মেট্রোপলিটন ইউনিভার্সিটি
Metropolitan University

Course Code & Title

CSE 436: Final Year Project
Department of CSE

Project Title

Building Learning Management System
using MERN Stack

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Proposal for CSE 436

Abstract

This project aims to design and develop a modern Learning Management System (LMS) using the MERN (MongoDB, Express.js, React.js, Node.js) stack. The LMS will provide a platform for educators to create, manage, and deliver courses, while enabling students to enroll, learn, and track their progress. Key features include user management, course creation, content organization, progress tracking, payment integration, and advanced search functionality. The project will follow an iterative development approach, combining agile methodologies with modern web development practices. The expected outcome is a fully functional, scalable, and user-friendly LMS that addresses the growing demand for online learning platforms. This project will also serve as a practical learning experience for mastering the MERN stack and building a real-world application.

Introduction

Background

The shift toward online education has accelerated in recent years, driven by the need for accessible and flexible learning solutions. Learning Management Systems (LMS) have become essential tools for educational institutions, businesses, and individual educators. However, many existing LMS platforms are either too complex or lack essential features, creating a demand for customizable and user-friendly solutions.

Problem Statement

There is a need for a modern, scalable, and feature-rich LMS that simplifies course management for educators and enhances the learning experience for students. Many existing platforms are either expensive, lack essential features, or are difficult to customize.

Objectives

• To develop a fully functional LMS using the MERN stack.
• To implement user management, course creation, content organization, and progress tracking features.
• To integrate payment gateways for course purchases and subscriptions.
• To create an intuitive and responsive user interface.
• To ensure scalability and maintainability of the application.

Scope

The project will focus on developing a web-based LMS that supports user registration, course creation, content management, and payment processing. Limitations include the exclusion of mobile app development and advanced analytics features in the initial version.

Literature Review

Overview

Existing research highlights the importance of LMS in enhancing the learning experience and improving educational outcomes. Studies have shown that effective LMS can lead to increased student engagement and better retention rates.

Gaps in Research

While existing platforms offer many features, there's a need for more streamlined and modern solutions that cater to the evolving needs of online learners and instructors. This project aims to address the gap by providing a lightweight yet powerful LMS using the MERN stack, with a focus on ease of use and flexibility.

Relevance

This project builds upon existing research by applying modern web development practices to create a practical and efficient LMS. It deviates by focusing on a specific technology stack (MERN) and a user-centric design approach.

Features

Homepage

• A simple, welcoming landing page designed to introduce the LMS platform and attract new users.
• A prominent banner with a tagline (e.g., "Unlock Your Potential with Online Learning") and clear call-to-action buttons (Sign Up, Log In, Browse Courses).
• A dynamic section highlighting limited-time offers or discounts (e.g., "Join now and get 10% off your first course!") to engage new users.
• Display 3-6 popular or newly added courses with thumbnails, titles, prices, and instructor names, fetched dynamically from the backend.
• Showcase course categories (e.g., Technology, Business, Arts) with clickable links to filter courses.
• Display 2-3 user reviews or success stories to build trust and credibility.
• Links to About, Contact, Privacy Policy, and social media icons**.**

User Management

- User registration and authentication.
- Role-based access control (RBAC) for different user privileges (Admin, Instructor and Students).
- User profile management.

Course Management

- Course creation and editing.
- Course categorization and tagging.
- Course enrollment and unenrollment.
- Course progress tracking.
- Course prerequisites and dependencies.

Content Management

- Upload and manage various content types.
- Organize content into modules and lessons.
- Content versioning and updates.
- Embedded video support.

Progress Tracking and Reporting

- Student progress tracking.
- Instructor dashboards for monitoring student progress.
- Visual progress representation.

Search and Filter

- Course Search: Implement a search feature to find courses by keywords, categories, or tags.
- Filter Options: Allow users to filter courses based on difficulty, duration, or ratings.

Payment Integration

- Payment Gateway: Integrate payment gateways like Stripe or PayPal for course purchases.
- Subscription Models: Offer subscription-based access to courses.

Methodology

Research Design

The project will follow an iterative development approach, combining agile methodologies with modern web development practices.

Data Collection

• User requirements will be gathered through online research and feedback from potential users (educators and students).
• Course content and user data will be simulated for testing purposes.

Data Analysis

• User feedback will be analyzed to refine the application's features and usability.
• Performance metrics (e.g., load times, error rates) will be monitored to optimize the application.

Tools and Resources

• Frontend: React.js, Redux, Tailwind CSS.
• Backend: Node.js, Express.js, JWT for authentication.
• Database: MongoDB, Mongoose.
• Payment Integration: Stripe or Other Payment System.
• Deployment: Heroku, Render, Netlify, or Vercel.
• Version control: Git for version control.
• Code Editor: Visual studio.

Timeline

Week 1-2: Revising MERN stack fundamentals and project setup.
• Focus on JavaScript, React.js, Node.js, Express.js, and MongoDB basics.
• Set up the project structure and version control with Git.
Week 3-4: Development of user management features.
• Implement user registration, authentication, and role-based access control (RBAC).
Week 5-6: Development of course management features.
• Create functionalities for course creation, editing, enrollment, and progress tracking.
Week 7-8: Implementation of content management features.
• Allow users to upload and manage various content types, organize content into modules and lessons.
Week 9-10: Development of progress tracking and reporting features.
• Implement student progress tracking and instructor dashboards.
Week 11: Integration of search and filter functionalities.
• Implement course search by keywords, categories, or tags, and add filter options.
Week 12-13: Integration of payment gateways.
• Research and implement payment processing using Stripe or PayPal.
Week 14: Testing and debugging.
• Conduct unit tests, user testing, and fix any identified issues.
Week 15: Deployment and final touches.
• Deploy the application on a platform like Heroku, Render or Vercel and make final adjustments based on feedback.
Week 16: Documentation and presentation preparation.

Expected Outcomes

Results

A fully functional LMS with user management, course management, content management, progress tracking, search/filter, and payment integration capabilities.

Impact

This project will provide a valuable tool for online education, enabling instructors to create and manage courses effectively and students to access high-quality learning resources.

Applications

The LMS can be used by educational institutions, online course providers, and individual instructors to create and deliver online courses.

Ethical Considerations

Ethics Statement

This project will adhere to ethical principles regarding data privacy and security. User data will be protected, and payment information will be handled securely.

Approval

No formal ethical approval is required for this project, as it does not involve human subjects or sensitive data.

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