



American  
Airlines

U.S. Domestic Route Performance

Q1

2025

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# Project Objective

- Built an interactive Tableau dashboard simulating the responsibilities of a Revenue Management Development Analyst at American Airlines
- Analyzed Q1 2025 route-level metrics such as Load Factor, ASM, Revenue per Pax, and total estimated revenue
- Dashboard supports exploratory insights around route profitability, efficiency, and volume
- Designed to demonstrate core RM competencies data-driven decision-making, visualization, and commercial analysis

**Note:** All analysis is based on publicly available data not proprietary American Airlines systems

# Data Sources

- **DB1B Ticket (Bureau of Transportation Statistics):**  
Provided itinerary-level passenger counts, fare paid, and coupon counts.
- **DB1B Coupon:** Detailed segment-level origin-destination (OD) pairs within itineraries.
- **T-100 Domestic Segment (U.S. Carriers Only):**  
Provided flight-level data including passengers flown, seats, and number of departures per OD.
- **Supplementary:** Airport coordinates dataset (publicly scraped) for mapping.
- Data represents a subset of the full AA network and has been cleaned and aggregated for modeling purposes



# Data Processing Workflow in R

01	02	03	04	05	06
<b>Filtered/Cleaned Data</b> Filtered and cleaned data for American Airlines across all datasets	<b>Merged Datasets</b> Merged coupon with ticket to distribute itinerary fare across segments.	<b>Aggregated</b> Aggregated coupon to calculate estimated revenue per route.	<b>Joined T100</b> Joined with T-100 to get actual flown passengers, seats, and departures.	<b>Created Final Dataset</b> Created final KPI dataset (route_final) including calculated metrics like Revenue, Load Factor, etc.	<b>Joined Airport Data</b> Joined airport coordinates to enable geographic visualizations in Tableau.

# Summary KPIs

- **Total Revenue: \$467M**
- **Average Fare per Pax: \$40.04**
- **Load Factor: 78.9%**
- **Total Pax Flown: 29.8M**
- **Total Flights: 223K**

## Calculation

- Route Revenue: Estimated from segment fare × passengers booked.
- Route Pax (T-100): Actual passengers flown.
- Load Factor: Flown passengers / Available seats.
- Drop-Off Rate: (Booked Pax - Flown Pax) / Booked Pax.
- ASM (Available Seat Miles): Seats × Distance.
- RASM (Revenue / ASM): Retained only where logical.

# Route Network MapKey Observations



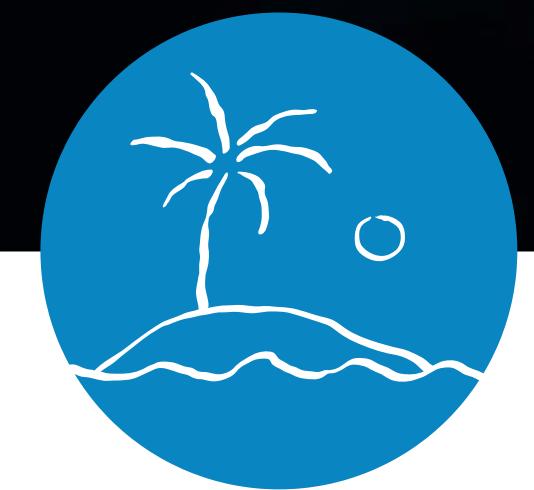
## Major Hubs

Major hubs (DFW, PHX, LAX) serve as critical connection points.



## Route Concentration

Dense route concentration on East Coast and Southeast U.S.



## Expanded Reach

Reach includes Alaska and Caribbean, showing market diversification.

### Strategic Note:

- Visualizes flight frequency and route breadth.
- Helps identify underutilized or non-centralized routes for further review.

# Key Route Level Insights

01

## High Performance Routes

### DFW–PHX

- 178,000+ passengers
- 850+ load factor
- ~1,090 flights
- Strong demand + efficient seat fill

### DFW–LAX

- ~1,130 flights (DFW→LAX), ~1,120 (LAX→DFW)
- Load factor around 78–79%
- Heavy hub-to-hub frequency

