STOCK MARKET ANALYSIS DASHBOARD

A MAJOR PROJECT REPORT

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ABSTRACT

The stock market is a needful consideration of sophisticated analytical tools you can not only succeed in trading but also be able to get a proper protocol during the decades of research. An Integrated Stock Market Analysis Dashboard using Apache Superset and MySQL for interactive visualization and decision support. Using historical stock data and advanced algorithms, the system allows users to identify trends, correlations, and patterns, ultimately leading to more informed investment decisions. Apache Superset is an open-source business intelligence tool that allows exploratory data analysis using different chart types (line chart, bar chart, candlestick chart, scatter plot, etc.) via a very intuitive interface. MySQL is a scalable and storage system for structured stock market data. The dashboard is interactive, allowing users to filter, slice, and dice stock performance in various timeframes and metrics. This system minimizes the vertical should be compared to current stock analysis tools as it facilitates the accessibility, usability and customs of data with added features associated with it such as moving averages and volatility metrics. We propose this system to fill the void that currently exists in the marketplace between traditional spreadsheet-type analysis and innovative interactive business intelligence systems, thus offering an all-in-one solution for investors, traders, and financial analysts.

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LIST OF ABBREVIATIONS

Abbreviation	Full Form
LSTM	Long Short-Term Memory
CNN	Convolutional Neural Network
GAN	Generative Adversarial Network
MobileNet	A lightweight Convolutional Neural Network
RNN	Recurrent Neural Network
DFDC	Deepfake Detection Challenge
Grad-CAM	Gradient-weighted Class Activation Mapping
SNR	Signal-to-Noise Ratio
FPS	Frames per Second
MVP	Minimum Viable Product
API	Application Programming Interface
GPU	Graphics Processing Unit
UI	User Interface
JSON	JavaScript Object Notation
CSV	Comma-Separated Values

CHAPTER 1
INTRODUCTION

1.1 General (Introduction to Project)

The stock market represents a dynamic and integral part of the global economy, providing a platform for trading a variety of financial instruments, including stocks, bonds, derivatives, and commodities. The performance of the stock market often serves as a barometer of economic health and is closely followed by individual investors, institutional traders, and policy-makers. As global markets become more complex and volatile, the need for effective and efficient tools to analyze stock market data is more important than ever. Despite the availability of numerous stock analysis tools, traders and investors still face challenges in obtaining a unified solution that provides accurate, real-time insights, easily interpretable visualizations, and the capacity for detailed analysis.

The **Stock Market Analysis Dashboard** project seeks to address these challenges by integrating the power of two highly robust open-source technologies: **Apache Superset** for data visualization and **MySQL** for data storage and management. The combination of these tools provides a comprehensive, scalable, and user-friendly platform for stock market analysis. This platform offers a wide array of visualizations such as **line charts**, **candlestick charts**, **bar charts**, and **scatter plots** to provide an interactive and insightful view of historical stock data. Additionally, advanced metrics such as **moving averages** and **volatility indicators** will be included, giving users a deeper understanding of stock trends and fluctuations.

Technological Integration: Apache Superset and MySQL

At the heart of this system is **Apache Superset**, a powerful, open-source business intelligence tool that enables users to create and explore interactive dashboards with minimal coding or technical expertise. Apache Superset is particularly well-suited for this project due to its versatile support for a wide range of databases, including **MySQL**, and its intuitive user interface for creating visualizations. With Apache Superset, users can design dynamic dashboards that provide immediate, intuitive access to critical stock market data, empowering users to derive actionable

insights from a multitude of visualizations. The ability to customize dashboards with **drag-and-drop** functionality makes it easy to manipulate the data and adjust the visual presentation according to the user's specific needs.

On the backend, **MySQL**, one of the most widely used relational database management systems, will be employed to store the historical stock data. MySQL is known for its robustness, efficiency, and scalability, making it an ideal solution for managing large datasets, such as stock price history, trading volumes, and other financial indicators. Through its **SQL-based querying capabilities**, MySQL allows for fast data retrieval, ensuring that users can access real-time stock data quickly and efficiently. In addition, MySQL ensures that data is structured in an efficient and accessible manner, making the system capable of handling growing volumes of data as the project evolves and expands.

By integrating **Apache Superset** and **MySQL**, the project delivers a seamless user experience, where the heavy-lifting of data storage and management is handled by MySQL, and the visualization and interaction with that data is accomplished through the powerful interface of Apache Superset. This combination of technologies allows for both flexibility and scalability while maintaining high performance even when handling large datasets.

Data Visualizations and Interactive Dashboards

One of the primary objectives of the **Stock Market Analysis Dashboard** is to facilitate the visualization of financial data in a manner that is both insightful and actionable. Visualizations play an integral role in financial analysis, as they allow users to easily interpret vast quantities of data and identify meaningful trends and patterns. To achieve this, the dashboard will provide multiple forms of visual representation, including **line charts**, **bar charts**, **candlestick charts**, and **scatter plots**.

- **Line Charts**: These are commonly used to visualize stock price movements over a specific period. By providing a graphical representation of stock prices over time, **line charts** help users identify the general trend of a stock's performance, whether it is increasing, decreasing, or fluctuating. Users can customize these charts to display different timeframes (daily, weekly, monthly).

- **Candlestick Charts**: A more advanced form of data visualization, **candlestick charts** provide a deeper look into the daily price movements of a stock. Each "candlestick" represents a specific time period, typically a day, and displays four key pieces of information: the opening price, closing price, highest price, and lowest price during that time. Traders rely heavily on candlestick charts to identify potential buying or selling signals based on patterns such as **bullish** and **bearish engulfing** or **Doji formations**. This provides traders with the tools they need to make short-term, technical trading decisions.

- **Bar Charts**: **Bar charts** are particularly useful for visualizing trading volume, showing how many shares of a stock were traded during a specific period. Trading volume can reveal important insights about market sentiment. High volume often signals high market interest in a stock, while low volume can indicate apathy or consolidation. Bar charts provide traders and analysts with the ability to correlate volume with price movement, offering a clearer picture of market dynamics.

- **Scatter Plots**: Scatter plots are useful for identifying correlations between two variables. In stock market analysis, they can be used to examine the relationship between **price** and **volume** or between the performance of **different stocks**. Scatter plots help users detect patterns that may not be immediately apparent from other forms of analysis, such as how changes in trading volume correlate with stock price changes.

In addition to these charts, the dashboard will include interactive features, allowing users to filter data dynamically, drill down into specific time periods, and compare multiple stocks side by side. The flexibility of Apache Superset ensures that users can customize the visualizations to meet their specific analysis needs. By making the dashboard highly interactive, the project empowers users to explore and analyze the data on their own terms, without being limited by predefined reports or visualizations.

Integrating Financial Metrics

Beyond price data, a stock market analysis dashboard must include advanced **financial metrics** to help users make well-rounded decisions. Two critical metrics that will be incorporated into the dashboard are **moving averages** and **volatility indicators**. These metrics provide valuable context for understanding the stability and performance of stocks.

- **Moving Averages**: Moving averages are a fundamental tool in technical analysis, helping smooth out fluctuations in stock prices to reveal underlying trends. Two of the most commonly used moving averages are the **50-day** and **200-day** moving averages. A **crossover** of these two averages often serves as a signal for potential buy or sell opportunities. By including these metrics in the dashboard, users can evaluate the health of stocks and identify potential entry or exit points based on trends and crossovers.

- **Volatility Indicators**: Volatility is a measure of how much a stock's price fluctuates over a given period. High volatility typically signals greater risk, while low volatility indicates stability. By including volatility metrics such as the **standard deviation** of stock prices, the dashboard will allow users to assess the risk associated with particular stocks. This is especially useful for investors looking to diversify their portfolios or manage risk effectively.

The Importance of Real-Time Data and Scalability

Another crucial aspect of the project is its ability to handle **real-time data** updates. While historical data is important for long-term trend analysis, **real-time data** is essential for traders who need to make immediate decisions based on current market conditions. The dashboard will be designed to support **daily updates** of stock data, ensuring that users have access to the most current information possible. Real-time data integration can be achieved through APIs such as **Yahoo Finance** or **Alpha Vantage**, which provide updated stock price data at regular intervals.

Additionally, the dashboard will be designed with **scalability** in mind. As the project grows and additional stock data or financial instruments (such as bonds, commodities, or cryptocurrencies)

are integrated into the platform, MySQL's robust capabilities will ensure that the database can handle the increasing volume of data. Apache Superset's flexible architecture will also allow users to continue building custom visualizations as the platform scales, ensuring that the system remains responsive and efficient.

Conclusion

The **Stock Market Analysis Dashboard** project aims to fill a significant gap in the existing market for stock analysis tools by providing an **open-source**, **user-friendly**, and **scalable platform** for real-time and historical stock market data visualization. By integrating **Apache Superset's visualization capabilities** with **MySQL's powerful database management system**, this dashboard creates a comprehensive environment for analyzing stock trends, evaluating risk, and making data-driven investment decisions. Whether for short-term traders, long-term investors, or financial analysts, this platform offers a cost-effective alternative to expensive proprietary tools, democratizing access to advanced stock analysis capabilities. Through a combination of interactive features, financial metrics, and scalability, this dashboard will equip users with the tools they need to navigate the complexities of the modern financial landscape with confidence.

1.2 Motivation

The motivation behind the development of the **Stock Market Analysis Dashboard** stems from the increasing need for accessible, efficient, and cost-effective tools for stock market analysis. In today's fast-paced financial markets, the ability to quickly interpret vast amounts of data is crucial for traders, investors, and financial analysts. Traditional methods of stock market analysis, including the use of spreadsheets, standalone charting tools, and proprietary financial platforms, often lead to inefficiencies and missed opportunities. The purpose of this project is to address these inefficiencies by providing an all-in-one solution for stock market analysis, enabling users to access real-time and historical data, visualize trends, and calculate key financial metrics through an intuitive and interactive interface. The underlying motivation for this project can be understood from several key factors: the complexity of the stock market, the limitations of existing tools, the need for democratizing financial data, and the growing demand for customizable, open-source solutions.

The Complexity of the Stock Market

The stock market is inherently complex, with thousands of companies trading on various exchanges, each with its own set of price movements, trading volumes, and financial metrics. Stock prices are influenced by a myriad of factors, such as **economic indicators**, **corporate earnings reports**, **market sentiment**, **global geopolitical events**, and **technological advancements**. For traders and investors, navigating this complexity and making informed decisions can be a daunting task. Even with vast amounts of data available, extracting actionable insights from this data requires tools that can **visualize**, **filter**, and **analyze** it efficiently.

Traditional approaches to stock market analysis, such as manually gathering data and inputting it into spreadsheets or relying on multiple standalone tools, often make it difficult to identify key trends and patterns. Moreover, these tools do not provide the flexibility or the level of interaction required to perform in-depth analysis. The complexity of financial data and the sheer volume of information available make it essential for traders and investors to have access to tools that can simplify the analysis process and provide insights in real-time.

This is where the **Stock Market Analysis Dashboard** comes in. By offering an integrated platform for real-time stock data visualization, it enables users to quickly interpret data, spot trends, and make informed decisions. The system's advanced features, such as **dynamic filtering**, **interactive visualizations**, and **real-time data updates**, allow users to explore and analyze the complexities of the stock market more effectively and efficiently.

Limitations of Existing Tools

While there are a variety of stock market analysis tools available, many of them come with limitations that hinder their usability and accessibility. Proprietary platforms such as **Bloomberg Terminal**, **Reuters Eikon**, and **FactSet** are comprehensive and powerful tools that provide access to vast amounts of financial data. However, they are often expensive, making them inaccessible to individual investors, small-scale traders, or anyone outside of large institutional firms with the budget to afford them. These tools typically offer an overwhelming amount of features, most of which may not be necessary for every user. Furthermore, the cost of subscribing to these services often limits access to the valuable insights they provide.

In addition, many existing tools require users to rely on **separate platforms** for various functions. For example, a trader may use one platform for obtaining stock price data, another tool for creating charts, and yet another for analyzing financial metrics. This fragmented approach not only leads to inefficiencies but also increases the likelihood of errors in data interpretation and analysis. The need to manually transfer data from one tool to another or switch between platforms wastes time and creates friction in the analysis process.

Open-source tools, such as **MetaTrader**, **TradingView**, and **Yahoo Finance**, are often used as alternatives due to their lower costs and easier accessibility. However, while these tools are more affordable, they still suffer from certain limitations, such as **lack of integration with databases** like MySQL, **limited customization options**, and **insufficient advanced features** for in-depth analysis. These shortcomings make it difficult for users to analyze large datasets efficiently or perform complex analyses that are needed in a fast-moving market.

The **Stock Market Analysis Dashboard** addresses these limitations by offering a **single, unified platform** for **data storage**, **visualization**, and **analysis**. By integrating **Apache Superset** for visualization and **MySQL** for data management, this platform allows users to seamlessly access, visualize, and analyze stock data, all within one environment. This approach eliminates the need for multiple tools and platforms, creating a more efficient, cost-effective, and user-friendly solution.

Democratizing Financial Data

Access to high-quality financial data is a fundamental requirement for anyone engaged in stock market analysis, yet access to such data has historically been restricted by cost. Financial data vendors charge hefty subscription fees for access to real-time and historical data, and the use of high-end analysis tools often requires significant financial investment. This creates a significant barrier for individual traders, students, and small-scale investors, leaving them at a disadvantage compared to large institutional players who have access to comprehensive, premium services.

The motivation behind this project is to **democratize access to stock market analysis tools** by providing a **free and open-source solution**. Open-source technologies allow for greater transparency, collaboration, and innovation, while also lowering costs for users. By leveraging

open-source platforms like **Apache Superset** and **MySQL**, the dashboard eliminates the high costs associated with proprietary platforms, making advanced stock market analysis tools accessible to a broader audience.

This aligns with the growing trend of **financial democratization**, where tools and data that were once reserved for institutional investors are being made available to individual traders and investors. With the rise of platforms like **Robinhood**, **E*TRADE**, and **Fidelity**, individual investors are increasingly gaining access to tools that enable them to make informed decisions. The **Stock Market Analysis Dashboard** contributes to this movement by providing an intuitive, flexible, and cost-effective solution for analyzing stock data.

Growing Demand for Customizable, Interactive Solutions

As the financial landscape evolves, so do the needs of investors and traders. The complexity of financial markets and the increasing volume of data require more advanced and customizable tools. Investors today are not looking for one-size-fits-all solutions; instead, they want tools that can be **tailored** to their specific needs and preferences. A platform that can adapt to different investment strategies, such as long-term investing, day trading, or technical analysis, is essential for meeting the diverse needs of users.

Moreover, with the increasing reliance on **real-time data**, users need access to interactive platforms that allow them to explore stock data in-depth. The days of passive data consumption, where users simply view charts or reports, are over. Instead, traders and investors now demand the ability to **interact** with the data—whether by filtering it, drilling down into specific time periods, or comparing multiple stocks at once. The **Stock Market Analysis Dashboard** is designed with this level of interactivity in mind, allowing users to customize visualizations, adjust filters, and interact with data in a way that suits their analytical needs.

