

Practical No 05

Date:

Aim: Prepare use cases and draw use case diagram using modeling tools for AI Stock Analyzer System

THEORY: USE CASE DIAGRAM IN UML

A Use Case Diagram is a type of Unified Modeling Language (UML) diagram that represents the interaction between actors (users or external systems) and a system under consideration to accomplish specific goals. It provides a high-level view of the system's functionality by illustrating the various ways users can interact with it.

In the context of an AI Stock Analyzer System, use case diagrams help visualize how different types of users interact with the intelligent stock analysis platform, from basic portfolio tracking to advanced AI-powered predictions and automated trading recommendations.

SYSTEM ACTORS IDENTIFICATION

PRIMARY ACTORS:

- Retail Investor (Individual User)
- Professional Trader
- Portfolio Manager
- System Administrator

SECONDARY ACTORS:

- External Data Provider (API)
- AI/ML Engine (System Actor)

USE CASE IDENTIFICATION

PRIMARY USE CASES:

1. User Registration & Authentication
2. Create Investment Profile
3. Add Stocks to Watchlist
4. View Real-time Stock Prices
5. Analyze Technical Indicators
6. Generate AI Predictions
7. Perform Fundamental Analysis
8. Optimize Portfolio Allocation
9. Set Price Alerts
10. Execute Paper Trading
11. Generate Performance Reports
12. Access Market News & Sentiment
13. Configure Risk Parameters

14. Export Analysis Reports
15. Manage User Preferences

ADMINISTRATIVE USE CASES:

1. Manage User Accounts
2. Monitor System Performance
3. Update ML Models
4. Configure Data Sources
5. Generate System Reports
6. Backup Database
7. Maintain Security Settings

USE CASE DIAGRAM TEXTUAL REPRESENTATION

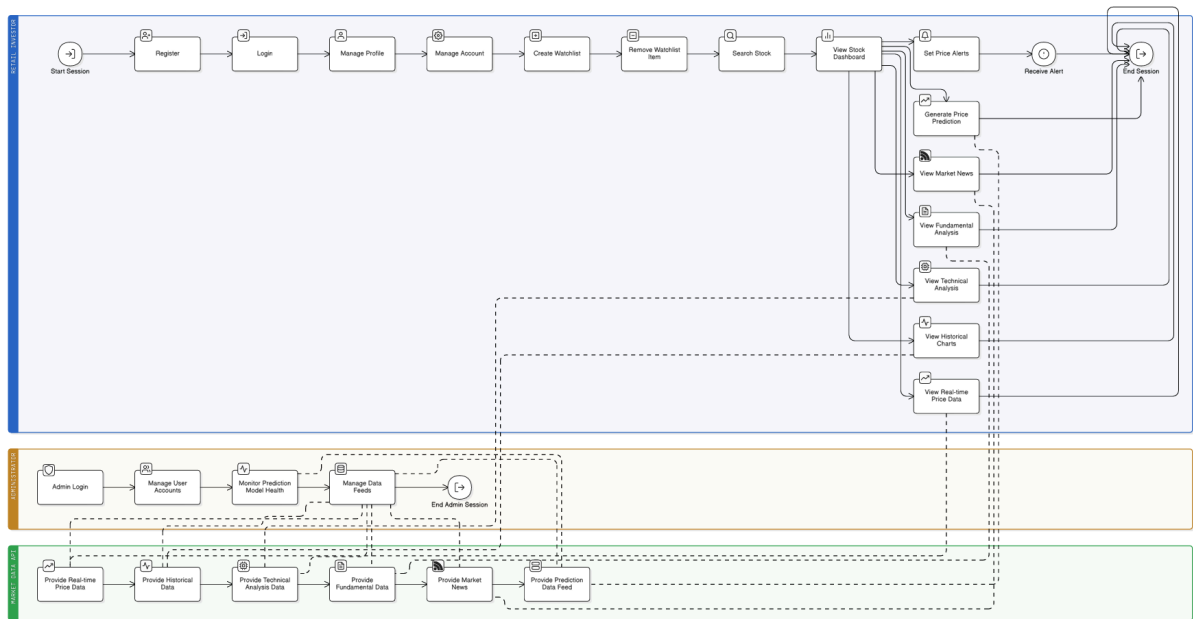
SYSTEM BOUNDARY: AI Stock Analyzer System

CORE ANALYSIS ENGINE MODULE:

- |— User Registration & Authentication
- |— Create Investment Profile
- |— Add Stocks to Watchlist
- |— View Real-time Stock Prices
- |— Analyze Technical Indicators
- |— Generate AI Predictions
- |— Perform Fundamental Analysis
- |— Optimize Portfolio Allocation
- |— Set Price Alerts
- |— Execute Paper Trading
- |— Generate Performance Reports
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ADMINISTRATION MODULE:

- |— Manage User Accounts
- |— Monitor System Performance
- |— Update ML Models
- |— Configure Data Sources
- |— Generate System Reports



DETAILED USE CASE SCENARIOS

USER ONBOARDING PROCESS:

A new user registers on the platform by providing basic information and investment experience level. During registration, the system creates an investment profile based on risk tolerance, investment goals, and preferred asset classes. After successful authentication, users gain access to the dashboard with personalized recommendations powered by machine learning algorithms.

