



PROJECT REPORT

Project Title:

Jewellery Store Management System (JSMS)

Course Name: Software Engineering (SE)

Course ID:118797

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JEWELLERY STORE MANAGEMENT SYSTEM (JSMS)

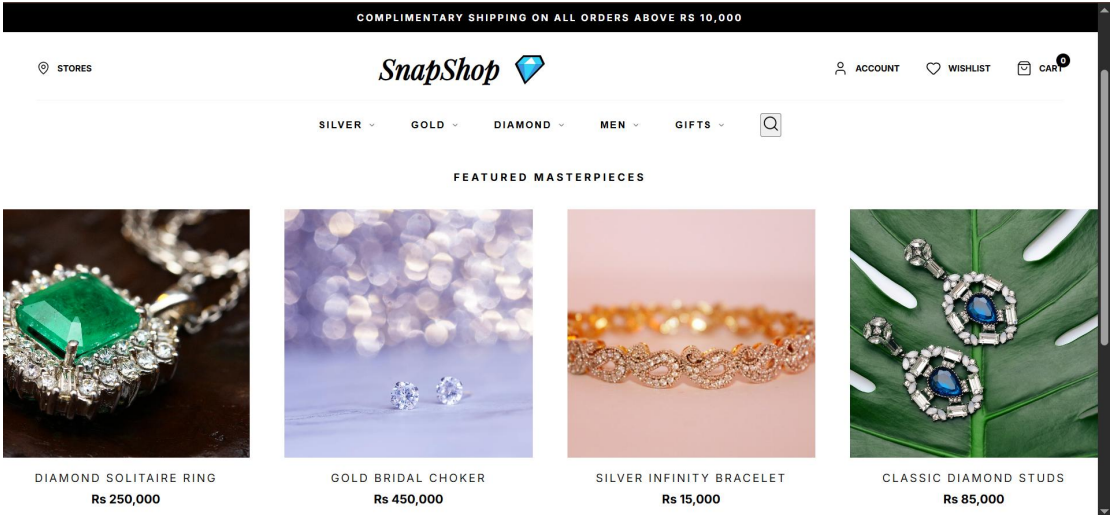


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1. Introduction

1.1 Purpose:

This document provides a detailed description of the requirements for the Jewellery Store Management System (JSMS). It is intended to guide the development team through the design and implementation phases of this Python-based desktop application.

1.2 Project Scope:

- **In-Scope:** Role-based authentication, Inventory tracking (metals/gems), POS terminal for sales, Invoicing with GST, CRM features (wishlists), and Supplier purchase orders.
- **Out-of-Scope:** Online payment gateway integration, multi-branch synchronization, and AI-based price forecasting.

1.3 Definitions:

- JSMS: Jewellery Store Management System.
- RBAC: Role-Based Access Control (Admin, Manager, Sales Staff).
- SKU: Stock Keeping Unit for unique item identification.

1.4 Features:

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1. User Management & Security

- Role-Based Access (RBAC): Distinct permissions for Admin, Manager, and Sales Staff.
- Secure Authentication: Encrypted login system with password validation and account lockout protection.
- Audit Trails: Automatic logging of all user activities and transaction history for security.

2. Inventory Management

- Detailed Tracking: Manage metals (Gold, Silver, Platinum), purity levels, and gemstone carats.
- Stock Monitoring: Automatic low-inventory alerts and barcode/QR code scanning support.
- Digital Catalog: Bulk import/export of inventory data with image management for jewellery items.

3. Sales & POS System

- Transaction Processing: Real-time point of sale interface with cart management and receipt generation.
- Financial Calculations: Automated GST/VAT calculation, discount management, and multi-payment method tracking.
- Returns & Exchanges: Standardized workflow for processing sales returns and cash drawer management.

4. Customer Relationship Management (CRM)

- Customer Profiles: Detailed records including KYC compliance, purchase history, and wishlists.
- Retention Tools: Loyalty program tracking, personalized recommendations, and anniversary/birthday reminders.
- Feedback System: Integration for customer reviews and communication logs.

5. Supplier & Purchase Management

- Order Automation: Creation and tracking of purchase orders for raw materials and finished goods.
- Supplier Analysis: Vendor rating system and payment history tracking.
- Repair Tracking: Dedicated ticket system for monitoring customer repair jobs.

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System Non-Functional Features

- Responsive Design: Touchscreen and tablet-friendly interface for POS use.
- Data Integrity: Regular backup procedures and protection against SQL injection.
- Performance: Optimized for quick loading times during peak sales periods.

Requirement Analysis:

Requirement analysis involves defining the expectations of the users and the system's operational constraints to ensure the software solves specific business problems.

User Requirements:

User requirements describe what the different stakeholders expect from the system:

- Sales Staff: Requires a fast, intuitive POS interface to process transactions, search inventory by metal/stone, and generate receipts during peak hours.
- Inventory Manager: Needs real-time tracking of gold/silver purity, gemstone carats, and automatic alerts for low stock.
- Store Admin: Requires high-level analytics for revenue tracking, user role management (RBAC), and supplier performance reviews.
- Customers: Expect a "Luxury UI" to browse products, manage wishlists, and receive personalized recommendations based on purchase history.

Product Management:

- Jewellery Specifications: Metal types (Gold, Silver, Platinum), purity (24K, 18K, 14K)
- Gemstone Details: Diamonds, Rubies, Emeralds with carat weight and quality grades
- Product Variations: Sizes, designs, stone options
- Product Reviews: Customer feedback on jewellery purchases

Order and Checkout:

- Easy-to-use cart management for sales transactions
- Quick invoice generation for repeat customers
- Custom order tracking for bespoke jewellery

Security and Privacy:

- Data encryption and protection for sensitive customer information
- Compliance with jewellery industry regulations
- Secure handling of financial and KYC data

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Search and Navigation:

- Quick product selection by metal type, stone, or category
- Sorting by price, popularity, and stock status
- Clear menus and navigation for sales staff

Administrator Features:

- Roles and permissions for different staff levels
- Stock tracking with low-inventory alerts
- Order processing and repair job fulfillment
- Sales commission tracking

Performance and Scalability:

- Handling multiple concurrent users at POS terminals
- Quick loading times for product searches
- Efficient handling of large jewellery catalogs

Mobile-Friendly Design:

- Touchscreen compatibility for POS systems
- Responsive layout for different screen sizes
- Tablet-friendly interface for mobile sales

Compliance and Legal:

- Adherence to jewellery hallmarking standards
- GST/VAT compliance for billing
- KYC compliance for high-value purchases
- Clearly defined return and warranty policies

Testing and Quality Assurance:

- Ensuring system functionality for daily operations
- Handling peak sales periods (festive seasons)
- Protecting customer purchase history and preferences

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Maintenance and Support:

- Regular updates for pricing and inventory
- Bug fixes and system improvements
- Responsive support for staff training

Usability and Accessibility:

- Easy navigation for quick sales processing
- Accessible interface for all staff members
- Clear transaction workflows

Specification:

System Architecture:

- Desktop Application (Python based)
- Scalability for growing jewellery inventory
- Modular Design for easy feature addition

Product Management:

- Inventory Tracking with detailed jewellery specifications
- Product Images with zoom and multiple views
- Product Recommendations based on customer preferences
- Gemstone Certification tracking

User Accounts:

- User Registration for staff members
- User Profiles with access permissions
- Customer Profiles with purchase history
- Vendor/Supplier account management

Security:

- Data Encryption for sensitive jewellery valuations
- Secure Authentication for staff access
- Audit Trails for all transactions
- Backup and Recovery systems

Search and Filtering:

- Advanced Search by metal, stone, price, category
- Multiple Sorting Options (price, date added, popularity)
- Quick Filters for stock status and categories
- Barcode/QR Code search capability

Performance and Load Handling:

- Performance Optimization for large image databases
- Efficient Database Queries for quick searches
- Load Testing for multiple POS terminals
- Memory Management for transaction processing

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Support and Maintenance:

- Customer Support ticket system for repairs
- Content Updates for new collections
- Price Updates for gold and gemstone rate changes
- Inventory Synchronization across locations

