

A
Project Report
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Cryptocurrency Analysis WebApp
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DECLARATION

We hereby declare that this submission is our own work and that, to the best of our knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgment has been made in the text.

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CERTIFICATE

This is to certify that the Project Report entitled “**Cryptocurrency Analysis WebApp**” which is submitted by **Akanksha Mishra, Anshul Sharma and Anushraya Sharma** in partial fulfillment of the requirement for the award of degree B. Tech. in the Department of Computer Science of Dr A.P.J. Abdul Kalam Technical University, Lucknow is a record of the candidate’s own work carried out by him under my supervision. The matter embodied in this report is original and has not been submitted for the award of any other degree.

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Last but not the least, we acknowledge our friends for their contribution in the completion of the project.

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ABSTRACT

The cryptocurrency Analysis WebApp is a web-based application which provide the easy and live trends of the top current cryptocurrencies such as ETH, Bitcoin, Dogecoin etc at one place in a combined manner and their past records which will ultimately help us to make better investments and also provide us the insights to make a profitable future investment in the crypto currencies. This app will provide the latest data and records such as the current price of each cryptocurrency (in INR as well as USD), their rank, market cap and the rise or fall in the value within the past 24 hours, you can search the results for any desired cryptocurrency. It will help the people to invest in these cryptocurrencies and get the most benefit out of that, as many crypto lovers are investing and buying the crypto currencies for the sake of making profitable investments. The app will also have major application areas such as in the field of market and industry and in the investment sector as well. In order to meet the complex needs of investors and enthusiasts in navigating the complexity of the cryptocurrency ecosystem, the Cryptocurrency Analysis WebApp provides a comprehensive solution. This initiative, which was created as a result of thorough study, creative design, and state-of-the-art technology, intends to give consumers a centralized platform for obtaining important data, examining historical trends, and making knowledgeable investment decisions in the cryptocurrency space. The Cryptocurrency Analysis WebApp was developed using an advanced data analytics approach that leverages machine learning algorithms, statistical models, and data collection, analysis, and predictive modeling. User-friendly interfaces and intuitive visualization tools are integrated into the platform to provide users with insights into market dynamics, trends, and possible investment possibilities. The project's outcomes highlight the usefulness and feasibility of the Cryptocurrency Analysis WebApp as a resource for traders, investors, and fans all at once. In addition, the project's future scope calls for improvements in data coverage, user education, and predictive modeling, which will put the platform at the forefront of cryptocurrency investing, research, and analysis.

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LIST OF ABBREVIATIONS

ETH	Ethereum
DFD	Data Flow Diagrams
NFT	Non-fungible Token
BTC	Bitcoin
CRC	Cryptocurrency Research Conference
SHA-256	Secure Hash Algorithm-256
EOS	Electro Optical System
IDE	Integrated Development Environment
CSS	Cascading Style Sheets
SDK	Software Development Kit
API	Application Programming Interface
SQL	Structured Query Language
OS	Operating System
HTTPS	Hyper Text Transfer Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
SSL	Secure Socket Layer
SDLC	Software Development Lifecycle
UID	User Identification
DOM	Document Object Model

CHAPTER 1

INTRODUCTION

1.1 Introduction

The cryptocurrency Analysis WebApp is a web-based application which aims to solve this problem - designed to present all information in a structured and centralized manner. Ranging from history and analysis of past performance to reliable predictions about future dips and rises, this covers them all. Adding on top of these, handy tools like real time value, local currency conversions, monitor of top performing currencies, and other performance statistics are also integrated. It will ultimately help us to make better investments and also provide us the insights to make a profitable future investment in the crypto currencies. It will help the people to invest in these cryptocurrencies and get the most benefit out of that, as many crypto lovers are investing and buying the crypto currencies for the sake of making profitable investments.

The cryptocurrency Analysis WebApp is a pivotal solution to the scattered and decentralized nature of cryptocurrency information. In the vast and rapidly evolving landscape of digital currencies, investors often find themselves overwhelmed by the abundance of data sources and the complexities of analyzing market trends. This web-based application is meticulously crafted to address these challenges, providing users with a centralized platform to access comprehensive insights and make informed investment decisions.

At its core, the cryptocurrency Analysis WebApp is designed to streamline the process of accessing and interpreting cryptocurrency data. By aggregating information from multiple sources and presenting it in a structured manner, the application empowers users to navigate the intricacies of the cryptocurrency market with ease.

One of the primary objectives of the cryptocurrency Analysis WebApp is to bridge the gap between novice investors and seasoned traders. Whether users are new to the world of cryptocurrencies or seasoned veterans, the platform caters to a diverse range of needs and preferences. Novice investors can leverage user-friendly interfaces and educational resources to gain a deeper understanding of cryptocurrency fundamentals, while experienced traders can access advanced analytics tools to fine-tune their investment strategies.

1.2 Project Category

Category: Internet Based

Description:

The Cryptocurrency Analysis WebApp falls under the category of Internet Based projects. It is a web-based application designed to provide comprehensive information and tools for cryptocurrency investors. Users can access historical data, analyze past performance, and receive predictions about future trends. The application also includes real-time value tracking, currency conversions, and performance statistics for top cryptocurrencies. By centralizing and structuring this information, the web app aims to empower users to make informed investment decisions and maximize their returns in the volatile world of cryptocurrency.

1.3 Objectives

- 1.3.1 Address the issue of information asymmetry and analysis complexity within the cryptocurrency market.
- 1.3.2 Provide users with trustworthy data, facilitate thorough analyses, and support well-informed conclusions amidst the proliferation of digital assets and market dynamics.
- 1.3.3 Overcome the challenges faced by users of traditional financial analysis tools by offering a single platform to access comprehensive information and conduct in-depth analysis of cryptocurrency markets.
- 1.3.4 Enable users to navigate the complexity of the cryptocurrency market confidently and clearly through easy visualization tools, real-time data updates, and advanced analytical capabilities.
- 1.3.5 Democratize access to cryptocurrency analysis, empowering individuals from diverse backgrounds to participate in the digital asset economy.
- 1.3.6 Foster trust and confidence among users by providing transparent and reliable data sources, ensuring credibility and integrity in market analysis.
- 1.3.7 Enhance financial literacy and awareness about cryptocurrencies by offering educational resources, tutorials, and guides within the platform.
- 1.3.8 Promote responsible investing practices by providing risk assessment tools, portfolio management features, and personalized investment recommendations.
- 1.3.9 Foster a sense of community and collaboration among cryptocurrency enthusiasts by facilitating discussions, forums, and social networking features within the platform.
- 1.3.10 Continuously innovate and evolve the platform to adapt to changing market trends, technological advancements, and user feedback, ensuring its relevance and effectiveness in the long term.

1.4 Structure Of Report

1.4.1 Introduction

This section contains an overview of the Cryptocurrency Analysis WebApp, highlighting its purpose and key features. The application is designed to centralize and streamline cryptocurrency information, providing users with historical data, performance analysis, future trend predictions, real-time value tracking, currency conversions, and performance statistics for top cryptocurrencies. It aims to help users make informed investment decisions and maximize their returns. Additionally, the section outlines the project's category as internet-based and specifies the key objectives of the project.

1.4.2 Literature Review

This section contains a literature review of 15 research papers focusing on cryptocurrency and its advancements. The review provides a comprehensive analysis of existing research on various aspects of cryptocurrency, including its technological development, market dynamics, regulatory challenges, and

potential future trends. The literature review aims to offer insights into the evolution of cryptocurrency technology and its foundational principles, market behavior and investment patterns within the cryptocurrency ecosystem, the impact of regulatory frameworks on cryptocurrency adoption and innovation, comparative studies of different cryptocurrencies in terms of performance and utility etc. By synthesizing findings from these research papers, this section aims to provide a well-rounded understanding of the current state and future prospects of cryptocurrency, highlighting key trends, challenges, and opportunities in the field.

1.4.3 Proposed System

This section contains an overview of the proposed system for the Cryptocurrency Analysis WebApp, highlighting its main features and unique aspects. The web app provides comprehensive historical data, real-time market updates, technical analysis tools, and portfolio management, aiming to help users make profitable cryptocurrency investments. Unique features include consolidated data from multiple sources, access to live trends and historical records, multi-currency support with prices in INR and USD, and monitoring of significant value changes in the past 24 hours. Additionally, the app offers quick access to specific cryptocurrency information through a search functionality, an integrated platform for buying and selling cryptocurrencies, and market analysis tools for performance analysis and future trend predictions. It serves as a centralized hub for cryptocurrency information, ensuring real-time value updates and featuring a user-friendly interface designed for ease of navigation for all users.

1.4.4 Requirement Analysis and System Specification

This section contains an overview of the requirements analysis and system specification for the Cryptocurrency Analysis WebApp, detailing its data, functional, performance, maintainability, and security requirements, along with the chosen SDLC model and system design. The data requirements include real-time and historical data on cryptocurrency prices, market capitalization, trading volume, price changes, cryptocurrency metadata, user watchlist data, user authentication and profile information, transaction data, external API data, and system logs and metrics. Functional requirements emphasize reliable data sources, real-time price updates, seamless integration of real-time tracking, and performance optimization. Performance requirements focus on quick response times, efficient data processing, high reliability and uptime, caching, browser compatibility, mobile responsiveness, and optimized third-party integrations. Maintainability requirements highlight a modular code structure, clean and readable code, version control, comprehensive documentation, automated testing, dependency management, scalability, and robust error handling and logging. Security measures include data encryption, strict access control, secure authentication, data privacy adherence, comprehensive logging and auditing, and resilient security protocols. The Agile-based Scrum methodology is chosen for the SDLC model, featuring iterative sprints, continuous feedback, and incremental delivery. System design encompasses dataflow diagrams, use case diagrams, and database design, prioritizing efficiency, scalability, security, and optimal performance with proper indexing, constraints, and encryption techniques.

1.4.5 Implementation

The implementation of the Cryptocurrency Analysis WebApp utilizes a blend of programming languages, tools, and technologies to create a robust, interactive, and user-friendly platform. JavaScript serves as the core language for the frontend, enabling dynamic content updates and user interaction handling. React.js, chosen for its component-based architecture and efficient rendering, forms the foundation of the user interface, enhanced by Material UI's pre-designed, customizable components that ensure a consistent and aesthetically pleasing design. CSS is employed for detailed styling, while Chart.js facilitates the creation of interactive charts and graphs to visualize cryptocurrency trends. The Context API in React.js manages global

state, enhancing code maintainability and readability. Real-time and historical cryptocurrency data is fetched using the CoinGecko API, and MetaMask integration allows users to securely manage Ethereum-based assets. Firebase provides authentication, real-time database capabilities, and reliable hosting services. Docker ensures consistency across development, testing, and production environments, while Visual Studio Code, chosen for its versatility and rich feature set, serves as the primary IDE, supporting various programming languages and frameworks. This combination of technologies ensures the WebApp is scalable, performant, and capable of delivering comprehensive cryptocurrency insights to users.

1.4.6 Testing, and Maintenance

This section contains an outline of the testing techniques and test cases utilized for the Cryptocurrency Analysis WebApp. It details the strategies employed to ensure the application's reliability, performance, and accuracy in delivering cryptocurrency-related information and predictions. The testing methodologies, including Manual Testing and Automated Testing, are discussed, along with their respective scopes and objectives. Specific test cases are outlined for various aspects of the WebApp, such as user authentication, cryptocurrency data display, search functionality, chart displays, buy and sell transactions, and error handling. Additionally, it includes a description of how Manual Testing is conducted using Boundary Value Analysis and Automated Testing using the Selenium tool.

1.4.7 Results and Discussion

This section offers a concise overview of the modules within the Cryptocurrency Analysis WebApp, presenting key functionalities and interfaces through snapshots. It outlines frontend modules such as Navigation, Cryptocurrency Carousel, and Wallet Integration, along with backend components like Authentication and Database modules. Additionally, the section discusses key findings from the project, highlighting opportunities and challenges in cryptocurrency analysis. It concludes with a description of the database used, showcasing snapshots of the authentication and watchlist tables, essential for user management and personalized features.

1.4.8 Conclusion and Future Scope

In the conclusion, the focus lies on the rising interest in cryptocurrency investments and the necessity for centralized platforms to aid decision-making in this dynamic market. It highlights the role of cryptocurrency tracker web applications in consolidating data from various sources to empower users with informed investment choices while prioritizing security. Emphasizing their significance in maximizing profit and instilling user confidence, the conclusion underscores their pivotal role in navigating the complexities of cryptocurrency trading. Regarding future scope, the potential for expansion is vast, driven by increasing global interest in cryptocurrency investments. Integration with traditional financial markets presents a significant opportunity, allowing the application to cater to conventional investors seeking exposure to digital assets. By bridging the gap between traditional and digital finance, the application can diversify investment portfolios and adapt to the evolving landscape of global finance.

CHAPTER 2

LITERATURE REVIEW

2.1 Literature Review

2.1.1. An Analysis of Cryptocurrency, Bitcoin, and the Future, Peter D. DeVries

Bitcoin, the world's most common and well-known cryptocurrency, has been increasing in popularity. It has the same basic structure as it did when created in 2008, but repeat instances of the world market changing has created a new demand for cryptocurrencies much greater than its initial showing. By using a cryptocurrency, users are able to exchange value digitally without third party oversight. Cryptocurrency works on the theory of solving encryption algorithms to create unique hashes that are finite in number. Combined with a network of computers verifying transactions, users are able to exchange hashes as if exchanging physical currency. Bitcoin does not have intrinsic value like gold in that it cannot be used to make physical objects like jewelry that have value. Nevertheless, value continues to exist due to trust and acceptance.

Transaction increase is an indicator of user acceptance growing. The conditions for Bitcoin's widespread adoption could be described as a "fire triangle". Where fire needs fuel, oxygen, and heat to exist; Bitcoin needs user acceptance, vendor acceptance, and innovation to ignite. Without all three aspects, bitcoin may not truly become a legitimized mainstream currency. South America has seen a huge increase in bitcoin transactions, increasing 510% from 2014 to 2015 (Bitcoin: A New Global Economy, 2015).

