Miles Acquisition System

FINAL YEAR PROJECT

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Abstract

Miles Acquisition System (MAS) is a web-based application developed for airline companies to streamline flight data management and miles accumulation processes. The system enables users to submit flight details, track earned miles, and redeem rewards, while staff and administrators verify submissions and manage requests. The MAS platform integrates Firebase for secure authentication and real-time updates, and Angular for a dynamic and responsive UI. This paper analyzes the core functionalities of MAS, including its modules for authentication, user and flight management, and reward redemption. A comparative study of MAS with existing systems reveals its strengths in role-based access, real-time processing, and scalability for airline loyalty programs.

Keywords — Miles Management, Firebase Authentication, Angular, Flight Verification, Reward Redemption, Airline Loyalty System.

I. Introduction

Efficient management of customer loyalty programs is critical for modern airline companies. Traditional systems often involve manual processes or legacy platforms that struggle with scalability, real-time updates, and secure authentication. This results in delays, inaccuracies, and reduced user satisfaction.

To address these challenges, the proposed solution — Miles Acquisition System (MAS) — is a centralized web-based application built with modern frameworks and technologies such as Angular and Firebase. MAS allows airline users to earn and redeem miles through flight submissions, while staff and administrators manage approvals and rewards efficiently. The system is modular, role-based, and designed to ensure secure, responsive, and scalable management of flight-related data and user interactions.

II. Literature Review

Existing Project 1: Flight Miles Management System by T. Rao and K. Sharma

- **Features**:
    - Provided a basic web platform for flight miles submission.
    - Allowed manual approval of miles by staff.
    - Maintained user records in a relational database.
- **Strengths**:
  ○ Simple data entry and tracking of miles.
  ○ Centralized user database for easy management.
- **Limitations**:
  ○ No real-time updates for user actions.
  ○ No role-based dashboards or advanced UI.
  ○ Lacked reward redemption workflows.

Existing Project 2: Airline Loyalty Tracker by P. Nair and J. Varma

- **Features**:
    - Allowed users to track flight history and earned points.
    - Admin portal for viewing high-value users.
- **Strengths**:
  ○ Highlighted user trends and engagement through reports.
  ○ Emphasized customer loyalty through consistent tracking.
- **Limitations**:
  ○ No verification workflow for submitted flights.
  ○ No integration with reward systems.
  ○ Lacked role-specific dashboards and authorization.

Existing Project 3: Frequent Flyer Rewards App by R. Desai and V. Mehta

- **Features**:
    - Mobile-based system for miles redemption and offers.
    - Used push notifications to alert users about new rewards.
- **Strengths**:
  ○ Enhanced user engagement through notifications.
  ○ Provided seamless mobile access.
- **Limitations**:
  ○ Lacked flight verification by staff.
  ○ Limited admin functionalities for user and flight control.
  ○ Did not support scalable backend authentication or session management.

III. Proposed Methodology

The proposed MAS builds upon the strengths of existing systems while resolving their limitations. The methodology is divided into the following components:

1. **Real-Time Data Synchronization**:
   Firebase ensures that all users and staff receive instant updates on flight submissions, miles earned, and redemption approvals.
2. **Role-Based Dashboards**:
   Separate interfaces for users, staff, and administrators improve functionality and reduce clutter, with specific actions and data views for each role.
3. **Modules and Components**:
    - **Authentication Module**:
      ○ Uses Firebase Authentication for login, logout, and session control.
      ○ AuthGuard ensures route protection for authorized users only.
    - **User Management Module**:
      ○ Admins can view and manage user details, roles, and miles balance.

- **Flight Management Module**:
  ○ Users submit flight details to earn miles.
  ○ Staff verify and approve or reject these submissions.
- **Miles and Redemption Module**:
  ○ Tracks miles earned or redeemed.
  ○ Admins manage and approve reward requests.
- **Dashboards**:
  ○ AdminDashboardComponent and StaffDashboardComponent provide a clean UI to manage flights, users, and rewards.

4. **Technology Stack**:
   - *Frontend*: Angular, Bootstrap (for responsive UI).
   - *Backend*: Firebase Authentication, (optional) Node.js/Express.
   - *Database*: Firebase Firestore / MySQL for flight and user data.

IV. Comparison of Proposed and Existing Systems

Feature	**Flight Miles Mgmt System**	**Airline Loyalty Tracker**	**Frequent Flyer Rewards App**	**Proposed MAS**
Real-Time Notifications	No	No	Yes	**Yes**
Role-Based Access	No	No	No	**Yes**
Flight Submission Verification	Manual	No	No	**Yes (Auto/Staff)**
Reward Redemption Workflow	No	Yes	Yes	**Yes (Streamlined)**
Firebase Authentication	No	No	No	**Yes**
Cloud-Based Infrastructure	No	No	Yes	**No**
Technology Stack Modernization	Low	Moderate	Moderate	**High**
Ease of Use	Moderate	Moderate	Moderate	**High**

V. Results and Conclusion

The proposed **Miles Acquisition System (MAS)** is a centralized digital platform designed to simplify and optimize the airline miles management lifecycle. Current systems lack integration, often requiring manual processes for flight verification, limited user access control, and no real-time user engagement. MAS addresses these issues through a feature-rich, scalable solution using modern technologies.

- **Firebase Authentication** provides secure and role-based access to users, staff, and administrators.
- **Angular-powered interface** ensures responsiveness and user-friendly experience on both desktop and mobile platforms.
- **Automated flight submission** and **staff verification workflows** remove manual errors and delays.
- **Real-time notifications** and **redemption tracking** keep users informed of status updates and rewards eligibility.

By offering secure authentication, streamlined operations, and enhanced user engagement, MAS bridges the existing technological gaps in loyalty miles management. It delivers a practical, mobile-accessible, and scalable solution tailored to the needs of modern airline customer service systems.

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