American International University-Bangladesh (AIUB)

Department of Computer Science

Faculty of Science & Technology (FST)

PROJECT TITLE

AgriConnect: Connecting Micro Entrepreneurs With Farmers

By

Semester: Spring_24_25		**Section: H**	**Group Number: 01**	
SN	Student Name	Student ID	Contribution (CO4)	Individual Marks
1.	Ishan, Ibnul Ishtiak	22-49545-3	25%	
2.	Siddique, Md Abu Bakar	22-48322-3	25%	
3.	Md. Ibtihazaman	22-49153-3	25%	
4.	Md. Anisur Rahman	22-49553-3	25%	

The project will be evaluated for the following Course Outcomes

CO3: *Select* appropriate software engineering models, project management roles, and their associated skills for the complex software engineering project and evaluate the sustainability of developed software, taking into consideration the societal and environmental aspects	Total Marks	
Appropriate Process Model Selection and Argumentation with Evidence	[5 Marks]	
Evidence of Argumentation Regarding Process Model Selection	[5Marks]	
Analysis of the impact of societal, health, safety, legal, and cultural issues	[5Marks]	
Submission, Defense, Completeness, Spelling, grammar, and Organization of the Project report	[5Marks]	

Description of Student's Contribution in the Project work

Student Name: Ishan, Ibnul Ishtiak Student ID: 22-49545-3 Contribution in Percentage (%): 25% Contribution in the Project: Project Proposal, Requirement Analysis(Authentication), OO Diagram(Class Diagram) _____ Signature of the Student
Student Name: Siddique, Md Abu Bakar Siddique Student ID: 22-48322-3 Contribution in Percentage (%): 25% Contribution in the Project: System Analysis, Project Proposal, Requirement Analysis(Admin), OO Diagram(Use Case) _____ Signature of the Student
Student Name: Md. Ibtihazzaman Student ID: 22-49153-3 Contribution in Percentage (%): 25% Contribution in the Project: Project Proposal, Requirement Analysis(Consumer), OO Diagram(Activity Diagram), Model Selection _____ Signature of the Student
Student Name: Md. Anisur Rahman Student ID: 22-49553-3 Contribution in Percentage (%): 25% Contribution in the Project: Project Concept, Requirement Analysis(Farmer), OO Diagram(Sequence Diagram) _____ Signature of the Student

Rubric for Project Assessment (CO3)

Criteria	Marks distribution (Max 3X5= 15)				Acquired Marks
	Inadequate (1-2)	Satisfactory (3)	Good (4)	Excellent (5)	
Selection of Software Engineering Models	Does not articulate a position or argument of choosing appropriate model. Does not present any evidence to support the arguments for the choice of the model	Articulates a position or argument for choosing models that is unfocused or ambiguous. Presents incomplete/vague evidence to support argument for model choice	Articulates a position or argument of choosing models that is limited in scope. Does not present enough evidence to support the argument for the choice of the model	Clearly articulates a position or argument for the choosing software engineering models. Presents sufficient amount of evidence to support argument for the model selection	
Role identification and Responsibility Allocation	The project has poor project management plans for identifying roles and assigning the responsibilities	Identify few roles in the project management where some of the roles are left alone with any project responsibilities	Identify most of the roles in the project management and assign their responsibilities	Well planned project with proper role identification and responsibility allocation in the project management activities	
Impact identification					
Formatting and Submission	Project report is not complete and Several errors in spelling and grammar. Present a Confusing	Some errors in spelling and grammar. Some problems	Few errors in spelling and grammar. Presents most of the details in	Project report is complete and No errors in spelling and grammar. Consistently	

	organization of concepts, supporting arguments, and real-life example. Sentences rambling, and details are repeated.	of organizing the answer in a logical order of defining, elaborating, and providing real-life examples.	a logical flow of organization in definition, details, and example.	presents a logical and effective organization of definition, details, and real-life example of the topic.	
				Acquired marks:	
				CO Pass / Fail:	

Background & Problem Domain

The agricultural sector in many developing regions encounters significant challenges within its supply chain structure. Farmers frequently face limited market access, exploitation of prices by middlemen, and insufficient financial resources to improve their productivity. At the same time, micro-entrepreneurs, who have the potential to bridge the gaps in the agricultural value chain, often lack the necessary connections, resources, and knowledge to effectively collaborate with farmers.

