DESIGN AND IMPLEMENTATION OF E-LEARNING BASED WEBSITE: EduSell

BY

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FINAL YEAR DESIGN PROJECT REPORT

This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering

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DAFFODIL INTERNATIONAL UNIVERSITY

DHAKA, BANGLADESH

May 5, 2025

APPROVAL

This Project titled **"Design and Implementation of E-Learning basaed Website:EDUSELL"**, submitted by Gazi Shahriar Samrat, ID No:192-15-2814 **Student ID** to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on **14 May, 2025.**

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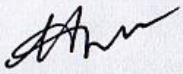

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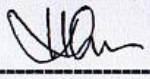

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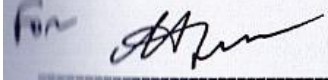

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DECLARATION

We hereby declare that this project has been done by us under the supervision of **Aliza Ahmed Khan,Lecturer (Senior Scale),Department of Computer Science and Engineering, Daffodil International University**. We also declare that neither this project nor any part of this project has been submitted elsewhere for the award of any degree or diploma.

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We would like to thank our entire course mate in Daffodil International University, who took part in this discussion while completing the course work.

Finally, we must acknowledge with due respect the constant support and patience of our parents.

ABSTRACT

The online marketplace known as EduSell provides users with an innovative platform to conduct course purchases and sales between learners. By using the platform people can explore numerous educational opportunities before making secure transactions to access valuable content at times convenient for them. Among EduSell's features the platform provides a discussion forum that enables students to communicate with educators and classmates for improved learning outcomes as well as built-in software promotion tools that extend educators to present training materials or relevant applications to their courses. Learners benefit from this feature since it improves course value by providing them with essential resources. EduSell implements a rigorous review platform that permits users to evaluate courses and instructors while assisting fellow students with essential choices. The backend structure operates through Node.js with Express.js programming along with front-end development using React.js and DaisyUI for providing an intuitive user interface. The platform utilizes MongoDB as a storage system that efficiently manages data along with a safe payment processing gateway integrated for transactional operations. The system gives administrators access to a control panel that enables them to manage users alongside courses and promotions in addition to analyzing system performance. The development cycle of EduSell depends on user suggestions because it uses an iterative approach. This platform works to develop an all-inclusive digital learning space which smoothly unites teachers with students and educational software developers.

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CHAPTER 1

Introduction

1.1 What is EduSell -?

EduSell represents a contemporary web-based marketplace that unifies academic instructors with students by creating an online market for educational courses. The user-oriented platform of EduSell connects educators with learners through a simplified learning environment created using React.js and styled by DaisyUI. Through this platform users gain the capability to make money from their expertise while students can explore educational materials from multiple categories. EduSell enables users to create accounts while they can view courses and pay for enrollment at checkout and retrieve the purchased materials. The distinctive feature of EduSell includes a discussion forum which facilitates interaction between learners while improving learning outcomes. The backend system of EduSell runs on Node.js and Express.js together with MongoDB which handles efficient management of users, courses, transactions and forum data. The admin panel provides capabilities to handle course developments as well as account management alongside review administration and order processes and promotional offer features. The administrative section of EduSell provides complete visibility through platform metrics and detailed reports which makes the platform flexible and expandable. Student learners and educators alike will find EduSell makes an ideal solution that matches their individual needs no matter their role. The platform provides a safe and interactive learning environment which serves as an exceptional solution for digital education today.

1.2 Motivation

Clear access to education with high quality standards must exist in the digital speed-up for students who need it inclusively. Online learning platforms run multiple platforms which primarily concentrate on delivering content without offering community assistance or independent access to instructors. EduSell was created by founders to enable diverse non-university organizations to provide knowledge sharing for learners through a simple course

discovery system.

Students can search and find various affordable quality educational materials through our platform which enables instructors to receive payments directly from their work rather than working through intermediary organizations. Learning platforms currently fail to provide proper channels that enable learner interaction with each other. The platform hosts a built-in discussion feature that lets students connect and obtain help from fellow learners.

EduSell citizen developers used their practical training to build full-stack applications that combined protected Node.js/Express.js backend workings with MongoDB database environment setup and development of React.js interfaces. The core mission of digital educational system delivery became completely operable because of user authorization systems and payment processing capabilities and administrator interface management systems.

1.3 Objectives

EduSell builds an all-inclusive user-friendly system designed for enabling online transactions of educational courses. The core pursuit of this project consists of three particular targets mentioned as follows:

Enable Course Monetization: The platform enables teaching professionals to interact directly with buyers to show their courses with no limitations imposed by intermediaries.

Facilitate Learning Access: Users require a basic searching system that enables them to retrieve materials for learning and purchase courses alongside homework access.

Implement Secure Transactions:bUsers should access a secure payment processing system through the platform to make purchases of online courses.

Foster Learner Interaction: A dedicated discussion zone must be developed on the system which enables students to support their peers taking similar courses.

Support Admin Management: The system needs to enable administrator control of platform users and courses while selling products and gathering feedback through simple intuitive graphical interfaces.

Ensure Scalability and Flexibility: The platform requires development of a flexible design that allows for future growth through upcoming feature updates and increased user numbers.

Enhance User Experience: A user-friendly frontend interface using React.js also with DaisyUI will be implemented to create responsive design which works across different devices.

Practice Full-Stack Development: The integration of contemporary technical skills achieves improvement through Node.js, Express.js and MongoDB which helps develop frontend and backend database components together.

1.4 Methodology

EduSell was developed through a systematic process which integrated frontend and backend code to build a complete and easy-to-use system. The project development process included these main operational phases:

Requirement Analysis: The team identified essential functions for user registration, course exploration and buying, administrative management tasks. The team established objectives together with determining scope limits from requirements of learners as well as educators and school administrators.

System Design: I designed front-end elements as wireframes and user interface mockups using user experience testing and accessibility needs.The system used RESTful APIs and developed a safe database structure which processed user data along with course materials and transactions and allowed discussion capabilities.

Technology Stack Selection: The application features React.js as the frontend framework alongside DaisyUI to produce responsive component styles.Node.js together with Express.js serves as the backend tool to execute server tasks and create API pathways.

Database: MongoDB for flexible and scalable data storage.

Development Process: Users experienced interfaces for viewing courses combined with capabilities for dialogues and personal profiles through their login and registration sequence

and dashboard features.The system featured API development for user authentication as well as courses management and payment processing and forum communication functions.

Admin Panel: Created admin-specific routes and dashboards for content and user management.

Integration: My work integrated the frontend user interface with backend Application Programming Interfaces to create real-time data processing possible. We established a safe electronic payment platform for users to conduct course purchases.

Testing & Debugging: I conducted a unit along with functional tests to confirm each module performed properly. Throughout the project I fixed problems along with improving performance standards.

Deployment: The application received deployment using contemporary platforms such as Render, Vercel and similar solutions for its online availability.

1.5 Project Outcome:

The completed EduSell web application delivered secure online course trading services to users according to its primary purpose. EduSell created several essential end results through the project execution.

User-Friendly Platform: Users enjoy an easy website experience because the React.js and DaisyUI-based framework enables them to find and purchase courses effortlessly using responsive components.

Secure Authentication and Payments: Secure payment transactions are possible through the integrated payment gateway because users can access the system easily both for registration and logging in.

Course Marketplace: The platform facilitates browser sessions to let students join instructor-led courses with features for customized school content examination based on their preferences.

Interactive Discussion Forum: The built-in student discussion forums on EduSell enable peer interaction between students to increase their educational involvement.

Robust Admin Dashboard: The system administrator has full control to manage users through the platform alongside handling course setups and reviews and orders processes effortlessly. Through the system administrators obtain platform statistic visibility that allows them to create analytical reports for assessment purposes.

Scalability and Extensibility: The platform follows modular design principles along with scalability features to allow administrators the capability of adding new features including video streaming and certificates and mobile application development in future implementations.

The EduSell system demonstrates how superior technology seamlessly teams up with educational quality to create an all-encompassing e-learning platform.

1.6 Report Layout

Developing a thorough report layout for " EduSell" entails organizing several parts to highlight the specifics of the project, its stages of development, its features, and its results. An outline for the report layout may be seen below:

Chapter	Title
Chapter 1	Introduction
Chapter 2	Background
Chapter 3	Research Methodology
Chapter 4	Implementation and Results
Chapter 5	Engineering Standards and Design Challenges
Chapter 6	Conclusion

Figure 1.6: Report Layout of this Project.

CHAPTER 2

Background

2.1 Introduction

The fast development of digital technology now controls educational institutions because it transforms basic classroom education to personalized and flexible online learning solutions. Educators together with learners are adopting innovative teaching and educational acquisition methods through e-learning platforms across boundary limitations. Many current e-learning platforms restrict content through institutional permissions or fail to include features necessary for group learning engagement between users. Independent educators encounter difficulties in generating revenue from their courses because platform rules limit their monetary options and rate commissions are too high. Students usually experience excessive content while interacting with minimal peers and lack assistance from online communities. The marketplace known as EduSell exists to resolve these issues through its free and secure platform for educational course transactions. EduSell combines traditional e-learning features with forum functionality to foster communication among its users beyond basic transaction activities because it focuses on both platform commerce and community engagement. This introduction delivers critical information to interpret the EduSell project which includes its objectives and technical design along with demographic setting. The document presents essential online learning system fundamentals alongside full-stack web development principles and explains the vital role community-based education plays in current educational systems.

2.2 Literature Review

Substantial research has emerged about e-learning platforms because of increased online education demand.Different research investigations have studied both the technology and teaching approaches required for building effective online learning platforms.

Table 2.2: Summary of Literature Reviewed.

Author(s)	Year	Title	Methodology	Key Findings
Moore, Dickson-Deane & Galyen	2011	E-Learning, Online Learning, and Distance Learning	Theoretical analysis of e-learning approaches	Effective e-learning requires learner autonomy, content access, and interaction.
Anderson	2003	A Community of Inquiry Framework for Online Learning	Conceptual framework development	Social presence is essential for meaningful online education.
Sadalage & Fowler	2012	NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence	Technical exploration of NoSQL databases	MongoDB and similar databases support scalable, flexible data structures.
Li & Min	2019	A Study on Frontend Frameworks: React vs Angular vs Vue	Comparative analysis of frontend frameworks	React.js provides better performance and flexibility for single-page applications.
Dhawan	2020	Online Learning: A Panacea in the Time of COVID-19 Crisis	Survey-based study during the pandemic	Online learning is effective but must address engagement and accessibility gaps.
Wang et al.	2021	Enhancing Student Interaction in Online Platforms	Case studies of e-learning platforms with forum integration	Forums boost engagement and improve knowledge retention among learners.

2.2.1 Similar Applications

A The basic framework and operational aspects of EduSell match several existing marketplaces and research initiatives which target online course selling platforms and student motivation systems and peer instruction methods. These relevant applications together with research efforts include the following summary:

Udemy:

Udemy functions as a top platform where teachers can develop educational resources for student acquisition. Udemy delivers effective monetization features however it demands steep commissions and provides restricted learner-to-learner contact options. EduSell resolves this issue by eliminating the platform commission limits and implementing its own discussion platform.

Teachable:

Through Teachable teachers possess the ability to construct their own professionally

branded training websites. Its powerful features cater better to instructors than students and it lacks features that support central student discussion. The marketplace provided by EduSell features both commercial and communicative functionality into one centralized platform.

