Technology Stack

Date	26june,2025
Team Id	LTVIP2025TMID53783
Project name	Learn Hub
Maximum Marks	4 marks

Technical Architecture:

The LearnHub platform uses a full-stack MERN architecture designed to be scalable, secure, and responsive. Below is the architectural diagram (to be added separately as per submission guidelines) followed by detailed tables of components and characteristics.

Table-1: Components & Technologies:

S. No	Component	Description	Technology
1.	User Interface	Web-based interface for students, teachers, and admin	HTML, CSS, JavaScript, React.js, Bootstrap
2.	Application Logic-1	Authentication and Authorization	Node.js, Express.js, JWT
3.	Application Logic-2	Course creation and management logic	Node.js, Express.js
4.	Application Logic-3	Assignment of courses and section updates	Node.js, Express.js
5.	Database	Stores users, courses, sections, assignments	MongoDB (NoSQL)
6.	Cloud Database	(Optional if using a cloud-managed DB)	MongoDB Atlas
7.	File Storage	Stores assets like thumbnails or course PDFs (optional)	Local filesystem / Cloudinary / AWS S3
8.	External API-1	None currently (can integrate AI or analysis APIs later)	—
9.	External API-2	(Future scope for integration with EdTech APIs)	—
10.	Machine Learning Model	(Optional in future for recommendation systems)	TensorFlow / scikit-learn (Future Integration)

11.	Infrastructure	Cloud-ready, runs locally during development	Node.js server on Render / Vercel / Localhost

Table-2: Application Characteristics:

S. No	Characteristics	Description	Technology / Implementation
1.	Open-Source Frameworks	React.js, Node.js, Express.js, MongoDB	MERN Stack
2.	Security Implementations	JWT authentication, password hashing with bcrypt, route protection	bcrypt, JWT, Helmet, CORS
3.	Scalable Architecture	Built with 3-tier architecture: Frontend, Backend API, and Database	MERN architecture + REST APIs
4.	Availability	Supports future deployment on scalable cloud infra	Can deploy on Render, Heroku, Vercel, or Kubernetes
5.	Performance	REST APIs, optimized DB queries, frontend component reuse, lazy loading	Axios, React Suspense, MongoDB indexes

This design ensures smooth delivery of learning content, robust teacher and student interactions, and easy course management. Future integrations can include ML-powered recommendations, live classrooms, and analytics dashboards.