High Level Design Document

Introduction

This High Level Design (HLD) document outlines the architecture and core components for **MentorMatch - AI Career Guidance Platform**. MentorMatch is a web-based platform leveraging generative AI to connect students with mentors, generate personalized mentorship plans, and facilitate collaborative career development workflows.

1. System Architecture Overview

Architecture Summary:
MentorMatch is a modular, cloud-ready web application with a React frontend, Node.js backend, AI services, and MongoDB for data storage. All components are containerized using Docker.

Module	Role
Web Frontend	User interface for students, mentors, and teams (React)
API Gateway	Central entry point for client requests, routing, and auth (Node.js)
User Auth Service	Secure authentication and authorization (JWT/OAuth)
AI Matching Engine	Matches users and generates mentorship plans (Generative AI)
Collaboration Module	Messaging, scheduling, and document sharing
Progress Tracker	Tracks mentee progress and feedback
Database	Stores users, plans, sessions, and logs (MongoDB)

2. Component Interactions

Sequence Step	Interaction Description
1	User accesses frontend; requests routed via API Gateway
2	API Gateway authenticates user via Auth Service
3	Authenticated requests for matching/plans sent to AI Matching Engine
4	AI Engine queries Database for user profiles, interests, and history
5	AI Engine returns matches/plans to API Gateway, which relays to Frontend
6	Collaboration and progress updates are managed via Collaboration Module and Progress Tracker
7	All persistent data (users, plans, messages, progress) stored/retrieved from Database

3. Data Flow Overview

Data Flow	Source	Destination	Purpose
User Registration/Login	Frontend	Auth Service	Secure user authentication
Profile/Interest Update	Frontend	API Gateway/DB	Update user data for matching
Match Request	Frontend	AI Engine	Generate mentor/mentee matches
Mentorship Plan Creation	AI Engine	Database/Frontend	Store and display personalized plans
Messaging/Scheduling	Frontend	Collaboration Mod.	Enable mentor-mentee communication
Progress Updates	Frontend	Progress Tracker	Track and display mentee progress

4. Technology Stack

Layer/Component	Technology/Framework
Frontend	React, TypeScript
Backend/API	Node.js, Express
AI Services	Generative AI (OpenAI API or similar)
Database	MongoDB
Containerization	Docker
Authentication	JWT, OAuth
Deployment	Cloud (AWS/Azure/GCP)

5. Scalability & Reliability

- **Scalability:**
    - Stateless backend services enable horizontal scaling via container orchestration.
    - MongoDB supports sharding for large-scale data.
    - AI services can be scaled independently based on demand.

- **Reliability & Security:**
    - Secure authentication (JWT/OAuth) and encrypted data storage.
    - API Gateway enforces rate limiting and input validation.
    - Regular backups and monitoring for all critical services.

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