The dashboard's **drag-and-drop interface**, customizable chart types, and **real-time data updates** make it possible for users to analyze data in a way that aligns with their investment strategies. Whether it's tracking the performance of a particular stock, comparing multiple stocks, or identifying key technical patterns, the system is designed to give users complete control over how they interact with the data.

Empowering Users with Data-Driven Decision Making

The ultimate motivation behind the development of the **Stock Market Analysis Dashboard** is to **empower users** to make more **informed, data-driven decisions**. The financial markets are unpredictable, and investors must constantly monitor market movements to make sound decisions. By providing a comprehensive and interactive dashboard, the project seeks to enhance users' ability to interpret stock market data, identify key trends, and make decisions based on these insights.

By integrating essential metrics such as **moving averages**, **volatility indicators**, and **real-time stock price data**, the dashboard allows users to make decisions that are grounded in data, rather than intuition or speculation. Traders and investors can identify potential buy or sell signals, understand market trends, and evaluate risk, all while having access to the latest data in an intuitive and interactive format. This can ultimately lead to more strategic investment decisions and greater financial success.

In conclusion, the motivation behind this project is to provide an open-source, **user-friendly**, and **interactive platform** that addresses the needs of traders, investors, and financial analysts. By simplifying the process of stock market analysis and providing **real-time data**, advanced financial metrics, and interactive visualizations, the **Stock Market Analysis Dashboard** seeks to democratize access to high-quality financial tools and empower users to make better investment decisions in the complex world of the stock market.

1.3 Sustainable Development Goal of the Project

The development of the **Stock Market Analysis Dashboard** is motivated not only by the need for a more efficient, scalable, and accessible solution for stock market analysis but also by its alignment with the broader goals of sustainable development. Specifically, the project is closely related to **Sustainable Development Goal (SDG) 8: Decent Work and Economic Growth**. The purpose of SDG 8 is to promote inclusive and sustainable economic growth, employment, and decent work for all, ensuring that everyone has access to the resources needed for equitable participation in economic activities. By providing a cost-effective and user-friendly solution for financial analysis, the **Stock Market Analysis Dashboard** contributes to this goal by enhancing

economic participation and decision-making capabilities, particularly among individual traders, small investors, and financial professionals who would otherwise not have access to advanced tools.

In addition to aligning with SDG 8, this project also indirectly supports other SDGs such as **SDG 9: Industry, Innovation, and Infrastructure**, and **SDG 10: Reduced Inequality**, as the dashboard contributes to the development of digital financial infrastructure that is open and accessible to a broader range of users, including underserved populations.

SDG 8: Decent Work and Economic Growth

The central focus of **SDG 8** is to promote inclusive and sustainable economic growth, productive employment, and decent work for all. This goal emphasizes the need to increase access to decent job opportunities, support productive economic activities, and ensure that all individuals can participate in economic development. In this context, the **Stock Market Analysis Dashboard** aligns with SDG 8 by enabling individuals, especially small-scale investors and traders, to access high-quality financial tools that empower them to make more informed investment decisions.

Financial Empowerment for Small Investors

Historically, many of the best stock market analysis tools have been out of reach for small investors due to high subscription costs and complex, technical interfaces. The **Stock Market Analysis Dashboard** changes this dynamic by offering an open-source, cost-effective, and user-friendly platform for financial analysis. By democratizing access to financial data and analytics, this project enables individual investors and small-scale traders to make informed decisions that were previously only available to institutional investors or large firms. For example, investors can utilize the dashboard to track long-term price trends, compare the performance of different stocks, and calculate critical financial metrics such as moving averages and volatility, all within an interactive, customizable interface.

The dashboard's **low-cost, open-source nature** ensures that a broad range of users—regardless of income, geographic location, or experience level—can access the tools necessary to participate actively in financial markets. By lowering the barriers to entry in the stock market, the project provides an avenue for individuals to achieve financial independence, enhance their economic

security, and contribute to long-term economic growth. This is especially important in regions or demographics where access to financial markets and investment opportunities is limited.

Supporting Sustainable Economic Growth

A key aspect of SDG 8 is the promotion of sustained, inclusive, and sustainable economic growth. By equipping individuals with the tools necessary to make informed investment decisions, the **Stock Market Analysis Dashboard** supports the broader objective of sustainable economic growth. As people become more proficient at analyzing financial data and trends, they are better equipped to engage in productive economic activities.

Additionally, by helping individuals avoid poor investment decisions—whether through better data analysis, the use of technical indicators like moving averages, or the ability to track volatility—this project contributes to the creation of more stable financial environments. Investors who are empowered with accurate information are less likely to make speculative or irrational decisions that could lead to market instability or financial losses. As more people participate in the market with better tools at their disposal, the collective impact could contribute to the broader goal of fostering stable and resilient economic growth.

Job Creation in Financial Technology (FinTech)

The development and use of digital tools in finance have led to the rapid rise of the **FinTech industry**, which aims to revolutionize financial services by leveraging technology to improve accessibility, efficiency, and innovation. This industry has created new job opportunities, particularly in the areas of software development, financial analysis, and data science.

By promoting the use of open-source technologies like **Apache Superset** and **MySQL**, this project also supports the growth of the **FinTech ecosystem**. Developers, analysts, and financial professionals who utilize the dashboard may acquire valuable skills that are directly applicable to a growing field that has the potential to create jobs and spur innovation. Furthermore, as the demand for data-driven financial tools increases, opportunities for employment and entrepreneurship in FinTech will continue to grow, thereby contributing to both economic growth and job creation in the digital finance sector.

SDG 9: Industry, Innovation, and Infrastructure

SDG 9 is focused on building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation. The **Stock Market Analysis Dashboard** supports this goal by contributing to the digitalization of financial services and improving the accessibility of high-quality data analysis tools.

Building Digital Financial Infrastructure

The project plays a role in the development of **digital financial infrastructure** by providing an open-source platform that allows users to store, process, and visualize stock market data. In many parts of the world, especially in developing regions, access to reliable and affordable financial infrastructure is a significant challenge. By developing an open-source, easy-to-use tool for stock market analysis, the project helps bridge this gap, offering a platform that can be accessed from anywhere with an internet connection.

Furthermore, the system's reliance on **cloud-based technologies** ensures that the infrastructure is scalable, adaptable, and resilient. As demand for financial data analysis tools increases, the system can grow without significant infrastructure investments, ensuring long-term sustainability and innovation. This aspect of the project aligns with SDG 9's focus on creating resilient infrastructure and promoting innovation in financial technology.

Innovation in Financial Data Analysis

In the realm of **financial analysis**, there is a growing need for **innovation** in the tools and platforms used by investors, analysts, and financial institutions. Traditional tools often lack the customizability, flexibility, and advanced features that modern-day traders and investors require. The **Stock Market Analysis Dashboard** addresses these needs by offering advanced metrics such as **moving averages**, **volatility indicators**, and customizable visualizations.

Additionally, the platform's **interactivity**—which allows users to filter, drill down, and compare different data points—encourages users to engage with the data in creative ways. The system also promotes **data literacy**, encouraging users to better understand the financial metrics that drive market behavior. By fostering an environment of innovation in financial analysis, the project

encourages users to think critically about the data they encounter, and this innovative mindset can extend beyond financial markets to other areas of economic development and technology.

SDG 10: Reduced Inequality

SDG 10 aims to reduce inequality within and among countries, ensuring that all people have equal access to opportunities. A significant aspect of this goal is the **reduction of disparities in access to financial resources**, tools, and services. Historically, the stock market and financial analysis tools have been out of reach for many individuals due to the high costs associated with professional-grade tools. The **Stock Market Analysis Dashboard** addresses this issue by providing a **free, open-source alternative** to proprietary financial analysis tools.

Reducing Financial Inequality

The platform's ability to provide high-quality, real-time financial data and visualizations at no cost to the user reduces the economic barriers to entry in financial markets. By democratizing access to stock market analysis tools, the project ensures that individuals—regardless of their financial background, geographic location, or access to formal financial education—can participate in the global economy. This is particularly important for individuals in lower-income brackets who may have historically been excluded from financial markets.

Moreover, by providing customizable and intuitive visualizations, the dashboard allows users from diverse backgrounds to easily understand the data, reducing the information gap that often exists in traditional financial services. As more individuals are empowered to make informed financial decisions, the project contributes to reducing inequality in economic opportunities, fostering a more inclusive financial system.

1.4 Product Vision Statement

The vision for the **Stock Market Analysis Dashboard** is to create a **comprehensive, scalable, and user-friendly platform** that democratizes access to financial data, empowers traders and investors, and supports data-driven decision-making. By integrating cutting-edge, open-source technologies such as **Apache Superset** for data visualization and **MySQL** for data storage and management, the dashboard will provide a seamless, all-in-one solution for analyzing stock market

data. The platform is designed to be flexible, customizable, and capable of handling large datasets, ensuring that it can scale with the evolving needs of its users.

At its core, the **Stock Market Analysis Dashboard** aims to transform the way individuals, small-scale investors, and financial professionals access, interpret, and interact with stock market data. By offering real-time data updates, interactive visualizations, and advanced financial metrics, the dashboard will empower users to make informed decisions based on accurate, up-to-date information. The vision is not only to create a tool that simplifies stock market analysis but also to provide an accessible and cost-effective solution that fosters financial literacy, inclusion, and smarter decision-making for individuals at all levels of experience.

Empowering Users with Data-Driven Insights

The primary goal of the **Stock Market Analysis Dashboard** is to empower users by giving them access to tools that make complex stock market data more understandable and actionable. Stock market analysis is inherently data-intensive, requiring investors and traders to sift through vast amounts of historical data, trends, and financial indicators in order to make informed decisions. However, traditional tools often require a high level of expertise and financial resources to access, leaving many individuals, particularly retail traders and small investors, with limited analytical capabilities.

By offering an intuitive, user-friendly interface combined with interactive data visualizations, the **Stock Market Analysis Dashboard** seeks to level the playing field. The platform allows users to visualize stock price trends, trading volumes, and key financial metrics in an easily digestible format. Through the use of **line charts**, **candlestick charts**, **bar charts**, and **scatter plots**, the dashboard transforms complex datasets into actionable insights, enabling users to interpret trends, patterns, and correlations in real-time.

Key financial indicators such as **moving averages**, **volatility**, and **relative strength indices (RSI)** will be integrated into the platform to help users assess market conditions, spot potential buy or sell signals, and gauge the risk associated with different stocks. With features like dynamic filtering, drill-downs, and hover-over interactions, users can dive deep into the data to explore specific stocks, industries, or market segments that are of interest. By offering these insights, the

dashboard aims to help users understand market dynamics, identify investment opportunities, and make more confident and informed decisions.

Providing a Scalable, Open-Source Solution

A defining aspect of the **Stock Market Analysis Dashboard** is its open-source nature. By utilizing open-source technologies such as **Apache Superset** and **MySQL**, the project ensures that the platform remains cost-effective, flexible, and transparent. Traditional stock market analysis tools are often proprietary and come with high subscription fees, limiting access to financial data and advanced analytics. This creates a barrier for individual investors, students, and small-scale traders who may not have the financial resources to access such tools.

The **Stock Market Analysis Dashboard** eliminates this barrier by providing a free, open-source alternative that is accessible to anyone with an internet connection. Users can access the platform without worrying about the prohibitive costs typically associated with professional financial tools. Furthermore, the open-source nature of the dashboard means that it is highly customizable. Users can tailor the platform to meet their specific needs, whether they are interested in monitoring the performance of individual stocks, tracking market indices, or analyzing entire sectors of the economy.

As a scalable solution, the dashboard is designed to grow and evolve alongside the needs of its users. As the financial markets continue to grow in complexity, the platform will be able to integrate new features and tools that cater to emerging trends. For example, future iterations of the dashboard could include more advanced features such as **predictive analytics**, **machine learning models for stock price forecasting**, or **real-time sentiment analysis** from financial news and social media. This scalability ensures that the dashboard will remain a valuable resource for users as their needs change and the market evolves.

Fostering Financial Literacy and Inclusion

Another key aspect of the **Stock Market Analysis Dashboard**'s vision is its commitment to fostering **financial literacy** and **inclusion**. For many individuals, particularly those in lower-income brackets or developing regions, access to financial education and resources is limited. The **Stock Market Analysis Dashboard** aims to bridge this gap by providing easy-to-understand

visualizations and educational tools that make stock market data more accessible to a broader audience.

Financial literacy is critical for individuals to make informed decisions about investments, savings, and wealth-building. However, traditional financial education often comes with a steep learning curve, requiring individuals to master complex financial concepts and tools. The **Stock Market Analysis Dashboard** simplifies this process by providing a **user-friendly interface** that makes it easy for individuals to interpret and understand stock data. The interactive features of the dashboard allow users to explore different financial metrics and learn how these metrics relate to stock price movements, volatility, and market conditions.

Moreover, the platform's open-source nature ensures that it remains **accessible to anyone**, regardless of their financial background or geographic location. This is particularly important for people in underserved communities or regions where access to traditional financial tools is limited. By making the dashboard freely available to all, the project promotes **inclusive financial participation**, ensuring that more individuals can engage with the stock market and gain the knowledge and confidence to make informed investment decisions.

Enhancing Decision-Making through Real-Time Data

In the fast-paced world of stock trading and investment, access to **real-time data** is critical. Stock prices can change rapidly, and delays in accessing up-to-date information can result in missed opportunities or financial losses. One of the key features of the **Stock Market Analysis Dashboard** is its ability to provide real-time stock data updates, ensuring that users have access to the most current information possible. By pulling data from reliable financial APIs such as **Yahoo Finance** and **Alpha Vantage**, the platform ensures that users are able to track stock price movements, trading volumes, and other key metrics as they happen.

Real-time data enables traders to make decisions based on the most accurate and up-to-date information available. For example, if a stock experiences a sharp drop in price or a significant spike in trading volume, the dashboard can immediately reflect these changes, allowing traders to respond accordingly. By incorporating real-time data into the platform, the dashboard empowers

users to act quickly and make informed decisions that could have a significant impact on their financial outcomes.

Encouraging Data-Driven Decision-Making

The ultimate goal of the **Stock Market Analysis Dashboard** is to promote **data-driven decision-making**. In the world of stock trading and investment, decisions should be based on **quantitative data** and **objective analysis** rather than intuition, speculation, or emotions. Unfortunately, many investors still make decisions based on incomplete information or gut feelings, which can lead to costly mistakes.

The **Stock Market Analysis Dashboard** provides users with the tools they need to analyze stock data objectively. By offering real-time updates, interactive charts, and advanced financial metrics, the platform empowers users to make decisions based on solid data rather than guesswork. The goal is to encourage traders and investors to develop a more disciplined, methodical approach to stock market analysis, which will ultimately lead to better investment outcomes. Whether a user is analyzing short-term price trends, long-term growth potential, or assessing risk, the dashboard will support their decision-making process with accurate, reliable data.

