ANALYSIS REPORT

GUIDE

(Guided User Itinerary & Destination Explorer)

A Personalized Tour Recommendation and Guidance System

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Contents

1 INTRODUCTION

GUIDE (Guided User Itinerary & Destination Explorer) is a context-aware travel planning and guidance platform designed to support personalized itinerary generation for cultural and historical travel within Turkey. The system addresses the fragmentation of existing travel planning tools, where users must rely on multiple disconnected applications for navigation, research, and contextual information.

GUIDE integrates route optimization, point-of-interest (POI) recommendation, and multilingual content delivery into a unified platform. The system utilizes OpenStreetMap (OSM) [1] for geospatial data, Open Source Routing Machine (OSRM) [2] for route calculation, and the ElevenLabs API [3] for multilingual text-to-speech functionality. By considering user preferences such as trip duration, daily distance constraints, and POI categories, GUIDE generates optimized multi-day itineraries supported by interactive map visualization and audio guidance in Turkish, English, and German.

2 CURRENT SYSTEM

As of January 2026, the GUIDE system is in the documentation and design phase of development. The system has not yet been implemented or deployed. Therefore, this section is left empty.

3 PROPOSED SYSTEM

3.1 Overview

GUIDE (Guided User Itinerary & Destination Explorer) is proposed as an integrated, context-aware travel planning platform that addresses the fundamental limitations of existing fragmented solutions. The system combines intelligent route generation, preference-aware POI recommendations, interactive map visualization, and multilingual audio guidance within a unified web-based interface. The core innovation lies in integrating multiple technologies and data sources to provide comprehensive trip planning support. Unlike existing tools, GUIDE is designed to minimize planning effort while maximizing trip quality.

3.1.1 System Architecture

GUIDE is designed using a layered architectural approach that aims to keep system responsibilities clearly separated while supporting scalability and maintainability. The architecture consists of four main layers: presentation, application, integration, and data. The presentation layer is responsible for user interaction and map-based visualization through a responsive web interface. The application layer implements the core system logic, including route generation, POI filtering, and itinerary construction. External services such as routing and text-to-speech are handled within the integration layer to isolate third-party dependencies. The data layer manages structured POI metadata and associated multimedia content. A more detailed discussion of the architectural design, including component-level diagrams and design decisions, is provided in the High-Level Design (HLD) report [4].

3.1.2 System Limitations and Constraints

The design and implementation of GUIDE are influenced by a combination of technical, infrastructural, functional, and academic constraints. These include performance limits on route generation, a restricted geographic scope limited to Turkiye, and the absence of real-time traffic, road condition, and dynamic POI operational data. The system relies on static maps and content sources, with POI information curated during development and not continuously updated. Infrastructure constraints affect storage capacity, external map tile dependencies, and deployment resources, while functional scope limitations define supported languages, data sources, and session-based user interaction without persistent accounts. In addition, academic constraints such as project timeline, documentation standards, team capacity, and a preference for open-source technologies shape design decisions and implementation strategies. A comprehensive and detailed specification of these constraints, including their rationale and implications, is provided in the Project Specification Report document [5].

3.1.3 Key Features and Capabilities

Intelligent Route Generation: GUIDE generates personalized multi-day itineraries by filtering and ranking Points of Interest (POIs) according to user-defined categories, geographic constraints, and trip preferences. Route construction balances travel distance, estimated visit durations, and user interests, and is optimized using the Open Source Routing Machine (OSRM) with OpenStreetMap data [1], [2].

Interactive Map Visualization: Generated itineraries are presented through an interactive map interface that displays day-based route segments, POI markers, and connecting paths. Users can explore routes through standard map interactions such as zooming, panning, and marker selection, enabled by the Leaflet.js mapping library [6].

Multilingual Content Delivery: The system provides textual and audio POI information in Turkish, English, and German. Audio guidance is pre-generated using a text-to-speech service to improve accessibility and support users with different language preferences [3].

Dynamic Route Modification: Users may adjust AI-generated itineraries by removing selected POIs. The system automatically recalculates optimized routes based on the updated POI set while preserving overall itinerary consistency.

3.2 Functional Requirements

Functional requirements define the core system behaviors that enable GUIDE to generate personalized itineraries and provide destination guidance. Rather than listing individual requirements, this analysis groups them. The groups are presented in Table 1. The complete and formal specification of all functional requirements is provided in the Project Specification Report[5].

Table 1: Functional Requirement Groups and Scope

Requirement Group	Covered High-Level Requirements	Primary Focus
Input and Preference Management	FR-H01	User input collection, validation, and preference specification
Core Route Generation	FR-H02, FR-H07	Route optimization, itinerary construction, and visit duration estimation
Route Visualization	FR-H04, FR-H06	Map-based route display and user interaction
Route Modification and Feedback	FR-H03, FR-H08	User-controlled route adjustments and error handling
Multilingual Content and Transparency	FR-H05, FR-H09	Accessibility, text-to-speech support, and data source disclosure

3.2.1 Input and Preference Management

This requirement group covers the mechanisms through which users provide the necessary inputs for route generation, including destination selection, trip duration, distance constraints, category filters, and exclusion preferences. These requirements correspond primarily to FR-H01 and its related low-level requirements. Input management forms the entry point of the system and directly influences all subsequent processing stages.

Dependencies: All route generation, itinerary optimization, and visualization requirements depend on the validity and completeness of user inputs. Invalid or inconsistent inputs prevent further system operation.

Analysis Considerations: While input handling is not computationally complex, robust validation and clear error feedback are essential to prevent infeasible routes and ensure a smooth user experience. This group also establishes a strong dependency between functional and usability-related requirements.

3.2.2 Core Route Generation

This group represents the central functionality of GUIDE and includes requirements related to AI-based route generation and day-by-day itinerary organization. These behaviors correspond to FR-H02, FR-H07, and their associated low-level requirements.

Dependencies: Core route generation depends on validated user inputs, availability of POI metadata, and reliable routing services. It also interacts closely with performance requirements due to its computational complexity.

Analysis Considerations: This group introduces the highest technical complexity in the system. Balancing route optimality, performance constraints, and user preferences requires careful algorithm design. Limitations on trip duration and dataset scope are direct consequences of these challenges.

3.2.3 Route Visualization and User Interaction

This requirement group addresses how generated routes are presented to the user and how users interact with them. It includes requirements for map-based route visualization, user interaction with map elements, and destination information display, corresponding to FR-H04 and FR-H06.

Dependencies: Visualization requirements depend on successful route generation and the availability of geospatial data. They also rely on external mapping libraries and frontend responsiveness.

Analysis Considerations: Although visualization does not alter route logic, it has a significant impact on perceived system quality. Clear visual structure and intuitive interaction are critical for user comprehension and trust in generated itineraries.

