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-- Airline Business Intelligence Database
-- PostgreSQL 16+ DDL - Empty schema with constraints
-- Save as: sql/001_schema.sql

BEGIN;

-- Optional: put everything in its own schema
CREATE SCHEMA IF NOT EXISTS airline;
SET search_path TO airline, public;

-- ===== ENUM TYPES =====
DO $$
BEGIN
    IF NOT EXISTS (SELECT 1 FROM pg_type WHERE typename = 'flight_status') THEN
        CREATE TYPE flight_status AS ENUM
('Scheduled', 'Departed', 'Arrived', 'Cancelled', 'Diverted');
    END IF;

    IF NOT EXISTS (SELECT 1 FROM pg_type WHERE typename = 'payment_method') THEN
        CREATE TYPE payment_method AS ENUM ('Card', 'Points', 'Voucher', 'Cash');
    END IF;

    IF NOT EXISTS (SELECT 1 FROM pg_type WHERE typename = 'payment_status') THEN
        CREATE TYPE payment_status AS ENUM ('Authorized', 'Captured', 'Refunded', 'Failed');
    END IF;

    IF NOT EXISTS (SELECT 1 FROM pg_type WHERE typename = 'loyalty_tier') THEN
        CREATE TYPE loyalty_tier AS ENUM ('Basic', 'Silver', 'Gold', 'Platinum');
    END IF;

    IF NOT EXISTS (SELECT 1 FROM pg_type WHERE typename = 'miles_txn_type') THEN
        CREATE TYPE miles_txn_type AS ENUM ('EARN', 'REDEEM', 'ADJUST');
    END IF;
END$$;

-- ===== REFERENCE TABLES =====
CREATE TABLE IF NOT EXISTS airports (
    airport_id        BIGSERIAL PRIMARY KEY,
    iata_code         VARCHAR(3) UNIQUE,
    icao_code          VARCHAR(4) UNIQUE,
    name              TEXT NOT NULL,
    city              TEXT,

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country          TEXT,
latitude         NUMERIC(8,5),
longitude        NUMERIC(8,5),
timezone         TEXT,
CONSTRAINT chk_airports_lat CHECK (latitude BETWEEN -90 AND 90),
CONSTRAINT chk_airports_lon CHECK (longitude BETWEEN -180 AND 180)
);

CREATE TABLE IF NOT EXISTS airlines (
  airline_id      BIGSERIAL PRIMARY KEY,
  name           TEXT NOT NULL,
  iata_code       VARCHAR(3) UNIQUE,
  icao_code        VARCHAR(3) UNIQUE,
  country         TEXT
);

CREATE TABLE IF NOT EXISTS aircraft (
  aircraft_id     BIGSERIAL PRIMARY KEY,
  manufacturer     TEXT,
  model           TEXT NOT NULL,
  seat_capacity    INT NOT NULL CHECK (seat_capacity > 0),
  tail_number     TEXT UNIQUE
);

-- Routes represent a carrier + origin + destination (schedule-level concept)
CREATE TABLE IF NOT EXISTS routes (
  route_id        BIGSERIAL PRIMARY KEY,
  airline_id       BIGINT NOT NULL REFERENCES airlines(airline_id),
  origin_airport_id BIGINT NOT NULL REFERENCES airports(airport_id),
  destination_airport_id BIGINT NOT NULL REFERENCES airports(airport_id),
  distance_nm      INT CHECK (distance_nm >= 0),
  CONSTRAINT uq_routes UNIQUE (airline_id, origin_airport_id, destination_airport_id),
  CONSTRAINT chk_route_diff_airports CHECK (origin_airport_id <>
destination_airport_id)
);

-- ===== CORE TRANSACTIONAL TABLES =====
CREATE TABLE IF NOT EXISTS flights (
  flight_id       BIGSERIAL PRIMARY KEY,
  airline_id       BIGINT NOT NULL REFERENCES airlines(airline_id),
  aircraft_id      BIGINT NOT NULL REFERENCES aircraft(aircraft_id),
  route_id         BIGINT REFERENCES routes(route_id),

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origin_airport_id    BIGINT NOT NULL REFERENCES airports(airport_id),
destination_airport_id BIGINT NOT NULL REFERENCES airports(airport_id),
flight_number        TEXT  NOT NULL,
flight_date          DATE  NOT NULL,
scheduled_departure_utc TIMESTAMP NOT NULL,
scheduled_arrival_utc  TIMESTAMP NOT NULL,
actual_departure_utc  TIMESTAMP,
actual_arrival_utc    TIMESTAMP,
delay_minutes         INT,
delay_cause           TEXT,
status               flight_status NOT NULL DEFAULT 'Scheduled',
CONSTRAINT uq_flight_instance UNIQUE (airline_id, flight_number, flight_date),
CONSTRAINT chk_sched_times CHECK (scheduled_departure_utc < scheduled_arrival_utc)
);

