



Swinburne University of Technology

Ho Chi Minh Campus

Decentralised Trading System

Project Design Document

COS30049 - Computing Technology Innovation Project

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1. Project background and introduction

1.1 Introduction

Blockchain technology is regarded as one of the most important inventions since the creation of the Internet in the modern world. As a distributed database, it allows its members to share transaction records with one another (Dmitry Efanov and Pavel Roschin, 2018). The intrinsic property of blockchain technology is its immutability, which makes data stored on nodes impossible to remove or alter (Features of Blockchain, 2020). This quality becomes more and more important given the rise in instances of hackers breaking into bank accounts to steal money or login credentials.

Blockchain appears as a way to guarantee transactions are transparent, strengthen security, and support decentralized applications. Blockchain stores information into a block, those blocks are linked together through cryptography (Adam Hayes 2023). Strong systems are essential to fend off cyberattacks because of the growing risks in the digital sphere. By offering an unchangeable and transparent record, blockchain allays these worries and improves the general security posture of online transactions. The current project's goal is to create a decentralized trading platform. In addition to allowing users to examine their transaction history, this technology attempts to facilitate safe money transfers among network users. This decentralized trading system adheres to the fundamental principles of blockchain technology by utilizing blockchain technology to guarantee accountability and transparency in addition to offering a secure method of conducting financial transactions. As we delve into the intricacies of the project, it becomes evident that the proposed system embodies the principles of security and transparency that are integral to the promise of blockchain technology.

1.2 Project Background

The emergence of blockchain technology has caused a revolution in the financial industry, opening the door to a decentralized future. A few of the difficulties

faced by traditional, centralized exchanges are their lack of transparency, manipulation susceptibility, and single point of failure risk. Decentralized trading systems eliminate intermediaries and centralized organizations from all asset trading procedures with the use of modern technologies (Rakesh Sharma 2023) Transactions involving digital assets, such as tokens and cryptocurrencies, are handled using decentralized trading platforms, which facilitate speedy and inexpensive transaction processing. Decentralized trading systems, which promise more equitable, secure, and easily accessible financial markets, therefore stand out as a revolutionary alternative in this environment. We have created a decentralized trading system after realizing the shortcomings of conventional methods. Our system's objective is to enable safe, transparent, and highly efficient trading, while decreasing reliance on intermediary transaction sources. My project will center on a few essential features. The first option is asset trading, where users can exchange bitcoins using their address. In order to ensure that their transaction process goes as smoothly as possible, consumers can also keep track of their transaction process, information, and status. By changing the "Difficulty" and "Mining reward" input types, users can personalize their trade status. There is a chance that the trading market will alter as a result of the deployment of our decentralized trading system. to establish a robust and easily navigable financial environment. Additionally, it reduces the issues and dangers associated with traditional transactions.

1.3 Motivation

The decentralized trading system (Decentralized Trading System) is currently gaining popularity and is becoming an essential component of the blockchain and electronic markets, benefiting consumers and investors alike. Utilize it to share and access digital assets with ease. My team members are motivated to investigate, create, and develop a decentralized trading system as a result..

Transparency is one of the best features of the decentralized system; every transaction is permanently recorded and made public on the blockchain. Since all transactions are stored amongst users, the decentralized trading system does not rely on a third party to handle or keep customer assets. Put differently, having control over your resources through a decentralized system reduces dangers like fraud and hacking. Decentralized markets display trading information in real time and employ

various technologies for live transactions. This facilitates transactions by removing the need for buyers and sellers to be present in the same location (Carla Tardi 2021). Decentralized systems are fascinating for this reason, which is why our team decided to perform a project on them.

1.4 Core function requirements

The decentralized trading system will provide users with safety and transparency during use. Below are some core functional requirements. My system provides users with the login vs signup function to provide users with the best and most comprehensive experience.

1. Signup allows new users to register for an account by providing first name, last name, username, email, password and phone number. There is integrated authentication to check validity and prevent duplicate accounts. clause
2. Login allows users to access the system if the user uses a username with a registered password. We also use the password hash mechanism to protect user information more strictly
3. My system also has transactions for users to make money transfers. Users can enter the recipient address with the recipient address and the amount of money they make the transaction, and update the balance after making the transaction
4. In addition, our system also allows users to track and view information and transaction times so that users can easily manage their own delivery process and transaction performance.

