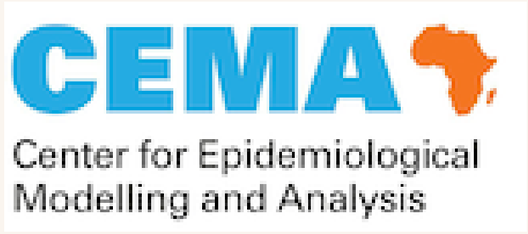
CEMA Health Information System – Presentation

CEMA Software Engineering Internship Task Solution



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Software Engineering Internship

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Problem Statement & Task Brief

Design a basic health information system for doctors to:

- Create health programs (e.g., TB, HIV, Malaria)
- Register new clients
- Enroll clients into one or more programs
- Search and view client profiles with enrollment history
- Expose client profiles via an API for external access

✅ Built as part of the CEMA Software Engineering Internship Challenge

Approach & Architecture

🔧 API-First Full-Stack System

- RESTful backend built with FastAPI + MongoDB
- Modern frontend using React + TypeScript + Vite
- Seamless integration via custom API layer

🧱 Modular Design

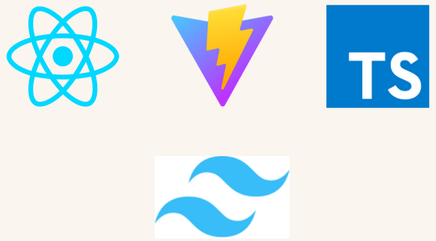
- Separation of concerns between frontend, backend, and database
- Fully documented and accessible APIs via Swagger
- Reusable components, clean structure, and scalable architecture

Feature Walkthrough (All 6 Tasks Covered)

Task	Feature	Implemented As
1. Create Health Program	/programs (POST)	FastAPI Route + Frontend Form
2. Register Client	/clients (POST)	FastAPI Route + Client Form
3. Enroll in Programs	/enrollments (POST)	Enrollment Form with dropdowns
4. Search Clients	Client list with search filter	React + react-query
5. View Profile & Programs	/clients/{id}	Full profile with enrollments
6. Expose via API	/clients, /clients/{id}	Public API with OpenAPI docs

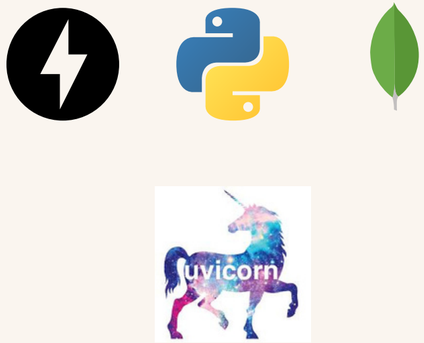
Tech Stack

Frontend

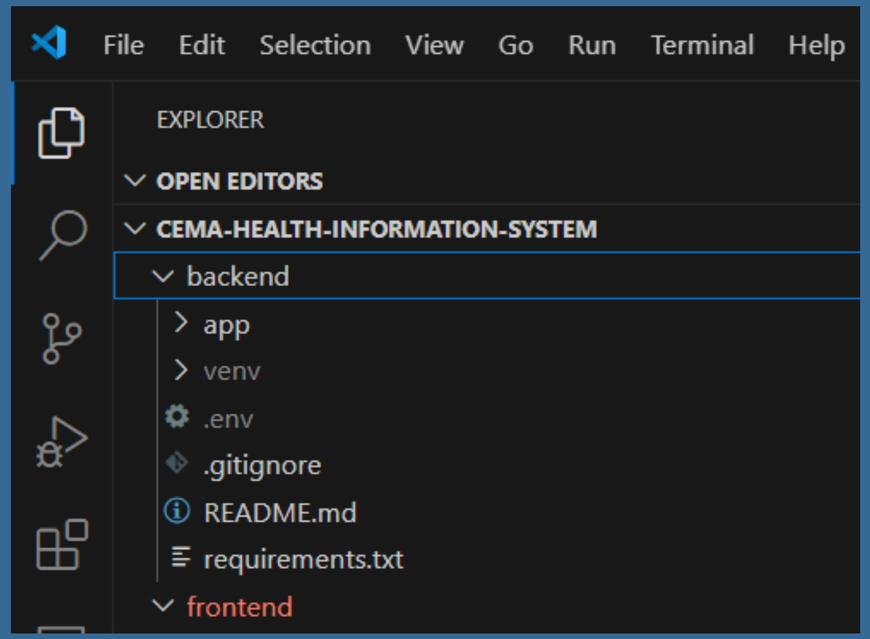


- React + TypeScript + Vite
- Tailwind CSS, shadcn/ui for sleek UI
- React Router for pages
- React Query for data fetching
- Recharts for dashboards

