Ho Chi Minh City International University

School of Computer Science and Engineering

WEB APPLICATION DEVELOPMENT

IT093IU

PROJECT: VEDUCAT – VIRTUAL EDUCATION FLATFORM

Submitted by

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CHAPTER I: INTRODUCTION

1. **Abstract**

This project was developed to meet the requirements of the course Web Application Development at the International University - Vietnam National University, Ho Chi Minh city. The core objective of this course project is to develop a website to support students and lecturers in their studies. The system is designed to improve the efficiency of managing learning materials and grades for students. By implementing a user-friendly platform, the system facilitates easy uploading and downloading of documents. In addition, the website is created through the process of collecting and integrating data from many surveys and documents provided by reputable websites, ensuring the reliability and accuracy of the information in the database. The proposed website aims to create a flexible and advanced university environment within the university community. This project aims to provide a practical perspective on building and managing a basic website while developing teamwork skills and experience in solving problems that arise during the process of building and managing a database management system for each team member.

2. **Key Features**

   2.1. Introduction of Website:

   "Course Activity Management for Distance Learning" addresses a critical and growing need in modern education. With the shift towards online learning due to advancements in technology and increasing demand for flexible learning solutions, it's essential to develop efficient tools for managing course activities virtually. This system not only mirrors real-world classroom dynamics (like discussions, exams, and announcements) but also improves upon them by adding flexibility, structure, and accountability. By choosing this topic, we focus on solving challenges faced in distance learning, such as engagement, assessment, and communication, while providing a practical and scalable solution for educators and students.

   2.2. Development Process:

   To develop an education web project within over one months, the timeline must be carefully structured to ensure efficiency. The first week we focus on defining requirements, finalizing the tech stack, designing wireframes, and setting up the development environment, including database schema design. The second week is dedicated to implementing the authentication system with secure user login, signup, and API integration. By the third week, attention shifts to course management, including building user interfaces for listing and managing courses and setting up role-based access control. The fourth week involves creating the discussion system, incorporating real-time chat functionality through WebSocket integration. In the

fifth week, thorough testing of both frontend and backend is conducted to identify and fix bugs while refining the overall user experience.

3. Achievement

The "Course Activity Management for Distance Learning" project achieved several key milestones:

- **Efficient Course Management:** Enabled administrators to effectively manage courses, teachers, and students.
- **Enhanced Learning Experience:** Provided tools for teachers to manage materials, assignments, grading, and announcements, and for students to complete tasks, view updates, and participate in discussions.
- **User-Friendly Design:** Developed an intuitive interface using EJS and SCSS for seamless navigation.
- **Secure and Reliable System:** Ensured secure authentication with JWT and bcrypt, and efficient data handling with MongoDB.
- **Team Collaboration:** Fostered teamwork and practical application of web development knowledge using GitHub for version control.

These achievements highlight the project's success in delivering a robust solution for virtual education.

4. Techniques and Tools

Programming Language	Back-end: JavaScript (Node.js)
	Front-end: HTML (ejs), CSS/SCSS, JavaScript
Framework	Express.js
Libraries	EJS, Mongoose, Socket.io, Multer, JWT, Bcrypt, Nodemailer
Database	MongoDB
Github	GitHub served as a central hub for collaborative development. Using Git, we maintained a detailed commit history, ensuring a streamlined collaboration process, code management, and issue tracking.

Table 1: Techniques and Tool Used

CHAPTER II: CONTRIBUTION

Name	Responsibility	Contribution
Ưng Huỳnh Phúc	UI/UX Design & Frontend Development	33%

| Trần Thiện | System Development & Backend Development | 33% |
| Lê Thiên Ngân | Backend Development & Testing | 33% |

Table 2: Group Contribution

CHAPTER III: METHODOLOGY

1. **Requirements analysis**

    - **Purpose:** Develop a Virtual Education Website
    - **Environment**: University, School, Education Central, etc.
    - **Target User**: Student and Teacher
    - **Features**: Real-time chat (discussion), submit and upload documents, send and receive data.

