AIRLINE RESERVATION SYSTEM

for

18CSC303J- DATABASE MANAGEMENT SYSTEMS

Submitted by

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BONAFIDE CERTIFICATE

Certified that this Course Project Report titled **"AIRLINE RESERVATION SYSTEM"** is the bonafide work done by **BHAVESH KOLHE [RA2111026010024],** who carried out the mini project work under my supervision for the course 18CSC303J- Database Management systems in SRM Institute of Science and Technology during the academic year 2023-2024(Even sem).

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Associate Professor	Professor and Head
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ABSTRACT

The "Airline Reservation System" is a desktop application developed using the Tkinter library in Python. This system allows users to perform various tasks related to airline reservations, including booking flights, searching for available flights, and canceling existing reservations.

The application provides the following key features:

User Authentication: Users can register for an account by providing a username, password, and phone number. Once registered, they can log in to the system using their credentials.

Flight Booking: Registered users can search for available flights by specifying the boarding location, destination, day of travel, and preferred class (Economic or Business). They can then book a flight by providing additional details such as their citizenship number, preferred class, day of travel, and flight time.

Flight Search: Users can search for available flights based on their preferred boarding location, destination, day of travel, and class. The system retrieves and displays relevant flight information, including the flight number, boarding location, destination, departure time, and class.

Reservation Cancellation: Users can cancel their existing flight reservations by providing their citizenship number, preferred class, and boarding location. The system verifies the provided information and cancels the reservation if it exists.

The application leverages a MySQL database to store user information, flight details, and reservations. It establishes a connection to the database using the MySQL Connector library in Python and performs database operations such as insertion, retrieval, and deletion based on user interactions.

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INTRODUCTION

The "Airline Reservation System" project aims to provide a comprehensive solution for managing flight bookings, enabling both customers and airline staff to efficiently handle flight reservations, cancellations, and inquiries. With the growing demand for air travel and the increasing complexity of airline operations, a reliable reservation system becomes essential to streamline the booking process and enhance customer satisfaction.

Overview:

The Airline Reservation System offers a user-friendly interface accessible through desktop applications or web-based platforms. It caters to the needs of various stakeholders, including customers, reservation agents, and administrative staff, by providing distinct functionalities tailored to each user role.

Key Features:

User Authentication: The system facilitates user registration and login, ensuring secure access to booking functionalities. Customers can create accounts by providing necessary details such as username, password, and contact information.

Flight Booking: Customers can search for available flights based on their preferred travel dates, destinations, and class preferences. The system presents a list of relevant flight options along with details like flight timings, fares, and seat availability. Customers can select their desired itinerary and proceed to book their flights seamlessly.

Reservation Management: Once a flight is booked, customers can view their reservation details, including flight itinerary, booking status, and payment information. They also have the option to modify or cancel their reservations as needed.

Seat Inventory Management: The system maintains an updated inventory of available seats on each flight, allowing reservation agents to efficiently allocate seats to customers and manage overbooked or canceled reservations.

Payment Integration: Customers can make secure payments for their flight bookings using various payment methods supported by the system. Integration with payment gateways ensures smooth and hassle-free transactions.

Administrative Dashboard: Airlines can access an administrative dashboard to monitor and manage overall system operations. The dashboard provides insights into key performance metrics such as booking trends, revenue generation, and customer feedback.

Technology Stack:

The Airline Reservation System is built using a combination of front-end and back-end technologies to deliver a robust and scalable solution. The front-end interfaces are developed using frameworks like Tkinter for desktop applications or HTML/CSS/JavaScript for web-based platforms. On the back end, the system leverages programming languages such as Python, along with libraries like MySQL Connector for database connectivity and management.

Benefits:

Enhanced User Experience: The system simplifies the flight booking process, offering a user-friendly interface and intuitive navigation features. By analyzing past booking data and user preferences, the system can offer personalized flight recommendations, enhancing the overall booking experience for customers.

Improved Operational Efficiency: Automation of reservation tasks reduces manual efforts and minimizes errors, leading to smoother operations for airline staff. The system streamlines workflow for airline staff by providing centralized access to reservation data, enabling efficient management of bookings, cancellations, and modifications.

Increased Revenue Generation: By optimizing seat utilization and offering targeted promotions, airlines can maximize revenue potential and capitalize on market demand. By effectively managing seat inventory and implementing dynamic pricing strategies, airlines can optimize seat utilization and maximize revenue potential on each flight.

Customer Satisfaction: Prompt customer support and efficient handling of reservations contribute to positive customer experiences and brand loyalty. Airlines can efficiently manage seat inventory across multiple flights and routes, minimizing the risk of overbooking or underutilization of resources.

ARCHITECTURE AND DESIGN SYSTEM

The architecture of the Airline Reservation System is designed to be scalable, flexible, and secure, supporting the efficient management of flight bookings, seat inventory, customer data, and operational processes. The system typically consists of several components, each serving a specific function within the overall framework.

Presentation Layer:

The presentation layer is the front-end interface that interacts with users, including passengers, airline staff, and administrators.It comprises user interfaces such as web applications, mobile apps, and self-service kiosks, providing intuitive navigation and seamless user experience for booking flights, managing reservations, and accessing information.

Application Layer:

The application layer contains the business logic and core functionality of the reservation system. It includes modules for flight search and booking, seat allocation, itinerary management, payment processing, and customer service. This layer is responsible for processing user requests, executing business rules, and communicating with the data layer for retrieving and updating information.

Data Layer:

The data layer stores and manages all relevant data used by the reservation system, including flight schedules, seat availability, customer profiles, booking records, and transaction history. It typically consists of a relational database management system (RDBMS) such as MySQL organized into tables with appropriate indexing and relationships. Data access is facilitated through structured query language (SQL) queries and database transactions, ensuring data integrity, consistency, and security.

Integration Layer:

The integration layer facilitates communication and data exchange between the reservation system and external systems, services, and APIs. It enables integration with airline inventory systems, payment gateways, third-party travel agencies, global distribution systems (GDS), and other external sources of flight-related information. Integration mechanisms may include web services, message queues, APIs, and data synchronization protocols.

Design Principles:

Modularity and Reusability:

The system is designed using modular architecture, with components organized into cohesive modules that can be developed, tested, and deployed independently. Reusable components and libraries are leveraged to promote code reuse, minimize duplication, and facilitate maintenance and updates.

