STKViewer

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1. Introduction

The everyday operations of stakeholders at the Macedonian Stock Exchange (MSE) involve various trading activities, investor communications, financial analysis, and other essential functions. These activities occur across different time frames and locations, making it necessary to have a robust system that facilitates seamless trading, information sharing, and market updates.

Consequently, the need arises for a platform or system to ensure efficient communication and the smooth execution of trading activities, addressing the challenges that brokers, analysts, and investors often face in staying up-to-date with real-time market developments and fulfilling their responsibilities promptly.

1.1   Purpose

The purpose of this system is to provide users with easy access to information about the Macedonian Stock Exchange, including real-time data on stock prices, historical data analysis, and additional tools to support market-related activities. The system is designed to offer a straightforward and accessible interface without complex features like meetings or authentication processes. This document introduces the features and functionalities the system offers to enhance user access to stock information and support efficient analysis of market trends specific to the Macedonian Stock Exchange.

1.2   Scope

The scope of the Macedonian Stock Exchange (MSE) system is to develop a user-friendly web application that provides comprehensive market data for selected companies listed on the MSE. This application will allow users to access real-time and historical data on stock prices, trading volumes, and other key financial indicators, all through an intuitive interface. Users will be able to visualize stock performance trends over time with the help of charts and graphs, supporting market analysis and informed decision-making. The system will be designed as an open-access information platform, with no authentication requirements, ensuring a straightforward experience focused on delivering reliable and timely market data.

1.3   Definitions, terms and acronyms

1. **MSE** – Macedonian Stock Exchange; the main stock exchange in North Macedonia, providing market data and stock prices.

2. **Web Application** – A platform accessed via a web browser to deliver information and tools online.

3. **Market Data** – Financial information on stock prices, trading volumes, and other market indicators.

4. **Stock Performance** – Activity in the market over time, such as price and volume changes.

5. **API** – Protocols for software applications to communicate and share data, used for real-time market data.

6. **Database** – An organized set of electronic data, storing information on stocks and historical trends.

7. **Frontend** – The user-facing side of the web application, displaying information and allowing interaction.

8. **MUI** - Shorthand for Material UI - a React component library used for some parts of the frontend design.

9. **Backend** – The server-side processing data and communicating with the database.

10. **Real-time Data** – Up-to-date information on stock prices and market conditions.

11. **Charting Tool** – Visual representations (e.g., graphs) of stock price trends.

12. **User Interface (UI)** – The application layout and design, ensuring ease of use.

13. **HTML/CSS/JavaScript** – Core web technologies (HTML for structure, CSS for design, JavaScript for interaction).

14. **Stock Symbol** – A code identifying publicly traded companies on the MSE.

15. **Historical Data** – Past stock prices and trends available for analysis.

16. **Data Refresh Interval** – The frequency of data updates for current market information.

1.4   Document Overview

This document provides a detailed outline of the requirements necessary for the efficient and reliable operation of a web application designed to present comprehensive information about the Macedonian Stock Exchange (MSE). It includes essential information about the system's purpose, scope, and core functionalities, along with diagrams to illustrate typical user interactions within the platform. These scenarios focus on how users can access and view market data, monitor stock performance, and analyze financial data without the need for roles, permissions, or trading capabilities. Requirements are organized hierarchically by priority, ensuring that the platform's essential functionalities for providing up-to-date and accurate MSE information are addressed first, meeting the primary needs of users effectively.

2.   System Review

2.1   System perspective

The Macedonian Stock Exchange (MSE) platform is a web application designed to offer users easy access to up-to-date market information, stock performance, and key financial data. Users can simply visit the application to view detailed stock prices, performance trends, and relevant financial information for companies listed on the MSE, without requiring any login or authentication process.

The platform provides users, including investors and analysts, with tools to analyze stock performance over time through clear visualizations and trend charts. Users can view the latest stock data and access historical data to gain insights into the market. The platform is designed to present data in a straightforward and accessible format, supporting informed decision-making and enhancing user experience by focusing solely on delivering market information.

2.2   System functions

· **Market Data Access**: Real-time stock information.
· **Reporting and Analytics**: Generate performance reports.

2.3   Constraints

Additionally, system performance is a critical consideration, especially during peak trading hours, as response times and load management are essential for maintaining operational efficiency.

