Swinburne University of Technology

Ho Chi Minh Campus

Decentralised Trading System

Project Design Document

COS30049 - Computing Technology Innovation Project

Project Group 3TL:

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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.

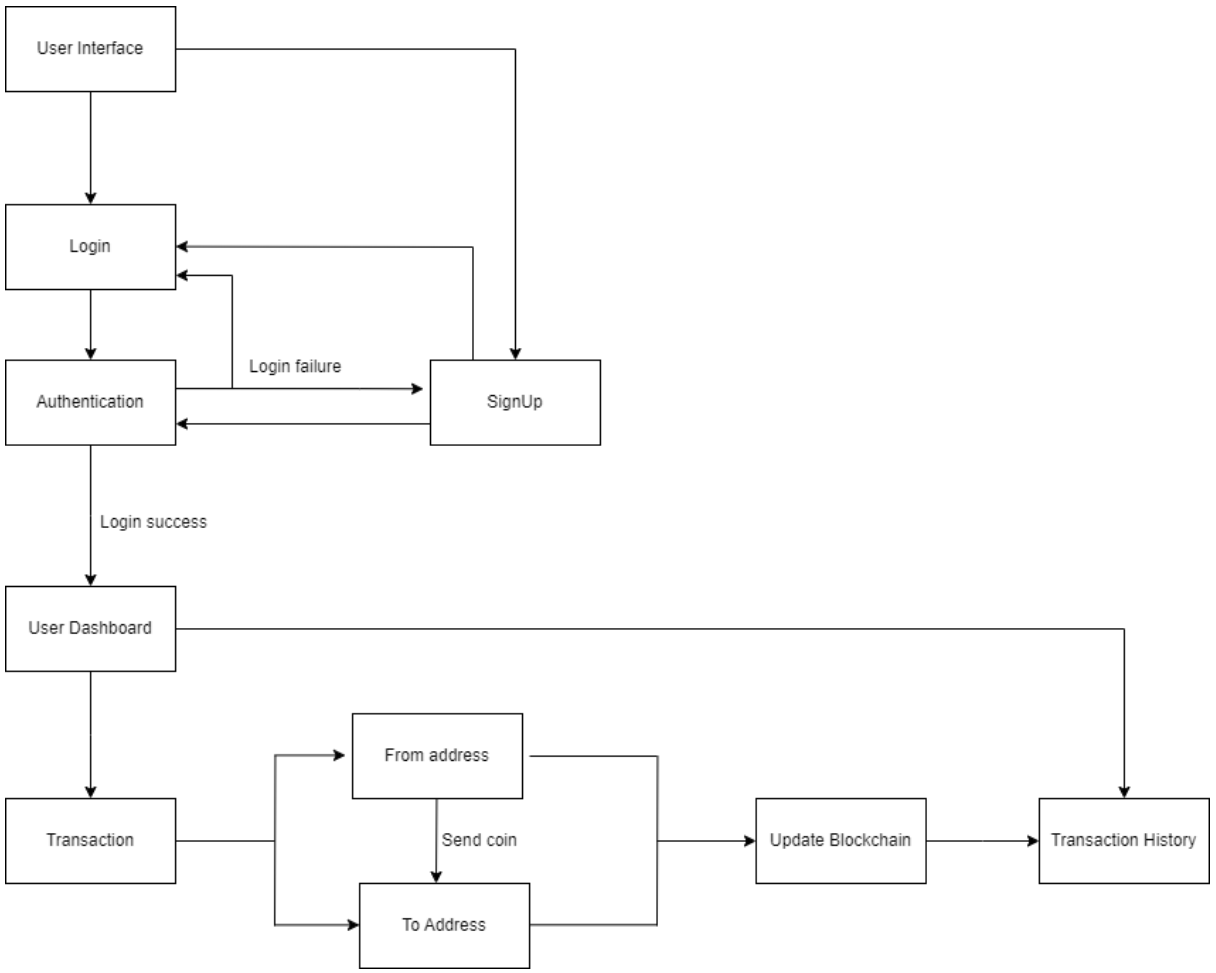

Image 1 : Diagram of core function requirement

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 appreciate 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.

4.1.4 Transaction Confirmation:

- Users receive notifications or confirmations once money transfer is successfully completed.
- Confirmation should include details such as transition 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 transitions.