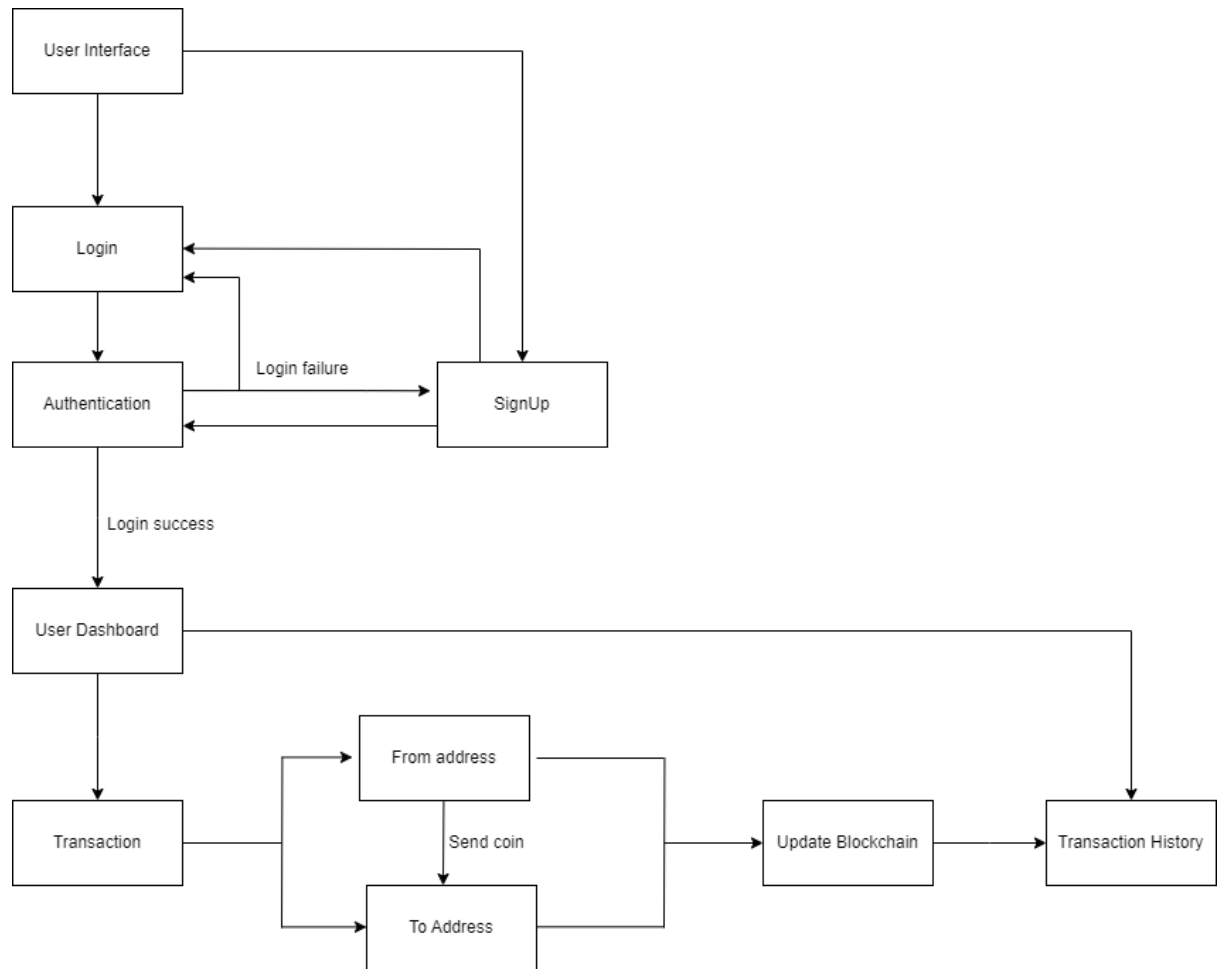


Image 1 : Diagram of core function requirement

2. Team introduction

The project team consists of three people, each of whom specializes in one of the project's domains, such as cybersecurity, software development, and software design:

Table 1: Team Responsibilities

Team members	Responsibilities
Tran Thanh Minh	Software development, Blockchain development
Nguyen Quoc Thang	Software development, Cybersecurity
Nguyen Do Nhat Nam	Software development, Software design

3. Project Description

This application is a decentralized money transfer system which will be implemented with technologies such as React, Django, Solidity to enable the users to securely send and receive money in a decentralized manner. This project will be executed in two major phases for software development. The first phase involves the development of frontend components, including the static web pages and the user interface design. The second phase focuses on the backend logic and components where the core functional requirements are implemented to handle decentralized money transfer functionalities.

4. Project requirement list

4.1 Functional Requirements

4.1.1 User Authentication and Registration:

- Users can create accounts by providing details
- Users can log in to the system using their credentials
- Passwords should be securely stored using appropriate encryption techniques

4.1.2 Wallet Creation and Management:

- Users have a digital wallet associated with their account
- Wallets support basic functionalities such as balance inquiry and transaction

4.1.3 Decentralised Money Transfer:

- Users can send money to other users within the system using decentralized technologies.
- Transactions should be secure, transparent and verifiable.

4.1.4 Smart Contracts:

- Integration of smart contracts using Solidity for executing transactions
- Smart contracts should define rules for money transfers and ensure trust among users.

4.1.5 Transaction Confirmation:

- Users receive notifications or confirmations once money transfer is successfully completed.
- Confirmation should include details such as transaction ID, amount and timestamp.

4.1.6 User Dashboard:

- A user-friendly dashboard displaying wallet balance, user's wallet address, transaction history, account details.
- Real-time updates on wallet status and recent transactions.

4.1.7 Security Measures:

- Implementation of security protocols to safeguard user data and transactions.
- Use HTTPS, encryption, and secure authentication methods.

4.2 Non-functional Requirements

4.2.1 Scalability:

- The system should be scalable to handle an increasing number of users and transactions.

4.2.2 Performance:

- Efficient handling of transactions with minimal latency.
- Quick response times for user interactions.

4.2.3 Reliability:

- The system should be available and reliable, minimizing downtime.
- Backups and recovery plans should be in place.

4.2.4 Security:

- Implementation of robust security measures to protect user data and financial transactions.

4.2.5 Usability:

- User-friendly interfaces for both web and mobile platforms.
- Clear instructions and error messages for users.

4.2.6 Compatibility:

- Compatibility with various browsers and devices.
- Ensure a consistent user experience across different platforms.

5. Project design

5.1. Frontend Prototype

Link to our frontend Prototype: [Link](#)

