B.M.S. COLLEGE OF ENGINEERING BENGALURU
Autonomous Institute, Affiliated to VTU

Lab Record

Software Engineering and Object-Oriented Modeling

Submitted in partial fulfillment for the 5th Semester Laboratory

Bachelor of Engineering
in
Computer Science and Engineering

Submitted by:

Amrutha Ravisanna

1BM22CS036

Department of Computer Science and Engineering
B.M.S. College of Engineering
Bull Temple Road, Basavanagudi, Bangalore 560 019
Oct 2024-Jan 2025

B.M.S. COLLEGE OF ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CERTIFICATE

This is to certify that the Object-Oriented Analysis and Design(23CS5PCOOM) laboratory has been carried out by Amrutha Ravisanna (1BM22CS036) during the 5th Semester Oct24-Jan2025.

Signature of the Faculty Incharge:

NAME OF THE FACULTY: Prof. Lakshmi Neelima

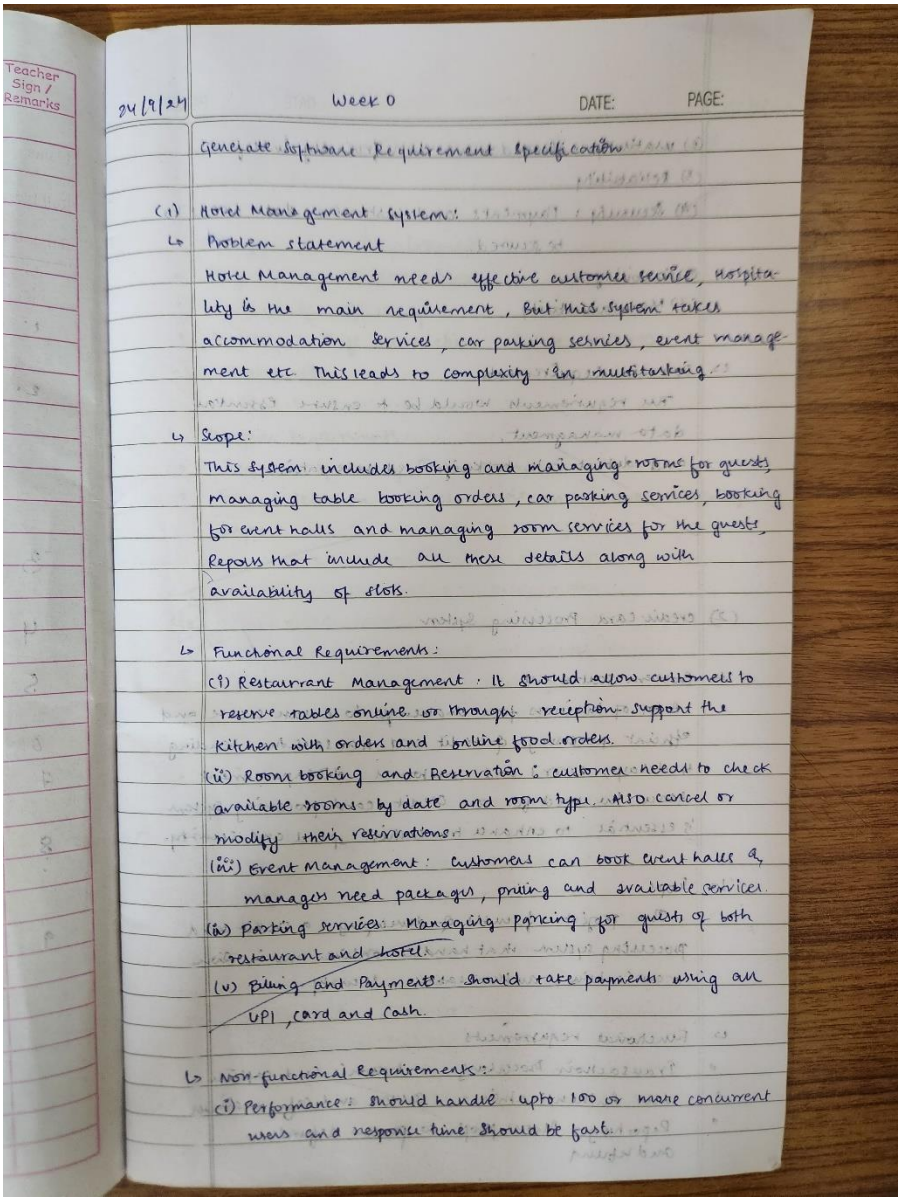
Department of Computer Science and Engineering
B.M.S. College of Engineering, Bangalore

Table of Contents

1. Hotel Management System

1.1 Problem Statement: The current manual operations in hotel management are inefficient, prone to errors, and time-intensive. Tasks such as managing room reservations, guest check-ins and check-outs, billing processes, and housekeeping coordination require extensive manual intervention. This often results in mistakes and reduced customer satisfaction. A need exists for a streamlined, automated system that simplifies these tasks, improves operational efficiency, and enhances the guest experience.

1.2 SRS:



Teacher Sign / Remarks

24/9/24 Week 0 DATE: PAGE:

Generate Software Requirement Specification

(1) Hotel Management System:

↳ Problem statement

Hotel Management needs effective customer service, Hospitality is the main requirement, But this system takes accommodation services, car parking services, event management etc. This leads to complexity in multitasking.

↳ Scope:

This system includes booking and managing rooms for guests, managing table booking orders, car parking services, booking for event halls and managing room services for the guests, Reports that include all these details along with availability of slots.

↳ Functional Requirements:

(i) Restaurant Management: It should allow customers to reserve tables online or through reception support the kitchen with orders and online food orders.

(ii) Room booking and Reservation: customer needs to check available rooms by date and room type. Also cancel or modify their reservations.

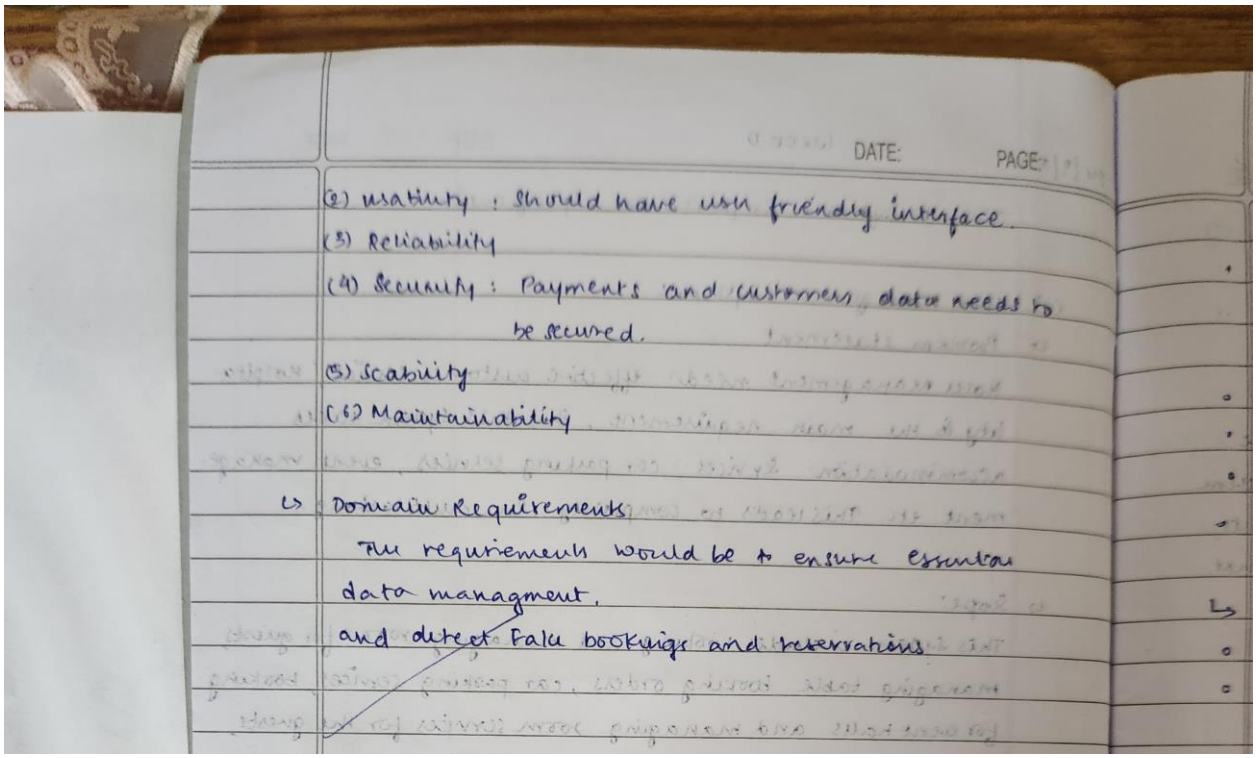
(iii) Event Management: Customers can book event halls & managers need packages, pricing and available services.

(iv) Parking services: Managing parking for guests of both restaurant and hotel.

(v) Billing and Payments: should take payments using all UPI, card and cash.

↳ Non-functional Requirements:

(i) Performance: should handle upto 100 or more concurrent users and response time should be fast.


DATE: PAGE:

(2) usability : Should have user friendly interface.
(3) Reliability
(4) Security : Payments and customers data needs to be secured.
(5) Scability
(6) Maintainability

↳ Domain Requirements

The requirements would be to ensure essential data managment.
and detect Fake bookings and reservations

1.3 Class Diagram:

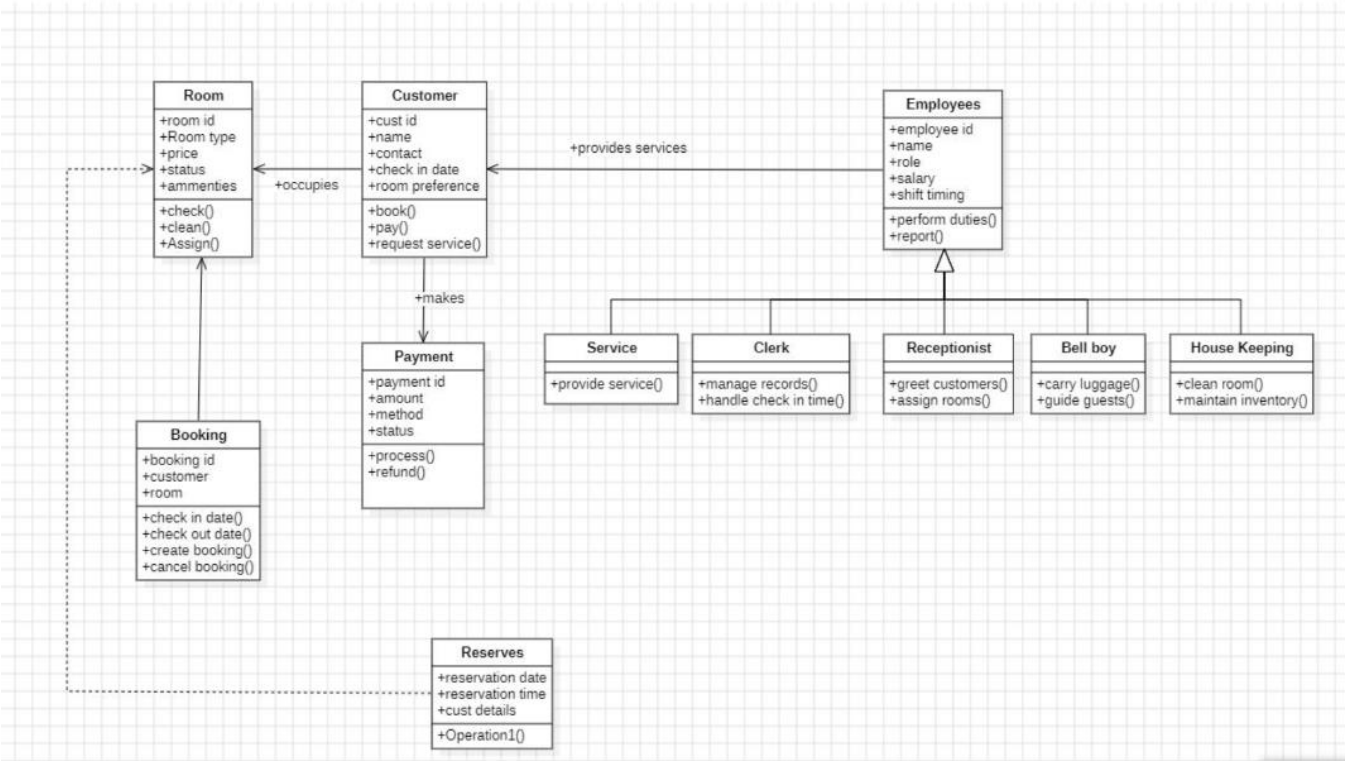


Fig 1.3.1: Class Diagram

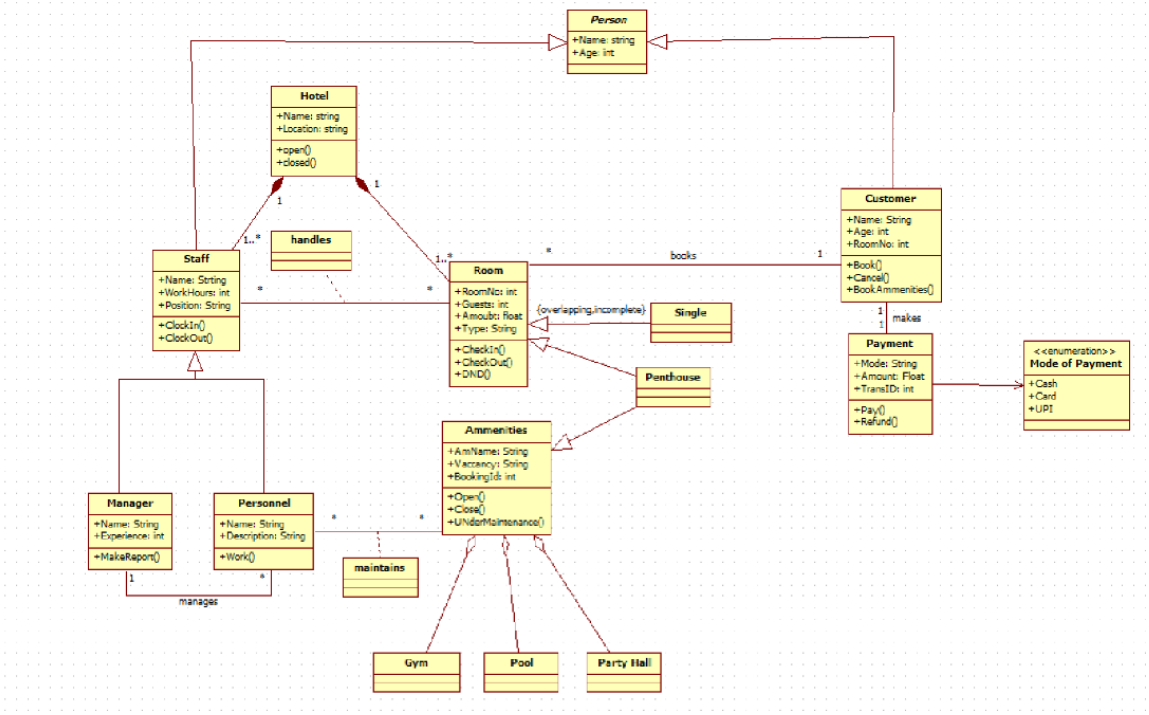


Fig 1.3.2: Advanced Class Diagram

Description:

The class diagram illustrates the structure of the system, highlighting key entities and their relationships.

- **Classes:**

  - **Booking Class**: Manages details of reservations such as booking ID, dates, room type, and status.

PersonAccount Class: Abstract class serving as a base for employees and customers.

  - **Customer Class**: Inherits from PersonAccount and includes attributes like customer ID, name, and contact details.
  - **Employee Class**: Inherits from PersonAccount and includes attributes like employee ID, role, and shift details.

  - **Room Class**: Represents the rooms in the hotel, with attributes such as room number, type, availability status, and price.
  - **Payment Class**: Manages payment details, including payment ID, method, status, and amount.

- **Relationships:**

  - The **Booking Class** is associated with both **Room Class** and **Customer Class**, signifying that customers make bookings for rooms.
  - The **Payment Class** is related to the **Booking Class** to process transactions for bookings.
  - **Employee Class** is involved in managing bookings and customer queries.

1.4 State Diagram:

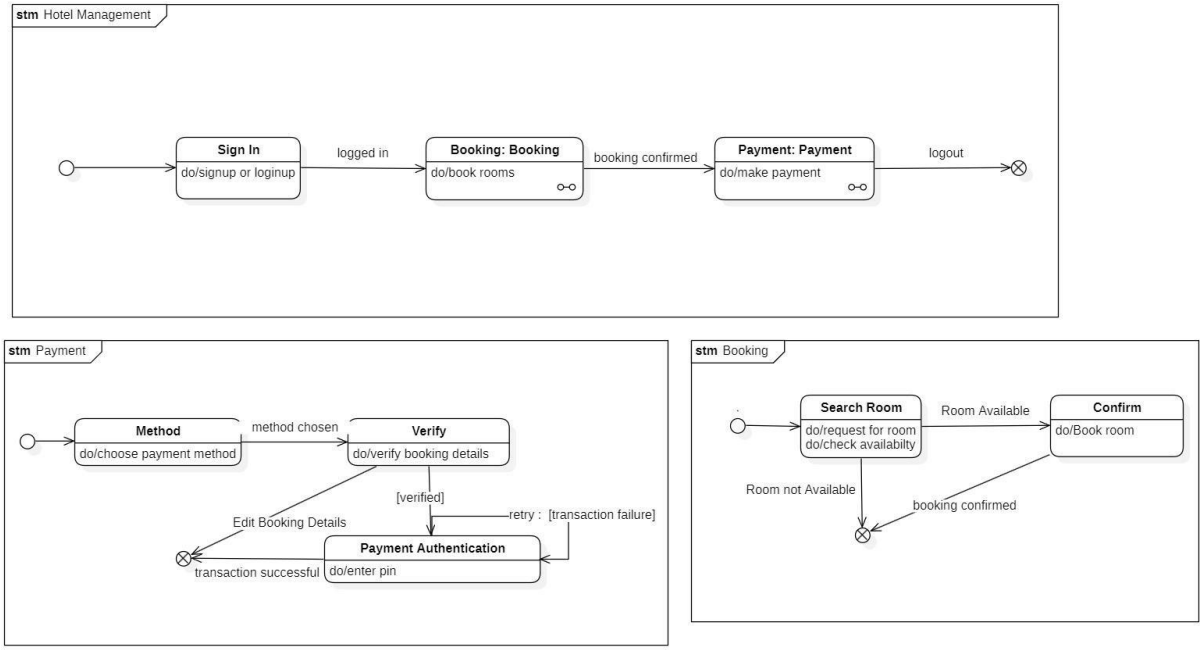


Fig 1.4.1: State Model Diagram

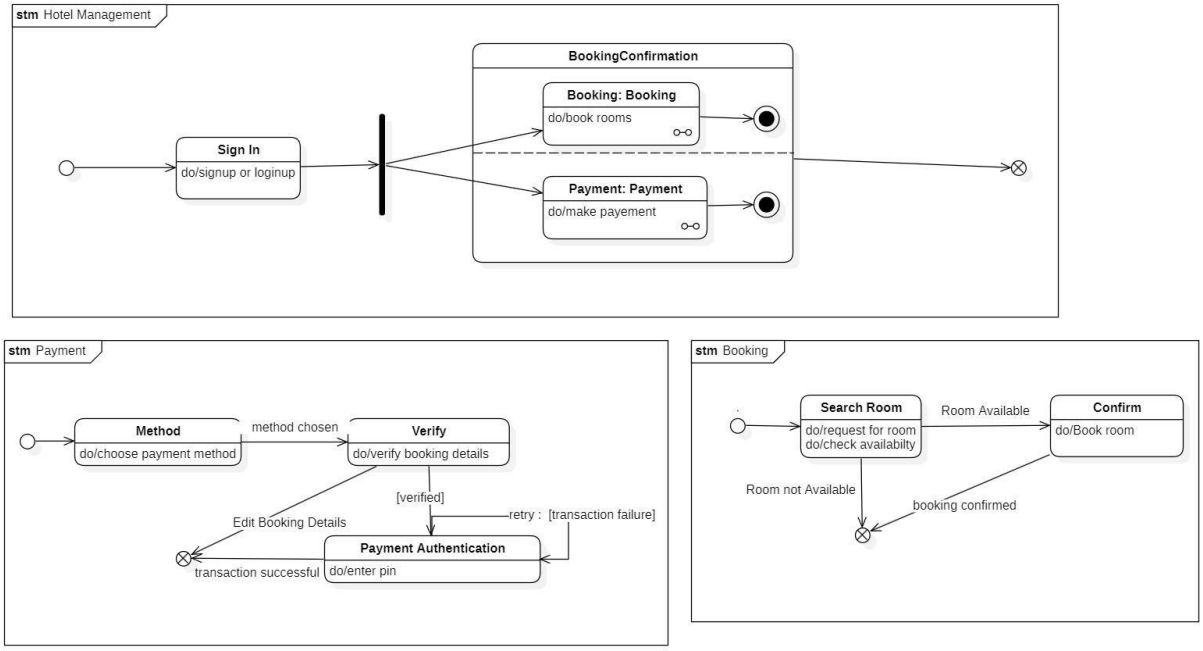


Fig 1.4.2: Advanced State Model

Description:

The state diagram shows the various states and transitions involved in the hotel management system.

- **States:**
    - **Sign-In State**: Represents when a user logs into the system (either customer or employee).
    - **Booking State**: Manages the reservation process, including selecting room type, dates, and confirming availability. Sub-states include:
        - Room Selection
        - Availability Check
    - **Payment State**: Handles payment processing for bookings. Sub-states include:
        - Payment Method Selection
        - Payment Confirmation
    - **Concurrent States:**
        - Booking and Payment processes are concurrent, allowing simultaneous management of reservations and transactions.

1.5 Use Case Diagram:

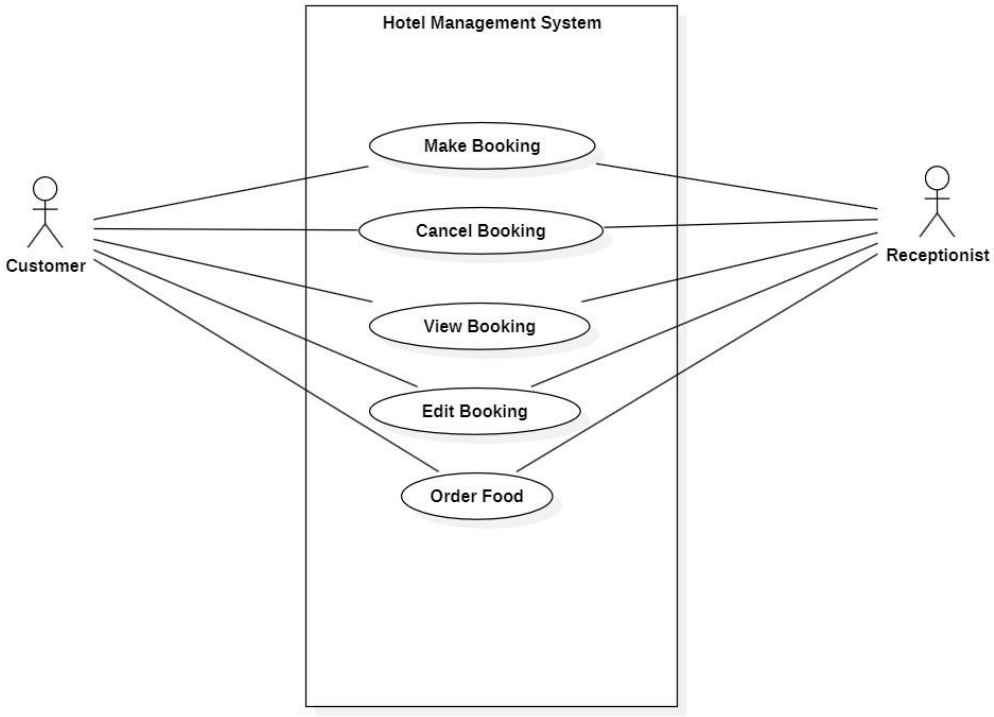


Fig 1.5.1: Use Case Diagram

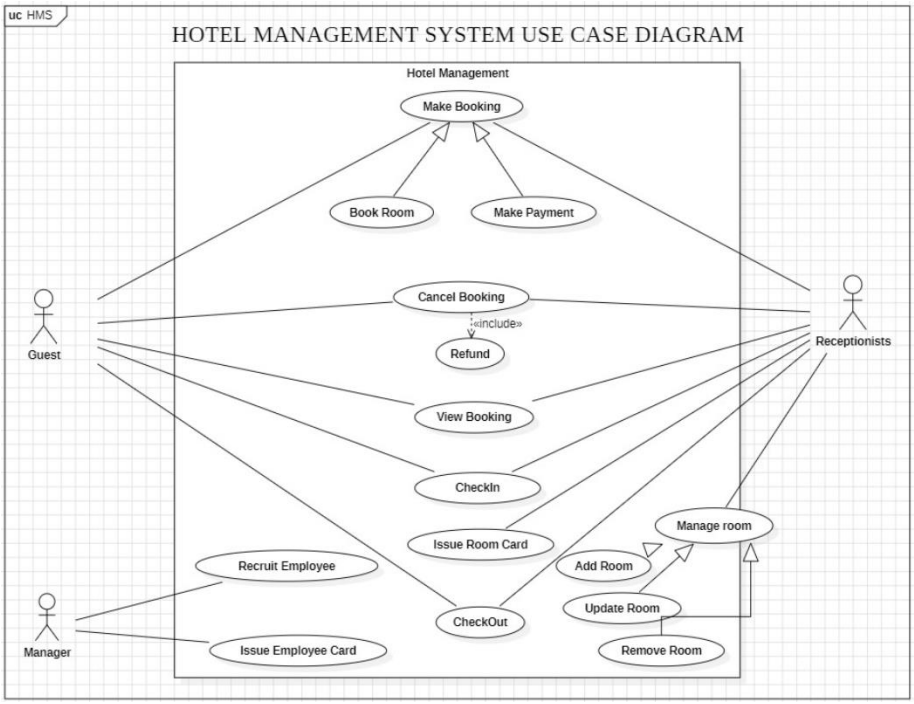


Fig 1.5.1: Use Case Diagram

Description:

The use case diagram defines interactions between actors and system functionalities.

