

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:

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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 AGAM TIWARI (1BM22CS023) during the 5th Semester Oct24-Jan2025.

Signature of the Faculty Incharge:

NAME OF THE FACULTY: Sandhya A K

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1. Hotel Management System

1.1 SRS:

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Generating SRS

1) * Hotel Management System

→ Problem Statement: Develop a Software application for Hotel rooms and Services management, services like booking, complaint, food ordering etc.

→ Requirements

→ Functional Requirements

(i) User Registration

- User should be able to register or login through the application.

(ii) Different Categories of Room Booking

- Customers can view and explore different types of rooms, with different facilities.
- They will get booking details and cancellation option after successful booking.

(iii) Food Ordering

- Customers can view food section on application and order with no delivery charges.
- Fresh fruits or vegetables also can be ordered.

(iv) Party Hall / Sports Hall Booking

- Customers can view Special Hall and book different time slots.

(iv) Complaint Section

- Customers can go to Complaint Section and fill the form or talk to customer service to resolve problems in some of services.

(v) Premium Subscription

- Customers can take one premium subscription which gives features of advance booking, cab service, all halls subscription facility.

(vi) Map of Hotel

- Users can view map of hotel and explore different areas, halls of rooms using it.

Non-Functional Requirements

(i) Performance

- The performance of application should be upto the mark for smooth customer experience.

(ii) Security

- Secure authentication of payment gateway
- User data should be protected

(iii) Reliability

- The Application should be reliable and available to access various services of booking 24x7 all time

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FVI Scalability

- The Application should be Scalable as per number of users or if more hotels & services come in future.

VR Payment Requirements

- Custome I/O specification
- Multipre language support as per requirement
- Third Party Services management
- Government rules and laws to follow

Sale

6. Design Constraints

6.1 Proper display of constraints required for room booking

6.2 Capable to handle simultaneous 1000 users

8. Preliminary Schedule and Budget

8.1 Controlled Spending and Organizing budget for software, hotel management.

8.2 Software Completion in a previously given time schedule

1.2 Class Diagram:

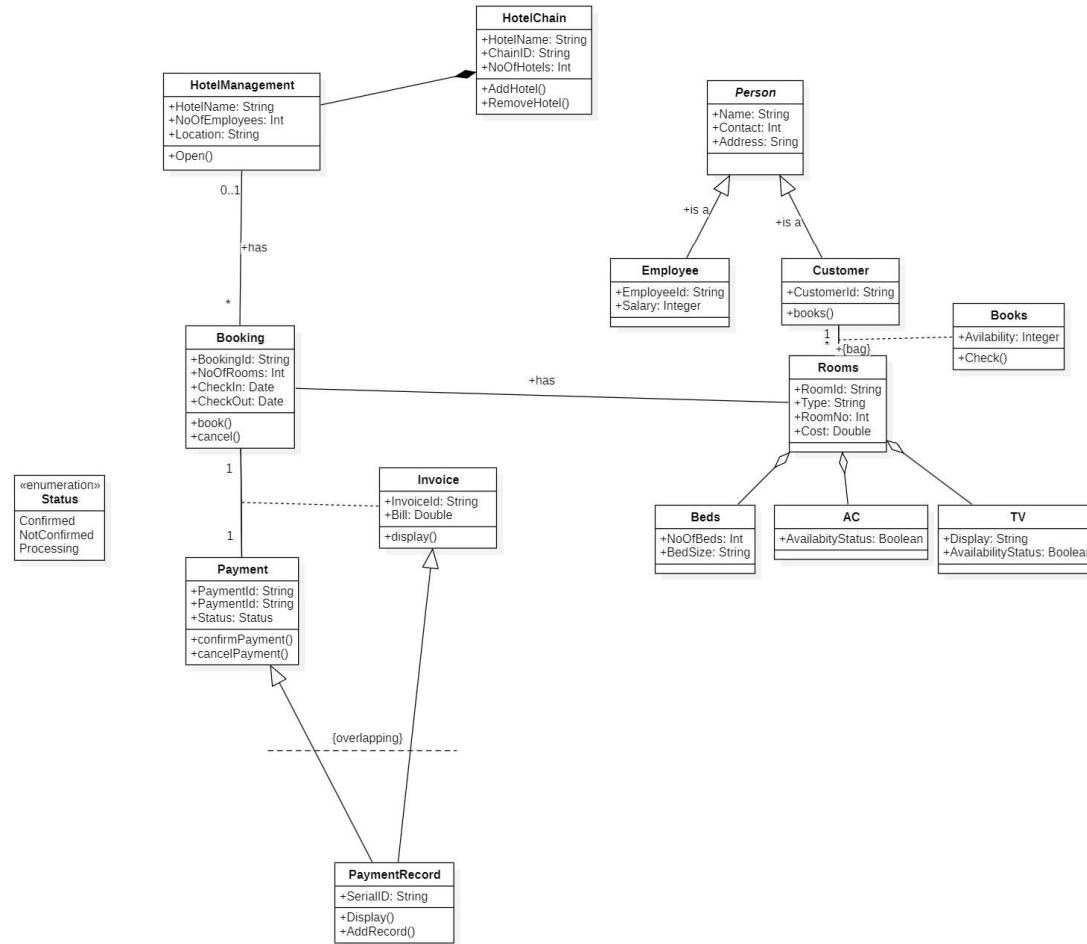


Fig 1.1: Class Diagram

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.

1.3 State Diagram:

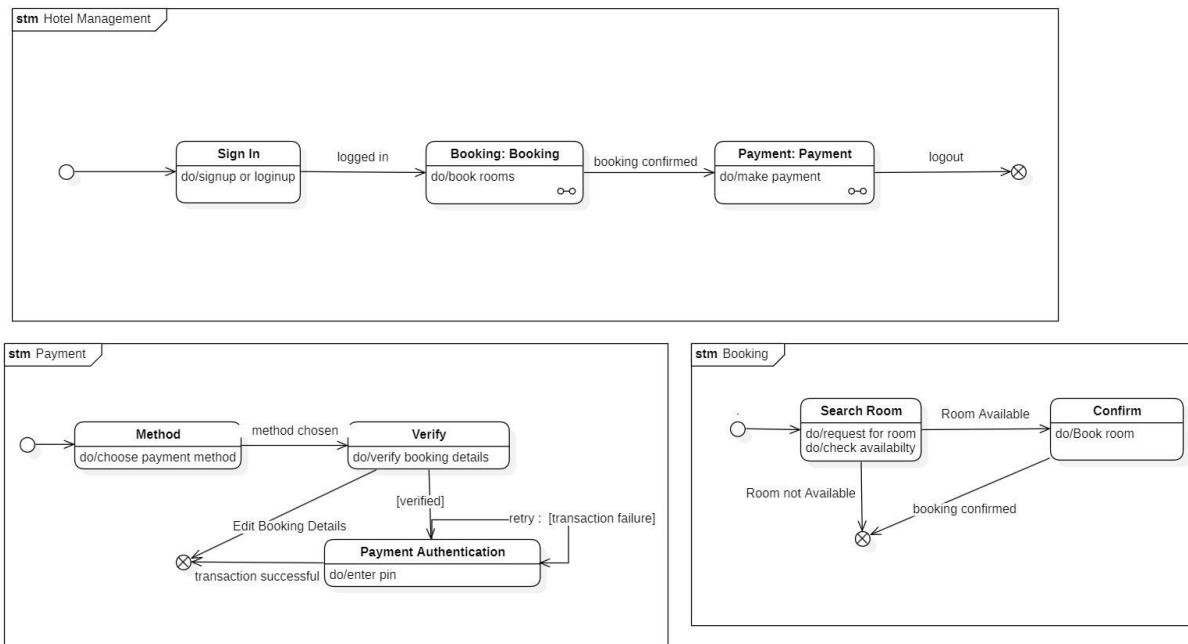


Fig 1.2: State Model Diagram

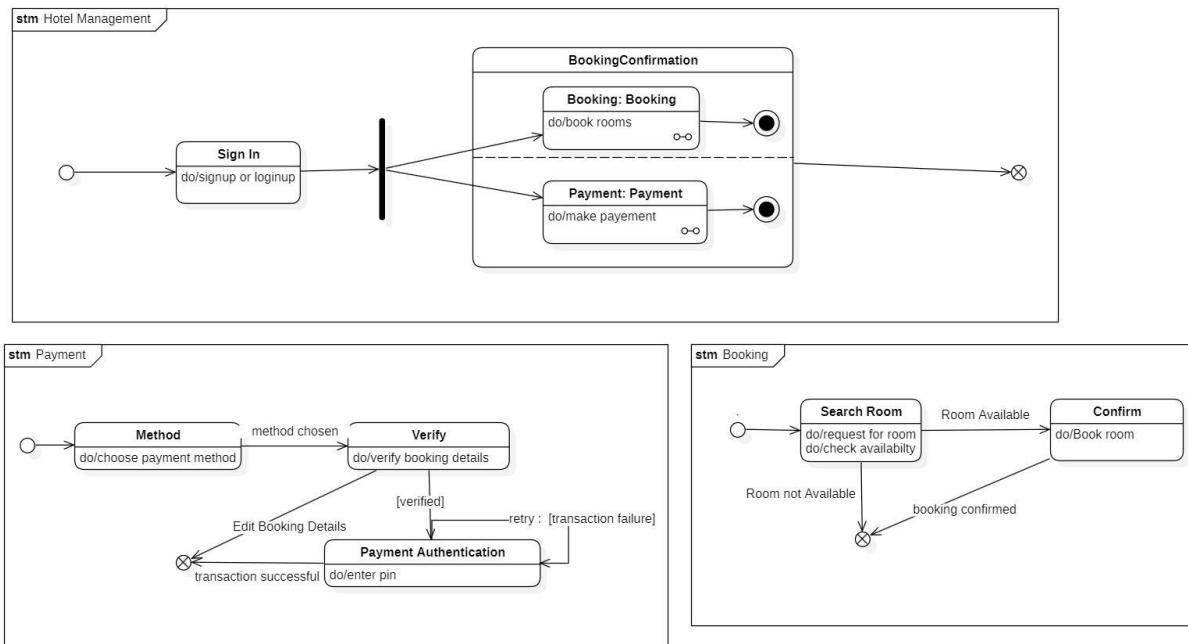


Fig 1.2: Advanced State Model Diagram

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.

1.4 Use Case Diagram:

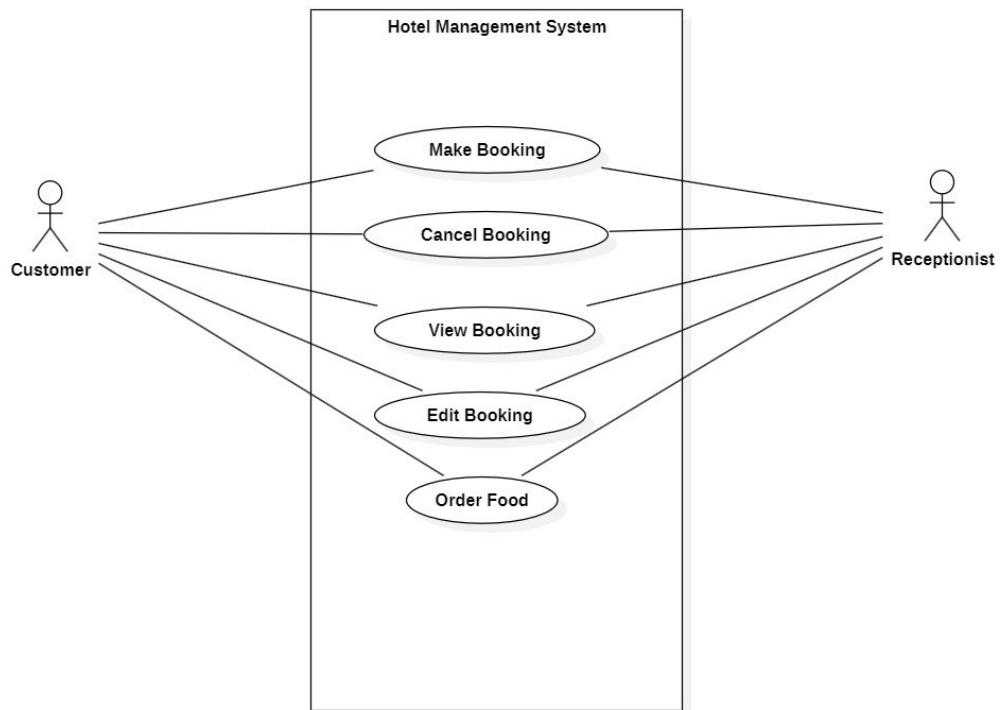


Fig 1.3 : Use Case Diagram

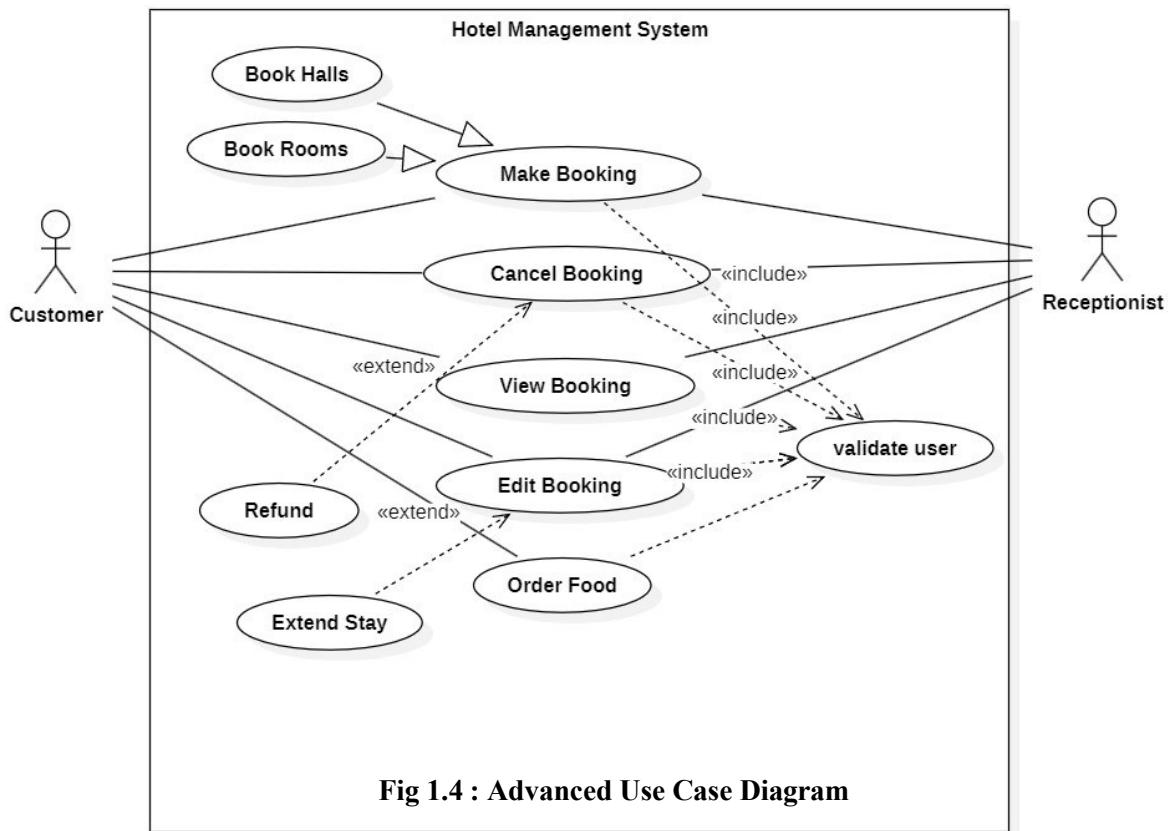


Fig 1.4 : Advanced Use Case Diagram

Description:

