



CAPSTONE PROJECT REPORT

Report 1 – Project Introduction

– Hanoi, Jan 2023 –

Table of Contents

I. Project Report	3
1. Status Report	3
2. Team Involvements	3
3. Issues/Suggestions	3
II. Project Introduction	4
1. Overview	4
1.1 Project Information	4
1.2 Project Team	4
2. Product Background	4
3. Existing Systems	4
3.1. Practical Coding and Learning website	4
3.2. Appointy	6
4. Business Opportunity	7
5. Software Product Vision	7
6. Project Scope & Limitations	7
6.1 Major Features	7
6.2 Limitations & Exclusions	8

I. Project Report

1. Status Report

#	Work Item	Status	Notes (Work Item in Details)
1	Create project overview, project background and exiting systems	Completed	
2	Create business opportunity and software product vision	Completed	
3	Create project major feature	Completed	
4	Create project limitations	Completed	

2. Team Involvements

#	Task	Member	Notes (Task Details, etc.)
1	Create project overview, project background and exiting systems	AnhLB, HungLN, DieuDQ	
2	Create business opportunity and software product vision	All members	
3	Create project major feature	All members	
4	Create project limitations	All members	

3. Issues/Suggestions

#	Issue	Status	Notes (Solution, Suggestion, etc.)
1			
2			
3			

II. Project Introduction

1. Overview

1.1 Project Information

- Project name: Practice Code & Learning Website
- Project code: PCAW
- Group name: SWP490_G9
- Software type: Web Application

1.2 Project Team

a. Supervisor

Full Name	Email	Phone Number	Title
Bùi Ngọc Anh	AnhBN5@fe.edu.vn		Lecture

b. Team Members

Full Name	Email	Mobile	Role
Lê Nguyên Hùng	hunglnHE141720@fpt.edu.vn		Leader
Lưu Bảo Anh	anhlbSE05203@fpt.edu.vn		Member
Đàm Quang Diệu	dieudqHE130531@fpt.edu.vn		Member
Phạm Trung Hiếu	hieuptHE130222@fpt.edu.vn		Member

2. Product Background

Officially established on September 8, 2006 under the Decision of the Prime Minister, FPT University became the first university in Vietnam established by an enterprise with 100% investment capital from the Corporation. FPT. For more than 15 years, FPT has been the leading school in Vietnam in the field of information technology, training in the form of close association with businesses, linking training with practice, with research and implementation. and the most modern technologies.

Currently, FPT University has 5 campuses stretching from north to south across the country.



