Faculty of Computing

SECB3104: Application Development

System Documentation (SD)
Final Report

INTELLILEARN LEARNING MANAGEMENT SYSTEM

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Revision Page

a. **Overview**

High school education faces challenges in providing students with access to high-quality learning resources, interactive content, and personalized attention. The shift to remote learning has exposed disparities in learning outcomes, with many students needing help transitioning to an online environment. This is evident when compared to the rise of online learning around the world. The quick switch to online platforms revealed differences among students, and many of them still struggle to adapt to this new way of learning.

The planning project aims to revolutionize the way high school is taught by introducing a comprehensive learning system that utilizes technology to enhance interactivity and personalization. Recognizing that the current teaching methods are not optimal, the project intends to create a platform that addresses the challenges faced by high school students, providing them with the tools and resources necessary for success in the evolving landscape of education.

Through the implementation of this new learning platform, the project seeks to create a more welcoming and effective classroom environment, ultimately paving the way for improved academic performance in high school and facilitating a smoother transition to higher education. The goal is to make the educational journey more manageable for high school students, making their path toward university and college studies more seamless and promising.

b. **Target Audience**

IntelliLearn is a project that centers around the subfield of Education Technology as its primary domain of focus. IntelliLearn is an innovative Learning Management System (LMS) designed to modernize and enhance high school education, particularly at SMK Tunku Abdul Rahman in Batu Arang, Selangor. It achieves this by streamlining management tasks for teachers, offering valuable analytics for administrators, and modifying learning experiences for high school students from Form 1 to Form 5, all within a digital learning environment that is safe and welcoming to all learners.

c. **Project Team Members**

Member Name	Role	Task	Status
Nurathirah	● Project Manager ● Front-End Developer ● Back-End Developer ● Assign and managed team ● Arrange and deal with stakeholders	● **Modules:** Communication (Chatbox), Calendar, Announcement, Subject Management,	Complete
Farah	● Front-End Developer ● Back-End Developer ● Documentation Lead	● **Modules:** Login, User Profile, Exercise, API, Payment Gateway	Complete
Yusra	● Front-End Developer ● Back-End Developer ● System Analysis	● **Modules:** Material Content, Attendance	Complete
Harchana	● Front-End Developer ● Back-End Developer	● **Modules:** Home/ Dashboard, Grade	Complete

d. **Version Control History**

Version	Primary Author(s)	Description of Version	Date Completed
Sprint 1	Nurathirah	- Admin panel - Admin calendar - Testing Sprint 1 - Implementation of Sprint 1	16/12/2023
	Farah	Login student profile	16/12/2023
	Yusra	View attendance (Student)	16/12/2023
	Harchana	Student dashboard	16/12/2023

Version	Primary Author(s)	Description of Version	Date Completed
Sprint 2	Nurathirah	- Student and teacher calendar - Communication: Write and post announcement teacher - Communication: Receive notification - Admin calendar and event	20/12/2023
	Farah	- View exercise module - View teacher profile - View student profile - Testing Sprint 2 - Implementation of Sprint 2	20/12/2023
	Yusra	View material content	20/12/2023
	Harchana	Teacher dashboard	20/12/2023

Version	Primary Author(s)	Description of Version	Date Completed
Sprint 3	Nurathirah	- Subject module: Student with function view subject - Subject module: Admin will assign user function as class with teacher and student - Communication function of chat box and message student for the conversation - Communication function of chat box and message student for the conversation - Testing Sprint 3 - Implement Sprint 3	30/12/2023
	Farah	- Stripe API Gateway - Update user profile (Student) - Update user profile (Teacher)	30/12/2023
	Yusra	- Tick attendance (Teacher) - Download student attendance list (Teacher)	30/12/2023
	Harchana	Forum/Group discussion among students	30/12/2023

Version	Primary Author(s)	Description of Version	Date Completed
Sprint 4	Nurathirah	- Communication: Receive announcements for student and teacher - Integrate all code and fix code that affects the integration	18/1/2024

	Farah	● Documentation	18/1/2024
	Yusra	● Upload materials (Teacher) ● Download materials (Student)	18/1/2024
	Harchana	● Key in marks by teacher ● View marks by students ● Download exam slip	18/1/2024

Table of Contents

1. Introduction

In the System Documentation (SD), the section should provide the details of the entire document, comprising the System Requirements Specification (SRS), System Design Document (SDD), and System Testing Documentation (STD) which includes the introduction and system overview. We will collect and record the functional and non-functional requirements of the system such as system inputs, outputs, functions, and limitations are all clearly defined in detail in this section.

1.1 Purpose

The goal of IntelliLearn is to enhance high school education by creating a web-based e-learning platform for students and teachers. It aims to address the problems of limited access to quality resources, lack of engagement, and disparities in learning outcomes. The objectives of this project (proposed system) are as follows:

1. Develop a web-based platform that provides students with easy access to high-quality educational materials, quizzes, and interactive content.

2. Create a secure user authentication system for students and teachers.

3. Personalize user experiences with customized dashboards, courses, and interactive quizzes.

4. Facilitate communication and collaboration through discussion, announcements, and private messaging.

5. Track and display assignment submissions and grades.

6. Implement a notification system to inform users about assignments, quizzes, and announcements.

7. Ensure the system's security and compliance with data protection regulations.

It is planned that the project will completely change high school education by introducing an innovative learning method that will solve important problems. This project will likely make it much easier for people to get good learning tools, which will remove challenges that get in the way of good learning. The objective of this project is to make it easier for students to understand difficult ideas by getting them more involved and involved in the activities.

This will help them understand the material better. Also, adding this method looks like it will completely change the way people learn from afar, helping students a great deal as they deal with the difficulties of online learning. The project's focus on a standardized and interactive digital world is a smart move to level the playing field in education by lowering differences in how well students learn. The main goal of this project is to give students more power by giving them the tools they need to do well in school through a simple-to-use web-based platform. This way, all learners can reach their full academic potential.

1.2 Scope

IntelliLearn represents a comprehensive web-based platform designed to revolutionize high school education targeting challenges associated with remote learning, engagement, and disparities in learning outcomes. The scope of the project encompasses several key features aimed at providing students with an enriched educational experience.

1. Access to quality learning resources:
   Intellilearn focuses on ensuring improved access to quality learning materials. The platform will offer a diverse range of resources that cater to different learning styles, fostering a more inclusive learning environment.

2. Interactivity and Personalization:
   This project aims to increase engagement through interactive elements such as personalized dashboards and quizzes. By the content individual students need, Intellilearn strives to enhance the learning experience and make complex concepts more accessible.

3. Modules Student, Teachers, and Administrators:
   There are different modules on the platform for students, teachers, and managers. These modules are meant to give you a personalized experience, useful training tools, and administrative features, in that order.

4. Hybrid Agile Methodology:
   IntelliLearn uses a method called "Hybrid Agile," which is a mix of standard project management and Agile methods. This method, which uses some scrum ideas, makes sure that it can be changed to fit the goals and limits of the project. It starts with online talks with the client, then moves on to a step-by-step development process, and ends with the client giving their approval on the finished project.

Several technologies will be implemented to enhance existing systems. To be precise, each of these technologies has its functionality to help the development of this system. These are the technologies that will be applied in the system with their respective descriptions:

No	Technology	Description
1	XAMPP server	XAMPP is a free, open-source web server solution stack package that works on multiple platforms. It comes with PHP, MySQL, Apache HTTP Server, and an HTTP server. Cross-platform, Apache, MySQL, PHP. Often used to build and test websites locally because it creates a system that works like a real server.
2	Open Database Connectivity	Has to be used as an Application Programming Interface to connect the system with the database
3	MySql 8.0 version	Has to be used as the system database server
4	Integrated Development Environment (IDE)	● Visual Studio Code Source code viewer that is small, light, and very flexible. It works with many computer languages and comes with built-in support for Git, syntax highlighting, IntelliSense for code completion and suggestion, debugging, and add-ons that add extra features. ● Notepad++ This is a free and open-source code editor for Windows. It works with many computer languages and has syntax highlighting, auto-completion, and editing of multiple documents at once and is known for being quick and easy to use.

		● Adobe Dreamweaver Proprietary web creation software with a graphical user interface for building and managing websites. It can be used by both designers and developers because it lets you change code as well as visual designs. Works well with many other Adobe tools.
5	Hypertext Markup Language (HTML)	Has to be used as the system's graphical user interface (GUI)
6	Hypertext Preprocessor (PHP)	Server-side coding language made for building websites. It is put into HTML code and run on the computer, which makes dynamic content. People often use PHP to do things like manage form data, connect to databases, and make interactive web pages.
7	Javascript	Interpreted high-level computer language that is mostly used for building websites for clients. Dynamic content on web pages lets users connect with them by letting them do things like form validation, animations, and updates without having to reload the page.
8	Cascading Style Sheets (CSS)	This is the stylesheet language that tells you how to show an HTML document. It manages how web pages are laid out, formatted, and looked. It lets writers style things like fonts, colors, spacing, and positioning to make a website look better.

