Airline Customer Support System

Problem Statement – 2

Airline customer service needs to handle **diverse customer requests efficiently**, such as flight status, cancellations, seat availability, or policy questions.

We **need a system that automatically executes all required tasks** for each request — collecting details, calling airline APIs, retrieving policies, and responding — to ensure **fast, accurate, and consistent service**.

The Solution

An Intelligent, Automated Backend

Automated Intent Recognition: Accurately understands customer requests using **Google Gemini AI**, including multi-intent detection and entity extraction (PNR, flight numbers, dates).

- **Dynamic Task Orchestration:** Automatically executes multi-step workflows, such as booking retrieval, policy checks, cancellation fee calculation, and refund processing.
- **Centralized Policy Management:** Maintains a single source of truth for all airline policies, ensuring consistent and up-to-date responses.
- **Scalable Architecture:** Designed to support with configurable workflows, enabling seamless scaling and high availability.

Tech Stack

1. **Frontend (React UI)**

Customer-facing chat interface.
Admin panel for system configuration.

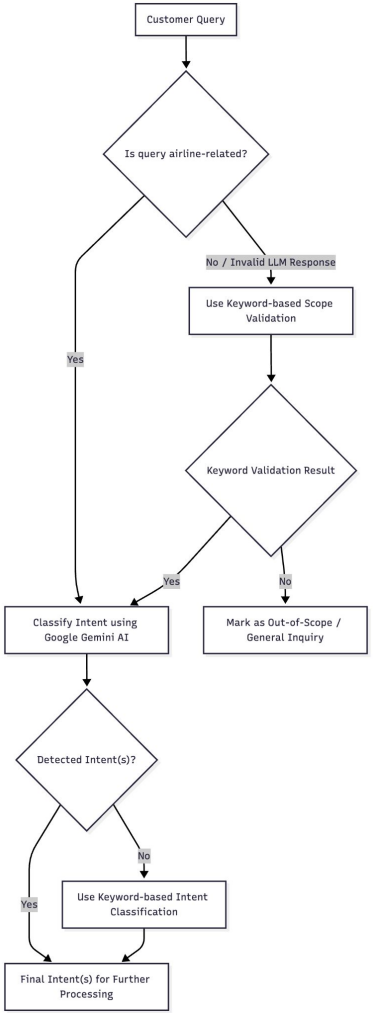
2. **Backend (FastAPI)**

- API Routers: Handle Customer, Airline, and Admin requests.
- Service Layer:
  - Intent Classifier (Gemini AI): Understands the query.
  - Task Orchestrator: Executes the correct workflow.
  - Airline & Policy Services: Contain the business logic.
- Data Layer (SQLAlchemy): Manages database communication.