5.1.1. Setting page

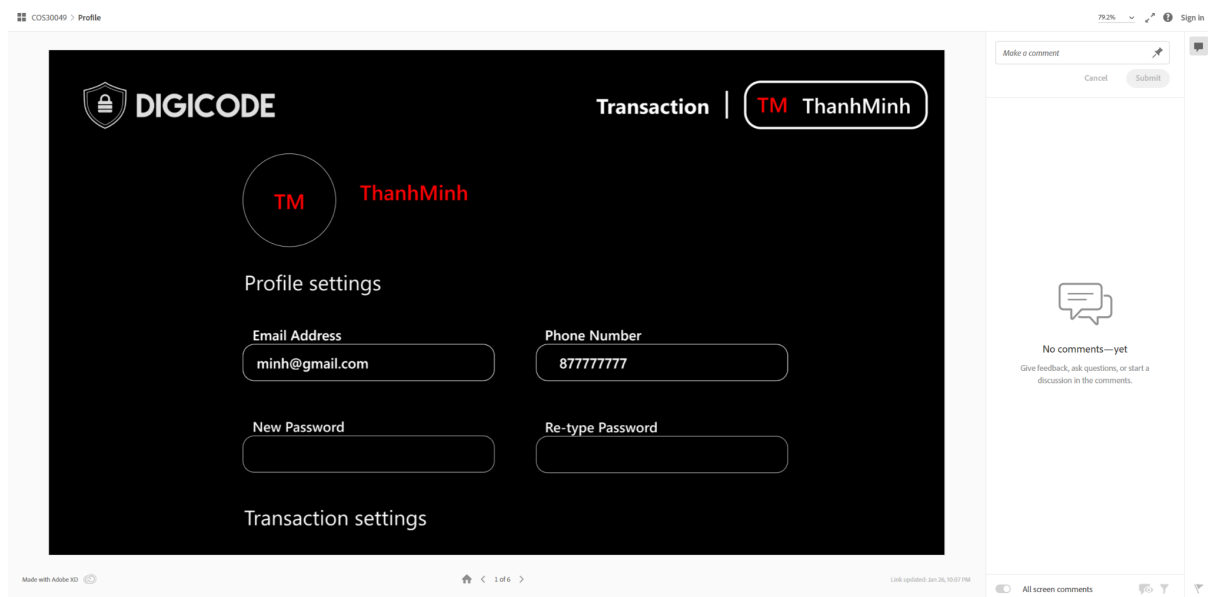


Image 2: Profile settings page

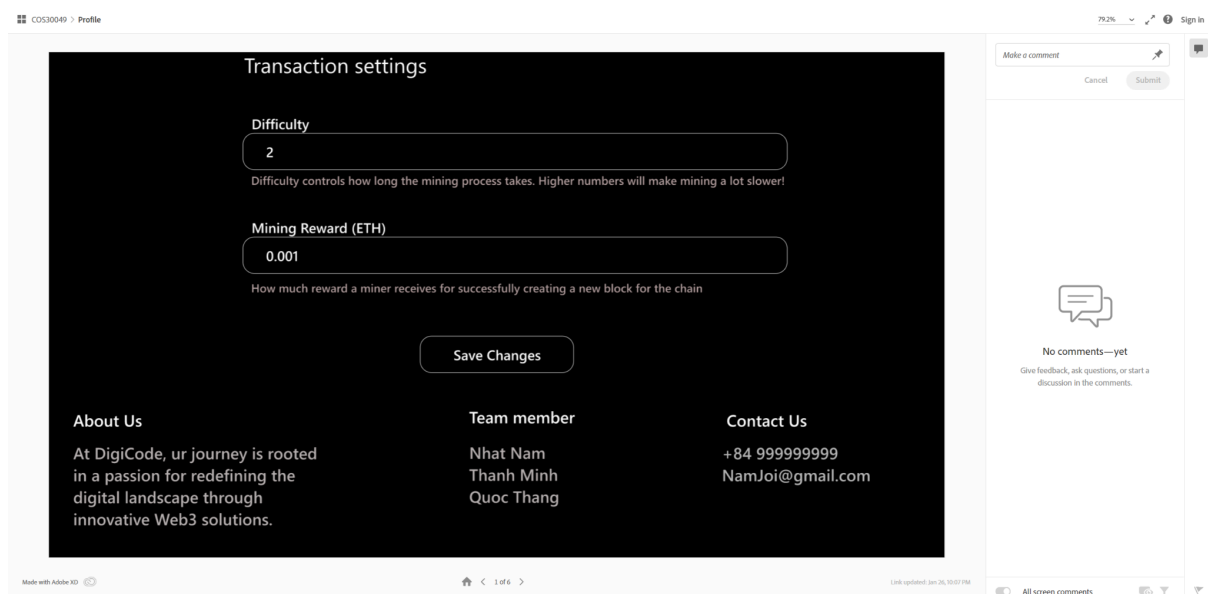


Image 3: Transaction settings page

5.1.2. Transaction page

The screenshot shows the DIGICODE Transaction page. At the top left is the DIGICODE logo. To its right, the word "Transaction" is underlined, followed by a user profile icon and the name "ThanhMinh". Below the logo, the "Your Wallet Address:" is displayed as "0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f". To the right, the "Balance:" is shown as "10.343 ETH". The main heading is "Create transaction". Below it, the "From Address" section contains a text input field with the same wallet address and a note: "This is your wallet address. You cannot change it because you can only spend your own coins". The "To Address" section has an empty text input field. On the right side, there is a comment section with a "Make a comment" input, "Cancel" and "Submit" buttons, and a message stating "No comments—yet" with a link to "Give feedback, ask questions, or start a discussion in the comments". The bottom of the page includes a footer with "Made with Adobe XD", navigation arrows, and a "Link updated: Jan 26, 10:07 PM" timestamp.

Image 4: Create transaction form

This screenshot shows the same DIGICODE Transaction page, but with the "To Address" section filled out. The text input field for "To Address" contains the address "0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f". Below it, a note reads: "The address of the wallet where you want to send the money to. Note: Please enter the correct address or you will lost all the transferring funds". The "Amount (ETH)" section has an empty text input field with a note below it: "You can transfer any amount.". At the bottom of the form is a large button labeled "Sign & Create Transaction". The right side of the page, including the comment section and footer, remains the same as in Image 4.