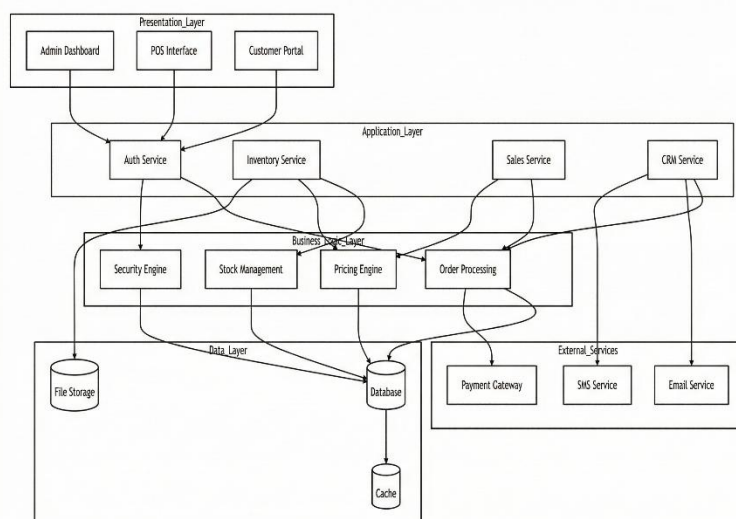
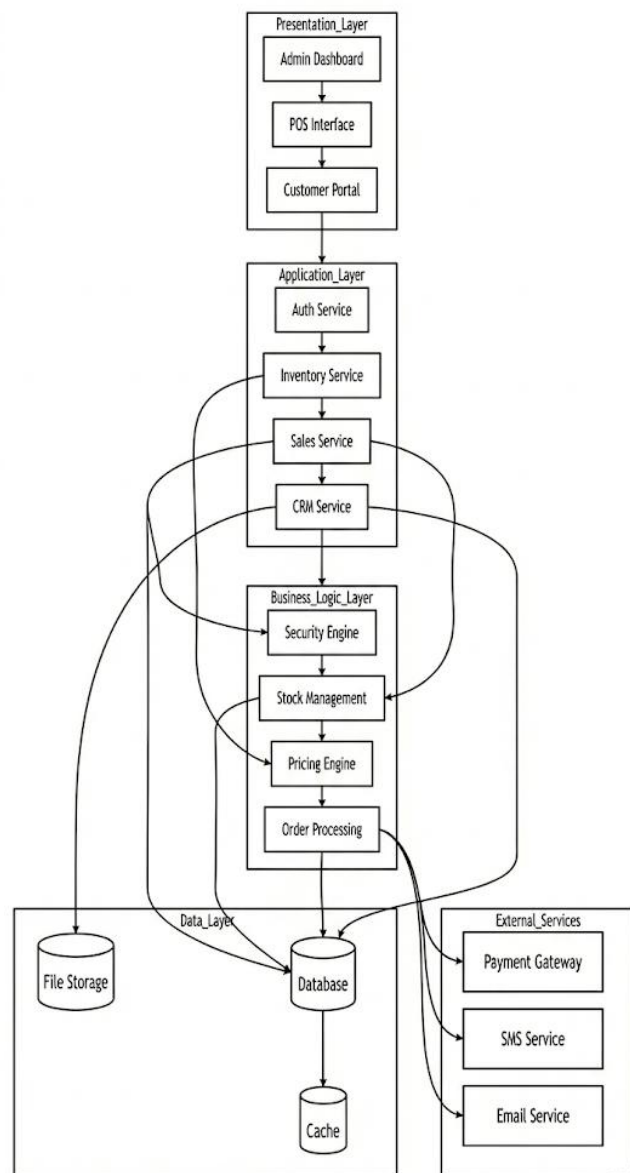
2. Overall Description:

2.1 Product Perspective

JSMS is designed as a standalone system for jewellery retail. It replaces manual ledgers with a digital ecosystem where the frontend communicates with a FastAPI server to perform CRUD operations on a persistent SQLite database (snapshot.db).

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System Architecture:



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2.2 Product Functions

Module 1: User Management & Security

➤ **Academic Focus:** Authentication, authorization, and data protection

➤ **Features:**

- ◆ Secure login/logout system with encrypted passwords
- ◆ Role-based access control (Admin, Manager, Sales Staff)
- ◆ User session management with timeout
- ◆ Password strength validation and reset functionality
- ◆ User activity logging and audit trails
- ◆ Data input validation and SQL injection prevention
- ◆ Account lockout after multiple failed attempts

Module 2: Inventory Management

➤ **Academic Focus:** Database CRUD operations and data structures

➤ **Features:**

- ◆ Add, edit, delete jewelry items with detailed specifications
- ◆ Categorize items (Rings, Necklaces, Earrings, Bracelets, Watches)
- ◆ Track metal types (Gold, Silver, Platinum) and purity (10K, 14K, 18K, 24K)
- ◆ Gemstone management: Record Diamond, Ruby, and Emerald data by carat weight and quality.
- ◆ Search and filter by multiple criteria (category, price, metal, stones)

Module 3: Sales & POS System

➤ **Academic Focus:** Transaction processing and business logic

➤ **Features:**

- ◆ Point of Sale interface with quick product search
- ◆ Shopping cart management with quantity adjustments
- ◆ Receipt generation with company branding
- ◆ Hold cart functionality for ongoing sales
- ◆ Daily sales summary and cash drawer management

Module 4: Customer Relationship Management

➤ **Academic Focus:** Data relationships and persistence

➤ **Features:**

- ◆ Comprehensive customer profiles with KYC details
- ◆ Purchase history tracking with timeline view
- ◆ Wishlist management for future purchases

Module 5: Supplier & Purchase Management

➤ **Academic Focus:** Database relationships and business processes

➤ **Features:**

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- ◆ Procurement: Purchase order (PO) creation with automated status tracking.
- ◆ Vendor Relations: Supplier rating system and payment history tracking.
- ◆ Repair System: Dedicated ticket system for monitoring customer jewellery repair jobs.
- ◆ Valuation: Inventory synchronization based on fluctuating metal rates.

2.3 User Characteristics

- Sales Staff: Requires basic computer literacy; uses the GUI for daily sales and customer interactions.
- Store Management: Advanced users who handle inventory auditing, supplier orders, and staff monitoring.
- Admin: Technical users responsible for system maintenance, database backups, and RBAC settings.

2.4 General Constraints

- Timeline: Completion within the university semester timeframe (Dec 2025).
- Hardware: Limited to standard university computer systems and receipt printers.
- Environment: Designed specifically as a desktop application, not for web/mobile deployment.

2.5 Assumptions and Dependencies

Assumptions:

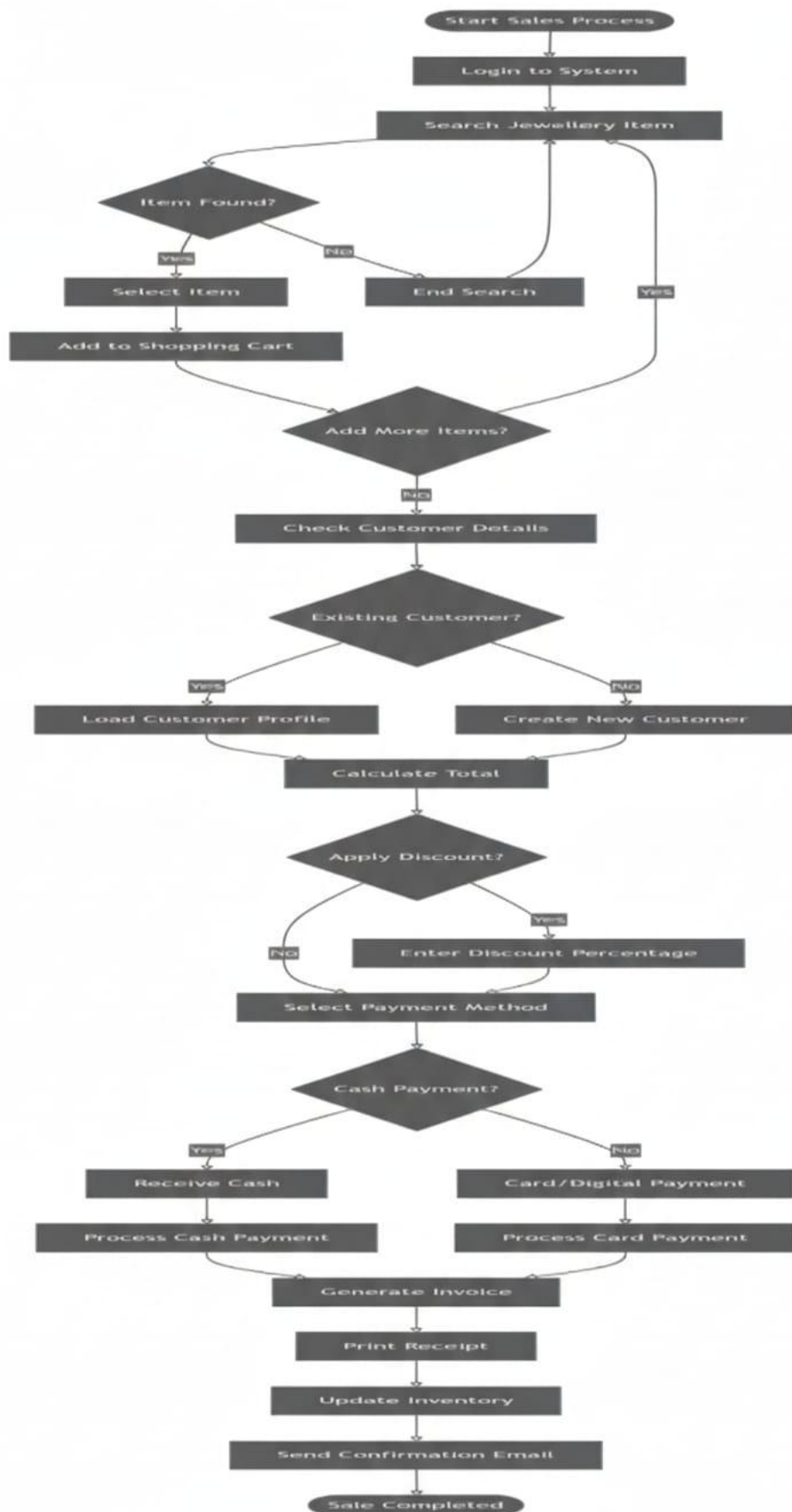
The system assumes a single-store environment with a stable local power supply and regular manual backup procedures.

Dependencies:

The application depends on the Python 3.x environment and compatible SQLite/MySQL drivers.