Argentina is a hotbed for increased cryptocurrency usage due to its extremely high inflation rate and high population of unbanked citizens (Magro, 2016). In the past, Argentinians would convert their currency into US dollars to preserve their value. However, Argentina has recently put restrictions on how many US dollars its citizens can convert. As a result, both a black market for purchasing USD at a higher price and increased bitcoin adoption has arisen (Magro, 2016). The demand for Argentinians to keep their currency value has made itself very apparent, and cryptocurrencies are prominent legal vehicles to meet that demand.[1] Weakness-Bitcoin has quite a few internal weaknesses that are part of its design and cannot easily be modified. The public ledger, or block chain, means that every user can see every transaction. There is semi-anonymity, in that the owners of bitcoin wallets cannot be identified outright, but it is slightly nerve-racking for some potential adopters.

Opportunities-Businesses are beginning to see the value in using cryptocurrencies for international transactions, especially when transactions need to occur quickly in response to an emergency. Cryptocurrencies are solely positioned to solve this problem thanks to the speed and ease of transaction in the peer-to-peer system. Money can be wired internationally, but typically arriving days after being sent and not for the full amount. The transaction can be hit with any number of unexplained fees as it crosses borders, making it difficult to send the correct amount to another business. The transaction can be hit with any number of unexplained fees as it crosses borders, making it difficult to send the correct amount to another business. Cryptocurrency seems to have move past the early adoption phase that new technologies experience. Even motor vehicles experienced this phenomenon. Bitcoin has begun to carve itself a niche market, which could help advance cryptocurrencies further into becoming mainstream; or be the main cause of it failing. Cryptocurrencies are still in their infancy, and it is difficult to see if they will ever find true mainstream presence in world markets.

2.1.2. Understanding Cryptocurrency and its Dynamics, M. Ajith Kumar

Cryptocurrency is a mysterious industry. With time, more and more people show interest in it and testing their fortune by investing in digital currencies, such as Bitcoin, Ethereum, Litecoin, Cardano, Polkadot, Stellar, Dogecoin, Bianca Coin, Tether, Monero and so on. Where Cryptocurrency is a type of digital or virtual currency that uses cryptography to safeguard transactions, it is a peer-to-peer payment system that allows anyone from anywhere to send and accept payments. One of crypto's most notable features is that it can be used to transfer value between two parties. This is done without the involvement of a third party, resulting in a more open and censorship-resistant transaction. While the price of a cryptocurrency can spike to dizzying highs, they can crash to terrifying lows just as quickly.

Nowadays, all have been pushed back by Crypto currency. But Crypto currency is different, where no tax or commission is charged on this. It is also not recognized by the Governments. It is banned in the countries, such as Algeria, Bangladesh, China, Egypt, Iraq, Morocco, Nepal, Qatar and Tunisia.

The objective of this paper is to learn about cryptocurrency and how it affects investors, such as how the market value of cryptos is going up, what you need to know before investing, how risky cryptos transactions are, how to choose it, and what people think about it. Advantages of cryptocurrency- Protection from inflation, Self-run and managed Decentralized, Cost-effective mode of transaction, Currency exchanges go smoothly, Secure and private, Easy money transfers.

Disadvantages- Illegal transactions, Risk of Data Loss, Power is in the hands of a few, Buying NFTs with other tokens, No refunds or cancellations. Blockchain is the technology behind digital currencies. A blockchain is a list of all the transactions that all the computers in a network share. It's a book that keeps track of everything that's happened to that money.[2] It is a way to keep track of information that makes it impossible to break into the system.

How to buy Cryptocurrency-

The cryptocurrency market is run by exchanges or brokers, just like the stock market. Most of the time, each trade on these exchanges costs a fee or commission. Some give rewards when you reach a certain goal, and others give them as a sign-up bonus.

The financial system around the world is very interested in cryptocurrencies. Cryptocurrency exchange rates change a lot. Because of this, it is very risky to trade in these cryptocurrencies. Many investors are interested in their growth. It's easy to move them around. Once people trust cryptocurrencies enough to use them, they will be used by more people. If people don't trust cryptocurrencies, their boom could slow down. They are still young, and no one knows when they will be old enough to trade on markets all over the world.

2.1.3. Assessing the probability of bankruptcy when investing in cryptocurrency, Serhii Kozlovskiy, Iaroslav Petrunenko, Hennadii Mazur, Natalya Ivanyuta

The cryptocurrency market is not regulated, people and companies wishing to invest in cryptocurrency do not have the same protection as when investing in other assets. In the absence of information and regulatory laws, investors should decide if cryptocurrencies make sense for their financial goals and what kind of investment strategy to choose not to go bankrupt.

The creation of cryptocurrency generated huge interest worldwide and led to excitement among financial traders and investors who have not seen anything like that before. A new currency Bitcoin was created in 2009 as an answer for the world's financial crisis of unfathomable proportions. For the post-crisis age, Bitcoin promised an alternative to the financial system of the traditional banking institutions of past decades. Despite the fact that crypto hype peak was some years ago, today technology and financial services companies are investing huge amounts in research and development in the field of blockchain and cryptocurrencies. An analysis of the Blockchain marketplace in 2021 found the industry should grow from a value of \$4.9 billion in 2021 to \$67.4 billion by 2026 (Blockchain Statistics, 2022). [3] It means that the most important changes in the digital finance are going to come. Even though Bitcoin has been on the

financial market for more than 10 years, scientific articles on the prediction of bankruptcy have only begun to appear in the last 5 years. In 2019, an article was published where the authors formulated that cryptocurrency valuation was largely uncertain and subject to incalculable risks and the lack of a regulatory framework created significant legal uncertainty in this market. The articles by Alzahrani and Daim (2019) contains a literature review of past research related to cryptocurrency adoption. The main factors supporting its adoption, according to this review, include “the investment opportunity, the anonymity of the transactions and privacy, the acceptance by businesses as a payment method, the fast transfer of funds, the low cost of transactions and technological curiosity”.

Bitcoin and US dollar price quote (BTC-USD) is taken over the period from September 1, 2014 up to July 1, 2022 (CoinDesk, 2022). The information base of the study is the site data (CoinDesk, 2022). Different time horizons are allocated for long-term and short-term investment strategies. Cryptocurrency market analysis shows that for a short-term investment strategy, a horizon is usually less than 30 days, while for a long-term. The biggest loss per one Bitcoin is 25 thousand US dollars. The probability of such event is 0.4%, which is the same as for the biggest profit from investing that reaches 28 thousand US dollars.[4] On average, extreme values of the normal distribution fluctuate between losses of 25-20 thousand US dollars and profit of 25-280 thousand US dollars per one Bitcoin. The probability of bankruptcy for a short-term cryptocurrency investment strategy is about 17%-23%.

Solving the problem of reducing the risk of bankruptcy in the crypto business is one of the most dynamic and relevant problems of our time. The search for a solution to this problem is based on the choice of the most optimal and high-quality methods of economic and mathematical analysis. Existing approaches to assessing the probability of bankruptcy are based on the methods of technical and fundamental analysis. But these methods and approaches do not allow predicting the risks of investing in cryptocurrency with a very high probability.

2.1.4. Cryptocurrencies: market analysis and perspectives, Giancarlo Giudici, Alistair Milne, Dmitri Vinogradov

Cryptocurrencies continue to draw a lot of attention from investors, entrepreneurs, regulators and the general public. Much recent public discussions of cryptocurrencies have been triggered by the substantial changes in their prices, claims that the market for cryptocurrencies is a bubble without any fundamental value, and also concerns about evasion of regulatory and legal oversight. These concerns have led to calls for increased regulation or even a total ban. Cryptocurrencies are digital financial assets, for which records and transfers of ownership are guaranteed by a cryptographic technology rather than a bank or other trusted third party. They can be viewed as financial assets because they bear some value for cryptocurrency holders, even though they represent no matching liability of any other party and are not backed by any physical asset of value (such as gold, for example, or the equipment stock of an enterprise).

Cryptocurrencies: an asset on a blockchain that can be exchanged or transferred between network participants and hence used as a means of payment—but offers no other benefits. If it is the ease and the speed of transactions, then new transaction technologies and fund transfer systems that greatly improved in the recent decade (such as TransferWise and similar systems) should have wiped out a big chunk of the cryptocurrency value, yet this does not seem to be the case. A possible answer may lie in the features that distinguish cryptocurrencies from other assets and payment systems. Privacy, or rather anonymity, is a prominent distinctive feature popping up in most discussions of cryptocurrencies.

A key development in the rise of cryptocurrencies and other crypto assets has been the emergence of crypto exchanges where anyone can open accounts and trade crypto assets both against each other and against fiat currencies.[5] In a survey by Hileman and Rauchs (2017), the US dollar, the Euro and the British Pound are currently most widely traded against cryptocurrencies, while the importance of the Chinese Renminbi (CNY) significantly diminished after the tightening of the regulation by the People’s Bank of China; about three-quarters of large exchanges provide trading support for two or more cryptocurrencies. Growing

attention has been paid to cryptocurrencies in the academic literature, discussing whether they are supposed to disrupt the economy or are a speculative bubble which could crash and burn or favour money laundering and criminals. In support of the first view, it is often argued they meet a market need for a faster and more secure payment and transaction system, disintermediating monopolies, banks and credit cards. Critics, on the other hand, point out that the unstable value of cryptocurrencies make them more a purely speculative asset than a new type of money. The reality is somewhere in between these two positions, with cryptocurrencies performing some useful functions and hence adding economic value, and yet being potentially highly unstable.

2.1.5. Security and Trust in Cryptocurrencies, Jozef Bucko, Dana Palova, Martin Vajacka

The term of cryptocurrency is phenomenon of recent years, standing for digital currency based on principles of cryptography. General public may confuse this term with Bitcoin, but many other cryptocurrencies arose. Bitcoin was first cryptocurrency introduced and still it is the most popular. All other cryptocurrencies are inferred on principle from Bitcoin with some adjustments. There are two types of Bitcoin users: basic ordinary users and so called “miners”. Ordinary Bitcoin users use digital wallet similar to electronic banking for management of Bitcoin cash and transferring payments in bitcoins. Bitcoins exist only as data in a computer or mobile device. Access to these data has only the holder of cryptographic private key. If the wallet data is lost (e.g. the wallet data file is inadvertently corrupted or deleted), then the bitcoins contained in this wallet are lost forever (when file was not backed up). The public address of the wallet still exists, but it can only be accessed by the private key, which has been deleted. And breaking Bitcoin’s impossible using common computational force of personal computer in timely manner.

New units of Bitcoin are generated by Bitcoin network in process called mining, which is performed by so called miners. Miners are dedicating their computational power to solving artificial mathematical problem. The awareness of cryptocurrency affects the numbers of its users and therefore also its stability. Significant role in the field of awareness plays the media. [6] High media coverage of Bitcoin’s price rally definitely drew attention of numerous additional speculators. Besides the all forms of media also the word of mouth increases the awareness of cryptocurrencies and contributes to increase of cryptocurrency users’ numbers. On the other hand, negative information about cryptocurrencies in media discourages potential users. The cryptocurrency payments are anonymous and hardly traceable. This is the main reason of their usage in illegal activities. Governments and other legal authorities are afraid of virtually untraceable transactions that might be connected with illegal activities or even financing terrorist organizations. Bitcoins are generated by mining procedures, where miners use special software to solve cryptographic hash problems and it is primary source to gain bitcoins.[7] Miners are awarded with bitcoins only if they provide valid proof-of-work and this keeps BTC network stable, safe and secure by approving transactions. Proof-of-work is a process of verifying the block of data (transactions) in order to generate the next block by computing some random sequence (cryptographic problem), which is computed using a brute-force method employing software or hardware resource. The first factor of cryptocurrency security is the security of block and block chains. A block of data with unverified cryptocurrency transactions has a unique key embedded. A new block cannot be submitted to the network without opening the present block of unverified transactions.

Research identified multiple factors affecting trust in cryptocurrencies. Enormous volatility of cryptocurrencies exchange rates was detected. Their high volatility causes high risk of trading cryptocurrency and is reflected in the formation of price bubbles. However, the great growths of their exchange rates attracted many speculators, but it is obvious that cryptocurrencies can only hardly retain their value. Cryptocurrencies in comparison with commodities have advantage of easy portability thanks to their virtual character. However, it makes them unusable outside of electronic environment. Cryptocurrencies are still popular medium of exchange in black economy. If potential legitimate users’ trust in cryptocurrencies will rise in future, they will be used in increased scale also officially. Otherwise trust in cryptocurrencies might not reach necessary levels and their boom might sublime.

2.1.6. Research Perspectives and Challenges for Bitcoin and Cryptocurrencies, Joseph Bonneau, Andrew Miller, Jeremy Clark, Arvind Narayanan

Consider two opposing viewpoints on Bitcoin in straw man form. The first is that “Bitcoin works in practice, but not in theory.” At times devoted members of the Bitcoin community espouse this philosophy and criticize the security research community for failing to discover Bitcoin, not immediately recognizing its novelty, and still today dismissing it due to the lack of a rigorous theoretical foundation. A second viewpoint is that Bitcoin’s stability relies on an unknown combination of socioeconomic factors which is hopelessly intractable to model with sufficient precision, failing to yield a convincing argument for the system’s soundness. Given these difficulties, experienced security researchers may avoid Bitcoin as a topic of study, considering it prudent security engineering to only design systems with precise threat models that admit formal security proofs. We intend to show where each of these simplistic viewpoints fail. To the first, we contend that while Bitcoin has worked surprisingly well in practice so far, there is an important role for research to play in identifying precisely why this has been possible, moving beyond a blind acceptance of the informal arguments presented with the system’s initial proposal.

Furthermore, it is crucial to understand whether Bitcoin will still “work in practice” as practices change. We expect external political and economic factors to evolve, the system must change if and when transaction volume scales, and the nature of the monetary rewards for Bitcoin miners will change over time as part of the system design. It is not enough to argue that Bitcoin has worked from 2009–2014 and will therefore continue likewise. We do not yet have sufficient understanding to conclude with confidence that Bitcoin will continue to work well in practice, which is a crucial research challenge that requires insight from computer science theory.