Figure 1- FPT University Ha Noi



Figure 2- FPT University Da Nang



Figure 3- FPT University Can Tho



Figure 4- FPT University Ho Chi Minh

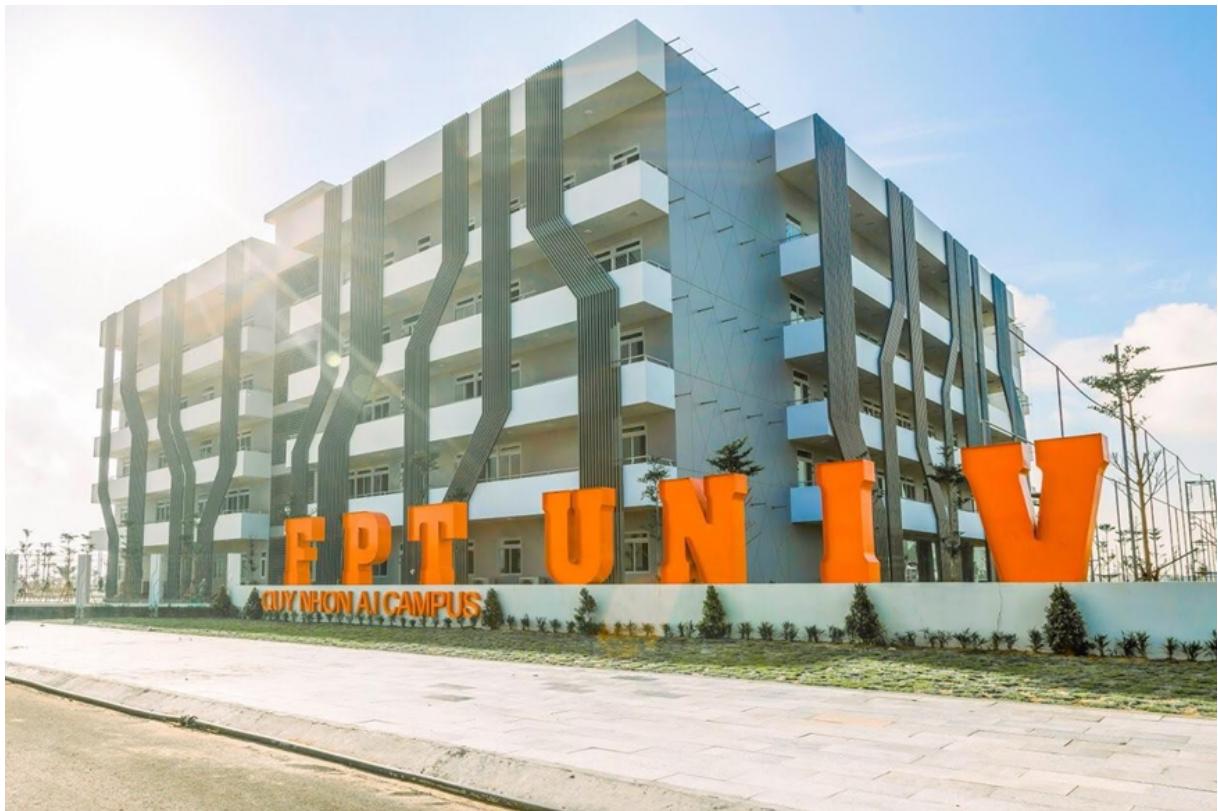


Figure 5- FPT University Quy Nhon

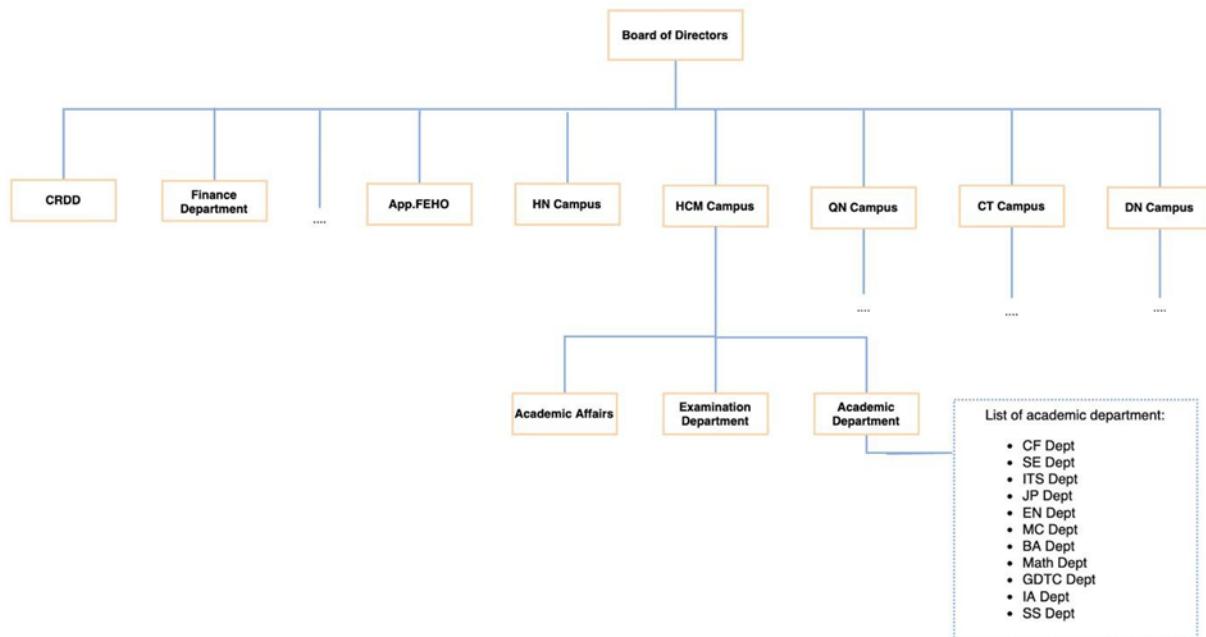


Figure 6- FPT University Organization

An all-in-one platform designed to help teachers organize homework, projects, and even compile code directly within the web interface. Our platform is designed with teachers in mind, providing them with the tools and resources they need to create a streamlined, efficient, and effective learning environment for their students.