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

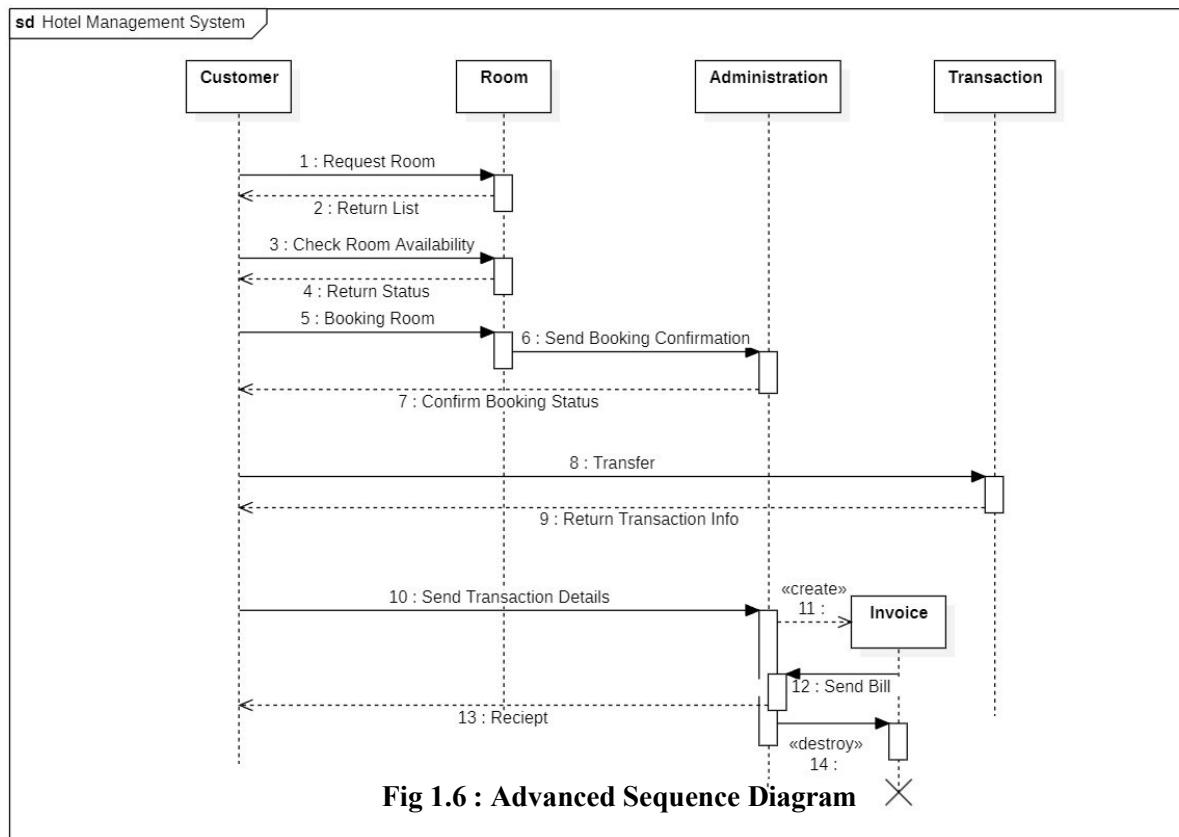
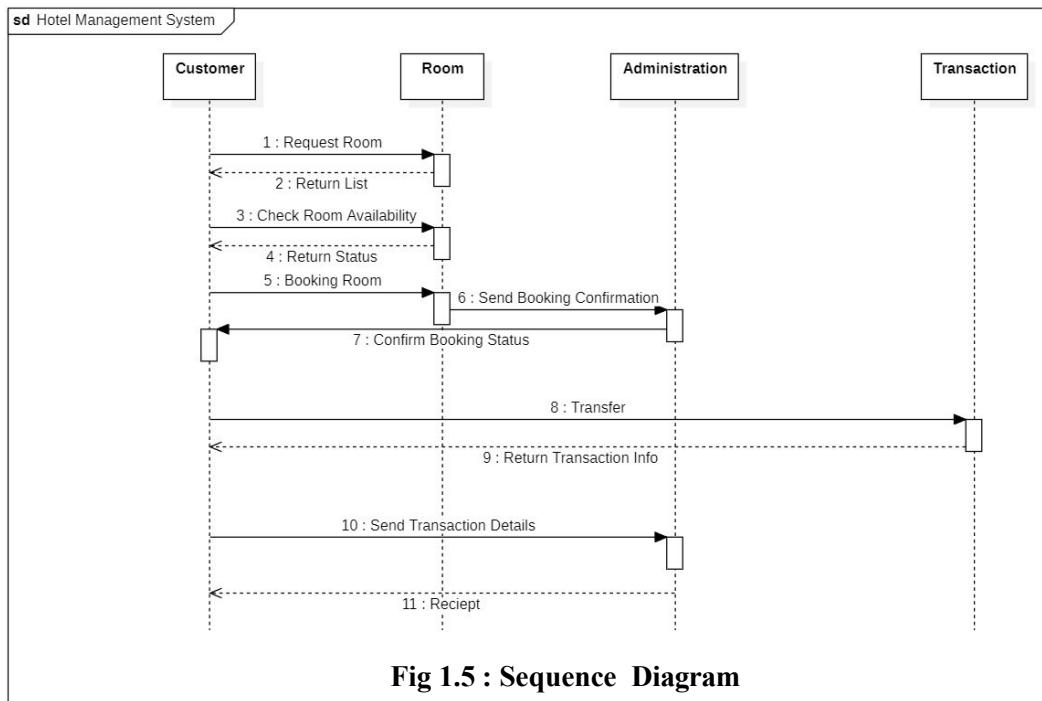
- **Actors:**

- **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.

1.5 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.

1.6 Activity Diagram:

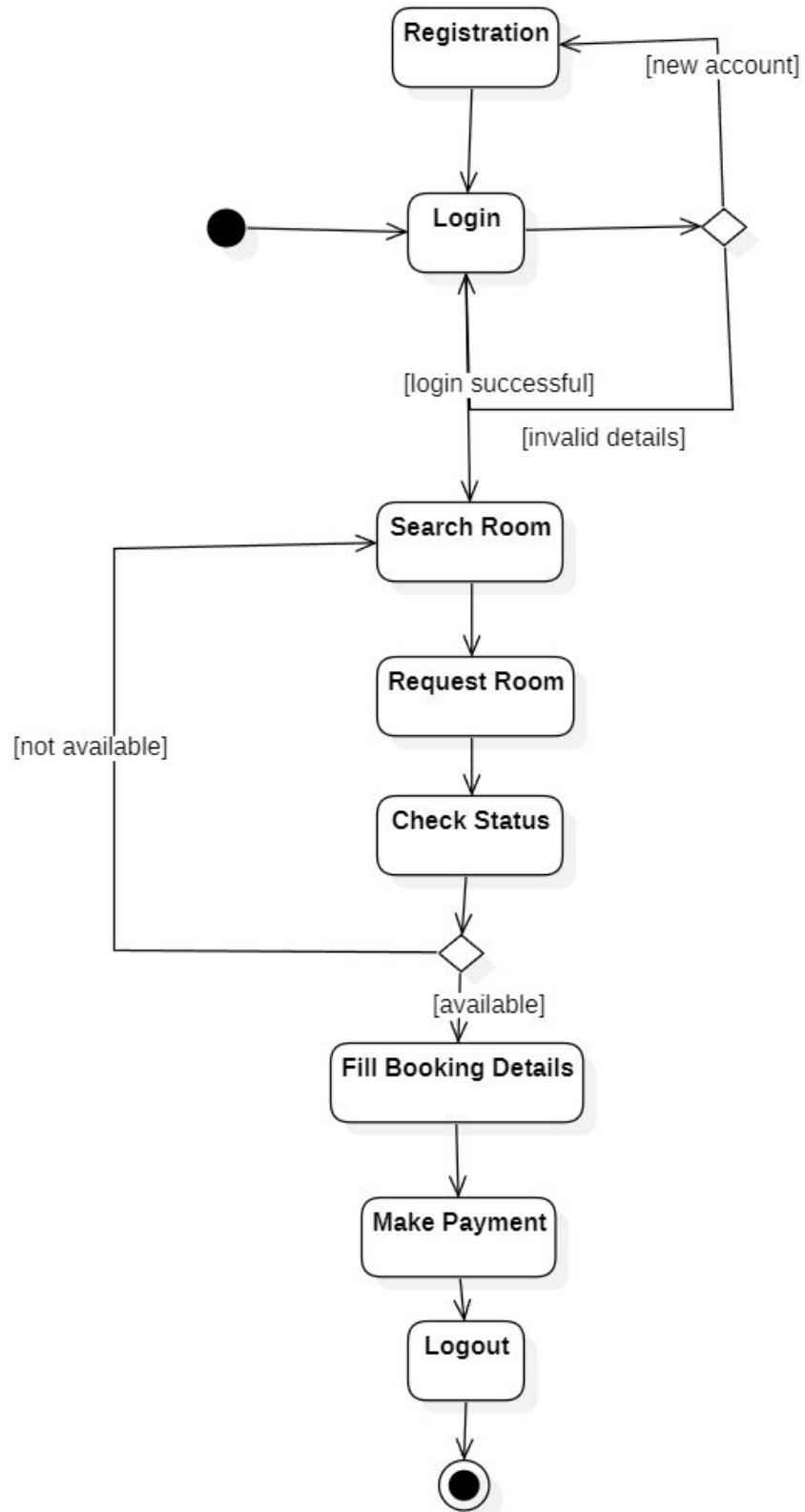


Fig 1.7 : Activity Diagram

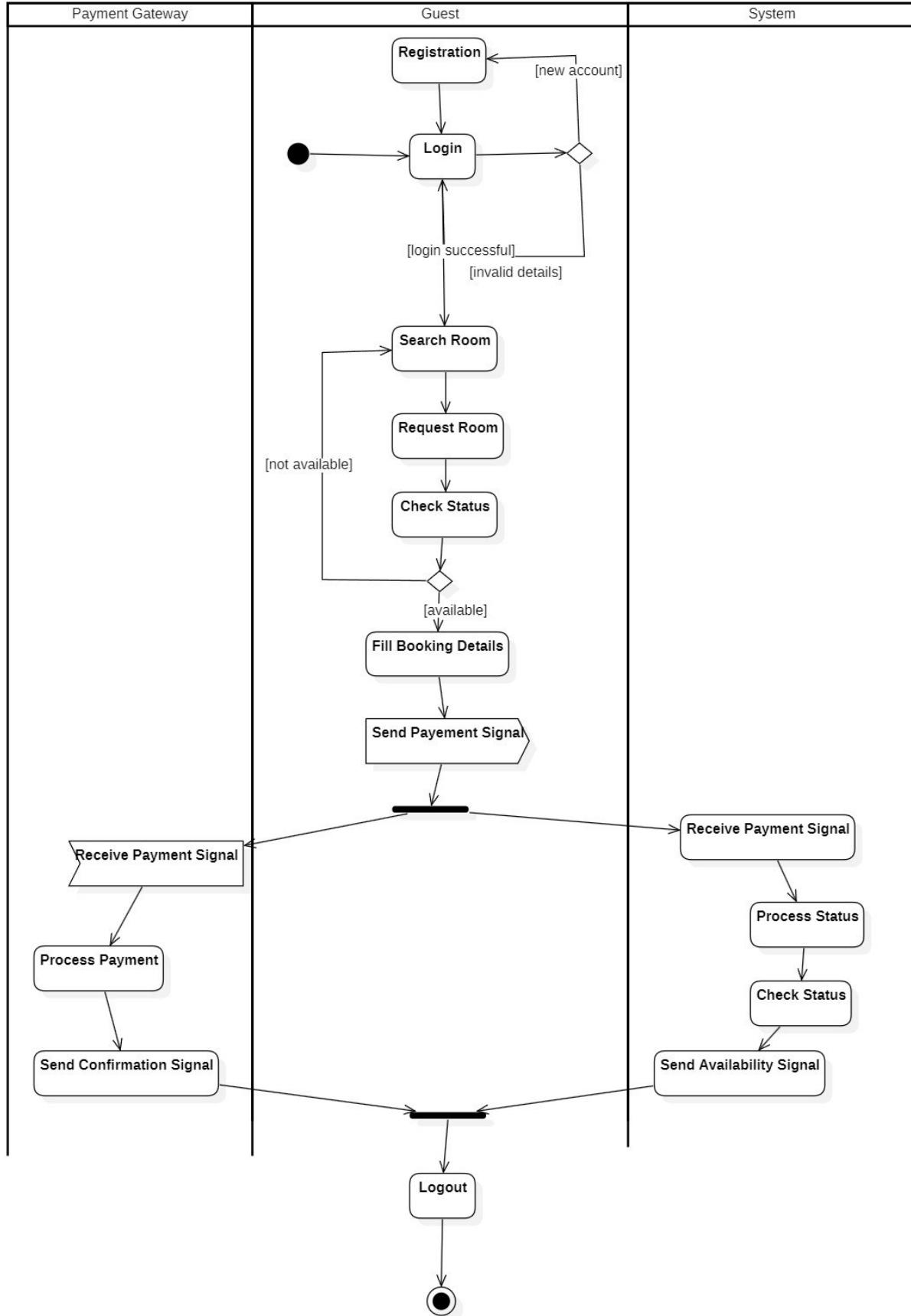


Fig 1.8 : Advanced Activity Diagram

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 SRS:

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<p>2) ★ Credit Card Processing System</p> <p>→ <u>Problem Statement</u> - Develop a application which manages credit card processing such as checking balance, transaction, security of payment.</p> <p>→ <u>Functional Requirements</u></p> <p>(i) <u>Validating Card Details</u></p> <ul style="list-style-type: none">• System should validate Card, its expiry, remaining balance of account holder details. <p>(ii) <u>Secure Holder Pin Management</u></p> <ul style="list-style-type: none">• PIN of Card should be fetched from system database <p>(iii) <u>Account Statement Update</u></p> <ul style="list-style-type: none">• After successful transaction → account should be updated with this transaction and update remaining Credit card limit <p>(iv) <u>Checking Account Details</u></p> <ul style="list-style-type: none">• Credit Card holder can access system database for profile, credit limits, upgradation and other services.	

→ Non Functional Requirements

(i) Performance

- Fast transaction of validation every time

(ii) Security

- Secure transactions with collect bin & payment gateway management

(iii) Reliability

- System should be reliable for transactions & information every time

(iv) Scalability

~~Domain Requirements~~

- Government Rules & Regulations for transactions
- Support of different machines
- Other Module requirements

~~Design Constraints~~

- Software must be accessible for mentally impaired user
- Proper Specification of rules and regulation

Milestones Schedule and Budget

Time - within 6 months

Budget - Rs 500,000

2.2 Class Diagram:

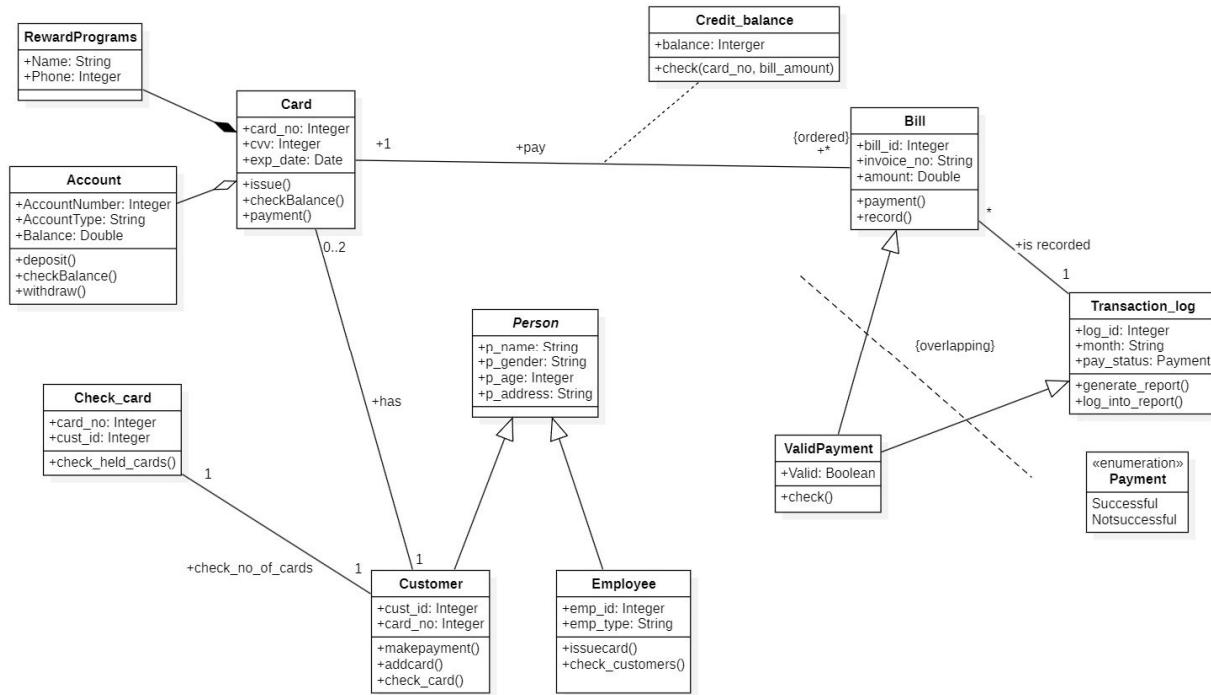


Fig 2.1: Class Diagram

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.

