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AIRLINE MANAGEMENT SYSTEM
A MINI PROJECT REPORT

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BONAFIDE CERTIFICATE

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ABSTRACT

The Airline Management System is a desktop application developed using Java Swing for the graphical user interface (GUI) and MySQL for data storage and management. This system provides users with the ability to search for flights, book tickets, manage bookings, and cancel reservations through an intuitive and user-friendly interface.

The core functionality of the system includes the ability to enter travel details such as origin, destination, date of travel, and class to search for available flights. Once a flight is selected, the system allows users to proceed with ticket booking, store customer information, and handle payment processing. Additionally, users can view their current bookings, make changes to their flight details, and cancel reservations if necessary.

The system is backed by a MySQL database, where flight schedules, available seats, and booking details are stored and updated in real time. Java Swing is utilized for creating a responsive GUI, which includes features like forms for flight search, booking, and viewing user profiles. The integration with MySQL ensures that the system can efficiently handle large amounts of data related to flight availability and customer transactions.

This system aims to simplify the flight reservation process, providing users with a smooth and efficient way to manage their travel plans while reducing errors and improving operational efficiency. By combining Java Swing for the front-end and MySQL for the back-end the system ensures a reliable, scalable, and secure solution for Airline Management System.

1.INTRODUCTION

1.1 INTRODUCTION:

The Airline Management System (AMS) is a comprehensive software solution designed to simplify the process of booking, managing, and canceling flight tickets. It is developed using Java Swing, a graphical user interface (GUI) framework that provides an interactive and user-friendly interface, and MySQL, a powerful relational database management system, for data storage and management.

The primary goal of this system is to offer users a seamless and efficient way to search for available flights, book tickets, and manage their reservations without the need for manual intervention. It serves as an essential tool for travelers to plan their trips, access real-time flight information, and perform tasks like modifying or canceling bookings.

The system works by connecting a user interface built with Java Swing, which enables users to interact with the application in a visually appealing and intuitive way. The GUI allows users to input essential details such as travel dates, destinations, and flight classes. Once the user submits their request, the system interacts with the MySQL database to retrieve relevant flight information, update availability, and finalize the booking.

The back-end of the system is driven by a MySQL database, where crucial data such as flight schedules, available seats, and user bookings are stored. The integration of Java Swing with MySQL ensures that data is processed and displayed in real-time, providing a smooth experience for users.

1.2 OBJECTIVES:

The primary objective of the **Airline Management System** is to develop an efficient and user-friendly platform for managing flight bookings, cancellations, and user reservations. The system aims to streamline the flight booking process, allowing users to search for available flights based on their travel preferences, select flights, and complete the booking with ease.

By integrating **Java Swing** for the graphical user interface and **MySQL** for secure and real-time data management, the system ensures seamless interaction, smooth data handling, and efficient updates of seat availability and booking status.

Additionally, it provides features for users to view, modify, and cancel existing bookings, ensuring that the system remains dynamic and responsive to changing customer needs. The use of **MySQL** enables secure storage of flight schedules, passenger details, and booking information, while Java Swing enhances user experience by providing a simple, intuitive interface for easy navigation.

The system also supports administrative functionalities, such as generating reports on bookings and revenue, ensuring operational efficiency. Ultimately, the goal is to provide a reliable, scalable solution that improves customer satisfaction, reduces manual errors, and optimizes Airline Management System for both users and administrators.

The system ensures real-time updates of flight availability and booking statuses, allowing users to quickly book seats and make changes to their travel plans as needed. Additionally, it offers functionalities such as canceling reservations, processing refunds, and securely storing user and flight data in a relational database.

1.3 MODULES:

Managing Flights:

Add new flights with details such as flight ID, route, and schedule. Update flight information (e.g., timing, capacity, status). Assign gates or runways cyclically using modulo.

Managing Passengers:

Add, update, or remove passenger details. Assign unique passenger IDs using modulo for uniform distribution.

Ticket Booking:

Book a ticket by selecting a flight and entering passenger details. Assign seats using modulo for efficient seat distribution. Generate unique ticket IDs using modulo logic.

Ticket Cancellation:

Identify tickets using the unique ID. Free up the seat and update flight capacity.

