

AIRLINES DATA ANALYTICS FOR AVIATION INDUSTRY

A Project Report

Submitted by

Santhosh S (SSNCE193002093)

Naveen Raj E(SSNCE193002066)

Praveen J(SSNCE193002075)

Ranjith P(SSNCE193002308)

Team ID: PNT2022TMID52969

Under the Guidance of

Industrial Mentor: Mohammed Azhar Uddin

Faculty Mentor: Dr.Kishore R

TABLE OF CONTENTS

1. INTRODUCTION

1.1. Project Overview

1.2. Purpose

2. LITERATURE SURVEY

2.1. Existing problem

2.2. References

2.3. Problem Statement Definition

3. IDEATION & PROPOSED SOLUTION

3.1. Empathy Map Canvas

3.2. Ideation & Brainstorming

3.3. Proposed Solution

3.4. Problem Solution fit

4. REQUIREMENT ANALYSIS

4.1. Functional requirement

4.2. Non-Functional requirements

5. PROJECT DESIGN

5.1. Data Flow Diagrams

5.2. Solution & Technical Architecture

5.3. User Stories

6. PROJECT PLANNING & SCHEDULING

6.1. Sprint Planning & Estimation

6.2. Sprint Delivery Schedule

6.3. Reports from JIRA

7. CODING & SOLUTIONING (Explain the features added in the project along with code)

7.1. Feature 1

7.2. Feature 2

7.3. Database Schema (if Applicable)

8. TESTING

8.1. Test Cases

8.2. User Acceptance Testing

9. RESULTS

9.1. Performance Metrics

10. ADVANTAGES & DISADVANTAGES

11. CONCLUSION

12. FUTURE SCOPE

13. APPENDIX

Source Code

GitHub & Project Demo Link

INTRODUCTION

1.1 Project Overview

Project Title: Airline Data Analytics for Aviation Industry

Proposed Solution:

- Using the Analytical Visualizations, build Dashboard for Airline Data.
- Saving and visualizing the final dashboard in the IBM Cognos Analytics.

Goals:

- Know fundamental concepts and can work on IBM Cognos Analytics
- Gain a broad understanding of plotting visualizations to provide the suitable solutions
- Able to create meaningful Visualizations and the Dashboard(s).

Deliverables:

- Create a website with dashboard that can visualize different Airline data parameters.

1.2 Purpose

- To provide better Airline and AirPort services and to avoid delays in Air Travel across different locations at Municipality level.
- The aim is to provide airports, airlines, and the travelling public with a neutral, third-party view of which airlines are delivering on their promise to get passengers from Point A to Point B on-time.

LITERATURE SURVEY

S. NO	TITLE	AUTHOR AND JOURNAL	INFERENCE
1	Airline Data Analysis	Navuluri Madhavilatha, Bheema Shireesha, Chunduru Anilkumar. (International Journal of Scientific Research in Computer Science, Engineering and Information Technology 2019)	The delay distribution of the airport can make it easier to understand the airport delay. We also found the most popular origin to destination pairs according to the number of flights running. Then compared the average arrival and departure delays among them as well. And also calculated the average delays to all the airports.
2	Data Analysis of Delays in Airline Networks	Lucian Ionescu, Claus Gwiggner, Natalia Kliewer. (Cross Mark – 2015)	A better understanding of delay mechanisms may lead to a better trade-off between cost-efficiency and robustness and is therefore the purpose of this paper. They provide a regression modeling approach for daytime delay trends based on a data-driven detection of spatio-temporal patterns. The focus is on interpretable rules whose prediction accuracy is compared to random forests as a non-para-metric, automated modeling approach.
3	Empirical Study on Airline Delay Analysis and Prediction	Ripon Patgiri, Sajid Hussain, and Aditya Nongmeikapam. (Research Article EAI.EU)	The flight delay is predicted by training a very small set of data from 2000 to 2007 which is validated using 2008 dataset. Thus, a flight can be scheduled, organized and analyzed in a much better way. The Random Forest outperforms other four machine learning models, however, KNN and Gaussian Naive Bayes perform similar. The accuracy of the Random Forest model is 82% with a threshold of 15 minutes.
4	A Review on Flight Delay Prediction	L. Carvalho, A. Sternberg, L. Maia Goncalves, A. Beatriz Cruz, J.A. Soares, D. Brandao, D. Carvalho, e E. Ogasawara, 2020 (ResearchGate)	Flight delay models has created for delay prediction over the last years, and this work contributes with an analysis of these models from a Data Science perspective. We developed a taxonomy scheme and classified models in respect of detailed components. It was stated that the flight delay prediction is classified into two main categories, such as delay propagation and root delay and cancellation.

2.3 Problem Statement definition:

WHO

IS AFFECTED?

WHO is having the problem?
WHO will benefit from our solution?
What do we know/assume about them?

1 Directions - Personas Brainstorm

10 mins

Example: How to get customers to open new savings accounts?

1 Individually, in silence think of these questions:
What is facing the problem?
Who will benefit from our solution?
What do we know/assume about them?

2 Brainstorm an idea/note. One Persona per idea/note.

3 Vote the most important Personas. 3 dots/person

Students with loans
Parents with young children
Security alert professionals

2 Brainstorm in silence your target customer, audience, persona.

Retired people who want to travel
Old aged people
People who wants to move for medication
Higher rank officers who move for conference
Middle class people
Film personalities
young aesthetic travellers
PG&Research scholars
Government officials who wants to the thief catch
Professional Athletes
VVIP Business endeavor

3 Directions - Facts Brainstorm

10 mins

Example: How to get customers to open new savings accounts?

1 Individually, in silence think of these questions:
What are some relevant facts to about them?
What can you identify them by?

2 Brainstorm an idea/note. One fact per idea/note.

3 Vote the most important Facts. 3 dots/person

They have just began their bachelor degree
They are living in a rented apartment

4 Brainstorm in silence some facts about your customer.

Proper value for money
Excited first time travellers
To participate in business meetings
To participate in international sports events
Business men who travels frequently
People who avoid for medical propagation
On time travel
Travel itinerary
Worrying about safety
High educational travellers
Proper travel experience
Actor movies for shooting

WWP business endeavor

WHERE/WHEN

DOES IT OCCUR?

What is the context where the Persona is experiencing the problem?
Can we easily explain the context?

Have we got proof of the problem happening in a certain context or space?

Directions - Context Brainstorm

Individually, in silence think of three questions:

What is the context where the Persona is experiencing the problem?
How can you prove it? all the problems
Happening in a specific context or space?
Can we easily explain the context?

Brainstorm on sticky notes. One context per sticky note.
Vote for the most important Context. 8 dots/person.

Example: How to get customers to open their savings accounts?

When trying to plan a vacation When planning on buying a yacht

Braintorm in silence When/Where is the customer experiencing the problem?

Unexpected delay over the estimated time of arrival

Time taken of mobility for ability
Transportation Agreement
Landed at Restricted access point
Custom checked her belongings
Reached destination facilities
Delay in checking the luggage
Personal baggage items left
Lost item
Security concerns / restricted access
Physical distance between points

WHAT

Is it easy to explain?
Is it an actual/real problem?
Have we got any evidence?

IS IT ABOUT?

Directions - Problems Brainstorm

1. Individually, in silence think of three questions:
What is the problem from our persona perspective?
Is it easy to explain?
Is it an actual/real problem?
Have we got any evidence?

Example: How to get customers to open new savings accounts?