Skillshare:

Skillshare provides creative and professional educational courses that operate through subscription-based payment services. Skillshare operates under a system that prevents educators from establishing individual course prices which reduces their ability to adjust their pricing methods. With EduSell instructors obtain complete authority regarding their course pricing together with full control over their content delivery.

Coursera and edX:

Students can access university-level education through these digital platforms but the content mostly comes from authorized academic institutions. EduSell operates as an educator-driven platform which provides independent teaching professionals with platform ownership while enabling learners to find flexible-priced educational materials from a diverse range of instructors.

Research by Wang et al. (2021):

The authors of this research demonstrated that adding forum functions to web-based learning methods enhances student dedication to classroom material. The platform design of EduSell implements the learning strategy by integrating a built-in discussion forum.

Mobile App Examples (e.g., Learnyst, Thinkific)

Learning platforms with mobile capabilities enable learners to access content but they normally do not support social interaction directly through their systems. EduSell reduces the gap through its forum interaction tool and its planned responsive design implementation that leads to mobile application development.

2.2 Related Research

Engagement and Interaction in Online Learning:

The Community of Inquiry framework demonstrates according to Anderson (2003) that social presence alongside teaching presence and cognitive presence form vital components for successful online education. According to the theory online classes require collaborative tools which include student forums with live chats because they enhance classroom engagement and student study habits. Students at EduSell use the discussion forum to communicate through messages or ask questions to fellow students and instructors.

Learning Management Systems (LMS) and Course Delivery:

Moodle and Blackboard LMS platforms generate reports about the obstacles that prevent student community engagement in their virtual learning environments. Garrison & Vaughan (2008) explain that Learning Management Systems succeed at content distribution however they reduce productive student interaction. Students experience improved cooperation through the forum function in EduSell that extends past traditional content management functions.

Monetization Models for E-Learning Platforms:

The central revenue sharing policy at Teachable and Udemy identified through Li & Min (2019) produces issues that obstruct independent instructors from using these platforms. The monetization framework at EduSell maximizes instructor earnings through independent price setting while ensuring instructors receive greater revenue shares thus it attracts more content developers to join.

Mobile Learning and Flexibility:

According to Sharples (2006), the ability for researchers to select how materials are delivered through apps leads to better educational accessibility and higher levels of learner engagement within mobile learning environments. Mobile application development demands attention in the initial web-based design of EduSell since it will enhance learning content accessibility for mobile learners.

2.3 Gap Analysis

Features	Existing Platforms	EduSell
Peer-to-Peer Interaction (Discussion Forum)	No	Yes
Software Promotion	No	Yes
Flexible Monetization for Instructors	No	Yes
Admin Dashboard for Management	No	Yes
Instructor Control over Content & Pricing	No	Yes
Student-Driven Learning Features	No	Yes

2.4 Summary

This section examined the differences between EduSell and existing e-learning platforms through which current platforms demonstrate deficiencies in specific areas. EduSell fills three specific gaps in peer-to-peer interaction and instructor flexibility and administration control functions. EduSell sets itself apart by letting users establish peer-based learning communities through included discussion features and it gives instructors more control over their content creation process and provides robust administration tools. EduSell completes the unfulfilled features of alternative platforms by providing a flexible interactive instructor-centered e-learning solution.

CHAPTER 3

Research Methodology

3.1 Methodology

One The application development of EduSell happens through Agile Software Development with benefits that include continuous enhancement along with user input implementation and regular system upgrades. The team constructed EduSell using contemporary web programming methods which split the application into frontend and backend zones and a database section.

1. Planning and Requirement Gathering

Market research confirmed the absence of sufficient e-learning solutions in the marketplace.Defined user roles (normal user and admin) and listed all necessary features.We gathered functional and non-functional requirements using expected use cases as a basis for collection.

2. System Design

The frontend part utilized React JS in combination with DaisyUI for building user-compliant interfaces that adjusted to different screen sizes.The Node.js and Express.js structure forms the backend while ensuring scalable database-to-front-end communication through RESTful API protocols.The database implementation features MongoDB collections for users and courses alongside orders and reviews which establish data retrieval efficiency along with proper relationships.

3. Development Phases

During the first development phase users authenticate and browse courses for registration.Phase-2 delivers an administrator dashboard instrument which allows administrators to regulate courses together with user profiles and carry out review monitoring.The third development phase encompasses both payment gateway links and

discussion board establishment.Independent testing was performed for each phase to proceed with the following development step.

4. Testing

Our team conducted testing on backend APIs through unit testing and executed component testing for frontend elements.Different modules underwent integration testing to establish smooth information exchange between them.Our solution received usability feedback through activities with test users.

5. Deployment

The final installment got deployed through cloud-based deployment services like Vercel/Netlify for frontend functions and Render/Heroku for backend operations.Developed the system to be usable with all necessary performance attributes along with security features for everyday practicality.

3.1.1 Overview

Online learners access easy e-course transaction capabilities through the web platform EduSell. EduSell uses MongoDB together with Node.js, React.js, Express.js for building its platform which delivers smooth user journeys to instructors and learners. The main distinctive feature of EduSell involves its built-in discussion platform which enables users to interact and learn from each other. Users can access secure payment tools along with friendly interfaces and an administrator dashboard that enables course management and user control and report generation on the platform. EduSell addresses existing e-learning platform limitations through its dedicated solution for educator monetary opportunities and student involvement capabilities.

3.1.2 System Design

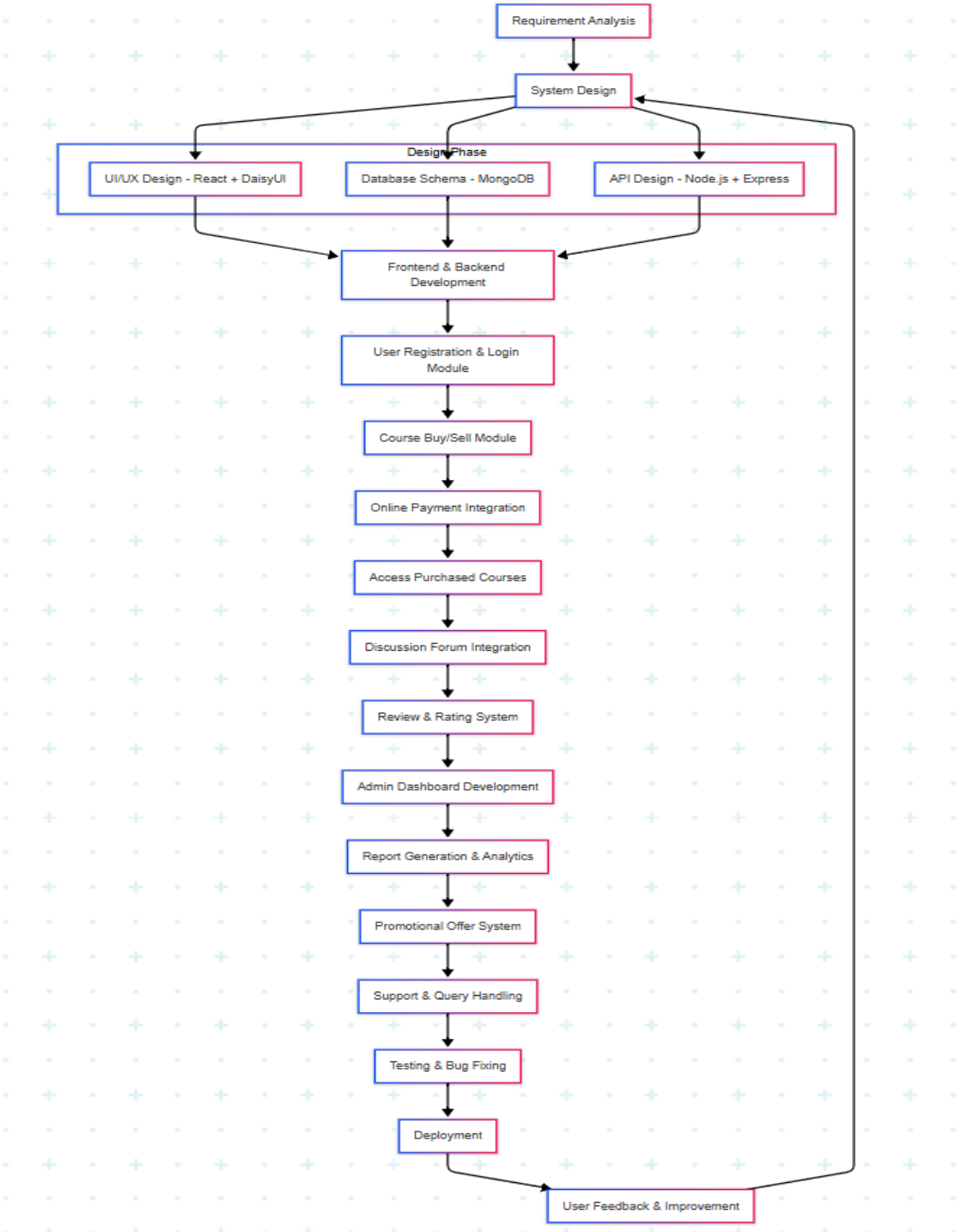


Figure 3.1.2: System Design

3.1.3 Functional and Nonfunctional Requirements

Functional Requirements:

User Registration & Login: Users can sign up, log in, and manage sessions securely.

Course Browsing: Users can view, search, and filter available courses.

Course Purchase & Enrollment: Users can buy courses through an integrated payment gateway.

Discussion Forum: Users can post questions and replies in a forum for each course.

Leave Reviews: Users can leave ratings and feedback for courses they've completed.

Admin Dashboard: Admins can manage courses, users, and reviews.

Order Management: Admins can view and manage all transactions.

Promotional Offer Management: Admins can create and manage discounts for specific courses.

Non Functional Requirements:

Performance: The platform should load pages within 3 seconds under normal load.

Scalability: Should support increased traffic and data growth without performance issues.

Security: Secure user data with encryption, JWT authentication, and secure payment APIs.

Usability: The interface should be intuitive and easy to use for both users and admins.

Data Integrity : All user actions, such as course purchases, must be reliably saved in the system.

