Универзитет „Св. Кирил и Методиј“ во Скопје
ФАКУЛТЕТ ЗА ИНФОРМАТИЧКИ НАУКИ И КОМПЈУТЕРСКО ИНЖЕНЕРСТВО

Software Design and Architecture
Homework 1

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2. Short Project Description

The **Macedonian Stock Exchange Data Analysis System** is a web-based application developed to automate data collection, processing, and analysis of historical stock data from the Macedonian Stock Exchange. Designed for a range of users, including investors, analysts, and financial institutions, this system provides streamlined access to up-to-date stock data spanning at least ten years. The system enables users to analyze market trends, retrieve complete issuer lists, and access structured data for further insights.

Using a **pipe-and-filter architecture**, the application facilitates efficient data processing from acquisition to storage, supporting reliable data transformation and storage in Macedonian-standard formats. Users can retrieve historical data for all issuers, analyze real-time trends, and perform periodic updates, all through a user-friendly interface that optimizes market analysis and investment decision-making.

3. Specification of Functional and Non-functional Requirements

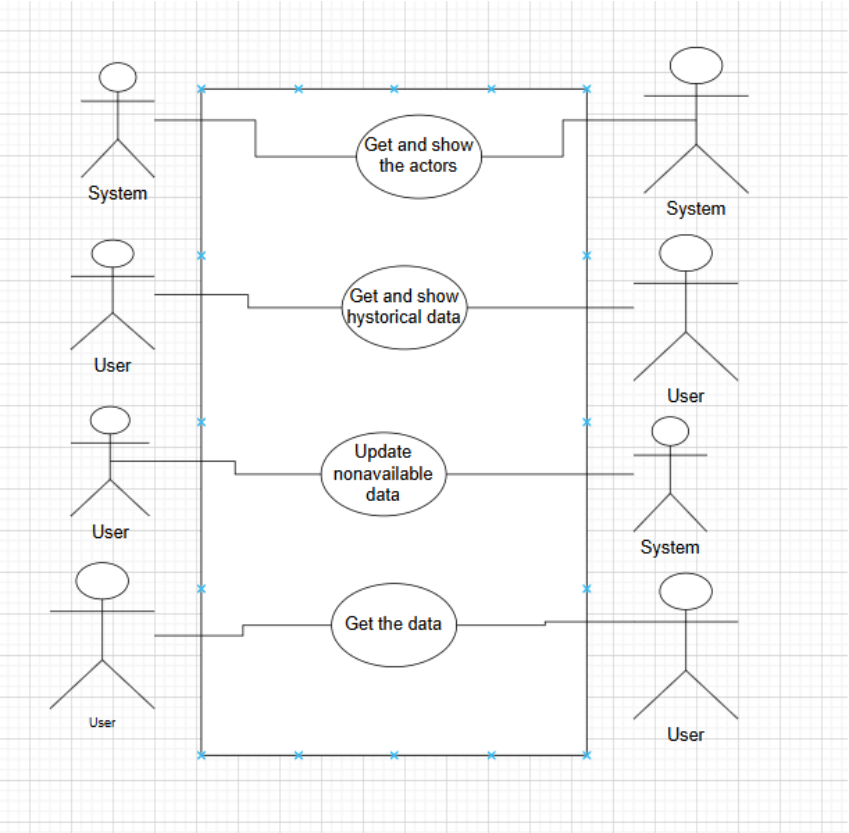
Functional Requirements

1. **Data Collection**
    - **FR 1.1**: The system shall retrieve historical data for a minimum of ten years for each stock issuer.
    - **FR 1.2**: The system shall automatically check and update the database daily with new data.
    - **FR 1.3**: The system shall automatically retrieve a complete list of stock issuers from the Macedonian Stock Exchange website each day.
    - **FR 1.4**: The system shall filter out non-stock issuers (e.g., bonds) from the retrieved issuer list.
    - **FR 1.5**: The system shall retrieve key stock metrics such as the opening price, closing price, highest price, lowest price, trading volume, and trading date for each trading day.
2. **Data Processing and Transformation**
    - **FR 2.1**: The system shall transform dates into a consistent format (YYYY.MM.DD) for all entries.
    - **FR 2.2**: The system shall format all numeric values with a period as a decimal separator and a comma for thousands.
    - **FR 2.3**: The system shall validate all numeric data before storing it in the database to ensure accuracy and consistency.
3. **Data Storage**
    - **FR 3.1**: The system shall store all data in a structured database, ensuring efficient access and updating.
    - **FR 3.2**: The system shall prevent duplicate data entries when adding new data.
    - **FR 3.3**: The system shall merge newly retrieved data with existing records in the database.
    - **FR 3.4**: The system shall ensure data integrity during the storage process.
4. **Performance Tracking**

- **FR 4.1**: The system shall measure and display the time required for initial data loading and each subsequent update.

Non-functional Requirements

1. **Performance and Scalability**
    - **NFR 1.1**: The system shall be capable of processing large historical datasets without performance degradation.
    - **NFR 1.2**: The system shall complete the initial data loading process within 30 minutes.
    - **NFR 1.3**: The system shall complete daily updates within 5 minutes.
    - **NFR 1.4**: The system shall optimize data retrieval and processing times to support efficient operations.
    - **NFR 1.5**: The system shall operate efficiently, consuming minimal computational resources.
2. **Availability and Reliability**
    - **NFR 2.1**: The system shall maintain an availability rate of 99.9% on a monthly basis.
    - **NFR 2.2**: The system shall include mechanisms to handle network interruptions without data loss or corruption.
3. **Scalability**
    - **NFR 3.1**: The system shall support adding new filters to the pipeline as needed.
    - **NFR 3.2**: The system shall handle up to a 200% increase in the number of issuers from its initial capacity.
    - **NFR 3.3**: The system shall be capable of integrating additional data sources in the future.
4. **Maintainability and Extensibility**
    - **NFR 4.1**: The system shall provide alerts for any data retrieval or processing failures.
    - **NFR 4.2**: The system architecture shall support easy modification, debugging, and extension of the pipe-and-filter processes.
5. **Data Integrity and Compliance**
    - **NFR 5.1**: The system shall implement mechanisms to verify data integrity at every processing stage.
    - **NFR 5.2**: The system shall comply with the Macedonian Stock Exchange's data access policies.
    - **NFR 5.3**: The system shall limit server requests to avoid overloading the Macedonian Stock Exchange website.



4. Personas and descriptive narrative

Persona 1: Financial Analyst - Ana

- Ana is a financial analyst working at an investment firm. She uses stock data to analyze historical trends and provide investment advice to clients.
- Ana needs up-to-date, reliable stock data formatted for easy analysis. She uses this application to quickly access accurate data in the Macedonian format.
- Ana opens the app, requests the latest data for Macedonian Stock Exchange issuers, and within seconds, receives the most recent information.

Persona 2: Individual Investor - Marko

- Marko is a young investor interested in the Macedonian Stock Exchange. He uses the app to track trends and decide where to invest.
- Marko frequently checks the app for the latest stock market updates. When he opens it, he reviews data for issuers over a chosen period and knows that the app automatically updates to the latest available data for each issuer.