

Crypto Currency Exchange Tracker Using JS

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Abstract- *the emergence of cryptocurrencies has caused a paradigm shift in the world's financial system, presenting both new opportunities and difficulties for traders and investors. The demand for dependable and effective tools for real-time market analysis and monitoring has grown critical as the bitcoin market continues to develop quickly. In order to meet this demand, this research study takes a novel approach by employing React JS, a well-liked JavaScript toolkit for creating user interfaces, to create a bitcoin tracker. The suggested cryptocurrency tracker makes advantage of React JS's features to build a dynamic, interactive user interface that smoothly aggregates real-time data from several cryptocurrency exchanges and presents it in a thorough, approachable way. Through the utilization of React JS components and state management, the tracker offers a rich set of features, including real-time price updates, historical price charts, portfolio management, and customizable alerts. The development process involves the utilization of APIs provided by cryptocurrency exchanges to fetch and update market data in real-time. The data is then processed and rendered using React JS components, allowing users to monitor their favorite cryptocurrencies and make informed decisions based on the latest market trends. The integration of charting libraries enables users to visualize historical price data and identify patterns or trends that can aid in decision-making. Furthermore, the cryptocurrency tracker incorporates advanced features such as portfolio management, where users can track the performance of their cryptocurrency holdings and analyze their overall investment portfolio. Customizable alerts can also be set to notify users of specific market conditions or price movements, enhancing the tool's functionality and providing users with timely information.*

The research discusses the design and implementation of the cryptocurrency tracker, highlighting the key components, data flow, and user interface considerations. Additionally, it evaluates the performance and usability of the tracker through user testing and provides insights into potential areas for future enhancements and research.

Keywords- Crypto currency, React JS, API, JavaScript, Data Flow, State Management

I. INTRODUCTION

As a disruptive force in the world's financial system, cryptocurrencies are REVOLUTIONIZING how transactions are carried out and upending preconceived concepts of value and currency. The demand for efficient tools to manage, ANALYZE, and monitor the constantly shifting cryptocurrency market in real-time is rising along with cryptocurrency acceptance and popularity. In order to meet this demand, the research paper develops a Cryptocurrency Tracker UTILIZING React JS, a potent JavaScript toolkit for creating user interfaces. To make wise investing selections, the market for cryptocurrencies must be constantly monitored and analysed due to its volatility. Investors and traders need trustworthy and effective tools that give them access to the most recent data on cryptocurrency prices, market trends, and portfolio performance. Current bitcoin tracking programmes frequently lack the interactive features, real-time data updates, and desired user experience needed to satisfy changing market participant demands. Consequently, there is a critical need for a cutting-edge cryptocurrency tracker that fuses the strength of real-time data with a user-friendly and dynamic user interface. React JS, with its component-based architecture and declarative approach, has gained significant popularity among web developers. Its ability to efficiently handle dynamic data rendering and seamlessly update user interfaces in response to changes makes it an ideal choice for developing a cryptocurrency tracker that can provide real-time market analysis and monitoring. By harnessing the capabilities of React JS, this research aims to create a versatile and user-friendly cryptocurrency tracker that not only presents real-time data but also empowers users with customizable features for personalized analysis and alerts. The proposed cryptocurrency tracker will leverage APIs provided by various cryptocurrency exchanges to fetch real-time market data, including cryptocurrency prices, trading volumes, and market capitalization. This data will be processed and rendered using React JS components, ensuring a seamless and responsive user experience. Additionally, the tracker will integrate charting libraries to enable users to visualize historical price trends and patterns, empowering them to make data-driven investment decisions. Moreover, the cryptocurrency tracker will incorporate advanced functionalities such as portfolio management, allowing users to track the performance of their cryptocurrency holdings and analyze their overall investment

portfolio. Customizable alerts will provide users with timely notifications about specific market conditions or price movements, enabling them to react swiftly to opportunities or risks in the cryptocurrency market.

II. MOTIVATION

The motivation behind this research is to create a platform where people can learn about Cryptocurrency and know market trends. This website helps to keep track of your favorite Crypto coin by showing coin prices in the last 24 hr, three days, 30 days, and one year. The coin pricing history is shown in graphical format, which makes it easy to track Crypto coin prices and decide which coin will be best for investment.