2.3 State Diagram

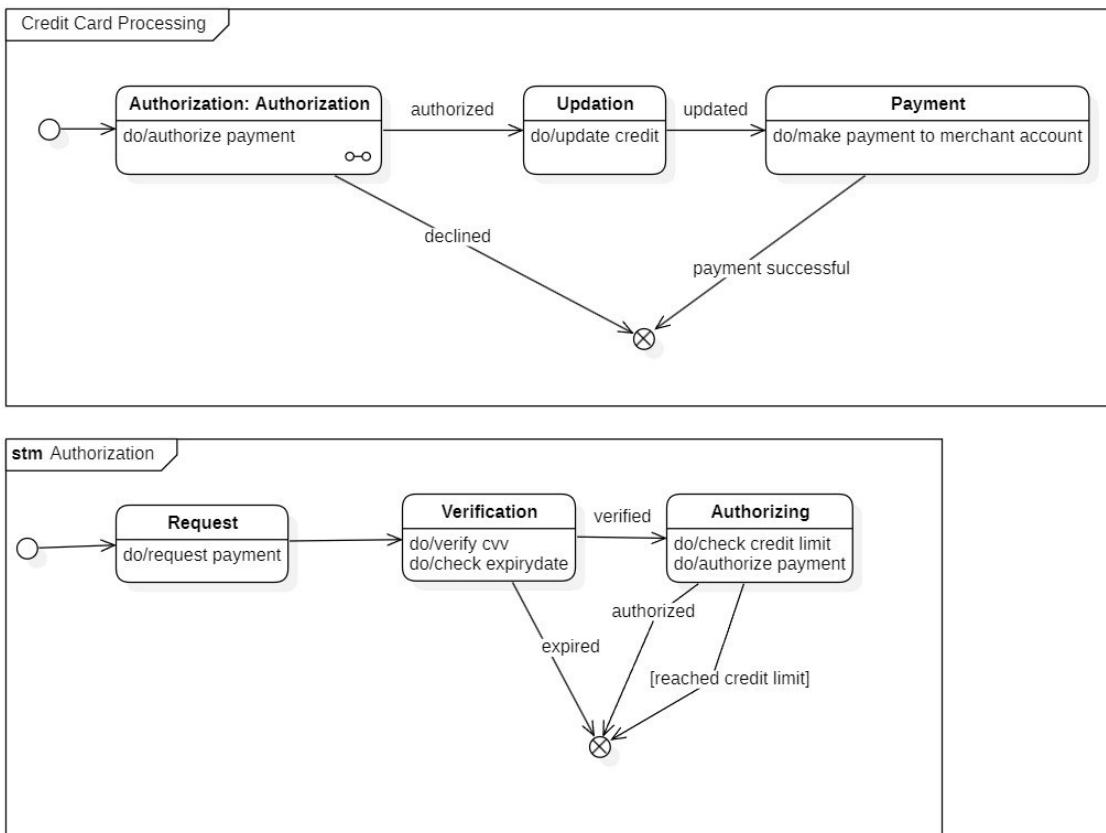


Fig 2.2: State Diagram

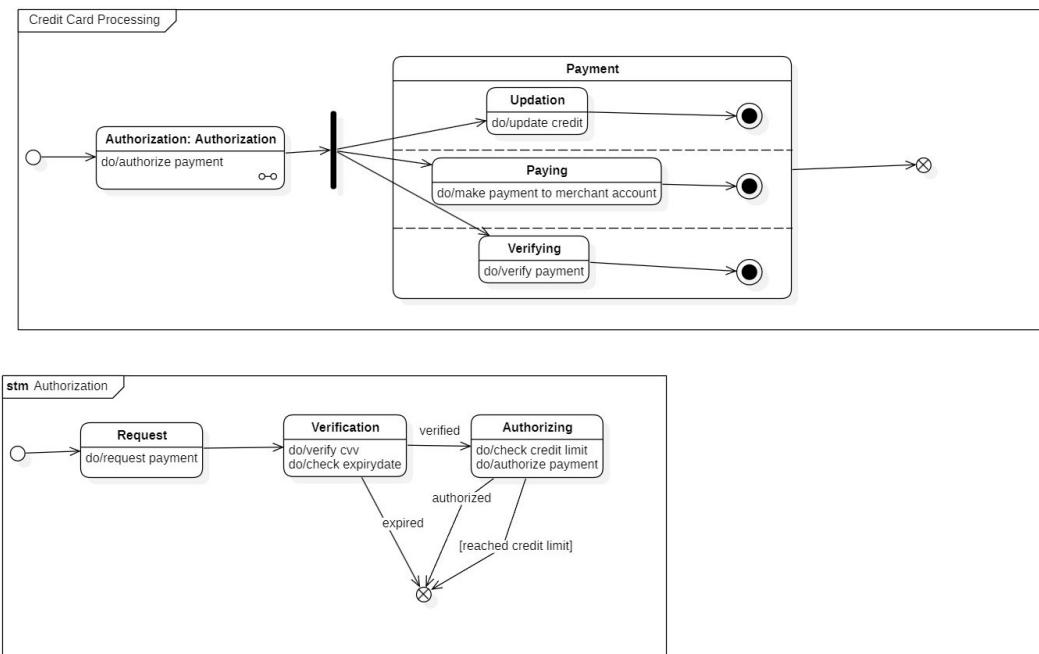


Fig 2.3: Advanced State Diagram

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.

2.4 Use Case Diagram:

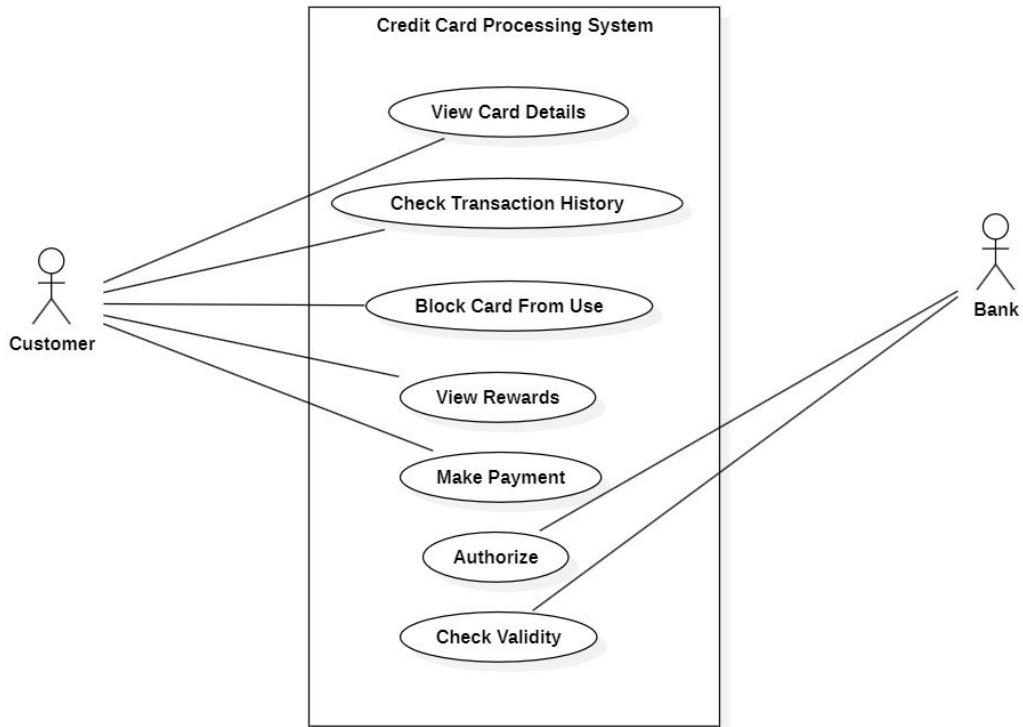


Fig 2.3: Use Case Diagram

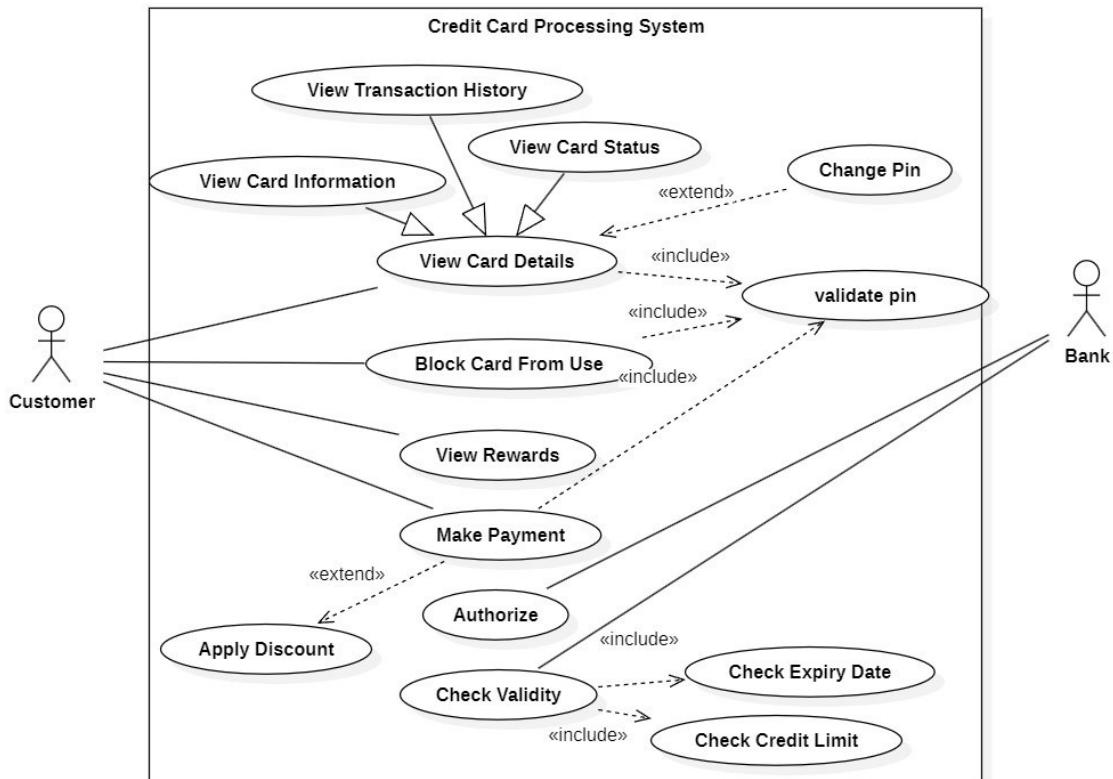


Fig 2.4: Advanced Use Case Diagram

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.

2.5 Sequence Diagram:

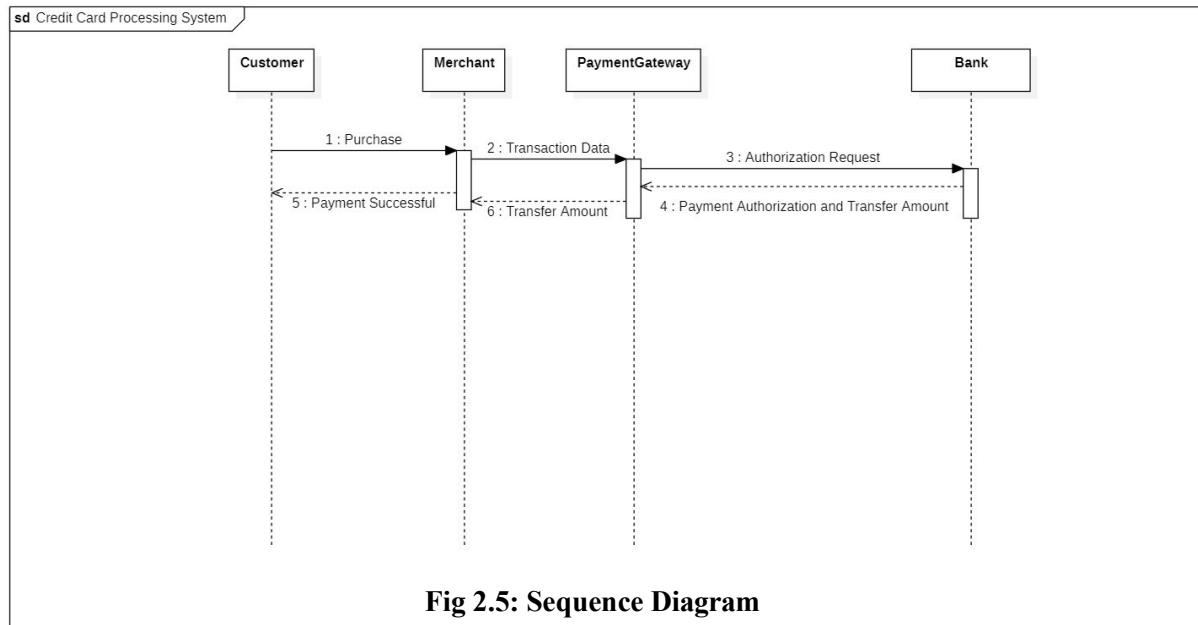


Fig 2.5: Sequence Diagram

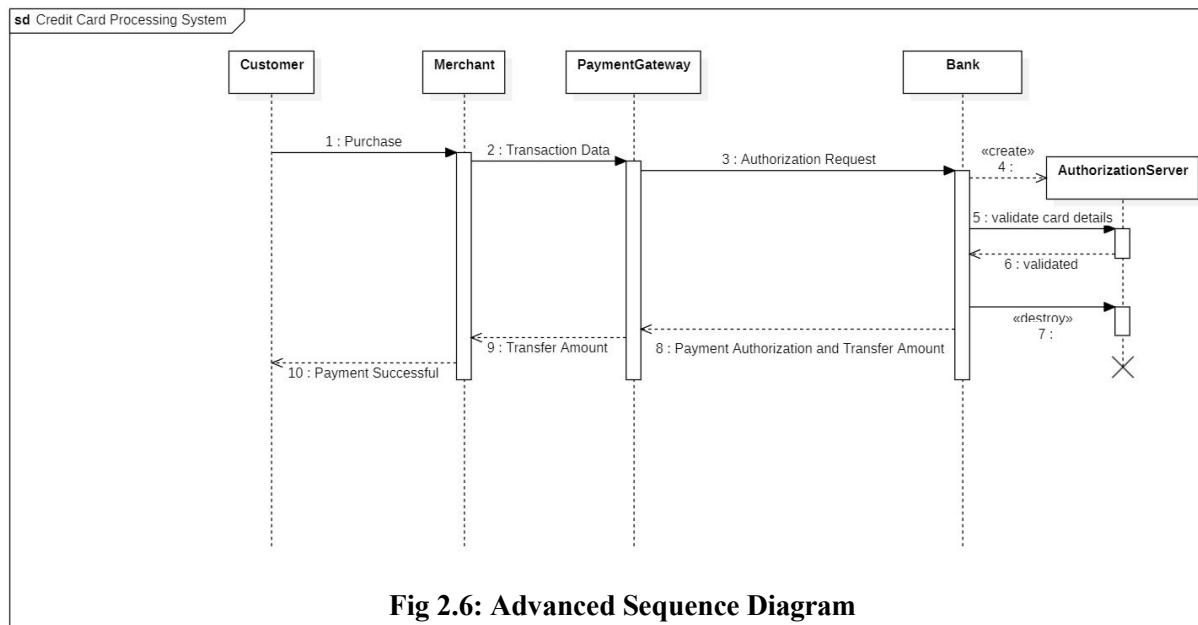


Fig 2.6: Advanced Sequence Diagram

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.