Insights drawn from companies like iFarmer and Agroshift reveal a considerable opportunity to establish a platform that links farmers with micro-entrepreneurs. Such a platform could offer vital services, resources, and market access, thereby promoting a more efficient and equitable agricultural ecosystem.

Category – A

Root Cause of the Problem

Several interconnected issues plague the current agricultural ecosystem:

1. **Fragmented Market Access**: Farmers have limited visibility into market demand and prices, forcing them to sell at whatever price intermediaries offer.
2. **Multiple Layers of Intermediaries**: The presence of numerous middlemen in the supply chain results in farmers receiving only a small fraction of the final selling price while consumers pay inflated costs.
3. **Post-Harvest Losses**: Inadequate storage facilities and inefficient transportation lead to 30-40% post-harvest losses.
4. **Limited Access to Finance**: Small-scale farmers struggle to access capital for investing in better farming techniques and technologies.
5. **Information Asymmetry**: Farmers lack knowledge about modern farming practices, market trends, and optimal timing for planting and harvesting.
6. **Untapped Potential of Micro-Entrepreneurs**: Many small-scale entrepreneurs who could provide valuable services to farmers lack the platforms and resources to connect with them.

Process Model

The **Agile Model** is the software process model for the “AgriConnect” project because it allows the flexibility, fast changes, and consistent teamwork, which is important for this project that has different type of users and needs that evolve over time. Agile operates in short cycles or sprints, meaning updates can be quickly made based on real-time feedback from farmers and consumers. As the needs of the users are likely to evolve, it’s important to be able to make quick adjustments. With Agile, key features like product listings and order management can be released early, and improvements can be made as development continues. Additionally, Agile encourages continuous

communication with users to gather feedback, ensuring that the platform is always evolving to meet their needs.

Other models, like the **Waterfall Model**, follow a rigid, step-by-step approach where each stage must be completed before moving on to the next. This makes it difficult to adjust once the process is in motion, which isn't ideal for this project, where user needs are likely to change over time.
The **V-Model** is an extension of the waterfall model, where each phase of development has a corresponding testing phase. But it still lacks the flexibility that Agile provides, the rigidity of no backtracking or changes once a phase is completed makes it difficult to select this model for this project.
The **Prototyping Model** allows for early versions of the system, but it can lead to delays as prototypes are repeatedly changed. Agile, on the other hand, handles changes in a more organized way, using well-defined sprints to keep the project on track.
The Incremental Model develops the system in smaller sections, but it needs careful planning upfront and does not handle changes as easily. On the other hand, Agile allows for continuous feedback and quick updates through its sprints, making it more responsive to evolving user needs.

Functional Requirements

Authentication System Requirements

1. Login Page

Functional Requirements

- Users (admin, farmers, consumers) can log in using email/phone and password.
- The system verifies credentials against the database before granting access.
- Error messages appear for incorrect login details.
- "Remember Me" option allows users to stay logged in.
- "Forgot Password" link directs users to the password reset page.
- Successful login redirects users to their respective dashboards (admin, farmers, consumers).

Non-Functional Requirements

- The login page must load within 5 seconds for a smooth experience.
- Data transmission must be secure using encryption.
- The page must be responsive (work on desktops, tablets, and mobiles).
- Error messages should be clear and user-friendly to guide users.

Project Development Constraints

- Must use firebase Authentication
- The system must differentiate between Admin, Farmer and Consumer logins

- Save previous login information

2. Sign-up Page

Functional Requirements

- Users create an account by providing their name, email, phone number, address and password, currently cultivating which crops (for farmers), Land quantity (for farmers), NID(for farmers).
- Option to select Farmer or Consumer role during registration.
- Email/phone verification via OTP.
- Password must follow security rules: At least 8 characters, one uppercase letter, one number, and one special character.
- Users must agree to terms and conditions before signing up.
- Upon successful signup, users are redirected to their dashboard.

Non-Functional Requirements

- Signup must be completed within short time for an efficient user experience.
- OTP verification should be delivered within 10 seconds.
- Secure data storage using encryption techniques.
- Intuitive user interface for easy navigation.
- Fully responsive design for desktop, tablet, and mobile.

Project Development Constraints

- User roles (Farmer, Consumer) must be properly defined.
- Integration with custom email service.
- Follow data protection laws.

