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Airline Management System using Salesforce Customer Relationship Management

Mr. Prathamesh Killol, Prof. Shreya Gangane, Mr. Atharva Ghadekar,
Mr. Shweta Bhalchakra
Department of Computer Science & Engineering , PRMCEAM , Badnera, Maharashtra, 444701,India

Abstract : The airline industry requires efficient operational management, real-time decision making, and reliable customer service to handle increasing passenger demands and complex flight operations. Traditional airline management systems often rely on fragmented applications and manual processes, which lead to scheduling conflicts, data duplication, delayed communication, and limited operational visibility. To address these challenges, this paper proposes a cloud-based Airline Management System implemented on the Salesforce platform.

The proposed system integrates key airline operational modules including flight scheduling, passenger management, booking and payment processing, aircraft management, and staff allocation within a unified cloud environment. Custom objects and relational data models are designed using Salesforce Schema Builder to ensure structured and consistent data management. Business process automation is implemented using Salesforce Flow Builder to enable real-time notifications, booking confirmations, and operational alerts. Additionally, Apex Triggers are employed to enforce complex business rules such as automated seat allocation, payment validation, and prevention of overbooking.

The system also incorporates role-based security mechanisms, responsive user interfaces using Lightning Web Components, and real-time dashboards for monitoring operational performance and booking analytics. By leveraging Salesforce's scalable cloud architecture, the proposed solution improves data integrity, operational efficiency, and communication across airline operations. The implementation demonstrates how a CRM-driven cloud platform can effectively modernize airline management systems and support data-driven decision-making in the aviation industry

INDEX TERMS - Airline Management System, Salesforce Platform, Cloud Computing, Customer Relationship Management (CRM), Business Process Automation, Apex Triggers, Flow Builder, Data Analytics, Airline Reservation System

I. INTRODUCTION

The aviation industry is a highly dynamic sector that requires efficient operational management, real-time decision-making, and seamless coordination between multiple stakeholders. Airlines must manage several interconnected processes such as flight scheduling, passenger reservations, aircraft management, crew allocation, and payment processing. Traditional airline management approaches often rely on fragmented systems and manual procedures, which can lead to operational inefficiencies, scheduling conflicts, and delays in communication.

With the rapid growth of digital technologies and increasing passenger demand, airlines require intelligent and integrated systems that can improve operational efficiency and customer experience. Recent advancements in cloud computing, artificial intelligence, and microservices architectures have significantly transformed airline reservation and operational management systems. AI-driven reservation platforms enable dynamic pricing, demand forecasting, and personalized customer services, while microservices architectures enhance system scalability and flexibility in cloud environments.

Similarly, modern airline reservation applications developed using web technologies and integrated architectures have demonstrated the ability to streamline airline operations and enhance customer interaction through user-friendly interfaces and real-time information access. Furthermore, emerging airline operational control systems utilize service-oriented architectures and advanced data processing techniques to optimize resource allocation and reduce operational risks.

Customer Relationship Management (CRM) platforms also play a significant role in improving operational efficiency and customer engagement in modern enterprises. Studies have shown that digital communication platforms and

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social technologies can strengthen supplier and customer relationship management, thereby improving organizational performance and operational coordination. Additionally, cloud-based CRM platforms supported by distributed architectures provide scalable and secure infrastructure for handling large volumes of operational data while ensuring high availability and improved performance. The integration of artificial intelligence within CRM ecosystems further enhances workflow automation, predictive analytics, and data-driven decision making in enterprise environments.

Among the available CRM platforms, Salesforce has emerged as one of the most powerful cloud-based enterprise platforms for application development, automation, and business process management. Salesforce enables organizations to design customized applications, manage complex data relationships, automate workflows, and integrate analytical dashboards within a unified cloud ecosystem. Previous studies have also demonstrated how cloud computing and optimized service scheduling mechanisms can enhance CRM system performance and resource utilization in distributed environments.

Motivated by these advancements, this paper proposes a cloud-based Airline Management System implemented on the Salesforce platform. The proposed system integrates multiple airline operational modules including flight management, passenger records, booking and payment processing, aircraft management, and staff allocation within a unified data architecture. Salesforce automation tools such as Flow Builder are used to automate operational workflows and real-time notifications, while Apex Triggers are implemented to enforce complex business rules such as automated seat allocation and overbooking prevention. In addition, real-time dashboards and analytical reports provide operational insights that support efficient decision- making.

The primary objective of the proposed system is to enhance operational efficiency, ensure data consistency, and provide real-time visibility across airline operations using a scalable cloud-based architecture.

I. LITERATURE REVIEW

Recent research in airline management and enterprise systems has focused on improving operational efficiency, customer relationship management, and cloud-based system integration. Various studies have explored the role of emerging technologies such as cloud computing, artificial intelligence, microservices architecture, and CRM platforms in transforming airline operations and enterprise management systems.

