CHANDIGARH ENGINEERING COLLEGE

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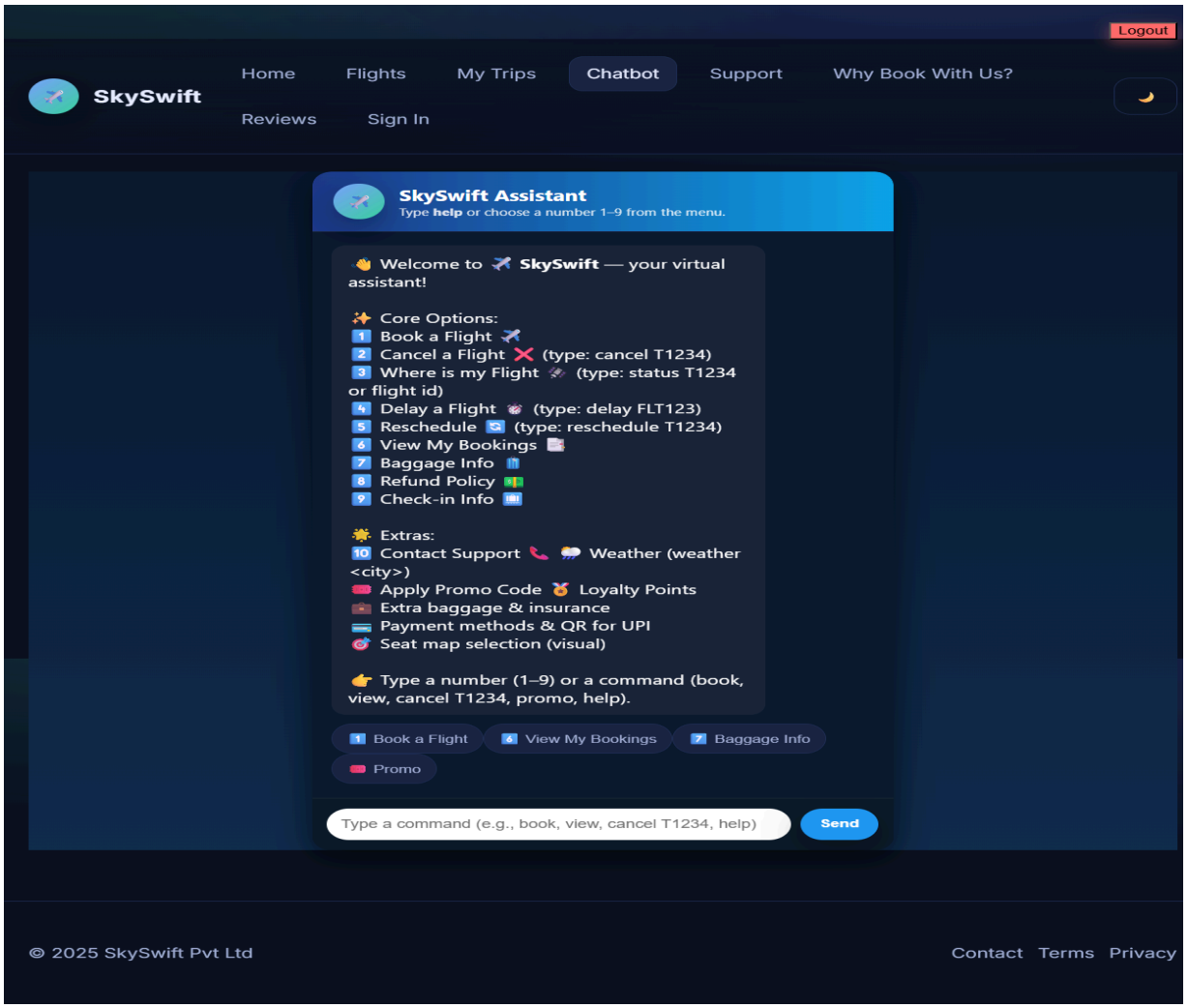
Jhanjeri, Mohali

Project Report: SkySwift Smart Flight Booking System

BACHELOR OF TECHNOLOGY in Computer Science and Engineering

Submitted By:

Name	Roll No.
PRACHI GARG	2420800
SANCHI KATYAL	2420831
RAGHAV DADWAL	2420810
SAHIL AHMAD	2420826



1. Project Overview

SkySwift is a smart flight booking system designed to provide a "modern approach to seamless travel planning". The project's primary goal is to address the challenges of traditional booking systems, which are often "cluttered," "confusing," and "slow".

The proposed solution, SkySwift, simplifies the entire booking process through a "modern UI design," "intelligent automation," and "user-centric features". It aims to create a "frictionless experience" for the user, from the initial search to the final confirmation.

