Business Problem Statement — Flight Price Analytics (Travel-Planner App)

Context

Users of our travel-planner app often don't know when to book is better. Prices swing with seasonality, lead time, weekends/holidays, and fare class. Without guidance, users either abandon searches or overpay, which hurts **conversion**, **trust**, and **retention**.

Problem

We lack route-level, time-series price intelligence to: (1) advise "Buy now" vs "Wait", (2) detect unusual spikes/drops, and (3) highlight high-volatility routes for targeting. Result: static price display, no actionable advice, limited marketing timing, and no alerting when prices become favorable.

> **Business Question:** How can we use route-level daily price data to forecast near-term moves and give simple, trustworthy Buy/Wait guidance that improves conversion while building user trust?

Deliverables

1. **Data Preparation:** Clean & dedupe; standardize currency; compute lead_time_days = depart_date – search_date; tag DOW/DOM/month/holidays.
2. **Data Analysis (SQL):** Build views: route_day, volatility, anomalies, buy_wait_rules (alerts). Aggregate by **route × lead-time band** for KPIs.
3. **Modeling & Backtesting (Python):** Baselines (7-day, seasonal-naive) + ARIMA/Prophet (per-route or pooled); rolling backtests; metrics (MAE/MAPE); hypothesis tests (weekend/holiday, ≤14d vs >14d).
4. **Buy/Wait ML Model (Python, scikit-learn):** Frame Buy vs Wait as a supervised classification problem; train logistic regression and random-forest models with time-based validation; report ROC AUC and precision/recall; expose a simple buy_or_wait() helper for the app.
5. **Visualization & Insights (Power BI):** Pages—Route Overview, Forecast vs Actual, Lead-Time Price Curves, Alerts & Playbook; slicers for route, cabin/class, lead-time, holiday.
6. **Report & Presentation:** One-page Business Problem Statement + results (headline accuracy, sample alerts); short slide/PDF; brief A/B test plan.
7. **GitHub Repository:** Well-structured /sql, /python, /powerbi, /docs; concise README linking to one-pagers and dashboard exports.