3. Forgot Password Page

Functional Requirements

- Users enter their registered email or phone number to reset their password.
- The system sends an OTP or password reset link via email/phone.
- Users enter the OTP and create a new password (following security rules).
- A success message confirms the password has been changed.
- Users can now log in with the new password.

Non-Functional Requirements

- The page must be secure to prevent unauthorized access.
- OTP should be delivered within 10 seconds for quick password recovery.
- The entire process should be **completed within 1 minute**.
- The page must work smoothly on all devices (desktop and mobile).

Project Development Constraints

- Limit password reset attempts per user to prevent spam.
- Requires email/SMS API integration (e.g., Firebase, Twilio).
- Provide clear success/error messages to guide the user.

Admin Requirements

Dashboard

Functional Requirements

- System shall display total number of active farmers and consumer with trend graphs
- System shall show transaction history
- System shall display top products by transaction volume
- System shall show user acquisition metrics with conversion rates from registration to active usage
- System shall display alerts for critical issues (payment failures, system errors, unusual activity)
- System shall provide quick access buttons for common administrative tasks
- System shall provide access to create a new admin account
- System shall provide access to fixed each product price, minimum quantity

Non-Functional Requirements

- Dashboard shall fully load within 5 seconds on standard admin workstations
- Dashboard shall automatically refresh data every 5 minutes without user intervention
- Dashboard shall be available 99.9% of the time
- Dashboard shall support customization of displayed widgets and metrics
- Dashboard shall be optimized for minimum 1366x768 screen resolution

Project Development Constraints

- Dashboard development must be completed within 2 weeks

- Dashboard must support offline functionality for critical metrics
- Dashboard must implement caching mechanisms to reduce database load
- Dashboard must not consume more than 50MB of client memory

User Management (Admin)

Functional Requirements

- The system displays a searchable and filterable list of all registered users.
- The system allows searching users by name, email, phone, ID, location, and user type.
- The system displays detailed user profile information, including verification status.
- Admins can edit user profile information and update verification status.
- Admins can activate, deactivate, or suspend user accounts.
- The system provides user activity logs, including login history, transactions, and listings.
- Admins can reset user passwords and send verification emails.
- Admins can manually verify user identities and documents.
- Collectors take products from farmers and deliver them to customers who placed the order.

Non-Functional Requirements

- User search shall return results within 2 seconds for any search criteria
- User management interface shall log all admin actions for audit purposes
- System shall mask sensitive user data by default with explicit action to reveal
- User management functions shall be accessible only to admins with appropriate permissions

Project Development Constraints

- User management module must be developed within 3 weeks
- Module must implement role-based access control with at least 3 privilege levels(Director, GM, Collector)
- Module must maintain immutable audit logs for all user management actions
- Implementation must comply with relevant data protection regulations

Product Research (Product Management)

Functional Requirements

- System shall display a searchable and filterable list of all product/service listings
- System shall allow searching products by name, category, price range
- System shall display detailed product information including images and descriptions
- System shall allow admins to approve, reject, or flag products for review
- System shall allow admins to edit product information and categories
- System shall provide analytics on product performance (views, sales, ratings)
- System shall allow admins to create and manage product categories
- System shall allow admins to feature specific products on the marketplace

Non-Functional Requirements

1. Product search shall return results within 2 seconds for any search criteria
2. Product management interface shall log all admin actions for audit purposes
3. System shall support batch operations for up to 5,000 products at once
4. Product analytics shall be updated at least hourly for accurate reporting

Project Development Constraints

1. Product management module must be developed within 3 weeks
2. Module must implement content moderation tools for product listings
3. Module must support image processing and optimization for product photos
4. Implementation must include spam detection algorithms for product listings

Reports

Functional Requirements

- System shall generate user acquisition reports by date range and user type
- System shall generate transaction reports showing volume, value, and fees collected
- System shall generate product performance reports by category and region
- System shall generate user engagement reports showing active users and session data
- System shall generate financial reports including revenue and payment processing

- System shall allow admins to create custom reports with selectable metrics and filters
- System shall allow exporting reports in multiple formats (PDF, CSV, Excel)

Non-Functional Requirements

- Standard reports shall generate within 5 seconds for any date range
- Custom reports shall generate within 30 seconds of request
- System shall support concurrent report generation for up to 10 admins
- Report data shall be clearly labelled with timestamp and data freshness
- Reports shall be accessible and printable from all modern browsers