- **Actors:**
    - **Customer**: Can make a booking, cancel a booking, view existing bookings, edit bookings, and order food.
    - **Receptionist**: Can assist customers by managing bookings, updating information, and processing food orders.
- **Use Cases:**
    - **Make Booking**: Allows a customer to reserve a room.
    - **Cancel Booking**: Enables cancellation of an existing booking.
    - **View Booking**: Provides booking details to the customer or receptionist.
    - **Edit Booking**: Allows modifications to an existing booking.
    - **Order Food**: Lets the customer request room service or meals during their stay.

1.6 Sequence Diagram:

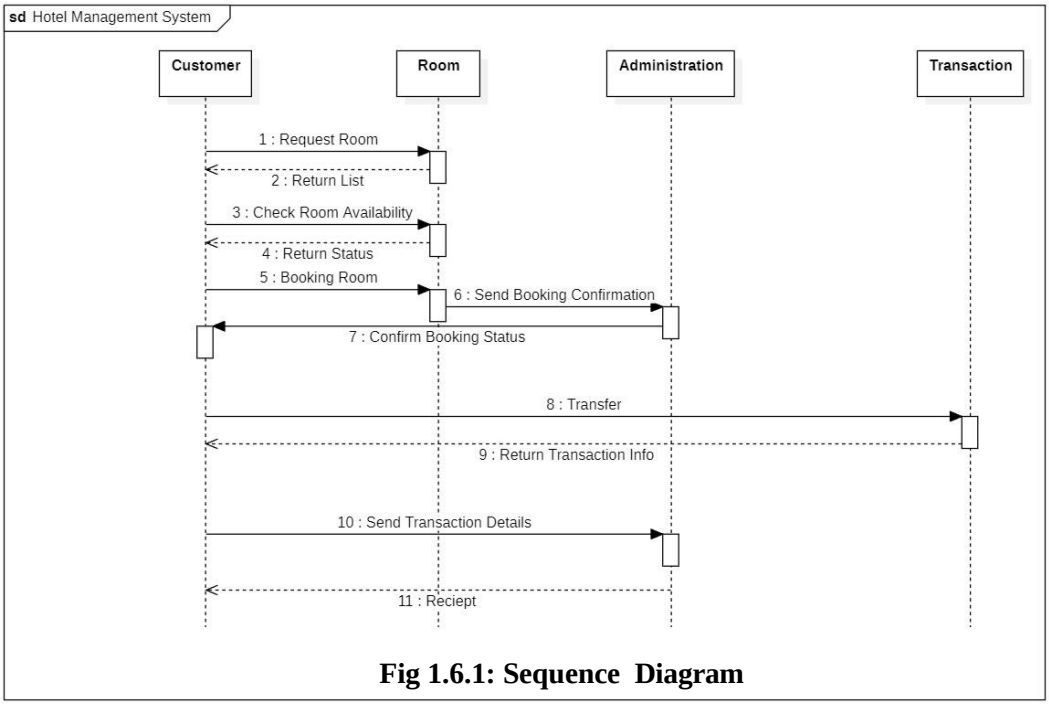


Fig 1.6.1: Sequence Diagram

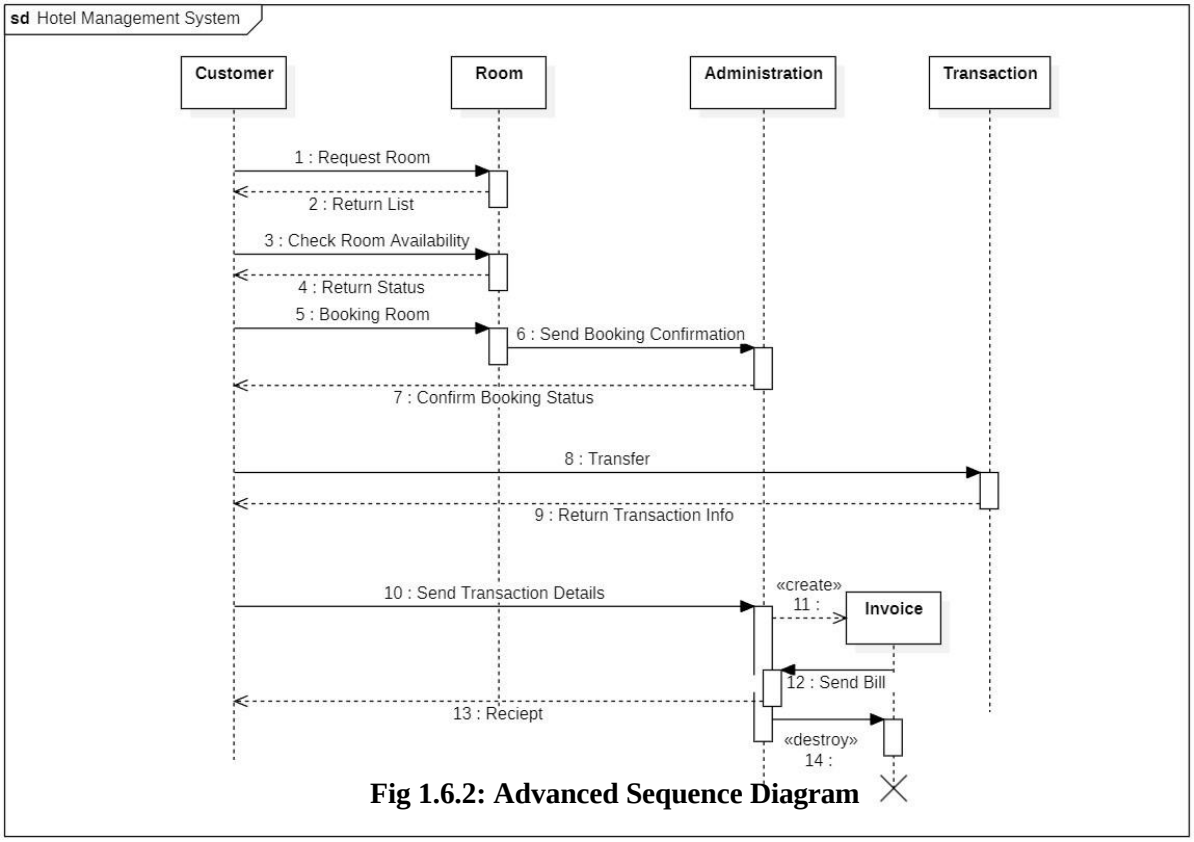


Fig 1.6.2: Advanced Sequence Diagram

Description:

The sequence diagram details the interactions between objects to perform a booking operation.

- **Objects:**
    - **Customer**: Initiates the booking process.
    - **Room**: Provides room availability and details.
    - **Administration**: Validates the booking and room availability.
    - **Transaction**: Processes the payment for the booking.
    - **Invoice (Transient Object)**: Created after payment confirmation, representing the receipt of the transaction.
- **Flow:**

1. Customer requests a room booking.
2. System checks room availability via the Room object.
3. Administration validates the details.
4. Payment is processed via the Transaction object.
5. Invoice is generated and sent to the Customer.

1.7 Activity Diagram:

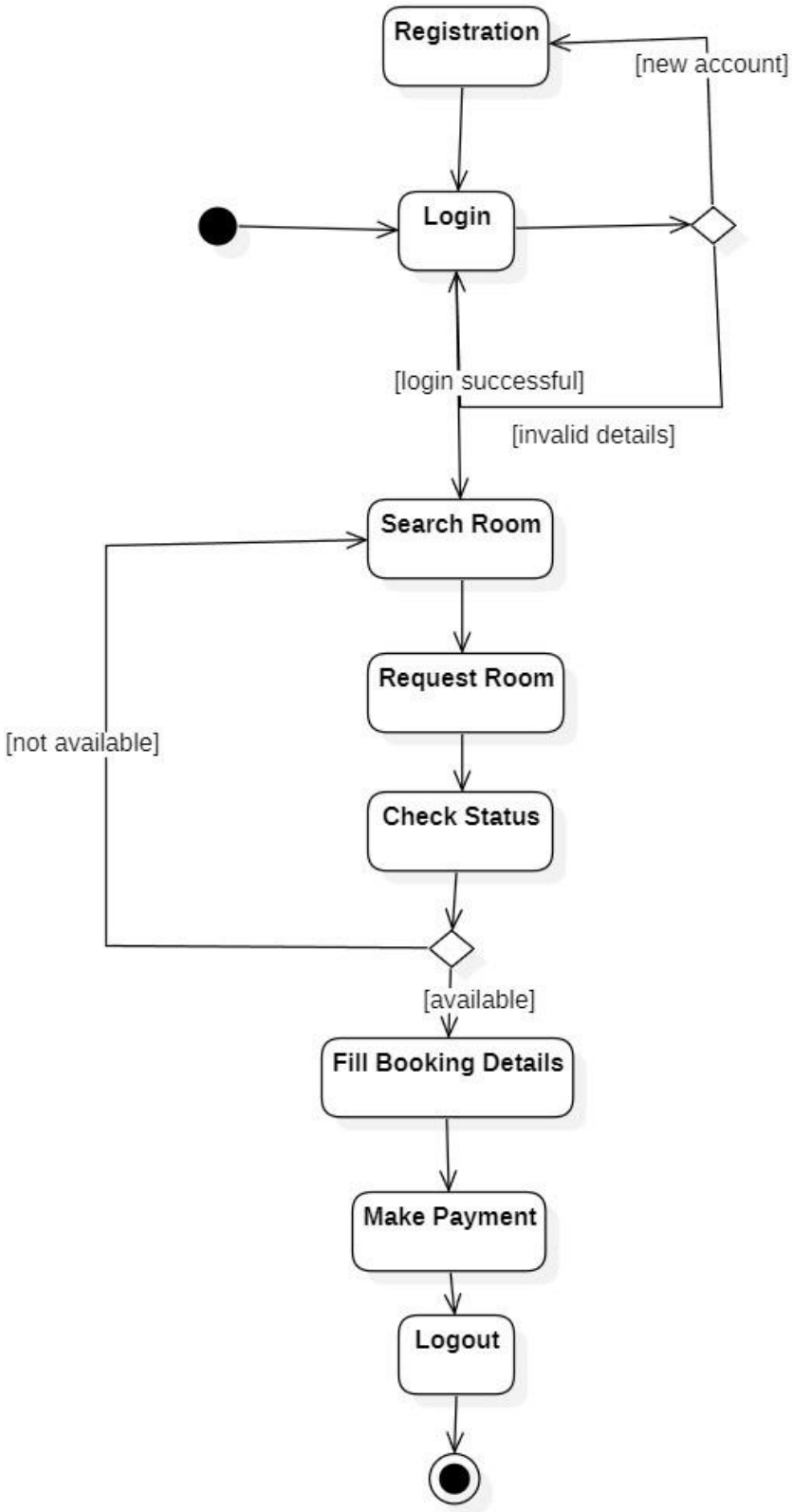


Fig 1.7.1 : Activity Diagram

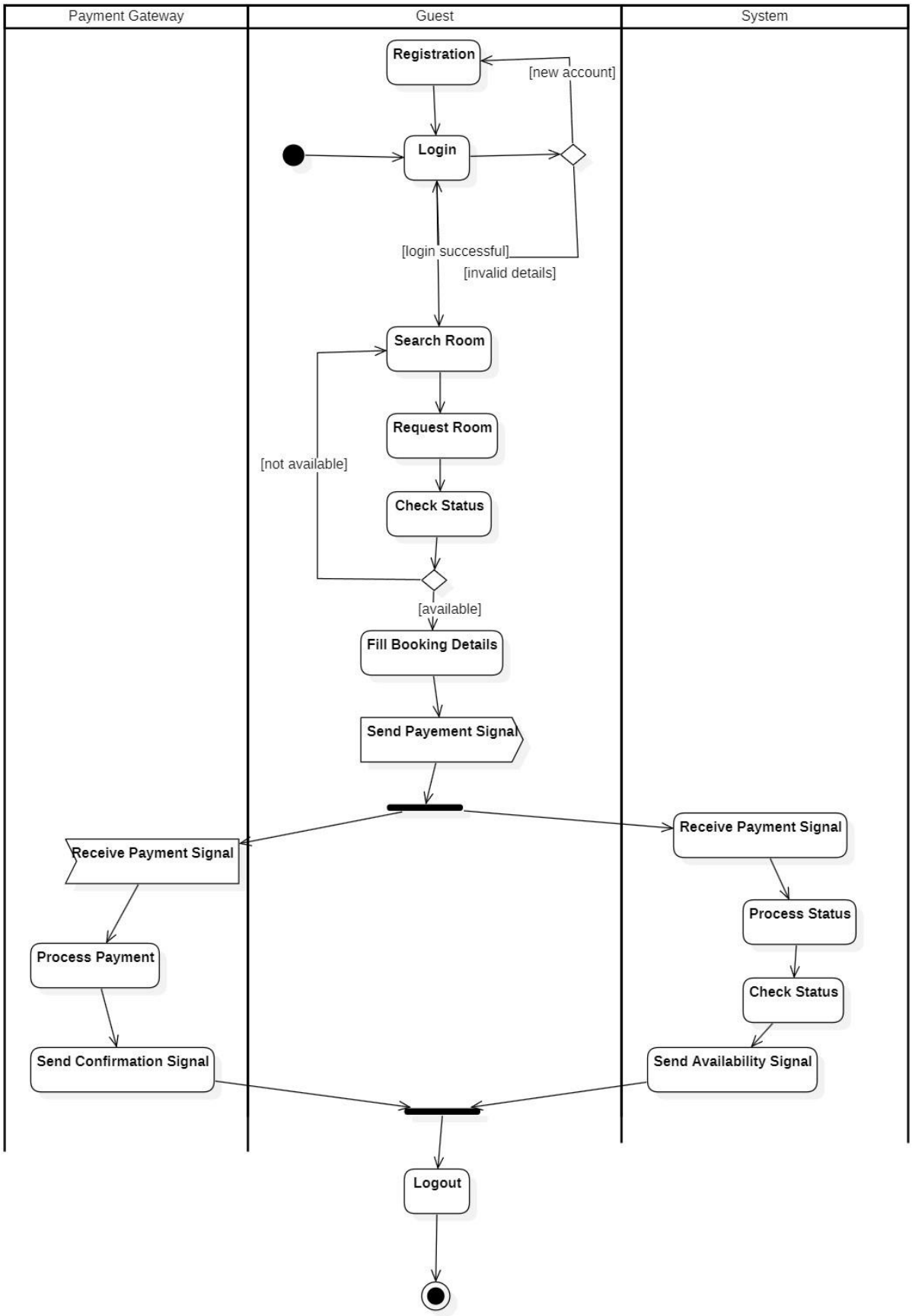


Fig 1.7.2 : Advanced Activity Diagram

Description:

The activity diagram represents the flow of activities for making a payment, divided into swimlanes for clarity.

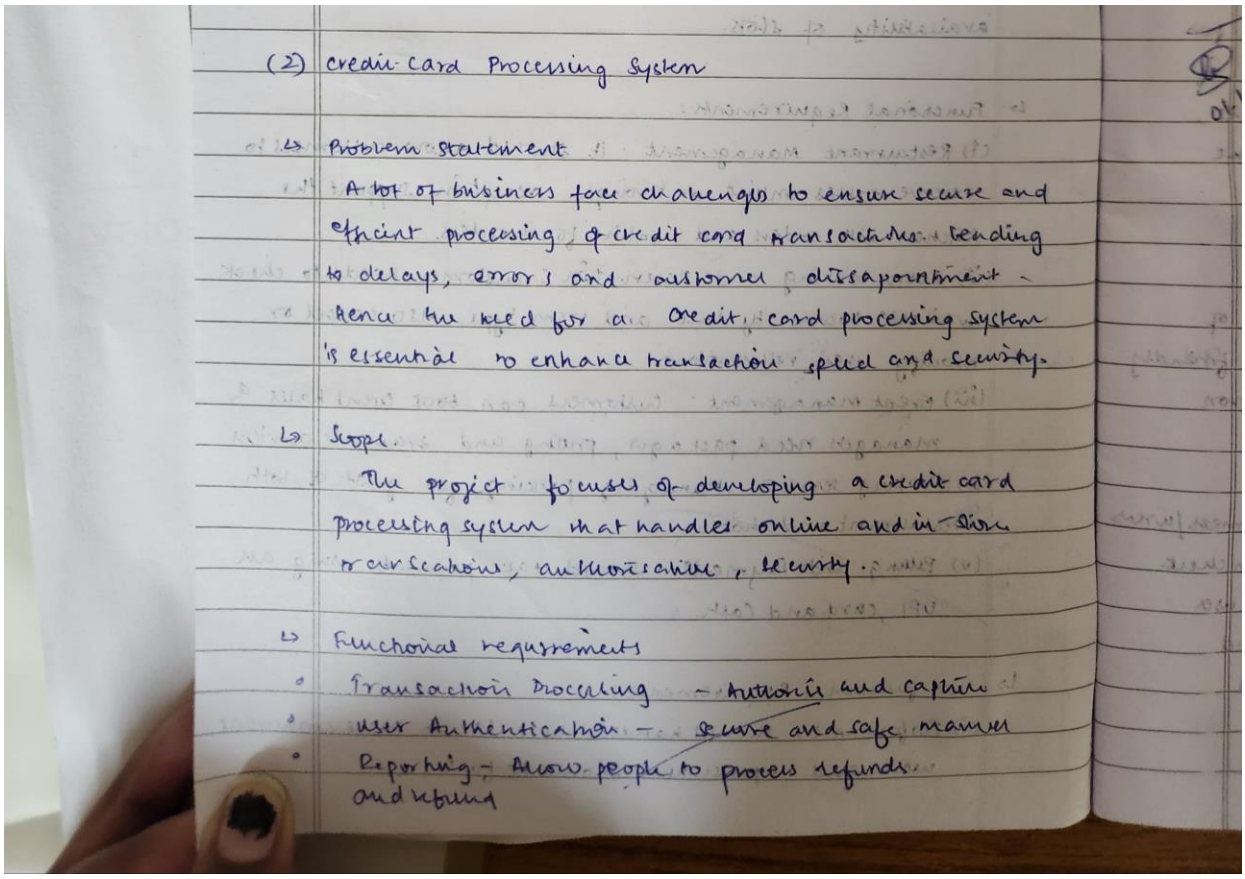
- **Swimlanes:**
    - **Payment Gateway**: Processes the payment details, including authentication and transaction completion.
    - **Guest**: Performs actions like selecting the room, confirming booking details, and initiating payment.
    - **System**: Validates input, updates booking records, and generates invoices.
- **Flow:**

1. Guest selects room and initiates payment.
2. System validates the booking and redirects to the Payment Gateway.
3. Payment Gateway processes the payment and confirms success.
4. System updates the booking status and generates an invoice for the guest.

2. Credit Card Processing System

2.1 Problem Statement: With the increasing volume of credit card transactions, financial institutions face challenges in ensuring secure, accurate, and real-time processing of payments. Current systems often struggle with fraud detection, transaction delays, and compliance with industry regulations. A robust, scalable, and secure system is required to process credit card payments efficiently while providing real-time fraud monitoring and adhering to regulatory standards.

2.2 SRS:


(2) credit card Processing System

↳ Problem statement

A lot of business face challenges to ensure secure and efficient processing of credit card transactions leading to delays, errors and customer dissapointment - Hence the need for a credit card processing system is essential to enhance transaction speed and security.

↳ Scope.

The project focuses of developing a credit card processing system that handles online and in-store transactions, authorisation, security.

↳ Functional requirements

- Transaction Processing - Authorise and capture
- User Authentication - secure and safe manner
- Reporting - Allow people to process refunds and refund

DATE: PAGE:

and generate receipt of transaction

- Integration

Non functional Requirements

- Performance - Response time
- Scalability, efficiency
- Security - Safe transactions without malware.
- Availability

Domain Requirements

- Payment gateway Integration
- Fraud detection is essential and ensure currency support.

01/10

2.3 Class Diagram:

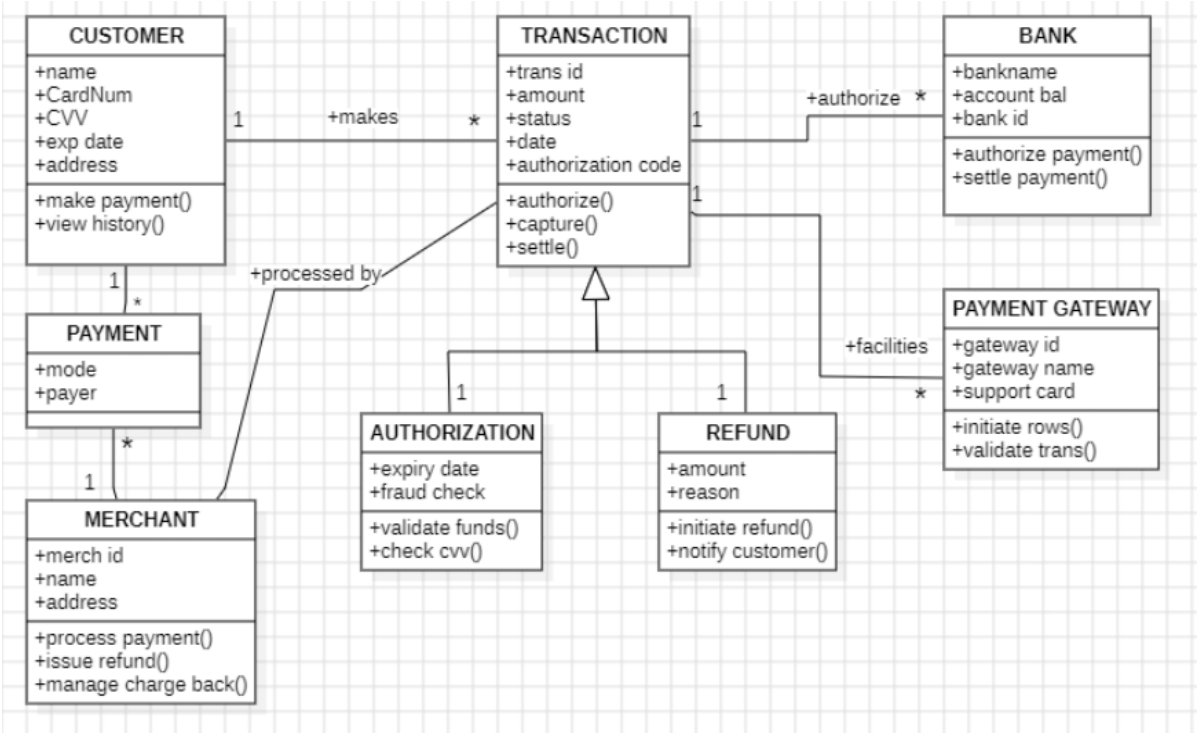


Fig 2.3.1: Class Diagram

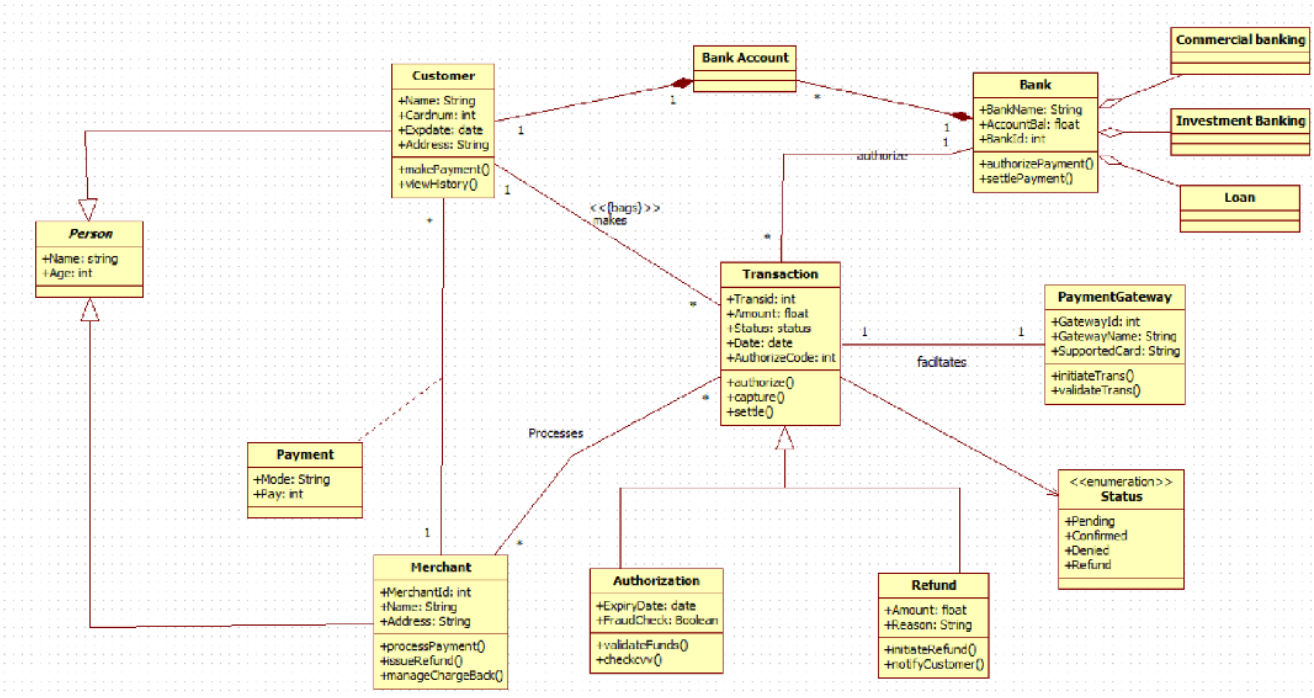


Fig 2.3.1: Advanced Class Diagram

Description:

The class diagram represents the static structure of the credit card processing system, highlighting the main entities and their relationships.