2.4   User characteristics

The users of the Macedonian Stock Exchange (MSE) encompass a diverse group with distinct characteristics that influence their interactions with the platform. These users typically include individual investors, institutional investors, brokers, and financial analysts, each with varying levels of experience and expertise in trading.

Individual investors may range from beginners who require user-friendly interfaces and educational resources to more experienced traders seeking advanced analytical tools and real-time market data. Institutional investors often prioritize robust reporting features, comprehensive data analysis, and the ability to execute large-volume trades efficiently. Brokers, acting as intermediaries, require tools for managing multiple client accounts, facilitating trades, and providing insights into market trends.

Financial analysts utilize the MSE platform to conduct in-depth market research and analysis, needing access to historical data, performance metrics, and reporting functionalities. All users value security, seeking assurance that their personal and financial information is well protected. Additionally, users may vary in their technological proficiency, necessitating a platform that accommodates both novice and advanced users through intuitive design and responsive support services. Overall, the user characteristics of the MSE highlight the need for a versatile platform that caters to the diverse requirements of its clientele.

2.5   Assumptions and Dependencies

The functioning of the stock exchange is based on several key assumptions and dependencies that influence its operations and user interactions. One fundamental assumption is that all users will have a basic understanding of stock trading principles and financial markets. This is essential for ensuring that participants can effectively utilize the platform's features and make informed trading decisions.

Additionally, it is assumed that the users will have stable internet access, which is critical for seamless interactions with the platform. Access to the system is dependent on whether or not the user has an internet connection, making this assumption vital for usage.

The platform also relies on the accurate and timely delivery of market data from external sources, such as financial information providers and data feeds. Any delays or inaccuracies in this data can significantly impact trading activities and decision-making processes for users.

Furthermore, the system assumes compliance with regulatory requirements set by financial authorities. This dependency ensures that the platform operates within the legal framework, maintaining trust and transparency among its users.

Finally, there is an assumption that users will engage with the platform in a responsible manner, adhering to trading regulations and ethical practices. This expectation is crucial for fostering a fair and orderly trading environment.

3. Specific Requirements

3.1 Functional requirements

Priority 1	Requirements of utmost importance, without which the system would not be able to function as intended.
Priority 2	Requirements that are desirable for the system to have but are not as critical as Priority 1 requirements and without which the system can still function.
Priority 3	Requirements that are not essential for the system's functionality but contribute to an improved user experience.

3.1.1. When the program launches, it will scrape data from the MSE, adding only new information not already stored in the database. **Priority 1**

3.1.2. The system will have a drop-down menu which will allow the selection of a specific company to view information for. **Priority 1**

3.1.3. The system will display an interface with a graph showing stock price changes over time, accompanied by additional data on the dates, last trade prices, and last changes in stock value. **Priority 1**

3.1.4. The system will have a drop-down menu which will add a second section for side-by-side comparison of information between two companies. **Priority 2**

3.1.5. The system will allow its user to select the period (1 week, 1 month or 2 months) for which they will observe the stock data. **Priority 1**

3.1.6. The system will contain a button which will allow the changing of the characteristic whose trend is being displayed on the graph. **Priority 1**

3.1.7. The system will make predictions for potential future values of the selected characteristic. **Priority 1**

3.1.8. The system will contain a 'Report issue' button that will redirect to the project's Issues page on Github. **Priority 1**

3.1.9. The system will contain a link to the project's Github in the footer of the website. **Priority 1**

3.1.10. The system will contain links to the project members' LinkedIn profiles in the footer of the website. **Priority 1**

3.1.11. Error handling mechanisms will be implemented to notify the user if the data source is temporarily unavailable or if there are connectivity issues. **Priority 2**

3.1.12. The system will ensure a smooth user experience across both desktop and mobile devices. **Priority 3**

3.2 Performance requirements

3.2.1. The system should support access to information for all the companies listed on the MSE. **Priority 2**

3.2.2. The system should maintain a stable connection with a downtime rate of less than 1% when updating data from the Macedonian Stock Exchange. **Priority 1**

3.2.3. The system should display accurate trading data and maintain data integrity in line with stock exchange standards. **Priority 1**

3.2.4. The system will allow users to access stock data and conduct searches within 10 seconds. **Priority 1**

3.2.5. The system shall update its stock exchange every time it is launched by an admin. **Priority 1**

3.2.6. The system shall update its stock exchange database in 24 hour intervals without needing manual intervention. **Priority 1**

