

Movie Theater Ticketing System

Software Design Specification

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System Description:

The Movie Theater Ticketing System is a web-based application that is designed using a three-tier architecture made up of the Presentation Layer, Business Logic Layer, and Data Access Layer. Users will have various capabilities depending on their status as a customer, theater staff, or administrator.

The Presentation Layer will provide the user interface (UI) of the system. It is intended to be responsive to ensure compatibility with various devices like laptops, desktops, tablets, and smartphones. The UI will provide functionality for customers to browse movies, view showtimes, and purchase tickets, with provisions for theater staff and administrators to perform duties related to business operations.

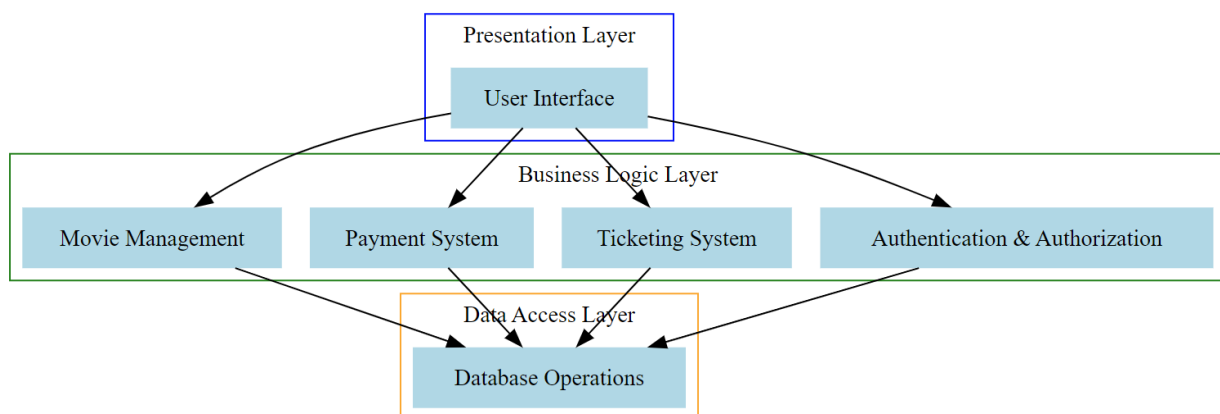
The Business Logic Layer will contain the core logic of the system. It manages operations such as user authentication, ticket purchasing, movie listing updates, and payment processing. The logic will ensure that customer data is handled securely and will comply with all current data integrity and security standards.

The Data Access Layer interacts with the database, handling all database operations. It provides consistent and up-to-date information to the Presentation Layer, as well as transaction history management.