1.3 Definitions, Acronyms, and Abbreviations

Definitions of all terms, acronyms, and abbreviations used in the system:

Term	Definition
SRS	System Requirement Specification - A document that outlines the requirements and object of the software product being developed.
SDD	System Design Document - A document that describes the system architecture, components, and interface in detail.
STD	System Testing Documentation - The document outlines the testing process and procedures for the software product that is being developed.
IntelliLearn	Intelligent Learning Management System - IntelliLearn is a web-based platform aimed at transforming high school education by providing students with access to quality learning resources, interactivity, and personalization. It addresses challenges related to remote learning, engagement, and disparities in learning outcomes.
LMS	Learning Management System - Educational platform more to online learning
API	Application Programming Interface - A set of protocols of tools for building software application
UI	User Interface - Interface in a device for human-computer interaction.

1.4 References

a) Andrew Burak. (2023). *Your 2023 Guide to Writing a Software Requirements Specification (SRS) Document*. Retrieved from https://relevant.software/blog/software-requirements-specification-srs-document/

b) Gerhard Kruger, Charles Lane. (2023). *How to Write a Software Requirements Specification (SRS Document)*. Retrieved from https://www.perforce.com/blog/alm/how-write-software-requirements-specification-srs-document

c) GeeksforGeeks. (2022). *Unified Modeling Language UML | Sequence Diagrams*. Retrieved from https://www.geeksforgeeks.org/unified-modeling-language-uml-sequence-diagrams/

d) AltexSoft. (2019, December 9). *Technical Documentation in Software Development: Types, Best Practices, and Tools*. Retrieved from https://www.altexsoft.com/blog/business/technical-documentation-in-software-development-types-best-practices-and-tools/

1.5 Overview

IntelliLearn is a web-based platform aimed at transforming high school education by providing students with access to quality learning resources, interactivity, and personalization. It addresses challenges related to remote learning, engagement, and disparities in learning outcomes. The platform includes features such as personalized dashboards, interactive quizzes, and course materials. It leverages web technologies to ensure a seamless user experience. With distinct modules for students, teachers, and administrators, IntelliLearn is designed to make learning accessible, interactive, and engaging while providing educators with effective teaching tools. It aims to make learning more adaptable and intelligent by the time students graduate high school. This web-based platform focuses on personalization at the center of its design, and as a result, it offers students individualized learning paths while also dramatically improving the teaching experience for instructors.

IntelliLearn is a project that focuses on the subfield of Education Technology as its main focus domain. IntelliLearn is an innovative Learning Management System (LMS) that is designed to modernize and enhance high school education mainly in SMK Tunku Abdul Rahman. It does this by improving management duties for teachers, providing valuable analytics for administrators, and modifying learning experiences for students, all within a digital learning environment that is safe and welcoming to all learners. High school education faces challenges in providing students with access to high-quality learning resources, interactive content, and personalized attention. It aims to address the problems of limited access to quality resources, lack of engagement, and disparities in learning outcomes. We use hybrid agile methodology, a way of managing projects that takes parts from both traditional methods, like Waterfall, and Agile concepts. It commences with online client interviews at the project's initiation, followed by a step-by-step app development process akin to Waterfall. Hybrid Agile best fit for our project needs such as scrums. We make a project plan that includes both standard project phases and Agile iterations, also known as sprints.

2. Specific Requirements

The System Requirement Specification (SRS) is typically a standalone document that serves as the primary reference for software development. It is a part of the system documentation, which includes all documents related to the software project, such as functional specifications, design documents, test plans, and user manuals. The System Requirement Specification (SRS) is a detailed document that outlines the functional and non-functional requirements of the software system. It typically includes a description of all inputs and outputs of the system, as well as the various functions that the system should be able to perform in response to those inputs or outputs. The SRS is a critical document in software development as it helps ensure that all stakeholders have a clear understanding of the system's requirements and that the system is developed according to those requirements.

2.1 User characteristics

In SRS, the user characteristics section describes various attributes of the intended users of the system. This section aims to provide a clear understanding of the users requirements, needs, preferences, and limitations which will be taken into account during the design and development of the system. The user characteristics section typically includes information about the user's technical proficiency or other relevant factors that might impact their interaction with the system.

2.1.1 Teacher

- Teachers using the platform are expected to have basic computer skills, and the interface should be user-friendly to accommodate varying levels of technical proficiency.
- The platform should provide an intuitive content management system, allowing teachers to easily add, edit, and organize educational materials.
- Teachers need the capability to create, customize, and assess quizzes and exercises to support a dynamic and adaptive learning environment.

2.1.2 Student

- Students should easily access and view learning materials, ensuring a seamless learning experience.
- The platform should offer engaging exercises and quizzes to actively involve students in the learning process.
- Students need a user-friendly interface to track their progress, view assessment results, and receive timely feedback.

2.1.3 Administrator

- Administrators require tools for efficient user account management, including adding, modifying, and removing users as needed.
- The system should facilitate content moderation, allowing administrators to manage educational materials in alignment with the curriculum.
- Administrators need comprehensive reporting and analytics features to monitor system performance, user engagement, and overall effectiveness for continuous improvement.

2.2 System Features

IntelliLearn provides students, teachers, and administrators with individualized dashboards, which guarantees a customized learning experience for all parties involved. Course materials, interactive quizzes, communication, and donation are beneficial to students since they allow for greater flexibility in their educational experience. The platform provides users with access to a wide variety of comprehensive learning resources, which may be adapted to their specific learning profiles to maximize efficiency. While administrators manage user identities and system settings, teachers can collaborate in a seamless manner using the tools that are built into the system. Students and teachers alike can monitor their progress in real time using the web-based platform, which is available across all computing platforms. Both adaptability and ongoing improvement are ensured by the implementation of a hybrid agile methodology. The development environment is improved by the presence of multiple integrated development environments (IDEs), such as Visual Studio Code and MySQL for database administration. Essentially, IntelliLearn's objective is to transform the way high school education is delivered by utilizing an approach that is user-centric, interactive, and customizable.

Use Case Diagram Link:
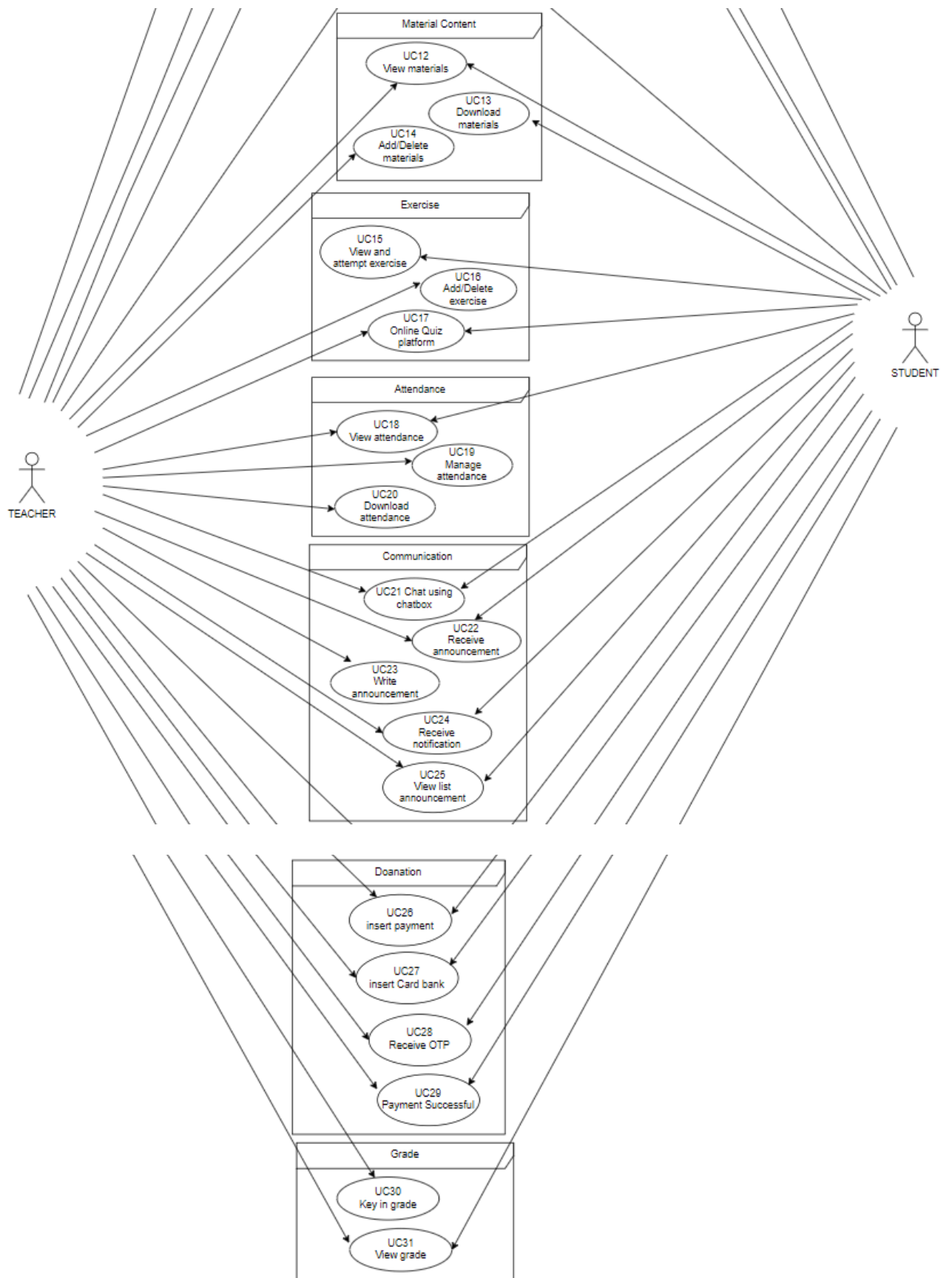https://drive.google.com/file/d/1lfLYdLRy0bHgfXf2-kMUDQuBeG39Jqd-/view?usp=sharing

Figure 2.2.1: Use Case Diagram for IntelliLearn System

Table 1: Description of Module and Functions for IntelliLearn

Module	Function	Description
User Profile	UC01 - Login into the system	This process ensures that only authorized users can access information related to project proposals.
	UC02 - Update profile	Users can update their profile information.
	UC03 - View profile	Users can view their details information on profile
	UC04 - Add or delete user account	Admins utilizing their privileges can add new users or delete the existing user account
	UC05 - Manage system	Allows admin to customize the system according to institutional needs, ensuring flexibility in adapting to evolving requirements.
	UC06 - Manage user	Administrators have the authority to modify user attributes, such as updating user profiles, resetting passwords, and adjusting user roles
Calendar	UC09 - Add or delete events	Users can add new events to the calendar or remove existing events.
	UC10 - View events	Users can easily view all events listed on the calendar and an overview of scheduled activities.
	UC11 - Receive notification event	Users receive timely notifications for upcoming events about important dates and activities.