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-- Passengers with demographics

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CREATE TABLE IF NOT EXISTS passengers (
    passenger_id    BIGSERIAL PRIMARY KEY,
    first_name      TEXT NOT NULL,
    last_name       TEXT NOT NULL,
    email           TEXT UNIQUE,
    gender          TEXT,
    age_group       TEXT,
    state_or_country TEXT,
    created_at      TIMESTAMP NOT NULL DEFAULT NOW()
);

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-- Simple model: one booking per passenger & flight

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CREATE TABLE IF NOT EXISTS bookings (
    booking_id      BIGSERIAL PRIMARY KEY,
    passenger_id    BIGINT NOT NULL REFERENCES passengers(passenger_id),
    flight_id       BIGINT NOT NULL REFERENCES flights(flight_id),
    booking_date    TIMESTAMP NOT NULL,
    fare_class      TEXT,
    base_price_usd  NUMERIC(10,2) CHECK (base_price_usd >= 0),
    booking_channel TEXT,
    CONSTRAINT uq_booking_unique UNIQUE (passenger_id, flight_id)
);

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CREATE TABLE IF NOT EXISTS payments (
    payment_id      BIGSERIAL PRIMARY KEY,
    booking_id      BIGINT NOT NULL REFERENCES bookings(booking_id) ON DELETE CASCADE,

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amount_usd      NUMERIC(10,2) NOT NULL CHECK (amount_usd >= 0),
method          payment_method NOT NULL,
status          payment_status NOT NULL,
paid_at         TIMESTAMP NOT NULL
);

CREATE TABLE IF NOT EXISTS loyalty_accounts (
    loyalty_id    BIGSERIAL PRIMARY KEY,
    passenger_id  BIGINT NOT NULL UNIQUE REFERENCES passengers(passenger_id) ON DELETE
CASCADE,
    tier          loyalty_tier NOT NULL DEFAULT 'Basic',
    miles_balance INT NOT NULL DEFAULT 0 CHECK (miles_balance >= 0),
    enrolled_at  TIMESTAMP NOT NULL DEFAULT NOW()
);

CREATE TABLE IF NOT EXISTS miles_transactions (
    miles_txn_id  BIGSERIAL PRIMARY KEY,
    loyalty_id    BIGINT NOT NULL REFERENCES loyalty_accounts(loyalty_id) ON DELETE
CASCADE,
    flight_id     BIGINT REFERENCES flights(flight_id),
    txn_type      miles_txn_type NOT NULL,
    miles_delta   INT NOT NULL,
    posted_at     TIMESTAMP NOT NULL DEFAULT NOW()
);

-- Optional: audit table for aircraft swaps
CREATE TABLE IF NOT EXISTS flight_changes (
    change_id     BIGSERIAL PRIMARY KEY,
    flight_id     BIGINT NOT NULL REFERENCES flights(flight_id) ON DELETE CASCADE,
    old_aircraft_id BIGINT REFERENCES aircraft(aircraft_id),
    new_aircraft_id BIGINT REFERENCES aircraft(aircraft_id),
    reason        TEXT,
    changed_at    TIMESTAMP NOT NULL DEFAULT NOW()
);

-- ===== INDEXES =====
CREATE INDEX IF NOT EXISTS idx_flights_date_route ON flights (flight_date,
route_id);
CREATE INDEX IF NOT EXISTS idx_flights_airline_num ON flights (airline_id,
flight_number, flight_date);
CREATE INDEX IF NOT EXISTS idx_routes_od ON routes (origin_airport_id,
destination_airport_id);

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CREATE INDEX IF NOT EXISTS idx_bookings_passenger ON bookings (passenger_id);
CREATE INDEX IF NOT EXISTS idx_payments_booking ON payments (booking_id);
CREATE INDEX IF NOT EXISTS idx_miles_loyalty ON miles_transactions
(loyalty_id);
CREATE INDEX IF NOT EXISTS idx_loyalty_passenger ON loyalty_accounts
(passenger_id);
CREATE INDEX IF NOT EXISTS idx_airports_codes ON airports (iata_code,
icao_code);

COMMIT;

-- ===== COMMENTS =====
COMMENT ON SCHEMA airline IS 'Schema for Airline Business Intelligence Database (DTSC
691 Capstone)';
COMMENT ON TABLE flights IS 'Flight instances by date; join to
routes/airports/airlines for network analytics';
COMMENT ON TABLE bookings IS 'Simple 1:1 passenger-to-flight bookings; extend to PNR
header + booking_passengers if needed';
COMMENT ON TABLE miles_transactions IS 'Immutable audit of loyalty miles
earn/redeem/adjust events';

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