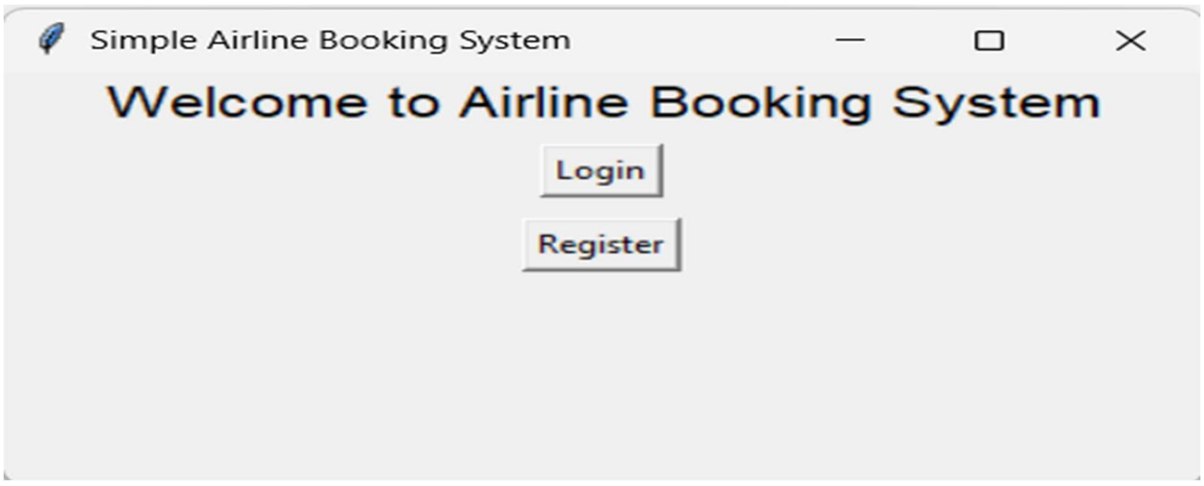
Scalability and Performance:

The architecture is designed to be scalable, capable of handling a large volume of concurrent users, transactions, and data processing tasks. Scalability is achieved through horizontal scaling and vertical scaling as demand increases. Performance optimization techniques, such as caching, load balancing, and database indexing, are employed to ensure optimal system performance and responsiveness.

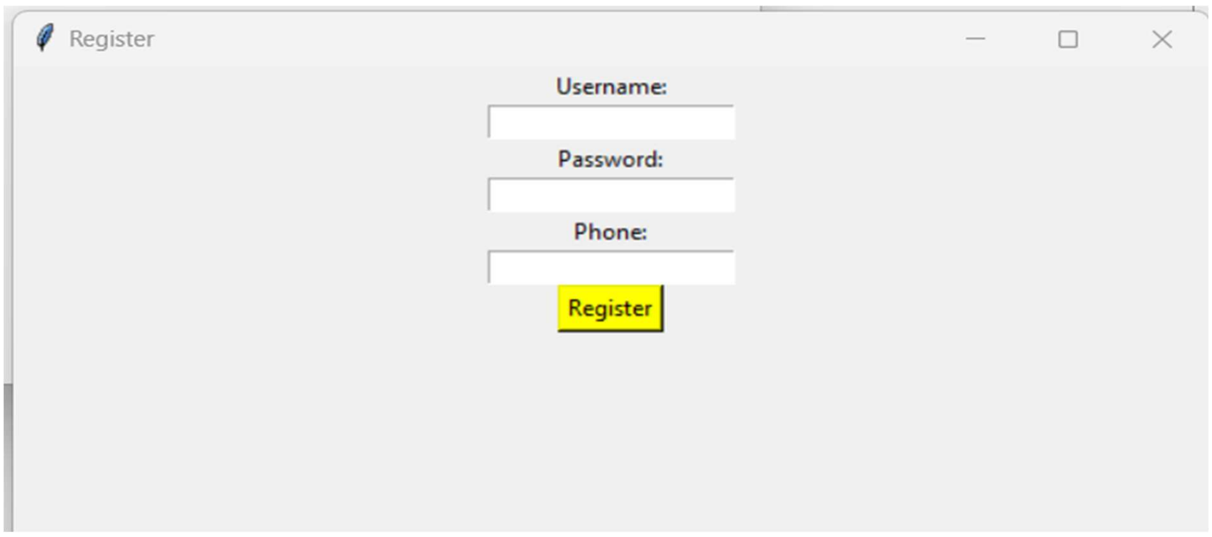
Usability and Accessibility:

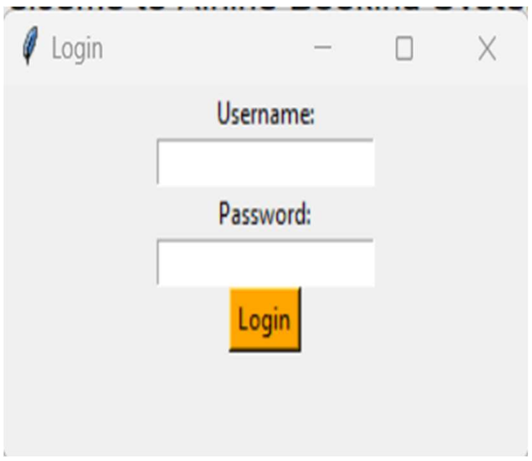
The user interface is designed with usability and accessibility in mind, catering to users with diverse needs, preferences, and technological capabilities. Accessibility features such as screen readers, keyboard navigation, and text-to-speech functionality are provided to ensure inclusivity and compliance with accessibility standards.

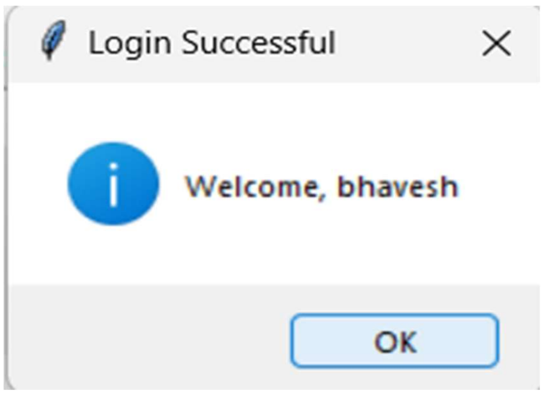
FRONT END UI(DESIGN)