2.6 Activity Diagram

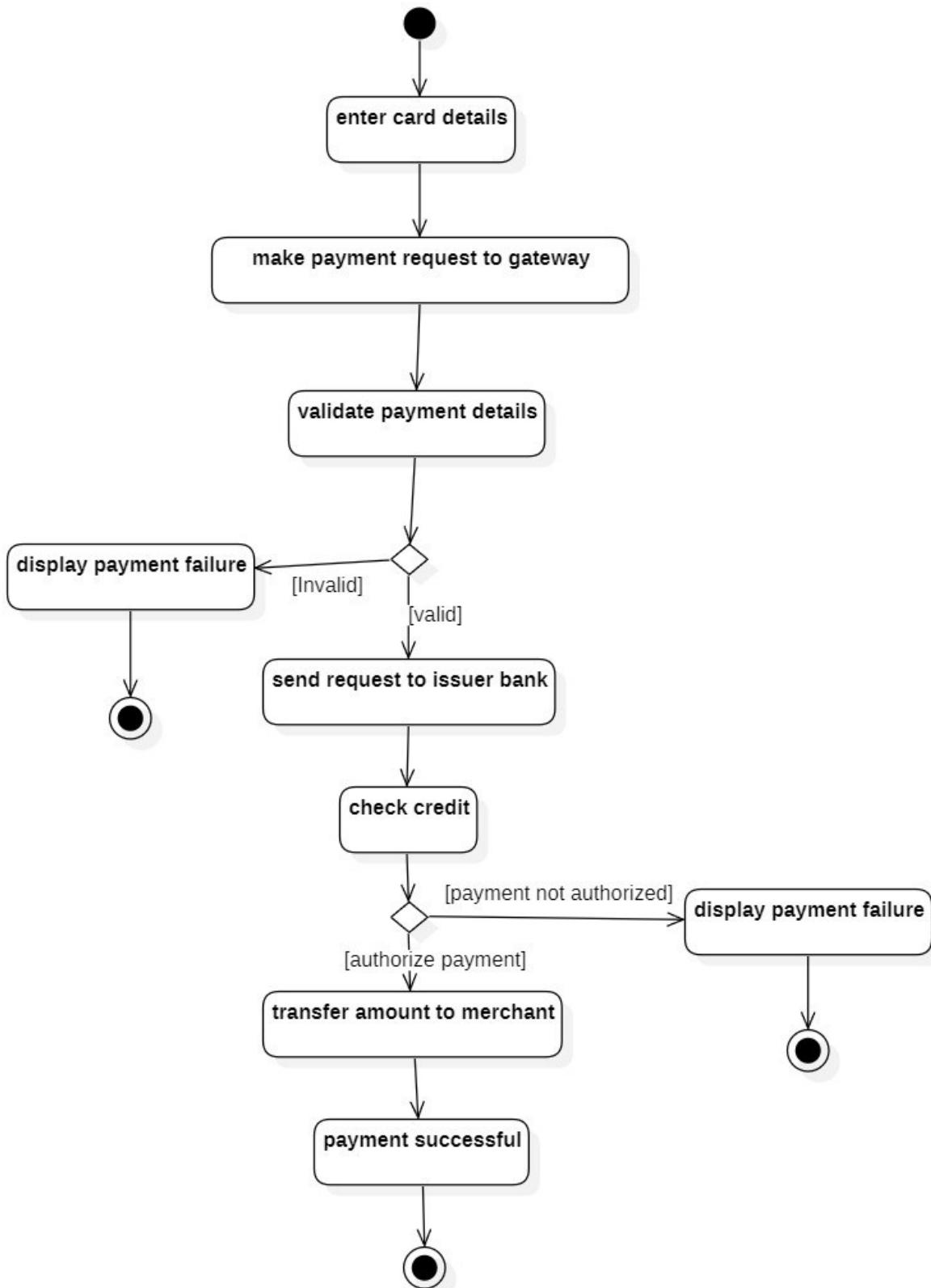


Fig 2.7: Activity Diagram

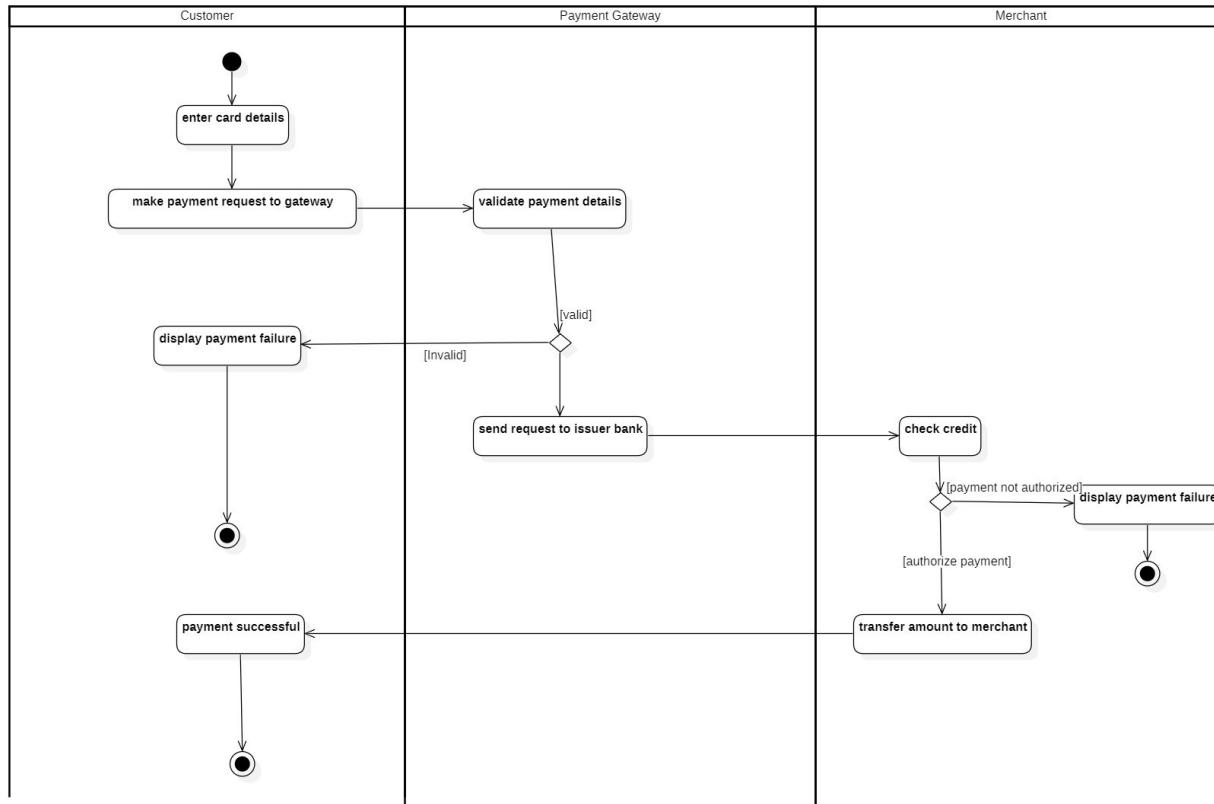


Fig 2.8: Advanced Activity Diagram

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 SRS:

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SRS document

3) Library Management

 > Introduction

 Problem Statement

 → To manage a library's inventory, member registration, borrowing and return processes.

 Scope

 → LMS will allow admins to catalog books, manage member information and track borrowing/return activity.

2) Functional Requirements

 (i) Catalog Management : Librarians can add, delete, or update books.

 (ii) Member management : System allows registration and maintains member details.

 (iii) Borrow/Return : members can borrow and return books and the system tracks due dates.

 (iv) Search : User can search for books by title, author or category.

 (v) Fines : System calculates fines for overdue books

3) Non-Functional Requirements

(i) Performance : It should handle multiple users accessing the catalog simultaneously.

(ii) Scalability : The System must be able to handle increasing numbers of books and users without performance degradation.
It should support at least 50 concurrent users.

(iii) Response time : The System should respond to any query within few seconds.

4) Domain Requirements

- (i) User Interface
- (ii) Payment gateway
- (iii) Customer feedback & review
- (iv) Policies & procedures

5) Appendices

6) Index

7) Design Constraints

- 7.1 Accessibility : Should be accessible for users even for user with disabilities
- 7.2 System should be open source

8) Milestones Schedule and Budget

8.1 Completed within 1 year

8.2 budget : Under Rs 10,00,000 in loc or FP

3.2 Class Diagram:

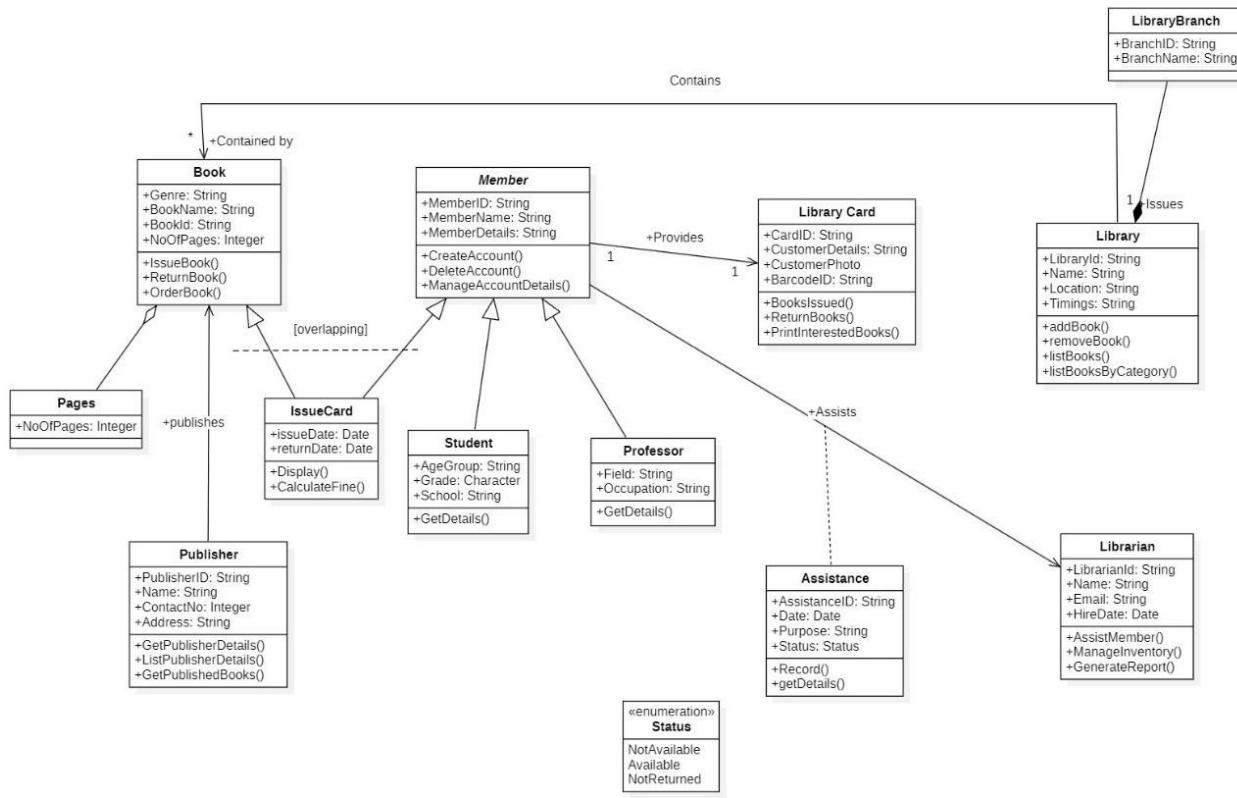


Fig 3.1: Class Diagram

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.

3.3 State Diagram:

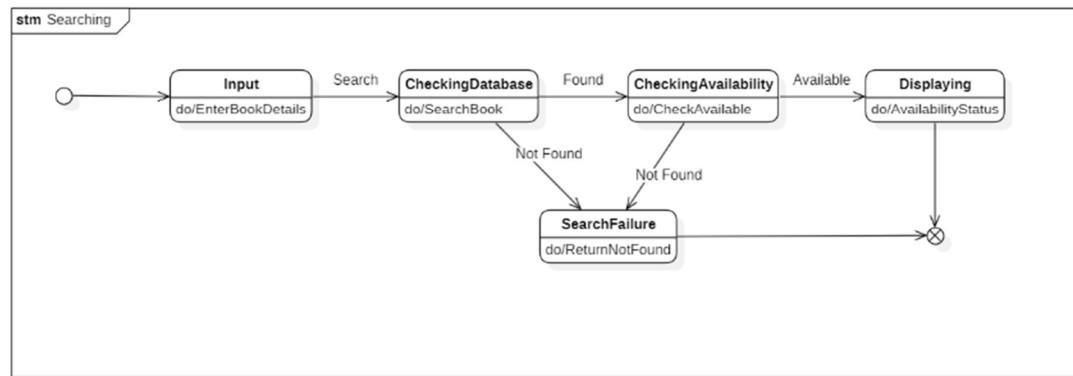
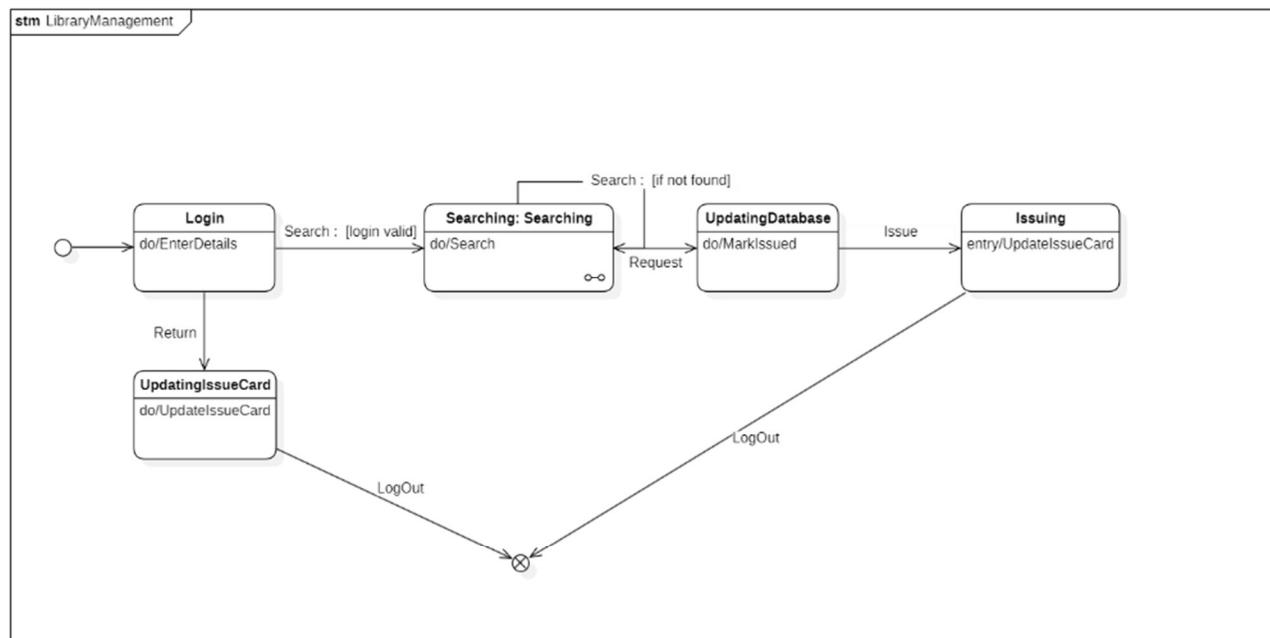


Fig 3.2: State Diagram

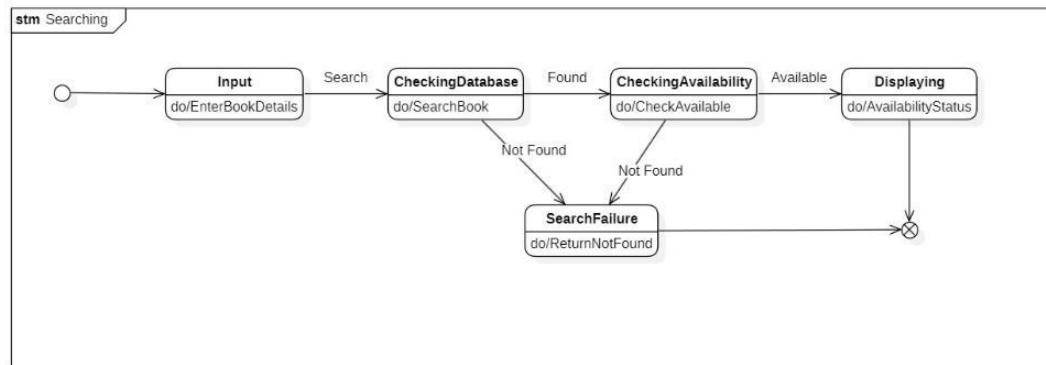
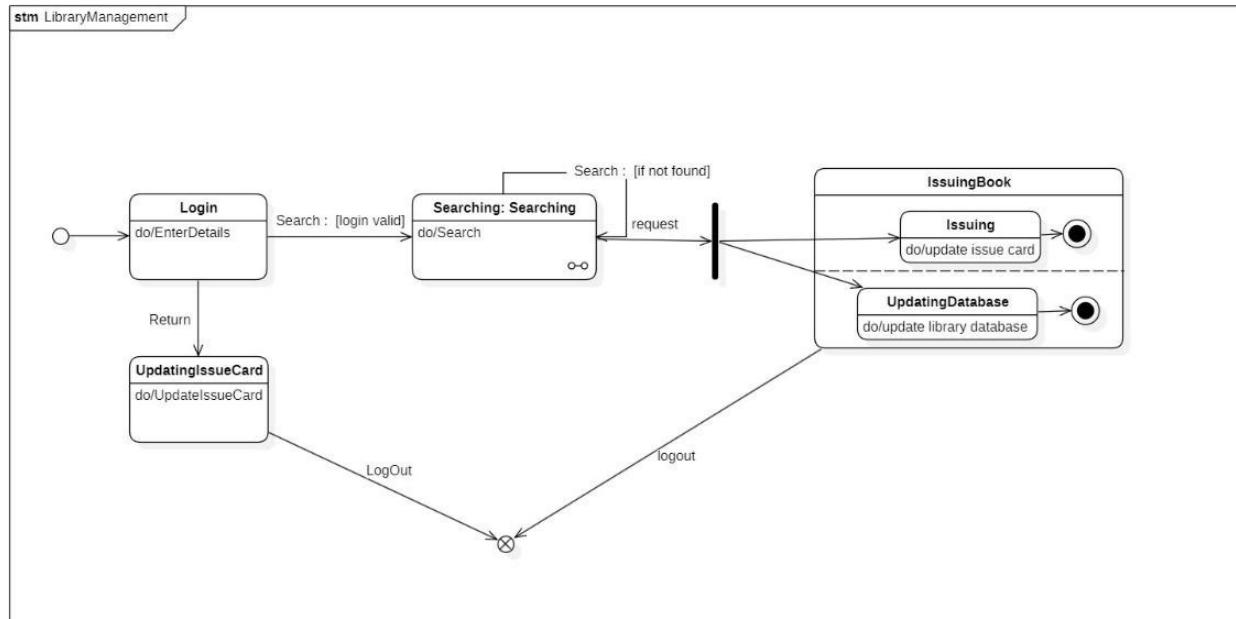


Fig 3.3: Advanced State Diagram

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.