02

## Top Revenue Routes

### Highest Revenue per Passenger

#### MSY–LAX:

- \$940 per pax
- High-yield leisure/business blend

### Highest Total Route Revenue

#### MCO–DFW:

- \$2.81 million
- Strong overall contribution to bottom line

03

## Largest Capacity Deployment

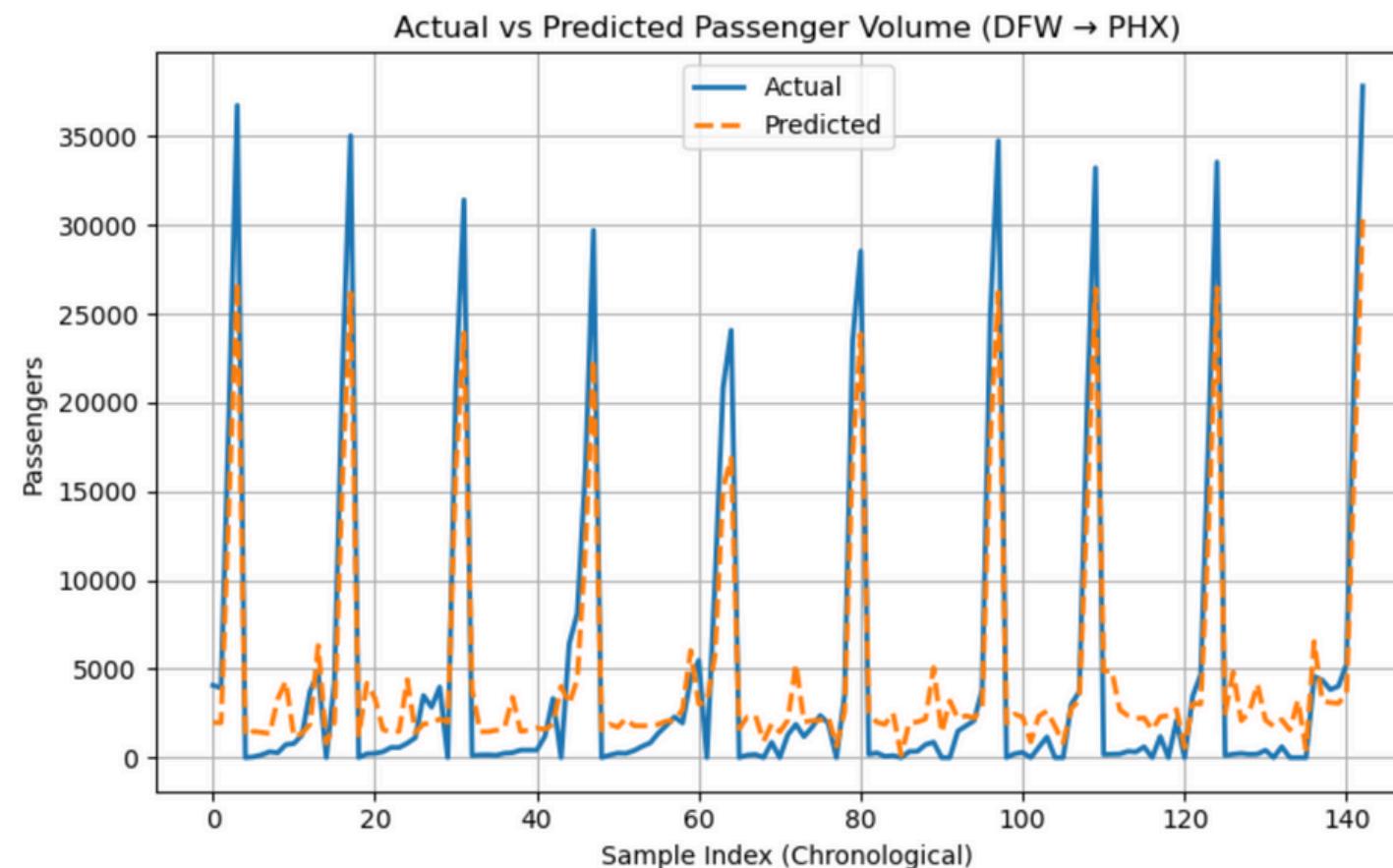
### DFW–LAX

- Over 304 billion seat-miles (ASM)
- Largest commitment of capacity, high strategic value

# Route-Level Passenger Prediction

## Machine Learning Model

- Built a neural network model (Multi-Layer Perceptron) to predict passenger volumes based on route-level metrics
- Trained on historical AA data – validated using:
  - $R^2$  Score (explained variance)
  - Median Absolute Error
  - Mean Absolute Percentage Error
- Forecast accuracy showcased on high-traffic routes like DFW–PHX, DFW–JFK, LAX–LAS



- ✓ Results for route DFW → PHX:
- 1234  $R^2$  Score: 0.8874
- Bar Chart Median Absolute Error: 1655.01
- Line Graph Mean Absolute Percentage Error: 458.90%

# Route Opportunity Insights

This supports RM planning by identifying where to grow, where to optimize, and where to monitor all using a custom development layer.