2. Brainstorm on sticky notes. One problem per sticky note.

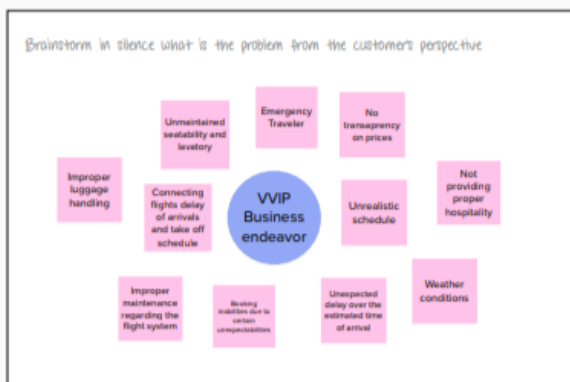
3. Vote for the most important Problems. 3 dots/person

10 min

They are in need of immediate monetary support

Planning to buy a new house

Spending too much on books & resources



WHY

CARE ABOUT IT?

What is the most important value for the user?
What pain points would a solution help get rid of?
Why is it worth our investment?
How does it meet our business goals? KPIs?

Directions - Value for the Persona

1. Individually, in silence think of three questions:
What is the value for our Persona?
What pain points would our solution help get rid of?
What are their goals?

Example: How to get customers to open new savings accounts?

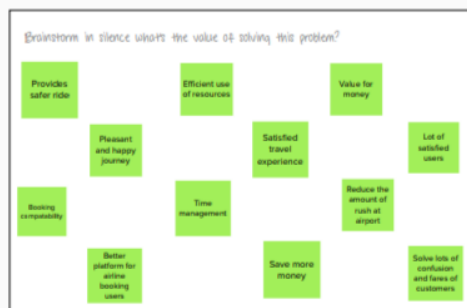
2. Brainstorm on sticky notes. One fact per sticky note.

3. Vote for the most important Value for the persona. 3 dots/person

10 min

Secure financial position in the long run

Freedom to travel



Directions - Value for the Business

1. Individually, in silence think of three questions:
Why is it worth the investment?
How does it meet our business goals? KPIs?

Example: How to get customers to open new savings accounts?

2. Brainstorm on sticky notes. One fact per sticky note.

3. Vote for the most important value for the Business. 3 dots/person

10 min

Increase deposit card use

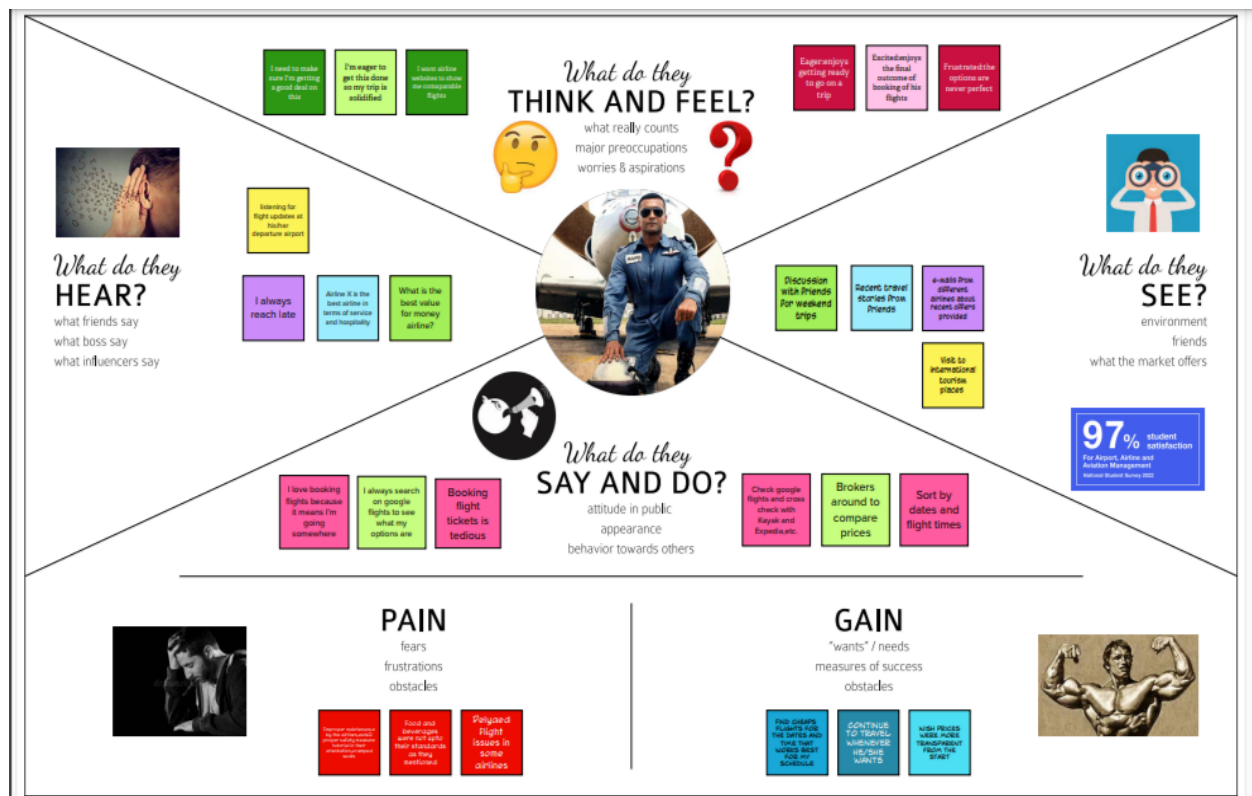
Increase new clients



IDEATION AND PROPOSED SOLUTION

3.1 Empathy Map Canvas:

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes. It is a useful tool to help teams better understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.



3.2 Brainstorming ideas:

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem-solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.





3.3 Proposed solution:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Delays in Air Travel across different locations is a serious problem for frequent air travelers
2.	Idea / Solution description	To provide a neutral third party service for better airline and airport services at municipality level
3.	Novelty / Uniqueness	Creating an user-friendly environment by providing the best possible options for travelling.
4.	Social Impact / Customer Satisfaction	This platform is service-based, mainly focusing on the benefits of the users.
5.	Business Model (Revenue Model)	Revenue through annual subscription of customers for service.
6.	Scalability of the Solution	Solution to this problem is flexible and can be integrated for wide area locations. Hence it is highly scalable.

3.4 Problem Solution Fit:

Project Title: Airlines Data Analytics for Aviation Industry		Project Design Phase-I - Solution Fit Template		Team ID: PNT2022TMID52969	
Define CS, fit into CC	1. CUSTOMER SEGMENT(S) <small>Who is your customer? i.e. working parents of 0-5 y.o. kids</small> Celebrities,VVIP business endeavor,People who move for medication.	6. CUSTOMER CONSTRAINTS <small>What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices.</small> Network connection, Unupdated schedules of flight arrivals and departures.	5. AVAILABLE SOLUTIONS <small>Which solutions are available to the customers when they face the problem? Or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital rebooking</small> IBM dashboard for customer convenience.	Explore AS, differentiate	
	2. JOBS-TO-BE-DONE / PROBLEMS <small>Which jobs to-be-done (or problems) do you address for your customers? There could be more than one, explore different sides.</small> To provide better Airline and AirPort services and to avoid delays in Air Travel across different locations at Municipality level.	9. PROBLEM ROOT CAUSE <small>What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations.</small> Not keeping it pre-planned,Sudden unavoidable emergency situations,Lack of knowledge.	7. BEHAVIOUR <small>What does your customer do to address the problem and get the job done? i.e. Directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace)</small> Customer choose the right airline based on ratings and previous data about the airline,Choosing a right travel associator.		
Focus on J&P tap into BE, understand RC	3. TRIGGERS <small>What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.</small> Recent travel stories from friend's social media.	10. YOUR SOLUTION <small>If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fill entire canvas and come up with a solution that fits within customer limitations, solves a problem matches customer behaviour.</small> To create an interactive dashboard to visualise and To provide better Airline and AirPort services and to avoid delays in Air Travel across different locations at Municipality level based on available metrics as dataset.	8. CHANNELS of BEHAVIOUR #1 ONLINE <small>What kind of actions do customers take online? Extract online channels from #7</small> #2 OFFLINE <small>What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.</small> Customers are provided with the legit website which is provided by airlines. Customers are provided with esteemed travel agencies.	Identify strong TR & EM	
	4. EMOTIONS: BEFORE / AFTER <small>How do customers feel when they face a problem or a job and afterwards? i.e. lost, insecure + confident, in control –use it in your communication strategy & design.</small> Delayed,Late>Punctual,Difficulty in time management after getting delayed.				

