**✅ Project Design Phase-II**

**Technology Stack (Architecture & Stack)**

**Date**

31 January 2025

**Team ID**

LTVIP2025TMID49959

**Project Name**

Your Center for Skill Enhancement (Online Learning Platform)

**Maximum Marks**

4 Marks

**✅ Technical Architecture**

The architecture for the Online Learning Platform (OLP) is a **full-stack MERN application** deployed either locally or in the cloud. The system enables students, teachers, and administrators to interact seamlessly.

* All data flows through REST APIs between frontend and backend.
* Data storage uses a NoSQL database.
* Stripe API is integrated for secure payment processing.
* Certificates are generated as PDF files and stored on the server.

**Architectural Diagra**

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│ User Device │

│ (Browser) │

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HTTP / HTTPS

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│ Frontend UI │

│ (React + Vite) │

└──────┬───────┘

│

REST API Calls

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┌───────────────┐

│ Backend API │

│ (Node + Express) │

└──────┬────────┘

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Mongoose ODM

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│ MongoDB │

│ Database │

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**External APIs:**

- Stripe for payments

- PDFKit for certificate generation

**✅ Table-1: Components & Technologies**

| **S.No** | **Component** | **Description** | **Technology** |
| --- | --- | --- | --- |
| 1 | User Interface | How users interact with OLP | HTML, CSS, JavaScript, React.js, Vite |
| 2 | Application Logic-1 | Handles user registration, login, dashboards, and CRUD for courses | Node.js, Express.js |
| 3 | Application Logic-2 | Payment processing for premium courses | Stripe API |
| 4 | Application Logic-3 | PDF generation for course certificates | PDFKit |
| 5 | Database | Stores users, courses, enrollment data | MongoDB, Mongoose |
| 6 | Cloud Database (Optional) | Cloud deployment of MongoDB | MongoDB Atlas |
| 7 | File Storage | Certificate PDF storage | Local Filesystem or Cloud Storage |
| 8 | External API-1 | Secure payment transactions | Stripe API |
| 9 | External API-2 | Social logins for easier registration (future enhancement) | Google OAuth, Facebook OAuth |
| 10 | Machine Learning Model | (Future) Personalized course recommendations | TensorFlow, scikit-learn (planned) |
| 11 | Infrastructure | Deployment on local or cloud server | Local, AWS, or other cloud services |

**✅ Table-2: Application Characteristics**

| **S.No** | **Characteristics** | **Description** | **Technology** |
| --- | --- | --- | --- |
| 1 | Open-Source Frameworks | Frameworks used for development | React.js, Node.js, Express.js, Mongoose |
| 2 | Security Implementations | JWT authentication, password hashing, secure payments | JWT, bcrypt.js, HTTPS, Stripe security |
| 3 | Scalable Architecture | Scalable via microservices if needed in future; currently built as modular MVC | MERN Stack, RESTful services |
| 4 | Availability | Can deploy in cloud with redundancy and load balancers for high availability | AWS Elastic Load Balancer, MongoDB Atlas Cluster |
| 5 | Performance | Vite for fast builds, optimized queries in MongoDB, potential CDN usage | Vite, MongoDB indexes, NGINX, Cloudflare CDN |

**✅ References**

* [C4 Model](https://c4model.com/)
* [IBM Architecture Center](https://www.ibm.com/cloud/architecture)
* [AWS Architecture Center](https://aws.amazon.com/architecture)
* [Medium - Drawing Useful Architecture Diagrams](https://medium.com/the-internal-startup/how-to-draw-useful-technical-architecture-diagrams-2d20c9fda90d)

**✅ Outcome:**

This technology stack ensures the Online Learning Platform is scalable, secure, and performant, providing a seamless experience to all users.