RIPHAH INTERNATIONAL UNIVERSITY

DATABASE SYSTEM

CINEMA MANAGEMENT SYSTEM PROJECT BY

HOORAIN ASHIQ	60090	DBMS	4th
MARYAM SAEED	**57169**	**DBMS**	**4th**
ARUSA SHAUKAT	**60091**	**DBMS**	**4th**

CINEMA MANAGEMENT SYSTEM

Abstract

The **Cinema Management System (CMS)** is a database-driven application designed to automate and optimize the operations of a movie theater. This system manages movies, genres, cinema screens, seating arrangements, show schedules, customer bookings, and payments in an efficient and organized manner. By providing a centralized platform for administrators, it enables easy management of movie schedules, seat allocation, and revenue tracking. Customers benefit from a streamlined interface for browsing movies, selecting shows, reserving seats, and making payments securely.

The project employs a relational database to maintain data integrity and support real-time updates, preventing issues such as double bookings or seat over-allocation. With features such as genre-based movie categorization, dynamic seat management, and booking history tracking, the system enhances operational efficiency while improving the overall customer experience. The CMS ultimately serves as a robust solution for modern cinema management, integrating administrative control with user-friendly customer services.

Project description

The **Cinema Management System (CMS)** is a comprehensive database-driven application designed to manage the complete operations of a movie theater. It provides a centralized platform for administrators and customers to perform all essential tasks efficiently. The system uses **CRUD operations (Create, Read, Update, Delete)** for managing critical data entities such as **movies, genres, cinema screens, seats, shows, customers, bookings, and payments**. Administrators can **add new movies and genres, update show timings, modify screen layouts, and delete obsolete records**, ensuring that the system always reflects the latest information. Customers can **view available movies, browse shows by genre or screen, select preferred seats, make bookings, and manage or cancel their reservations**. Each booking is linked to a **payment record**, which tracks transactions securely. The system also maintains **real-time seat availability** to prevent double bookings and ensures data integrity through relational database management. By automating these processes, the CMS not only streamlines administrative tasks but also enhances the **overall customer experience**, providing a reliable and user-friendly platform for modern cinema operations.

System Overview

- Brief description of the system: web-based or software-based.
- Users of the system:
    - **Admin:** Manages movies, shows, screens, seats.
    - **Customer:** Books tickets, views shows and movies.
- Benefits: time-saving, accurate bookings, easier management.

USER STORIES

- **As a user**, I want to browse available movies and showtimes so that I can choose the best option for my schedule and preferences.

- **As a user**, I want to select and reserve my seat when purchasing a ticket so that I can ensure I have the seating arrangement I prefer.

- **As a user**, I want to have a payment gateway so that I can choose a payment method.

- **As a user**, I want to sign up for a membership so that I can receive exclusive discounts and early access to tickets.

- **As a member**, I want to manage my membership and view my rewards so that I can keep track of my benefits and stay updated on perks.

- **As a user**, I want to log in securely and manage my account so that I can update my personal details and view my purchase history easily.

- **As a user**, I want to see a list of movies that are going to be released soon, along with their release dates and length, so that I can plan future visits to the cinema.

- **As a user**, I want to see my cart and add tickets to my cart so that I can pay the order.

- **As an admin**, I want to access a dashboard where I can see a list of all purchases (tickets and food orders) along with user details, so that I can assist customers with any issues.

- **As an admin**, I want to add new films, create showtimes and update showtimes so that I can manage the cinema featured films.

System Requirements

A. Functional Requirements

The functional requirements of the cinema management API specify the key actions that the system must perform to facilitate efficient cinema operations. These requirements include:

- **User Authentication**: The system must allow users (customers and administrators) to log in using a username and password.
- **Movie Management**: Administrators should be able to add, update, and delete movie listings, including details such as title, duration, genre, and screening times.

- **Showtime Scheduling**: The system must allow admins to define movie schedules, assign theaters, and manage availability.
- **Ticket Booking**: Customers should be able to search for movies, select showtimes, choose seats, and book tickets.
- **Payment Processing**: The system must handle secure online transactions and provide booking confirmation.
- **User Role Management**: Different access levels must be defined for administrators and customers.
- **Report Generation**: The system should generate reports on ticket sales, revenue, and attendance trends.

B. Nonfunctional Requirements

Non-functional requirements (NFRs) define the qualities and constraints that the cinema management API must adhere to, ensuring performance, security, usability, and other critical aspects. Key non-functional requirements include:

- **Performance**: The system should respond to user actions within 2 seconds under normal load.
- **Scalability**: The system must support up to 1.000 concurrent users without degradation in performance.
- **Usability**: The API should be well-documented, allowing developers to integrate it easily with front-end applications.
- **Availability**: The system must have an uptime of at least 99.9
- **Maintainability**: The software should allow for easy updates, bug fixes, and feature expansions with minimal downtime.
- **Data Integrity**: The system should ensure accurate and consistent data storage for movie listings, bookings, and user accounts. By addressing both functional and non-functional require ments, the cinema management API can provide a robust, secure, and user-friendly experience for administrators and customers alike.