3.4 Use Case Diagram:

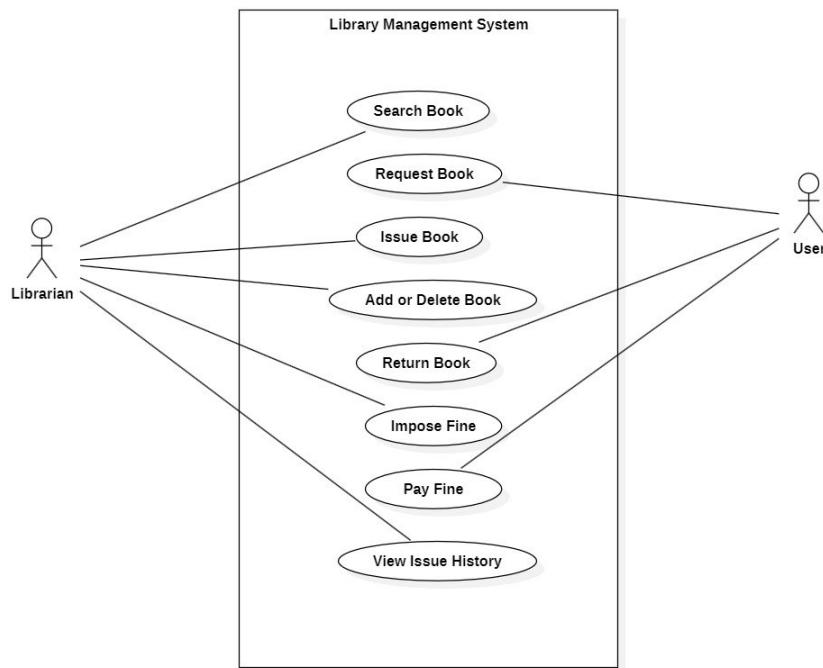


Fig 3.4: Use Case Diagram

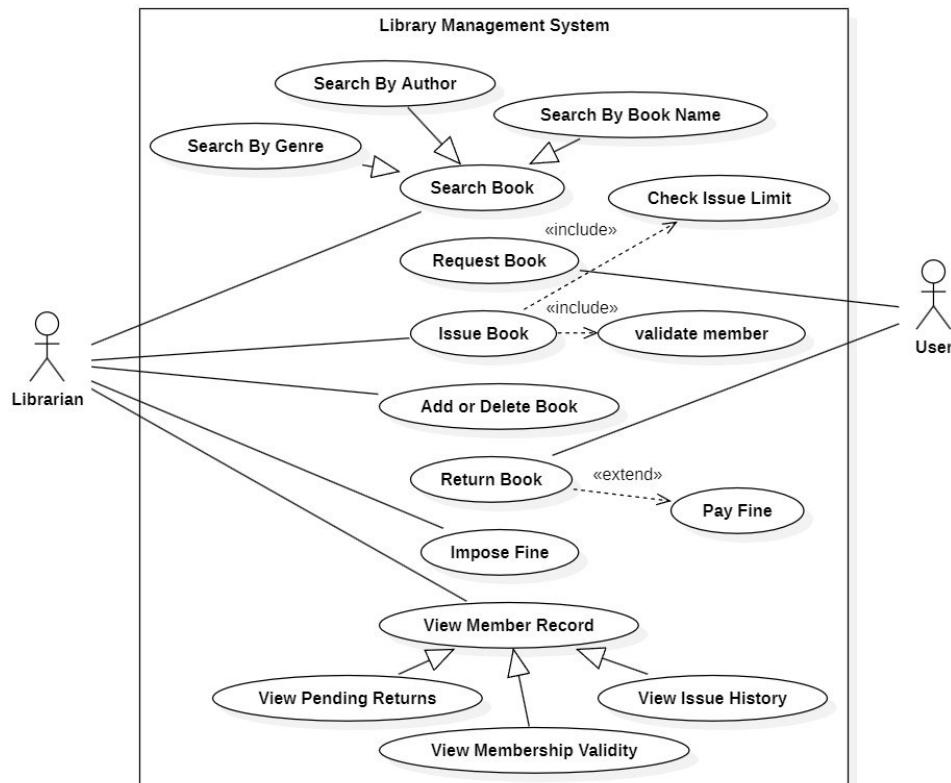


Fig 3.5: Advanced Use Case Diagram

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.

3.5 Sequence Diagram:

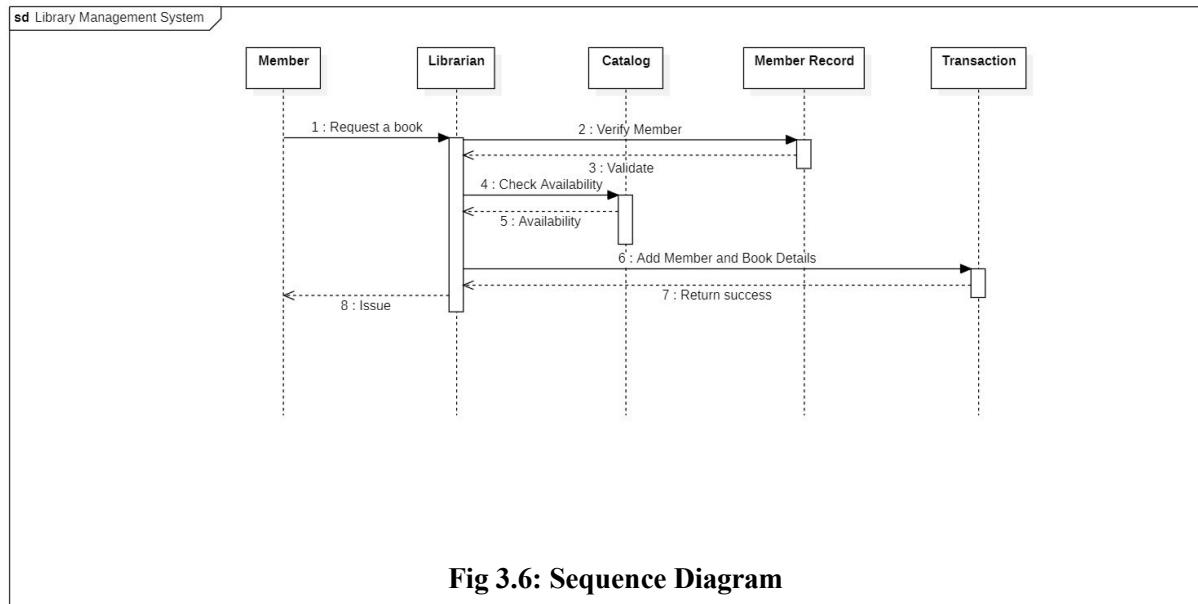


Fig 3.6: Sequence Diagram

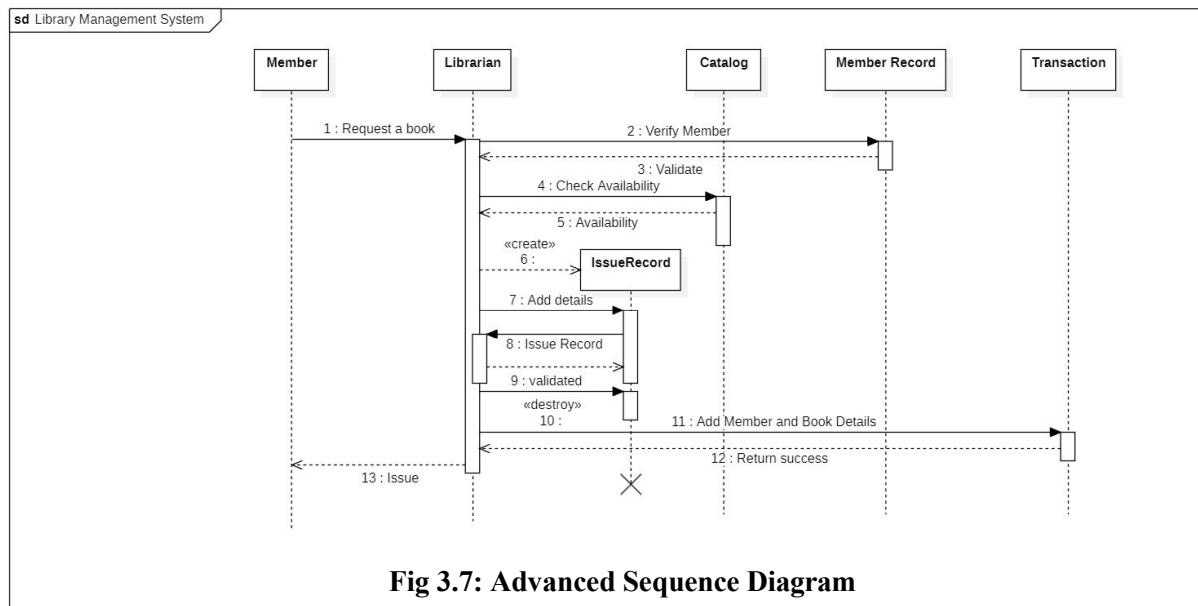


Fig 3.7: Advanced Sequence Diagram

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.

3.6 Activity Diagram

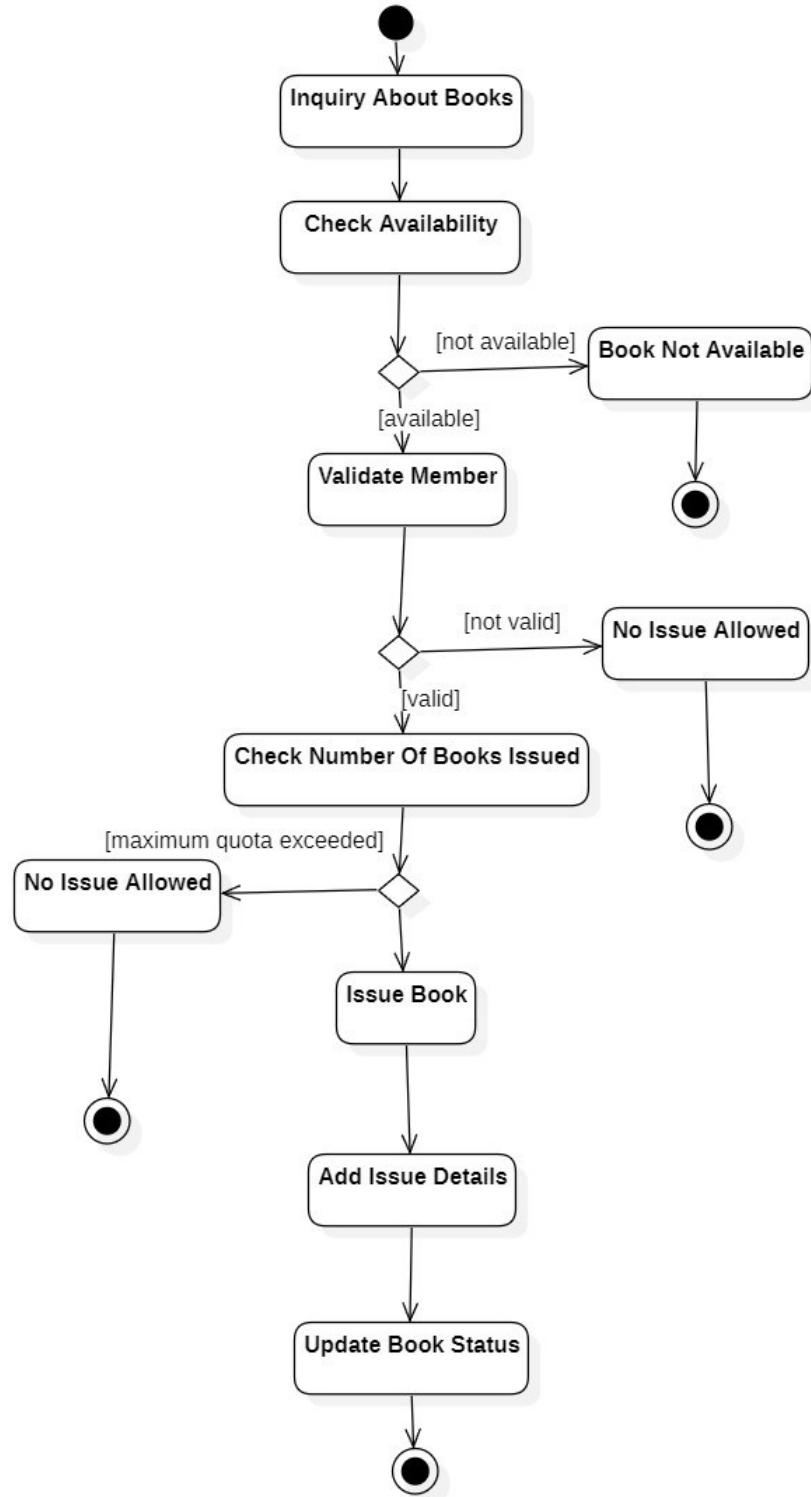


Fig 3.8: Activity Diagram

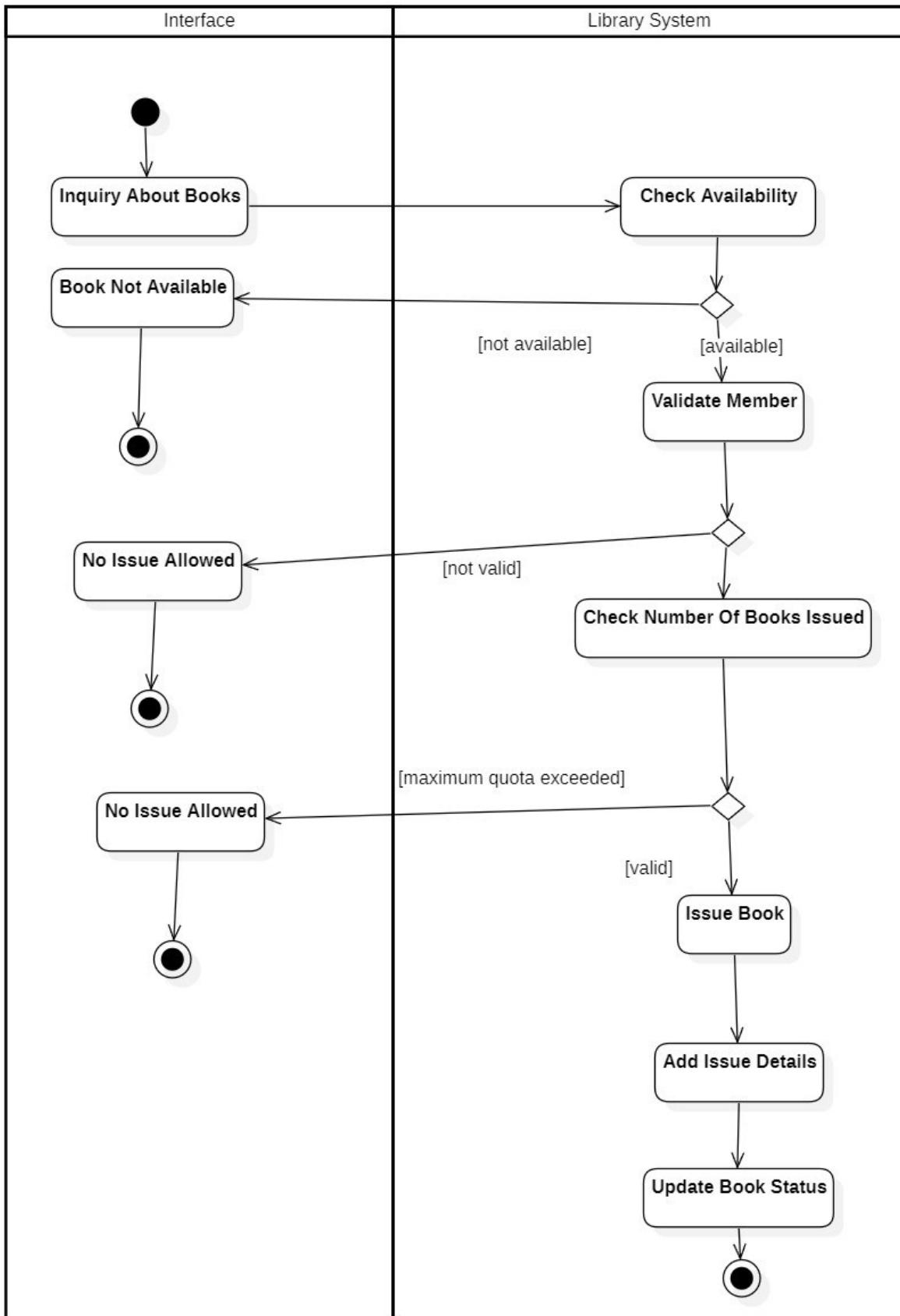


Fig 3.9: Advanced Activity Diagram

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 SRS:

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<p>Passport Automated System (SRS)</p>		
1. Introduction		
1.1 Purpose : To automate the passport application process, reduce manual tasks.		
1.2 Scope : This system will cover new passport applications, renewal, status tracking.		
1.3 Outward : A web and mobile based solution aimed at digitizing the application, tracking process.		
2. General Description		
This system allows user to have a passport, upload document, schedule appointments and receive real-time application status.		
2.1 Features		
→ Update of status notification → Online payment for application fees. → Form submission		
2.2 Benefits		
→ Reduces process delays by minimizing manual intervention → Enhances efficiency of the passport office		
3. Functional Requirements		
→ Document Verification: official verifying documents online.		

→ Appointment Scheduling : User can choose available dates for verification.

→ Status Tracking : Applicants check status & receive updates at each stage.

4. Interface Requirements

→ External Integration : Integrate with national ID and payment gateway for verification.

→ API requirement : Provide an API for third party applications, such as central services.

5. Performance Requirements

→ Processing time : Average form submission must be in no time.

→ Capacity : Handle upto 50,000 application per month.

6. Design Constraints

→ Legal Conformity : Must comply with government policies on data protection.

→ Accessibility : Must be accessible to people with disabilities.

7. Non Functional Attributes

- Security : Sensitive information should be encrypted.
- Reliability : Ensure a failover mechanism to achieve an uptime.
- Scalability : Should be able to handle seasonal spikes.

