

Full-Stack Project Overview

Project Title: Online Learning Platform

Objectives: The project aimed to create a web-based platform where users can browse, enroll in, and complete online courses. The platform includes features such as user authentication, course creation, interactive content, and progress tracking.

1. Backend

Structure: The backend was built using a RESTful API architecture with a focus on modularity and scalability. It handles user authentication, course management, progress tracking, and integration with third-party APIs for video streaming.

Technologies Used:

- **Framework:** Node.js with Express.js
- **Database:** MongoDB (NoSQL)
- **Authentication:** JSON Web Tokens (JWT) for secure login and session management.
- **Other Tools:** Mongoose for data modeling and validation.

Database Design:

- **Collections:**
 1. **Users:** Stores user profiles, credentials, and roles (e.g., student, instructor).
 2. **Courses:** Includes course metadata, instructor details, and enrollment status.
 3. **Progress:** Tracks user-specific progress for each enrolled course.

Key Server-Side Logic:

1. **Authentication Module:**
 - Handles login, registration, and password reset.
 - Middleware to validate JWT tokens for secured routes.
2. **Course Management Module:**
 - CRUD operations for courses (accessible only to instructors).
 - Endpoint for students to enroll in courses.
3. **Progress Tracking:**
 - Updates progress upon video completion or quiz submission.
 - Provides progress reports for users.

2. Frontend

Technologies Used:

- **Framework:** React.js with functional components and hooks.
- **State Management:** Redux Toolkit for global state management.
- **Styling:** Tailwind CSS for responsive and modern UI.
- **Additional Libraries:** Axios for API calls, React Router for navigation.

UI Design:

- **Dashboard:** Separate dashboards for students and instructors.
- **Course Page:** Displays course details, interactive videos, and quizzes.
- **Profile Page:** Allows users to update personal information and view enrolled courses.

User Experience (UX):

- **Responsive Design:** Optimized for desktop, tablet, and mobile devices.
- **Intuitive Navigation:** Easy access to courses and progress reports.
- **Interactive Elements:** Dynamic loading indicators and animations enhance user engagement.

3. Hosting

Hosting Environment:

- **Backend:** Hosted on AWS EC2 with a Node.js runtime environment.
- **Frontend:** Deployed using Vercel for optimized performance and CDN distribution.
- **Database:** MongoDB Atlas for cloud-based, scalable database management.

Deployment Process:

1. Backend:
 - Continuous integration using GitHub Actions.
 - Deployed to AWS EC2 using PM2 for process management.
 - HTTPS enabled with an SSL certificate.
2. Frontend:
 - Automated builds and deployments on push to the main branch via Vercel.
3. Environment Variables:
 - Securely stored API keys and database credentials in AWS Secrets Manager and Vercel's environment settings.

4. Project Link

- **Application URL:** [Online Learning Platform](#)
- **GitHub Repository:** [GitHub Repo](#)