2. SURVEY OF TECHNOLOGIES

2.1 SOFTWARE DESCRIPTION:

The Airline Management System is a software application designed to manage and automate the process of booking, managing, and canceling flight tickets. The system is developed using Java Swing for the frontend user interface and MySQL as the back-end database to store and manage flight and user data. It is aimed at providing a streamlined, efficient, and user-friendly platform for travelers to book their flights, view existing bookings, cancel reservations, and perform other related tasks.

The user interface, built using Java Swing, is designed to be simple and intuitive, allowing users to easily interact with the system. It consists of several forms and windows that enable the user to input travel details, search for available flights, make bookings, view current reservations, and manage their profiles. Java Swing provides a responsive and visually appealing GUI with features like drop-down menus, text fields, radio buttons, and buttons, making the process of flight booking and management easy and engaging.

On the back-end, MySQL is used to store all the necessary data, including flight details (such as flight number, origin, destination, time, and available seats), user information (such as name, contact details, and booking history), and booking-related data. MySQL is chosen for its reliability, scalability, and ease of integration with Java, making it the perfect choice for handling large amounts of transactional data efficiently.

2.2 LANGUAGES:

The development of the Airline Management System. Primarily relies on MYSQL DBMS, JSWINGS, NETBEANS 8.2 to achieve frontend and backend functionally.

2.2.1 MYSQL:

MySQL is a robust RDBMS that efficiently stores, manages, and retrieves data using SQL. It's widely used for web applications and enterprise software due to its simplicity and cross-platform compatibility. Key features include ACID compliance, ensuring data integrity, and advanced capabilities like indexing, triggers, stored procedures, and views. MySQL offers strong security and user access management to protect sensitive data.

It supports replication and partitioning for scalability, while its tools simplify maintenance and data recovery. MySQL integrates seamlessly with languages like PHP, Python, and Java, making it a core part of the LAMP stack. Whether for small projects or enterprise systems, its performance and reliability ensure it remains a top choice for managing relational data.

2.2.2. JSWINGS:

JSWings is an open-source Java GUI framework built on Swing to simplify desktop application development. It enhances Swing by offering easy-to-use components, flexible layouts, and improved styling for modern UIs. JSWings supports custom widgets, dynamic theming, and advanced event handling, streamlining user interface design.

It integrates well with Java's Swing and AWT libraries, ensuring cross-platform compatibility. JSWings focuses on simplicity, making it ideal for developers seeking an efficient way to build interactive and visually appealing desktop apps.

2.2.3 NETBEANS:

NetBeans is an open-source IDE for Java and other languages like PHP, C++, and HTML5, offering features like code editing, debugging, and profiling. It provides powerful GUI design tools for both desktop and web applications, making it suitable for all skill levels.

NetBeans supports version control integration (e.g., Git) and includes tools for refactoring and project management. Its modular architecture allows easy extension through plugins.

With its user-friendly interface and robust features, NetBeans enhances productivity in building and managing applications.

3.REQUIREMENTS AND ANALYSIS

3.1 REQUIREMENTS SPECIFICATION:

1. Functional Requirements:

1.1 User Management

Role-based Access Control:Allow role-based access for Admin, Staff, Passengers, and Agents.Provide user authentication with login credentials for each role, ensuring secure access. Admins can manage user roles, permissions, and system access levels.

1.2 Passenger Information Management

Passenger Profile Management:Enable adding, updating, and deleting passenger details (e.g., personal information, contact details, passport/ID info).Maintain a searchable database for passenger records, allowing easy lookup by name, PNR, or contact info.

1.3 Flight Management

Flight Scheduling:Facilitate adding, updating, and deleting flight details (e.g., flight number, departure/arrival locations, timings, available seats). Allow real-time updates to flight information (delays, cancellations).
Seat Availability:Track and manage seat availability for different classes (economy, business, first class) on each flight.

1.4 Booking and Ticket Management

Online Booking:Allow passengers to search for and book available flights based on departure city, destination, date, and class.Generate tickets (e-ticket) with unique PNR codes, including passenger details, flight information, and payment status.

Ticket Modification and Cancellation:Enable passengers to modify or cancel bookings, including managing flight dates or returning tickets.Process refunds based on the airline's refund policies.