Subject management	UC07 - Assign users	To the subjects they are registered for and assign users to their respective subjects.
	UC08 - View enrolled subjects	Teachers and students can easily see the subjects registered for them, including the members of the class for that subject.
Attendance	UC18 - View attendance	Students can see their attendance taken by their respective class teachers on each class date.
	UC19 - Manage attendance	Class teachers can mark the attendance of their class students for the current date.
	UC20 - Download attendance	Class teachers can download the student attendance list file for the current class after saving the attendance.
Material Content	UC12 - View materials	Users can access and view educational materials provided by their teachers.
	UC13 - Download materials	Users can download educational materials (providing offline access to resources).
	UC14 - Add or delete materials	Users can manage the content library by adding new educational materials or removing outdated ones as needed.
Exercise	UC15 - View and attempt exercise	Users can view and actively engage with exercises, fostering an interactive learning experience within the platform.
	UC16 - Add or delete exercises	Users possess the ability to enrich the learning experience by adding new exercises or removing outdated exercises.

	UC17 - Online Quiz Platform	The platform is integrated with Quizizz, an external online quiz platform, enabling users to participate in interactive quizzes to assess and reinforce their understanding of the learning material.
Grade	UC30 - Key in grade	Allows teachers to record and manage grades for students
	UC31 - View grade	Allow students to view their exam grades
Communication	UC21 - Chat using chatbox	Engage in real-time communication using the chat box feature to enable convenience and instant messaging within the IntelliLearn platform.
	UC22 - Receive announcements	Users stay informed about critical updates and receive important information.
	UC23 - Write announcements	Admin and teachers create and send announcements to users within the system to share important messages with the IntelliLearn community.
	UC24 - Receive notification	Users receive notifications for important events to inform them of any updates or changes.
	UC25 - View list announcement	Users can easily access and view a list of messages or important announcement updates.
Donation	UC26 - Insert payment	Users initiate the payment process by providing details such as the amount, triggering the transaction.

|	UC27 - Insert card bank	To complete the payment, users securely enter their card or bank details, including card number, expiry date, and CVV.
	UC28 - Receive OTP	As an additional security measure, users receive a One-Time Password (OTP) on their registered mobile number or email for authentication.
	UC29 - Payment successful	Upon successful verification and processing by the Stripe gateway, users receive confirmation that the payment has been completed.
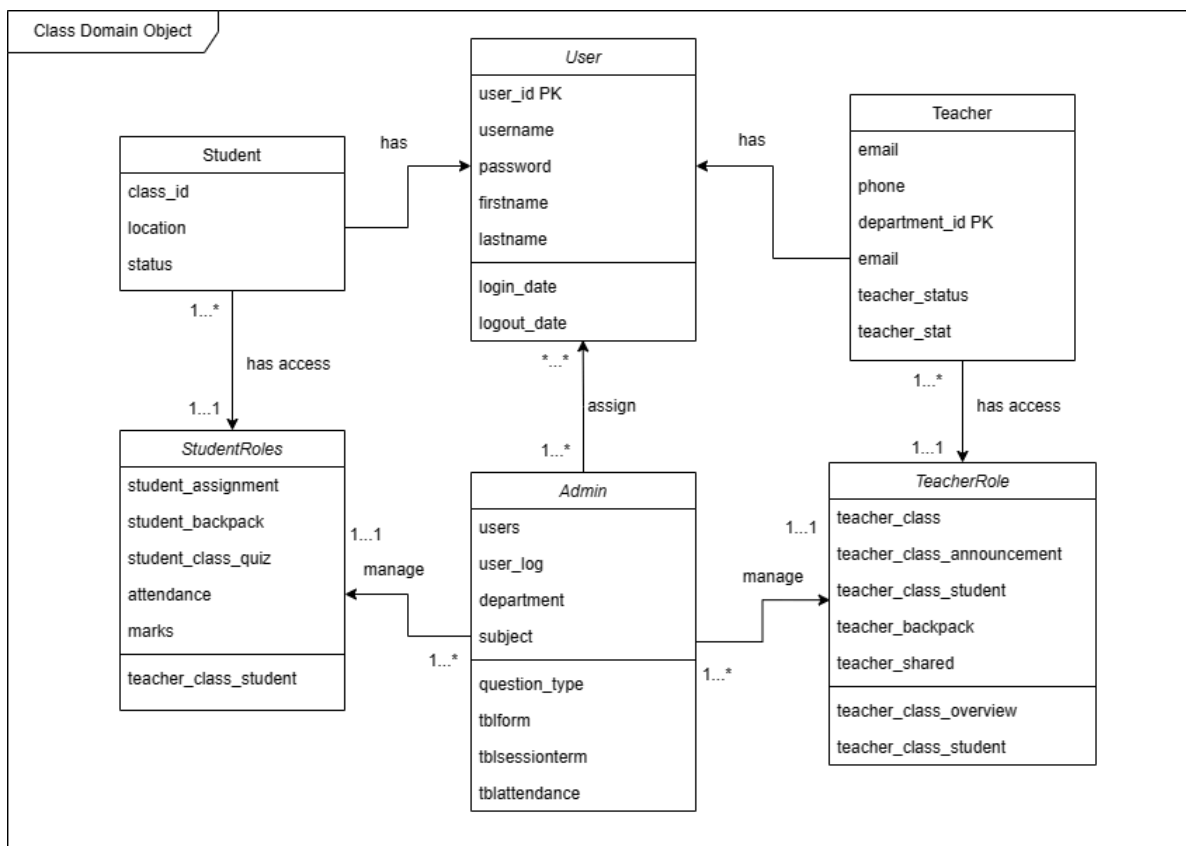
Figure 2: Domain Model for <Intellilearn System>

2.3 Software System Attributes, Performance, and Other Requirements

Software System Attributes:

- Usability: With a user-friendly interface Intellilearn puts a focus on usability, ensuring an easy and convenient experience for students, teachers, and administrators. The system design focuses on simplicity as well as clarity to make it easy for users to navigate. Furthermore, integrated personalization tools enable users to personalize features and customize the system to fit their needs, experience, and set preferences. By ensuring a consistent and ideal experience across a variety of systems, including desktops, laptops, tablets, and smartphones, the responsive design further improves usability.

- Reliability: Intellilearn is built with reliability in thoughts, so it works easily and has minimal downtime. The system is designed to be available all the time, so users will experience as few errors as possible. Data security is fundamental and strong protections are in place to keep data from getting lost. Regular backup procedures are set up to improve reliability by protecting against data loss and making it easier to get back up and running quickly if something goes wrong.

- Maintainability: This part is a very important part of Intellilearn's progress. The system is built in modules, which lets developers change, improve, or fix certain modules without affecting the whole system. There is a lot of information available to help writers understand the structure, functions, and codes of the system so that it can be updated and maintained more easily. Version control systems are used to keep track of changes. This lets several people work together on updates and keeps a clear record of all the changes, which makes the platform easier to manage overall.

- Portability: Making sure that the app works with the main web browsers. This means that users can easily access it from any browser. The platform is made to work on any device, so users can access IntelliLearn on a variety of devices without losing any usefulness or experience. This focus on flexibility makes

the platform easier to use by making it more flexible and able to meet the needs and wants of users.

- Compatibility: Easy integration with third-party apps and services. This lets users use more educational technologies and resources. As a result of following referred-to web standards, the platform works well with many different web technologies. This commitment to compatibility makes it easier for users to have a smooth experience in a variety of settings, letting them freely access a wide range of teaching tools and technologies.

Performance:

- Response time: Sets a high value on quick response times to make sure that users have a fast and quick experience. The system is made so that there is little time between what the user does and what the system does in response, which makes transfers quick. This is done with fast user interfaces, server-side processes that work well, and code that is optimized. Intellilearn improves user satisfaction and engagement by prioritizing low response times. This makes the entire user experience better.

- Throughput: A critical Intellilearn performance indicator that shows how well the system can handle multiple users and tasks at the same time. The tool is made to handle a lot of data and requests at once, so many people can use it at the same time without any delays. This is done with scalable architecture, fast data processing methods, and optimized database processes, all of which make the platform strong and fast.