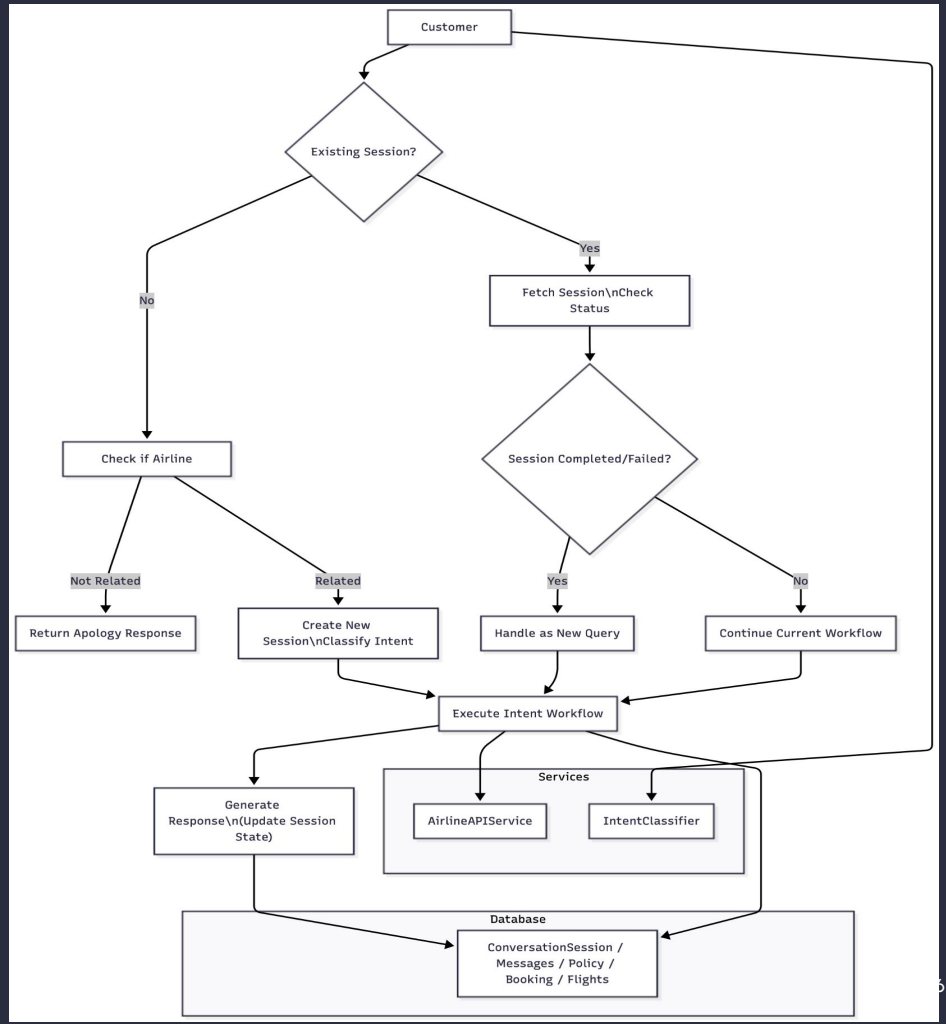
3. **Database (PostgreSQL)**

Stores all data: flights, bookings, seats, policies, and conversation logs.