There are a few issues with the existing cryptocurrencies tracker that have caused some problems. One issue is that data present on cryptocurrencies tracker websites are overwhelming. There is a lot of unnecessary information available. The user interface is not straightforward. These things encouraged us to create a website where only necessary information regarding cryptocurrencies is provided, which will be enough for a normal user who just wants to know the current trend of the crypto market along with the profit/loss of top coins. Our UI is also straightforward and clean as we follow Google's Material theme, which is user-friendly and easier to navigate than complex websites.

III. FEATURES AND TECHNOLOGIES

A. Features:

Some features are mentioned below:

- A comprehensive and user-friendly platform for crypto currency tracking.
- Real-time information on crypto currency prices.
- Various Cryptocurrencies are available.
- Analyze each cryptocurrency.
- Filter out search.
- Graph which shows prices and market cap up to a year.
- Track the trading volumes.
- Analyze the past performance of cryptocurrency.
- Trending coin section.
- Personalized watchlist section for logged-in user.

B. Technology Stack:

1. React JS: Utilizing a virtual DOM (Document Object Model) for quick updates and UI component rendering is one of ReactJS's standout features. Additionally, ReactJS has a unidirectional data flow design, which simplifies the management and updating of the application state. With ReactJS, programmers can build reusable user interface components that may be used across numerous web pages or software applications. Additionally, it offers server-side rendering, which enhances application efficiency and yields better SEO (Search Engine Optimization) outcomes. For creating intricate, dynamic, and interactive user interfaces, ReactJS is frequently used in web development. It frequently works with other technologies like **GraphQL, Redux, and React Native**.

2. Material UI : A collection of pre-built UI components based on Google's Material Design standards are offered through the well-known Material UI React component package. A uniform appearance and feel is offered by the visual language of Material Design on a variety of platforms and gadgets. A variety of features, including buttons, icons, forms, tables, grids, and navigational elements, are available in the Material UI. Developers may simply create cutting-edge and responsive web applications with these components because they are made to be versatile and adjustable. It is simple to modify the appearance of components to coordinate with the branding and design of a web application because to the theming and styling capabilities provided by Material UI.

3. Chart JS: Making interactive graphs and charts for the web requires the usage of the well-known open-source package Chart.js. Based on the HTML5 canvas element, it makes it simple to incorporate dynamic, editable charts into your web pages. Charts can automatically resize and modify to match various screen sizes and devices because it is responsively constructed. It offers a variety of customization choices so you may style your charts to match the layout of your website. The title of the chart, the axis labels, the legend, and the colours can all be changed. Because of its straightforward and user-friendly API, Chart.js is usable by developers of all levels. It supports interactive features such as hover effects, click events, and tooltips, which allow users to interact with the charts and gain insights from the data. It makes it easy to add data labels to your charts, which can help users understand the information being presented.

4. Axios: A popular open-source JavaScript library called Axios is used to send HTTP requests from web browsers or Node.js programs. It offers a simple API for sending asynchronous HTTP requests to other web services or RESTful APIs, and it consistently handles responses. Because Promises are used in its construction, handling asynchronous

requests and responses is simple. In order to add authentication headers or alter data, Axios offers interceptors that let you intercept requests or replies before they are transmitted or received. Axios can be used in both web browsers and Node.js applications, making it a versatile library for web development. It is a lightweight library that doesn't require any additional dependencies, making it easy to add to your project without adding any additional overhead. It has a simple and easy-to-use API for sending HTTP requests. It provides default settings for common HTTP request methods like GET and POST, and it supports a variety of request parameters, such as headers, query parameters, and request data. Additionally, Axios supports sending requests with files and streams. It also provides consistent error handling for failed requests, with detailed error messages that can be helpful for debugging. It also supports automatic retrying of failed requests, which can help improve the reliability of your application.

5. Coin Gecko API: A well-known cryptocurrency data portal called CoinGecko offers details on thousands of cryptocurrencies and exchanges. Developers can utilize CoinGecko's complete API to obtain this data programmatically. The CoinGecko API gives users access to a variety of cryptocurrency data, such as:

- Historical and real-time price data for cryptocurrencies.
- Market capitalization and trading volume data; Statistics on cryptocurrency developers and communities.
- Exchange data, such as trading pairs, volumes, and order book data.