REQUIREMENT ANALYSIS

4.1 Functional Requirements

FR No.	Functional Requirement (Epic)	Sub Requirement (Story/ Sub-Task)
FR-1	customer Registration	customer can makeRegistration through Gmail
FR-2	User Confirmation	After the Registration the customer will getconfirmation through mail.
FR-3	Visualizing data	User can visualize the Regular trendsof delay of flightsUsingIBM cognos Analytics
FR-4	Generating Report	User canview the flightdelay report

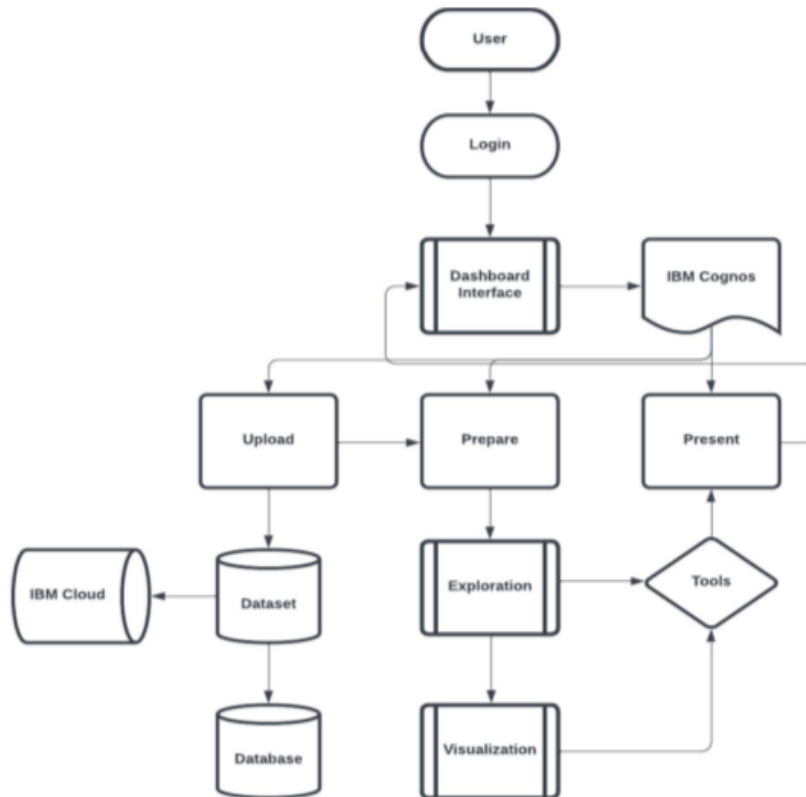
4.2 Non-Functional Requirements

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	The application will have a simple and user-friendlygraphical interface. Users will be able to understand and use all the features of the application easily. Anyaction has to be performed with just a few clicks
NFR-2	Security	The main security concern is for users account hence proper login mechanism should be used to avoid hacking. The organization systemsshould notdisclose personal information of usersand other organization details to public.
NFR-3	Reliability	When the systemis disconnected or frozen due tooveraccess at the sametime, it should save all the process of the usersmade up to the pointofabnormal happenings.
NFR-4	Performance	The system shouldrequire a fair amount of speed especially while browsing throughthe catalogue.
NFR-5	Availability	The system shall be available 24 hours a day 7 days aweek. Usercan access at anytime.
NFR-6	Scalability	Large Number of users canaccess the website

PROJECT FLOW DESIGN

5.1 Data Flow Diagram:

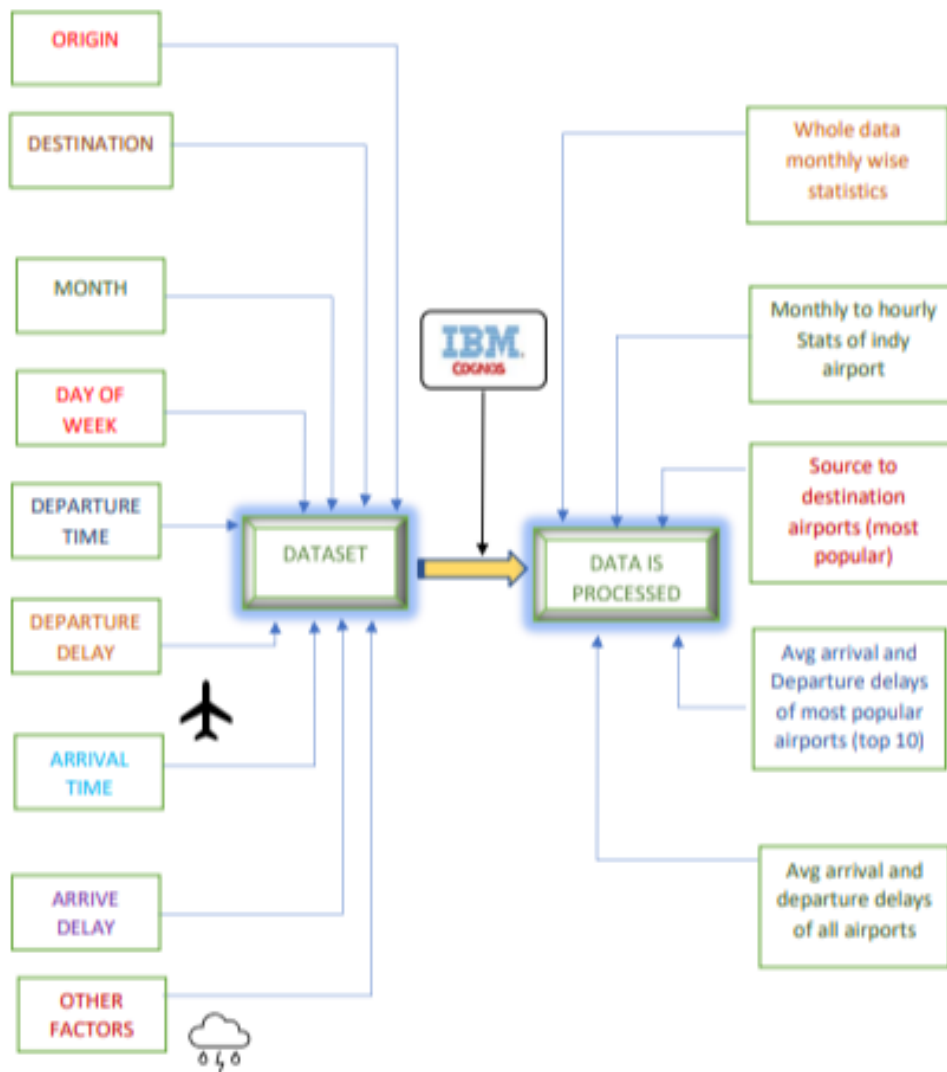
A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored



5.2 Solution Architecture

TEAM ID: PNT2022TMID52969

BATCH: B8-2A4E



5.3 User stories:

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the dashboard by entering my email, and password, and confirming my password.	I can access my account in the dashboard	High	Sprint-1
		USN-2	As a user, I will receive a confirmation email once I have registered for the dashboard	I can receive a confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the dashboard through Social Media	I can register & access the dashboard with Social Media Login	Low	Sprint-2
		USN-4	As a user, I can register for the dashboard through Gmail	I can register and access dashboard with Gmail	Medium	Sprint-2
	Login	USN-5	As a user, I can log into the application by entering email & password	I can login to the account in my email login.	High	Sprint-2
	Dashboard	USN-6	As a user, I can use my account in my dashboard for uploading dataset.	I can login to the account for uploading dataset.	Medium	Sprint-3
Customer (Web user)	Website	USN-7	As a user, I can use my dashboard in website	I can login into the dashboard by visiting website.	Medium	Sprint-3
Customer Care Executive		USN-8	As a user, I can contact Customer care Executive for my login.	I can contact customer executive for my login.	High	Sprint-4
Administrator		USN-9	As a user, I can contact administrator for my queries.	I can contact administrator for solving my queries.	High	Sprint-4
Exploration	Dashboard	USN-10	As a user, I can prepare data by using Exploration Techniques.	I can prepare data by using Exploration Techniques.	High	Sprint-3
Presentation	Dashboard	USN-11	As a user, I can Present data in my dashboard.	I can present data by using my account in dashboard.	High	Sprint-4
Visualization	Dashboard	USN-12	As a user, I can Prepare Data by using Visualization Techniques.	I can prepare data by using Visualization Techniques.	High	Sprint-3

PROJECT PLANNING AND SCHEDULING

6.1,6.2 Planning and Estimation, Sprint Delivery Scheul

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming that.	2	Low	E.Naveen Raj
Sprint-1	Registration	USN-2	As a user, I will receive confirmation email once I have registered for the application	3	High	J.Praveen
Sprint-1	Login	USN-3	As a user, I adapt to logging into the system with credentials.	2	Low	P.Ranjith
Sprint-1	Designation of Region	USN-4	As a user, I can collect the dataset and select the region of interest to be monitored and analysed	5	Medium	S.Santhosh
Sprint-2	Exploration Of The Data	USN-5	As a developer, I will explore the given dataset through cognos.	6	High	E.Naveen Raj
Sprint-2	Visualization Of The Dataset	USN-6	As a developer, I will visualize the given dataset into a dashboard using cognos.	6	High	J.Praveen
Sprint-3	Customization Of The Dashboard	USN-7	As a user, I can customize the visualized dashboard.	6	Medium	P.Ranjith
Sprint-3	Ease of Access	USN-8	As a user, I can easily access and manipulate the dashboard.	6	Medium	S.Santhosh
Sprint-4	Report Generation	USN-9	As a user, I can view the detailed report of my visualization.	6	High	E.Naveen Raj J.Praveen
Sprint-4	Establishment of the Dashboard	USN-10	As a developer, I established the dashboard into a website and submit the website.	6	High	P.Ranjith S.Santhosh

Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	12	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	12	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	12	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	12	19 Nov 2022

6.3 Reports form Jira

Sprints			
ADAFAI-1 Registration			
ADAFAI-2 Login			
ADAFAI-3 Designation of Region			
ADAFAI-4 Exploration of the Data			
ADAFAI-5 Visualization of the Dataset			
ADAFAI-6 Customization of the Dashbo...			
ADAFAI-7 Ease of Access			
ADAFAI-8 Report Generation			
ADAFAI-9 Establishment of the Dashboa...			

Code
Project pages
Add shortcut
Project settings
You're in a team-managed project

ADAFAD-Sprint 1 31 Oct – 14 Nov (3 issues)
Complete sprint

To understand the dataset and explore the dataset

ADAFAI-19 As a user, I can view the data DONE
ADAFAI-24 As a analyst, I can explore the data and prepo... DONE
ADAFAI-28 As a analyst, I will create the Data module TO DO

+ Create issue

Issues are individual pieces of work that you assign to teammates.
Issues can be tasks or stories.
[Show me](#) [View issue tutorial](#)
 Invite your teammates

Software project
PLANNING
Roadmap
Backlog
Board
DEVELOPMENT
Code
Project pages

Backlog

ADAFAD-Sprint 2 31 Oct – 14 Nov (2 issues)
Complete sprint

To do Exploratory data analysis and Visualization for Flight dataset

ADAFAI-5 As a analyst, I will visualize the Number of Airport... DONE
ADAFAI-4 As a analyst, I will create the explorato... DONE

+ Create issue

Quickstart

Create a project
Create an issue

Issues are individual pieces of work that you assign to teammates.

