Task 1 Project Proposal: Sales Forecasting and Optimization of Egyptian Stock Market Shares

1. Overview

The Egyptian stock market plays a critical role in the country's economic development, providing investment opportunities and capital access for businesses. However, market fluctuations, econom uncertainty, and investor sentiment often pose challenges in predicting stock performance. This project aims to develop a data-driven framework for forecasting sales and optimizing investment strategies in Egyptian stock market shares. By leveraging machine learning models and financial analytics, the project seeks to enhance decision-making for investors and businesses.

2. Objectives

The key objectives of this project are:

- **Develop predictive models**: Utilize statistical and machine learning techniques to forecast stock prices and trading volumes of different companies listed on the Egyptian Exchange (EGX).
- **Identify market trends**: Analyze historical stock data, macroeconomic indicators, and market sentiment to detect patterns that influence stock performance.
- **Optimize investment decisions**: Design optimization strategies to maximize returns while minimizing risks based on forecasted sales and stock market performance.
- **Incorporate sentiment analysis**: Assess investor sentiment using news articles, social media, and financial reports to improve stock price predictions.
- **Enhance decision-making**: Provide investors, financial analysts, and businesses with actionable insights through data visualization and predictive analytics.

3. Scope

3.1 Data Collection

- Historical stock prices and trading volumes from the Egyptian Exchange (EGX)
- Financial reports of listed companies
- Macroeconomic indicators such as inflation rates, GDP growth, and interest rates

- Market news, analyst reports, and social media sentiment analysis

3.2 Methodology

- **Data Preprocessing**: Cleaning and normalizing stock market data, financial statements, and economic indicators.
- **Exploratory Data Analysis (EDA)**: Identifying key trends, correlations, and anomalies in historical data.
- **Predictive Modeling**:
    - Time series forecasting (e.g., ARIMA, LSTM, Prophet)
    - Machine learning models (e.g., Random Forest, XGBoost, Neural Networks)
    - Deep learning techniques for improved accuracy
- **Optimization Algorithms**:
    - Portfolio optimization using Modern Portfolio Theory (MPT)
    - Risk assessment using Value at Risk (VaR) and Sharpe Ratio
- **Visualization and Reporting**:
    - Interactive dashboards for data presentation
    - Automated reporting for stakeholders

3.3 Expected Deliverables

- A robust forecasting model for Egyptian stock market shares.
- Insights into factors affecting stock performance and investment trends.
- A web-based dashboard for visualizing stock predictions and investment recommendations.
- A comprehensive report with recommendations for investors and policymakers.

4. Project Plan

4.1 Timeline (Gantt Chart)

Task	24 Feb - 10 Mar	11 Mar - 20 Mar	21 Mar - 30 Mar	31 Mar - 5 Apr	6 Apr - 10 Apr
Data Collection	✔				
Data Preprocessing	✔	✔			
Exploratory Data Analysis		✔			

Predictive Modeling		✔	✔		
Optimization Strategies			✔		
Visualization & Reporting				✔	
Final Report & Deployment					✔

4.2 Milestones

- **10 March 2025**: Completion of data collection
- **20 March 2025**: Completion of data preprocessing and initial exploratory analysis
- **30 March 2025**: Development of initial predictive models
- **5 April 2025**: Optimization strategies implemented
- **10 April 2025**: Dashboard, final report, and deployment of forecasting model

4.3 Resource Allocation

- **Data Analysts**: Responsible for data collection, preprocessing, and exploratory analysis.
- **Machine Learning Engineers**: Develop and fine-tune predictive models.
- **Financial Analysts**: Interpret stock trends and macroeconomic factors.
- **Software Developers**: Develop interactive dashboards and visualization tools.
- **Project Manager**: Oversees project execution, ensures timeline adherence, and coordinates team efforts.

5. Task Assignment & Roles

5.1 Team Members and Responsibilities

- **Project Manager** (Lead Coordinator): Osama Ghandour , Ahmed Hasan
    - Oversees project planning, execution, and timeline management.
    - Ensures communication between teams and resolves roadblocks.
    - Coordinates resource allocation and budget control.
- **Data Analysts**: Habiba , Shiko
    - Collect and preprocess historical stock market data, financial reports, and macroeconomic indicators.
    - Perform exploratory data analysis (EDA) to identify patterns and trends.
    - Assist in feature engineering for predictive models.

- **Machine Learning Engineers**: Habiba , Ahmed Hasen , Omer Nagib
    - Develop, train, and optimize predictive models for sales forecasting and stock price predictions.
    - Implement deep learning techniques and hyperparameter tuning to improve accuracy.
    - Collaborate with data analysts to refine data preprocessing steps.
- **Financial Analysts**: Osama Ghandour , Omar Nagib
    - Interpret stock trends and macroeconomic factors to provide domain-specific insights.
    - Validate model predictions with real-world market conditions.
    - Contribute to investment optimization strategies.
- **Software Developers**: Osama Ghandour & Ahmed Hasan , Shiko
    - Design and develop interactive dashboards for visualizing stock predictions and investment recommendations.
    - Implement web-based reporting tools for stakeholders.
    - Ensure the deployment and scalability of the final model.

6. Risk Assessment & Mitigation Plan

6.1 Identified Risks and Solutions

Risk	Impact	Mitigation Strategy
Data Quality Issues	Poor predictions due to missing or incorrect data	Implement robust data cleaning and validation techniques
Market Volatility	Unexpected market fluctuations affecting model accuracy	Use adaptive learning models and continuously update data inputs
Regulatory Changes	Changes in financial regulations impacting stock trading	Stay updated with regulatory frameworks and adjust models accordingly
Computational Constraints	High processing power required for deep learning models	Optimize algorithms, use cloud computing resources

Interpretability of Models	Difficulty in explaining complex ML models to stakeholders	Use explainable AI (XAI) techniques and provide interpretable visualizations
Cybersecurity Risks	Potential data breaches or cyber threats	Implement strong encryption, access controls, and regular security audits
Project Delays	Risks of missing deadlines due to unforeseen challenges	Maintain a buffer in project timeline and conduct regular progress reviews

7. Key Performance Indicators (KPIs)

7.1 Metrics for Project Success

KPI	Description	Target
Prediction Accuracy	Percentage of correctly predicted stock price movements	≥ 85%
Model Training Time	Time taken to train predictive models	≤ 2 hours
System Uptime	Availability of the forecasting platform	99.5% uptime
User Adoption Rate	Number of financial analysts and investors using the tool	500+ users
Response Time	Time taken for predictions and reports to generate	≤ 5 seconds
Data Processing Efficiency	Speed of handling large financial datasets	1M+ records processed in under 10 minutes
Investment Optimization Success Rate	Improvement in returns using model-generated strategies	≥ 15% increase

Task 2 Literature Review

2.1 Feedback & Evaluation

- Lecturer's assessment will focus on the project's approach, implementation, and overall feasibility.
- Evaluation of the accuracy and efficiency of predictive models.
- Review of the clarity and effectiveness of data visualization and reporting.

2.2 Suggested Improvements

- Enhance model accuracy by integrating additional financial indicators.
- Improve dashboard interactivity for better user experience.
- Explore alternative optimization algorithms for better investment strategies.

2.3 Final Grading Criteria

Component	Weight
Documentation	25%
Implementation	30%
Testing & Validation	25%
Presentation	20%

2.4 Conclusion

This project aims to bridge the gap between traditional stock market analysis and modern data-driven forecasting techniques. By implementing machine learning and financial optimization strategies, it will provide valuable insights for investors and businesses in the Egyptian stock market. The outcome of this research can support better investment decisions, improve market stability, and enhance economic growth.

Task 3 : 3. Requirements Gathering

3.1 Stakeholder Analysis – Identifying Key Stakeholders and Their Needs

3.1.1. Investors and Traders

Needs:

- Accurate and timely stock predictions.
- User-friendly interface for market analysis.
- Reliable data sources and updates.
- Customizable alerts and notifications.
- Risk assessment tools.

3.1.2. Financial Analysts

Needs:

- Advanced analytics and data visualization.
- Historical stock data for trend analysis.
- API access for integrating with other financial tools.
- Machine learning insights and explainability features.

3.1.3. Stock Market Enthusiasts

Needs:

- Educational resources and tutorials on stock market trends.
- Simplified reports and insights.
- Community forums for discussion and knowledge sharing.
- Free and premium access options.

3.1.4. Regulatory Authorities (e.g., Egyptian Financial Regulatory Authority - FRA)

Needs:

- Compliance with financial regulations.
- Data transparency and ethical AI usage.
- Secure user data protection measures.
- Reporting mechanisms for market manipulation detection.

3.1.5. Business Owners and Entrepreneurs

Needs:

- Insights on market trends affecting business sectors.
- Integration with business financial planning tools.

- Forecasting models for economic impact assessment.

3.1.6. Software Developers and Data Scientists

Needs:

- Open-source tools or API for research and development.
- High-performance data processing infrastructure.
- Continuous model improvements and testing environments.
- Collaboration opportunities in fintech research.

3.1.7. Advertisers and Sponsors

Needs:

- Targeted audience for financial products.
- Ad placements on the platform.
- Performance tracking of advertisements.
- Partnership opportunities.

3.1.8. Media and Journalists

Needs:

- Access to stock predictions for financial reporting.
- Expert insights and commentary.
- Real-time updates on market trends.

3.1.9. Website Administrators and Support Teams

Needs:

- Scalable and secure infrastructure.
- Efficient data management and maintenance.
- Monitoring tools for uptime and security.
- Responsive customer support solutions.

By addressing these stakeholders' needs, the website can effectively serve as a valuable tool for predicting Egyptian stock trends while ensuring usability, compliance, and engagement across various user groups.

3.2User Stories & Use Cases – Scenarios Illustrating How Users Interact with the System

3.2.1. Investor/Trader User Story

As an investor, I want to receive real-time stock predictions so that I can make informed trading decisions.