Image 5: Create transaction form

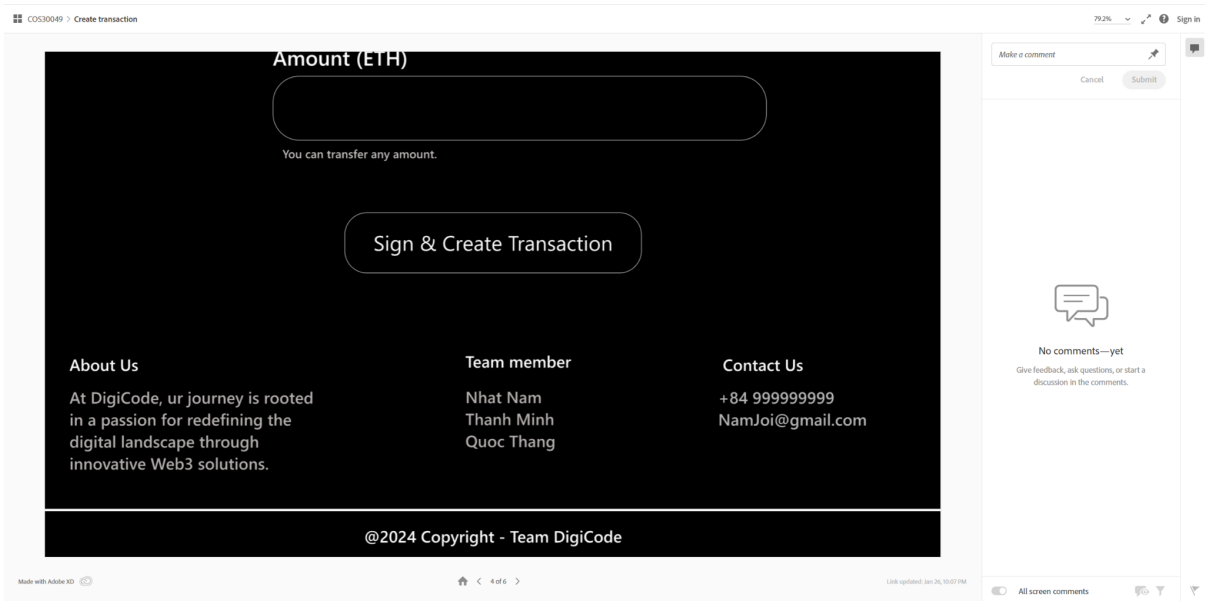


Image 6: Create transaction button

5.1.3. Transaction History page

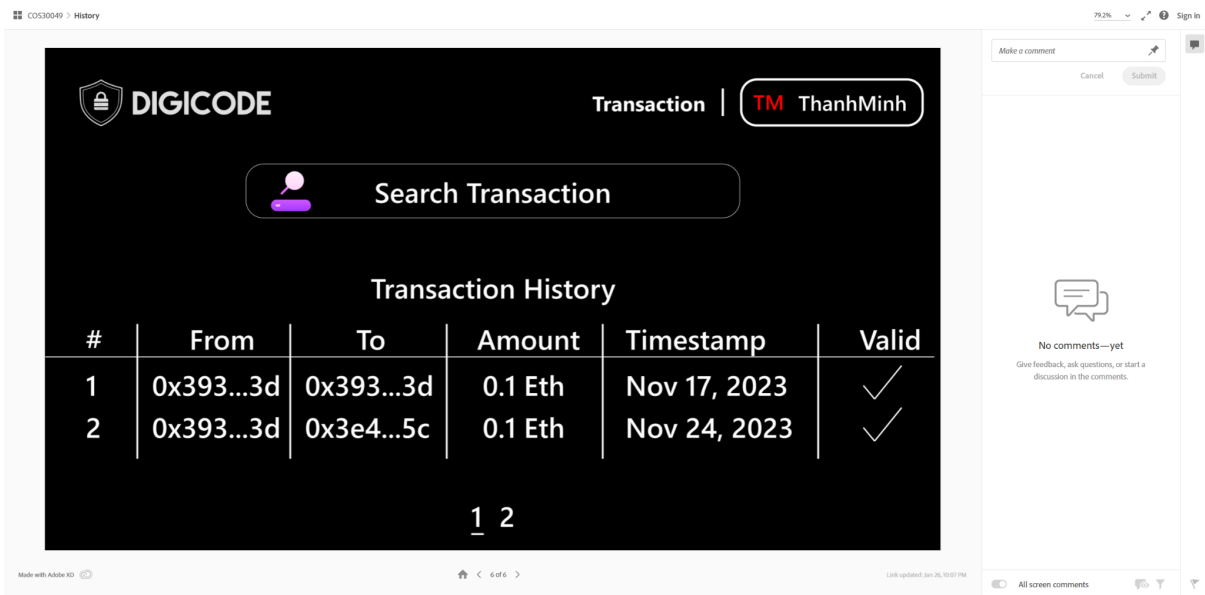


Image 7: Transaction history table



Image 8: Transaction history pagination

5.2 Overall system architecture design

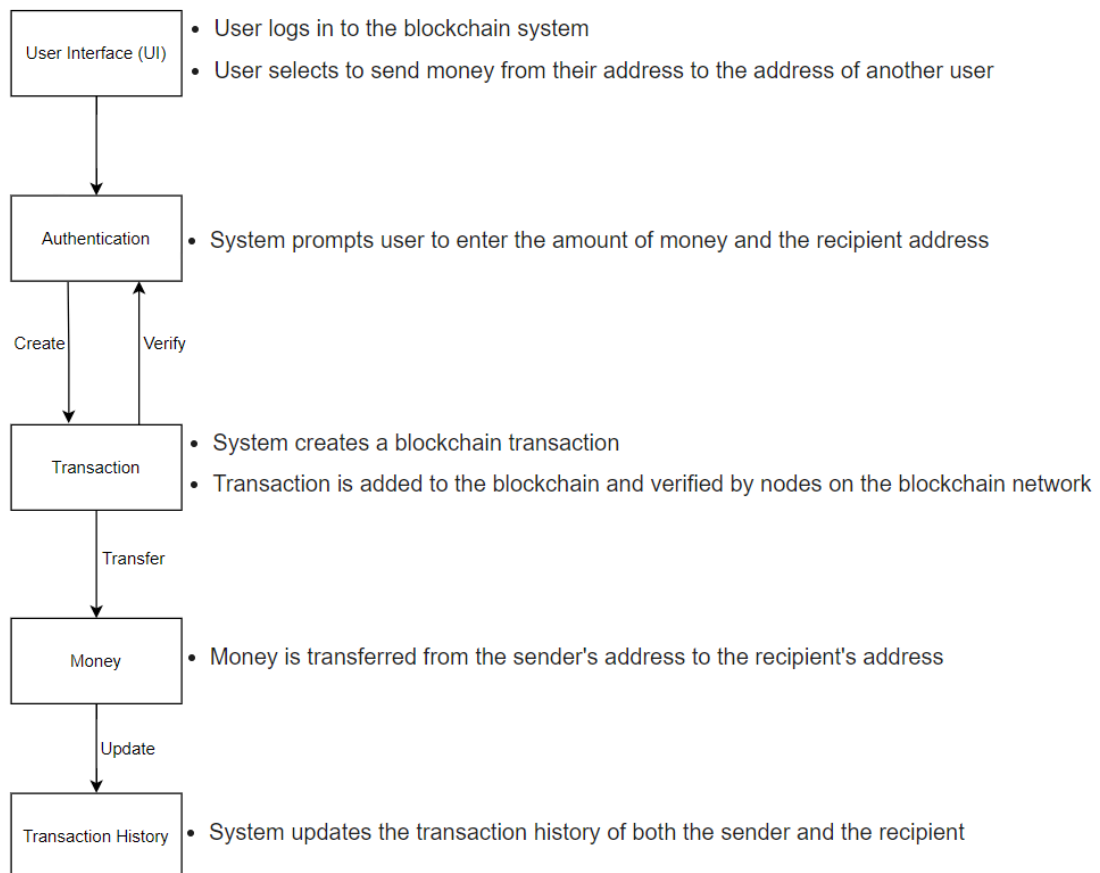


Image 9: Overall system diagram

6.Result and Performance Evaluation

Link to access the web page online: <https://cos30049-digicode.netlify.app/>

6.1 Library used

Here are list of the library used with React to develop the frontend phase:

- *@mui/material*: This is the official Material UI library for React Offering a comprehensive set of pre-built, customizable UI components.
- *@mui/x-data-grid*: This library provides a powerful data grid component for React applications.
- *eslint-plugin-react* and *eslint-plugin-react-hooks*: These plugins for ESLint to help enforce React coding conventions and catch any potential errors in the development stage to ensure the code quality and consistency.
- *react-fast-marquee*: This library provides a component for creating scrolling text marquees in React.
- *react-router-dom*: This library is used for client-side routing in React applications, enabling navigation between different views and components.
- *react-toastify*: This library provides a way to display toast notifications in React applications, informing users about events or actions.
- *tailwindcss*: This is a utility-first CSS framework that provides a vast collection of CSS classes for styling React components.
- *axios*: This library helps to make HTTP requests such as fetching data from a server or sending data to a server.
- *@mui/icons-material*: This library provides a lot of icons for the Material UI components.

All the above libraries can be install in the project with the command line *npm install [library]*

6.2 Package Installation

The client should have the NodeJS installed on the computer, if not the client can follow this link to install the NodeJS (<https://nodejs.org/en/download>).

1. Navigate to the folder
2. Execute this in the command line to install packages: *npm install*

3. Execute this in the command line to start the server: `npm start`
4. Then navigate to <http://localhost:3000/> to open the web view.