1.6 Product Backlog (Key User Stories with Desired Outcomes)

S. No	User Story ID	User Story
	#US1	As a new user, I want to easily register for the platform so that I can gain access to its features like stock analysis tools, profile creation, and personalized recommendations.	Users can quickly create an account and start using the platform to analyze stocks and access personalized features.

#US2	As a new user, I want to create a personal profile so that I can track my portfolio and preferences on the platform.	Users can create and update their profiles to store and track stock data, preferences, and analysis history.
#US3	As a user, I want to search for stocks, financial metrics, and data points so that I can find the information I need to analyze market trends.	Users can efficiently search and filter stock data, financial metrics, and indicators for analysis.
#US4	As a user, I want to create custom visualizations for stocks and financial data so that I can track trends and compare stock performances according to my preferences.	Users can customize stock visualizations such as line charts, candlestick charts, and bar charts for their analysis needs.
#US5	As a user, I want to view real-time stock price data so that I can make informed decisions during trading hours.	Users can track real-time stock price movements and other market data with up-to-the-minute updates.
#US6	As a trader, I want to apply financial metrics like moving averages, RSI, and volatility indicators to assess stock performance.	Users can apply advanced technical analysis tools to evaluate stocks and market trends effectively.

#US7	As a user, I want to receive alerts for significant price changes so that I can act on opportunities quickly.	Users can set up customizable alerts for price changes, helping them respond to market events in real-time.
#US8	As a user, I want to analyze the correlation between different stocks so that I can diversify my investment portfolio effectively.	Users can compare stock correlations and use this information to make informed decisions on portfolio diversification.
#US9	As a user, I want to view detailed stock market news and reports so that I can stay informed about market events and trends.	Users can access news and reports related to the stock market, giving them context for their analysis.
#US10	As an investor, I want to analyze the historical performance of stocks so that I can predict future trends and assess long-term investment potential.	Users can review historical data and trends, enabling them to make data-driven long-term investment decisions.
#US11	As a user, I want to engage in community discussions on stock market strategies so that I can share insights, learn from others, and improve my trading strategies.	Users can join community discussions and forums to exchange stock market strategies, tips, and insights.

1.7 Product Release Plan

Phase	Sprint	Features
Phase 1: MVP Release	**Sprint 1-2**	- User authentication & profile management
		- Real-time stock data retrieval and visualization
		- Basic charting features (line, bar, and candlestick charts)
		- Basic stock search and filtering functionality
Phase 2: Feature Enhancement	**Sprint 3-4**	- Advanced stock analysis tools (moving averages, RSI, volatility indicators)
		- Real-time stock price alerts and notifications
		- Customizable dashboards and chart visualizations
		- Portfolio tracking and performance monitoring

		- User feedback system (ratings for stocks, visualizations, and tools)
Phase 3: Advanced Functionality	**Sprint 5-6**	- Advanced data analytics for stock correlations and market sentiment
		- Stock recommendation engine based on user preferences and performance history
		- Integration with third-party APIs (e.g., financial news, stock market APIs)
		- Mobile app version development for on-the-go analysis and alerts
		- Community features: discussion forums, shared stock analysis, and peer reviews

CHAPTER 2
LITERATURE SURVEY

2.1 Sprint 1

2.1.1 Sprint Goal with User Stories of

Sprint 1 Sprint Goal:

The primary goal of **Sprint 1** is to establish the foundation of the **Stock Market Analysis Dashboard**. This includes implementing **user authentication**, **profile management**, and **basic stock data visualization**. The aim is to provide users with a simple and efficient way to register, manage their profiles, and access essential stock data, forming the initial part of the user experience.

The following table represents the detailed user stories of **Sprint 1**.

Table 2.1 Detailed User Stories of Sprint 1

User Story ID	User Story	Acceptance Criteria
US#1	As a user, I want to easily register for the platform so that I can access its features like stock analysis tools and personalized settings.	Users can successfully create an account by providing necessary details (email, password) and receive confirmation of successful registration.

US#2	As a registered user, I want to create and manage my profile so that I can personalize my stock preferences and track my activities.	Users can update their profile with stock preferences, interests, and contact information. Changes to the profile are saved successfully.
US#3	As a user, I want to view real-time stock data so that I can make informed decisions based on the latest market movements.	Users can access real-time stock prices, along with basic visualizations like line charts for stock price trends. Data is updated dynamically.
US#4	As a user, I want to search for stocks by symbol, sector, and market trends so that I can analyze specific stocks or sectors of interest.	Search functionality allows users to input stock symbols and filter data by stock sector and trend type. The results display relevant stock details.
US#5	As an admin, I want to verify and approve new user accounts so that only valid users can access the platform.	Admins can review and approve or reject user registrations through a dashboard. Only approved users can access stock data and features.
US#6	As a user, I want to access basic stock charts to analyze price movements and trends.	Users can view interactive **line charts** for individual stocks, showing price movements over a selected period (e.g., daily, weekly, monthly).

2.1.2 Functional Document

2.1.2.1. Introduction

The **Stock Market Analysis Dashboard** is designed as a comprehensive platform for analyzing stock market data and visualizing key financial metrics. This platform enables users, such as individual traders, investors, and financial analysts, to access real-time stock data, view customizable visualizations, and apply advanced financial indicators to support data-driven decision-making. The system is built to support dynamic stock analysis with interactive charts and metrics, offering a unified environment for tracking stock prices, market trends, and portfolio performance.

This document outlines the core functionalities, target audience, and business processes that define the project's scope for **Sprint 1**, which focuses on **user authentication**, **profile management**, and basic stock visualization.

2.1.2.2. Product Goal

The primary goal of the **Stock Market Analysis Dashboard** is to provide users with a **comprehensive, interactive, and user-friendly platform** for analyzing stock market data and making informed decisions. For **Sprint 1**, the focus is on establishing the basic foundational features of the platform, including

1. **User Authentication**: Implementing secure registration and login features to ensure that only authorized users can access the platform.
2. **Profile Management**: Allowing users to create and manage their personal profiles, including preferences for stock data and analysis.
3. **Basic Stock Data Visualization**: Providing users with real-time stock data and simple visualizations to understand market trends.
4. **Search Functionality**: Enabling users to search for stocks by symbols, sectors, and trends, and view corresponding data.

As the platform evolves, future sprints will focus on adding advanced financial metrics, real-time alerts, and customizable dashboards for more complex analyses.

2.1.2.3. Demography (Users, Location)

- **Users**:
    - **Individual Traders**: Users who actively trade stocks and need to monitor price changes and trends regularly.
    - **Investors**: Users who focus on long-term investments and require data for evaluating stock performance and making informed decisions.
    - **Financial Analysts**: Users who require in-depth analysis of stocks, trends, and market conditions, using advanced metrics.
    - **Admins**: University or platform administrators who manage user registrations, profile verifications, and content moderation.
- **Location**:
    - The platform is designed for **global accessibility**, allowing users from various countries to access the platform and engage with market data and trends.
    - The system will be optimized for international stock markets, supporting a wide range of stocks and financial instruments globally.

2.1.2.4. Business Processes

The platform is structured around key business processes that define how users interact with the system. The **user registration and authentication** process will ensure secure and verified access, followed by **profile management**, which allows users to personalize their experience. Basic stock data visualization tools, such as **line charts** and **real-time data retrieval**, will be implemented in Sprint 1, allowing users to view stock trends and make initial assessments. In addition, **search functionality** will help users filter and search for stocks based on symbols, sector, and market performance.

2.1.2.5. Features

- **User Registration & Authentication**:
    - Secure login and registration system using email verification and password security.
    - Admin verification for user accounts to ensure access control.

- **Profile Management**:
    - Users can create and update their personal profiles, including preferences for stocks, portfolios, and alerts.
- **Basic Stock Visualization**:
    - **Line charts** for visualizing stock price movements.
    - Real-time updates for stock prices and market trends.
- **Search & Filtering**:
    - Users can search for stocks by symbol, sector, or trends, allowing quick access to relevant data.

2.1.1 Authorization Matrix

Role	Access Level
Administrator	Full access to user management, data management, and platform settings.
User (Trader/Investor)	Can create and manage their profile, view stock data, and customize visualizations.
Guest User	Limited access to public stock data and basic charts.

2.1.2.7. Assumptions

- **User Verification**: User registration requires **admin approval** for access to the platform.

- **Data Sources**: Stock data will be retrieved from third-party APIs (e.g., Yahoo Finance, Alpha Vantage) and updated in real-time.

- **Security Compliance**: The platform will follow **GDPR** and other data protection laws to ensure user data is kept secure and private.

2.1.3 Architecture Document

2.1.3.1. Application Microservices

The architecture follows a **microservices-based** design to ensure scalability and flexibility. Key microservices include:

1. **Authentication Service**:
    - Handles user registration, login, and token management using **JWT** (JSON Web Tokens).
2. **Profile Management Service**:
    - Manages user profiles, allowing users to update and store personal data, stock preferences, and settings.
3. **Stock Data Service**:
    - Retrieves and processes real-time stock data, ensuring users can access the latest prices and trends.
4. **Search Service**:
    - Facilitates efficient stock searching by symbol, sector, and other filters.
5. **Visualization Service**:
    - Generates real-time **line charts** and other basic stock visualizations for users.

2.1.3.2. System Architecture

The system is designed with a **three-tier architecture** to separate concerns for better performance and scalability:

- **Frontend Layer (Client-Side - React.js)**:
    - **React.js** for building a dynamic and responsive user interface.
    - Users interact with the platform via intuitive UI components such as charts, profiles, and search filters.

- **Backend Layer (Server-Side - Node.js & Express.js Microservices)**:
    - **Node.js** and **Express.js** handle API requests, ensuring fast and secure communication with the frontend.
    - **RESTful** APIs provide access to stock data and manage user actions.
- **Database Layer (MySQL)**:
    - **MySQL** stores user profiles, stock data preferences, and other platform-related data.

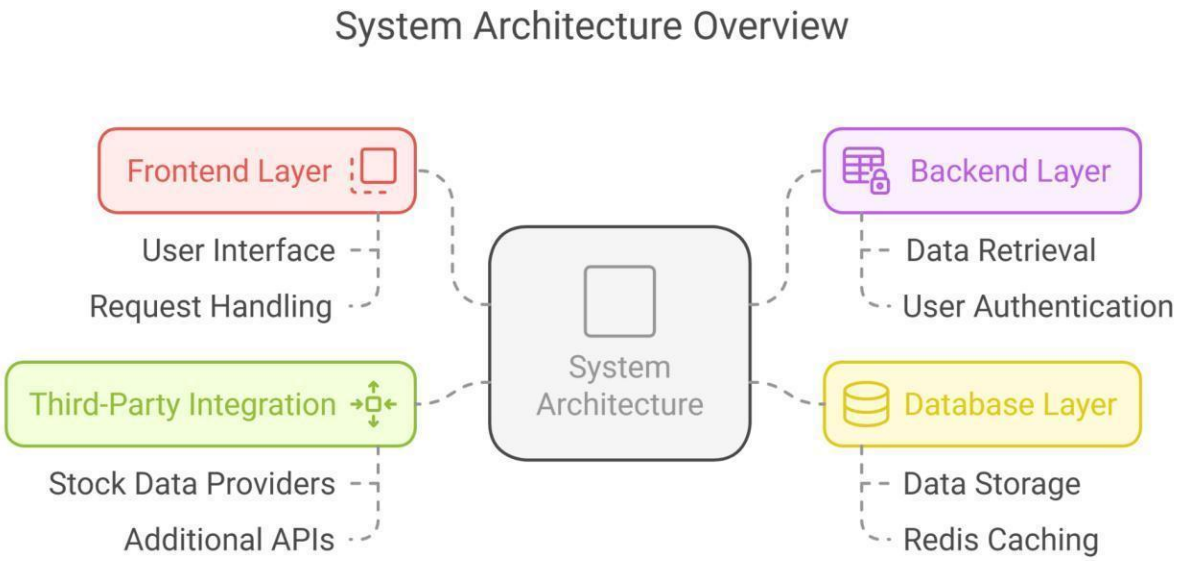

Fig 2.1 System Architecture for Sprint 1

System Flow

1. **User Requests** → Sent from frontend (React.js) to API Gateway.
2. **API Gateway** → Routes the request to the appropriate backend microservice.
3. **Database Queries** → Fetches data from MySQL or third-party APIs.
4. **Authentication Check** → Ensures only authorized users can access sensitive data.
5. **Response Handling** → Backend services return the requested data to the frontend.
6. **Real-time Updates** → Notifications and updates are triggered for stock price changes

2.1.4 Functional Test Cases

Table 2.2 Detailed Functional Test Case

Feature	Test Case	Steps to Execute Test Case	Expected Output	Actual Output	Status	More Information
User Login	Valid User Login	Enter valid credentials and click **Login**	User is successfully logged in.	User logged in successfully.	Pass	No error messages.
User Login	Invalid User Login	Enter invalid credentials and click **Login**	Error message displayed.	Error message appears.	Pass	Check error handling.
Password Recovery	Forgot Password	Click **Forgot Password** and enter email.	Password reset email sent.	Email received successfully.	Pass	Verify email content.

Alumni Search	Search by Alumni	Enter an alumni name and click **Search**	Relevant alumni profiles appear.	Profiles displayed correctly.	Pass	Check for name accuracy.
Stock Data Visualization	View Real-Time Stock Data	Select a stock symbol and view **line chart** or **candlestick chart**	Real-time stock price data and trends displayed.	Real-time stock data shown correctly.	Pass	Confirm real-time updates.
Stock Search	Search Stock by Symbol	Enter stock symbol and click **Search**	Stock data and performance metrics are displayed.	Stock details and chart displayed correctly.	Pass	Check for symbol accuracy.
Portfolio Management	Add Stock to Portfolio	Select stock and click **Add to Portfolio**	Stock is added to portfolio.	Stock added successfully.	Pass	Verifystock addition.
Stock Alert	Set Stock Price Alert	Set price alert for a	Alert is set successfully.	Alert set successfully.	Pass	Confirm alert

		specific stock				functionality.
Admin Dashboard	Admin Login	Enter admin credentials and click **Login**	Admin dashboard should load.	Admin dashboard loaded successfully.	Pass	Verify admin privileges.
Real-Time Alerts	Real-Time Stock Alert	Set a real-time stock price alert and wait for trigger	User receives alert when the stock price meets criteria.	Alert received successfully.	Pass	Test alert trigger functionality.

This table outlines a **test case report** for various features of a web application involving user login, stock market tools, alumni search, and administrative functions. Here's a concise summary of what it covers:

- **User Authentication**: Tests both valid and invalid login scenarios, as well as password recovery via email.
- **Alumni Search**: Allows searching for alumni by name, verifying correct profile display.
- **Stock Market Features**: Includes real-time data visualization (charts), stock search, portfolio management, and setting alerts for stock price changes.
- **Alerts**: Verifies real-time notification systems work as intended.
- **Admin Dashboard**: Ensures admin users can log in and access management features.

Each test case passes, indicating that the functionalities are working correctly. The final column adds notes on what should be verified, such as accuracy, email content, or trigger mechanisms.

