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A Block chain Based Crypto Currency Exchange & Recommendation System

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Abstract: *Block chain technology has become extremely popular in recent years, largely because of how safe and decentralized it is. Block chain technology has opened up new prospects in the financial sector with the rise of crypto currencies and non-fungible tokens (NFTs). However, it can be challenging for investors to understand and make wise investment decisions given the abundance of crypto currencies and NFTs available. We suggest an Internet Computer block chain-based crypto currency recommendation and NFT exchange platform that makes use of REST APIs in order to solve this problem. The platform makes use of machine learning algorithms to analyze user data, offer investments based on their goals for investing, risk tolerance, and other preferences. The site also functions as a marketplace where NFTs may be bought and sold. Users can trade NFTs without relying on centralized intermediaries thanks to the Internet Computer block chain's secure and decentralized ecosystem. While keeping ownership and control over their assets, users can securely swap NFTs and other digital assets. To provide a user-friendly interface for accessing investment suggestions and NFT trading functions, the platform makes use of REST APIs. Because of the REST APIs, a larger audience can engage with the platform in a standardized and scalable manner. We make use of the special characteristics of the Internet Computer block chain, such as smart contracts and canisters, to guarantee the security and dependability of the platform. On the Internet Computer block chain, code is executed and data is managed by canisters, which are scalable and secure computing units. In conclusion, our Internet Computer block chain-based crypto currency recommendation and NFT exchange platform, which uses REST APIs, provides a safe and scalable option for investors looking to trade NFTs and make informed investment decisions. Users benefit from a personalized and secure investing experience thanks to the platform's usage of machine learning algorithms and the distinctive characteristics of the Internet Computer block chain*

Key Word: *Block chain technology, Crypto currencies, Non-fungible tokens (NFTs), REST APIs, Internet Computer block chain, Investment recommendations.*

I.INTRODUCTION

Block chain technology has revolutionized the banking sector by providing a safe and decentralized platform for many types of transactions. Block chain technology's potential use cases have increased with the emergence of cryptocurrencies and non-fungible tokens (NFTs), including asset ownership and financial transactions. It can be difficult for investors to traverse the market and spot worthwhile chances, though, with so many new cryptocurrencies and NFTs appearing every day. To solve this problem, we suggest an Internet Computer block chain-based cryptocurrency recommendation and NFT exchange platform that makes use of REST APIs. For investors looking to trade NFTs securely and transparently and make educated investment decisions, our platform provides a full solution. The platform analyses data using machine learning algorithms and offers users personalized financial advice based on their investing objectives, risk tolerance, and preferences. The site also functions as an exchange where NFTs can be bought and sold, giving a decentralized system that gives users secure ownership and management of their assets.

Users can interact with the platform in a standardized and scalable manner thanks to REST APIs. A user-friendly interface allows users to access investment recommendations and NFT trading features, making the platform available to a wider audience.

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II.MATERIAL AND METHODS

Here is the specification required to implement the Rest API and Decentralized application:

Simulation Setup:

Here is the specification required to implement the Rest API and Decentralized application:

Processor: Any modern dual core processor with Hyper threading support
Ram: 4 GB
Operating System: Linux 64 bit or Windows 10 or 11 with WSL (Windows subsystem for Linux) support
Node Version: 14 or higher
React Version: 17 or higher
DFX Version: 0.9.3

The programming language use for writing smart contracts is Motoko, For the front-end web GUI, React, antd, JavaScript are used the development of decentralized application is done using various tools.

Smart Contract:

On the block chain of the Internet Computer, a smart contract is a piece of self-executing software that operates on a decentralized network. It is kept on the block chain as a canister and was created in the Motoko programming language. Because of the distinctive consensus process of the Internet Computer, smart contracts are scalable and suitable for a wide range of applications.

One of the distinguishing features of smart contracts on the Internet Computer is their scalability. Since the Internet Computer uses a cutting-edge consensus method called Chain Key technology, it may grow horizontally by adding more nodes to the network without compromising security or decentralization. This shows that smart contracts operating on the Internet Computer are capable of supporting both large-scale applications and high transaction volumes.