Use Case:

- User log into the platform.
- User selects a stock to analyze.
- System provides real-time predictions and risk assessment.
- User sets alerts for price changes.
- User makes investment decisions based on insights.

3.2.2. Financial Analyst User Story

As a financial analyst, I want to access historical and predictive data to conduct market analysis.

Use Case:

- User logs in and accesses advanced analytics.
- User retrieves historical data for a specific stock.
- User compares trends using visualization tools.
- User exports reports for financial modeling.

3.2.3. Stock Market Enthusiast User Story

As a stock market enthusiast, I want to learn about stock trends in an easy-to-understand format.

Use Case:

- User registers on the website.
- User accesses educational materials and simplified reports.
- User engages in forum discussions.
- User follows market trends through notifications.

3.2.4. Business Owner User Story

As a business owner, I want to analyze stock trends that impact my industry so I can plan accordingly.

Use Case:

- User logs in and selects an industry sector.
- System provides economic impact forecasts.
- User integrates stock trends into business strategy.

3.2.5. Regulatory Authority User Story

As a regulatory authority, I want to monitor market activity to ensure compliance with financial laws.

Use Case:

- User logs in with regulatory credentials.
- User accesses compliance reports.

- User sets alerts for potential market manipulation.

3.2.6. Advertiser User Story

As an advertiser, I want to reach potential customers through targeted financial ads.

Use Case:

- User creates an advertiser account.
- User selects a target audience based on financial interests.
- System displays ads to relevant users.
- User monitors ad performance and adjusts strategy.

3.2.7. Website Administrator User Story

As a website administrator, I want to ensure the system runs smoothly and securely.

Use Case:

- Admin logs into the backend panel.
- Admin monitors system performance.
- Admin reviews security logs and resolves issues.
- Admin manages user accounts and permissions.

These user stories and use cases ensure that the system meets the needs of all key stakeholders efficiently.

3.3Functional Requirements – List of Features and Functionalities

3.3.1. User Authentication and Authorization

- Users can register and log in using email and password.
- Two-factor authentication for added security.
- Role-based access control (Investors, Analysts, Admins, etc.).

3.3.2. Stock Prediction and Analysis

- Real-time stock market data retrieval.
- AI-based stock prediction model.
- Historical data visualization and trend analysis.
- Risk assessment and investment insights.

3.3.3. Custom Alerts and Notifications

- Users can set up alerts for stock price changes.
- Email and push notifications for market updates.
- Personalized recommendations based on user preferences.

3.3.4. Data Visualization and Reporting

- Interactive charts and graphs for market trends.
- Exportable reports in CSV, PDF, and Excel formats.
- Comparative analysis between different stocks and sectors.

3.3.5. Educational Resources and Community Engagement

- Learning materials on stock trading and investment strategies.
- Discussion forums for user engagement.
- Webinars and expert insights.

3.3.6. API Integration and Data Access

- API access for financial analysts and developers.
- Third-party integrations for real-time market feeds.
- Secure data exchange and storage.

3.3.7. Admin and Regulatory Compliance Tools

- User activity monitoring and analytics.
- Compliance with financial regulations.
- Fraud detection and reporting mechanisms.

3.3.8. Advertiser and Sponsor Management

- Ad placement and management features.
- Targeted marketing based on user behavior.
- Ad performance tracking and reporting.

3.3.9. Performance and Security Features

- High-speed data processing and low-latency predictions.
- Secure encryption for user data protection.
- Continuous system monitoring and backup solutions.

These functionalities ensure the platform provides accurate stock predictions, user engagement, and regulatory compliance.

3.4 Non-functional Requirements – Performance, Security, Usability, and Reliability Criteria

3.4.1. Performance Requirements

- The system should handle at least 10,000 concurrent users without performance degradation.
- Stock predictions should be generated within 2 seconds.
- Data updates should occur in real-time with a maximum latency of 1 second.
- API response time should be under 500ms for standard queries.

3.4.2. Security Requirements

- User data must be encrypted using AES-256.
- Secure authentication with OAuth 2.0 and multi-factor authentication (MFA).
- Protection against common security threats such as SQL injection, XSS, and CSRF.
- Regular security audits and penetration testing should be conducted.

3.4.3. Usability Requirements

- The platform should have an intuitive and user-friendly interface.
- Responsive design to support desktop, tablet, and mobile devices.
- Accessibility compliance with WCAG 2.1 standards.
- User onboarding tutorials and tooltips for guidance.

3.4.4. Reliability Requirements

- System uptime should be at least 99.9%.
- Automated failover mechanisms in case of server failures.
- Daily database backups with a retention period of 30 days.
- Redundant data storage to prevent loss in case of hardware failure.

3.4.5. Maintainability and Scalability Requirements

- Modular and well-documented codebase for easy maintenance.
- Cloud-based architecture to allow horizontal scaling as needed.
- Continuous integration and deployment (CI/CD) pipelines for updates.
- Load balancing to distribute traffic efficiently.

Ensuring these non-functional requirements are met will help create a secure, high-performing, and user-friendly stock prediction platform.

Task 4 . System Analysis & Design

4.1.Problem Statement & Objectives – Define the problem being solved and project goals.

4.1.1 Use Case Diagram & Descriptions – Identify system actors and interactions.

4.1.1.1Use Case View Stock Predictions:

Use Case Name: : View Stock Predictions	ID: UC-01	Priority:High
Actor: Investor/Trader, Financial Analyst		
Description: Allows users to view AI-generated stock predictions based on market data.		
Trigger: User selects a stock to analyze.		
Type: External		
Preconditions: User must be logged in and have access to stock data.		
Normal Course: 1. User logs into the system. 2. User navigates to the stock prediction section. 3. User selects a stock. 4. System applies AI model to generate predictions. 5. User reviews predictions and trends.	Information for Steps: System verifies user credentials. System displays available stocks for analysis. System retrieves historical and real-time data. System displays the predicted stock performance. System provides visualization tools for analysis.	
Alternative Courses: 1a. If stock data is unavailable, the system notifies the user. 2a. If prediction processing fails, the system retries or notifies the user.		
Postconditions: User gains insight into stock trends for investment decisions.		

4.1.1.2Use Case Set Alerts & Notifications:

Use Case Name: Set Alerts & Notifications	ID: UC-02	Priority:High
Actor: Investor/Trader, Stock Market Enthusiast		
Description: Allows users to configure alerts for stock price changes.		
Trigger: User sets a price alert for a specific stock.		
Type: External		
Preconditions: User must be logged in and have access to stock data.		
Normal Course: 1. User logs into the system. 2. User navigates to the alerts section. 3. User selects a stock and sets a price threshold. 4. System monitors stock prices in real-time. 5. User receives notification via email or app.	Information for Steps: The system verifies user credentials. The system displays existing alerts and configuration options. The system stores alert preferences. If the stock reaches the threshold, the system sends an alert. System logs alert event for tracking.	
Alternative Courses: 1a. If stock data is unavailable, the system notifies the user. 2a. If alert processing fails, the system retries or notifies the user.		
Postconditions: User is notified when the stock reaches the set threshold.		

4.1.1.3Use Case Access Market Analysis Reports:

Use Case Name: Access Market Analysis Reports	ID: UC-03	Priority:Medium
Actor: Financial Analyst, Business Owner		
Description: Users can generate and analyze market trend reports.		
Trigger: User requests a market report.		
Type: External		
Preconditions: User must be logged in and have access to stock data.		
Normal Course: 1. User logs into the system. 2. User navigates to the reports section. 3. User selects report parameters. 4. System generates a report based on the selected criteria. 5. User downloads or shares the report.	Information for Steps: System verifies user credentials. System displays available report options. System retrieves relevant stock data. Report is displayed in a readable format. System logs the report generation event.	
Alternative Courses: 1a. If data is unavailable, the system notifies the user. 2a. If report generation fails, the system retries or notifies the user.		
Postconditions: User receives a detailed market report for analysis.		

4.1.1.4 Use Case Participate in Discussions & Learning:

Use Case Name: Participating in Discussions & Learning	ID: UC-04	Priority:Medium
Actor: Stock Market Enthusiast		
Description: Users access educational materials and engage in forums.		
Trigger: User navigates to the discussion or learning section.		
Type: External		
Preconditions: User must be logged in.		
Normal Course: 1. User logs into the system. 2. User navigates to the learning section. 3. User joins a discussion forum. 4. User participates by posting or replying.	Information for Steps: System verifies user credentials. System displays educational resources System provides access to user discussions. System updates forums with new content.	
Alternative Courses:		
Postconditions: User gains insights and interacts with the community.		

4.1.1.5 Use Case Monitor Compliance & Fraud Detection:

Use Case Name: Monitor Compliance & Fraud Detection	ID: UC-05	Priority:High
Actor: Regulatory Authority		
Description: Authorities monitor stock activity and flag suspicious behaviors.		
Trigger: System detects suspicious stock transactions.		
Type: External		
Preconditions: System must be continuously monitoring stock activity.		
Normal Course: 1. System collects stock transaction data. 2. System applies fraud detection algorithms. 3. Regulatory authority receives notifications. 4. Investigative action is taken if necessary.	Information for Steps: Identifies unusual trading patterns. Flags suspicious transactions. Reviews flagged activities. Possible legal enforcement.	
Alternative Courses:		
Postconditions: Fraudulent activities are detected and flagged.		

4.1.1.6Use Case Manage Advertisements:

Use Case Name: Manage Advertisements	ID: UC-06	Priority:Medium
Actor: Advertiser		
Description: Advertisers set up, manage, and track ad campaigns on the platform.		
Trigger: Advertiser initiates an ad campaign.		
Type: External		
Preconditions: Advertiser must have an account and ad budget.		
Normal Course: 1. Advertiser logs into the platform. 2. Advertiser navigates to ad management section. 3. Advertiser sets campaign parameters. 4. Ad is published on the platform. 5. System provides analytics on campaign performance.	Information for Steps: System verifies credentials. System displays ad options. System stores configurations. Users interact with the advertisement. Advertiser reviews engagement metrics.	
Alternative Courses:		
Postconditions: Advertisements are managed effectively.		