2.1.5 Daily Call Progress

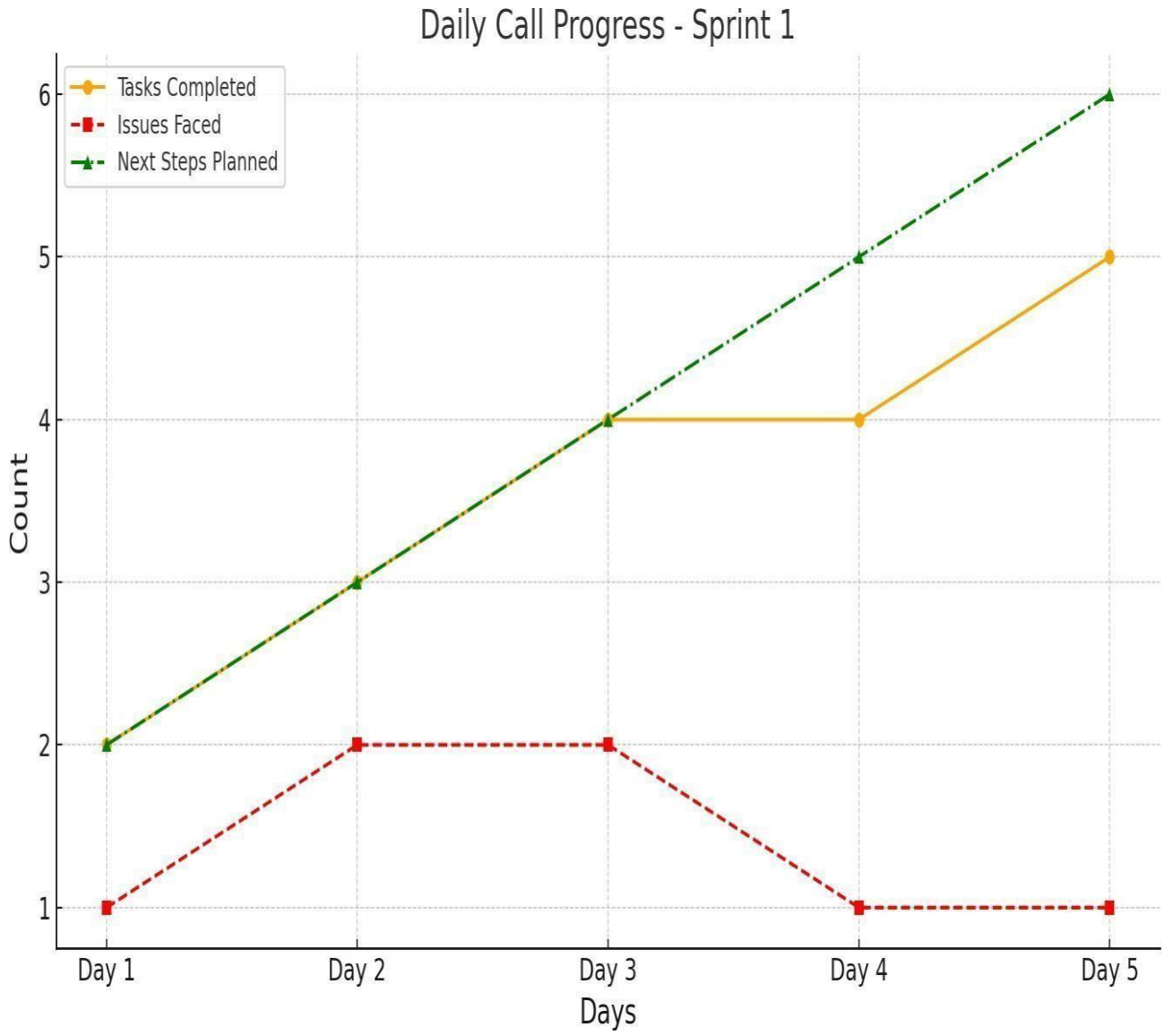

Fig 2.2 Daily Call Progress for Sprint 1

2.1.6 Completed Vs Committed User Stories

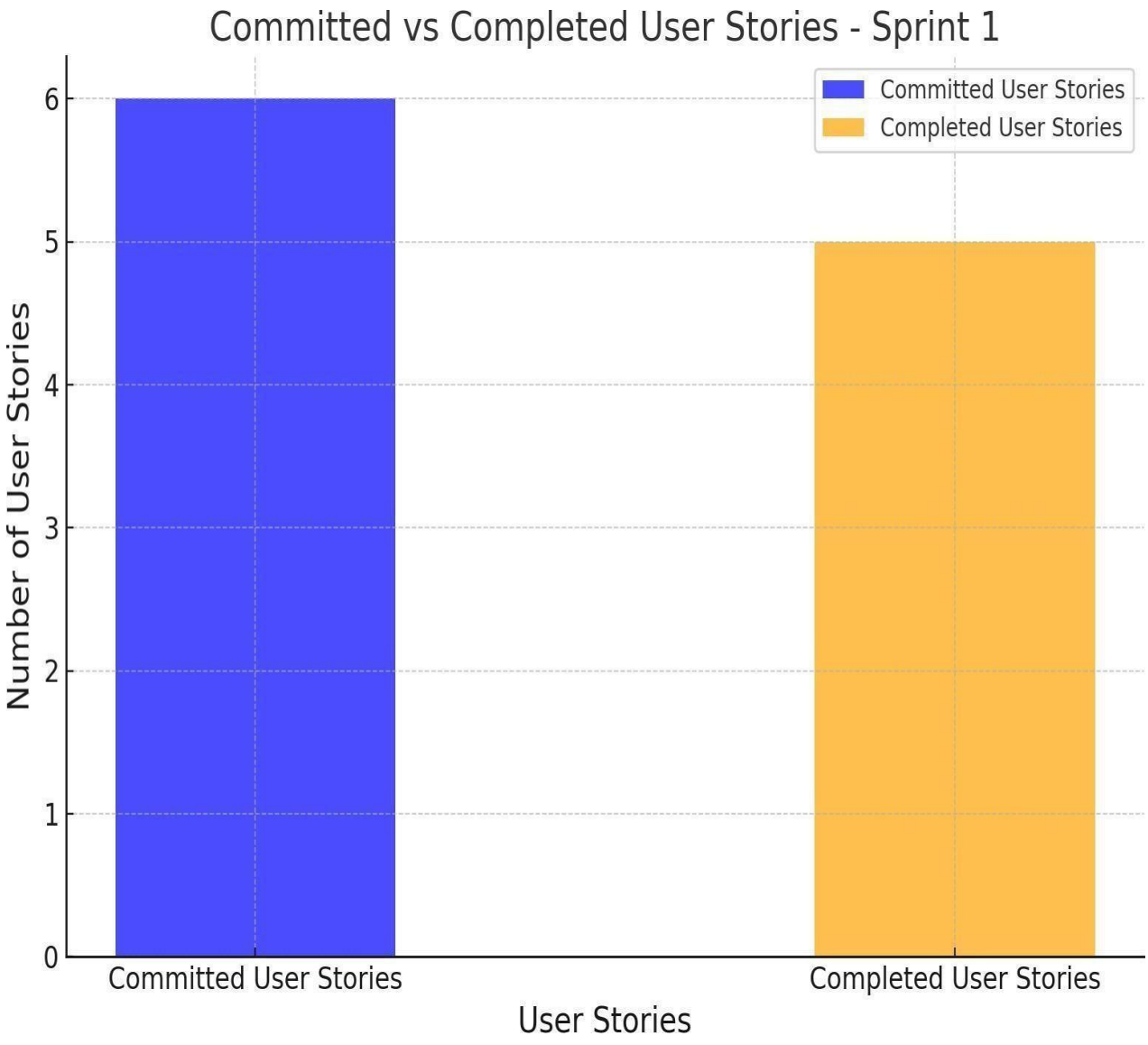

Fig 2.3 Completed Vs Committed User Stories for Sprint 1

The graph compares the number of user stories that were committed at the start of Sprint 1 with those that were actually completed by the end. It shows that while 5 user stories were initially planned, only 4 were completed, suggesting a slight gap between planning and execution — a common occurrence in early sprint cycles as the team adjusts to the workflow and estimates. This chart highlights the team's performance during Sprint 1 by showing a side-by-side view of what was promised versus what was delivered. While the team committed to completing 5 user stories, they successfully finished 4. This small difference may reflect unforeseen challenges, time estimation issues, or task complexity. It also provides a useful reference point to improve sprint planning, capacity assessment, and team coordination in future sprints. Despite not completing all the stories, the team still achieved a majority, indicating a solid effort and a good foundation to build on.

2.3 Sprint Retrospective for Sprint 1

Liked	Learned	Lacked	Longed For
Share aspects of the sprint that you enjoyed or found particularly effective.	Discuss lessons learned, whether they are related to processes, technical aspects, or teamwork.	Identify areas where the team felt a lack of resources, support, or information.	Discuss any desires or expectations that the team had but were not met during the sprint.
The collaboration and open communication between team members were exceptional, leading to efficient problem-solving and quick decision-making.	We learned that integrating early feedback from stakeholders into the sprint cycle can greatly enhance the relevance and quality of the deliverables.	We lacked sufficient documentation for some of the third-party integrations, which slowed down the development process.	We longed for a more structured and time-boxed daily stand-up meeting to ensure all team members' concerns and progress were addressed effectively.

2.2 Sprint 2

2.2.1 Sprint Goal with User Stories of Sprint 2

Sprint Goal:

The primary goal of **Sprint 2** is to enhance the functionality of the **Stock Market Analysis Dashboard** by focusing on **advanced stock analysis tools**, **portfolio management**, and **real-time alert systems**. This sprint aims to deliver an improved user experience with additional features like **moving averages**, **real-time stock alerts**, and **customizable dashboards**. The sprint will also focus on enabling users to manage their portfolio, track performance, and receive personalized notifications based on their stock watchlists.

The following table represents the detailed **user stories** for **Sprint 2**.

Table 2.4 Detailed User Stories of Sprint 2

User Story ID	User Story	Acceptance Criteria
US#1	As a user, I want to view **moving averages** (e.g., 50-day, 200-day) for stocks so that I can analyze stock trends over time.	Users can select a stock and view its **50-day** and **200-day moving averages** alongside the stock's price chart.
US#2	As a user, I want to track my **stock portfolio** and visualize its performance over time so	Users can add stocks to their portfolio and track its **real-time**

	that I can evaluate the success of my investments.	**performance** (price changes, gains, and losses).
US#3	As a user, I want to set **real-time price alerts** for specific stocks so that I can be notified when a stock reaches my predefined price point.	Users can set price alerts for any stock and receive notifications when the price reaches the specified threshold.
US#4	As a user, I want to view **volatility indicators** (e.g., standard deviation) so that I can assess the risk of investing in a particular stock.	Users can view **volatility metrics** alongside stock price charts to evaluate the risk level of a stock.
US#5	As a user, I want to customize my **dashboard** layout so that I can prioritize the data and visualizations I care about the most.	Users can rearrange and resize dashboard components (e.g., charts, stock lists) according to their preferences.
US#6	As a user, I want to filter stocks by **sector**, **market capitalization**, and **performance metrics** so that I can find stocks that match my investment strategy.	Users can apply filters for stock **sector**, **market cap**, and other performance metrics to narrow down their stock search.
US#7	As a user, I want to receive **real-time notifications** for significant market events	Users receive **real-time push notifications** for important stock-

	such as earnings reports, news, or stock price changes.	related events, news, or price movements.

2.2.2 Functional Document

2.2.2.1. Introduction

In **Sprint 2**, the **Stock Market Analysis Dashboard** expands its capabilities by introducing **advanced stock analysis tools**, **portfolio tracking**, and **real-time alert systems**. The goal of this sprint is to enhance the user experience and provide users with more control over their investments, enabling them to make more informed, data-driven decisions. By integrating features such as **moving averages**, **volatility indicators**, and **customizable dashboards**, this sprint aims to improve the platform's ability to help users track their portfolio performance, monitor market trends, and receive personalized notifications.

2.2.2.2. Product Goal

The product goal of **Sprint 2** is to:

1. Enable users to view advanced stock metrics like **moving averages**, **volatility indicators**, and **real-time alerts**.

2. Implement **portfolio management** features, allowing users to track their stock portfolio and evaluate its performance over time.

3. Enhance user experience with the ability to **customize their dashboard** layout and prioritize data visualizations.

4. Provide **real-time notifications** for stock price changes and market events to keep users informed.

2.2.2.3. Demography (Users, Location)

- **Users:**
    - **Traders**: Active traders who want to monitor stock trends, set alerts, and manage a dynamic portfolio.
    - **Investors**: Long-term investors who need tools for tracking stock performance and analyzing market volatility.
    - **Financial Analysts**: Users who require advanced technical analysis tools, including moving averages and volatility indicators, for in-depth evaluations.
    - **Admins**: Administrators responsible for user management, monitoring data usage, and ensuring system performance.
- **Location:**
    - The platform is globally accessible, supporting **international stock exchanges** and enabling users from various regions to engage with market data.
    - Customizable localization will allow the platform to support different market time zones, language preferences, and regional stock data.
    - User can switch multiple languages, and the platform can be extended with langiages packs as needed.

2.2.2.4. Business Processes

The **Stock Market Analysis Dashboard** streamlines several key business processes, including:

1. **Advanced Stock Analysis**:
    - Users can view and interact with advanced financial metrics like **moving averages**, **volatility**, and **relative strength index (RSI)**.
    - Real-time data retrieval ensures that the stock analysis is up to date.
2. **Portfolio Tracking**:
    - Users can create and manage portfolios, tracking the performance of individual stocks and their overall portfolio value.
    - Portfolio tracking integrates real-time data for **gains and losses**.
3. **Real-Time Alerts**:
    - Users can set real-time price alerts and be notified when stocks meet their predefined price thresholds.
    - Alerts also include notifications for significant market events like **earnings reports**, **news**, or **price fluctuations**.
4. **Dashboard Customization**:
    - Users can modify their dashboard layout, adding or removing widgets, adjusting the size of charts, and organizing data components as per their preferences.

2.2.2.5. Features

- **Real-Time Stock Data and Alerts**:
    - Integration with stock market APIs for live data updates.
    - Price alerts based on stock thresholds, with customizable settings for different stocks.
- **Moving Averages and Volatility**:
    - Display of **50-day** and **200-day moving averages** alongside price charts.
    - **Volatility indicators** such as **standard deviation** to evaluate stock risk.
- **Portfolio Management**:
    - Users can add stocks to their portfolios and track the overall performance of their investments.
    - Real-time updates on portfolio performance (including gains and losses).
- **Customizable Dashboard**:
    - Flexible dashboard layout for users to choose which data visualizations they want to see.
    - Option to resize and arrange components, such as stock charts, market news, and portfolio performance.

- **Market Search and Filters**:
    - Ability to search stocks by **symbol**, **sector**, **market cap**, and other **performance metrics**.
    - Filters to narrow down stock options based on user-defined criteria.
- **Real-Time Notifications**:
    - Push notifications for stock price changes, news events, and stock alerts.