3.1.4 Context diagram

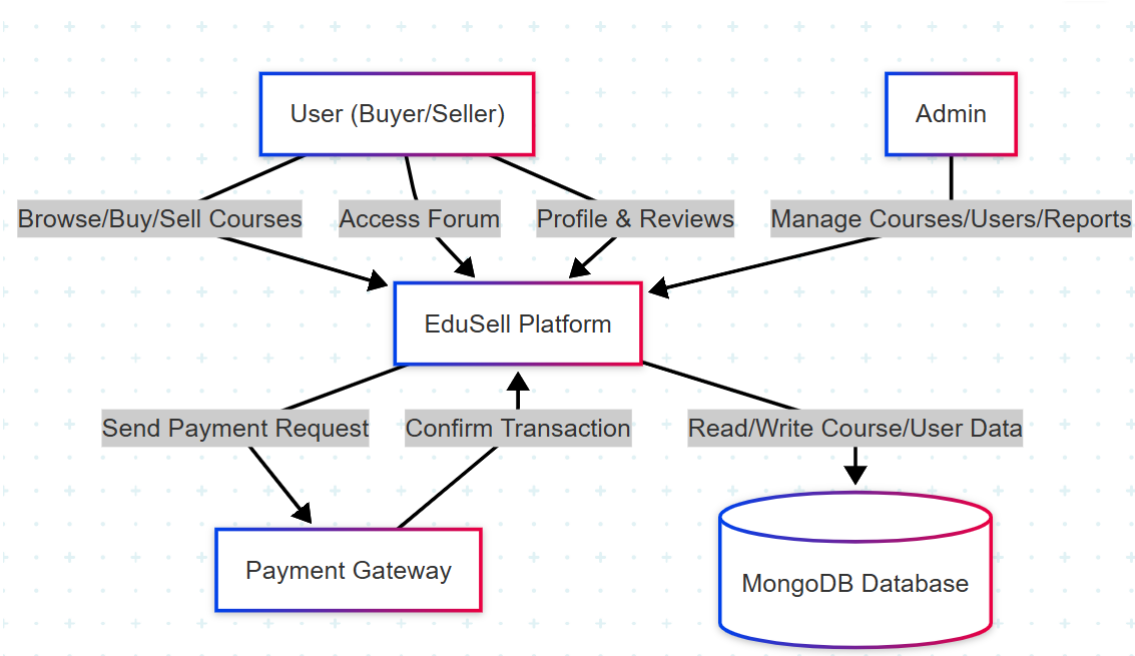


Figure 3.1.4:Context diagram

3.1.5 Data Flow Diagram Level 1

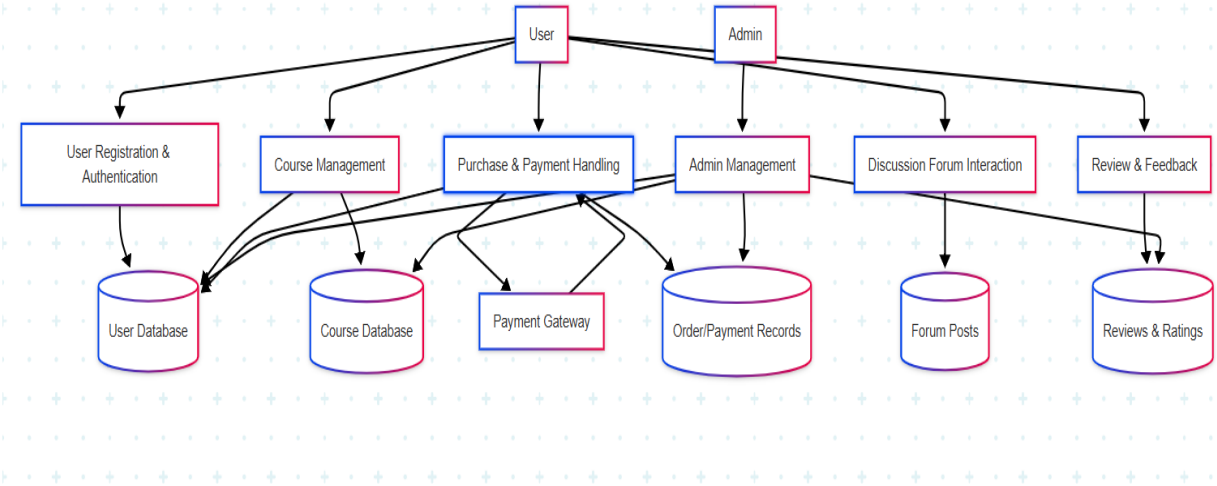
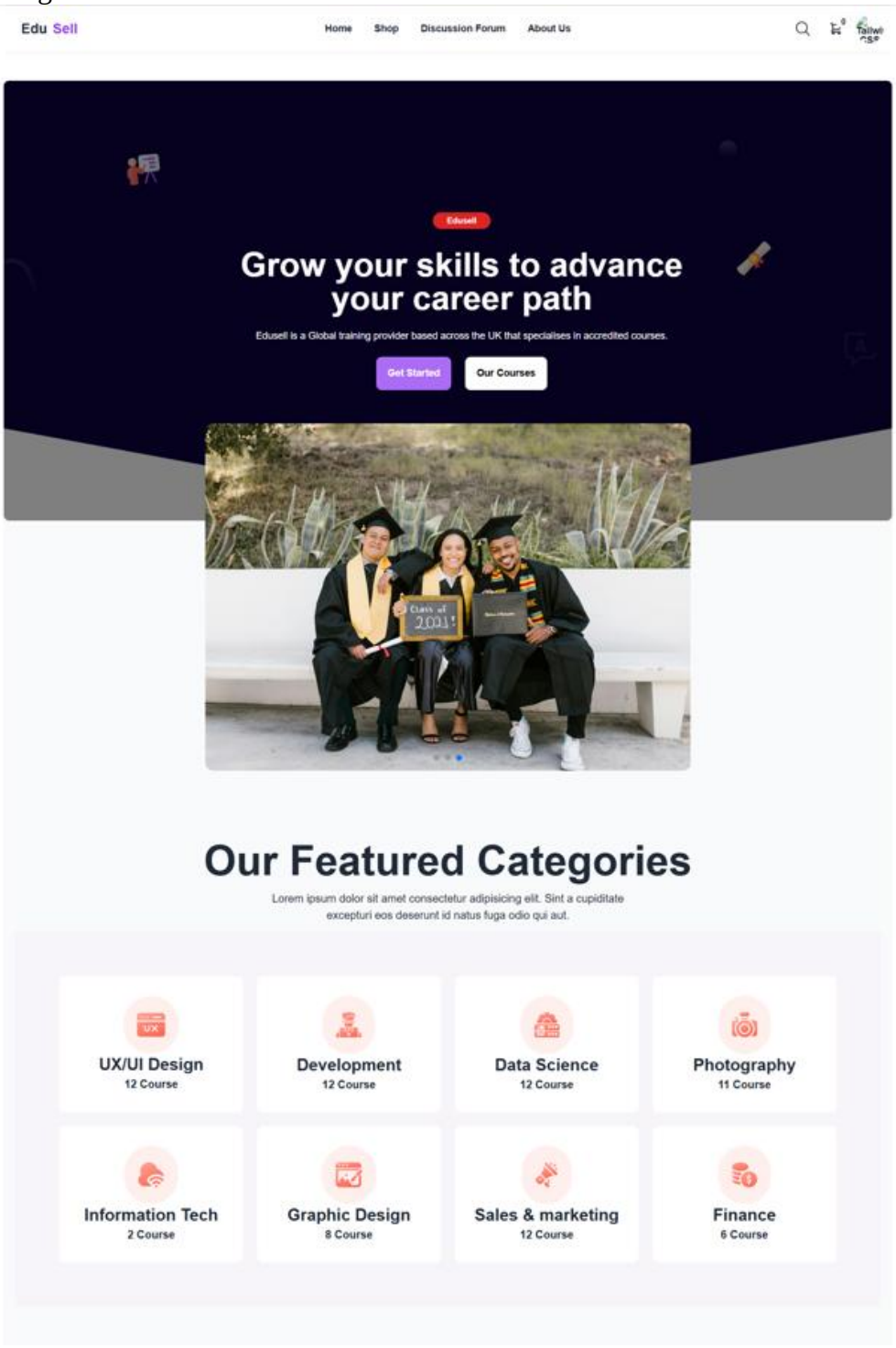