- Capacity: Carefully plans its capacity to make sure that the system can handle different levels of user activity and load. The software is built to handle more users without slowing down, so it can grow without any problems. This scalability is made possible by assigning materials efficiently, distributing loads effectively, and being able to adapt quickly to changing usage trends. Intellilearn makes sure that the platform is stable and fast even during times of high usage by prioritizing capacity.

- Availability: Connectivity is very important, and the system is designed to keep users' access high. This means reducing downtime as much as possible, setting up backups, and having strong plans for what to do in case of a disaster. IntelliLearn uses server clustering, load sharing, and redundant data storage to make sure that all of its resources are always available. This maximizes uptime and gives users uninterrupted access to learning materials. The Intellilearn system is reliable and trustworthy because it has a high availability rate.

Other Requirements:

- Safety: A lot of focus is given to keeping user data safe by using strong data privacy ways like encryption and safe storage. Secure user authentication and authorization systems are also in place to prevent people who are not supposed to be there from getting in. This keeps private information safe.

- Security: Encrypts data sent over the internet using secure communication methods like HTTPS to make it safer. The platform has firewalls and breach detection systems built in to protect against hackers and other people who should not be able to get in.

- Legal and Regulatory: Intellilearn is in line with education regulations and laws, making sure that it follows program guidelines, accreditation requirements, and other rules set by educational authorities. The app also meets accessibility standards, which means that people with disabilities can use it.

- Environmental: To help protect the environment, Intellilearn works on energy efficiency by making the best use of server configurations and eco-friendly data center practices. As a way to help the environment, the platform encourages online applications and assessments to minimize paper use.

2.4 Design Constraints

These constraints may alter based on the nature of project requirements. Here are some of the design constraints to consider:

a) Security and Privacy constraints: It is essential to the system that user info is kept safe and private. Strong security features, like data encryption and tight user authentication, are built into the platform to keep private data safe and in line with privacy laws.

b) Time constraints: This system is using a Hybrid Agile method due to understanding how important time is in the development process. This way of doing this by following the plan and phases, putting it in often during the development, and changing views depending on new requirements quickly.

c) User Experience constraints: Intellilearn has a lot of importance on a good user experience by making the interface easy to use. Clear navigation and features that are easy for users to use are used to make the learning experience fun and effective. Using user feedback all the time makes sure that changes are always being made to satisfy user needs.

d) Performance constraints: Focus a lot of pressure on scalability planning to handle possible performance problems. This means making improvements to the system so it can handle more users well. Furthermore, load testing is carried out to create different usage situations and find possible problems.

e) Hardware and Platform constraints: Make sure that its design works effectively on a variety of devices so that it can be used by both teachers and students. The platform is designed to function easily on various hardware configurations and running systems. This gives users options and makes sure that the experience is the same on all devices.

3. System Architectural Design

3.1 Architecture Pattern and Rationale

Figure 3.1.1: Architectural Pattern Diagram for Intellilearn System

Detailed Description of Components

3.2 Complete Package Diagram

A package diagram for IntelliLearn reflects the modular structure of the Learning Management System, encapsulating technologies provided by the XAMPP server, Open Database Connectivity (ODBC), and MySQL 8.0 within the "Database Connectivity" package. This package manages the interaction between the web-based platform, developed using Hypertext Markup Language (HTML), and the server-side logic implemented through Hypertext Preprocessor (PHP) scripts, organized under the "Integrated Development Environment (IDE)" package. The "UI Framework" package encapsulates the front-end development technologies, namely HTML and JavaScript, responsible for delivering an interactive and user-friendly interface.

The integration of XAMPP as the local server environment is illustrated as part of the "Server Environment" package, ensuring a comprehensive platform for running PHP scripts and managing MySQL databases. The "User Account" package, represented in the diagram, includes PHP scripts responsible for managing user-related functionalities, aligning with IntelliLearn's user-centric approach. This package diagram effectively captures the relationships and dependencies among these technologies, providing a visual representation of the system's architecture for IntelliLearn developers and stakeholders.
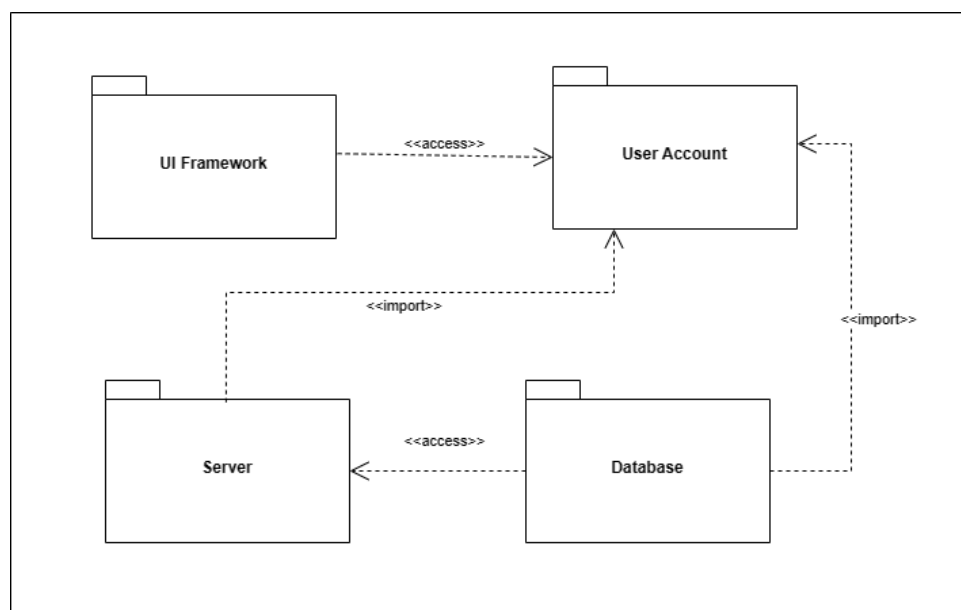
Figure 3.2.1: Package Diagram for Intellilearn System

3.3 Detailed Description

3.3.1   P001: User Profile Subsystem
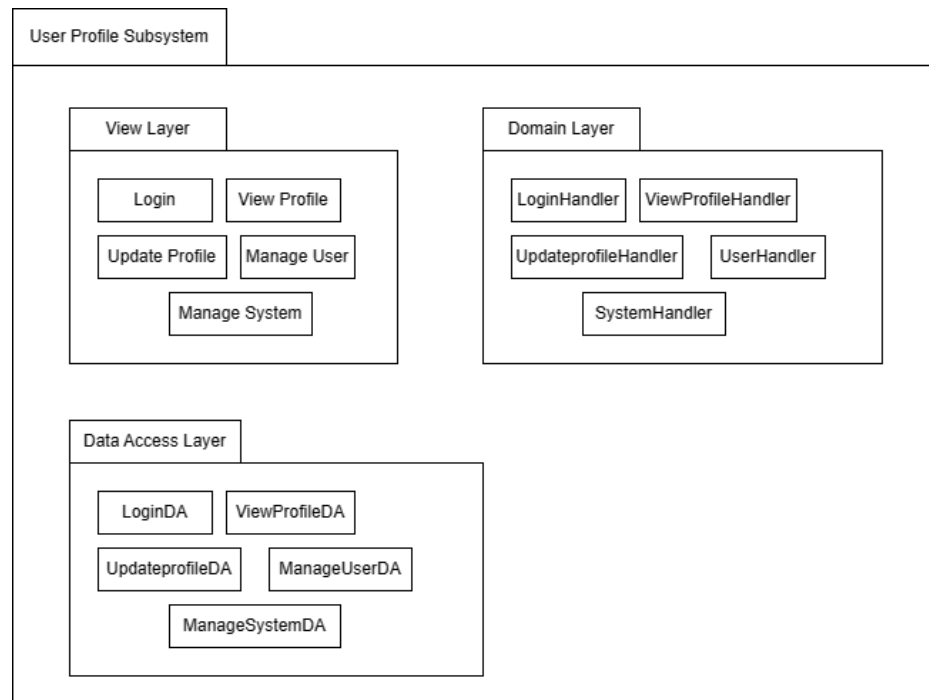
Figure 3.3.1.1: Package Diagram for User Profile Subsystem

3.3.2   P002: Subject Management Subsystem
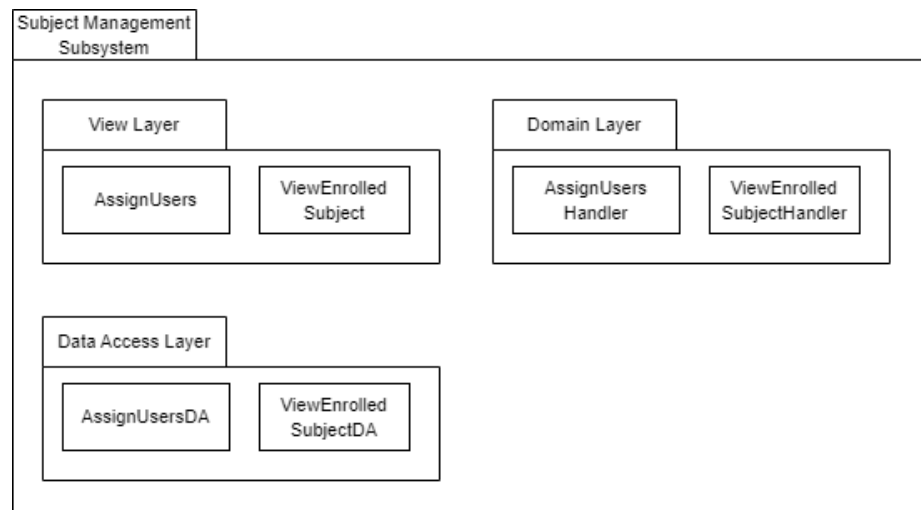
Figure 3.3.1.2: Package Diagram for Subject Management Subsystem