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

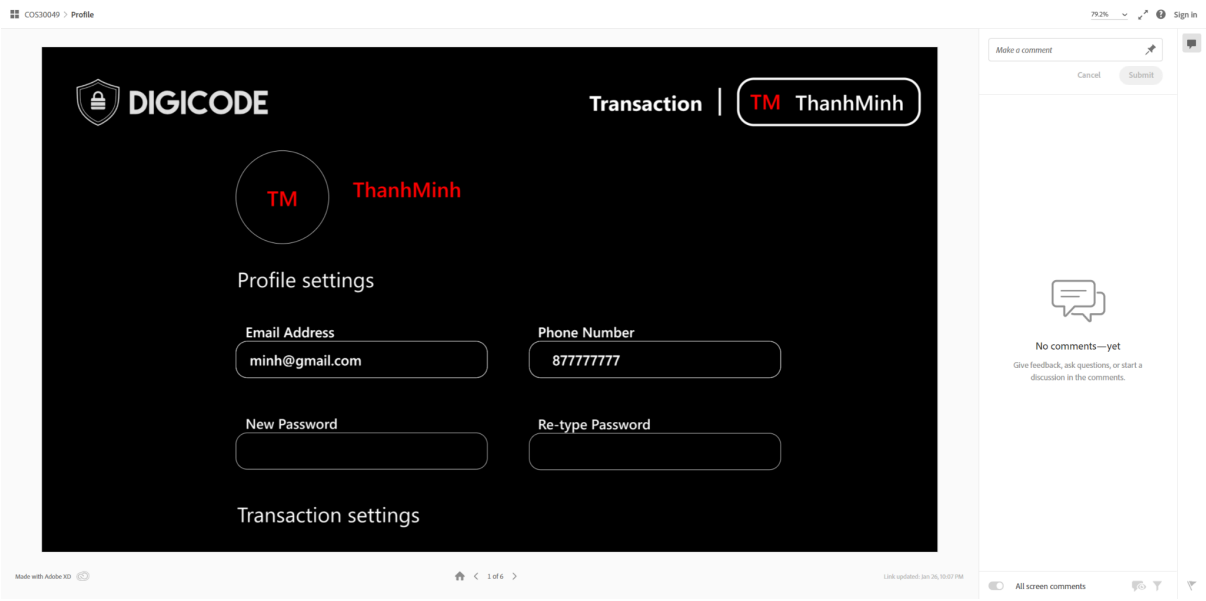

Image 2: Profile settings page

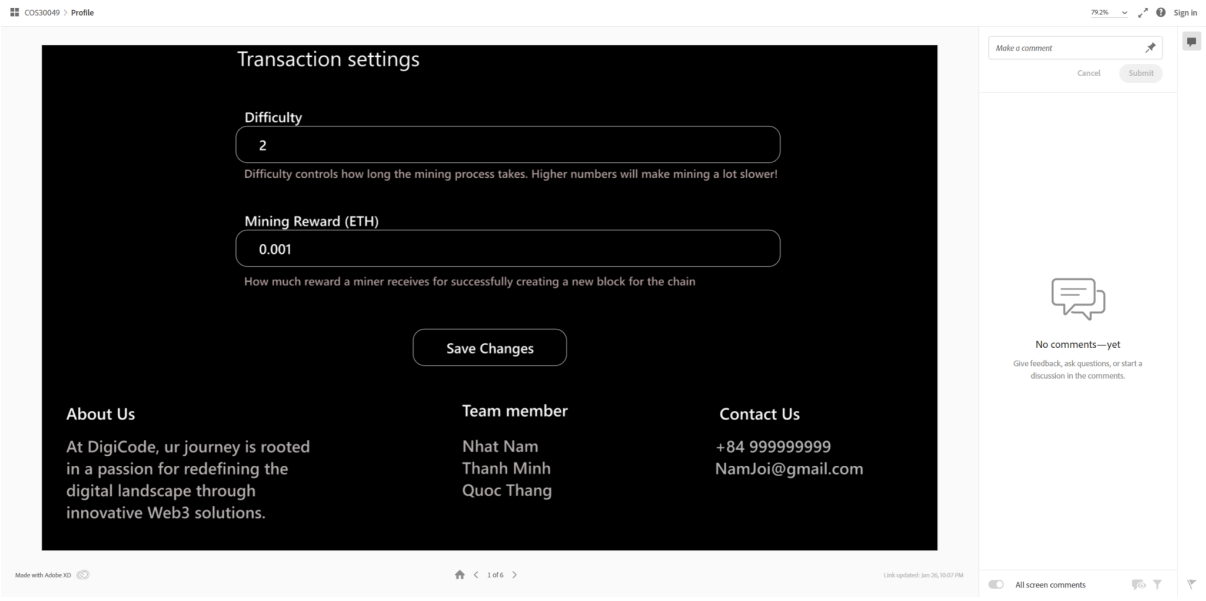

Image 3: Transaction settings page

5.1.2. Transaction page

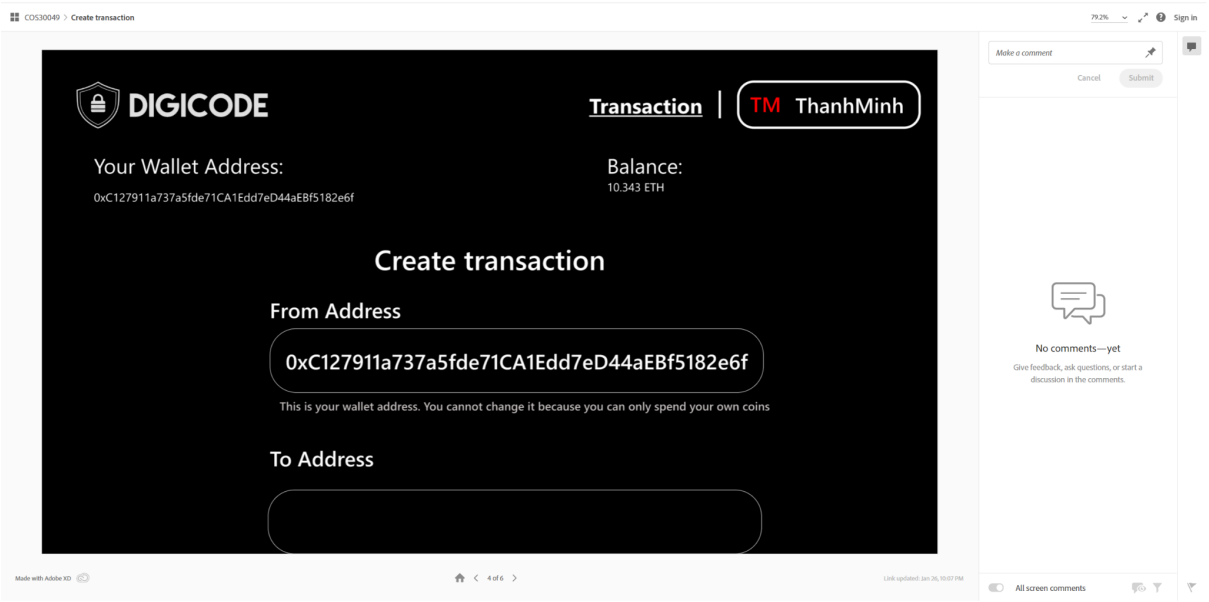

Image 4: Create transaction form

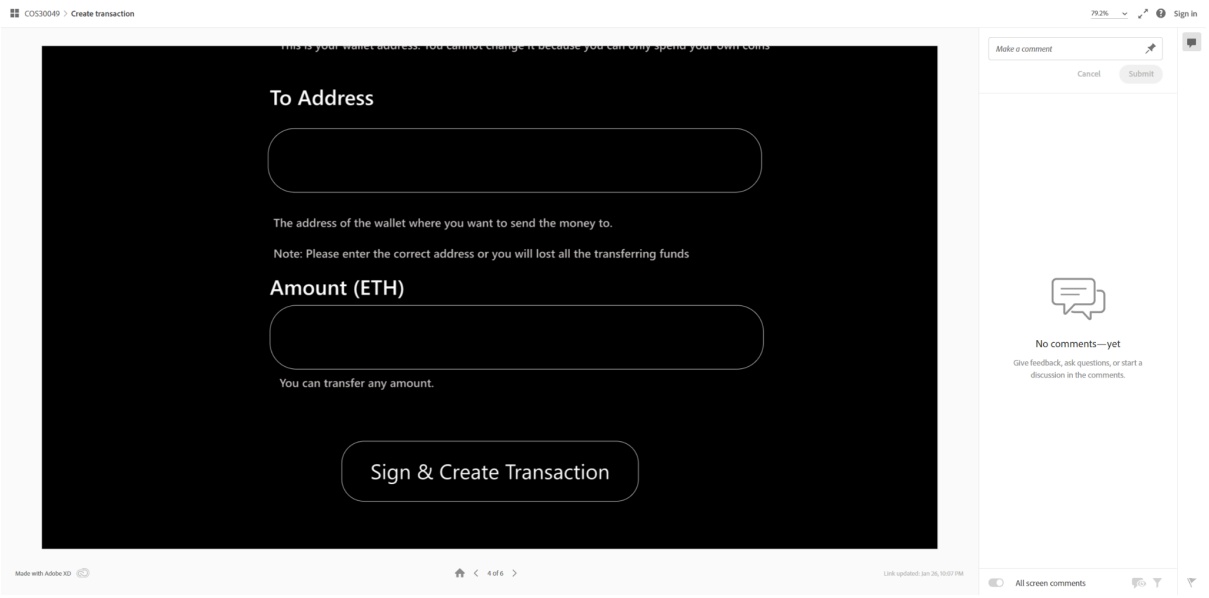