3.2.4 Dynamic Route Modification and Feedback

This group includes requirements that allow users to modify AI-generated routes and receive meaningful system feedback. It primarily corresponds to FR-H03 and FR-H08.

Dependencies: Route modification depends on the availability of a previously generated route and requires seamless reintegration with the route optimization logic.

Analysis Considerations: Supporting user intervention improves transparency and user autonomy but increases system complexity. Error handling and feedback mechanisms must be carefully designed to maintain system stability during replanning operations.

3.2.5 Multilingual Content Delivery and Transparency

This group covers requirements related to text-to-speech functionality and transparency of data sources, corresponding to FR-H05 and FR-H09.

Dependencies: These requirements depend on the availability of curated POI content and pre-generated audio assets.

Analysis Considerations: Multilingual support enhances accessibility but introduces additional content management and resource constraints. Explicit data source disclosure improves user trust and aligns with ethical and academic transparency standards.

3.3 Non-Functional Requirements

Non-functional requirements define the quality attributes that constrain how GUIDE's functional requirements are implemented. These requirements influence architectural decisions rather than specifying direct system behaviors. The focus and group of the requirements are presented in Table 2.

Table 2: Non-Functional Requirement Groups and Scope

Requirement Group	**Covered High-Level Requirements**	**Primary Focus**
Performance Constraints	PR-H01	Route generation latency and response time limits to maintain user engagement
User Capacity and Scalability	PR-H02	System behavior under concurrent access and architectural scalability considerations
Usability and Interface Quality	EIR-H01	Web-based interface usability, responsive design, and intuitive user interaction
Reliability and Error Handling	FR-H08*	System stability, graceful error handling, and meaningful user feedback
Transparency and Trust	FR-H09*	Clear disclosure of data sources and system behavior to users

Although FR-H08 and FR-H09 are specified as functional requirements in the Project Specification Report, they are analyzed here due to their impact on non-functional quality attributes such as reliability, usability, and user trust.

3.3.1 Performance and Scalability

Performance requirements focus on route generation latency and concurrent user capacity, corresponding to PR-H01 and PR-H02. These constraints directly affect algorithm selection, system architecture, and deployment strategies.

Analysis Considerations: Maintaining acceptable response times requires efficient algorithms and localized routing services. Scalability considerations motivate stateless backend design and limit system scope to ensure predictable performance under load.

3.3.2 Usability and Interface Quality

Usability-related requirements are reflected primarily in the external interface requirements (EIR-H01 and related low-level requirements). These requirements shape the design of the web-based interface, interaction patterns, and accessibility across devices.

Analysis Considerations: Clear navigation, responsive layout, and intuitive interaction are essential to reduce user effort and support non-technical users. Usability constraints influence frontend technology choices and validation strategies.

3.3.3 Reliability and Error Handling

Reliability requirements ensure consistent system behavior in the presence of invalid inputs, network issues, or partial system failures. These concerns are closely linked to functional error handling requirements.

Analysis Considerations: Graceful degradation and informative error feedback are critical to maintaining user trust and preventing system crashes, especially during route generation and replanning phases.

3.4 Pseudo Requirements

In addition to formal, functional, and non-functional requirements, GUIDE includes a small set of preliminary statements that reflect desired system qualities but are not yet fully measurable or testable. Unlike formal requirements, they may contain vague terms, missing thresholds, or undefined success criteria. For this reason, pseudo requirements are treated as candidates for refinement and may later be converted into formal FR/PR/EIR items once clear acceptance criteria and metrics are established.

PSR-01: Intelligent POI Importance Ranking

Informal Statement: "The system shall prioritize POIs when generating routes for time-limited trips, ensuring that the selected POIs are relevant to user preferences. To support this prioritization, descriptive POI texts and user inputs shall be transformed into feature representations using pretrained language models such as Sentence-BERT[7] or E5[8], and POIs shall be ranked based on the comparative similarity of these representations."

Ambiguities:

- How should non-contextual POI attributes be incorporated into the importance evaluation?

- Should semantic relevance override geographic feasibility, or should spatial constraints limit the importance ranking?
- How can the correctness and consistency of POI importance ranking be evaluated?

Refinement Needed: POI importance shall be determined through contextual comparison between user preferences and descriptive POI information. Non-contextual POI attributes shall be incorporated through complementary evaluation layers that support the overall importance ranking while preserving feasibility and consistency.

Current Status: Basic candidate filtering and preliminary importance rating are implemented. However, non-contextual and spatial POI attributes are not yet incorporated into the importance evaluation.

PSR-02: Appropriate Visit Duration Estimates

Informal Statement: "Each POI should have an appropriate estimated visit duration."

Ambiguities:

- What is "appropriate"? (Average visitor time? Expert recommendation? Category-based heuristic?)
- Should duration vary by user type (cultural enthusiast vs. casual tourist)?
- How to validate duration estimates?
- Should the system allow the user to override?

Refinement Needed: Establish duration estimation methodology (research-based defaults by POI type: museums 90-120min, historical sites 45-60min, natural landmarks 60-90min). Define user customization capability.

Current Status: Fixed duration estimates included in POI metadata. Dynamic adjustment not specified.

PSR-03: Sufficient Multilingual Content Quality

Informal Statement: "POI descriptions and audio should be of sufficient quality in all supported languages."

Ambiguities:

- What constitutes "sufficient quality"? (Grammatical correctness? Information completeness? Cultural appropriateness?)
- How to measure quality objectively?
- What quality assurance process is required?
- Acceptable error tolerance?

Refinement Needed: Define quality criteria: (1) grammatical accuracy verified by native speakers, (2) minimum 200-word descriptions, (3) cultural sensitivity review checklist, (4) TTS pronunciation validation for Turkish proper nouns.

Current Status: Content sourced from authoritative references. Formal QA process not specified.

PSR-04: Optimal Route Balance Across Days

Informal Statement: "Multi-day itineraries should be balanced optimally across days."

Ambiguities:

- What is "optimal balance"? (Equal distances? Equal POI counts? Equal time investment?)
- How to handle geographic constraints (clustered POIs in one region)?
- Should the system prefer balanced vs. minimized total distance?
- What deviation from perfect balance is acceptable?

Refinement Needed: Specify balancing algorithm: minimize variance in daily distances while respecting maximum daily distance constraint. Define acceptable imbalance threshold (e.g., no day exceeds 120% of average daily distance).

Current Status: Greedy day-based allocation algorithm. Balance optimization is not formally defined.