A. Sequence Diagrams

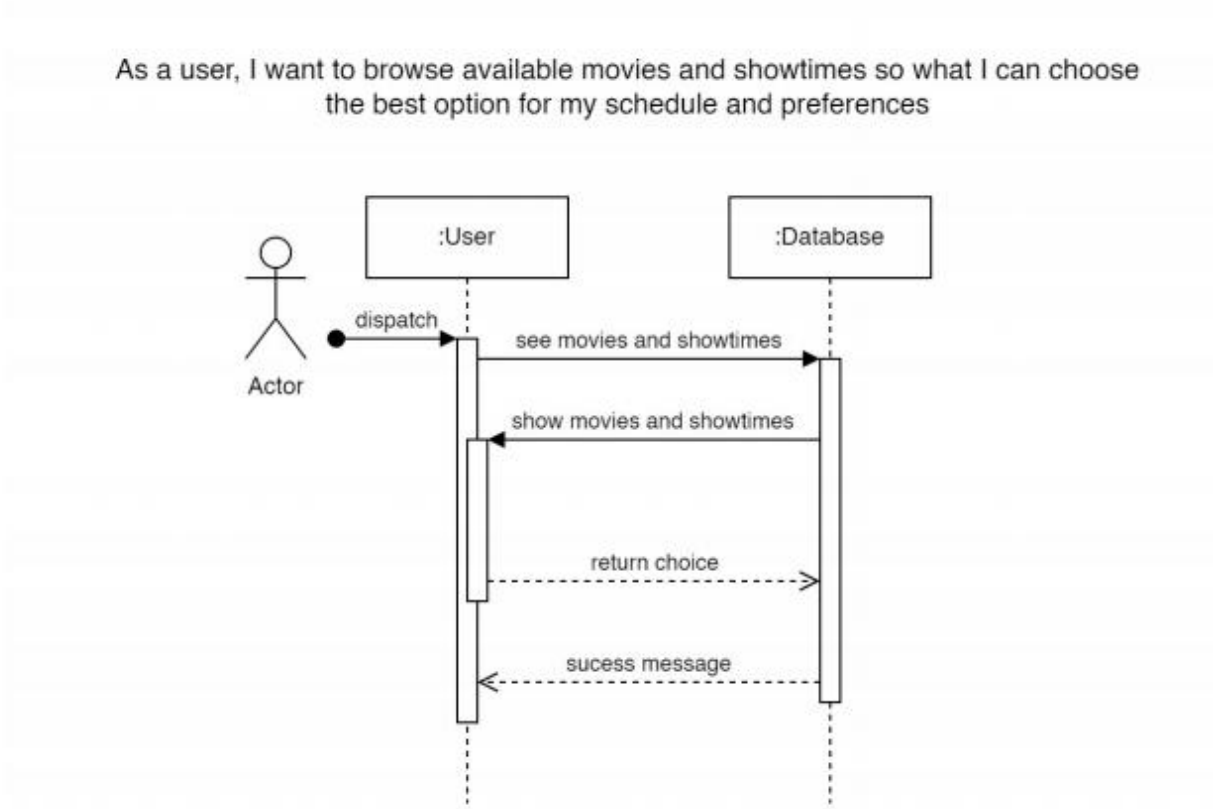

Fig. 1. Sequence Diagram 1

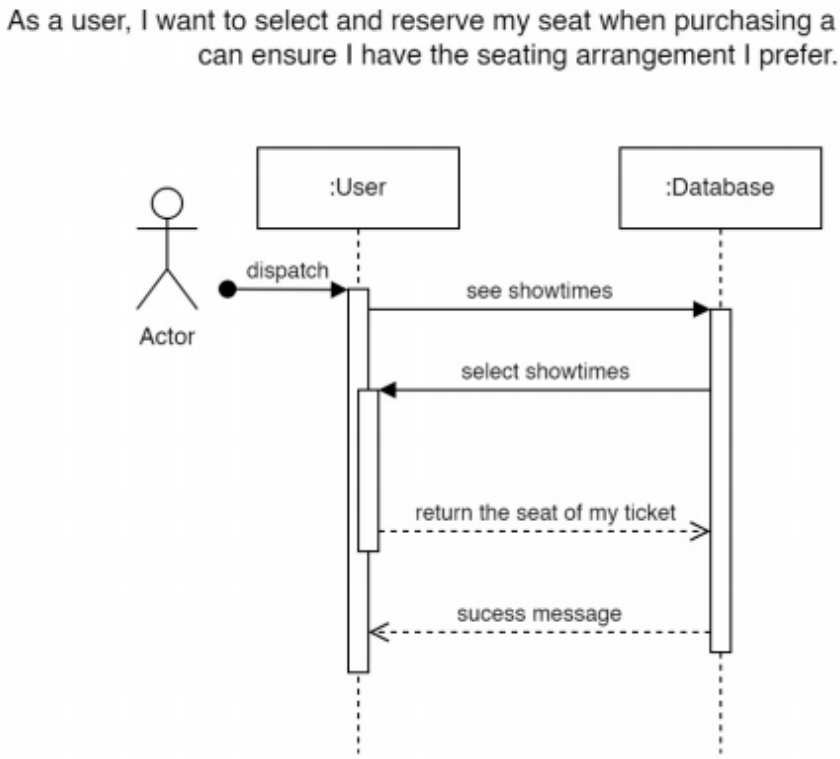

Fig. 2. Sequence Diagram 2

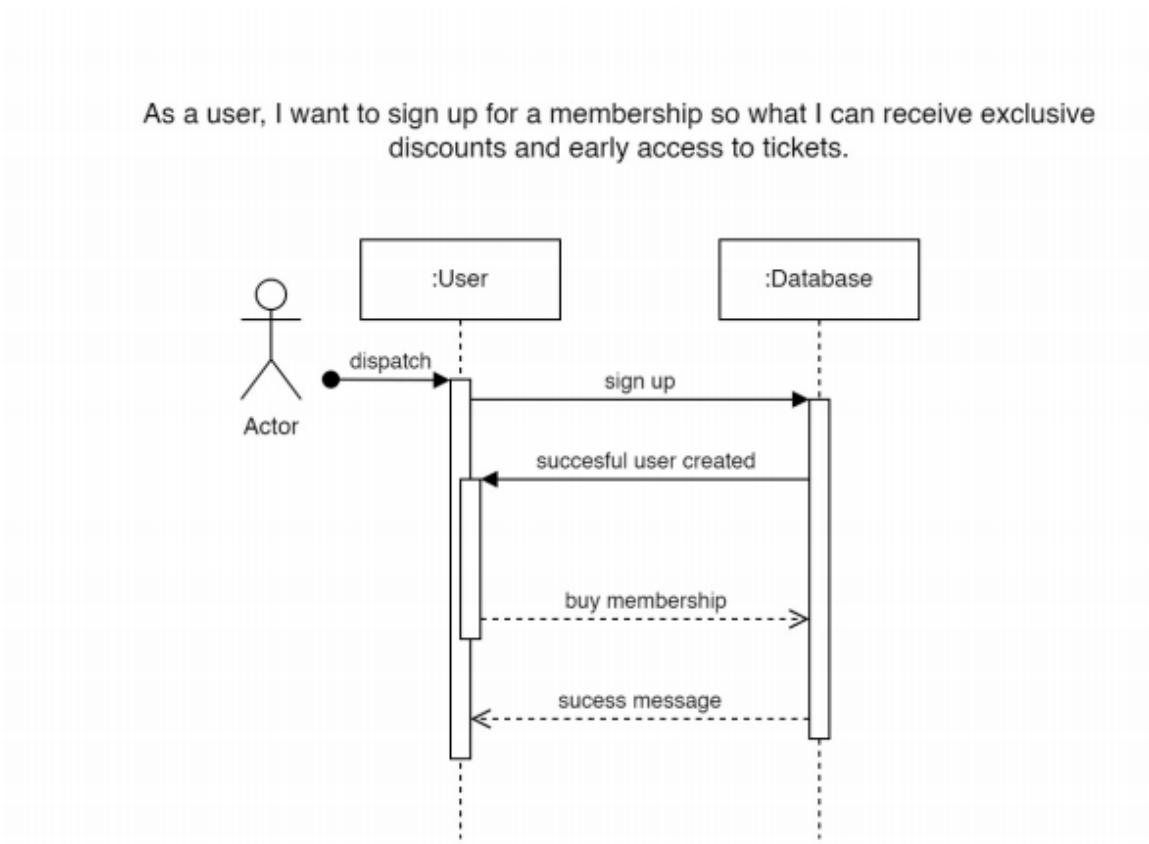

Fig. 3. Sequence Diagram 3