2. **System Analysis**

    2.1. Entity Relationship Diagram
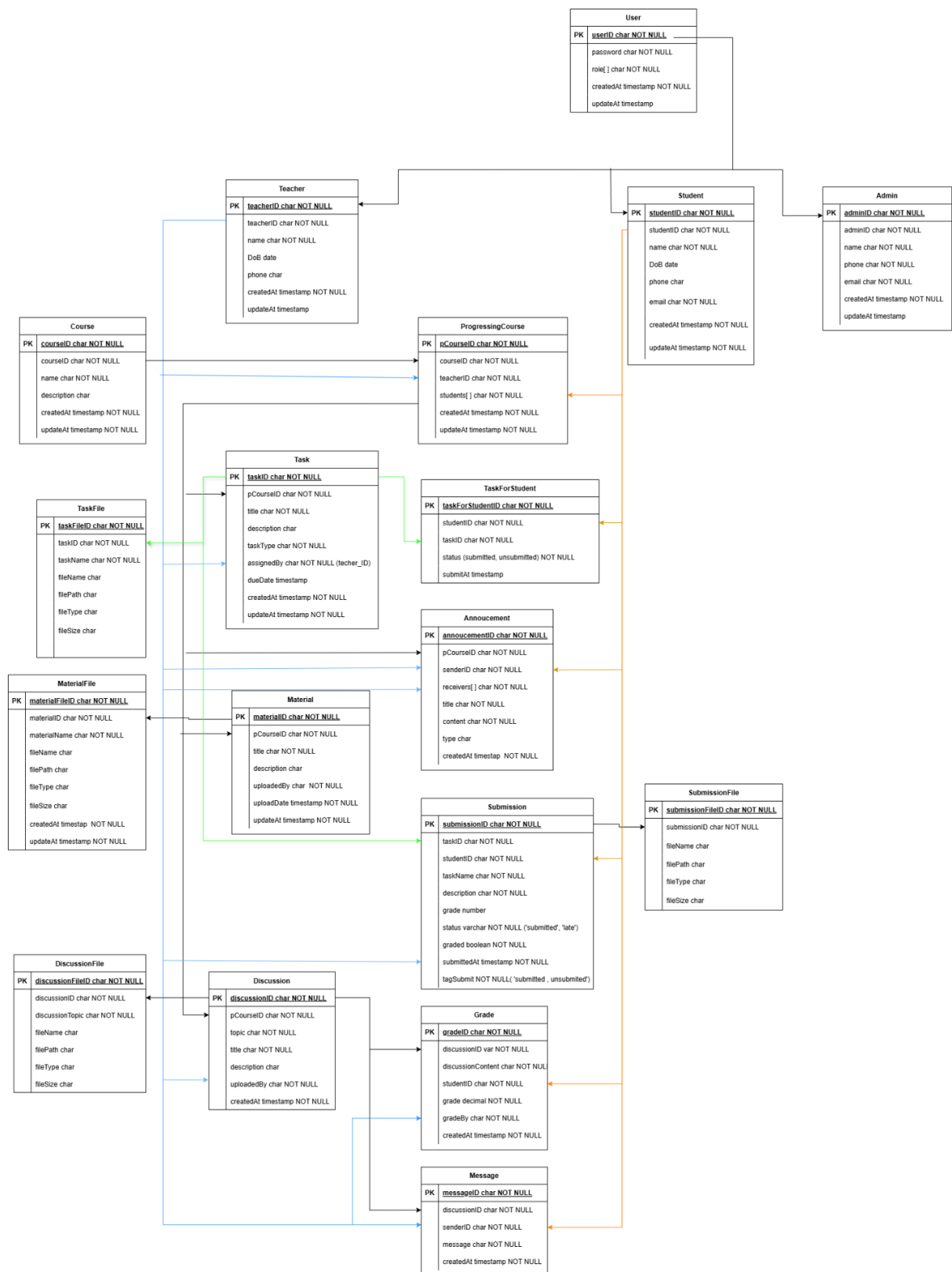