STOCK ANALYSIS WORKFLOW:

Users add stocks to their watchlist for continuous monitoring and analysis. The system provides real-time stock prices integrated from multiple financial data APIs (Alpha Vantage, Yahoo Finance). Technical analysis tools generate automated insights using indicators like RSI, MACD, Bollinger Bands, and custom AI-detected patterns.

AI-POWERED PREDICTIONS:

The ML engine analyzes historical data, market sentiment, and technical patterns to generate price predictions. LSTM neural networks provide short-term price forecasts with confidence intervals and accuracy metrics. Natural language processing analyzes news sentiment and social media trends to influence prediction models.

PORTFOLIO MANAGEMENT:

Users can optimize their portfolio allocation using Modern Portfolio Theory algorithms implemented with AI enhancements. The system provides rebalancing recommendations based on risk-return optimization and market conditions. Paper trading functionality allows users to test strategies without financial risk.

ALERT AND NOTIFICATION SYSTEM:

Price alerts notify users when stocks reach target levels or when AI models detect significant pattern changes. The system sends automated recommendations for buying, selling, or holding positions based on ML analysis.

REPORTING AND ANALYTICS:

Performance reports track portfolio returns, risk metrics, and compare against market benchmarks. Export functionality allows users to download analysis in PDF or Excel formats for external use.

ADMINISTRATIVE FUNCTIONS:

System administrators manage user accounts, monitor platform performance, and ensure data integrity. Regular updates to machine learning models improve prediction accuracy based on new market data. Database backup and security management maintain platform reliability and user data protection.

EXTERNAL SYSTEM INTEGRATION:

External data providers continuously feed real-time market data, financial statements, and news feeds. The AI/ML engine processes this data to update models and generate fresh insights for users.

ADVANCED FEATURES:

Risk parameter configuration allows users to customize their risk tolerance and investment preferences. Market news and sentiment analysis provide context for investment decisions using NLP algorithms. Historical backtesting validates trading strategies against past market performance.

USE CASE RELATIONSHIPS

INCLUDE RELATIONSHIPS:

- "Generate AI Predictions" includes "Analyze Technical Indicators"
- "Optimize Portfolio Allocation" includes "Generate Performance Reports"
- "User Registration & Authentication" includes "Create Investment Profile"

EXTEND RELATIONSHIPS:

- "Set Price Alerts" extends "View Real-time Stock Prices"
- "Execute Paper Trading" extends "Optimize Portfolio Allocation"
- "Export Analysis Reports" extends "Generate Performance Reports"

GENERALIZATION RELATIONSHIPS:

- "Professional Trader" and "Portfolio Manager" generalize from "Retail Investor"
- "Update ML Models" generalizes to "Monitor System Performance"

SYSTEM REQUIREMENTS ANALYSIS

FUNCTIONAL REQUIREMENTS:

1. Real-time data processing capability (>10,000 stocks simultaneously)
2. AI prediction accuracy of 78-85% for short-term forecasts
3. Response time <2 seconds for real-time queries
4. Support for 1000+ concurrent users
5. Multi-factor authentication and data encryption

6. Automated portfolio rebalancing recommendations
7. Integration with multiple financial data APIs
8. Machine learning model continuous learning capability

NON-FUNCTIONAL REQUIREMENTS:

1. System availability: 99.9% uptime
2. Data backup and recovery mechanisms
3. Scalable cloud infrastructure deployment
4. Mobile-responsive web interface
5. Compliance with financial data regulations
6. Multi-language support capability
7. Advanced security protocols implementation

CONCLUSION

Use cases and their diagrams play a pivotal role in requirement gathering and system design for AI-powered financial platforms. They bridge the gap between users' investment needs and the system's AI-driven functional implementation, ensuring that complex machine learning algorithms serve practical investment decision-making processes.

The use case diagram for the AI Stock Analyzer System demonstrates how intelligent automation can enhance traditional stock analysis while maintaining user-centric design principles. This systematic approach ensures comprehensive coverage of all user interactions and system functionalities, providing a solid foundation for system development and testing phases.