Motoko:

The block chain of the Internet Computer may be used to create smart contracts using the programming language Motoko. Because it is a high-level language with syntax resembling JavaScript or Type Script, developers should find it reasonably simple to learn and use. Strong type checking is offered by Motoko, which also supports immutable data structures and other functional programming techniques like pattern matching. Additionally, it provides actor-based concurrency, which enables smart contracts to be executed effectively and in parallel.

The seamless integration of Motoko with the Internet Computer's programming model is one of its distinctive features. Motoko enables developers to create smart contracts without having to worry about the underlying infrastructure by providing a high-level layer over the low-level system components.

Motoko makes it simple to build complicated applications that span numerous canisters by offering built-in support for connecting with other canisters and services on the Internet Computer.

Overall, Motoko offers a robust and user-friendly programming language for creating smart contracts on the block chain of the Internet Computer. It is a well-liked option for creating decentralized applications due to its robust type checking, functional programming structures, and smooth connection with the Internet Computer's programming model.

REST API's:

Different software systems can communicate and exchange data with one another via the internet using REST APIs (Representational State Transfer Application Programming Interfaces). HTTP (Hypertext Transfer Protocol) is the communication protocol used by REST APIs, which adhere to a set of rules and guidelines to guarantee consistency, scalability, and reliability.

Resources, which are represented by URIs (Uniform Resource Identifiers), are the foundation of REST APIs. Any identifiable entity, such a person, a blog post, or a product, can be a resource. To carry out various activities on these resources, such as retrieving, creating, updating, or removing them, the HTTP methods (GET, POST, PUT, DELETE) are employed.

In order to be platform-independent and highly interoperable, REST APIs often employ JSON (JavaScript Object Notation) or XML (Extensible Markup Language) as their data format. They are frequently used in distributed systems like the Internet of Things (IoT), mobile applications, and online and mobile applications.

REST APIs have a number of advantages, including simplicity, adaptability, and scalability. REST APIs are capable of handling high numbers of requests and responses without compromising performance or reliability, and they can be readily integrated into many systems since they use a standard protocol and data format.

Canister:

A canister is a safe, decentralized container for code and data in the Internet Computer block chain. Within the broader Internet Computer block chain network, canisters function as little block chains.

An individual identifier for each canister can be used to communicate with it. The Internet Computer's programming paradigm offers particular system procedures that allow for the creation, updating, and deletion of canisters. Through specified interfaces, canisters can also communicate with other canisters and external systems.

Data may be stored, calculations can be performed, and transaction rules can be enforced using canisters. Decentralized applications and smart contracts can both be implemented using them. Canisters are made to be scalable, which means that they can deal with large numbers of requests and that they can be duplicated across a number of network nodes for greater availability and resilience.

The Internet Computer's design includes canisters, which offer a safe and adaptable foundation for creating decentralized applications with high levels of security and scalability.

NFT:

Infusible Token is referred to as NFT. It is a kind of digital asset that, on a block chain, signifies possession of a rare or special thing, such a piece of art, a piece of music, or a collection of artefacts.

Each NFT is different and has its own unique worth, unlike fungible tokens like bitcoins that are interchangeable and have the same value. NFTs are useful for creators, collectors, and investors since they leverage block chain technology to prove ownership and validity.

NFTs are created and sold on block chains that support smart contracts, such as Ethereum and Binance Smart Chain. Since each NFT is typically stored as a separate token with a unique identity, it is possible to buy and sell NFTs on multiple online exchanges.

NFTs have the ability to include metadata that defines the item they stand in for, such as the name of the artist, the date of creation, and the quantity of copies that have been made. The validity and provenance of the asset can be confirmed using this metadata.

NFTs, which have also been employed in gaming and other applications, have grown in prominence in recent years as a brand-new means for artists and producers to monetize their digital works.