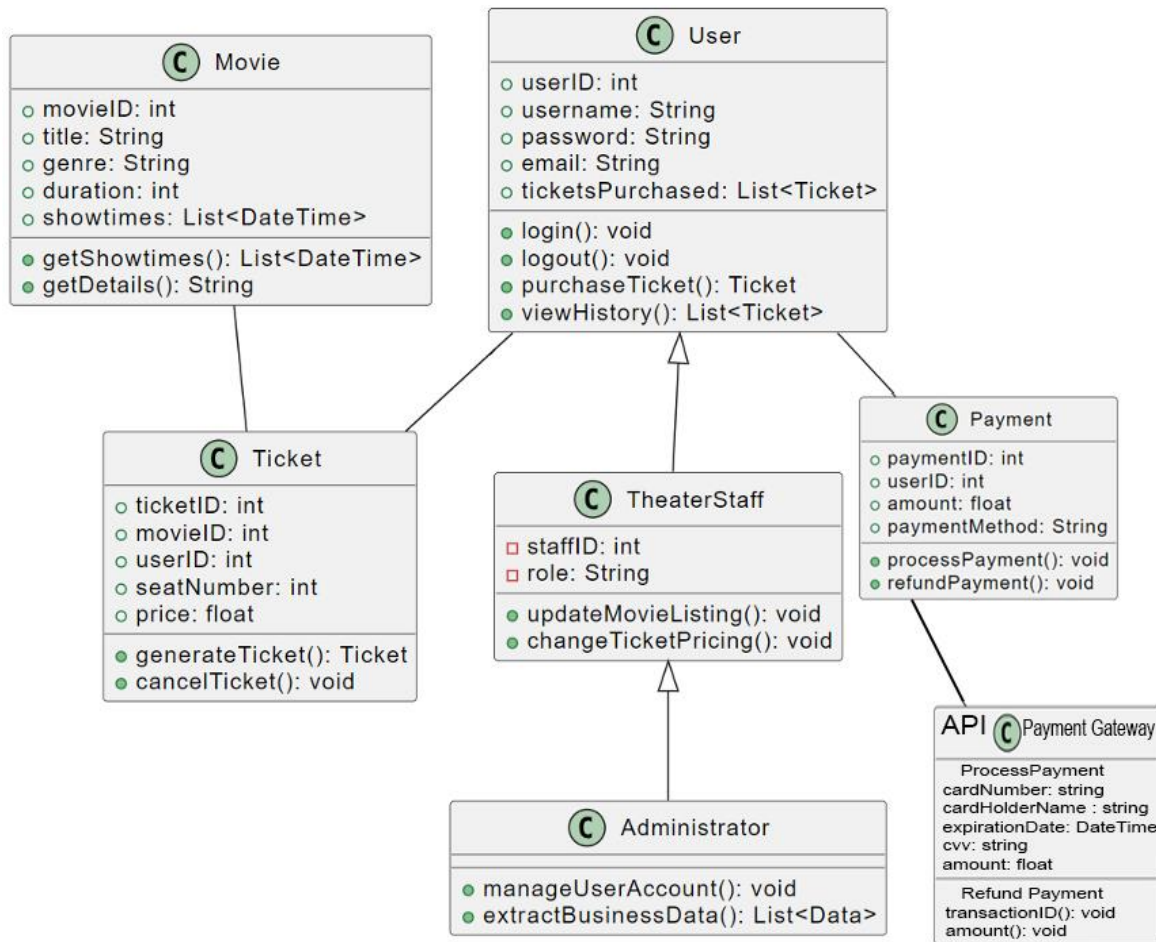
Software Architecture Overview:

The architecture of the system is comprised of three layers, the Presentation Layer, Business Logic Layer, and Data Access Layer.

Architectural Diagram:



UML Diagram:



Description of Classes:

User: Represents the end-users of the system. Users can login and logout, purchase tickets, and view their purchase history.

TheaterStaff: Inherits from the User class and represents an employee of the theater. In addition to the capabilities of the User class, they can update the movie listings and change ticket pricing.

Administrator: Inherits from the TheaterStaff class and represents the system administrator. They have all the capabilities of the User and TheaterStaff classes, with the additional ability to extract business data. Administrators are also responsible for managing user accounts.

Movie: Represents the movies listed by the system. Each movie has details like title, genre, duration, and showtimes.

Ticket: Represents the tickets purchased by users. Each ticket is associated with a Movie and a User.

Payment: Represents the payment transactions in the system. Each payment is associated with a User and has a specific transaction amount.

Description of Attributes:

User:

- **userID:** Unique identifier for the user. Automatically generated by the Business Logic Layer. Integer type. Public.
- **username:** User's chosen name for login. Chosen by user in the Presentation Layer, verified to be unique by the Business Logic Layer. String type. Public.
- **password:** User's password for authentication. Chosen by the user in the Presentation Layer, verified by the Business Logic Layer to include at least one capital letter, one number, and one special character. String type. Public.
- **email:** User's email address. Entered by the user in the Presentation Layer, confirmed to be authentic by the Business Logic Layer. String type. Public.
- **ticketsPurchased:** List of tickets that the user has purchased. Maintained by the business logic layer and presented to the user by the Presentation Layer. List<Ticket> type. Public.

TheaterStaff:

- **staffID:** Unique identifier for the employee of the movie theater. Automatically generated by the Business Logic Layer. Integer type. Private.
- **role:** Specific role for the staff member (Cashier, Manager, etc.). Created by the Administrator in the Presentation Layer. String type. Private.