Software project
PLANNING
Roadmap
Backlog
Board
DEVELOPMENT
Code
Project pages

Backlog

ADAFAD-Sprint 2 31 Oct – 14 Nov (2 issues)
Complete sprint

To do Exploratory data analysis and Visualization for Flight dataset

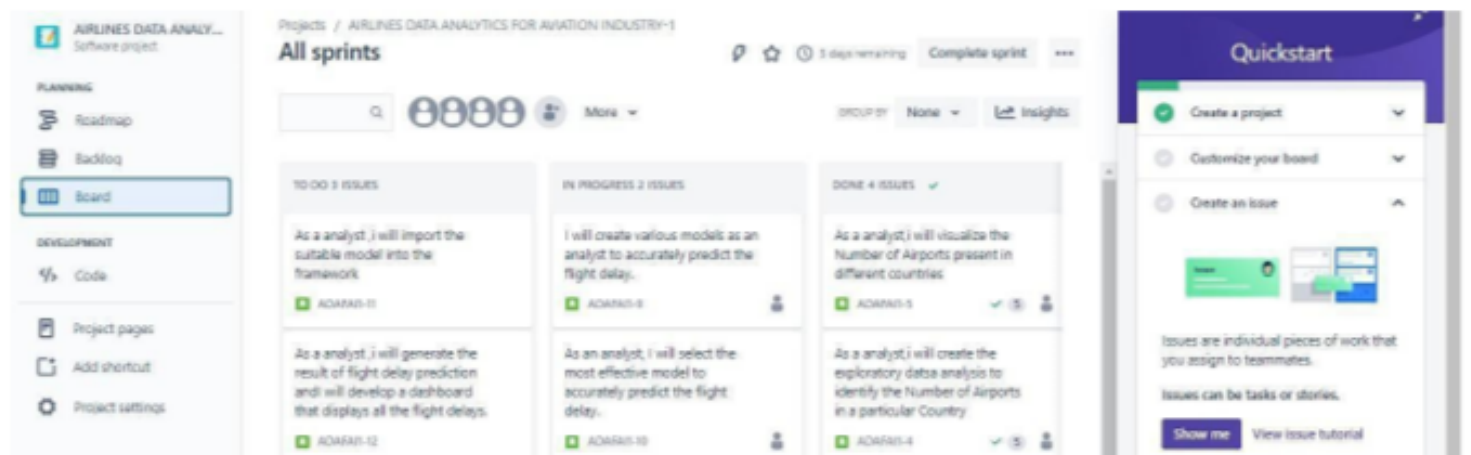
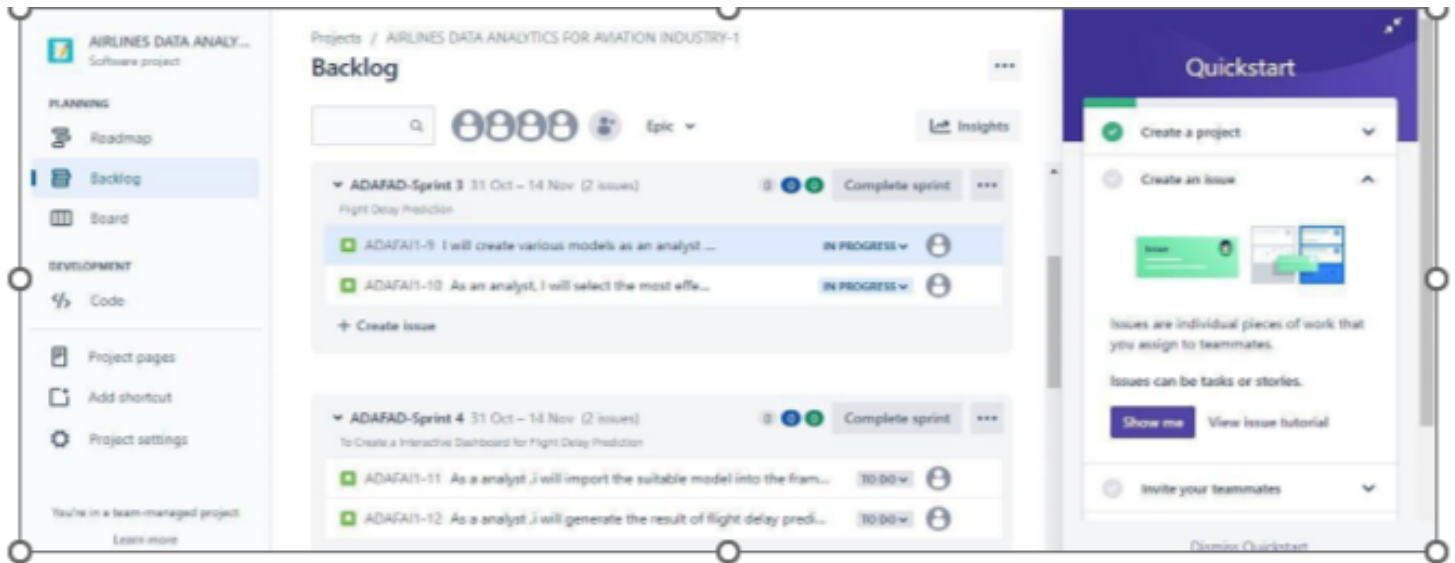
ADAFAI-5 As a analyst, I will visualize the Number of Airport... DONE
ADAFAI-4 As a analyst, I will create the explorato... DONE

+ Create issue

Quickstart

Create a project
Create an issue

Issues are individual pieces of work that you assign to teammates.



CODING WITH SOLUTION

7.1 Feature 1

Any user can login into the webpage by using a valid gmail login.

CODE:

```
<!DOCTYPE html>
<html lang="en">

<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>Login Form</title>
  <link rel="stylesheet" href="style.css">
  <link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/5.15.3/css/all.min.css" />
</head>

<body>
  <div class="wrapper">
    <header>Login Form</header>
    <form action="#">
      <div class="field email">
        <div class="input-area">
          <input type="text" placeholder="Email Address">
          <i class="icon fas fa-envelope"></i>
          <i class="error error-icon fas fa-exclamation-circle"></i>
        </div>
        <div class="error error-txt">Email can't be blank</div>
      </div>
      <div class="field password">
        <div class="input-area">
          <input type="password" placeholder="Password">
          <i class="icon fas fa-lock"></i>
          <i class="error error-icon fas fa-exclamation-circle"></i>
        </div>
        <div class="error error-txt">Password can't be blank</div>
      </div>
      <div class="pass-txt"><a href="#">Forgot password?</a></div>
```

```

        <div class="button">
        <a href="main.html">Login</a>
        </div>

    </form>
    <div class="sign-txt">Not yet member? <a href="#">Signup now</a></div>
</div>

<script src="script.js"></script>

</body>
</html>

```

7.2 Feature 2

The user can visualize the dashboard made and able to get knowledge on the airline data.

CODE:

```

    </div>
</section>
<section id="services" class="section-bg">
    <div class="container" data-aos="fade-up">

        <header class="section-header">
            <h3>Dashboard</h3>
            <p>Using the given dataset, we created various graphs and charts to highlight
the insights and visualizations</p>
        </header>

        <iframe class="i1"
src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2FAirline_dashboard&action=view&mode=dashboard&subView=model0000018486b1d4d1_00000000"></iframe>

    </div>

```

TESTING

8.1 Test cases

Test case ID	Feature Type	Component	Test Scenario	Pre-conditions	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation (Y/N)	Bug ID
LoginPage_TC_001	Functional	Home Page	Verify user is able to see the Login/Signup popup when user clicked on My account button	Visual Broken Code UAT Prod CI Jira Sonar JUnit	1. Enter URL and click go 2. Click on My Account dropdown button 3. Verify login/Signup popup displayed or not		Login/Signup popup should display	Working as expected	Pass			
LoginPage_TC_002	UI	Home Page	Verify the UI elements in Login/Signup popup	Visual Broken Code UAT Prod CI Jira Sonar JUnit	1. Enter URL and click go 2. Click on My Account dropdown button 3. Verify login/Signup popup with below UI elements: a. email text box b. password text box c. login button d. New customer? Create account link e. Lost password? Recovery password link		Application should show below UI elements: a. email text box b. password text box c. login button with usage colour d. New customer? Create account link e. Lost password? Recovery password link	Working as expected	Fail	Steps are not clear to follow		BUG-1234
LoginPage_TC_003	Functional	Home page	Verify user is able to log into application with valid credentials	Visual Broken Code UAT Prod CI Jira Sonar JUnit	1. Enter URL (https://shopster.com/) and click go 2. Click on My Account dropdown button 3. Enter valid username/email in email text box 4. Enter valid password in password text box	Username: chaham@gmail.com password: Testing123	User should navigate to user account homepage	Working as expected	pass			
LoginPage_TC_004	Functional	Login page	Verify user is able to log into application with invalid credentials	Visual Broken Code UAT Prod CI Jira Sonar JUnit	1. Enter URL (https://shopster.com/) and click go 2. Click on My Account dropdown button 3. Enter invalid username/email in email text box 4. Enter valid password in password text box	Username: chaham@gmail.com password: Testing123	Application should show "incorrect email or password" validation message	Working as expected	pass			
LoginPage_TC_005	Functional	Login page	Verify user is able to log into application with invalid credentials	Visual Broken Code UAT Prod CI Jira Sonar JUnit	1. Enter URL (https://shopster.com/) and click go 2. Click on My Account dropdown button 3. Enter valid username/email in email text box 4. Enter invalid password in password text box	Username: chaham@gmail.com password: Testing1238766887668876876	Application should show "incorrect email or password" validation message	Working as expected	pass			
LoginPage_TC_006	Functional	Login page	Verify user is able to log into application with invalid credentials	Visual Broken Code UAT Prod CI Jira Sonar JUnit	1. Enter URL and click go 2. Click on My Account dropdown button 3. Enter invalid username/email in email text box 4. Enter invalid password in password text box 5. Click on login button	Username: chaham@gmail.com password: Testing1238766887668876876	Application should show "incorrect email or password" validation message	Working as expected	pass			
viewing the dashboard	Functional	dashboard	User view the dashboard	IBM cognos				Working as expected	pass			
Enter report	Functional	page	User view detailed visualization	IBM cognos				Working as expected	Pass			

8.2 User Acceptance Testing:

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the Airlines Data Analytics for Aviation Industry project at the time of the release to User Acceptance Testing (UAT).

2. Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

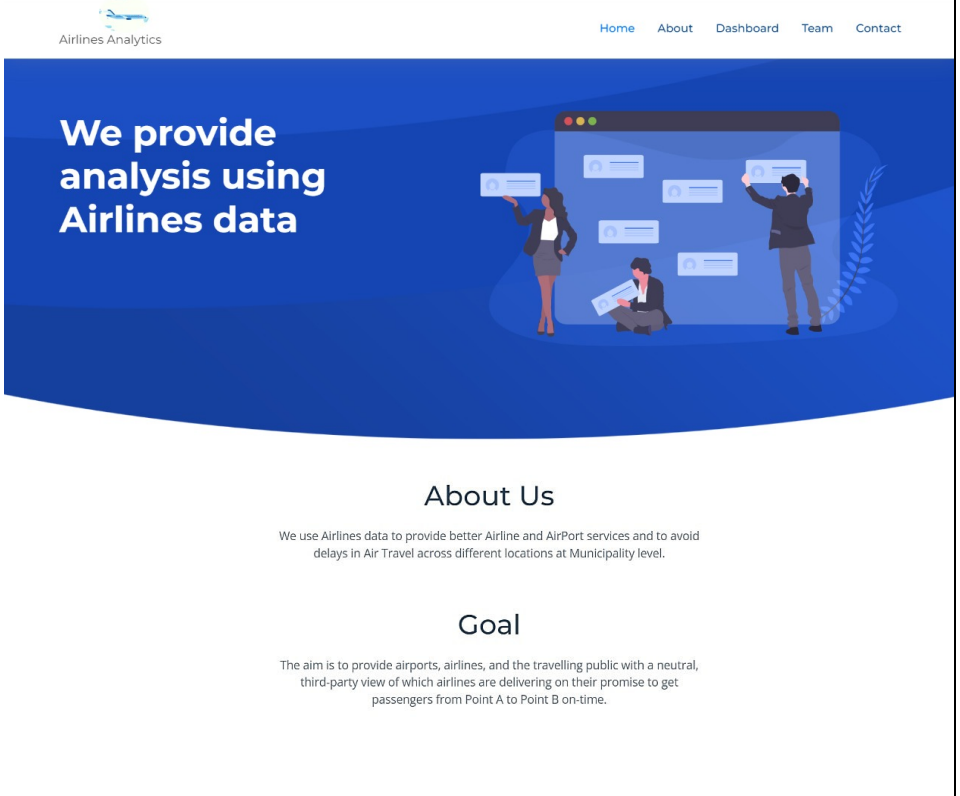
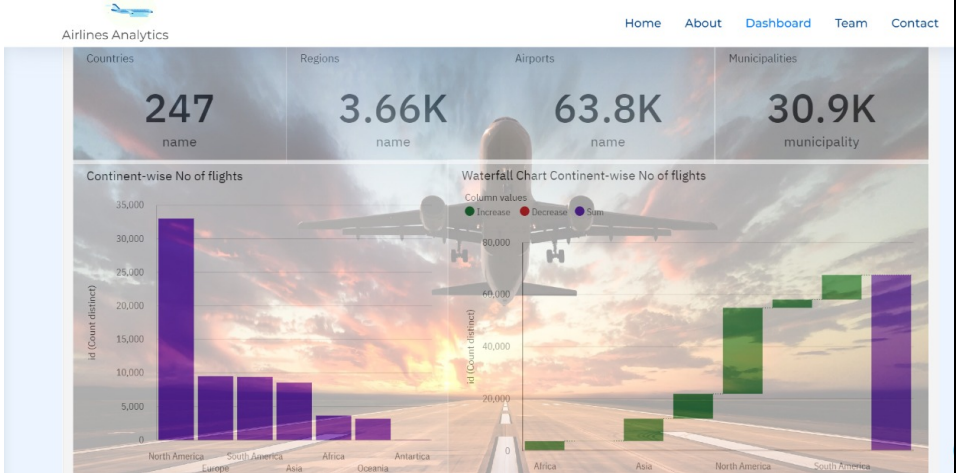
Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	4	2	3	20
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	24	14	13	26	77

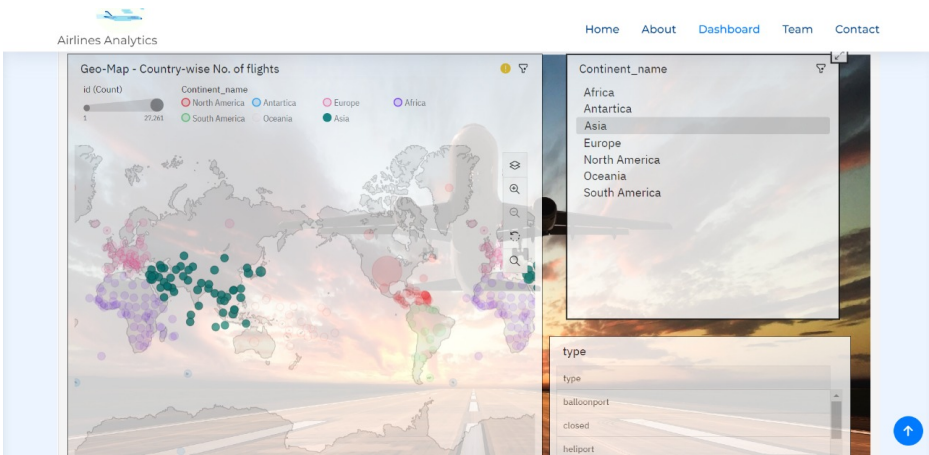
3. Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	0	7
Client Application	30	0	0	30
Security	2	0	0	2

RESULTS

S.No	Parameter	Screenshot / Values
1.	Dashboard design	 <p>About Us</p> <p>We use Airlines data to provide better Airline and AirPort services and to avoid delays in Air Travel across different locations at Municipality level.</p> <p>Goal</p> <p>The aim is to provide airports, airlines, and the travelling public with a neutral, third-party view of which airlines are delivering on their promise to get passengers from Point A to Point B on-time.</p>
2.	No of vizualization Charts	18
3.	Data responsiveness	<p>The data will change dynamically if the dataset changes and graph too changes.</p> 

4.	Effective User Stories	6
5	Descriptive Reports	<p>Visualization charts provide information on different airlines in different countries. Users have access to 18 different visualization charts.</p>  <p>The screenshot displays the 'Airlines Analytics' dashboard. The main feature is a 'Geo-Map - Country-wise No. of flights' showing a world map with colored dots representing flight counts by continent. A legend on the right lists continents: Africa, Antarctica, Asia, Europe, North America, Oceania, and South America. Below the map, there are filters for 'Continent_name' and 'type'. The 'Continent_name' filter is set to 'Asia', and the 'type' filter is set to 'balloonport'. The dashboard also includes a navigation bar with links to Home, About, Dashboard, Team, and Contact.</p>

ADVANTAGES & DISADVANTAGES

Advantages

- This application helps users predict the delays if they occur.
- As a result, they can accurately predict these flight delays allowing passengers to be well prepared for the deterrent caused to their journey.
- Enabling airlines to respond to the potential causes of flight delays in advance to diminish the negative impact.
- Therefore, predicting flight delays can improve airline operations and passenger satisfaction, which will result in a positive impact on the economy

Disadvantages

- The people who are unaware of this application will have no idea about their flight delay unless they have been notified

CONCLUSION

Flight delays are a major problem in civil aviation. They incur direct and indirect costs, such as maintenance at the gate, extra fees for crew, food service, and lodging. They also affect passenger satisfaction. Flight delay is inevitable and it plays an important role in both profits and losses of the airlines. An accurate estimation of flight delay is critical for airlines because the results can be applied to increase customer satisfaction and the incomes of airline agencies. So, the prediction and analysis of flight delays are of great significance to airlines, passengers, and airports. Predicting delays will help an airport to adjust resource allocations, quickly analyse the causes, and take measures to reduce or eliminate delays. Therefore, It delivers a well-friendly graphical UI and gives a proper delay rate to the users.