3.2.7. The system should maintain the same data quality for archival and retrieval within historical records. **Priority 1**

3.3 External Requirements
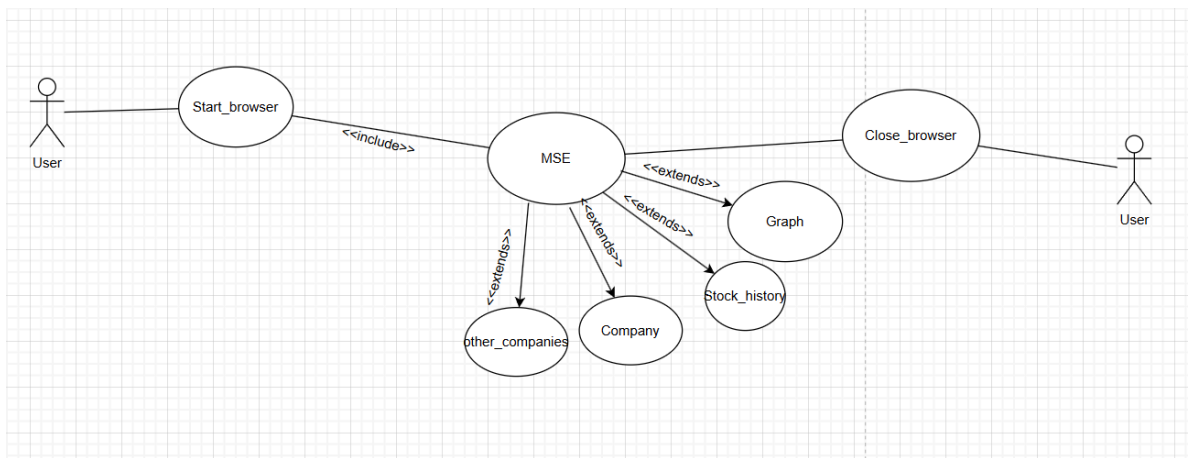
3.4 Logical Database Requirements

3.4.1. The system shall store stock exchange data. **Priority 1**

3.5 Design Constraints

3.5.1. The backend system for scraping will be developed in Python. **Priority 1**

3.5.2. The system will be hosted on GitHub. **Priority 1**

3.5.3. The backend system will be structured using a Pipe and Filter architecture. **Priority 1**

3.5.4. The system will use Python to scrape the MSE website. **Priority 1**

3.5.5. The system will use Python to create the stock information database. **Priority 1**

3.5.6. The project will include a database containing historical data to prevent redundant scraping each time the program runs. **Priority 1**

3.5.7. The system will use the React framework, Vite and MUI to implement the frontend design. **Priority 1**

3.5.8. The system will use the Recharts library to implement the graphs for stock prices. **Priority 1**

4. References

- Macedonian Stock Exchange Official Website - www.mse.mk
- Financial Data Providers and APIs (e.g., Yahoo Finance, Alpha Vantage) - www.yahoofinance.com / www.alphavantage.co
- Data Scraping Techniques and Best Practices (Online Articles and Tutorials) - www.scrapingbee.com/blog/web-scraping-tutorial
- Python Libraries for Web Scraping (e.g., Beautiful Soup, Scrapy) - www.crummy.com/software/BeautifulSoup/ / scrapy.org
- Python Libraries for Analysis and Price Prediction - https://www.nltk.org/ / https://docs.python.org/3/library/threading.html / https://www.tensorflow.org/api_docs
- Database Management Systems Documentation (e.g., MySQL, PostgreSQL) - dev.mysql.com/doc/ / www.postgresql.org/docs/
- JavaScript Libraries for UI Design and Implementation - https://react.dev/ / https://mui.com/

5. Validation

To validate the system requirements and ensure their fulfillment, a method of simple checks was employed during the validation phase. The SRS document was compared with the project scope, objectives, and the needs of stakeholders. A checklist was created to verify the consistency, clarity, and feasibility of the requirements.

The created UML diagram for use cases and the domain model were reviewed to confirm that they align with the specified functional requirements. During the validation process, it was ensured that all functional and non-functional requirements were addressed, with no conflicting or contradictory requirements identified. Furthermore, the requirements were confirmed to be clear and unambiguous.