1. **Identify Ambiguities:** List all vague terms, undefined metrics, and missing details in the informal statement.
2. **Team Consultation:** Engage team members to clarify intent and establish concrete definitions.
3. **Define Acceptance Criteria:** Specify measurable, testable conditions that determine requirement satisfaction.
4. **Technical Feasibility Analysis:** Assess implementation complexity, performance implications, and resource requirements.
5. **Formalize Specification:** Rewrite as functional requirement, non-functional requirement, or design constraint with clear, unambiguous language.
6. **Validation:** Review formal requirement with stakeholders to ensure original intent preserved.

Pseudo requirements may be addressed in future project iterations or deferred to post-deployment enhancements based on priority and resource availability.

3.5 System Models

This section presents the system models used to describe the structural and behavioral aspects of the GUIDE system. The models collectively illustrate how the system is used, how its components are organized, and how they interact over time. Scenarios provide representative usage examples, the use case model captures user–system interactions, object and class models describe the static structure of the system, dynamic models illustrate runtime behavior and message flows, and user interface models present navigational paths and screen-level interactions.

3.5.1 Scenarios

The following scenarios present representative usage examples of the GUIDE system. These scenarios illustrate typical system behavior under different user profiles, preferences, and constraints. Collectively, they reflect the full functional scope of the system, including input specification, route generation, itinerary modification, map-based visualization, and multilingual content delivery.

Scenario 1: Erasmus Student Visiting Istanbul
User Type: International student / short-term visitor
Scenario Description: Kayrahan is an Erasmus student staying in Turkiye and plans to spend three days in Istanbul. Upon accessing GUIDE, the user specifies the trip duration (three days), destination (Istanbul), and a maximum travel distance of approximately 40 km. The user further selects category-based preferences, including natural attractions, outdoor areas, historical sites, and religious landmarks.
Based on the provided inputs, GUIDE generates an AI-assisted ranking of relevant Points of Interest (POIs) and constructs a three-day itinerary organized on a day-by-day basis. For each destination, GUIDE provides descriptive text and visual content. During the trip, the user selects English audio guidance for POI descriptions. GUIDE also allows the user to remove unwanted destinations and automatically regenerates the route accordingly.
Objective: To generate a culturally rich and time-efficient itinerary that satisfies the constraints of limited travel duration and distance for international students.

Scenario 2: Family-Oriented Domestic Trip Planning
User Type: Domestic user / family trip planner
Scenario Description: Erdem plans a five-day family vacation in Antalya. Using GUIDE, the user enters the destination, trip duration, maximum route length, and preference constraints, explicitly excluding indoor museum visits in favor of outdoor activities.
GUIDE processes these inputs and generates a multi-day itinerary optimized for accessibility and daily feasibility. The system presents a five-day plan with distinct daily routes and POI recommendations. Each destination includes descriptive information, visual content, and Turkish audio narration. GUIDE also provides estimated visit durations for each POI to support flexible daily planning without enforcing strict schedules.
Objective: To support family users in planning practical, preference-aware daily itineraries that emphasize outdoor and leisure-oriented destinations.

Scenario 3: Language-Oriented Cultural Exploration
User Type: International tourist / language-learning user

Scenario Description: Tuna is a traveler learning German who wishes to explore cultural destinations in Izmir over a two-day period. The user specifies the destination, trip duration, and travel distance constraints.

GUIDE analyzes these inputs and identifies culturally significant POIs suitable for the specified timeframe. The system generates a two-day itinerary and provides textual descriptions, images, and German text-to-speech audio for each destination, allowing the user to combine cultural exploration with language practice.

Objective: To enhance cultural travel experiences by integrating multilingual audio guidance that supports language learning.

Scenario 4: Local User Exploring Nearby Attractions

User Type: Local resident

Scenario Description: Ebrar is a local resident in Ankara with one available day for exploration. After entering the destination and time constraint, GUIDE identifies prominent cultural and historical locations within the city and presents a suggested route.

The user may exclude previously visited destinations, prompting GUIDE to regenerate an updated route. The finalized itinerary is displayed on an interactive map and supported with descriptive content and Turkish audio guidance for each POI.

Objective: To enable local users to systematically discover and revisit cultural landmarks within their own cities.

3.5.2 Use Case Model

GUIDE's use case model describes the primary interactions between users and the system, structured around the core workflow of preference specification, route planning, route visualization, and destination information access. Each use case is supported by a dedicated diagram to illustrate the corresponding user–system interaction in isolation.

UC-01: Manage Preferences

This use case represents the initial configuration phase of the system. GUIDE provides a structured input interface that allows users to specify essential planning parameters such as destination (city or region), trip duration, maximum travel distance, and category-based POI preferences. These inputs define the constraints and scope of the itinerary generation process and directly influence all subsequent system behavior. The interaction flow of this use case is illustrated in Figure 1.

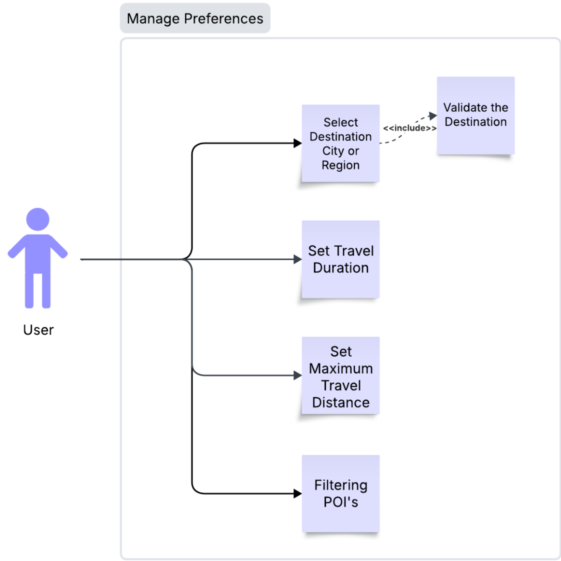

Figure 1: Use Case Diagram for UC-01: Manage Preferences

UC-02: Route Planning

This use case captures the core planning functionality of GUIDE. Based on the preferences provided by the user, the system generates a route by analyzing POI relevance and geographic feasibility. The resulting itinerary is organized on a day-by-day basis and presented for review. GUIDE supports iterative refinement by allowing destinations to be added or removed, after which the route is automatically regenerated. The interaction flow is shown in Figure 2.

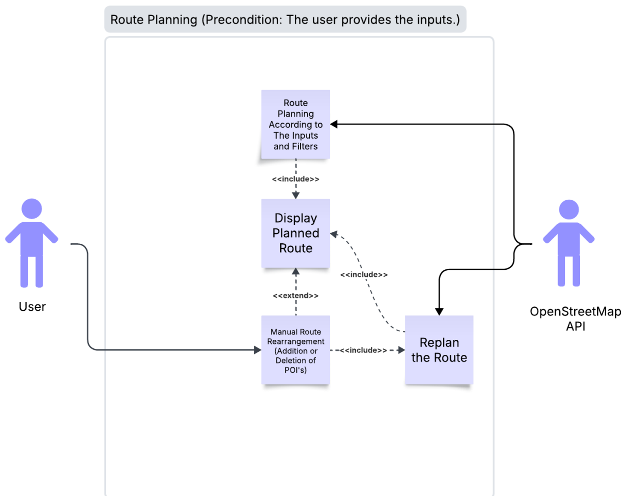

Figure 2: Use Case Diagram for UC-02: Route Planning

UC-03: Route and POI Visualization

This use case focuses on the visual presentation of the generated itinerary. GUIDE displays the planned route on an interactive map, where each Point of Interest is represented by a marker and connected through route paths. The map interface enables users to explore the itinerary spatially and inspect individual destinations. Figure 3 illustrates the interactions involved in route and POI visualization.

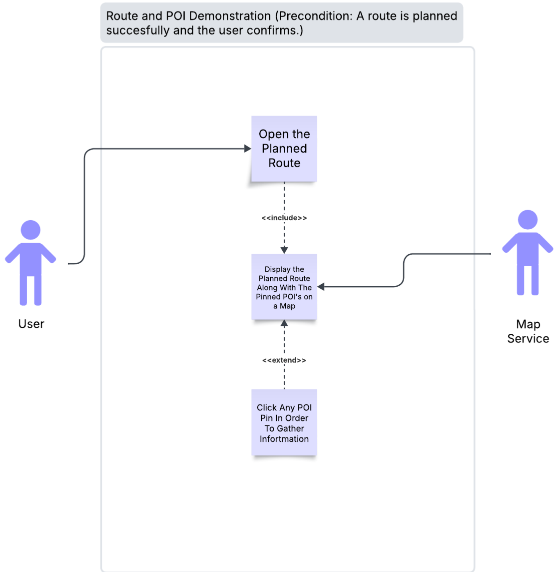

Figure 3: Use Case Diagram for UC-03: Route and POI Visualization

UC-04: POI Information Access

This use case describes how detailed information about individual destinations is accessed. Selecting a POI marker opens a dedicated detail view containing descriptive text, images, and additional metadata. GUIDE also provides optional multilingual audio narration in Turkish, English, and German. The interaction flow for this use case is depicted in Figure 4.

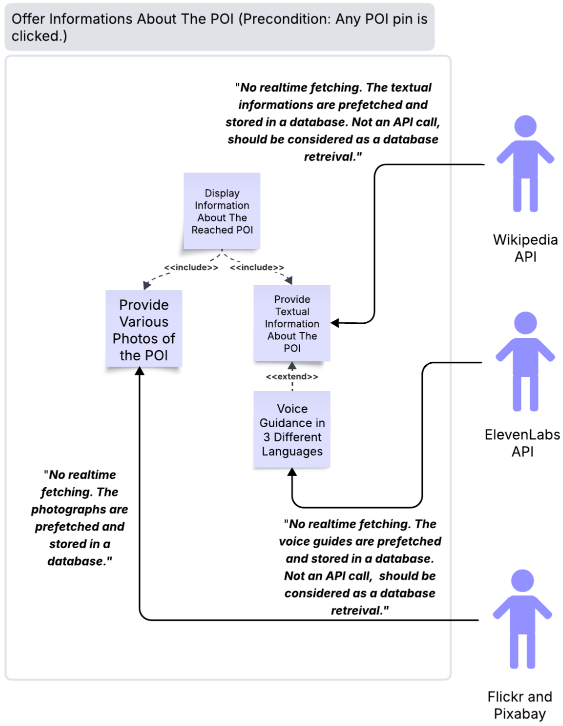

Figure 4: Use Case Diagram for UC-04: POI Information Access

3.5.3 Object and Class Model

This subsection presents the static structure of GUIDE through an object model and a UML class diagram. The object model provides a conceptual view of the main domain entities and how they relate at runtime, while the class diagram refines this view by defining class responsibilities, attributes, and associations.