2.1.7. Cryptocurrency trading: A comprehensive survey, Fan Fang, Carmine Ventre

In recent years, the tendency of the number of financial institutions to include cryptocurrencies in their portfolios has accelerated. Cryptocurrencies are the first pure digital assets to be included by asset managers. Although they have some commonalities with more traditional assets, they have their own separate nature and their behavior as an asset is still in the process of being understood. It is therefore important to summarize existing research papers and results on cryptocurrency trading, including available trading platforms, trading signals, trading strategy research and risk management.

This paper provides a comprehensive survey of cryptocurrency trading research, by covering 146 research papers on various aspects of cryptocurrency trading (*e.g.*, cryptocurrency trading systems, bubble and extreme condition, prediction of volatility and return, crypto-assets portfolio construction, technical trading and others). This paper also analyses datasets, research trends and distribution among research objects (contents/properties) and technologies, concluding with some promising opportunities that remain open in cryptocurrency trading.

Cryptocurrencies have experienced broad market acceptance and fast development despite their recent conception. Many hedge funds and asset managers have begun to include cryptocurrency-related assets into their portfolios and trading strategies. This paper seeks to provide a comprehensive survey of the research on cryptocurrency trading, by which we mean any study aimed at facilitating and building strategies to trade cryptocurrencies.

2.1.8. Abuses of Cryptocurrency in Dark Web and Ways to Regulate Them, Shiv Hari Tiwari

The blockchain technology is a distributed ledger system where it is distributed among the users who does the transactions using this technique, it first came in trend after the sudden rise in the value of bitcoin in

2017 and then people get to know about this blockchain system and its working, it provides anonymity and security both to the user and that is why cryptocurrencies like Bitcoin and now Monero are using the blockchain method to ensure the safe, secure and untraceable transactions. Anonymity and security are like two edges of the same sword, they can be used for the great purposes like protecting the privacy of people, fostering, freedom of speech etc on the other hand they can be misused for the illegal activities happening over the internet like cyber terrorism and perpetrators often go unaccounted for their acts. Where there are many qualities of blockchains there are also some downsides too, because of increased security and anonymity it worked as a fuel for the dark web users to illicit transactions and do the illegal activities on the dark web. In this paper we have shown what are the downsides of blockchain, how the transaction happens on the dark web and how we can regulate and track the illegal activities on the dark web using regulated and sovereign backed cryptocurrencies.

2.1.9. A bibliometric review of cryptocurrencies: how have they grown?, Francisco Javier García-Corral, José Antonio Cordero-García

With the development of new technologies, some concepts become relevant in the economic area, as is the case with cryptocurrencies, in general, or Bitcoin and Ethereum, in particular. Due to the impact of these tools, a detailed bibliometric study that allows us to obtain all information about cryptocurrencies must be conducted. This study will help scientific production by specifying the development and lines of related research that have been followed and are currently being followed. We have used Tableau, R (Bibliometrix R Package), and VOS viewer software to analyze the information.[8] These have been combined to create and review unified metadata from the Web of Science (WoS) and Scopus databases. The bibliometric analysis shows 771 articles on the WoS database and 648 articles on Scopus published between 2010 and early 2019. They present the most relevant articles, research areas, countries, institutions, authors, journals, and trends during the last few years. In conclusion, the number of publications has grown in the last 3 years. The analysis shows the evolution of blockchain technology used in this type of cryptocurrency.

In the last decade, secondary payment methods other than legal tender have been developed to boost the market (Corrons [2017](#)). Lietaer and Hallsmith ([2006](#)) defined one of these payment mechanisms as an agreement to use more than just legal tender as a means of exchange to link unused sources to unmet needs. In particular, a series of complementary currencies incorporated into the economic world are mentioned. Although these new supplementary payment methods are not listed in any global database, more than 6000 types are presumed to exist. Among them, new electronic payment methods have recently been incorporated, including virtual currencies or cryptocurrencies. Although complementary currencies have been used for a longer period, by historical amount and weight, the central focus of this study is the most innovative cryptocurrencies.

2.1.10. Bitcoin: A regulatory nightmare to a libertarian dream, Primavera De Filippi

Cryptocurrencies are digital currencies that rely on a cryptographic protocol to regulate the manner in which (and the extent to which) currency can be created and/or exchanged. As opposed to previous digital currencies (such as Second Life's Linden dollars, or World Of Warcraft's gold) which are both issued and regulated by a central server, bitcoin is a distributed, worldwide, decentralized cryptocurrency that is managed solely and exclusively by an open source cryptographic protocol: there is no government, company, or bank in charge of issuing or managing bitcoins. Bitcoins are created through the process of 'mining' - a process which rewards users for contributing computing power to the network by awarding newly created bitcoins to every user who resolves a complicated mathematical problem (the so-called 'Proof of Work') whose difficulty increases with overall network strength¹. The mining process ultimately serves to ensure the security and integrity of the overall system, by providing a means to verify transactions through a decentralized network of peers simultaneously processing transaction data (often in exchange of a fee)

before they are recorded into a public ledger or ‘blockchain’.[9] Thus, instead of relying on a centralized bank or authority, bitcoin relies on cryptographic algorithms and peer-to-peer technologies to allow users to transfer money securely and pseudonymously, without passing through any given intermediary (Nakamoto, 2008).² It is important to note that - contrary to common belief - bitcoin transactions are not, strictly speaking, anonymous, to the extent that the bitcoin protocol makes it possible to trace all transactions to and from a pseudonymous bitcoin address, which can eventually be linked to a particular identity (Brito & Castillo, 2013). Yet, although the bitcoin protocol does not itself incorporate any specific feature for anonymity, the use of bitcoin in combination with anonymization services (see e.g., Dark Wallet or the various bitcoin mixing/laundry services, such as BitMixer, BitLaunder, CoinJoin, etc) could, as a matter of fact, provide the necessary degree of “unlikability” to preserve the anonymity of bitcoin users.

2.1.11. Cryptocurrency research: future directions, Andrew Urquhart, Larisa Yarovaya

In the financial world, cryptocurrencies are posing a serious threat to established structures and drawing attention from academics, investors, and decision-makers alike. Since the launch of Bitcoin in 2009, the market for cryptocurrencies has grown at an unprecedented rate, stimulating research and innovation in a wide range of fields. With the use of blockchain technology, numerous cryptocurrencies with distinct features and applications have been created. Scholars have delved deeply into the fundamental concepts of blockchain technology, cryptographic algorithms, and consensus mechanisms in order to classify cryptocurrency assets according to their technological features and applications.[10] Extreme price volatility has drawn the attention of investors and researchers to the cryptocurrency industry. A lot of research has been done on the integration of cryptocurrencies into established financial markets, looking at factors such as market performance, efficiency, liquidity, and anomalies. The rapid rise and popularity of cryptocurrencies, combined with the absence of regulation, have resulted in a number of scandals and controversies, ranging from fraudulent schemes and market manipulations to security breaches and hacks. Researchers studying finance are interested in these situations because they want to know what causes them, what effects they have on financial markets, and how they contribute. Comprehending the actions of market players is essential for understanding fluctuations in bitcoin prices. The study of investor sentiment, herding behavior, and the influence of emotions on decision-making have all been studied using behavioural finance. Furthermore, research has looked at how the media affects the sentiment surrounding the cryptocurrency market and its capacity to forecast price movements. Dr. Larisa Yarovaya initiated the first Cryptocurrency Research Conference (CRC) in 2018 to advance research on cryptocurrencies. The conference, held at various universities, aimed to foster debates on cryptocurrencies and digital finance. The 2020 version featured 40 invited papers, with seven accepted for the special issue. The conference was hosted virtually in 2021, 2022, and 2023, with keynote speakers from Florida Atlantic University and Macquarie University. Cryptocurrency research needs to integrate with climate and green finance to better understand the environmental impact of cryptocurrencies. While some use proof-of-work consensus, others have significant environmental impacts. Future research should merge these areas to document and mitigate these issues.

2.1.12. Technology and Security Analysis of Cryptocurrency Based on Block Chain, Chao Yu, Wenke Yang, Feiyu Xie, Jianmin Hie

This article uses blockchain technology and related platforms to investigate the stability and security of cryptocurrencies. It demonstrates how inadequate and undeveloped the security assistance offered by these platforms is. The top ten platforms are vital to security support because they offer substantial benefits in terms of money, time, and manpower. Through the use of hash algorithms and digital signatures, encryption guarantees the security of cryptocurrencies (SHA256).[11] Six separate parts make up the blockchain's structure, and they are coupled together. The security of DAG and Bitcoin is strongly associated with their

underlying ledger systems. For instance, SPECTRE uses trusted transaction sets, block manufacturing, and conflict resolution to provide network resilience and security. PHANTOM uses block connectivity analysis to find malicious blocks.

Blockchain is the fundamental technology that powers cryptocurrencies; it is seen as an immutable distributed ledger. The "next-generation Internet" and "new foundational technology" have been described as blockchain technology. In addition, bitcoin might be able to conduct microtransactions and close the economic gap in comparison to conventional state-sponsored currencies.[12] On the other hand, the use of blockchain technology is labelled as "Ponzi schemes," including the use of numerous cryptocurrencies that function as distributed autonomous organizations (DAOs) and are built on top of blockchain infrastructures. Furthermore, the platforms for blockchain technology that are in use now are disorganized and struggle to reach agreements, plan actions, and settle disputes. Blockchain technology platforms don't provide enough security support. Compared to more established online financial platforms like Lufax, blockchain technology businesses raise far less money. Furthermore, the average duration of these blockchain technology platforms is 5.8, with a range of 3 to 10. This suggests that, although most of these businesses are still in their early stages of development, the infrastructure and global support for cryptocurrencies have expanded significantly over the past ten years.

2.1.13. Cryptocurrency Market Analysis from the Open Innovation Perspective, Alexey Mikhaylov

The paper analyses the cryptocurrency open innovation market to predict sustainable growth. It proposes a pool complexity approach using internet activity, trading parameters, and technical indicators. EOS cryptocurrency is found to be the most effective and promising, with the lowest complexity and commission level among analyzed digital currencies.

Cryptocurrencies struggle to compete with financial assets and fiat money due to lack of global recognition and regulatory foundation. However, digital coins and platforms are actively competing, with new systems emerging and existing ones being developed. The competition features uninterrupted trading and mining, high potential market capacity, and attracting additional funds.[13] Platforms like EOS introduce technological innovations to capture market share, with EOS offering the most innovative system with scalability and modernization of technical equipment. The EOS system combines horizontal and vertical chain formation, allowing parallel transaction processing without losing security properties.

The EOS system is a highly effective cryptocurrency project, offering a commission system for RAM, allowing users to make money transfers worldwide without additional expenses. It competes in the domestic crypt market and rivals existing payment systems and cross-border transfer systems due to its favourable conditions for companies, citizens, and citizens.[14] The EOS cryptocurrency has a potential of 50,000 transactions per second without commission, outperforming Bitcoin and Ethereum. Despite an average system throughput of 1200 transactions per second, it remains the market leader.

2.1.14. Implementation and Analysis of Cryptocurrency, Sowmiya L, Keerthana D, Mahalakshimi L, Ramya A

Cryptocurrency, a digital currency based on blockchain technology, has gained popularity in recent years. However, it is not fully controlled and regulated, leading to countries not allowing it in their economic activities. The project aims to understand cryptocurrency concepts, analyze market types, and address challenges, while also developing a prototype crypto system. Cryptocurrency is a digital currency developed nine years ago, allowing for digital barter through a peer-to-peer network. It operates without a central authority, facilitating digital transactions. Bitcoin, the first and most popular cryptocurrency, is paving the way for disruptive technology in traditional financial payment systems. Understanding the original idea, motivation, operation mode, and potential applications of cryptocurrencies and blockchain technology is

crucial. The proposed system eliminates the need for centralized intermediaries like banks and monetary institutions to enforce trust and police transactions between parties. Cryptocurrency transfers are faster than standard money transfers due to the absence of third-party intermediaries. Decentralized finance, such as flash loans, can be executed quickly and are used in trading.

Advantages of proposed system-

Transaction Cost

Private Transactions

Scalability and Performance

Interoperability and Open Source

This paper proposes a decentralized system that can be integrated with various Cryptocurrencies such as DeFi, NFT, software tokens, and shop cost tokens, allowing traders and buyers to use this wallet for convenience and security.

2.1.15. A study on Cryptocurrency web-based application with Data Analysis using Python, Manasi Kaur, Dr. Avinash Gupta, Preeti Singh, Alka Singh

This paper discusses web applications that display cryptocurrency price trends, aiding traders in making investment decisions. The app is built using Python data analysis and multiple Python libraries for data visualization, focusing on the ease of use and effectiveness of these applications in facilitating cryptocurrency investment.

The era of information and technology has led to increased dependence on the virtual world, transforming daily life activities and enhancing effectiveness. The financial sector has benefited from these online connections, leading to the emergence of cryptocurrency as a business phenomenon for buying, selling, and trading in financial aspects. Cryptocurrency is a tradable asset or digital form of money built on block chain technology that only exists online. It uses encryption to authenticate and protect transactions, hence its name. Cryptocurrencies are used for making payments, but they cannot replace traditional payment techniques. Banks should consider cryptocurrencies as a potential way to transfer ownership of value in the long term. Cryptocurrencies represent valuable and intangible objects used in electronic applications and networks like social networking and games.

Cryptocurrency traders have developed web and mobile applications to facilitate buying and selling of crypto coins.[15] Web applications are application software that runs on a computer system with an active internet connection, while mobile applications run on mobile or Android devices with an active internet connection. Native mobile apps are built using specific languages and Integrated Development Environments (IDE) depending on the platform. Apple devices use Objective-C or Swift, while Android apps use Java and are built using Android Studio. Web apps are built using JavaScript, CSS, HTML, and Python, but there is no standard SDK for building web apps. The study discusses the data analysis process using Python libraries for studying cryptocurrency trends. A comparison of different websites reveals a slight difference between the developed web app and existing ones. The app's graphs are clear and easy to understand, and it offers unique statistical options. The app successfully fulfills the motivation of understanding data analysis and web page design. It also covers the basics of cryptocurrency and API connection. The app offers various graph types for studying cryptocurrency trends, making it a complete data visualization package.