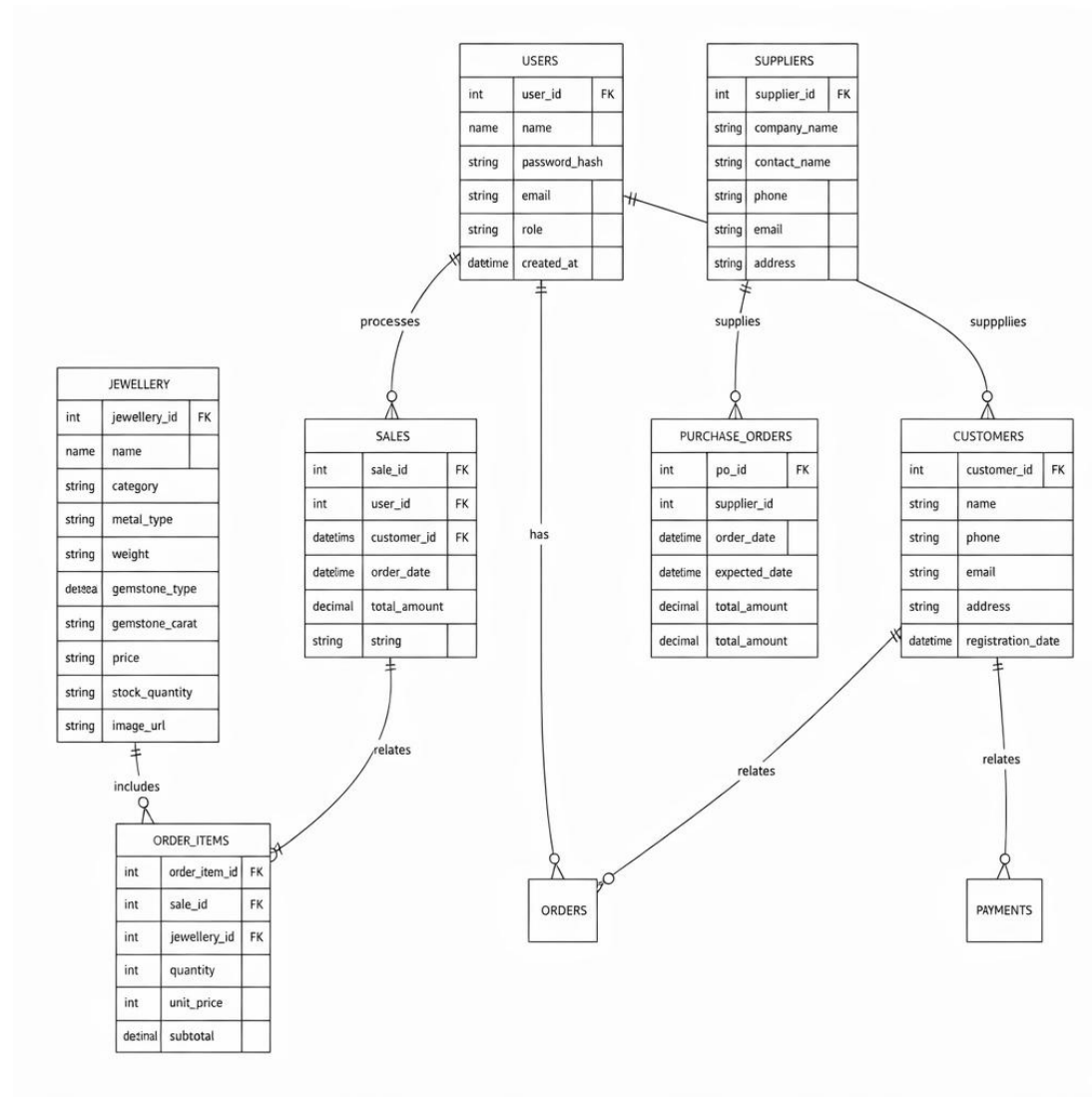
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Flowchart - User Registration & Login

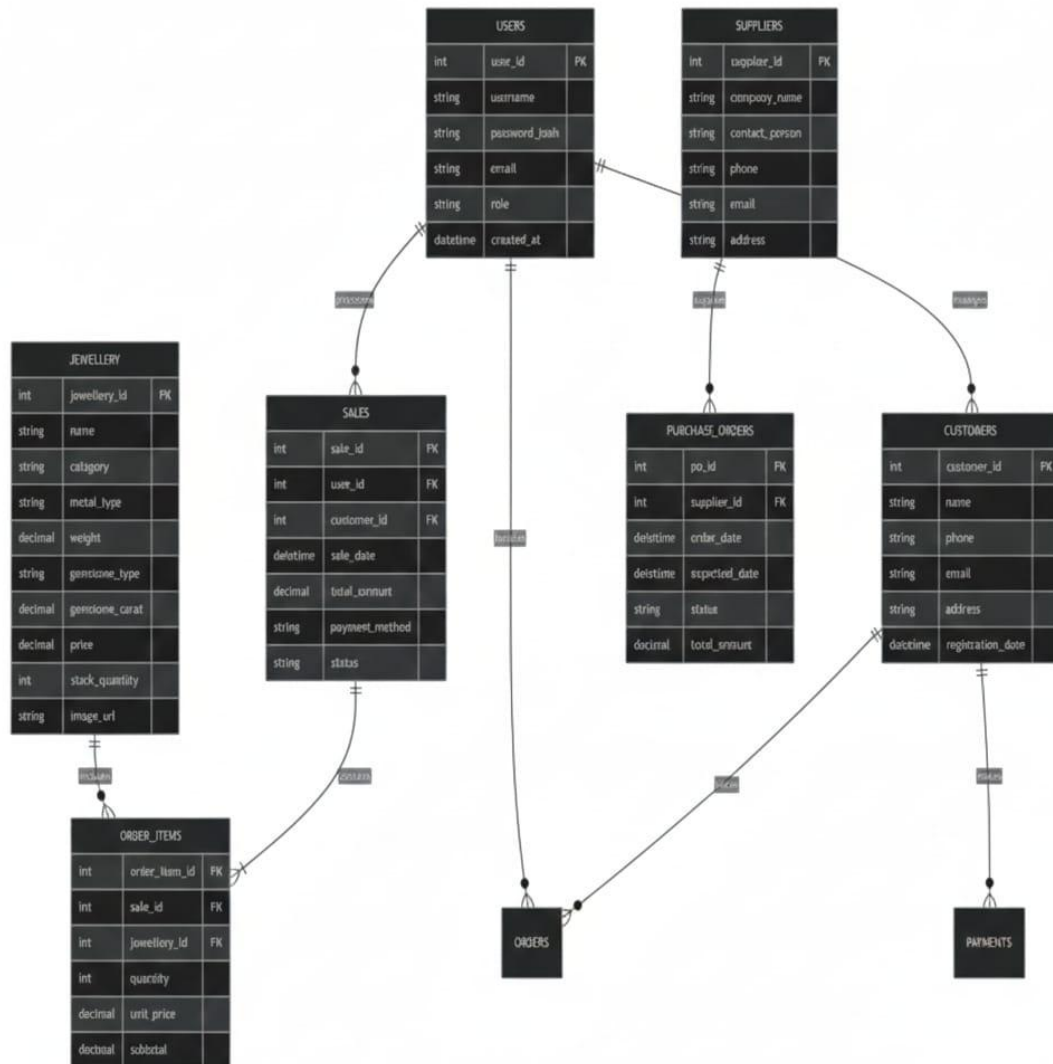


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ERD Diagram - Database Schema



Class Diagram - System Architecture



Use Case Scenario - Complete Purchase Process

Actor: Customer/Sales Staff

System: JSMS

Scenario: Complete Jewellery Purchase

Precondition: User is logged into the system

Main Flow:

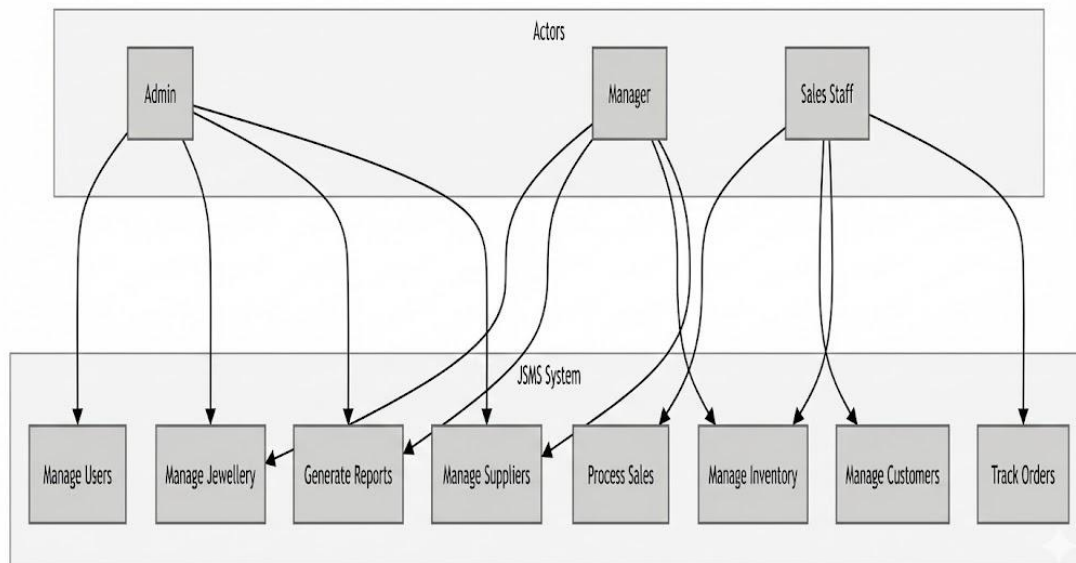
- Sales staff searches for jewellery item using filter options (category, price, metal type)
- System displays available jewellery items with details (images, specifications, price)
- Staff selects item and adds to shopping cart
- Staff enters customer details (new or existing customer)
- System calculates total amount including taxes
- Staff applies discounts if applicable

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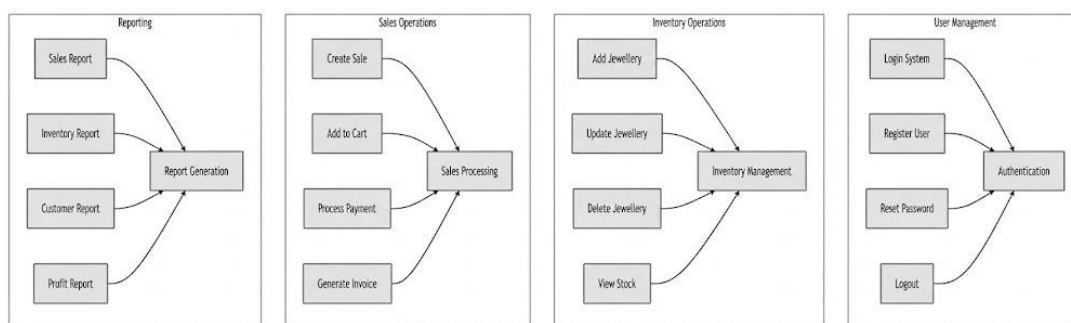
- Customer chooses payment method (Cash/Card/Digital)
- System processes payment and generates invoice
- System updates inventory stock levels
- Customer receives receipt
- System sends confirmation email to customer
- Staff updates order status to "Completed"