- **Classes:**
    - **Card Class**: Represents a credit card with attributes like card number, expiration date, CVV, and status (active/inactive).
    - **Account Class**: Represents the customer's account associated with the credit card, with attributes like account ID, balance, credit limit, and holder details.
    - **Bill Class**: Manages billing details, including billing ID, due date, amount due, and payment status.
    - **Transaction Class**: Tracks individual transactions with attributes like transaction ID, timestamp, amount, merchant details, and status (approved/declined).
- **Relationships:**

- **Card Class** is associated with the **Account Class** since each card is tied to a specific account.
- **Transaction Class** is linked to both **Card Class** and **Account Class**, representing purchases made with the card and their effect on the account.
- **Bill Class** is associated with the **Account Class** to manage periodic payments and outstanding balances.

2.4 State Diagram

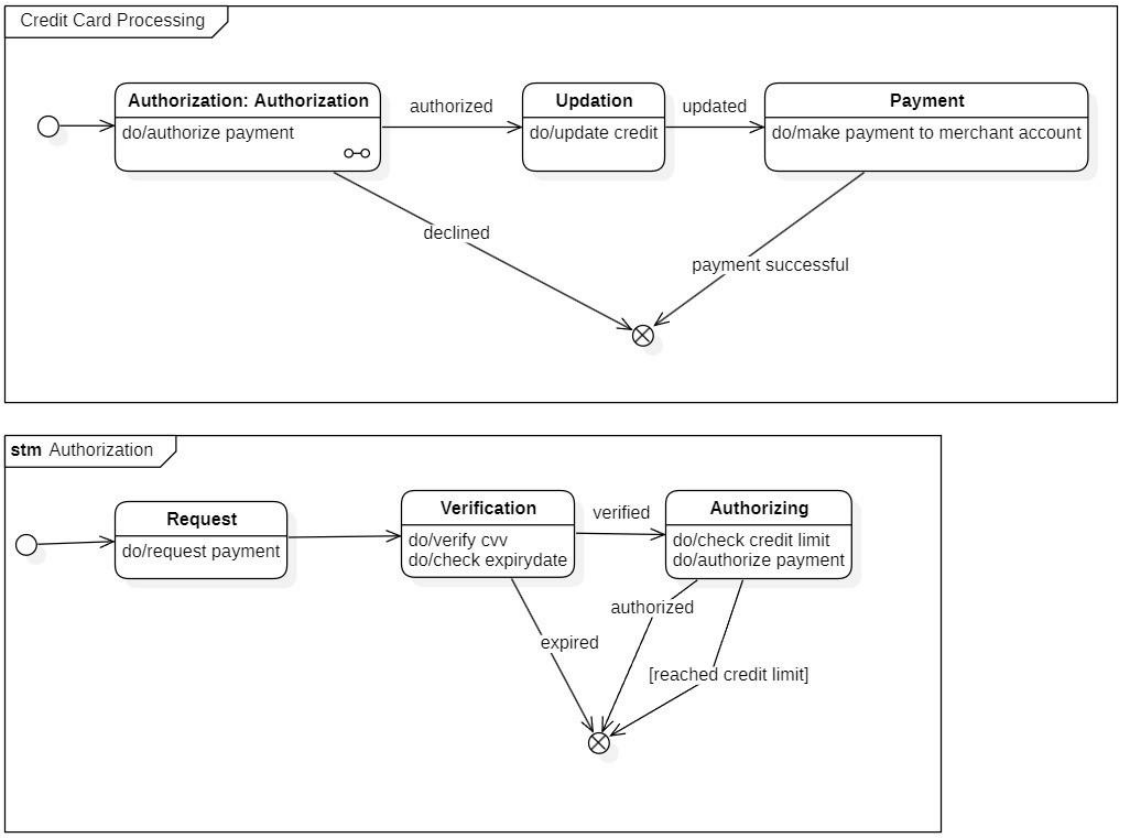


Fig 2.4.1: State Diagram

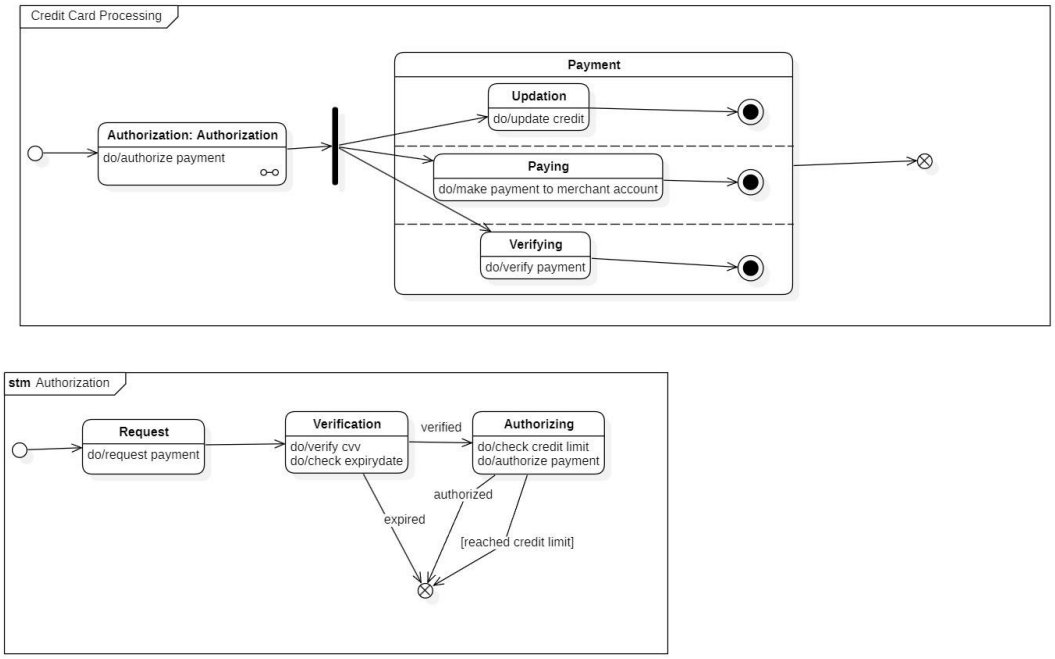


Fig 2.4.2: Advanced State Diagram

Description:

The state diagram showcases the dynamic behavior of the system, focusing on the transitions between different states.

- **States:**
    - **Authorization State**: Validates card details, checks account status, and approves or declines the transaction.
        - Sub-states:
            - Card Validation
            - Fraud Detection
            - Approval/Rejection
    - **Payment State**: Handles the payment process, involving concurrent sub-states:
        - **Updation of Credit**: Updates the available credit after a successful transaction.
        - **Paying**: Deducts the amount from the account and marks the transaction as paid.
        - **Verifying**: Confirms that the payment is correctly processed and logged.

2.5 Use Case Diagram:

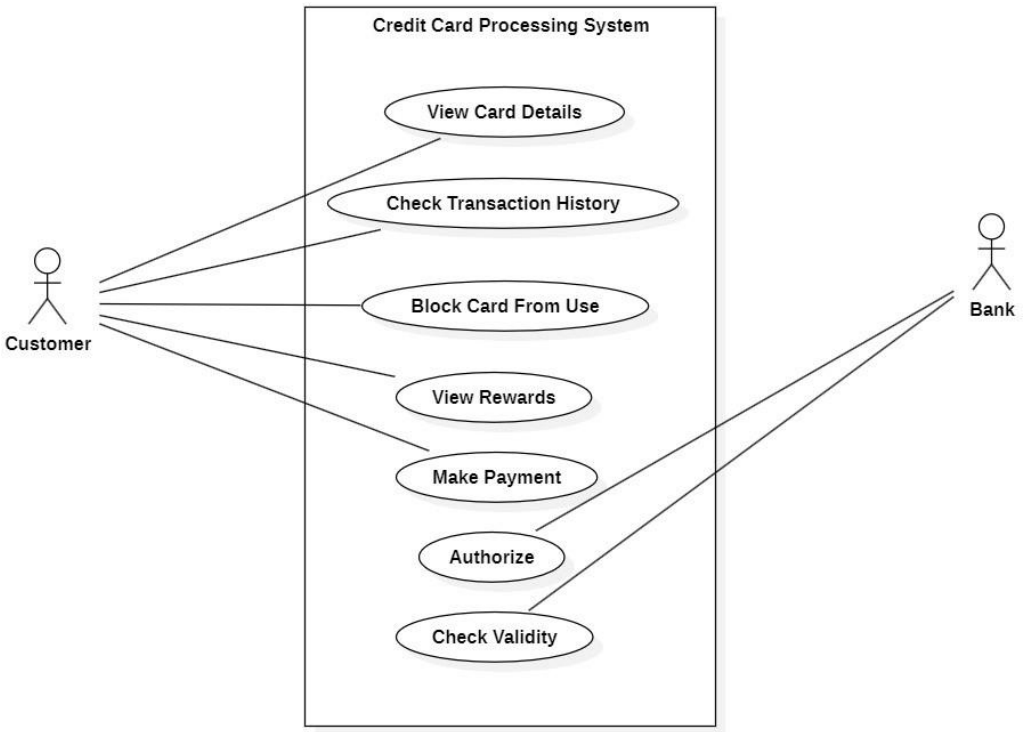


Fig 2.5.1: Use Case Diagram

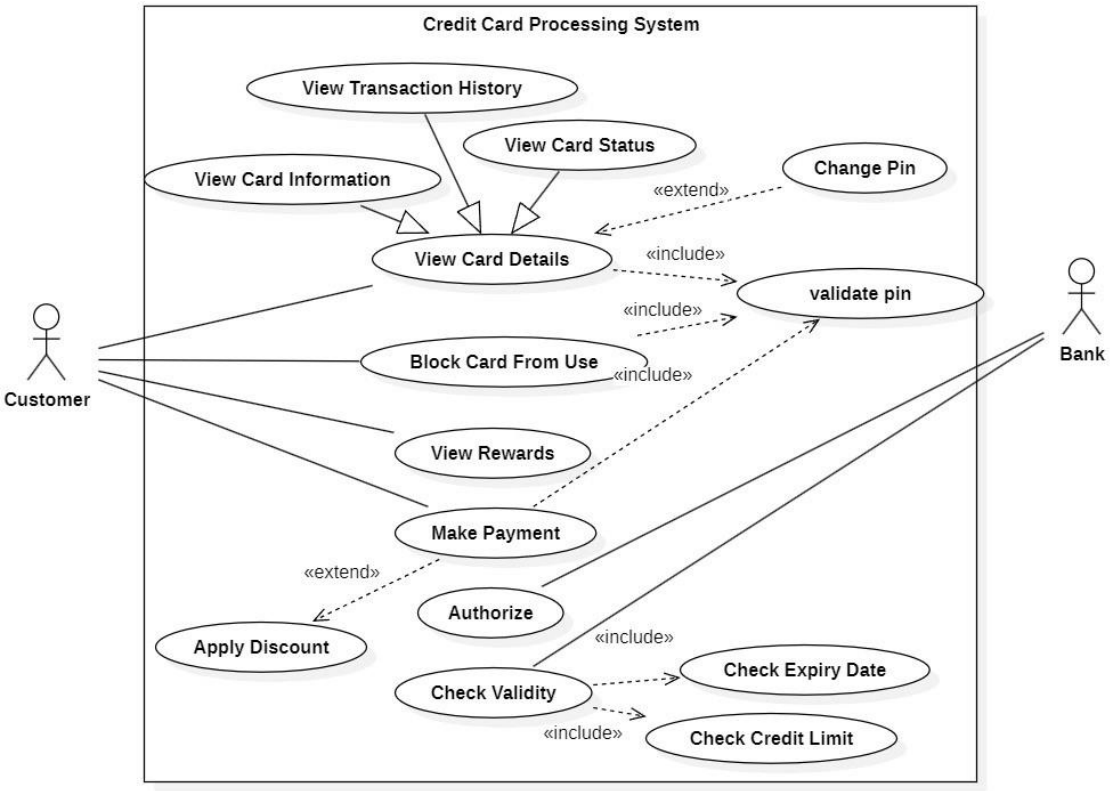


Fig 2.5.2: Advanced Use Case Diagram

Description:

The use case diagram identifies the interactions between actors and the system functionalities.

- **Actors:**
    - **Customer**: Manages card details, transactions, and rewards.
    - **Merchant**: Initiates transactions and payments.
    - **System**: Authorizes payments and manages account information.
- **Use Cases:**
    - **View Card Details**: Customers can check their credit card information.
    - **Check Transaction History**: Provides a log of past transactions for review.
    - **Block Card from Use**: Allows customers to block a lost or stolen card.
    - **View Rewards**: Displays accrued rewards or cashback for the customer.
    - **Authorize**: Validates a transaction initiated by the merchant.
    - **Make Payment**: Processes bill payments for the credit card.

2.6 Sequence Diagram:

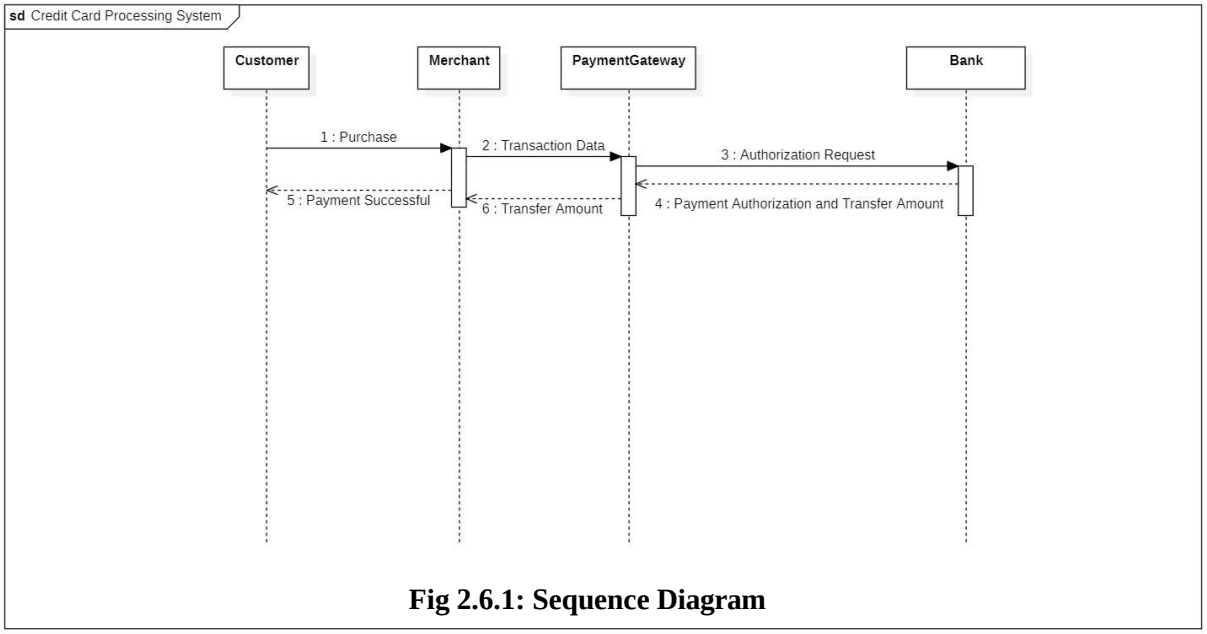


Fig 2.6.1: Sequence Diagram

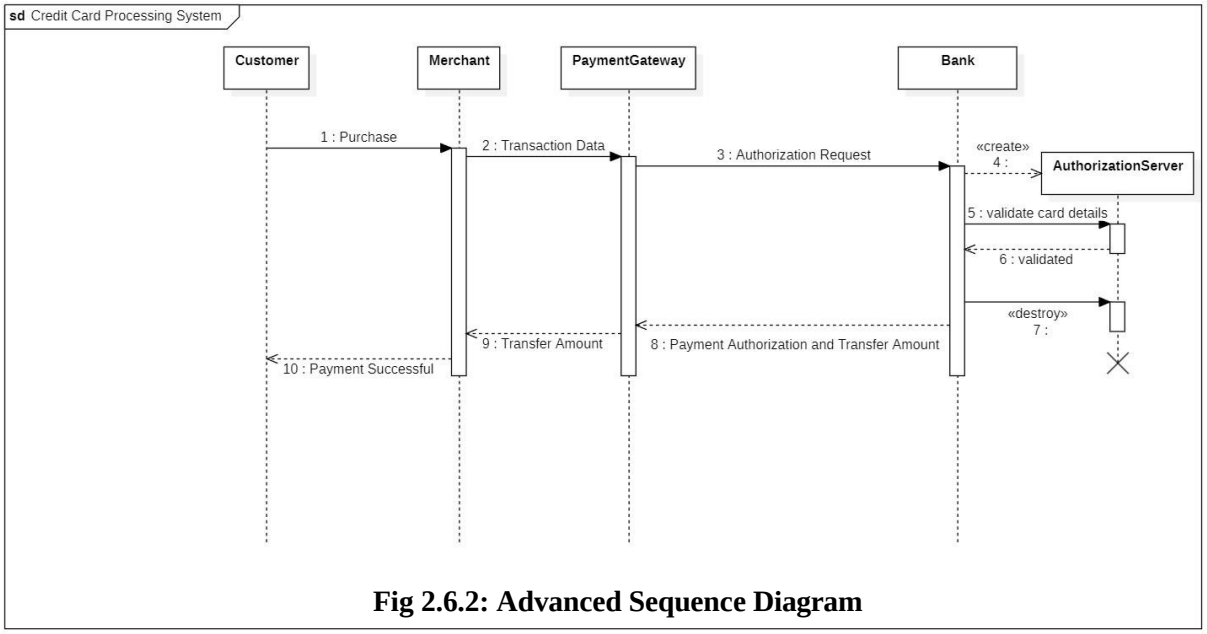


Fig 2.6.2: Advanced Sequence Diagram

Description:

The sequence diagram represents the interaction flow during a transaction.

- **Objects:**
    - **Customer**: Initiates the transaction by providing card details.

- **Merchant**: Sends the payment request to the system.
- **Payment Gateway**: Mediates between the merchant and the bank, ensuring secure processing.
- **Bank**: Validates the card and processes the transaction.
- **Authorization (Transient Object)**: Created temporarily to validate the transaction.

- **Flow:**

1. Customer provides card details to the Merchant.
2. Merchant forwards the details to the Payment Gateway.
3. Payment Gateway requests transaction approval from the Bank.
4. Bank validates card and account details, creating an Authorization object.
5. Authorization object verifies and responds with an approval/decline status.
6. Payment Gateway informs the Merchant, who finalizes the transaction.

2.7 Activity Diagram

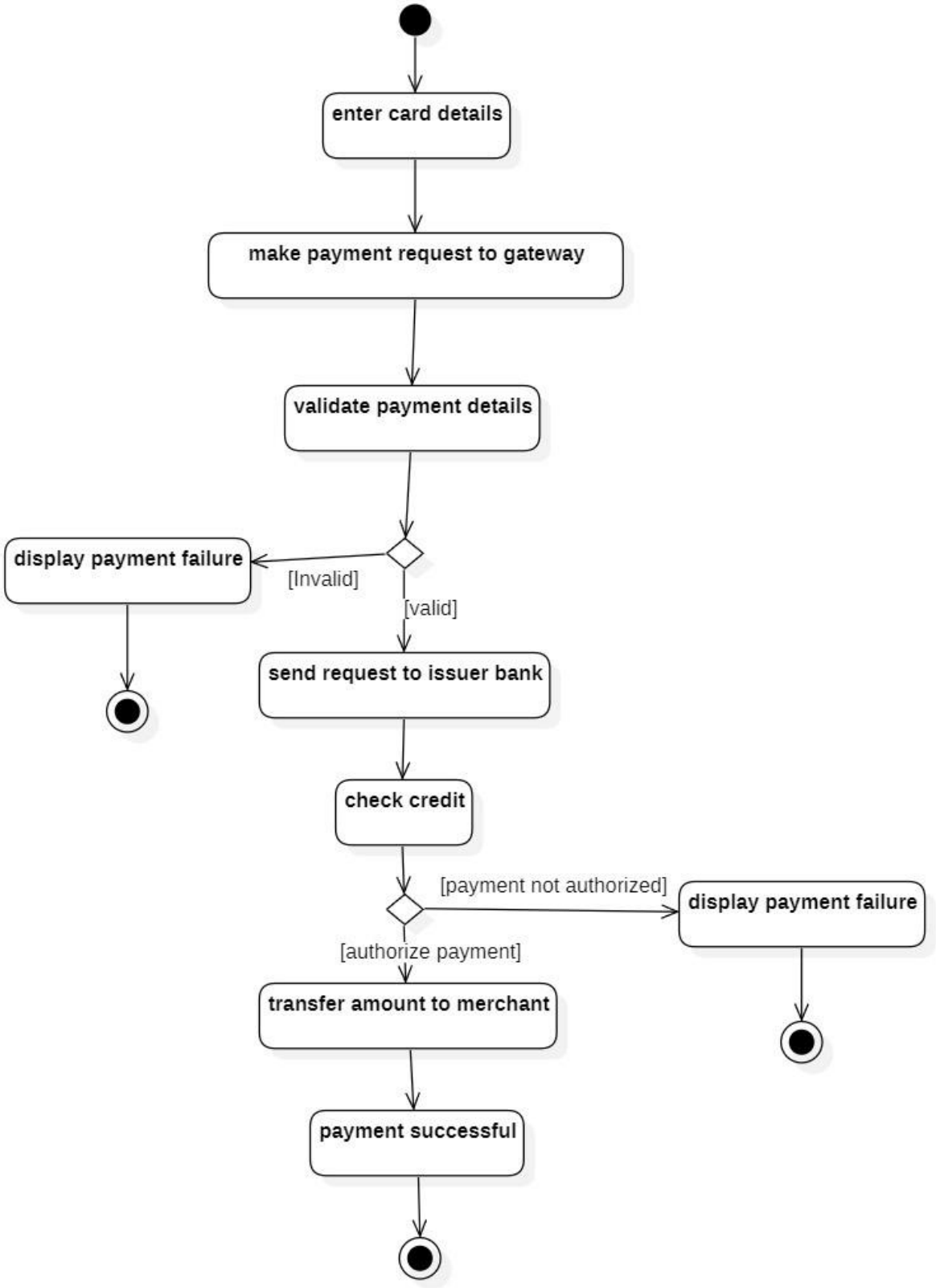


Fig 2.7.1: Activity Diagram

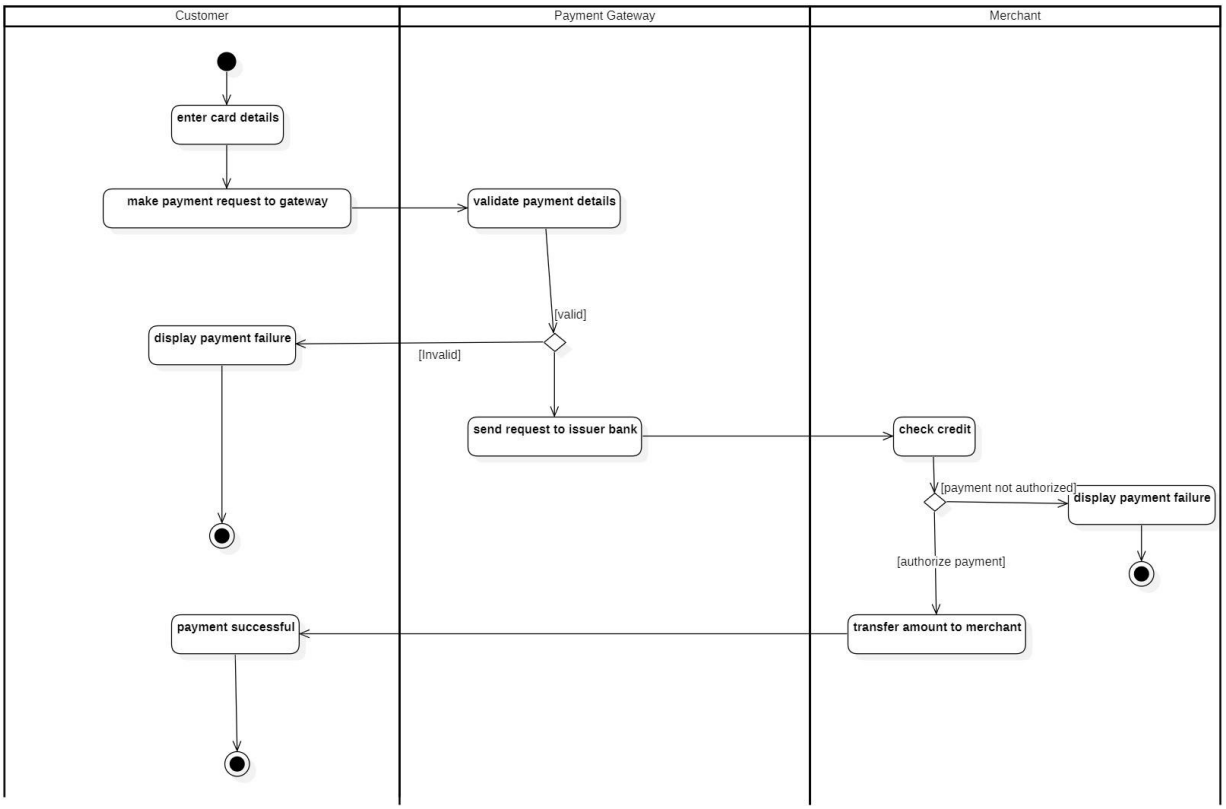


Fig 2.7.2: Advanced Activity Diagram

Description:

The activity diagram outlines the process flow during a payment, divided into swimlanes for clarity.