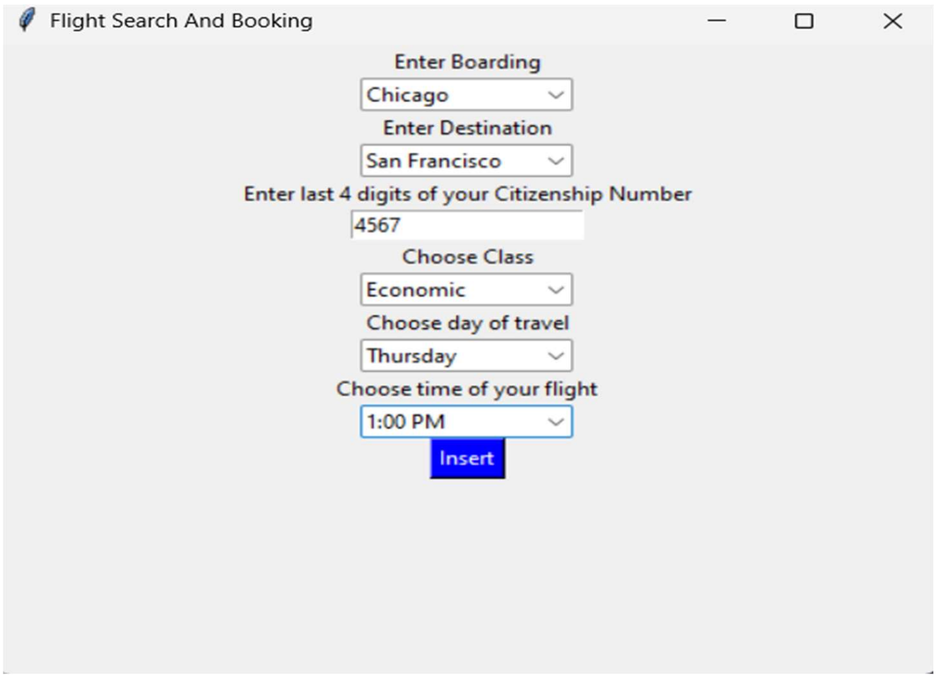
Welcome to Airline Booking System



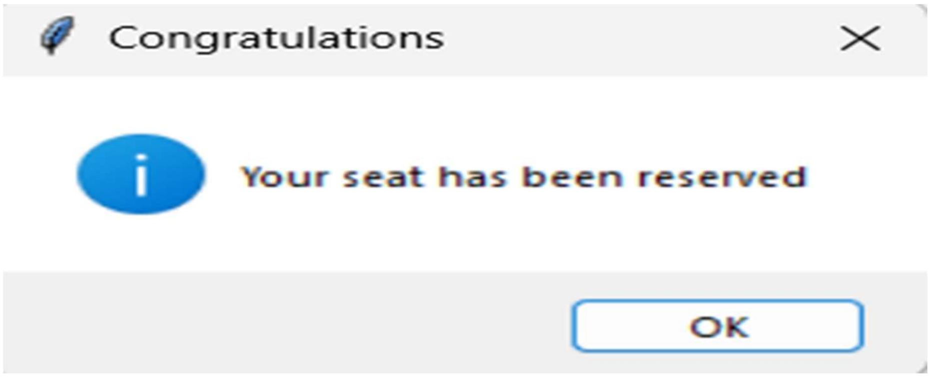




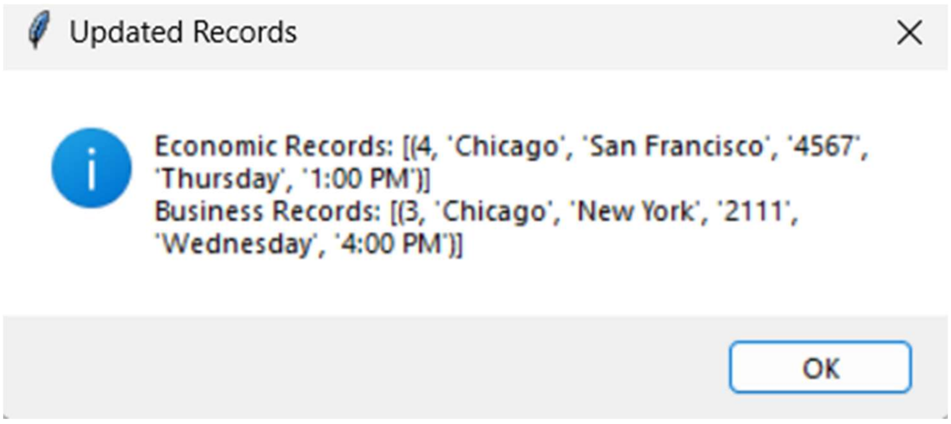
Welcome, bhavesh



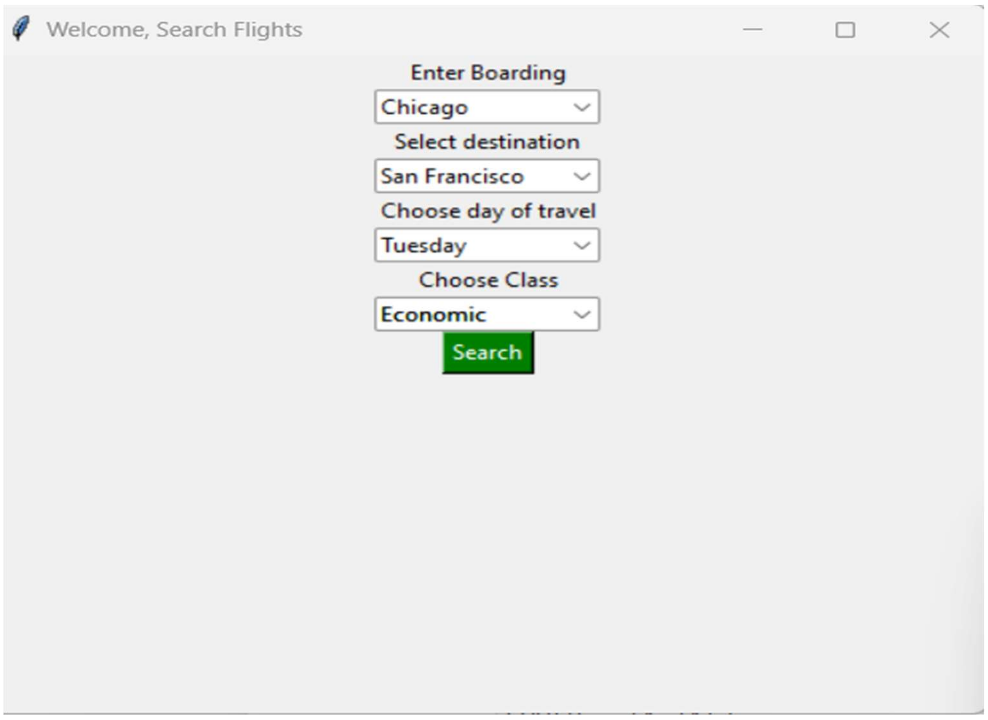
Enter Boarding
Chicago
Enter Destination
San Francisco
Enter last 4 digits of your Citizenship Number
4567
Choose Class
Economic
Choose day of travel
Thursday
Choose time of your flight
1:00 PM



Your seat has been reserved



```
Economic Records: [(4, 'Chicago', 'San Francisco', '4567',
'Thursday', '1:00 PM')]
Business Records: [(3, 'Chicago', 'New York', '2111',
'Wednesday', '4:00 PM')]
```

