MANIPAL UNIVERSITY
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A Major Project Synopsis on

NextGen

(An Online E-Learning Platform)

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I. Introduction

NextGen is a modern virtual learning system designed to connect learners with better scholars. With the fast pace of the virtual world today, acquiring new skills and staying updated is now mandatory.

NextGen offers a dynamic, engaging and friendly learning experience for students, professionals and individuals committed to lifelong learning.

NextGen uses technology to give you a hassle free way of learning online. It's interactive, flexible and designed to fit your learning style. With a wide range of courses in various fields, people can learn at their own pace and in the comfort of their homes.

NextGen is built to be an expandable, secure and fast e-learning portal by leveraging the latest Java based backend infrastructure and flexible React.js frontend. Our technology provides seamless learning experience, real time connection and structured content for both instructors and learners.

The initial part of NextGen is built with React.js. It helps in creating a great and efficient workspace for users. With component based architecture, it provides flexibility, reusability and improved loading times. The user interface also uses Redux to handle data states to handle live data changes smoothly. Tailwind CSS enhances the UI with modern and clean designs and Progressive Web App (PWA) support ensures seamless mobile learning experience across different devices.NextGen's foundation is built on its backend powered by Spring Boot, meant to support independent growth of multiple components within a microservices architecture. The server component has RESTful applications for managing user authentication, lesson content, payment and data review. Secure Spring Security is used to secure data transfer and levels of access based on roles, making it a safe environment for teachers and students.

The site also comes with Stripe and Razorpay integrated for secure payment processing, so students can buy courses easily. NextGen allows students to choose whether to subscribe or pay for each course so they can decide how they want to learn. Teachers are also assisted by the system in generating invoices and displaying earnings on dashboards making it easy to track money in and out.

NextGen stands out because of its cloud deployment, real time chats, AI driven learning pathways and solid user security. Its backend is done in small independent services, recommends intelligent course selections and is compatible with multiple devices. So it can scale while still performing well. In future they will implement a mobile app, make the learning experience more of a game and use AI to personalize the experience even more. These changes will make learning more fun and useful.

II. Motivation

The school is a cornerstone of development; nevertheless, various students are facing obstacles when trying to secure quality education elements scheduled for budget constraints, geographic limitations, or otherwise inflexible agendas.

NextGen aims at addressing the above mentioned challenges by providing flexible, cost-effective, and stimulating information that is accessible to all, throughout the entire area and from every location.

The theory of education is a cornerstone of human change, although different students find it difficult to comprehend the important aspects of education. Where they are concentrated elsewhere on a strict timetable, the increase in costs is likely to be caused by increased costs where they are concentrated elsewhere on a strict timetable.

NextGen's efforts to mitigate the aforementioned disadvantage. It's a learning knowledge that fits your needs, doesn't split the deposit and keeps you on the ropes. You are free to make use of new materials whenever you like, no matter where you are. Mentors and tutors often deal with difficulties in growing their listeners, earning income from them, and successfully managing their subjects.

NextGen provides a powerful platform for the learning Godhead, allowing them to concentrate more on teaching while we contemplate the supervision of communities, student interaction, and fulfilling excursions. The development of e-learning channels has shown the potential of virtual education; nevertheless, many relevant channels are frequently difficult to access, complex, or restrictive. NextGen aims to provide a user-friendly, low cost, and scalable solution that ensures that students with different backgrounds receive standard information. A significant failing detected in a number of e-learning degrees is the absence of real-time interaction between students and teachers.

NextGen fills this gap by offering live lectures, chat rooms, and synergies, thus creating an appropriate atmosphere for collaboration, inquiry, and prompt responses for students. As technology progresses, guidance is needed to move beyond the usual classroom location. NextGen enables learners to take charge of their learning journey, allowing them to identify their own speed and effectively monitor their development. Safety and trust play an essential role in machine clear education, especially in remitting, certification, and buyer information. NextGen provides a secure platform that uses a powerful authentication, code exchange, and validation process to provide reliable and smooth training expertise. Our objective shall be to provide equal prospects for learners and teachers through innovative means of facilitating synergies and the exchange of information. NextGen objectives related to adjusting the delivery and consumption of education through the provision of appropriate instruments, support, and up-to-date study techniques. As we move forward into the future, NextGen will have to persist in order to create and integrate new movements such as AI-enhanced training nerve nerve pathways, gamification, and realistic projects to move forward.

III. Problem Statement

3.1 Creators:

- Built in marketing tools and SEO optimization for targeted audience
- Flexible pricing and high revenue sharing % to ensure fair earnings.
- Analytics tools to provide student progress , Engagement and improvement.
- Dedicated instructor communities, live interaction features foster growth.