Image 5: Create transaction form

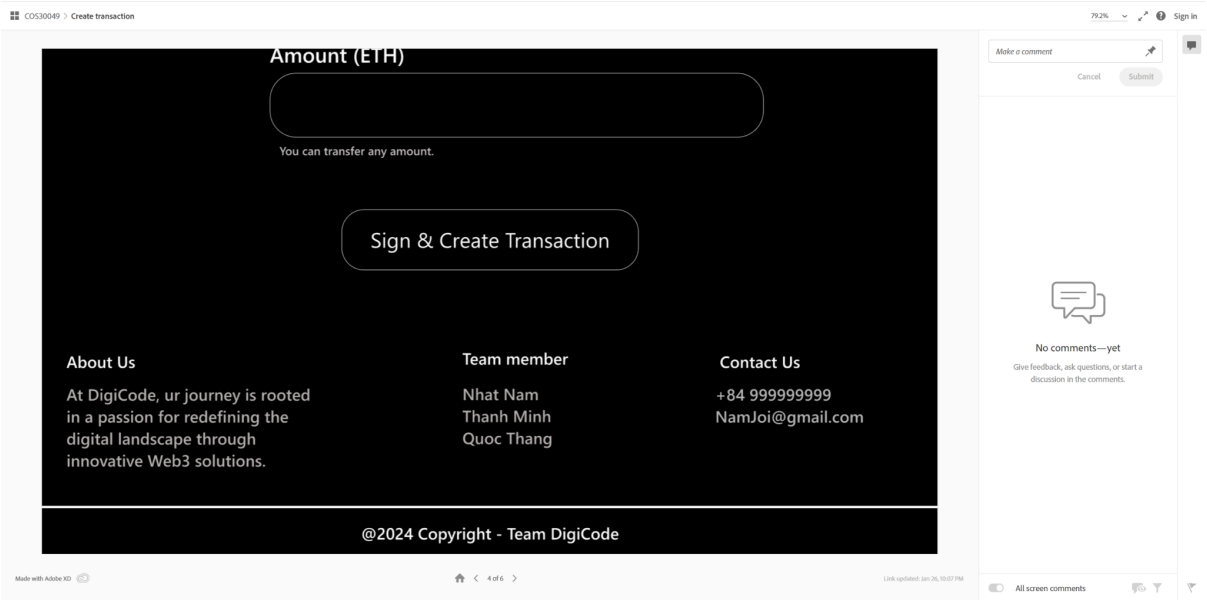

Image 6: Create transaction button

5.1.3. Transaction History page

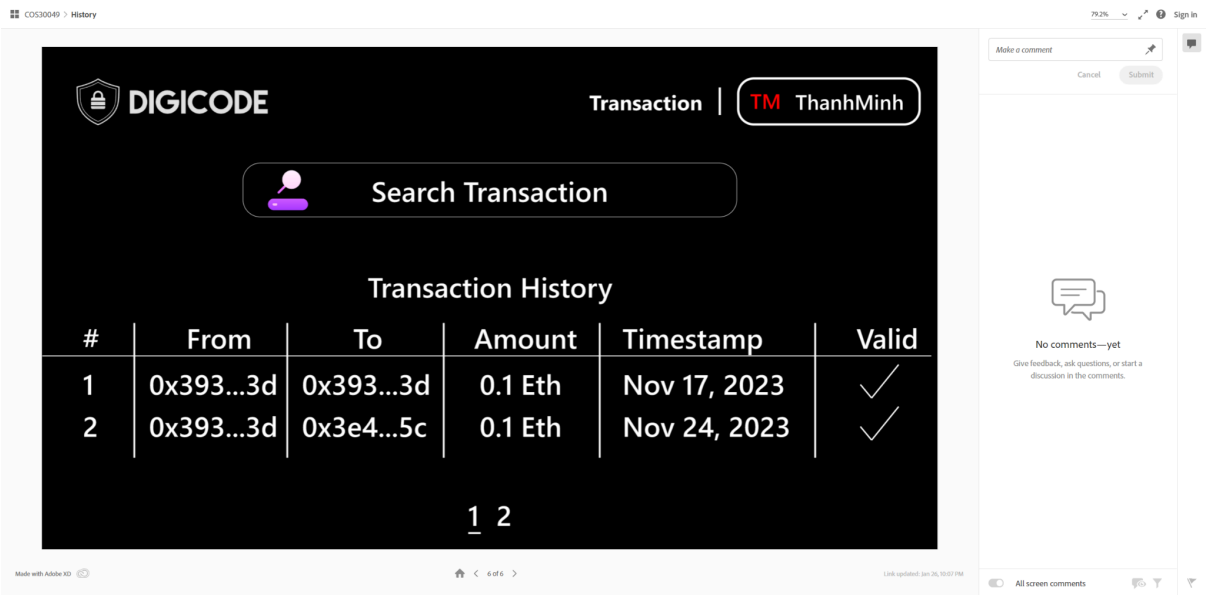

Image 7: Transaction history table

Image 8: Transaction history pagination

5.2 Overall system architecture design

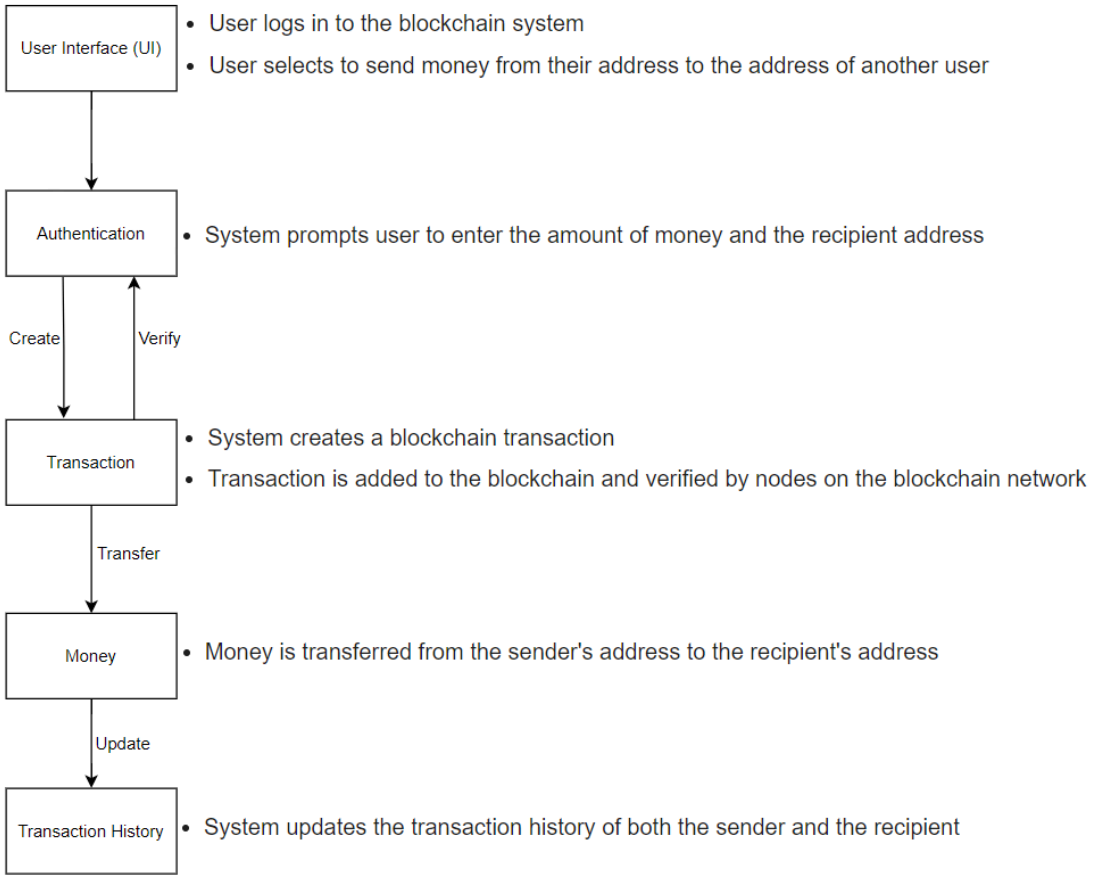