6.3 Result

Link to our website which is deployed online: <https://cos30049-digicode.netlify.app/>

Link to our source code on Github: <https://github.com/NamJoi/COS30049-Frontend>

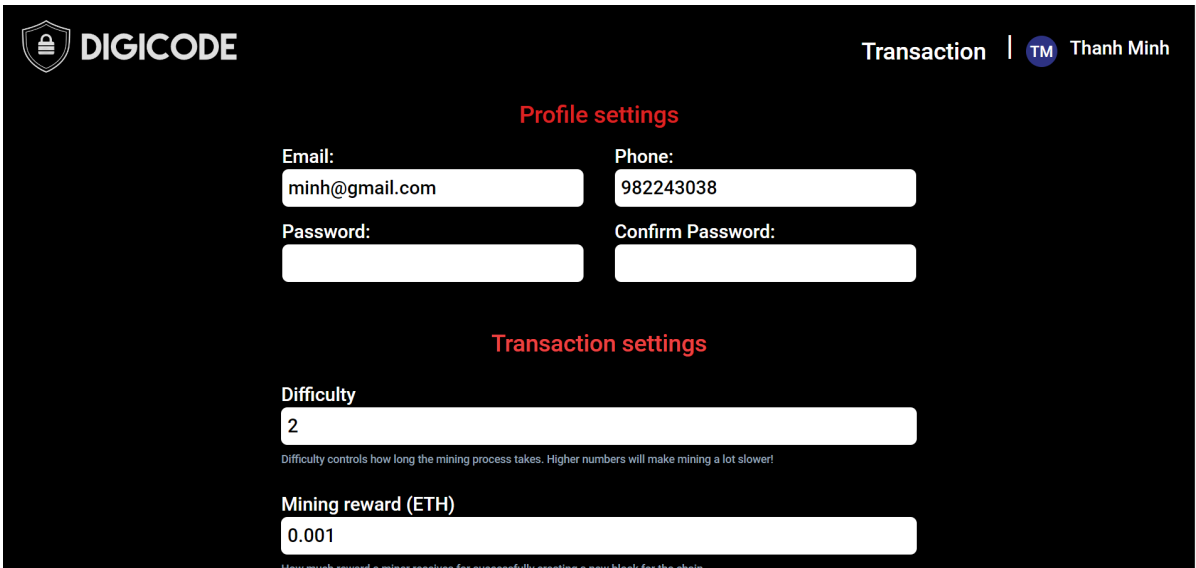
There is a fake user that have been created with the following credentials:

- **Username:** admin
- **Password:** admin

6.3.1 Profile and Transaction Settings page

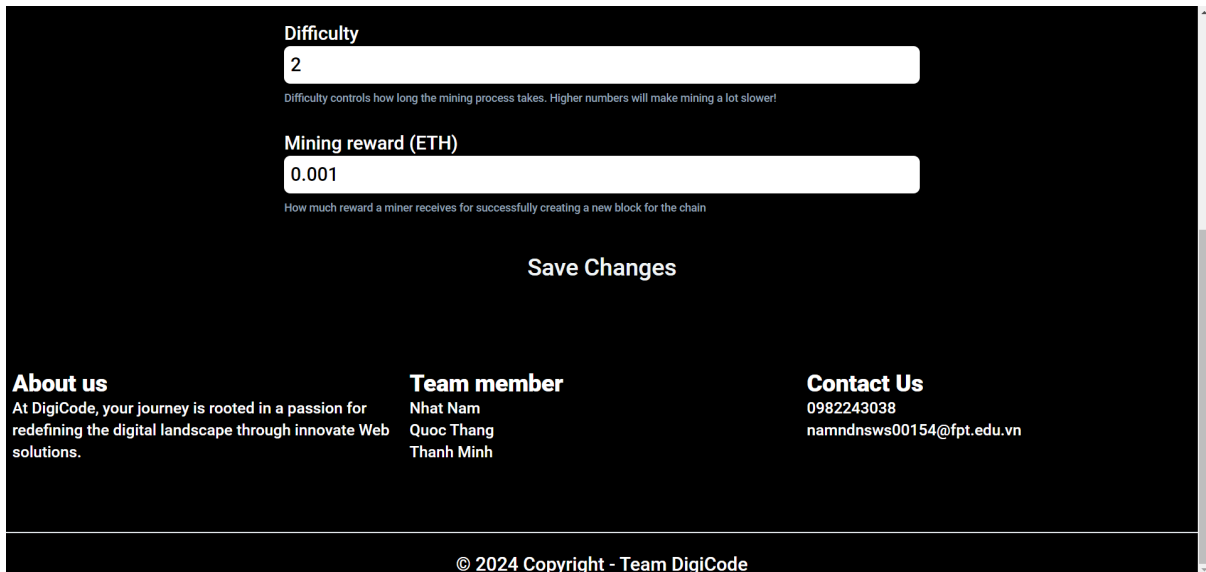
In the first section of the "Profile and Transaction Settings" page, we have designed the Profile section to allow users to edit personal information such as "Email", "Phone", and "Password".

The second section is our Transaction settings. In this section, users will be able to modify information in two input forms, namely "Difficulty" and "Mining reward (ETH)". The "Difficulty" section will adjust the mining difficulty to maintain a stable time between blocks. The "Mining reward (ETH)" section will determine the amount of ETH a miner receives when successfully creating a new block on the blockchain. Both the "Profile" and "Transaction" sections will be stored in the database to save any changes.



The screenshot displays the DIGICODE application interface. At the top left is the DIGICODE logo. At the top right, there is a navigation bar with 'Transaction' and a user profile icon labeled 'TM Thanh Minh'. The main content area is divided into two sections. The first section, titled 'Profile settings' in red, contains four input fields: 'Email' (with 'minh@gmail.com'), 'Phone' (with '982243038'), 'Password', and 'Confirm Password'. The second section, titled 'Transaction settings' in red, contains two input fields: 'Difficulty' (with '2') and 'Mining reward (ETH)' (with '0.001'). Below the 'Difficulty' field, there is a small text note: 'Difficulty controls how long the mining process takes. Higher numbers will make mining a lot slower!'. Below the 'Mining reward (ETH)' field, there is another small text note: 'How much reward a miner receives for successfully creating a new block for the chain'.

