next.js
- Library: babel, hardhat, material ui, ampproject, ethereumjs, etherproject, fastify, multiformats
- IDE: Visual Studio Code, Remix
- Version Control: Git & GitHub

Conclusion

Our project marks an important turning point in the realm of online fundraising. We have deployed the concept of safe, transparent, and decentralized crowdfunding by incorporating blockchain technology. More of the money goes to the intended causes because to the lower fees and improved accessibility, which helps contributors and campaign organizers alike.

Our concept represents the potential for a crowdfunding ecosystem that is more transparent and equal, in line with the ideals of the rapidly changing digital environment. This DApp is positioned to have a significant impact going forward by bringing together people and communities from all over the world and encouraging a giving and supportive attitude. Our crowdfunding DApp is proof of the infinite possibilities of blockchain technology in the web 3.0 era.

Things we have learned:

We went on an enlightening journey during this project that broadened our perspectives and improved our comprehension of a number of important technologies and ideas. Above all, we explored the complex realm of blockchain technology, understanding its fundamental ideas and its revolutionary potential in contemporary applications. We developed our expertise in Solidity, a programming language designed specifically for creating smart contracts, and we used it to create the framework for our project. We were able to guarantee dependable and effective content delivery by realizing the importance of IPFS (InterPlanetary File System) as a decentralized data storage solution. Furthermore, our understanding of Metamask highlighted how crucial secure wallet integration is to giving users a seamless and safe experience. Completing tests on the Polygon testnet and learning how to configure Hardhat further demonstrated our proficiency in blockchain development. Through this project, we have developed our technical abilities but also a deep respect for teamwork and the enormous potential that blockchain technology has to change the digital environment.

Difficulties We Have Faced:

Here are the some of the difficulties that we faced during realization of the project:

1. Our first installation of node.js was 20.8.1. But due to difference from our vision, we had to scrap our project and start building the dapp from scratch in node.js version 12.1.0.
2. Due to next.js components issue in front end components we had to install babel packages.
3. Since next.js didn't have all the components we needed we had to install additional icons.
4. Since infura IPFS client changed from being completely open source to trial first, we had to look for external IPFS services.
5. We had to manage external credit card to get access to infura.io IPFS client.
6. We faced issue collecting test token from Polygon Testnet due to additional restriction.

Future Directions:

"HelpSeekers" sees a dynamic evolution in the future, characterized by deeper integration of NFTs to improve participation, cross-chain interoperability to increase accessibility, and the deployment of decentralized governance (DAOs) for community-driven decision-making. The platform will extend its reach to assist international cooperation by supporting global philanthropy and disaster relief initiatives. Trust from users will be ensured by giving priority to strong security measures. "HelpSeekers" will persist in representing the fundamental principles of decentralization and transparency, transforming crowdfunding through the complete integration of Web 3.0 technologies and empowering people to effect significant change within a safe, engaging, and worldwide networked community.

References

1. https://nextjs.org/docs
2. https://remix.run/docs/en/main
3. https://www.gofundme.com/
4. https://www.quantmre.com/
5. https://gamefi.org/

Appendix: A (CEP Mapping)

Complex Engineering Problem & Mapping How Ps are addressed through the Project:

Ps	Attribute	How Ps are addressed through the project	COs	POs
P1	Depth of Knowledge Requirement	This system requires knowledge of blockchain technology(K4), design and implementation of the dapp(K5), (K6), rigorous study of existing journals(K8)	CO1 CO2 CO3	PO1 PO2 PO3
P3	Depth of analysis required	Our dapp requires proficient knowledge about Blockchain and IPFS server.	CO6 CO7	PO8 PO9
P4	Familiarity of Issues	Donating with not enough amount of Matic could result in an unsuccessful donation.	CO7 CO8	PO9 PO10
P7	Interdependence	Interdependency subsystem like • Campaign organization • Generate successful donations	CO3 CO9	PO3 PO11

How As are addressed through the project:

As	Attribute	As are addressed through the project
A1	Range of Resources	This project needs infura IPFS, HardHat, Metamask wallet, Polygon Testnet, Binance wallet, Web framework (Next.js) was used for both backend and front-end connection with blockchain.
A2	Level of Interaction	It requires constant interaction between IPFS, Blockchain wallet and the user to fulfill its purpose. Needs to provide fast transaction and donation update. Dashboard will past donations and created campaigns.
A3	Familiarity	Our project deals with people who are seeking for donations from a broader donor around the world and kindhearted people who are open to share their resources.
A4	Consequences for society and the environment	Will help to motivate kind peoples to donate, also will be greatly helpful resource for help seekers to deals with their financial needs.

How COs are addressed through the Project:

COs	How COs are addressed throughout the project	Corresponding POs
CO1	Apply the Engineering knowledge to provide a working solution on a complex engineering problem and submit a mapping.	PO1
CO2	Identify, formulate and analyze a real-world complex engineering problem based on requirement	PO2
CO3	Design/Develop a working solution on a complex software-intensive system and verify and validate the solution using industrial state of the practice, that indicates a high-quality software-intensive system	PO3
CO4	Use a modern/popular IDE to test complex software-intensive systems.	PO5
CO7	Work as a team and fulfill individual responsibility	PO9
CO8	Communicate effectively through presentation and write effective reports and documentations on the project.	PO10
CO9	Apply project management principles using Version Control System, and appraise project operating cost, financial risk analysis for complex software intensive systems.	PO11