3.3.3 P003: Calendar Subsystem
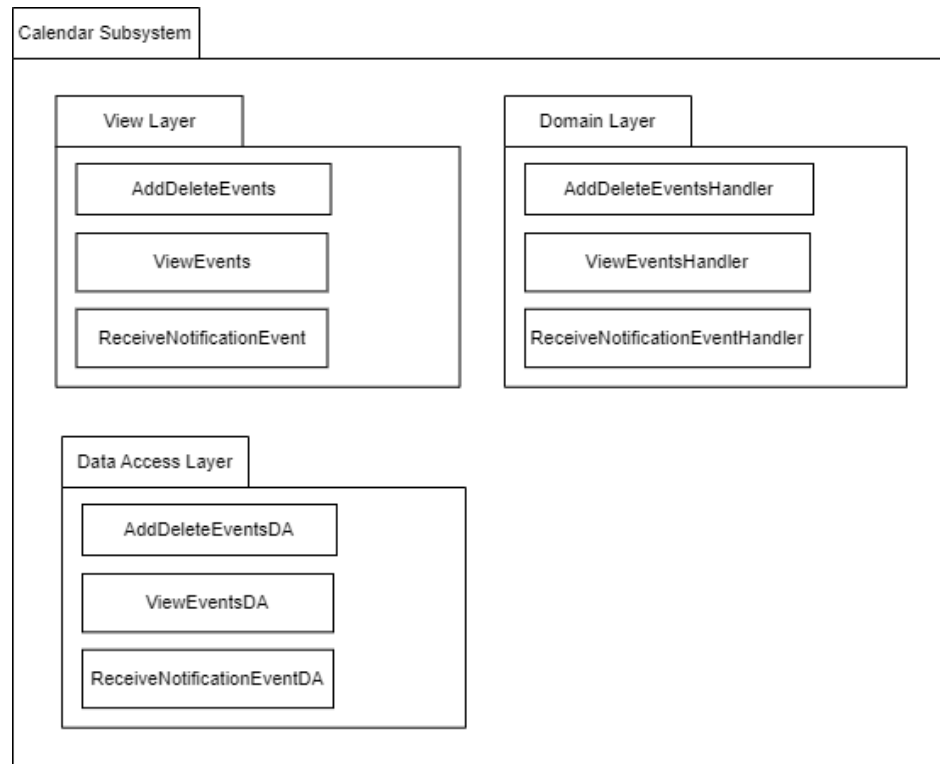
Figure 3.3.1.3: Package Diagram for Calendar Subsystem

3.3.4 P004: Material Content Subsystem
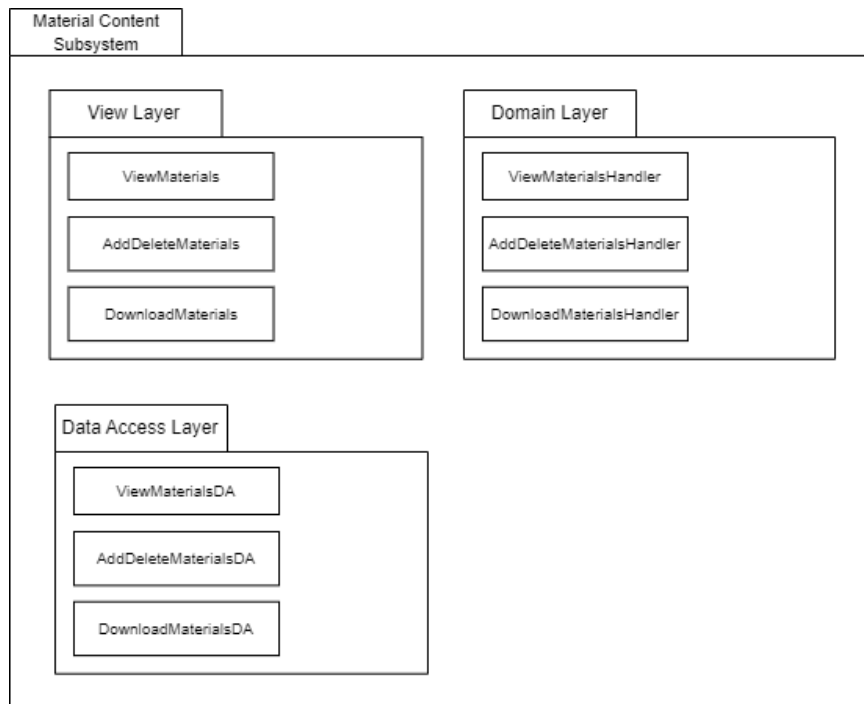
Figure 3.3.1.4: Package Diagram for Material Content Subsystem

3.3.5 P005: Exercise Subsystem
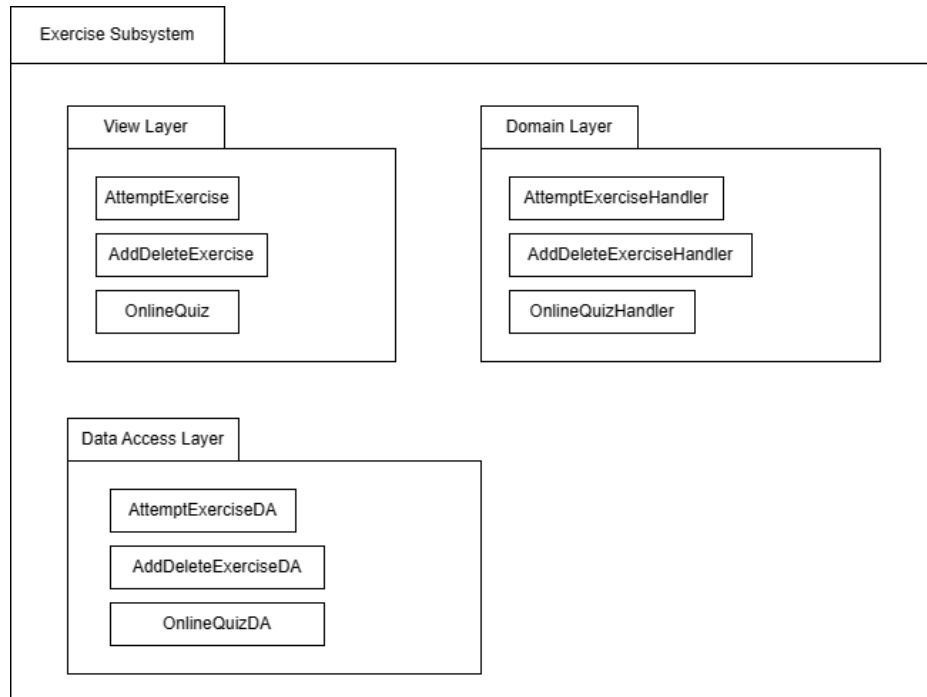
Figure 3.3.1.5: Package Diagram for Exercise Subsystem

3.3.6 P006: Attendance Subsystem

Figure 3.3.1.6: Package Diagram for Attendance Subsystem

3.3.7 P007: Communication Subsystem

Figure 3.3.1.7: Package Diagram for Communication Subsystem

3.3.8 P008: Donation Subsystem

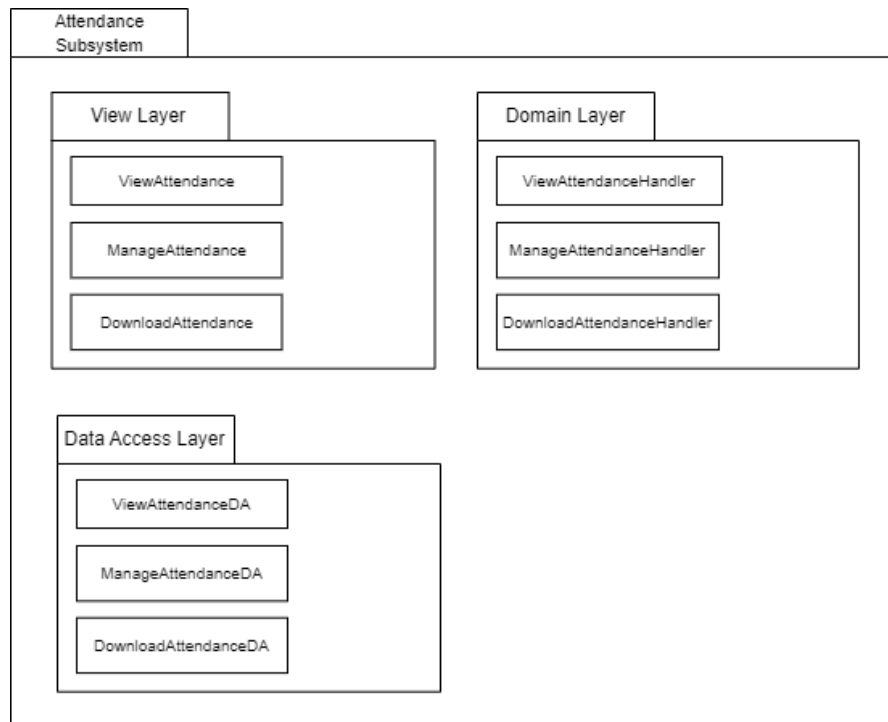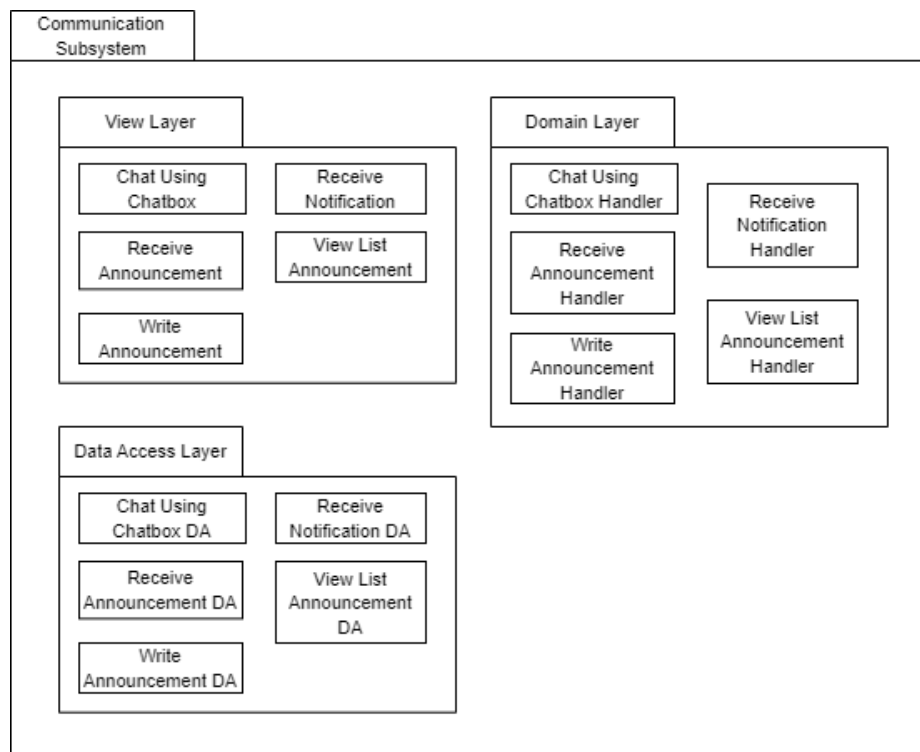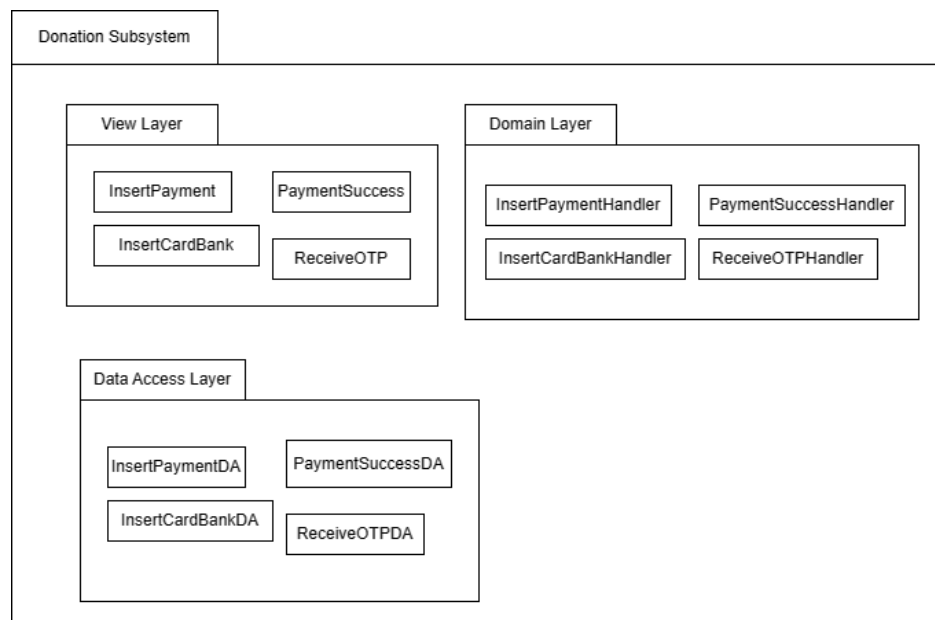**Figure 3.3.1.8: Package Diagram for Donation Subsystem**

3.3.9 P009: Grade Subsystem
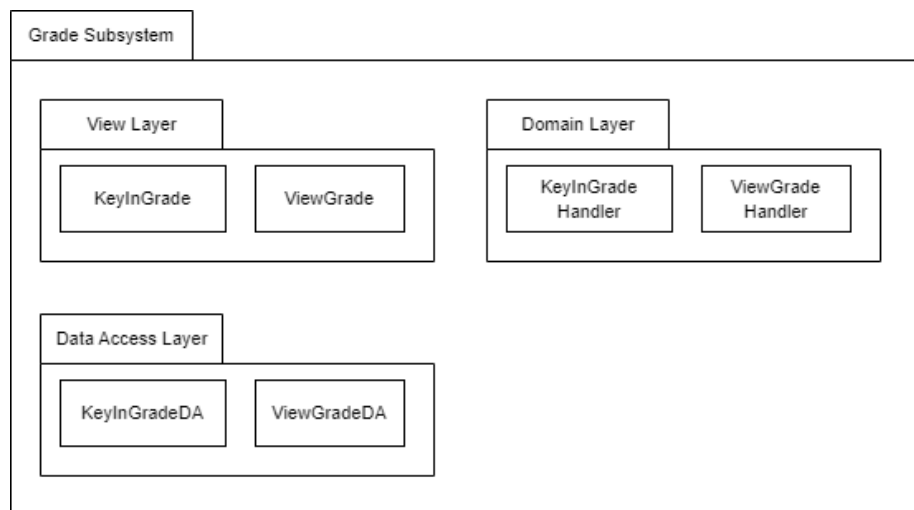
Figure 3.3.1.9: Package Diagram for Grade Subsystem

4. Data Design

4.1 Data Description

A relational database, known as 'tryintellilearn,' stores the most crucial data and system entities associated with IntelliLearn, an innovative Learning Management System (LMS). The following entities are created through the processing and organization of data by the database, as listed in Table 4.1.

As part of the IntelliLearn system's data design, data entities and their connections are organized and structured. This process includes establishing the data schema, tables, attributes, and connections between entities.

Table 4.1: Description of Entities in the Database

No	Entity Name	Description
1.	Teacher	Teachers represent those in charge of utilizing the platform and are expected to possess basic computer skills, they encounter a user-friendly interface designed to accommodate varying levels of technical proficiency. The platform equips teachers with an intuitive content management system, facilitating the seamless addition, editing, and organization of educational materials. In their role as educators using the platform, teachers can create, customize, and assess quizzes and exercises. This feature empowers them to establish a dynamic and adaptive learning environment tailored to the specific needs of their classrooms. Overall, the platform is a tool that puts teachers in charge, offering flexibility and accessibility for effective content management and assessment creation.
2.	Student	Students, as the primary users of the platform, should easily access and view learning materials, ensuring a seamless learning experience. The platform is designed to provide engaging exercises and quizzes, actively involving students in the learning process. For students, a user-friendly interface is crucial for tracking their progress, viewing assessment results, and receiving timely feedback. The platform prioritizes a student-centric

		approach, aiming to enhance the overall learning journey by offering accessibility, engagement, and efficient progress tracking.
3.	Administrator	Administrators manage user accounts efficiently by adding, modifying, and removing users. They oversee content moderation, ensuring educational materials align with the curriculum. Additionally, administrators utilize comprehensive reporting and analytics to monitor system performance and user engagement, supporting continuous improvement efforts.

4.2 Data Dictionary

A data dictionary for a system gives a comprehensive description of the data components that are utilized in the system. This description may include the data elements' names, descriptions, data types, sizes, and any other pertinent features. An example of a data dictionary for the system that has been proposed by the IntelliLearn system.