8. Preliminary Schedule and Budget

Schedule :

- (i) Requirements Analysis : 2-3 weeks
- (ii) System design and architecture : 4 weeks
- (iii) Development Phase : 8-10 weeks
- (iv) Testing : 3-4 weeks

Budget :

- (i) Requirements : £ 8,000
- (ii) Design and Architecture : £ 10,000
- (iii) Development : £ 45,000
- (iv) Testing : £ 8,000
- (v) Deployment : £ 5,000

Estimated Cost : £ 96,000

4.2 Class Diagram:

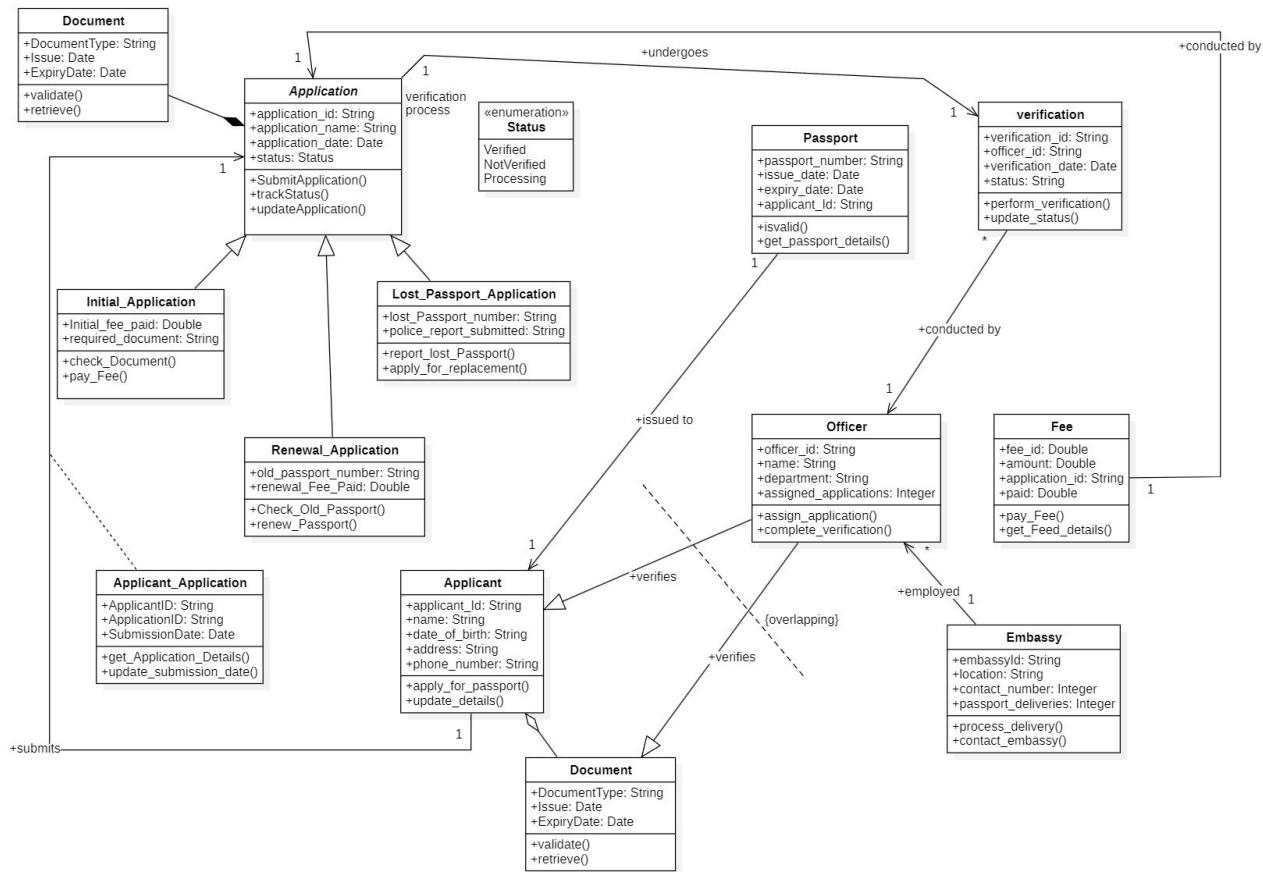


Fig 4.1: Class Diagram

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.

4.3 State Diagram:

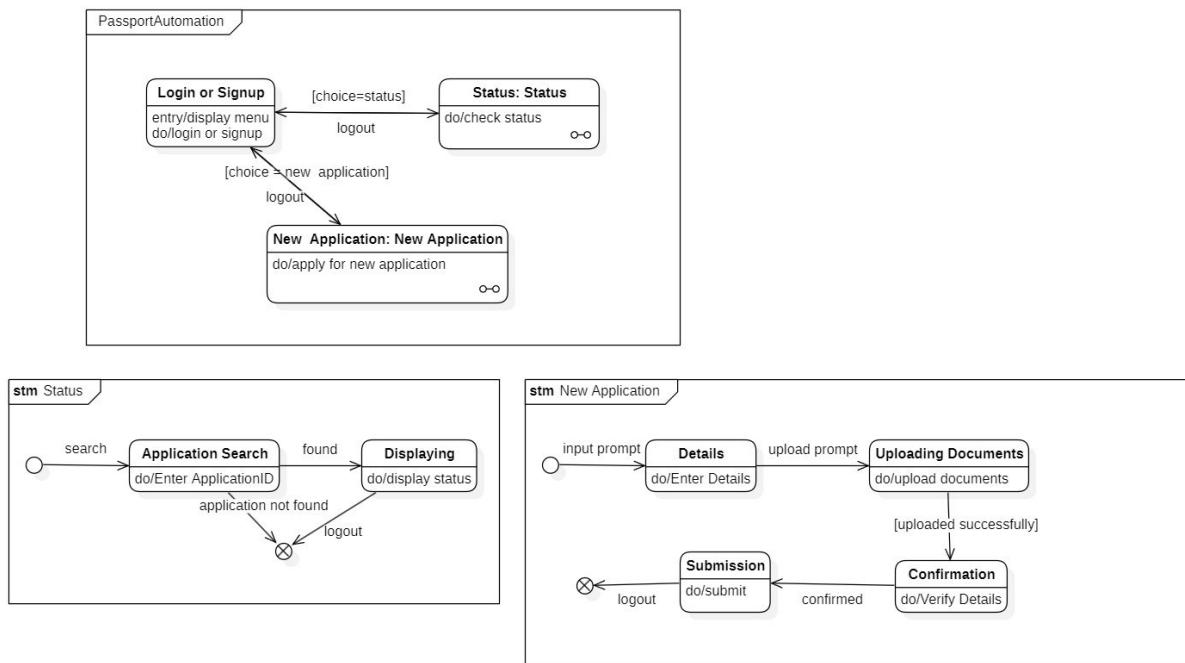


Fig 4.2: State Diagram

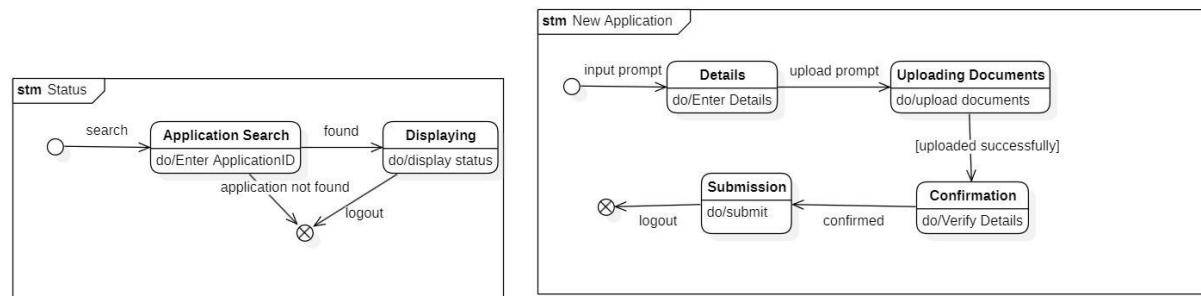
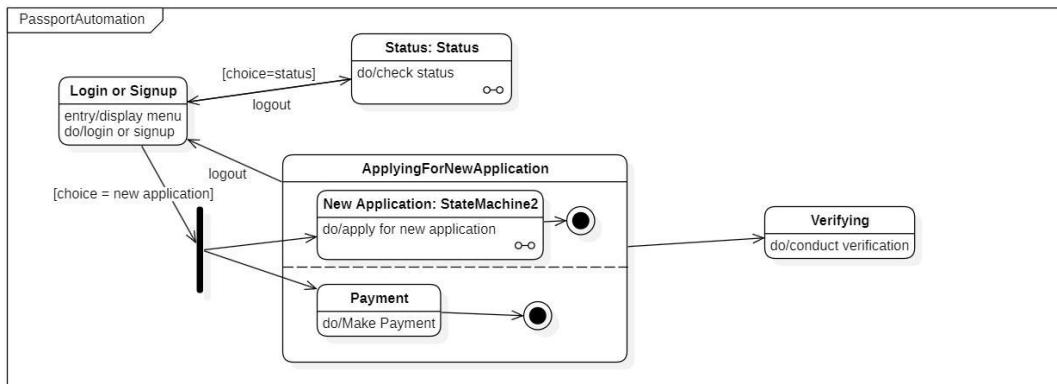


Fig 4.3: Advanced State Diagram

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.

4.4 Use Case Diagram:

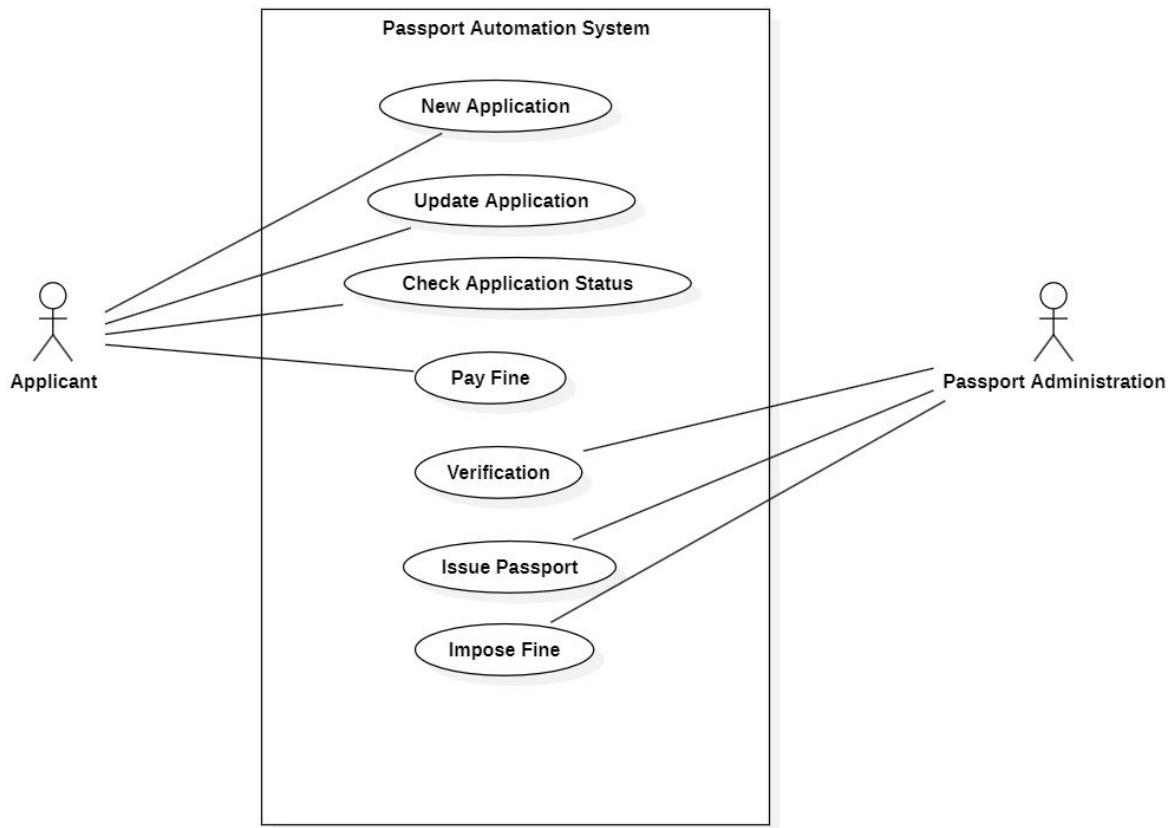


Fig 4.4: Use Case Diagram

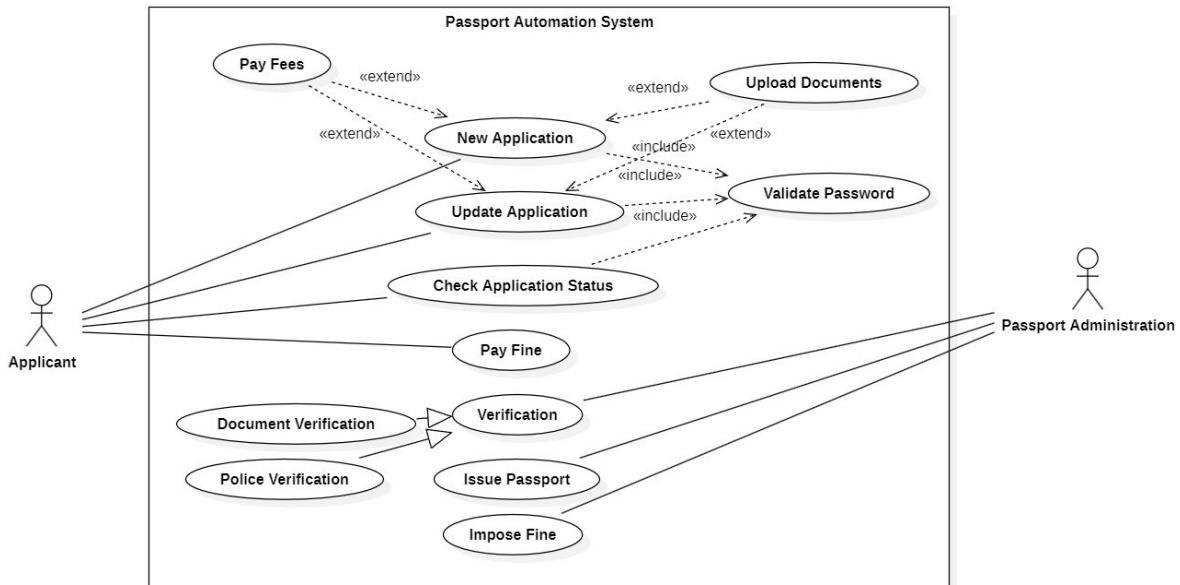


Fig 4.5: Advanced Use Case Diagram

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.

4.5 Sequence Diagram:

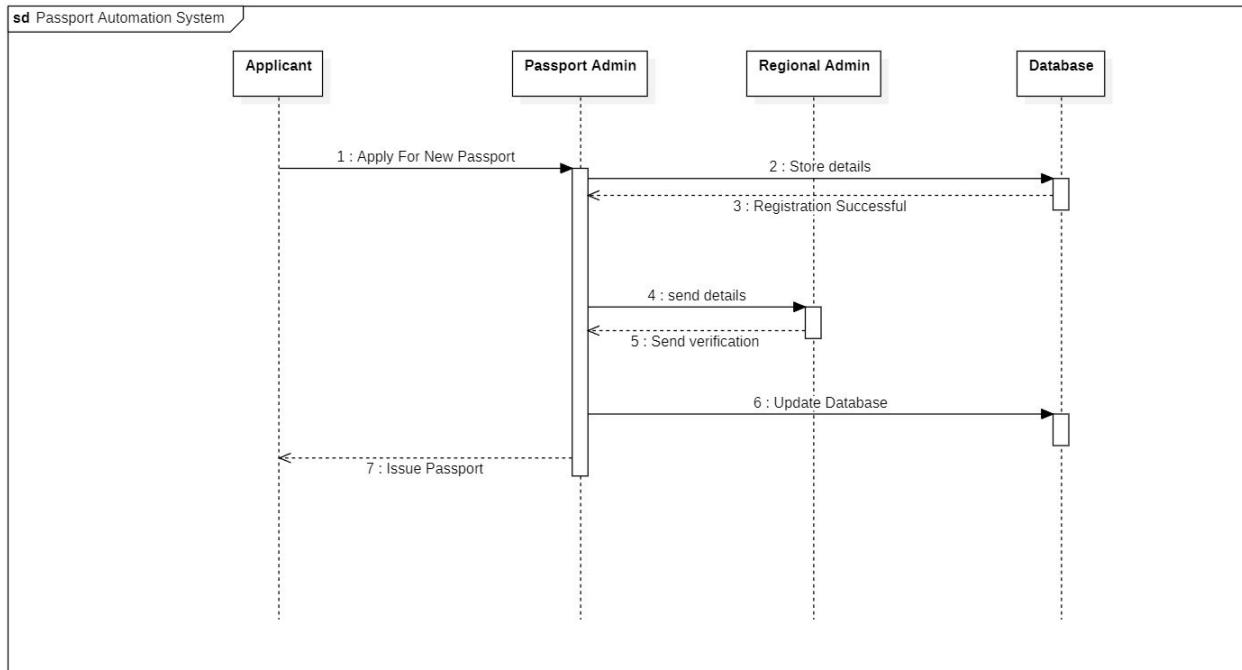


Fig 4.6: Sequence Diagram

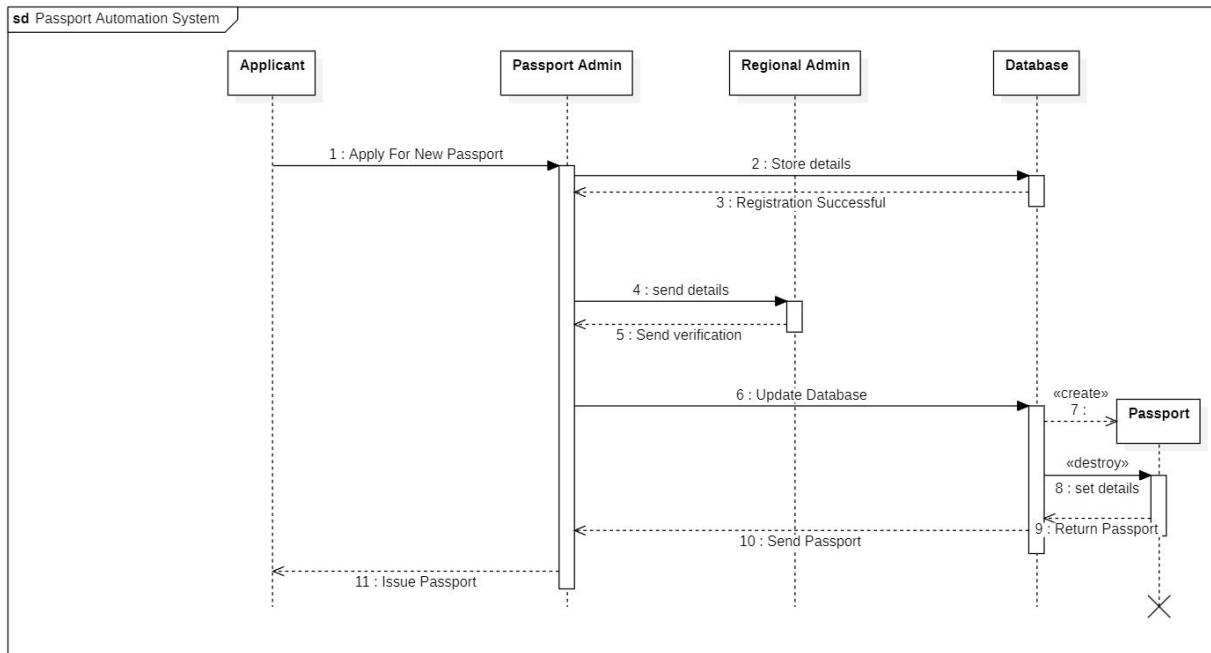


Fig 4.7: Advanced Sequence Diagram

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.