FUTURE SCOPE

There are still deficiencies in this application. Furthermore, this application can be enhanced for allocating various resources to the customers if a delay has occurred and they can also book tickets for their flights through this application.

APPENDIX

Source Code:

```
<!DOCTYPE html>
<html lang="en">

<head>
  <meta charset="utf-8">
  <meta content="width=device-width, initial-scale=1.0" name="viewport">

  <title>Airlines Analytics</title>
  <meta content="" name="description">
  <meta content="" name="keywords">

  <!-- Favicons -->
  <link href="https://encrypted-
tbn0.gstatic.com/images?q=tbn:ANd9GcTY8DXvL16E_fIqP_sHrecQA5o8msgQuz
u49A&usqp=CAU" rel="icon">
  <link href="assets/img/apple-touch-icon.png" rel="apple-touch-icon">

  <!-- Google Fonts -->
  <link
href="https://fonts.googleapis.com/css?family=Open+Sans:300,300i,400,400i,600,6
00i,700,700i|Montserrat:300,400,500,700" rel="stylesheet">

  <!-- Vendor CSS Files -->
  <link href="assets/vendor/aos/aos.css" rel="stylesheet">
  <link href="assets/vendor/bootstrap/css/bootstrap.min.css" rel="stylesheet">
  <link href="assets/vendor/bootstrap-icons/bootstrap-icons.css" rel="stylesheet">
```

```
<link href="assets/vendor/glightbox/css/glightbox.min.css" rel="stylesheet">
<link href="assets/vendor/swiper/swiper-bundle.min.css" rel="stylesheet">
```

```
<!-- Template Main CSS File -->
<link href="assets/css/style.css" rel="stylesheet">
```

```
</head>
```

```
<body>
```

```
<header id="header" class="fixed-top d-flex align-items-center">
  <div class="container d-flex justify-content-between">
```

```
    <div class="logo">
```

```
      <a href="index.html" class="img1"></a>
```

```
      <h6>Airlines Analytics</h6>
```

```
    </div>
```

```
<nav id="navbar" class="navbar">
```

```
  <ul>
```

```
    <li><a class="nav-link scrollto active" href="#hero">Home</a></li>
```

```
    <li><a class="nav-link scrollto" href="#about">About</a></li>
```

```
    <li><a class="nav-link scrollto" href="#services">Dashboard</a></li>
```

```
    <!-- <li><a class="nav-link scrollto" href="#clients">Predictive
Analytics</a></li> -->
```

```
    <li><a class="nav-link scrollto" href="#team">Team</a></li>
```

```
    <li><a class="nav-link scrollto" href="#contact">Contact</a></li>
```

```
  </ul>
```

```
  <i class="bi bi-list mobile-nav-toggle"></i>
```

```
</nav>
```

```
</div>
```

```
</header>
```

```
<section id="hero" class="clearfix">
```

```
<div class="container" data-aos="fade-up">
```

```
<div class="hero-img" data-aos="zoom-out" data-aos-delay="200">
```

```

```

```
</div>
```

```
<div class="hero-info" data-aos="zoom-in" data-aos-delay="100">
```

```
<h2>We provide<br>analysis using<br>Airlines data</h2>
```

```
</div>
```

```
</section>
```

```
<main id="main">
```

```
<section id="about">
```

```
<div class="container" data-aos="fade-up">
```

```
<header class="section-header">
```

```
<h3>About Us</h3>
```

```
</header>
```

```
<div class="section-header">
```

```
<p >
```

We use Airlines data to provide better Airline and AirPort services and to avoid delays in Air Travel across different locations at Municipality level.

```
</p>
```

```
<header class="section-header">
```

```
<h3>Goal</h3>
```

```
</header>
```

<p class="description">The aim is to provide airports, airlines, and the travelling public with a neutral, third-party view of which airlines are delivering on their promise to get passengers from Point A to Point B on-time.

```
</div>
```

```
</div>
```

```
</div>
```

```
</section>
<section id="services" class="section-bg">
  <div class="container" data-aos="fade-up">

    <header class="section-header">
      <h3>Dashboard</h3>
      <p>Using the given dataset, we created various graphs and charts to highlight
the insights and visualizations</p>
    </header>

    <iframe class="i1"
src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2FAirline_dashboard&action=view&mode=dashboard&subView=model0000018486b1d4d1_00000000"></iframe>

  </div>

</section>

<!-- <section id="clients" class="section-bg"> -->

<!-- <div class="container" data-aos="fade-up">

  <div class="section-header">
    <h3>Predictive Analytics</h3>
    <p>Length of Stay for each patient on case by case basis has been
predicted</p>
  </div>

  <div class="client-logo">
    
  </div>

  <br>
```

```
<div class="client-logo1">
  
</div>
</div>
```

```
<br>
</div>
<div class="container" data-aos="fade-up">
```

```
<div class="client-logo1">
  
</div>
```

```
<br>

<div class="client-logo3">
  
</div>
</div>
```

```
<br>
</div>
<div class="container" data-aos="fade-up">
```

```
<div class="client-logo">
  
</div>
```

```
</div>
```

```
</div>
<br>
```

```
</section> -->
```

```

<section id="team">
  <div class="container" data-aos="fade-up">
    <div class="section-header">
      <h3>Team</h3>
      <p>Any sufficiently advanced technology is equivalent to magic</p>
    </div>

    <div class="row">

      <div class="col-lg-3 col-md-6" data-aos="zoom-out" data-aos-delay="100">
        <div class="member">
          
          <div class="member-info">
            <div class="member-info-content">
              <h4>Santhosh S</h4>
              <span>Team leader</span>
              <div class="social">
                <a href=""><i class="bi bi-twitter"></i></a>
                <a href=""><i class="bi bi-facebook"></i></a>
                <a href=""><i class="bi bi-instagram"></i></a>
                <a href=""><i class="bi bi-linkedin"></i></a>
              </div>
            </div>
          </div>
        </div>

        <div class="col-lg-3 col-md-6" data-aos="zoom-out" data-aos-delay="200">
          <div class="member">
            
            <div class="member-info">
              <div class="member-info-content">
                <h4>Naveen Raj E</h4>
                <span>Team member</span>
                <div class="social">

```



```

        <a href=""><i class="bi bi-twitter"></i></a>
        <a href=""><i class="bi bi-facebook"></i></a>
        <a href=""><i class="bi bi-instagram"></i></a>
        <a href=""><i class="bi bi-linkedin"></i></a>
    </div>
</div>
</div>
</div>
</div>
</div>

```

```

<div class="col-lg-3 col-md-6" data-aos="zoom-out" data-aos-delay="300">
    <div class="member">
        
        <div class="member-info">
            <div class="member-info-content">
                <h4>Praveen J</h4>
                <span>Team member</span>
                <div class="social">
                    <a href=""><i class="bi bi-twitter"></i></a>
                    <a href=""><i class="bi bi-facebook"></i></a>
                    <a href=""><i class="bi bi-instagram"></i></a>
                    <a href=""><i class="bi bi-linkedin"></i></a>
                </div>
            </div>
        </div>
    </div>
</div>
</div>