Image 9: Overall system diagram

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.

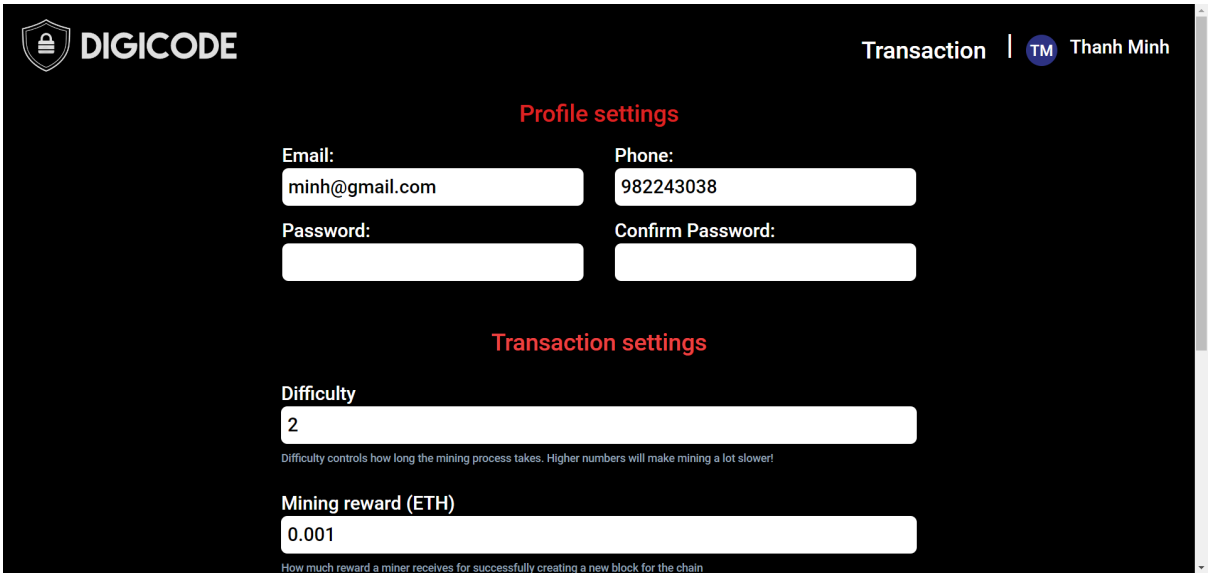

Image 10: Profile and Transaction Settings session

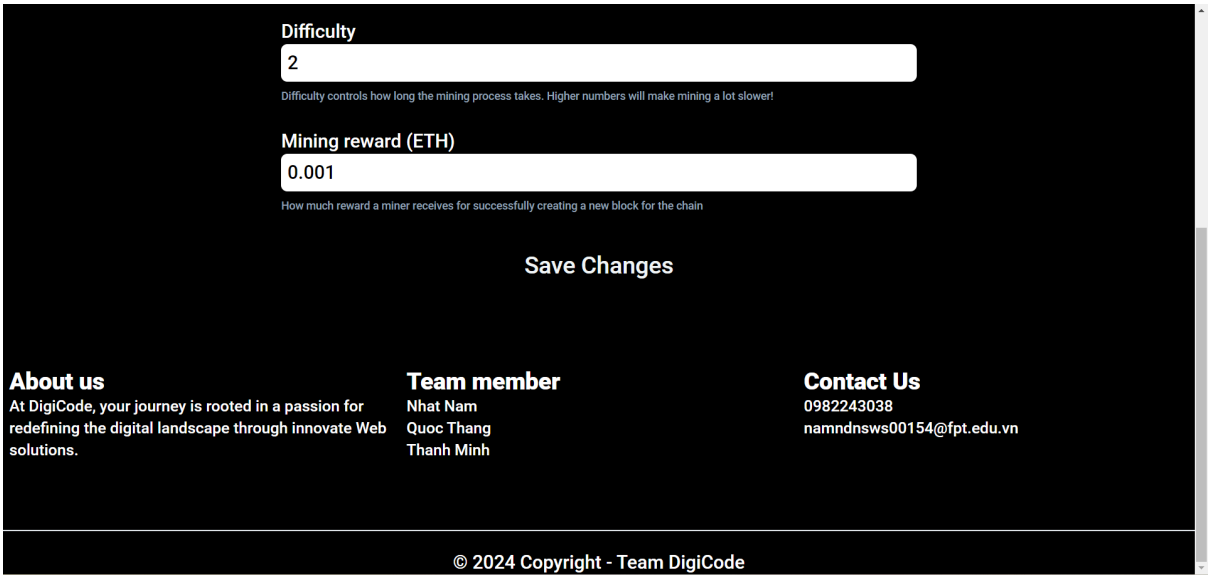

Image 11: Save Changes setting button

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.

