Intelligent Floor Management System

Problem Statement

The project aims to create an Intelligent Floor Plan Management System for efficient workspace and meeting room management. The objectives are:

- Admin Floor Plan Management: Enable admins to upload/modify floor plans
- Meeting Room Optimization: Implement a booking system that suggests rooms based on capacity, availability, and past preferences, with real-time updates.

Technology Stacks used:

- o Java: Programming languages utilized for developing the application.
- MySQL: Database employed for managing data concerning users, rooms, and floor layouts.
- JDBC: Enables the interaction between the application and the MySQL database.

Modules Overview:

- o Admin Management
- Floor Management
- User Management
- JDBC module

- The Admin Management module is central to the overall functionality of the application, enabling administrators to set up and maintain the system's structure.
- The Floor Management module operates closely with the Admin Management module, allowing for real-time adjustments to the floor plans as needed, ensuring efficient space management.
- The User Management module plays a vital role in managing user interactions
 within the booking system, providing essential functionalities like sign up, log in,
 and manage their bookings, this module streamlines the process of room
 reservation and provides users with a comprehensive interface for their
 interactions.

DEMO

Username and Password Login System: The system ensures secure login for both admin and regular users, with each having a unique username and password. It uses Role-Based Access Control where Admins can manage floor plans and room data, and regular users can view available rooms, and book rooms and their bookings.



```
mysql> show databases;
 demodb
 information schema
 mysql
 performance_schema
5 rows in set (0.03 sec)
mysql> use demodb;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A
Database changed
mysql> show tables
 | Tables in demodb |
 Admin
 user
2 rows in set (0.01 sec)
mysql> SELECT * from Admin;
Empty set (0.00 sec)
mysql> SELECT * from user;
Empty set (0.01 sec)
mysql>
```

SQL

Initially there are no admins so an admin needs to sign up and login after that

```
mysql> SELECT * from Admin;
Empty set (0.00 sec)

mysql> SELECT * from user;
Empty set (0.01 sec)

mysql> SELECT * from Admin;
+-----+
| uname | password |
+-----+
| karthik | 12345 |
+-----+
1 row in set (0.00 sec)

mysql> 

mysql> 

mysql>
```

```
Connecting to database...
Welcome to Floor Plan Management System
Select Role
0. Exit
1. Admin
2. User
Welcome to FPMS Admin
1. Signup
2. Login
3. Back to Main Menu
Admin Register
Enter New User name: karthik
Enter New Password: 12345
Admin registered successfully!
```

```
Admin Register
Enter New User name: karthik
Enter New Password: 12345
Admin registered successfully!
Welcome to FPMS Admin
1. Signup
2. Login
3. Back to Main Menu
Admin Login
Enter your username: karthik
Enter your Password: 12345
Login successful! Welcome, karthik!
Select one of the following options
1. Add a floor map
2. Modify a floor map
3.logout
```

Then admin can see admin dashboard and he can see his options or features which are:

- Adding a floormap
- Modifying a floormap
- Logout

Now if admin chooses to add a floor he can give details like number of rooms and capacity of those rooms and **add a floor** to the database and we can see here in image in list of floor details: floor 1 is being printed.

```
Select one of the following options
1. Add a floor map
2. Modify a floor map
3.logout
Enter number of rooms:
Enter each room capacity:
Capacity for room 1: 43
Capacity for room 2: 23
Capacity for room 3: 35
Table floor1 created successfully.
All rooms have been added to the floor1 table successfully.
Select one of the following options
1. Add a floor map
2. Modify a floor map
3.logout
```

Select one of the following options
1. List all floor details
2. Modify a floor
3. Back
1
floor1