4.6 Activity Diagram

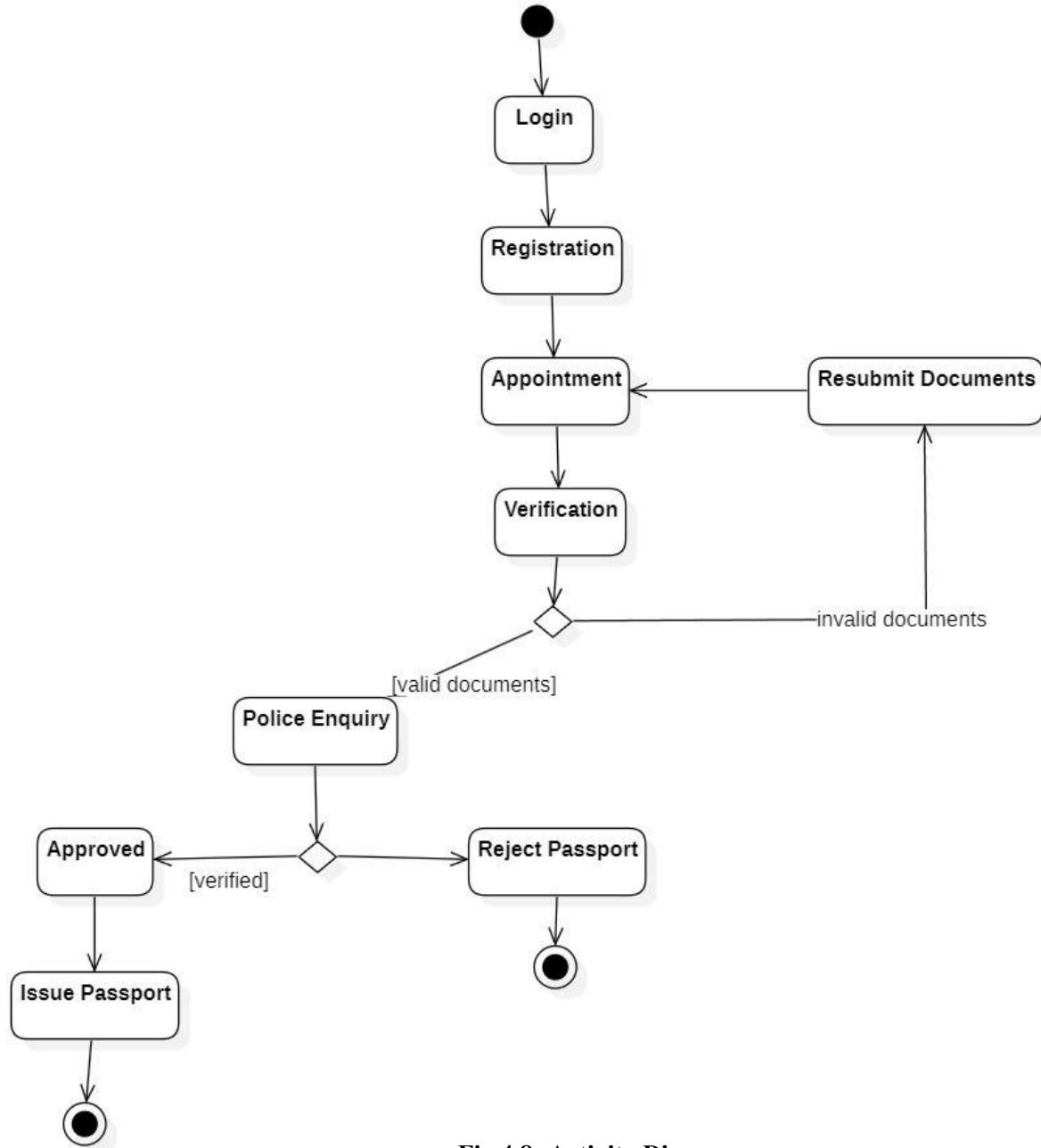


Fig 4.8: Activity Diagram

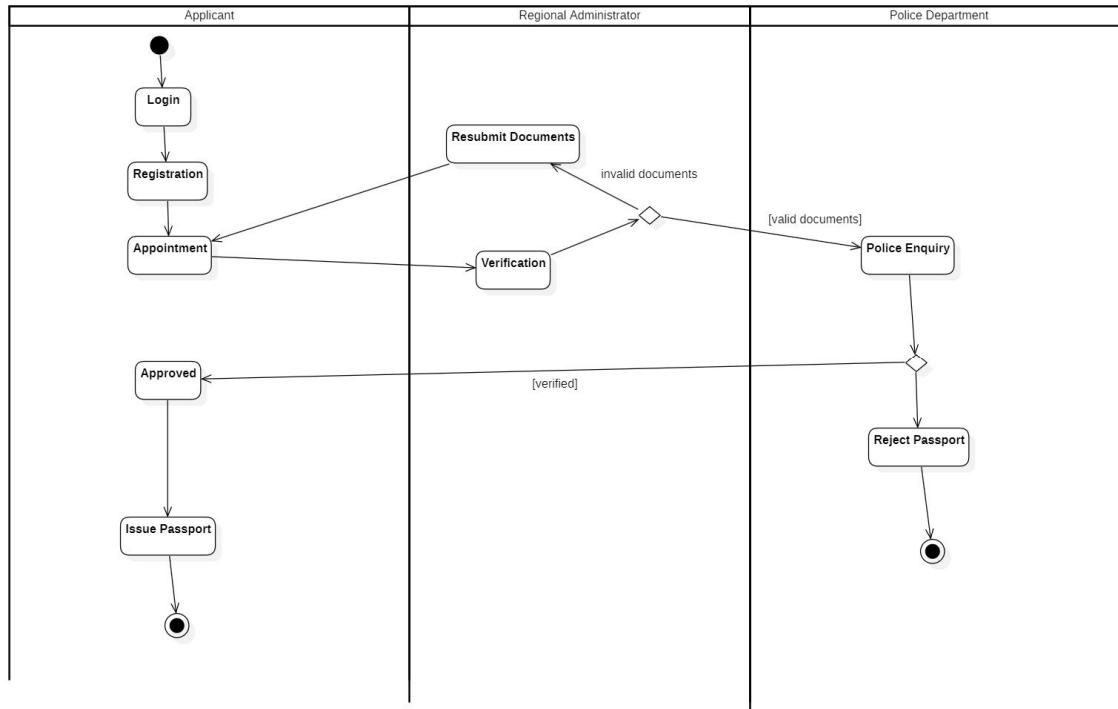


Fig 4.9: Advanced Activity Diagram

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 SRS:

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<p>1) <u>Stock Maintenance</u></p> <p><u>Problem Statement</u></p> <p>→ Automates Stock management for warehouses, keeping track of Inventory levels, Reddels and Stock audits.</p> <p>⇒ <u>Sysbe</u></p> <p>SMS will allow warehouse manager to track Stock levels, manage Reddels, Stocks, audit.</p> <p><u>Functional Requirements</u></p> <p>(i) Stock Tracking : Tracks Stock levels of all products in the inventory</p> <p>(ii) Reddelling : Automatically generates Reddell notifications when Stock reaches predefined levels.</p> <p>(iii) Stock Audit : Allows periodic Stock audits and actual Stock levels.</p> <p>(iv) Reporting : Generates reports on Stock levels, Reddell history and Stock analysis</p> <p><u>Design Constraints</u></p> <ul style="list-style-type: none">• Cloud Support• Document Representation			

Non Functional Requirements

- (i) Scalability : The system must scale as more products are added to the inventory.
- (ii) Reliability : The system must always display accurate stock levels.
- (iii) Usability : Easy navigation for the warehouse staff and managers.

Interface Requirements

- (i) Web Interface
- (ii) API integration
- (iii) Database interface

Preliminary Schedule & budget

- (i) Time, within 6 months
- (ii) Budget within Rs 100000 in LOC of FP.
- (iii) Requirement Analysis : 2-3 weeks
- (iv) Development time : 8-10 weeks
- (v) Testing : 3-4 weeks

Budget :

- (i) Requirements : ₹ 8000
- (ii) Design and Architecture : ₹ 10000
- (iii) Development : ₹ 45000
- (iv) Testing : ₹ 5000
- (v) Deployment : ₹ 25000

5.2 Class Diagram:

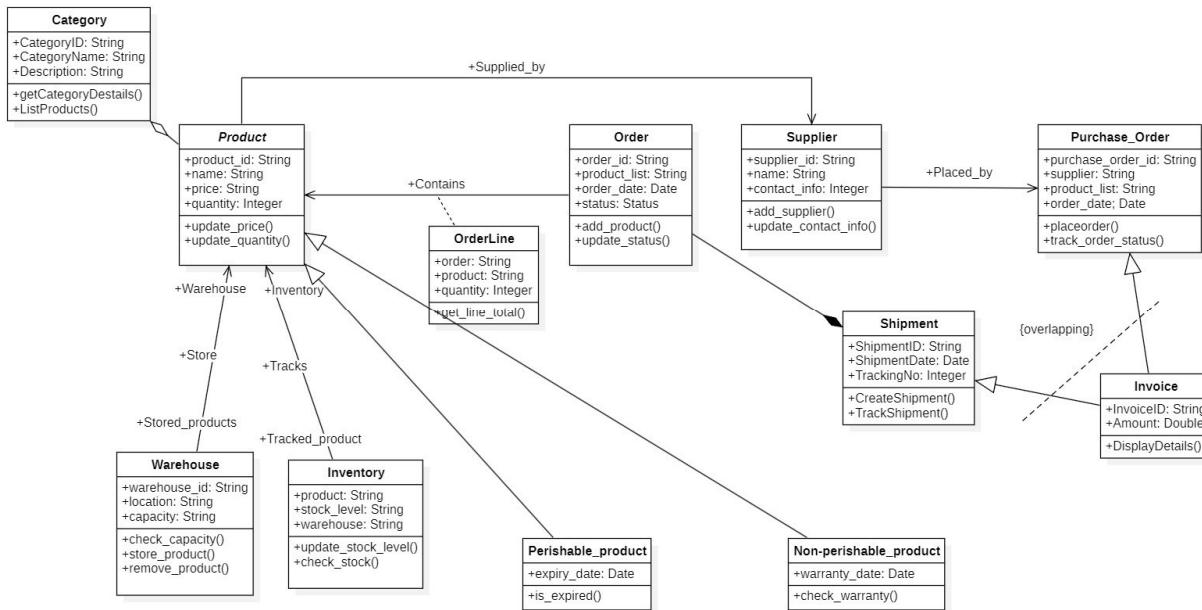


Fig 5.1: Class Diagram

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.

5.3 State Diagram:

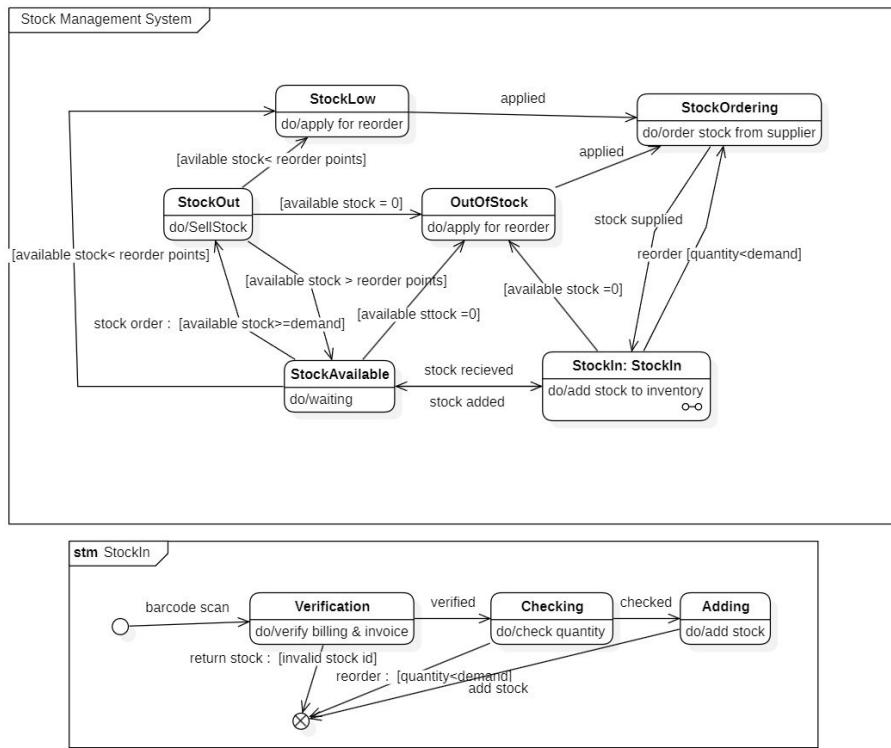


Fig 5.2: State Diagram

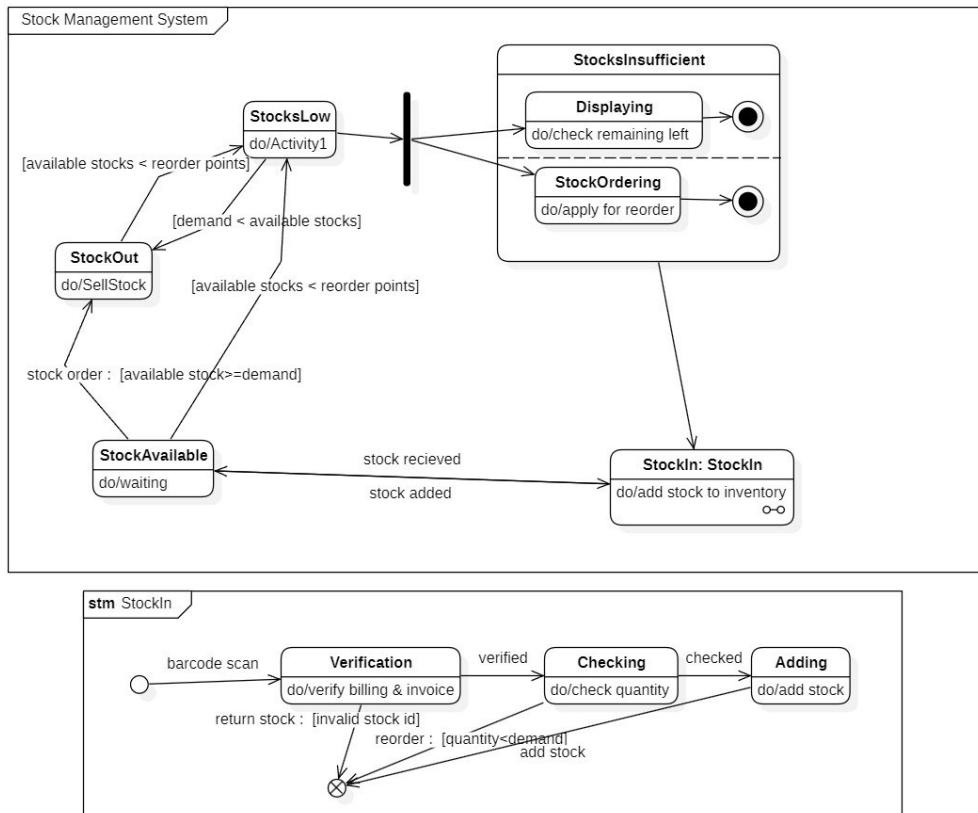


Fig 5.3: Advanced State Diagram

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.

