

# Malnad College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)  
Hassan, Karnataka, India – 573202



## PROJECT BASED LEARNING TITLE: MOVIE TICKET BOOKING SYSTEM

Course: Data Structures and Application

Cours Code: 23AI304

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## **PROBLEM STATEMENT:**

Simulate the online booking of movie tickets. The application should show the venue, show timings, movie details, available number of seats, exact available slots. The user should be able to reserve a given number of seats and the total ticket cost should be generated.

## **Data Structures Used to Solve the Problem**

1. Array
2. Structs
3. Linked List
4. Priority Queue
5. Hash Map

## **Justification for Using Data Structures**

### **1. Arrays**

- **Purpose:** Store fixed-size collections of items.
- **Used For:**
  - **Movie movies:** Stores the list of available movies.
  - **venues** (inside Movie): Stores the list of venues for a particular movie.
  - **selected Seats:** Temporarily holds the seats selected by the user for booking.

## 2. Structs

- **Purpose:** Group related data into cohesive units.
- **Used For:**
  - **Movie:** Stores Information about movies, including title, genre, price, venues, and slots.
  - **Slot:** Represents the movie timings and seat availability (VIP and REGULAR)
  - **Priority Queue:** Manages booking requests in a priority order.
  - **Booking Request:** Represents a user's booking request, including seat preferences and priority.
  - **HashMap:** Tracks the availability of seats (booked or not booked).

## 3. Linked List

- **Purpose:** Dynamically manage a variable number of elements without predefined limits
- **Used For:**
  - **Slot:** A linked list is used to manage multiple time slots for a movie dynamically
  - **Booking Request:** Used in the priority queue for dynamically managing booking requests in priority order.

## 4. Priority Queue

- **Purpose:** Manage booking requests based on priority (VIP seats get higher priority).

- **Used For:**
- Queueing booking requests with different priorities.
- **Implementation:**
- A linked list is used to maintain priority, where the node with the highest priority is processed first.

## 5. Hash Map

- **Purpose:** Efficiently store and retrieve seat booking status.
- **Used For:**
- **Seat Tracking:** Keys represent seat number (e.g., VIP1, REGULAR2), and values indicate whether a seat is booked or available
- **Implementation:** Functions like `insertHash()` , `deleteHash()` and `SearchHash()` manage the hash map operation.

## Explanation of Data Structures Used

### 1. Arrays

Arrays are used to store data in a fixed-size, indexed manner. In this program, arrays are used in the following ways:

- **Usage in the Program:**
  - **Movies array:** To store details about each movie, such as title, genre, available slots, and venues.
  - **Seats array:** To store available and booked seats for each movie slot and venue.

- **Selected Seats:** The array is used to store the seat numbers that the user selects for booking.

## 2. Structure

A struct is a user-defined data type in C that groups related data into a single logical unit. It allows for better organization and management of complex data.

- **Usage in the Program:**

- The Movie struct organizes details like title, genre, venues, slots, and prices into a single unit, simplifying the handling of multiple movies.
- Similarly, Slot and BookingRequest structs store slot details and booking requests, making the program modular and easier to manage.

## 3. Linked Lists

Linked lists are used for dynamic data storage where the size is not fixed and can grow or shrink during runtime.

- **Usage in the Program:**

- **Slot linked list:** Each movie has a linked list of available slots, with each node representing a time slot for that movie. This structure allows efficient additions and deletions of slots as required.
- **Booking Request queue:** A priority queue implemented using a linked list stores the booking requests. The queue uses priority (VIP or regular) to determine the order in which the requests are processed.

#### 4. Priority Queue

A priority queue is used to handle booking requests based on their priority (VIP or Regular). The priority queue is implemented using a linked list where:

- **Usage in the Program:**

- Booking requests are added to the priority queue based on their priority (VIP or Regular). This ensures that VIP requests are handled first, reflecting real-world scenarios where certain bookings take precedence.

#### 5. Hash Map

A hash map (or hash table) is used to manage seat availability for both VIP and regular seats.