Administrator:

- Inherits attributes from TheaterStaff.

Movie:

- **movieID:** Unique identifier for the movie. Automatically generated by the Business Logic Layer. Integer type. Public.
- **title:** Name of the movie. Updated by the Business Logic Layer and sourced from the Data Access Layer. String type. Public.
- **genre:** Category of the movie (Action, Drama, etc.). Updated by the Business Logic Layer and sourced from the Data Access Layer. String type. Public.
- **duration:** Length of the movie in minutes. Updated by the Business Logic Layer and sourced from the Data Access Layer. Integer type. Public.
- **showtimes:** List of showtimes for the movie. Updated by the Business Logic Layer and sourced from the Data Access Layer. List<DateTime> type. Public.

Ticket:

- **ticketID**: Unique identifier for the ticket. Automatically generated by the Business Logic Layer. Integer type. Public.
- **movieID**: Unique identifier for the movie. Automatically generated by the Business Logic Layer. Integer type. Public.
- **userID**: Unique identifier for the user. Automatically generated by the Business Logic Layer. Integer type. Public.
- **seatNumber**: Seat number for the ticket. Automatically generated by the Business Logic Layer. Integer type. Public.
- **price**: Cost of the ticket. Updated by the Business Logic Layer. Float type. Public.

Payment:

- **paymentID**: Unique identifier for the payment. Automatically generated by the Business Logic Layer. Integer type. Public.
- **userID**: Unique identifier for the user. Automatically generated by the Business Logic Layer. Integer type. Public.
- **amount**: Amount of the transaction. Calculated by the Business Logic Layer. Float type. Public.
- **paymentMethod**: Method used to pay the transaction amount (Credit Card, Debit Card, etc.). Chosen by the user in the Presentation Layer and verified by the Business Logic Layer. String type. Public.

Description of Operations:

User:

- **login(username): String, password: String)**, Boolean: Allows the User to log into the system. Takes String parameters for username and password. Returns 'true' if the login was successful, 'false' otherwise.
- **logout(), void**: Allows the User to log out of the system. Does not return any value.
- **purchaseTicket(movieID: Integer, showtime: DateTime, seatNumber: Integer), Ticket**: Allows the user to purchase a ticket for a specific movie, showtime, and seat. Returns the purchased 'Ticket' object.
- **viewHistory(), List<Ticket>**: Allows the User to view their purchase history. Returns a list of 'Ticket' objects.

TheaterStaff:

- **updateMovieListing(), Boolean:** Allows the theater staff to update the movie listings using the Movie Listing Database. Returns 'true' if the listing was updated successfully, 'false' otherwise.
- **changeTicketPricing(ticketID: Integer, newPrice: float), Boolean:** Allows the staff to modify ticket pricing using the ticket's ID and a new price. Returns 'true' if the change was successful, 'false' otherwise.

Administrator:

- **manageUserAccount(userID: Integer, action: String), Boolean:** Allows the administrator to manage user accounts using the user's ID and a specific action (Delete User, Add User, Add TheaterStaff, etc.). Returns 'true' if the action was successful, 'false' otherwise.
- **extractBusinessData(dateRange: DateTime), List<Data>:** Allows the administrator to extract business-related data for a specific date range. Returns a list of 'Data' objects.

Movie:

- **getShowtimes(movieID: Integer), List<DateTime>:** Retrieves the list of showtimes for a specific movie using the movie's ID. Returns a list of 'DateTime' objects.
- **getDetails(movieID: Integer), String:** Retrieves the detailed information about a specific movie using the movie's ID. Returns a String that contains the details related to the movie.

Ticket:

- **generateTicket(userID: Integer, movieID: Integer, seatNumber: Integer), Ticket:** Allows the User to purchase a ticket for a specific movie, showtime, and seat. Returns a 'Ticket' object that represents the purchased ticket.
- **cancelTicket(ticketID: Integer), Boolean:** Allows the User to cancel a purchased ticket using the ticket ID. Returns 'true' if the cancellation was successful, 'false' otherwise.

