

Flight Scheduling Platform

Introduction:

Flight scheduling in aviation is a sophisticated and essential process that underpins the entire air travel industry. By meticulously planning and organizing every aspect of a flight, from departure to arrival, and ensuring the seamless integration of various components, flight scheduling ensures the efficient, safe, and reliable operation of flights. The automation of distance calculations between airport locations, the assignment of specialized crew members, and the detailed management of passenger and baggage information are critical to this process. Furthermore, linking trips to invoices and quotes provides financial transparency and accuracy.

Our client in the aviation industry sought to streamline their flight scheduling process to improve efficiency and responsiveness. They needed a solution to effectively manage recurring trips and adjust flight schedules dynamically, accommodating cancellations or rescheduling needs. By categorizing trips by status, they aimed for real-time monitoring and effective management to ensure each flight schedule was handled according to plan. This initiative was crucial to meet passenger demands, adhere to safety regulations, and optimize operational efficiency.

Client Details:

Name: Confidential | **Location:** Canada | **Industry:** Aviation

Technologies:

AWS, PHP, Laravel, MySQL, jQuery, HTML, CSS, JavaScript, Node, GraphQL, S3

Flight Scheduling Platform

Project Description:

Our team developed a platform that primarily targets flight scheduling in aviation, a critical and intricate process ensuring efficient, safe, and reliable air travel. It involves a comprehensive range of tasks and considerations that need to be meticulously planned to coordinate flights from departure to destination.

Detailed breakdown of the key elements involved:

1. Flight Scheduling

Flight scheduling is the process of planning the departure and arrival times of flights to optimize airline operations, maximize efficiency, and meet regulatory requirements. This includes:

- **Route Planning:** Determining the routes that flights will take, considering factors like air traffic, weather, and distance.
- **Slot Management:** Securing takeoff and landing slots at airports, which are often limited and highly regulated.
- **Frequency Planning:** Deciding how often flights will operate on each route, based on demand and operational capacity.
- The process begins with scheduling trips between departure and destination airports, with some trips involving an overnight stay/ Remain Over Night (RON) at a specific location before continuing. This is often necessary for long-haul flights or when crew rest requirements must be met.

2. Flight Legs

A flight leg is a segment of a journey between two airports. A complete flight can consist of one or multiple legs. Each leg is planned with precise details, including:

- **Departure and Arrival Airports:** Designated ICAO and IATA codes.
- **Flight Duration:** Estimated time from takeoff to landing.
- **Scheduled Departure and Arrival Times:** Timings adjusted for time zones and daylight saving changes.
- **Turnaround Time:** Time required to service the aircraft between flight legs, including refueling, boarding, and cleaning.

Flight Scheduling Platform

3. Trip Types and Crew Assignment:

Different types of trips, such as domestic, international, cargo, or charter flights, are identified and planned accordingly. Specialized crew members, including pilots and flight attendants, are assigned based on the specific needs of each flight, ensuring compliance with regulatory standards and operational requirements.

- Duty Time Limits: Maximum allowable working hours to ensure safety.
- Rest Periods: Mandatory rest times between duties.
- Qualifications: Matching crew qualifications and ratings to aircraft types.
- Seniority and Preferences: Considering crew preferences and seniority in assignments.

4. Passenger and Baggage Details:

Managing passenger information includes:

- Detailed information about passengers, including their names, contact details, and the number of passengers, is recorded.
- Additionally, baggage details such as quantity and weight are noted to ensure proper aircraft weight and balance management.

5. Auto Calculating Distance and Time:

The distance between two points is calculated automatically using the geographical coordinates (longitude and latitude) of airport locations. This precise measurement is crucial for planning flight times, fuel requirements, and overall cost estimation.

6. Mapping Trips to Invoices and Quotes:

Each scheduled trip is linked to corresponding invoices and quotes, facilitating accurate billing and financial transparency for passengers and clients.

7. Recurring Trips:

For regular routes and frequent travel demands, trips can be scheduled on a recurring basis, such as daily, weekly, or monthly. This feature simplifies the management of consistent flight schedules and passenger expectations.

8. Flight Schedule Management:

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The flight schedule can be dynamically managed, allowing for the cancellation or rescheduling of trips as necessary. This flexibility is vital for adapting to unexpected changes such as weather conditions, technical issues, or shifts in passenger demand.

9. Trip Status Categorization:

Trips are categorized by their status, such as scheduled, in-progress, completed, or canceled. This categorization enables real-time monitoring and efficient management of flight operations.