4.1.1.7 Use Case Administer Platform:

Use Case Name: Administer Platform	ID: UC-07	Priority:High
Actor: Website Administrator		
Description: Admins oversee system performance, security, and user management.		
Trigger: System event or user report requiring admin action.		
Type: External		
Preconditions: Admin must have proper access credentials.		
Normal Course: 1. Admin logs into the system. 2. Admin monitors system performance and security. 3. Admin takes necessary actions (e.g., banning users, fixing bugs). 4. Admin updates platform features as needed.	Information for Steps: System verifies admin credentials. Identifies issues or anomalies. Ensures system integrity. Deploys patches and improvements.	
Alternative Courses:		
Postconditions: System remains secure and operational.		

4.1.2 Functional & Non-Functional Requirements

Functional **Requirement**	**Description**	**Example s**
Process-ori ented	A process the system must perform; actions the system must execute.	- The system must allow users to view AI-based stock predictions. - Users should be able to set stock price alerts and notifications. - The system should support real-time stock data retrieval. - Admins must have access to manage platform security and content.
Information -oriented	Information the system must contain and manage.	- The system must store historical stock data for analysis. - Users' portfolio and stock watchlist should be saved securely. - The system must include financial reports and market analysis insights. - The system should log transactions and user activities for auditing.

Non-Functional Requirement	**Description**	**Examples**
Performance	Defines speed, scalability, and responsiveness.	- The system should handle at least 1,000 concurrent users. - Stock prediction results should be generated in under 2 seconds. - Data retrieval should not exceed 1 second for frequently accessed stocks.
Security	Defines access control, data protection, and fraud detection.	- User authentication must be required for all transactions. - The system should use encryption to protect user data. - A fraud detection mechanism must flag suspicious stock activities.
Usability	Ensures ease of use and accessibility.	- The platform should have a user-friendly UI for investors and analysts. - The system should be mobile-responsive for smartphone access. - Users should be able to customize dashboards and reports easily.

Reliability	Defines system uptime and fault tolerance.	- The system should have 99.9% uptime. - A backup mechanism must be in place to recover user data. - If a stock data source fails, an alternative should be used automatically.

Functional Requirements

1. Stock Prediction & Market Analysis
1.1 The system will provide AI-based stock price predictions. **1.2 The system will allow users to search for and track specific stocks.** **1.3 The system will retrieve and display real-time stock market data.** **1.4 The system will visualize historical stock trends using charts and graphs.** **1.5 The system will allow users to set up stock alerts based on price changes.** **1.6 The system will generate daily, weekly, and monthly market insights.**
2. User Portfolio & Watchlist Management
2.1 The system will allow users to create and manage their stock watchlists. **2.2 The system will provide a personalized dashboard for portfolio tracking.** **2.3 The system will store users' investment preferences and risk profiles.** **2.4 The system will send notifications for significant market movements.** **2.5 The system will allow users to simulate trading strategies based on AI models.** **2.6 The system will provide exportable reports on portfolio performance.**
3. Platform Administration & Security
3.1 The system will require secure login and authentication for all users. **3.2 The system will allow administrators to monitor website traffic and activity.** **3.3 The system will automatically detect and flag suspicious trading patterns.** **3.4 The system will enable role-based access for different user types.** **3.5 The system will back up stock market data periodically for data recovery.** **3.6 The system will allow advertisers to manage and track their ad campaigns.**

Non-Functional Requirements

Performance

- **The system must handle at least 1,000 concurrent users without performance degradation.**
- **Stock predictions must be generated within 2 seconds.**
- **Market data retrieval should not exceed 1 second.**

Security

- **All user data must be encrypted to prevent unauthorized access.**
- **Two-factor authentication must be required for high-privilege users.**
- **Fraud detection algorithms must identify and flag unusual stock activity.**

Usability

- **The system must have an intuitive and user-friendly interface for investors.**
- **The platform must be accessible from mobile devices and desktops.**
- **Users should be able to navigate between different market analysis tools easily.**

Reliability

- **The system must have an uptime of at least 99.9%.**
- **A backup mechanism must ensure data recovery in case of failure.**
- **The platform should support automatic failover to alternative stock data sources.**

4.1.3 Software Architecture – High-level design outlining system components, interactions, and architecture style (e.g., MVC, Microservices).

Architecture Style: Model-View-Controller (MVC)

The system follows the **MVC architecture**, which separates concerns into three main components:

1. **Model (Data & Business Logic Layer)**
    - Manages stock market data, user portfolios, and prediction algorithms.
    - Stores historical and real-time stock data in a **relational database (PostgreSQL/MySQL)**.
    - Utilizes **machine learning models** for price prediction.
    - Ensures data integrity and consistency through **APIs and database transactions**.
2. **View (User Interface Layer)**
    - Provides a web-based dashboard for users to track stock trends and receive predictions.
    - Displays real-time data through interactive charts and graphs using **React.js or Vue.js**.
    - Ensures responsive design for mobile and desktop users.
3. **Controller (Application Logic Layer)**
    - Handles user inputs, processes stock data, and manages authentication.
    - Connects the **frontend (View)** with the **backend (Model)** using RESTful or GraphQL APIs.
    - Implements **business rules** for stock alerts, portfolio updates, and AI-based recommendations.

System Components & Interactions

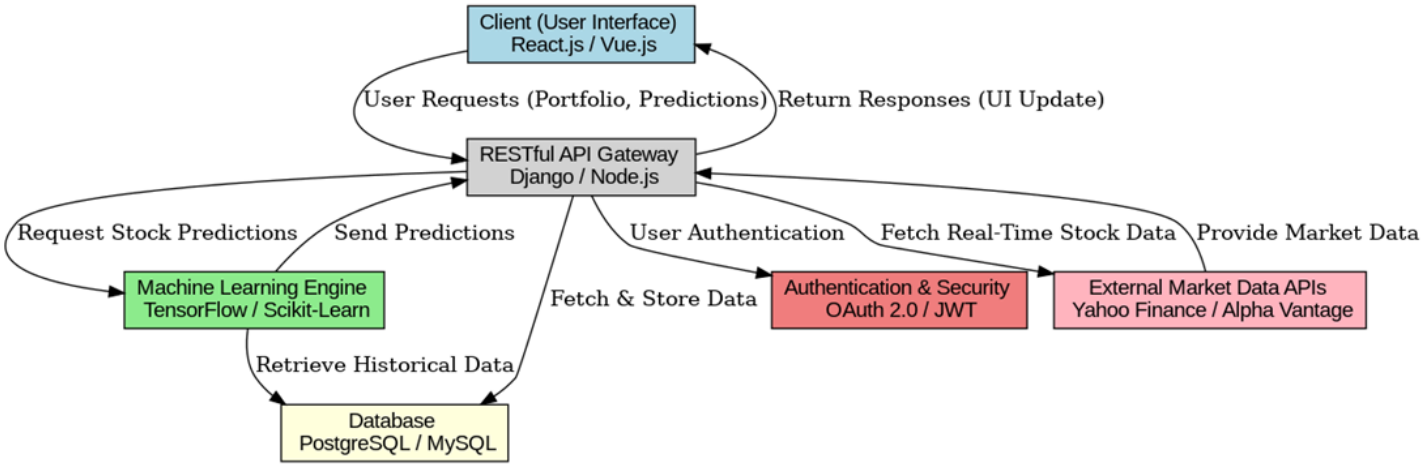
1. **Frontend (Client-Side)**
    - Developed using **React.js or Vue.js** for an interactive UI.
    - Fetches stock data and predictions via **RESTful APIs**.
    - Displays user portfolios, market trends, and AI-generated insights.
2. **Backend (Server-Side)**
    - Developed using **Django (Python) / Node.js (Express.js)** for handling business logic.
    - Processes requests from the frontend and interacts with the database.
    - Implements **machine learning models** (e.g., TensorFlow, Scikit-Learn) for stock predictions.

3. **Database (Data Storage)**
    - Uses **PostgreSQL/MySQL** for structured stock data storage.
    - Stores historical stock records, user preferences, and portfolio data.
    - Provides efficient querying and indexing for fast retrieval.
4. **Machine Learning Engine**
    - Runs predictive models trained on historical stock prices and market indicators.
    - Integrates with **Flask/FastAPI** to expose ML models via an API.
    - Continuously updates predictions based on real-time data streams.
5. **External APIs (Market Data Providers)**
    - Fetches real-time stock prices, news, and financial indicators from APIs like **Yahoo Finance, Alpha Vantage, or IEX Cloud**.
    - Ensures up-to-date market data for accurate predictions.
6. **Authentication & Security Module**
    - Uses **OAuth 2.0 / JWT-based authentication** for secure user login.
    - Implements role-based access control (RBAC) for different user types.
    - Encrypts sensitive user and financial data.