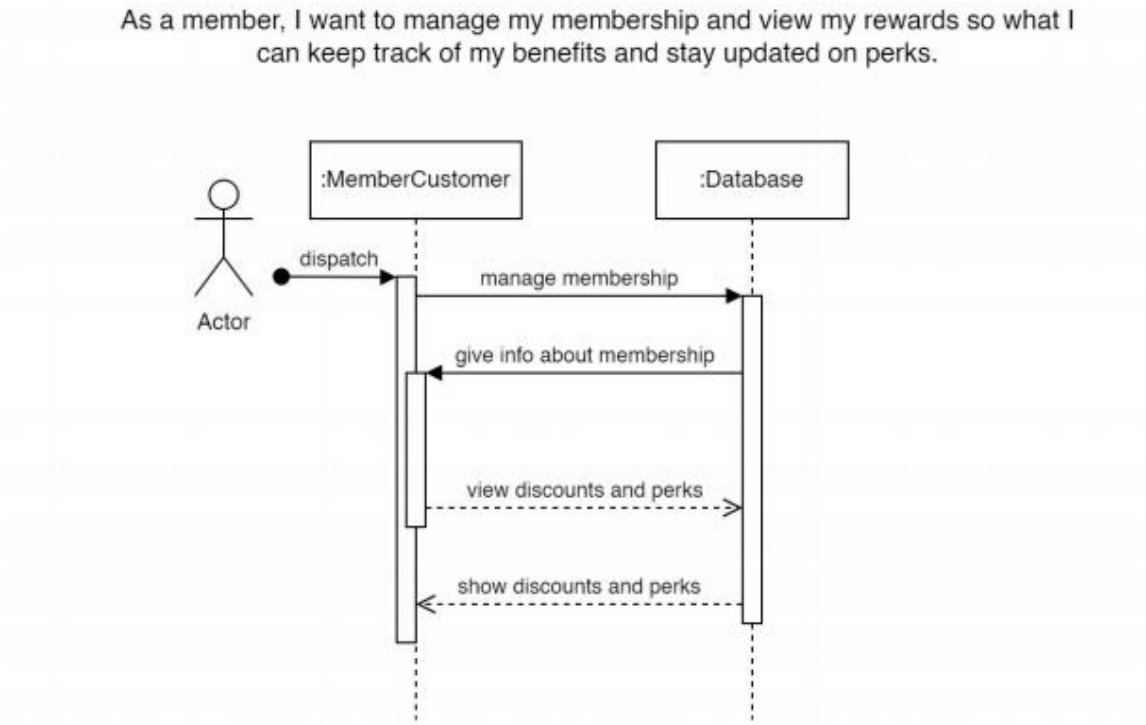

Fig. 4. Sequence Diagram 4

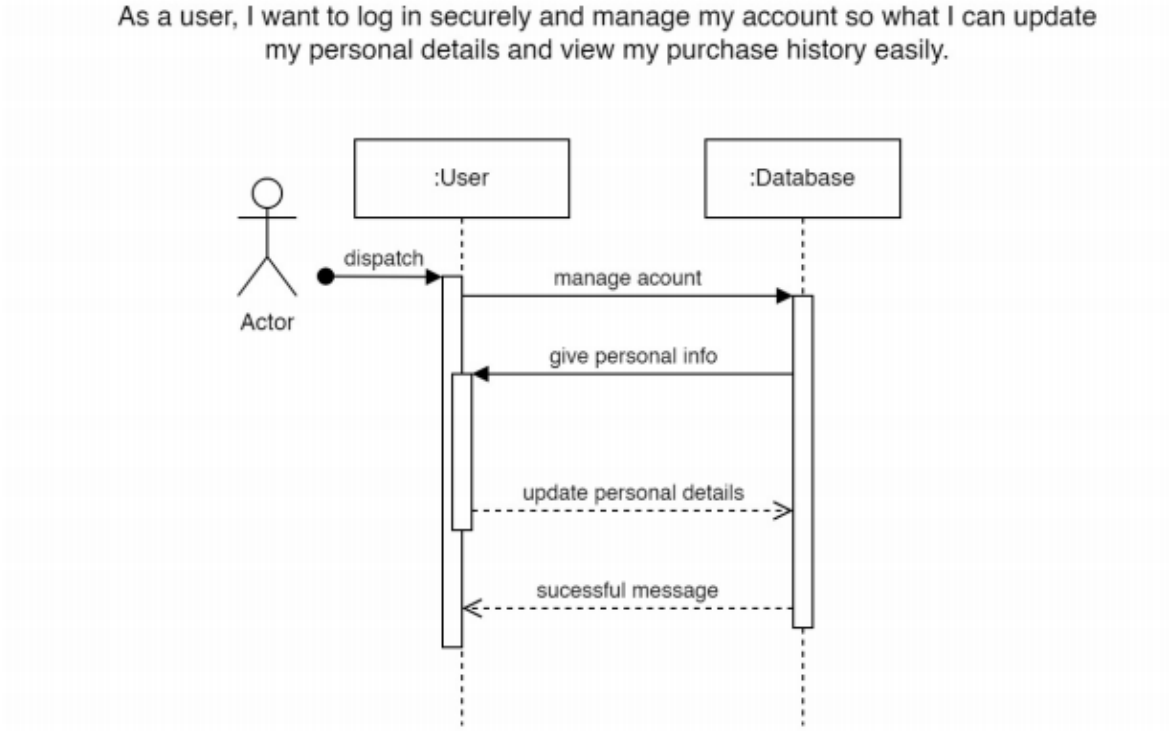

Fig. 5. Sequence Diagram 5

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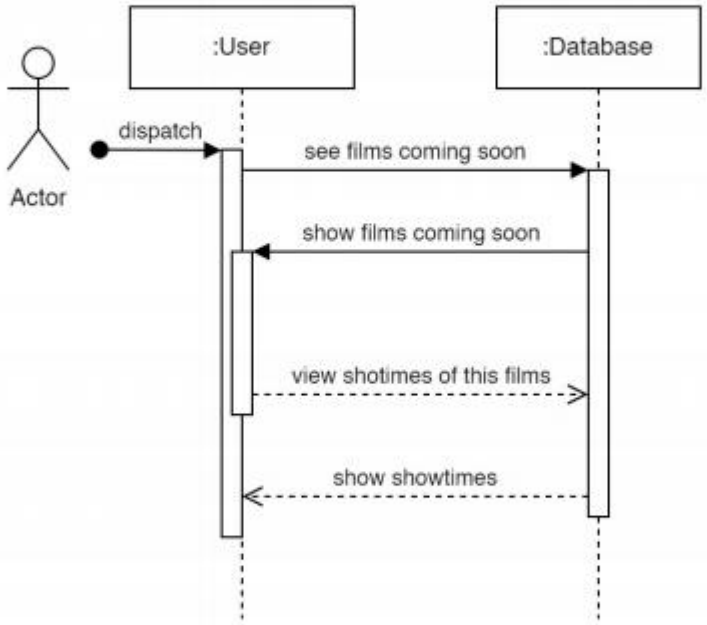