The information of rooms is stored as shown where each room has a booked/not status and EAT(earliest available time) which is the earliest time when the book remains unbooked/available for booking

```
mysql> SELECT * from Admin;
        password
 karthik | 12345
1 row in set (0.00 sec)
mysql> show tables;
 Tables in demodb
+-----
 Admin
 floor1
 user
<del>------</del>
3 rows in set (0.01 sec)
mysql> select * from floor1
+----
 roomnumber | capacity | booked | EAT
                 43
                         0 | 2024-10-25 15:02:57
                         0 | 2024-10-25 15:02:57
                 23
                 35
                         0 | 2024-10-25 15:02:57
3 rows in set (0.00 sec)
```

- Admin can choose to modify a floormap. If admin chooses this and then the floor he wants to modify.
- Then he will get an option to either delete a room in that floor or modify the capacities of certain rooms.

```
Select one of the following options

1. Add a floor map

2. Modify a floor map

3.logout

2
```

```
Select one of the following options
1. List all floor details
2. Modify a floor
3. Back
1
floor1
```

```
Select one of the following options
1. List all floor details
2. Modify a floor
3. Back
2
Enter the floor number you want to modify
1
```

capacity	booked EAT	
43	0	2024-10-25 15:02:57
23	0	2024-10-25 15:02:57
35	0	2024-10-25 15:02:57
	43 23	43 0 23 0

Select one of the following options

^{1.} If you want to delete a room

^{2.} If you want to modify the room capacity

^{3.} Back

```
Select one of the following options
1. List all floor details
2. Modify a floor
3. Back
Enter the floor number you want to modify
```

roomnumber	capacity	booked EAT	
1	43	0	2024-10-25 15:02:57
2	23	0	2024-10-25 15:02:57
3	35	0	2024-10-25 15:02:57

Select one of the following options

1. If you want to delete a room

2. If you want to modify the room capacity

3. Back

Updating room capacity for floor1 Enter the room number to update: 2 Enter the new capacity: 39

Room 2 capacity updated successfully.

Select one of the following options

1. If you want to delete a room 2. If you want to modify the room capacity

3. Back

As in the images the capacity of a room can also be changed by the admin.

```
mysql> select * from floor1
 roomnumber | capacity | booked | EAT
                          0 | 2024-10-25 15:02:57
         2 |
                          0 | 2024-10-25 15:02:57
                          0 | 2024-10-25 15:02:57
3 rows in set (0.00 sec)
mysql> select * from floor1;
| roomnumber | capacity | booked | EAT
+----+
         1 |
                          0 | 2024-10-25 15:02:57
         2 |
                          0 | 2024-10-25 15:02:57
                          0 | 2024-10-25 15:02:57
3 rows in set (0.01 sec)
mysql>
```

```
Select one of the following options
1. List all floor details
2. Modify a floor
3. Back
Enter the floor number you want to modify
roomnumber
               capacity
                               booked EAT
                                                2024-10-25 15:02:57
                39
                               0
                                                2024-10-25 15:02:57
               35
                                               2024-10-25 15:02:57
Select one of the following options
1. If you want to delete a room
2. If you want to modify the room capacity
3. Back
Enter the Room number you want to delete
Room 1 deleted successfully from floor1
Select one of the following options
1. If you want to delete a room
2. If you want to modify the room capacity
3. Back
Select one of the following options
1. List all floor details
2. Modify a floor
3. Back
Enter the floor number you want to modify
roomnumber
               capacity
                               booked EAT
                                                2024-10-25 15:02:57
               35
                                               2024-10-25 15:02:57
```

 Also a certain room could be deleted by the admin

```
mysql> select * from floor1;
+-----
roomnumber | capacity | booked | EAT
                 0 | 2024-10-25 15:02:57
                 0 | 2024-10-25 15:02:57
                 0 2024-10-25 15:02:57
3 rows in set (0.01 sec)
mysql> select * from floor1;
4----4
roomnumber | capacity | booked | EAT
0 | 2024-10-25 15:02:57
                 0 2024-10-25 15:02:57
+----+
2 rows in set (0.00 sec)
mysql>
```