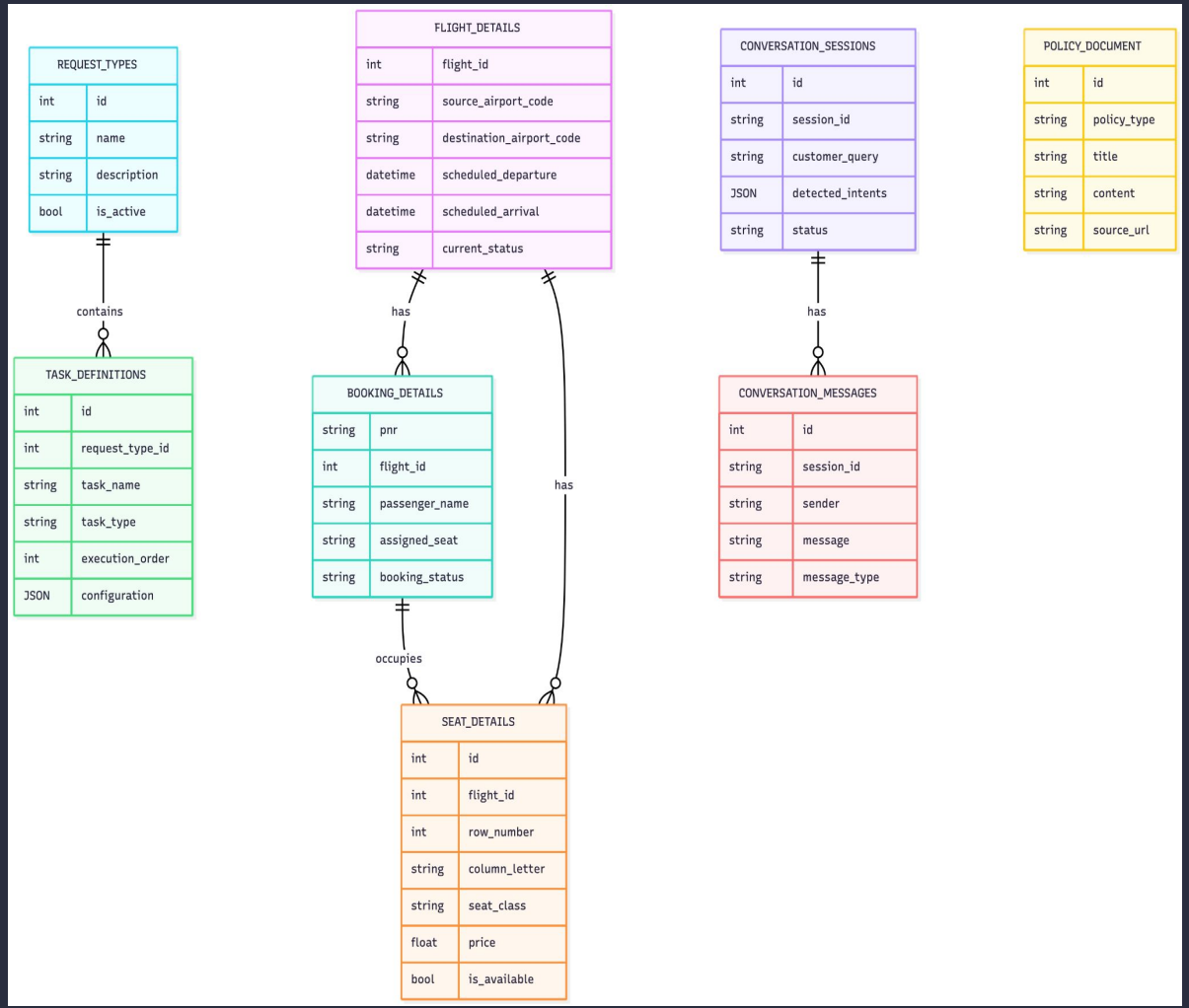
Intent Classification

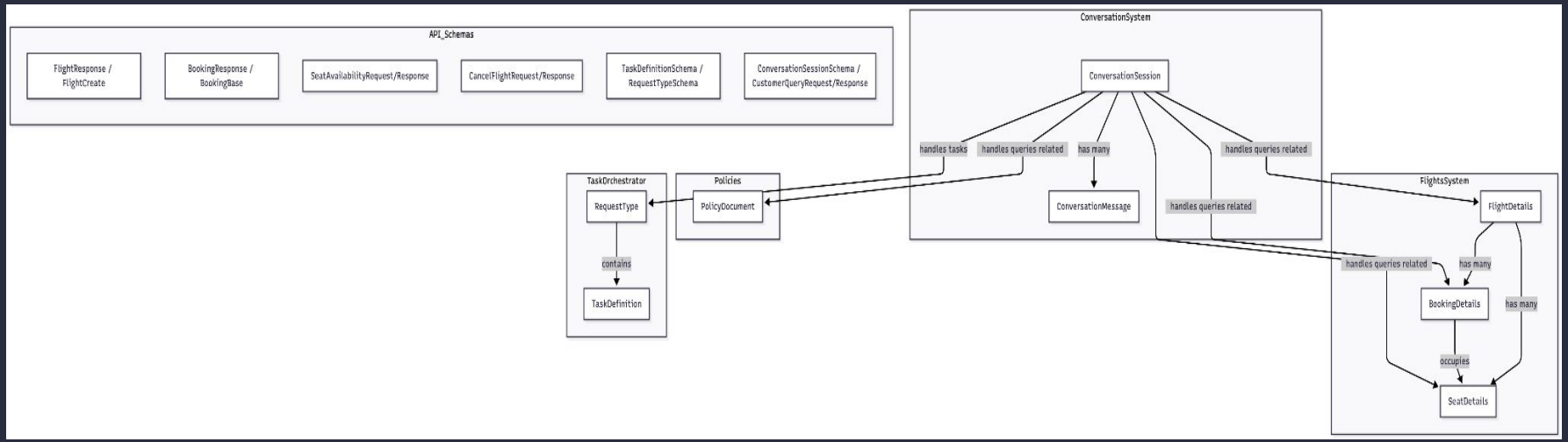


Task Orchestrator

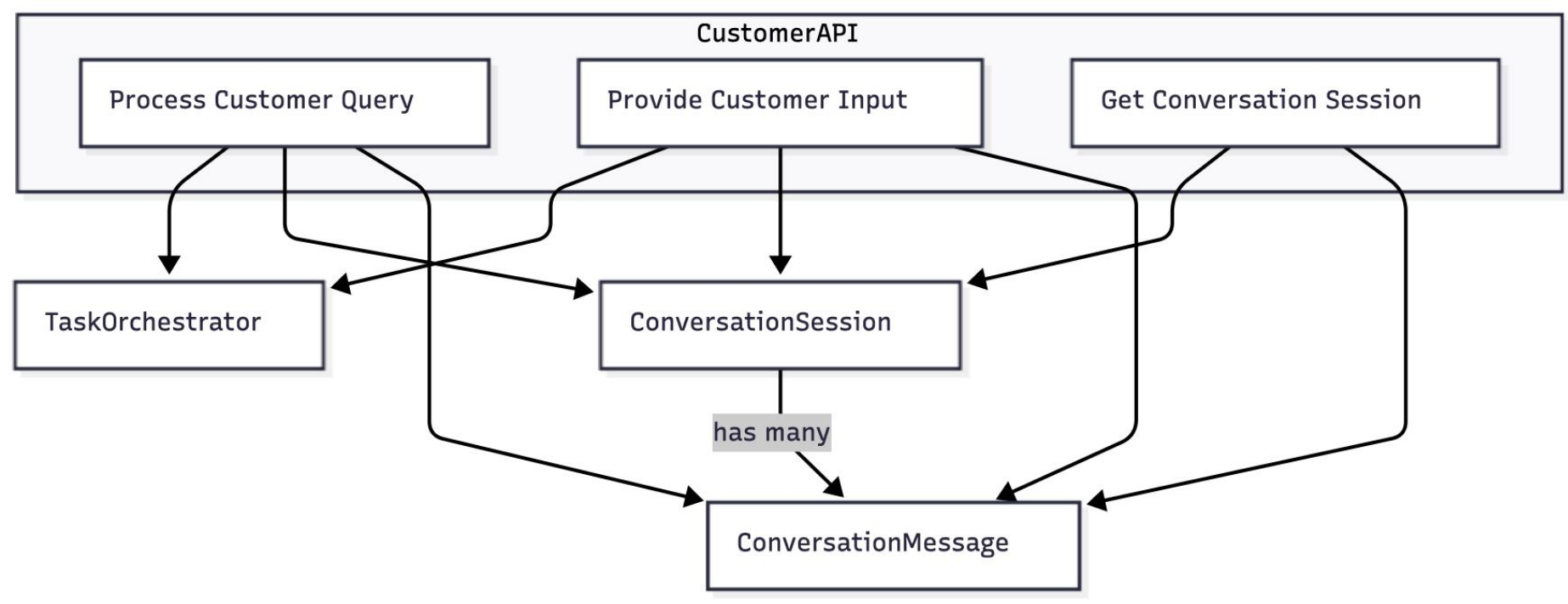


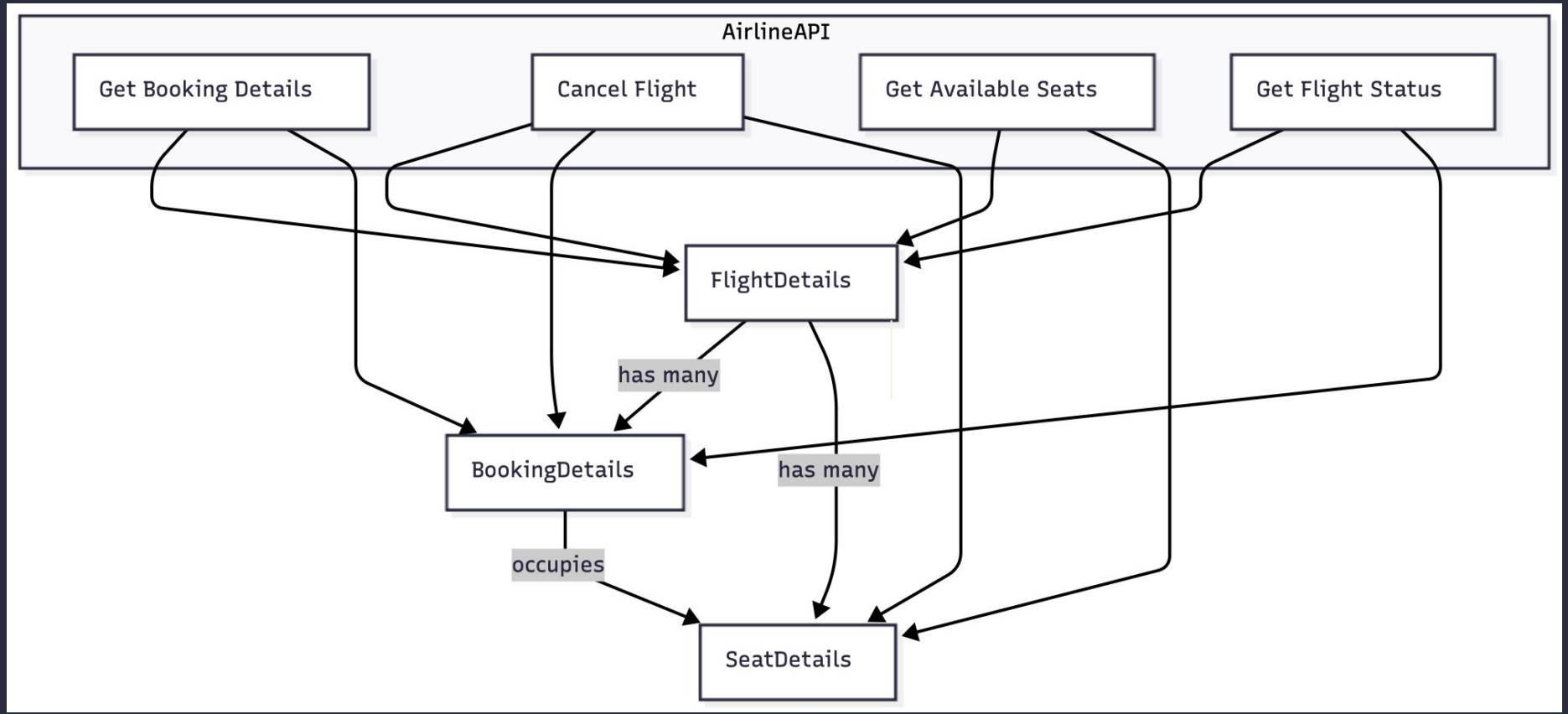
Database

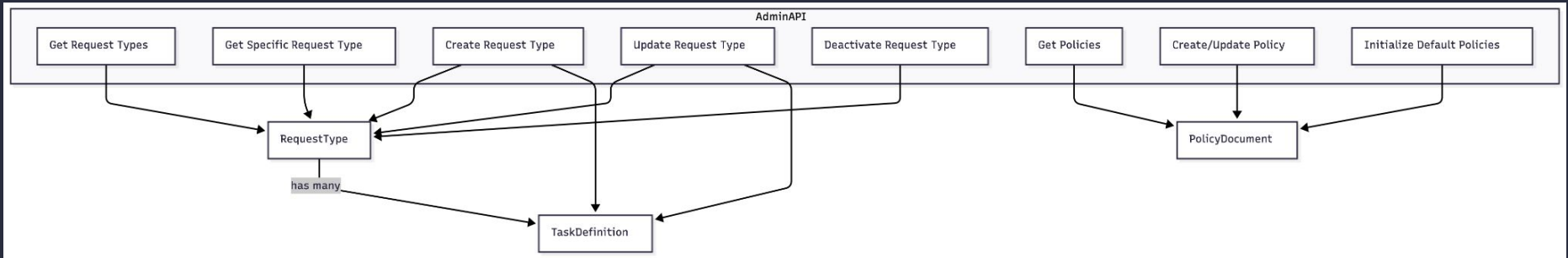

REQUEST_TYPES
int id
string name
string description
bool is_active
contains
TASK_DEFINITIONS
int id
int request_type_id
string task_name
string task_type
int execution_order
JSON configuration
FLIGHT_DETAILS
int flight_id
string source_airport_code
string destination_airport_code
datetime scheduled_departure
datetime scheduled_arrival
string current_status
has
BOOKING_DETAILS
string pnr
int flight_id
string passenger_name
string assigned_seat
string booking_status
occupies
has
SEAT_DETAILS
int id
int flight_id
int row_number
string column_letter
string seat_class
float price
bool is_available
CONVERSATION_SESSIONS
int id
string session_id
string customer_query
JSON detected_intents
string status
has
CONVERSATION_MESSAGES
int id
string session_id
string sender
string message
string message_type
POLICY_DOCUMENT
int id
string policy_type
string title
string content
string source_url


