# MICHIGAN STATE UNIVERSITY Project Plan Presentation Airport Capacity & Ground Management

#### The Capstone Experience

#### Team NetJets

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From Students... ...to Professionals

#### **Project Sponsor Overview**

- World's Leading Private Jet Company
- Sells Fractional Shares of Private Jets
- Leads a Fleet of Over 600 Planes



# **Project Functional Specifications**

- Problem:
  - Obtain real-time information on airport capacity and ground space
  - Affecting planning, resource allocation, & operational efficiency
- Overview:
  - Web application to monitor airport ground capacity
  - Real-time flight data integration
  - Capacity analysis using current & historical data
     Recommendation engine

# **Project Design Specifications**

- Standalone Web Application for Internal Use
- Homepage with Map View for Use in Scouting Airports
- Secondary Modals and Pages Expand on Airport Information and Include Simulation Capabilities

# Screen Mockup: Full Homepage



# Screen Mockup: Homepage with Sidebars Open

| Search     |               |           | Notifications  |              |
|------------|---------------|-----------|--|--------------|
| смн        | Optimal       | MINNESOTA | John Glen Columbus Internati<br>Airport is now at optimal capa | onal<br>city |
| LAX        | Underutilized |           | Gerald R Ford International Ai<br>is at overcapacity           | rport        |
| SFO<br>DRD | Optimal       | MISSOURI  | Los Angeles International Air<br>ow underutilized              | port is      |
| FK         | Underutilized | 00        | San Francisco International Al<br>is now at optimal capacity   | irport       |
| DEN        | Over Capacit  |           | John Glen Columbus Internati<br>Airport is now underutilized   | onal         |
| .GA        | Underutilized |           | 60 0 Denver International Airport                              | is at        |

# Screen Mockup: Airport Selection



# **Screen Mockup: Airport Simulation**

| -                       | ethels   World's seading Prise 3 | 1             |                               |   |                       |                                  |  |   |                        |             |      |
|-------------------------|----------------------------------|---------------|-------------------------------|---|-----------------------|----------------------------------|--|---|------------------------|-------------|------|
| 2.5                     | 0 \$ netjets.com/m               | uh/           |                               |   |                       |                                  |  |   |                        | *           | 1    |
| ) KTEB Flight Simulator |                                  | KTEB Capacity |                               | nce Tail Number 1/                            |                       | Armai Firm<br>1 / 25 / 2025 23:2 | Armal Time Bank<br>1 / 25 / 2025 23 22 |   | Type Northe<br>CL-650S | 505         |      |
| Atla                    | ntic Aviation                    |               | FBO Capacity<br>10/12         | <ul> <li>Deperting</li> <li>Parked</li> </ul> |                       | FBO<br>Atlantic Aviation V       | Local Time<br>1 / 25 / 2025 23 23      |   | Large                  | KEGE        |      |
|                         | Tail Number                      | Status        | Type N                        | ame   | Next Ev               | ent                              |  |   | ALERTS                 | θ.          |      |
|                         | N246Q5                           | Parkad        | CL-8505                       |   | 2/3/2025 11 15:00     |                                  |  | Move Recomendations                         |                        |             |      |
|                         | N246QS                           | Parked        | CL-6505                       |   | 2/3/2025 11:15:00     |                                  |  | Tail Nor                                    |                        | Next Even   | nt.  |
|                         | N246QS                           | Departing     | CL-650S                       |   | 2/3/2025 11:15:00     |                                  |  | N246Q5                                      | Parked                 | 2/10/2025   |      |
|                         | N246QS                           | Parked        | CL-6503                       |   | 2/3/2025 11:15:00     |                                  |  | N114QS                                      | Parked                 | 1730/2028   | 5 4  |
|                         | N246QS                           | Departing     | CL-8505                       | 3L-8505 2 / 3 / 2025 11:15:00                 |                       |                                  | - <b>R</b> (                           | N129Q5                                      | Parked                 | 1/30/2025   | 5.4  |
|                         | N246QS                           | Parked        | CL-6505 2 / 3 / 2625 11:15:00 |   |                       |                                  |  | Not Schedulert Until 1 / 30 / 2025 14 30:00 |                        |             |      |
|                         | N246QS                           | Parked        | CL-6505                       |   | 2/3/2025              | 5 11:15:00                       |  |   |                        |             |      |
|                         | N246QS                           | Parked        | CL-6505                       |   | 2/3/2025              | 11:15:00                         |  |   |                        |             |      |
|                         | N246QS                           | Parked        | CL-650S                       |   | 2/3/2025              | 5 11-15:00                       |  |   |                        |             |      |
|                         | N246QS                           | Parked        | CL-6505                       |   | 2/3/202               | 5 11:15:00                       |  |   |                        |             |      |
|                         | N2460S                           | Parked        | CL-6505                       |   | 2/3/2025              | 5 11:15:00                       |  | 1000000                                     |                        |             |      |
|                         | N246QS                           | Parked        | CL-6805                       |   | 2 / 3 / 2025 11:15:00 |                                  |  | N246Q5                                      | Parked                 | 17-307-2025 | 1.14 |
|                         | N246QS                           | Parked        | CL-8505                       |   | 2/3/2020              | 5 11:15:00                       |  |   | 2 VOIDE                | 1.000.0000  |      |
|                         | N246QS                           | Parked        | CL-8508                       |   | 2/3/2025              | 5 11:15:00                       |  |   |                        |             |      |
|                         | N246QS                           | Parked        | CL-6505                       |   | 2/3/2025              | 5 11:15:00                       |  |   |                        |             |      |
|                         | N246Q5                           | Parked        | CL-8505                       |   | 2/3/202               | 5 11 15:00                       |  |   |                        |             |      |
|                         | N246QS                           | Maintenano    | e CL-8508                     |   | 2/3/2025              | 5 11:15:00                       |  |   |                        |             |      |
|                         | N246QS                           | Maintenano    | e CL-6505                     |   | 2/3/2021              | 5 11:15:00                       |  |   |                        |             |      |

# **Project Technical Specifications**

- Amazon Web Services
- React Framework
- Languages used for development (JS, CSS, HTML)
- Authentication using NetJets Okta login

# **Project System Architecture**



### **Project System Components**

- Software Platforms / Technologies
  - AWS Amplify
  - Amazon API Gateway
  - AWS Lambda
  - Amazon RDS
  - Google Maps API
  - JavaScript
  - Express.js Framework
  - React.js Framework
  - Node.js Framework
  - Okta SDK

# **Project Risks**

#### Constant Data Updates

- Currently, the client utilizes airframe specification from an excel sheet from the FAA that occasionally updates by creating a new sheet
- Discussing with our client the best path forward for creating a workflow that would allow us to update the data periodically. Otherwise, we could use data scraping techniques on the FAA website.
- Parking Area Locations and Access
  - We have not found a database that accurately depicts all airport parking coordinates for US-based airports
  - Continue to engage the client about that data. Otherwise, satellite imagery could provide insights to make estimates

#### Determining Parking Dimensions

- The application needs to consider the dimensions of parking areas at airports across the country and determine capacity and parking strategies based on parking lot and airplane dimensions.
- Could be done using Google Maps' distance measure feature and grouping airlines based on their size to efficiently determine parking lot availability
- Recommendation Engine
  - Designing an effective algorithm to generate recommendations based on variables like aircraft type and parking zones.
  - Working with NetJets to determine most important influences to reduce over-reliance on less important factors.



# **Questions?**