Figure 1: Schema diagram of Veducat

2.2.Use Case Diagram
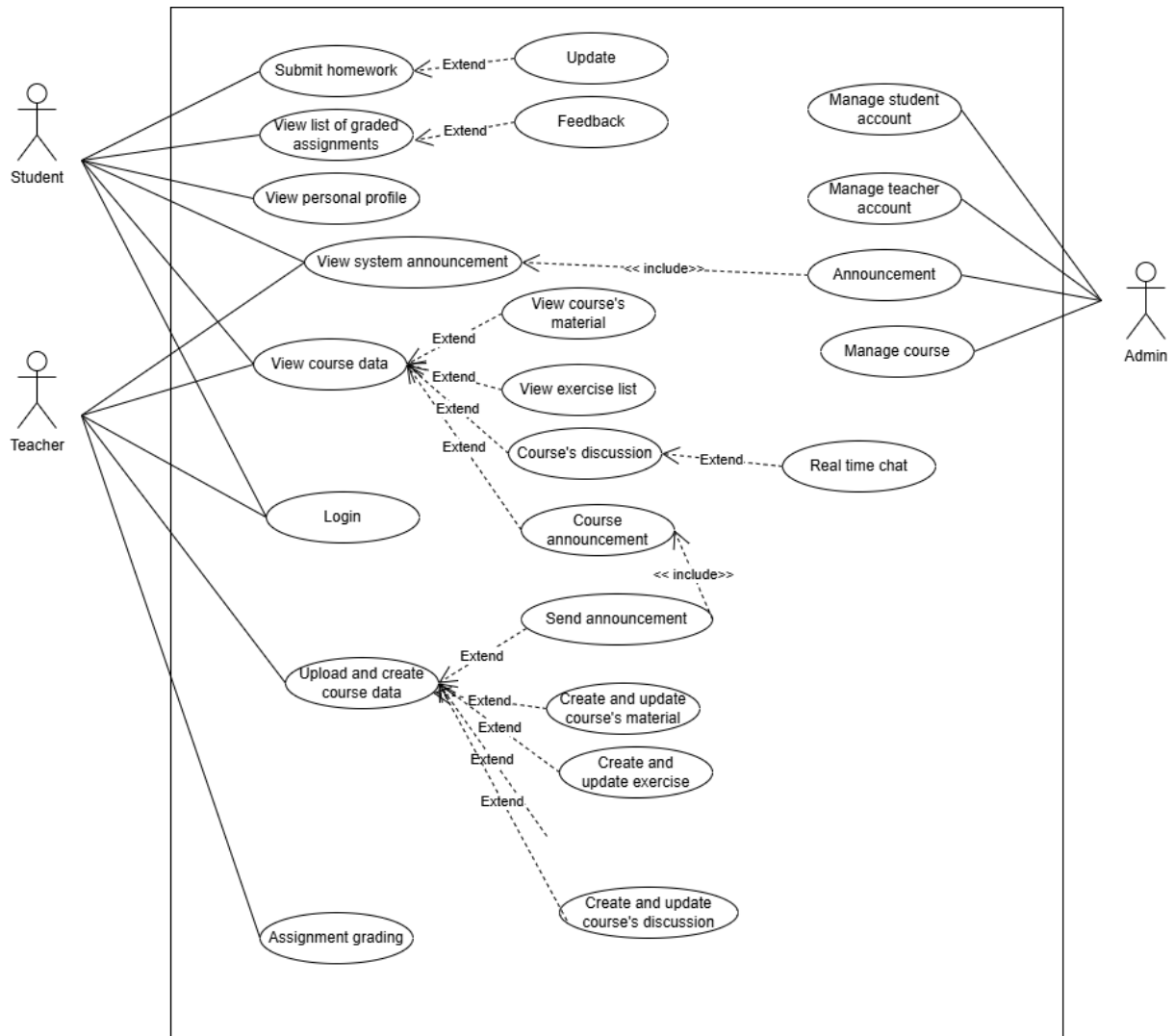
Figure 2: Use Case Diagram