```

```

<div class="col-lg-3 col-md-6" data-aos="zoom-out" data-aos-delay="400">
    <div class="member">
        
        <div class="member-info">
            <div class="member-info-content">
                <h4>Ranjith P</h4>
                <span>Team member</span>
                <div class="social">
                    <a href=""><i class="bi bi-twitter"></i></a>

```

```

        <a href=""><i class="bi bi-facebook"></i></a>
        <a href=""><i class="bi bi-instagram"></i></a>
        <a href=""><i class="bi bi-linkedin"></i></a>
    </div>
</div>
</div>
</div>
</div>
</div>

```

```
</div>
```

```
</div>
```

```
</section>
```

```
<section id="contact">
```

```
    <div class="container-fluid" data-aos="fade-up">
```

```

        <div class="section-header">
```

```
            <h3>Contact Us</h3>
```

```
        </div>
```

```
<div class="row">
```

```

    <div class="col-lg-6">
```

```
        <div class="map mb-4 mb-lg-0">
```

```
            <iframe
```

```
src="https://www.google.com/maps/embed?pb=!1m14!1m8!1m3!1d12097.4332134
60943!2d-
```

```
74.0062269!3d40.7101282!3m2!1i1024!2i768!4f13.1!3m3!1m2!1s0x0%3A0xb89d1
fe6bc499443!2sDowntown+Conference+Center!5e0!3m2!1smk!2sbg!4v153994375
5621" frameborder="0" style="border:0; width: 100%; height: 340px;"
```

```
allowfullscreen></iframe>
```

```
        </div>
```

```
    </div>
```

```
<div class="col-lg-6">
```

```
    <div class="row">
```

```
        <div class="col-md-5 info">
```

```

        <i class="bi bi-geo-alt"></i>
        <p>A108 Adam Street, IND 535022</p>
    </div>
    <div class="col-md-4 info">
        <i class="bi bi-envelope"></i>
        <p>info@example.com</p>
    </div>
    <div class="col-md-3 info">
        <i class="bi bi-phone"></i>
        <p>+1 5589 55488 55</p>
    </div>
</div>

<div class="form">
    <form action="forms/contact.php" method="post" role="form" class="php-
email-form">
        <div class="row">
            <div class="form-group col-lg-6">
                <input type="text" name="name" class="form-control" id="name"
placeholder="Your Name" required>
            </div>
            <div class="form-group col-lg-6 mt-3 mt-lg-0">
                <input type="email" class="form-control" name="email" id="email"
placeholder="Your Email" required>
            </div>
        </div>
        <div class="form-group mt-3">
            <input type="text" class="form-control" name="subject" id="subject"
placeholder="Subject" required>
        </div>
        <div class="form-group mt-3">
            <textarea class="form-control" name="message" rows="5"
placeholder="Message" required></textarea>
        </div>
        <div class="my-3">
            <div class="loading">Loading</div>
            <div class="error-message"></div>

```

```
        <div class="sent-message">Your message has been sent. Thank  
you!</div>
```

```
    </div>
```

```
        <div class="text-center"><button type="submit" title="Send  
Message">Send Message</button></div>
```

```
    </form>
```

```
</div>
```

```
</div>
```

```
</div>
```

```
</div>
```

```
</section>
```

```
</main>
```

```
<footer id="footer">
```

```
    <div class="footer-top">
```

```
        <div class="container">
```

```
            <div class="row">
```

```
                <div class="col-lg-4 col-md-6 footer-info">
```

```
                    <h3>PPTS</h3>
```

```
                    <p></p>
```

```
                </div>
```

```
                <div class="col-lg-2 col-md-6 footer-links">
```

```
                    <h4>Useful Links</h4>
```

```
                    <ul>
```

```
                        <li><a href="#">Home</a></li>
```

```
                        <li><a href="#">About us</a></li>
```

```
                        <li><a href="#">Services</a></li>
```

```
                        <li><a href="#">Terms of service</a></li>
```

```
                        <li><a href="#">Privacy policy</a></li>
```

```
                    </ul>
```

```
                </div>
```

```
                <div class="col-lg-3 col-md-6 footer-contact">
```

<h4>Contact Us</h4>

<p>

A108 Adam Street

New York, IND 535022

INDIA

Phone: +1 5589 55488 55

Email: info@example.com

</p>

<div class="social-links">

<i class="bi bi-twitter"></i>

<i class="bi bi-facebook"></i>

<i class="bi bi-instagram"></i>

<i class="bi bi-instagram"></i>

<i class="bi bi-linkedin"></i>

</div>

</div>

<div class="col-lg-3 col-md-6 footer-newsletter">

<h4>Our Newsletter</h4>

<form action="" method="post">

<input type="email" name="email"><input type="submit"

value="Subscribe">

</form>

</div>

</div>

</div>

</div>

<div class="container">

<div class="copyright">

© Copyright PPTS. All Rights Reserved

</div>

<div class="credits">

```
    Designed by <a href="https://bootstrapmade.com/">PPTSMade</a>
  </div>
</div>
</footer>
```

```
<a href="#" class="back-to-top d-flex align-items-center justify-content-center"><i
class="bi bi-arrow-up-short"></i></a>
```

```
<script src="assets/vendor/purecounter/purecounter_vanilla.js"></script>
<script src="assets/vendor/aos/aos.js"></script>
<script src="assets/vendor/bootstrap/js/bootstrap.bundle.min.js"></script>
<script src="assets/vendor/glightbox/js/glightbox.min.js"></script>
<script src="assets/vendor/isotope-layout/isotope.pkgd.min.js"></script>
<script src="assets/vendor/swiper/swiper-bundle.min.js"></script>
<script src="assets/vendor/php-email-form/validate.js"></script>
```

```
<script src="assets/js/main.js"></script>
```

```
</body>
```

```
</html>
```

index.html:

```
<!DOCTYPE html>
```

```
<html lang="en">
```

```
<head>
```

```
  <meta charset="UTF-8">
```

```
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
```

```
  <title>Login Form</title>
```

```
  <link rel="stylesheet" href="style.css">
```

```
  <link rel="stylesheet" href="https://cdn.jsdelivr.net/npm/bootstrap@5.15.3/css/all.min.css" />
```

```
</head>
```

```
<body>
```

```
<div class="wrapper">
  <header>Login Form</header>
  <form action="#">
    <div class="field email">
      <div class="input-area">
        <input type="text" placeholder="Email Address">
        <i class="icon fas fa-envelope"></i>
        <i class="error error-icon fas fa-exclamation-circle"></i>
      </div>
      <div class="error error-txt">Email can't be blank</div>
    </div>
    <div class="field password">
      <div class="input-area">
        <input type="password" placeholder="Password">
        <i class="icon fas fa-lock"></i>
        <i class="error error-icon fas fa-exclamation-circle"></i>
      </div>
      <div class="error error-txt">Password can't be blank</div>
    </div>
    <div class="pass-txt"><a href="#">Forgot password?</a></div>
    <div class="button">
      <a href="main.html">Login</a>
    </div>

  </form>
  <div class="sign-txt">Not yet member? <a href="#">Signup now</a></div>
</div>

<script src="script.js"></script>

</body>

</html>
```

GITHUB AND PROJECT DEMO LINK

Github Link: <https://github.com/IBM-EPBL/IBM-Project-20486-1659720483>

Project Demo Link:

https://drive.google.com/file/d/12WnBFXjE0EQuwn1RAKYrU4WmBV_ZumKi/view?usp=share_link