Project Development Constraints

- Reporting module must be developed within 4 weeks
- Module must implement server-side processing for report generation
- Implementation must include data caching mechanisms for frequent reports
- Module must support data anonymization for sensitive information
- Module must limit resource usage to prevent report generation from impacting system performance

Farmer Requirements

Order Management

Functionality:

- Farmers can place orders for seeds, fertilizers, pesticides, and equipment directly through the platform.
- Real-time updates on the status of farm supply orders.
- Farmers can review their previous orders to assist with future planning.
- Farmers have the ability to cancel or modify orders before they are processed.
- Generate detailed invoices for all purchased farm supplies.
- Farmers can monitor their payment history

Non-Functionality:

- Orders should be confirmed instantly, with notifications sent via email or SMS.
- Ensure that there are no unnecessary delays during the order placement and checkout process.
- Allow farmers to quickly reorder frequently used supplies.

Project Development Constraints (PDC):

- Orders must be stored securely with encryption.
- Connect with delivery tracking systems for farm supply orders.
- Capable of handling large orders from multiple farmers simultaneously without delays.

Selling Products to Consumers

Functionality:

- Farmers list crops, livestock, and other products with details like price, quantity, and availability.
- Collectors can add farmers' products to the system based on availability but do not act as buyers.
- Highlights high-demand items based on market trends.
- Provides harvest dates, quality ratings, and pickup/delivery locations.

Non-Functional Requirements:

- Instant product availability and quick loading times.
- Clear pricing, stock, and product details for easy browsing.

Project Development Constraints (PDC):

- Real-time updates for listings and availability.
- Secure system for flexible yet fair pricing.
- Supports growing product listings and transactions.

Order and Payment Management

Functionality:

- Farmers receive orders directly from consumers.
- Real-time updates from placement to delivery.
- Secure transactions via payment gateways.
- Farmers can track sales, revenue, and pending payments.
- Farmers can modify or cancel unconfirmed orders.
- Farmers hand over products to collectors for delivery.

Non-Functional Requirements:

- Orders are confirmed immediately with notifications.
- No delays in order processing or payments.

- Clear details on payments and pending amounts.

Project Constraints:

- Encrypted order and payment data.
- Real-time status tracking.
- Fast, accurate payment handling.

Transaction History

Functionality:

- **Sales Overview:** View total revenue, sold products, and buyer details.
- **Downloadable Reports:** Export sales data in CSV or PDF format.
- **Transaction Filtering:** Sort by date, product, buyer, or payment status.
- **Detailed Insights:** Access product, quantity, price, buyer, and payment details.
- **Revenue Analytics:** Visual reports on sales trends and top-selling items.

Non-Functional Requirements:

- **Fast Data Retrieval:** Quick access to transaction history.
- **Accurate Records:** Ensure precise financial tracking.
- **User-Friendly Layout:** Clear, organized display for easy navigation.

Project Constraints:

- **Secure Storage:** Encrypted financial data protection.
- **Scalable Management:** Handles large transaction volumes efficiently.
- **Efficient Report Downloads:** Quick exports, even for extensive records.

Agricultural Expert Support

Functionality:

- Advice Requests: Farmers can seek expert guidance on crops, soil, and pest control.
- Real-Time Chat: Instant expert support for urgent farming issues.
- Scheduled Consultations: Book expert appointments for detailed advice.
- Knowledge Base: Access expert-written articles, guides, and tutorials.

Non-Functional Requirements:

- Fast Responses: Experts should reply promptly to inquiries.

- Availability Display: Show open consultation slots to avoid conflicts.
- Practical Advice: Ensure responses are clear, actionable, and relevant.

Project Constraints:

- Role-Based Access: Limit expert consultation features to authorized users.
- Reliable Chat System: Ensure smooth real-time communication.
- Updated Resources: Regularly refresh knowledge base content.

Consumer Requirements

Dashboard Requirements

Functionality:

1. Users will have a personal dashboard displaying recent orders, product recommendations, and saved items.
2. Users can track order status (e.g., payment confirmation, delivery updates).
3. Quick access to the cart, orders, ratings, and support will be available.
4. Users will receive notifications for discounts, promotions, and restocked items.
5. The dashboard will have a simple, user-friendly design for efficient navigation.