3. Application Structure
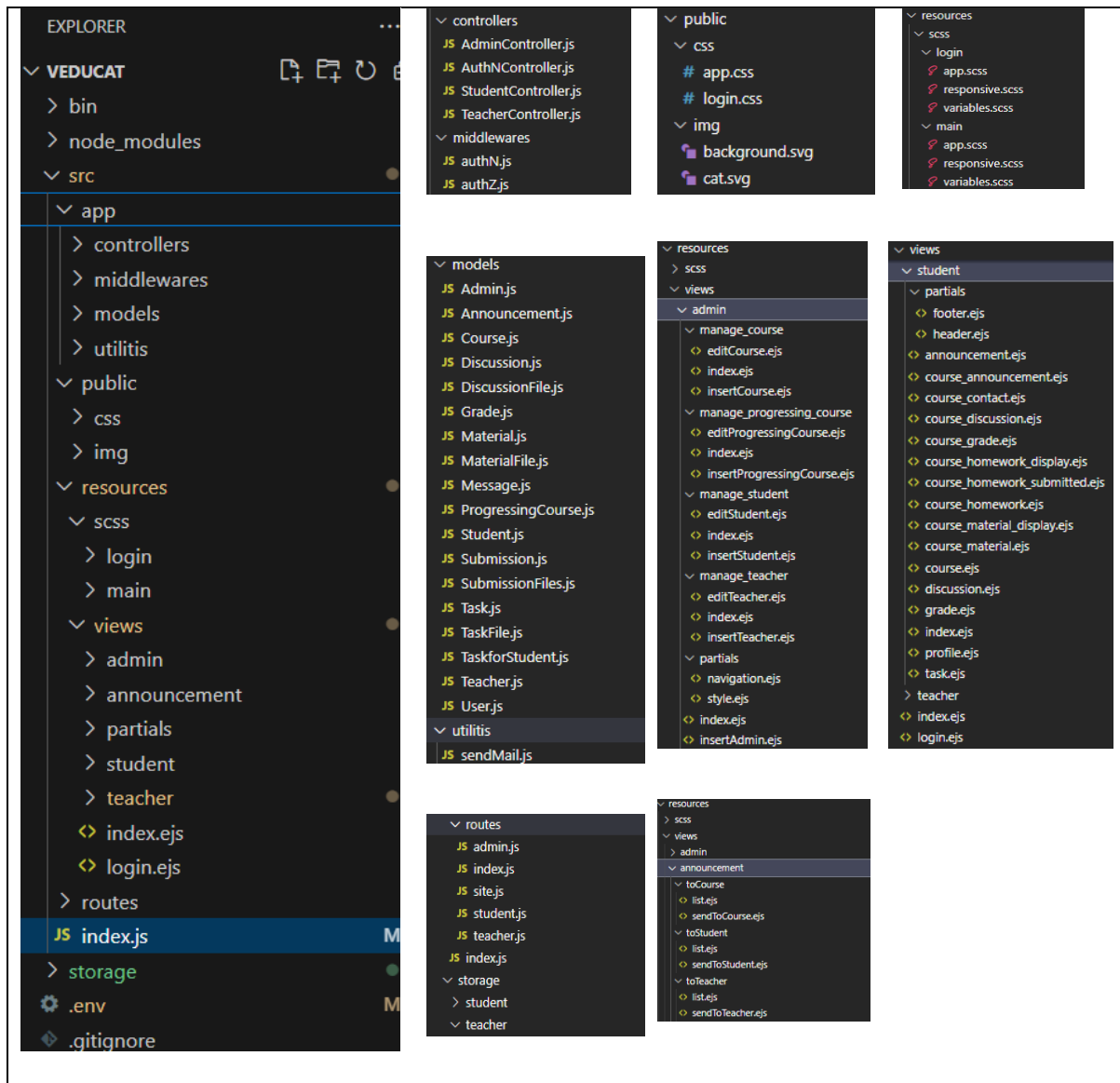
Figure 3: Class Structure

CHAPTER IV: IMPLEMENTATION

1. **Github**: **Github Link**
2. **Main Features**

2.1. Announcements

Teacher can send an announcement for all students in the course (See in figure 5). Moreover, when sending an announcement, it also sends to students email about this announcement (See in figure 6).
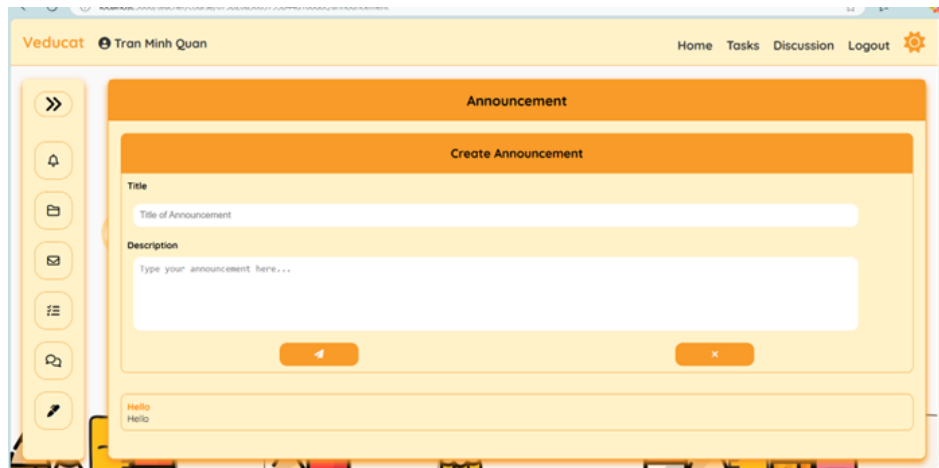
