

Data flow overview:

1. User Authentication & Authorization

- A user (moviegoer, admin, or theater manager) accesses the system via the frontend
- The login or registration data is sent to the **Authentication Module**.
- The backend verifies credentials and issues a **JWT token** if successful.
- This token is used in future requests to authorize and authenticate the user across the system.

2. Movie & Theater Browsing

- After authentication, users can browse movies by **category** or **theater**.
- Requests are sent to the **Movie Module**, which fetches:
- Movie titles, genres, ratings
- Associated showtimes
- Theater details and location
- The system retrieves data from the **MongoSQL database** and returns it to the frontend.

3. Viewing Schedules & Seat Availability

- When a user selects a movie and a theater, the system:
- Retrieves the theater's **unique seat layout**
- Displays real-time seat availability using the **Theater Module** and **Booking Module**
- Seat availability is dynamically updated to prevent double bookings.

4. Ticket Booking Process

- The user selects their preferred seat(s), showtime, and optionally adds features (e.g., VIP seating, snacks).
- The selected booking details are sent to the **Booking Module**.
- The system checks availability again before final confirmation.
- If available, the system initiates a payment request via the **Payment Module** (integrated with **Stripe/PayPal**).

5. Payment and Confirmation

- The **Payment Module** securely sends transaction data to the payment gateway.
- Upon successful payment:
- The booking is confirmed and stored in the database.
- Seat availability is updated in real time.
- Booking details are passed to the **Notification Module**.

6. Notifications

- The **Observer Pattern** is used here: once a booking is confirmed, the Notification Module is triggered.
- Users receive:
- Email/SMS booking confirmations
- Reminders for upcoming shows
- Notifications are handled via third-party services like SendGrid or Twilio.

7. Admin & Theater Manager Functions

- Admins and managers access a secure dashboard to:
- Manage movie listings, schedules, theater configurations
- Monitor booking data and reports
- Data changes (like showtime edits or new movies) are pushed to the **Movie** and **Theater Modules** and stored in the database.

8. User History & Profile

- Users can view their profile, booking history, and saved preferences.
- All user-specific data is securely retrieved from the database via the **User Module**, filtered through their JWT token.

High level architecture diagram:



