Full-Stack SDE Intern Assignment — Technical Documentation

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Assignment: Travel Itinerary Backend System

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# Overview

This assignment focused on building a backend system using FastAPI and SQLAlchemy to manage and recommend travel itineraries. The solution includes a robust database schema, RESTful APIs for CRUD operations, and a recommendation endpoint that provides itineraries based on trip duration.

# Step-by-Step Implementation

## Project Initialization

Created a virtual environment and initialized the project using FastAPI. Installed required packages: fastapi, uvicorn, sqlalchemy, and pydantic. Structured the project into modules for models, schemas, routers, and main application.

## Database Design (SQLAlchemy ORM)

Defined models for Itinerary, Day, Hotel, Transfer, and Activity. Added constraints, cascading deletes, and indexing.

## Database Seeding

Developed a custom script (seed.py) to populate the database with realistic itineraries in Phuket and Krabi.

## API Development

Built RESTful endpoints: POST /itineraries, GET /itineraries, and GET /recommendations/{nights}. Used Pydantic for validation and implemented error handling.

## Testing & Documentation

Verified functionality using Swagger UI and wrote example request/response formats in README.md.

# Key Design Choices

- Normalized Data Structure to reduce redundancy.  
- Day-wise Modular Structure for flexibility.  
- Pre-seeded Recommendations categorized by trip length.

# Assumptions Made

- Trips are based in Thailand (Phuket/Krabi).  
- Activities, transfers, and hotels are per day.  
- Night count equals the number of Day entries.  
- The user is a travel planner/admin.

# Challenges Encountered & Solutions

## Nested Model Validation

FastAPI required validation for complex nested inputs. Solution: Defined recursive Pydantic models.

## Data Population

Manual creation of realistic data was time-consuming. Solution: Used functions to generate entries.

## Maintaining Referential Integrity

Issues with cascading deletes. Solution: Enabled cascade='all, delete' in relationships.

# Final Notes

- Components are modular and scalable.  
- Swagger provides endpoint documentation.  
- Project is organized and ready for deployment.