To use the CoinGecko API, we need to sign up for a free API key on the CoinGecko website. Once we have an API key, we can use it to make requests to the API endpoints using HTTP requests. The API responses are returned in JSON format, which can be easily parsed and used in our application. For this project we are using the following API of coinGecko:

- CoinList API
- Single Coin API
- Historical Chart Display API
- Trending Coin API

C. Entity Relationship Diagram:

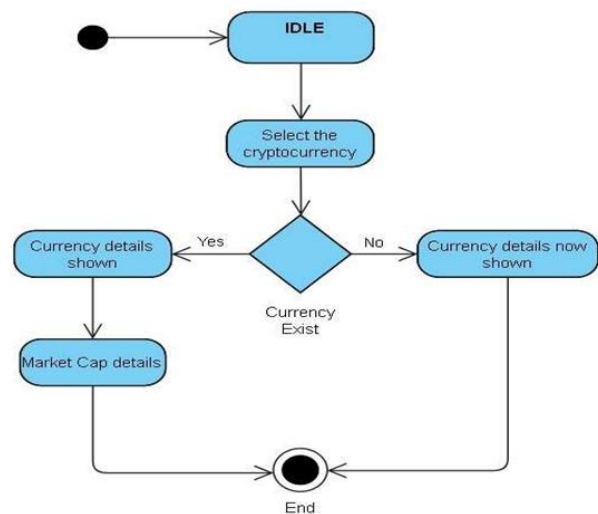


Fig. 1. ER Diagram

Our aim is to give consumers a tool to monitor the growth in value of their cryptocurrency holdings. Our website provides users with a platform to monitor the performance of various cryptocurrencies and to help them make informed decisions about their investments.

This might be handy for tracking the value of your possessions or for investing purposes. Real-time tracking of the prices of different cryptocurrencies will be done through our website. Additionally, it will be used to monitor changes in the pricing, volume, and market capitalization of cryptocurrencies. Each coin also has a brief description provided. With the help of our website, we provide consumers with a simple, clean experience with up-to-date information about the cryptocurrency market. The data flow diagram

D. Data Flow Diagram:

The data flow diagram for the Cryptocurrency Tracker for Real-Time Market Analysis and Monitoring using React JS depicts the flow of information and data within the system. It illustrates how various components interact with each other to ensure real-time data updates and provide users with accurate and up-to-date market information. Once the data is retrieved from the cryptocurrency exchange APIs, it flows into the data processing component. This component is responsible for parsing and structuring the incoming data to make it suitable for display and analysis within the application. It may also involve data manipulation and calculations to generate additional metrics or insights. The processed data is then passed on to various components within the React JS application. The real-time market data component displays the current cryptocurrency prices, trading volumes, and market trends. It provides users with up-to-date information on the cryptocurrency market, allowing them to

monitor the performance of specific cryptocurrencies. The Customization of the algorithm can be performed based on specific requirements and application scenarios.

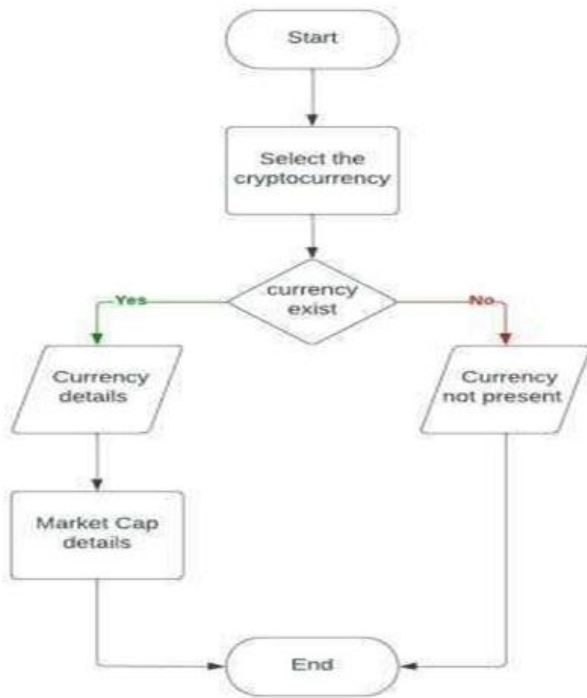


Fig.2. DFD for Proposed Architecture

IV. FRAMEWORK, LIBRARY, AND NODE MODULES

- Code for Material UI installation:
- `npm install @mui/material @emotion/react @emotion/styled`
- `npm install @mui/lab @mui/material`
- `npm install tss-react`
- Code for Axios - `npm install axios`
- Code for React Alice Carousel - `npm install react-alice-carousel`
- Code for HTML React Parser - `npm install html-react-parser`
- Code for Chart JS - `npm install chart.js`
- Code for Chart JS 2 - `npm install react-chartjs-2`
- Code for Firebase - `npm install firebase`
- Code to install Icons
 - `npm install react-icons`
 - `npm install react-google-button`
 - `npm install @mui/icons-material`
- Code for Firebase - `npm install firebase`

V. EXPERIMENT AND RESULTS

A. App Bar:

The App Bar is section of DOM which displays information and help in navigating in website. On the left-hand side, it shows the website name, and on the right side 'Currency toggle' and 'Login/Logout' buttons. For creating the App Bar we have used the AppBar component of material UI because it provide a responsive design align with feature to customize the logo with the help of the Typography class.