Deployment & Scalability Considerations

- **Cloud Deployment:** Hosted on AWS/GCP/Azure for scalability.
- **Load Balancing:** Uses **NGINX** or **AWS Load Balancer** to distribute traffic.
- **Microservices (Optional):** Can be extended into a **microservices-based** system where prediction, portfolio management, and authentication services run independently.
- **Containerization:** Uses **Docker & Kubernetes** for deployment and orchestration.

high-level software architecture diagram for **Egyptian Stock Prediction Website following the MVC architecture.**



4.2.1 Database Design & Data Modeling

Step 1: Identify Entities

Entities are the main objects or concepts in your system. For a Task Management System, the entities could be:

1. **User**
2. **Task**
3. **Project**
4. **Comment** (optional, for task discussions)
5. **Category** (optional, for task categorization)

Step 2: Define Attributes for Each Entity

Attributes are the properties or details of each entity. For example:

1. **User**
    - user_id (Primary Key)
    - name
    - email
    - password
    - role (e.g., Admin, Member)
2. **Task**
    - task_id (Primary Key)
    - title
    - description
    - due_date
    - status (e.g., To Do, In Progress, Done)
    - user_id (Foreign Key to User)
    - project_id (Foreign Key to Project)
3. **Project**
    - project_id (Primary Key)
    - name
    - description
    - start_date
    - end_date
4. **Comment** (optional)
    - comment_id (Primary Key)
    - content
    - timestamp
    - user_id (Foreign Key to User)
    - task_id (Foreign Key to Task)

5. **Category** (optional)
    - category_id (Primary Key)
    - name
    - task_id (Foreign Key to Task)

Step 3: Define Relationships

Relationships describe how entities interact with each other. For example:

1. **User** and **Task**:
    - A user can create many tasks.
    - A task belongs to one user.
    - Relationship: **One-to-Many (1:N)**.
2. **Project** and **Task**:
    - A project can have many tasks.
    - A task belongs to one project.
    - Relationship: **One-to-Many (1:N)**.
3. **Task** and **Comment**:
    - A task can have many comments.
    - A comment belongs to one task.
    - Relationship: **One-to-Many (1:N)**.
4. **Task** and **Category**:
    - A task can belong to one category.
    - A category can have many tasks.
    - Relationship: **Many-to-One (N:1)**.

Step 4: Create the ER Diagram

You can use tools like **Draw.io**, **Lucidchart**, **MySQL Workbench**, or **Visual Paradigm** to create the ERD. Here's how the diagram will look:

Entities and Attributes

1. **User**
    - user_id (PK)
    - name
    - email
    - password
    - role
2. **Task**
    - task_id (PK)
    - title

    - description
    - due_date
    - status
    - user_id (FK)
    - project_id (FK)
3. **Project**
    - project_id (PK)
    - name
    - description
    - start_date
    - end_date
4. **Comment**
    - comment_id (PK)
    - content
    - timestamp
    - user_id (FK)
    - task_id (FK)
5. **Category**
    - category_id (PK)
    - name
    - task_id (FK)

Relationships

1. **User** → **Task** (1:N)
    - A user can create many tasks.
    - A task is created by one user.
2. **Project** → **Task** (1:N)
    - A project can have many tasks.
    - A task belongs to one project.
3. **Task** → **Comment** (1:N)
    - A task can have many comments.
    - A comment belongs to one task.
4. **Category** → **Task** (1:N)
    - A category can have many tasks.
    - A task belongs to one category.

Step 5: Draw the ERD

Here's a textual representation of the ERD. You can use this as a guide to draw it in your chosen tool:

Copy

[User] (1) ---- creates ---- (N) [Task]

| |

| |

(1) owns (N) belongs to

| |

v v

[Project] (1) ---- has ---- (N) [Task]

[Task] (1) ---- has ---- (N) [Comment]

[Task] (N) ---- belongs to ---- (1) [Category]

Step 6: Add Cardinality and Constraints

- Use **crow's foot notation** to represent relationships (e.g., | for one, O for zero, and || for many).
- Example:
  - **User** to **Task**: | (one) to || (many).
  - **Task** to **Comment**: | (one) to || (many).

Step 7: Export and Include in Documentation

Once your ERD is complete:

1. Export it as an image (e.g., PNG or JPEG).
2. Add it to your **System Analysis & Design** documentation.
3. Write a brief description of the ERD, explaining the entities, attributes, and relationships.

Logical & Physical Schema – Tables, attributes, keys, and normalization considerations.

1. Logical Schema

The logical schema defines the structure of the database at a conceptual level, including tables, attributes, and relationships.

Tables and Attributes

1. User Table
    - user_id (Primary Key)
    - name
    - email (Unique)
    - password
    - role (e.g., Admin, Member)
2. Project Table
    - project_id (Primary Key)
    - name
    - description
    - start_date
    - end_date
3. Task Table
    - task_id (Primary Key)
    - title
    - description
    - due_date
    - status (e.g., To Do, In Progress, Done)
    - user_id (Foreign Key to User)
    - project_id (Foreign Key to Project)
4. Comment Table
    - comment_id (Primary Key)
    - content
    - timestamp
    - user_id (Foreign Key to User)
    - task_id (Foreign Key to Task)
5. Category Table
    - category_id (Primary Key)
    - name
    - task_id (Foreign Key to Task)

Relationships

1. User → Task: One-to-Many (1 user can create many tasks).
2. Project → Task: One-to-Many (1 project can have many tasks).
3. Task → Comment: One-to-Many (1 task can have many comments).

4. Category → Task: One-to-Many (1 category can have many tasks).

---

2. Physical Schema

The physical schema defines how the logical schema is implemented in the database, including data types, constraints, and indexing.

Tables with Data Types and Constraints

1. User Table

sql

Copy

```
CREATE TABLE User (
    user_id INT AUTO_INCREMENT PRIMARY KEY,
    name VARCHAR(100) NOT NULL,
    email VARCHAR(100) UNIQUE NOT NULL,
    password VARCHAR(255) NOT NULL,
    role ENUM('Admin', 'Member') NOT NULL
);
```

2. Project Table

sql

Copy

```
CREATE TABLE Project (
    project_id INT AUTO_INCREMENT PRIMARY KEY,
    name VARCHAR(100) NOT NULL,
    description TEXT,
    start_date DATE,
    end_date DATE
```

);

3. Task Table

sql

Copy

```
CREATE TABLE Task (
    task_id INT AUTO_INCREMENT PRIMARY KEY,
    title VARCHAR(100) NOT NULL,
    description TEXT,
    due_date DATE,
    status ENUM('To Do', 'In Progress', 'Done') NOT NULL,
    user_id INT,
    project_id INT,
    FOREIGN KEY (user_id) REFERENCES User(user_id) ON DELETE CASCADE,
    FOREIGN KEY (project_id) REFERENCES Project(project_id) ON DELETE CASCADE
);
```

4. Comment Table

sql

Copy

```
CREATE TABLE Comment (
    comment_id INT AUTO_INCREMENT PRIMARY KEY,
    content TEXT NOT NULL,
    timestamp DATETIME DEFAULT CURRENT_TIMESTAMP,
    user_id INT,
    task_id INT,
```

```
    FOREIGN KEY (user_id) REFERENCES User(user_id) ON DELETE CASCADE,
    FOREIGN KEY (task_id) REFERENCES Task(task_id) ON DELETE CASCADE
);
```

5. Category Table

```
sql
Copy
CREATE TABLE Category (
    category_id INT AUTO_INCREMENT PRIMARY KEY,
    name VARCHAR(100) NOT NULL,
    task_id INT,
    FOREIGN KEY (task_id) REFERENCES Task(task_id) ON DELETE CASCADE
);
```

---

3. Normalization Considerations

Normalization is the process of organizing the database to reduce redundancy and improve data integrity. We'll normalize the database to Third Normal Form (3NF).

Steps for Normalization

1. First Normal Form (1NF)
    - Ensure each table has a primary key.
    - Eliminate repeating groups (e.g., store comments in a separate table instead of a list in the Task table).
2. Second Normal Form (2NF)
    - Remove partial dependencies (ensure all non-key attributes depend on the entire primary key).
    - For example, in the Task Table, title, description, due_date, and status depend entirely on task_id.
3. Third Normal Form (3NF)
    - Remove transitive dependencies (ensure non-key attributes depend only on the primary key).
    - For example, in the User Table, role depends only on user_id, not on any other attribute.

Normalization Example

- Before Normalization (Unnormalized Table):

sql

Copy

```
CREATE TABLE UnnormalizedTask (
    task_id INT PRIMARY KEY,
    title VARCHAR(100),
    description TEXT,
    due_date DATE,
    status VARCHAR(50),
    user_id INT,
    user_name VARCHAR(100),
    user_email VARCHAR(100),
    project_id INT,
    project_name VARCHAR(100)
);
```

    - Issues: Redundant data (e.g., user_name, user_email, project_name).
- After Normalization (3NF):
    - Split into separate tables: User, Project, and Task.
    - Use foreign keys to establish relationships.

---

4. Indexing and Optimization

- Add indexes to frequently queried columns to improve performance.
  Example:

sql

Copy

```
CREATE INDEX idx_user_email ON User(email);

CREATE INDEX idx_task_status ON Task(status);
```

---

5. Example Queries

Here are some example SQL queries for your database:

1. Get all tasks for a specific user:

sql

Copy

```
SELECT t.task_id, t.title, t.status

FROM Task t

JOIN User u ON t.user_id = u.user_id

WHERE u.email = 'user@example.com';
```

2. Get all comments for a specific task:

sql

Copy

```
SELECT c.content, c.timestamp, u.name AS commenter

FROM Comment c

JOIN User u ON c.user_id = u.user_id

WHERE c.task_id = 1;
```

3. Get all tasks in a specific project:

sql

Copy

```
SELECT t.task_id, t.title, t.status
```

```
FROM Task t

JOIN Project p ON t.project_id = p.project_id

WHERE p.name = 'Project Alpha';
```

---

6. Documentation

Include the following in your documentation:

1. Logical Schema: Tables, attributes, and relationships.
2. Physical Schema: SQL statements for table creation.
3. Normalization Explanation: Describe how the database is normalized to 3NF.
4. Example Queries: Provide sample queries to demonstrate how the database will be used.

4.2DFD (Data Flow Diagram) – Context-level and detailed levels showing how data moves through the system.

1. Context-Level DFD

The Context-Level DFD provides a high-level overview of the system and its interactions with external entities. It shows the system as a single process and its inputs/outputs.

