Department of Artificial Intelligence and Data Science

FinTrack: Smart Portfolio Management and Analytics

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Introduction

Overview: Briefly introduce the concept of stock market portfolio analysis, its importance, and how it helps investors make informed decisions.

Objective: Define the project's main goal—developing a system to analyze and optimize stock portfolios based on various criteria (e.g., risk, return, diversification).

Scope: Outline the scope of the project, including the main features and functionalities to be developed.

Existing System

Overview: Existing portfolio management systems provide data analysis, financial modeling, and optimization but are often expensive, complex, or lack customization for individual investors.

Limitations: Limitations include high costs, limited accessibility, and a lack of transparency in automated decision-making.

Advantages and Disadvantages of Existing System

Advantages:

- Established market presence
- User familiarity
- Basic analysis features

Disadvantages:

- Limited data sources
- Lack of real-time analysis
- Complex interfaces
- Inefficient handling of large datasets

Proposed System

Overview: Present the new system, focusing on how it will overcome the limitations of the existing system.

Key Features:

- Real-time data analysis
- Advanced risk assessment tools
- User-friendly interface
- Automated portfolio optimization algorithms

Advantages and Disadvantages of Proposed System

Advantages:

- Enhanced data accuracy
- Real-time decision-making
- Improved user experience
- Comprehensive risk analysis and diversification strategies

Disadvantages:

- High initial development cost
- Potential complexity for novice users
- Dependence on real-time data feeds

SRS (Software Requirements Specification)

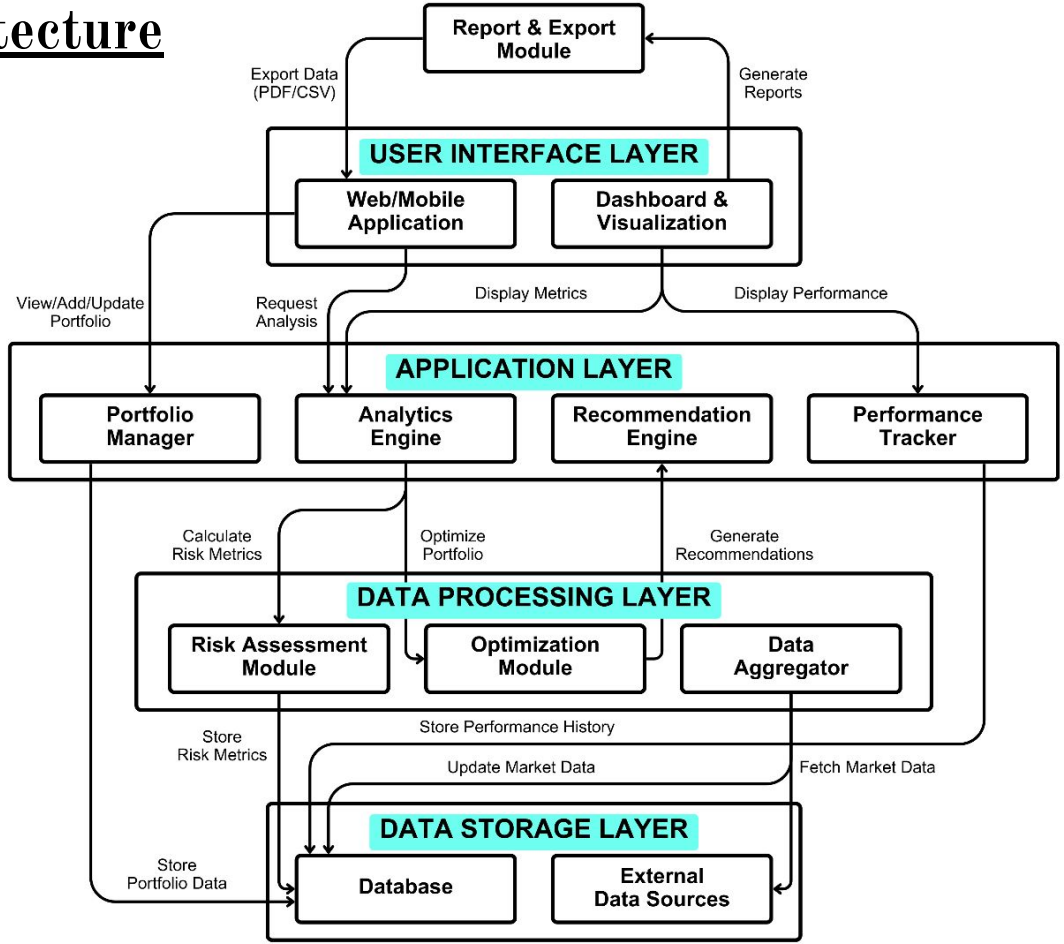
Functional Requirements:

- **User Authentication**: Users must be able to create accounts and log in.
- **Portfolio Management**: Users should be able to create, modify, and analyze portfolios.
- **Real-time Data Integration**: The system should fetch and display real-time market data.
- **Risk Analysis**: Provide detailed risk assessments for portfolios.
- **Optimization**: Offer portfolio optimization based on user-defined criteria.

Non-Functional Requirements:

- **Performance:** The system should process data quickly and provide real-time updates.
- **Security:** Ensure that user data and transactions are secure.
- **Scalability:** The system should handle increasing numbers of users and data without performance degradation.
- **Usability:** The interface should be intuitive and easy to navigate.
- **Reliability:** The system should have high availability and minimal downtime.

System Architecture



Software Development Model(Waterfall Model):

Phase	Activities	Deliverables
1. Requirements Gathering	Collect user needs, define system features, document functional/non-functional requirements.	Requirements Specification Document
2. System Design	High-level system architecture, database design, UI/UX wireframes, and security specifications.	System Design Document
3. Implementation (Coding)	Develop the front-end and back-end systems, integrate APIs, and implement the database.	Codebase (source code)
4. Testing	Unit testing, integration testing, system testing, security testing, performance testing, and user acceptance testing.	Test Reports
5. Deployment	Deploy the application to production, migrate data, and set up monitoring tools.	Deployed System
6. Maintenance	Bug fixes, updates, system performance monitoring, and adding new features based on feedback.	Updated System

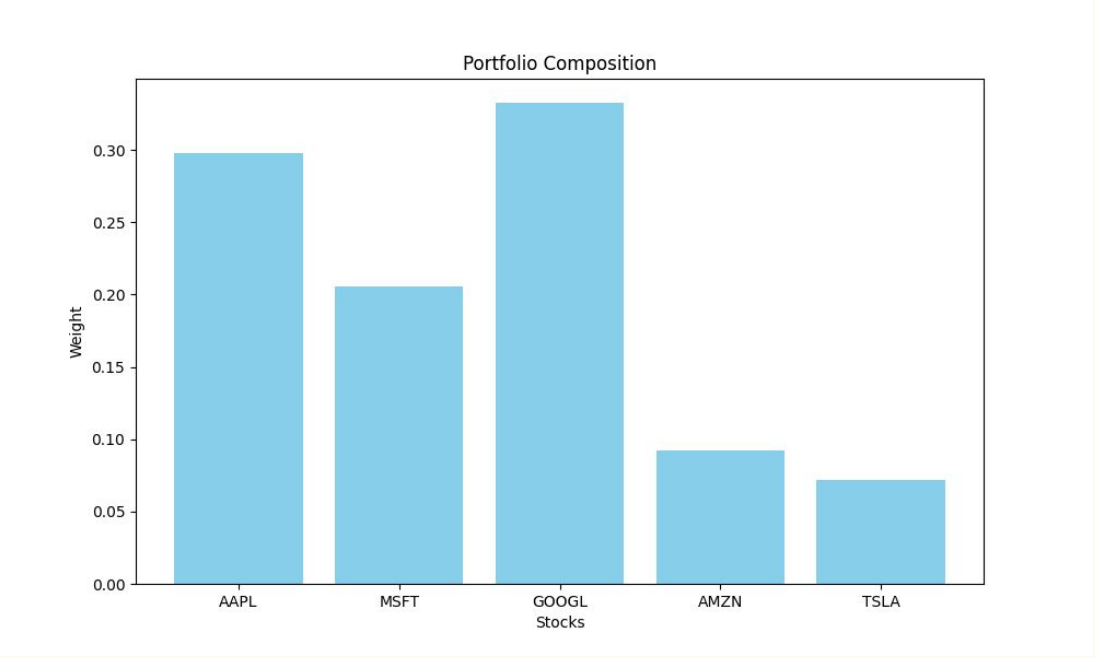
Unit Testing

```
PS C:\Users\ADMIN\OneDrive\Desktop\SE> & C:/Users/ADMIN/AppData/Local/Programs/Python/Python312/python.exe c:/Users/ADMIN/OneDrive/Desktop/SE/main.py
....Pie Chart Execution Time: 0.1846 seconds
Line Chart Execution Time: 0.0648 seconds
Bar Chart Execution Time: 0.0558 seconds
Scatter Chart Execution Time: 0.0568 seconds
..
----------------------------------------------------------------------
Ran 6 tests in 0.362s

OK
```