5.4 Use Case Diagram:

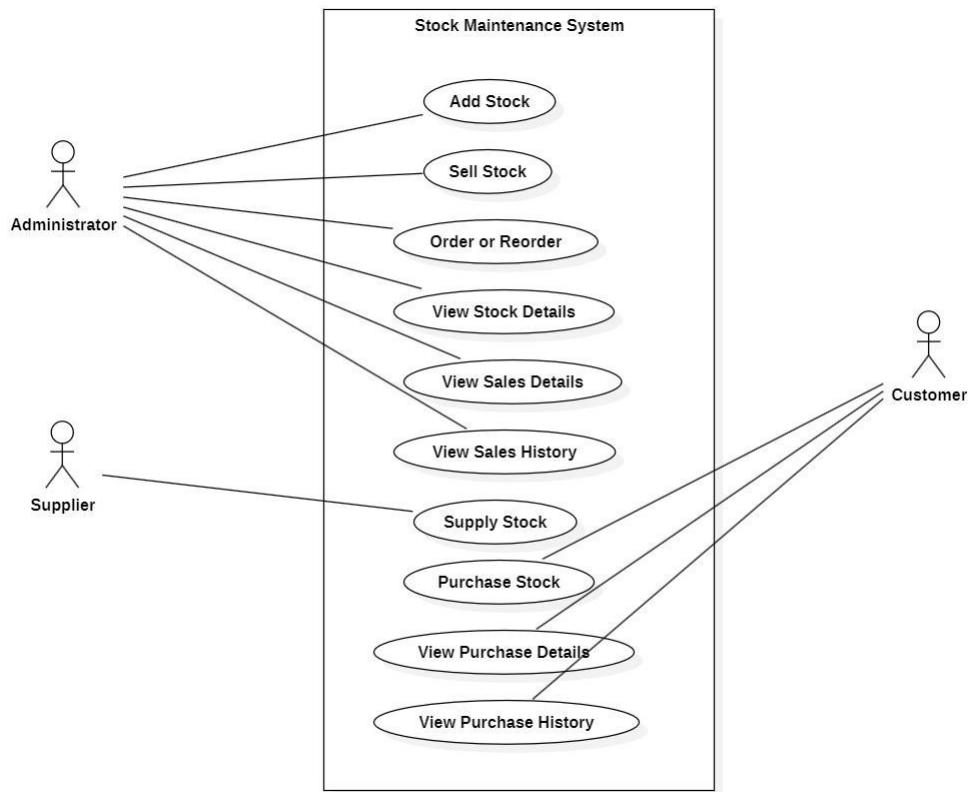


Fig 5.4: Use Case Diagram

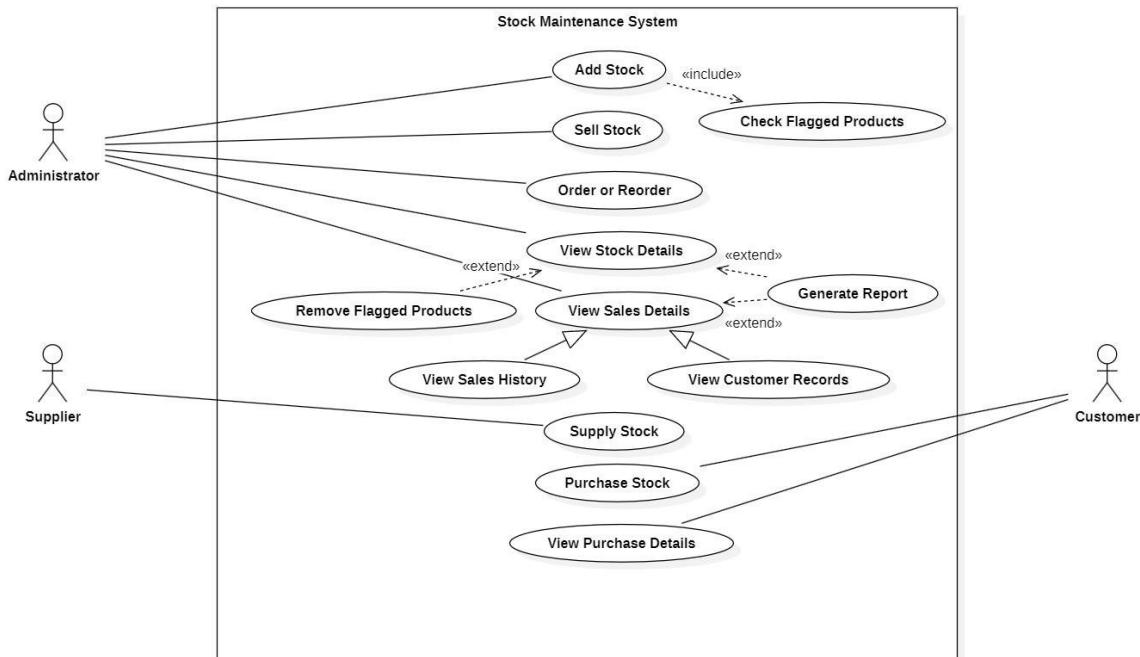


Fig 5.5: Advanced Use Case Diagram

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.

5.5 Sequence Diagram:

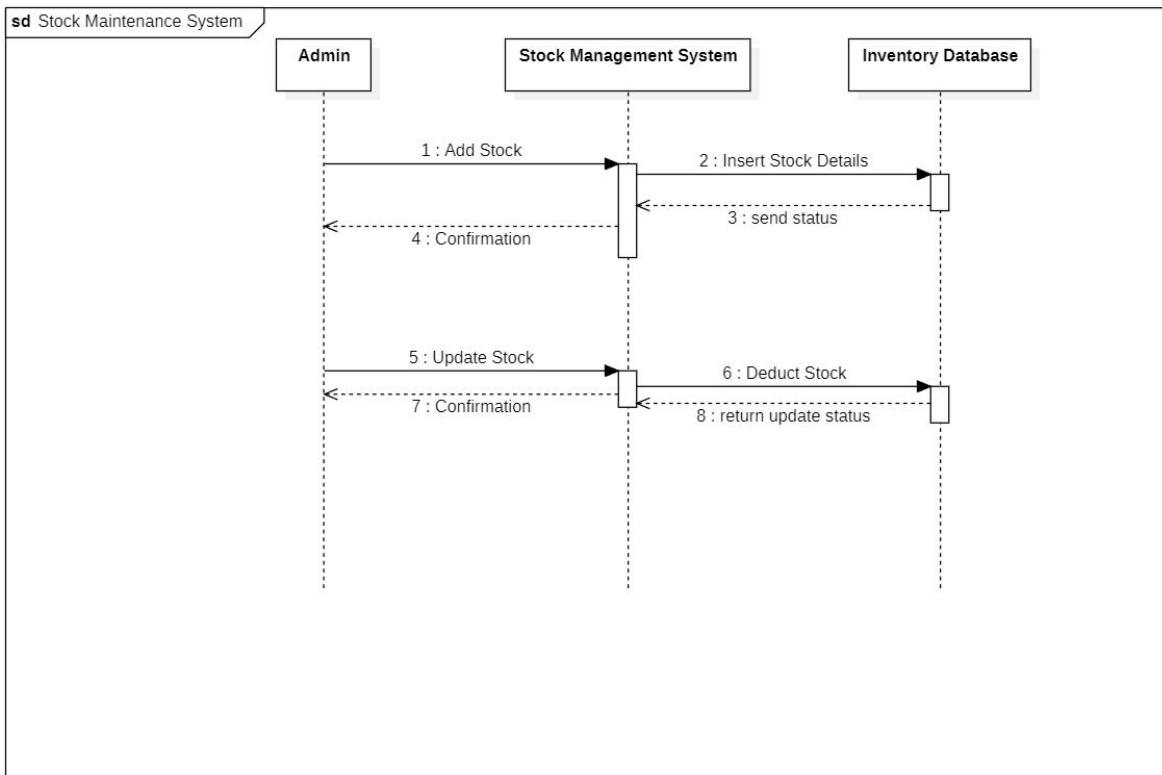


Fig 5.6: Sequence Diagram

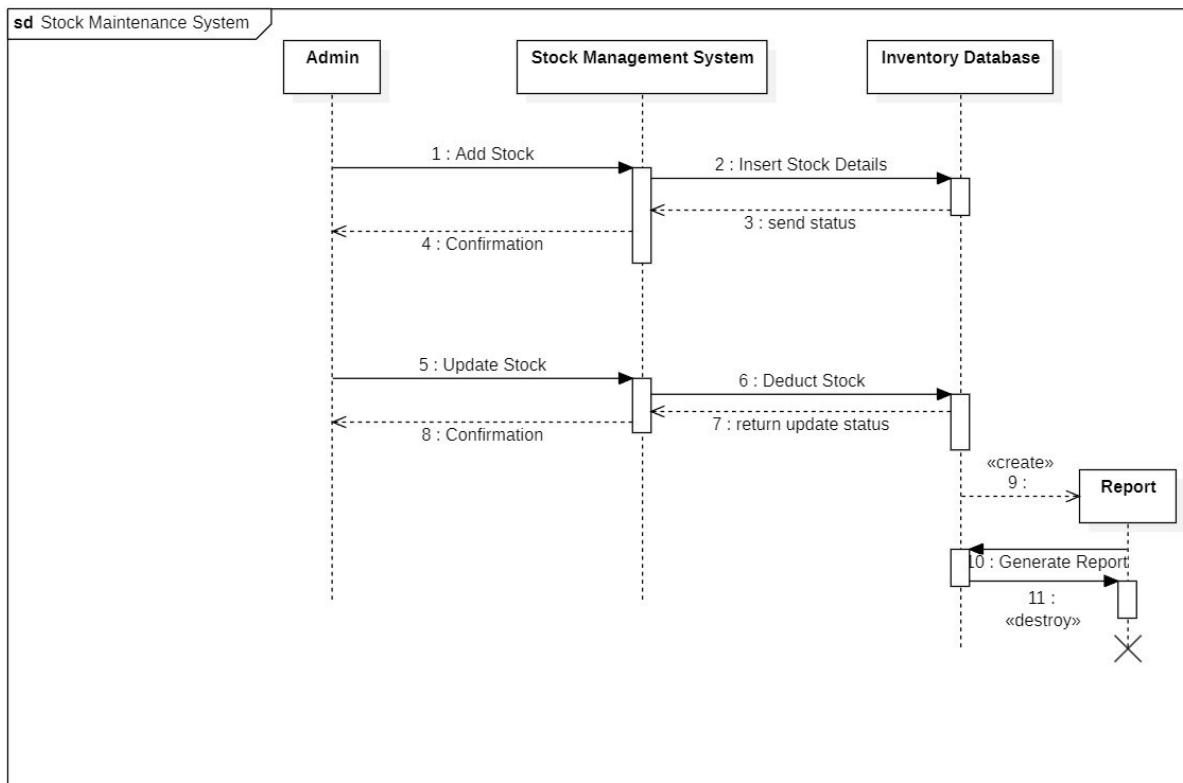


Fig 5.7: Advanced Sequence Diagram

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.

5.6 Activity Diagram

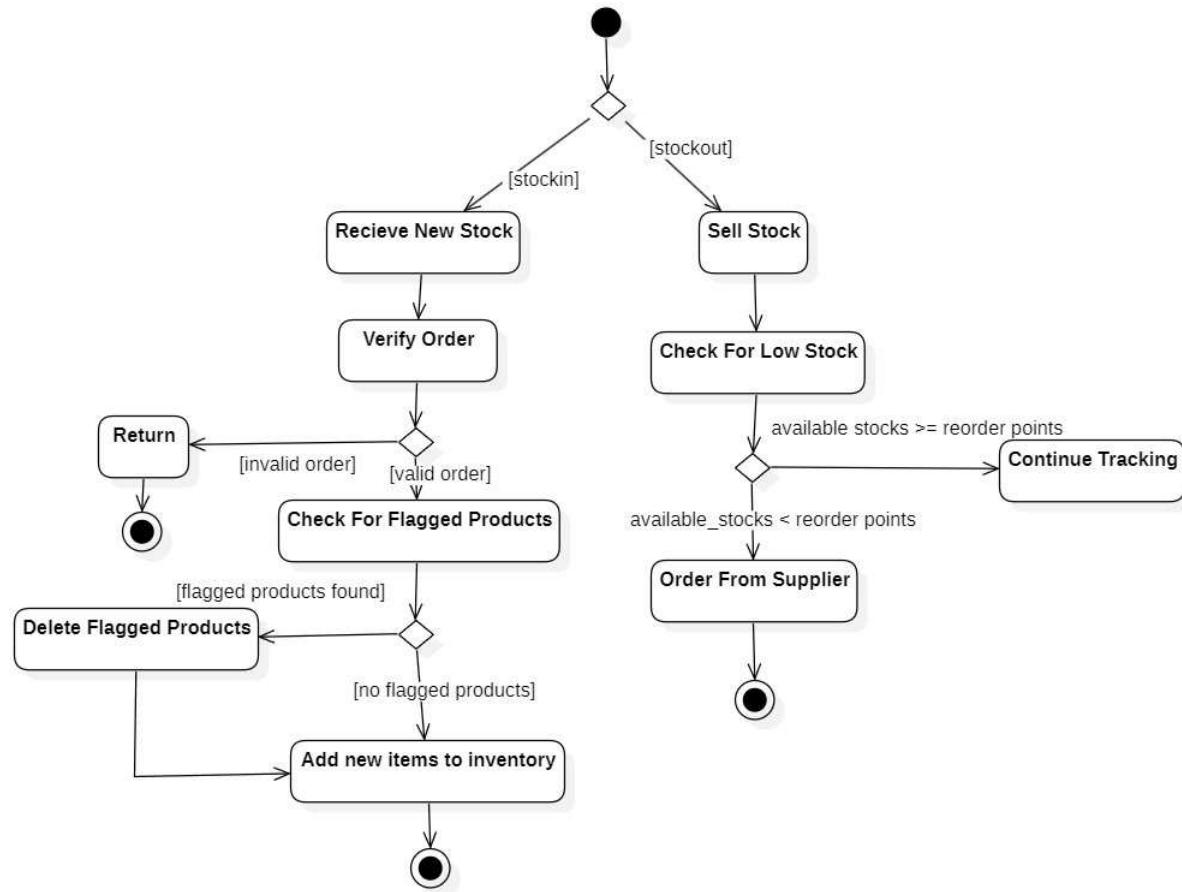


Fig 5.8: Activity Diagram

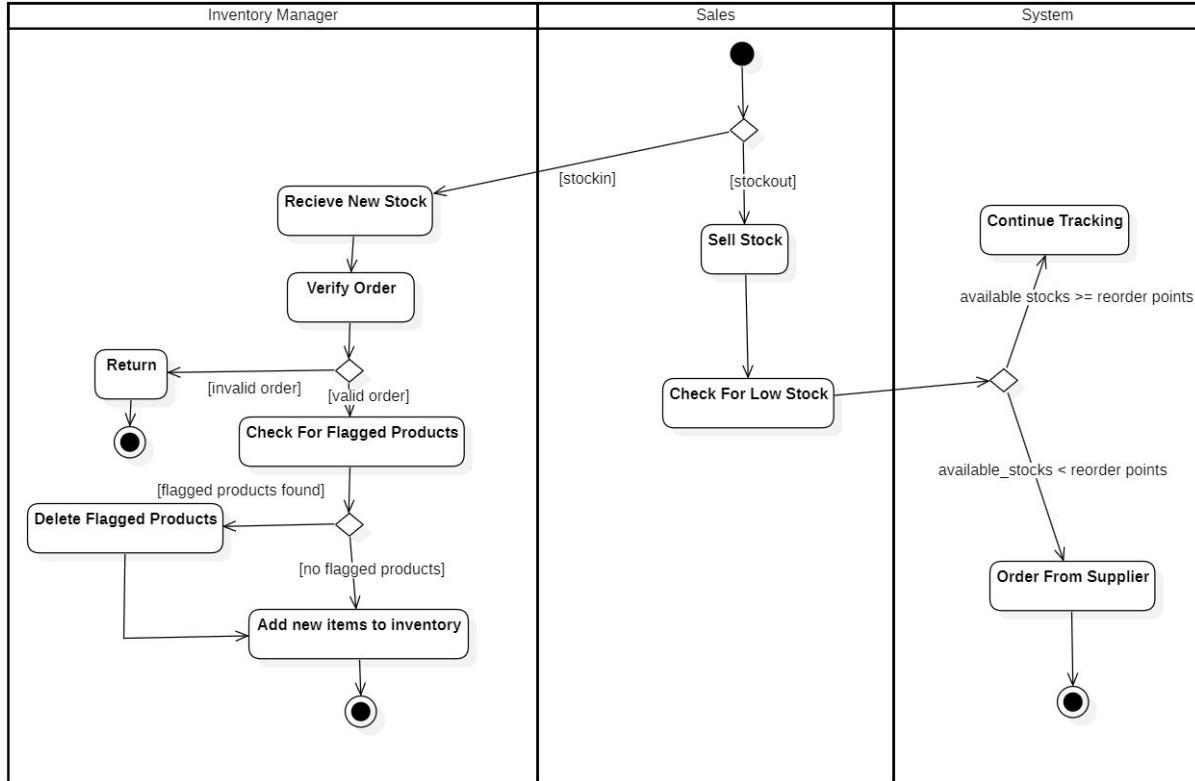


Fig 5.9: Advanced Activity Diagram

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.