- **Swimlanes:**
    - **Payment Gateway**: Manages secure processing and communication with the bank.
    - **Customer**: Initiates the transaction and confirms payment.
    - **Merchant**: Processes the payment request and completes the transaction.
- **Flow:**

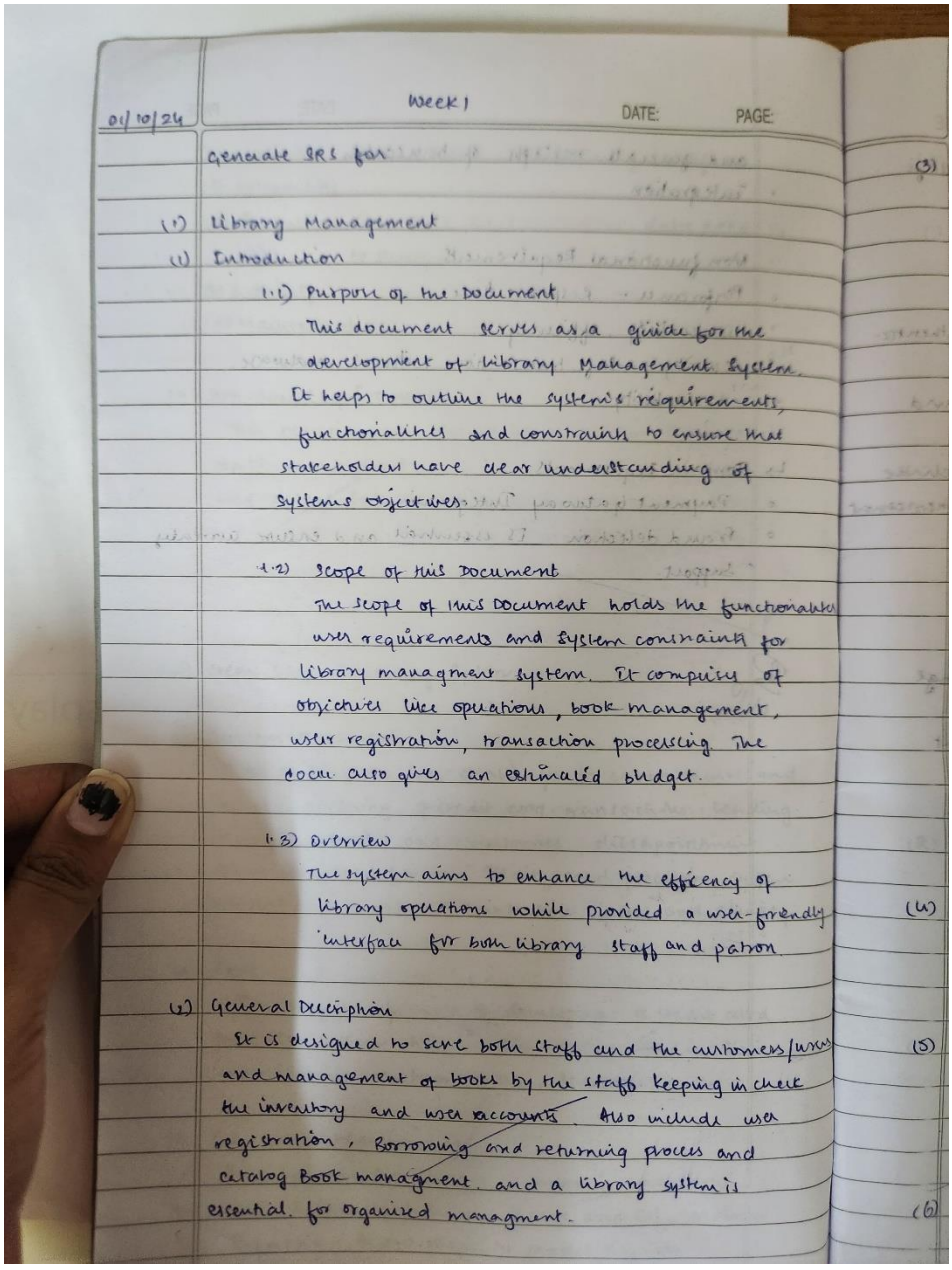
1. Customer initiates payment by providing card details to the Merchant.
2. Merchant sends payment details to the Payment Gateway.
3. Payment Gateway validates details and communicates with the Bank.
4. Bank processes the transaction and confirms success/failure to the Payment Gateway.

5. Payment Gateway updates the Merchant, who completes the process and informs the Customer.

3. Library Management System

3.1 Problem Statement: Traditional library management systems rely heavily on manual record-keeping, which is inefficient and susceptible to errors. Tasks like book issuance, returns, fine calculations, and inventory management are time-consuming and difficult to track. There is a need for an automated system that can streamline these operations, provide accurate records, and improve user accessibility to library resources.

3.2 SRS:



01/10/24 Week 1 DATE: PAGE:

Generate SRS for (3)

(1) Library Management

(1) Introduction

1.1) Purpose of the Document

This document serves as a guide for the development of library Management System. It helps to outline the system's requirements, functionalities and constraints to ensure that stakeholders have clear understanding of systems objectives.

1.2) Scope of this Document

The scope of this Document holds the functionality user requirements and system constraints for library managment system. It compriss of objectives like operations, book management, user registration, transaction processing. The docu also gives an estimated budget.

1.3) Overview

The system aims to enhance the efficency of library operations while provided a user-friendly interface for both library staff and patron. (4)

(2) General Description

It is designed to serve both staff and the customers/users (5)
and management of books by the staffs keeping in check the inventory and user accounts. Also include user registration, Borrowing and returning process and catalog Book managment. and a library system is essential for organized managment. (6)

DATE: PAGE:

(3) Functional Requirements.

1) User registration and Authentication
- That is users should be able to login and register their accounts
- Admin access to manage and handle these accounts.

2) Book Management
- The Admins can add update, and delete book records.
- The system should have relevant details about the books: title, author etc.)

3) search filter and Borrowing and returning books process
users can search using title, author and efficiently research and borrow books.

4) Reporting
The system should generate reports on borrowing activity, popular books etc.

(4) Interface Requirements
User and system Interface are required for accessibility and users APIs for trans-interaction.

(5) performance Requirements
This would include the response time, Usage of Data how to handle traffic on the Application and enhance multiple user experience.

(6) Design constraints
This would include technological constraints that is it

DATE: PAGE:

to be developed by Specific tools like Javascript, Node.js HTML/CSS for both frontend and backend.
And enhance accessibility.

(7.) Non functional Attributes:

- Security - The system must ensure secure user authentication and privacy of data.
- Portability - The application should be applicable and accessible in all other devices.
- Reliability - The system must be efficient and reliable.
- Scalability - The system should be open to enhancements and future changes.

(8) Preliminary Schedule and Budget:

Timeline of the Project - we can consider a range and here we take a year.

Requirement gathering, design, development testing and deployment.

Budget - Assuming the costs

Requirements would be - 30000 Rupees

Testing and Deployment - ₹ 1,00,000.

01.10

3.3 Class Diagram:

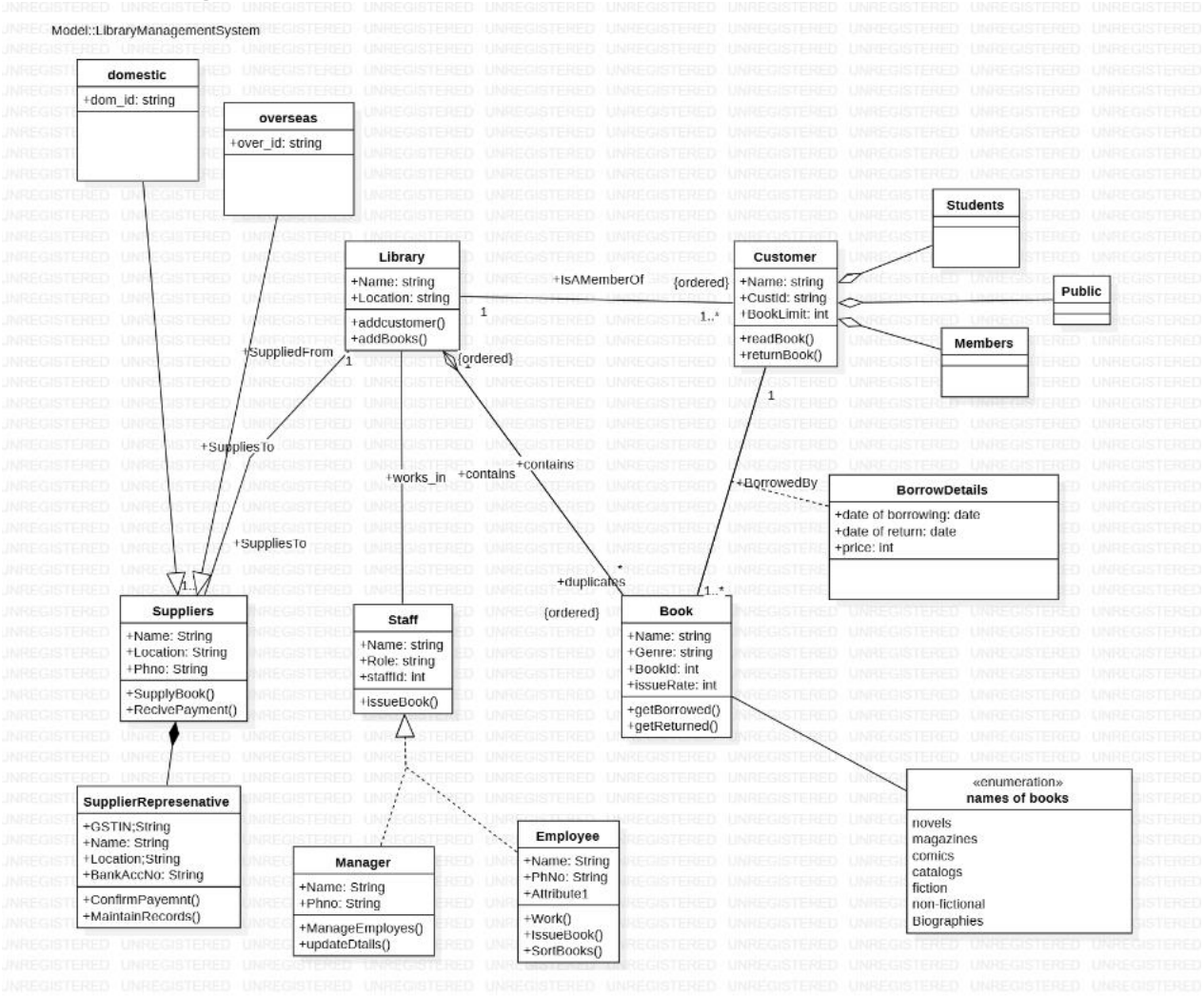


Fig 3.3.1: Class Diagram

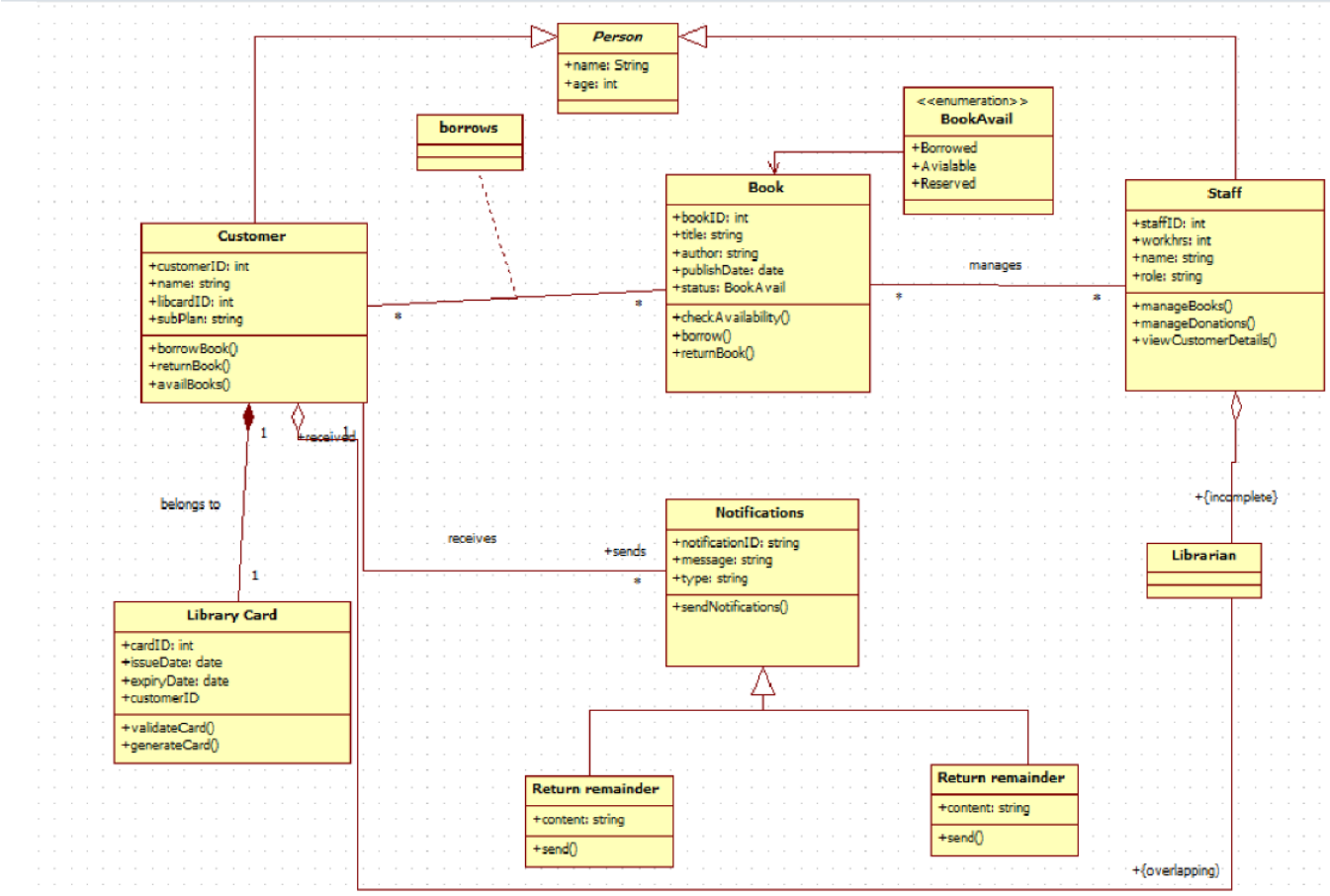


Fig 3.3.2: Advanced Class Diagram

Description:

The class diagram outlines the structure of the library management system, highlighting key entities and their relationships.

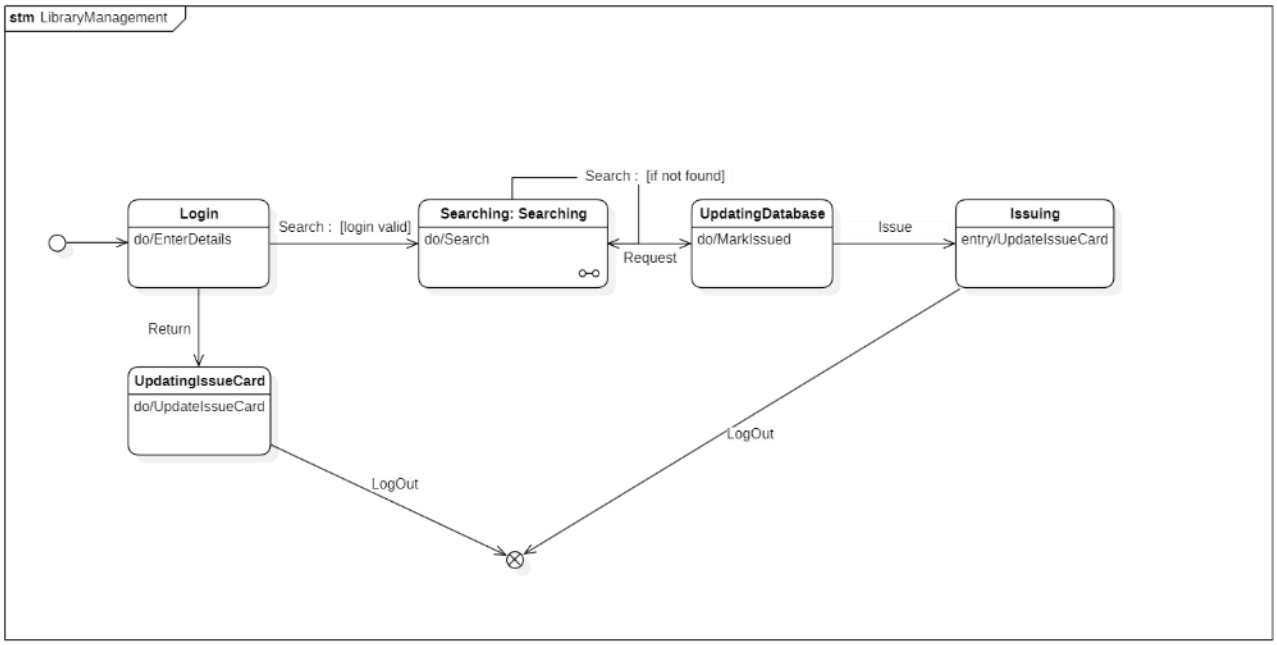
- **Classes:**
    - **Book Class**: Represents a book with attributes like book ID, title, author, genre, and availability status.
    - **Member Class**: Abstract class representing library members, generalized into:
        - **Student Class**: A specific type of member with attributes like student ID and grade.
        - **Professor Class**: A specific type of member with attributes like professor ID and department.
    - **LibraryCard Class**: Represents a unique card assigned to members to track borrowing activity.

- **IssueCard Class**: Represents a temporary overlap of **Book** and **Member**, tracking the details of issued books, including issue date, due date, and status.
- **Library Class**: Manages the overall library system, composed of:
  - **LibraryBranch Class**: Represents individual branches with attributes like branch ID, name, and address.

- **Relationships:**
  - The **Member Class** and **LibraryCard Class** have an association since each member holds a library card.
  - The **IssueCard Class** overlaps the **Book Class** and **Member Class**, representing borrowed books.
  - **Library Class** is composed of multiple **LibraryBranch Classes** for a distributed library system.

‘

3.4 State Diagram:



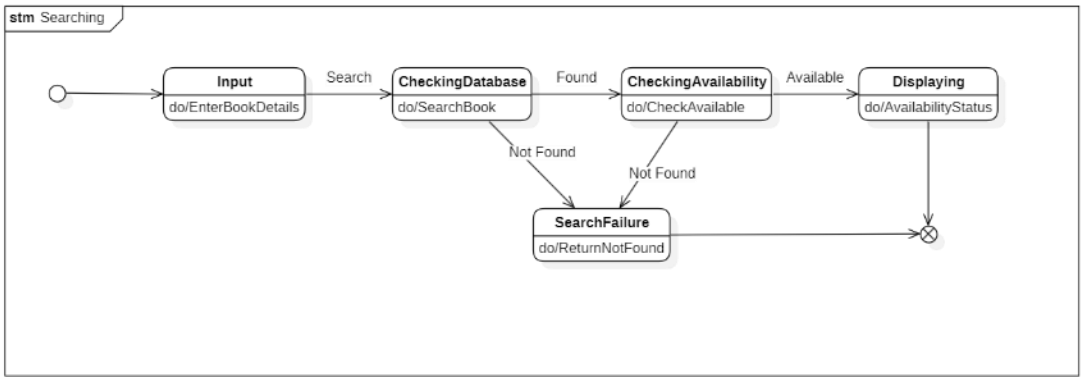


Fig 3.4.1: State Diagram

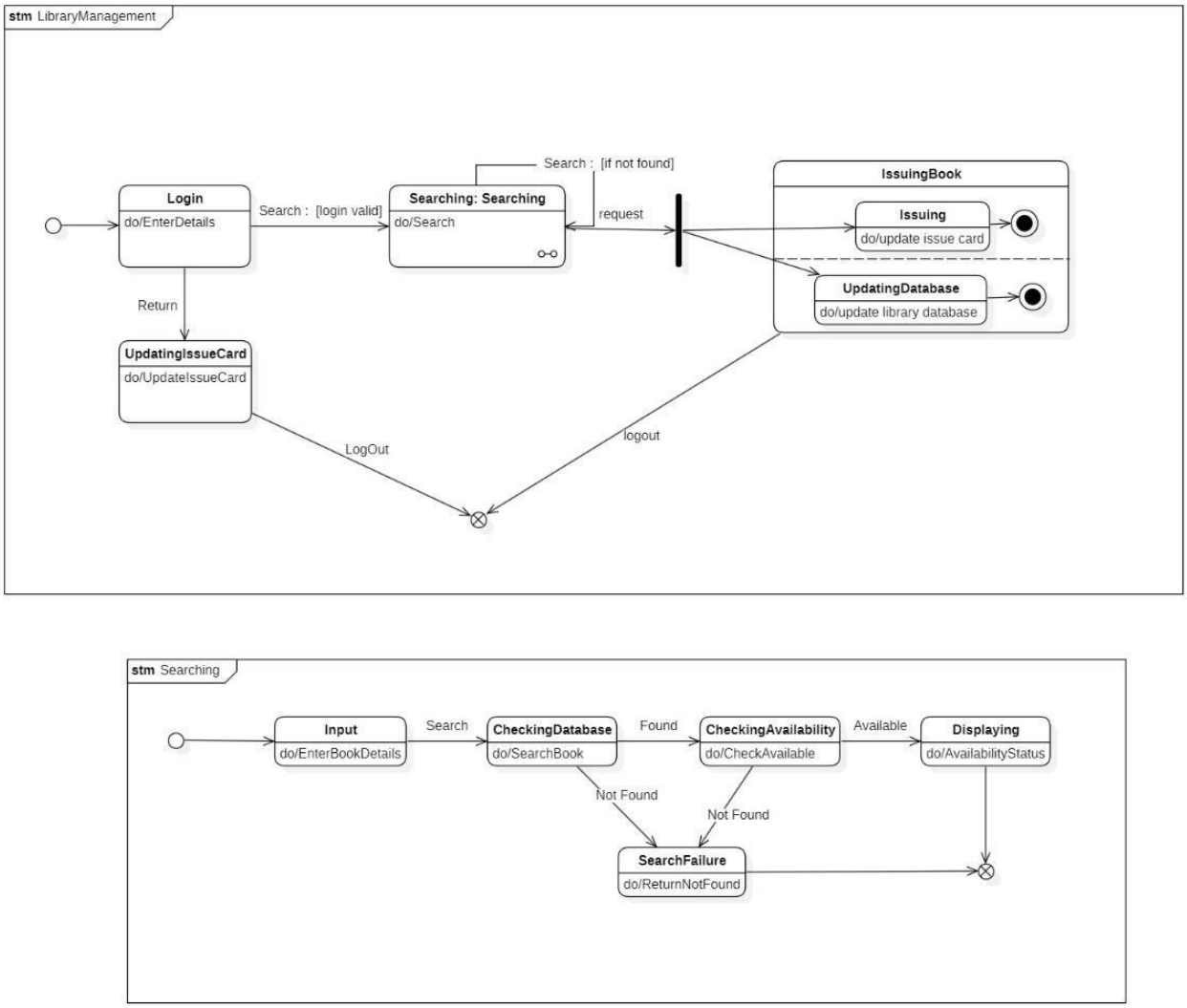


Fig 3.4.2: Advanced State Diagram

Description:

The state diagram illustrates the transitions between various states in the library management system.