Postcondition: Sale recorded, inventory updated, customer notified

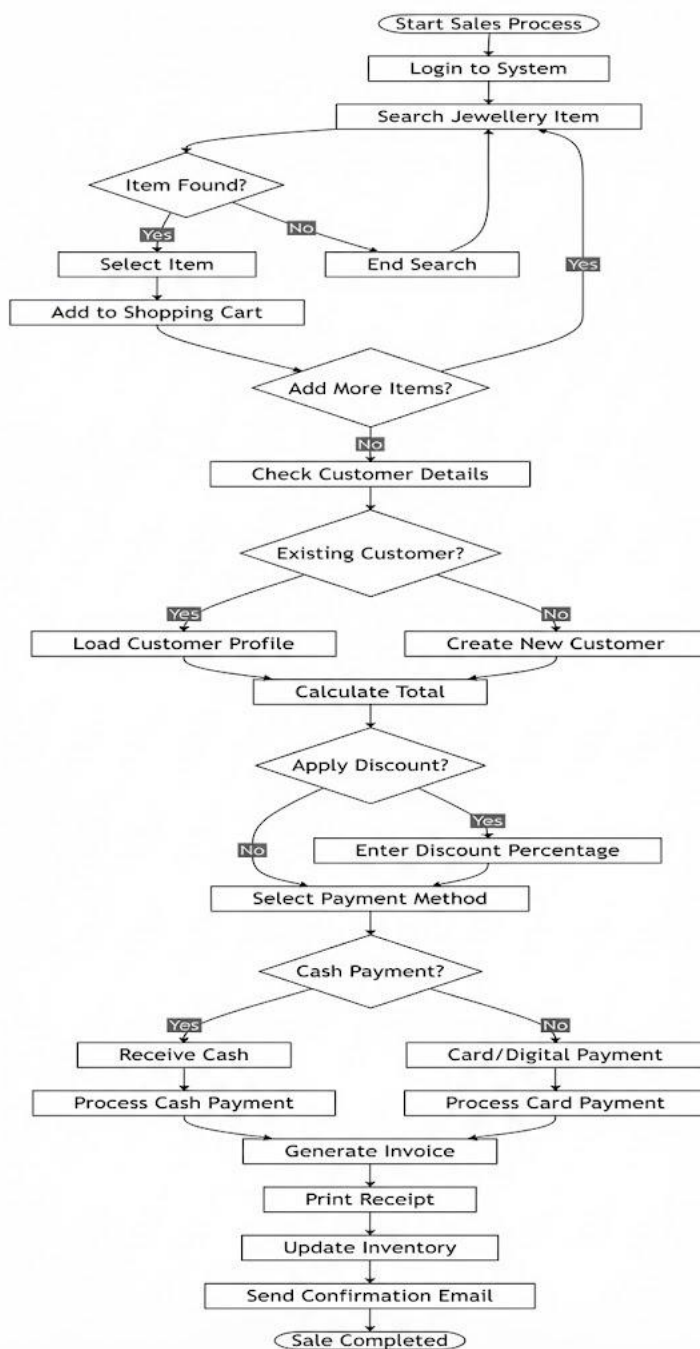
Use Case Diagram



Use Case Generalization Diagram

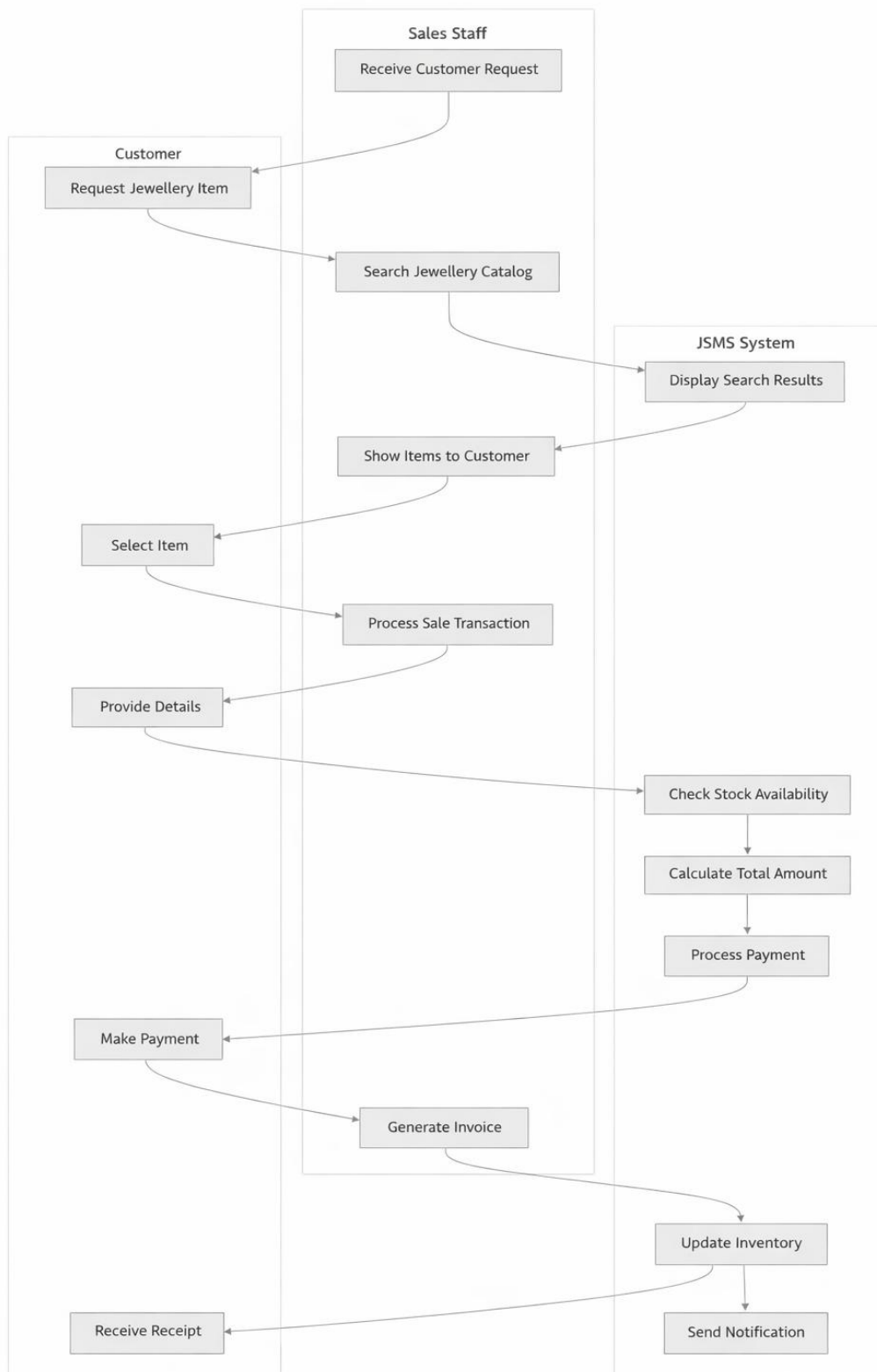


Activity Diagram - Complete Sales Process



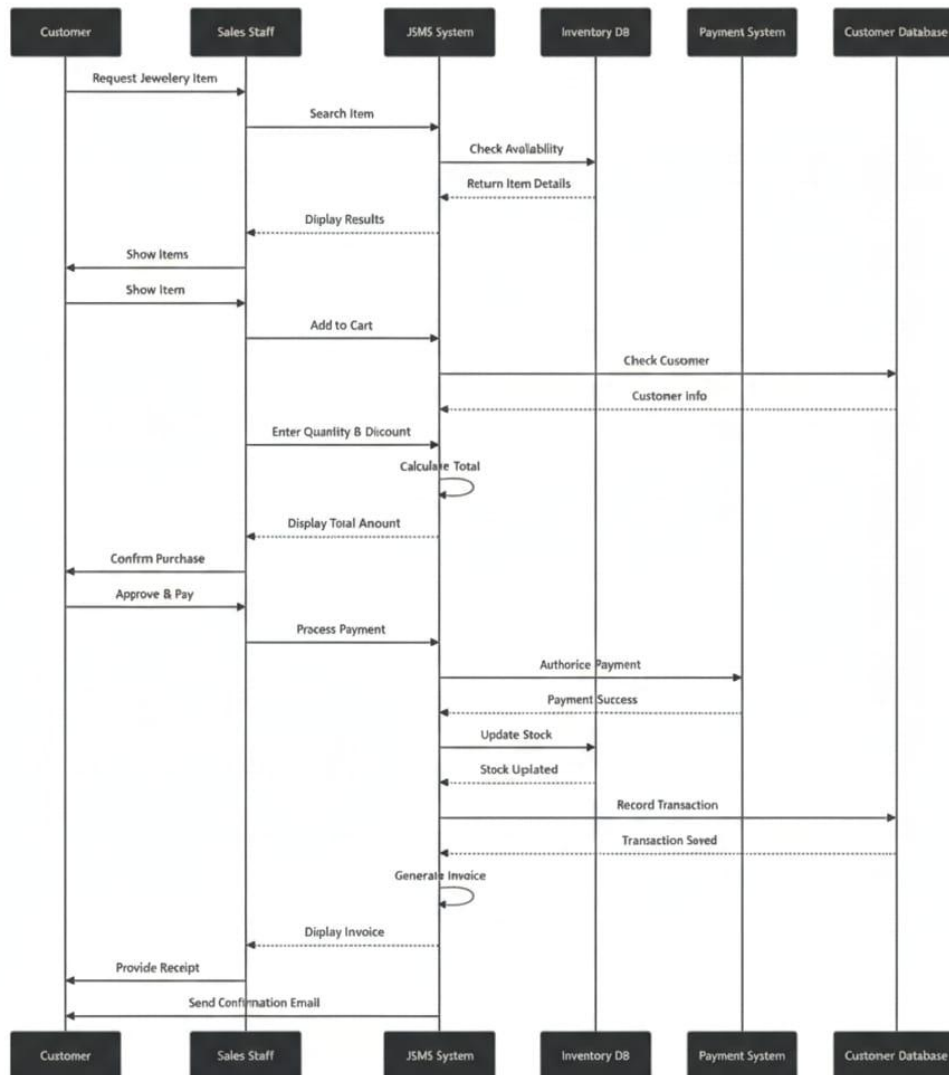
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Swimlane Diagram - Order Processing