Functional Testing

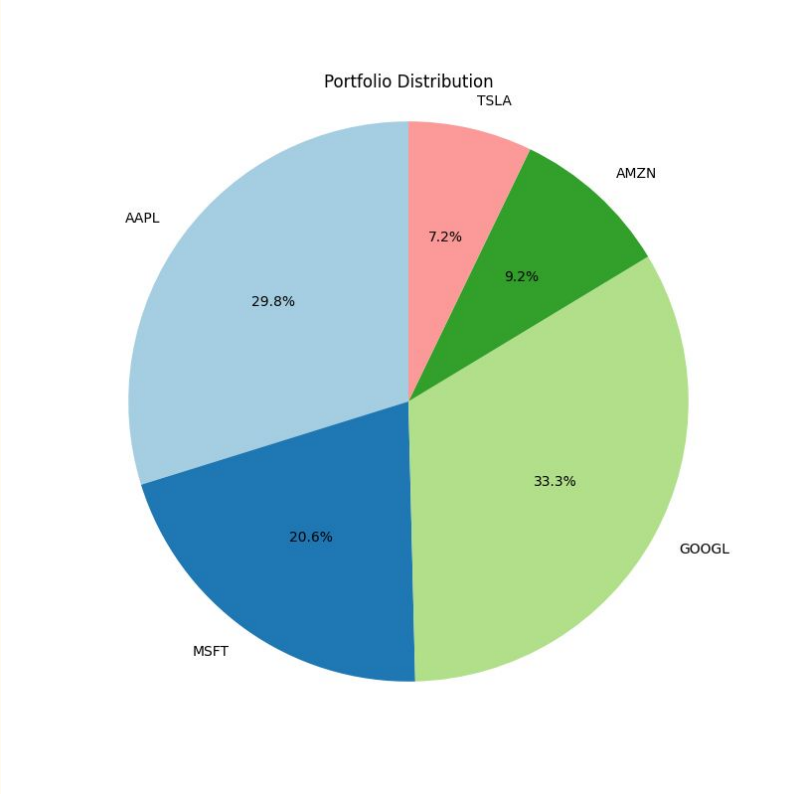
```
PS C:\Users\ADMIN\OneDrive\Desktop\SE> & C:/Users/ADMIN/AppData/Local/Programs/Python/Python312/python.exe c:/Users/ADMIN/OneDrive/Desktop/SE/Functional_test.py
..Pie Chart Execution Time: 0.1027 seconds
Line Chart Execution Time: 0.0682 seconds
Bar Chart Execution Time: 0.0561 seconds
Scatter Chart Execution Time: 0.0558 seconds
...
----------------------------------------------------------------------
Ran 5 tests in 0.284s

OK
```