Image 10: Profile and Transaction Settings session

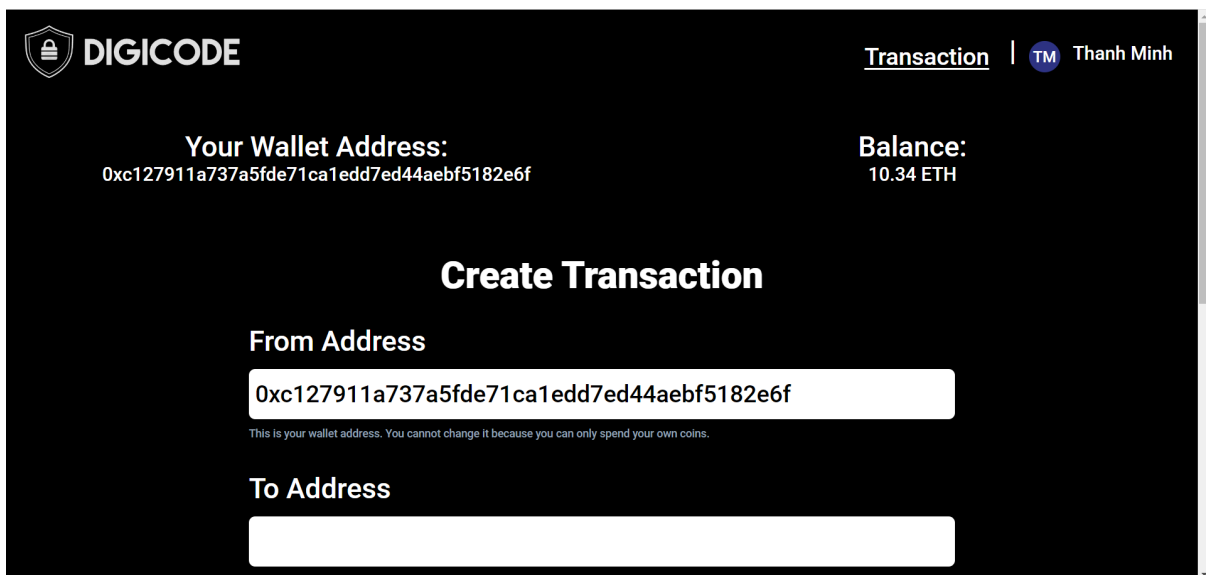


The screenshot shows a dark-themed interface for mining settings. At the top, there are two input fields: 'Difficulty' with the value '2' and 'Mining reward (ETH)' with the value '0.001'. Below each field is a small explanatory text. The 'Difficulty' text says 'Difficulty controls how long the mining process takes. Higher numbers will make mining a lot slower!'. The 'Mining reward' text says 'How much reward a miner receives for successfully creating a new block for the chain'. Below these fields is a prominent 'Save Changes' button. At the bottom of the interface, there is a footer section with three columns: 'About us' (describing DigiCode's mission), 'Team member' (listing Nhat Nam, Quoc Thang, and Thanh Minh), and 'Contact Us' (providing a phone number and email). The footer also includes a copyright notice: '© 2024 Copyright - Team DigiCode'.

Image 11: Save Changes setting button

6.3.2 Transaction page

On this page, we provide users with the functionality to transfer ETH from one address to another. The page will display the default address and the total amount of ETH the user currently possesses. Users can initiate the process of transferring ETH from one address to another based on their decision.



The screenshot shows the 'Transaction' page of the DigiCode wallet. The top navigation bar includes the DigiCode logo, the word 'Transaction', and a user profile icon labeled 'Thanh Minh'. The main content area displays 'Your Wallet Address:' as '0xc127911a737a5fde71ca1edd7ed44aebf5182e6f' and 'Balance:' as '10.34 ETH'. Below this is a large 'Create Transaction' button. Underneath the button, there are two input fields: 'From Address' (pre-filled with the wallet address) and 'To Address' (empty). Small text below the 'From Address' field states: 'This is your wallet address. You cannot change it because you can only spend your own coins.' The bottom of the form has a small, partially visible text: 'This address of the wallet address you must spend the money to'.

Image 12: Create Transaction form

When the user presses the button, the system will receive the information and execute the transaction.

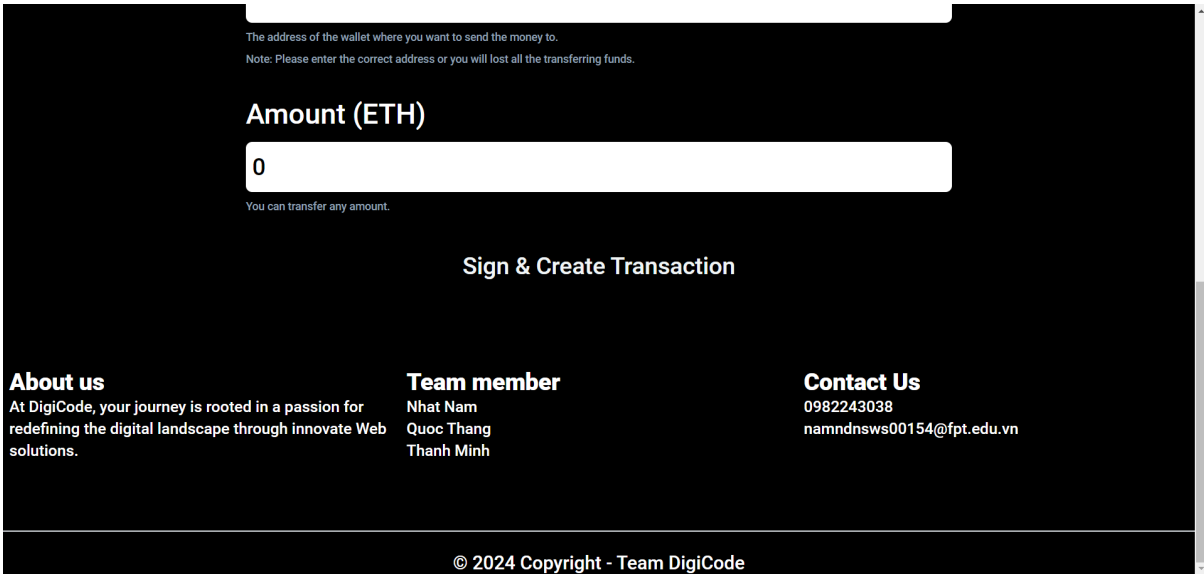


Image 13: Create Transaction button

6.3.3 Transaction History page

This page will enable users to view and manage all the transaction history they have conducted. All transaction history will be displayed in a table format. This table provides comprehensive details such as "ID", "From Address", "To Address", "Amount (ETH)", "Time Stamp", and "Valid".