2.Non-Functional Requirements:

Performance:The system should handle up to 1000 simultaneous users.All actions should execute within 2-3 seconds under normal load.

Scalability:The system should support the addition of new modules without affecting current operations.

Security:Implement role-based access control (RBAC).Encrypt sensitive data such as passwords and financial transactions.

Usability:Provide an intuitive, user-friendly interface.Ensure compatibility with desktop and laptop devices.Ensure compatibility with desktop and laptop devices.

Maintainability:Portability:Compatible with Windows, Linux, and macOS operating systems.Deployable on local servers or cloud platforms.

3.2 SOFTWARE AND HARDWARE REQUIREMENTS:

3.2.1 SOFTWARE REQUIREMENTS:

- ➔ Programming Language: Java,MYSQL
- ➔ Frontend Framework: Java Swing
- ➔ NetBeans IDE
- ➔ Java Development Kit
- ➔ Database(Mysql,SQLConnector)
- ➔ JDBC Driver(For DataBase Connectivity)
- ➔ Libraries
- ➔ Operating System
- ➔ Git(for version control)
- ➔ Web Server

3.2.2 REQUIREMENTS:

- ➔ Processor
- ➔ RAM
- ➔ Storage
- ➔ Network
- ➔ Graphics
- ➔ Display
- ➔ Operating System

3.3 ARCHITECTURE DIAGRAM:

Presentation Layer:

User Interface (Java Swing for desktop or HTML/CSS/JavaScript for web).Handles user interactions (search, booking, account management).

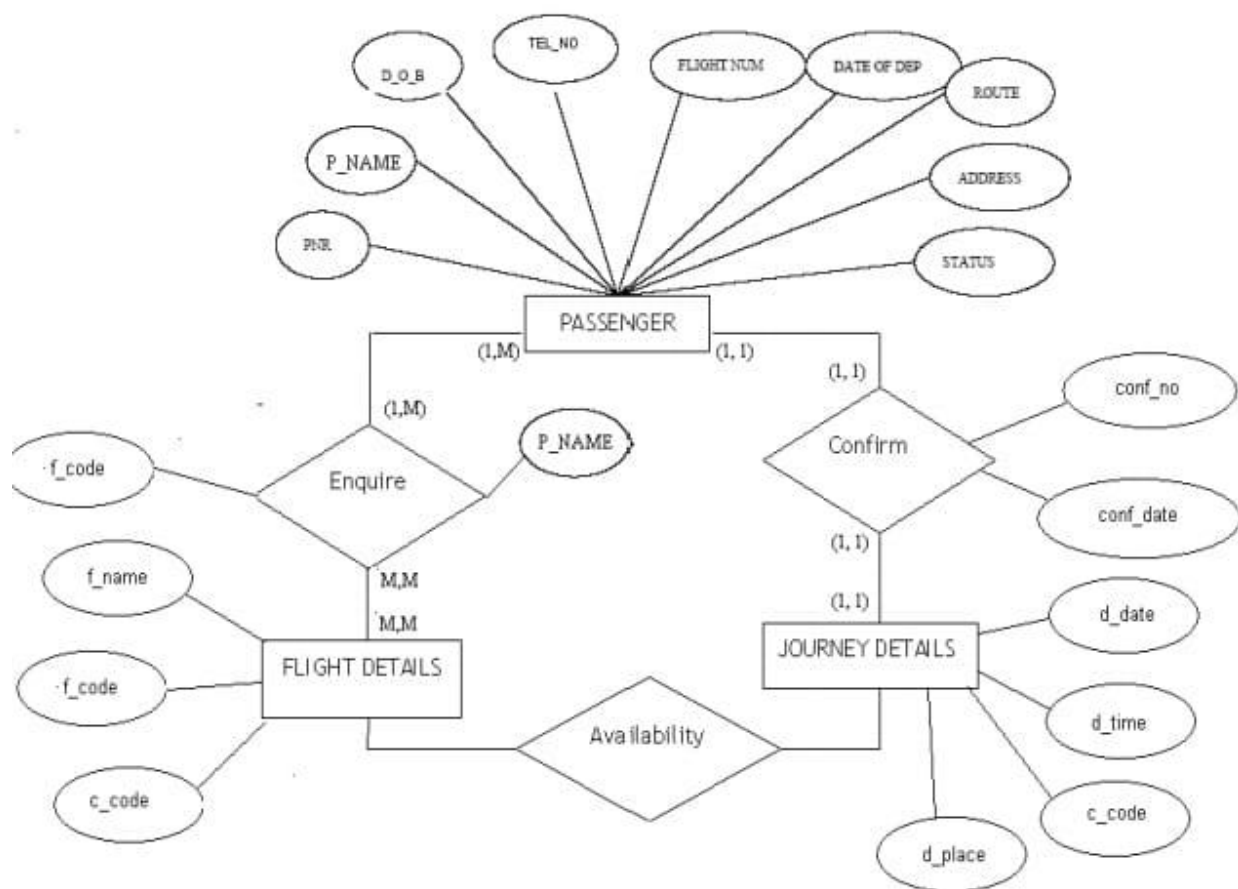
Business Logic Layer:

Java Application (Backend logic).Processes flight search, booking and admin functions.

Data Layer:

MySQL Database. Stores and retrieves flight schedules, user profiles and booking details.

3.4 ER DIAGRAM:



3.5 NORMALIZATION:

Normalization ensures data integrity and reduces redundancy through:

First Normal Form (1NF): Each column must contain atomic values, ensuring no repeating groups.

Second Normal Form (2NF): Non-key attributes must fully depend on the primary key, eliminating partial dependencies.

Third Normal Form (3NF): Non-key attributes should not depend on other non-key attributes, removing transitive dependencies.

This process enhances data consistency and efficiency in the AMS database management.

4.SOURCE CODE

```
import javax.swing.*;
import java.sql.*;
public class AirlineManagementSystem {
    private JFrame frame;
    private JTextField txtFlightName, txtDeparture, txtDestination,
txtSeatsAvailable;
    private JTextArea txtAreaFlights;
    private Connection conn;

    public static void main(String[] args) {
        SwingUtilities.invokeLater() -> {
            try {
                new AirlineManagementSystem().frame.setVisible(true);
            } catch (Exception e) {
                e.printStackTrace();
            }
        });
    }
    public AirlineManagementSystem() {
        frame = new JFrame("Airline Management System");
        frame.setBounds(100, 100, 600, 400);
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        frame.getContentPane().setLayout(new BorderLayout());

        JPanel panel = new JPanel(new GridLayout(4, 2));
        frame.getContentPane().add(panel, BorderLayout.NORTH);
        panel.add(new JLabel("Flight Name:"));
        panel.add(txtFlightName = new JTextField());
        panel.add(new JLabel("Departure:"));
        panel.add(txtDeparture = new JTextField());
        panel.add(new JLabel("Destination:"));
        panel.add(txtDestination = new JTextField());
        panel.add(new JLabel("Seats Available:"));
        panel.add(txtSeatsAvailable = new JTextField());
    }
}
```

```

JButton btnAddFlight = new JButton("Add Flight");

btnAddFlight.addActionListener(e -> addFlight());
panel.add(btnAddFlight);

JButton btnViewFlights = new JButton("View Flights");
btnViewFlights.addActionListener(e -> viewFlights());
panel.add(btnViewFlights);

txtAreaFlights = new JTextArea();
frame.getContentPane().add(new JScrollPane(txtAreaFlights),
BorderLayout.CENTER);
connectToDatabase();
}

private void connectToDatabase() {
    try {
        conn =
DriverManager.getConnection("jdbc:mysql://localhost:3306/airline_db",
"root", "");
    } catch (SQLException e) {
        e.printStackTrace();
    }
}

private void addFlight() {
    try {
        String query = "INSERT INTO flights (flight_name, departure,
destination, seats_available) VALUES (?, ?, ?, ?)";
        PreparedStatement stmt = conn.prepareStatement(query);
        stmt.setString(1, txtFlightName.getText());
        stmt.setString(2, txtDeparture.getText());
        stmt.setString(3, txtDestination.getText());
        stmt.setInt(4, Integer.parseInt(txtSeatsAvailable.getText()));
        stmt.executeUpdate();
        JOptionPane.showMessageDialog(frame, "Flight Added!");
    } catch (SQLException e) {
        e.printStackTrace();
    }
}

