**Design Document**

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5. **Class Diagram (CRC Cards)**

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| Class Name: **User** |
| Parent Class: None  Subclass: None |
| Responsibilities:   * Store and manage user information (username, email, password, phone, etc.). * Maintain lists of visited countries. * Maintain passport information if needed (e.g., user could have multiple passports). * Provide methods or properties to access/update user’s travel data. |
| Collaborators:   * **AuthService**: for handling registration/login. * **TravelService**: for marking visited countries and fetching visited percentage. * **VisaService**: for looking up visa requirements based on user’s passports. * **PostService**: Links users to their travel-related posts and retrieves their published content. * **CommentService**: Associates users with comments they leave on posts. * **VoteService**: Tracks users' ratings/votes on posts and comments and prevents duplicate votes. * **TripService**: manages trip-related operations (creating, updating, retrieving, and deleting trips) and associates trips with the user account. * **LeaderboardService**: retrieves and collects user metrics (e.g., visited countries count and points) to generate leaderboards. |

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| Class Name: **AuthService** |
| Parent Class: None  Subclass: None |
| Responsibilities:   * Handle user registration (POST /register). * Handle user login (POST /login). * Verify credentials (username/email and password). * Manage session data or tokens once a user is authenticated. |
| Collaborators:   * **User**: AuthService creates and validates User objects. |

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| Class Name: **VisaService** |
| Parent Class: None  Subclass: None |
| Responsibilities:   * Process visa requirements (POST /visa-requirements) based on the user’s passports. * Determine the “best visa option” for each destination. * Return relevant visa info (visa required, visa on arrival, etc.). |
| Collaborators:   * **User**: for accessing user’s passport list. * **Passport:** For detailed passport data. * **Country**: for retrieving country-specific visa rules. |

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| Class Name: **TravelService** |
| Parent Class: None  Subclass: None |
| Responsibilities:   * Generate travel suggestions (POST /travel-suggestions) given a user’s budget. * Track user’s visited countries:   + Add or remove a visited country (POST /markVisitedCountries).   + Calculate the percentage of visited countries (GET /visitedCountriesPercent). |
| Collaborators:   * **User**: for retrieving and updating visited-country data and budget info. * **Country**: for storing or looking up country details (e.g., codes, names, region). |

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| Class Name: **PostService** |
| Parent Class: None  Subclass: None |
| Responsibilities:   * Manage user posts (create, delete, get). * Store user travel experiences. * Track votes on posts. |
| Collaborators:   * **User**: Retrieves the author of each post. * **CommentService**: Gets and manages comments related to posts. * **VoteService**: Manages upvotes/downvotes on posts. |

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| Class Name: **CommentService** |
| Parent Class: None  Subclass: None |
| Responsibilities:   * Manage comments on posts. * Track votes on comments. * Ensure users can only delete their own comments. |
| Collaborators:   * **User**: Retrieves the author of each comment. * **PostService**: Ensures comments are associated with posts. * **VoteService**: Manages upvotes/downvotes on comments |

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| Class Name: **VoteService** |
| Parent Class: None  Subclass: None |
| Responsibilities:   * Handle upvotes/downvotes for posts and comments. * Prevent duplicate voting (toggle upvotes and downvotes). |
| Collaborators:   * **User**: Identifies who is voting. * **PostService**: Ensures votes are linked to posts. * **CommentService**: Ensures votes are linked to comments. |

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| Class Name: **TripService** |
| Parent Class: None  Subclass: None |
| Responsibilities:   * Manage trip-related operations including creating, updating, retrieving, and deleting trips. * Handle associated expense management within trips. |
| Collaborators:   * **User :** associates trips with a user account |

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| Class Name: **LeaderboardService** |
| Parent Class: None  Subclass: None |
| Responsibilities:   * Generate a leaderboard by retrieving and collecting user metrics such as visited countries count and points. * Sort and rank users based on chosen criteria. |
| Collaborators:   * **User :** retrieve information associated with user account. |

1. **System Interaction with the Environment**

**Operating Environment and Dependencies:**

* **Operating System**: The application is assumed to run on a Unix-like environment (e.g., Linux) or a Windows server with Node.js installed.
* **Programming Language / Framework**: Node.js (v16+) with Express.js (for REST endpoints).
* **Database**: A relational (PostgreSQL) database for persistent storage of user accounts, country data, user comments, posts, and visited country records.
* **Virtual Machines / Containers**: The application may be deployed in Docker containers.
* **Network Configuration**: Standard HTTP/HTTPS traffic; the service exposes ports 4000 (configurable) and 3000 (configurable).
* **External APIs / Services**: The system requires external data (e.g., real-time visa rules or travel cost info), it will connect via secure API requests, Google Cloud Storage Bucket for image uploads.

