AIRBUS AEROTHON 6.0
2024

AFNS

Advanced Flight Navigation System

PROTOTYPE SUBMISSION

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GROUP MEMBERS

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PROJECT THEME

Enhancing Flight Navigation Mechanism for Optimal Route Planning and Risk Mitigation

PROBLEM STATEMENT

In the domain of air travel, our goal is to efficiently connect any two airports while minimizing travel time. We have worked on a solution that generates all possible flight paths between two airports and recommends the fastest route. Airlines can customize routes by including or excluding specific airports. Our web application presents clear flight metrics data, weather updates, and visual travel paths to help make informed decisions.

SOLUTION

Flight Path Generation

- Gathered real-life data from Kaggle and used available APIs
- Detected all the possible flight routes available that connects two places
- Path with the lowest travel time is named as the optimal path
- Travel time is calculated based on the distance between the two places and the number of stopovers there are in the route.

Addressing the Problem

- Dataset was not readily available, so we merged two datasets and did data preprocessing
- Optimal route not only provides us with the shortest travel time, but also does real-time risk mitigation
- There is a feature of including and excluding certain airports is there is any harsh weather or any political threat of air space closing and becoming a no fly zone
- These impact metric helps the airline to take guided decision on the choice of flight path, and makes our solution effective and robust.

SOLUTION Continued

Technology Used

We have used SQLite, Python, Flask, Angluar
Algorithm used: Depth First Search

Assumptions & Reasoning

We have assumed the average cruising speed of commercial passenger aircraft to be 900 Km/hr (485.961 Knots), and the average time per stop-over is considered to be 2hr to calculate the total time for a particular route. We have chosen these numbers based on available data.

Implementation & Scalability

Our solution is simple to emplement and can be scaled to incorporate large databases. The solution provide the airline with all possible routes while taking constraints into consideration if any, and also suggests the optimal path based on total travel time, total distance, number of stopovers, weather and flight metrics

METHODOLOGY

DATASET & MODEL

- Merged two data sets based on Airport ID
- Cleaned up Missing Data
- Generated distance between source and destination using latitute and Longititude
- Assumed a cruising speed and stop-over time to find total travel time
- Used DFS Algo to generate path
- Least travel time gave optimal path