2.2 Research Gaps

Integration of Multiple Cryptocurrencies: While the literature discusses Bitcoin extensively, there's a lack of focus on integrating a wide range of cryptocurrencies into a single analysis platform. Research could explore the challenges and benefits of incorporating multiple cryptocurrencies into a unified analysis tool, considering factors like data aggregation, API integration, and user interface design.

User-Friendly Data Visualization: Although existing applications offer data visualization features, there's room for improvement in terms of user-friendliness and accessibility. Research could focus on developing innovative visualization techniques that cater to both novice and experienced cryptocurrency investors, ensuring that complex data insights are presented in a comprehensible manner.

Real-Time Market Analysis: While some literature mentions the importance of real-time data for cryptocurrency trading, there's limited discussion on the technical challenges associated with implementing real-time market analysis features. Research could delve into the development of robust real-time data processing algorithms, exploring issues such as data latency, API throttling, and scalability.

Security and Privacy Concerns: Although cryptocurrencies offer benefits like anonymity and decentralization, there are significant security and privacy concerns associated with trading and storing digital assets. Research could investigate innovative solutions for enhancing the security of cryptocurrency analysis platforms, such as implementing multi-factor authentication, encryption techniques, and secure wallet integration.

Regulatory Compliance: With the increasing regulatory scrutiny surrounding cryptocurrencies, there's a need for analysis platforms to adhere to legal requirements and compliance standards. Research could explore the legal implications of developing and operating cryptocurrency analysis tools, addressing issues such as KYC/AML regulations, tax reporting requirements, and jurisdictional compliance.

User Behavior Analysis: Understanding user behavior and preferences is crucial for designing effective cryptocurrency analysis tools. Research could involve conducting user studies and surveys to identify user needs, preferences, and pain points when using existing analysis platforms. Insights from such research could inform the design and development of user-centric features and functionalities.

2.3 Problem Formulation

The cryptocurrency Analysis WebApp is a web-based application which aims to solve this problem - designed to present all information in a structured and centralized manner. Ranging from history and analysis of past performance to reliable predictions about future dips and rises, this covers them all. Adding on top of these, handy tools like real time value, local currency conversions, monitor of top performing currencies, and other performance statistics are also integrated. It will ultimately help us to make better investments and also provide us the insights to make a profitable future investment in the crypto currencies. It will help the people to invest in these cryptocurrencies and get the most benefit out of that, as many crypto lovers are investing and buying the crypto currencies for the sake of making profitable investments. Cryptocurrencies have become a disruptive force in the ever-changing world of digital finance, upending conventional financial and investment assumptions. Investors, technologists, and financial experts from all around the world are interested in cryptocurrencies because of their decentralized character and innovative technological foundation. Strong analytic tools are becoming more and more necessary as the cryptocurrency market develops. In order to meet the complex needs of investors and enthusiasts in navigating the complexity of the cryptocurrency ecosystem, the Cryptocurrency Analysis WebApp provides a comprehensive solution. This initiative, which was created as a result of thorough study, creative design, and state-of-the-art technology, intends to give consumers a centralized platform for obtaining important data, examining historical trends, and making knowledgeable investment decisions in the cryptocurrency space.

CHAPTER 3

PROPOSED SYSTEM

3.1 Proposed System

The Cryptocurrency Analysis WebApp's scope includes a vast range of features and capabilities designed to provide a comprehensive and engaging user experience. Important elements of the project consist of:

- **Historical Data Analysis:** Users can access comprehensive historical data for a wide range of cryptocurrencies, spanning multiple timeframes and market cycles.
- **Real-Time Market Updates:** The platform provides real-time updates on cryptocurrency prices, market trends, and news, ensuring users stay informed about the latest developments in the crypto space.
- **Technical Analysis Tools:** Built-in technical analysis tools enable users to perform in-depth chart analysis, identify key support and resistance levels, and execute informed trading strategies.
- **Portfolio Management:** Users can create and manage personalized cryptocurrency portfolios, track performance metrics, and monitor portfolio diversification strategies.

It will help the people to invest in these cryptocurrencies in a more profitable manner. The future world holds great potential for web applications based on cryptocurrencies. With people becoming more aware of cryptocurrency investments on a daily basis, they are inclined to make better investments in these assets.

3.2 Unique Features Of The System

Unique Features of the Cryptocurrency Analysis WebApp:

3.2.1. **Consolidated Cryptocurrency Data:** The web application aggregates data from multiple sources to provide users with a comprehensive view of the top cryptocurrencies in one place. This saves users the time and effort of searching through various platforms for up-to-date information.

3.2.2. **Live Trends and Historical Records:** Users can access both live trends and historical records of cryptocurrencies such as ETH, Bitcoin, Dogecoin, etc. This feature enables investors to analyze past performance and make informed decisions about their investments.

3.2.3. **Multi-currency Support:** The application displays cryptocurrency prices in both INR and USD, catering to users from different regions and facilitating easy comparison of values in local currencies.

3.2.4. **Rise/Fall Monitoring:** Users can monitor about significant rises or falls in cryptocurrency values within the past 24 hours. This real-time system helps investors stay updated on market fluctuations and take timely actions.

3.2.5. **Search Functionality:** The app allows users to search for specific cryptocurrencies, providing quick access to relevant information without the need to navigate through extensive lists.

3.2.6. Buy and Sell Functionality: In addition to providing information, the web application offers a platform for users to buy and sell cryptocurrencies directly. This integrated feature streamlines the investment process and enhances user experience.

3.2.7. Market Analysis Tools: The application provides tools for market analysis, including insights into past performance, reliable predictions for future trends, and monitoring of market cap and rank of cryptocurrencies. These tools assist investors in making informed decisions and maximizing profits.

3.2.8. Centralized Information Hub: As cryptocurrencies are a relatively new and scattered domain, the web app serves as a centralized hub for all crypto-related information. It simplifies the learning process for new investors and provides a trusted source for reliable data.

3.2.9. Real-time Value Updates: Users can access real-time cryptocurrency values, ensuring that they have the latest information at their fingertips for making investment decisions.

3.2.10. User-friendly Interface: The web application features a user-friendly interface designed for ease of navigation and accessibility. It caters to both experienced investors and newcomers to the cryptocurrency market, making it inclusive for all users.

CHAPTER 4

REQUIREMENT ANALYSIS AND SYSTEM SPECIFICATION

4.1 Feasibility Study

The feasibility study for the Cryptocurrency Analysis WebApp evaluates its technical, economical, and operational aspects to determine its viability and potential success.

4.1.1 Technical Feasibility

Technical Feasibility of the Cryptocurrency Analysis WebApp:

Software Feasibility:

Backend Technology: The web application can be built using robust backend technologies such as Node.js, or Python to handle data processing, API integrations, and server-side logic effectively.

Database Management: Utilizing databases like Google Firebase can efficiently store and manage cryptocurrency data, providing scalability and reliability as the application grows.

API Integration: Integrating with reliable and well-documented cryptocurrency APIs (e.g., Coin Gecko) ensures access to real-time and historical data, enhancing the accuracy and usefulness of the app.

Frontend Framework: Employing modern frontend frameworks like React.js enables the development of a dynamic and responsive user interface, enhancing user experience and engagement.

Scalability: Designing the application architecture to support horizontal scaling allows for seamless expansion as the user base and data volume increase. Utilizing cloud platforms like AWS or Google Cloud facilitates easy scaling of resources based on demand.

Reliability: Implementing fault-tolerant mechanisms such as redundancy, failover systems, and error handling ensures uninterrupted availability of the application, even in the event of server failures or unexpected errors. Implementing comprehensive automated testing, including unit tests, integration tests, and end-to-end tests, helps identify and prevent potential issues early in the development lifecycle, ensuring the reliability of the application.

By addressing these aspects of software development, scalability, and reliability, the Cryptocurrency Analysis WebApp can be feasibly implemented to provide users with a reliable, scalable, and efficient platform for cryptocurrency analysis and investment.

4.1.2 Economical Feasibility

Cost Benefit Analysis:

Development Costs: Given the educational context, development costs may primarily involve time investment rather than monetary expenses. However, any expenditures for necessary software tools or resources should be accounted for.

Infrastructure Costs: Leveraging free or low-cost hosting services and cloud platforms with student discounts can minimize infrastructure expenses while still providing reliable hosting for the web application.

API Costs: Opting for free or affordable cryptocurrency APIs or open data sources ensures access to necessary data without significant financial outlay.

Marketing and Promotion: While marketing strategies may be limited by budget constraints, utilizing cost-effective tactics such as leveraging social media platforms, college networks, and academic presentations can help promote the project effectively.

Resource Allocation: Efficiently allocate time and effort among team members, if applicable, to ensure timely completion of project milestones within the allotted timeframe.

Cost Control Measures: Emphasize the use of free resources, open-source tools, and platforms with student discounts to keep expenses minimal while maintaining project quality.

Risk Management: Identify potential risks such as technical challenges, scope creep, or time constraints, and develop contingency plans to mitigate these risks within the project's parameters.

By adopting cost-effective strategies, prioritizing objectives, and practicing prudent budget management, the Cryptocurrency Analysis WebApp project can be successfully implemented.

4.1.3 Operational Feasibility

User Acceptance and Operational Support:

User-Friendly Interface: Designing an intuitive and visually appealing user interface enhances user acceptance by providing a seamless and engaging experience for both novice and experienced users.

Feedback Mechanism: Implementing a feedback mechanism allows users to provide input and suggestions, fostering a sense of involvement and ownership in the application's development process.

Responsive Support: Providing responsive customer support channels, including email, chat, or helpdesk systems, ensures timely assistance and resolution of user inquiries or issues, contributing to overall user satisfaction and acceptance.

User Guides and Tutorials: Developing comprehensive user guides, tutorials, and FAQs helps users familiarize themselves with the application's features and functionalities, reducing the need for extensive training.

Onboarding Process: Implementing an effective onboarding process, including welcome emails, guided tours, and tooltips, assists users in getting started with the application quickly and efficiently.

Regular Maintenance: Conducting regular maintenance activities, including software updates, bug fixes, and performance optimizations, maintains the reliability and functionality of the application, minimizing disruptions to user operations.

Security Measures: Implementing robust security measures, such as encryption, two-factor authentication, and security audits, protects user data and transactions, instilling trust and confidence in the application's security posture.

By addressing user acceptance, operational support considerations, the Cryptocurrency Analysis WebApp can effectively meet the needs and expectations of its users while ensuring smooth and efficient operation.

4.2 Software Requirement Specification

4.2.1. Data Requirements

Data requirements for the cryptocurrency analysis web application include:

Cryptocurrency Price Data:

Real-time price data for various cryptocurrencies, including Bitcoin, Ethereum, Dogecoin, etc.

Historical price data for each cryptocurrency, spanning different time intervals such as hourly, daily, weekly, monthly, and yearly.

Market Capitalization Data:

Real-time market capitalization values for each cryptocurrency, representing the total value of all coins in circulation.

Historical market capitalization data for trend analysis and comparison over time.

Volume Data:

Real-time trading volume data for each cryptocurrency, indicating the total number of coins traded within a specific time period.

Historical volume data to analyze trading activity and liquidity trends.

Price Change Data:

Real-time and historical price change data, showing the percentage change in cryptocurrency prices over different time intervals (e.g., 24 hours, 7 days, 30 days).

Cryptocurrency Metadata:

Information about each cryptocurrency, including its name, symbol, rank, circulating supply, maximum supply, and algorithm.

User Watchlist Data:

User-specific watchlists containing cryptocurrencies of interest to the user.

Preferences and settings related to the display and organization of cryptocurrency data.

User Authentication and Profile Data:

User authentication credentials, such as usernames, passwords, and authentication tokens.

User profile information, including email addresses, preferences, and personalized settings.

Transaction Data (if applicable):

Details of cryptocurrency transactions initiated by users, including transaction IDs, timestamps, amounts, and recipient addresses.

Transaction history for each user, facilitating tracking and management of past transactions.

External API Data:

Data obtained from third-party APIs, such as CoinGecko API, for accessing cryptocurrency price, market, and historical data.

Integration with external services for features like wallet management, exchange rates, and news updates.

System Logs and Metrics:

Logs of user interactions, system events, and errors for monitoring and troubleshooting purposes.

Performance metrics and analytics data to assess system usage, user engagement, and application performance.

These data requirements are essential for the functioning of the cryptocurrency analysis web application, enabling users to access comprehensive and reliable information for making informed investment decisions and tracking cryptocurrency market trends over time.

4.2.2. Functional Requirements

REQ-1: Data sources:

The web application must have access to reliable and up-to-date data sources that provide real-time prices for various cryptocurrencies. This requirement ensures that the application has access to accurate and current data necessary for analysis and decision-making.

REQ-2: Real-time price updates:

The web application must be able to update the price of each cryptocurrency in real-time, without any significant delay. This functionality is crucial for providing users with timely information about price fluctuations and market trends, enabling them to make informed investment decisions.

REQ-3: Integration with real-time price tracking:

The web application should integrate seamlessly with the real-time price tracking feature, allowing users to switch between real-time and historical data analysis with ease. This requirement enhances user flexibility, enabling them to analyze both current market conditions and historical trends to gain deeper insights into cryptocurrency performance.

REQ-4: Performance Optimization:

The web application must be optimized for performance to ensure that historical data retrieval and analysis occur quickly and smoothly. This optimization is essential for providing users with a seamless and responsive user

experience, especially when handling large volumes of data or conducting complex data analysis tasks.

By optimizing performance, the application can deliver efficient and reliable service to users, enhancing overall usability and satisfaction.

These functional requirements collectively ensure that the cryptocurrency analysis web application provides users with accurate, timely, and actionable insights into cryptocurrency markets, empowering them to make informed investment decisions based on real-time and historical data analysis.

4.2.3. Performance Requirements

Performance requirements for the cryptocurrency analysis web application ensure that it operates efficiently, responds promptly to user interactions, and handles data processing tasks effectively. These requirements aim to optimize the application's speed, reliability, and scalability to deliver a seamless user experience. Here are the performance requirements:

Response Time: The web application must respond to user interactions, such as navigation, search queries, and data filtering, within milliseconds to ensure a smooth and responsive user experience.

Real-time price updates and data retrieval should occur instantly, with minimal latency, to provide users with up-to-date information without delay.