- **Usage in the Program:**

- The `seatMap` tracks the availability of seats (e.g., VIP1, Regular5) and checks whether a seat is already booked. This prevents double booking and enables efficient seat management.

### **Functions Used in the Program with Pseudocode**

#### **1. initializeMovies (movies [])**

- **Initialization of Movies:** Initializes the details of each movie, including title, genre, venues, and slots.

- **Movie Slot Setup:** For each movie, sets the time and available seats (VIP and Regular) for each slot.

### Pseudocode:

```
Function initializeMovies(movies[])
  For i = 0 to MOVIE - 1 do
    Assign title to movies[i].title
    Assign genre to movies[i].genre
    Assign venues to movies[i].venues
    Initialize movies[i].slots as a linked list
      Set time for each slot
      Set available VIP seats for each slot
      Set available Regular seats for each slot
  End For
End Function
```

## 2. Display\_Movie(movies [])

- **Display All Movies:** Loops through all movies and prints their titles and genres, showing the available movie options.

### Pseudocode:

```
Function Display_Movies(movies[])
  For i = 0 to MOVIE - 1 do
    Print movies[i].title and movies[i].genre
  End For
End Function
```

## 3. Display\_Venues(movie)

- **List of Venues for Movie:** Shows the list of venues available for the selected movie, allowing users to pick a venue.

### Pseudocode:

```
Function Display_Venues(movie)
    For i = 0 to VENUE - 1 do
        Print movie.venues[i]
    End For
End Function
```

#### 4. **display\_Slot(movie, venue)**

- **Available Show Slots:** Displays the available show slots for the selected movie and venue, including available VIP and Regular seats.

### Pseudocode:

#### 5. **Book\_Ticket (movies [], queue, seatMap)**

```
Function display_slot(movie, venue)
    For i = 0 to 2 do
        Print "Time:", movie.slots[i].time
        Print "Available VIP Seats:", movie.slots[i].availableVipSeats
        Print "Available Regular Seats:", movie.slots[i].availableRegularSeats
    End For
End Function
```



- **Main Booking Function:** This function manages the booking process. It displays movies, venues, and time slots, and allows the user to select the number of seats and seat type.
- After collecting the necessary information, the booking request is added to the queue.
- It processes the booking request by displaying available seats based on the priority (VIP or regular) and booking the selected seats.
- The function also handles confirming or cancelling the booking, releasing seats when necessary.

### Pseudocode:

```

Function Book_Ticket(movies[], queue, seatMap)
    Display available movies and ask user to choose a movie
    Display available venues for the selected movie
    Ask user to choose a time slot
    Ask user for the number of seats and seat type (VIP or Regular)
    Add the booking request to the queue
    Process the booking request from the queue
        If priority is VIP, display VIP seats
        If priority is Regular, display Regular seats
        Book seats based on the user's choice
        Display booking summary
        Ask for confirmation
            If confirmed, complete the booking
            Else, cancel the booking and release the booked seats
    End Function
  
```

## 6. **inqueue (queue, movieIndex, venueIndex, slotNumber, numSeats, priority)**

- **Queueing Booking Requests:** This function creates a new booking request with the provided movie index, venue index, slot number, number of seats, and priority.
- It then inserts the request into the priority queue, ensuring that the request is processed in the correct order based on the priority.

### **Pseudocode:**

```
Function inqueue(queue, movieIndex, venueIndex, slotNumber, numSeats, priority)
    Create a new booking request with the following:
        - Movie Index: movieIndex
        - Venue Index: venueIndex
        - Slot Number: slotNumber
        - Number of Seats: numSeats
        - Priority Level: priority
    Insert the booking request into the queue based on its priority
        (e.g., VIP requests have higher priority)
    Confirm that the request is added successfully
End Function
```

## 7. **Outqueue(queue)**

- **Processing Booking Requests:** Retrieves the highest priority booking request from the queue, enabling the processing of bookings in order of priority.