Cho et al. [1] investigated the influence of social media technologies on supplier and customer relationship management within industrial organizations in the United States. The study applied social network theory and structural equation modeling to analyze the impact of digital communication platforms on supply chain relationships. The results demonstrated that social media technologies significantly improve operational efficiency and knowledge sharing between organizations, leading to stronger supplier and customer relationships. The findings highlight the importance of digital communication technologies in improving enterprise-level collaboration and operational performance.

Research presented in [2] examined the role of Artificial Intelligence (AI), microservices architecture, and cloud computing in the evolution of airline reservation systems. The study highlights how AI techniques such as machine learning and deep learning support dynamic pricing, demand forecasting, and personalized passenger services. Additionally, microservices architecture enhances system scalability and flexibility in cloud-based airline platforms. However, the research also identifies several challenges including data privacy, security concerns, interoperability, and system scalability that must be addressed for efficient implementation.

The work presented in [3] introduced a modern web- based airline reservation application developed using technologies such as Java, Angular, Spring Boot, and REST APIs. The proposed system focuses on improving passenger experience by providing real- time flight information, simplified booking procedures, and flexible system architecture. The integration of modern web technologies enables airlines to improve operational efficiency and customer interaction while adapting to rapidly changing market demands.

Another study in [4] proposed an airline operational control system architecture based on risk preprocessing techniques. The research emphasizes the importance of integrating emerging technologies such as service-oriented architecture, data science, and information security mechanisms to enhance airline operational control. The proposed architecture improves flight operation risk management and optimizes resource allocation across airline operations.

The study presented in [5] focused on optimizing Customer Relationship Management (CRM) platforms using distributed cloud architectures. The research demonstrates how decentralized cloud frameworks can improve system scalability, security, and performance. By implementing distributed cloud technologies and robust encryption mechanisms, CRM platforms can efficiently manage large

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volumes of operational data while ensuring compliance with data protection standards.

Research conducted in [6] analyzed the integration of Artificial Intelligence within Salesforce ecosystems to enhance enterprise decision-making and workflow automation. The study highlights how predictive analytics, natural language processing, and machine learning techniques can improve CRM intelligence and business automation. The findings suggest that AI-driven Salesforce platforms can significantly enhance customer engagement, operational efficiency, and enterprise-level data management.

Finally, the research presented in [7] proposed an optimal service scheduling model for improving CRM performance in cloud computing environments. The study introduced scheduling algorithms such as Adaptive Service Level Scheduling Algorithm (ASLSA) and Support Level Load Balancer (SLLB) to optimize resource allocation and workload management. The proposed approach improves Quality of Service (QoS) and enhances resource utilization in cloud-based CRM platforms. Although previous studies have explored airline reservation systems, CRM optimization, and cloud- based enterprise platforms, limited research has focused on integrating airline operational management with CRM-based cloud platforms such as Salesforce. Therefore, this study proposes a Salesforce-based Airline Management System that integrates automation, centralized data management, and real-time operational analytics to improve efficiency and decision-making in airline operations.

II. METHODOLOGY

This research proposes a cloud-based Airline Management System implemented using the Salesforce platform to automate airline operations and improve operational efficiency. The system is designed to provide centralized data management, automated workflows, and real-time operational insights across airline management processes. Salesforce is utilized as a scalable cloud platform that supports application development, workflow automation, security management, and analytical reporting.

The proposed system integrates multiple airline operational modules including flight management, passenger management, booking processing, payment handling, aircraft management, and staff allocation. These modules are connected through a structured data model and automated processes that ensure efficient coordination among different airline operations.

A. System Architecture

The architecture of the proposed Airline Management System is built using Salesforce cloud infrastructure. Salesforce provides a unified environment that integrates data storage, business logic implementation, automation tools, and user interface components. The system architecture consists of four main layers: data layer, application logic layer, automation layer, and presentation layer.

The data layer manages all airline operational data using Salesforce custom objects. The application logic layer implements business rules using Apex triggers and validation mechanisms. The automation layer uses Salesforce Flow Builder to automate operational processes such as booking confirmations and flight notifications. The presentation layer provides user-friendly interfaces through Lightning Web Components and dashboards for monitoring airline operations.

This layered architecture ensures system scalability, data integrity, and efficient operational management within the airline ecosystem.

B. Data Model Design using Schema Builder

The proposed system utilizes Salesforce Schema Builder to design and visualize the relational data model of the airline management system. The data model consists of six primary custom objects: Flight, Passenger, Booking, Payment, Aircraft, and Staff.

These objects are interconnected through defined relationships to ensure structured data flow within the system. For instance, the Passenger object maintains a one-to-many relationship with the Booking object, allowing a passenger to create multiple bookings. Similarly, the Booking object is connected to the Payment object through a one-to-one relationship to ensure that each booking has a corresponding payment record. The Flight object is associated with Aircraft and Staff objects to manage aircraft assignments and crew allocation for specific flights. This relational schema enables integrated data management and provides a clear representation of the relationships between operational entities within the airline management system.