Concurrent User Handling: The application should be able to handle a large number of concurrent users without experiencing performance degradation or system crashes.

It should support scalability to accommodate increasing user traffic during peak periods, such as market volatility or promotional events, without compromising performance.

Data Processing Speed: Data retrieval, analysis, and visualization tasks, including fetching historical price data and generating charts, should be performed efficiently to minimize processing time.

Backend processes for aggregating and updating cryptocurrency data should be optimized to ensure timely delivery of information to users.

Reliability and Uptime: The web application should maintain high availability and uptime, with minimal downtime for maintenance or upgrades.

It should be resilient to system failures, network disruptions, and unexpected errors to ensure uninterrupted access to critical functionalities.

Caching and Data Optimization:

Implement caching mechanisms to store frequently accessed data and reduce the load on backend servers. Optimize data retrieval and storage processes to minimize database queries and optimize resource utilization.

Browser Compatibility: The application should be compatible with a wide range of web browsers, including Google Chrome, Mozilla Firefox, Safari, and Microsoft Edge, to ensure consistent performance across different platforms and devices.

Mobile Responsiveness: Ensure that the web application is optimized for mobile devices and tablets, with responsive design and layout to provide a seamless user experience on smaller screens.

Third-Party Integrations: Integration with external APIs, such as CoinGecko API for cryptocurrency data, should be optimized to minimize latency and ensure reliable data retrieval.

4.2.4. Maintainability Requirements

Maintainability requirements for the cryptocurrency analysis web application ensure that it can be easily updated, modified, and enhanced over time with minimal effort. These requirements focus on the organization of code, documentation, and development practices to facilitate ongoing maintenance and support. Here are the maintainability requirements:

Modular Code Structure: The application code should be organized into modular components with clear boundaries and separation of concerns.

Use of modular design patterns, such as MVC (Model-View-Controller) or component-based architecture, to promote code reusability and ease of maintenance.

Clean and Readable Code: Adherence to coding best practices, naming conventions, and style guidelines to ensure code readability and understandability.

Use of meaningful variable names, comments, and documentation to facilitate comprehension and future modifications by developers.

Version Control: Utilization of version control systems, such as Git, to track changes to the codebase and collaborate effectively among team members.

Regular commits, branching strategies, and pull requests to manage code changes and review code contributions.

Documentation: Comprehensive documentation covering system architecture, API endpoints, database schema, and codebase structure to assist developers in understanding and maintaining the application.

Inline comments and documentation within the codebase to provide context and explanations for complex logic or algorithms.

Automated Testing: Implementation of automated unit tests, integration tests, and end-to-end tests to validate the functionality of the application and detect regressions during development and updates.

Continuous integration and continuous deployment (CI/CD) pipelines to automate testing and deployment processes, ensuring reliability and consistency.

Dependency Management: Management of external dependencies and libraries using package managers, such as npm for JavaScript or pip for Python, to easily update and maintain third-party components.

Regular monitoring of dependencies for security vulnerabilities and updates to ensure the application remains secure and up-to-date.

Scalability Considerations: Designing the application architecture with scalability in mind to accommodate future growth and increased user demand.

Implementing horizontal scaling strategies, such as load balancing and clustering, to distribute traffic and resources efficiently across multiple servers or instances.

Error Handling and Logging: Implementation of robust error handling mechanisms to gracefully handle exceptions, log errors, and provide informative error messages to users.

Centralized logging infrastructure to capture and analyze application logs for debugging, troubleshooting, and performance monitoring.

4.2.5 Security Requirements

Security and privacy requirements are paramount for a cryptocurrency tracker web application, given the sensitivity of financial data involved. These requirements ensure the confidentiality, integrity, and availability of user information. Here's an elaboration on the security requirements:

Data Encryption: Utilize industry-standard encryption protocols such as SSL/TLS (Secure Sockets Layer/Transport Layer Security) to encrypt data transmitted between the user's browser and the application server. This prevents unauthorized interception and eavesdropping of sensitive information during transit.

Employ robust encryption algorithms (e.g., AES-256) to encrypt stored user data in the database. This safeguards sensitive user details, including account credentials, wallet addresses, and transaction history, against unauthorized access in the event of a data breach.

Access Control: Implement strict access control mechanisms to restrict access to sensitive functionalities and data within the application. Role-based access control (RBAC) can be employed to assign specific roles and permissions to users based on their roles (e.g., admin, regular user).

Enforce strong authentication measures, such as multi-factor authentication (MFA), to verify the identity of users before granting access to sensitive features or performing high-risk transactions.

Secure Authentication: Employ secure authentication methods to verify the identity of users during login sessions. This includes using strong password hashing algorithms (e.g., bcrypt) to securely store user passwords in the database and protect against brute-force attacks.

Provide users with the option to enable additional authentication factors, such as biometric authentication (e.g., fingerprint or facial recognition) or hardware-based authenticators (e.g., security keys), for enhanced security.

Data Privacy: Adhere to relevant data privacy regulations, such as the General Data Protection Regulation (GDPR) or the California Consumer Privacy Act (CCPA), to protect user privacy rights and ensure lawful processing of personal data.

Implement privacy-by-design principles, integrating privacy considerations into the design and development of the application. This includes minimizing data collection, providing transparent privacy notices, and enabling users to exercise control over their personal data through privacy settings.

Logging and Auditing: Implement comprehensive logging and auditing mechanisms to record user activities, system events, and security-related incidents. Log entries should include timestamps, user IDs, IP addresses, and actions performed to facilitate forensic analysis and investigation in the event of security breaches or unauthorized access attempts.

Regularly review and analyze audit logs to identify security threats, suspicious activities, or compliance violations, and take appropriate remedial actions to mitigate risks and strengthen security posture.

By adhering to these security requirements, the cryptocurrency tracker web application can ensure the protection of user data, maintain user trust, and mitigate the risk of security breaches or data leaks.

4.3 SDLC Models To Be Used

For designing the Cryptocurrency Analysis WebApp, an appropriate Software Development Life Cycle (SDLC) model needs to be selected to ensure efficient and systematic development. Considering the dynamic nature of cryptocurrency markets and the need for iterative development and frequent updates, an

Agile-based SDLC model would be most suitable. One of the commonly used Agile frameworks is the Scrum methodology.

Scrum SDLC Model for Cryptocurrency Analysis WebApp:

Project Initiation: The project initiation phase involves defining the project scope, objectives, and stakeholders. Key activities include identifying the target audience, analyzing market requirements, and establishing project goals and timelines.

Product Backlog Creation: The product backlog is a prioritized list of features, enhancements, and user stories that need to be implemented in the WebApp. This backlog is continuously refined and updated based on feedback from stakeholders and market trends.

Sprint Planning: In Scrum, development work is divided into time-boxed iterations called sprints, typically lasting 2-4 weeks. During sprint planning, the development team selects a set of items from the product backlog to work on during the upcoming sprint. Tasks are estimated, and a sprint goal is defined.

Sprint Execution: Development activities take place during the sprint, with the team working collaboratively to implement the selected backlog items. Daily stand-up meetings are held to track progress, discuss any issues or impediments, and make necessary adjustments.

Daily Stand-up Meetings: These short daily meetings allow team members to synchronize their work, discuss progress, and identify any obstacles. It promotes transparency, collaboration, and accountability within the team.

Sprint Review: At the end of each sprint, a sprint review meeting is conducted to demonstrate the completed work to stakeholders and gather feedback.

Sprint Retrospective: Following the sprint review, a retrospective meeting is held to reflect on the sprint process, identify areas for improvement, and make adjustments to team practices and processes. Continuous improvement is a core principle of the Agile approach.

Incremental Delivery: The Scrum model emphasizes delivering working software increments at the end of each sprint. This allows for early and frequent feedback from stakeholders, enabling rapid iteration and adaptation to changing requirements and market conditions.

Continuous Integration and Testing: Continuous integration practices ensure that new code changes are integrated and tested frequently, minimizing the risk of integration issues and ensuring the stability and quality of the WebApp.

Release Planning and Deployment: Once the desired set of features has been implemented and tested, a release planning session is conducted to prioritize and plan the release of the WebApp.

4.4 System Design

System design for the cryptocurrency analysis web application involves creating diagrams and models to represent the system's architecture, data flow, and user interactions. Here's an overview of the components typically included in system design:

4.4.1 Dataflow Diagrams

DFD LEVEL-0

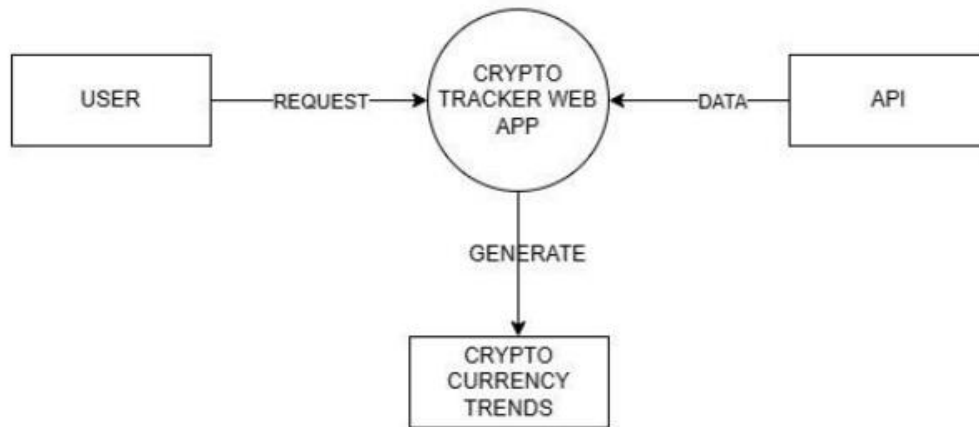


Figure-4.1 DFD Level 0 diagram

DFD LEVEL-1

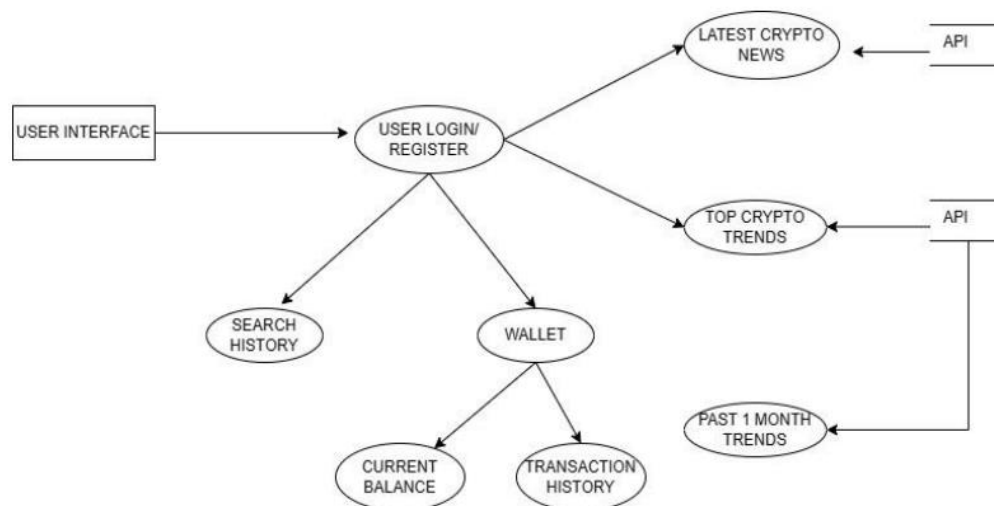


Figure-4.2 DFD Level 1 diagram

4.4.2 Usecase Diagram

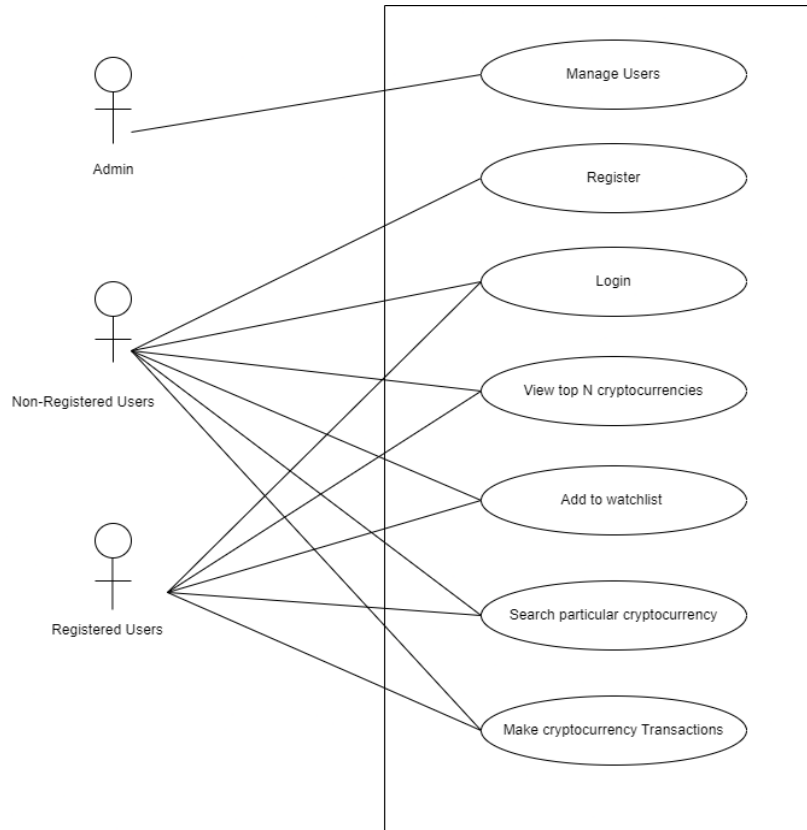


Figure-4.3 Usecase diagram

4.5 Database Design

Database Design for the Cryptocurrency Analysis WebApp plays a crucial role in storing, organizing, and managing the vast amount of data required for comprehensive analysis of digital currencies. The design should prioritize efficiency, scalability, and security to ensure seamless operation and user satisfaction. Here's an overview of the database design considerations for the web application:

Data Model: The database schema should be designed to accommodate various types of data related to cryptocurrencies, including historical price data, market trends, user profiles, transactions, and more. A relational database model is commonly used for its flexibility and scalability.