Components of a Context-Level DFD

1. External Entities: These are sources or destinations of data outside the system (e.g., users, admins).
2. System: Represented as a single process (e.g., "Task Management System").
3. Data Flows: Arrows showing the movement of data between external entities and the system.

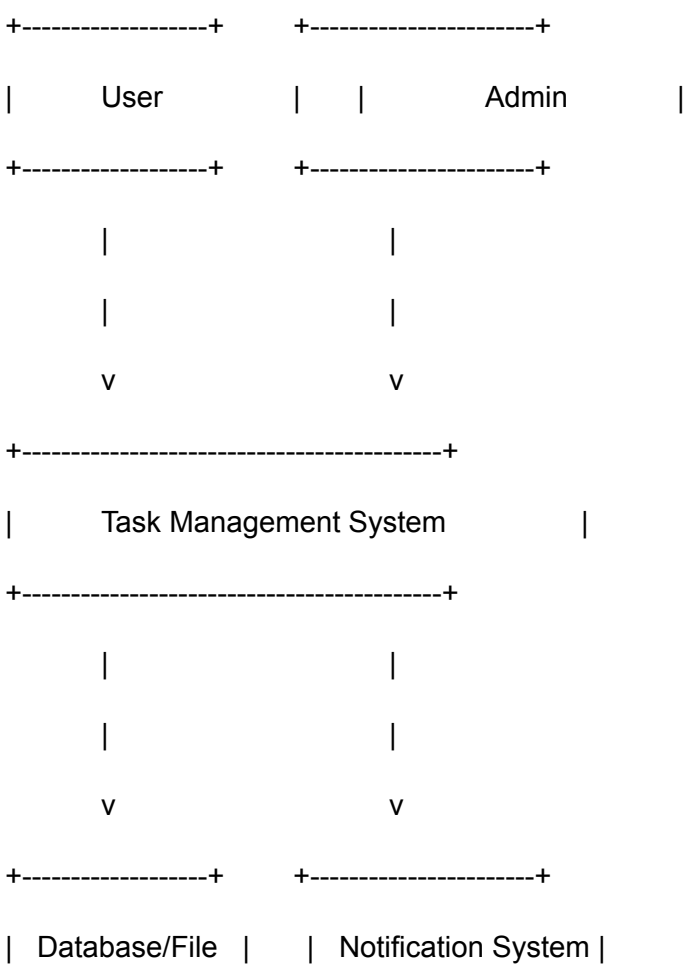
Context-Level DFD for Task Management System

1. External Entities:
    - User: Interacts with the system to create tasks, view tasks, and add comments.
    - Admin: Manages projects and users.
2. System:
    - Task Management System: The main process that handles all functionalities.
3. Data Flows:
    - User → System:
        - Login credentials

        - Task details (title, description, due date)
        - Comment content
    - System → User:
        - Task list
        - Task status updates
        - Notifications
    - Admin → System:
        - Project details
        - User management commands
    - System → Admin:
        - Project reports
        - User activity logs

Diagram Representation

Copy



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2. Detailed-Level DFD

The Detailed-Level DFD breaks down the system into smaller processes and shows how data flows between them. It includes:

1. Processes: Specific actions performed by the system (e.g., "Create Task," "View Tasks").
2. Data Stores: Where data is stored (e.g., "User Database," "Task Database").
3. Data Flows: Arrows showing the movement of data between processes and data stores.

Processes in the Task Management System

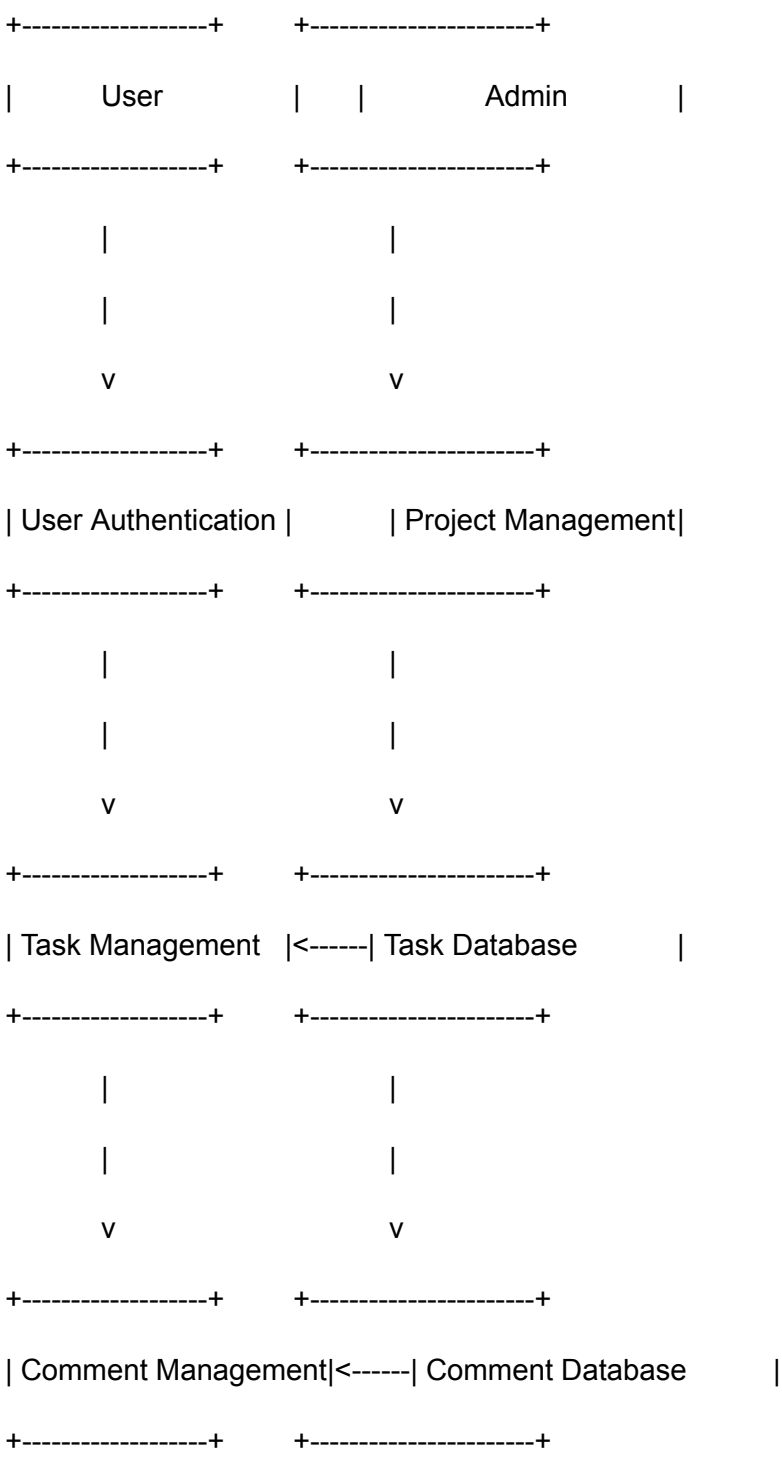
1. User Authentication:
    - Verifies user credentials.
    - Input: Login details
    - Output: Authentication status
2. Task Management:
    - Create, update, delete, and view tasks.
    - Input: Task details
    - Output: Task list
3. Comment Management:
    - Add, view, and delete comments on tasks.
    - Input: Comment content
    - Output: Comment list
4. Project Management:
    - Create, update, and delete projects.
    - Input: Project details
    - Output: Project list
5. Notification System:
    - Sends notifications to users (e.g., task deadlines).
    - Input: Task status
    - Output: Notifications

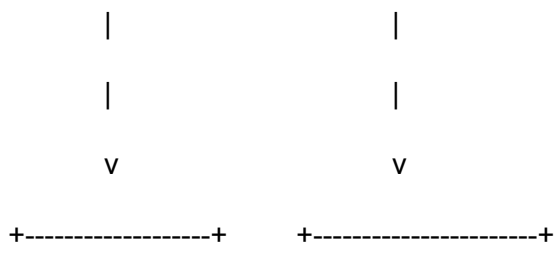
Data Stores

1. User Database: Stores user information (e.g., User table).
2. Task Database: Stores task information (e.g., Task table).
3. Project Database: Stores project information (e.g., Project table).
4. Comment Database: Stores comment information (e.g., Comment table).

Detailed-Level DFD Diagram

Copy





Explanation of Data Flows

1. User Authentication:
    - User provides login credentials.
    - System verifies credentials against the User Database.
    - Returns authentication status.
2. Task Management:
    - User provides task details (title, description, due date).
    - System stores task in the Task Database.
    - Returns task list to the user.
3. Comment Management:
    - User provides comment content.
    - System stores comment in the Comment Database.
    - Returns comment list to the user.
4. Project Management:
    - Admin provides project details.
    - System stores project in the Project Database.
    - Returns project list to the admin.
5. Notification System:
    - System checks task deadlines in the Task Database.
    - Sends notifications to users via the Notification Database.

---

3. Tools to Create DFDs

You can use the following tools to create your DFDs:

1. Draw.io (Free and easy to use)
2. Lucidchart (Collaborative and feature-rich)
3. Microsoft Visio (Professional tool for diagrams)
4. Visual Paradigm (Great for software design diagrams)

---

4. Documentation

Include the following in your documentation:

1. Context-Level DFD: High-level overview of the system and external entities.
2. Detailed-Level DFD: Breakdown of processes, data stores, and data flows.
3. Explanation: Describe each process, data store, and data flow in detail.

Example Documentation

Context-Level DFD:
"The Context-Level DFD shows the interaction between the Task Management System and its external entities (User and Admin). The User interacts with the system to manage tasks and comments, while the Admin manages projects and users. Data flows include login credentials, task details, and notifications."

Detailed-Level DFD:
"The Detailed-Level DFD breaks down the system into processes such as User Authentication, Task Management, and Comment Management. Data stores include the User Database, Task Database, and Comment Database. Data flows represent the movement of information between processes and data stores."