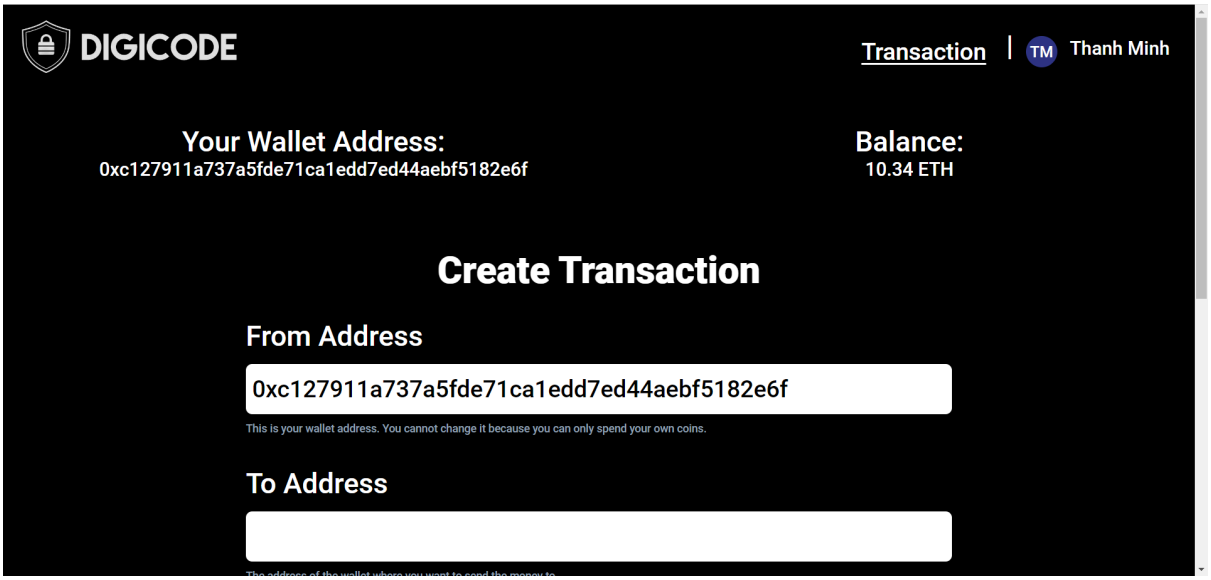

Image 12: Create Transaction form

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

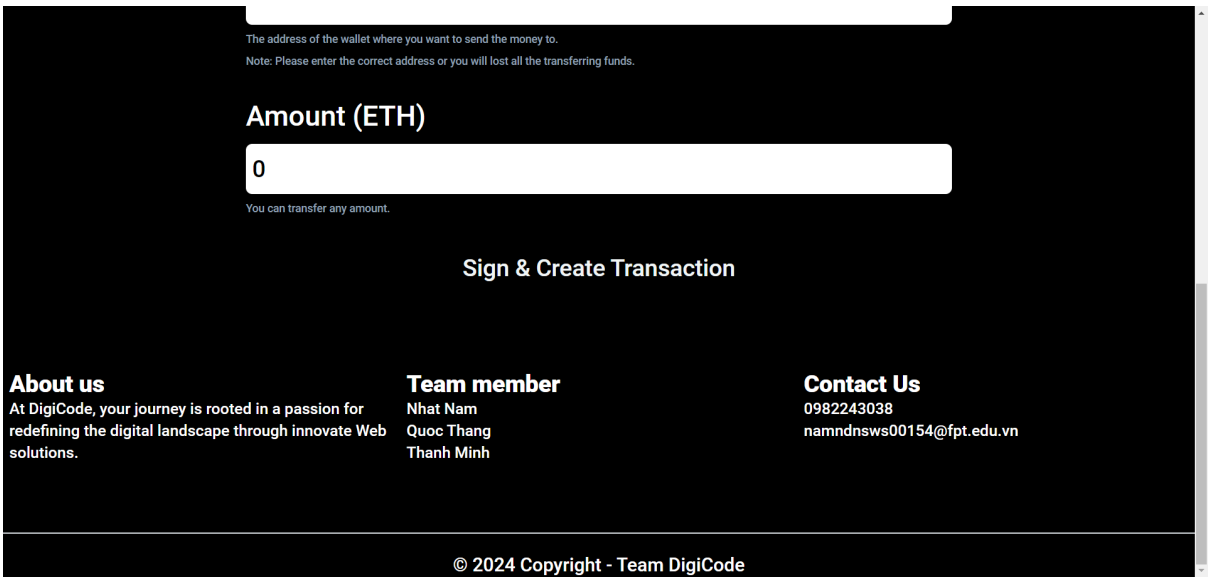

Image 13: Create Transaction button

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".