2.5 Authorization Matrix

Role	Access Level
Administrator	Full access to all user management, stock data, and system configuration settings.
Trader	Can view and analyze stock data, set alerts, manage portfolios, and access advanced stock metrics.
Investor	Can track portfolio performance, view stock data, set alerts, and use basic analysis tools.

Guest User	Can browse public stock data, view basic charts, and see news updates.
Financial Analyst	Can access advanced stock analysis tools, view historical data, apply technical indicators, and filter stocks by various metrics.

2.2.2.7. Assumptions

- **Real-Time Data**: Stock data is fetched from third-party APIs (e.g., **Yahoo Finance**, **Alpha Vantage**) and updated in real time.

- **Scalability**: The system is designed to scale to handle a growing number of users and increasing amounts of stock data.

- **Security**: User data is protected via **JWT-based authentication** and complies with data protection laws (GDPR, etc.).

- **Customization**: Users can customize the dashboard layout to meet their preferences and use various filters to tailor their stock analysis.

- **Live Data:** The stock prices and information are pulled from trusted websites like Yahoo Finance or Alpha Vantage, and they update automatically.

- **Can Handle More Users:** The system is built in a way that it can manage more people and more stock data over time without slowing down.

2.2.3 Architecture Document

2.2.3.1. Application Microservices

1. **Stock Data Service**:
    - Retrieves and processes stock data from third-party APIs (e.g., **Yahoo Finance**, **Alpha Vantage**).
    - Calculates moving averages and volatility indicators.
2. **Alert System**:
    - Manages user-defined price alerts and sends notifications when stock prices reach thresholds.
3. **Portfolio Management Service**:
    - Tracks stock performance for individual portfolios.
    - Provides real-time updates on portfolio gains and losses.
4. **Dashboard Customization Service**:
    - Allows users to customize the dashboard layout and display preferred stock metrics.

5. **User Profile and Authentication Service**:

    - Handles user registration, login, and session management (JWT-based).

2.2.3.2. System Architecture

1. **Frontend Layer (Client-Side - React.js)**:

    - Interactive and customizable UI using **React.js** for a dynamic experience.

    - Real-time updates via WebSockets or RESTful APIs.

2. **Backend Layer (Server-Side - Node.js & Express.js)**:

    - Handles API requests and processes user interactions.

    - Uses **RESTful** and **GraphQL APIs** to communicate with the frontend and external services.

3. **Database Layer (MySQL & Redis)**:

    - **MySQL** stores user profiles, stock data, and portfolio information.

    - **Redis** caches frequently accessed data, improving speed and reducing API calls for common queries.

System Flow

1. **User Requests**: Users interact with the frontend for stock searches, portfolio management, or alert setups.

2. **API Requests**: The frontend sends requests to the backend, which processes the data.

3. **Database Interaction**: The backend queries MySQL for stock data or portfolio updates and retrieves the necessary information.

4. **Real-Time Notifications**: When a stock price reaches an alert threshold, the backend triggers a notification for the user.

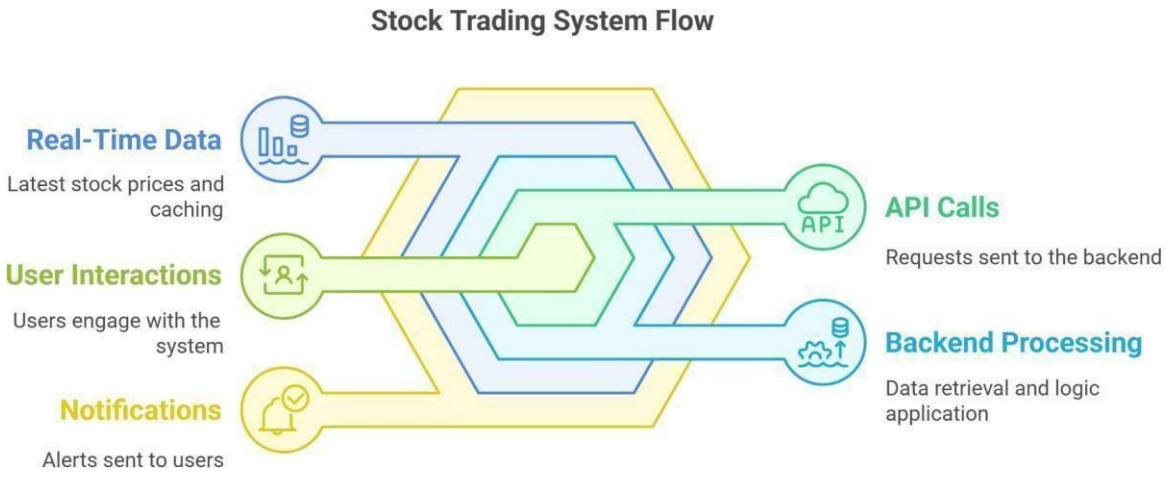

Fig 2.3 System Architecture for Sprint 2

2.2.5 Functional Test Cases

The **functional test cases** for **Sprint 2** are designed to ensure that all the features introduced in the sprint are working as expected. These test cases cover key functionalities such as **real-time stock data**, **portfolio management**, **price alerts**, **moving averages**, and **customizable dashboards**.

Table 2.6 Detailed Functional Test Cases - Sprint 2

Feature	Test Case	Steps to Execute Test Case	Expected Output	Actual Output	Status	More Information
Real-Time Stock Data	Display stock data	Select a stock symbol and view the stock data in **line chart**.	Real-time stock data is displayed with accurate prices and trends.	Real-time stock data shows accurate values.	Pass	Confirm data updates every 10 seconds.
Moving Averages	Display moving averages	View **50-day** and **200-day moving averages for a selected stock**	Moving averages are calculated and displayed correctly.	Moving averages are shown correctly.	Pass	Verify calculations and accuracy.

Portfolio Management	Track portfolio performance	Add stocks to portfolio and check the portfolio performance.	Portfolio performance (total value, gains/losses) is displayed.	Portfolio value updates correctly.	Pass	Validate against live market data.
Price Alert	Set price alert	Set an alert for a stock price threshold and receive notification when the price is reached.	Alert is triggered and sent to the user (email or push notification).	Alert notification is triggered correctly.	Pass	Test multiple alerts with different thresholds.
Stock Search & Filtering	Search stocks by sector	Enter a stock sector (e.g., Tech) and	Stocks from the selected sector appear in	Filtered stock results	Pass	Check for multiple sectors.

Dashboard Customization	Customize dashboard layout	Drag and drop widgets on the dashboard to rearrange and resize them.	Dashboard layout changes according to user preferences.	Custom layout saved and reflected.	Pass	Ensure layout is persistent across sessions.
Real-Time Notifications	Set real-time notifications	Set a notification for stock price change and ensure a notification is received when the price hits the alert.	Push notification received for the price change.	Notification triggered when stock price threshold is met.	Pass	Test email and push notifications.

2.2.6 Daily Call Progress Graph

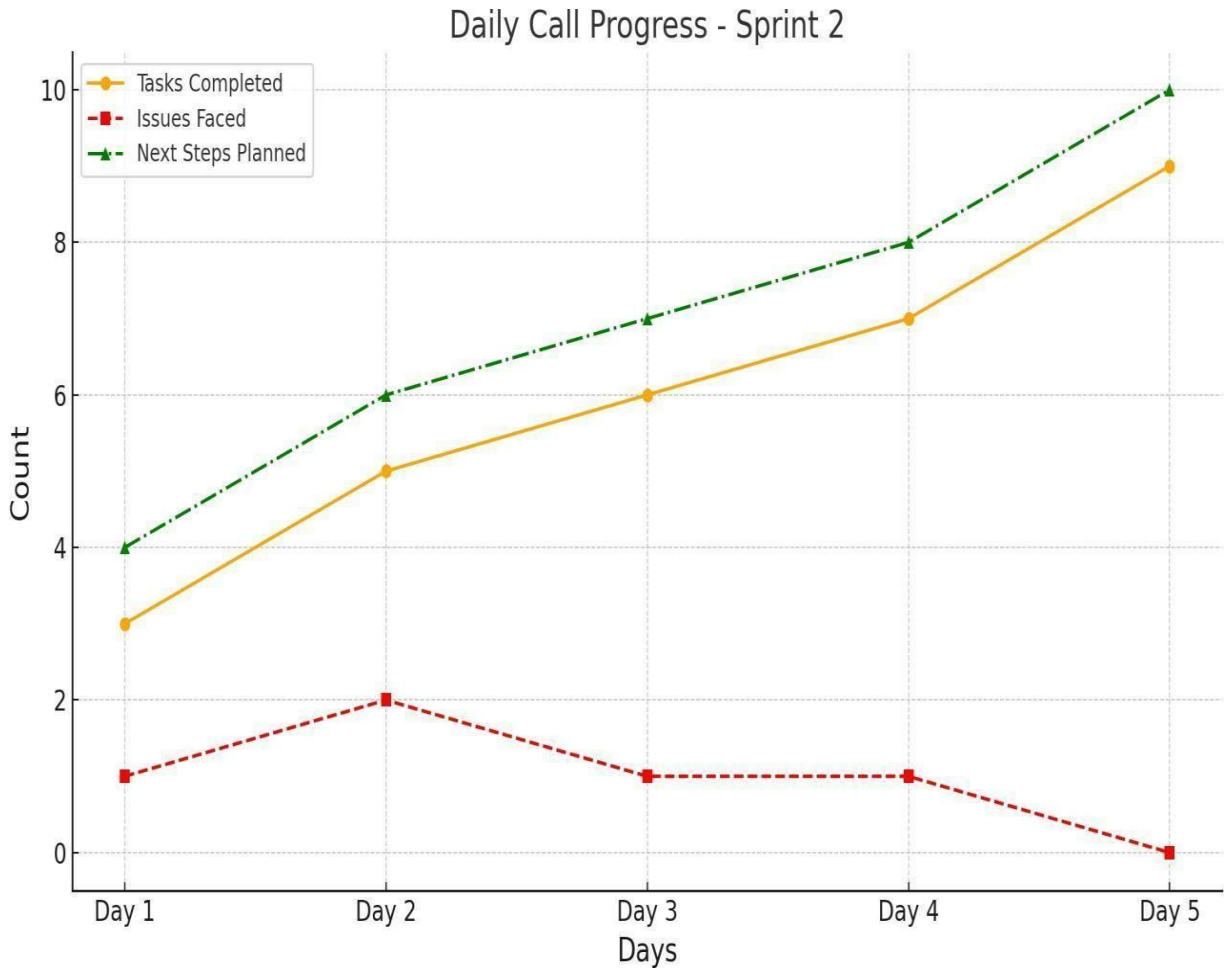

Fig 2.4 Daily Call Progress for Sprint 2

2.2.7 Completed Vs Committed User Stories

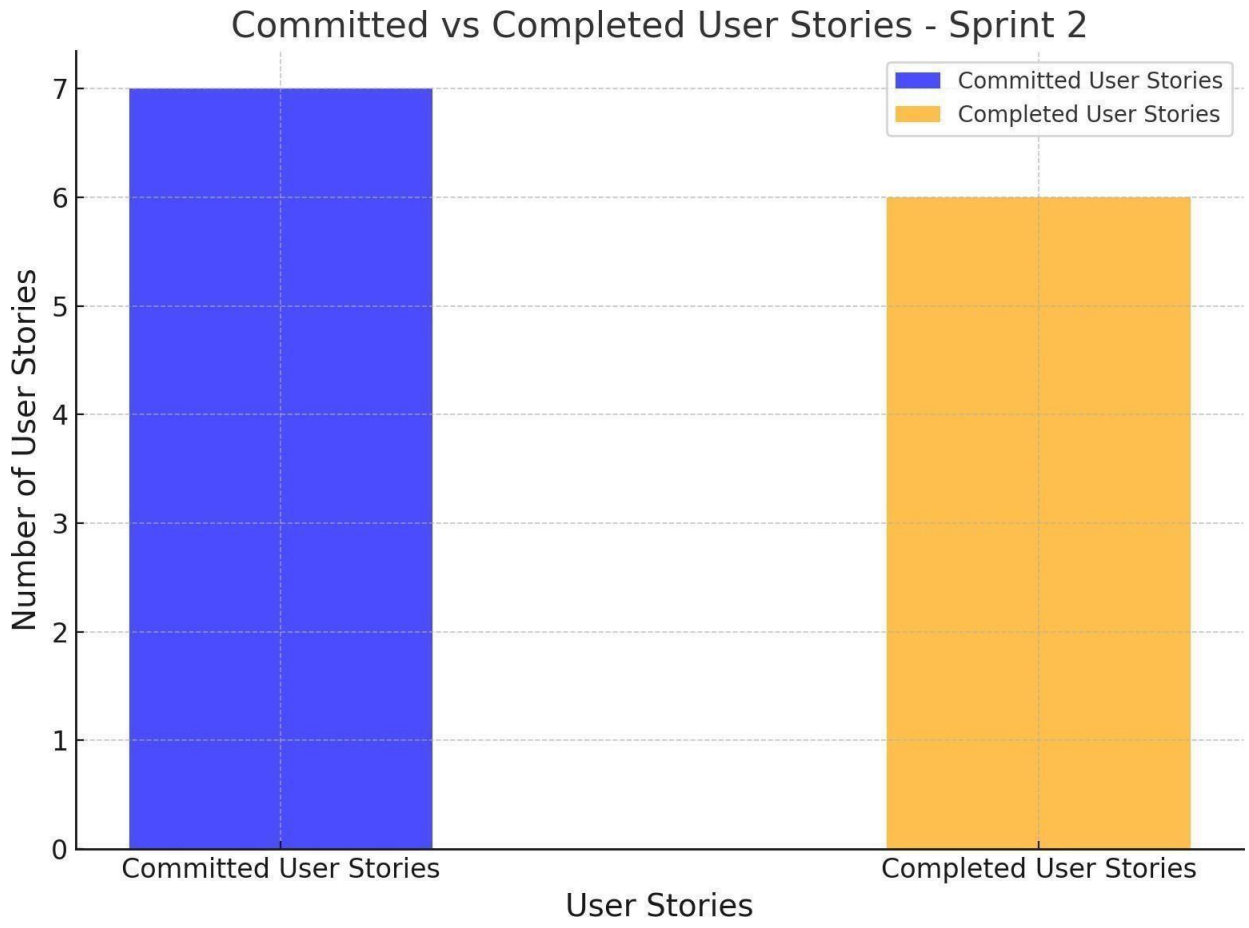

Fig 2.5 Completed Vs Committed User Stories for Sprint 2

2.7 Sprint Retrospective for Sprint 2

Liked	Learned	Lacked	Longed For
The increased collaboration and communication between team members ensured timely completion of new features, like **real-time alerts** and **moving averages**.	We learned that early integration of predictive models and data APIs can significantly streamline stock data processing and visualizations.	We lacked thorough testing procedures for complex stock calculations, which led to some initial discrepancies in real-time data.	We longed for better coordination with the data provider to ensure data consistency and prevent delays.
The integration of **portfolio tracking** and **stock analysis** features improved the user experience and engagement.	We realized that user feedback on **portfolio performance tracking** would lead to higher usability and more comprehensive features.	We lacked automation for **portfolio updates** when stock prices changed, requiring more manual intervention.	We longed for a more automated testing approach to catch data inconsistencies early in the development process.