Fig. 6. Sequence Diagram 6

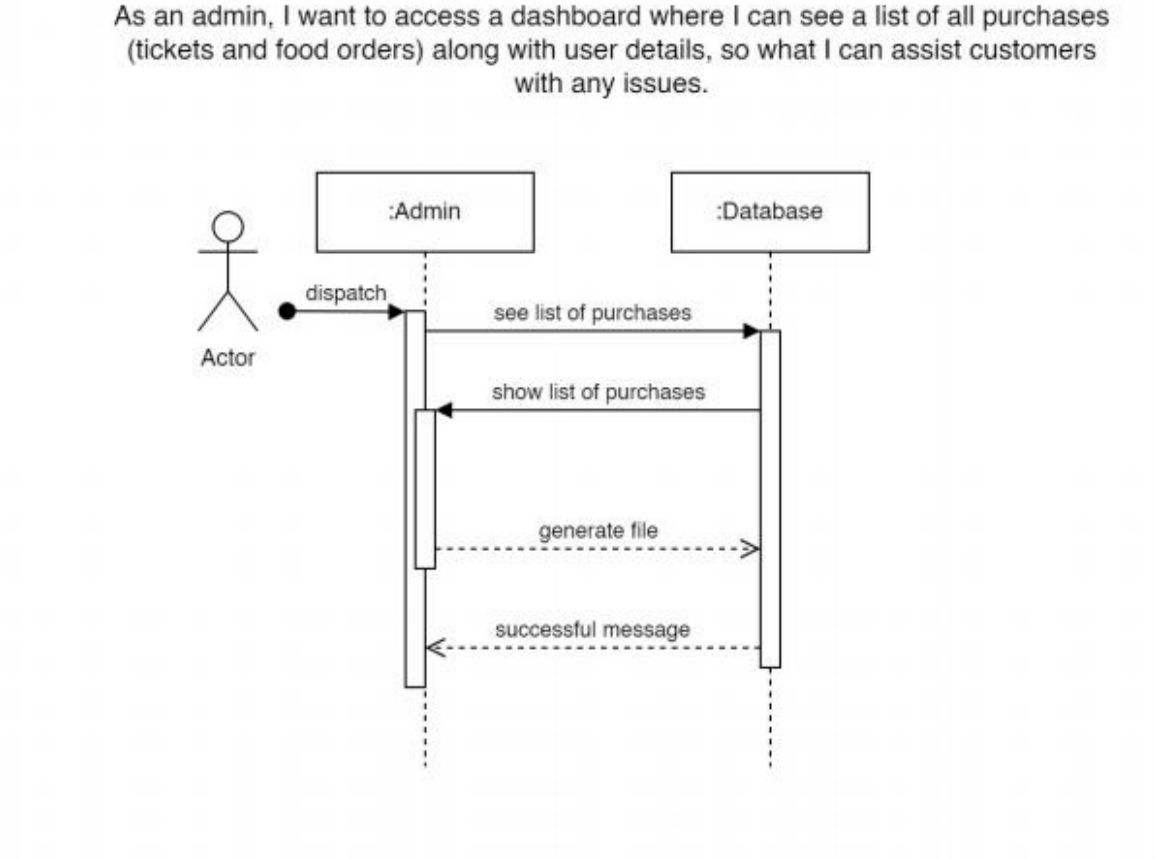
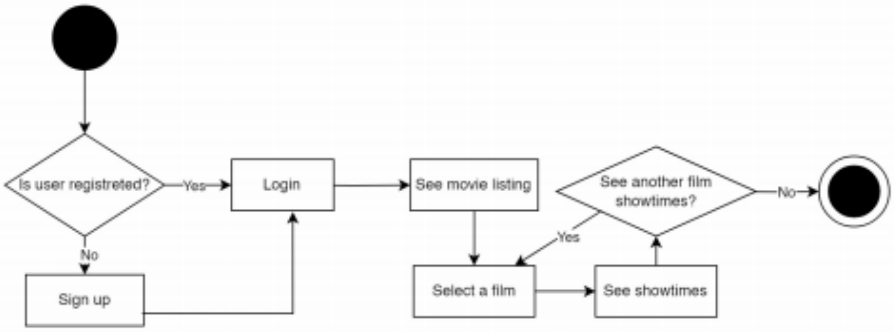


Fig. 7. Sequence Diagram 7

B. Activity Diagrams

As a user, I want to browse available movies and showtimes so what I can choose the best option for my schedule and preferences.



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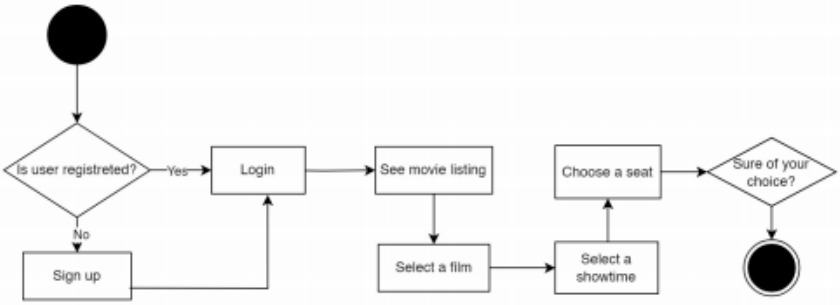

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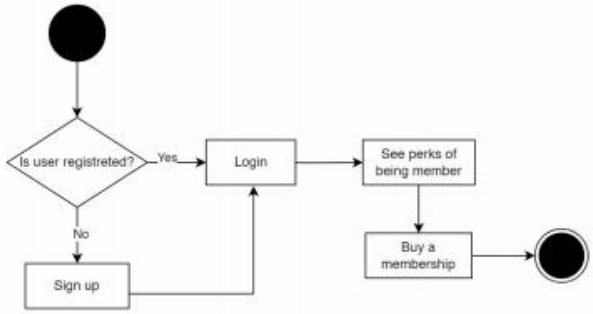

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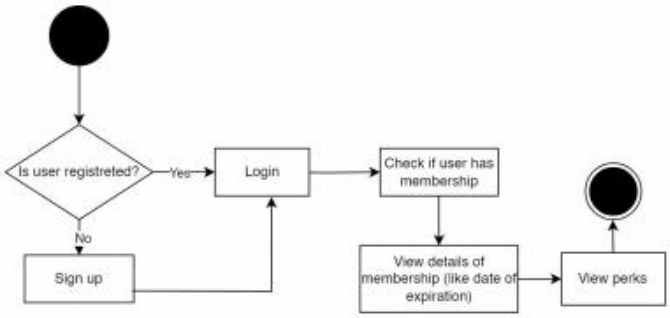

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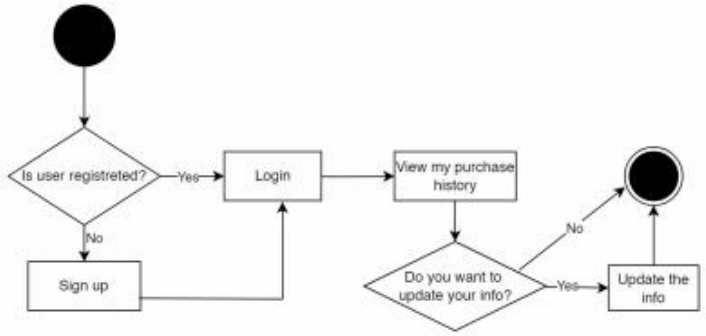

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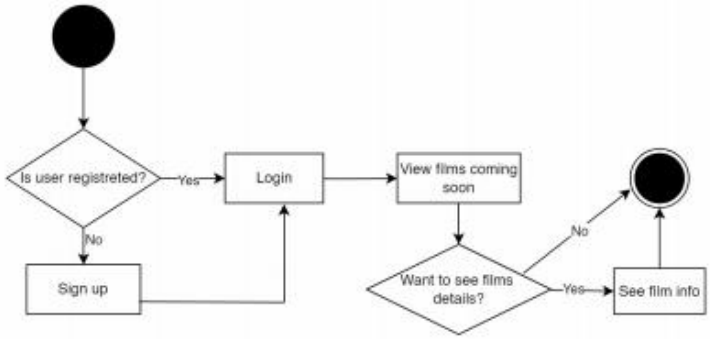