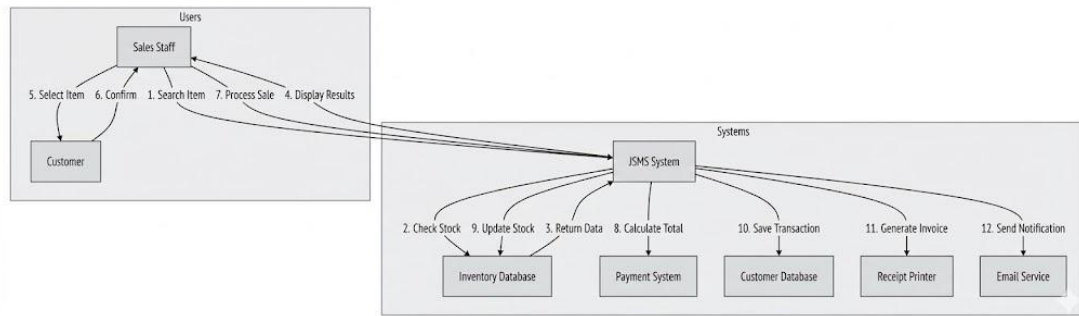
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Sequence Diagram - Complete Transaction

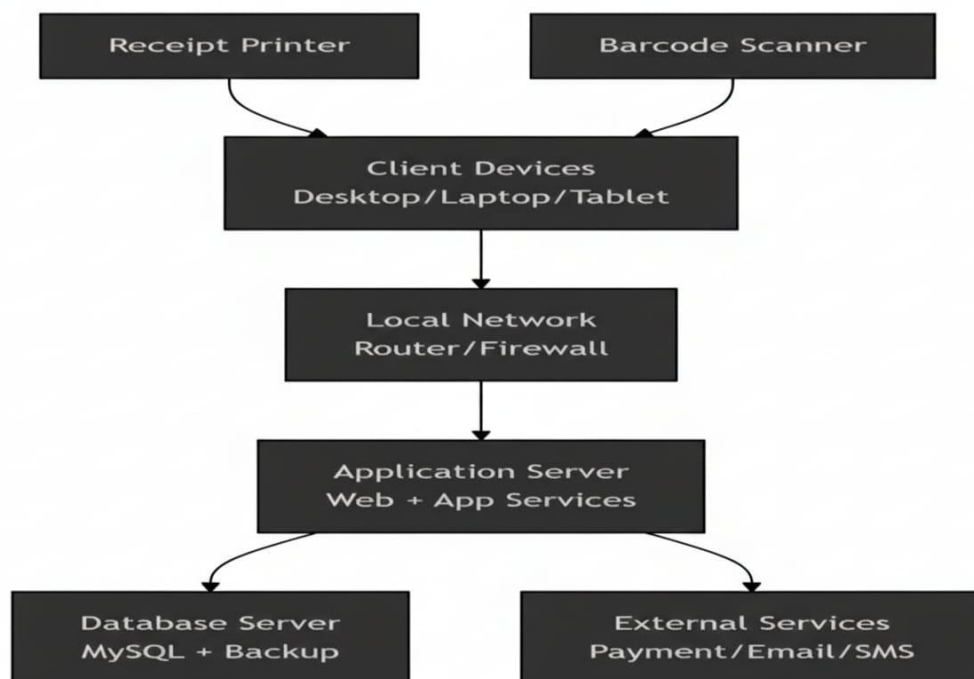


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Collaboration Diagram

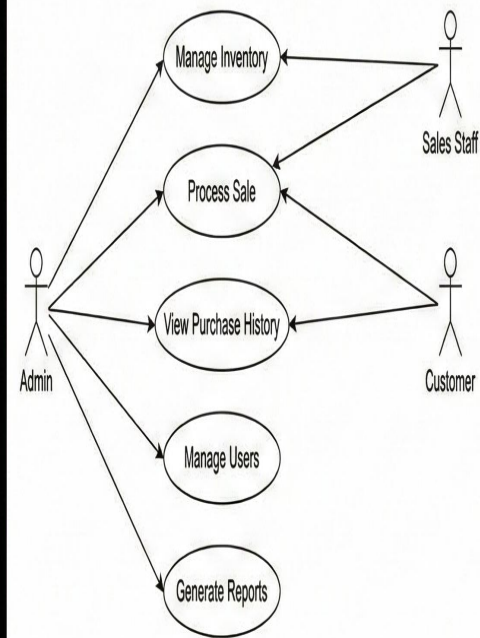


Deployment Diagram

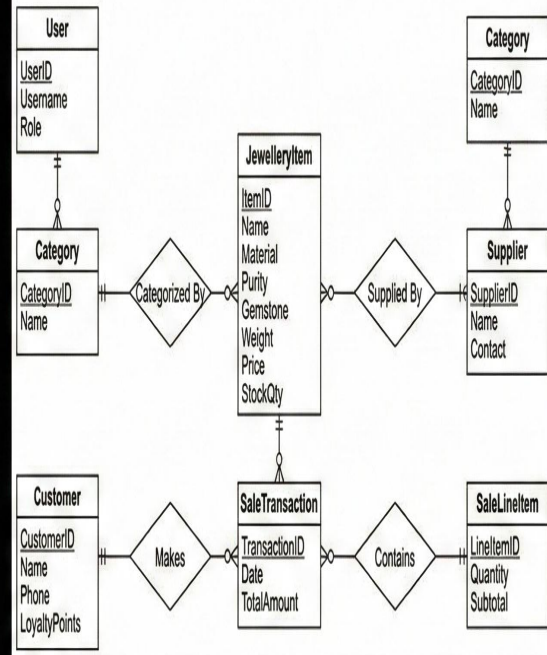


2. Specific Requirements

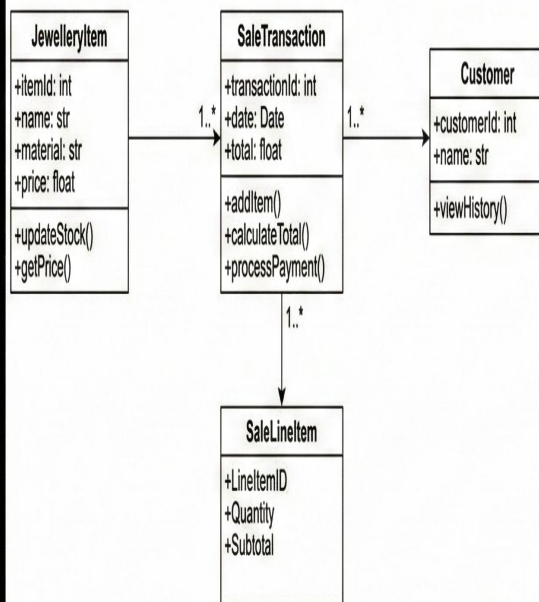
Jewellery Store System Use Cases



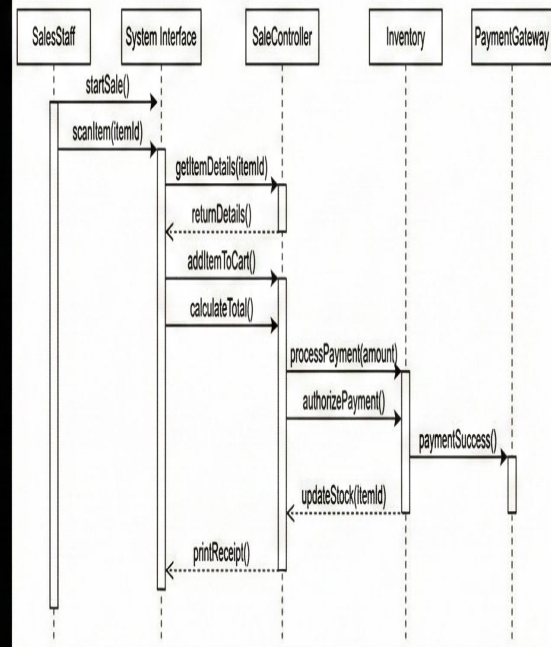
Database Schema - Jewellery Store



System Class Structure



Process Sale Scenario



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3.1 Functional Requirements

3.1.1 Module 1: User Authentication (Login)

Description: Only authorized users with a system account can manage inventory or place orders. Users are classified as Administrators or Customers.