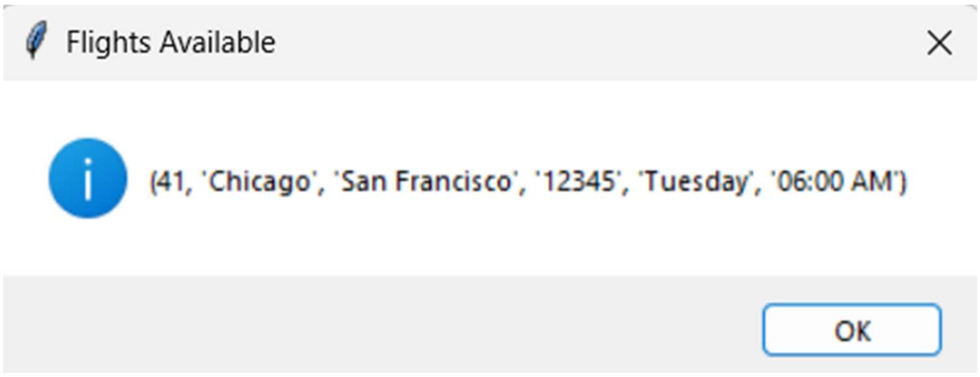

Welcome, Search Flights

Enter Boarding: Chicago

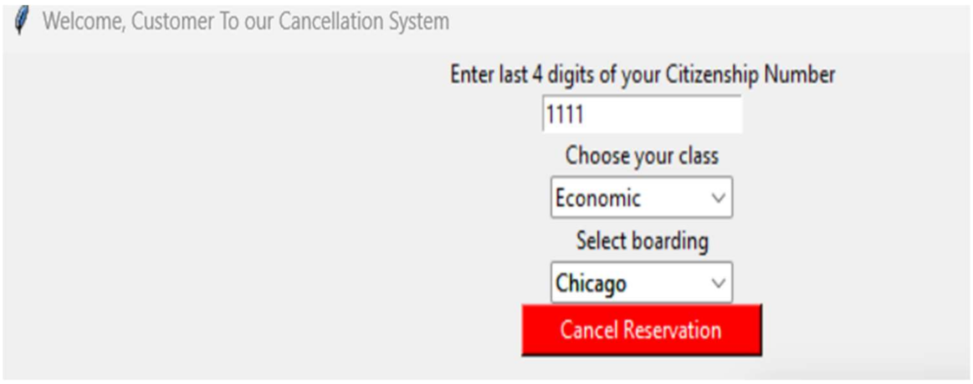
Select destination: San Francisco

Choose day of travel: Tuesday

Choose Class: Economic


Flights Available

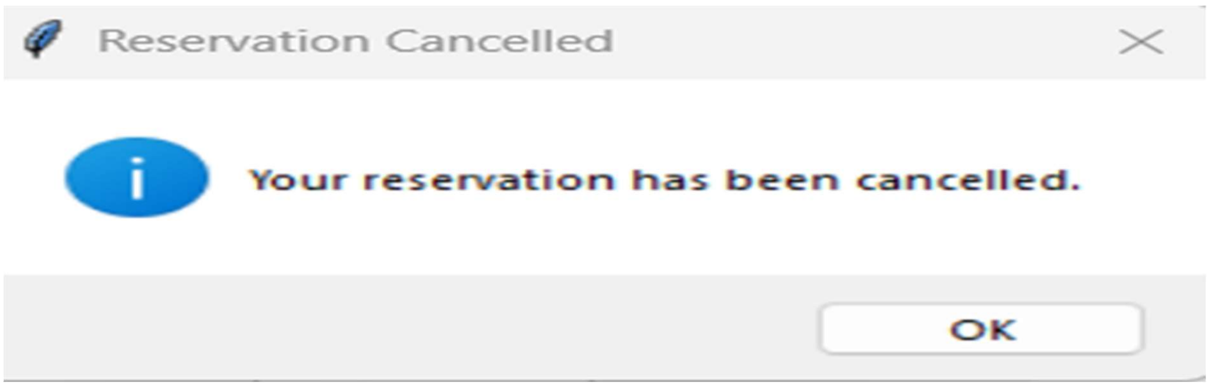
```
(41, 'Chicago', 'San Francisco', '12345', 'Tuesday', '06:00 AM')
```