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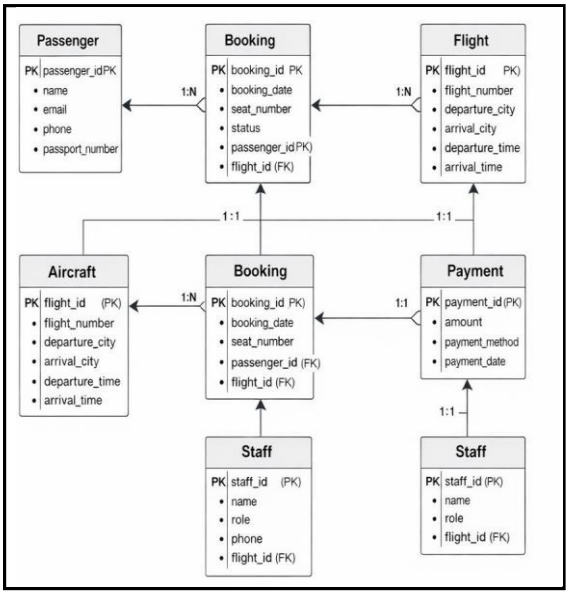

Fig 1 : Data Model Design using Schema Builder

C. Workflow Automation using Salesforce Flow Builder

To reduce manual intervention and improve operational efficiency, the system utilizes Salesforce Flow Builder for automating airline management processes. Record-triggered flows are implemented on critical objects such as Flight and Booking to enable automated responses to operational events.

When flight details are updated, the system automatically triggers notifications to passengers and airline staff through integrated email services. Similarly, booking confirmation workflows are executed automatically when a new booking record is created. These automated flows ensure real-time communication between the airline system and its users while reducing operational delays.

The implementation of automated workflows improves process efficiency and ensures consistent information delivery across different airline operational processes.

D. Business Logic Implementation using Apex Triggers

While Flow Builder handles process automation, complex business logic and validation mechanisms are implemented using Apex Triggers. Apex provides a powerful programming framework within Salesforce for executing custom logic during database operations.

In the proposed system, Apex triggers are used to implement several critical airline operational rules. Automated seat allocation is performed during the booking process by identifying available seats within a flight. The system also implements overbooking prevention mechanisms by validating booking records against the seating capacity of the assigned aircraft. Additionally, payment validation triggers ensure that booking status is updated only after successful payment confirmation.

These validation mechanisms ensure data consistency, enforce operational rules, and maintain system-wide data integrity across the airline management platform.

FLOW CHART

Fig. 1 shows the Flow Chart of the System

III. DISCUSSION

The proposed airline management system demonstrates the effectiveness of using Salesforce Schema Builder for designing and managing structured relational data models. By integrating key operational entities such as Passenger, Flight, Booking, Payment, Aircraft, and Staff, the system ensures smooth data flow and centralized information management. The relationships between these entities support efficient handling of booking records, passenger information, and payment transactions. This structured approach improves system transparency and reduces data redundancy across different operational modules. Furthermore, the visual representation of the schema helps developers and administrators better understand system interactions. Overall, the model provides a scalable foundation for managing airline operations in a digital environment.

A. Implications for Practice and Research The implementation of the proposed data model highlights

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the practical benefits of using Salesforce- based schema design for enterprise applications. In real-world airline management systems, structured data relationships enable efficient tracking of passenger bookings, flight schedules, and payment records. The use of Schema Builder simplifies database visualization and enhances system maintainability. From a research perspective, the model demonstrates how cloud-based platforms can support complex operational workflows. It also opens opportunities for further studies on integrating CRM platforms with transportation management systems. Such approaches can contribute to improving service efficiency and data-driven decision making in the aviation sector.

B. Limitations and Future Research Direction

Despite its advantages, the proposed model has certain limitations. The current system focuses primarily on core operational entities and does not incorporate advanced features such as predictive analytics or real-time flight monitoring. Additionally, the model assumes a simplified airline structure and may require modifications for large-scale airline networks. Security considerations and passenger data privacy mechanisms also require deeper implementation in real-world applications. Future research can extend this work by integrating artificial intelligence for demand forecasting and automated flight scheduling. Further improvements may also include real-time data integration, advanced reporting dashboards, and scalable cloud-based deployment strategies.

VI. CONCLUSION

The proposed airline management system presents a structured approach for organizing operational data using Salesforce Schema Builder. By modeling key entities such as Passenger, Flight, Booking, Payment, Aircraft, and Staff, the system ensures efficient data organization and seamless interaction between different operational components. The relational data model helps maintain data integrity while simplifying the management of airline operations. Additionally, the visual schema design improves system understanding and supports easier development and maintenance. The proposed model demonstrates how cloud-based platforms can effectively support airline data management. Overall, the system provides a scalable and efficient foundation for managing airline services and operational workflows.

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