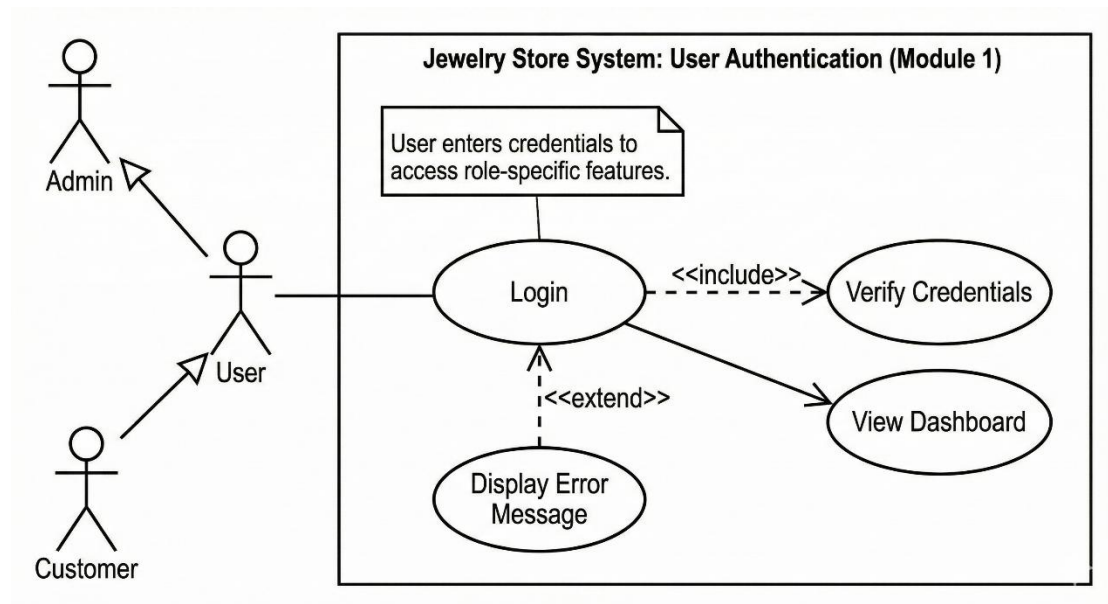
Use Case Description:

- **Actor:** User/Client.
- **Objective:** To access a personalized dashboard and role-specific features.
- **Prerequisites:** The user must have a registered account.
- **Principal Flow:** User visits the login page, enters credentials, and the system verifies the password before redirecting to the appropriate dashboard (Admin or Customer).

Flow of Event:

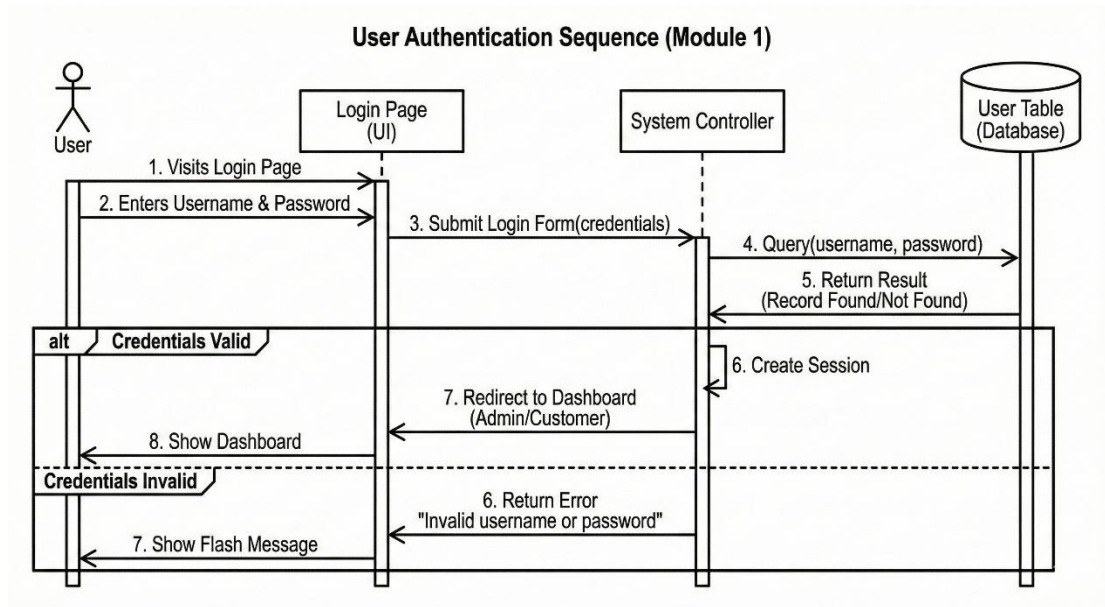
- User submits the Login Form.
- System validates the input and queries the User table.
- If valid, a session is created.
- If invalid, a Flash message "Invalid username or password" is displayed.

1. Use Case Diagram

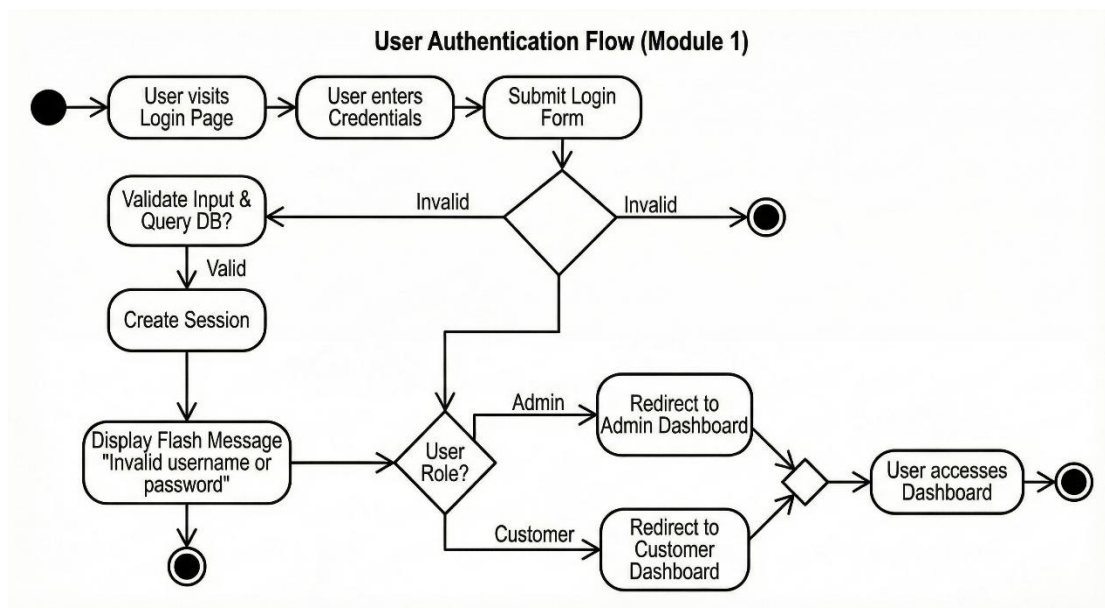


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2. Sequence Diagram (System Diagram)



3. Activity Diagram (Flow Diagram)



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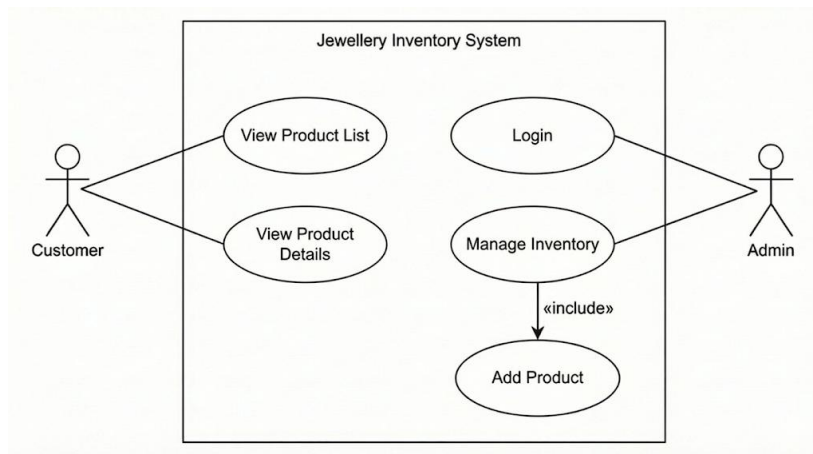
3.1.2 Module 2: Inventory & Product Management

Description: Oversees jewellery commodities with precision. Customers can view detailed descriptions, while Admins manage stock and specifications.

Usage Scenarios:

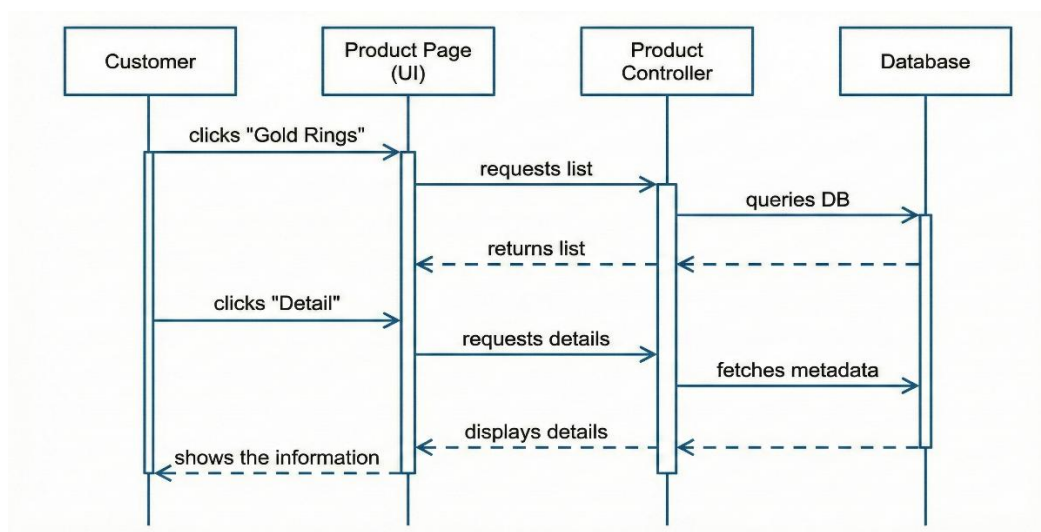
- **Customer:** A user visits the products page, views items like "Gold Rings," and clicks on "Detail" to see the price, metal purity, and current stock.
- **Admin:** The Admin logs in, visits the inventory section, and clicks "Add Product". They enter item details (e.g., "Silver Bracelet") and set the initial stock, which is then saved to the Product table.