Figure 4: Teacher's Interface for creating an announcement.

Figure 5: System send email for students (recipients)

2.2. Upload Materials

Teacher can upload the materials file for all students in a particular course by uploading material form. And it will display in both interface of teacher and student. Teachers can edit or delete the material if they want.
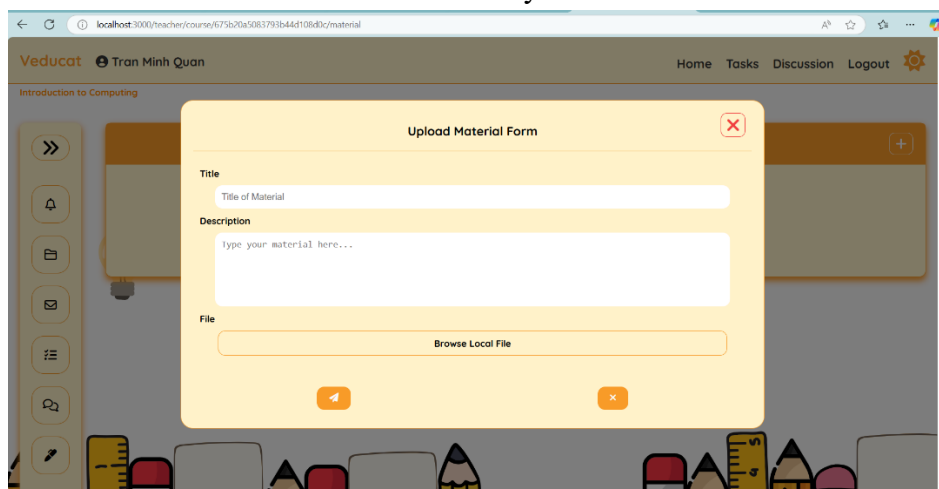
Figure 6: Uploading Material Form