Output

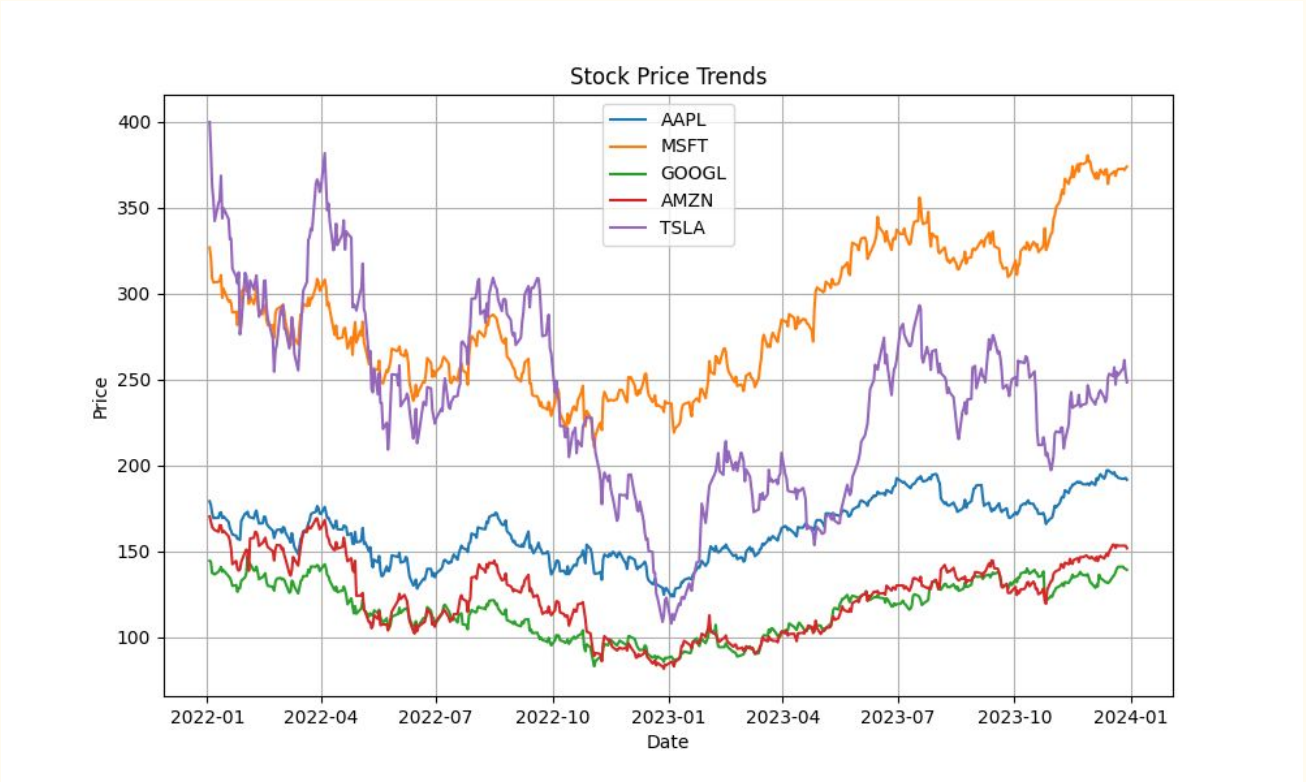



```
PS C:\Users\ADMIN\OneDrive\Desktop\SE> & C:/Users/ADMIN/AppData/Local/Programs/Python/Python312/python.exe c:/Users/ADMIN/OneDrive/Desktop/SE/try.py
[*********************100%***********************]  5 of 5 completed
c:\Users\ADMIN\OneDrive\Desktop\SE\try.py:87: FutureWarning: DataFrame.fillna with 'method' is deprecated and will raise in a future version. Use obj.ffill() or obj.bfill() instead.
  stock_data = stock_data.fillna(method='ffill')  # Forward fill missing data
Portfolio Return: 0.05
Portfolio Risk: 0.31
Optimal Portfolio (Max Sharpe Ratio): Return=0.09, Risk=0.28, Sharpe Ratio=0.33
```