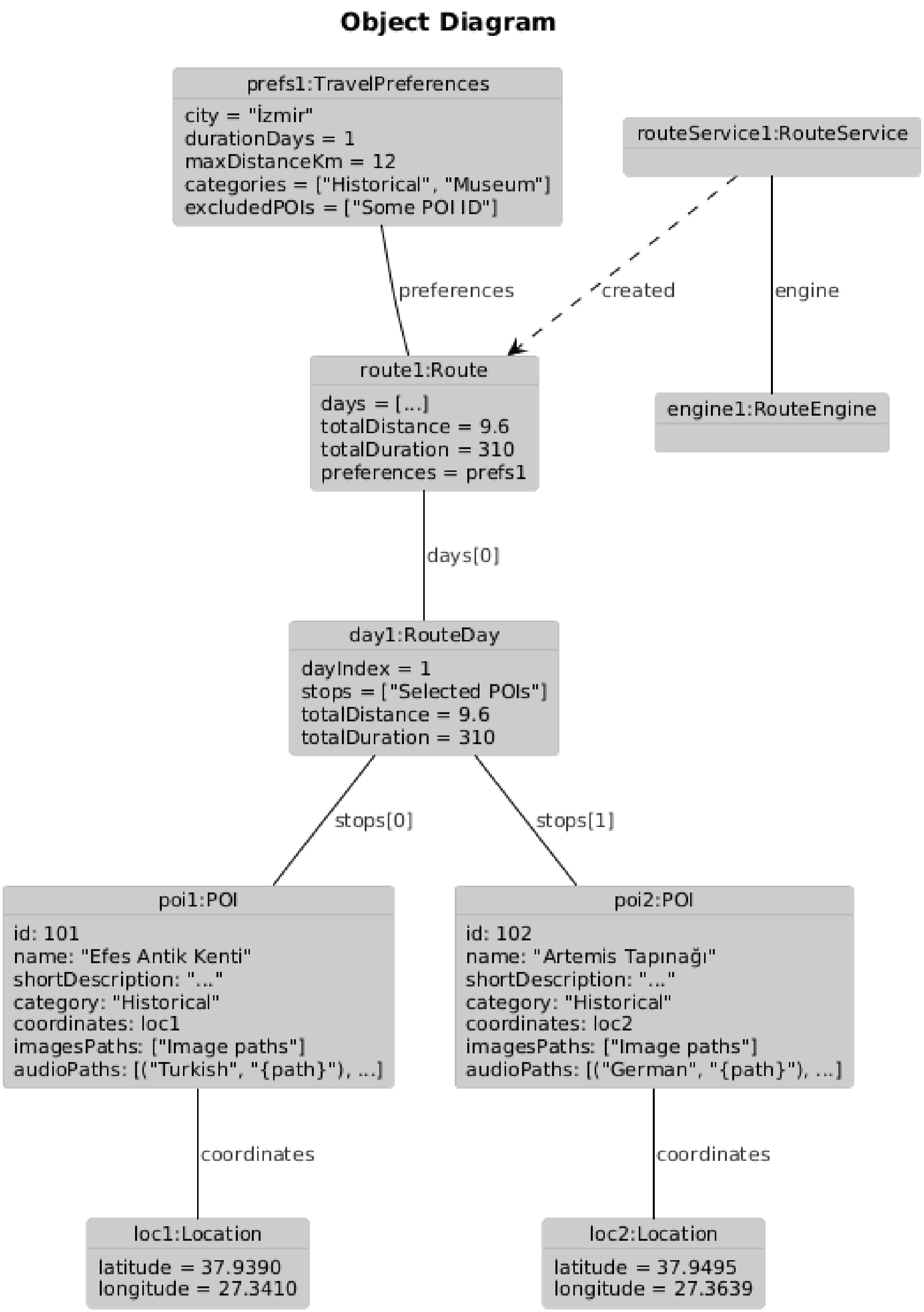

Figure 5: GUIDE Object Model

Figure 5 illustrates the object model of the GUIDE domain, focusing on core entities such as POI, Route, and TravelPreferences and their high-level relationships.

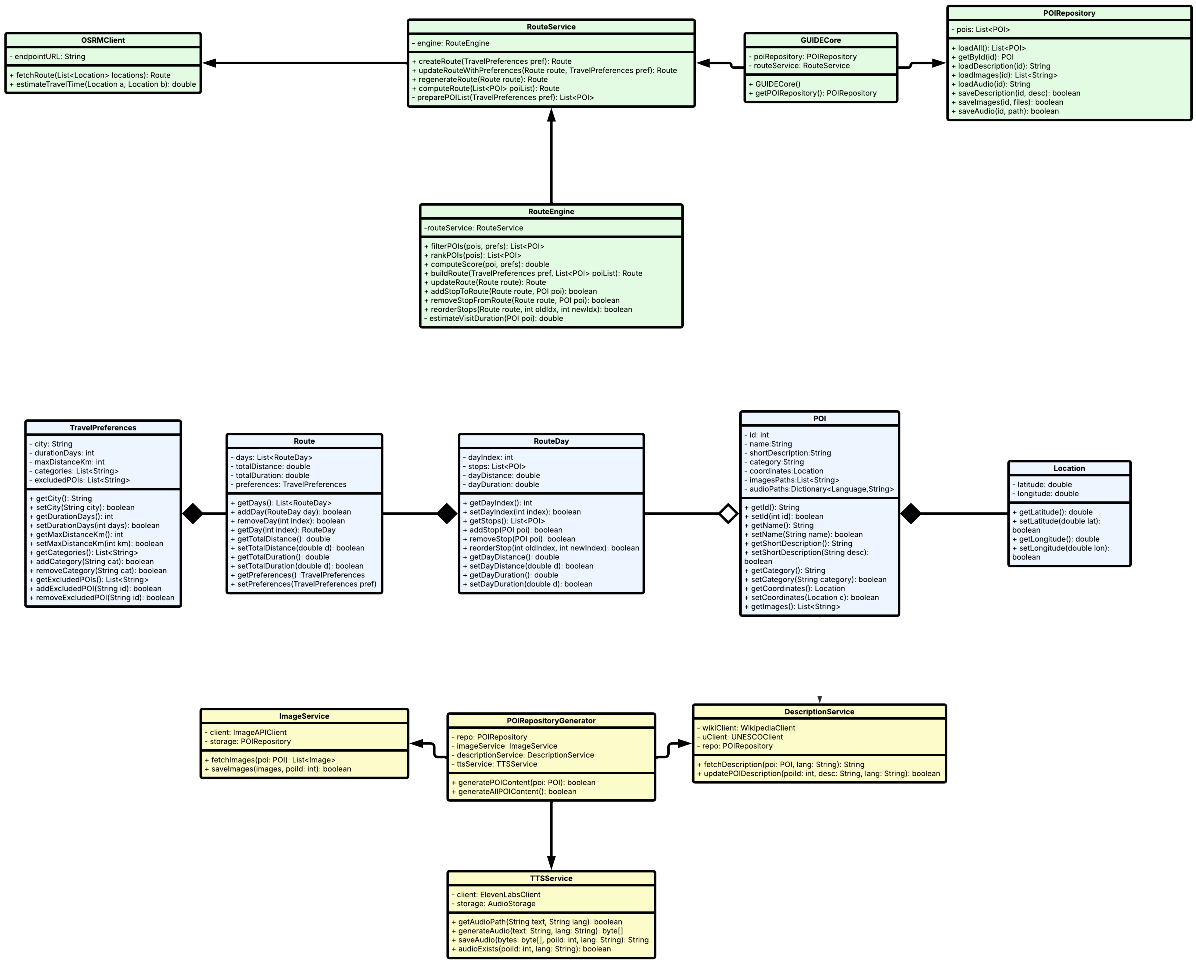

Figure 6: GUIDE System Class Diagram

Figure 6 presents the UML class model of GUIDE, emphasizing the main domain classes and their relationships (e.g., *POI*, *Route*, *RouteDay*, *TravelPreferences*, and supporting data structures such as *Location*). The diagram captures the core data flow from user preferences to itinerary construction and representation.

3.5.4 Dynamic Models

The dynamic behavior of the GUIDE system is described using multiple complementary modeling techniques. Sequence diagrams illustrate message flows and temporal interactions between system components, and activity diagrams model control flow and decision logic across core workflows. These dynamic models focus on representative operational scenarios and do not aim to exhaustively document all possible system interactions; instead, they provide insight into the runtime behavior of GUIDE under typical usage conditions.

Sequence Diagrams:

GUIDE's dynamic behavior is modeled through sequence diagrams illustrating message flows and temporal interactions between system components. The following diagrams represent key operational sequences but do not exhaustively document all possible system interactions.

Sequence 1: Input Collection Phase – Route Planning

This sequence describes the initial interaction phase in which trip planning parameters are collected. GUIDE presents a structured input interface that allows users to specify the destination (city or region), trip duration, maximum travel distance, and category-based POI preferences. These parameters define the scope and constraints of the route generation process and are validated before further processing begins. The message flow for this interaction is illustrated in Figure 7.