### **Pseudocode:**

```
Function outqueue(queue)
    If queue is not empty:
        Remove and return the highest priority booking request
    Else:
        Return NULL
End Function
```

## 8. displaySeats(seatMap, type, maxSeats)

- **Seat Booking:** Allocates selected seats to the user and updates the seat availability in the seatMap for the movie slot.

**Pseudocode:**

```
Function displaySeats(seatMap, type, maxSeats)
  For i = 1 to maxSeats do
    If seatMap[type][i] is available then
      Print seat i as available
    Else
      Print seat i as booked
    End For
  End Function
```

## 9. bookSeats (movies [], seatMap, request, selectedSeats)

- **Seat Booking:** Allocates selected seats to the user and updates the seat availability in the seatMap for the movie slot.

**Pseudocode:**

```
Function bookSeats(movies[], seatMap, request, selectedSeats[])
  For i = 0 to request.numSeats - 1 do
    Assign seat to selectedSeats[i]
    Mark the seat as booked in the seatMap
  End For
End Function
```

## 10. deleteHash (seatMap, seatKey)

- **Cancel Seat Booking:** Removes the seat from the seatMap if the user decides not to confirm the booking, restoring the seat availability.

### Pseudocode:

```
Function deleteHash(seatMap, seatKey)
    Remove seat with key seatKey from seatMap
    Update the seat availability in the relevant movie slot
End Function
```

## 11. Void Main()

- **Initialization of Data Structures:** Initializes the movies list, priority queue for bookings, and seat map for seat allocation.
- **User Interaction with Menu:** Presents a menu with options to explore movies, book tickets, or exit the program.
- **Function Calls Based on User Input:** Calls Display\_Movies to show available movies or Book\_Ticket to handle booking based on the user's choice.
- **Exit and Invalid Inputs:** Exits with a thank-you message or prompts for valid input if the user provides incorrect choices.

## Pseudocode:

```
Function main()
    Declare and initialize movies array
    Initialize priority queue for booking requests
    Initialize hash map for seat allocation

    Loop until user decides to exit:
        Print welcome menu: "1. Explore Movies", "2. Book Tickets", "3. Exit"
        Read user's choice

        If choice is 1:
            Call Display_Movies(movies)
        Else If choice is 2:
            Call Book_Ticket(movies, queue, seatMap)
        Else If choice is 3:
            Print "Thank you for using the system!"
            Exit the program
        Else:
            Print "Invalid choice. Please try again."

    End Loop
End Function
```

## OUTPUT OF PROGRAM

The output highlights the program's features, including exploring movies, booking tickets, and handling user inputs. It showcases the workflow and functionality with sample outputs.

### 1. MAIN MENU

```
=====
Welcome to our Movie ticket booking Program 🎬🎟️💰
=====
1. Explore Movies
2. Book the tickets
3. Exit
-----
What would you like to do next? 🤖
```

### 2. EXPLORE MOVIE OPTION's

```
=====
Welcome to our Movie ticket booking Program 🎬🎟️💰
=====
1. Explore Movies
2. Book the tickets
3. Exit
-----
What would you like to do next? 🤖
1
*****
!!Explore Movies 🎬!!
*****
1. Smile 2 (Horror)
2. Laapataa Ladies (Drama)
3. Lucky Baskhaṛ (Triller)
4. Teri Baaton Mein Aisa Uljha Jiya (Comedy)
5. Amaran (Action)
6. Mungaru Male (Romantic)
*****
```