Figure 3.1.5:Context diagram

3.1.6 UI Design

User Design: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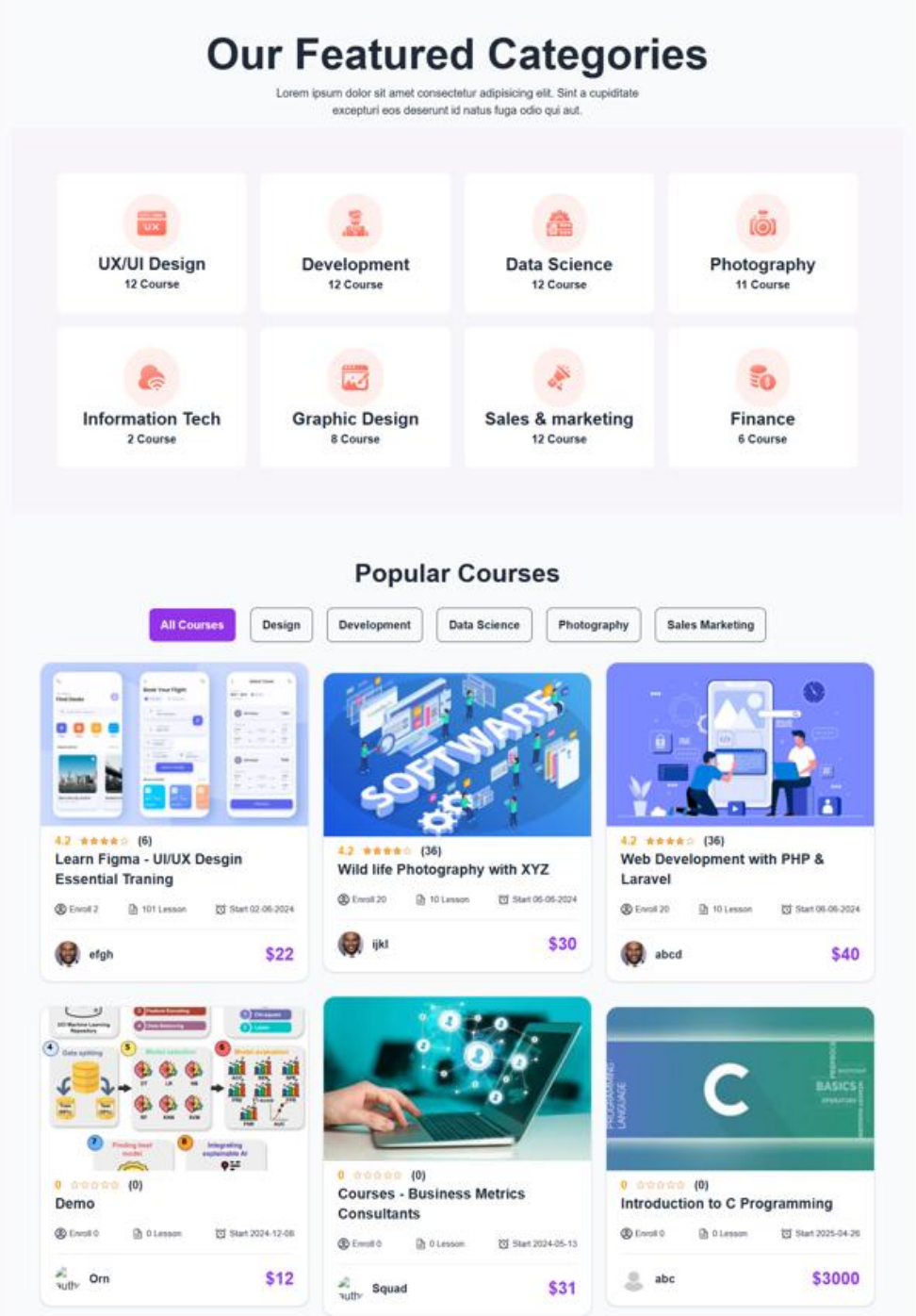
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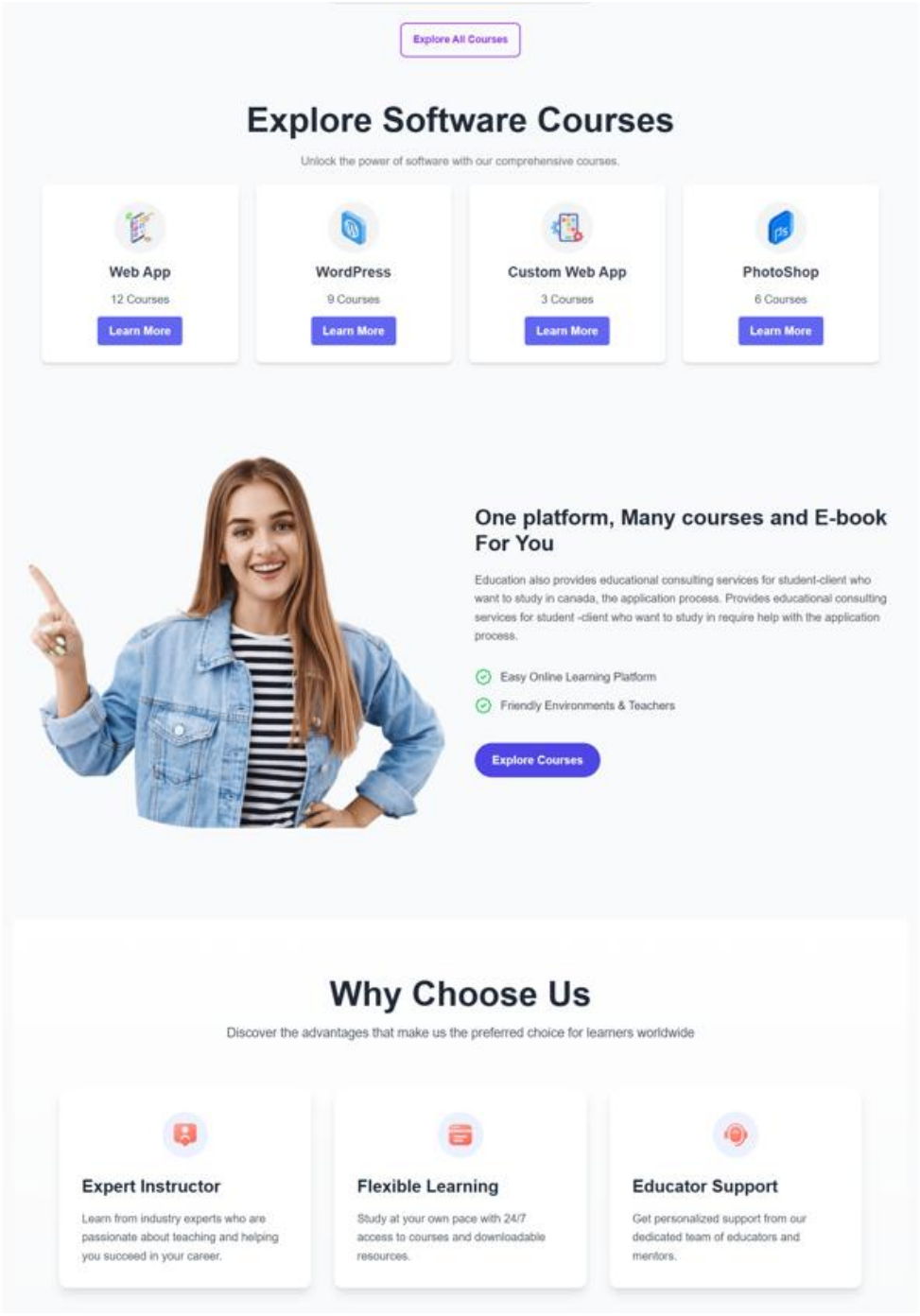
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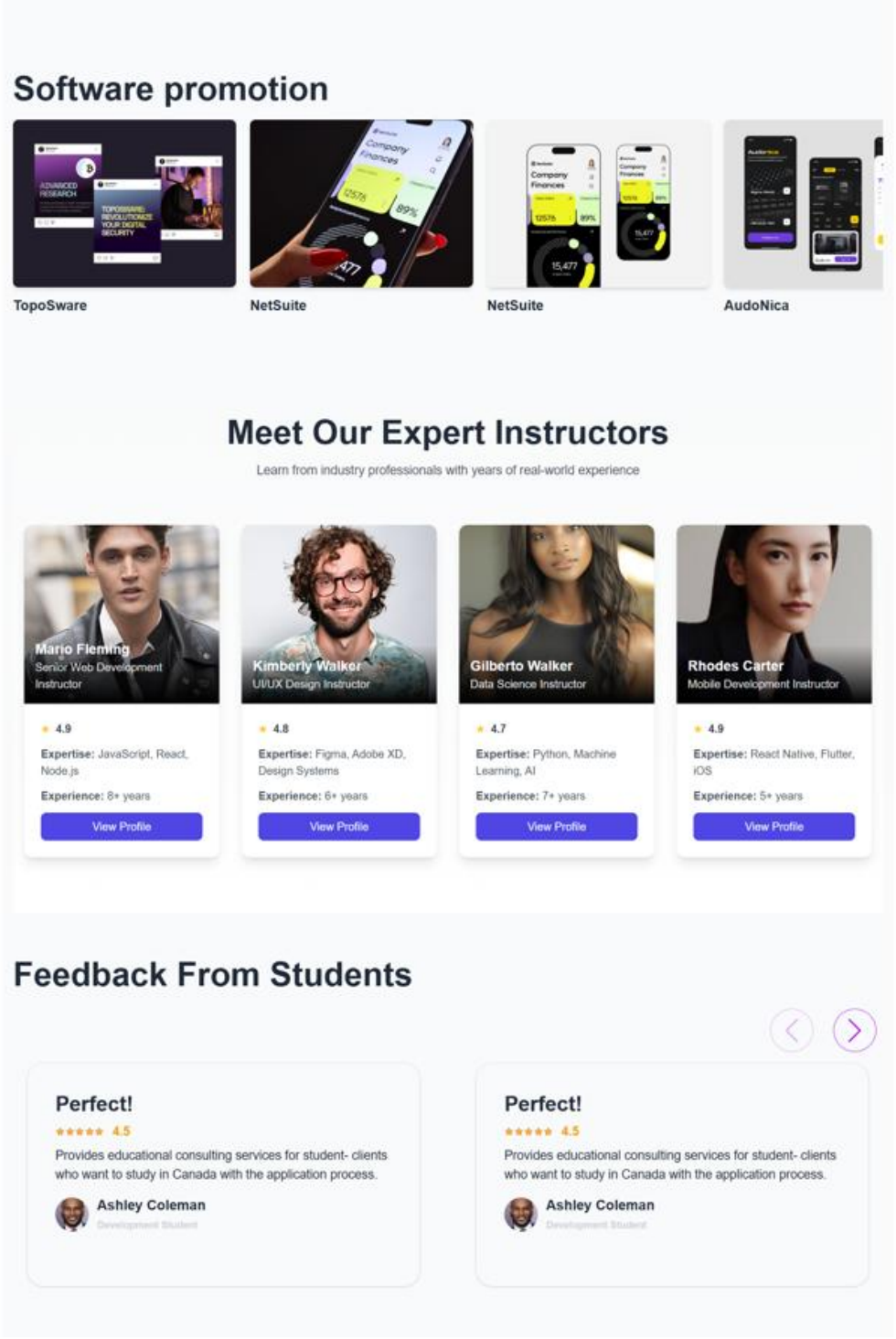
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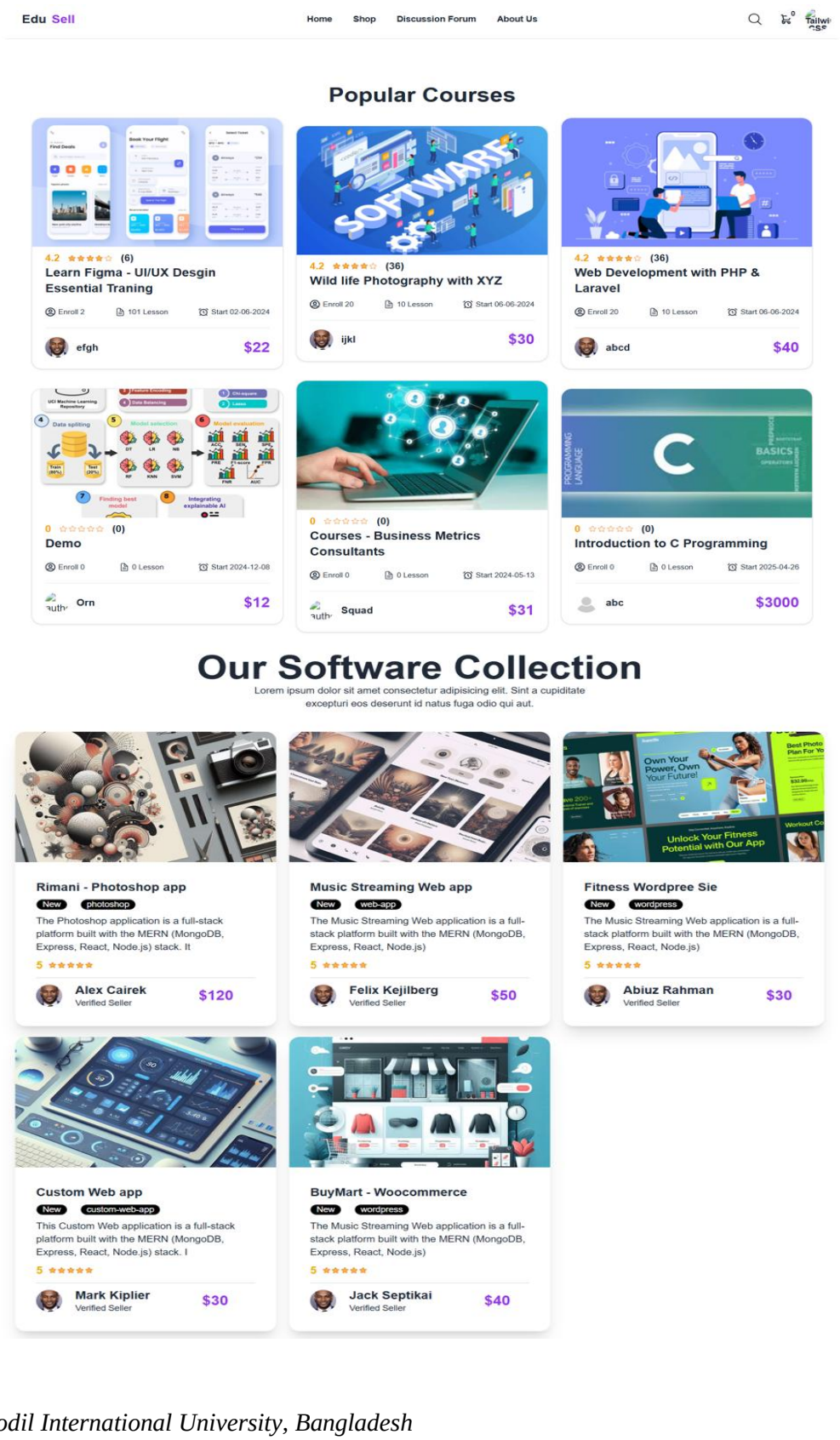
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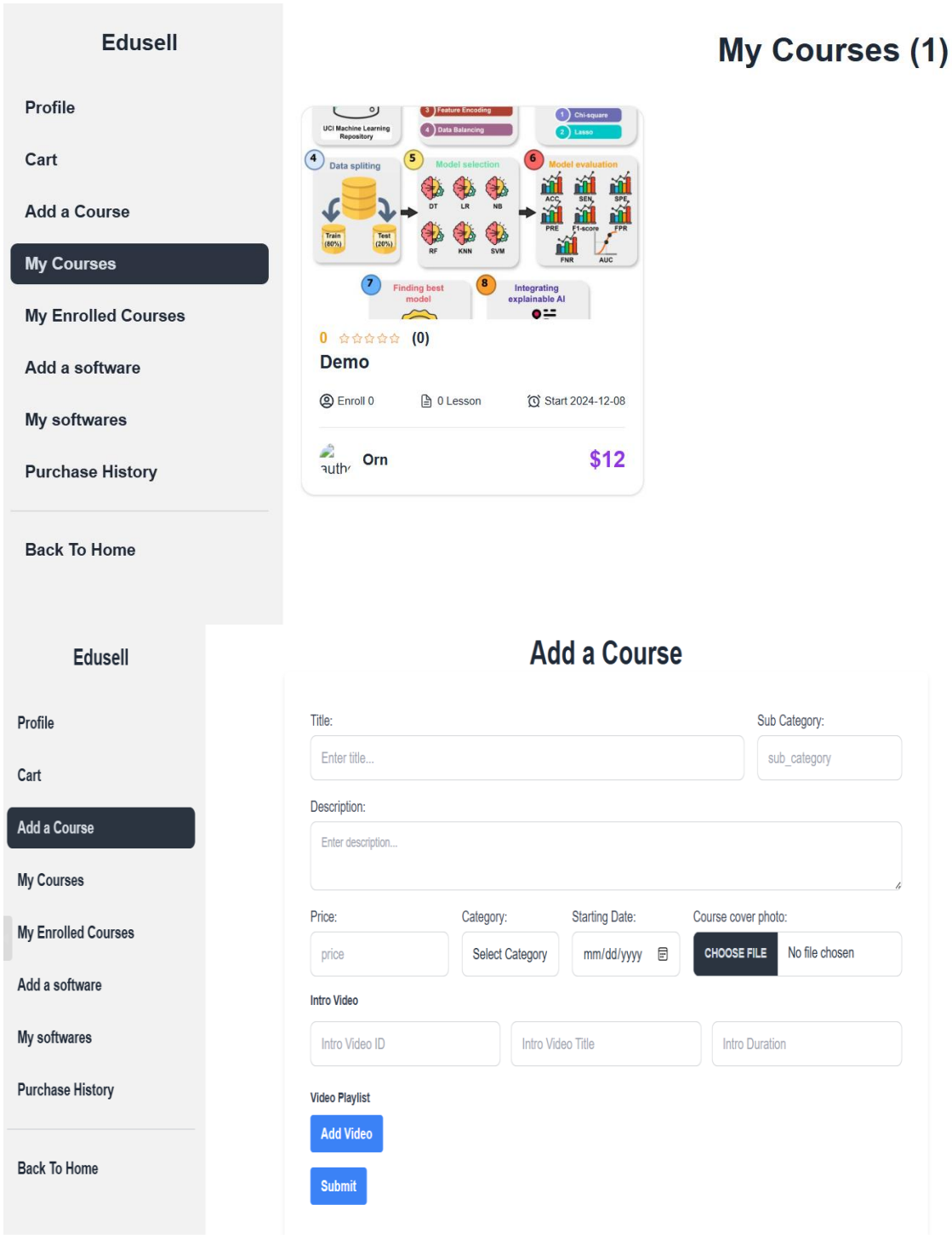