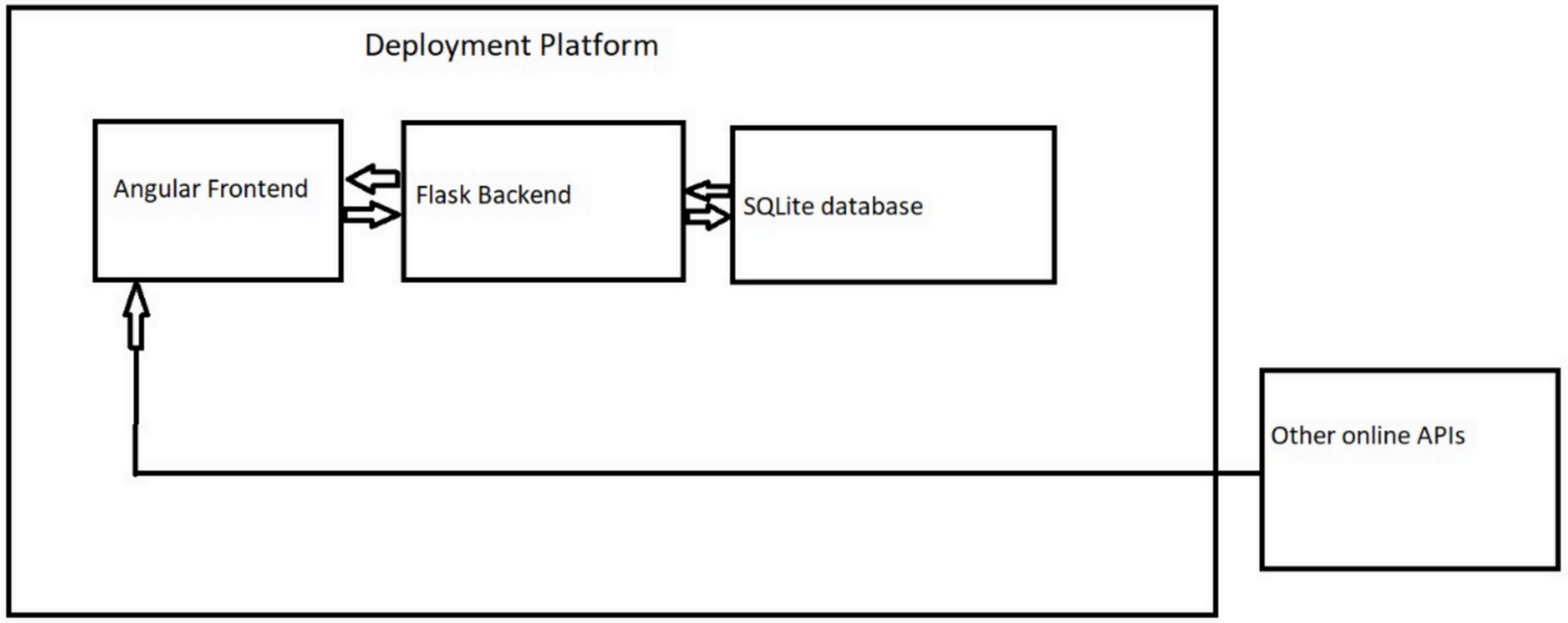
FRONTEND

- Used D3.js to generate dynamic graph to represent the route sected
- Used Angular for the frontend development
- Used three.js for the login screen globe.

BACKEND

- Generated APIs
- Developed the backend using flask.
- Used readily available APIs for some features.

