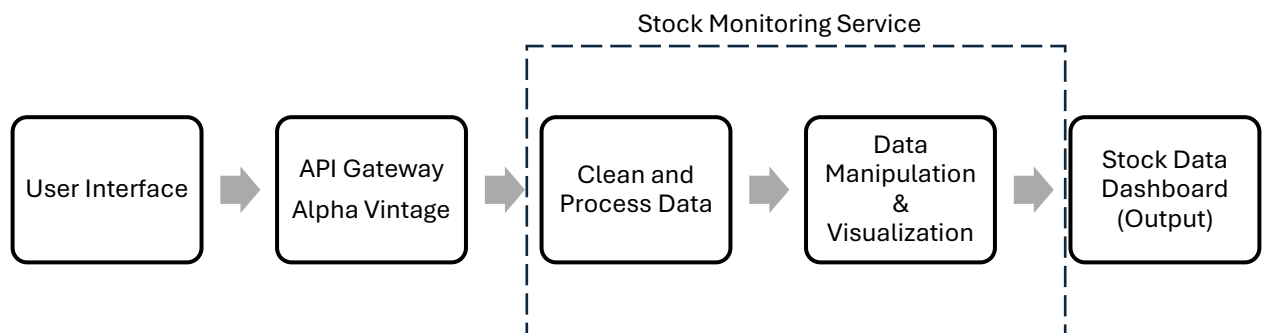


Technical Data Design

Introduction

We are developing a "Real-time Stock Monitoring and Analysis Desktop Tool for Startup Investments." As the name suggests, this lightweight desktop application aims to assist startups investing in the stock market by monitoring specific companies' stocks in real-time. It will provide useful analysis to help startups make informed decisions about current and future investments.

Architecture Overview



User Interface

The user, startup provides:

1. A list of stock symbols they are interested in (e.g., AAPL, GOOGL, MSFT) from a list (dropdown menu)
2. Specific period, Start and end date, from a calendar.

API Gateway

Fetch the stock data from Alpha Vantage, <https://www.alphavantage.co/>, and save it temporarily into the memory in a dictionary of numby data frames. The keys represent the company's symbol and the data frame contains all the stock data information from Numby. The application does not save data in a database; instead, it retrieves updated data from Alpha Vantage each time the program runs.

Stock Monitoring Services

This is the core of our application which encompasses receiving data from the API, processing, cleaning, organizing, aggregating, and analyzing it to provide visual insights through tables and graphs.

Clean and Process data

Remove duplicates and empty cells, ensure the correct format for each variable, and verify the correct naming of each variable. Once the data is clean and organized, it will be ready for analysis.

Data Manipulation and Visualization

We aim to provide the following five overviews:

1. **General Stock Price Overview (Daily Close Price and Moving Average):** Provides an overview of the stock trend over a specific period, including daily closing prices and the price moving average.
2. **Monthly Average Overview:** Displays the average monthly closing price trend and the total monthly trade volume for each company.
3. **Return on Investment Overview (ROI Analysis):** Shows the daily return on investment for each stock and the overall monthly return on investment.
4. **Risk Analysis Overview:** Measures stock volatility in comparison to 'SPY' (the S&P 500 stock) as a market reference. This includes calculating the Beta and plotting the rolling volatility for each stock compared to 'SPY'. Although the users might not select 'SPY' to monitor our code should pull its data for risk analysis calculations.
5. **Frequency Trend Analysis:** Highlights the highest and lowest monthly prices, showing the exact dates and days. It also identifies the days of the week with the highest and lowest prices, as well as the highest monthly average price over a specific period.

Stock Data Dashboard

The analysis and visualization should be organized in a professional manner and presented to the end user. This will include a mix of overviews that we designed above.

Technical Details

- Programming Language: Python 3.10.12
- Libraries: NumPy, Pandas, Tikker, Matplotlib, Plotly.
- Coding software: Google Collab and Jupiter Notebook.

Data Flow Chart