1. Sequence Diagram

A Sequence Diagram shows how components interact over time, focusing on the order of messages exchanged between objects.

Example: Creating a Task

1. Actors: User, System, Task Database
2. Steps:
    - User sends a request to create a task.
    - System validates the request.
    - System saves the task in the Task Database.
    - System confirms the task creation to the user.

Diagram Representation

plaintext

Copy

User System Task Database

| | |

|--Create Task->| |

| |--Validate---->|

| |<--Valid-------|

| |--Save Task--->|

| |<--Task Saved--|

|<--Task Created--| |

---

2. Activity Diagram

An Activity Diagram visualizes the workflow of processes or user actions within the system.

Example: Task Management Workflow

1. Start: User logs in.
2. Decisions:
    - If the user wants to create a task, they provide task details.
    - If the user wants to view tasks, the system retrieves tasks from the database.
3. End: User logs out.

Diagram Representation

plaintext

Copy

+------------------+

| Start: Login |

+------------------+

  |

  v

+------------------+

| Provide Task Details (Create Task) |

+------------------+

|

v

+------------------+

| Retrieve Tasks (View Tasks) |

+------------------+

|

v

+------------------+

| End: Logout |

+------------------+

---

3. State Diagram

A State Diagram represents the different states of an object and how it transitions between them.

Example: Task States

1. States:
    - To Do: Task is created but not started.
    - In Progress: Task is being worked on.
    - Done: Task is completed.
2. Transitions:
    - From To Do to In Progress (when work starts).
    - From In Progress to Done (when work is completed).

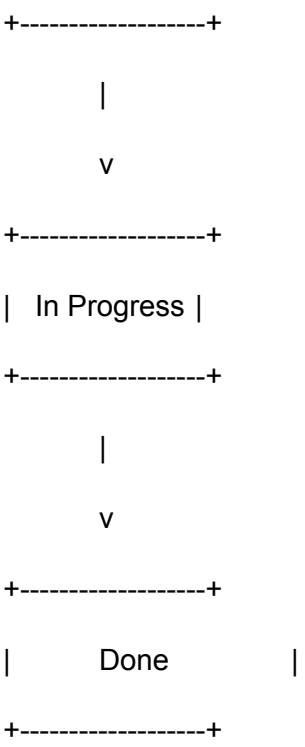
Diagram Representation

plaintext

Copy

+------------------+

| To Do |



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4. Class Diagram

A Class Diagram defines the structure of the system by showing classes, attributes, methods, and relationships.

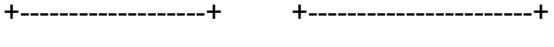
Example: Task Management System Classes

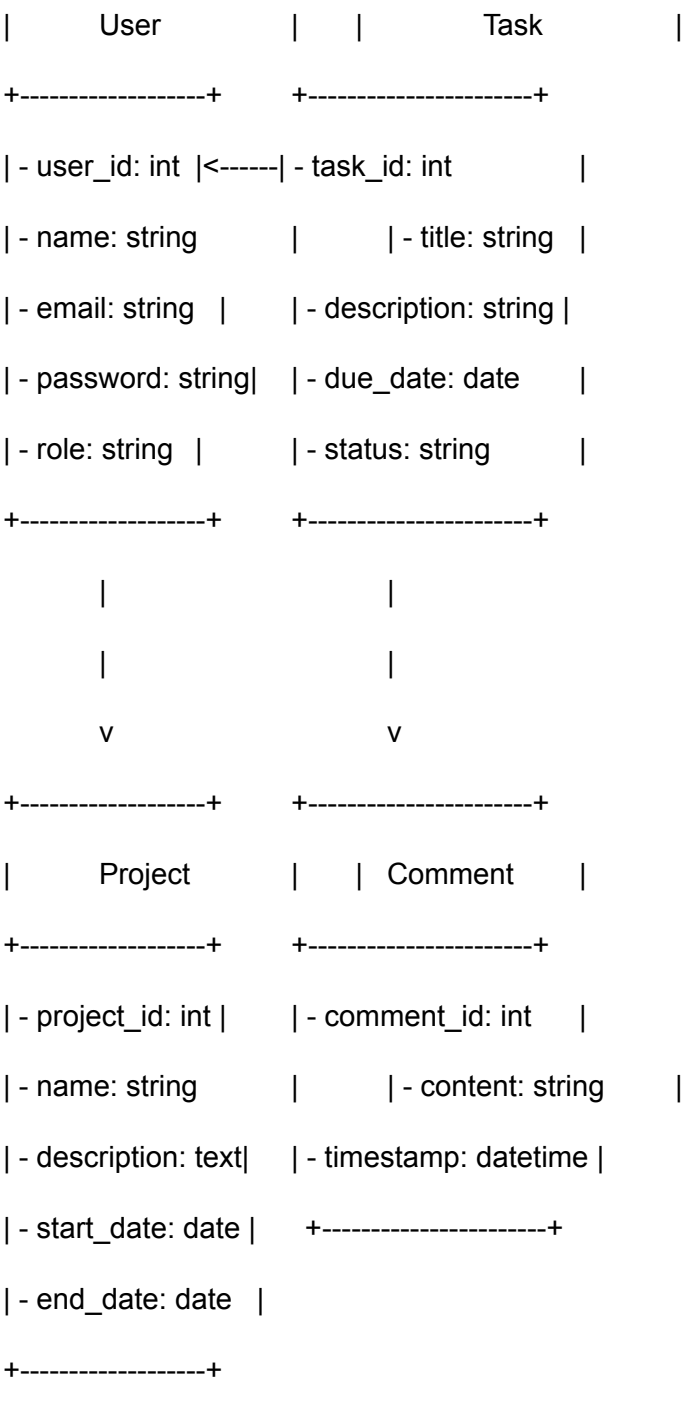
1. Classes:
    - User: Represents a user in the system.
    - Task: Represents a task.
    - Project: Represents a project.
    - Comment: Represents a comment on a task.
2. Relationships:
    - A User can create many Tasks.
    - A Task can have many Comments.
    - A Project can have many Tasks.

Diagram Representation

plaintext

Copy





Tools to Create Diagrams

You can use the following tools to create these diagrams:

1. Draw.io (Free and easy to use)
2. Lucidchart (Collaborative and feature-rich)

3. Microsoft Visio (Professional tool for diagrams)
4. Visual Paradigm (Great for software design diagrams)

Documentation

Include the following in your documentation:

1. Sequence Diagram: Explain key interactions between components.
2. Activity Diagram: Describe workflows and user actions.
3. State Diagram: Explain object states and transitions.
4. Class Diagram: Describe the system's structure and relationships.

Example Documentation

Sequence Diagram:
"The Sequence Diagram for creating a task shows the interaction between the User, System, and Task Database. The User sends a request to create a task, which is validated and saved by the System. The System then confirms the task creation to the User."

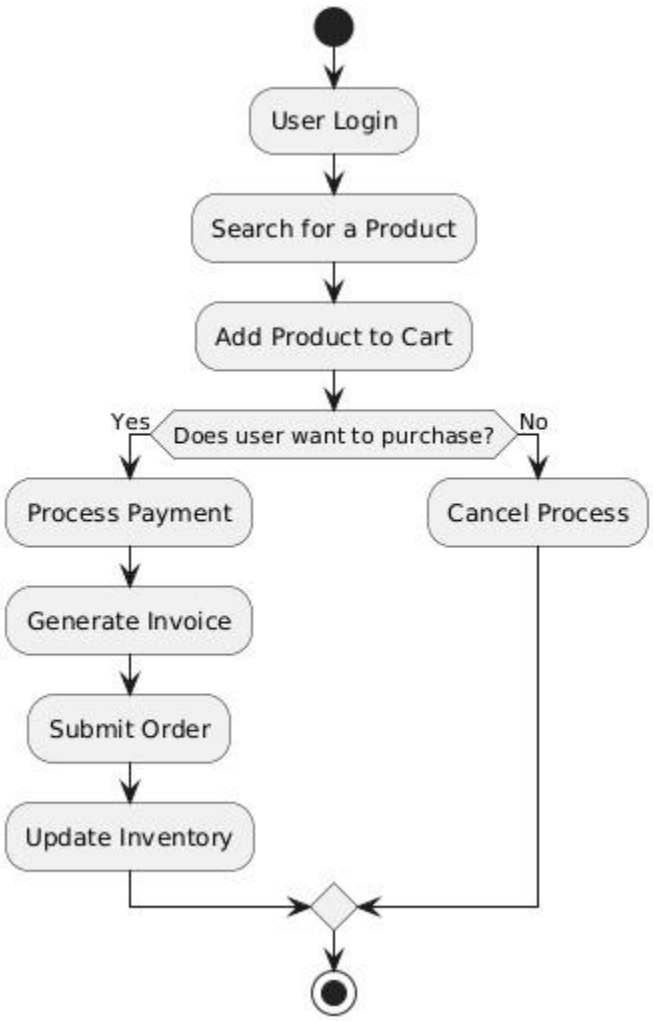
Activity Diagram:
"The Activity Diagram visualizes the Task Management workflow. It starts with the User logging in, followed by creating or viewing tasks, and ends with the User logging out."

State Diagram:
"The State Diagram represents the lifecycle of a Task, which transitions from 'To Do' to 'In Progress' and finally to 'Done'."