Regulatory and Safety Considerations

In order to ascertain the protection of passengers, crew, and aircraft, a Safety Management System (SMS) is needed to uphold and maintain high levels of safety standards. Implementing SMS requires unwavering commitment from all levels of the organization. This comprehensive approach involves systematic processes to identify, assess, and mitigate safety risks, fostering a proactive and a safety-conscious culture.

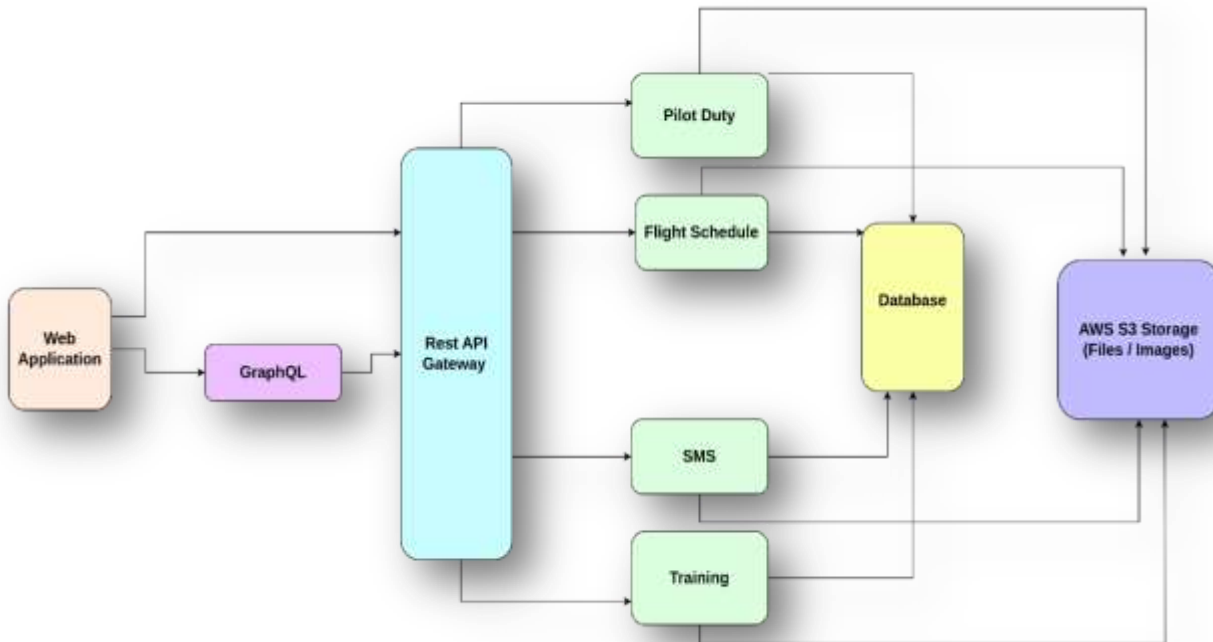


Methodology followed:

- The web platform is developed with Laravel blade, and the backend is powered by Laravel framework with Rest APIs. The database used is MySQL.
- AWS EC2 is used as a cloud platform for code deployment.
- Docker is used for container management.