2.3. Task for Students

Teachers can create a task (homework) for all students in the their course:
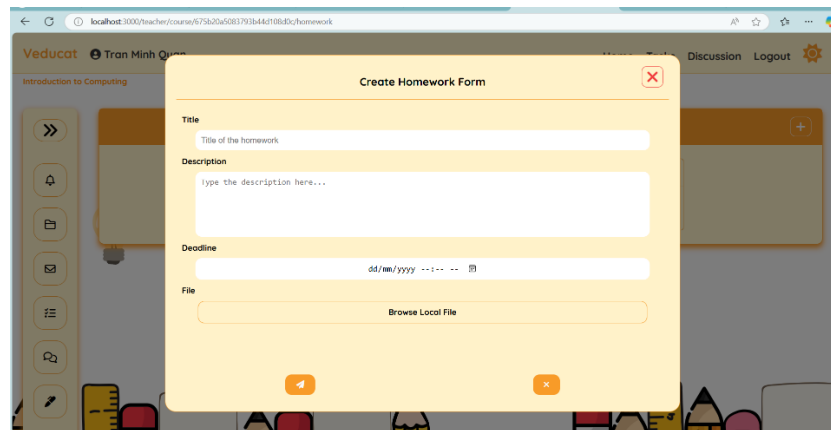
Figure 7: Create Homework Form

And then it will display in homework list in both teacher's interface and student's interface. In teacher's homework detail, it just displays detail of this homework and allow teacher to 'delete' or 'edit' the homework.

In student's homework detail, it displays the homework detail and homework submission form (See in figure 9). This allows students to submit the written answer and upload file answer (best support for pdf file).
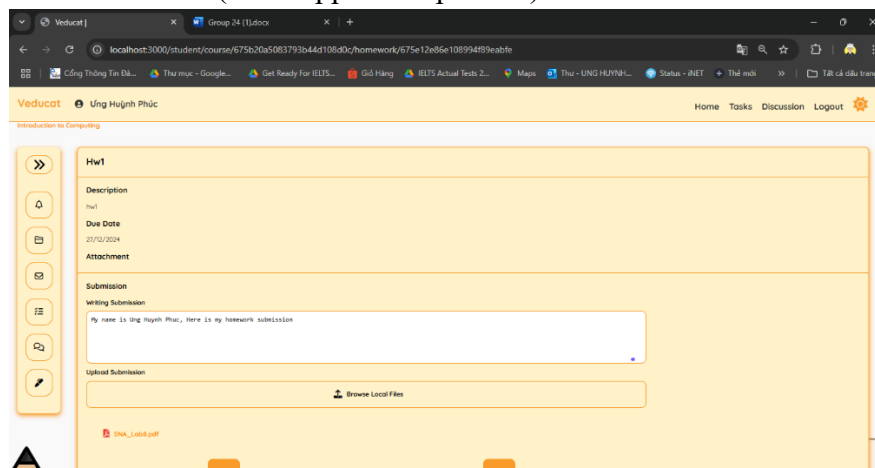

Figure 8: Homework submission form and homework information.

2.4. Discussion Room

Teachers can create a Discussion room by clicking on the 'plus' button in the discussion header, and in the navigation bar 'Discussion' to quickly create a discussion room.
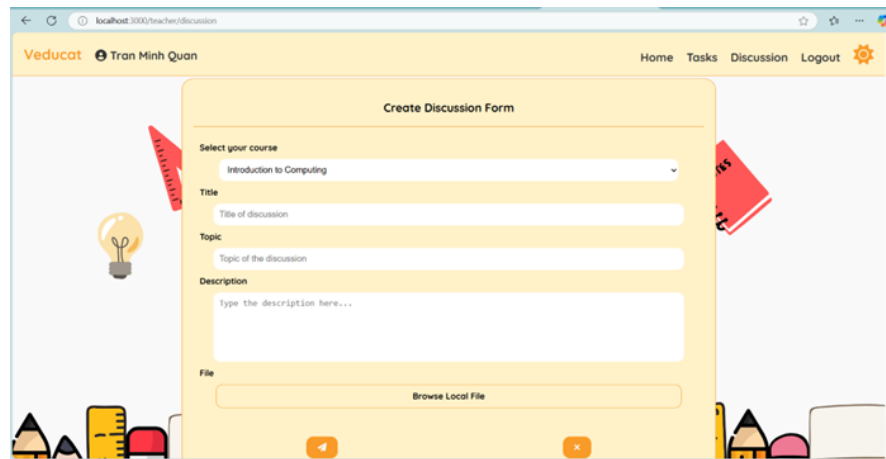
Figure 9: Creating Discussion Form