Payment:

- **processPayment(userID: Integer, amount: Float, paymentMethod: String), Boolean:** Processes the payment transaction for a specific User, amount, and payment method. Returns 'true' if the payment was successful, 'false' otherwise.
- **refundPayment(paymentID: Integer, Boolean):** Refunds a payment using the payment ID. Returns 'true' if the refund was successful, 'false' otherwise.

Payment Gateway API:

Description of Operations: this module is to integrate the system with any merchant such as Visa, master card, American Express, etc. This method is used to initiate a payment transaction with the payment gateway.

Create two Booleans, ProcessPayment and RefundPayment.

Parameters:

- **cardNumber (string):** The card number associated with the user's payment method.
- **cardHolderName (string):** The name of the cardholder as it appears on the payment card.
- **expirationDate (DateTime):** The expiration date of the payment card.
- **cvv (string):** The Card Verification Value, typically a security code on the back of the card.
- **amount (float):** The amount of money to be charged or authorized for the payment transaction.

Return Value:

- **bool:** The method returns a Boolean value (true or false) to indicate whether the payment processing was successful (true) or not (false).

RefundPayment Method:

- **Purpose:** This method is used to initiate a refund transaction with the payment gateway. It is responsible for processing a refund for a previous payment transaction, using the transaction ID and the refund amount.

Parameters:

- **transactionID (string):** A unique identifier or reference associated with the original payment transaction that needs to be refunded.
- **amount (float):** The amount of money to be refunded.

Return Value:

- **bool:** The method returns a Boolean value (true or false) to indicate whether the refund processing was successful (true) or not (false).

Development Plan and Timeline:

Task	Description	Estimated Date	Team Member
Create Movie class	Create the movie class and design its functions. Write logic for the getShowtimes() and cancelTicket() functions. The class must also define variables movieID, title, genre, duration, and showtimes.	10/18/2023	Robert Ashe
Create TheaterStaff class	Create a class for the theater staff and its functions. Define variables staffID and role. Write logic for functions: updateMovieListing() and changeTicketPricing().	11/4/2023	Matthew Press
Create User class	Create the user class and its functions. Variables userID, username, password, email, and ticketsPurchased must be defined in this class. Write the logic for the login(), logout(), purchaseTicket(), and viewHistory() functions.	10/31/2023	Jaden Perleoni
Create Administrator class	Create the administrator class and its two functions: manageUserAccount() and extractBusinessData().	10/16/2023	Mohammed Almousawi
Create Ticket class	Create the movie class, its variables, and its functions. Define variables movieID, title, genre, duration, and showtimes. Design the functions getShowtimes() and getDetails().	11/09/2023	Matthew Press
Create Payment class	Create the payment class, its variables, and its functions. Define variables paymentID, userID, amount, and paymentMethod. Write the logic for functions processPayment() and refundPayment().	11/01/2023	Jaden Perleoni

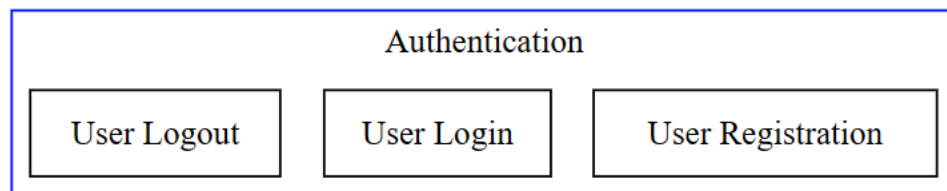
Verification Test Plan

The Verification Test Plan aims to ensure that the Movie Theater Ticketing System meets the design specifications and functions correctly. Each of the following test cases are designed to target specific features of the system and verify desired functionality.