**Assumptions:**

* Adequate network reliability and bandwidth for communicating with the database or any external APIs.
* A modern web browser for the front-end.
* Node.js environment must have all required dependencies installed (Express, body-parsers, session libraries, etc.).

1. **High Level Architecture Overview**

A screenshot of a computer flowchart

Description automatically generated

* **Frontend**: A web or mobile client that interacts via REST calls.
* **REST API / Express:**
  + **AuthService** manages user registration, login, and session handling.
  + **VisaService** processes requests for visa requirements using user passport data.
  + **TravelService** handles travel suggestions, marking visited countries, and calculating visited-country percentages.
  + **PostService** manages user-generated travel posts, including creation, deletion, and retrieval.
  + **CommentService** manages comments on posts, including adding, deleting, and fetching comments.
  + **VoteService** manages rating functionalities for comments and posts in terms of upvotes and downvotes (like and dislike), preventing duplicate votes.
  + **TripService** creates, updates, retrieves, and deletes trips, as well as manages associated expense operations.
  + **LeaderboardService** retrieves and sort user rankings based on visited countries or points
* **Database**: Stores user records, passport data, visited country lists, travel posts, comments, votes, and pre-defined country/visa information.
* **External Services:** Could include third-party APIs for real-time travel advisories, flight/hotel info, Google Cloud Storage Bucket for image uploads.

1. **System Decomposition and Error/Exception Strategy**

**System Decomposition:**

* **AuthService**:
  + **Role**: Validates credentials, handles new user registration and login, and maintains session or token data.
  + **Interactions**: Communicates with the database (e.g., Users table/collection) to create accounts and verify passwords.
* **VisaService**:
  + **Role**: Receives a list of user passports and returns visa requirements for each destination.
  + **Interactions**: May consult an internal (local) data store or external API to fetch country-specific visa rules.
* **TravelService**:
  + **Role**: Generates travel suggestions based on user’s budget; tracks and calculates visited countries.
  + **Interactions**: Reads/writes user data in the database to update visited-country lists; calculates visited-percent metrics.
* **Database Layer**:
  + **Role**: Provides persistent storage for user profiles, countries, visited records, and any needed reference data.
  + **Interactions**: Exposed through ORM Prisma.
* **PostService**:
  + **Role**: Manages user posts, including creating, getting, and deleting.
  + **Interactions**: Communicates with the database to store posts, fetch user travel experiences, and track post ratings/votes.
* **CommentService**:
  + **Role**: Handles comment creation, retrieval, deletion, and rating/voting functionality.
  + **Interactions**: Interacts with the database to store and retrieve comments and collaborates with PostService to associate comments with posts.
* **VoteService**:
  + **Role**: Manages rating functionalities, i.e. upvotes and downvotes, for posts and comments.
  + **Interactions**: Connects with PostService and CommentService to apply votes and interacts with the database to store vote data.
* **TripService**:
  + **Role**: Manage trips by handling CRUD operations for trips and expenses.
  + **Interactions**: Communicates with the database via Prisma to validate trip data (for example, ensuring required fields like trip name, dates, budget, etc.).
* **LeaderboardService**:
  + **Role**: Generates leaderboard by retrieving user data, collecting metrics such as visited countries count and points, and ranking users based on chosen criteria.
  + **Interactions**: Communicates with the database via ORM Prisma to access user records, like visited countries and points, and computes rankings based on the retrieved metrics.

**Error and Exception Handling:**

* **Invalid User Input**:
  + **Strategy**: Validate incoming JSON payloads (e.g., username/email format, password length, budget must be numeric).
  + **Response**: Return HTTP 400 (Bad Request) with a descriptive error message object ({ errors: [{ msg: ... }] }).
* **Authentication/Authorization Failures**:
  + **Strategy**: If a user is not logged in or a session is invalid, respond with HTTP 401 (Unauthorized).
  + **Response**: Provide a clear error message and instructions to log in again.
* **External System Failures** (e.g., third-party visa API unavailable):
  + **Strategy**: Return partial results or a fallback response if external data is temporarily unavailable.
  + **Response**: Return HTTP 500 if the error is unrecoverable, or a 503 (Service Unavailable) if an external dependency is down.
* **Database Connectivity Issues**:
  + **Strategy**: Restart the computer, troubleshoot by checking .env files, make sure migrations are up to date, all packages are installed and up to date.
  + **Response**: Return HTTP 500 (Internal Server Error) and log the event for troubleshooting.
* **Unexpected Exceptions**:
  + **Strategy**: Catch unhandled exceptions at a global error handler (e.g., app.use(...) in Express). Log details for debugging.
  + **Response**: Return a generic HTTP 500 (Internal Server Error) message to the user, without exposing sensitive stack traces.