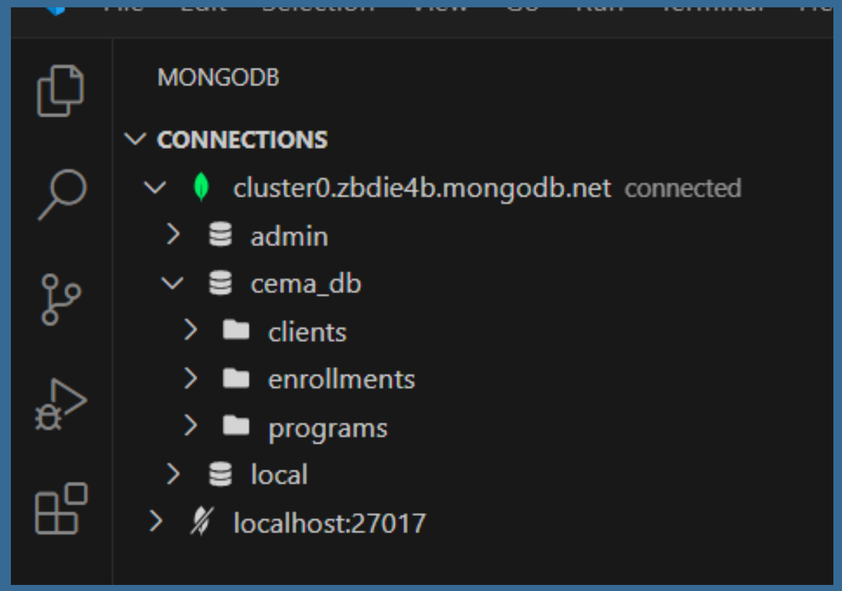
Backend



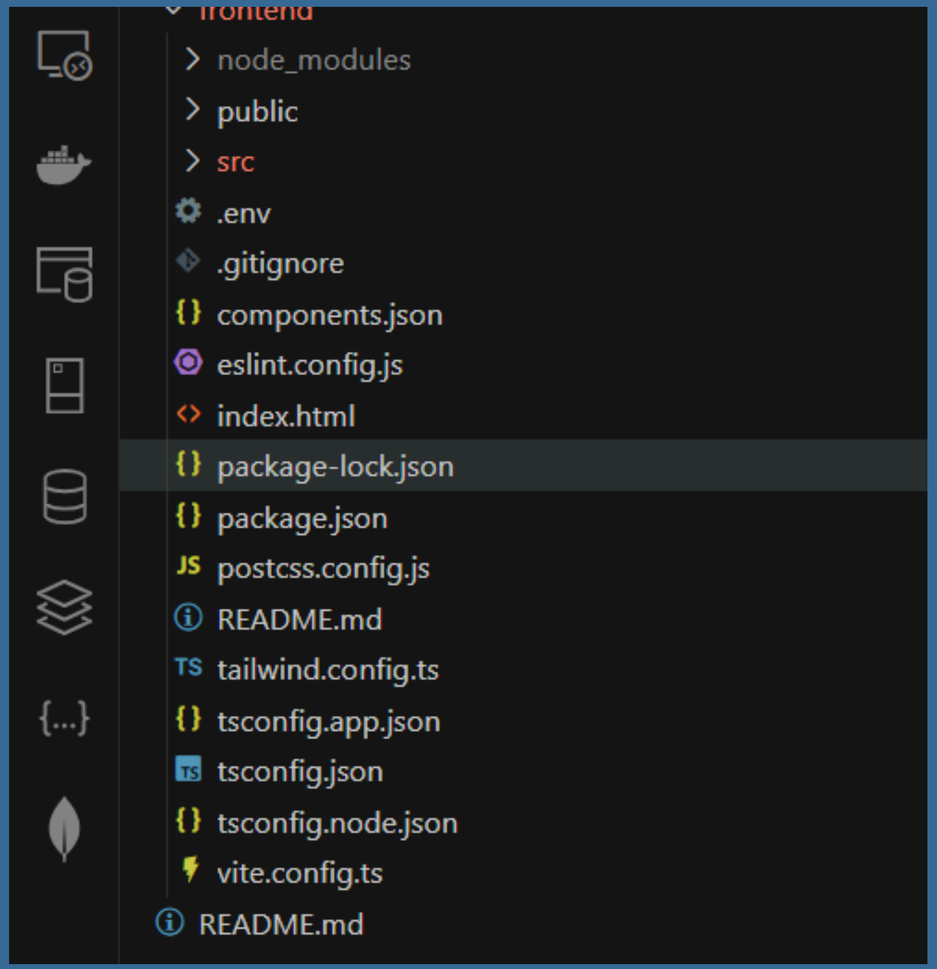
- python, FastAPI for fast, typed REST API
- MongoDB (Motor) for document storage
- Pydantic for validation
- Uvicorn for ASGI serving
- .env for secure configuration



Backend



Database



Frontend

DEV-ENVIRONMENT PREVIEW

Highlights & Strengths

- **Clean Code** – Modular, readable, and well-commented
- **FastAPI + MongoDB** – Async, scalable, and lightweight
- **UI/UX** – Clear layouts, consistent styling, responsive design
- **API-First** – Fully browsable and testable endpoints at /docs
- **Ready for Testing:** API supports easy unit test integration
- **Security Ready:** .env setup, environment separation

Innovations & Optimizations (Above Expectations)

- ✅ Custom Theming for Healthcare in Tailwind CSS
- ✅ Chart Dashboard for real-time insights
- ✅ Component-based UI system for faster dev & scaling
- ✅ Typed APIs and Frontend for safer integration
- ✅ Async backend for performance

Future Improvements

- Add JWT authentication and role-based access
- Docker-based deployment
- More analytics (active clients, dropout rate, etc.)
- Export reports (CSV, PDF)
- 🧠 AI-based insights or client risk profiling

Prototype Demo

Explore the app in Action HERE

Final Thoughts

✅ Challenge fully addressed

🔥 Designed with best practices

💻 Built solo, from scratch

🎓 A showcase of full-stack engineering, problem-solving, and clean architecture

Access source code here

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Thank You!

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