3.2 Learners:

- Gamification, Quizzes, community discussions making learning engaging.
- Hands on projects and case studies ensure Practical Knowledge application.
- Affordable pricing, free introductory courses provide budget friendly learning.
- Live Q&A, Mentorship programs foster better student-instructor interaction

IV. Methodology/Planning of Work:

Week 1: Project Setup & Initial Development

a. Requirement Gathering & Planning

- Define core features for the MVP (Minimum Viable Product).
- Finalize tech stack (React.js, Spring Boot, MySQL, AWS, etc.).

b. Backend Setup (Spring Boot + MySQL)

- Create a Spring Boot project with basic configurations.
- Implement user authentication (JWT & OAuth2).
- Define database schema for Users, Courses, Payments, and Progress.
- Set up MySQL database and establish connections.

c. Frontend Setup (React.js + Tailwind CSS)

- Initialize React.js project with Vite for faster performance.
- Implement basic routing (React Router).
- Develop homepage and authentication screens (Login, Signup).

Week 2: User Management & Course Module

a. Backend Development

- Implement User Roles (Student, Instructor, Admin).
- Develop CRUD APIs for Courses (Create, Update, Delete, Fetch).
- Implement file storage (AWS S3) for course materials.

b. Frontend Development

- Build User Dashboard (Enrolled Courses, Profile, Learning Progress).
- Develop Course Listing & Course Preview Pages.
- Fetch course data from backend using Axios/Fetch API.

c. Database Integration

- Create tables for User Profiles, Courses, and Enrollments.
- Test database queries using Postman.

Week 3: Payment System & Course Enrollment

a. Backend Development

- Integrate Stripe/Razorpay for course payments.
- Implement Order & Payment Processing APIs.
- Develop subscription models (One-time purchase & Monthly Plans).

b. Frontend Development

- Implement course purchase & checkout page.
- Develop Instructor Dashboard (Course Creation, Earnings Tracking).
- Show purchase history & invoice generation.

c. Testing & Optimization

- Perform API testing with Postman.
- Conduct unit testing on payment & enrollment flows.

Week 4: Interactive Features & AI-Based Recommendations

a. Backend Development

- Implement AI-powered course recommendations using user behavior data.
- Add progress tracking service to track student learning.
- Develop real-time notifications system (WebSockets).

b. Frontend Development

- Build Discussion Forums & Live Chat System.
- Display personalized course recommendations.
- Implement quiz & assessments module.

c. Cloud Deployment (AWS/GCP)

- Deploy backend services on AWS EC2.
- Use AWS RDS for database hosting.
- Integrate CloudFront CDN for faster content delivery.

Week 5: Admin Panel & Security Enhancements

a. Backend Development

- Develop Admin Dashboard (Manage Users, Courses, Payments).
- Implement a content moderation system for course approvals.
- Add security features (Spring Security, OAuth, CSRF protection).

b. Frontend Development

- Build Admin Portal UI with analytics and reports.
- Implement a user management system (Activate/Deactivate accounts).
- Optimize frontend for mobile responsiveness.

c. Performance & Security Testing

- Conduct stress testing to handle high traffic loads.
- Run security audits to prevent vulnerabilities.

Week 6: Final Testing, Bug Fixes & Deployment

a. Bug Fixes & Optimizations

- Fix UI inconsistencies and optimize load times.
- Resolve backend errors and database queries.
- Optimize API response times.

b. Final Testing

- Perform end-to-end testing on all features.

- Test payment flows, enrollment, and content delivery.
- Conduct user testing for UI/UX feedback.

c. Production Deployment & Marketing Launch

- Deploy frontend (Vercel/Netlify) & backend (AWS/GCP).
- Set up monitoring tools (Prometheus & Grafana).
- Start SEO & digital marketing campaigns.

V. Requirements for proposed work -:

5.1 Software Requirement:

- Operating System: Windows 11
- User Interface: React JS
- Database: MYSQL
- Backend: Spring Boot using Java , Postman for Restful APIs , Firebase

5.2 Hardware Requirement:

- RAM: 8GB expandable 32GB.
- Storage: 512 SSD.

VI. Bibliography/References -:

6.1 Spring Boot Official Docs: https://spring.io/projects/spring-boot
6.2 Building REST APIs with Spring Boot: https://www.baeldung.com/rest-api-spring
6.3 Spring Security & JWT Authentication: https://www.baeldung.com/spring-security-jwt
6.4 React Official Docs: https://react.dev/
6.5 MySQL Documentation: https://dev.mysql.com/doc/
6.6 Postman API Testing: https://learning.postman.com/docs/getting-started/introduction/

VII. Conclusion -:

NextGen will revolutionize e-learning by providing a user-friendly, intelligent, and flexible platform that can be both legal and adaptable. In order to manage data efficiently while also maintaining high performance, security measures, and user participation, it has a well-structured, 6-week development cycle that includes React.js, Spring Boot, and MySQL. NextGen will offer premium learning and user-friendliness through its combination of Adaptive Learning, Real-Time Interaction, and an intuitive inception structure. It has cloud storage, AI-based recommendations, and an easy-to-use settlement platform, which makes it ready for the future. NextGen will become a major e-learning platform capable of revolutionizing understanding transfer and education worldwide, together with appropriate execution, continuous development, and critical advertising.