Fig. 13. Activity Diagram 6

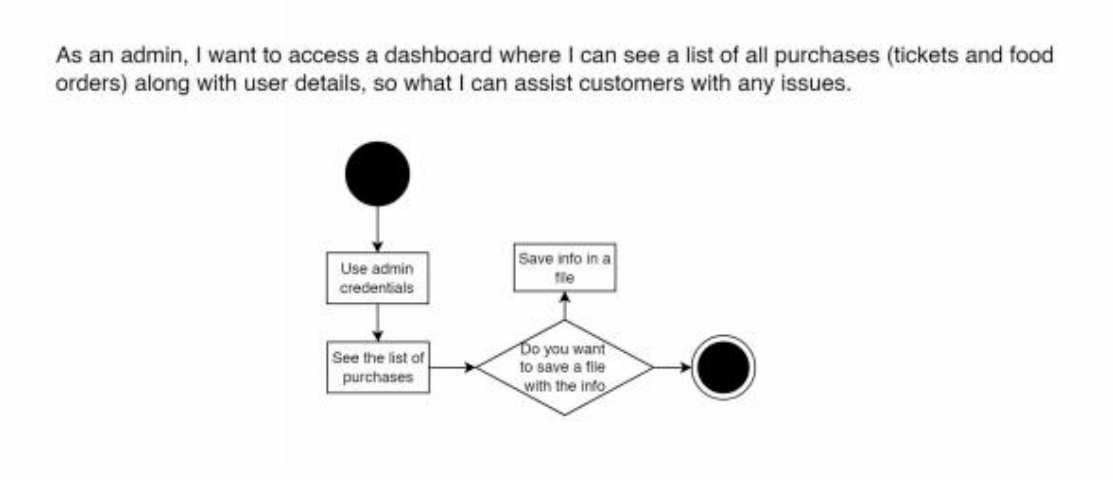

Fig. 14. Activity Diagram 7

1.2 STATEMENT OF THE PROBLEM

There is a problem of having online access to the booking system of most cinema viewing centers. Tickets may have to be purchased on site and seat booking is not feasible over the internet.

1.3 OBJECTIVES OF THE STUDY

The objective of this study is to

- Design and implement a web based cinema management system.
- Test the system online using test data
- Explain the benefits of using computers in information management

1.4 SIGNIFICANCE OF THE STUDY

a. It would automate the process of booking for cinema seat space online

b. Generation of pins and serial numbers for cinema cards will be present

c. Digital format of viewers will be stored

d. Movies lists can be accessible over the internet

1.5 SCOPE OF THE PROJECT

The scope of this work will include the following

a. Development of cinema management system to enhance ticket booking and processing online.

b. Presentation of flowcharts and database design of system

1.6 LIMITATIONS OF THE STUDY

This project is limited to the use of scratch cards in accessing the system as online payment processing is expensive to implement.

2.0 Information Management System (IMS)

An **Information Management System (IMS)** is a structured framework that allows an organization to **collect, process, store, and manage information** efficiently. In the context of cinema operations, an IMS plays a vital role in organizing data related to movies, showings, halls, clients, and bookings, providing administrators with the tools to make informed decisions and improve operational efficiency.

2.1 Definition of Information Management System

An Information Management System can be defined as a **computer-based system designed to manage, process, and control information to facilitate decision-making, coordination, and analysis** (Laudon & Laudon, 2018). It integrates hardware, software, databases, procedures, and users to ensure data is accurately captured, securely stored, and efficiently retrieved whenever required.

2.2 Importance of IMS in Cinema Operations

The cinema industry generates a large volume of data daily, including ticket sales, seat bookings, movie schedules, and client information. An IMS ensures that this information is **organized, reliable, and easily accessible** for staff and management. Key benefits include:

1. **Efficiency**: Automates routine tasks such as seat allocation, booking confirmation, and client management.
2. **Accuracy**: Reduces errors caused by manual processes, such as double-booking or incorrect billing.
3. **Data Security**: Protects sensitive information like client details and payment records through user authentication and role-based access control.

4. **Decision Support**: Provides managers with accurate reports and analytics to make informed decisions regarding movie scheduling, hall utilization, and customer engagement.
5. **Customer Satisfaction**: Ensures smooth and seamless operations, improving customer experience with real-time booking, seat selection, and ticketing.

2.3 Components of an IMS in Cinema Management

A well-designed IMS for a cinema integrates several key components:

1. **Database Management System (DBMS)**: Stores all critical data including clients, movies, showings, halls, and bookings. Ensures data integrity and quick retrieval.
2. **User Interface (UI)**: Provides a graphical interface for staff and clients to interact with the system, perform bookings, view schedules, and manage hall assignments.
3. **Business Logic Layer**: Processes all operations, including seat reservation algorithms, booking validations, payment processing, and report generation.
4. **Security and Authentication**: Protects the system using login credentials, role-based access, and encrypted data storage.
5. **Reporting and Analytics Module**: Generates insights into sales, hall occupancy, popular movies, and customer behavior to guide operational and strategic decisions.

2.4 Role of IMS in ITNO Simple Cinema

In **ITNO Simple Cinema**, the Information Management System serves as the backbone of the entire operation. Its main roles include:

- **Client Management**: Maintain records of all cinema patrons and their booking history.
- **Movie and Showing Management**: Schedule movies, assign halls, and update showtimes efficiently.
- **Seat Allocation and Ticketing**: Ensure real-time seat availability, prevent double-booking, and issue tickets automatically.

- **Operational Reporting**: Generate sales reports, analyze customer preferences, and optimize hall utilization.

2.5 Advantages of IMS in Cinema Management

1. Centralizes all cinema operations in a single platform.
2. Improves accuracy in bookings and scheduling.
3. Enhances customer satisfaction with faster and smoother services.
4. Reduces operational workload for staff.
5. Supports data-driven decision-making for management.

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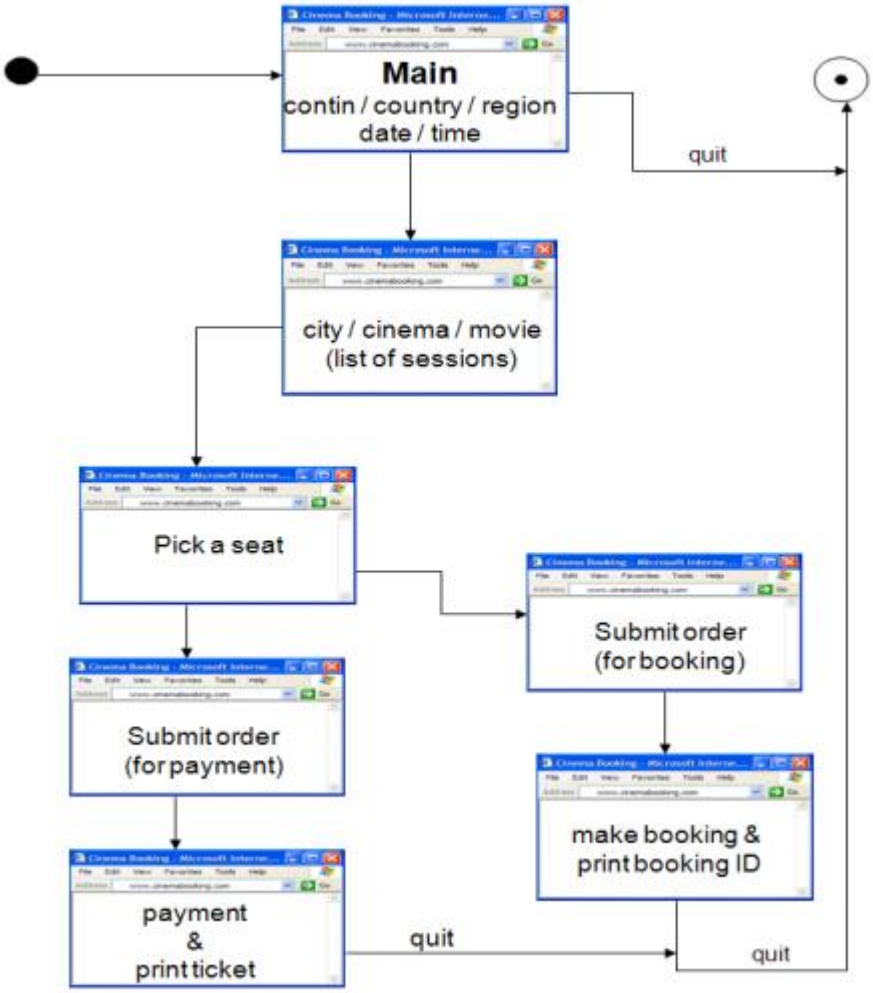

1.