Tables and Entities: The database should consist of multiple tables, each representing a specific entity or data category. For example, there may be tables for cryptocurrencies, users, transactions, watchlists, market data, and more. Each table should have well-defined attributes that capture relevant information.

User Table: The user table stores user profiles, login and authentication data. It includes fields such as time logged in, date logged in, user preferences, and authentication tokens.

Watchlist Table: Users can create watchlists to monitor specific cryptocurrencies. This table stores the associations between users and the cryptocurrencies they are tracking.

Indexes and Constraints: Proper indexing should be implemented to optimize query performance, especially

for frequently accessed data. Constraints such as primary keys, foreign keys, and unique constraints help maintain data integrity and enforce relationships between entities.

Data Encryption and Security: Given the sensitivity of financial data, encryption techniques should be employed to protect user information and transactional data. SSL/TLS encryption should be used for data transmission, and sensitive data should be encrypted at rest using strong cryptographic algorithms.

Scalability and Performance: The database design should be scalable to accommodate future growth in data volume and user traffic. Techniques such as sharding, replication, and caching can be employed to improve performance and scalability.

Backup and Recovery: Regular backups of the database should be performed to prevent data loss in case of hardware failures, software errors, or security breaches. A robust backup and recovery strategy ensures the availability and integrity of data.

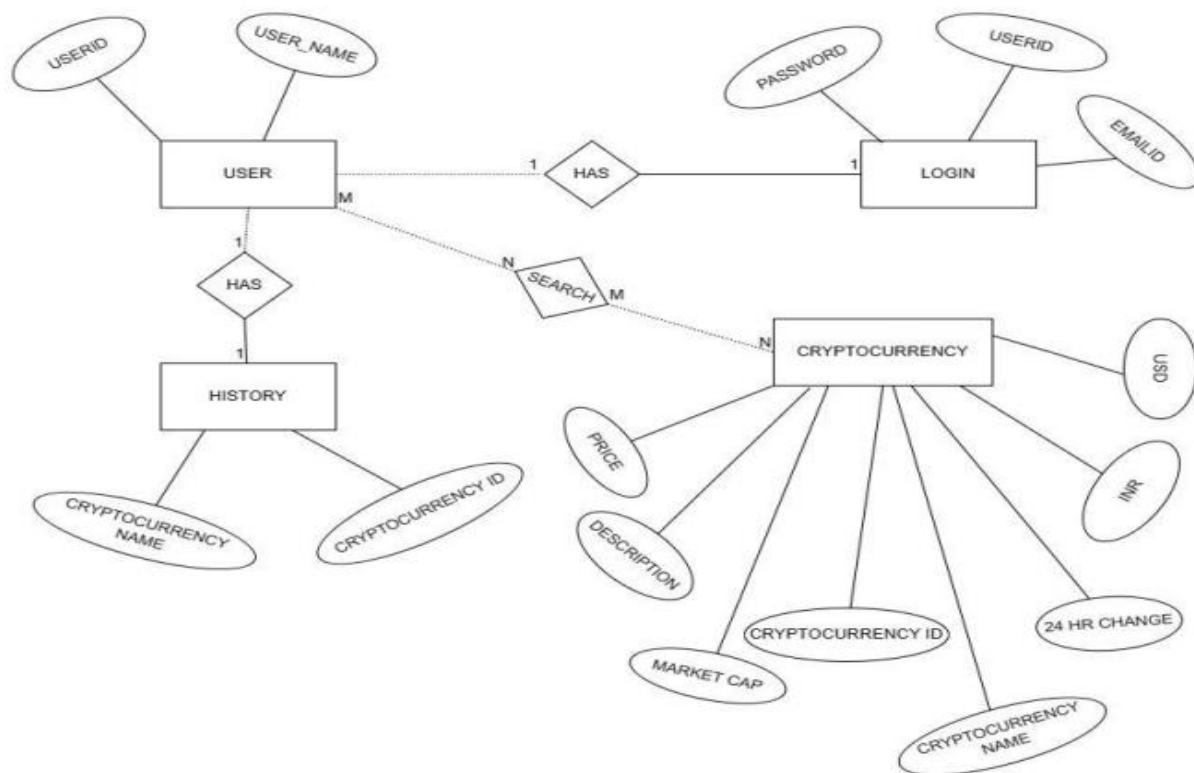


Figure-4.4 ER Diagram

CHAPTER 5

IMPLEMENTATION

5.1 Introduction To Languages, Tools And Technologies Used For Implementation

The Cryptocurrency Analysis WebApp utilizes a combination of languages, tools, and technologies to achieve its goals:

5.1.1 Programming Languages

JavaScript:

JavaScript is the core programming language used for developing the frontend of the web application. It is essential for adding interactivity, dynamic behavior, and functionality to the user interface. JavaScript allows for the manipulation of HTML elements, handling user events, making asynchronous requests to APIs, and dynamically updating the content based on user interactions. Its versatility and compatibility with web browsers make it the foundation for building modern web applications.

5.1.2 Tools And Libraries

React.js:

React.js is a popular JavaScript library for building user interfaces, known for its component-based architecture and efficient rendering. It was chosen for developing the frontend of the Cryptocurrency Analysis WebApp due to its scalability, reusability, and ease of development. React's virtual DOM (Document Object Model) enables efficient updates to the UI, while its declarative syntax simplifies state management and facilitates component reusability. Additionally, React's ecosystem provides a rich set of tools and libraries for building complex applications with ease.

Material UI:

Material UI is a UI framework for React.js that provides pre-designed components following Google's Material Design guidelines. It was utilized in the WebApp for its extensive collection of ready-to-use UI components, such as buttons, cards, forms, and navigation elements. Material UI's components are highly customizable, responsive, and aesthetically pleasing, helping to create a cohesive and visually appealing user interface. By leveraging Material UI, development time is reduced, and the application's design consistency is maintained across different screens and devices.

CSS:

Cascading Style Sheets (CSS) were used for styling and customizing the appearance of the WebApp's user interface. CSS allows for the presentation layer of the application to be separated from its structure and behavior, enabling precise control over elements' layout, typography, colors, and animations. Custom CSS styles were applied to complement the Material UI components and achieve the desired visual design, branding, and user experience.

Chart.js:

Chart.js was utilized to generate interactive and visually appealing charts and graphs to visualize cryptocurrency data trends. Chart.js provides a simple and flexible way to create various types of charts, including line charts, bar charts, and pie charts. Its ease of use and customization options make it suitable for displaying complex data sets in an intuitive manner.

5.1.3 Technologies

Context API:

The Context API in React.js was utilized for managing global state and passing data throughout the component tree without the need for prop drilling. It provides a convenient way to share data between components at different levels of the hierarchy, enhancing code readability and maintainability. Context API simplifies state management in complex applications by reducing the need for passing props manually through multiple layers of components.

CoinGecko API:

The CoinGecko API was integrated into the WebApp to fetch real-time cryptocurrency data, including prices, market cap, and trading volumes. It serves as a reliable source of cryptocurrency information, enabling users to access up-to-date market trends and historical data for informed investment decisions. By leveraging the CoinGecko API, the WebApp provides comprehensive insights into the performance of various cryptocurrencies and enhances the user experience.

MetaMask:

MetaMask is a browser extension that enables users to interact with Ethereum-based decentralized applications (DApps) directly from their web browser. It was incorporated into the WebApp to facilitate secure and seamless interactions with the Ethereum blockchain, particularly for buying, selling, and managing cryptocurrencies. MetaMask provides a user-friendly interface for handling transactions, managing digital assets, and interacting with smart contracts, enhancing the functionality and usability of the WebApp.

Firebase:

Firebase is a comprehensive platform provided by Google for building and managing web and mobile applications. It offers a suite of services, including authentication, real-time database, hosting, and cloud functions. Firebase was utilized in the WebApp for user authentication, data storage, and hosting. It provides secure authentication methods, real-time database capabilities for storing user data and preferences, and

reliable hosting infrastructure for deploying and serving the WebApp to users worldwide. Firebase simplifies backend development tasks and accelerates the development process, allowing developers to focus on building features and delivering value to users.

5.1.4 Software Development

Docker:

Docker is a containerization platform that simplifies the process of deploying and managing applications in isolated environments called containers. It was used in the development of the WebApp to ensure consistency and reproducibility across different environments, including development, testing, and production. Docker containers encapsulate the application's dependencies and runtime environment, enabling seamless deployment across different platforms and infrastructure configurations. Docker also facilitates scalability and resource efficiency by allowing applications to be deployed as lightweight, portable containers that can be easily scaled up or down based on demand. By utilizing Docker, the development team can streamline the development workflow, improve collaboration, and simplify the deployment process of the WebApp.

IDE (Integrated Development Environment):

Used for writing and debugging code, such as Visual Studio Code for JavaScript, React.js and CSS. It was chosen as the primary Integrated Development Environment (IDE) for developing the Cryptocurrency Analysis WebApp due to its versatility, extensibility, and popularity among developers. Visual Studio Code provides a rich set of features, including syntax highlighting, IntelliSense code completion, debugging capabilities, and built-in Git integration, which enhance productivity and streamline the development process.

Moreover, Visual Studio Code supports a wide range of programming languages and frameworks, including JavaScript, React.js, and CSS, making it well-suited for frontend web development. Additionally, Visual Studio Code's intuitive user interface and seamless integration with other development tools and services, such as Docker, Git, and various linters and formatters, further enhance the development experience.

These technologies were chosen based on their compatibility, performance, ease of use, and the specific requirements of the Cryptocurrency Analysis WebApp. Together, they facilitate the development of a responsive, interactive, and visually appealing platform for analyzing cryptocurrency trends and making informed investment decisions.

CHAPTER 6

TESTING AND MAINTAINANCE

6.1 Testing Techniques and Test Cases Used

6.1.1 Testing Techniques

The Cryptocurrency Analysis WebApp is developed to provide the facility to present all information and trends of cryptos in a structured and centralized manner ranging from history and analysis of past performance to reliable predictions about future dips and rises along with the market cap and rank of these cryptos in order to provide profitable future investments in cryptocurrencies.

For the Cryptocurrency Analysis WebApp project, the testing strategies will focus on ensuring the application's reliability, performance, and accuracy in providing cryptocurrency-related information and predictions. The following test strategies will be employed:

. Functional Testing:

Test the core functionalities of the application, such as historical data retrieval, analysis tools, prediction algorithms, real-time value updates, and currency conversions.

Ensure that user data, especially financial information, is stored and transmitted securely.

. Security Testing:

Identify and address security vulnerabilities, such as data breaches and unauthorized access.

Ensure that user data, especially financial information, is stored and transmitted securely.

. Compatibility Testing:

Test the application on various web browsers and devices to ensure cross browser and cross-platform compatibility.

Ensure that the application is responsive and usable on different screen sizes.

6.1.2 Methodologies

The testing methodologies used for the project may include a combination of the following:

Manual Testing: Manual testing will be essential for exploring the application's usability and conducting user acceptance testing. It is a software testing process in which test cases are executed manually without using any automated tool. All test cases executed by the tester manually according to the end user's perspective.

Automated Testing: Automation can be employed for repetitive tasks, such as performance testing and regression testing. It is the application of software tools to automate a human-driven manual process of reviewing and validating a software product.

6.1.3 Scope Of Testing

Functional Requirements to be tested:

User Authentication: Test user registration, login, and password recovery processes. Verify that user accounts are secure and private.

User Dashboard: Ensure that users have a personalized dashboard to track their favorite cryptocurrencies and access their investment portfolios.

Search and Filtering: Validate search functionality for finding specific cryptocurrencies or market data. Verify the effectiveness of filters for refining search results.

Data Visualization: Test the graphical representation of data, including charts, graphs, and visual indicators for historical and real-time data.

Non-Functional Requirements to be tested:

Performance: Test the application's response times and ensure it can handle a high volume of users and data without slowing down. Verify that real-time data updates are timely and smooth.

Security: Conduct security testing to identify and address vulnerabilities, including data encryption, user authentication, and secure API connections.

Compatibility: Test the application's compatibility with various web browsers, operating systems, and mobile devices.

Usability: Evaluate the user interface for user-friendliness and ease of navigation. Gather feedback from users to improve the application's usability.

6.1.4 Testing Objectives

Ensure Conformance to Functional and Non-Functional Requirements: Verify that the application adheres to all functional requirements, such as historical data analysis, real-time data updates, and predictive analysis. Confirm that non-functional requirements, including performance, security, and usability, are met.

Validate Quality Specifications: Ensure that the application meets the quality specifications and standards defined by the client, including accuracy, reliability, and data presentation. Identify and Resolve Bugs/Issues: Detect and report any defects, bugs, or issues within the application. Ensure that these identified issues are resolved and validated before the application goes live to provide a smooth user experience.

Enhance User Confidence: Improve user confidence in the application's reliability, accuracy, and security. Help users make informed investment decisions by ensuring that the application provides valuable insights and data.

Support Profitable Investments: Ultimately, the primary objective is to help users make profitable investments in cryptocurrencies by providing them with the necessary information and tools to make informed decisions.

6.1.5 Test Cases Used

Test Cases for the Cryptocurrency Analysis WebApp:

TESTCASE 1- User Authentication

Verify that users can successfully register an account with valid credentials.

Ensure users can log in with their registered email and password.

Test for proper error handling when users provide invalid credentials during authentication.

TESTCASE 2- Cryptocurrency Data Display

Verify that the WebApp displays a list of top cryptocurrencies on the homepage.

Test that cryptocurrency includes relevant information such as name, price, market cap, and 24-hour change.

Ensure that the cryptocurrency data is updated in real-time or at regular intervals.

TESTCASE 3- Search Functionality:

Test that users can search for specific cryptocurrencies using the search bar.

Verify that the search results are accurate and relevant to the user's query.

Ensure that searching for non-existent cryptocurrencies returns appropriate feedback to the user.

TESTCASE4- Chart Display:

Verify that clicking on a cryptocurrency card opens a detailed chart displaying its price history.

Test that the chart is interactive and allows users to zoom in/out, pan, and view specific time periods.

Ensure that the chart data is displayed accurately and reflects real-time or historical price fluctuations.