After creating the discussion, it will open for students in this course and allow students and teachers discuss in a limit time that set by the deadline.
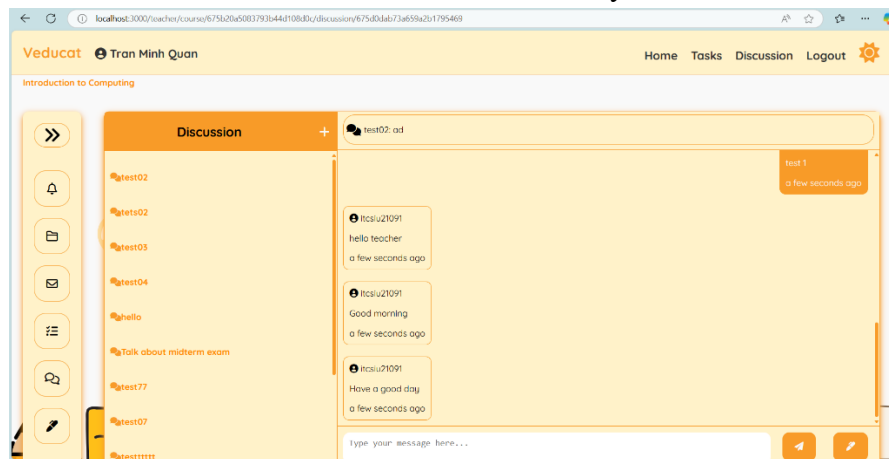
Figure 10: Discussion Room (Teacher's interface)

3. Admin Page

In this system, administrators play a crucial role in managing and maintaining its functionality. They are responsible for overseeing courses, managing teachers and students, and ensuring seamless operation. Administrators can create and organize courses, register new users (both students and teachers), and handle various tasks essential to the system's workflow. Their actions form the backbone of the platform, enabling smooth interactions and effective usage for all users.

3.1. Manage Teacher

Figure 11: Homepage of Manage Teacher

Figure 12: Insert New Teacher Form

Figure 13: Teacher List

Figure 14: Edit Teacher Form

Figure 15: Announcement for Teachers Form

Figure 16: Announcement List (Teacher)

3.2. Manage Student

Figure 17: Home Page of Student Management

Figure 18: Insert New Student Form

Figure 19: Student List

Figure 20: Edit Student Form

Figure 21: Announcement for Students Form

Figure 22: Announcement List (Students)