Cinema_Admin

Purpose: Manages the cinema system, oversees movies, shows, screens, bookings, and staff.

Typical Columns:

- AdminID (Primary Key)
- Name
- Email
- Password
- Role (e.g., Manager, Staff)

Relationships:

- Can add/edit/delete movies, shows, screens, and genres.

2. Genre

Purpose: Categorizes movies based on type (Action, Drama, Comedy, etc.).

Typical Columns:

- GenreID (Primary Key)
- GenreName (e.g., Action, Horror)

Relationships:

- Movie table has a GenreID as a foreign key to identify the movie's genre.

3. Movie

Purpose: Stores information about the movies being screened.

Typical Columns:

- MovieID (Primary Key)
- Title
- Description
- Duration (in minutes)
- ReleaseDate
- GenreID (Foreign Key → Genre.GenreID)

Relationships:

- Linked to Genre for categorization.
- Linked to Shows to determine which shows feature this movie.

4. Customer

Purpose: Stores information about the cinema customers who book tickets.

Typical Columns:

- CustomerID (Primary Key)
- Name
- Email
- Phone

- Password (if online booking system)

Relationships:

- Can make multiple Bookings.
- Can have multiple Payments.

5. Screen

Purpose: Represents the cinema halls/screens where movies are shown.

Typical Columns:

- ScreenID (Primary Key)
- ScreenName (e.g., Hall 1, IMAX)
- Capacity (number of seats)
- Location (optional)

Relationships:

- Linked to Seats to define which seats belong to each screen.
- Linked to Shows to define which movies are screened in which hall.

6. Seats

Purpose: Represents individual seats in each screen.

Typical Columns:

- SeatID (Primary Key)
- ScreenID (Foreign Key → Screen.ScreenID)
- SeatNumber (e.g., A1, B5)
- SeatType (e.g., Regular, VIP)

Relationships:

- Linked to Booking to track which seats have been booked.

7. Shows

Purpose: Stores the schedule of movie showings.

Typical Columns:

- ShowID (Primary Key)
- MovieID (Foreign Key → Movie.MovieID)
- ScreenID (Foreign Key → Screen.ScreenID)
- ShowDate
- ShowTime
- AvailableSeats (optional, can be calculated dynamically)

Relationships:

- Each show is linked to a movie and a screen.
- Customers book seats for a specific show.

8. Booking

Purpose: Represents tickets booked by customers for a show.

Typical Columns:

- BookingID (Primary Key)
- CustomerID (Foreign Key → Customer.CustomerID)
- ShowID (Foreign Key → Shows.ShowID)
- BookingDate
- TotalAmount

Relationships:

- Linked to Seats (often via a junction table Booking_Seats) to mark which seats are booked.
- Linked to Payment for payment tracking.

9. Payment

Purpose: Records payment details for bookings.

Typical Columns:

- PaymentID (Primary Key)
- BookingID (Foreign Key → Booking.BookingID)

- PaymentDate
- Amount
- PaymentMethod (e.g., Credit Card, Cash)

Relationships:

- Each payment is associated with a booking.
- Ensures that booked seats are confirmed upon successful payment.