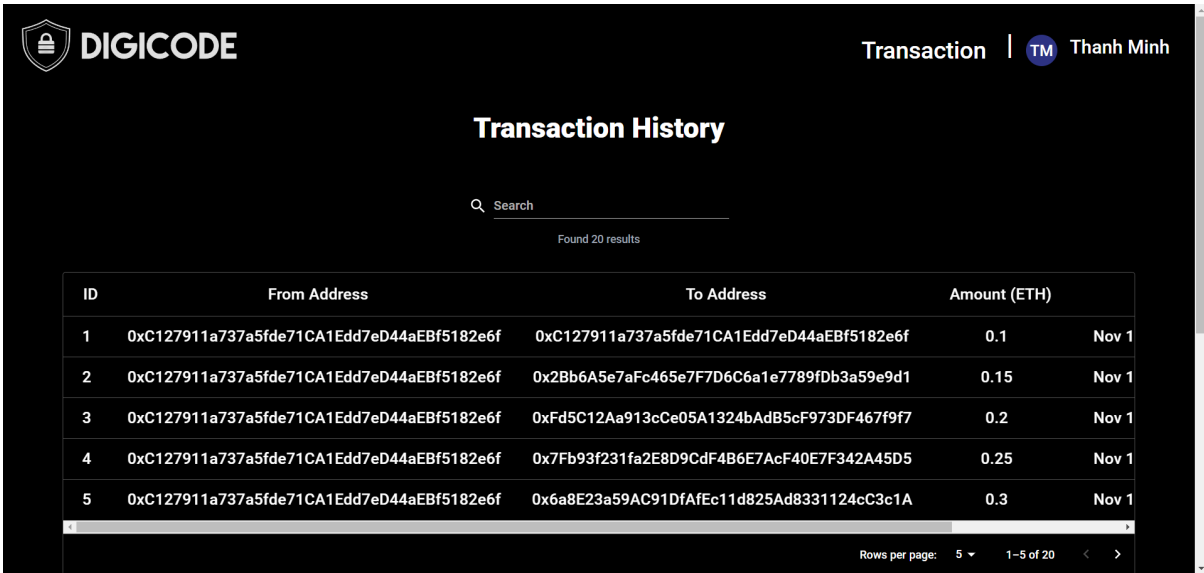


Image 14: Transaction History table

Moreover, for users looking to save time in searching, we have implemented a search bar, allowing users to search for specific transaction histories.

ID	From Address	To Address	Amount (ETH)	
3	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0xFd5C12Aa913cCe05A1324bAdB5cF973DF467f9f7	0.2	Nov 1
4	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0x7Fb93f231fa2E8D9CdF4B6E7AcF40E7F342A45D5	0.25	Nov 1

Image 15: History search bar

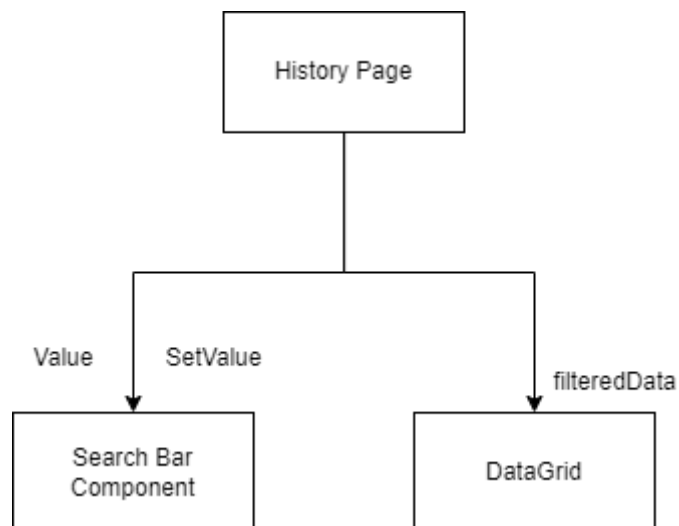


Image 16: Structure of History page.

In the page History, it will fetch the data of transaction history. Then users can search for any transaction that they are interested in. The Search bar component will get the input from the user and send it back to the History component and then there will be a function for filtering the user input to match with the data then it will display in the Data Grid (Image 16).

Additionally, we offer several user-friendly features like "Sort", "Filter", or "Hide and Show column" (Image 16 to Image 20).

DIGICODE Transaction | TM Thanh Minh

Transaction History

Search

Found 20 results

ID	From Address	To Address	Amount (ETH)	
×	Columns Amount (ETH)	Operator contains	Value Filter value	
1	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0.1	Nov 1
2	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0x2Bb6A5e7aFc465e7F7D6C6a1e7789fDb3a59e9d1	0.15	Nov 1
3	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0xFd5C12Aa913cCe05A1324bAdB5cF973DF467f9f7	0.2	Nov 1
4	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0x7Fb93f231fa2E8D9CdF4B6E7AcF40E7F342A45D5	0.25	Nov 1
5	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0x6a8E23a59AC91DfAFec11d825Ad8331124cC3c1A	0.3	Nov 1

Rows per page: 5 1-5 of 20

Image 17: Filter function

DIGICODE Transaction | TM Thanh Minh

Transaction History


Search


Found 20 results

ID	From Address ↓	To Address	Amount (ETH)	
1	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0.1	Nov 1
2	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0x2Bb6A5e7aFc465e7F7D6C6a1e7789fDb3a59e9d1	0.15	Nov 1
3	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0xFd5C12Aa913cCe05A1324bAdB5cF973DF467f9f7	0.2	Nov 1
4	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0x7Fb93f231fa2E8D9CdF4B6E7AcF40E7F342A45D5	0.25	Nov 1
5	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0x6a8E23a59AC91DfAFec11d825Ad8331124cC3c1A	0.3	Nov 1

Rows per page: 5 1-5 of 20

Image 18: Sort function

DIGICODE

Transaction |  Thanh Minh

Transaction History


Q Search


Found 20 results

ID	From Address ↓	Amount (ETH)	Time Stamp	Valid
1	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0.1	Nov 17, 2024 10:00 AM	✓
2	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0.15	Nov 17, 2024 11:30 AM	✓
3	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0.2	Nov 17, 2024 01:15 PM	✓
4	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0.25	Nov 17, 2024 02:45 PM	✗
5	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0.3	Nov 17, 2024 04:00 PM	✓

Rows per page: 5 1-5 of 20 < >

Image 19: Hide column function

DIGICODE

Transaction |  Thanh Minh

Transaction History

Q Search

Found 20 results

	From Address ↓	Amount (ETH)	Time Stamp	Valid
Find column	7eD44aEBf5182e6f	0.1	Nov 17, 2024 10:00 AM	✓
<input type="radio"/> ID	7eD44aEBf5182e6f	0.15	Nov 17, 2024 11:30 AM	✓
<input checked="" type="radio"/> From Address	7eD44aEBf5182e6f	0.2	Nov 17, 2024 01:15 PM	✓
<input type="radio"/> To Address	7eD44aEBf5182e6f	0.25	Nov 17, 2024 02:45 PM	✗
<input checked="" type="radio"/> Amount (ETH)	7eD44aEBf5182e6f	0.3	Nov 17, 2024 04:00 PM	✓
<input checked="" type="radio"/> Time Stamp				
<input checked="" type="radio"/> Valid				