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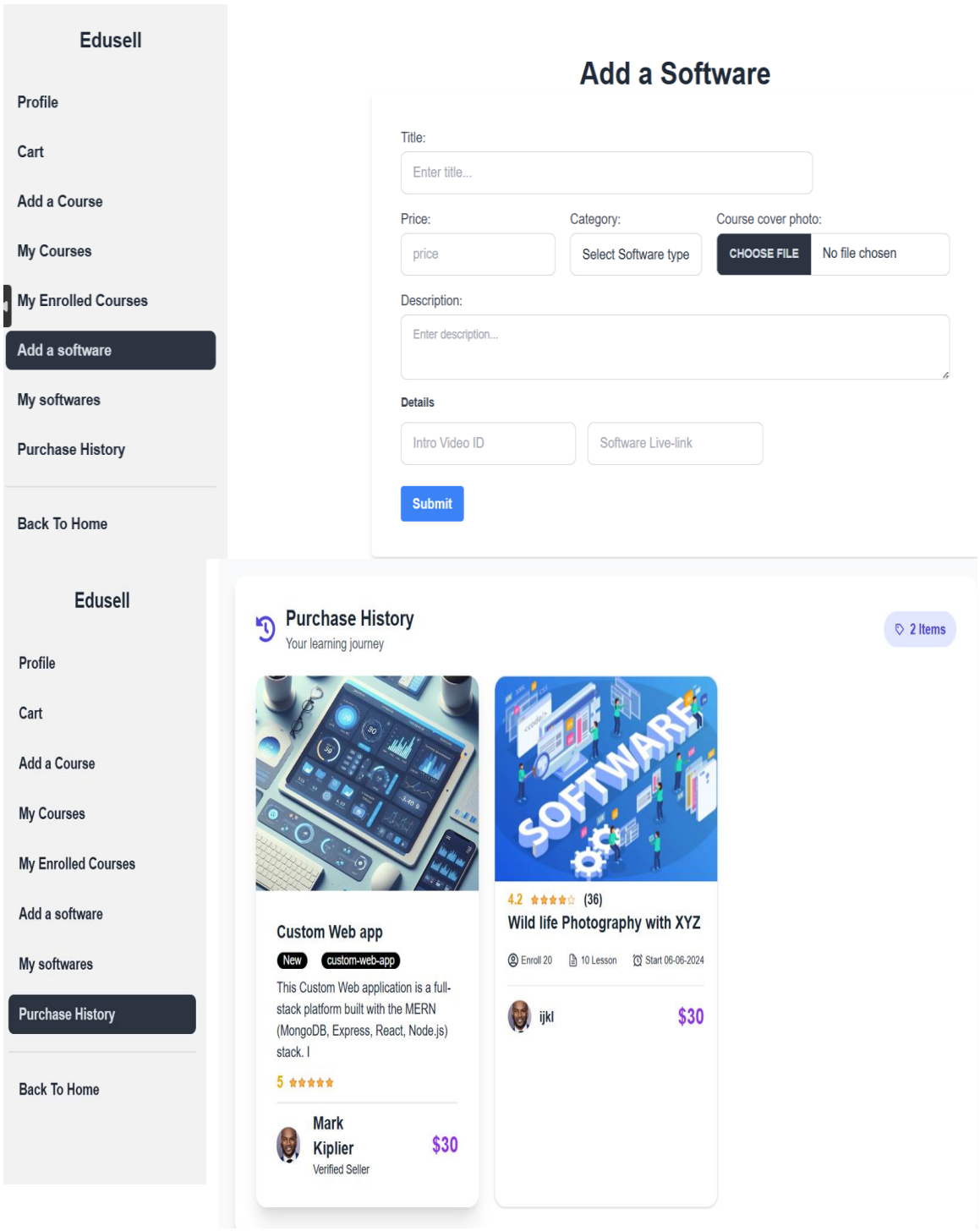
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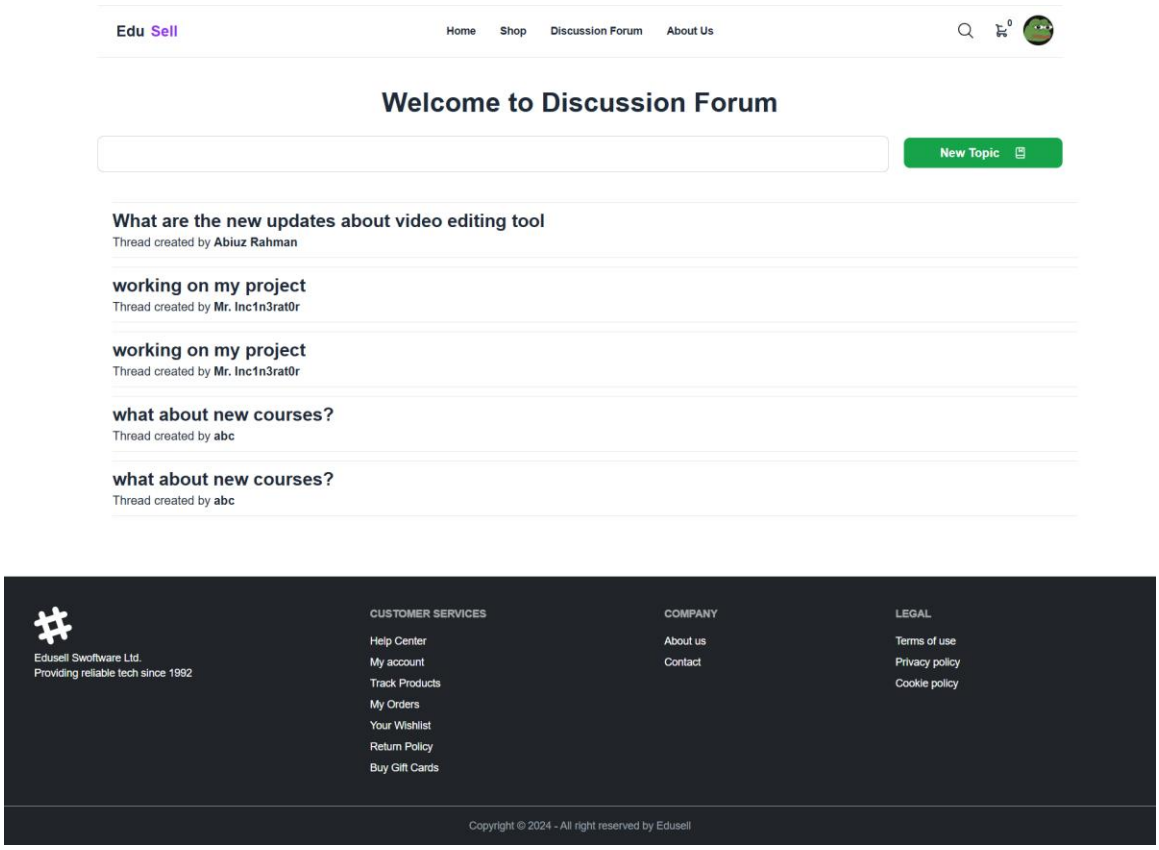
Edu Sell
Home
Shop
Discussion Forum
About Us
Welcome to Discussion Forum
New Topic
What are the new updates about video editing tool
Thread created by Abiuz Rahman
working on my project
Thread created by Mr. Inc1n3rat0r
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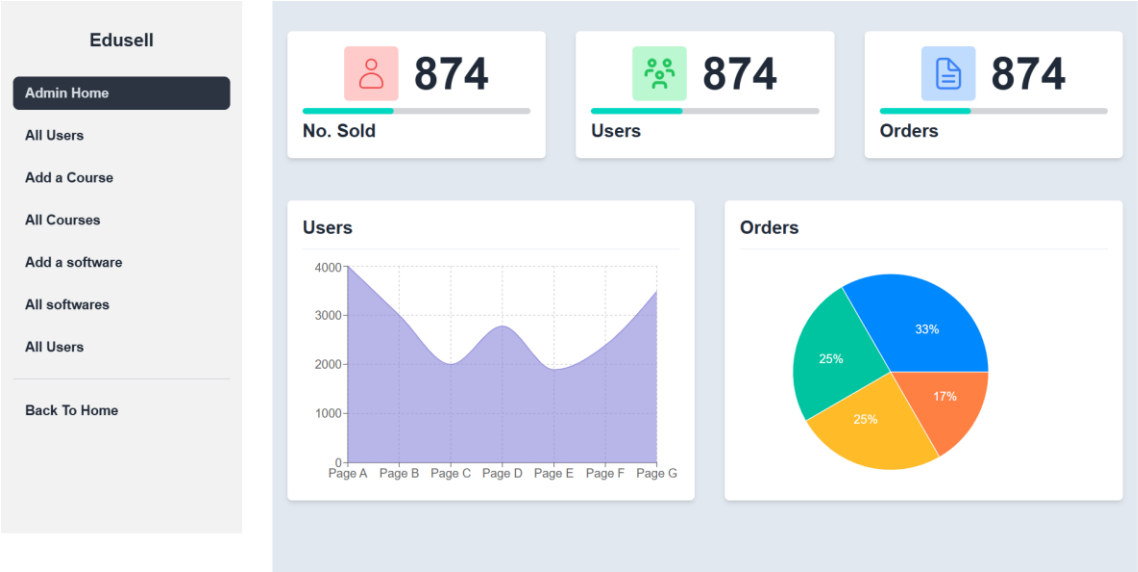