Non-Functionality:

1. The dashboard must load within 5 seconds for smooth user experience.
2. The system must support real-time updates for new orders and notifications.
3. The dashboard must be responsive to different screen sizes.
4. The interface should be user-friendly, with easy access to all features.

Project Development Constraints (PDC):

1. The dashboard will dynamically retrieve user-specific data from the database.
2. Firebase Authentication will be used for personalized access.
3. Data caching should be implemented to minimize load times.
4. The dashboard should distinguish between different user roles.

Products

Functionality

- Consumers can browse a categorized selection of agricultural products which are available for purchase.
- Each product list shows clear images, descriptions, prices, and availability status.

- Users can search for products using a keyword-based search and apply filters to refine results.
- Clicking on a product will open a detailed page with product specifications and seller information.
- New arrivals and trending products will be highlighted to attract buyers.

Non-Functionality

- The product list must be optimized to load quickly to prevent unnecessary delays.
- The system should allow smooth navigation between different product categories.
- Images should be high resolution but compressed for fast loading.
- The UI should ensure a clear and structured product display for better usability.
- The product database should be scalable to accommodate increasing items without slowing down performance.

Project Development Constraints (PDC)

- Product details must be retrieved dynamically from the database to ensure up-to-date information.
- The search and filter system should be linked with real-time queries for accuracy.
- A caching mechanism should be in place to speed up frequently accessed product pages.
- The browsing system must be efficient in handling large product inventories and high user traffic.

Cart

Functionality

- Consumers can add products to their shopping cart and modify quantities before confirm the order.
- The cart will automatically update total costs, including applicable taxes and discounts.
- Users can save their cart items for later purchases, even after logging out.
- The cart will have a direct checkout option to proceed with payment instantly.
- Items in the cart should reflect real-time stock availability to prevent order failures.

Non-Functionality

- The cart should be updated instantly when users add or remove items, without requiring a page reload.
- It must retain selected products even if users exit the website and return later.

- The UI should be simple and visually organized, making it easy to manage purchases.
- The system should ensure fast processing of cart updates, even under high user load.

Project Development Constraints (PDC)

- The cart should use session-based storage for temporary data and database storage for long-term data.
- Security measures must be implemented to prevent price manipulation and fraudulent activity.
- The system should be capable of handling large numbers of simultaneous shopping sessions.
- The checkout process should be seamlessly integrated with payment processing and order management.

Orders

Functionality

- Consumers can place orders directly from their cart after selecting payment options.
- Users can track order status updates in real-time from processing to delivery.
- The order history section will allow users to view past purchases for reference.
- Customers can cancel or modify orders before they are shipped.
- A detailed invoice will be generated automatically for each completed order.

Non-Functionality

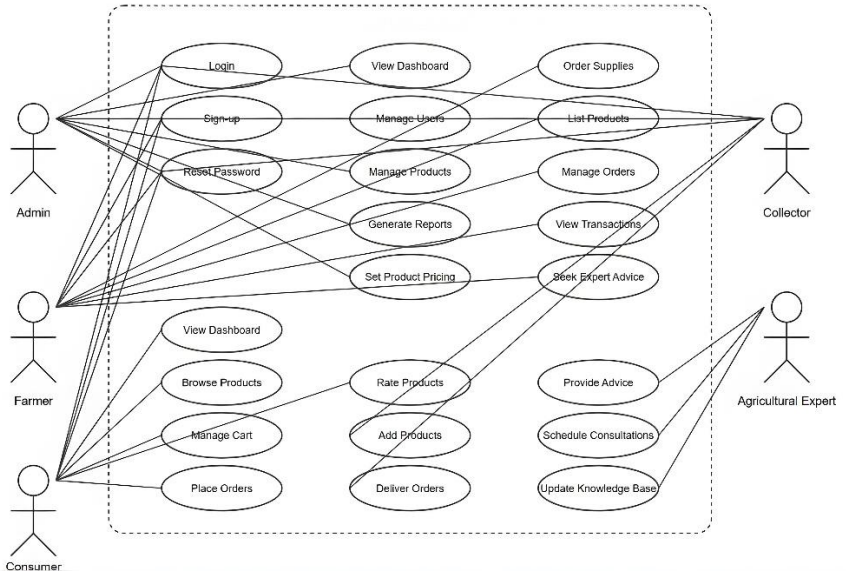
- Order confirmation must be instant, with an email or phone message sent to the user.
- The system should support real-time tracking of delivery status.
- The order process must be smooth and free of unnecessary delays.
- Users should be able to reorder previous purchases with a single click.