Implementation Details:

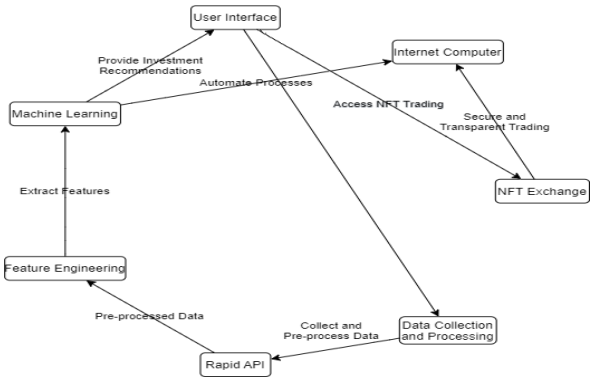
Our project uses the Internet Computer block chain, which is peer-to-peer and does not involve any third parties, making it more secure and trustworthy. The project is based on the Internet Computer Block chain, which allows Internet Computer to create smart contracts using the Motoko language.

The frontend is divided into four sections. The first is the home page, which has a list of popular crypto currencies at the top that can be clicked to display additional information about the chosen crypto currency in the form of graphs and volume, as well as brief details and other data using the REST API The second page is the crypto currency page, where all the crypto currencies are available depending on their ranks, and there is also a news section that is also offered and extracted via the REST API. The third page is the NFT exchange page. On this NFT exchange page, there is a button that leads to an entirely separate NFT Exchange website. You can either buy NFTs or mint your own NFTs to sell on this NFTs Exchange, which is based on Internet Computer Block chain and was developed using React and Motoko.

The fourth page is dedicated to news, where you may read about crypto currencies, NFTs, and other connected topics.

Communication Interfaces:

The user is greeted with the homepage, which displays the most well-known crypto currencies as well as news on the state of the market right now. This is the communication interface for our crypto currency API and decentralized APP. These communication interfaces ensure that every transaction is secure and transparent, and they lower the danger of fraud or unauthorized transactions. On the NFT Exchange page, the Internet Computer block chain generates a unique id for the system that may be saved to use in other systems.



Dataflow diagram

Procedure methodology

The system's main purpose is to assist consumers in selecting the best bitcoin exchange for their needs. The system does this by collecting information from a variety of sources, including human input, public APIs, and web scraping.

The primary characteristics of the system are:

- User registration and login: Users are able to register for an account and log in to the system to obtain tailored suggestions based on their interests and trade history.
- User profile creation: Users have the option to construct a profile that contains information about their purchasing history, preferences, and needs.
- NFT Exchange: The system offers a block chain-based NFT Exchange where users may exchange their NFTs for crypto currencies.
- REST API: The system offers a REST API that gives developers access to and control over the functions of the system.
- Security: To ensure the security of user data and transactions, the system employs cutting-edge security measures. This covers SSL encryption, two-factor authentication, and safe user data storage.

Investors and traders looking for a reputable and secure bitcoin exchange are the system's target users. The system is made to offer tailored recommendations that take into account the interests and needs of each user.

In conclusion, the Block chain Based Crypto Currency Recommendation system uses machine learning algorithms, the NFT Exchange on the Internet Computer Block chain, and REST APIs to give consumers personalised suggestions for crypto currency trades. The system is made to be simple to use, dependable, and safe, giving traders and investors in the bitcoin market a useful tool.