ARCHIETECTURE DIAGRAM

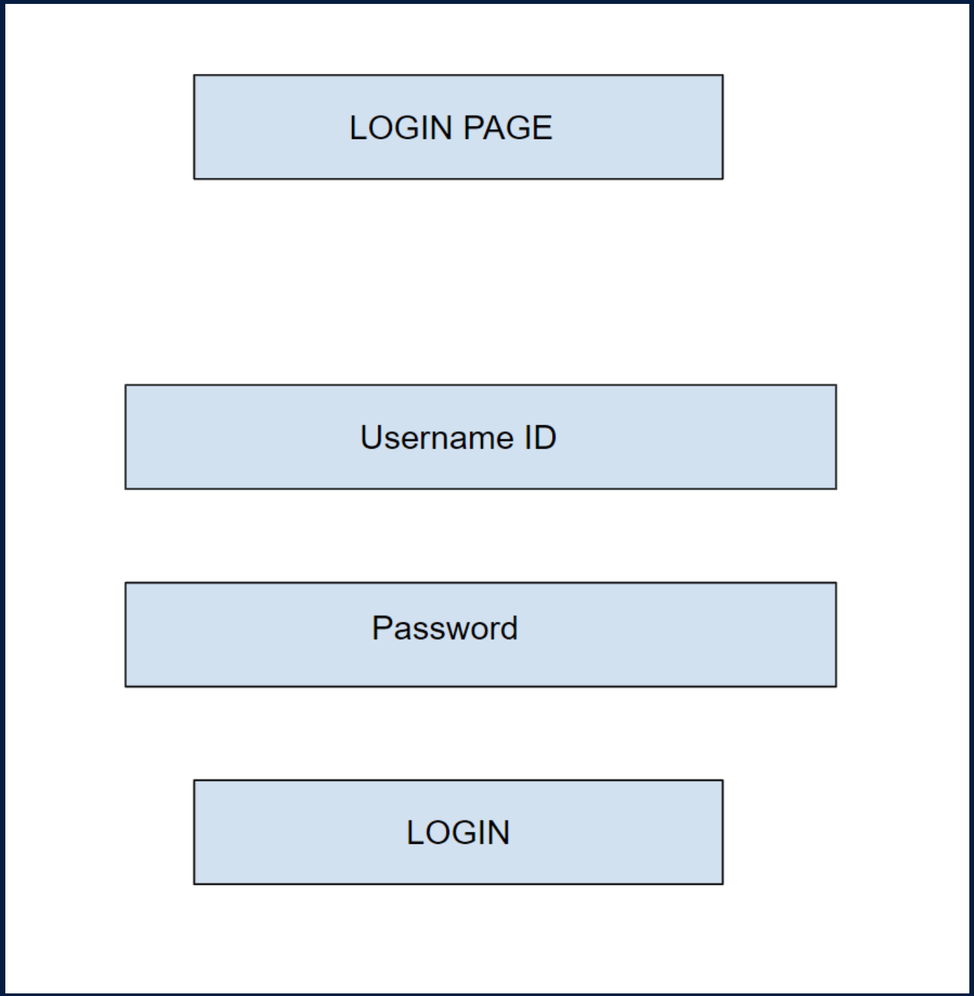


PROJECT DEMONSTRATION

Demo Video Link:
https://drive.google.com/file/d/1XqgG9vgzTIjQ3iFuO6r1ONZchzFhbC_J/view?usp=sharing

Links to Github:
https://github.com/varunk19/Frontend
https://github.com/varunk19/Backend

LOGIN PAGE WIREFRAME



DASHBOARD PAGE WIREFRAME

CREATE FLIGHT PLAN

Source:
Destination:
Included Stop:
Excluded Stop:

FETCH ROUTES

Optimal Route:

A - B - C	5 Hr

All Possible Routes List:

A - B - C	5 Hr
A - D - C	7 Hr
A - G - H - C	10 Hr
A - F - I - C	15 Hr

DYNAMIC FLIGHT PATH

METRICS PAGE WIREFRAME

METRICS:

WEATHER

Wind:
Visibility:
Humidity:
Pressure:

FLIGHT HEALTH

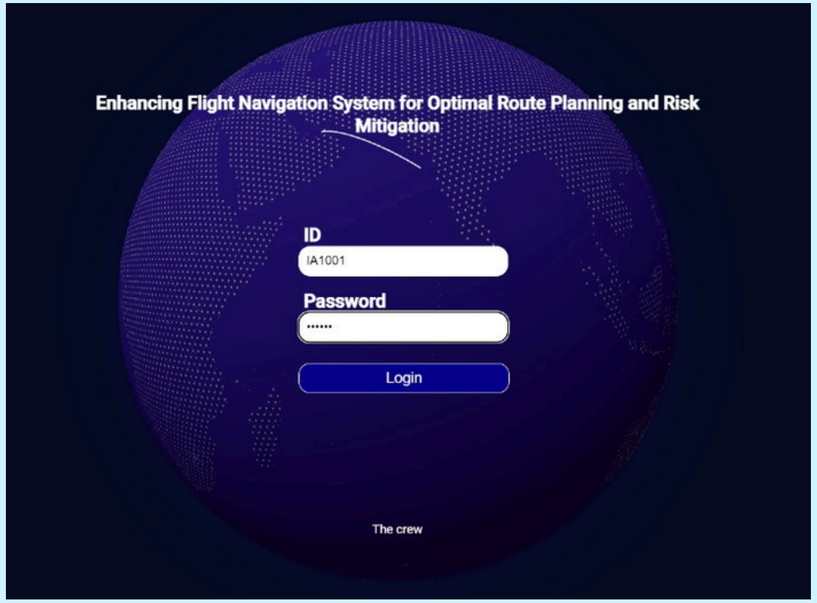
Altitude:
Groundspeed:
Heading:

ALERTS

Risk:
Weather:

DYNAMIC FLIGHT PATH

SCREENSHOTS FROM OUR DEMO



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THANK YOU