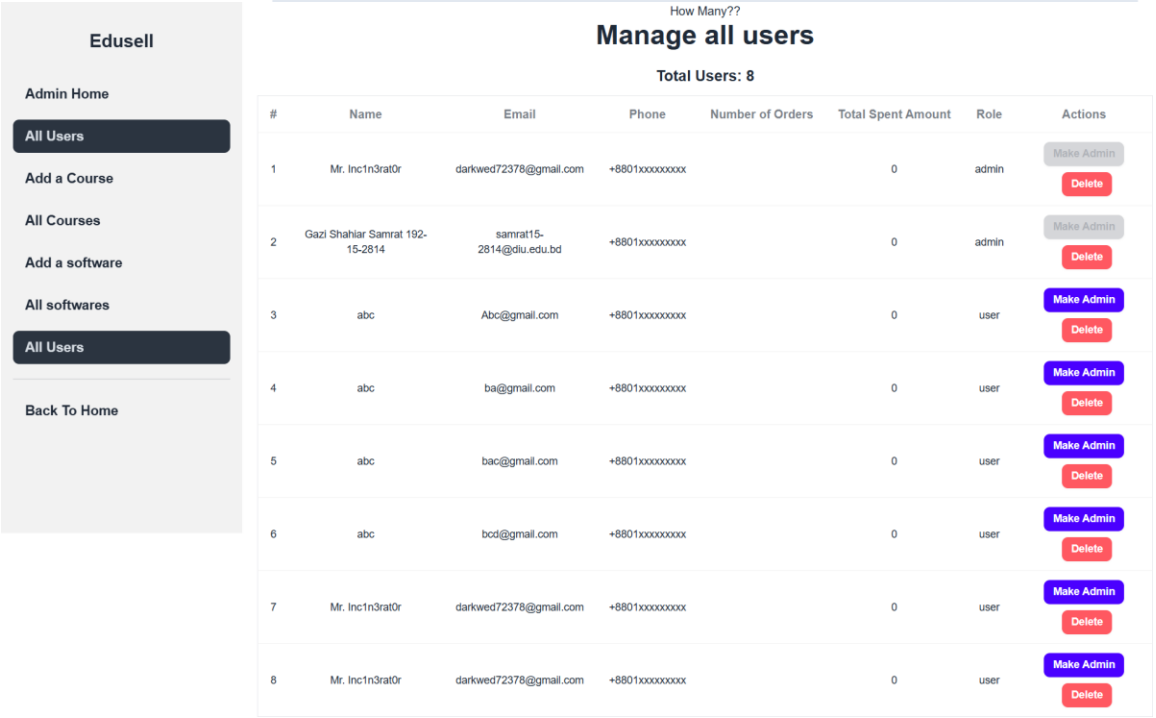

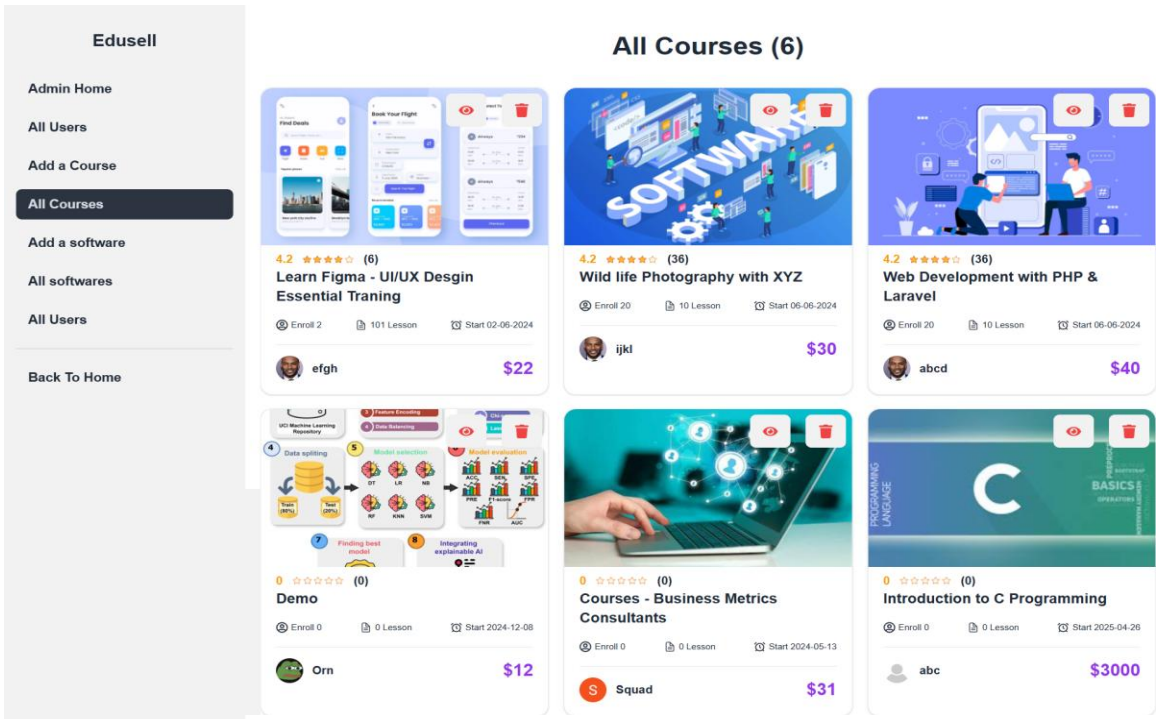
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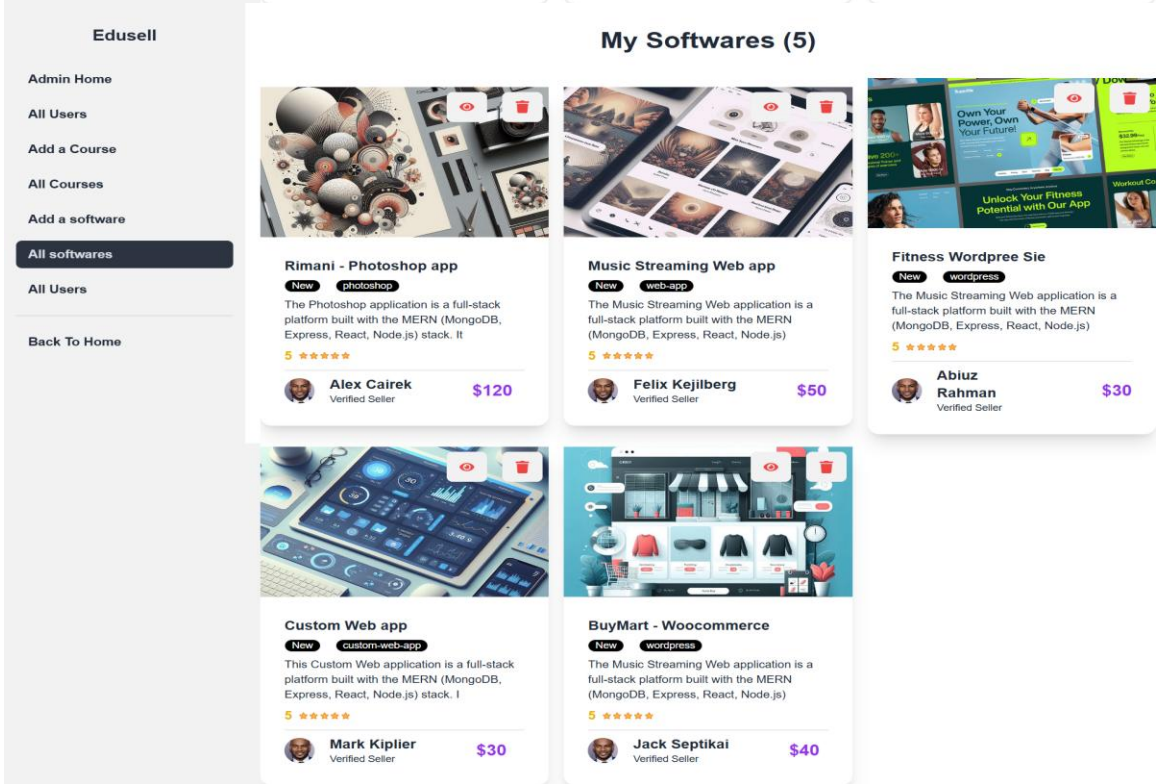
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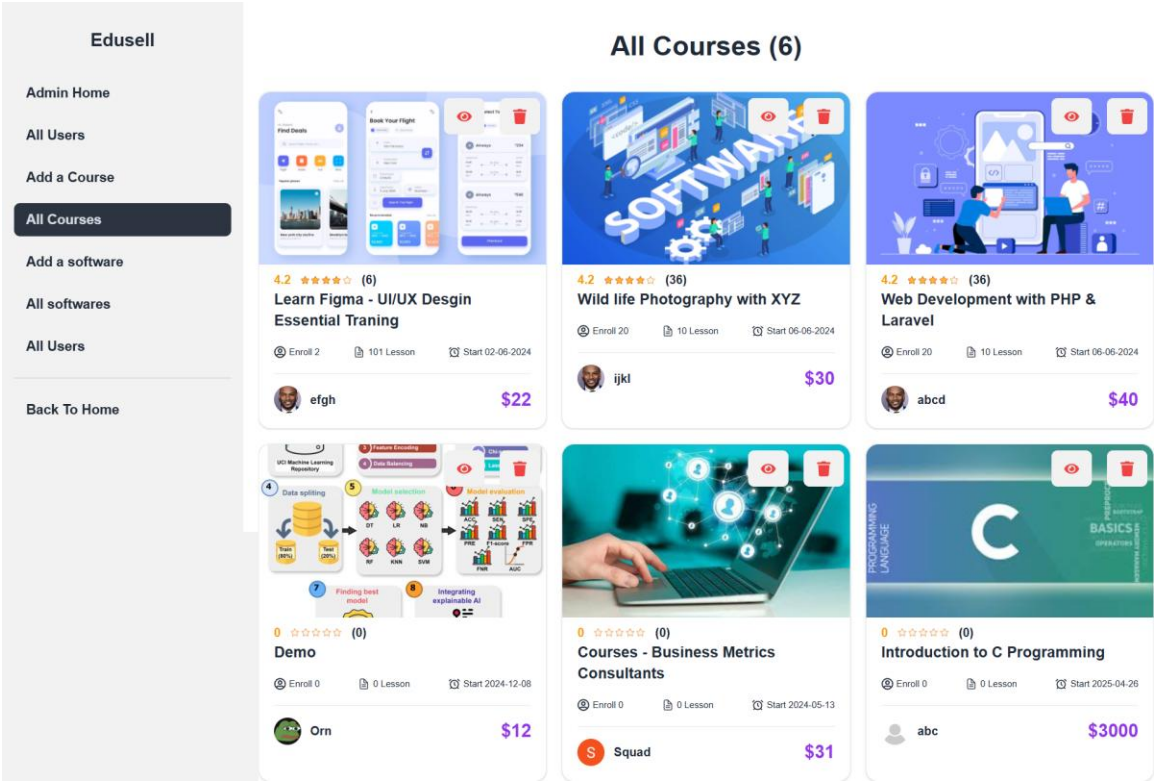
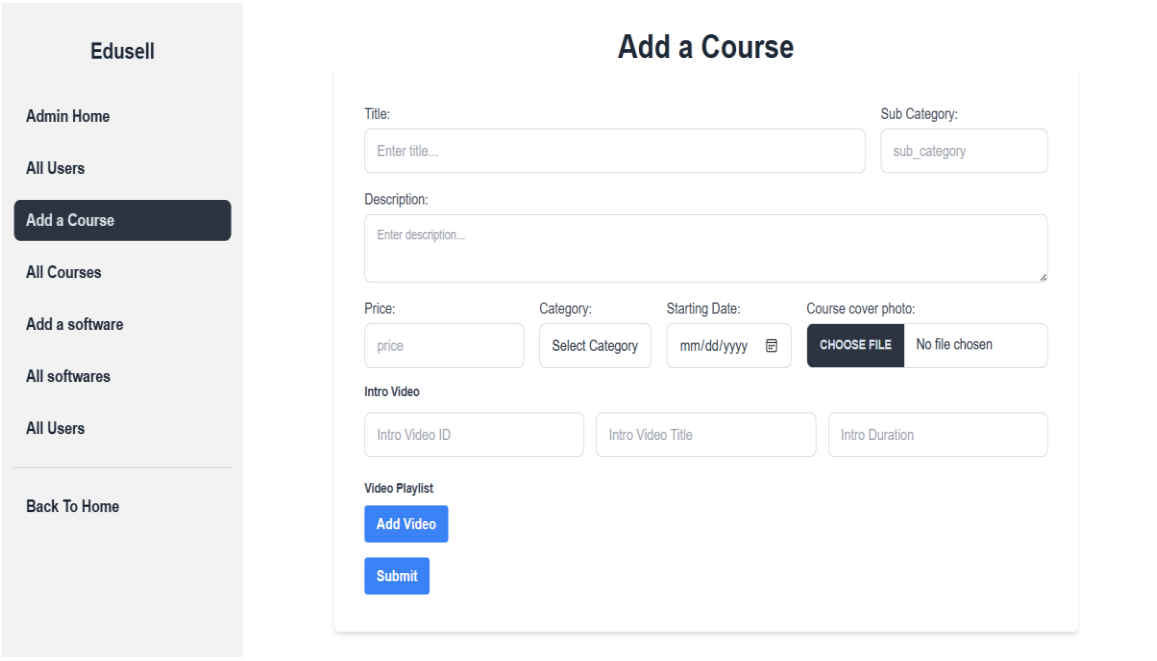
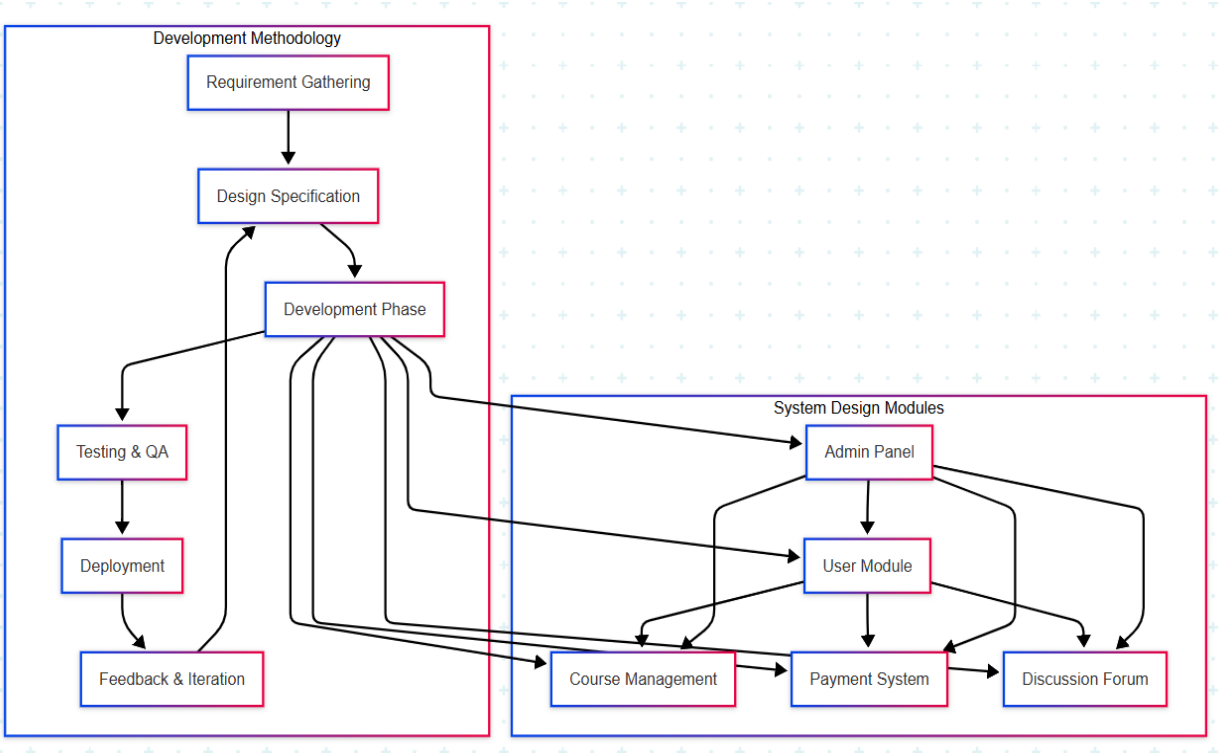




3.2 Detailed Methodology and Design



The Agile development process directed a modular and scalable approach to build EduSell. Organizational decisions through this approach enabled the team to develop the platform step by step while collecting testing feedback and enhancing requirements.

1. Design Approach

Frontend Design:

Selected Technologies: React.js and DaisyUI

Justification: React.js component-based structure.Applications built with speed become possible for developers when they combine Tailwind CSS with DaisyUI UI components.

Alternate Considered:

Members of the team have limited Vue.js expertise even though Vue.js is famous for its minimalistic framework design.User navigation within Bootstrap remains simple but the interface customization remains limited since Tailwind and DaisyUI deliver better advanced

interface options.

Backend Design

Selected Technologies: Node.js with Express.js

Justification: Node.js operates through an event-driven system with non-blocking functionality which suits concurrent operations such as course access and login procedures.The Express.js framework offers an optimized structure for developing APIs through a minimalistic structure that simplifies fast clear API development.

Alternate Considered:

Django (Python): Very powerful, but heavier for lightweight REST services and less compatible with real-time interactions without extra tools like Django Channels.

Database Design

Selected Database: MongoDB (NoSQL)

Justification: The system provides adaptable features for processing unstructured content consisting of course materials as well as user reviews alongside forum message collections.The database performs efficiently with scalability capabilities making it an appropriate choice for growing user and course-related information.

Alternate Considered:

The combination of MySQL/PostgreSQL works as a structured reliable system however they are inefficient at managing flexible unstructured data structures which forum discussions require.

3.3 Summary

The EduSell project implements an ordered iterative framework which derives from Agile Development principles. A detailed requirement analysis commences to establish both functional along with non-functional needs. The development system utilizes React.js for frontend implementation and Node.js together with Express.js for backend functionalities while deploying MongoDB as the database solution. Development occurs in parts and includes testing phases that enable continuous improvement of the system. The application uses continuous deployment for maintaining a solution that remains robust while scaling for user needs constantly throughout the development process.