B. Currency Toggle:

Users of our website can swap the price of cryptocurrencies between the Indian Rupee and the US Dollar using the currency toggle tool. We leveraged Context API, a React feature that lets you transfer data down the component tree without having to pass props to each individual component of React in the Hierarchy, to enable the currency toggle feature in our app. Without the requirement for explicit props digging, it offers a method for data sharing between components. In order for the Context API to function, a context object that can store data must be created. In order to receive updates anytime the data changes, components that require access to the data can then "subscribe" to the context object.

C. Login/Logout:

This feature of our website facilitates users to Sign up/ Login using email or a Google account. We have used CryptoState (Context API) to determine the current state of the user, whether the user is logged in or not. If the user is not logged in, then the login button will open a popup that allows the user to signup/login using email or a Google account.

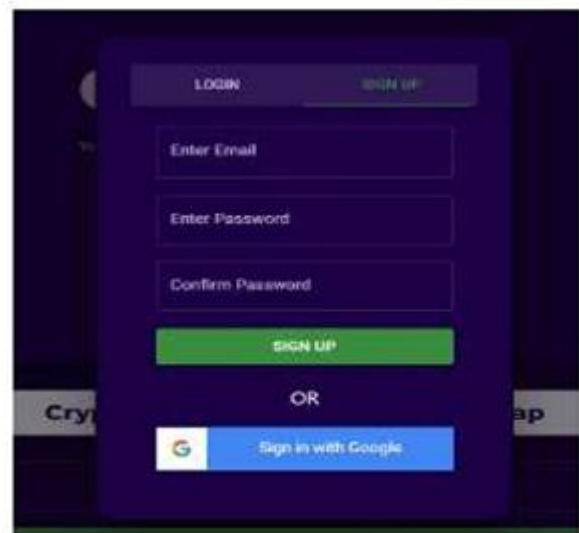


Fig.3. Login/Logout Interface

We used the material UI box, modal, and background components to build the aforementioned react component. The watchlist area of the website, which offers a personalised section with crypto coins contributed by the user, is accessible once the User has logged in. This makes it possible to monitor and examine the desired coins. We are utilising Firebase authentication to build the login functionality since it enables users to log in to your app using a variety of sign-in options, including federated identity providers like Google Sign-in and Facebook Login as well as email address and password sign-in.

D. Carousel:



Fig.4. Carousel in Website

Carousel shows trending cryptocurrency coins with Market Cap and profit/loss in the last 24hrs along with their symbol and logo. This section allows users to quickly monitor the top trending coins. Carousel has features like auto play and mouse tracking. This also responds to the touch input. For giving style to the react component, we have used makeStyles component of material UI. Carousel is implemented using the react-Alice-carousel. For populating the carousel, we have used coinGecko API, specifically trending coins API by using key point.

We need to use their public API which can be accessed through HTTP requests. We have used the Axios node module to make an async get call request to the API. This API endpoint returns an array of objects, where each object represents a trending coin. Each object contains information such as the coin's name, symbol, market capitalization, price, and price change percentage.

After the result is fetched, we have used map function of JavaScript to filter our result and store it inside a array say items. Then, Pass the items array as a prop to the component, along with any other props, such as the autoPlay and autoPlayInterval props to enable automatic scrolling.

E. Coin Table:

Rank	Price	24h Change	Market Cap
1	₹ 1,98,534.00	+0.5%	₹ 3,200,000M
2	₹ 1,92,700.00	+0.3%	₹ 1,120,000M
3	₹ 80.75	+0.3%	₹ 3,300,279M
4	₹ 204.00	+0.3%	₹ 2,000,000M
5	₹ 30.00	+0.3%	₹ 3,300,000M
6	₹ 10.70	+0.3%	₹ 1,000,000M
7	₹ 10.40	+0.3%	₹ 1,000,000M
8	₹ 0.07	+0.3%	₹ 100,000M
9	₹ 0.06	+0.3%	₹ 100,000M
10	₹ 0.05	+0.3%	₹ 100,000M

Fig.5. Coin Table Interface

Coin Table shows a list of the top 100 cryptocurrency coins by Market Capitalization with currency options of INR and USD. The table has data on current market price, profit/loss change in 24 hrs., and Market Cap.