### 3. BOOKING TICKET

#### a. Conformation of Tickets and Seats

```
Compile Result

=====
Welcome to our Movie ticket booking Program 🎬🎟️🎫
=====
1. Explore Movies
2. Book the tickets
3. Exit
-----
What would you like to do next?👉
2
===== !!BOOK A TICKET🎫!!=====
*****
🎟️ Is Your Popcorn Ready? Let's Find the Perfect Movie! 🎬🎟️🎫
*****
1. Smile 2 (Horror)
2. Laapataa Ladies (Drama)
3. Lucky Baskha₹ (Triller)
4. Teri Baaton Mein Aisa Uljha Jiya (Comedy)
5. Amaran (Action)
6. Mungaru Male (Romantic)
*****
Choose a movie you would love👉 to watch: 3
-----
Available Venues for 'Lucky Baskha₹':
-----
1. Cinepolies
2. INOX
3. PVR Cinemas Gold
Choose the venue you love to watch 'Lucky Baskha₹': 2
You have selected: INOX
-----
Available slots for 'Lucky Baskha₹' in 'INOX'
-----
+-----+-----+-----+-----+
| Slot | Time | VIP Seats | Regular Seats |
+-----+-----+-----+-----+
| 1 | 9:00AM-12:00PM | 20 | 30 |
| 2 | 2:00PM-5:00PM | 20 | 30 |
| 3 | 6:00PM-9:00PM | 20 | 30 |
+-----+-----+-----+-----+
Select the slot you would love to watch 'Lucky Baskha₹': 2
-----
How many seats would you like to book?
2
VIP(🎟️) Ticket Price:₹600
Regular(🎫) Ticket Price:₹300
Pick your perfect spot to enjoy the show! 🎬🎟️🎫
1. VIP (🎟️)
2. Regular (🎫)
What's your choice👉?
2
-----
Available Regular Seats (🟡 = Available, 🟠 = Booked):
-----
🟡1 🟡2 🟡3 🟡4 🟡5
🟡6 🟡7 🟡8 🟡9 🟡10
🟡11 🟡12 🟡13 🟡14 🟡15
🟡16 🟡17 🟡18 🟡19 🟡20
🟡21 🟡22 🟡23 🟡24 🟡25
🟡26 🟡27 🟡28 🟡29 🟡30
-----
Enter the seat numbers (👉) you want to book:
Enter 2 seat numbers separated by spaces (e.g., 1 2 3): 12 13
Regular12 successfully booked 🎟️🎫.
Regular13 successfully booked 🎟️🎫.
-----
| Booking Summary |
-----
Movie: Lucky Baskha₹
Venue: INOX
Time: 2:00PM-5:00PM
Number of Seats: 2
Total Price: ₹600
-----
Do you want to confirm the booking? s
Your ticket is successfully booked! 🎬🎟️🎫 You are all set to enjoy the movie! 🎬🎟️🎫
```

===== !!BOOK A TICKET🎫!!=====

\*\*\*\*\*

🎬 Is Your Popcorn Ready? Let's Find the Perfect Movie! 🎬🍿

\*\*\*\*\*

1. Smile 2 (Horror)
2. Laapataa Ladies (Drama)
3. Lucky Baskha₹ (Triller)
4. Teri Baaton Mein Aisa Uljha Jiya (Comedy)
5. Amaran (Action)
6. Mungaru Male (Romantic)

\*\*\*\*\*

Choose a movie you would love👉 to watch: 3

-----

Available Venues for 'Lucky Baskha₹':

-----

1. Cinepolies
2. INOX
3. PVR Cinemas Gold

Choose the venue you love to watch 'Lucky Baskha₹': 2

You have selected: INOX

-----

Available slots for 'Lucky Baskha₹' in 'INOX'

-----

Slot	Time	VIP Seats	Regular Seats
1	9:00AM-12:00PM	20	30
2	2:00PM-5:00PM	20	28
3	6:00PM-9:00PM	20	30

Select the slot you would love to watch 'Lucky Baskha₹': 2

-----

How many seats would you like to book?

2

VIP(👑) Ticket Price:₹600

Regular(👤) Ticket Price:₹300

Pick your perfect spot to enjoy the show! 🎬👑🌟

1. VIP (👑)
2. Regular (👤)

What's your choice🤔?