API_Schemas
FlightResponse / FlightCreate
BookingResponse / BookingBase
SeatAvailabilityRequest/Response
CancelFlightRequest/Response
TaskDefinitionSchema / RequestTypeSchema
ConversationSessionSchema / CustomerQueryRequest/Response
ConversationSystem
ConversationSession
handles tasks
handles queries related
has many
handles queries related
ConversationMessage
handles queries related
TaskOrchestrator
RequestType
contains
TaskDefinition
Policies
PolicyDocument
FlightsSystem
FlightDetails
handles queries related
has many
BookingDetails
has many
occupies
SeatDetails

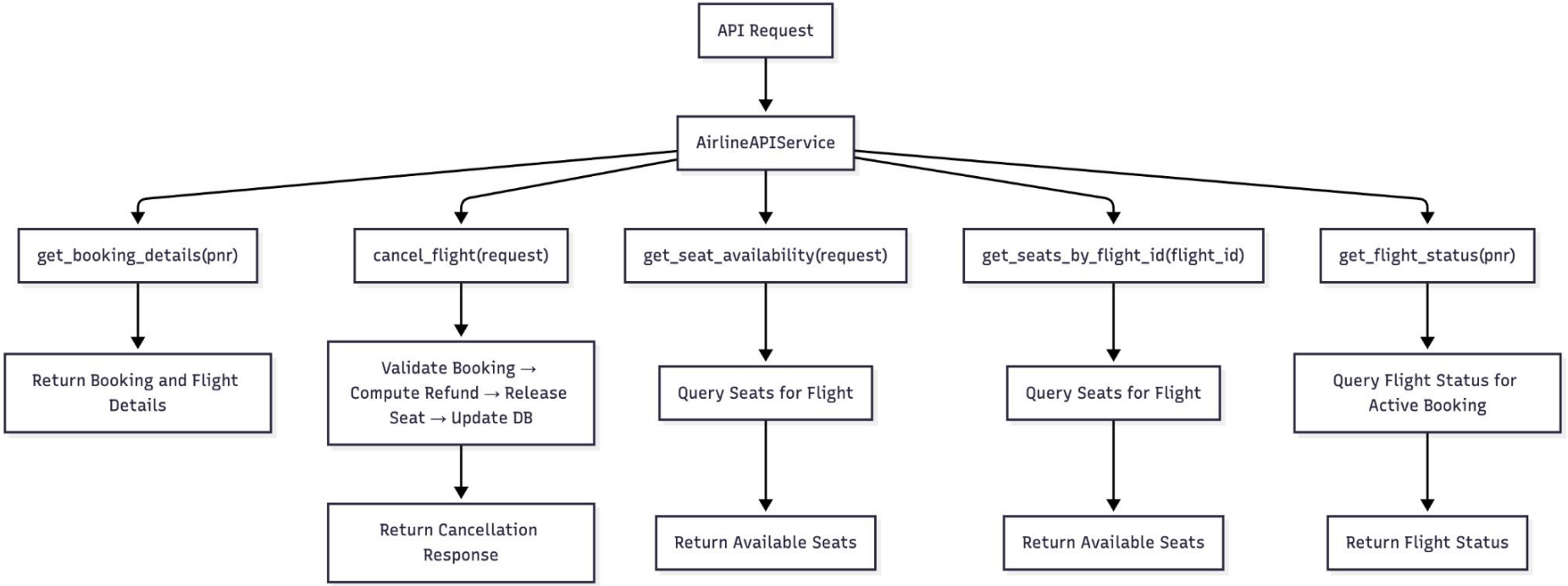
API Endpoints and Services




AirlineAPI
Get Booking Details
Cancel Flight
Get Available Seats
Get Flight Status
FlightDetails
has many
BookingDetails
has many
occupies
SeatDetails


AdminAPI
Get Request Types
Get Specific Request Type
Create Request Type
Update Request Type
Deactivate Request Type
Get Policies
Create/Update Policy
Initialize Default Policies
RequestType
PolicyDocument
has many
TaskDefinition

Airline API – Core Operations



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