4.2.1 Entity: User Profile

Attribute Name	Data Type	Description
user_log_id {PK}	INT(11)	Unique identifier for each user log entry
username	VARCHAR(100)	The username associated with the user log entry
login_date	DATETIME	Date and time when the user logged in
logout_date	DATETIME	Date and time when the user logged out (nullable)
user_id	INT(11)	Foreign key linking to the users table (user_id)

4.2.2 Entity: Subject Management

Attribute Name	Data Type	Description
teacher_shared_id {PK}	INT(11)	Unique identifier for each shared record
teacher_id	INT(11)	Identifier for the teacher sharing the resource
floc	VARCHAR(255)	File location or path for the shared resource
fdatein	DATETIME	Date and time when the resource was shared
fdesc	TEXT	Description of the shared resource
fname	VARCHAR(255)	Name of the shared resource file

subject_id	INT(11)	Identifier for the subject related to the shared resource
subject_code	VARCHAR(50)	Code assigned to the subject
subject_title	VARCHAR(255)	Title or name of the subject
category	VARCHAR(50)	Category or type of the shared resource
description	TEXT	Description of the subject or resource category
unit	INT(11)	Unit or credit value associated with the subject
Pre_req	VARCHAR(255)	Prerequisites for the subject
semester	INT(11)	Semester in which the subject is offered

4.2.3 Entity: Calendar

Attribute Name	Type	Description
event_id {PK}	INT(11)	Unique identifier for each event
event_title	VARCHAR(255)	Title or name of the event
event_description	TEXT	Description of the event
start_date	DATETIME	Start date and time of the event
end_date	DATETIME	End date and time of the event
is_all_day	BOOLEAN	Flag indicating if the event is an all-day event

4.2.4 Entity Material Content

Attribute Name	Type	Description
student_assignment_id {PK}	INT(11)	Unique identifier for each student assignment
assignment_id	INT(11)	Identifier for the related assignment
floc	VARCHAR(255)	File location or path for the assignment
assignment_fdatein	DATETIME	Date and time when the assignment was submitted
fdesc	TEXT	Description of the assignment
fname	VARCHAR(255)	Name of the assignment file
student_id	INT(11)	Identifier for the student submitting the assignment

4.2.5 Entity: Exercise

Attribute Name	Type	Description
quiz_id {PK}	INT(11)	Unique identifier for each quiz
quiz_title	VARCHAR(255)	Title of the quiz
quiz_description	TEXT	Description of the quiz
date_added	DATETIME	Date and time when the quiz was added
teacher_id	INT(11)	Identifier for the teacher who created the quiz
quiz_question_id	INT(11)	Unique identifier for each quiz question
question_text	TEXT	Text of the quiz question
question_type_id	INT(11)	Identifier for the type of the question (e.g., multiple choice, true/false)

points	INT(11)	Points assigned to the question
answer	TEXT	Correct answer to the question

4.2.6 Entity: Attendance

Attribute Name	Type	Description
id {PK}	INT(11)	Unique identifier for each record
student_id	INT(11)	Identifier for the student
status	VARCHAR(50)	Attendance status (e.g.: present, absent)
date	DATE	Date of the attendance record

4.2.7 Entity: Communication

Attribute Name	Type	Description
teacher_class_announcements_id {PK}	INT(11)	Unique identifier for each announcement
content	TEXT	Content of the announcement
teacher_class_id	INT(11)	Identifier for the class related to the announcement
teacher_notification_id	INT(11)	Identifier for the related notification
date_of_notification	DATETIME	Date and time of the announcement/notification
link	VARCHAR(255)	Link associated with the announcement
notification	TEXT	Notification content

4.2.8 Entity: Donation

Attribute Name	Type	Description
donation_id{PK}	INT(11)	Unique identifier for each donation
donor_id	INT(11)	Identifier for the donor
donation_date	DATE	Date of the donation
amount	DECIMAL	Monetary amount of the donation
donation_purpose	VARCHAR(255)	Purpose or description of the donation
acknowledgment	TEXT	Acknowledgment or message from the donor
receiver_id	INT(11)	Identifier for the recipient

4.2.9 Entity: Grade

Attribute Name	Type	Description
mark_id{PK}	INT(11)	Unique identifier for each mark record
student_id	INT(11)	Identifier for the student
firstname	VARCHAR(20)	First name of the student
subject_id	INT(11)	Identifier for the related subject
class_id	INT(11)	Identifier for the related class
teacher_id	INT(11)	Identifier for the teacher assigning the marks
grade	VARCHAR(10)	Grade assigned for the subject
passed	BOOLEAN	Flag indicating if the student passed
marks_obtained	INT(11)	Marks obtained by the student

5. Requirements Traceability Matrix

Table 5.1: Example of RTM for IntelliLearn

Package Item	Use Case ID	Use Case Description	Test Case ID
Package 1	UC01	Log In	TC-001
	UC02	Update Profile	TC-002
	UC03	View Profile	TC-003
	UC04	Add/Delete User Account	TC-004
	UC05	Manage System	TC-005
	UC06	Manage User	TC-006
Package 2	UC07	Assign Users	TC-007
	UC08	View Enrolled Subject	TC-008
Package 3	UC09	Add/Delete Events	TC-009
	UC10	View Events	TC-010
	UC11	Receive Notification Event	TC-011
Package 4	UC12	View Materials	TC-012
	UC13	Download Materials	TC-013
	UC14	Add/Delete Materials	TC-014
Package 5	UC15	View and Attempt Exercise	TC-015
	UC16	Add/Delete Exercise	TC-016
	UC17	Online Quiz Platform	TC-017
Package 6	UC18	View Attendance	TC-018

	UC19	Manage Attendance	TC-019
	UC20	Download Attendance	TC-020
Package 7	UC21	Chat using Chatbox	TC-021
	UC22	Receive Announcement	TC-022
	UC23	Write Announcement	TC-023
	UC24	Receive Notification	TC-024
	UC25	View Announcement List	TC-025
Package 8	UC26	Insert Payment	TC-026
	UC27	Insert Bank Card	TC-027
	UC28	Receive OTP	TC-028
	UC29	Payment Successful	TC-029
Package 9	UC30	Key In Grade	TC-030
	UC31	View Grade	TC-031

6. User Acceptance Testing

A test case is a detailed set of conditions, inputs, and expected outcomes designed to assess the functionality and behavior of a specific feature, module, or system. It serves as a specification for the steps to be followed and the expected results to be observed during the testing process. In this document, the test cases are classified according to the package, followed by the related use case.

Link:https://docs.google.com/spreadsheets/d/16uJ2iR7VcTezlzP-97W4xH6lOqszEd1hlfplbSObVac/edit?usp=sharing

NO	USE CASE	TC	SCENARIO	STEP DESCRIPTION	EXPECTED RESULTS	STATUS PASS	FAIL	REMARKS
1	Log In	TC-001	A user needs to log in to the IntelliLearn system to access personalized information and functionalities.	1. User navigates to the IntelliLearn login page. 2. Enters valid credentials (username and password). 3. Clicks on the "Login" button.	1. If the credentials are correct, the user is redirected to their personalized dashboard. 2. If the credentials are incorrect, an error message is displayed, and the user is prompted to enter valid credentials.	/		
2	Update Profile	TC-002	A user wants update their profile information	1. After logging in, the user navigates to the profile section. 2. Edits the desired fields (e.g., name, email, password, profile image). 3. Clicks on the "Update" button.	1. The user's profile information is successfully updated. 2. If there are any issues or validation errors, appropriate error messages are displayed.	/		
3	View Profile	TC-003	A user wishes to view their personal details on the IntelliLearn platform.	1. After logging in, the user navigates to the profile section. 2. Accesses the "View Profile" option.	The user sees a comprehensive view of their profile information.	/		
4	Add/Delete User Account	TC-004	An administrator needs to manage user accounts by adding new users or removing existing ones.	1. Admin logs into the IntelliLearn system. 2. Navigates to the "Manage Users" section. 3. Chooses the "Add Teacher/Student" option. 4. Fills in required user details. 5. Clicks on the "Add" button. 1. Admin logs into the IntelliLearn system. 2. Navigates to the "Manage Users" section. 3. Chooses the user account to be deleted. 4. Selects the "Delete User" option.	1. A new user account is created and added to the system. 2.The selected user account is removed from the system.	/		
5	Manage System	TC-005	An administrator needs to customize the IntelliLearn system according to institutional needs.	1. Admin logs into the IntelliLearn system. 2. Navigates to the "Manage System" section. 3. Adjusts settings, configurations, or preferences as required.	The system is customized according to the changes made by the administrator.	/		
6	Manage User	TC-006	An administrator requires the ability to modify user attributes, such as updating user profiles, resetting passwords, and adjusting user roles.	1. Admin logs into the IntelliLearn system. 2. Navigates to the "Manage Users" section. 3. Selects a user account. 4. Chooses the appropriate action (update profile, reset password, adjust user role).	User attributes are modified as per the selected action, ensuring effective user management.	/		
7	Assign Users	TC-007	At the beginning of the the academic year, a teacher needs to assign students to their respective subjects.	1. Teacher logs into Intellilearn system and navigates to the subject management module. 2. Teacher selects a specific subject for class such as "Mathematics 4 Berlian" 3. Teacher reviews the list of students available for assignment and selects the students who should be enrolled in the Mathematics class. 4. Aster making the selection, the teacher saves the class and subject.	The selected students are successfully assigned to the maths class for 4 Berlian. The teacher can confirm the class by viewing the updated list of student of students enrolled in the maths class. This ensures accurate subject enrollment at the beginning of the academic year.	/		
8	View Enrolled Subject	TC-008	Beginning of the year, a student wants to check and verify the subjects they are currently enrolled in to plan their academic schedule effectively.	1. Student logs into the Intellilearn system and navigates the subject module. 2. student looks for the section that displayed enrolled subjects for the semester. 3. Student review the list of subjects registered for the semester, including name, subject and code subject. 4. Student may click on each subject to access additional details such as class timings, teachers, and any associated subject materials.	It contains a full list of all the classes the student is taking this school year for them to see. Each subject is shown clearly with all the necessary information, which helps the student organize their homework well. The student can easily find out more about each subject, which makes it easier for them to understand their class plan or outlines.	/		
9	Add/Delete Events	TC-009	1. Teacher needs to add a new assignment deadline to the calendar. 2. An administrator needs to remove a canceled meeting from the calendar.	1. Teacher navigated to the calendar within system. 2. Teacher selects the date for the assigment deadline. 3. Teacher adds event details, include topic name and due time. 4. Teacher saves the new event. 1. Admin access the calendar. 2. Admin locates the canceled meeting event. 3. Admin select the event and chooses the delete option. 4. Admin confirms the deletion.	Added assignment deadline is reflected in the calendar on the date. Teacher can verify the event details and ensure it has been successfully added. The canceled meeting event is removed from the calendar, and users will no longer see it displayed. The administrator can confirm the successful deletion	/		
10	View Events	TC-010	Student wants to check the schedule for upcoming quizzes	1. Student enter calendar. 2. Student navigates to the relevant date for quiz information. 3. Student views the details of upcoming quizzes.	The student sees a clear list of upcoming quizzes on the selected date, providing an overview of scheduled activities. The student can easily access and review quiz information.	/		