1. Use Case Diagram



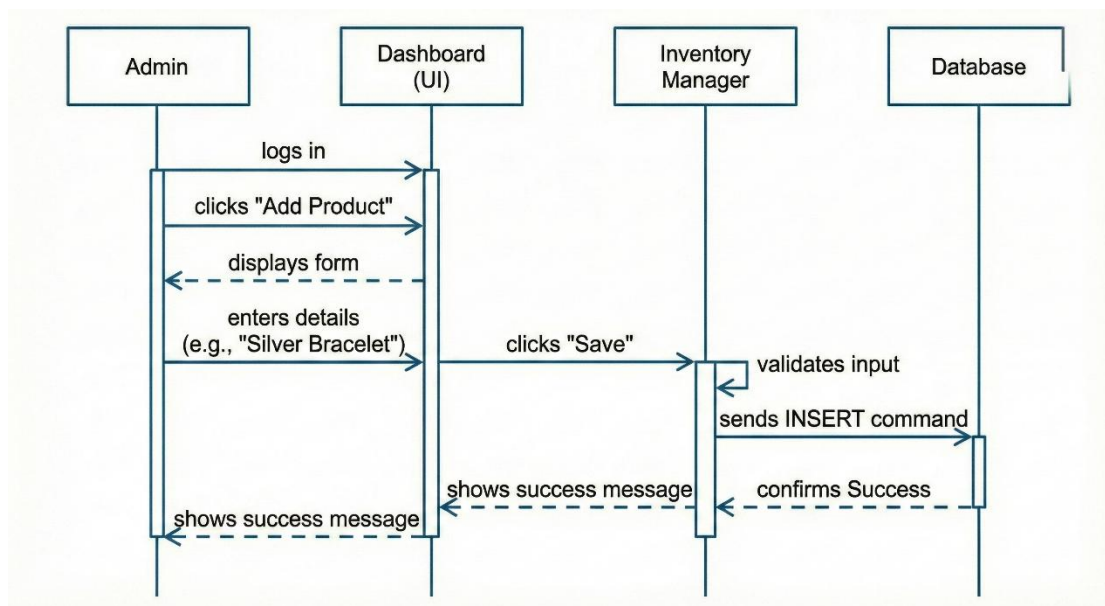
2. Sequence Diagrams

Scenario A: Customer Viewing a Product

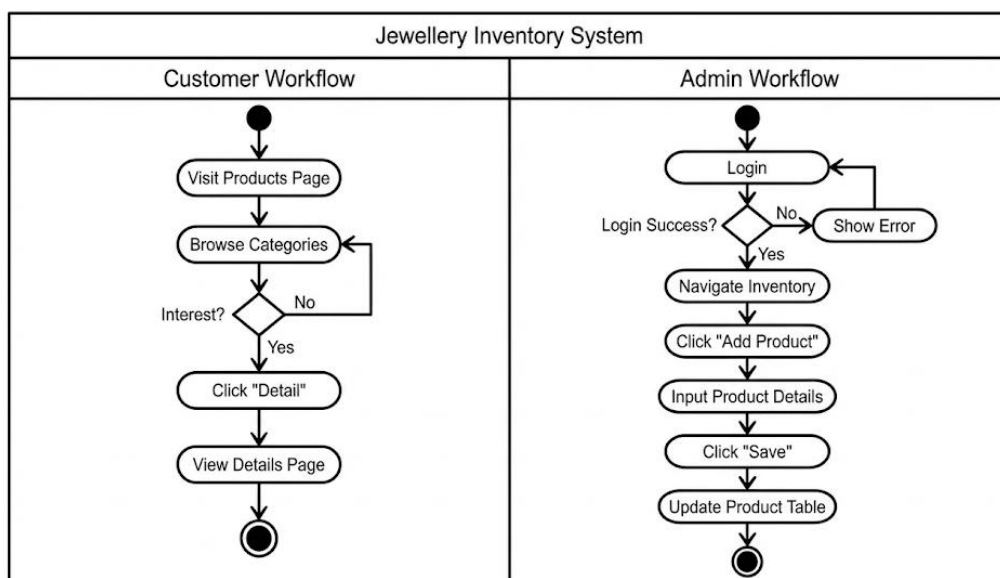


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Scenario B: Admin Adding a Product



3. Activity Diagram



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3.1.3 Module 3: Shopping Cart & Checkout

Description: Enhances the shopping experience by providing a secure checkout and real-time inventory updates.

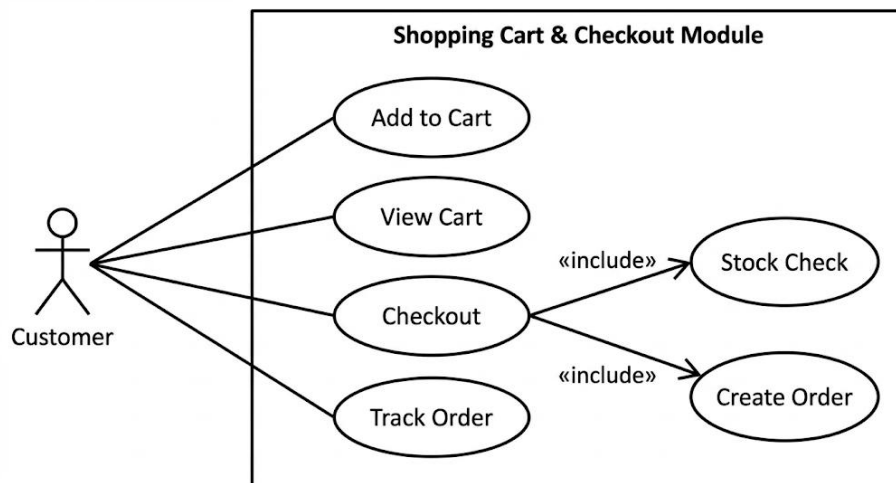
Usage Scenario:

- **Adding Products:** User selects a jewellery item and clicks "Add to Cart".
- **System Check:** The system verifies that the requested quantity is less than or equal to available stock.
- **Checkout:** User enters their shipping address and clicks "Proceed".
- **Completion:** The system creates an Order record, transfers items from the cart to the order, and deducts the units from the Product stock.

Checkout Process (Flow of Events):

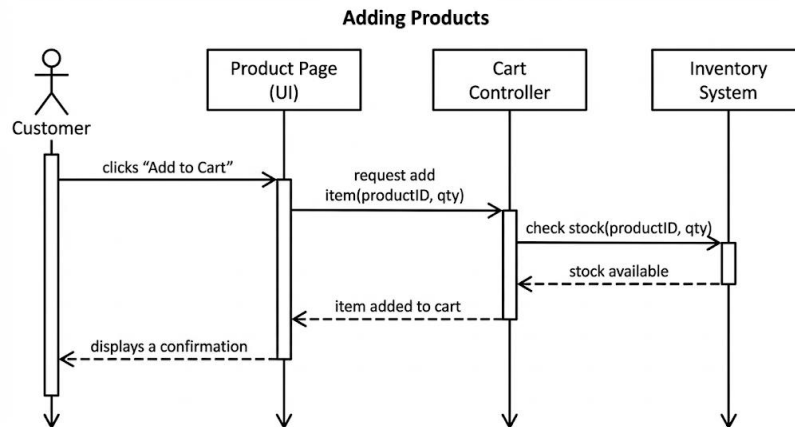
- User clicks "Proceed Checkout".
- System retrieves all CartItems for the session.
- **Stock Verification Loop:** For each item, the system checks if $\text{stock} \geq \text{quantity}$.
- **If Yes:** Deduct stock and create an OrderItem.
- **If No:** Rollback the transaction and show an error.
- Delete CartItems and commit the transaction to snapshot.db.
- Redirect to Order Tracking.

1. Use Case Diagram

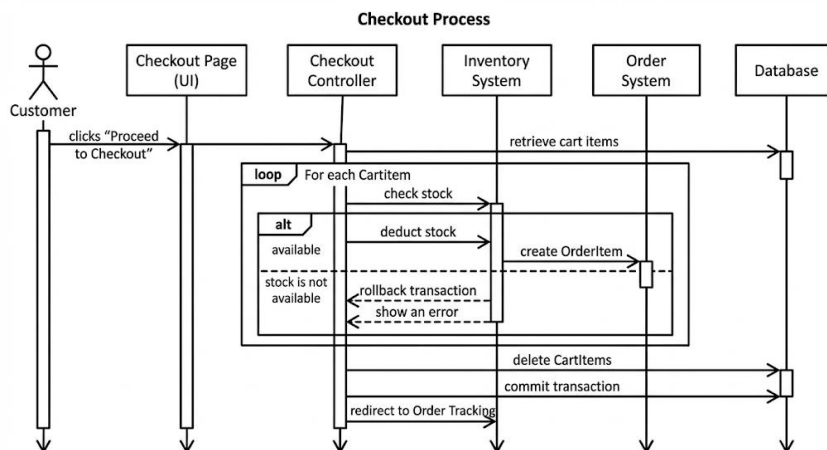


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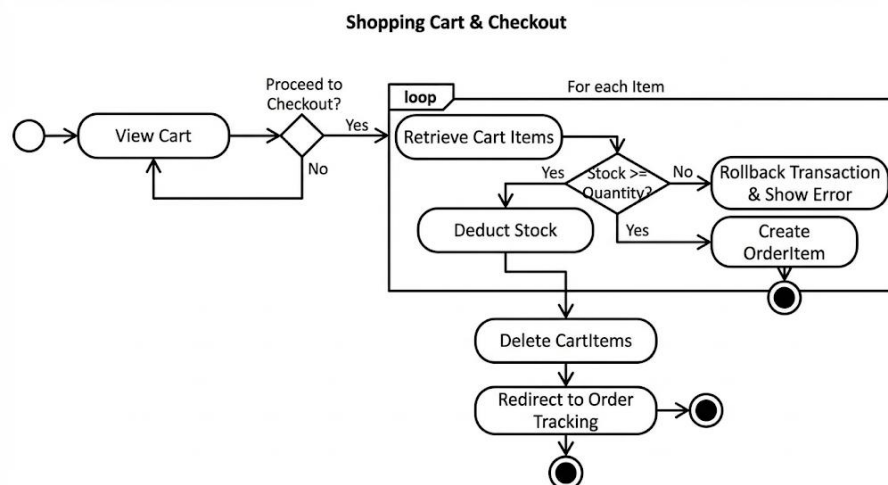
2. Sequence Diagram: Adding Products