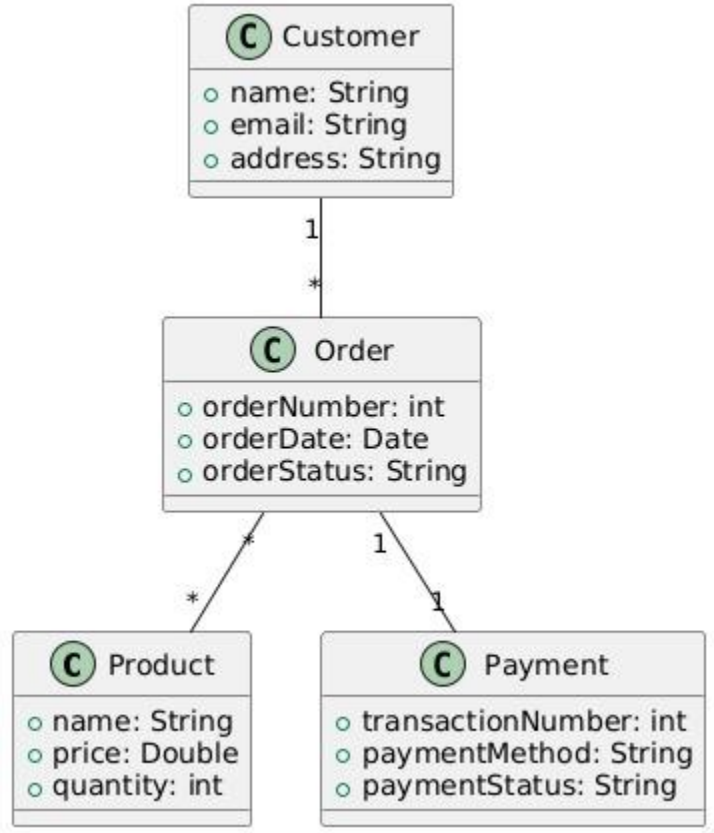
Class Diagram:
"The Class Diagram defines the structure of the Task Management System, including classes like User, Task, Project, and Comment, along with their attributes, methods, and relationships."

4.3. Data Flow & System Behavior

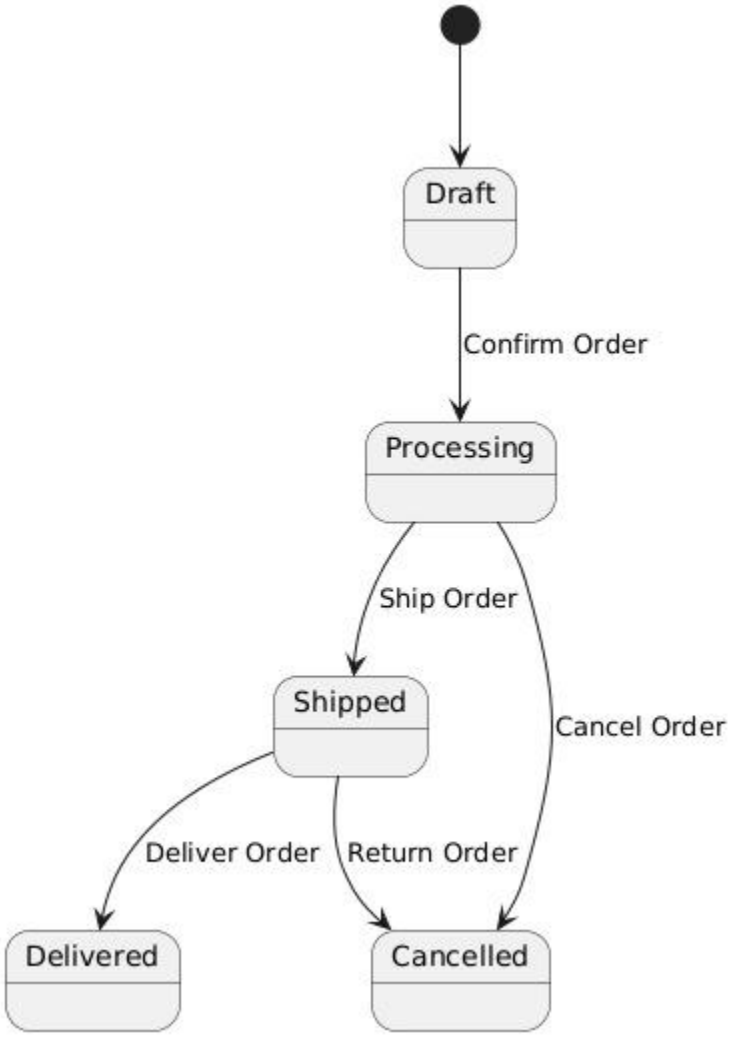
4.3.3 Activity Diagram – Visualizing the workflow of processes or user actions within the system.



4.3.4 State Diagram – Represents different states of an object and how it transitions between them.

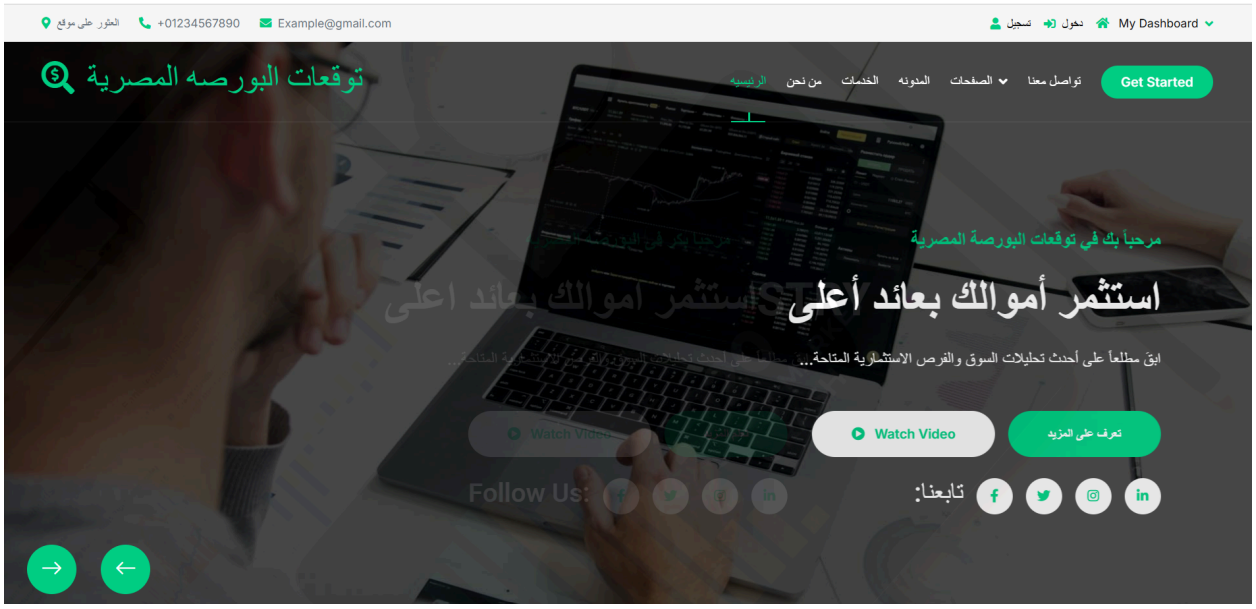


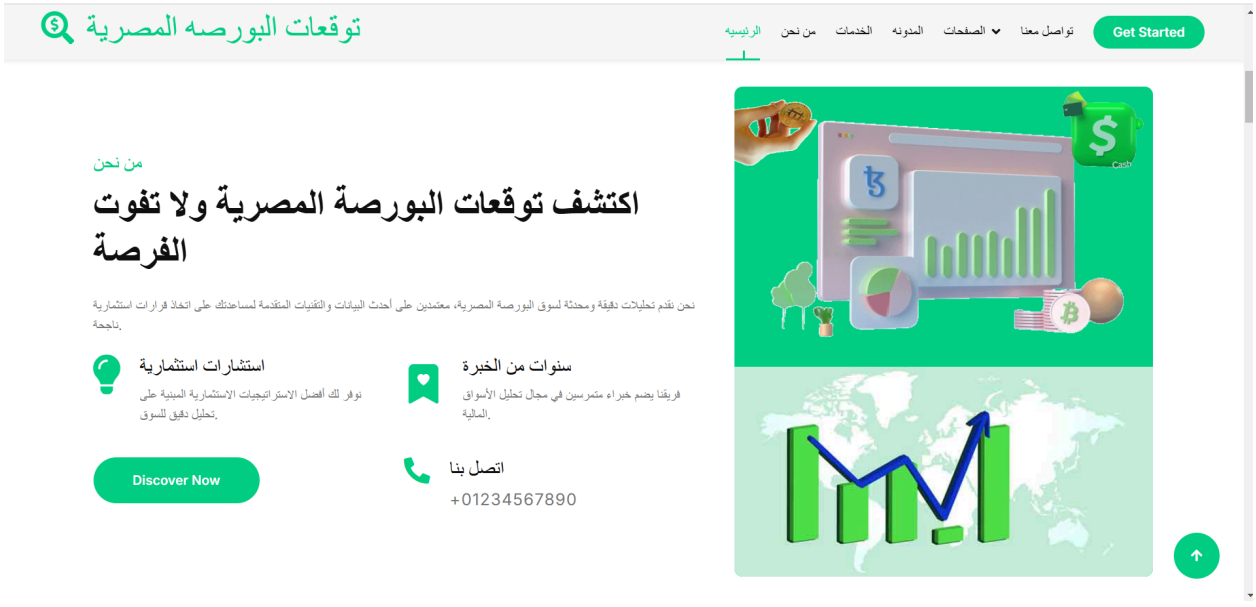
4.3.5 Class Diagram – Defines the structure of the system by showing classes, attributes, methods, and relationships.



4. 4 UI/UX Design & Prototyping

4.4.1 Wireframes & Mockups – Screens and visual representations of the user interface.





نقدم أفضل الخدمات في توقعات البورصة المصرية

.نهدف إلى تمكين المستثمرين من اتخاذ قرارات مدروسة من خلال تقديم تحليلات دقيقة وتوقعات موثوقة لسوق البورصة المصرية

توقعات السوق

نوفر توقعات دقيقة لحركة الأسهم والمؤشرات استنادًا إلى بيانات وتحليلات متقدمة.