- **States:**
    - **Login State**: Represents when users or librarians log into the system.
    - **Searching State**: Handles searching for books based on criteria like title, author, or genre.
        - Sub-states:
            - Keyword Search

        - Advanced Search (e.g., by publication date or availability)
    - **Updating Database**: Handles the addition, deletion, or modification of records (e.g., book details or member details).
        - Concurrent with **Issuing**.
    - **Issuing State**: Manages the borrowing process, including verifying book availability and member status.
    - **Updating Issue Card**: Updates records in the **IssueCard Class** to track borrowed books.
- **Concurrency:**
    - **Issuing** and **Updating Database** occur simultaneously.

3.5 Use Case Diagram:

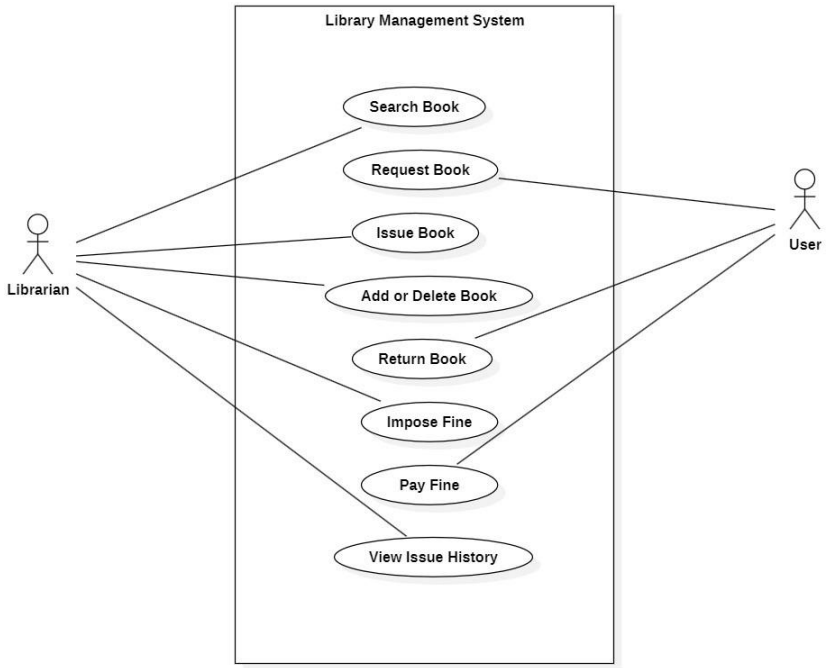


Fig 3.5.1: Use Case Diagram

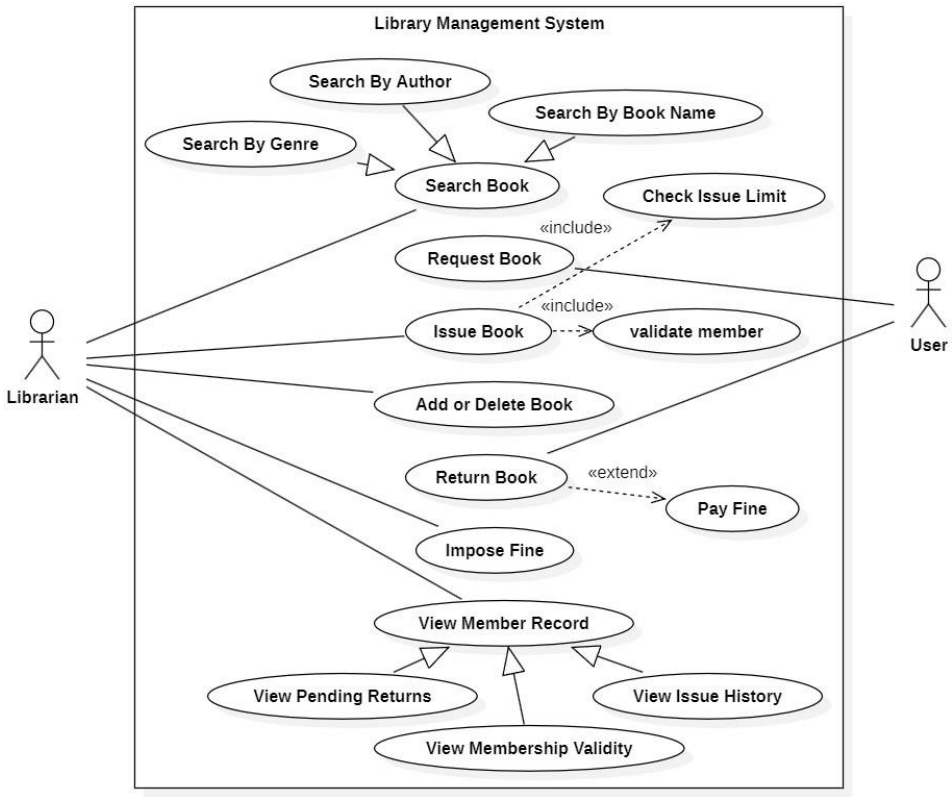


Fig 3.5.2: Advanced Use Case Diagram

Description:

The use case diagram defines the interactions between actors and system functionalities.

- **Actors:**
    - **Librarian**: Manages library operations such as adding/deleting books and imposing fines.
    - **Member**: Includes both students and professors, who interact with the system for book-related tasks.
- **Use Cases:**
    - **Search Book**: Members search for books in the library catalog.
    - **Request Book**: Members can place a request for unavailable books.
    - **Issue Book**: Books are issued to members after verification.
    - **Add or Delete Book**: Librarians manage the catalog by adding or removing books.
    - **Return Book**: Members return borrowed books, and the system updates the database.
    - **Impose Fine**: Librarians impose fines for overdue returns.
    - **Pay Fine**: Members pay the imposed fines through the system.
    - **View Issue History**: Members can view their borrowing history.

3.6 Sequence Diagram:

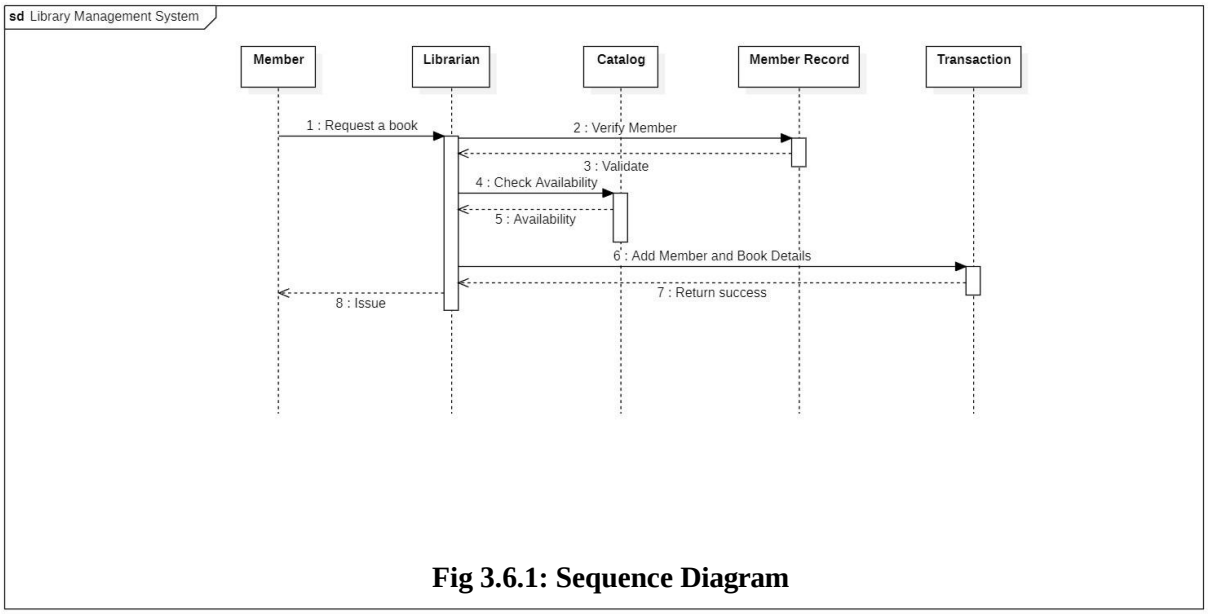


Fig 3.6.1: Sequence Diagram

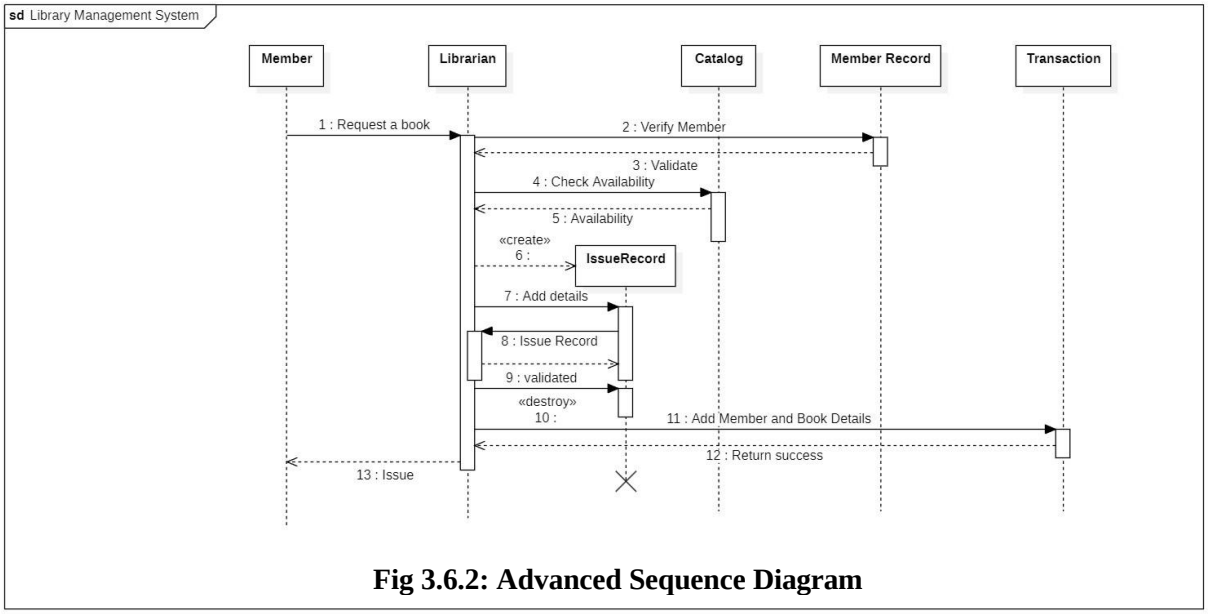


Fig 3.6.2: Advanced Sequence Diagram

Description:

The sequence diagram illustrates the interaction flow for issuing a book.

- **Objects:**

- **Member**: Initiates a book issue request.
- **Librarian**: Verifies the member's credentials and book availability.
- **Catalog**: Checks the availability of the requested book.
- **Member Record**: Updates the member's borrowing details after the book is issued.
- **Transaction**: Represents the book-issuing transaction, tracking details like issue and due dates.

- **Flow:**

1. Member searches for a book and requests to issue it.
2. Librarian checks the Member Record and verifies the book in the Catalog.
3. Catalog confirms book availability.
4. Transaction object records the issue details.
5. Member Record is updated with the new transaction.

3.7 Activity Diagram

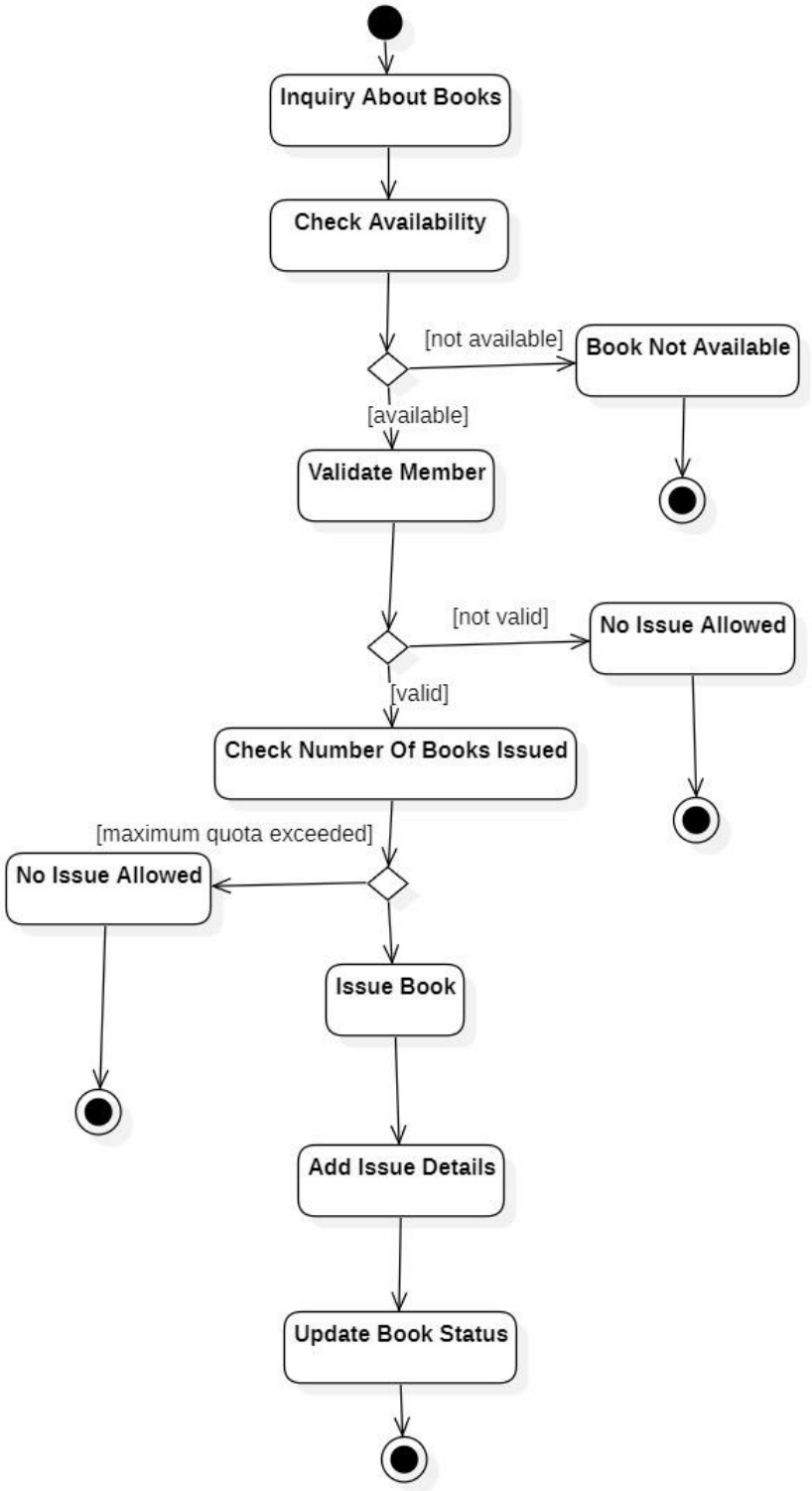


Fig 3.7.1: Activity Diagram

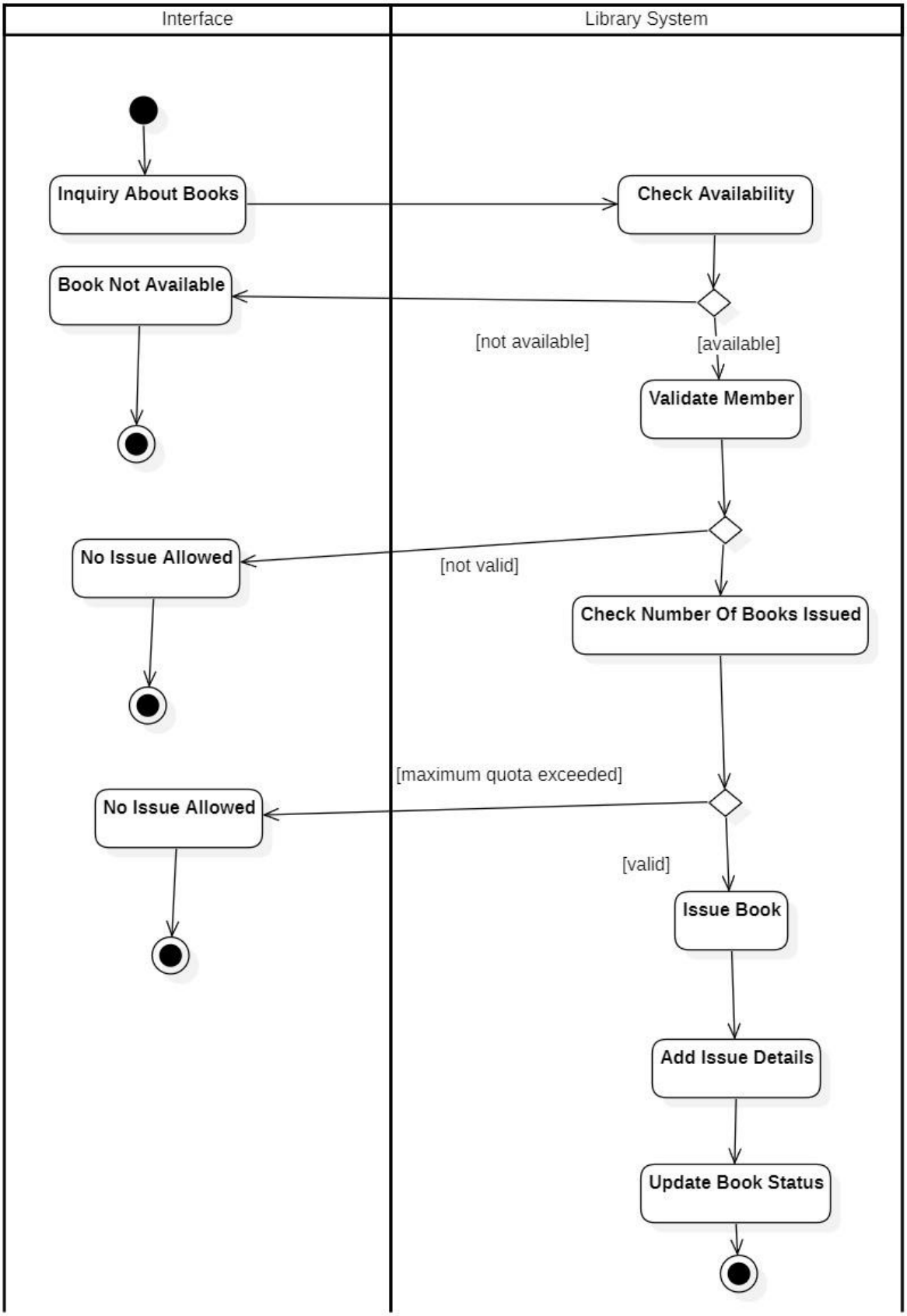


Fig 3.7.2: Advanced Activity Diagram

Description:

The activity diagram shows the process of issuing a book, divided into swimlanes for clarity.

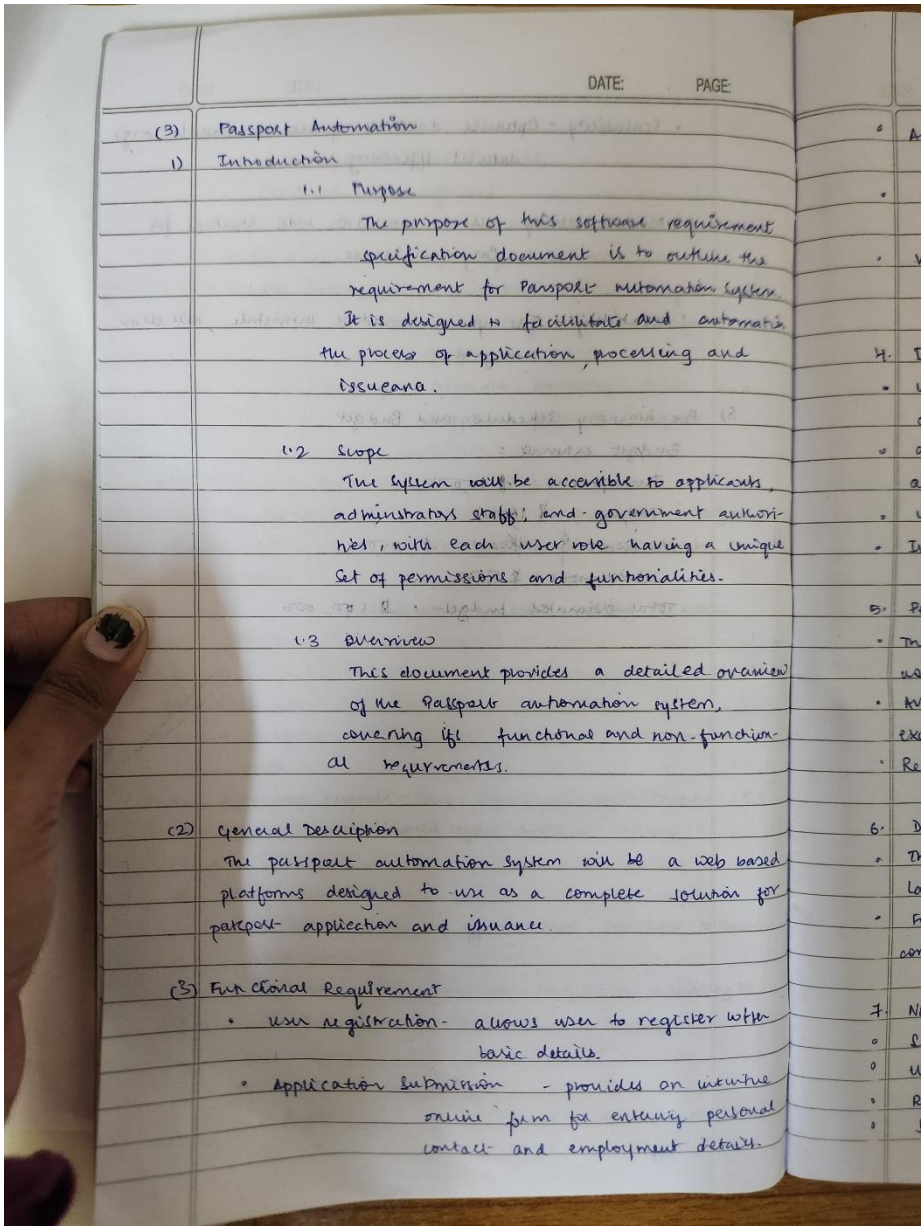
- **Swimlanes:**
    - **Interface**: Represents the system's user interface where members and librarians interact.
    - **Library Management**: Handles backend operations like book availability checks, member validation, and transaction processing.
- **Flow:**

1. Member logs in and searches for a book via the Interface.
2. Library Management validates the request and checks book availability.
3. If available, the book is issued, and the transaction is recorded.
4. Interface updates the member's borrowing details and confirms the issue.