HIDE ALL

SHOW ALL

Rows per page: 5 1-5 of 20 < >

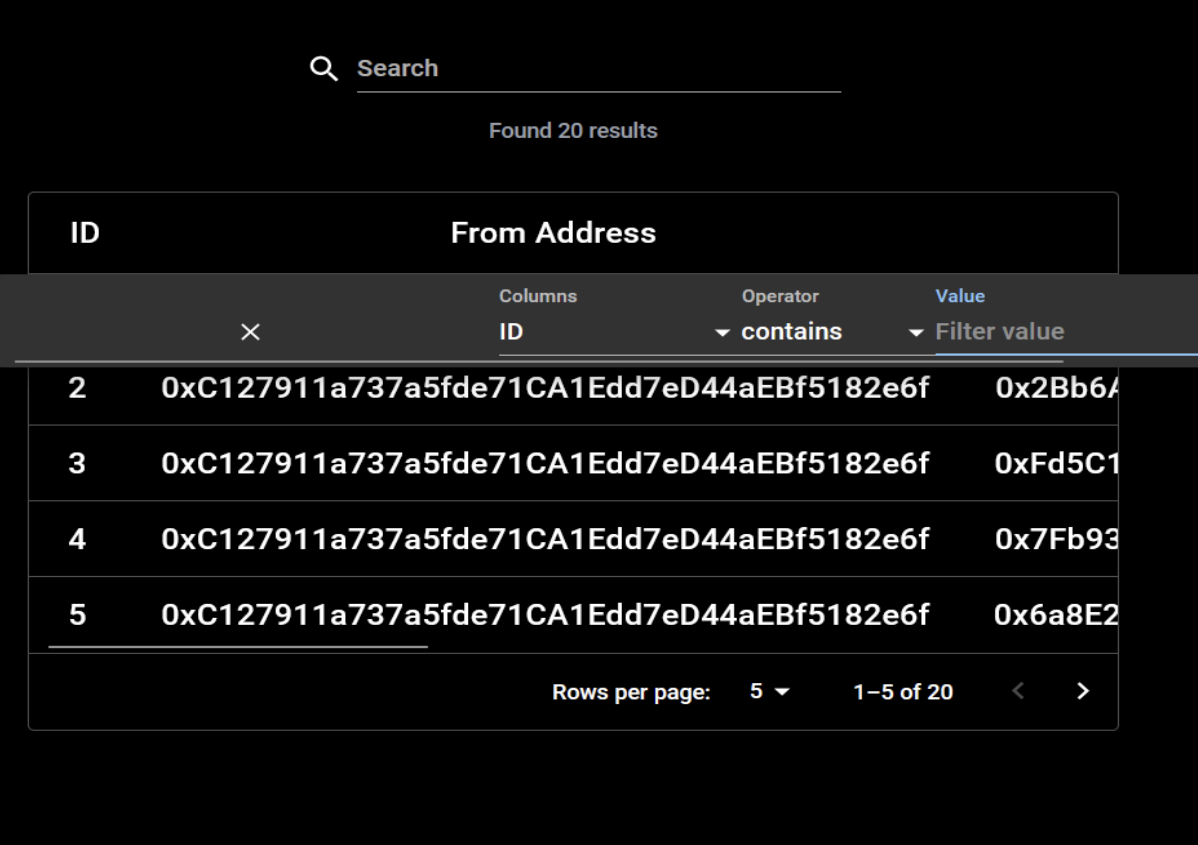
Image 20: Manage column session

6.4 Drawbacks and Improvement:

6.4.1 Drawback 1

Unable responsive when enabled Filter in Transaction History page.

Improvement: We will use other libraries that are more suitable for website responsiveness. Thereby giving users the most optimized experience possible.



Search

Found 20 results

ID	From Address	
2	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0x2Bb6A
3	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0xFd5C1
4	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0x7Fb93
5	0xC127911a737a5fde71CA1Edd7eD44aEBf5182e6f	0x6a8E2

Rows per page: 5 1-5 of 20 < >

Image 21: Error responsive Filter

6.4.2 Drawback 2

Unsuitable library horizontal scrolling animation.

Improvement: We will use other libraries to improve the lag effect. Users can also improve their web experience by accessing it with other browsers such as Firefox.

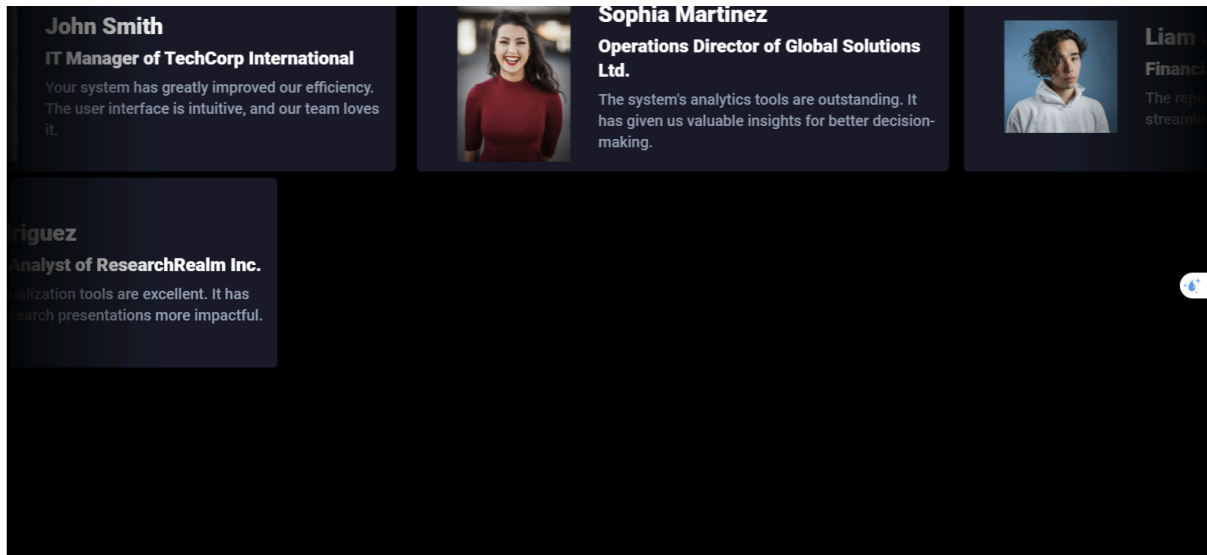


Image 22: Lagging animation

7. Reference

Dmitry Efanov and Pavel Roschin (2018). The All-Pervasiveness of the Blockchain Technology. *Procedia Computer Science*, [online] 123, pp.116–121.
doi:<https://doi.org/10.1016/j.procs.2018.01.019>.

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