Codelingo

System Design Document

Frontend CRC

Class Name: LandingPage	
Sub Classes: N/A Parent Class: N/A	
Responsibilities: - Greets new users with an introduction to the app. - Displays an overview of key features. - Provides Login/Register buttons for authentication.	Collaborators: NavBar

Class Name:Register	
Sub Classes: Parent Class: Login	
- Allows users to create an account by entering credentials. - Sends data to **Authenticator** for verification. - Handles validation (password strength, duplicate emails). - Displays success or error messages.	Collaborators: Authenticator

Class Name:Login	
Sub Classes: Register Parent Class: N/A	
- Authenticates existing users by verifying credentials. - Establishes a **cookie-based session**. - Handles login errors (incorrect credentials,	Collaborators: User

unverified accounts). - Redirects authenticated users to **Dashboard**.	

Class Name:Navbar	
Sub Classes: Parent Class: N/A	
- Provides navigation for authenticated users. - Updates dynamically based on user login status. - Contains links to **Dashboard, Lessons, Forum, Match Service, and Logout**. - Ensures consistent UI across pages.	Collaborators:

Class Name:Dashboard	
Sub Classes: Parent Class: N/A	
- Acts as the **authenticated user's homepage**. - Displays **lesson progress, match rank, and user details**. - Provides access to **Lessons, Forum, and Match Service**. - Loads personalized content dynamically.	Collaborators: User, Navbar, Login

Class Name: Discussion Board	
Sub Classes: Parent Class: N/A	
- Provides a platform for users to discuss topics. - Allows users to create, view, and respond to discussion threads. - Moderates discussions based on rules and guidelines.	Collaborators: User