Project Development Constraints (PDC)

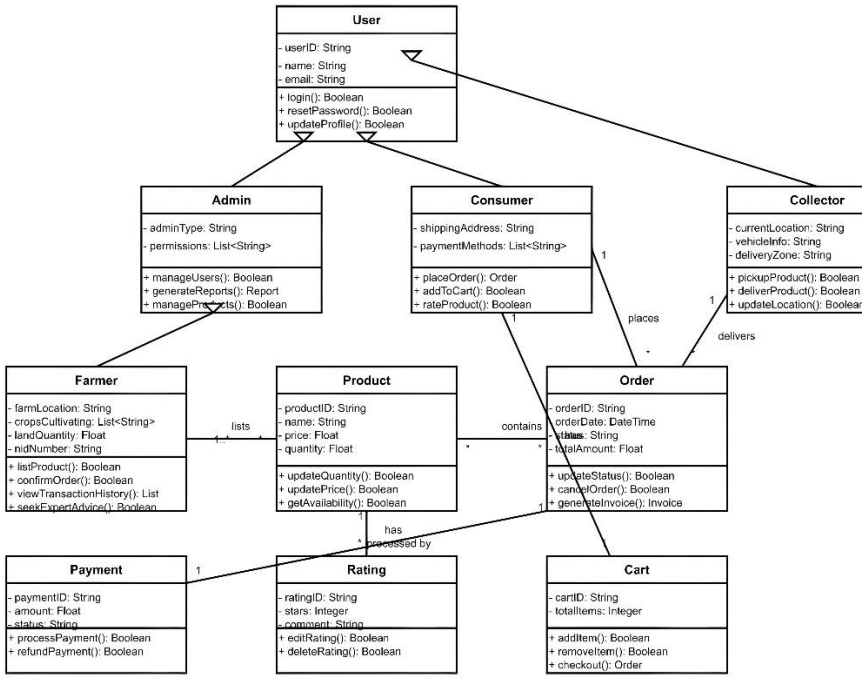
- Orders should be stored securely in the database with proper encryption.
- Payment verification must be completed before finalizing an order.
- The system should be integrated with external logistics services for delivery tracking.
- Order data must be structured to allow easy retrieval for reporting and analytics.
- The order management system should support refunds and returns efficiently.