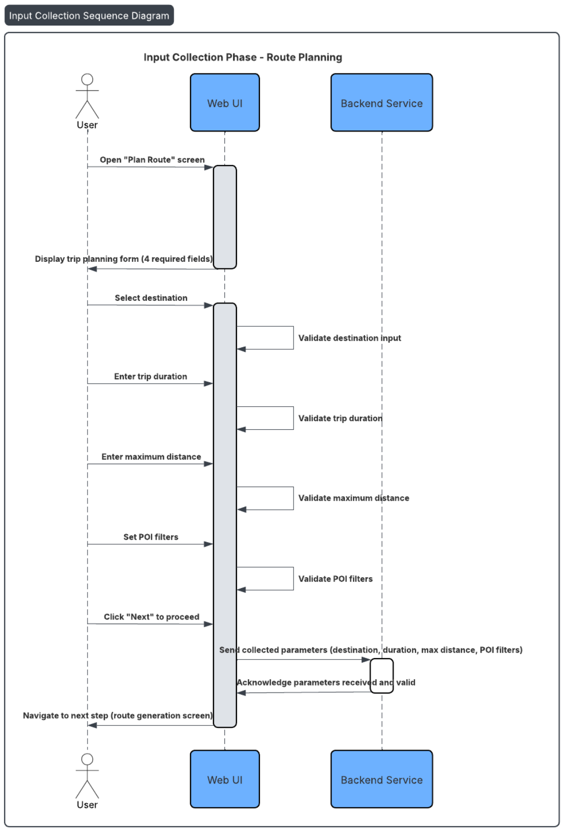

Figure 7: Sequence Diagram – Input Collection Phase

Sequence 2: Route Generation and Replanning

This sequence captures the core planning and replanning behavior of the system. Based on the validated user inputs, GUIDE generates an initial travel route using routing and POI selection mechanisms. The resulting itinerary is presented to the user for review. When destinations are added or removed, the system re-evaluates the remaining POIs and regenerates an optimized route reflecting the updated preferences. The interaction flow is shown in Figure 8.

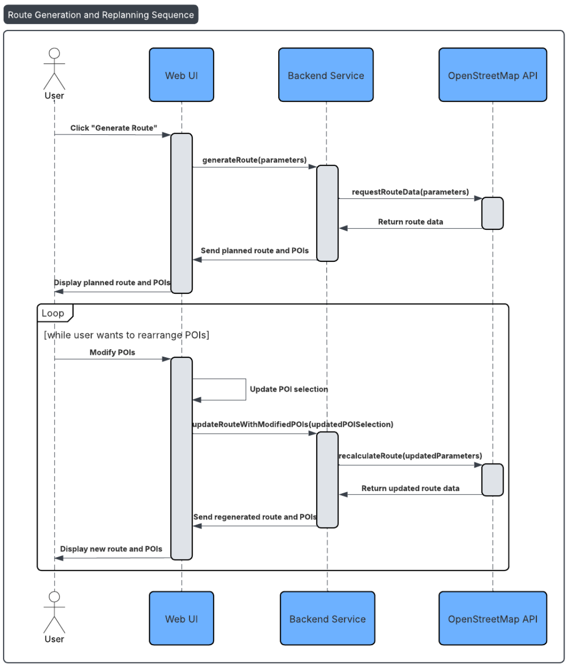

Figure 8: Sequence Diagram – Route Generation and Replanning

Sequence 3: Confirmed Route Display and POI Interaction

This sequence illustrates how a finalized itinerary is visualized and explored. Once the route is confirmed, GUIDE renders the itinerary on an interactive map, where each Point of Interest is represented by a marker and connected through route paths. User interactions with POI markers trigger further information retrieval, enabling detailed exploration of individual destinations. Figure 9 presents the message flow for route visualization and POI interaction.

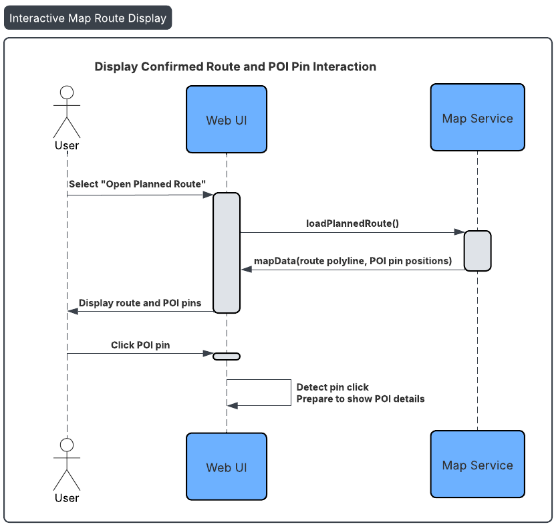

Figure 9: Sequence Diagram – Route Display and POI Interaction

Sequence 4: POI Details and Pre-generated Voice Guidance

This sequence describes the retrieval and presentation of detailed destination content. Selecting a POI marker opens a detail view containing descriptive text and images stored in the local repository. Users may optionally activate multilingual audio narration, after which the corresponding pre-generated text-to-speech file is played. The sequence of interactions involved in POI detail access and audio playback is illustrated in Figure 10.

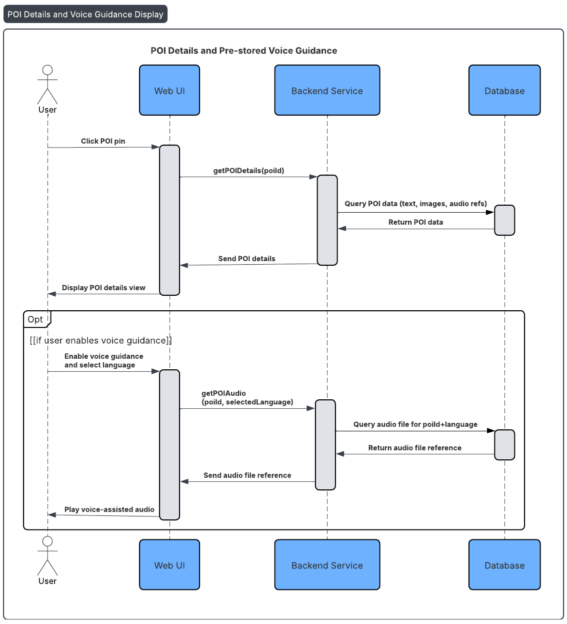

Figure 10: Sequence Diagram – POI Details and Voice Guidance

Important Note: All POI-related content is prepared prior to runtime. Textual descriptions are retrieved from the Wikipedia API, images are sourced from Flickr and Pixabay, and multilingual audio files are generated using the ElevenLabs API during the data preparation phase. All content is stored locally before execution; therefore, no external API calls occur during these sequences.

Activity Diagrams:

Activity diagrams are used to model the control flow and decision logic of GUIDE's core workflows. They illustrate how user actions, system validations, and internal processing steps are coordinated during route planning, POI information retrieval, and route replanning operations.

Activity 1: Complete Route Planning Workflow

Figure 11 represents the end-to-end route planning process, starting from user input collection and validation. The diagram highlights key decision points such as input completeness checks and user satisfaction evaluation, as well as the integration of routing services for path calculation. Iterative modification and replanning loops are explicitly modeled to reflect interactive user behavior.