4. Passport Automation System

4.1 Problem Statement: The manual process of passport issuance and renewal is cumbersome, time-consuming, and prone to delays due to inefficiencies in document verification and record management. Applicants often face challenges in tracking the status of their applications. An automated passport management system is needed to streamline the entire process, from application submission to passport issuance, while ensuring data security and transparency.

4.2 SRS:



DATE: PAGE:

(3) Passport Automation

1) Introduction

1.1 Purpose

The purpose of this software requirement specification document is to outline the requirement for Passport automation system. It is designed to facilitate and automate the process of application, processing and issuance.

1.2 Scope

The system will be accessible to applicants, administrators staffs, and government authorities, with each user role having a unique set of permissions and functionalities.

1.3 Overview

This document provides a detailed overview of the Passport automation system, covering its functional and non-functional requirements.

(2) General Description

The passport automation system will be a web based platforms designed to use as a complete solution for passport application and issuance.

(3) Functional Requirement

- User registration - allows user to register with basic details.
- Application Submission - provides an intuitive online form for entering personal contact and employment details.

DATE: PAGE:

- Appointment management - Allows users to book, reschedule or cancel appointment
- Payment processing - implement a secure payment gateway for application fees.
- Verification - workflow for document verification, BSL check, and police verification.

4. Interface Requirement
- User friendly portal with forms, tracking dashboard and appointment management.
- access to application approval, background check data and final issuance.
- integration with third-party payment gateways.
- Implement email and SMS for notification and OTP's.

5. Performance Requirement
- The system should support upto 10,000 concurrent users.
- Average response time for each transaction should not exceed .2 sec.
- Real-time updates for application tracking.

6. Design constraint
- The system must comply with national data protection laws.
- Follow security practices for data encryption and access control.

7. Non-functional Requirement
- Security - implement role based access control.
- Usability -
- Reliability - ensure 99.9% uptime for 24/7.
- Scalability

DATE: PAGE:

8. Preliminary schedule and Budget:

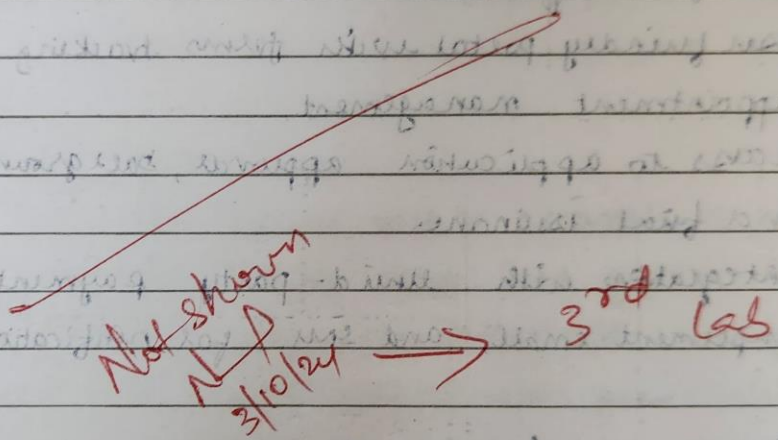
Budget estimate:

Development = $80,000

Testing: $ 20000

Hardware and Software: $ 25000

Miscellaneous: $ 5000



4.3 Class Diagram:

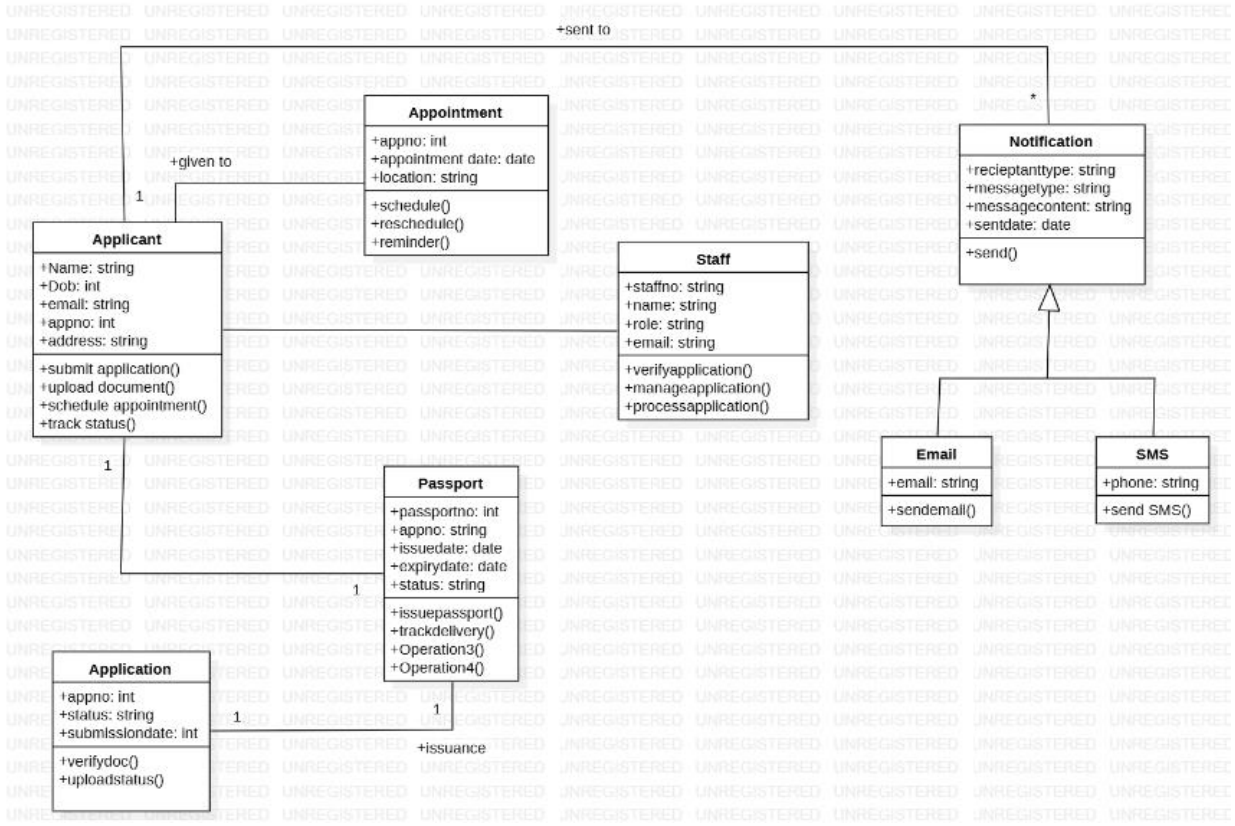


Fig 4.3.1: Class Diagram

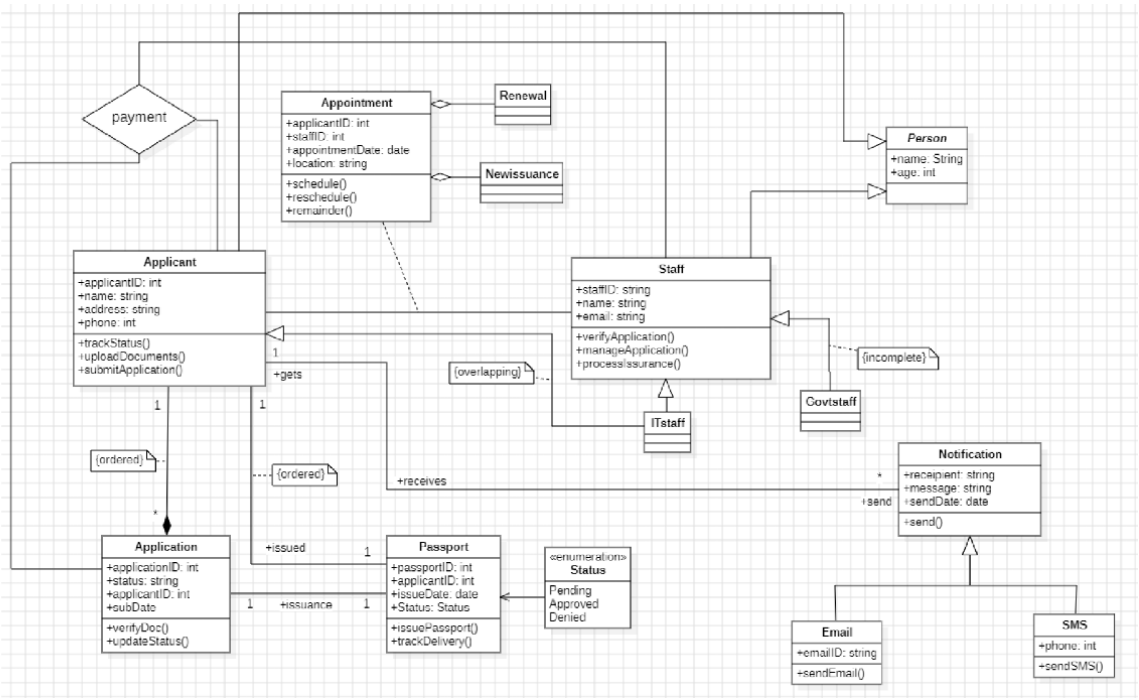


Fig 4.3.2: Advanced Class Diagram

Description:

The class diagram represents the static structure of the system, highlighting main entities and their relationships.

- **Classes:**
    - **Application Class**: Represents the overall process of passport applications, with generalizations:
        - **Initial Application**: For first-time passport applicants, containing attributes like birth certificate details and ID proof.
        - **Renewal Application**: For applicants renewing expired or soon-to-expire passports, with renewal-specific attributes.
        - **Lost Passport Application**: For applicants reporting and replacing lost

passports, including police complaint details.

- **Passport Class**: Represents a passport with attributes like passport number, issue date, expiration date, and applicant details.
- **Verification Class**: Manages the verification process, with attributes like verification ID, type (police, regional admin), and status (approved/rejected).

- **Relationships:**
  - **Application Class** is associated with **Passport Class** to represent the issuance process.
  - **Verification Class** is linked to **Application Class** to ensure every application goes through proper checks.

4.4 State Diagram:

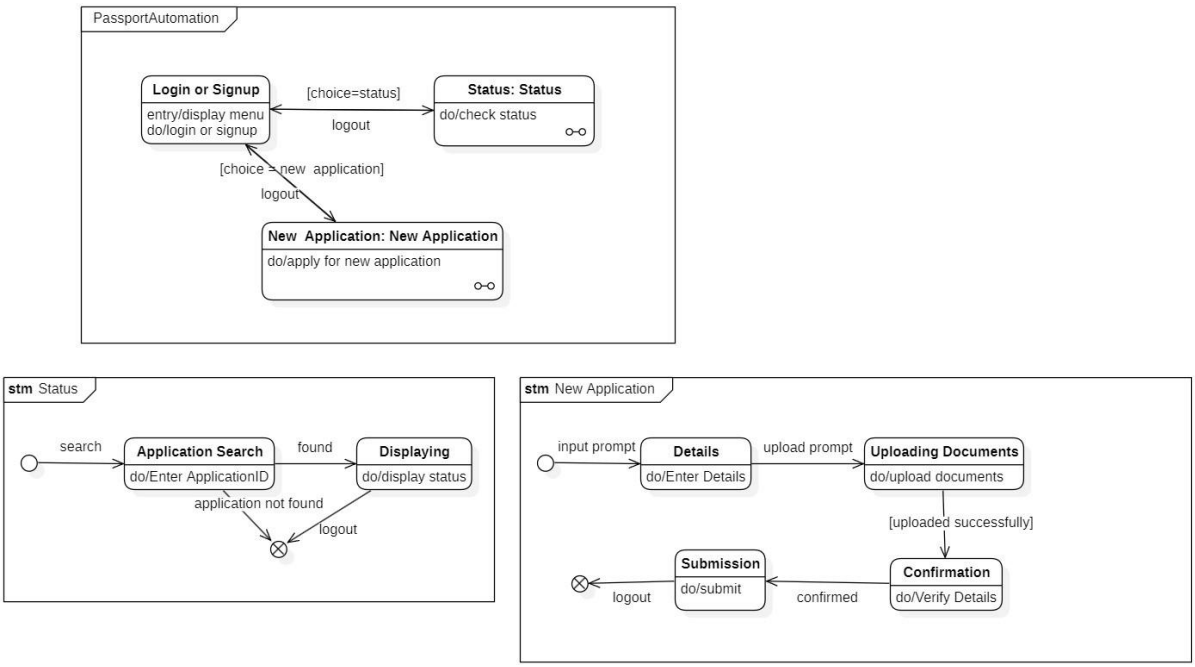


Fig 4.4.1: State Diagram

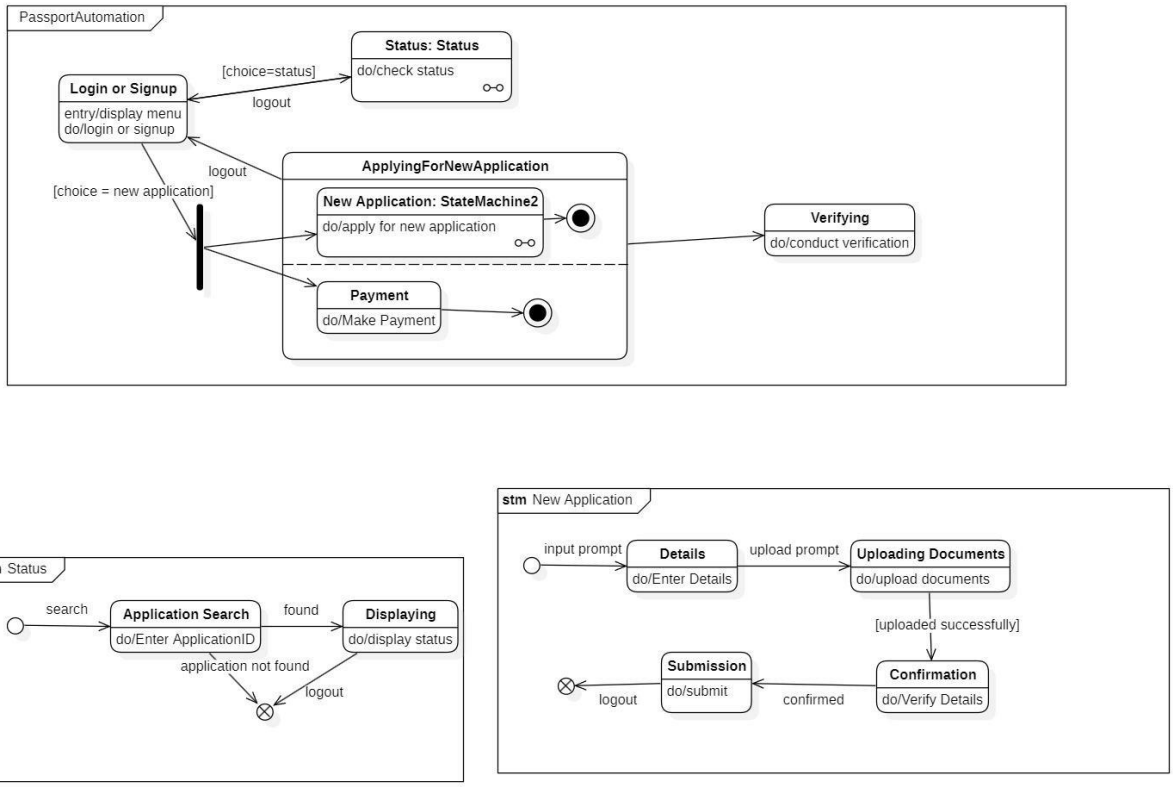


Fig 4.4.2: Advanced State Diagram

Description:

The state diagram outlines the transitions between different states in the passport automation system.

- **States:**
    - **Login State**: Represents user authentication into the system.
    - **Status State**: Enables applicants to check their application status.
    - **Verifying State**: Manages the verification of applicant details by authorities.
    - **Applying for New Application State**: Handles the process of submitting a new application.
        - **Concurrent States**:
            - **New Application**: Submits applicant details and required documents.
            - **Payment**: Manages the payment of fees for the application.
        - **Submachines**:
            - **New Application**: Includes steps like entering details and uploading documents.
            - **Status**: Tracks the progress of the application.

4.5 Use Case Diagram:

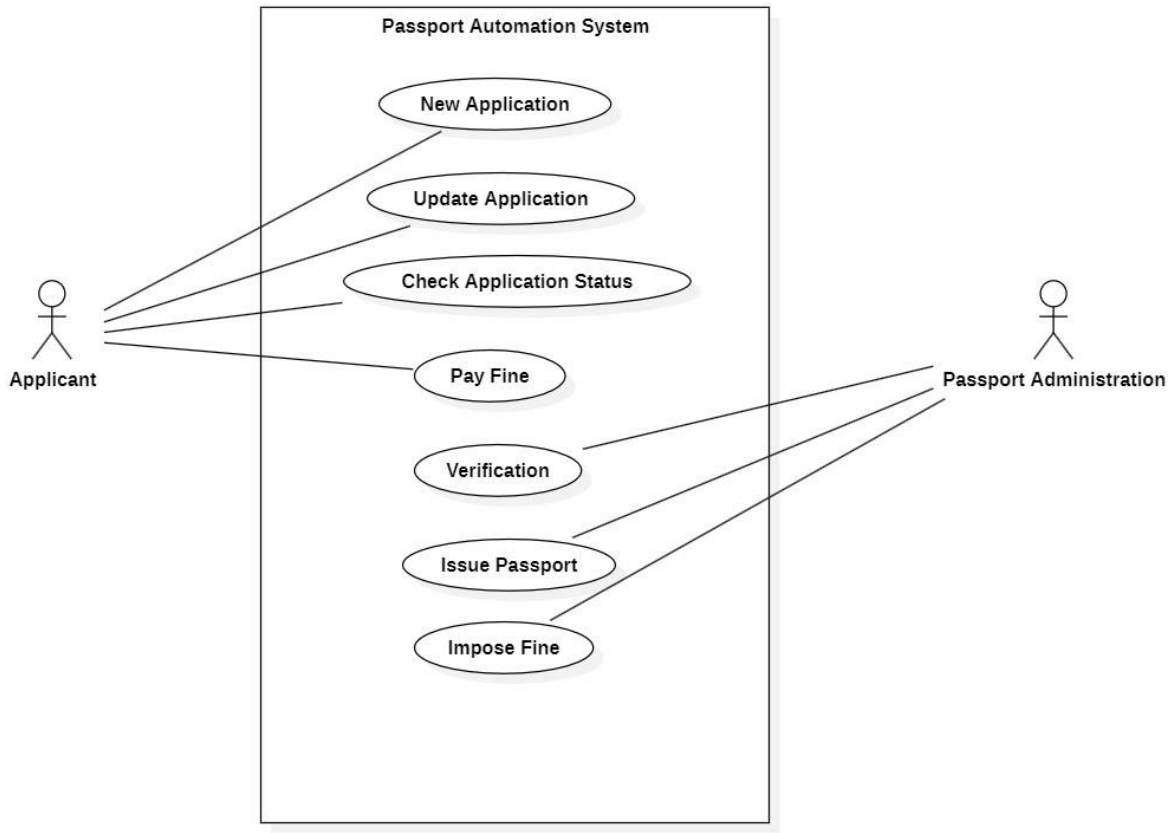


Fig 4.5.1: Use Case Diagram

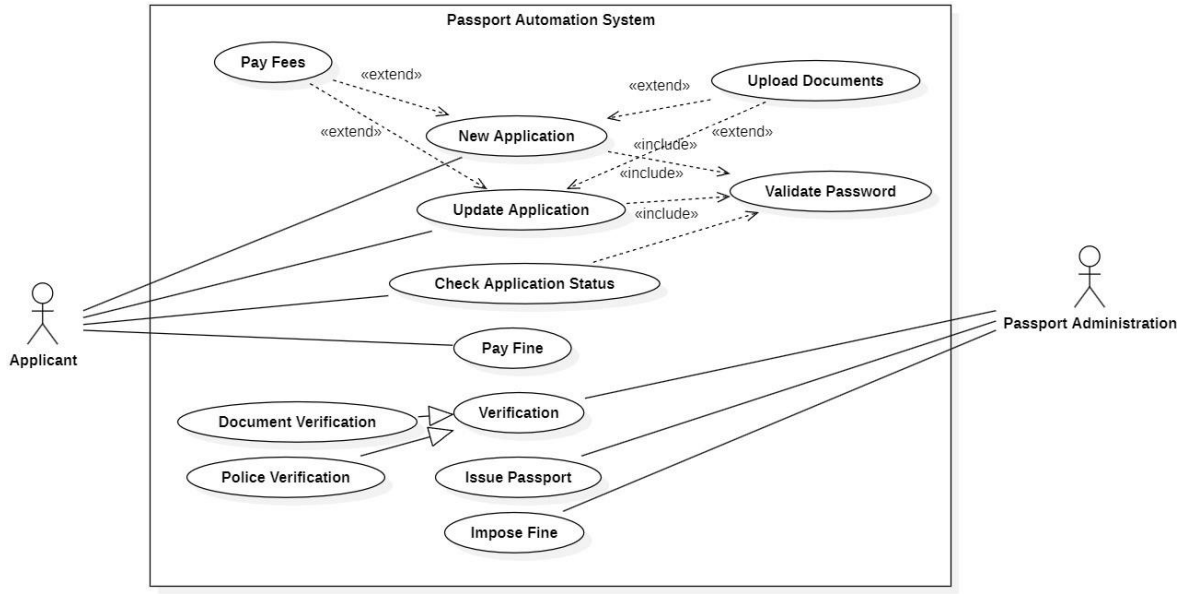


Fig 4.5.2: Advanced Use Case

Description:

The use case diagram illustrates interactions between users (actors) and system functionalities.

- **Actors:**
    - **Applicant**: Submits applications, checks status, and pays fines.
    - **Passport Admin**: Processes applications and imposes fines.
- **Use Cases:**
    - **New Application**: Submit a fresh application for a passport.
    - **Update Application**: Make changes to an ongoing or existing application.
    - **Check Application Status**: Track the progress of an application.
    - **Verification**: Authorities verify applicant details.
    - **Pay Fine**: Handles fines for late renewals or errors.
    - **Issue Passport**: Final step where the passport is issued to the applicant.

Impose Fine: Admin imposes penalties for discrepancies or delays.