اعرف المزيد

تقارير مالية متخصصة

نقدم تقارير تحليلية شاملة تساعد المستثمرين على فهم اتجاهات السوق واتخاذ قرارات مستنيرة.

اعرف المزيد

تدريب وتحليل مالي

نوفر برامج تدريبية متخصصة في مجال التحليل المالي والاستثماري لتعزيز مهارات المستثمرين.

اعرف المزيد

توقعات البورصه المصرية

الرئيسيه من نحن الخدمات المدونه الصفحات تواصل معنا Get Started

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نربط بين الأعمال والأفكار والأشخاص لتحقيق تأثير أكبر.

.يتميز مشروع توقعات البورصة المصرية بالدقة، التحليل العميق، والتنبؤات المبنية على البيانات، مما يساعد المستثمرين على اتخاذ قرارات مدروسة

تحليلات مالية متقدمة

نوفر تحليلات مالية دقيقة تساعدك على فهم اتجاهات السوق واتخاذ قرارات استثمارية مستنيرة.

اعرف المزيد

دعم فني واستشارات

فريقنا من الخبراء مستعد دائمًا لتقديم الدعم الفني والاستشارات لتحقيق أهدافك الاستثمارية.

اعرف المزيد

استراتيجيات استثمار مبتكرة

نقدم استراتيجيات استثمار حديثة تتماشى مع تطورات السوق لتحقيق أفضل عوائد.

اعرف المزيد

توقعات دقيقة للأسهم

نستخدم نماذج تحليل البيانات المتقدمة لتقديم توقعات دقيقة لحركة الأسهم في السوق المصري.

اعرف المزيد

توقعات البورصه المصرية

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الفوائد التي نقدمها

نقدم لك مجموعة من العروض المميزة التي تساعدك على الاستثمار بذكاء وتحقيق أرباح مضمونة في سوق البورصة المصرية. خدماتنا مصممة لتلبية احتياجات المستثمرين من جميع المستويات.

- توقعات دقيقة لحركة الأسهم
- استشارات استثمارية مخصصة
- تقارير تحليلية شاملة
- دعم فني وخدمة عملاء على مدار الساعة

توقعات دقيقة لحركة الأسهم

نعتمد على أحدث التقنيات في تحليل البيانات وتقديم توقعات دقيقة تساعدك على اتخاذ قرارات استثمارية سليمة.

اعرف المزيد

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توقعات البورصه المصرية

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مدونتنا واخبارنا

مقالات للمتداولين المحترفين

لوريم إيبسوم دولور سيت أميت، كونسيكتيتور أديبيسينغ إليت. تينيتور أديبيسكي فاسيلس كيو بيديتات ريكوساندي أبيريام تمبور ايبوس كوربوس إيتاكوي كيس فاكيري، نومكواه، أد كوليا ديسيرنت سينت دولوريم أوتيم أوبكاسيتي، إيبسام موليتيا هيك.

هل تداول الخيارات عمل مربح؟

لوريم إيبسوم دولور سيت أميت كونسيكتيتور أديبيسينغ إليت. دولوري أوت أليكوام سوسيبيت إيرور كوربوس أكوساموس لابوري....

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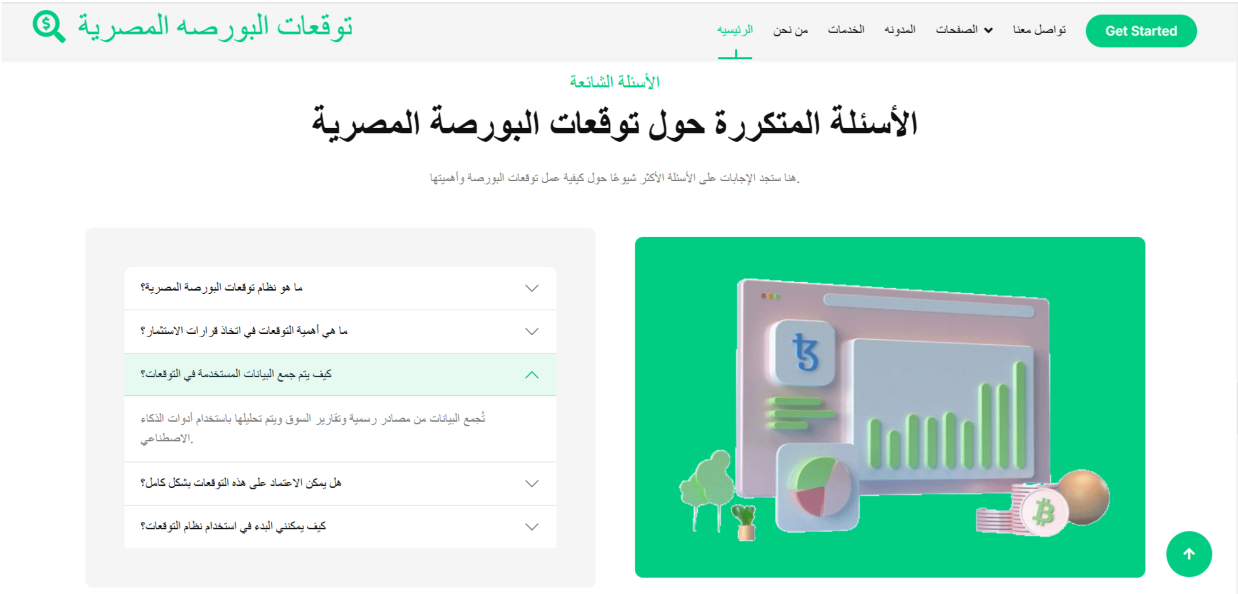
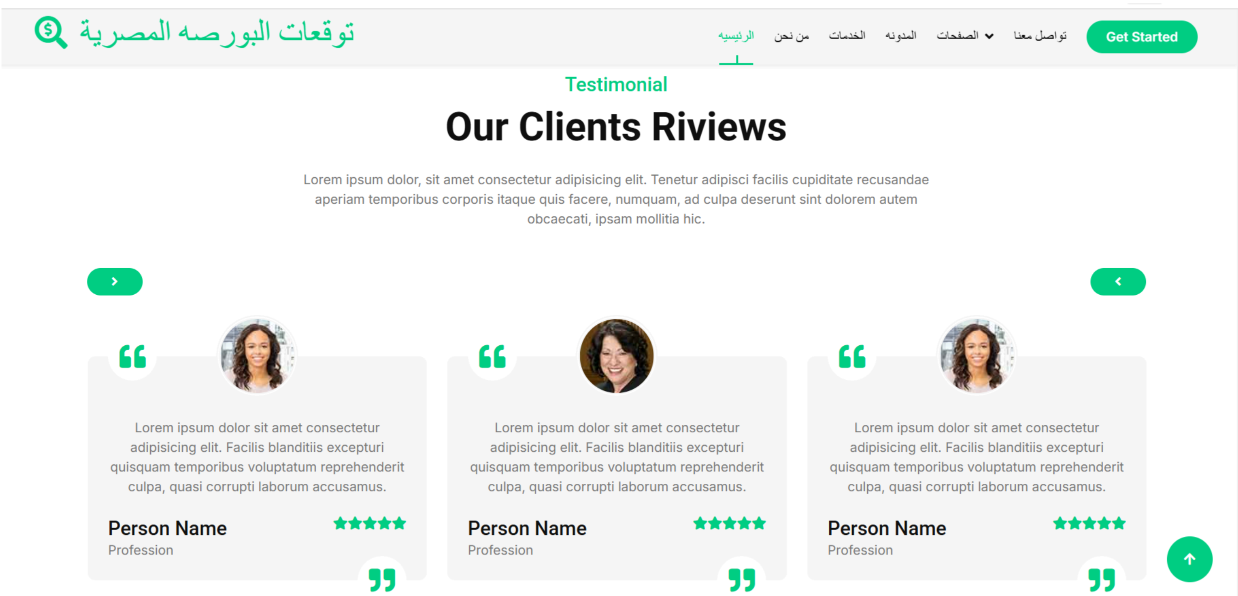

توقعات البورصه المصرية
الرئيسيه
من نحن
الخدمات
المدونه
الصفحات
تواصل معنا
Get Started
الأسئلة الشائعة
الأسئلة المتكررة حول توقعات البورصة المصرية
هنا ستجد الإجابات على الأسئلة الأكثر شيوعًا حول كيفية عمل توقعات البورصة وأهميتها.
ما هو نظام توقعات البورصة المصرية؟
ما هي أهمية التوقعات في اتخاذ قرارات الاستثمار؟
كيف يتم جمع البيانات المستخدمة في التوقعات؟
تُجمع البيانات من مصادر رسمية وتقارير السوق ويتم تحليلها باستخدام أدوات الذكاء الاصطناعي.
هل يمكن الاعتماد على هذه التوقعات بشكل كامل؟
كيف يمكنني البدء في استخدام نظام التوقعات؟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Get Started
Testimonial
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5 System Deployment & Integration

5.1 • Technology Stack – Backend, frontend, and database technologies.

Backend:

- **Programming Language:** Python
- **Web Framework:** Django / Flask
- **Machine Learning Libraries:** Scikit-learn, TensorFlow, PyTorch
- **API Development:** FastAPI / Django REST Framework

Frontend:

- **Framework:** React.js / Vue.js
- **Styling:** Tailwind CSS / Bootstrap
- **State Management:** Redux / Pinia

Database:

- **Relational Database:** PostgreSQL / MySQL
- **NoSQL Database:** MongoDB (if needed for unstructured data)

Other Technologies:

- **Version Control:** Git / GitHub
- **Containerization:** Docker
- **Deployment:** AWS EC2 / Heroku / DigitalOcean

5.2 **Deployment Diagram**

The deployment diagram describes how software components are distributed across hardware resources.

5.3 **Component Diagram**

The component diagram shows high-level system components and their dependencies.