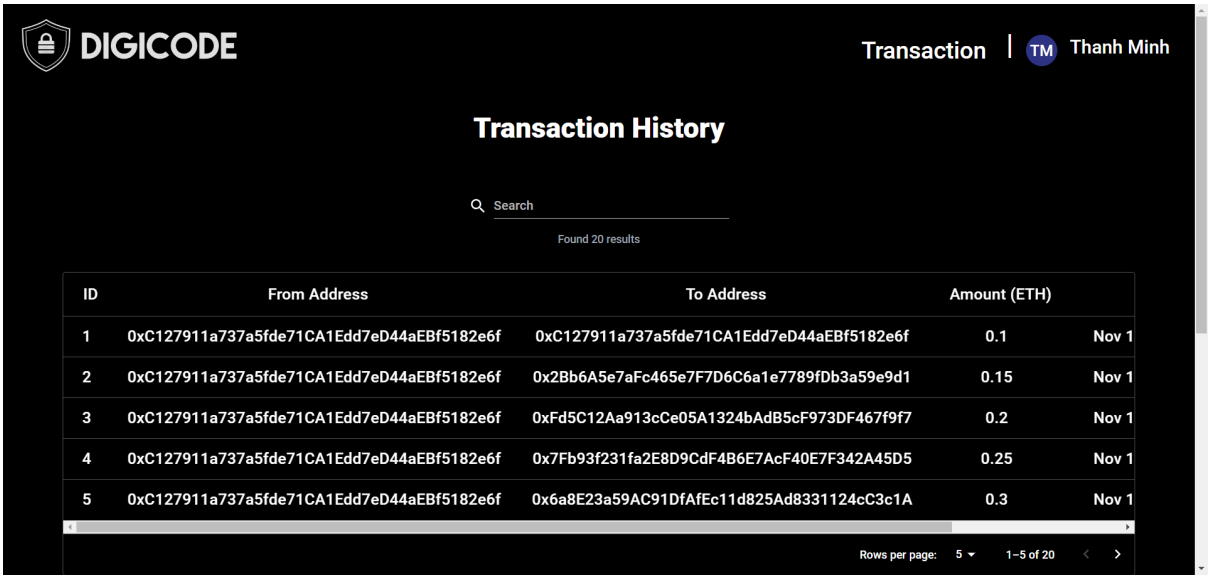

Image 14: Transaction History table

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

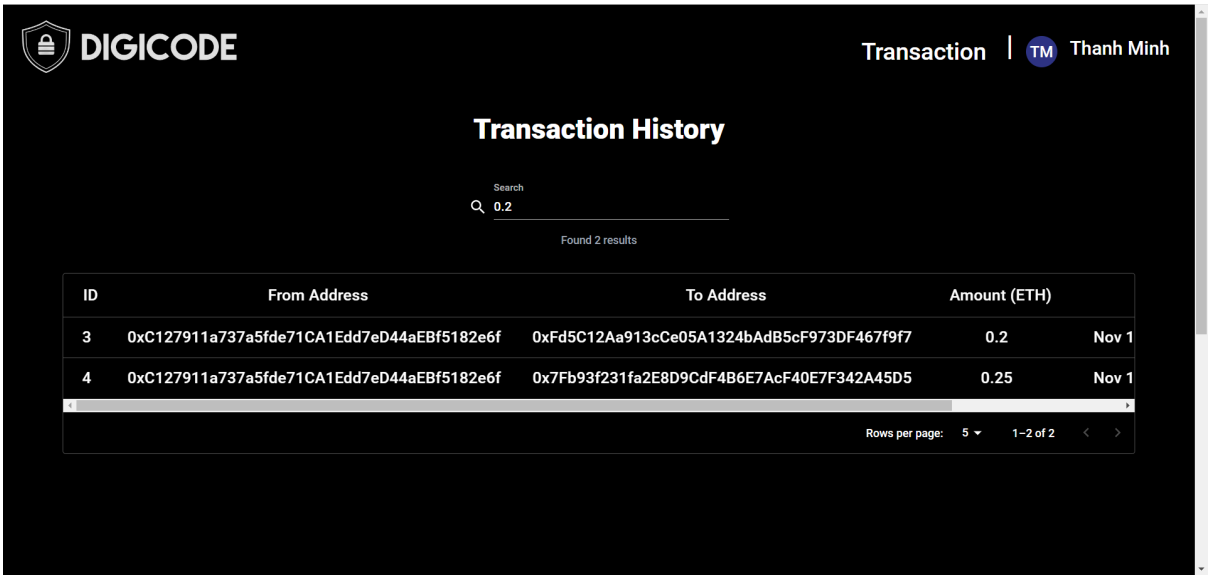

Image 15: History search bar

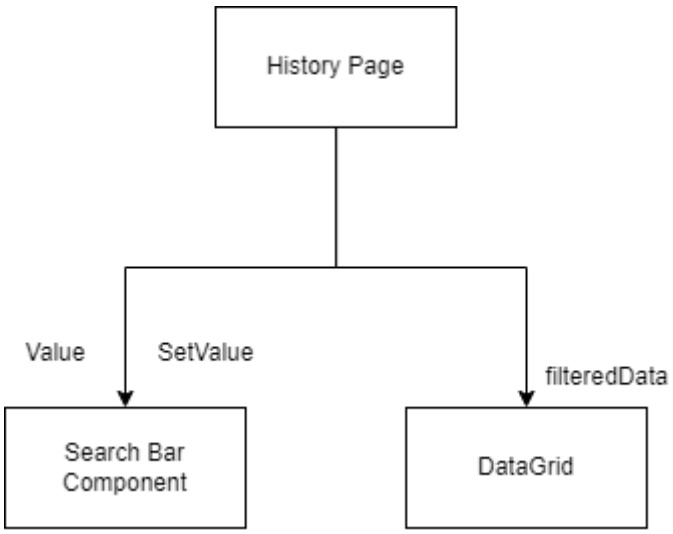

Image 16: Structure of History page.

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).