OOAD Diagrams

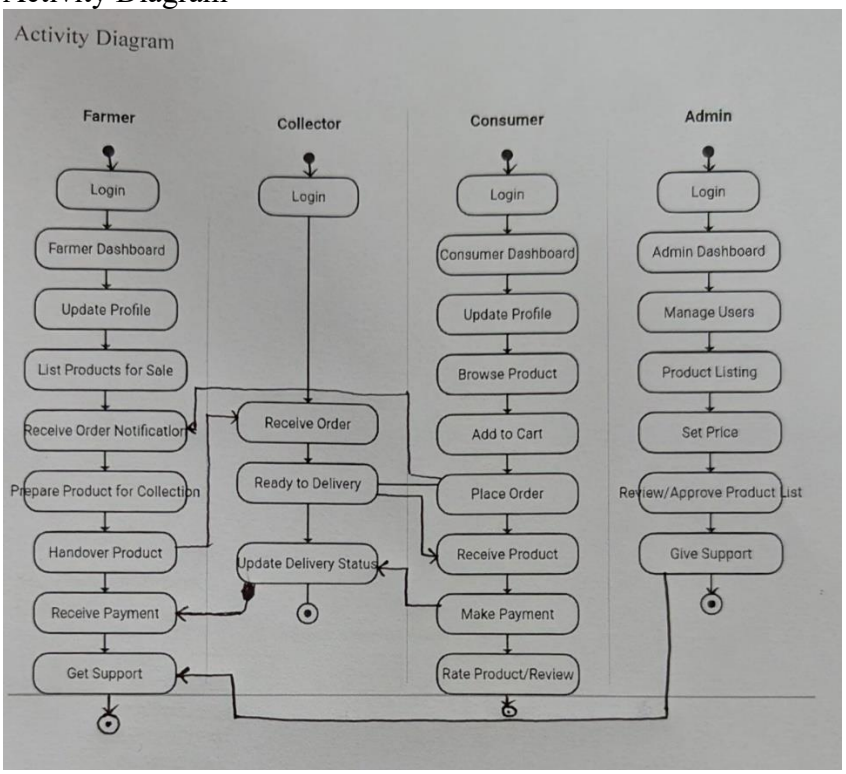
Use Case Diagram



Class Diagram

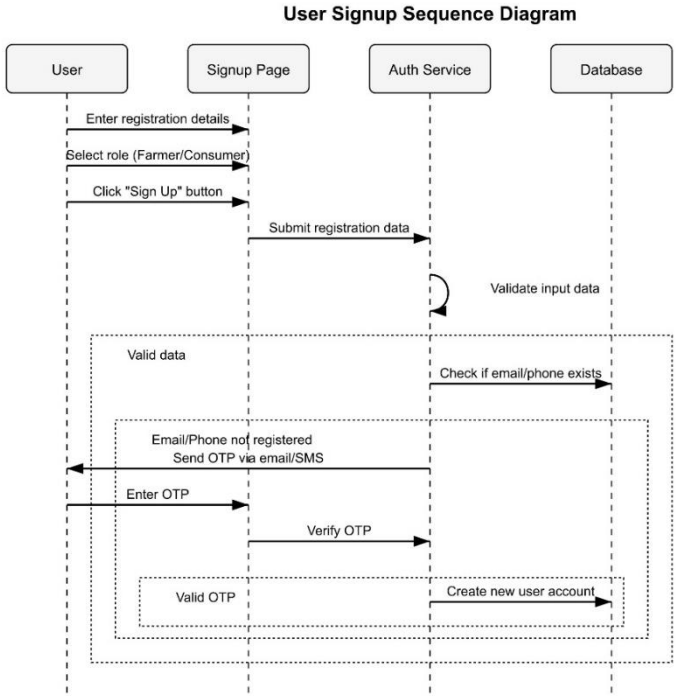


Activity Diagram

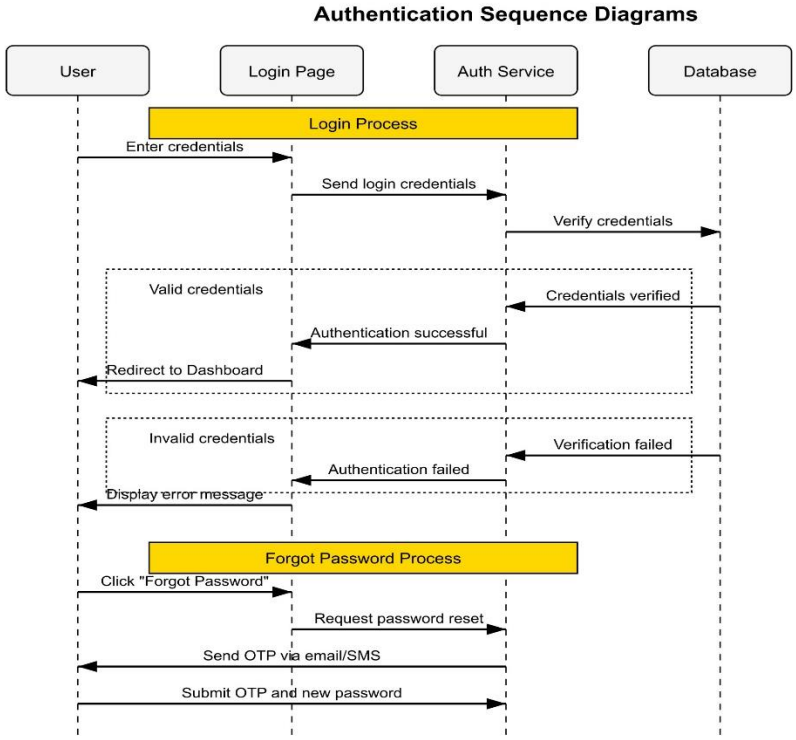


Sequence Diagrams

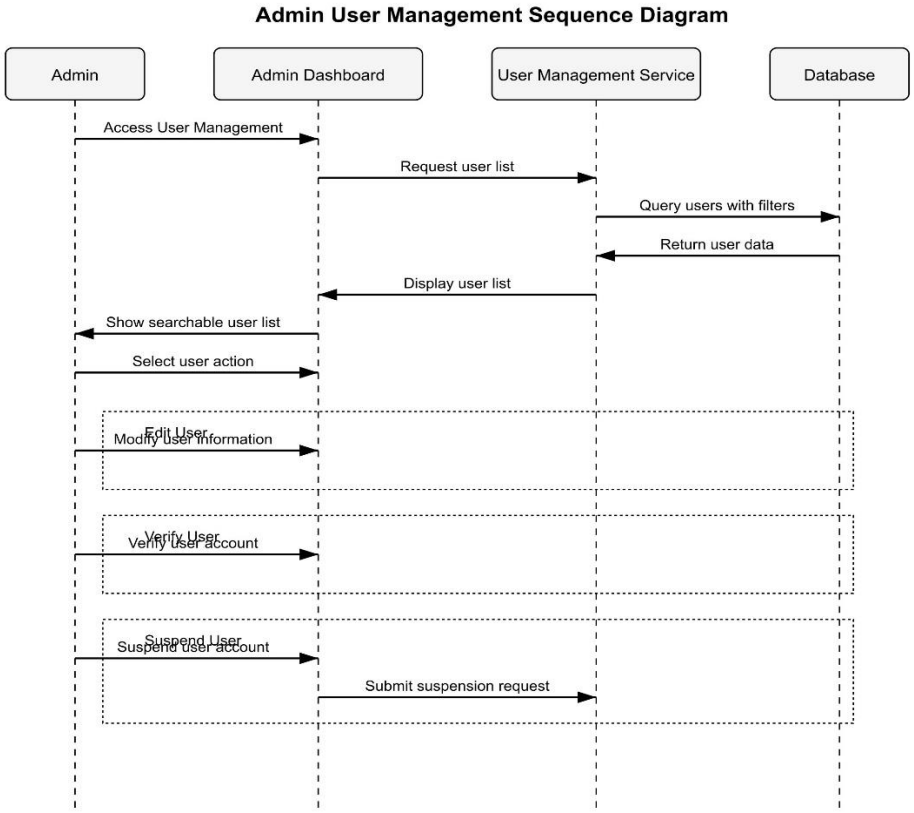
User



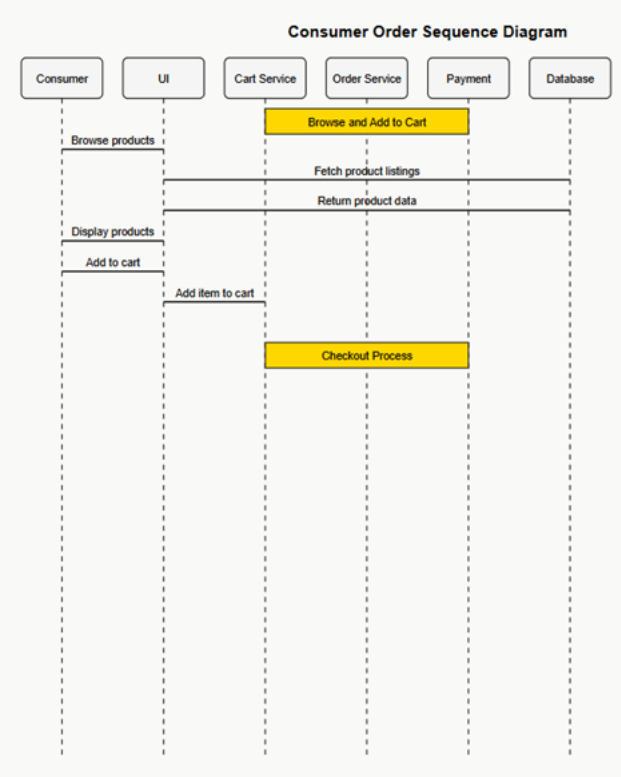
Authentication



Admin



Consumer


Consumer Order Sequence Diagram
Consumer
UI
Cart Service
Order Service
Payment
Database
Browse and Add to Cart
Browse products
Fetch product listings
Return product data
Display products
Add to cart
Add item to cart
Checkout Process