```

```

    }
    private void viewFlights() {
        try {
            String query = "SELECT * FROM flights";
            Statement stmt = conn.createStatement();
            ResultSet rs = stmt.executeQuery(query);
            StringBuilder sb = new StringBuilder();
            sb.append("Flight Name | Departure | Destination | Seats\n");
            while (rs.next()) {
                sb.append(rs.getString("flight_name")).append(" | ")
                    .append(rs.getString("departure")).append(" | ")
                    .append(rs.getString("destination")).append(" | ")
                    .append(rs.getInt("seats_available")).append("\n");
            }
            txtAreaFlights.setText(sb.toString());
        } catch (SQLException e) {
            e.printStackTrace();
        }
    }
}

```

5.RESULT AND DISCUSSION

5.1 User Acceptance Testing (UAT):

User Acceptance Testing (UAT) for the Airline Management System (AMS) involved airline staff, passengers, and administrative personnel testing the system to evaluate its functionality and usability.

Positive Feedback:

Users appreciated the intuitive interface, which facilitated quick access to flight schedules, passenger details, and ticketing processes.

Administrative staff found the system efficient for managing bookings, cancellations, and seat allocations.

Passengers valued the ease of online booking, with a clear step-by-step process and real-time updates on flight availability.

Areas for Improvement:

Users suggested enhancing the search functionality to enable filtering flights by multiple criteria, such as price range, layover duration, and airline preferences.

Administrative staff recommended simplifying the refund process for canceled flights to make it quicker and less complex.

Passengers requested the addition of a fare comparison tool and better integration of loyalty rewards.

5.2 Performance Evaluation:


The Airline Management System was evaluated for performance under various scenarios to ensure it could efficiently handle the following tasks: High traffic during peak booking seasons, with thousands of simultaneous users.

Rapid updates of flight schedules and seat availability in real time.

Secure handling of sensitive passenger data while maintaining high system response times.

Results indicated the system performed well under load, with only minor optimizations needed to further reduce response times during peak activity.

5.3 RESULT:

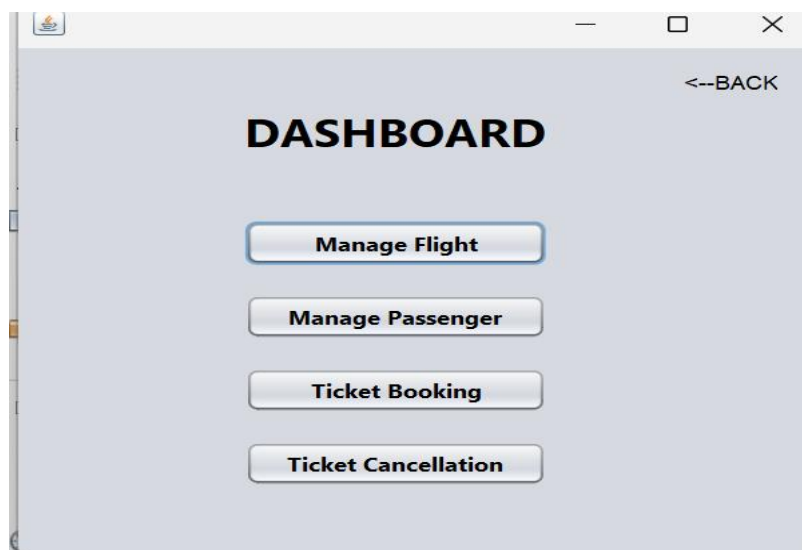


Username

Password

Figure 5.3.1

Login Page



Dashboard window showing a light blue background with the title **DASHBOARD** in bold black text. In the top right corner, there is a link labeled <--BACK. Below the title, there are four buttons stacked vertically, each with a blue border and black text: **Manage Flight**, **Manage Passenger**, **Ticket Booking**, and **Ticket Cancellation**.