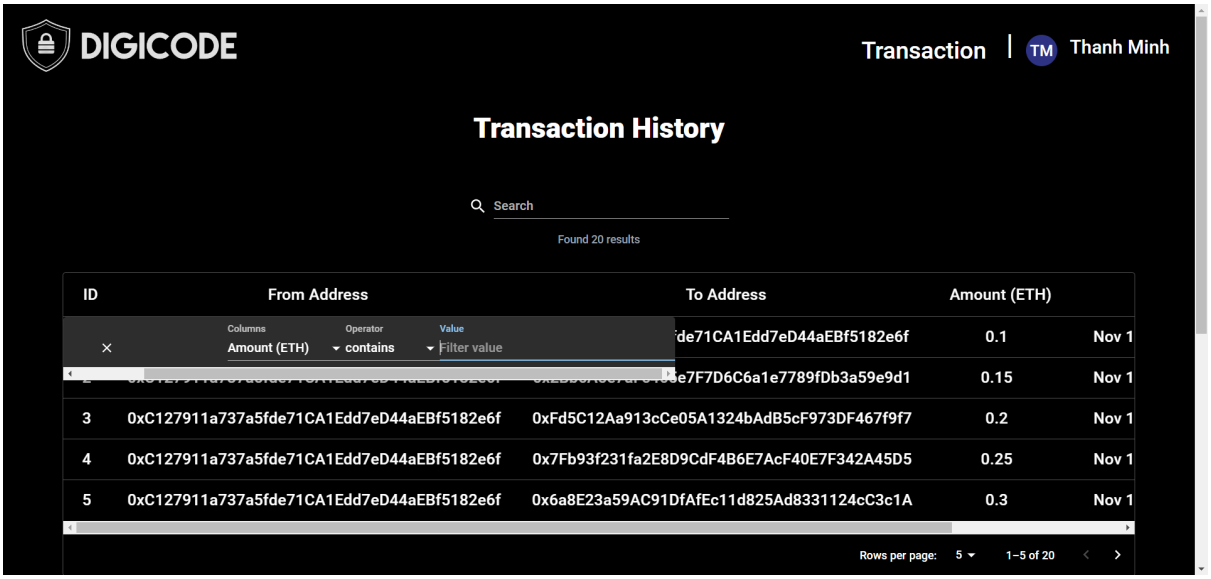

Image 17: Filter function

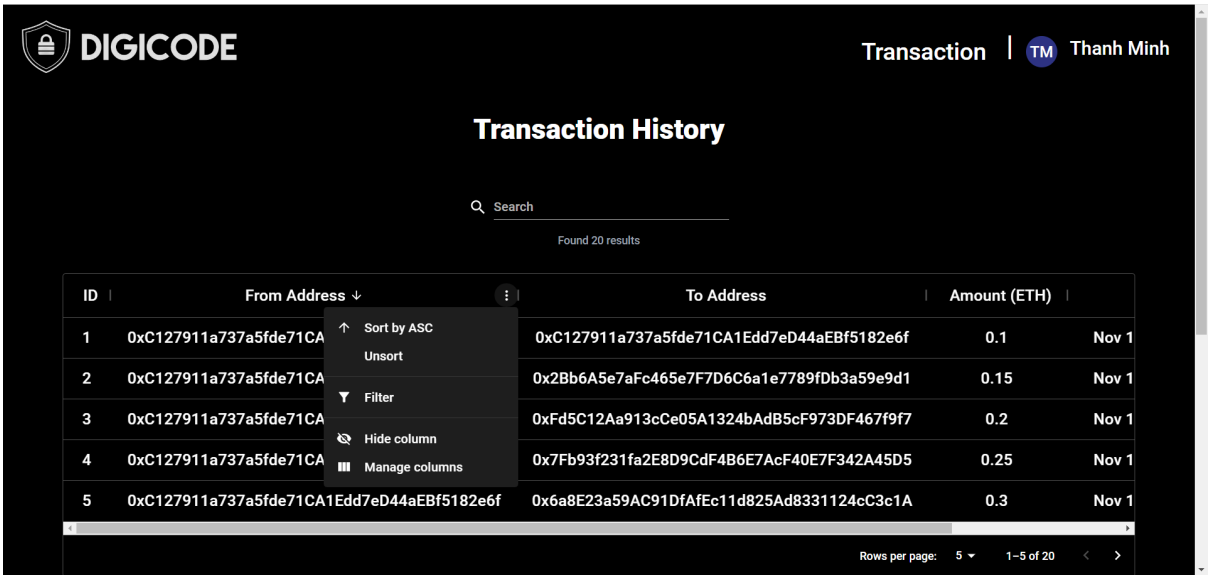

Image 18: Sort function

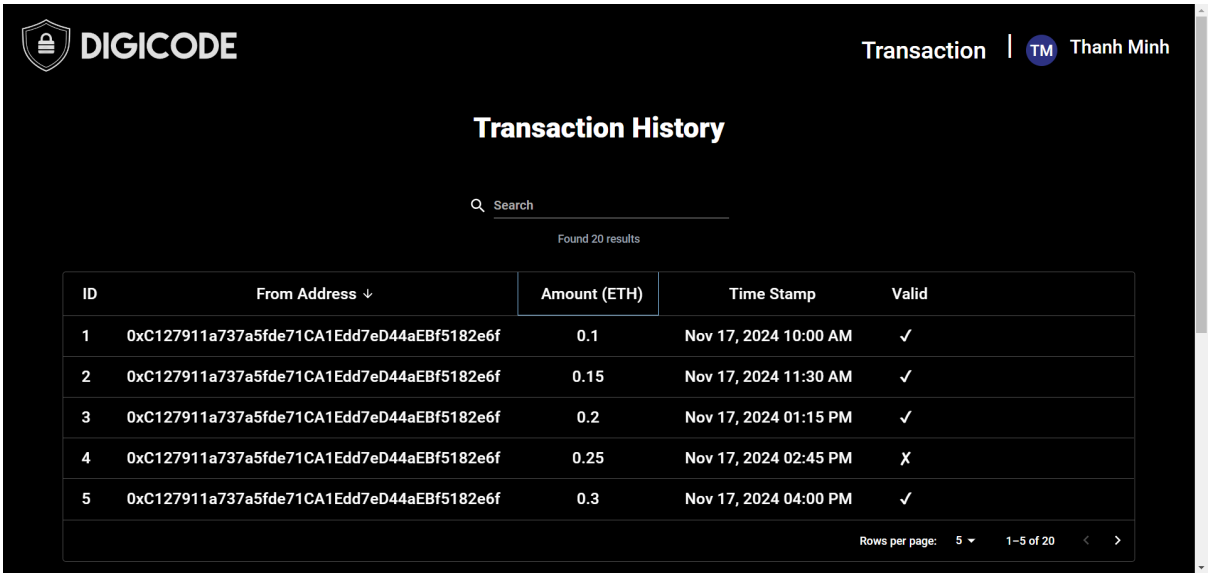

Image 19: Hide column function

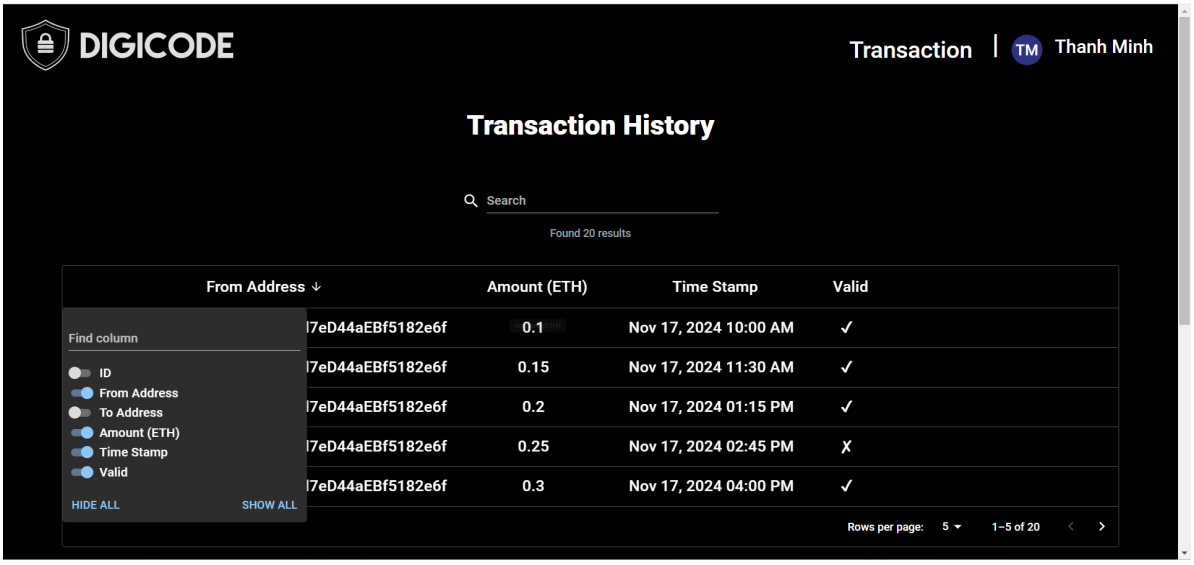

Image 20: Manage column session

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.