2

-----

Available Regular Seats (🔴 = Available, 🟡 = Booked):

-----

🔴1 🔴2 🔴3 🔴4 🔴5  
🔴6 🔴7 🔴8 🔴9 🔴10  
🔴11 🟡12 🟡13 🔴14 🔴15  
🔴16 🔴17 🔴18 🔴19 🔴20  
🔴21 🔴22 🔴23 🔴24 🔴25  
🔴26 🔴27 🔴28 🔴29 🔴30

-----

Enter the seat numbers (👉) you want to book:

Enter 2 seat numbers separated by spaces (e.g., 1 2 3):



## b. Cancelation of Seat and Tickets

```
=====
Welcome to our Movie ticket booking Program 🎬🎟️
=====
1. Explore Movies
2. Book the tickets
3. Exit
-----
What would you like to do next?👉
2
===== !!BOOK A TICKET🎟️!!=====
*****
🎬 Is Your Popcorn Ready? Let's Find the Perfect Movie! 🎬🎟️
*****
1. Smile 2 (Horror)
2. Laapataa Ladies (Drama)
3. Lucky Baskha₹ (Triller)
4. Teri Baaton Mein Aisa Uljha Jiya (Comedy)
5. Amaran (Action)
6. Mungaru Male (Romantic)
*****
Choose a movie you would love👉 to watch: 2
-----
Available Venues for 'Laapataa Ladies':
-----
1. AMB Cinemas
2. Victory Cinemas
3. Akash Cinemas
Choose the venue you love to watch 'Laapataa Ladies': 2
You have selected: Victory Cinemas
-----
Available slots for 'Laapataa Ladies' in 'Victory Cinemas'
-----
+-----+-----+-----+
| Slot | Time | VIP Seats | Regular Seats |
+-----+-----+-----+
| 1 | 9:00AM-12:00PM | 20 | 30 |
| 2 | 2:00PM-5:00PM | 20 | 30 |
| 3 | 6:00PM-9:00PM | 20 | 30 |
+-----+-----+-----+
Select the slot you would love to watch 'Laapataa Ladies': 2
-----
How many seats would you like to book?
2
VIP(👑) Ticket Price:₹200
Regular(👤) Ticket Price:₹100
Pick your perfect spot to enjoy the show! 🎬👉
1. VIP (👑)
2. Regular (👤)
What's your choice👉?
2
-----
Available Regular Seats (🟡 = Available, 🟠 = Booked):
-----
🟡1 🟡2 🟡3 🟡4 🟡5
🟡6 🟡7 🟡8 🟡9 🟡10
🟡11 🟡12 🟡13 🟡14 🟡15
🟡16 🟡17 🟡18 🟡19 🟡20
🟡21 🟡22 🟡23 🟡24 🟡25
🟡26 🟡27 🟡28 🟡29 🟡30
-----
Enter the seat numbers (👉) you want to book:
Enter 2 seat numbers separated by spaces (e.g., 1 2 3): 2 3
Regular2 successfully booked 🎬👤.
Regular3 successfully booked 🎬👤.
-----
| Booking Summary |
-----
Movie: Laapataa Ladies
Venue: Victory Cinemas
Time: 2:00PM-5:00PM
Number of Seats: 2
Total Price: ₹200
-----
Do you want to confirm the booking? yes
Your ticket is successfully booked! 🎬👤 You are all set to enjoy the movie! 🎬🎟️
```

```

=====
Welcome to our Movie ticket booking Program 🎬🎟️🍿
=====
1. Explore Movies
2. Book the tickets
3. Exit
-----
What would you like to do next?👉
2
===== !!BOOK A TICKET🎟️!!=====
*****
🎬 Is Your Popcorn Ready? Let's Find the Perfect Movie! 🎬🍿
*****
1. Smile 2 (Horror)
2. Laapataa Ladies (Drama)
3. Lucky Baskha₹ (Triller)
4. Teri Baaton Mein Aisa Uljha Jiya (Comedy)
5. Amaran (Action)
6. Mungaru Male (Romantic)
*****
Choose a movie you would love👉 to watch: 2
-----
Available Venues for 'Laapataa Ladies':
-----
1. AMB Cinemas
2. Victory Cinemas
3. Akash Cinemas
Choose the venue you love to watch 'Laapataa Ladies': 2
You have selected: Victory Cinemas
-----
Available slots for 'Laapataa Ladies' in 'Victory Cinemas'
-----
+-----+-----+-----+-----+
| Slot | Time           | VIP Seats | Regular Seats |
+-----+-----+-----+-----+
| 1     | 9:00AM-12:00PM | 20        | 30             |
| 2     | 2:00PM-5:00PM  | 20        | 28             |
| 3     | 6:00PM-9:00PM  | 20        | 30             |
+-----+-----+-----+-----+
Select the slot you would love to watch 'Laapataa Ladies': 2
-----
How many seats would you like to book?
1
VIP(👑) Ticket Price:₹200
Regular(👤) Ticket Price:₹100
Pick your perfect spot to enjoy the show! 🎬👉
1. VIP (👑)
2. Regular (👤)
What's your choice👉?
2
-----
Available Regular Seats (🟡 = Available, 🟠 = Booked):
-----
🟠1  🟡2  🟡3  🟠4  🟠5
🟠6  🟠7  🟠8  🟠9  🟠10
🟠11 🟠12 🟠13 🟠14 🟠15
🟠16 🟠17 🟠18 🟠19 🟠20
🟠21 🟠22 🟠23 🟠24 🟠25
🟠26 🟠27 🟠28 🟠29 🟠30
-----
Enter the seat numbers (👉) you want to book:
Enter 1 seat numbers separated by spaces (e.g., 1 2 3): 22
Regular22 successfully booked 🎬👉.
-----
|           Booking Summary           |
-----
Movie: Laapataa Ladies
Venue: Victory Cinemas
Time: 2:00PM-5:00PM
Number of Seats: 1
Total Price: ₹100
-----
Do you want to confirm the booking? no
Booking has been cancelled.
Skipping the ticket? 🤔 Looks like the movie will have to carry on without its VI
P. We'll miss you, but we know you'll be back for the encore! 🎬👉