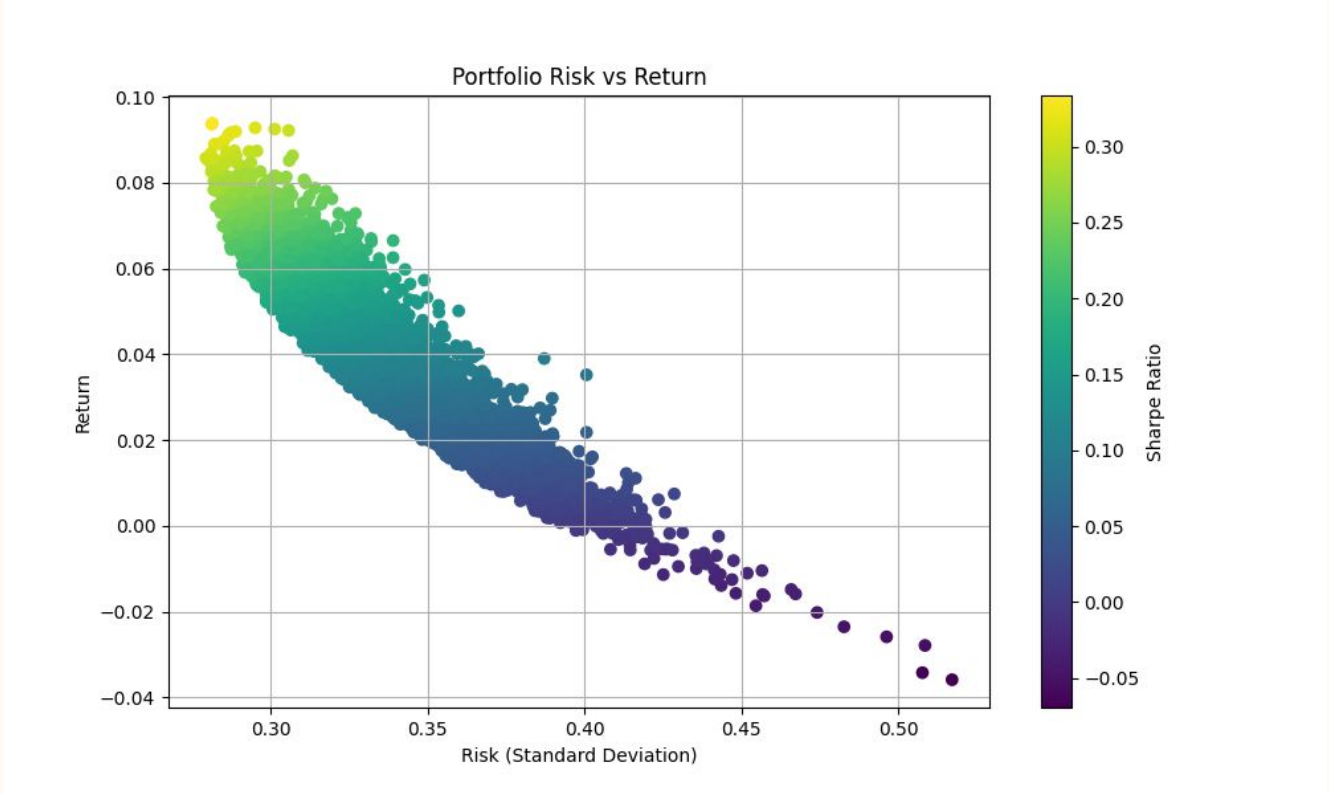
Output


Portfolio Distribution
TSLA
AMZN
AAPL
7.2%
9.2%
29.8%
33.3%
20.6%
GOOGL
MSFT

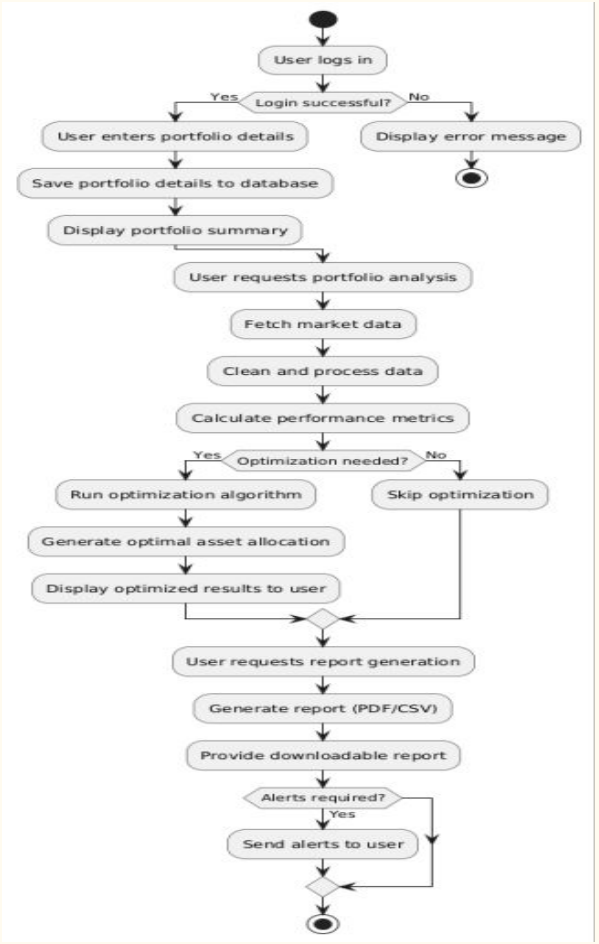
Output


Stock Price Trends
AAPL
MSFT
GOOGL
AMZN
TSLA
Price
400
350
300
250
200
150
100
2022-01
2022-04
2022-07
2022-10
2023-01
2023-04