Metric	Description	Key Value
<b>Route Opportunity Score</b>	Composite score combining missed revenue, load factor, and route volume	Highlighted Top 10 Routes
<b>Missed Revenue Estimate</b>	Estimated revenue lost due to demand exceeding supply	Up to <b>\$2.1M</b> on certain routes
<b>Flag Map of Underutilized Routes</b>	Visual marker on dashboard showing flagged routes with <80% load factor or high drop-off	Interactive in Dashboard

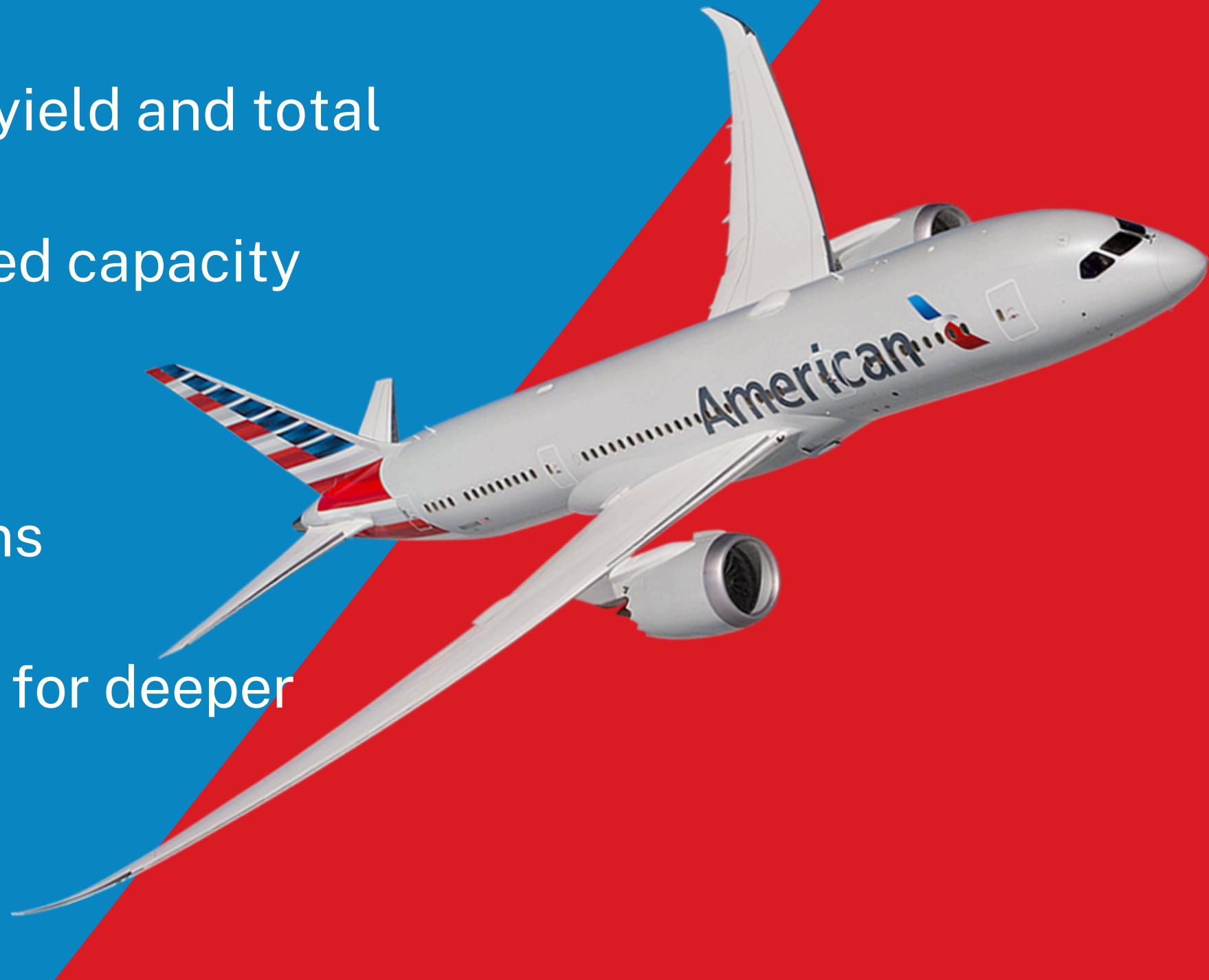
# Summary

## Key Takeaways

- Routes like DFW-PHX and DFW-LAX demonstrate strong volume and operational consistency.
- MSY-LAX and MCO-DFW stand out for high yield and total revenue, respectively.
- Load factor and ASM metrics support targeted capacity planning.

## Future Outlook

- Extend to other quarters for seasonal patterns
- Benchmark against competitor carriers
- Integrate cancellation rates and fare classes for deeper insights



# Thank you!

Appreciate your time reviewing this project.  
Would love the opportunity to contribute to  
Revenue Management at American Airlines  
someday.