- **Test Case: Authentication_0 (User Registration)**
 - **Features Tested:** User registration functionality.
 - **Test Vectors:** Valid username, password, and email address.
 - **Coverage:** This test ensures that a new user can register a new account successfully and that the system can handle and store the new user data correctly.
- 1. **Test Case: Authentication_1 (User Authentication)**
 - **Features Tested:** User login functionality.
 - **Test Vectors:** Valid username and password for an existing account.
 - **Coverage:** This test verifies that a registered user can log into the system using their credentials.
- 2. **Test Case: Authentication_2 (User Logout)**
 - **Features Tested:** User logout functionality.
 - **Test Vectors:** Active user session.
 - **Coverage:** This test ensures that a user that is logged in to the system can log out successfully and end their current session.
- 3. **Test Case: User_Functions_0 (Ticket Purchase)**
 - **Features Tested:** Ticket purchasing process.
 - **Test Vectors:** Desired movie, showtime, and seat selection.
 - **Coverage:** This test checks the system's capability to handle ticket purchases and update the user's purchase history.
- 4. **Test Case: User_Functions_1 (Get Details)**
 - **Features Tested:** Retrieval of detailed movie information.
 - **Test Vectors:** Selected movie title.
 - **Coverage:** This test ensures that the system can display the detailed information related to a selected movie title.
- 5. **Test Case: User_Functions_2 (View Purchase History)**
 - **Features Tested:** Viewing of user's purchase history.
 - **Test Vectors:** User profile that has previous ticket purchases.
 - **Coverage:** This test ensures that the system can display detailed information, including cast, director, and runtime.
- 6. **Test Case: Staff_Functions_0 (Update Movie Listing)**
 - **Features Tested:** Update movie listings.
 - **Test Vectors:** Selected movie and updated details.
 - **Coverage:** This test ensures that theater staff has the ability to manually update movie details.
- 7. **Test Case: Staff_Functions_1 (Change Ticket Pricing)**

- **Features Tested:** Changing ticket pricing.
 - **Test Vectors:** Selected ticket and new price.
 - **Coverage:** This test verifies the ability of theater staff to change ticket pricing.
8. **Test Case: Administrator_Functions_0 (Manage User Account)**
- **Features Tested:** Managing user accounts.
 - **Test Vectors:** Selected user account.
 - **Coverage:** This test ensures that administrators can manage user accounts.
9. **Test Case: Administrator_Functions_1 (Extract Business Data)**
- **Features Tested:** Extraction of business data.
 - **Test Vectors:** Specified date range.
 - **Coverage:** This test verifies that administrators have the ability to extract business data for a specified date range.
10. **Test Case: Movie_Functions_0 (Get Show Times)**
- **Features Tested:** Retrieval of movie showtimes.
 - **Test Vectors:** Selected movie title.
 - **Coverage:** This test ensures that the system can display the showtimes for a selected movie title.
11. **Test Case: Ticket_Functions_0 (Generate Ticket)**
- **Features Tested:** Generation of a ticket after a purchase has been made.
 - **Test Vectors:** Valid user ID, selected movie, showtime, and seat number.
 - **Coverage:** This test checks the system's capability to generate a ticket after a user has made a purchase, ensuring the ticket reflects the correct details.
12. **Test Case: Ticket_Functions_1 (Cancel Ticket)**
- **Features Tested:** Cancellation of a purchased ticket.
 - **Test Vectors:** User ID and ticket ID.
 - **Coverage:** This test verifies that a user can cancel a previously purchased ticket and that the system updates the available seats accordingly.
13. **Test Case: Payment_GW_Functions (Validate Card and Information)**
- **Features Tested:** Verify all card information are valid with merchant though PaymentGW API.
 - **Test Vectors:** Validate card name, type, Expire date & CVV.
 - **Coverage:** this test will make sure the credit card information is valid, proof of payment or rejection with transaction ID.

Test Plan Diagram



User Functions

View Purchase History

Get Details

Ticket Purchase

Staff Functions

Change Ticket Pricing

Update Movie Listing

Administrator Functions

Extract Business Data

Manage User Account

Payment Gateway - Card Details

Credit Card Security

Card Expire Date

Card Number 16D

Card Type

Payment Gateway - Transaction

Payment Reject

Payment Success

Unit Tests

Invalid Username Format

Valid Username Format