Stock Portfolio Manager - Complete Project Description

Project Overview

A Python-based stock portfolio suggestion engine that helps users make informed investment decisions with a minimum investment of $5,000 USD. The application provides intelligent portfolio allocation based on selected investment strategies, real-time tracking, and comprehensive analytics.

Technical Stack

- **Core Language**: Python 3.8+
- **Key Libraries**:
  - PyQt5: GUI framework
  - yfinance: Real-time stock data API
  - pandas: Data manipulation and analysis
  - matplotlib: Data visualization
  - numpy: Numerical computations

Investment Strategies

The application supports five distinct investment strategies:

1. Ethical Investing

- Focus: Companies with strong ESG practices
- Stocks:
  - Apple (AAPL)
  - Adobe (ADBE)
  - Nestle (NSRGY)
- Characteristics: Environmental responsibility, social impact, governance

2. Growth Investing

- Focus: High-growth potential companies
- Stocks:
  - Tesla (TSLA)
  - NVIDIA (NVDA)
  - Amazon (AMZN)
- Characteristics: High revenue growth, market leadership

3. Index Investing

- Focus: Market-tracking ETFs
- ETFs:
  - Vanguard Total Stock Market ETF (VTI)
  - iShares Core MSCI Total Intl Stk (IXUS)
  - iShares Core 10+ Year USD Bond (ILTB)
- Characteristics: Broad market exposure, diversification

4. Quality Investing

- Focus: Established companies with strong fundamentals
- Stocks:
  - Microsoft (MSFT)
  - Johnson & Johnson (JNJ)
  - Visa (V)
- Characteristics: Strong balance sheets, stable earnings

5. Value Investing

- Focus: Undervalued companies with solid foundations
- Stocks:
  - Berkshire Hathaway B (BRK-B)
  - JPMorgan Chase (JPM)
  - Procter & Gamble (PG)
- Characteristics: Low P/E ratios, strong fundamentals

Core Features

1. Investment Input

- Minimum investment: $5,000 USD
- Strategy selection: One or two strategies
- Input validation and error handling

2. Portfolio Allocation

- Smart fund distribution based on:
  - Historical performance
  - Risk-adjusted returns (Sharpe Ratio)
  - Market capitalization
  - Volume trends
  - Minimum allocation thresholds

3. Real-Time Analytics

- Live stock price updates
- Dynamic portfolio value calculation
- 5-day historical performance tracking
- Key metrics:
  - Current price
  - Daily change
  - Market cap
  - Volume
  - P/E ratio
  - Dividend yield

4. Visualization

- Portfolio distribution pie chart

- Historical performance line graph
- Trading data tables
- Risk metrics visualization

User Interface

1. Portfolio Input Tab

- Investment amount entry
- Strategy selection
- Submit button
- Input validation messages

2. Portfolio Summary Tab

- Selected stocks display
- Allocation percentages
- Share quantities
- Current values
- Total portfolio value

3. Charts Tab

- Portfolio distribution pie chart
- Value trend line graph
- Performance metrics
- Interactive elements

4. Stock Details Tab

- 5-day trading history
- Detailed stock information
- Risk metrics
- Market indicators

Data Processing

1. Stock Data Collection

- Real-time price fetching
- Historical data retrieval
- Volume and market data
- Company fundamentals

2. Calculations

- Share quantity determination
- Portfolio value computation
- Performance metrics
- Risk assessment
- Historical tracking

Portfolio Tracking

1. Real-Time Updates

- Live price monitoring
- Portfolio value recalculation
- Performance tracking
- Alert generation

2. Historical Data

- 5-day value history
- Price trends
- Volume analysis
- Performance metrics

🛠 Setup and Installation

Prerequisites

1. Python 3.8+
2. Required libraries:

   PyQt5
   yfinance
   pandas
   matplotlib
   numpy

Installation Steps

1. Create virtual environment:

```
python3 -m venv venv
```

2. Activate virtual environment:

```
source venv/bin/activate  # Unix/macOS
venv\Scripts\activate     # Windows
```

3. Install dependencies:

```
pip install -r requirements.txt
```

4. Run application

```
python main.py
```

Testing Scenarios

Test Case 1: Ethical + Growth ($10,000)

- Investment: $10,000
- Strategies: Ethical + Growth
- Stocks: AAPL, ADBE, NSRGY, TSLA, NVDA, AMZN
- Expected: Balanced allocation, real-time updates, 5-day tracking

Test Case 2: Index + Value ($5,500)

- Investment: $5,500
- Strategies: Index + Value
- Stocks: VTI, IXUS, ILTB, BRK-B, JPM, PG
- Expected: ETF focus, value metrics, diversification

Test Case 3: Quality + Value ($7,500)

- Investment: $7,500
- Strategies: Quality + Value
- Stocks: MSFT, JNJ, V, BRK-B, JPM, PG
- Expected: Fundamental analysis, stability metrics

Output Format

1. Portfolio Summary

- Selected stocks list
- Allocation breakdown
- Share quantities
- Current values

2. Real-Time Data

- Live stock prices
- Portfolio total value
- Performance metrics
- Risk indicators

3. Historical Tracking

- 5-day value history
- Trend analysis
- Performance comparison
- Risk assessment

Error Handling

1. Input Validation

- Minimum investment check
- Strategy selection validation
- Numeric input verification

2. Data Processing

- API connection errors
- Data retrieval failures
- Calculation errors
- Update failures

UI/UX Features

1. Design Elements

- Clean, professional interface
- Intuitive navigation
- Responsive layout
- Color-coded elements

2. User Feedback

- Input validation messages
- Loading indicators
- Error notifications
- Success confirmations

Performance Optimization

1. Data Management

- Efficient API calls
- Data caching
- Memory optimization
- Response time improvement

2. Resource Usage

- CPU utilization
- Memory management
- Network bandwidth
- Storage efficiency