```

```

=====
Welcome to our Movie ticket booking Program 🎬🎟️
=====
1. Explore Movies
2. Book the tickets
3. Exit
-----
What would you like to do next?👉
2
===== !!BOOK A TICKET🎟️!!=====
*****
🎟️ Is Your Popcorn Ready? Let's Find the Perfect Movie! 🍿🎬
*****
1. Smile 2 (Horror)
2. Laapataa Ladies (Drama)
3. Lucky Baskha₹ (Triller)
4. Teri Baaton Mein Aisa Uljha Jiya (Comedy)
5. Amaran (Action)
6. Mungaru Male (Romantic)
*****
Choose a movie you would love👉 to watch: 2
-----
Available Venues for 'Laapataa Ladies':
-----
1. AMB Cinemas
2. Victory Cinemas
3. Akash Cinemas
Choose the venue you love to watch 'Laapataa Ladies': 2
You have selected: Victory Cinemas
-----
Available slots for 'Laapataa Ladies' in 'Victory Cinemas'
-----
+-----+-----+-----+
| Slot | Time           | VIP Seats | Regular Seats |
+-----+-----+-----+
| 1    | 9:00AM-12:00PM | 20        | 30             |
| 2    | 2:00PM-5:00PM  | 20        | 28             |
| 3    | 6:00PM-9:00PM  | 20        | 30             |
+-----+-----+-----+
Select the slot you would love to watch 'Laapataa Ladies': 2
-----
How many seats would you like to book?
1
VIP(👑) Ticket Price:₹200
Regular(👤) Ticket Price:₹100
Pick your perfect spot to enjoy the show! 🎬👉
1. VIP (👑)
2. Regular (👤)
What's your choice👉?
2
-----
Available Regular Seats (🟡 = Available, 🟠 = Booked):
-----
🟡1 🟠2 🟠3 🟡4 🟡5
🟡6 🟡7 🟡8 🟡9 🟡10
🟡11 🟡12 🟡13 🟡14 🟡15
🟡16 🟡17 🟡18 🟡19 🟡20
🟡21 🟡22 🟡23 🟡24 🟡25
🟡26 🟡27 🟡28 🟡29 🟡30
-----
Enter the seat numbers (👉) you want to book:

```