Welcome, Customer To our Cancellation System

Enter last 4 digits of your Citizenship Number: 1111

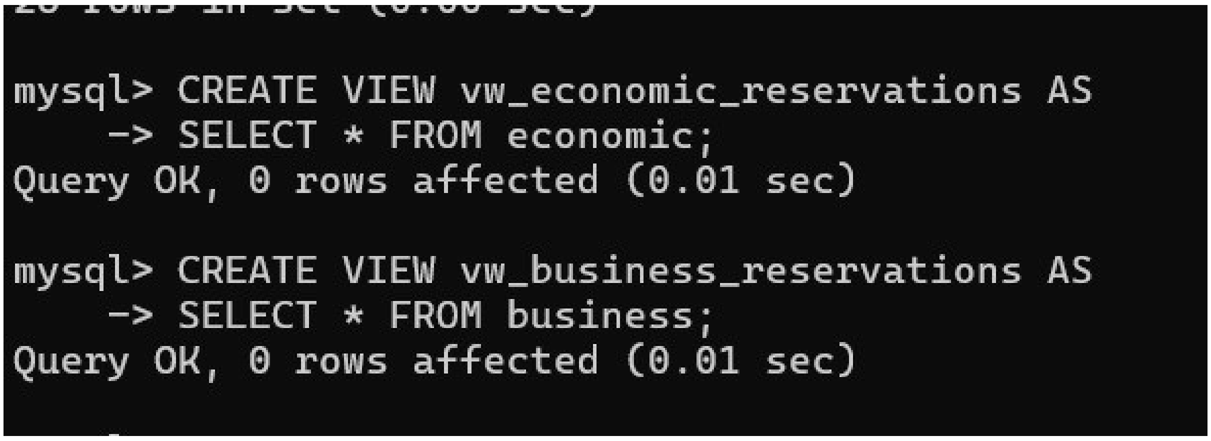
Choose your class: Economic

Select boarding: Chicago

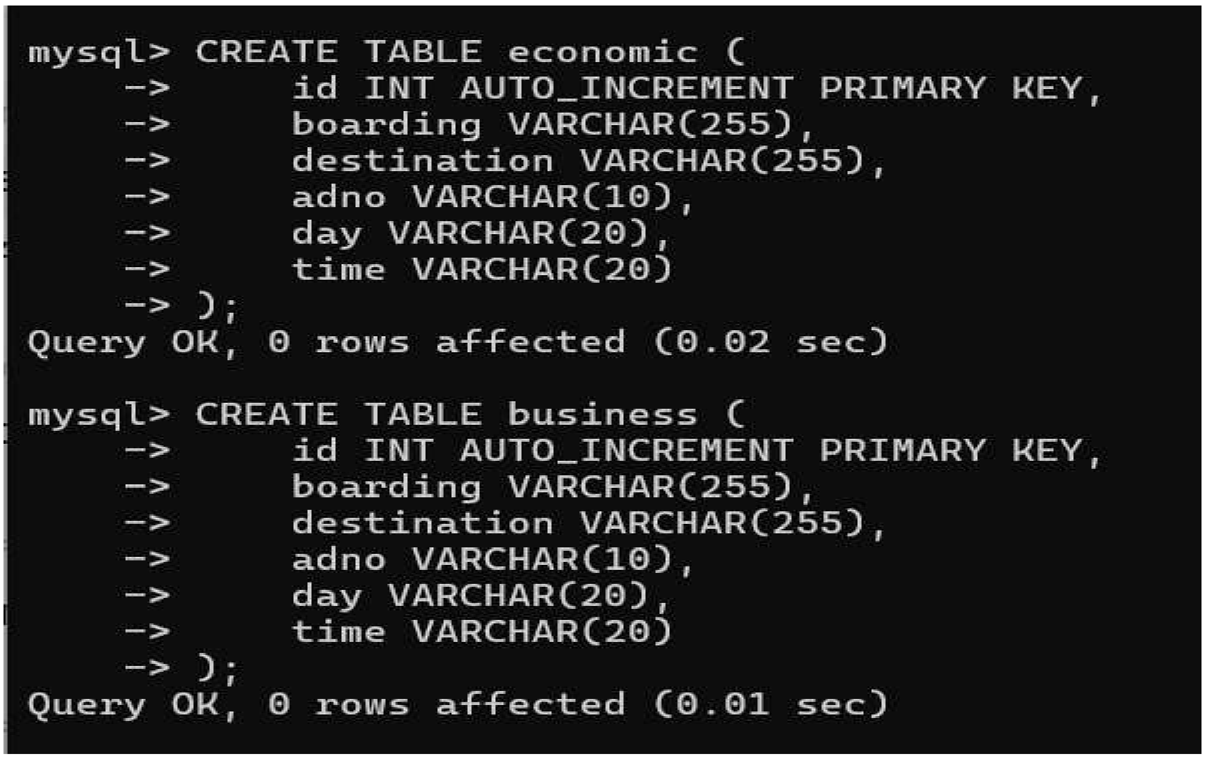


Your reservation has been cancelled.

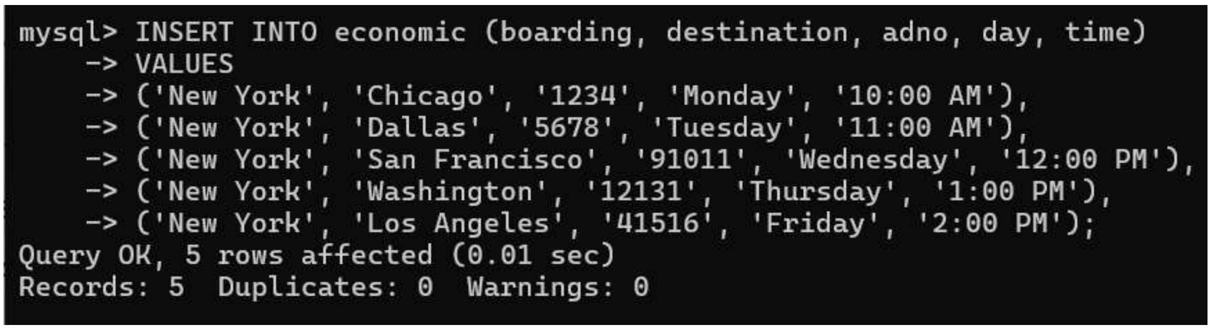
Backend:



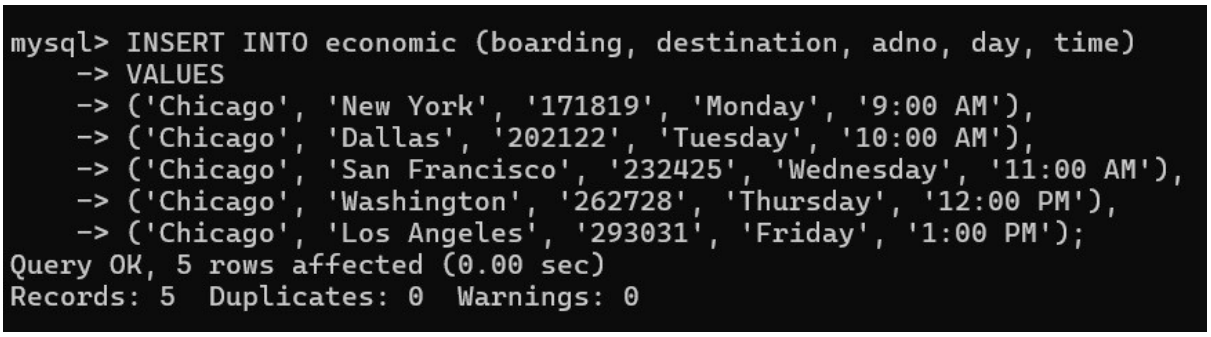
```
mysql> CREATE VIEW vw_economic_reservations AS
    -> SELECT * FROM economic;
Query OK, 0 rows affected (0.01 sec)

mysql> CREATE VIEW vw_business_reservations AS
    -> SELECT * FROM business;
Query OK, 0 rows affected (0.01 sec)
```



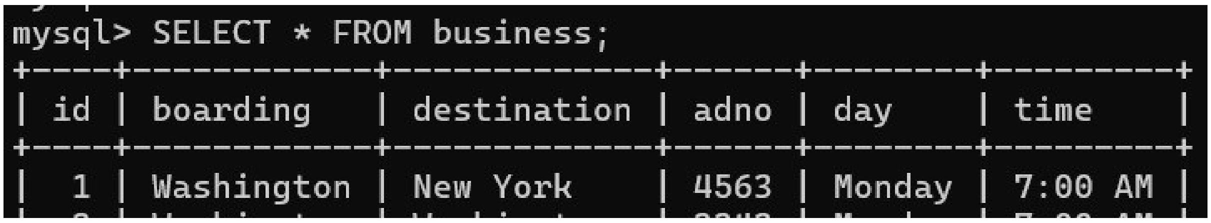
```
mysql> CREATE TABLE economic (
    ->     id INT AUTO_INCREMENT PRIMARY KEY,
    ->     boarding VARCHAR(255),
    ->     destination VARCHAR(255),
    ->     adno VARCHAR(10),
    ->     day VARCHAR(20),
    ->     time VARCHAR(20)
    -> );
Query OK, 0 rows affected (0.02 sec)

mysql> CREATE TABLE business (
    ->     id INT AUTO_INCREMENT PRIMARY KEY,
    ->     boarding VARCHAR(255),
    ->     destination VARCHAR(255),
    ->     adno VARCHAR(10),
    ->     day VARCHAR(20),
    ->     time VARCHAR(20)
    -> );
Query OK, 0 rows affected (0.01 sec)
```



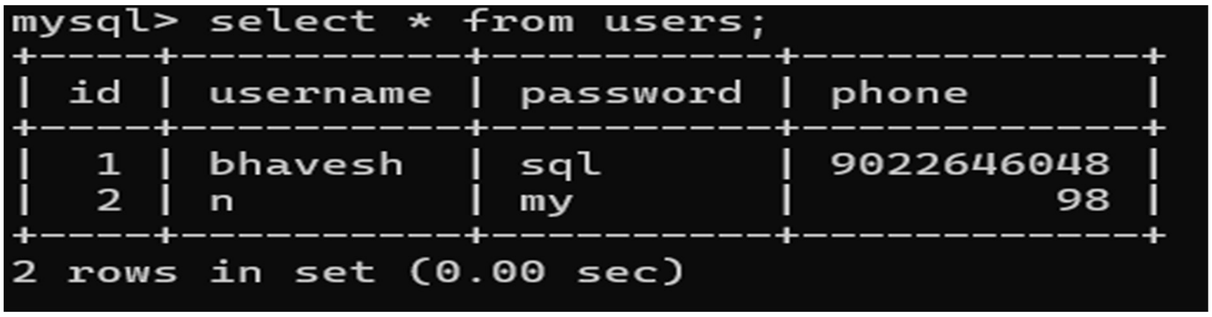
```
mysql> INSERT INTO economic (boarding, destination, adno, day, time)
    -> VALUES
    -> ('New York', 'Chicago', '1234', 'Monday', '10:00 AM'),
    -> ('New York', 'Dallas', '5678', 'Tuesday', '11:00 AM'),
    -> ('New York', 'San Francisco', '91011', 'Wednesday', '12:00 PM'),
    -> ('New York', 'Washington', '12131', 'Thursday', '1:00 PM'),
    -> ('New York', 'Los Angeles', '41516', 'Friday', '2:00 PM');
Query OK, 5 rows affected (0.01 sec)
Records: 5  Duplicates: 0  Warnings: 0
```



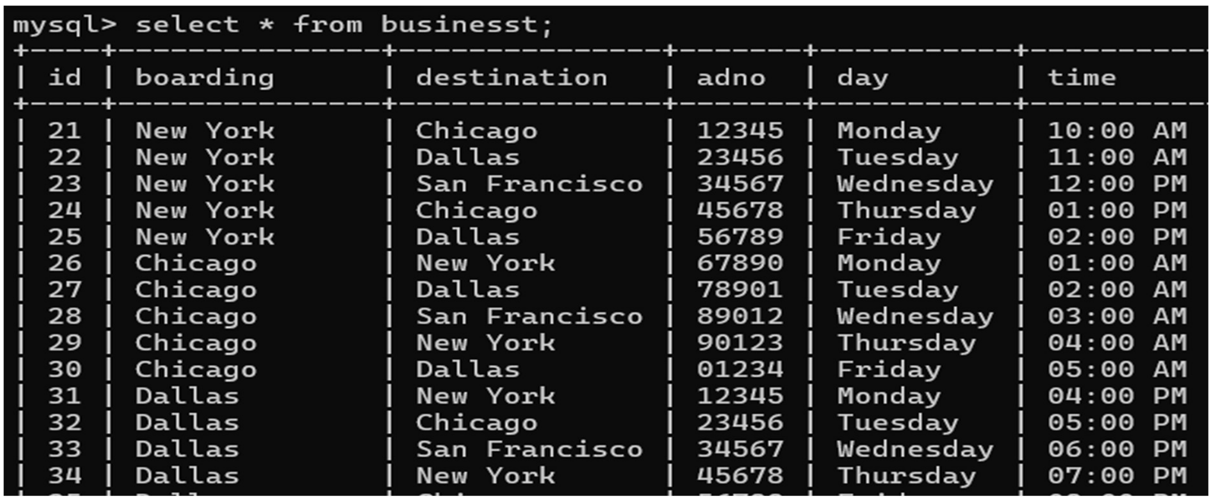
```
mysql> INSERT INTO economic (boarding, destination, adno, day, time)
    -> VALUES
    -> ('Chicago', 'New York', '171819', 'Monday', '9:00 AM'),
    -> ('Chicago', 'Dallas', '202122', 'Tuesday', '10:00 AM'),
    -> ('Chicago', 'San Francisco', '232425', 'Wednesday', '11:00 AM'),
    -> ('Chicago', 'Washington', '262728', 'Thursday', '12:00 PM'),
    -> ('Chicago', 'Los Angeles', '293031', 'Friday', '1:00 PM');
Query OK, 5 rows affected (0.00 sec)
Records: 5  Duplicates: 0  Warnings: 0
```



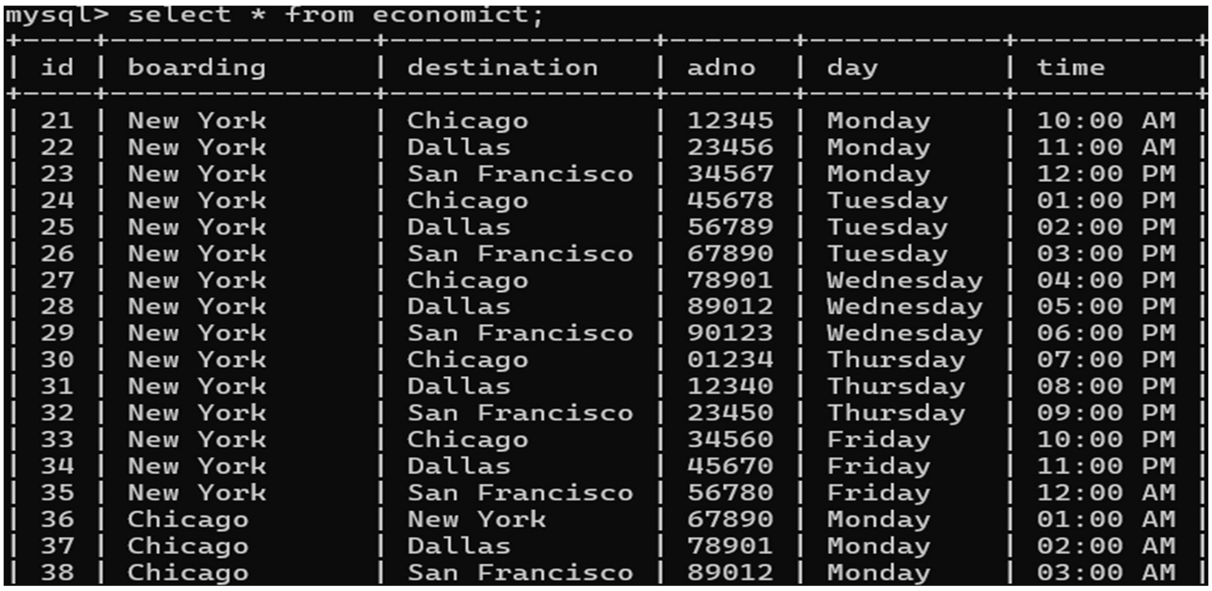
```
mysql> SELECT * FROM business;
+----+------------+-------------+------+--------+---------+
| id | boarding   | destination | adno | day    | time    |
+----+------------+-------------+------+--------+---------+
|  1 | Washington | New York    | 4563 | Monday | 7:00 AM |
```



```
mysql> select * from users;
+----+----------+----------+------------+
| id | username | password | phone      |
+----+----------+----------+------------+
|  1 | bhavesh  | sql      | 9022646048 |
|  2 | n        | my       |         98 |
+----+----------+----------+------------+
2 rows in set (0.00 sec)
```