CHAPTER 4

Implementation and Result

4.1Environment Setup

The following technical, operational, and developmental elements are included in the implementation requirements for " EduSell ":

- Front End Technologies
  - HTML
  - CSS
  - Tailwind css
  - Daisyui
  - React
- Back End Technologies
  - Express js
  - NoSQL
  - Mongodb
- Tools
  - Node js
  - Composer
  - Web Browser
  - Visual Studio Code (*IDE*)

4.2 Comparative Analysis

Feature	EduSell	Udemy	Coursera
Discussion Forum	Yes	No	No
Software promotion	Yes	No	Yes
Payment Gateway Integration	Bkash/Nagad and others gateway support	without Bkash/Nagad	without Bkash/Nagad

4.3 Results and Discussion

Users have access to a successful web-based system through EduSell platform implementation which functions for online course purchasing and selling. The modern interface of the application uses React.js and DaisyUI while its robust backend depends on Node.js and Express.js together with MongoDB.

Results:

Secure account registration should include token-based authentication along with account entry procedures.The system enables administrators to handle course management by adding courses while deleting existing courses but users only get access to view and purchase these courses.Users enroll in paid courses through a payment gateway known as Stripe who perform transactions successfully.Learners can engage through Discussion Forum which enables them to ask questions as well as share knowledge with each other.The platform automatically adjusts its display for users who access it through desktop or mobile platforms.Admin Dashboard Provides an overview of sales, users, and course data.

Discussion:

Platform testing has validated that the system fulfills every specified functional requirement together with secure login capabilities and automatic course management and payment processing. The discussion forum in this platform demonstrates strong potential to boost user involvement and educational exchanges because competitor platform Udemy lacks those features.Performance issues were observed while handling bulk data during testing but these issues were solved by optimizing API queries with caching implementation.

4.4 Summary

EduSell achieved the successful deployment of its responsive web application that supports both online course purchasing and selling functions. The implementation included complete deployment of essential features for user authentication security together with course

management tools and payment processing and a special discussion platform. The developers constructed the system using React.js and Node.js and Express.js together with MongoDB to boost performance and scalability. Testing results proved that the platform fulfills every functional and non-functional requirement. The system operated with dependable performance when stressed in addition to delivering optimal performance across different platforms. The EduSell platform delivers interactive reliability and ease of use to users while offering potential growth opportunities.

