Project Plan Presentation
United Airlines Training Forecast Model

The Capstone Experience
Team United Airlines Training
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Functional Specifications

• United Airlines training team will be able to use this application to ensure each station has sufficient line and base technicians to operate on the flights.

• The application will give a risk dashboard to display which station(s) are at greatest risk moving forward.

• Each station can also have a more detailed report pulled up to analyze risk on a by shifts and by fleet level.
Design Specifications

• The training forecast model will be built as a Web Application to help better forecast where training needs to be focused on during the right time across several United Hubs.
• With the use of the Web Application, the training team will be able to select and sort by various categories to view a forecast of the current technicians' training situation.
• The forecast will display the users the number of technicians as well as the potential understaff situation that could occur.
Screen Mockup: Overview Page

Overview:

EWR - Undertrained at BID Area 101, Shift Code 1, for 737MAX
May need 1 more technician

90%

IAD - Everything Looks Good!

100%

IAH - Undertrained at BID Area 102, Shift Code 3, for 777
Need several more technicians

50%

ORD - Everything Looks Good!

100%

SFO - Everything Looks Good!

100%
Screen Mockup: Training Forecast

Currently at Station EWR:

There is a slight issue

97%

Click below to view problem areas, or view all data.

<table>
<thead>
<tr>
<th>STATION</th>
<th>BID_AREA</th>
<th>SHIFT_CODE</th>
<th>737MAX</th>
<th>737NG</th>
<th>747</th>
<th>757</th>
<th>767</th>
<th>777</th>
<th>787</th>
<th>Airbus</th>
</tr>
</thead>
<tbody>
<tr>
<td>EWR</td>
<td>101</td>
<td>0</td>
<td>1</td>
<td>1</td>
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<td></td>
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<tr>
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<td>9</td>
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<td>9</td>
<td>5</td>
<td>2</td>
<td>8</td>
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</tbody>
</table>
Screen Mockup: Training Forecast

Currently at Station EWR:

Significant training may be required

54%

Click below to view problem areas, or view all data.

<table>
<thead>
<tr>
<th>Problem Areas</th>
<th>All Data</th>
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</thead>
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<td>STATION</td>
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<td>101</td>
</tr>
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<td>101</td>
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Screen Mockup: Training Forecast

Currently at Station EWR:

A great deal of training is required!!!

18%

Click below to view problem areas, or view all data.

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Screen Mockup: Prediction
Technical Specifications

• We store data on flight schedules and trained technicians in an Azure SQL Database
• Azure functions are responsible for ingesting this data and performing periodic analysis
• We use a Flask web server in Azure App Service to manage client authentication and serve the APIs for our frontend
• Analysis code is written in Python and can be reused by our server and our serverless functions
• User authentication will utilize Azure AD and its integration with other Azure services
• Our frontend client is written in TypeScript with the React framework
System Architecture

- Azure Functions (w/ Python)
  - Periodic analysis
  - Data ingest

- Azure SQL Database
  - Structured input data
  - Analysis results

- Azure App Service
  - Flask Python Server Framework
  - APIs for frontend
  - On-demand analysis
  - Client authentication

- React + TypeScript
  - Frontend client
  - Display analysis results and insights to users
System Components

• Cloud Services
  ▪ Azure App Service
    o PaaS offering that will host our backend server and serve our APIs
  ▪ Azure SQL DB
    o Microsoft compatible SQL database
    o Store structured input data and analysis results
  ▪ Azure Functions
    o Serverless functions, will use for periodic analysis and data ingest

• Software Platforms / Technologies
  ▪ React with TypeScript
    o Frontend JavaScript framework, will use with TypeScript for typing support
  ▪ Flask
    o Python framework for web server development
  ▪ Azure SDK for Python
  ▪ Python Data Science Libraries
    o Pandas, NumPy, etc. used for analysis

• Development Software
  ▪ Visual Studio Code
Risks

• Determine the number of necessary technicians for different bases
  ▪ Different airports have different amounts of traffic, and there is a lot of data to sort through to ensure the number is calculated correctly
  ▪ Request a walk-through on the document from the client and make sure all team members comprehend the format

• Connecting the backend with the frontend
  ▪ Connecting the two separate systems will be challenging, as they will be mostly developed independent of each other
  ▪ Devs on both sides will meet to live code integration. Some proof-of-concept API connections for testing should take place early in the process.

• Authentication of API Calls and Frontend Access
  ▪ Data we are handling is sensitive and should not be able to be seen by those unauthorized, and be held securely
  ▪ Will use Azure AD to authenticate users and rely on Azure App Service and other built-in features to ensure security
Questions?