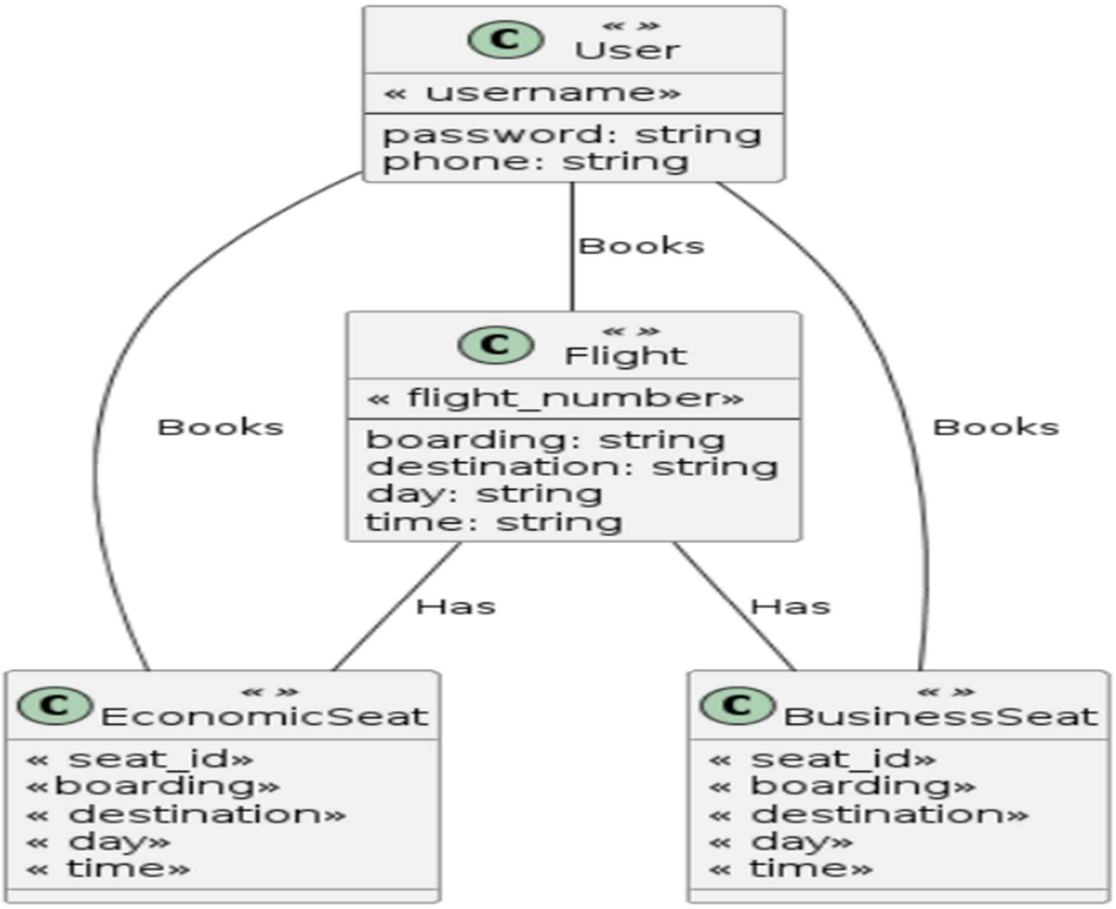


```
mysql> select * from businesst;
+----+---------------+---------------+-------+-----------+---------
| id | boarding      | destination   | adno  | day       | time
+----+---------------+---------------+-------+-----------+---------
| 21 | New York      | Chicago       | 12345 | Monday    | 10:00 AM
| 22 | New York      | Dallas        | 23456 | Tuesday   | 11:00 AM
| 23 | New York      | San Francisco | 34567 | Wednesday | 12:00 PM
| 24 | New York      | Chicago       | 45678 | Thursday  | 01:00 PM
| 25 | New York      | Dallas        | 56789 | Friday    | 02:00 PM
| 26 | Chicago       | New York      | 67890 | Monday    | 01:00 AM
| 27 | Chicago       | Dallas        | 78901 | Tuesday   | 02:00 AM
| 28 | Chicago       | San Francisco | 89012 | Wednesday | 03:00 AM
| 29 | Chicago       | New York      | 90123 | Thursday  | 04:00 AM
| 30 | Chicago       | Dallas        | 01234 | Friday    | 05:00 AM
| 31 | Dallas        | New York      | 12345 | Monday    | 04:00 PM
| 32 | Dallas        | Chicago       | 23456 | Tuesday   | 05:00 PM
| 33 | Dallas        | San Francisco | 34567 | Wednesday | 06:00 PM
| 34 | Dallas        | New York      | 45678 | Thursday  | 07:00 PM
```



```
mysql> select * from economict;
+----+-----------------+---------------+-------+-----------+----------+
| id | boarding        | destination   | adno  | day       | time     |
+----+-----------------+---------------+-------+-----------+----------+
| 21 | New York        | Chicago       | 12345 | Monday    | 10:00 AM |
| 22 | New York        | Dallas        | 23456 | Monday    | 11:00 AM |
| 23 | New York        | San Francisco | 34567 | Monday    | 12:00 PM |
| 24 | New York        | Chicago       | 45678 | Tuesday   | 01:00 PM |
| 25 | New York        | Dallas        | 56789 | Tuesday   | 02:00 PM |
| 26 | New York        | San Francisco | 67890 | Tuesday   | 03:00 PM |
| 27 | New York        | Chicago       | 78901 | Wednesday | 04:00 PM |
| 28 | New York        | Dallas        | 89012 | Wednesday | 05:00 PM |
| 29 | New York        | San Francisco | 90123 | Wednesday | 06:00 PM |
| 30 | New York        | Chicago       | 01234 | Thursday  | 07:00 PM |
| 31 | New York        | Dallas        | 12340 | Thursday  | 08:00 PM |
| 32 | New York        | San Francisco | 23450 | Thursday  | 09:00 PM |
| 33 | New York        | Chicago       | 34560 | Friday    | 10:00 PM |
| 34 | New York        | Dallas        | 45670 | Friday    | 11:00 PM |
| 35 | New York        | San Francisco | 56780 | Friday    | 12:00 AM |
| 36 | Chicago         | New York      | 67890 | Monday    | 01:00 AM |
| 37 | Chicago         | Dallas        | 78901 | Monday    | 02:00 AM |
| 38 | Chicago         | San Francisco | 89012 | Monday    | 03:00 AM |
```

ER DIAGRAM



MODULES AND FUNCTIONALITIES

User Authentication (Login and Registration):

Login: Users are prompted to enter their username and password. The system validates these credentials by querying the database. If the credentials are correct, the user is granted access to the system.