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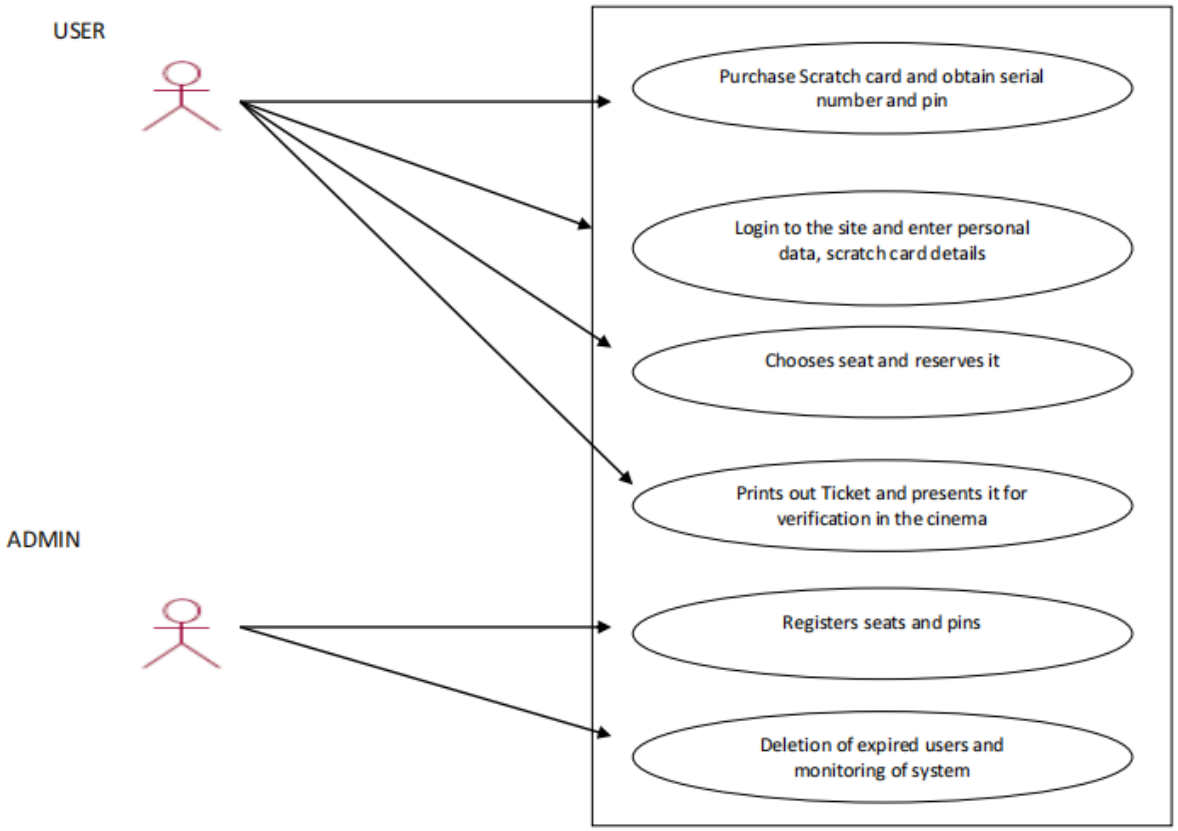
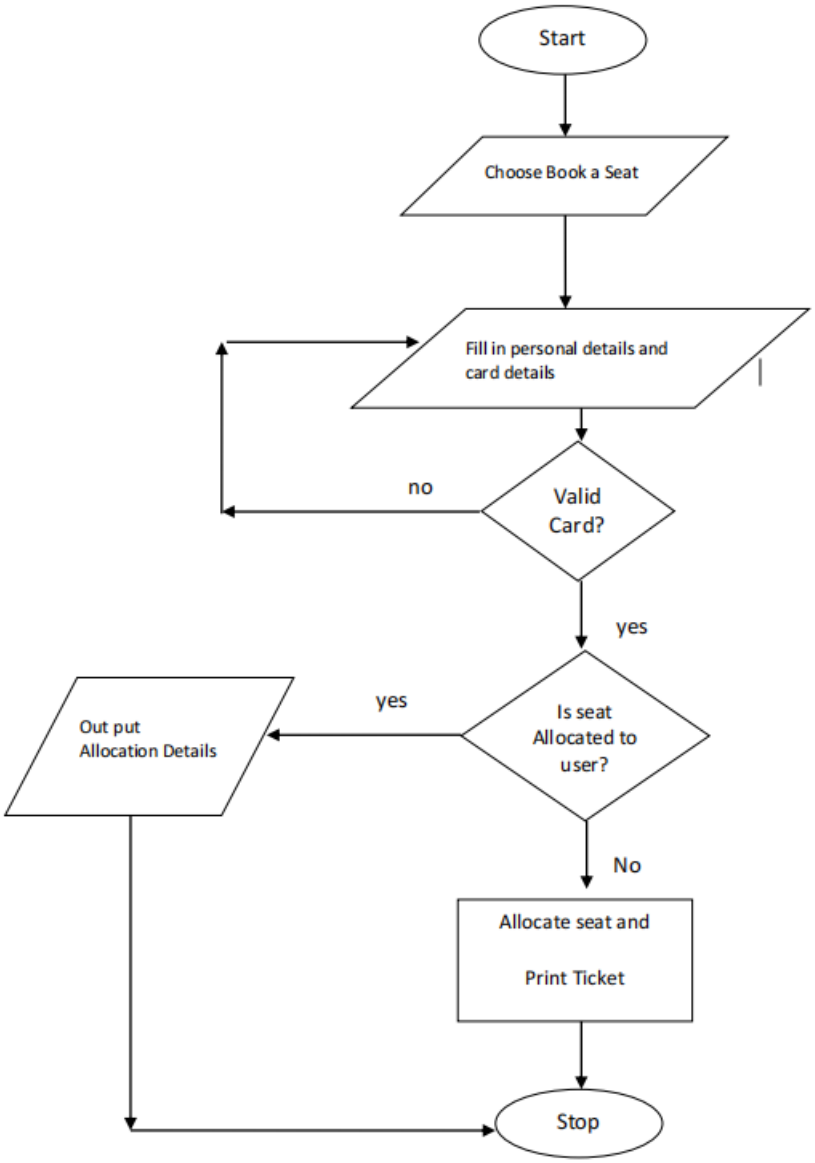
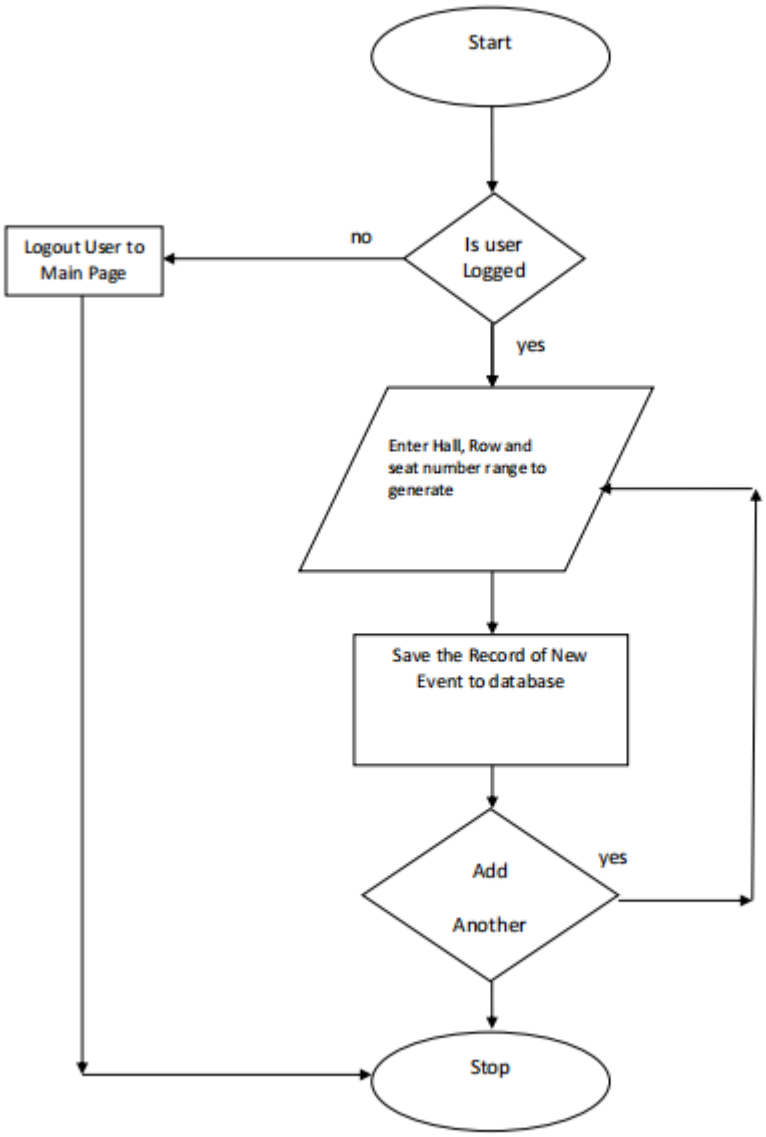


Seat Allocation Flow Chart



Seat Registration Flow Chart



DATABASE DESIGN

The system has one master database named “cinema”. The database has tables Cinema admin ,Genre ,Movie,Customer,Screen, Seats, Shows,Booking ,Payment.

1. Cinema_Admin

S/N	Field Name	Data Type	Length	Description
1	AdminID	INT	11	Primary Key, auto-increment
2	Name	VARCHAR	50	Admin full name
3	Email	VARCHAR	50	Admin email, unique
4	Password	VARCHAR	50	Admin password
5	Role	VARCHAR	20	Admin role (Manager, Staff)

2. Genre

S/N	Field Name	Data Type	Length	Description
1	GenreID	INT	11	Primary Key, auto-increment
2	GenreName	VARCHAR	50	Name of the movie genre

3. Movie

S/N	Field Name	Data Type	Length	Description
1	MovieID	INT	11	Primary Key, auto-increment
2	Title	VARCHAR	100	Movie title
3	Description	VARCHAR	255	Movie description
4	Duration	INT	11	Duration in minutes
5	ReleaseDate	DATE	-	Release date of movie
6	GenreID	INT	11	Foreign Key → Genre.GenreID

4. Customer

S/N	Field Name	Data Type	Length	Description
1	CustomerID	INT	11	Primary Key, auto-increment
2	Name	VARCHAR	50	Customer full name
3	Email	VARCHAR	50	Customer email, unique
4	Phone	VARCHAR	15	Customer phone number
5	Password	VARCHAR	50	Customer password