We have used the various component of Material UI for creating the structure of our table. We used the **Table Container** component as the root element for the table, and then we define the table structure using Table, **Table Head**, **Table Body**, **Table Row**, and **Table Cell** components.

CoinGeckho API is the source of data inside the table. We have, particularly used coin API from coinGeckho which provides us with the array containing the object of 100 coins. Each object has a coin name, symbol, coin image, price, and other details.

F. Brief description of the coin:



Fig.6. Coin Description

The coin description component which is a part of the coin page shows a short description of a selected cryptocurrency coin along with Rank, Current Price, and Market Cap. This section also has a button to add coins to favorites which later on get rendered to the watchlist section.

We are fetching the required details of coins that are already stored in the Crypto Context context API. And using JSX to write JavaScript code inside HTML tags. For the implementation of circular loading animation during the process of data fetching, we have used the same process as used in the case of the coin table.

G. Historical Graph of Coin:



Fig.7. Coin Graph

The performance of a cryptocurrency over time is depicted on the historical graph of that coin. It shows the coin's price movements as a line chart with the y-axis representing the coin's price in a certain currency and the x-axis representing time. Depending on the range of data being analysed, the duration can range from a few hours to several years. Users can learn more about how a coin has performed over time, spot trends and patterns in its price movements, and decide when to buy or sell the coin by examining a historical graph of that coin. The performance of various coins can be compared using historical graphs, and the performance of a single coin can be followed over time. The graph shows the price variation over the course of a day, a week, a month, and a year.

To create a historical graph of a cryptocurrency coin in React app, we have used a charting library like react-charts-2 and a cryptocurrency data API like CoinGecko API. We used the useState hook to define a state variable historicData and initialize it to an empty object. We use the useEffect hook to fetch the coin's price data for the past 30 days using the CoinGecko API. We then transformed the data into a format that can be used by the Line chart component provided by react-charts-2. We set the labels prop to an array of dates

formatted using toLocaleDateString(), and the datasets prop to an array containing a single object that describes the coin price data. Finally, we render the Line chart component with the `historicData` object as its data prop.

H. Alert Notification:

Alert notification is used for displaying success messages, error messages, warning messages, or information messages. For implementing this we have used the alert component in Material UI that allows to display of various types of alerts or notifications to the user. Whenever the user logged in, logout, coin added or removed from the watchlist. For all these operations alert notification get trigger and display in the screen. These alerts are dismissible which is achieved using the **snackbar component**.



Fig.9. Alert Notification

VI. CONCLUSION

We used the terminal's npm run build command to get websites ready for deployment. The build folder for the project is then dropped into **Netlify**. **Netlify** is a platform for creating, deploying, and utilising serverless backend services for dynamic websites and web applications, was used to launch the website. Each of the fundamental concepts underlying a cryptocurrency tracker are demonstrated by this project. The concept of a listing benefits the platform user. Making predictions about market trends and matching bitcoin investments will be made easier thanks to this endeavour. Our tracker is an invaluable tool for anyone interested in trading or investing in the bitcoin sector.

VII. FUTURE SCOPE

I. News Section:

The specialised section that gives visitors the most recent details on the bitcoin market and blockchain business will be the news section. Users can use it as a useful resource to stay up to date on the newest information, trends, and advancements in the cryptocurrency industry. Users can find a selection of articles covering a wide range of cryptocurrency-

related issues in the news area. Market analysis, changes in regulations, technological developments, new coin listings, partnerships, and important industry events are a few examples of possible themes. Using a few APIs, we will retrieve the content of articles. Each piece will have a headline that gives a succinct synopsis of what it will be about.

J. Email Alert Functionality:

The email alert functionality will facilitate users to customize their preferences and receive personalized notifications and updates regarding their cryptocurrency which they have added to the watchlist section. Users can set alerts for specific criteria such as price movements, specific cryptocurrencies, market trends, or news updates. The email alerts provide timely information to help users make informed decisions about their investments. The functionality will be designed to be user-friendly and customizable, ensuring users receive accurate and up-to-date information. Overall, it enhances user experience and keeps users connected to the cryptocurrency market.

K. Mobile Application Development:

Mobile app of our React website will be a user-friendly application optimized for smartphones and tablets. It offers users a convenient and accessible way to monitor investments and stay informed about the cryptocurrency market on the go.

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