TESTCASE 5- Buy and Sell Transactions:

Test that users can initiate buy and sell transactions for cryptocurrencies.

Verify that users can specify the quantity and type of cryptocurrency they want to buy/sell.

Ensure that transactions are processed correctly and reflect changes in the user's account balance.

TESTCASE 6- Error Handling and Validation:

Test for proper error handling throughout the application, such as invalid inputs, server timeouts.

Ensure that error messages are clear, concise, and help users understand how to resolve the issue.

By executing these test cases, the Cryptocurrency Analysis WebApp can be thoroughly evaluated to ensure it meets quality standards, performs reliably, and delivers a positive user experience.

6.1.6 Manual Testing Using Boundary Value Analysis

Table-6.1 Boundary Values for Testing User Login

Range	Username(Number of Characters)	Password(Number of Characters)
Min	4	4
Min+1	5	5
mid	17	7
Max-1	29	9
max	30	10

Table-6.2 Results Of Manual Testing

Testcase ID	Username	Password	Excepted Outcome	Actual Outcome	Pass/Fail
1	Anil	At@1	Login successful	Login Successful	Pass
2	Hin@	An@12	Login successful	Login successful	Pass
3	Rita	Anl@154	Login successful	Login successful	Pass
4	Rit1	Anil@1287	Login successful	Login successful	Pass
5	Riya	Anil@45721	Login successful	Login successful	Pass
6	Avi	An@12	Error	Error	Pass
7	Kavu2	Akq@123	Login successful	Login Successful	Pass
8	Any@	Ake@6532	Login successful	Login Successful	Pass
9	Aditi	Kaa@964	Login successful	Login Successful	Pass
10	Sanvi	Hi@01	Login successful	Login Successful	Pass
11	Arti8	Ri@	Error	Error	Pass
12	ShanayaTripathi12345@gmail.com	rejE@7	Login successful	Login successful	Pass
13	Shanaya@gmail.com	dey6@9W	Login successful	Login successful	Pass
14	ShanayaTripathi7892@gmail.com	Abrigjw@5Fy	Error	Error	Pass
15	ShanayaTripathi7892@gmail.com	Sh@34	Login successful	Login successful	Pass
16	ShanayaTripathi12347@gmail.com	Weg	Error	Error	Pass
17	Aman	dkE@54	Login successful	Login successful	Pass
18	Sakshi	lwm@4	Login successful	Login successful	Pass
19	Ayush	dd@4D	Login successful	Login successful	Pass
20	Si	kr@irP	Error	Error	Pass

6.1.7 Automated Testing Using Selenium Tool

Project: Cryptocurrency Analysis WebApp

Tests +

Search tests...

http://localhost:3000

	Command	Target	Value
7	click	css=.MuiButton-label	
8	click	css=.Mui-focused > .MuiInputBase-input	
9	type	css=.Mui-focused > .MuiInputBase-input	akanksha.2024cs1126@kiet.edu
10	type	css=.MuiFormControl-fullWidth:nth-child(2) .MuiInputBase-input	Akanksha@1234
11	mouse over	css=.MuiButton-containedSizeLarge > .MuiButton-label	
12	click	css=.MuiButton-containedSizeLarge > .MuiButton-label	
13	mouse out	css=.MuiButton-containedSizeLarge > .MuiButton-label	

Command: type

Target: css=.Mui-focused > .MuiInputBase-input

Value: akanksha.2024cs1126@kiet.edu

Runs: 1 Failures: 0

Log	Reference	
12. click on name=language	OK	23:02:59
13. select on name=language with value label=REACT	OK	23:03:00
14. click on css=.w-full:nth-child(3) .text-xl:nth-child(6)	OK	23:03:00
15. click on css=.text-2xl	OK	23:03:00
16. click on css=.text-2xl	OK	23:03:01
17. mouseOver on css=.text-2xl	OK	23:03:01

Figure-6.1 Automated Testing using Selenium Testing Tool

CHAPTER 7

RESULTS AND DISCUSSIONS

7.1 Description Of Modules With Snapshots

7.1.1 Frontend Module

Navigation Module: Responsible for rendering the navigation bar and menu system, providing users with intuitive access to different sections and features of the web application.

Cryptocurrency Carousel Module: Displays top trending cryptocurrencies with brief descriptions and price movements in a visually appealing carousel format, enhancing user engagement and providing quick access to market trends.

Cryptocurrency Table Module: Presents essential cryptocurrency data in a tabular format, facilitating comparative analysis and informed decision-making for users interested in tracking multiple assets simultaneously.

Cryptocurrency Details and Chart Module: Offers detailed information on selected cryptocurrencies, including descriptions and price charts depicting historical price movements over various timeframes. Empowers users with valuable insights for investment planning and analysis.

Wallet Integration Module: Allows users to connect their MetaMask wallets, view wallet addresses, check balances, and conduct transactions securely within the web application, streamlining the management of digital assets.

7.1.1.1 Navigation

This module encompasses the navigation bar and menu system of the web application, providing users with intuitive access to different sections and features. It ensures smooth navigation and seamless user experience throughout the application.



Figure-7.1 Navigation Menu of the Homepage

7.1.1.2 Cryptocurrency Carousel

The carousel module dynamically displays top trending cryptocurrencies with brief descriptions and price movements. It serves as an eye-catching feature, allowing users to quickly explore and stay updated on the latest market trends.



Figure-7.2 Top Trending Cryptocurrency Carousel

7.1.1.3 Cryptocurrency Trending Table

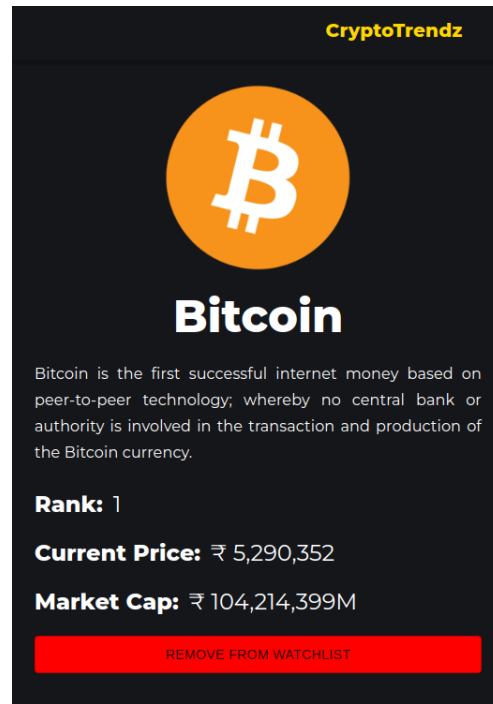
This module presents a tabular representation of essential cryptocurrency data, including names, prices, market caps, and 24-hour changes. It facilitates comparative analysis and informed decision-making for users interested in tracking multiple assets simultaneously

Search For a Crypto Currency.			
Coin	Price	24h Change	Market Cap
BTC Bitcoin	₹ 5,290,564.00	-0.82%	₹ 103,998,818M
ETH Ethereum	₹ 255,425.00	-2.28%	₹ 30,608,237M
USDT Tether	₹ 83.48	+0.04%	₹ 9,264,439M
BNB BNB	₹ 49,166.00	-0.20%	₹ 7,540,539M
SOL Solana	₹ 12,872.17	+0.14%	₹ 5,790,450M
USDC USDC	₹ 83.56	+0.14%	₹ 2,771,940M
XRP XRP	₹ 45.01	+1.44%	₹ 2,481,307M
STETH Stellar	₹ 255,368.00	-2.28%	₹ 2,384,629M

Figure-7.3 Cryptocurrencies Tabular Representation

7.1.1.4 Cryptocurrency Details and Chart

Upon selecting a specific cryptocurrency from the table, this module provides users with detailed information, including descriptions and price charts depicting historical price movements over various timeframes (24 hrs, 30 days, 3 months, 1 year). It offers valuable insights for investment planning and analysis.



7.1.1.5 Wallet Integration

Integrated with MetaMask, this module enables users to connect their wallets, view wallet addresses, check balances, and conduct transactions securely. It streamlines the process of managing digital assets and executing transactions directly from the web application.

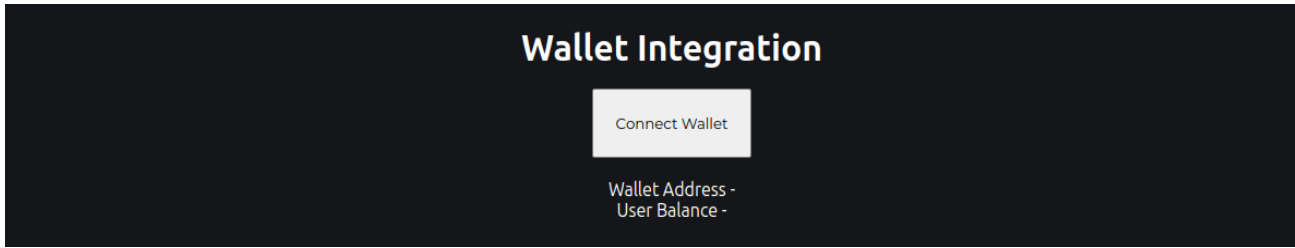


Figure-7.6 Connect to Wallet for Transaction

7.1.1.6 Login/Sign Up

This module facilitates user login and signup processes, allowing users to access personalized features such as watchlists and transaction history. It ensures user security and privacy while enhancing the overall user experience.

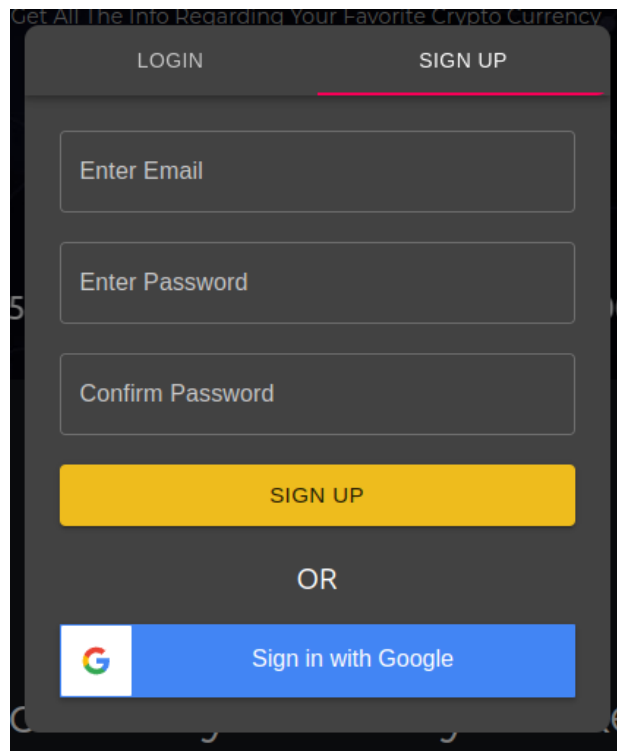


Figure-7.7 User Login/ Sign Up

7.1.1.7 Watchlist Management

Users can create and manage watchlists of their preferred cryptocurrencies, enabling them to track price movements and receive updates on their favorite assets. This module enhances user engagement and facilitates proactive investment strategies.

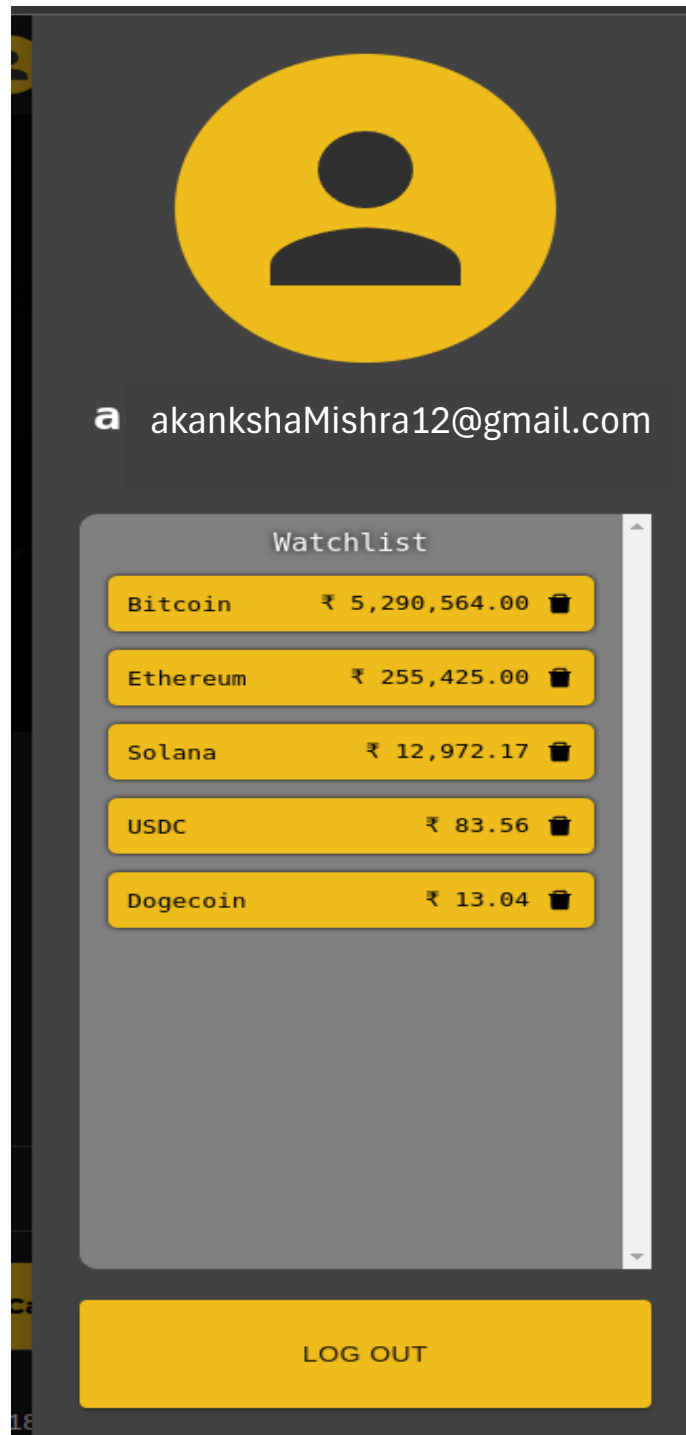


Figure-7.8 Watchlist Management

7.1.2 Backend Module

Authentication Module (Google Firebase): Handles user authentication processes, storing login details such as identifier, provider, created date, signed-in date, and user UID securely in Google Firebase Authentication. Ensures user security and privacy while enabling seamless access to personalized features.