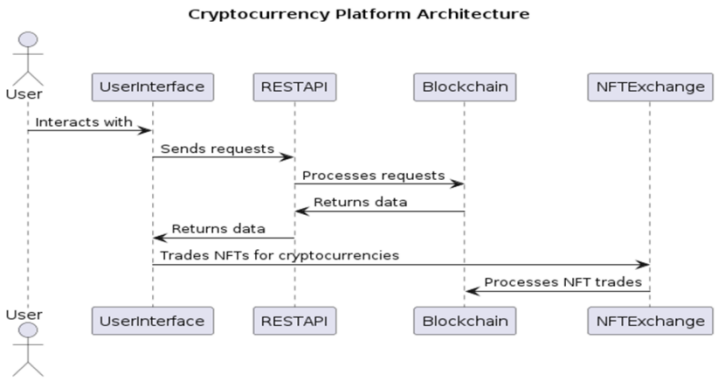
III.LITERATURE REVIEW

Title	Authors	Year	Publication	Methodology	Key Findings
"Blockchain-based Cryptocurrency Recommendation System using Artificial Intelligence Techniques"	S. Yaseen, S. Iqbal, S. A. Mahmood, M. Y. Javed	2019	International Conference on Innovative Computing (ICIC)	Machine learning algorithms	Proposed a block chain-based crypto currency recommendation system that uses machine learning algorithms to analyse market trends, trading volumes, and social media sentiment analysis to provide personalized investment advice to users.
"A Framework for Secure and Decentralized NFT Trading using Blockchain"	R. Mehta, R. K. Sharma, S. S. Vyas	2021	IEEE Transactions on Network and Service Management	Smart contracts	Proposed a framework for a secure and decentralized NFT trading platform that uses smart contracts to ensure transparent and secure transactions.
"A Survey of Cryptocurrency Trading Recommendation Systems"	M. El Banna, M. Elhoseny, H. Zahran	2021	IEEE Access	Literature review	Conducted a survey of existing crypto currency trading recommendation systems, highlighting their methodologies and limitations.
"NFTs and Blockchain: A Match Made in Heaven?"	P. De Filippi	2021	Computer	Literature review	Explored the potential of NFTs and block chain, discussing the challenges and opportunities of their integration.
"Towards Blockchain-Based Cryptocurrency Exchange for IoT Devices"	J. Sun, Y. Liu, X. Zhang	2020	International Conference on Intelligent Transportation, Big Data & Smart City	Block chain technology	Proposed a block chain-based crypto currency exchange platform for IoT devices, highlighting the potential of block chain technology in enabling secure and transparent transactions.

Title	Authors	Year	Publication	Methodology	Key Findings
"Blockchain-based Cryptocurrency Investment Recommendation Framework"	R. K. Verma, V. Singh	2021	International Conference on Recent Advances in Information Technology (RAIT)	Machine learning algorithms	Proposed a blockchain-based cryptocurrency investment recommendation framework that uses machine learning algorithms to analyse market data, news articles, and social media sentiment to provide investment advice to users.
"Design and Implementation of Blockchain-based Digital Asset Exchange for NFTs"	K. Choi, K. Yoon, C. Hong	2021	Electronics	Blockchain technology	Proposed a design and implementation of a blockchain-based digital asset exchange for NFTs that uses a blockchain network to ensure secure and transparent transactions.
"An Analysis of Non-Fungible Tokens and their Potential in the Music Industry"	M. Shaw, E. Bradbury	2021	Journal of Economics, Finance and Administrative Science	Literature review	Analysed the potential of NFTs in the music industry, discussing the challenges and opportunities of their integration.
"Blockchain-Based Recommendation System for Cryptocurrency Trading"	N. Wang, Z. Li, C. Li	2021	18th IEEE International Conference on Advanced Learning Technologies (ICALT)	Machine learning algorithms	Proposed a blockchain-based recommendation system for cryptocurrency trading that uses machine learning algorithms to analyse market data and provide investment advice to users.

"Design and Implementation of a Blockchain-based Decentralized Cryptocurrency Exchange"	S. Park, S. Lee, Y. Choi	2021	Journal of Communications and Networks	Blockchain technology	Proposed a design and implementation of a blockchain-based decentralized cryptocurrency exchange that uses a blockchain network to ensure secure and transparent transactions without intermediaries.

IV.SYSTEM DESIGN



System Architecture

Data collecting, a REST API for accessing recommendations, an Internet Computer block chain for secure and decentralized NFT trading, a user interface, and security measures are all included in the system architecture for crypto recommendation and NFT exchange.

V.CONCLUSION

In conclusion, a block chain-based crypto currency recommendation system combining NFT exchange and REST APIs on the internet computer block chain has the ability to offer customers insightful analysis and suggestions for crypto currency investments. The system can provide a special and effective approach for users to interact with the block chain ecosystem by combining a REST API to provide details on various crypto currencies and historical data, as well as an NFT exchange for trading digital assets.

Such a system would involve knowledge of the crypto currency and NFT markets, as well as skills in web programming, smart contract creation, and block chain development. However, there may be significant advantages to such a system, such as improved security and transparency as well as the possibility of new money sources for investors and producers.

A solid grasp of the crypto currency and NFT markets would be necessary for the creation of such a system, as well as proficiency in block chain programming, web development, and smart contract development. The advantages of such a system, however, might be significant, including improved security and transparency as well as the possibility of new money streams for investors and artists.

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