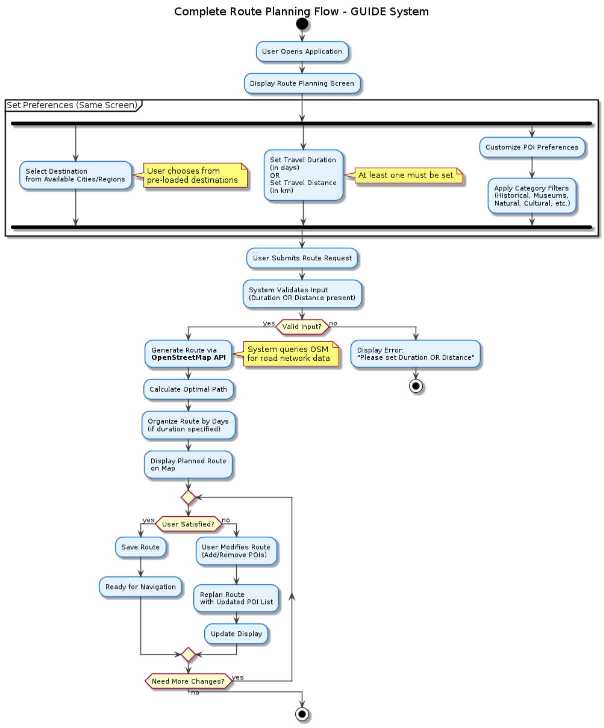

Figure 11: Complete Route Planning Activity Diagram

Activity 2: POI Information Retrieval

Figure 12 illustrates the parallel execution of multimedia content retrieval for a selected Point of Interest. Textual descriptions, images, and multilingual audio content are processed concurrently to minimize response time. The diagram also models conditional branches for audio availability and user language selection.

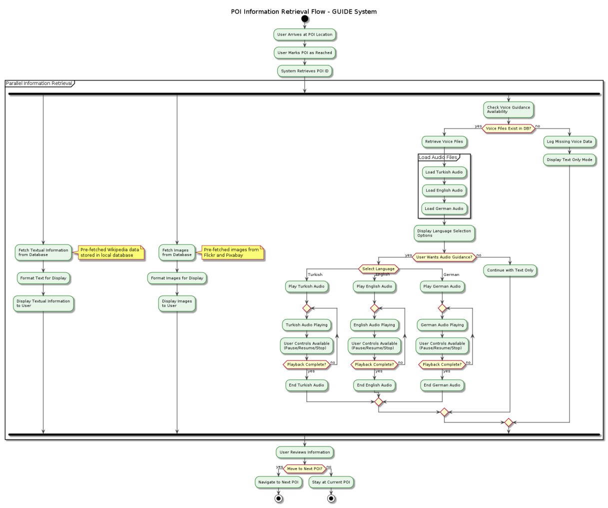

Figure 12: POI Information Retrieval Activity Diagram

Activity 3: Route Replanning Workflow

Figure 13 describes the dynamic route modification process triggered by user actions such as adding or removing POIs. The diagram captures constraint validation, alternative suggestion paths, and automatic route regeneration. Decision nodes emphasize compatibility checks and user confirmation before updates are applied to the itinerary.

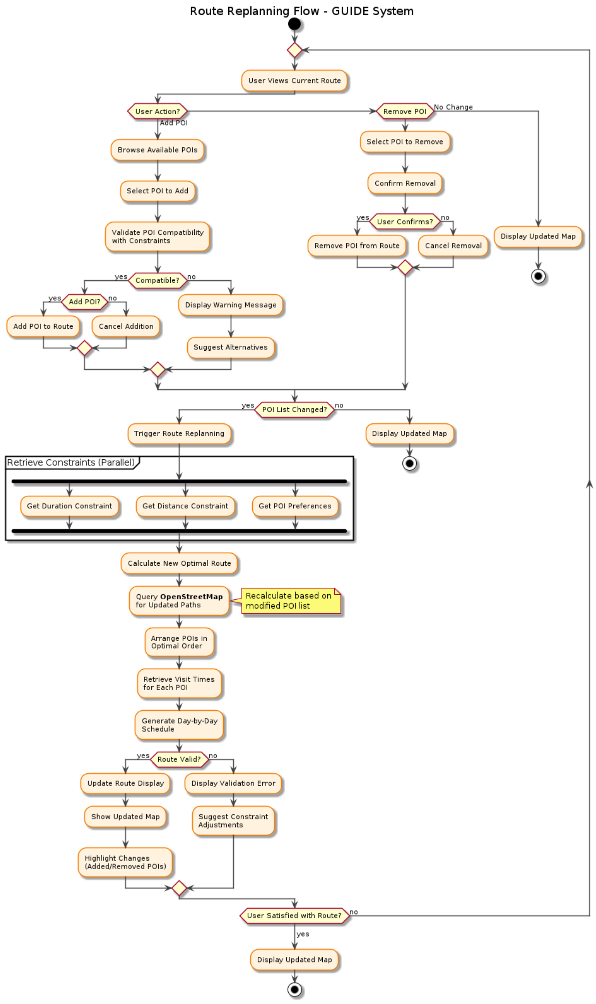

Figure 13: Route Replanning Activity Diagram

3.5.5 User Interface – Navigational Paths and Screen Mock-ups

Figure 14: GUIDE system logo

The GUIDE logo represents the system's core concept of guided exploration and route-based travel planning. Its visual identity emphasizes clarity, navigation, and geographic orientation, aligning with the system's focus on structured itineraries and user-guided discovery.

Navigational Structure and Screen Overview

GUIDE follows a linear yet flexible navigation structure that guides users from initial trip definition to detailed destination exploration. Each screen is designed to support a specific phase of the planning process while allowing forward and backward navigation when appropriate.

Landing Page

The landing page serves as the entry point to the system and introduces the core purpose of GUIDE. It presents the system branding, a brief explanatory text, and primary call-to-action buttons. From this screen, users may initiate the planning process or access high-level information about how the system operates.

Primary Navigation Elements:

- **Start Planning:** Navigates to the trip input form
- **How It Works:** Opens the system overview and workflow explanation

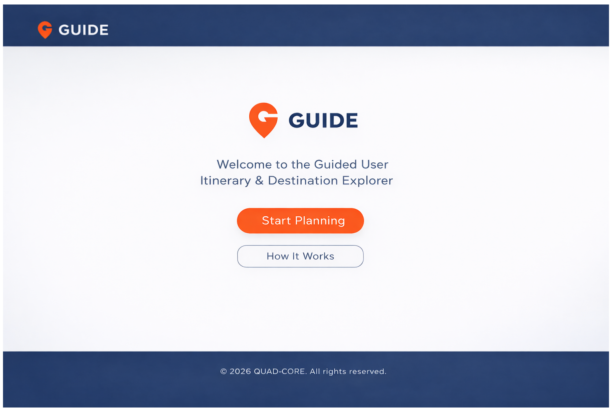

Figure 15: Landing Page

Trip Planning Input Form

The input form page collects all user-defined parameters required for route generation. Users specify the destination city or region, trip duration, maximum daily travel distance, and category-based POI preferences. These inputs define the constraints used during itinerary construction.