7.1.3 Database Module

Firestore Database (Google Firebase): Stores user watchlists, allowing users to create and manage lists of their preferred cryptocurrencies. Utilizes Firestore database functionality provided by Google Firebase for efficient data storage and retrieval, enhancing the user experience by enabling personalized content and features.

These modules collectively form the frontend, backend, and database components of the system, providing users with a comprehensive and seamless experience while ensuring efficient data management and security.

7.2 Key Finding Of The Project

The cryptocurrency analysis web application project yielded several key findings, highlighting both the opportunities and challenges in developing and implementing such a system:

Growing Interest in Cryptocurrency Investments: The project identified a significant and growing interest among individuals in cryptocurrency investments. As cryptocurrencies gain mainstream attention, there is a need for accessible tools that provide comprehensive insights and analysis to aid investors in making informed decisions.

Complexity of Cryptocurrency Markets: The project underscored the complexity of cryptocurrency markets, characterized by high volatility, rapid price fluctuations, and diverse investment options. Analyzing and tracking multiple cryptocurrencies require robust data sources, real-time updates, and advanced analytical capabilities to navigate the dynamic nature of the market.

Importance of Real-Time Data and Analysis: Real-time data and analysis emerged as critical requirements for the success of the web application. Users expect up-to-date information on cryptocurrency prices, market trends, and performance metrics to make timely investment decisions. Integrating reliable data sources and implementing efficient data processing mechanisms were essential for meeting user expectations.

Security and Privacy Concerns: Security and privacy considerations were paramount in designing the web application. Given the sensitive financial information involved, robust encryption, authentication mechanisms, and compliance with data privacy regulations were necessary to safeguard user data and maintain trust.

User Experience and Interface Design: The project highlighted the importance of user experience (UX) and interface design in enhancing the usability and adoption of the web application. Intuitive navigation, visually appealing charts and graphs, customizable dashboards, and seamless integration with external tools (e.g., wallets) were key factors influencing user engagement and satisfaction.

Future Growth and Expansion Opportunities: Despite the challenges, the project identified significant growth and expansion opportunities in the cryptocurrency market. As awareness and adoption of cryptocurrencies continue to rise, there is a growing demand for innovative solutions that cater to diverse user needs, including investment, trading, analysis, and education. Continual updates, feature enhancements, and integration with emerging technologies can position the web application for long-term success in this dynamic landscape.

In conclusion, the project's key findings underscored the importance of addressing user needs, ensuring data accuracy and security, and staying abreast of market trends and technological advancements to develop a

successful cryptocurrency analysis web application. By addressing these findings and adapting to evolving market dynamics, the project can deliver value to users and contribute to the broader cryptocurrency ecosystem.

7.3 Brief Description Of Database With Snapshots

At the backend, the Cryptocurrency Analysis WebApp utilizes Google Firebase Authentication for securely storing user login details. This includes essential information such as the user's unique identifier, authentication provider (e.g., Gmail), creation date, signed-in date, and user UID (User Identification). Google Firebase Authentication ensures robust authentication mechanisms, allowing users to securely log in or sign up using their Gmail accounts or manual credentials. This authentication data is stored securely within Firebase, providing a reliable and scalable solution for user management and authentication processes. In addition to authentication, the WebApp leverages Firestore, a NoSQL cloud database provided by Google Firebase, for managing user watchlists. Firestore offers a flexible and scalable database solution, ideal for storing and querying structured data such as cryptocurrency watchlists. Each user's watchlist is stored as a collection within Firestore, with documents representing individual cryptocurrencies. This allows for efficient querying and retrieval of watchlist data, enabling users to add, remove, and manage their preferred cryptocurrencies seamlessly. Firestore's real-time database capabilities ensure that watchlist data is kept up-to-date across devices, providing users with a synchronized and responsive experience. Overall, the combination of Google Firebase Authentication and Firestore database offers a reliable, secure, and scalable backend solution for managing user authentication and watchlist functionality within the Cryptocurrency Analysis WebApp.

7.3.1 Authentication Table

This snapshot displays the Firebase Authentication table, which stores login details such as identifier, provider, created date, signed-in date, and user UID. Each record represents a user account within the system, facilitating secure authentication and access control.

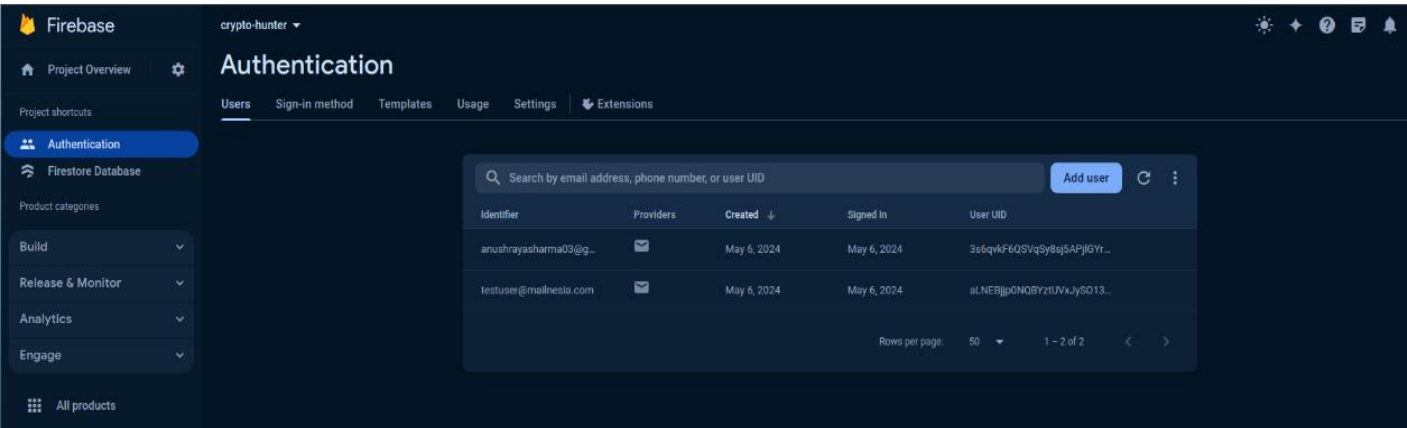
The image is a screenshot of the Firebase Authentication console. The top navigation bar shows the Firebase logo and the project name 'crypto-hunter'. The left sidebar contains links for 'Project Overview', 'Authentication', 'Firestore Database', and 'Product categories'. The main content area is titled 'Authentication' and has tabs for 'Users', 'Sign-in method', 'Templates', 'Usage', 'Settings', and 'Extensions'. The 'Users' tab is active, displaying a table of user accounts. The table has columns for 'Identifier', 'Providers', 'Created', 'Signed In', and 'User UID'. There are two rows of data. The first row has an identifier 'anushrayasharma03@g...', a provider icon for email, a creation date of 'May 6, 2024', a signed-in date of 'May 6, 2024', and a user UID '3tsqvkF6QSVqSy8sj5APjIGYr...'. The second row has an identifier 'testuser@mailnesia.com', a provider icon for email, a creation date of 'May 6, 2024', a signed-in date of 'May 6, 2024', and a user UID 'aLNEBjpQNBZy2tUVxJySQ13...'. At the bottom right of the table, it says 'Rows per page: 50' and '1 - 2 of 2'.

Figure-7.9 Authentication table for storing login records

7.3.2 Watchlist Table

The Watchlist table snapshot showcases the Firestore database table used to store watch listed coins for each user. It contains records of user-specific watchlists, where each record includes details of the cryptocurrencies added to the watchlist, such as name, symbol, and additional metadata.

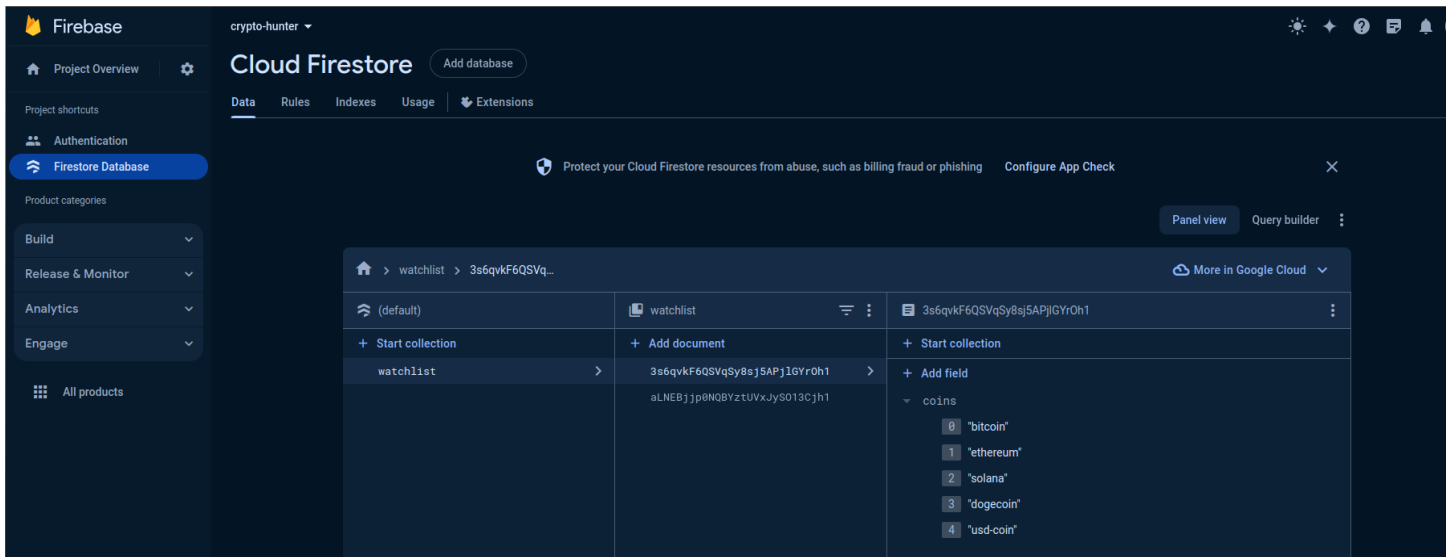


Figure-7.10 Watchlist table for storing watch listed coins for each user

These database snapshots illustrate the underlying data structures supporting key functionalities of the system. The Authentication table ensures secure user authentication and management of user accounts, while the Watchlist table facilitates personalized watchlist management for tracking favorite cryptocurrencies. Together, these tables form the backbone of the system's data architecture, enabling seamless user experiences and efficient data management.

CHAPTER 8

CONCLUSION AND FUTURE SCOPE

8.1 Conclusion

The conclusion emphasizes the growing trend of cryptocurrency investment and the need for a centralized platform to facilitate informed decision-making in this rapidly evolving market. As cryptocurrencies continue to garner interest and investment from individuals seeking financial opportunities, the importance of centralized data analysis becomes paramount. A centralized system allows users to access comprehensive information about various cryptocurrencies, including market prices, trends, and market capitalization, in one consolidated platform.

The emergence of cryptocurrency tracker web applications addresses this need by providing users with a centralized hub where they can monitor, analyze, and compare different cryptocurrencies before making investment decisions. By aggregating data from multiple sources and presenting it in an organized and accessible manner, these platforms empower users to make informed investment choices based on market insights and trends.

Moreover, the conclusion highlights the significance of security and profit maximization in cryptocurrency investments. A centralized crypto tracker web app not only offers convenience and efficiency in data analysis but also prioritizes security measures to safeguard users' assets and transactions. By providing a secure environment for users to manage their investments, these platforms instill confidence and trust, thereby enabling users to navigate the cryptocurrency market with greater assurance and potential for profit. In summary, the conclusion underscores the role of crypto tracker web applications as essential tools for navigating the complexities of the cryptocurrency market. By offering centralized access to crucial market data and prioritizing security and usability, these platforms empower users to make well-informed investment decisions, ultimately enhancing their chances of success in the dynamic world of cryptocurrency trading.

8.2 Future Scope

The future scope of the crypto-based web application is expansive, driven by the growing awareness and interest in cryptocurrency investments globally. As the adoption of cryptocurrencies continues to rise, propelled by factors such as technological advancements, financial innovation, and evolving consumer preferences, the demand for reliable and efficient platforms for managing and analyzing crypto assets will surge accordingly.

One significant avenue for the future development of the crypto-based web application lies in its integration with traditional financial markets, including stock markets and commodity exchanges. The application's robust features for monitoring market trends, analyzing asset performance, and facilitating transactions can be adapted to cater to the needs of traditional investors seeking exposure to cryptocurrencies. By bridging the gap between conventional and digital assets, the web application can serve as a valuable tool for diversifying investment portfolios and navigating the evolving landscape of global finance.

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- GitHub Link- <https://github.com/Akanksha0401/CS-2024-C/tree/main/PCS24-2>

ACCEPTANCE OF RESEARCH PAPER

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Conference Management Toolkit - Submission Summary

Submission Summary

Conference Name

INTERNATIONAL CONFERENCE ON ELECTRICAL, ELECTRONICS AND COMPUTING TECHNOLOGIES

Track Name

Track-3 (Computing Technologies)

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Paper Title

A Versatile Cryptocurrency Tracker Web Portal

Abstract

As we know cryptocurrency investments have surged in popularity, but the decentralized nature of the market poses challenges in accessing reliable information. To overcome this challenge this paper introduces the "Cryptocurrency Analysis WebApp", a web-based platform offering essential data and live trends for top cryptocurrencies like Ethereum (ETH), Bitcoin (BTC), and Dogecoin (DOGE) etc. in one centralized location. This paper highlights the webapp's versatile applications across financial markets, industries, and investment sectors, offering centralized information, historical performance analysis, and reliable predictions.

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Submission Files

A Versatile Cryptocurrency Tracker Web Portal.docx (1 Mb, 3/9/2024, 7:02:06 PM)