4.6 Sequence Diagram:

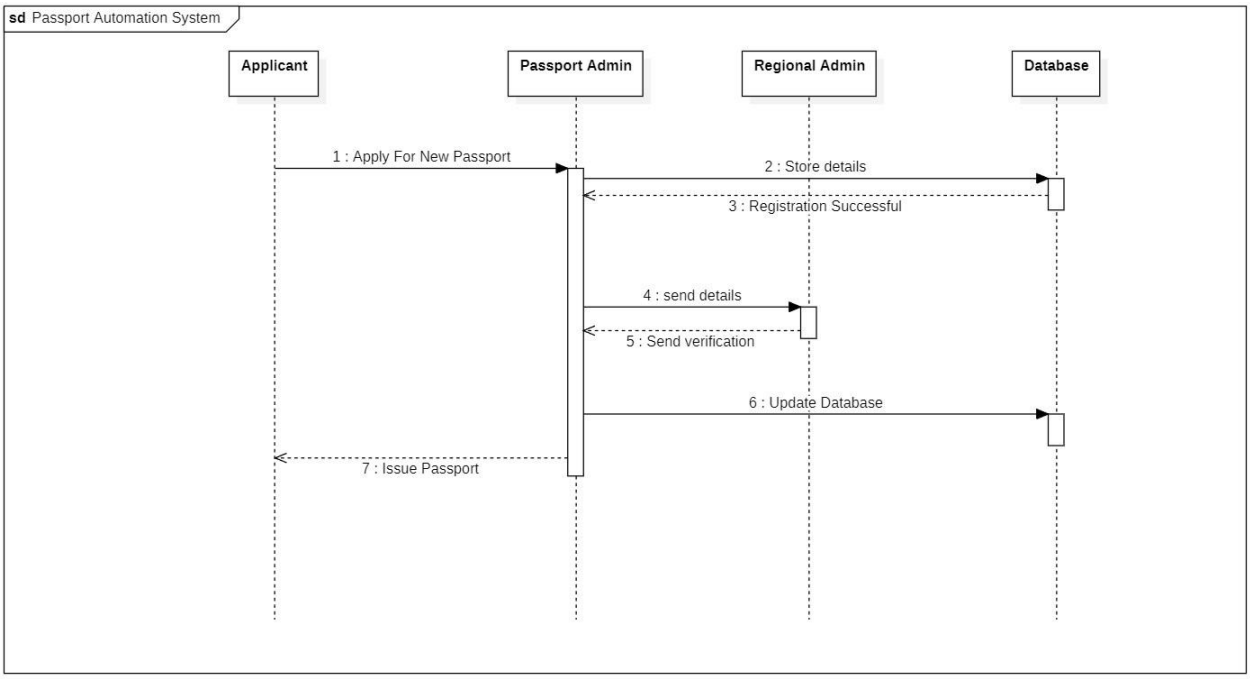


Fig 4.6.1: Sequence Diagram

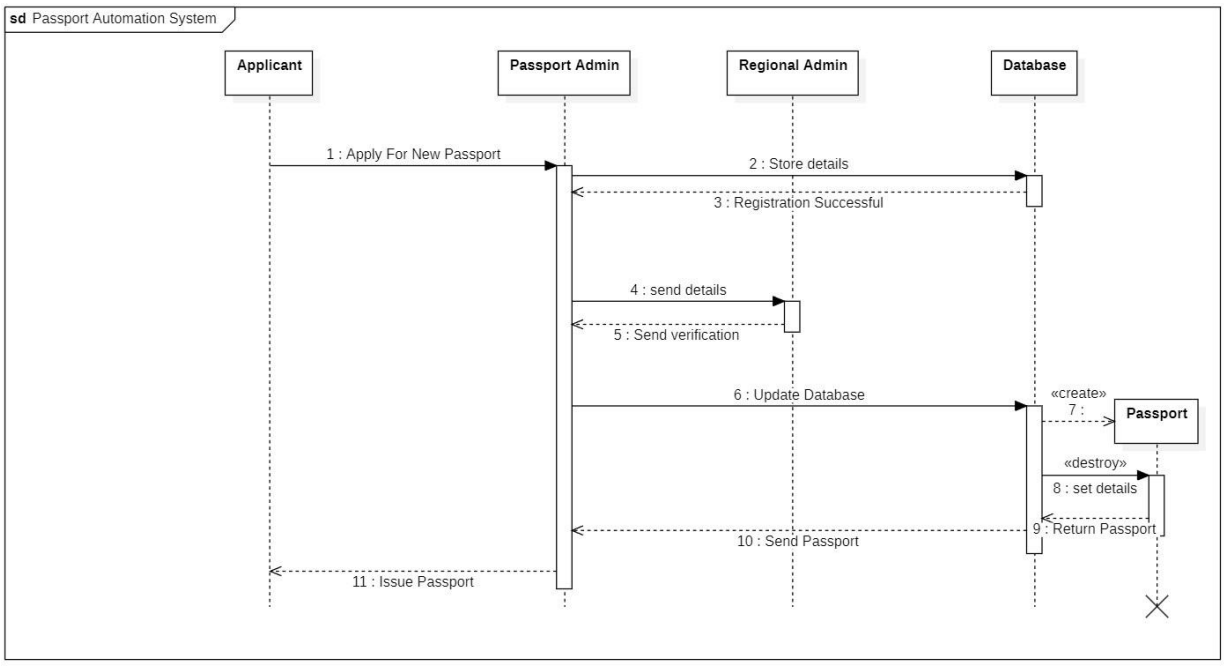


Fig 4.6.2: Advanced Sequence

Description:

The sequence diagram showcases the flow of interactions during the application process.

- **Objects:**
    - **Applicant**: Initiates the application and provides details.
    - **Passport Admin**: Processes the application and coordinates verification.
    - **Regional Admin**: Handles escalations or approvals for specific cases.
    - **Database**: Stores and retrieves application and verification information.
    - **Passport (Transient Object)**: Temporarily represents the passport being issued.
- **Flow:**

1. Applicant submits application details to the Passport Admin.
2. Passport Admin stores the application in the Database and forwards it for verification.
3. Regional Admin oversees the verification process and approves/rejects the application.
4. Upon approval, the Database updates the application status and generates the Passport object.
5. Applicant is notified of the issuance.

4.7 Activity Diagram

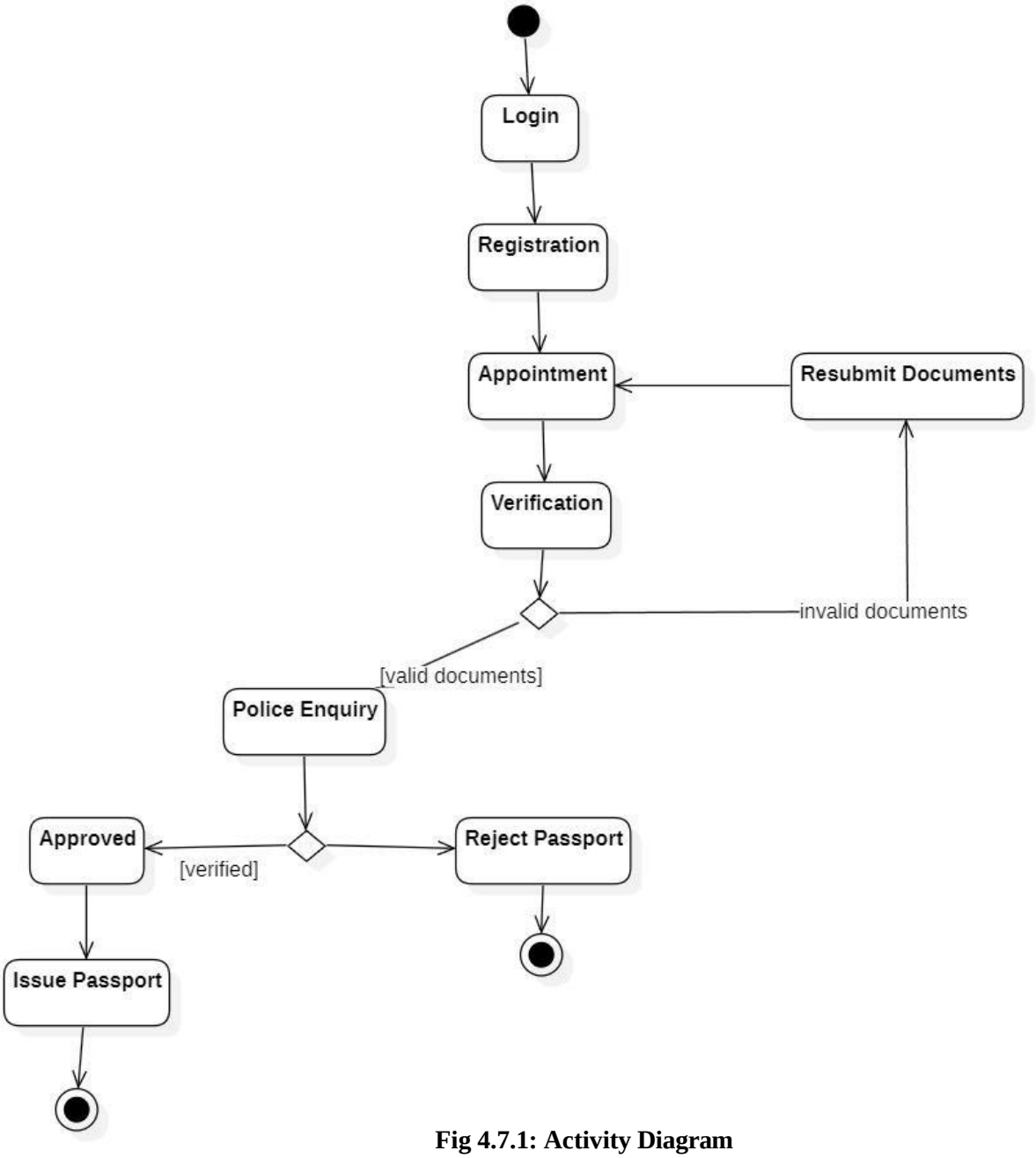


Fig 4.7.1: Activity Diagram

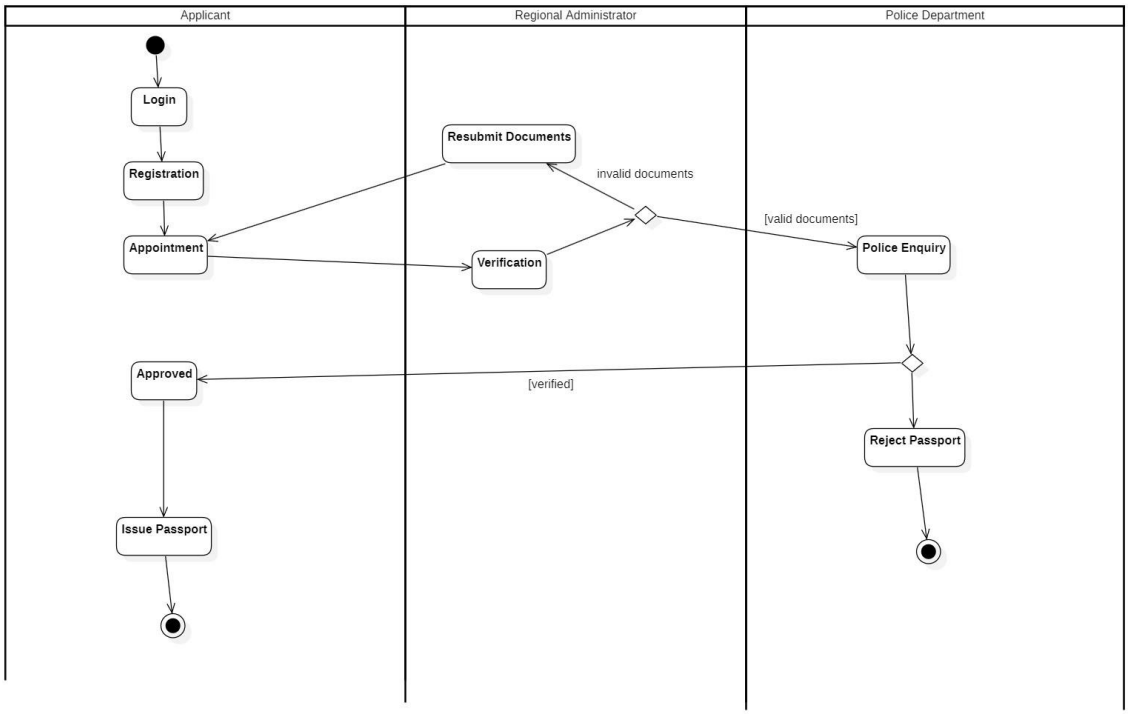


Fig 4.7.2: Advanced Activity Diagram

The activity diagram outlines the workflow for processing a passport application, divided into swimlanes for clarity.

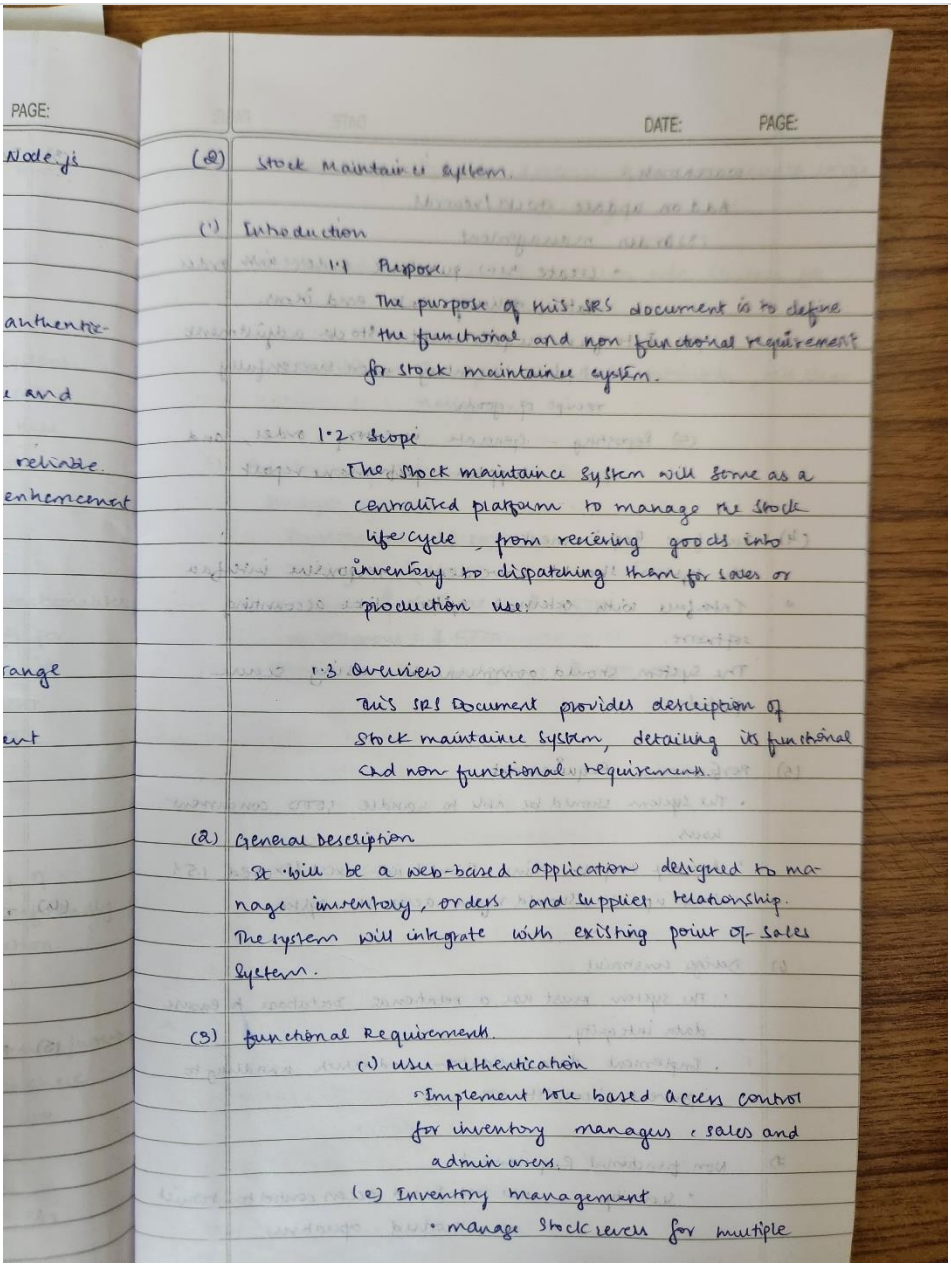
- **Swimlanes:**
    - **Applicant**: Submits application, provides documents, and pays fees.
    - **Regional Administrator**: Verifies the application and documents.
    - **Police Department**: Conducts background checks and verification.
- **Flow:**

1. Applicant logs into the system, submits the application, uploads documents, and makes payment.
2. The Regional Administrator verifies the documents and forwards the application to the Police Department.
3. The Police Department conducts a background check and updates the status.
4. The Regional Administrator approves the application and notifies the Applicant.
5. The passport is issued, and the Applicant is informed.

5. Stock Maintenance System

5.1 Problem Statement: Businesses face challenges in tracking inventory levels, forecasting demand, and minimizing stock wastage due to inefficiencies in manual stock management systems. Delays in stock replenishment often result in customer dissatisfaction or loss of revenue. An automated stock management system is required to monitor inventory in real time, optimize stock levels, and provide accurate reports to ensure efficient supply chain management.

5.2 SRS:



PAGE:

DATE: PAGE:

(a) Stock Maintainence system.

(1) Introduction

1.1 Purpose

The purpose of this SRS document is to define the functional and non functional requirements for stock maintainence system.

1.2 Scope

The Stock maintainence system will serve as a centralized platform to manage the stock life cycle, from receiving goods into inventory to dispatching them for sales or production use.

1.3 Overview

This SRS Document provides description of Stock maintainence system, detailing its functional and non functional requirements.

(2) General Description

It will be a web-based application designed to manage inventory, orders and supplier relationship. The system will integrate with existing point of sales system.

(3) functional Requirements.

(1) User Authentication

- Implement role based access control for inventory managers, sales and admin users.

(2) Inventory management

- manage stock levels for multiple

DATE: PAGE:

warehouse.

Add or update stocks/records.

(3) Order management

- Create new purchase order with order date, delivery date and items.

(4) Interface requirement + stock adjustments

- Update inventory upon successfully receipt of goods.

(5) Reporting — Generate inventory, order, and supplier performance report.

(4) Interface Requirement

- The system should have clean, responsive interface
- Interface with external systems like accounting software.

The system should communicate using secure protocols.

(5) Performance Requirement

- The system should be able to handle 1,000 concurrent users.
- Average response time should not exist/exceed 1.5 s
- Stock updates should reflect across the systems.

6) Design constraint

- The system must use a relational Database to ensure data integrity.
- Implement data validation and error handling to prevent inconsistencies.

7) Non functional Requirements

- Security - use role-based access control to restrict unauthorized operation

DATE: PAGE:

- Scalability - Optimise database queries to handle large dataset efficiency
- Maintainability - Use a modular code structure for easy maintaince.
- Usability - The system should be intuitive, with clear navigation.

8) Pre-liminary Schedule and Budget

Budget estimate :

Development : ₹ 80,000

Testing : ₹ 16000

Hardware & Software : ₹ 25000

Miscellanous : ₹ 5000

Total estimated budget : ₹ 1,50,000

5.3 Class Diagram:

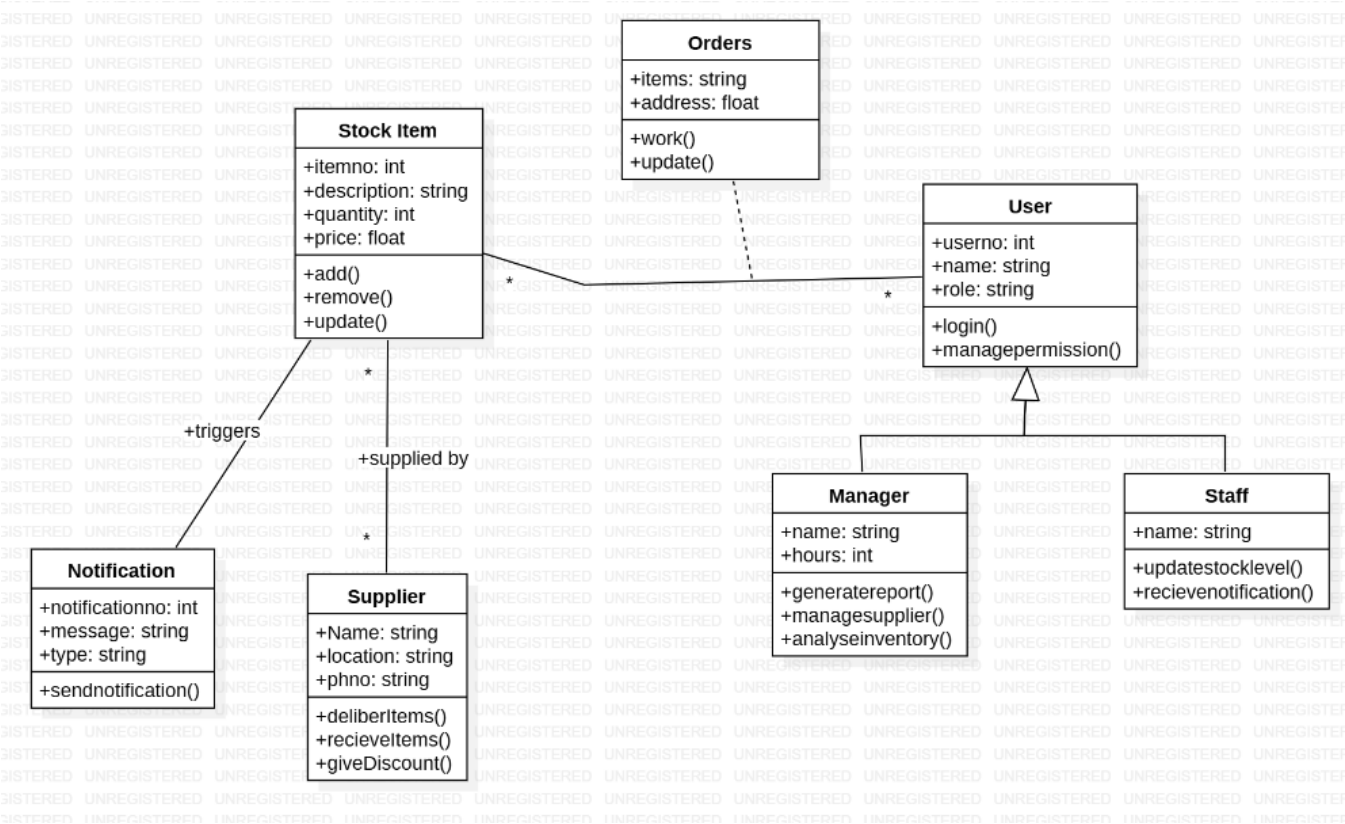


Fig 5.3.1: Class Diagram

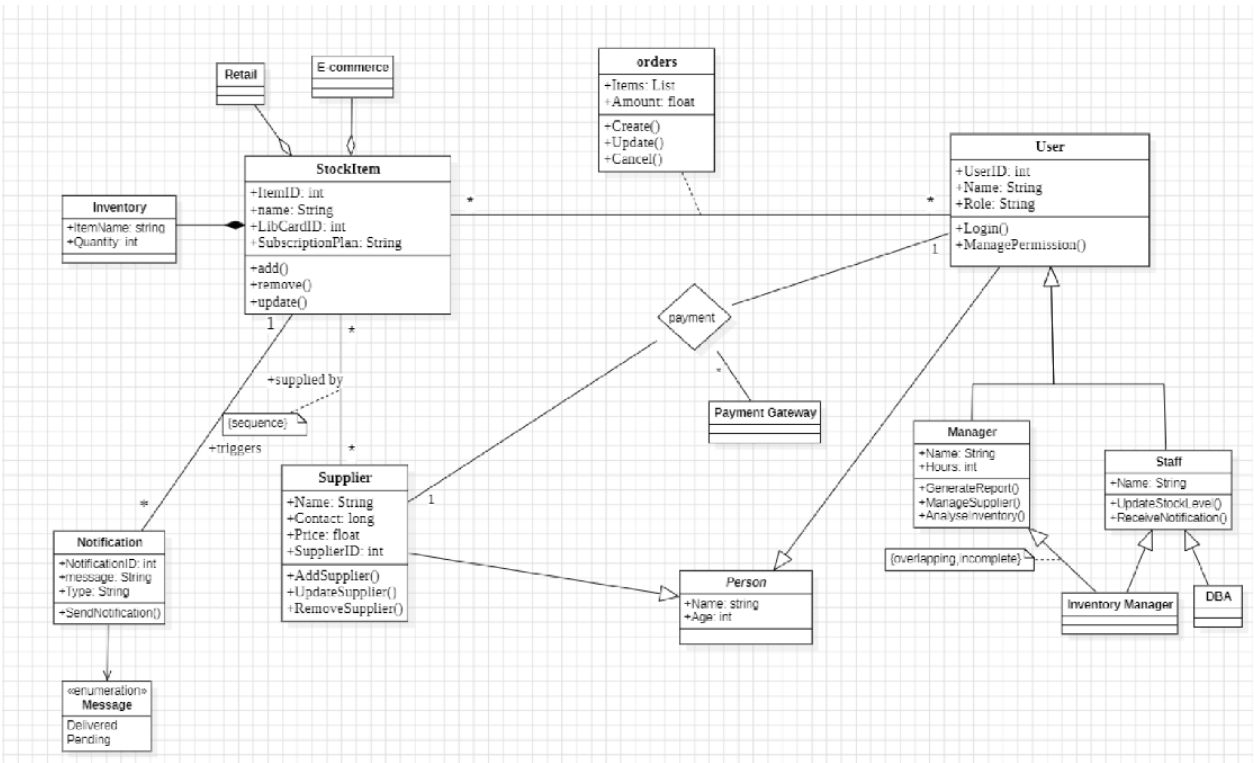


Fig 5.3.2: Advanced Class Diagram

Description:

This class diagram represents the key entities of the stock maintenance system and their relationships.

- **Classes:**
    - **Product Class**: Represents a product with attributes like product ID, name, price, and quantity.
        - **Perishable Product Class**: Subclass of Product with additional attributes like expiration date and storage requirements.
        - **Non-Perishable Product Class**: Subclass of Product without special storage needs.
    - **Category Class**: Represents the category of a product, with attributes like category ID and name.
    - **Warehouse Class**: Represents the storage location of products, with attributes like warehouse ID, location, and capacity.
    - **Inventory Class**: Manages stock levels and tracks product details, associating **Product** with **Warehouse**.

- **Relationships:**
    - **Product** is aggregated with **Category**, **Warehouse**, and **Inventory** to represent its categorization, storage, and stock level management.

