Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	20 February 2026
Team ID	LTVIP2026TMIDS24292
Project Name	LearnHub : Your Center For Skill Enhancement
Maximum Marks	4 Marks

Technical Architecture

The LearnHub platform follows a **3-tier client–server architecture** where the user interface interacts with backend services through REST APIs, and data is securely stored in a cloud database. The architecture ensures scalability, security, and high performance for online learning.

Table-1 : Components & Technologies

S.No	Component	Description	Technology
1	User Interface	Web-based interface through which users interact with the application	HTML, CSS, JavaScript, **React.js**, Tailwind CSS
2	Application Logic-1	Core backend logic for authentication, course management, and user operations	**Node.js**, Express.js
3	Application Logic-2	Business logic for learning flow, assessments, progress tracking	Node.js, Express.js
4	Application Logic-3	API services for payments, email notifications, and file handling	REST APIs, Nodemailer, Razorpay API
5	Database	Stores user data, course data, progress, and assessments	**MongoDB (NoSQL)**
6	Cloud Database	Managed cloud database service	MongoDB Atlas

S.No	Component	Description	Technology
7	File Storage	Storage for images, videos, certificates	Cloudinary
8	External API-1	Payment processing for course enrollment	Razorpay API
9	External API-2	Email notifications and verification	SMTP / Nodemailer
10	Machine Learning Model	(Future scope) Personalized course recommendation	Recommendation Model
11	Infrastructure (Server / Cloud)	Application deployment and hosting	Local Server / Cloud (AWS / Vercel / Render)

Local Server Configuration:

- Node.js runtime
- MongoDB local / Atlas connection

Cloud Server Configuration:

- Frontend: Vercel / Netlify
- Backend: Render / AWS EC2
- Database: MongoDB Atlas

Table-2 : Application Characteristics

S.No	Characteristics	Description	Technology

S.No	Characteristics	Description	Technology
1	Open-Source Frameworks	Frameworks used for frontend and backend development	React.js, Node.js, Express.js
2	Security Implementations	Authentication, authorization, and data protection	JWT Authentication, Password Hashing, HTTPS
3	Scalable Architecture	Separation of concerns and independent scaling	3-Tier Architecture, REST APIs
4	Availability	Ensures application is accessible with minimal downtime	Cloud Hosting, Load-ready backend
5	Performance	Optimized API responses and fast UI rendering	React Virtual DOM, Caching, CDN

Architecture Summary

- **Frontend:** React.js SPA for interactive user experience
- **Backend:** Node.js + Express REST APIs
- **Database:** MongoDB for flexible data storage
- **Cloud Services:** MongoDB Atlas, Cloudinary
- **Security:** JWT, encrypted credentials
- **Scalability:** Cloud-ready and modular design

References

- https://c4model.com/
- https://developer.ibm.com/patterns/online-order-processing-system-during-pandemic/

- https://www.ibm.com/cloud/architecture
- https://aws.amazon.com/architecture
- https://medium.com/the-internal-startup/how-to-draw-useful-technical-architecture-diagrams-2d20c9fda90d