 Now similar to Admin the user should signup before logging in and accessing the user dashboard

```
Select Role
0. Exit
1. Admin
2. User
Welcome to FPMS User
1. Signup
2. Login
3. Back to Main Menu
User Register
Enter New User name: kiran
Enter New Password: 12345
User registered successfully!
Welcome to FPMS User
1. Signup
2. Login
3. Back to Main Menu
User Login
Enter your username: kiran
Enter your Password: 12345
Login successful! Welcome, kiran!
Select one of the following options
1. Book a Room
2. List My Bookings
3. Logout
```

```
mysql> select * from user;
 uname | password
 kiran | 12345
+----+
1 row in set (0.01 sec)
mysql> show tables
    ->;
 Tables in demodb
 Admin
 floor1
 kiran Bookings
  user
4 rows in set (0.01 sec)
mysql> select * from kiran Bookings
    ->;
Empty set (0.03 sec)
mysql>
```

```
Select one of the following options
1. Book a Room
2. List My Bookings
3. Logout
1
```

```
Enter the capacity of the room you want to book

34

Floor: 1, Room: 2, Capacity: 39

Floor: 1, Room: 3, Capacity: 35

Enter the floor number you want to book:

1

Enter the Room number you want to book:

3

Enter the time (in format yyyy-MM-dd HH:mm:ss) upto when you want to book the room:
2024-10-26 13:00:00

Room booking updated successfully.

Booking entry inserted successfully in the user bookings table.
```

Select one of the following options

1. Book a Room

2. List My Bookings

3. Logout

A room can be booked after viewing all the available rooms based on our requirement(capacity) and also need to give the info regarding till when does the user want the room and that will get updated to the database as well

This booking can be viewed in list my bookings option and it will be displayed as shown here

```
Select one of the following options
1. Book a Room
2. List My Bookings
3. Logout
Floor: 1, Room: 3, Start Time: 2024-10-25 15:17:20.0, End Time: 2024-10-26 13:00:00.0
Select one of the following options
1. Book a Room
2. List My Bookings
Logout
```

```
Welcome to FPMS Admin
1. Signup
2. Login
3. Back to Main Menu
Admin Login
Enter your username: karthik
Enter your Password: 12345
Login successful! Welcome, karthik!
Select one of the following options
1. Add a floor map
2. Modify a floor map
3.logout
Select one of the following options
1. List all floor details
2. Modify a floor
3. Back
Enter the floor number you want to modify
roomnumber
                                booked EAT
                                                2024-10-25 15:02:57
                                               2024-10-26 13:00:00
Select one of the following options
1. If you want to delete a room
2. If you want to modify the room capacity
3. Back
```

 From the admin side as well, one can see changes in booking status of a room as shown here.

• EAT of a unbooked room is current time at any moment and that changes when a room is booked to the till which the room is booked.

Future Improvements

Input Validation

- **Enhancement**: Introduce validation checks for incorrect inputs, such as negative room counts, invalid capacities, or improper time entries.
- Benefits: Ensures only valid data is processed, minimizing errors and enhancing system stability.

Database Optimization

- **Improvement**: Consolidate all user bookings into a single table with user details stored separately for efficient data handling.
- **Benefits**: Streamlines data storage, reduces redundancy, and improves the booking process's overall efficiency.

Room Management Flexibility

- **Enhancement:** Enable admins to dynamically add rooms to existing floors as needed.
- Benefits: Allows for scalable management of room resources based on demand.

Graphical User Interface (GUI)

- Development: Replace the current console-based interface with a graphical user interface.
- Benefits: Improves user experience with an intuitive, visually appealing interface that simplifies navigation and task management.

• Advanced Room Recommendation Algorithm

- Improvement: Refine the room recommendation system to account for user preferences, booking history, and real-time availability.
- Benefits: Provides users with accurate and personalized room recommendations.

Password Hashing for Enhanced Security

- Implementation: Future updates will incorporate password hashing with secure algorithms like bcrypt.
- Benefits: Safeguards user credentials by preventing plain-text storage, reducing the risk of data breaches.