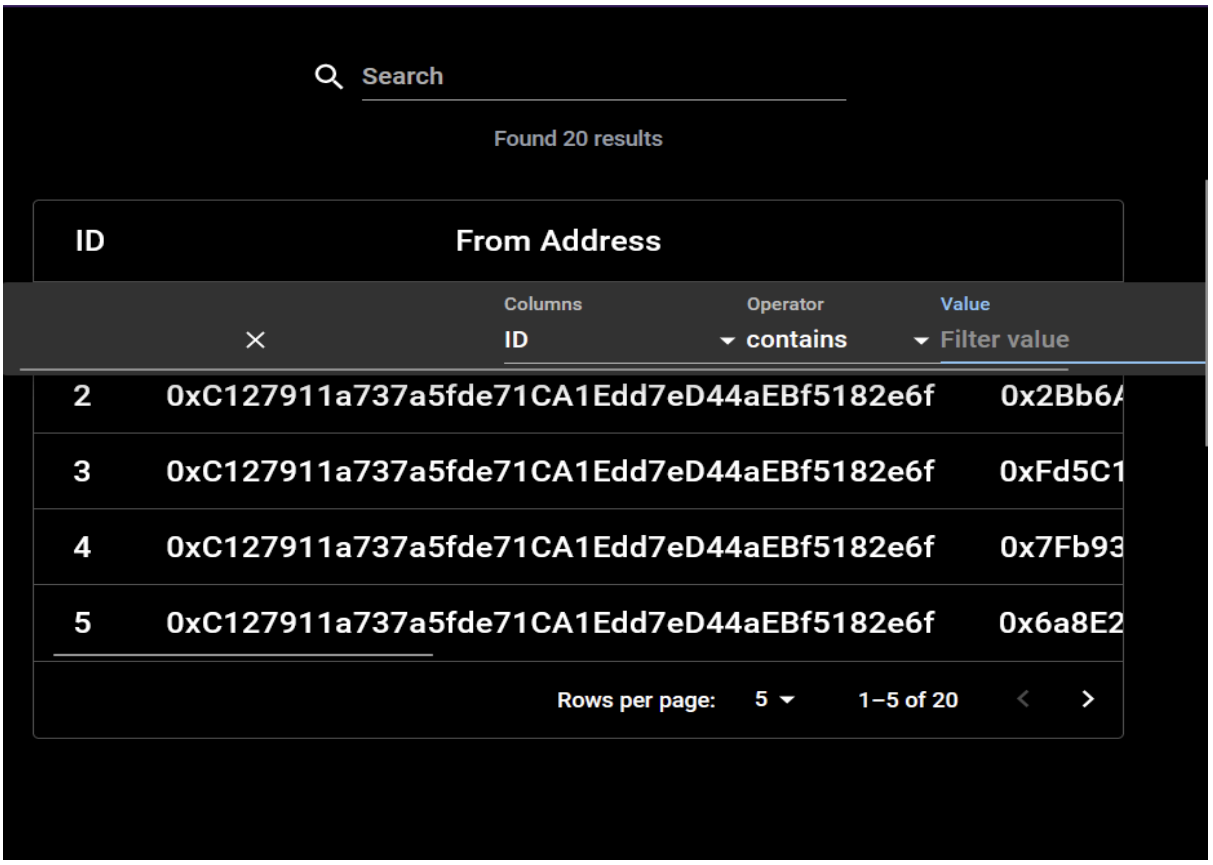

Image 21: Error responsive Filter

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.

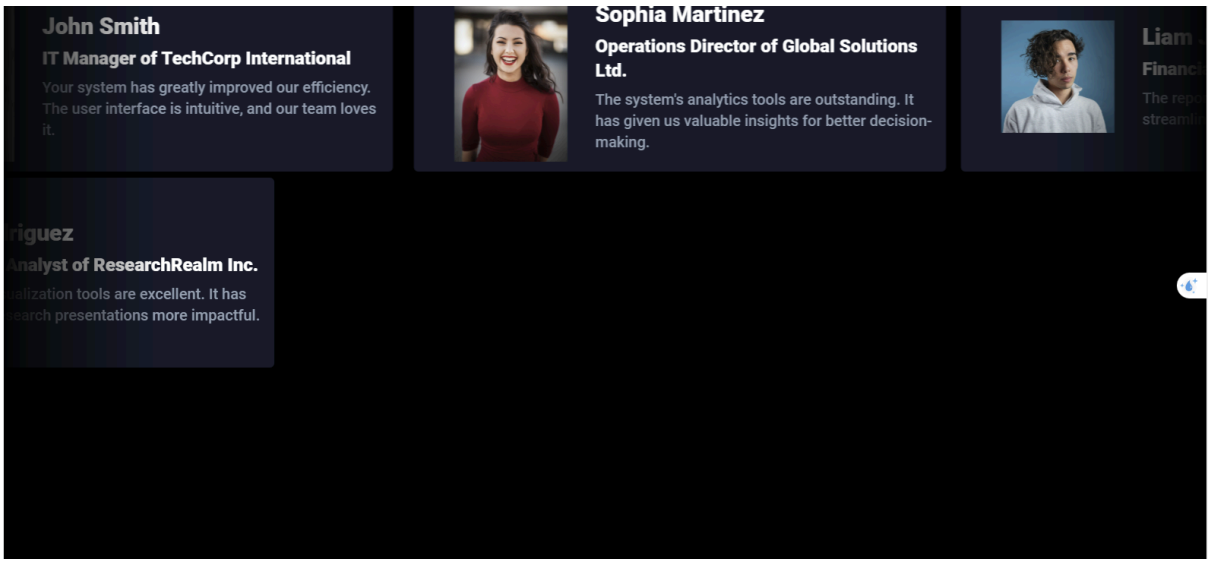

Image 22: Lagging animation

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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