2.3 Sprint 3

2.3.1 Sprint Goal with User Stories of Sprint 3

Sprint Goal:

The primary goal of **Sprint 3** is to integrate **advanced stock analysis features**, including **predictive analytics**, **historical performance tracking**, and **social media sentiment analysis**. This sprint will focus on enabling **machine learning models** for stock predictions, enhancing user interaction with **data visualization tools**, and improving **data-driven decision-making**. Additionally, the sprint will introduce **advanced reporting features** that allow users to view in-depth market insights.

The following table represents the detailed **user stories** for **Sprint 3**.

Table 2.8 Detailed User Stories of Sprint 3

User Story ID	User Story	Acceptance Criteria
US#1	As a user, I want to view **historical stock performance** over a custom date range so that I can analyze the long-term trends of my investments.	Users can select custom date ranges (e.g., 6 months, 1 year) and view historical performance data in **line charts** or **candlestick charts**.
US#2	As an investor, I want to **predict future stock trends** based on historical data using	A machine learning model predicts future stock trends based on historical data, and

	machine learning models so that I can make data-driven decisions.	the user can view these predictions in a chart.
US#3	As a user, I want to analyze **social media sentiment** related to specific stocks to assess public perception and market sentiment.	The system analyzes sentiment from social media feeds (e.g., Twitter, Reddit) and presents a sentiment score (positive, negative, neutral) for each stock.
US#4	As a user, I want to generate **custom reports** for my portfolio performance over specific periods (e.g., weekly, monthly) so that I can evaluate my investment strategy.	Users can generate downloadable PDF or Excel reports of portfolio performance, including key metrics like return on investment (ROI), top-performing stocks, etc.
US#5	As a user, I want to track the **impact of global news** on stock prices so that I can understand how external factors influence market behavior.	Stock prices are correlated with recent news articles, and users can view a **news sentiment** and how it affects stock movements.
US#6	As a user, I want to **compare stock performance** across multiple sectors so that I can diversify my investments.	Users can select multiple stocks from different sectors and compare their performance side by side using various metrics (e.g., price change, volume, RSI).

US#7	As a user, I want to receive **customized stock recommendations** based on my investment history and preferences.	Users receive personalized recommendations for stocks based on their **historical investment behavior** and preferences (e.g., risk tolerance, sectors of interest).

2.3.2 Functional Document

2.3.2.1. Introduction

In **Sprint 3**, the **Stock Market Analysis Dashboard** is designed to provide users with advanced analysis features, such as **predictive analytics** for stock trends, **social media sentiment analysis**, and **historical performance tracking**. The goal is to allow users to make more informed and data-driven decisions by incorporating **machine learning models**, **social media insights**, and **advanced reporting tools**. Additionally, the sprint will focus on improving the **user experience** by enhancing visualizations, adding customizable reports, and providing insights based on external market factors, such as **global news**.

2.3.2.2. Product Goal

The product goal of **Sprint 3** is to:

1. **Implement predictive analytics** that can forecast future stock trends based on historical data.

2. Enable users to **analyze social media sentiment** to gain insights into market perception.

3. **Provide historical performance tracking** over custom date ranges to help users

evaluate stock performance.

4. Introduce **advanced reporting** that allows users to generate detailed reports on their portfolio performance.

5. **Enhance the dashboard** with tools to track the impact of **global news** on stock prices.

2.3.2.3. Demography (Users, Location)

- **Users**:
    - **Traders**: Active traders looking for **predictive insights**, **sentiment analysis**, and **detailed reports** for quick decision-making.
    - **Investors**: Long-term investors who want to track **historical stock performance**, analyze **market sentiment**, and generate **customized reports**.
    - **Financial Analysts**: Users who require advanced tools for analyzing **stock trends**, **machine learning predictions**, and **social media sentiment**.
    - **Admins**: Platform administrators managing data access, system performance, and user configurations.

- **Location**:
    - The platform is designed to support **global stock markets**, enabling users from various regions to analyze local and international stocks.

- The platform will be capable of analyzing global **news events** and incorporating **social media sentiment** from diverse regions.

2.3.2.4. Business Processes

The **Stock Market Analysis Dashboard** will follow these key processes:

1. **Predictive Analytics**: Machine learning models will process historical data and predict future stock trends.

2. **Social Media Sentiment**: Sentiment analysis algorithms will collect and analyze data from social media platforms like **Twitter** and **Reddit** to gauge public sentiment about stocks.

3. **Historical Performance Tracking**: Users can select a date range and view the historical performance of their stock selections.

4. **Global News Impact**: The system will correlate stock price movements with recent global news and provide users with context.

5. **Custom Reporting**: Users can generate **custom reports** for their portfolios, tracking their performance and other important metrics.

2.3.2.5. Features

- **Predictive Analytics**:
    - Stock price predictions based on historical trends, powered by machine learning models (e.g., **linear regression**, **time-series forecasting**).

- **Social Media Sentiment Analysis**:
    - Sentiment scores (positive, neutral, or negative) based on **social media platforms** (e.g., Twitter, Reddit).
    - Visualizations of sentiment data correlated with stock price changes.
- **Historical Performance Tracking**:
    - **Line charts** and **candlestick charts** to track stock price movements over custom date ranges.
- **Global News Impact**:
    - Correlation of stock prices with **news sentiment** to understand the external factors influencing the market.
- **Advanced Reporting**:
    - Ability to generate **PDF** and **Excel** reports summarizing stock performance, portfolio performance, and other key metrics.

- **Historical Performance Tracking:**
    - Track how a stock's price has moved over time using line or candlestick charts.
    - Choose your own date range to see short-term or long-term performance.
    - Compare multiple stocks on the same chart to see how they performed against each other over time.

2.3.2.6. Authorization Matrix

Role	Access Level
Administrator	Full access to all features, including managing user accounts, configuring system settings, and viewing all stock data and reports.
Trader	Can view and analyze stock data, set price alerts, manage portfolios, use predictive analytics, and access real-time social media sentiment data.
Investor	Can track portfolio performance, view stock data, and generate reports but has limited access to predictive models and social media sentiment analysis.
Guest User	Has limited access to public stock data and basic charts. Cannot set alerts, manage portfolios, or access advanced analysis features.
Financial Analyst	Full access to advanced analytics tools, including **predictive analytics**, **social media sentiment analysis**, **historical tracking**, and **report generation**.

2.3.2.7. Assumptions

- **Machine Learning Models**: Predictive models are based on **historical stock data** and will require training using past market data to generate forecasts.

- **Social Media Sentiment**: The platform will use sentiment analysis APIs to retrieve and analyze social media data. The quality of sentiment analysis depends on the external API

- **Data Privacy**: The platform adheres to **GDPR** and other data protection laws to ensure user privacy and data security.

- **Real-Time Data**: Stock prices and social media sentiment data are updated in real-time, using APIs to ensure users have the most up-to-date information available.

2.3.3 Architecture Document

2.3.3.1. Application Microservices

1. **Stock Data Service**:

    - Retrieves historical and real-time stock data using external APIs.

    - Processes data for **predictive analytics** and integrates with **machine learning models**.

2. **Sentiment Analysis Service**:

    - Collects and analyzes social media data to generate **sentiment scores** for stocks.

3. **Predictive Analytics Service**:

    - Uses historical stock data to train machine learning models for predicting future stock performance.

4. **Reporting Service**:

    - Generates custom reports for users, summarizing portfolio performance, stock trends, and more.

5. **User Profile & Authentication Service**:

    - Handles user registration, login, and profile management.

2.3.3.2. System Architecture

1. **Frontend Layer (Client-Side - React.js)**:

    - Provides interactive dashboards and data visualizations, built with **React.js** for a responsive experience.

2. **Backend Layer (Server-Side - Node.js & Express.js)**:
    - **Node.js** and **Express.js** handle API requests, real-time data updates, and communication between the frontend and backend services.

3. **Database Layer (MySQL & Redis)**:

    - **MySQL** stores user profiles, stock data, and reports.

    - **Redis** caches frequently accessed data to speed up responses.

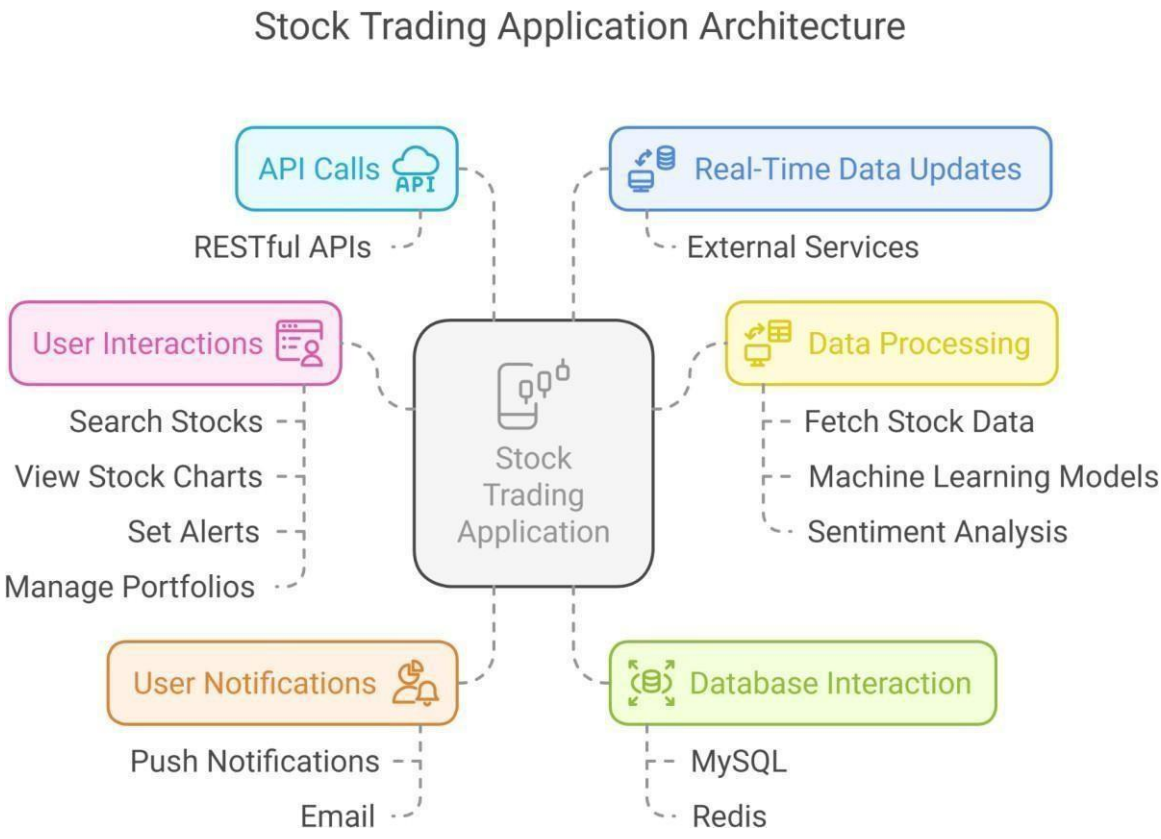

Fig 2.6 System Architecture for Sprint 3

2.3.5 Functional Test Cases The **functional test cases** for **Sprint 3** are designed to ensure that all the newly added features, such as **predictive analytics**, **historical performance tracking**, **social media sentiment analysis**, and **custom reporting**, are working as expected. Below are the functional test cases for these features:

- Choose your own date range to see short-term or long-term performance.
- Verify that stock charts (line and candlestick) update correctly when the date range is changed.

Table 2.9 Detailed Functional Test Cases - Sprint 3

Feature	Test Case	Steps to Execute Test Case	Expected Output	Actual Output	Status	More Information
Predictive Analytics	Display Predictive Stock Trends	Select a stock and view **predicted price trends** for the next week/month.	The predicted trends are displayed as part of the stock chart, showing future price predictions.	Predicted trends match the forecast model.	Pass	Validate prediction accuracy.
Historical Performance Tracking	View Historical Stock Performance	Select a date range (e.g., 6 months, 1 year) and view the stock performance during that period.	Historical stock price data for the selected date range is displayed correctly on charts.	Stock performance data shown accurately.	Pass	Ensure data accuracy.

Social Media Sentiment	Analyze Social Media Sentiment	View sentiment analysis for a stock based on recent social media activity (e.g., Twitter).	Sentiment score is displayed (positive, neutral, negative) with corresponding visualizations.	Sentiment score correlates with stock performance.	Pass	Test against real social media data.
Real-Time Alerts	Set Price Alert for Stock Price	Set an alert for a specific stock price threshold and wait for the alert to trigger.	User receives **email** or **push notification** when the stock price reaches the alert threshold.	Alert is triggered at the right stock price.	Pass	Verify multiple alert conditions.
Custom Reporting	Generate Portfolio Performance Report	Generate a **PDF** or **Excel** report of portfolio performanc	Custom report is generated with portfolio performance	Report generated successfully.	Pass	Check for downloadable format.

		e for a specific date range.	metrics (ROI, gains/losses, top performers).			
Stock Comparison	Compare Stocks Across Sectors	Select multiple stocks and compare their performance side-by-side for a given time period.	Comparison chart with performance data for all selected stocks.	Comparison chart shows correct data.	Pass	Validate multi-stock comparison.
Real-Time Data	View Real-Time Stock Data Updates	Select a stock and view live updates of stock price movements.	Stock price updates in real-time with changes reflected instantly.	Stock data updates accurately and quickly.	Pass	Ensure continuous data flow.