5.4 State Diagram:

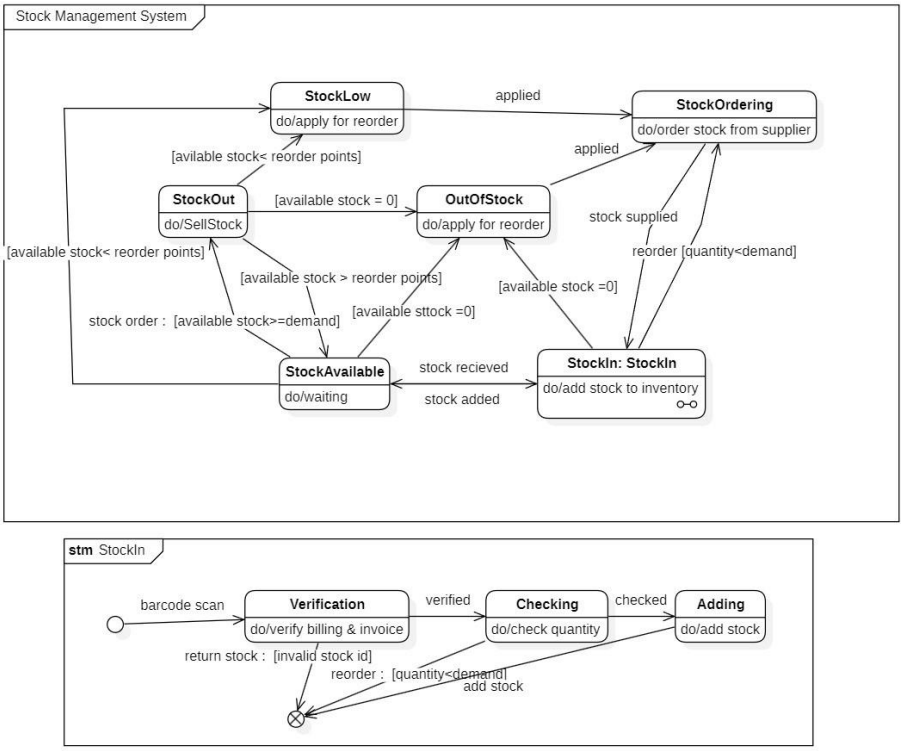


Fig 5.4.1: State Diagram

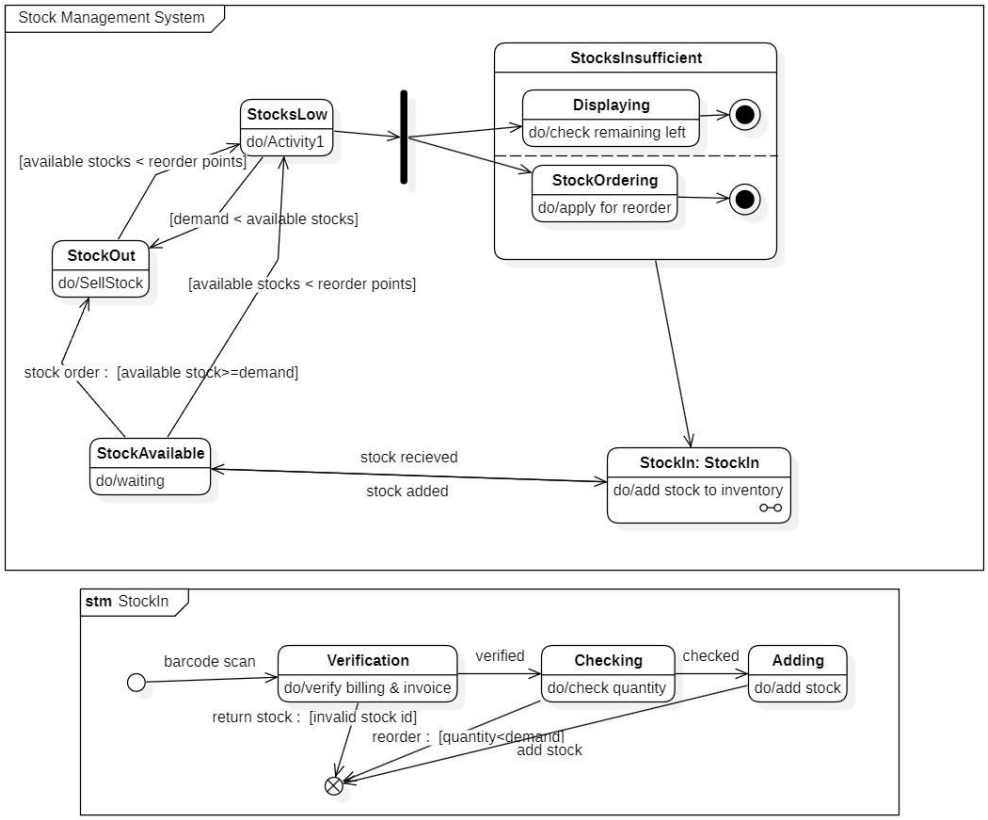


Fig 5.4.2: Advanced State Diagram

Description:

This state diagram highlights the transitions between various states in the stock lifecycle.

- **States:**
    - **Low Stock**: Indicates that product stock is below the reorder threshold.
    - **Stock Ordering**: Represents the process of ordering new stock.
    - **Stock Out**: Indicates that stock is being dispatched or sold.
    - **Stock In**: Represents the arrival and addition of stock to the inventory.
    - **Out of Stock**: Occurs when the product is unavailable for sale or dispatch.
    - **Stock Available**: Normal state when adequate stock is present in the inventory.

5.5 Use Case Diagram:

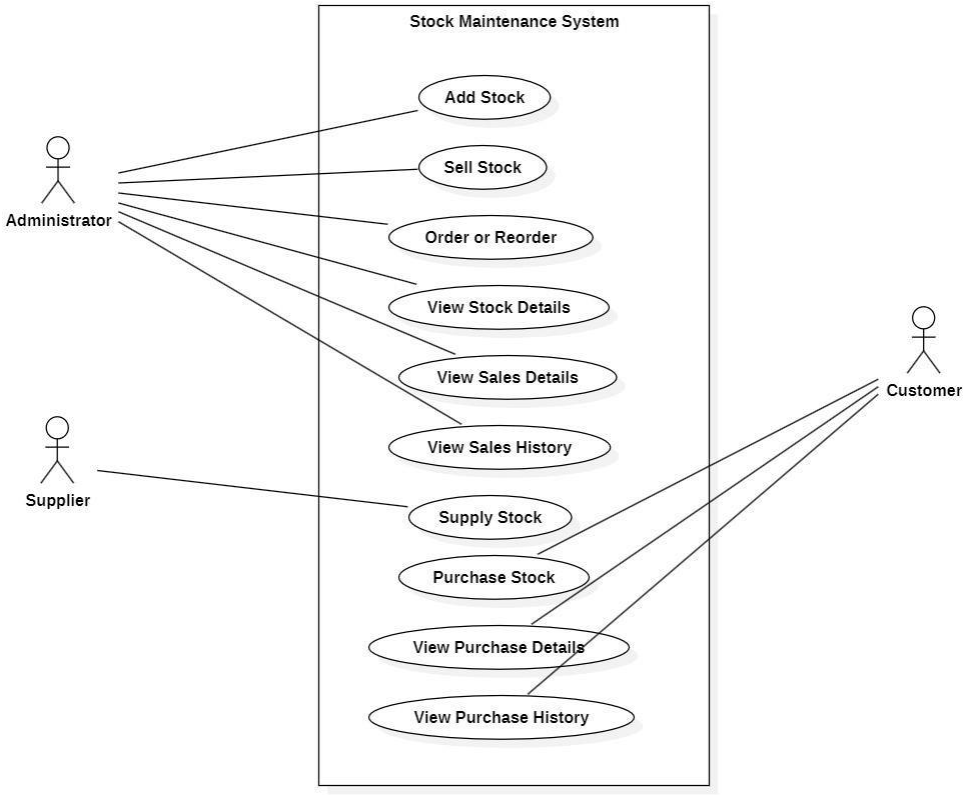


Fig 5.5.1: Use Case Diagram

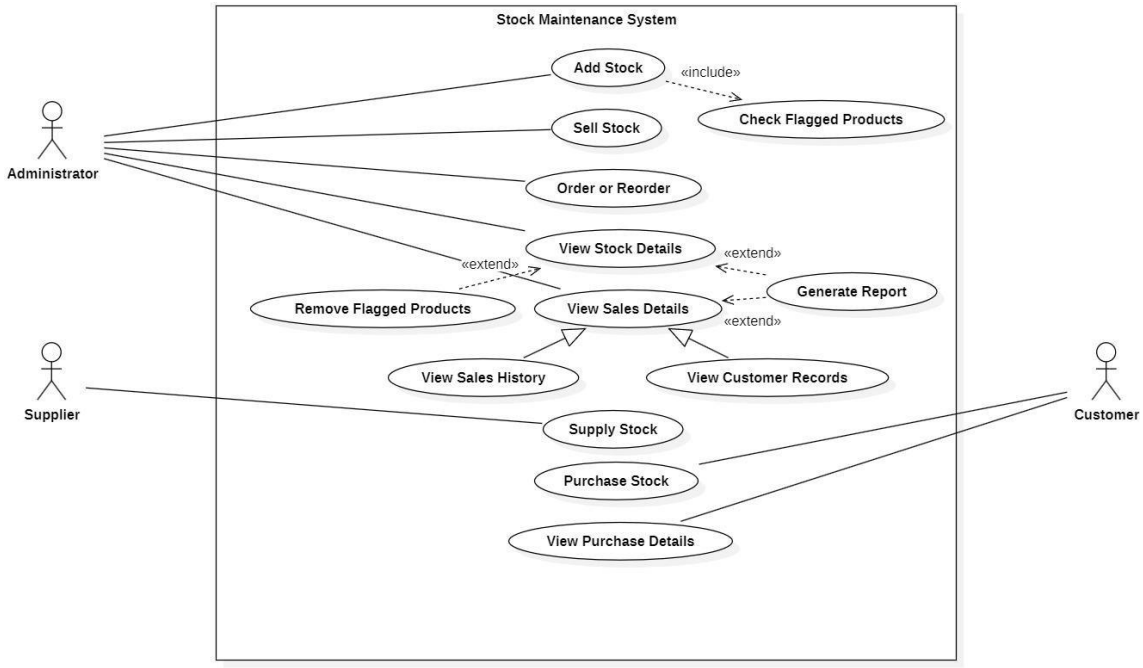


Fig 5.5.2: Advanced Use Case

Description:

The use case diagram illustrates the interactions between actors and system functionalities.

- **Actors:**
    - **Supplier**: Supplies stock to the warehouse.
    - **Admin**: Manages inventory and oversees operations like viewing stock and sales.
    - **Customer**: Purchases stock or products.
- **Use Cases:**
    - **Add Stock**: Admin adds new stock to the inventory.
    - **Sell Stock**: Stock is sold to customers.
    - **Order Stock**: Admin places an order for new stock with suppliers.
    - **View Stock Details**: Admin views detailed stock information, including quantities and categories.
    - **View Sales**: Admin tracks sales performance.
    - **Supply Stock**: Supplier delivers stock to the warehouse.
    - **Purchase Stock**: Customer buys products from the inventory.

5.6 Sequence Diagram:

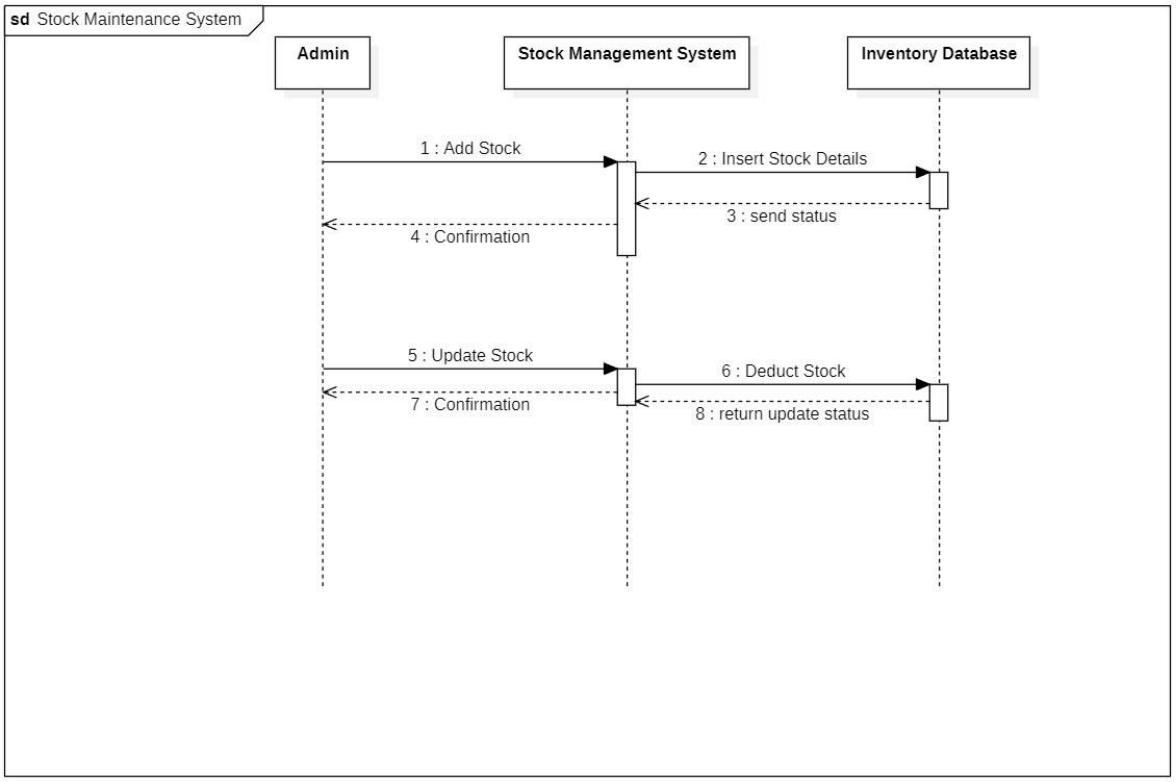


Fig 5.6.1: Sequence Diagram

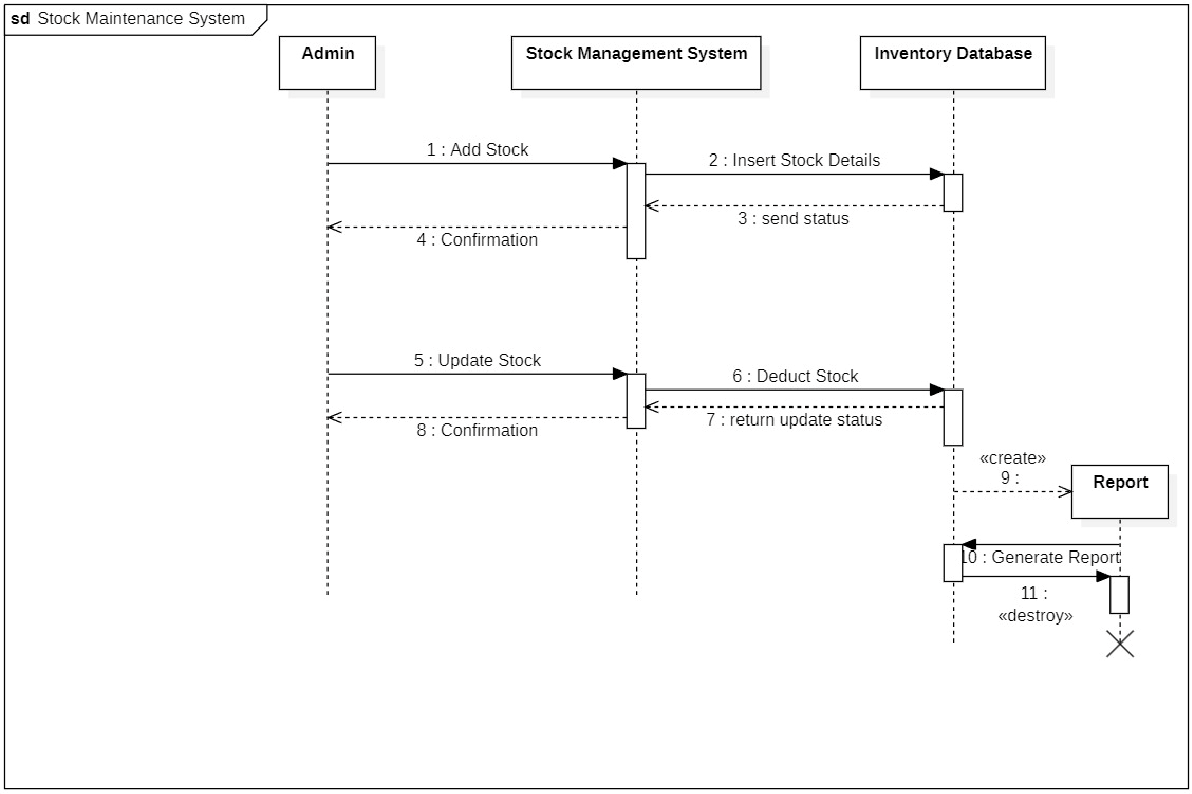


Fig 5.6.2: Advanced Sequence

Description:

The sequence diagram illustrates the flow of interactions for generating a stock report.

- **Objects:**
    - **Admin**: Initiates the request for stock management or reporting.
    - **Stock Maintenance System**: Processes requests related to inventory.
    - **Inventory Database**: Stores all stock and transaction details.
    - **Report (Transient Object)**: Temporarily represents the generated stock or sales report.
- **Flow:**

1. Admin requests a stock or sales report via the system.
2. Stock Maintenance System queries the Inventory Database for relevant data.
3. Inventory Database retrieves the requested information.
4. Stock Maintenance System generates a transient **Report** object.
5. Admin views or exports the report.

5.7 Activity Diagram

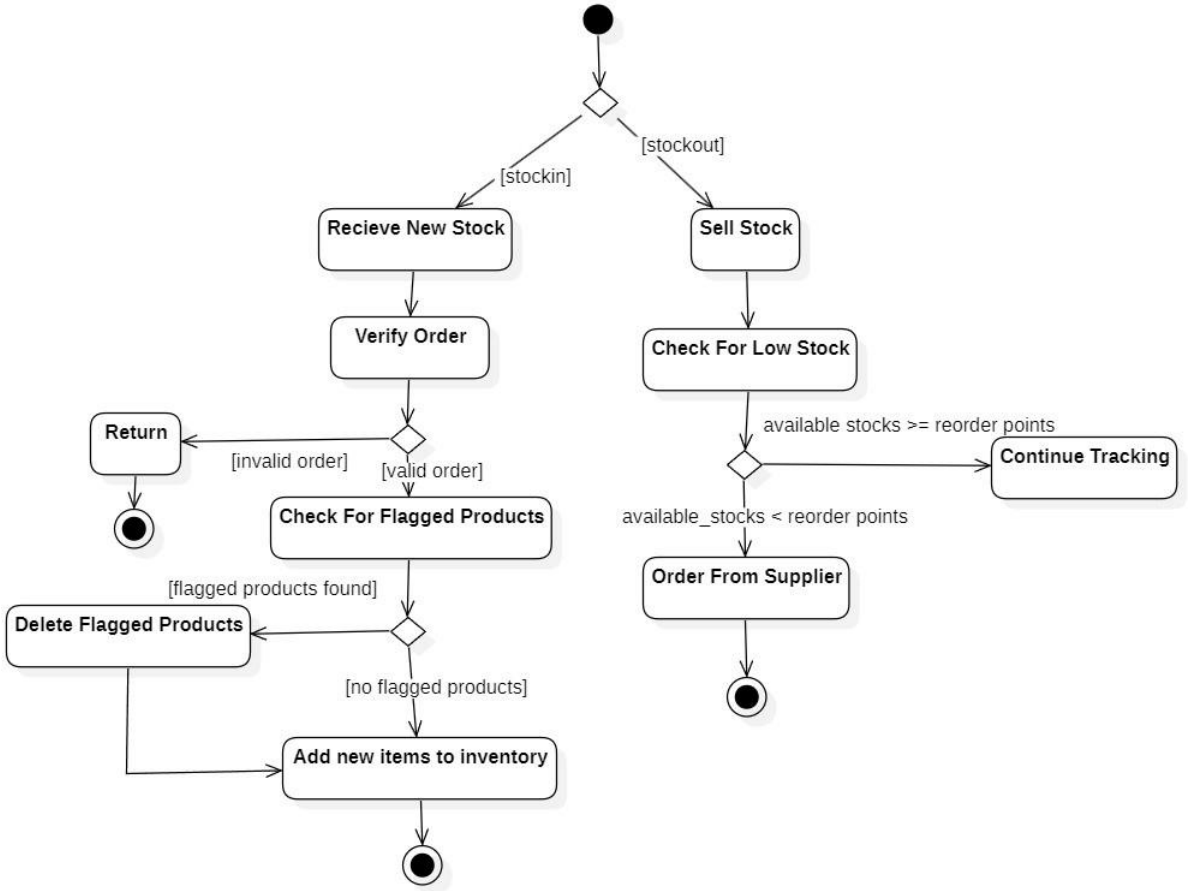


Fig 5.7.1: Activity Diagram

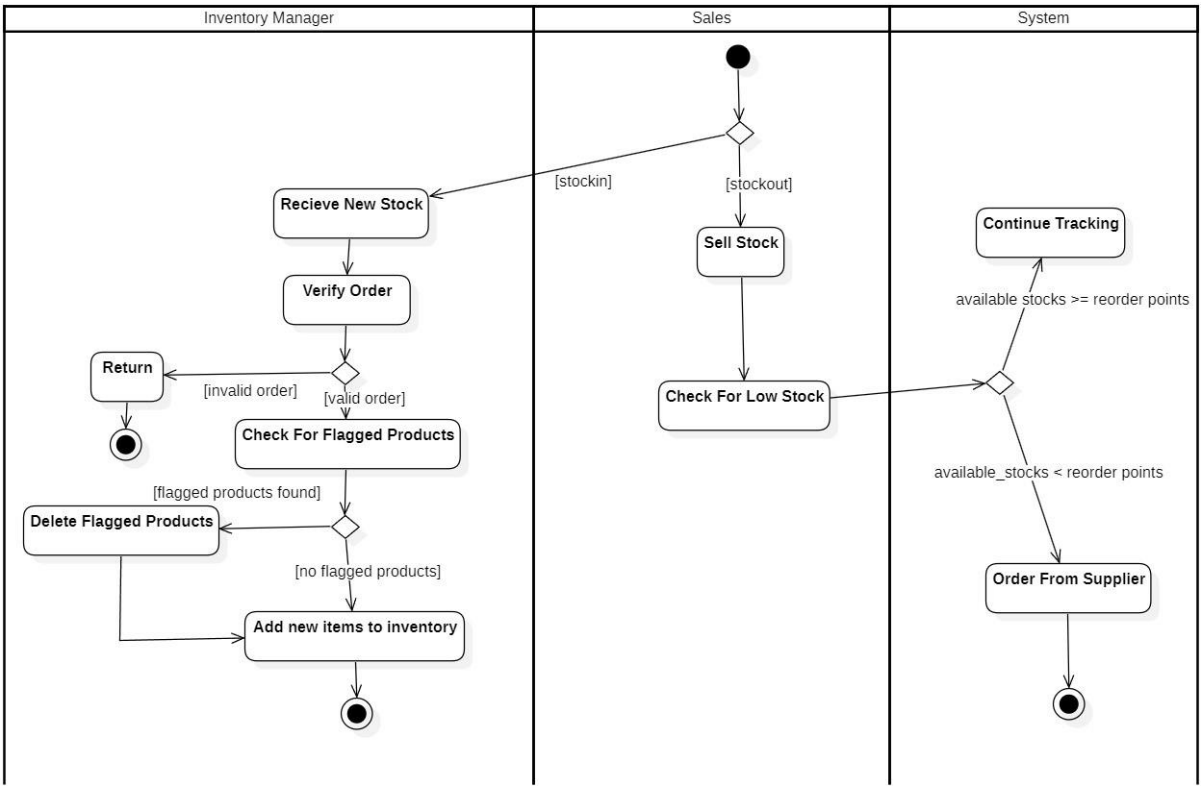


Fig 5.7.2: Advanced Activity Diagram

Description:

The activity diagram represents the workflow for managing inventory and sales.

- **Swimlanes:**
    - **Inventory Manager**: Handles stock updates, reorders, and inventory monitoring.
    - **Sales**: Processes sales transactions and updates stock levels.
    - **System**: Automates stock monitoring, order placements, and report generation.
- **Flow:**

1. Inventory Manager logs into the system and views stock levels.
2. If stock is low, a reorder is placed, and new stock is added upon arrival.
3. Sales transactions are processed, reducing stock in the inventory.
4. System generates sales and stock reports, which the Inventory Manager reviews.