CHAPTER 5

Engineering Standards and Design Challenges

5.1 Compliance with the Standards

Quality management together with performance and security requirements are achieved by the EduSell project through implementation of recognized engineering and development standards. The relevant engineering standards employed within the EduSell project fall under three categories with provided alternatives and rationale.

1. Web Content Accessibility Guidelines (WCAG) 2.1

The platform needs to be designed for users who have disabilities according to standard requirements.The platform demonstrates compliance through the implementation of semantic HTML together with ARIA labels and ability for navigation through keyboard input and maintained color contrast standards.Organizations choose to ignore accessibility issues or follow an internal universal approach which they set themselves.

Pros of WCAG:

Inclusive design

Legal compliance (in many regions)

Better user experience for all users

Cons:The platform requires a slight enhancement of design along with development work.The goal is to improve availability because it helps organizations extend their user base and matches both ethical principles and current law.

2. OWASP Top 10 Security Standards

Users worldwide recognize this standard as the premier list of the 10 security threats which are most detrimental to web application programs.

Compliance: Secured endpoints, input validation, JWT for authentication, and HTTPS-only traffic.

Alternative: Ad-hoc or basic security practices.

Pros:The standard protects systems from substantial security risks such as SQL injection and XSS attacks.Improves platform trustworthiness.

Cons:Requires continuous monitoring and updates.

Rationale: Essential for handling sensitive user data like login credentials and payment information.

3. ISO/IEC 25010: System and Software Quality Model.

Standard Description: Defines quality characteristics like performance, reliability, security, and usability.

Testing and evaluation benefit from the use of Compliance as an assessment standard.

Alternative: Rely on informal or user-defined quality metrics.

Pros:Comprehensive quality measurement.Enables structured testing and improvement.

Cons:Requires thorough documentation and review.

Rationale: Ensures high-quality delivery and maintainability of the EduSell platform.

5.1.1 Software Standards

The construction of the EduSell platform through Software Standards acts as an essential foundation to achieve security integrity together with project maintainability and operational consistency. EduSell applies security measures from OWASP Top 10 to shield its users from XSS attacks and CSRF attacks as well as injection-based attacks. The use of RESTful API standards provides platforms with predictable clean communication systems for backend access while enabling WCAG 2.1 guidelines to enable disability access to the platform and enhance scalability. The system becomes a robust friendly future-ready software system when vendors and users collaborate through professional development standards combined with semantic versioning while adopting modular code practices.

5.1.2 Hardware Standards

For effective operation of the EduSell platform users require Hardware Standards that define both recommended system requirements and essential technical specifications. Since EduSell operates as a web-based system using client-server architecture the application requires careful consideration of both client-side as well as server-side hardware components. The client application supports devices with 2 GB of RAM or more alongside dual-core processors as well as Chrome, Firefox and Edge web browsers. Cloud hosting services designed for Heroku and AWS need at least one virtual CPU and one gigabyte of memory and solid-state persistent storage to deliver a seamless backend experience and operational data access and payment management. The hardware standards create reliable device operation with scalability and compatibility requirements which allow EduSell to serve users with different system setups.

5.1.3 Communication Standards

EduSell establishes Communication Standards to enable the delivery of secure and dependable data communication among clients and their server and external services. All communication within the application operates through HTTPS (HTTP over SSL/TLS) as the main protocol which ensures safe and encrypted transfer of data especially for login details and payment data. The data format for standardized API communication with JSON allows lightweight structured transfer between React.js frontend elements and backend elements of Node.js and Express. The application benefits from secure connections when accessing MongoDB through its drivers which follows current security standards. The development team will prospectively evaluate WebSockets or MQTT standards for including live discussion features in future software updates. Secure scalable and interoperable interactions are established by these corporate communication standards throughout EduSell's system.

5.2 Impact on Society

The EduSell platform enables society to implement meaningful change through education

access equality and functionality that allows everyone to transform into knowledge distributors. EduSell enables users to both offer educational content for sale while purchasing courses because of its design to create educational engagements between digital participants. Such a method functions to merge academic frameworks with individual learning approaches thus allowing people to learn continuously from youth to adulthood. Learning through collaboration becomes possible through the platform's discussion forum because it lets users develop peer mentoring relationships. The platform supports economic success and inclusive digital adoption through its dual support for vendor and buyer digital ability advancement and entrepreneurship.

5.2.1 Impact on Life

Through EduSell users can attain affordable quality education while maintaining learning flexibility to improve their lives. Through the platform learners gain control of self-paced learning development while instructors receive financial benefits from teaching their skills. People strengthen their careers together with their personal development through the platform's flexible education system. A discussion forum built into EduSell allows users to connect with one another which helps them feel supported emotionally. EduSell promotes accessible user-driven learning which triggers self-improvement and builds confidence and leads to improved life outcomes.

5.2.2 Impact on Society & Environment

Through its platform operation EduSell creates social and environmental value. EduSell achieves social equity by allowing people from various demographics to use its online learning platform which creates digital learning communities and strengthens knowledge exchange abilities. The platform facilitates personal business growth together with skill mastery activities particularly for people in isolated and overlooked population areas. Through digital learning approaches Education sales facilitates reduced usage of physical infrastructure while also minimizing transportation activities and printed learning resources. Education becomes environmentally sustainable through these actions which

simultaneously reduce carbon pollution levels. EduSell supports both community inclusion efforts and environmental sustainability targets of current digital society.

5.2.3 Ethical Aspects

EduSell keeps to essential ethical guidelines through privacy protection of users along with data security together with fair access to educational material. The platform maintains complete transparency about course materials as well as payment details and stops both academic plagiarism and inappropriate educational content distribution. Discussion forum features on the platform promote respectful communication while building a risk-free and non-exclusive educational setting for users.

5.2.4 Sustainability Plan

EduSell creates a sustainability strategy that improves its platform development and ensures scalability and utilizes environmentally friendly approaches. The platform receives feature upgrades and system updates which users recommend to ensure its long-term effectiveness. EduSell assists digital learning support practices that help educate students reducing their dependence on physical textbook consumption for sustainable education.

5.3 Project Management and Financial Analysis

Cost Category	Budget	Rationale
Frontend Development	500000	React.js and DaisyUI development tools are essential for responsive user interface design.
UI/UX Design	200000	Professional UI/UX design ensures user-friendly interface, essential for engagement.
Backend Development	800000	Node.js, Express.js, and API development are crucial for

		the scalable backend architecture.
Database Setup (MongoDB Atlas)	400000	Reliable cloud database hosting to handle user data efficiently.
Total Annual Operational Cost	500000	The alternate budget saves on marketing and hosting, with more emphasis on organic outreach and local infrastructure.
Total	24,00000 Taka	

5.4 Complex Engineering Problem

The EduSell EduSell solves complex engineering issues through its combination of secure online payment solutions and real-time course access as well as its interactive user interface which exists in a flexible system architecture. The system links front-end speed to back-end speed and database reliability while safeguarding data and authenticating users and optimizing performance to ensure complete e-learning consistency.

5.4.1 Complex Problem Solving

Table 5.1: Mapping with complex problem solving.

EP1 Depth of Knowledge	Requires integration of web development, database management, and secure payment systems across multiple domains.
EP2 Range of Conflicting Requirements	Balances user needs (usability, speed) with admin needs (control, security), and business needs (revenue).
EP3 Depth of Analysis	Involves performance testing, payment integration, and database schema design with performance and scalability in mind.

EP4 Familiarity of Issues	Addresses both common issues (authentication, user roles) and uncommon challenges (course resale, discussion forum logic).
EP5 Extent of Applicable Codes	Implements web standards, data security practices, and integration with third-party APIs (Stripe, MongoDB Atlas).
EP6 Extent of Stakeholder Involvement	Involves users, instructors, admins, and payment providers — all influencing design decisions and functionality.
EP7 Interdependence of Components	All modules — authentication, course management, payment, reviews — are interdependent and must work seamlessly.

Mapping with Knowledge Profile for EP1.

Table 5.2: Mapping with knowledge Profile

K3	Engineering Fundamentals	Applies principles of software engineering, data structures, and secure web communication.
K4	Specialist Knowledge	Involves expertise in React.js, Node.js, Express.js, MongoDB, and payment gateway integration.
K5	Engineering Design	Requires full-stack system architecture design including user interface, backend APIs, and DB schema.
K6	Engineering Practice	Follows best practices in development, testing, deployment, version control, and documentation.
K8	Research Literature	Refers to academic and industry literature on e-learning systems, security protocols, and UI/UX design trends.

5.4.2 Engineering Activities

The complex development of EduSell depends on modern web frameworks for databases and payment security systems which operate across all platform resources. The system requires both users and administrators to communicate with external service platforms which comprise payment gateways and hosting solutions for appropriate operation. The platform provides new features in its course marketplace and discussion systems to its users. Through digital education implementation the innovative system creates better educational possibilities that overcome environmental effects by digitizing learning. Standard system elements handle authentication and course management but the unique challenge regarding dynamic resale rules requires a mix of approach from basic to complex engineering solutions.

5.5 Summary

Table 5.3: Mapping with complex engineering activities

EA1	Range of Resources	Utilizes diverse resources: cloud services (AWS/MongoDB), web technologies (React, Node), and third-party APIs.
EA2	Level of Interaction	High interaction between frontend, backend, database, users, payment gateways, and admins.
EA3	Innovation	Offers a unique course resale platform with discussion forums and real-time course access.
EA4	Consequences for Society and Environment	Promotes digital education, reducing paper usage and enabling accessible learning for a broad audience.
EA5	Familiarity	Combines both common (login, payment) and less common features (user-to-user course sale, integrated forum).

CHAPTER 6

Conclusion

6.1 Summary

The e-learning web application EduSell provides users full access to purchase and sell online courses in combination with safe payment options and discussion board features. The system implements React.js and Node.js for its backend structure in combination with Express.js and MongoDB for its database features to serve multiple user requirements. The project demanded complete requirement analysis and designed both functional and non-functional aspects while creating efficient implementations. ướn testing along with performance assessments confirmed that EduSell provides users with a smooth experience. The system presents itself as a technologically advanced and socially beneficial platform which enables accessible collaborative digital education.

6.2 Limitation

EduSell provides users with functional advancement and innovative features yet contains certain restrictions. EduSell does not feature built-in mobile application support which presents barriers to users who focus on mobile devices. Real-time communication features of the discussion forum should be improved by adding chat capabilities along with video options. The course resale system within EduSell must have stronger security measures implemented to protect against user misuse and duplicate items. EduSell needs more testing for its scalability performance during peak user concurrency as this aspect has not received full examination yet that may lead to operational limitations. The platform has limited integration capabilities with various global payment gateways thus restricting international users from accessing the platform. Future developments along with upgrades will stem from current limitations that exist in the system.

6.3 Future Work

The EduSell platform will see multiple future developments to improve its capabilities. A native mobile application targeting two OS platforms will be developed to improve user

accessibility through convenient mode of access. Real-time video conferencing combined with chat functions and notification modules will improve the discussion forum to allow interactive learning. The platform will evaluate the possibility of implementing AI system recommendations and plagiarism detection features for uploaded course materials. Modern security protocols together with performance scalability solutions and international payment gateway technologies will get implemented to expand the system's customer base. The platform development includes the addition of multilingual assistance together with reporting systems designed specifically for instructors to improve the complete user experience.

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