3.3. Manage Course

Figure 23: Home Page of Course Management

Figure 24: Insert New Course Form

Figure 25: Course List

Figure 26: Editing Course Form

3.4. Manage Progressing Course

Figure 27: Home Page of Progressing Course Management

Figure 28: Insert New Progressing Course Form
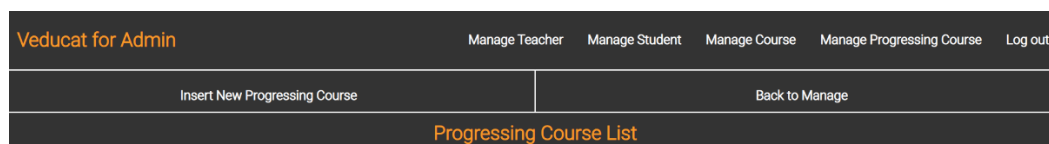
Figure 29: Progressing Course List
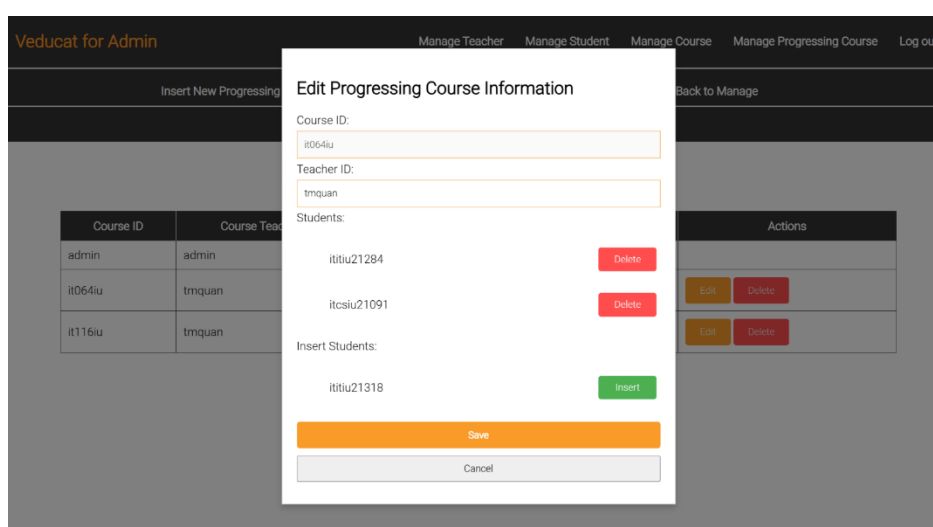
Figure 30: Editing Progressing Course Form

CHAPTER V: FUTURE FEATURE

1. Fixing

Currently, the system is not yet as stable as it could be, and we are committed to improving it in the near future. The grading feature is still incomplete, and there are occasional issues with displaying grades on the website. While grades can be submitted to the database, we have not yet fully optimized the process to retrieve and display them promptly for students. Additionally, the grading section for discussions has not been implemented for viewing yet. These areas will be a focus of our ongoing development efforts to ensure a seamless experience for users.

2. Updating

We will be adding a feature to display student grades directly on the discussion page, eliminating the need to access the grading section. Additionally, we will implement a system that allows teachers to upload final and midterm exams or create and post

quizzes for students at a scheduled time. The quizzes will be automatically graded based on the setup defined by the teacher.

3. Enhancing

We are working on enhancing the user interface to ensure it is more user-friendly. Currently, some responsive features are still under development. Additionally, we are focusing on optimizing the admin management interface to improve its logical flow, as we have identified inefficiencies in managing large datasets due to a lack of experience in this area.

To further improve the website, we plan to streamline the overall navigation, improve data visualization for better accessibility, and ensure that both the student and admin experiences are intuitive and efficient. By incorporating user feedback and prioritizing key areas for improvement, we aim to create a more seamless and scalable platform.

CHAPTER VI: CONCLUSION

The development of the "Course Activity Management for Distance Learning" project has been a meaningful experience, blending theoretical knowledge with practical application in web development. This project successfully addressed the growing need for virtual education tools by creating a platform that enhances the management of course activities, fosters collaboration, and improves communication between administrators, teachers, and students.

The system's key features, such as course management by administrators, assignment and grading tools for teachers, and task completion and discussion participation for students, offer a comprehensive and user-friendly solution to the challenges of distance learning. By integrating modern frameworks, libraries, and database management techniques, the platform ensures efficiency, scalability, and reliability in its operations.

Beyond its technical achievements, this project also provided valuable learning experiences for the team. We honed our skills in full-stack development, database management, and team collaboration while overcoming real-world challenges in software development. Additionally, by employing tools like GitHub, MongoDB, and Express.js, we demonstrated the ability to manage complex systems effectively and adapt to emerging technologies.

In conclusion, this project highlights the importance of leveraging technology to enhance the educational experience. It serves as a stepping stone for future innovations in distance learning, addressing the evolving demands of educators and students in a digital-first world. We believe this project not only fulfills the academic requirements but also contributes a meaningful solution to the field of education technology.

CHAPTER VII: REFERENCES

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