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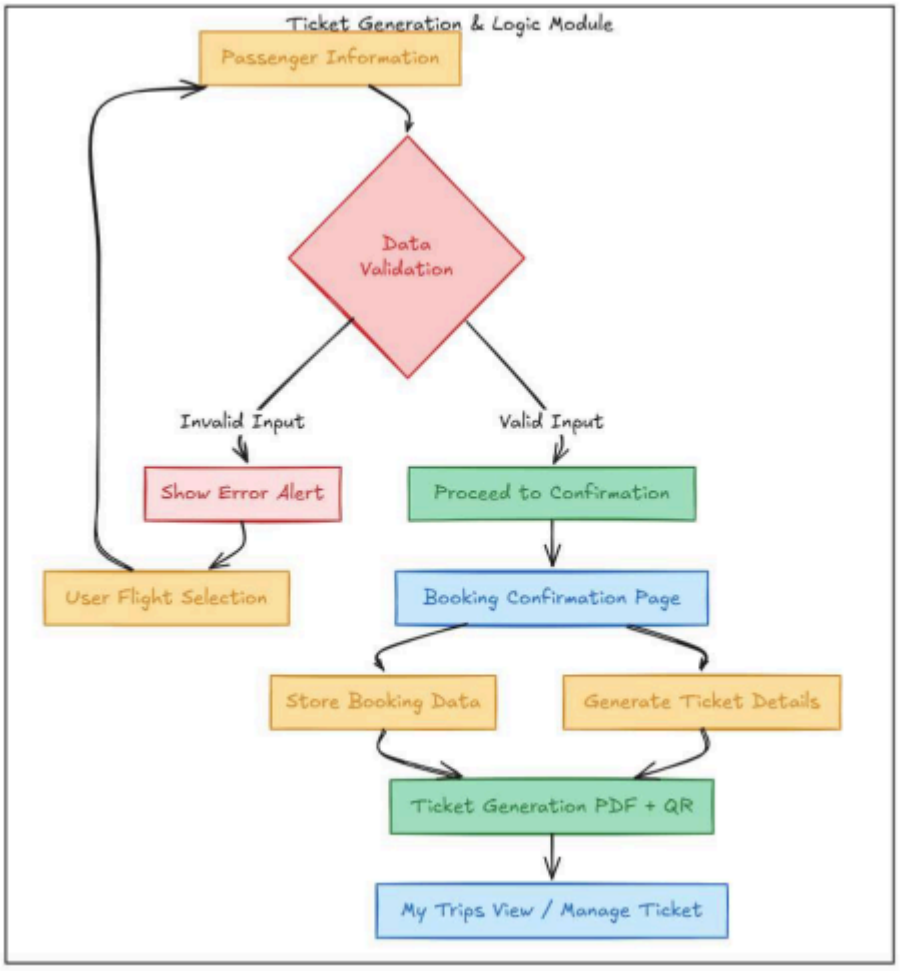
2. Core Features

The system includes a comprehensive set of features to manage the booking process:

- **Smart Search & Filters:** Allows users to filter flights by price, airline, duration, and stops with real-time results.
- **Interactive Seat Selection:** Provides visual seat maps showing live availability and offering "preference-based recommendations".
- **Secure Payment Flow:** Includes a "simulated payment gateway" that supports multiple payment methods and provides transaction confirmation.
- **AI Chatbot Support:** Features a "24/7 SkySwift Assistant" to help with bookings, answer FAQs, and offer real-time guidance.
- **Ticket Generation:** Automatically generates a PDF ticket with a scannable QR code and a PNR number upon successful booking.
- **Authentication & Trip Management:** A secure login system that allows users to manage their profiles and view their booked trips.
- **Theme Customization:** A one-click toggle for light and dark modes to enhance user comfort and readability.

- 

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3. Technology Stack

The project was built without relying on heavy frameworks, prioritizing performance and simplicity.

- **Frontend Foundation: HTML5, CSS3, and Vanilla JavaScript**.
- **Data Management:** The system uses the browser's **LocalStorage** to "simulate database operations" and "maintain user sessions," operating without a backend infrastructure.

- **Specialized Libraries:**
  - **jsPDF:** Used for "professional ticket generation".
  - **QRious:** Integrated to create "scannable QR codes" for mobile boarding passes.

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4. System Architecture and Design

System Flow

The user booking journey follows a clear, modular flow:

1. **User Login:** Authentication and session start.
2. **Search & Filter:** User finds relevant flights.
3. **Select Flight:** User chooses an itinerary.
4. **Enter Details:** User provides passenger information and selects seats.
5. **Payment:** User completes the secure checkout simulation.
6. **Confirmation:** The system generates a ticket and adds the booking to "My Trips".

UI/UX Design Philosophy

The design prioritizes "clarity, speed, and user confidence". Key principles include:

- A **dark theme** with gradient highlights to reduce eye strain and create a "premium feel".
- **Rounded card layouts** to establish a clear visual hierarchy.
- A **responsive grid system** that adapts from mobile to desktop.
- **Micro-interactions** like hover effects to enhance user engagement.

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5. Key Technical Challenges and Solutions

The project successfully navigated several challenges associated with its backend-less architecture:

- **Challenge: State Management Without Backend**
  - **Solution:** Implemented a "sophisticated LocalStorage architecture" using JSON serialization and state synchronization to manage data persistence effectively.
- **Challenge: Dynamic Seat Allocation**
  - **Solution:** Created an "intelligent seat management algorithm" that tracks availability in real-time and uses "optimistic locking patterns" to prevent booking conflicts.
- **Challenge: PDF & QR Code Integration**
  - **Solution:** Integrated the **jsPDF** and **QRious** libraries with custom templates to ensure professional formatting and cross-device compatibility for tickets.

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6. Future Roadmap

The presentation outlines a clear three-phase plan to scale the project from a simulation to a production-ready application:

- **Phase 1: Backend Integration:** Connect the system to "live flight APIs" and build a scalable database.
- **Phase 2: Payment Gateway:** Integrate real payment processors like **Stripe or PayPal** for secure, multi-currency transactions.

- **Phase 3: Enhanced Features:** Add push notifications, live flight tracking, a loyalty rewards program, and multi-city booking options.

7. Conclusion

The SkySwift project demonstrates that a "professional-grade booking system" can be delivered through "thoughtful design, modular architecture, and creative problem-solving," even without a complex backend infrastructure. It successfully prioritizes user experience, speed, and clarity.

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