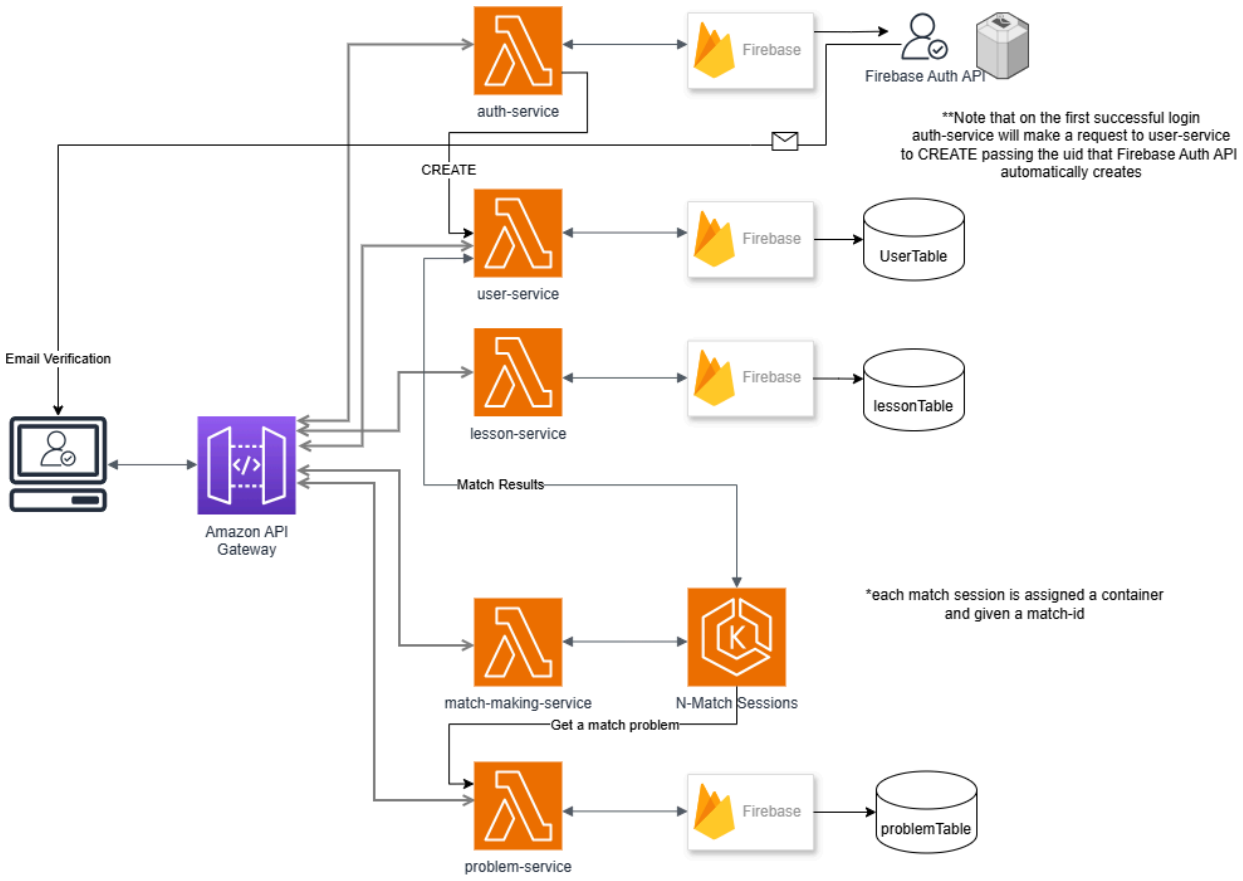
Backend CRC

Class Name:User	
Sub Classes: Parent Class: N/A	
- Stores and manages all user account details. - Contains attributes such as **email, rank, lesson progress, and unique user ID (UID)**. - Provides methods to retrieve and update user details.	Collaborators: User

Class Name: Discussion	
Sub Classes: Parent Class: N/A	
- Stores data relating to a specific problem discussion post so Authenticated Users can discuss problems. - Contains attributes such as **PID, title, content, upvotes, downvotes, UID.**	Collaborators: User, Problem (TBD)

Class Name: Authenticator	
Sub Classes: Parent Class: N/A	
- Handles user authentication and verification. - Stores **UID, email, hashed password, verification status, discussion board**. - Integrates with **Firebase email API** for authentication. - Ensures secure login and registration processes.	Collaborators: Firebase email api User

System Architecture



System Decomposition

Microservice Architecture

The system follows a **microservice architecture**, utilizing **five (5) Node.js APIs** hosted on **AWS Lambda** serverless functions. Services requiring persistent data interact with the **Firebase API** using `PUT`, `GET`, `DELETE`, and `UPDATE` operations. The **presentation layer** is decoupled and delivered to users via **Amazon API Gateway**.

Microservices Overview

1. Auth Service

A basic API handling authentication operations.

CREATE Functionality:

- Registers a new user if the email is unique using the **Firebase Auth API**.
- Sends a **verification email** containing a link.
- When a `GET` request is received on the verification link's endpoint, the user is marked as verified.
- Upon successful registration, the **auth service** makes a `CREATE` request to the **user-service**, passing the `uid` (generated by Firebase Auth) and email.

Successful registration: User is created and a verification email is sent.
Error (Non-unique email): Displays a popup message:

- *"This email is associated with an existing account."*

GET Functionality:

- Logs in users using a valid email and password.
- Sends a `GET` request to the **user-service** with the `uid` to retrieve account details.

Successful login: User data is retrieved for display.
Error (Invalid credentials): Displays a popup message:

- *"The email or password was incorrect. Try again or reset your password."*
- **Password Reset:** Handled externally via Firebase Auth API.

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2. User Service

A basic API managing user records.

- **CREATE:** Adds a user record to the **Firebase Users table**.
- **GET:** Retrieves user data based on `uid`.
    - You can also specify a post id to include a specific post `pid.`
- **UPDATE:** Modifies user data based on `uid`.

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3. Lesson Service

Handles lesson-related operations.

- **GET:** Retrieves lesson data based on `lid` (lesson ID).

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4. Match-Making Service

Facilitates user match making for sessions.

- **POST:**
    - Accepts a `uid`.
    - Requests user data.
    - Finds a valid match.
    - Hosts the match session on a **K-Match server**, which establishes connections between clients and the **problem-service**.

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5. Problem Service

Generates and provides problem-based challenges.

- **GET:**
    - Accepts a `problem` type (`enum`).
    - Accepts a `difficulty rating` (1, 2, or 3).
    - Returns a **seeded random problem** based on the provided parameters.