5. Screen

S/N	Field Name	Data Type	Length	Description
1	ScreenID	INT	11	Primary Key, auto-increment
2	Hall	VARCHAR	20	Screen/hall name
3	Capacity	INT	11	Number of seats

6. Seats

S/N	Field Name	Data Type	Length	Description
1	SeatID	INT	11	Primary Key, auto-increment
2	Hall	VARCHAR	20	Hall name
3	Row	VARCHAR	30	Row number or label
4	Seat	VARCHAR	40	Seat number or label
5	Owner	VARCHAR	40	Owner name (optional)
6	DateEntry	VARCHAR	4	Seat entry date
7	DateExit	VARCHAR	10	Seat exit date
8	ScreenID	INT	11	Foreign Key → Screen.ScreenID

7. Shows

S/N	Field Name	Data Type	Length	Description
1	ShowID	INT	11	Primary Key, auto-increment
2	MovieID	INT	11	Foreign Key → Movie.MovieID
3	ScreenID	INT	11	Foreign Key → Screen.ScreenID
4	ShowDate	DATE	-	Date of the show
5	ShowTime	TIME	-	Time of the show
6	AvailableSeats	INT	11	Number of available seats

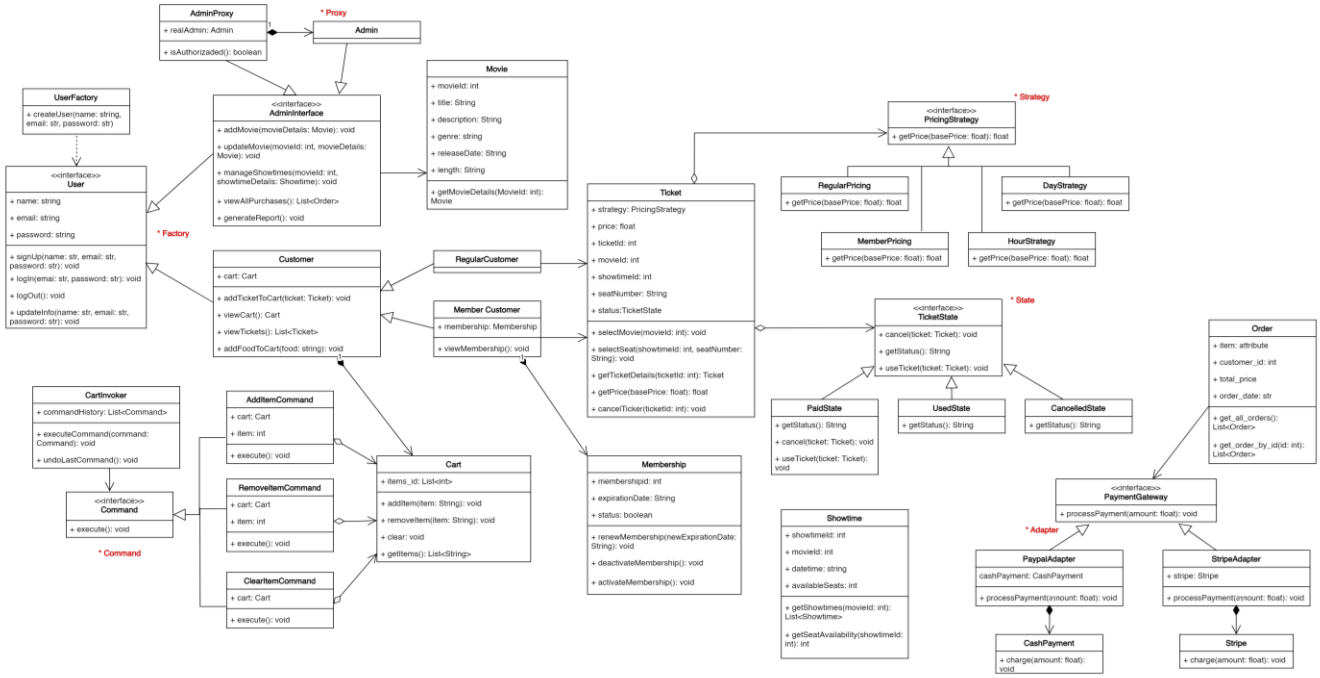
8. Booking

S/N	Field Name	Data Type	Length	Description
1	BookingID	INT	11	Primary Key, auto-increment
2	CustomerID	INT	11	Foreign Key → Customer.CustomerID
3	ShowID	INT	11	Foreign Key → Shows.ShowID
4	BookingDate	DATE	-	Date of booking
5	TotalAmount	DECIMAL	10,2	Total payment amount

9. Payment

S/N	Field Name	Data Type	Length	Description
1	PaymentID	INT	11	Primary Key, auto-increment
2	BookingID	INT	11	Foreign Key → Booking.BookingID
3	PaymentDate	DATE	-	Date of payment
4	Amount	DECIMAL	10,2	Payment amount
5	PaymentMethod	VARCHAR	20	Method (Cash, Card, Online)

CLASS DIAGRAM



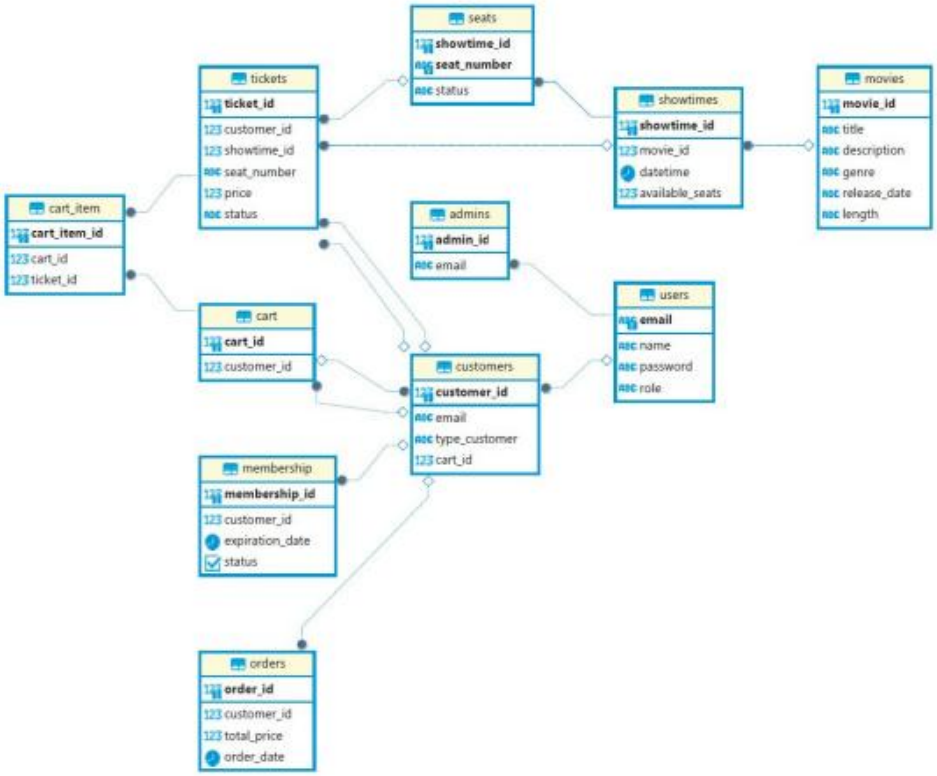


Image of the Entity-Relation diagram of the database