Flight Scheduling Platform

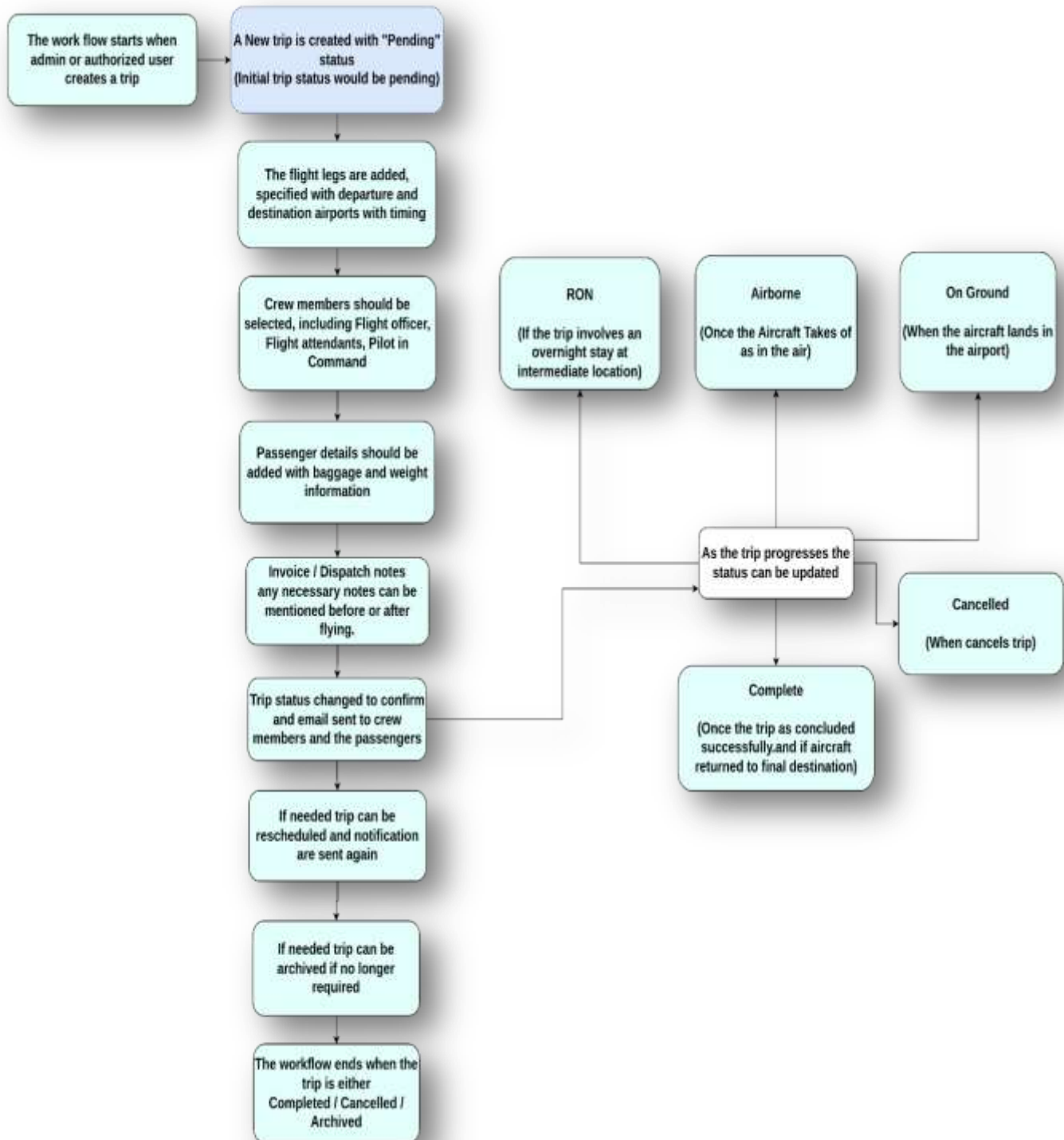
Architecture Diagram:



Workflow:

- Safety Management Systems (SMS): Implementing SMS to proactively identify and mitigate risks in flight operations.
- Initial Planning: Determining flight routes, frequencies, and aircraft types based on market demand analysis.
- Slot Coordination: Applying for and securing airport slots for the planned schedules.
- Crew Assignment: Assigning qualified crews to flights, ensuring compliance with duty regulations.
- Passenger Bookings: Managing reservations, special requests, and check-ins.
- Day-of-Operations Adjustments: Monitoring real-time data to make necessary adjustments for delays, cancellations, or rerouting.

Flight Scheduling Platform



Flight Scheduling Platform

Screenshots:




This screenshot displays a table with flight details. The table has several columns, including flight ID, status, origin, destination, departure time, arrival time, and other operational metrics. The data is presented in a structured grid format with alternating row colors for readability.

Flight ID	Status	Origin	Destination	Departure Time	Arrival Time	Other Metrics
101	On Time	London	New York	10:00	14:00	...
102	Delayed	London	New York	10:00	14:00	...
103	On Time	London	New York	10:00	14:00	...

Flight Scheduling Platform



The screenshot displays a web application interface for a flight scheduling platform. At the top, there is a navigation bar with several menu items. Below the navigation bar, there are two tabs: 'Flights' (active) and 'Reservations'. The main content area features a table with the following columns: 'Flight ID', 'Origin', 'Destination', 'Airline', 'Class', 'Status', 'Price', 'Seats', and 'Actions'. The table contains four rows of flight data. Each row has a green plus icon in the 'Flight ID' column and a red minus icon in the 'Status' column. The 'Price' column contains numerical values, and the 'Seats' column contains values like '10' and '5'. The 'Actions' column contains two green checkmark icons. At the bottom right of the table, there are summary statistics: 'Total: 100', 'Available: 100', and 'Booked: 0'.

Flight ID	Origin	Destination	Airline	Class	Status	Price	Seats	Actions
+	Delhi	Chennai	Indigo	Economy	-	₹ 1200	10	✓ ✓
+	Delhi	Chennai	Indigo	Economy	-	₹ 1200	10	✓ ✓
+	Delhi	Chennai	Indigo	Economy	-	₹ 1200	10	✓ ✓
+	Delhi	Chennai	Indigo	Economy	-	₹ 1200	10	✓ ✓