No	Test Case	Test ID	Description	Test Steps	Expected Result	Pass		
11	Receive Notification Event	TC-011	Teacher awaits for notification reschedule teacher meeting	1. Teacher logs into system. 2. Teacher waits for a notification regarding the meeting update.	Meeting is rescheduled, the teacher receives a notification, ensuring time aware of changes. The teacher can then proceed to view the updated event in the calendar.	/		
12	View Materials	TC-012	Students can view materials uploaded by each subject teacher.	1. Teacher/Student select 'Subject' on the left panel. 2. Click on any subject (eg: Bahasa Melayu). 3. It will redirect to the subject details page showing the uploaded material.	Materials uploaded by subject teachers can be viewed by students on the subject details page.	/		
13	Download Materials	TC-013	Students can download materials uploaded by each subject teacher.	1. Teacher/Student select 'Subject' on the left panel. 2. Click on a subject (eg: Bahasa Melayu). 3. It will redirect to the subject details page showing the uploaded material. 4. Click on the 'Download' button to download the material.	Students can successfully download the file if they click on the 'Download' button.	/		
14	Add/Delete Materials	TC-014	Teachers for each subject can remove or add materials in the material content page.	1. Teacher select 'Subject' on the left panel. 2. Click on the subject class (eg: Bahasa Melayu 5 Berlian). 3. It will redirect to the subject details page showing the uploaded material. 4. Click on 'Add' to add new material and 'Delete' to delete the uploaded material.	Teachers can add and delete materials to and from the system successfully.	/		
15	View and Attempt Exercise	TC-015	A student wants to view and attempt an exercise assigned by the teacher.	1. After logging into IntelliLearn, the student navigates to the "Exercises" section. 2. Chooses the specific exercise to view. 3. Reviews exercise details and instructions. 4. Attempts the exercise and submits answers. 5. Optionally, the student can review their submitted answers.	The student successfully views the exercise details, attempts the questions, and can review their submitted answers.	/		
16	Add/Delete Exercise	TC-016	A teacher needs to add a new exercise or remove an existing one from the IntelliLearn platform.	1. After logging in, the teacher navigates to the "Manage Exercises" section. 2. Chooses the "Add Exercise" option. 3. Creates the exercise, adds questions, and sets instructions. 4. Saves the exercise. 1. After logging in, the teacher navigates to the "Manage Exercises" section. 3. Selects the exercise to be deleted. 4. Chooses the "Delete Exercise" option.	1. The new exercise is successfully added to the platform. 2. The selected exercise is removed from the IntelliLearn platform.	/		
17	Online Quiz Platform	TC-017	Students want to participate in an online quiz administered through the IntelliLearn platform	1. After logging in, students navigate to the "Quizziz" section. 2. Select a specific quiz to attempt. 3. Review quiz details, such as time limit and instructions. 4. Answer quiz questions within the allotted time. 5. Submit the quiz for evaluation.	Students can successfully access and participate in online quizzes, with the platform providing real-time feedback on their performance.	/		
18	View Attendance	TC-018	Students want to check their attendance for confirmation.	1. Students select 'Attendance' on the left panel. 2. Students can see the attendance marked by the teacher by day.	Students can successfully see their attendance marked by the class teacher.	/		
19	Manage Attendance	TC-019	Class teachers want to know the number of students who are absent and the number of students who are present for their class.	1. Class teacher select 'Attendance' on the left panel. 2. The teacher marks the student's presence (Present/Absent). 3. Save attendance.	Class teachers can mark student attendance, and the current attendance taken can be saved into the system after clicking on the 'Save' button.	/		
20	Download Attendance	TC-020	The class teacher wants to get the student attendance list in softcopy file for documentation.	1. Class teacher select 'Attendance' on the left panel. 2. The teacher marks the student's presence (Present/Absent). 3. Save attendance. 4. Click on the 'Download' button to download the student attendance list.	The student attendance taken before can be downloaded and converted successfully to xls file.	/		
21	Chat using Chatbox	TC-021	A teacher or student wants to engage in real time communication with the student to provide instant feedback on assignment using this feature.	1. Teacher/Student navigates to the chatboc within the Intellilearn system. 2. Teacher/Student select the student name from the chat list. 3. The teacher /Student sends a real time message to student.	The student/teacher receive the message instantly, and a notification appears in the chatbox. Both users can engage in seamless real time communication.	/		
22	Receive Announcement	TC-022	Student awaits important announcement regarding schedule changes for an upcoming exam	1. Student logs into the Intellilearn system. 2. Student navigates to the announcements section. 3. Student waits to receive the updates.	As soon as an announcement is posted, the student receives a notivication, and the announcement is displayed in the announcement section. The student stays informed about any important updates.	/		
23	Write Announcement	TC-023	An administrator and teacher needs to share an important message with all teachers and studnet using the announcement feature.	1. Admin/teacher logs into system. 2. Navigates to announcement section. 3. Writes and send the announcement to all teachers and students.	All teacher and student receive a notification of the new announcememnt, and the message is displayed in the announcement section for their view. The important is effectively communicated to the Intellilearn community.	/		
24	Receive Notification	TC-024	Teacher awaits a notification for a rescheduled meeting	1. Teacher logs into the Intellilearn system. 2. The teacher waits for notification regarding the meeting update.	As soon as the meeting is recheduled the teacher receive a notification, ensuring timely aware of the time change.	/		
25	View Announcement List	TC-025	A student wants to review pass announcements to recap important information	1. The student logs into system. 2. studnet navigates to the list announcements.	The student sees a comprehensive list of pass announcements, making it easy to review and access important information shared over time.	/		

						/		
26	Insert Payment	TC-026	A user, such as a student or institution, needs to make a payment within the IntelliLearn system.	1. The user navigates to the "Donation" section within IntelliLearn. 2. Specifies the amount to be paid. 3. Click on the "Donate" button.	1. The system processes the donation transaction, securely recording the specified amount. 2. If there are any issues, such as invalid input or transaction failure, appropriate error messages are displayed, guiding the user to resolve the issue and retry the donation.	/		
27	Insert Bank Card	TC-027	A user intends to securely add or update their bank card information in the IntelliLearn system.	1. The user navigates to the "Bank Card" section. 2. Chooses the option to add or update bank card details. 3. Enters the bank card information, including card number, expiry date, and CVV. 4. Optionally, provides additional security information if required. 5. Confirms the addition or update.	1. If the bank card information is valid and the update is successful, the system stores the updated details securely. 2. If there are any issues or invalid information, appropriate error messages are displayed.	/		
28	Receive OTP	TC-028	For enhanced security, the IntelliLearn system requires users to receive and input a One-Time Password (OTP) during payment processing.	1. After initiating a payment, the system sends an OTP to the user's registered email or phone number. 2. The user checks their email or messages to retrieve the OTP. 3. Enters the OTP in the designated field during the payment process.	1. If the entered OTP is correct and valid, the payment process continues. 2. If the OTP is incorrect or expired, appropriate error messages are displayed, and the user is prompted to re-enter the OTP.	/		
29	Payment Successful	TC-029	The user has completed the payment process, and the system confirms the successful transaction.	1. After entering payment details, the system processes the transaction. 2. If the payment is successful, the system displays a confirmation message.	The user receives confirmation that the payment was successful. If there are any issues with the payment, appropriate error messages are displayed, guiding the user on corrective actions.	/		
30	Key In Grade	TC-030	A teacher needs to input marks for students in a mathematics class for a equation assignment.	1. The teacher logs into the system. 2. Teacher chooses the mathematics class and the equation assignment titled "CodeProject1". 3. System displays a list of students in the class. 4. Teacher inputs numerical grades for each student. 5. Teacher adds optional comments for student performance. 6. Teacher clicks "Save" to store grades in the system.	System saves entered grades, associating them with students, the teacher, subject, class, and assignment. Confirmation message indicates successful grade submission. Updated grades contribute to overall class assessment and progress tracking.	/		
31	View Grade	TC-031	Students want to view their equation assignment's grade of mathathics class	1. Student logs into the system using their username and password 2. Student navigates to the "View Grades" section and selects the relevant class, e.g., "2 Bestari." 3. View the grades	Student sees a comprehensive list of their grades for different assignments in the selected class. Grades are accompanied by any feedback or comments provided by the teacher. The view is organized, allowing the student to easily track their performance and identify areas for improvement.	/		