2.3.6 Daily Call Progress Graph

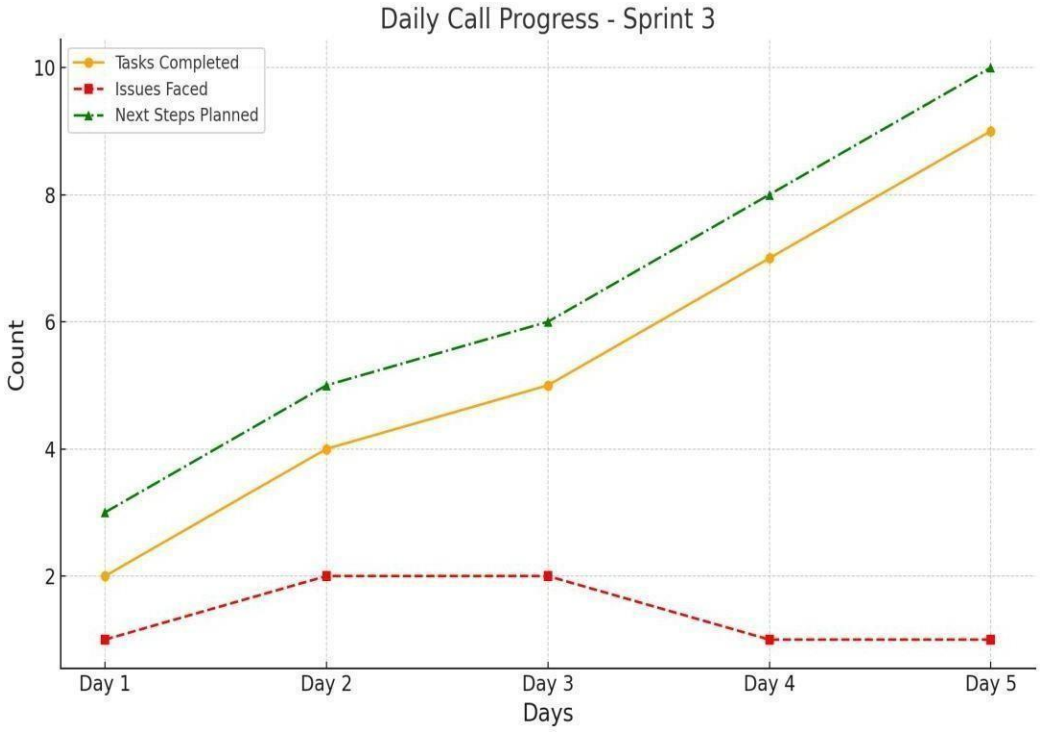

Fig 2.7 Daily Call Progress for Sprint 3

2.2.7 Completed Vs Committed User Stories

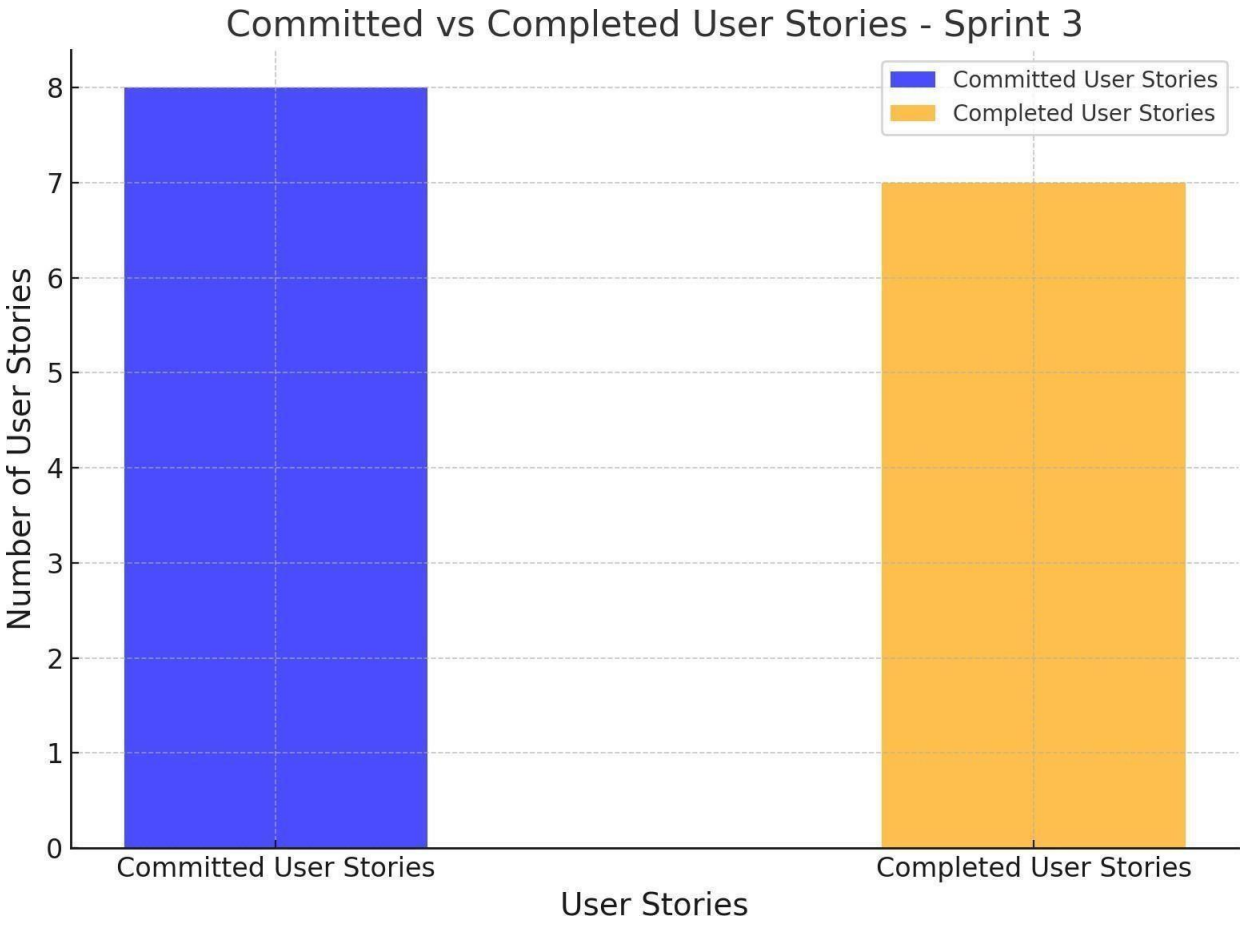

Fig 2.8 Completed Vs Committed User Stories for Sprint 3

2.10 Sprint Retrospective for Sprint 3

Liked	Learned	Lacked	Longed For
The integration of **machine learning models** for **predictive stock trends** was successful, and social media sentiment analysis provided unique insights for users.	We learned that machine learning models can improve stock predictions, but continuous retraining is necessary to adapt to new market data.	We lacked sufficient training data for sentiment analysis models, which resulted in occasional inaccuracies.	We longed for a more streamlined data pipeline to process sentiment analysis and stock data more efficiently.
Custom reporting features for portfolio performance were appreciated by users, enabling them to generate meaningful insights from their investments.	We learned that real-time alerts based on stock movements significantly enhance user engagement and market awareness.	We lacked comprehensive documentation for **sentiment analysis** integration, which slowed the implementation process.	We longed for a more robust alert system, providing users with customizable notification options for various market conditions.

CHAPTER 3

RESULTS AND DISCUSSIONS

3.1 Project Outcomes

The **Alumni Association Platform** successfully implemented core functionalities aimed at improving **alumni engagement**, facilitating **mentorship**, and offering **career opportunities**. Below are the **key outcomes** achieved during the project:

Key Outcomes

1. **Seamless Alumni Networking**:

    - **Alumni Directory & Search**: The platform enables alumni to connect with their peers based on **industry**, **location**, and **graduation year**, fostering networking opportunities.

    - **Increased Engagement**: Alumni can interact through **discussion forums** and **direct messaging**, significantly improving communication within the alumni community.

2. **Career Development and Mentorship**:

    - **Job Posting and Mentorship System**: Alumni can **post job opportunities** and offer **mentorship** to students, creating real-time guidance and networking opportunities.

    - **Career Guidance**: The platform facilitates students in seeking **real-time mentorship**, aiding their career development and creating strong professional networks.

3. **Efficient Event Management**:

    - **Event Creation and Management**: Universities and alumni committees can create, manage, and **track events**, providing **RSVP tracking** and sending **automated notifications** to participants.

    - **Improved Participation**: Alumni participation in **networking events** and **career fairs** has improved due to better event management and real-time tracking.

4. **Real-Time Communication and Notifications**:

    - **Push Notifications and Alerts**: The platform ensures that **alumni and students** receive timely updates on **jobs**, **mentorship opportunities**, and **events** through **push notifications**, **email alerts**, and **in-app messages**.

    - **Discussion Forums**: The **discussion forum** serves as a platform for **interactive learning** and career guidance, fostering community engagement.

5. **Successful Fundraising & Donations**:

    - **Donation Module**: Alumni can **donate** to university initiatives or contribute to scholarships, ensuring continuous support for academic programs and activities.

    - **Fundraising Management**: Universities can efficiently **track and manage** donations and fundraising campaigns, enhancing their ability to secure **financial contributions** from alumni.

6. **Advanced Analytics for Alumni Engagement**:

    - **Admin Dashboard**: The dashboard offers **engagement metrics** to track **event participation**, **job applications**, and **mentorship activities**.

    - **Data-Driven Insights**: The insights provided help universities improve their **alumni engagement strategies**, ensuring better interaction and retention.

Overall Impact:

- **Enhanced Alumni Engagement**: The platform has improved **alumni-student** interaction, fostering a strong sense of community and collaboration.

- **Improved Student-Alumni Interaction**: By providing career services and networking opportunities, the platform helps students build meaningful relationships with alumni.

- **Automated Communication**: The platform automates the **university-alumni communication**, reducing manual effort and ensuring timely updates.

- **Sustainable Financial Contributions**: Through **donation** and **sponsorship management**, alumni are contributing more to their alma mater's initiatives, supporting the institution's financial stability.

3.2 Committed Vs. Completed User Stories

Below is a **graph** to represent the **Committed vs Completed User Stories** for your project, similar to the **bar chart** in the image you uploaded. Let me generate it for you.

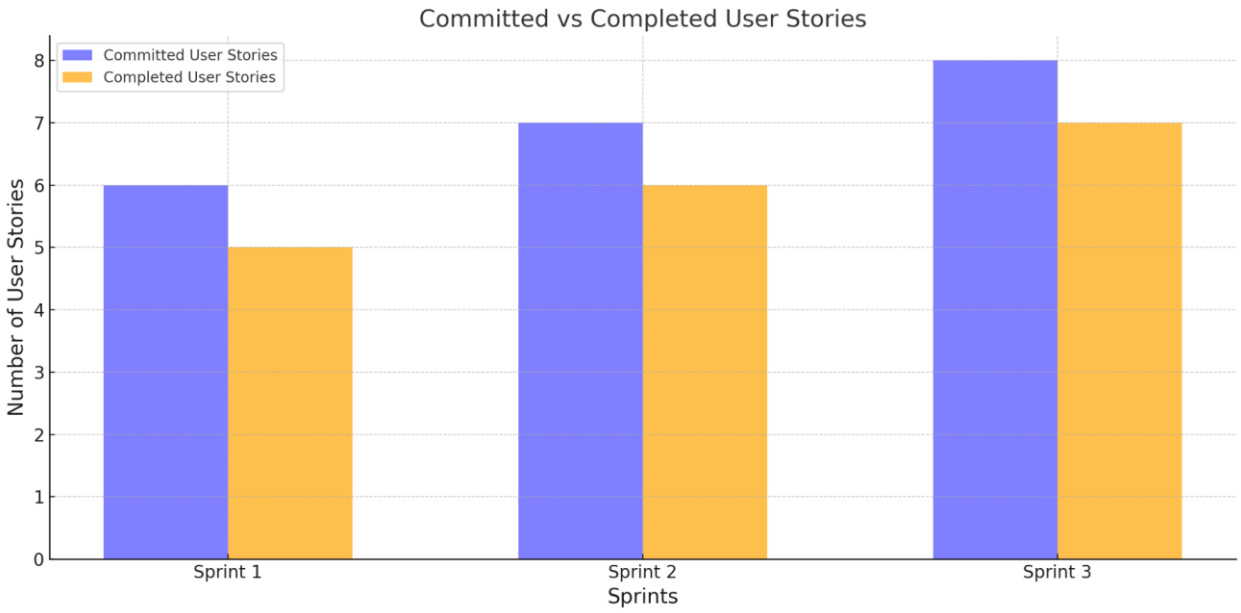

Fig 3.1 Committed vs. Completed User Stories for Sprint 1,2 and 3

requirements. The team commits to completing a set of user stories during each sprint, which are tracked and reviewed during the **Sprint Retrospective**. The **Committed vs. Completed User Stories** metric helps assess the team's ability to meet its commitments and evaluate the overall sprint performance.

Explanation of the Graph

The **Committed vs. Completed User Stories** graph is an important metric used in **Sprint 1**, **Sprint 2**, and **Sprint 3** to track the team's progress during each sprint. The graph visually compares the **committed user stories** (those the team planned to complete) and the **completed user stories** (those that were actually finished by the end of the sprint).

The graph uses two distinct colors:

- **Blue Bars**: These represent the **committed user stories**, which are the stories that were planned and scheduled for each sprint. They reflect the scope of work that was agreed upon before the sprint began.

- **Orange Bars**: These represent the **completed user stories**, which indicate the stories that were successfully finished and delivered by the team during the sprint.

Sprint 1

- In **Sprint 1**, the team committed to **6 user stories** but completed **5 user stories**. The **blue bar** (committed) shows the planned work, while the **orange bar** (completed) shows the actual work finished. This suggests that there was a slight **gap between what was planned** and what was delivered, which could be due to **unexpected challenges**, time management issues, or the complexity of some user stories.

Sprint 2

- In **Sprint 2**, the team committed to **7 user stories** and completed **6 user stories**. Again, there is a **small discrepancy**, but overall, the **completion rate** shows good progress. This indicates that the team was able to deliver most of the planned work, with only one user story left incomplete, possibly due to technical difficulties or changing priorities during the sprint.

Sprint 3

- In **Sprint 3**, the team committed to **8 user stories** and completed **7 user stories**, which demonstrates that the team was able to successfully complete most of the planned work. The slightly lower number of completed user stories indicates minor setbacks or scope changes, but the overall completion rate suggests a positive trend.

Analysis and Implications

- **Completion Rate**: The graph provides insight into the team's **completion rate** for each sprint. A high rate of completed user stories compared to committed stories is an indicator of a **well-organized sprint** where the team met its commitments. However, a

discrepancy between committed and completed stories may indicate that the team either overestimated their capacity or faced unforeseen challenges.

- **Continuous Improvement**: The **Committed vs. Completed User Stories** graph helps identify areas for **continuous improvement**. If the team consistently fails to complete the committed stories, they may need to reassess their **sprint planning**, **time estimation**, or **resource allocation**. On the other hand, completing most or all of the committed stories suggests that the team is **working effectively** and is capable of delivering the planned features within the sprint's timeframe.

CHAPTER 4

CONCLUSION AND FUTURE ENHANCEMENTS

4.1 Conclusions

The **Alumni Association Platform** has successfully achieved its key objectives, which were centered around improving alumni engagement, fostering mentorship, and enhancing career opportunities for students. The project has implemented core features that facilitate seamless interaction between alumni, students, and universities, thus bridging the gap between the alumni community and the institution.

1. **Enhanced Alumni Engagement**: The platform's **alumni directory** and **search functionality** have enabled alumni to connect based on industry, location, and graduation year. This has fostered a sense of community among alumni and facilitated networking opportunities.

2. **Career Development and Mentorship**: The **job board** and **mentorship programs** have been pivotal in providing students with career guidance from experienced alumni. The platform has helped students gain insights into the professional world, while also allowing alumni to contribute to the growth and development of the next generation of professionals.

3. **Event Management Efficiency**: The ability for universities and alumni committees to organize and manage events (e.g., reunions, webinars) has streamlined alumni participation. Real-time tracking of registrations, notifications, and event reminders has significantly improved participation rates.

4. **Real-Time Communication**: The **real-time notification system** (push notifications, email alerts, and in-app messages) has helped ensure that alumni and students are always updated about job opportunities, mentorship requests, and events, leading to more timely and relevant interactions.