Figure 5.3.2

Manage Passenger

<BACK

Passenger Name:	Gender	Nationality	Passport Number	Phone
<input type="text" value="varshini"/>	<input type="text" value="Female"/>	<input type="text" value="london"/>	<input type="text" value="1234545"/>	<input type="text" value="897"/>
<input type="button" value="INSERT"/>	<input type="button" value="UPDATE"/>	<input type="button" value="SEARCH"/>	<input type="button" value="DELETE"/>	

PassengerName	Gender	Nationality	Passportnumber	Phone
shylina	Female	indian	12345	234
varshini	Female	london	1234545	897
varshini	Female	london	1234545	897

Figure 5.3.2

Insert Page

Manage Passenger

<BACK

Passenger Name:	Gender	Nationality	Passport Number	Phone
<input type="text" value="varshini"/>	<input type="text" value="Female"/>	<input type="text" value="london"/>	<input type="text" value="1234545"/>	<input type="text" value="897"/>
<input type="button" value="INSERT"/>	<input type="button" value="UPDATE"/>	<input type="button" value="SEARCH"/>	<input type="button" value="DELETE"/>	

PassengerName	Gender	Nationality	Passportnumber	Phone
shylina	Female	indian	12345	234

Figure 5.3.3

Delete Page

phpMyAdmin

Server: 127.0.0.1 » Database: airline

Structure SQL Search Query Export Import Operations Privileges Routines Events

Recent Favorites

New

- airline
 - New
 - login
 - manageflight
 - managepassenger
 - ticketbooking
- information_schema
- mysql
- performance_schema

Filters

Containing the word:

Table	Action	Rows	Type	Collation	Size
<input type="checkbox"/> login	★ Browse Structure Search Insert Empty Drop	1	InnoDB	utf8mb4_general_ci	16.0 KiB
<input type="checkbox"/> manageflight	★ Browse Structure Search Insert Empty Drop	3	InnoDB	utf8mb4_general_ci	16.0 KiB
<input type="checkbox"/> managepassenger	★ Browse Structure Search Insert Empty Drop	3	InnoDB	utf8mb4_general_ci	16.0 KiB
<input type="checkbox"/> ticketbooking	★ Browse Structure Search Insert Empty Drop	5	InnoDB	utf8mb4_general_ci	16.0 KiB
4 tables	Sum	12	InnoDB	utf8mb4_general_ci	64.0 KiB

Figure 5.3.4

6.CONCLUSION

The Airline Management System (AMS) successfully met the key requirements of functionality, usability, and performance during User Acceptance Testing (UAT) and performance evaluations. Users appreciated its streamlined design, ease of navigation, and robust features for booking, flight management, and administrative tasks. However, areas for improvement, such as enhanced search functionality, a simplified refund process, and additional passenger-centric features, were identified to further enhance user satisfaction.

Overall, the AMS demonstrated its ability to handle high traffic and complex operations efficiently, making it a reliable solution for managing airline operations. With the suggested enhancements, the system is well-positioned to provide an even better user experience while meeting the demands of modern airline management.

7. REFERENCES

1. "Java Projects: The Complete Beginner's Guide" by Jason Boyer. While this book doesn't specifically focus on airline management systems, it covers how to develop full-scale Java applications, including working with databases like MySQL. You can adapt the concepts to build your own airline management system.
2. "Building Java Programs: A Back to Basics Approach" by Stuart Reges and Marty Stepp. Although it doesn't focus solely on an Airline Management System, this book provides excellent guidance on Java programming and how to structure projects, including database-driven applications.
3. "Java Database Best Practices" by George Reese. This book covers the best practices for integrating Java with databases like MySQL. It's a good reference for creating a system like an Airline Management System with effective database design.
4. "Pro JavaFX 8: A Definitive Guide to Building Desktop, Mobile, and Embedded Java Clients" by James Weaver, Weiqi Gao, and others. This book dives into JavaFX, which can be useful if you're considering more advanced UI techniques for your Airline Management System. While focused on JavaFX, the techniques can be adapted for Swing-based systems as well.
5. "Developing Java Software: A Practical Guide to Writing Programs" by Russell Winder. This book offers practical examples on how to build robust Java applications. It's useful for building both the back-end and front-end for an Airline Management System.
6. "Java Projects: A Hands-On Introduction for Beginners" by John Purcell. Though more focused on beginner projects, this book provides practical examples, and its concepts can be applied to building systems like an Airline Management System.