2023-07
2023-10
2024-01
Date

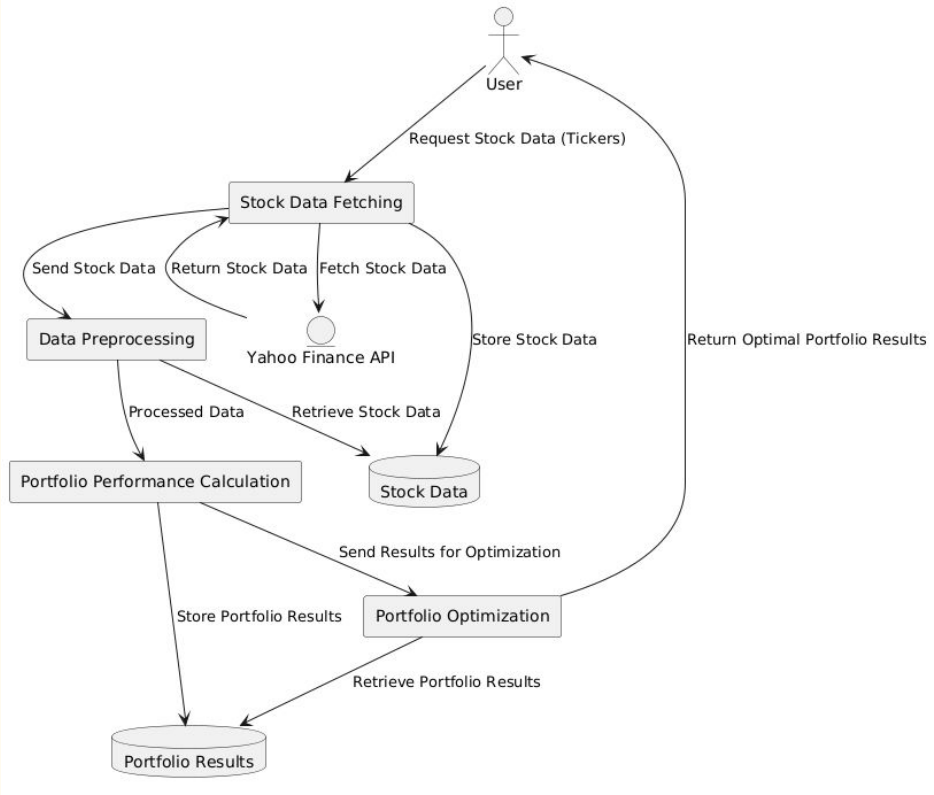
Output


Portfolio Risk vs Return
Return
Risk (Standard Deviation)
Sharpe Ratio
0.10
0.08
0.06
0.04
0.02
0.00
−0.02
−0.04
0.30
0.35
0.40
0.45
0.50
0.30
0.25
0.20
0.15
0.10
0.05
0.00
−0.05

Activity Diagram:



Data Flow Diagram:



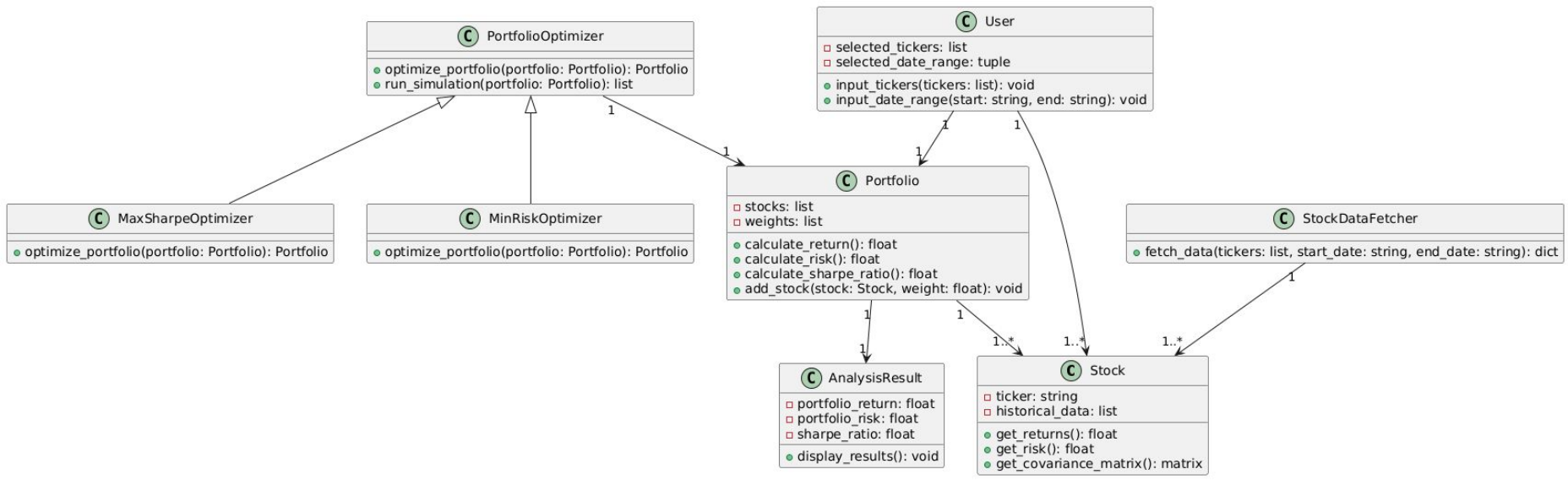
Object-Oriented Design

Overview: Explain how object-oriented principles like inheritance, polymorphism, and encapsulation are applied in the system.

Detailed Design

- Classes and Objects: Define the key classes, their attributes, and methods.
- Interactions: Describe how objects interact with each other to perform the required functions.

Object Oriented Design:



Conclusion

The FinTrack: Smart Portfolio Management and Analytics project provides a comprehensive solution for optimizing and analyzing stock portfolios. By leveraging object-oriented principles, the system efficiently organizes key functionalities such as stock data fetching, portfolio optimization, and performance analysis. The integration of various optimization strategies ensures tailored solutions based on user goals like maximizing returns or minimizing risk. Through interactive user interfaces, individuals can easily input stock tickers and define their desired date ranges for analysis. The system calculates essential metrics like return, risk, and Sharpe ratio, providing clear insights. Visualization tools like charts enhance the understanding of portfolio performance. The modular design allows for scalability, enabling the addition of new features in the future. Overall, FinTrack empowers users to make informed investment decisions through data-driven analytics. With a user-friendly experience and robust analytical tools, the project showcases the potential of smart portfolio management. The system's adaptability ensures it can be continuously improved to meet evolving user needs.

Reference

- Markowitz, H. M., "Portfolio Selection," *The Journal of Finance*, vol. 7, no. 1, pp. 77-91, 1952. doi: 10.1111/j.1540-6261.1952.tb01525.x.

- Sharpe, W. F., "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk," *The Journal of Finance*, vol. 19, no. 3, pp. 425-442, 1964. doi: 10.1111/j.1540-6261.1964.tb02865.x.

- Markowitz, H. M., "The Efficient Frontier," *The Journal of Financial and Quantitative Analysis*, vol. 5, no. 3, pp. 321-342, 1970. doi: 10.2307/2330072.

- Black, F., and Litterman, R., "Global Portfolio Optimization," *Financial Analysts Journal*, vol. 48, no. 5, pp. 28-43, 1992. doi: 10.2469/faj.v48.n5.28.

- Chen, J., and Zheng, Z., "Stock Market Prediction with Machine Learning Techniques," *Journal of Financial Data Science*, vol. 1, no. 1, pp. 1-19, 2019. doi: 10.3934/jfds.2019.1.1.

Thank You