Navigation and Actions:

- **Generate Route:** Submits inputs and triggers route generation

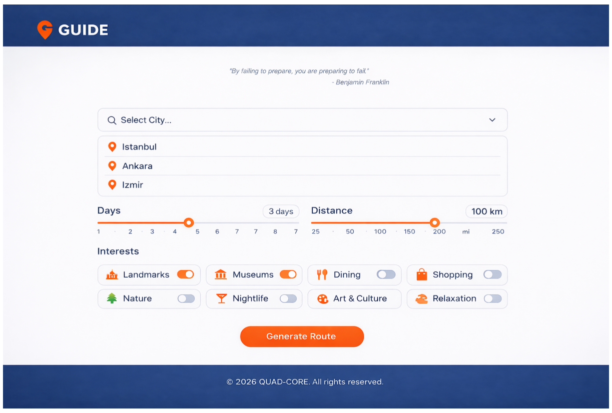

Figure 16: Trip Planning Input Form

Route Display Page

This screen presents the generated itinerary on an interactive map. The route is organized by day and visualized using POI markers and connecting paths. Users may explore the itinerary spatially and transition to detailed destination views.

Navigation and Actions: Navigation and Actions:

- **Select POI (Map Marker or List):** Opens the POI detail view by selecting a destination either from the interactive map markers or from the POI list displayed alongside the route.
- **Finish:** Navigates directly to the detail view of the first POI in the itinerary, initiating guided exploration.

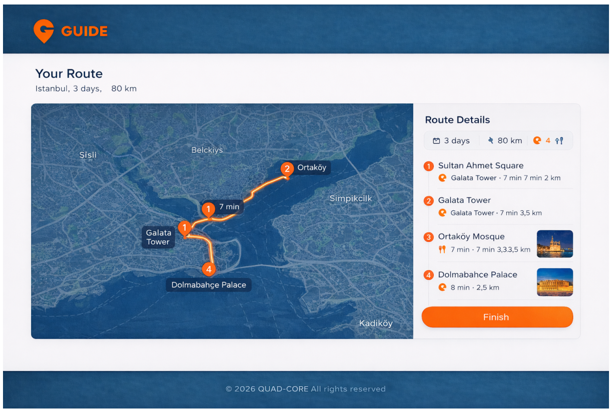

Figure 17: Generated Route Display

Route Replanning Interface

The route replanning screen allows users to iteratively refine the generated itinerary. POIs can be added or removed, after which the system automatically recalculates the route while preserving user-defined constraints.

Navigation and Actions:

- **Confirm Route:** Applies modifications and loads the Route Display Page.
- **Restart Planning:** Discards changes and returns to the route display

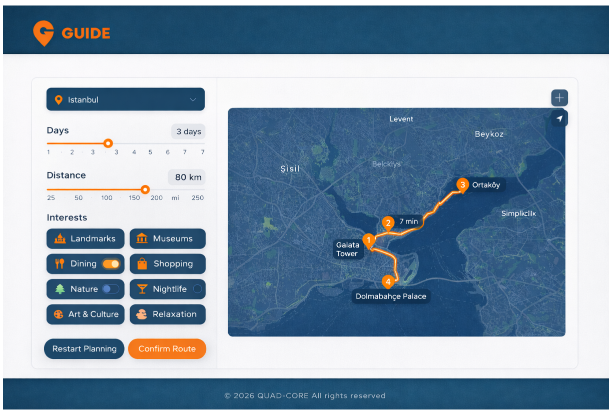

Figure 18: Route Replanning Interface

POI Detail View

The POI detail view provides comprehensive information about a selected destination. This includes textual descriptions, images, estimated visit duration, and optional multilingual audio narration. The screen supports informed exploration without leaving the itinerary context.

Navigation and Actions:

- **Language-Specific Audio Playback:** Provides separate text-to-speech listening buttons for Turkish, English, and German, allowing users to select their preferred narration language.
- **Previous POI:** Navigates to the detail view of the previous destination in the itinerary sequence.
- **Next POI:** Navigates to the detail view of the next destination in the itinerary sequence.
- **Back to Route:** Returns the user to the main route visualization page, preserving the current itinerary state.

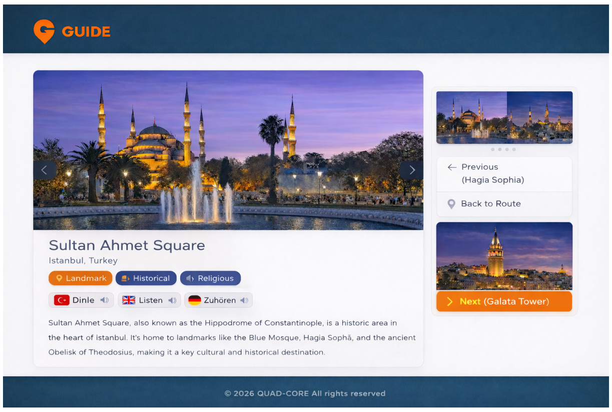

Figure 19: POI Detailed Information View

How It Works Page

This informational screen explains the internal workflow and technical components of GUIDE. It provides a high-level overview of routing, data sources, and multimedia generation without requiring user interaction.

Navigation and Actions:

- **Back to Landing:** Returns to the landing page

Figure 20: System Architecture and Workflow Overview

4 GLOSSARY

POI (Point of Interest) A destination or location of potential interest to travelers (e.g., museum, historical site, natural landmark).

OSRM (Open Source Routing Machine) Open-source routing engine using OpenStreetMap data to calculate optimal routes.

TTS (Text-to-Speech) Technology converting written text into spoken audio.

OSM (OpenStreetMap) Collaborative open-source geographic database providing map data.

Itinerary Planned sequence of destinations and routes for a trip, organized by days.

Day-Based Segmentation Division of multi-day trips into balanced daily schedules with distance/time constraints.

Polyline Sequence of connected line segments representing a route on a map.

Responsive Design Web design approach adapting layouts to different screen sizes (desktop, tablet, mobile).

Session-Based Architecture System design where user data exists only during an active session, not persistently stored.

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Note: Spell checking and basic grammatical verification were performed using Grammarly: (`https://www.grammarly.com`).

END OF ANALYSIS REPORT

GUIDE (Guided User Itinerary & Destination Explorer)
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