3. Sequence Diagram: Checkout Process



4. Activity Diagram



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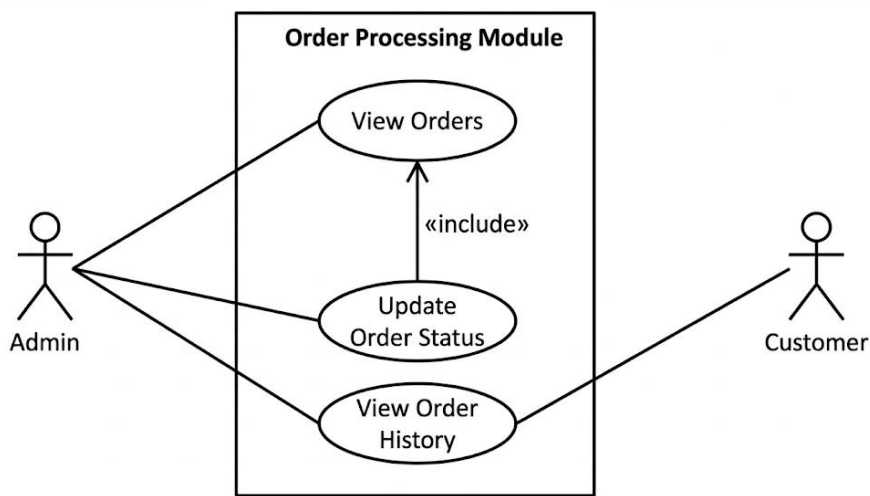
3.1.4 Module 4: Order Processing

Description: Streamlines the management of incoming orders. Admins can track and update the status of every transaction.

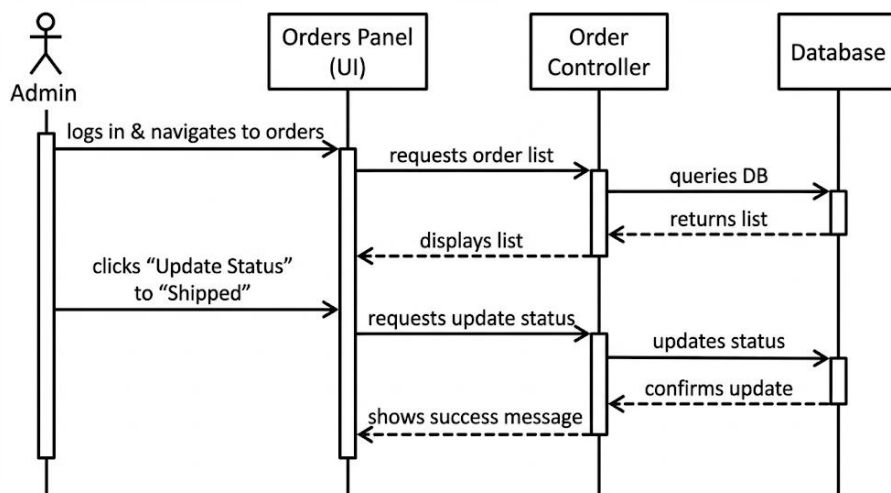
Usage Scenarios:

- **Admin:** Navigates to the orders panel, views a "Processing" order, packs the item, and updates the status to "Shipped".
- **Customer:** The user visits their order history and sees the status update to "Shipped" in real-time.

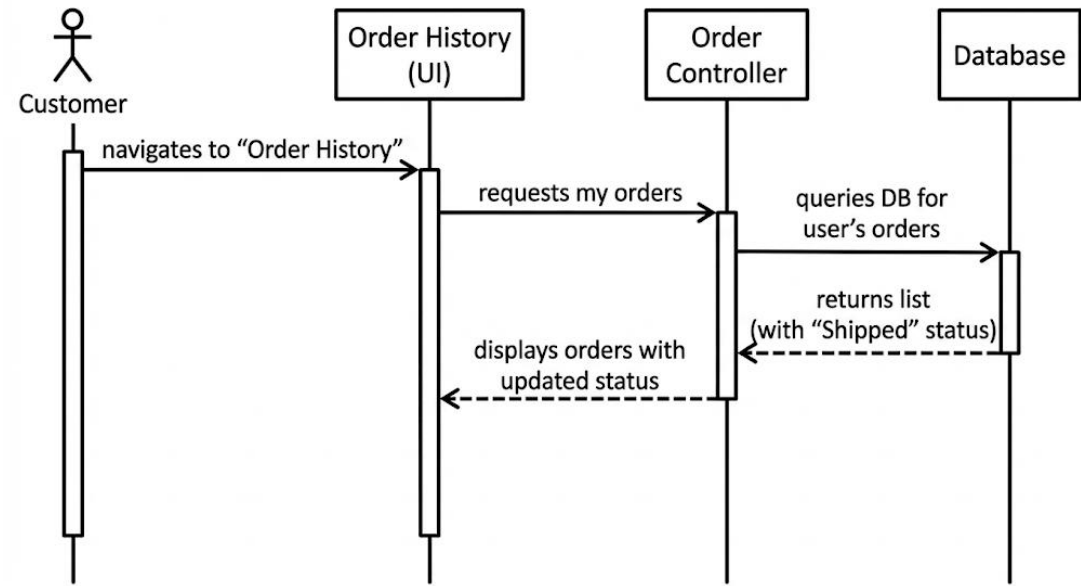
1. Use Case Diagram



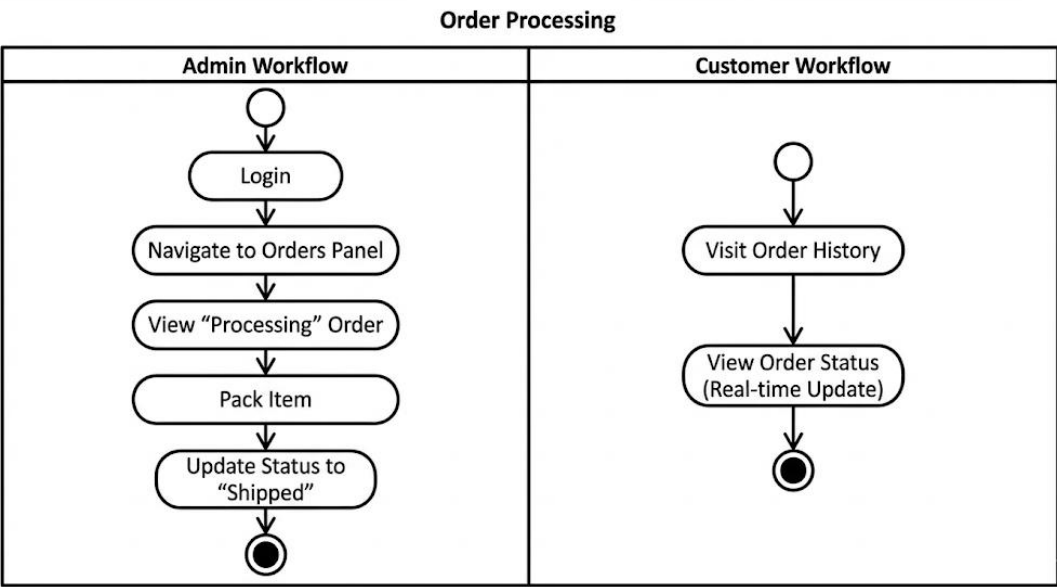
2. Sequence Diagram: Admin Scenario



3. Sequence Diagram: Customer Scenario



4. Activity Diagram



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3.2 External Interface Requirements

3.2.1 User Interfaces

The interface is a web-based application rendered via **Flask templates**.

- **Dashboard:** Displays "Featured Jewellery" and checks the user role.
- **Navigation:** Features dynamic links based on roles (e.g., Inventory for Admins, Cart for Customers).
- **Feedback:** Uses Flash messages at the top of the content area for system notifications.

3.2.2 Software Interfaces

- **Web Framework:** **Flask** handles routing and logic.
- **Database:** **SQLite** stores all data, accessed via **SQLAlchemy**.
- **Security:** **Werkzeug** manages password hash generation and verification.

3.3 Performance & Quality Requirements

- **Response Time:** Designed to be lightweight with optimized SQLAlchemy queries for rapid page loads.
- **Data Integrity:** Uses database transactions during checkout to ensure stock is only deducted if an order is successfully created.
- **Security:** Passwords are never stored in plain text; they are hashed using **SHA-256** via **Werkzeug**.
- **Reliability:** Ensures data persistence across server restarts, retaining order history and inventory levels.
- **Limitations:** Requires internet connectivity for browsing; SQLite may face scalability issues if the user base grows significantly.