Reservation System

Group 1:
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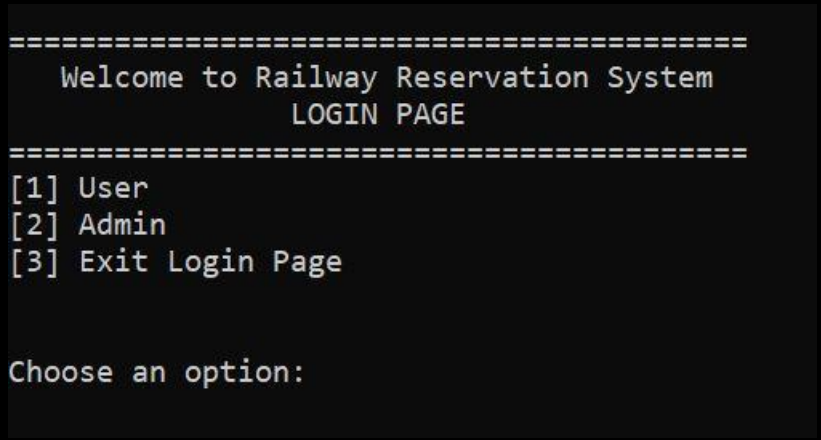
System Overview: Login

- Login Page: The main interface to access the server or the user side amenities
- Admin Login: Admin needs to login to start the server
- User Page: Users can register, login, reserve seat, view seats, etc…



System Overview: Server

One of the key components of the reservation system is the server.. It's functioning is as follows:

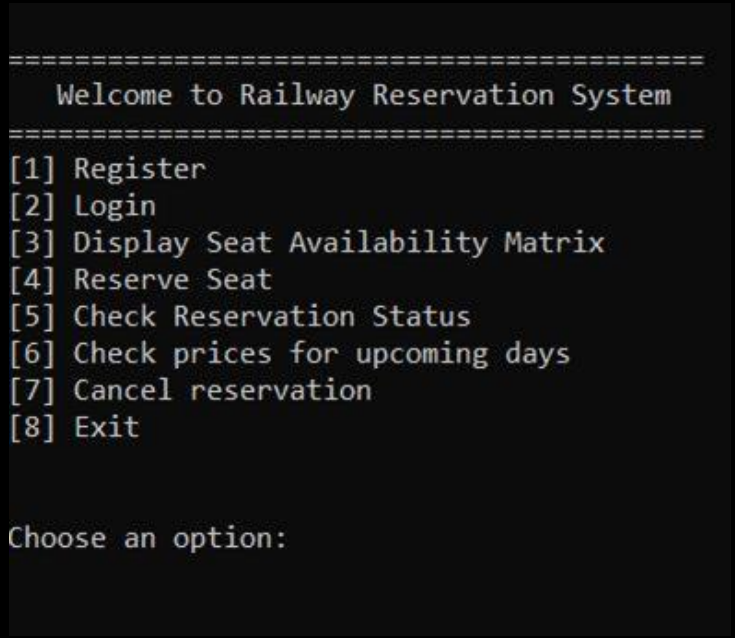
- Admin starts the server
- Admin monitors the user requests made to the server
- The server processes the user requests and relays required response back to the user
- Stores all information of the server in a text file
- Can handle multiple clients
- Synchronisation with help of semaphores

```
LOADing coach 0 with 40 available seats
LOADing coach 1 with 40 available seats
LOADing coach 2 with 43 available seats
Server listening on port 8080 at IP: 172.17.202.167

New client connected.
Request from client: REGISTER kunal_verma kunal0876
Request from client: LOGIN kunal_verma kunal0768
Request from client: LOGIN kunal_sharma kunalkkkk
Request from client: LOGIN unal_verma j
Request from client: LOGIN kunal_verma kunal0876
Request from client: DISPLAY_SEATS 0
Request from client: BOOK kunal_verma Kunal 23 0 D3
Seat Coll 3
Buffer Timeinfo2024-12-10 15:30:02
Request from client: RES_STATUS kunal_verma 1013 Kunal
Entered details: 1013
Request from client: BOOK kunal_verma Kunal 23 0 D3
Seat Coll 3
Request from client: DISPLAY_PRICE 0
Request from client: DISPLAY_PRICE 1
Request from client: CANCEL kunal_verma 1013
Request from client: CANCEL kunal_verma 1013
Request from client: EXIT
^C
Caught signal 2. Closing the server socket...
Server socket closed.
```

System Overview: Client Module

This module's purpose is for users to interact with the server. Through this, Users can:

- Register as a client
- Login as a client
- Reserve preferred seat in preferred coach
- View available seats along with prices
- View prices for upcoming days
- Cancel reservation



System Overview: Features

- Users can register using a unique username and password
- Using registered username and password they can login as a client
- Users get assigned a unique ticket number (PNR) upon successful reservation of seat
- The PNR can be used to view the reservation status (whether successfully booked or waitlisted) and cancel reservation
- Users are prompted to select another seat (in case preferred seat is already booked)
- User is put in a waiting list in case of unavailability of seats in the preferred coach (priority to older passengers)
- Upon cancellation, person from waiting list is assigned the seat

Reservation Overview

- There are three separate coaches with different base prices
- Users can also see a visual layout of the train (position of the coaches with respect to the engine)
- Users can also view prices for upcoming dates
- Seat Matrix:
  - Users can see seat numbers along with prices in form a matrix
  - Window seats cost more than other seats
- Dynamic Pricing:
  - Depends on demand factor, cancellation factor and time factor
  - Final Price=Base Price*Demand factor*Cancellation Factor*Time Factor

Seat Matrix

```
Server response:

============================================================
|    Engine    |$$$Coach 1$$$|   Coach 2   |    Coach 3     |
============================================================

        *Note: Prices may vary at time of reservation*
============================================================


        Seat Availability Matrix for Coach 1:
============================================================


        1       2               3       4       5

A       [ X ]   [ A2]           [ A3]   [ A4]   [ A5]
                 267.46        267.46   267.46   334.32

B       [ B1]   [ B2]           [ B3]   [ X ]   [ B5]
        334.32   267.46        267.46            334.32


C       [ C1]   [ C2]           [ C3]   [ C4]   [ C5]
        334.32   267.46        267.46   267.46   334.32

D       [ D1]   [ D2]           [ D3]   [ D4]   [ D5]
        334.32   267.46        267.46   267.46   334.32


E       [ X ]   [ E2]           [ E3]   [ E4]   [ E5]
                 267.46        267.46   267.46   334.32

F       [ F1]   [ F2]           [ F3]   [ F4]   [ X ]
        334.32   267.46        267.46   267.46


G       [ G1]   [ G2]           [ G3]   [ G4]   [ G5]
        334.32   267.46        267.46   267.46   334.32

H       [ H1]   [ H2]           [ H3]   [ H4]   [ H5]
        334.32   267.46        267.46   267.46   334.32


I       [ I1]   [ X ]           [ I3]   [ I4]   [ I5]
        334.32                 267.46   267.46   334.32


Press Enter to continue...
```

Dynamic Pricing

```
Server response:

                ============================================================
                        Prices for upcoming days for Coach 1
                ============================================================

                Date: 2024-12-11                        Approximate Price: 879.15

                Date: 2024-12-12                        Approximate Price: 893.57

                Date: 2024-12-13                        Approximate Price: 907.98

                Date: 2024-12-14                        Approximate Price: 922.39

                Date: 2024-12-15                        Approximate Price: 936.80


Press Enter to continue...
```

Socket Overview

Using socket programming, the devices are able to communicate with each other on a local network.

- The server binds its socket to a specific IP address and port and waits for connection.
- The client connects to the server using connect(), specifying the server's IP address and port.
- The client sends requests to the server using send(), and the server responds using send() or write().
- The server creates a new thread for each connected client using pthread_create(). This allows it to handle multiple clients simultaneously without blocking other connections.
- Both the client and server operate on the same network. The server listens on INADDR_ANY (binds to all available network interfaces) or a specific IP address, and the client connects using the server's IP address.

Socket Overview: Client

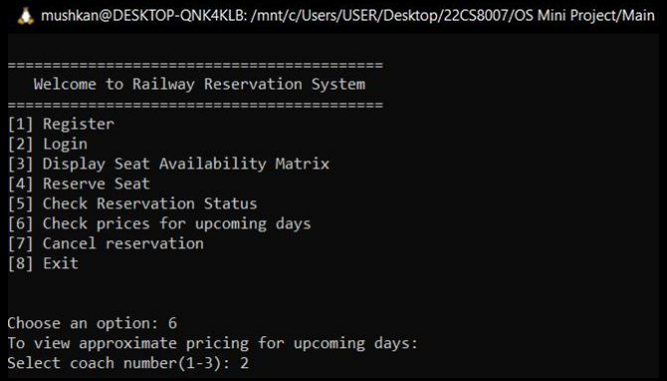
```
========================================
   Welcome to Railway Reservation System
========================================
[1] Register
[2] Login
[3] Display Seat Availability Matrix
[4] Reserve Seat
[5] Check Reservation Status
[6] Check prices for upcoming days
[7] Cancel reservation
[8] Exit


Choose an option: 2
To login:
Enter username: kirank
Enter password: k123
```