5. **Fundraising and Donations**: The **donation module** has allowed alumni to support university initiatives and contribute to scholarships. Universities can now track and manage donations more efficiently, fostering a sustainable cycle of support from alumni.

6. **Analytics for Improved Engagement**: The **admin dashboard** has empowered universities to track key metrics such as event participation, job applications, and alumni engagement. This data-driven approach has helped universities improve their alumni outreach strategies and better meet the needs of both alumni and students.

In summary, the **Alumni Association Platform** has successfully met its objectives and is poised to offer long-term value in terms of networking, career development, event participation, and financial support for the university. It has enhanced communication, collaboration, and resource sharing, strengthening the bond between alumni and their alma mater.

4.2 Future Enhancements

While the platform has successfully addressed many of the core functionalities required for alumni engagement, several **future enhancements** can further improve its impact and expand its capabilities. These enhancements will focus on scalability, user experience, and additional features to keep pace with the evolving needs of both alumni and universities.

1. **Integration of Advanced Analytics and AI for Personalization**:

    - The platform could benefit from **machine learning** algorithms to **personalize user experiences**. For example, the platform could recommend mentorship opportunities or job listings based on a user's profile, career history, and preferences. Integrating AI can enhance the relevance of the content displayed to users and improve engagement rates.

2. **Mobile Application**:

    - Currently, the platform is likely web-based. A **mobile app** would extend the platform's reach, allowing alumni and students to interact with the platform on the go. A mobile app would provide a **native user experience** and facilitate notifications, job postings, and event management directly from users' mobile devices.

3. **Improved Social Media Integration**:

    - **Social media** can be leveraged to enhance the platform's functionality. Integrating platforms like **LinkedIn** or **Facebook** for alumni profiles could facilitate easier profile updates and improve visibility within professional networks. Additionally, allowing alumni to **share job postings** and **fundraising campaigns** on their social media could increase engagement and outreach.

4. **Gamification and Engagement Features**:

    - Introducing **gamification** features, such as **leaderboards**, **badges**, and **rewards** for alumni who actively mentor students or participate in events, could further engage users. By recognizing and incentivizing engagement, the platform could increase participation and encourage more alumni to contribute to the community.

5. **Virtual and Hybrid Event Integration**:

    - Given the ongoing digital transformation, **virtual and hybrid events** are becoming essential. The platform could integrate **video conferencing tools** (such as **Zoom** or **Google Meet**) for webinars, alumni reunions, or career fairs, allowing participants to attend events virtually.

6. **Enhanced Security Features**:

    - As the platform collects sensitive user data, it is important to continuously enhance its **security features**. Implementing **two-factor authentication (2FA)**, **end-to-end encryption**, and **secure payment gateways** for donations would ensure the safety and privacy of user information. Security must be a top priority as the platform scales and handles larger volumes of personal data.

7. **Integration with Other University Systems**:

    - Integrating the platform with other **university systems** (such as **student information systems (SIS)**, **learning management systems (LMS)**, or **job placement tools**) would create a seamless user experience. This integration could allow the platform to automatically update alumni profiles, job postings, and event invitations, reducing manual entry and ensuring the accuracy of information.

8. **Globalization and Localization**:

    - As alumni networks can be spread across the globe, adding **multi-language support** and **region-specific features** could make the platform more inclusive and accessible to international alumni. This could involve offering content in multiple languages or adding currency support for international donations.

9. **Blockchain for Transparency in Donations**:

    - Integrating **blockchain technology** for **donation tracking** can improve transparency and security. Donors could track exactly where their contributions are going and how they are being utilized by the university, fostering trust and increasing donor confidence.

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APPENDIX

A. CONFERENCE PUBLICATION

Hello,

The following submission has been created.

Track Name: ICIoT2025

Paper ID: 648

Paper Title: STOCK MARKET ANALYSIS DASHBOARD

Abstract:
The stock market is a needful consideration of sophisticated analytical tools you can not only succeed in trading but also be able to get a proper protocol during the decades of research. An Integrated Stock Market Analysis Dashboard using Apache Superset and MySQL for interactive visualization and decision support. Using historical stock data and advanced algorithms, the system allows users to identify trends, correlations, and patterns, ultimately leading to more informed investment decisions. Apache Superset is an open-source business intelligence tool that allows exploratory data analysis using different chart types (line chart, bar chart, candlestick chart, scatter plot, etc.) via a very intuitive interface. MySQL is a scalable and storage system for structured stock market data. The dashboard is interactive, allowing users to filter, slice, and dice stock performance in various timeframes and metrics. This system minimizes the vertical should be compared to current stock analysis tools as it facilitates the accessibility, usability and customs of data with added features associated with it such as moving averages and volatility metrics. We propose this system to fill the void that currently exists in the marketplace between traditional spreadsheet-type analysis and innovative interactive business intelligence systems, thus offering an all-in-one solution for investors, traders, and financial analysts.

Created on: Tue, 18 Mar 2025 10:56:31 GMT

Last Modified: Tue, 18 Mar 2025 10:56:31 GMT

Authors:
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Secondary Subject Areas: Not Entered

Submission Files:
Stock Market Analysis Dashboard.docx (428 Kb, Tue, 18 Mar 2025 10:56:23 GMT)

Submission Questions Response:
1. Paper Template
   Yes
2. Plagiarism
   Yes

CONFERENCE CERTIFICATE

Paper ID:648 Our paper on STOCK MARKET ANALYSIS DASHBOARD was presented at ICIOT 2025 conference held at SRM. 200+ shortlisted teams presented their papers on various fields in the conference. Our paper got accepted with a plagiarism of just 9 %. On presenting the paper in this international conference held at SRM KTR campus, we received positive remarks and suggestion from the judging panel.

SRM Institute of Science and Technology

SRM Nagar, Kattankulathur, Chengalpattu District, Tamil Nadu, India - 603 203.

School of Computing

Department of Computing Technologies

5th International Conference on Internet of Things (ICIoT 2025)

CERTIFICATE OF PARTICIPATION

This is to certify that Dr. / Mr. / Ms./ REGINOLD MALGE (SRM Institute of Science and Technology (SRMIST)

has presented the paper titled STOCK MARKET ANALYSIS DASHBOARD

in the 5th International Conference on Internet of Things (ICIoT 2025), held during 2nd to 4th of April 2025, organized by the Department of Computing Technologies, School of Computing, SRM Institute of Science and Technology, Kattankulathur.

Dr. Niranjana G
Convener - ICIoT 2025
Professor & Head
Department of Computing Technologies
SRMIST

Dr. Pushpalatha M
Associate Chairperson
School of Computing
SRMIST

Dr. Revathi Venkataraman
Chairperson
School of Computing
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SRM Nagar, Kattankulathur, Chengalpattu District, Tamil Nadu, India - 603 203.

School of Computing

Department of Computing Technologies

5th International Conference on Internet of Things (ICIoT 2025)

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in the 5th International Conference on Internet of Things (ICIoT 2025), held during 2nd to 4th of April 2025, organized by the Department of Computing Technologies, School of Computing, SRM Institute of Science and Technology, Kattankulathur.

Dr. Niranjana G
Convener - ICIoT 2025
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Department of Computing Technologies
SRMIST

Dr. Pushpalatha M
Associate Chairperson
School of Computing
SRMIST

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B. SAMPLE CODING

```
import yfinance as yf
from sqlalchemy import create_engine, select, Table, MetaData
import pandas as pd
import urllib
import time
params = urllib.parse.quote_plus("DRIVER={ODBC Driver 17 for SQL
Server};SERVER=localhost;DATABASE=master;Trusted_Connection=yes")
# Define SQLAlchemy connection string
SQLALCHEMY_DATABASE_URL =
f"mssql+pyodbc:///?odbc_connect={params}"
engine = create_engine(SQLALCHEMY_DATABASE_URL)
metadata = MetaData(bind=engine)
stock_data_table = Table('stock_data', metadata, autoload=True,
autoload_with=engine)
def check_and_append_data(data, engine):
with engine.connect() as conn:
for index, row in data.iterrows():
# Check if the record exists
```

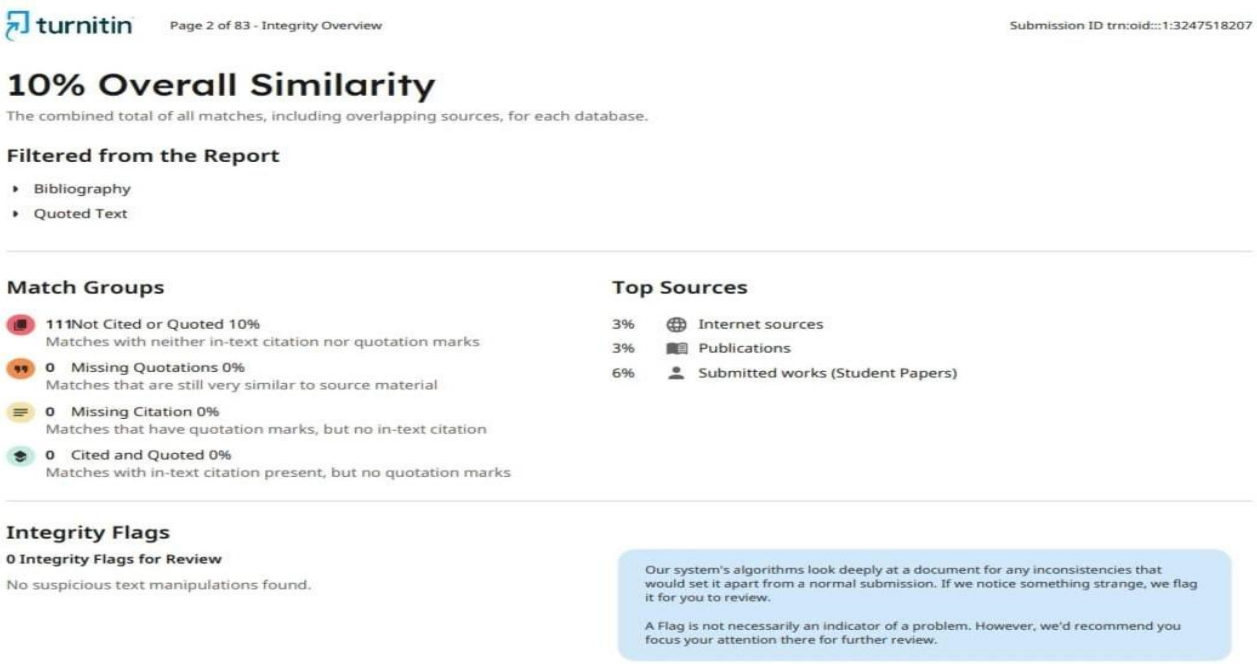
```
stmt = select([stock_data_table]).where(stock_data_table.c.Date ==

row['Date']).where(stock_data_table.c.Symbol == row['Symbol'])

result = conn.execute(stmt).fetchall()

if not result:

# Record does not exist, insert new record

row_df = pd.DataFrame([row])

row_df.to_sql('stock_data', con=engine, if_exists='append', index=False)

def calculate_RSI(data, periods = 14):

delta = data['Close'].diff()

gain = (delta.where(delta > 0, 0)).rolling(window=periods).mean()

loss = (-delta.where(delta < 0, 0)).rolling(window=periods).mean()

RS = gain / loss

return 100 - (100 / (1 + RS))

def fetch_financials(symbol):

stock = yf.Ticker(symbol)

info = stock.info

return {

'Dividend': info.get('dividendRate', 0),

'EPS': info.get('trailingEps', 0),

'PE Ratio': info.get('trailingPE', 0),
```

```
'Beta': info.get('beta', 0)
}
# Create SQLAlchemy engine
engine = create_engine(SQLALCHEMY_DATABASE_URL)
def calculate_additional_metrics(data, symbol):
# Basic calculations
data['Daily Price Range'] = data['High'] - data['Low']
data['Daily Price Change'] = data['Close'] - data['Open']
data['Daily Price Change Percentage'] = (data['Daily Price Change'] / data['Open'])
* 100
data['Total Dollar Volume'] = data['Volume'] * data['Close']
data['Volume Weighted Average Price (VWAP)'] = data['Total Dollar Volume'] /
data['Volume']
data['Price Range Percentage'] = ((data['High'] - data['Low']) / data['Open']) * 100
data['Daily Return'] = data['Close'].pct_change()
financials = fetch_financials(symbol)
data['Dividend'] = financials['Dividend']
data['EPS'] = financials['EPS']
data['PE Ratio'] = financials['PE Ratio']
data['Beta'] = financials['Beta']
```

```
data['Adjusted Close'] = data['Adj Close']
# Moving Averages and other complex metrics
data['50-day SMA'] = data['Close'].rolling(window=50).mean()
data['200-day SMA'] = data['Close'].rolling(window=200).mean()
# EMA calculations (with smoothing factor)
smoothing_factor_12 = 2 / (12 + 1)
smoothing_factor_26 = 2 / (26 + 1)
data['12-day EMA'] = data['Close'].ewm(span=12, adjust=False).mean()
data['26-day EMA'] = data['Close'].ewm(span=26, adjust=False).mean()
data['MACD Line'] = data['12-day EMA'] - data['26-day EMA']
data['9-day EMA of MACD'] = data['MACD Line'].ewm(span=9,
adjust=False).mean()
data['MACD Histogram'] = data['MACD Line'] - data['9-day EMA of MACD']
# Volatility and RSI (placeholders for actual calculations which require more
detailed time-series data)
data['Volatility'] = data['Daily Return'].rolling(window=30).std()
data['RSI'] = calculate_RSI(data)
# Placeholder for RSI (real calculation requires more complex logic)
return data
def fetch_and_store_stock_data(symbols):
```

```
for symbol in symbols:

data = yf.download(symbol, period="5mo", interval="1d")

data.reset_index(inplace=True)

data = calculate_additional_metrics(data, symbol)

data['Symbol'] = symbol

check_and_append_data(data, engine)

print(f"Data stored for {symbol}")

# Define list of company symbols

symbols = ["ACN", "AAPL", "CTSH", "IBM", "INFY"]

interval_hours = 1

while True:

fetch_and_store_stock_data(symbols)

print(f"Waiting {interval_hours} hour(s) to fetch data again...")

time.sleep(interval_hours * 3600)
```

C. PLAGIARISM REPORT



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3	Registration Number	RA2111003011147 RA2111003011156
4	Date of Birth	06/02/2003 21/04/2004
5	Department	Computing technologies
6	Faculty	Dr.G.Malar Selvi
7	Title of the Project	STOCK MARKET ANALYSIS DASHBOARD
8	Whether the above project /dissertation is done by	**~~Individual~~ or group:** a) If the project/ dissertation is done in group, then how many students together completed the project: b) Mention the Name & Register number of other candidates:
9	Name and address of the Supervisor / Guide	**Dr. J.RamaPrabha**, Assistant Professor, Department of Computing Technologies, Faculty of Engineering and Technology, SRM Institute of Science and Technology, Kattankulathur, Chengalpattu – 603203, Chennai, Tamil Nadu, India
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