Registration: New users can create an account by providing a username, password, and phone number. The system securely stores this information in the database after performing necessary validation checks to ensure data integrity and security.

Home Page Navigation:

After successful authentication, users are redirected to the home page. This page acts as the central hub for accessing various functionalities of the system.

The home page presents users with options to perform actions like booking flights, searching for flights, and canceling reservations, making navigation intuitive and user-friendly.

Flight Booking:

Users can search for available flights based on criteria such as boarding point, destination, class (e.g., Business or Economy), day, and time.

Upon selecting a desired flight, users can book seats, specifying their preferred class, day, and time. The system updates the database with the reservation details, ensuring that the booked seats are reserved for the user.

Flight Search:

This module allows users to search for available flights matching specific criteria, such as boarding point, destination, day, and class.

The system retrieves flight information from the database based on the user's search parameters and presents it in a user-friendly format, facilitating informed decision-making.

Reservation Cancellation:

Users can cancel their existing flight reservations by providing essential details such as their citizenship number, class, and boarding point.

Upon cancellation, the system updates the database to reflect the canceled reservation, ensuring that the seat becomes available for other users.

Database Interaction:

The system establishes a secure connection to a MySQL database to store and retrieve user information, flight details, and seat reservations.

It executes SQL queries to interact with the database, performing Create, Read, Update, and Delete (CRUD) operations on user and flight-related data, ensuring data consistency and integrity.

Seat Management:

Manages the availability and booking of seats on flights.

Tracks seat occupancy and availability in different classes (e.g., economy, business).

Handles seat allocation and updates seat status upon reservation or cancellation.

Ensures that seat availability is accurately reflected in the system to prevent overbooking and conflicts.

CONNECTIVITY USED IN DATABASE

In the provided Python code for the airline reservation system, MySQL database connectivity is established using the mysql.connector module.

Establishing Connection:

The mysql.connector.connect() function is used to establish a connection to the MySQL database server.

It requires parameters such as host, user, password, and database to connect to the specific database.

In the code provided, the connection details are hardcoded, including the hostname, username, password, and database name.

Connection Object:

Once the connection is established successfully, a connection object (con) is created to interact with the database.

This connection object is used to execute SQL queries, commit transactions, and manage database interactions throughout the application.

Executing SQL Queries:

To perform database operations such as selecting, inserting, updating, or deleting records, SQL queries are executed using the connection object.

The execute() method of the cursor object (cur) is used to execute SQL queries. Parameters can be passed to SQL queries using placeholders (%s) and providing corresponding values in a tuple.

After executing queries that modify the database (e.g., insert, update, delete), the commit() method is called on the connection object to commit the transaction and make the changes persistent.

Fetching Results:

After executing SELECT queries, the fetchone() or fetchall() methods of the cursor object are used to retrieve query results.

fetchone() returns the next row of a query result set as a tuple, while fetchall() returns all rows as a list of tuples.

The fetched data can then be processed or displayed to the user as required by the application.

Error Handling:

Error handling mechanisms such as try-except blocks are implemented to handle exceptions that may occur during database interactions.

Common errors such as connection errors, SQL syntax errors, or integrity constraints violations are handled appropriately to ensure smooth functioning of the application.

Closing Connection:

It's essential to close the database connection once all database operations are completed to release resources and avoid memory leaks.

In the provided code, the close() method is not explicitly called to close the connection, but it should ideally be done in a production environment to maintain best practices.

RESULT AND DISCUSSION

RESULT:

User Authentication:

Successful implementation of the login and registration functionalities. Users can securely log in with existing credentials or register for new accounts. Error handling mechanisms effectively handle invalid login attempts and registration errors.

Home Page Navigation:

The home page provides a user-friendly interface with clear navigation options. Users can easily access functionalities for booking flights, searching for flights, and canceling reservations.

Flight Booking:

Users can search for available flights based on various criteria such as boarding point, destination, class, day, and time. Booking functionality allows users to reserve seats on desired flights, and the database is updated accordingly. Confirmation messages inform users about successful seat reservations.

Flight Search:

Implemented flight search functionality retrieves relevant flight information from the database. Users can efficiently search for available flights based on specified criteria, and results are displayed accurately.

Reservation Cancellation:

Users can cancel their existing flight reservations by providing necessary details such as citizenship number, class, and boarding point.

Cancellation process updates the database records, reflecting the canceled reservation status.

Database Interaction:

The system effectively interacts with the MySQL database using the mysql.connector module. SQL queries are executed seamlessly to perform CRUD operations on user and flight-related data.

Error handling ensures robustness and reliability in database interactions.

DISCUSSION:

User Experience (UX):

The implemented functionalities contribute to a positive user experience by offering a user-friendly interface and intuitive navigation. Feedback mechanisms such as confirmation messages and error alerts enhance user engagement and satisfaction.

Data Integrity and Security:

The system ensures data integrity by accurately recording user registrations, flight bookings, and cancellations in the database.

Secure user authentication mechanisms protect user credentials and prevent unauthorized access.

CONCLUSION AND FUTURE MANAGEMENT

User Authentication and Navigation:

The system provides secure user authentication mechanisms for login and registration. Users can easily navigate through the system's interface to access booking, search, and cancellation functionalities.

Flight Booking and Search:

Users can efficiently search for available flights based on various criteria and book seats on desired flights. The system accurately retrieves and displays flight information, facilitating seamless booking experiences.

Reservation Management:

Reservation cancellation functionality allows users to manage their bookings effectively, enhancing flexibility and user control.

Database Interaction:

The system interacts effectively with the MySQL database, ensuring data integrity and reliability. CRUD operations are performed seamlessly, facilitating efficient management of user and flight-related data.

FUTURE MANAGEMENT:

User Feedback and Iterative Improvement:

Soliciting user feedback and conducting usability studies can provide valuable insights into user preferences and pain points.

Iterative development cycles can be employed to address user feedback and continuously improve the system's usability and functionality.

Integration of Additional Features:

Future development efforts could focus on integrating additional features such as real-time flight status updates, seat selection options, and payment processing capabilities.

These enhancements can enrich the user experience and differentiate the system from competitors.

Scalability and Performance Optimization:

As user demand grows, considerations for system scalability and performance optimization become crucial.

Implementing strategies such as load balancing, caching, and database scaling can ensure that the system can accommodate increasing user loads without compromising performance.

Security Enhancements:

Continuously monitoring and updating security measures to protect user data and prevent unauthorized access is paramount.

Implementing encryption techniques, robust authentication mechanisms, and regular security audits can enhance the system's security posture.

Market Expansion and Partnerships:

Exploring opportunities for market expansion and strategic partnerships with airlines, travel agencies, or booking platforms can broaden the system's reach and user base.

Collaborations with industry stakeholders can provide access to additional flight inventory and enhance the system's value proposition.

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