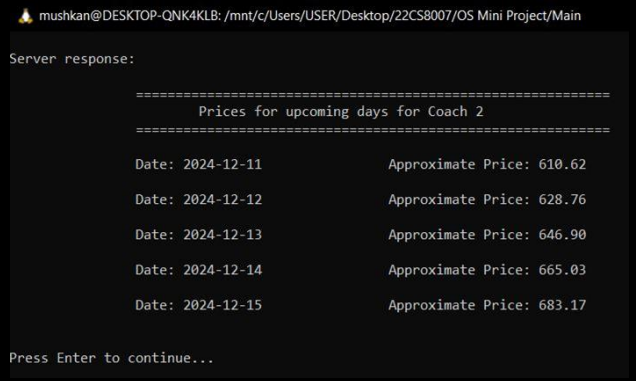
```
========================================
   Welcome to Railway Reservation System
========================================
[1] Register
[2] Login
[3] Display Seat Availability Matrix
[4] Reserve Seat
[5] Check Reservation Status
[6] Check prices for upcoming days
[7] Cancel reservation
[8] Exit


Choose an option: 4
To book a seat:
Enter Passenger Name: Kiran
Enter Age: 40
Choose a coach(1-3): 2
Choose a seat: E4
```

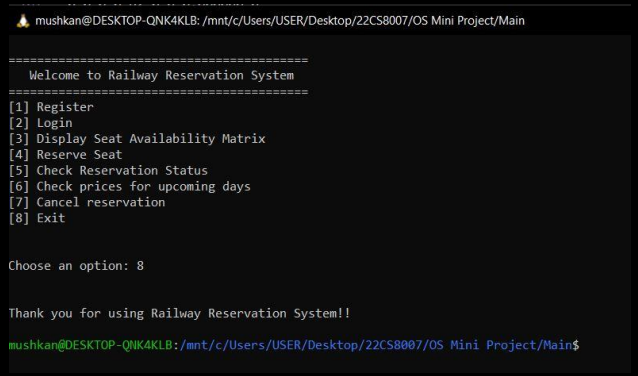
```
========================================
   Welcome to Railway Reservation System
========================================
[1] Register
[2] Login
[3] Display Seat Availability Matrix
[4] Reserve Seat
[5] Check Reservation Status
[6] Check prices for upcoming days
[7] Cancel reservation
[8] Exit


Choose an option: 5
To view reservation status:
Enter PNR: 1003
Enter Passenger Name corresponding to entered PNR: Kiran
```

```
mushkan@DESKTOP-QNK4KLB: /mnt/c/Users/USER/Desktop/22CS8007/OS Mini Project/Main

Server response:
        ======================================================
                        TICKET CONFIRMATION
        ======================================================
                Reservation found for username kirank
                Passenger Name: Kiran
                Age: 40
                Coach Number: 2
                Seat: E4
                Price: 607.32
                Departure Time : 2024-12-17 15:30:00
                Booking Time : 2024-12-11 11:16:15
        ======================================================


Press Enter to continue...
```

Socket Overview: Client







Socket Overview: Server

```
root@LAPTOP-JQIE41F7:/mnt/c/Users/PANKAJ/Downloads# gcc server5.c -o server
root@LAPTOP-JQIE41F7:/mnt/c/Users/PANKAJ/Downloads# ./server
LOADing coach 0 with 43 available seats
LOADing coach 1 with 45 available seats
LOADing coach 2 with 44 available seats
Server listening on port 8080 at IP: 0.0.0.0

New client connected.
Request from client: LOGIN kirank k123
Request from client: DISPLAY_SEATS 1
Request from client: BOOK kirank Kiran 40 1 E4
Seat Coll 4
Buffer Timeinfo2024-12-11 11:16:15
Request from client: RES_STATUS kirank 1003 Kiran
Entered details: 1003
Request from client: DISPLAY_PRICE 1
Request from client: EXIT
```

Member Contributions

Client Features: Anwesha, Sankar, Pratham, Hasin

Designing and maintaining the client features and defining logic to implement features like user registration, user login, reservation and cancellation of seats ,etc.

UI Design: Mushkan, Vaish, Aquib

Designing the user interface that the client and admin interact with, such as the client menu, seat matrix display, confirmation ticket, etc.

Server Features: Aryaman, Salman, Jahid

Designing and maintaining the server side code required for communicating with the client

Thank You