One of the core features of our website is our homework and project organization system. With our platform, teachers can easily create and assign homework and projects to their students, set deadlines and track progress, and provide feedback and grades all in one place. This not only makes it easier for teachers to manage their workload, but it also helps students stay organized and on track with their assignments.

In addition to our homework and project organization system, we also offer a built-in code compiler that allows teachers to assign coding assignments and have their students write and test code directly within the platform. This feature eliminates the need for students to download and install coding software on their own computers, making it easier for them to get started and reducing the likelihood of technical issues.

Our website also offers a variety of other tools and resources designed to make teaching and learning more efficient and effective. For example, we offer a gradebook feature that allows teachers to easily track student progress and calculate grades, as well as a messaging system that allows for easy communication between teachers and students.

Overall, this website is designed to help teachers save time, stay organized, and provide their students with the resources and support they need to succeed. We are committed to making the teaching and learning process as seamless and enjoyable as possible, and we are constantly updating our platform to ensure that it meets the evolving needs of educators and students alike.

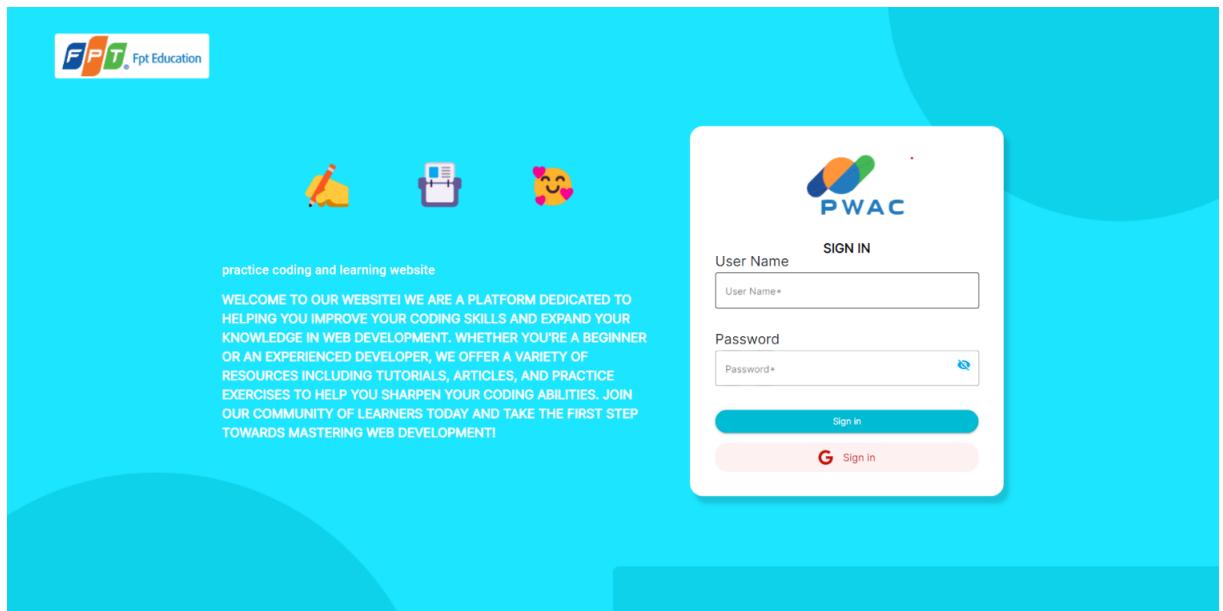


Figure 7 - PCAW portal example.

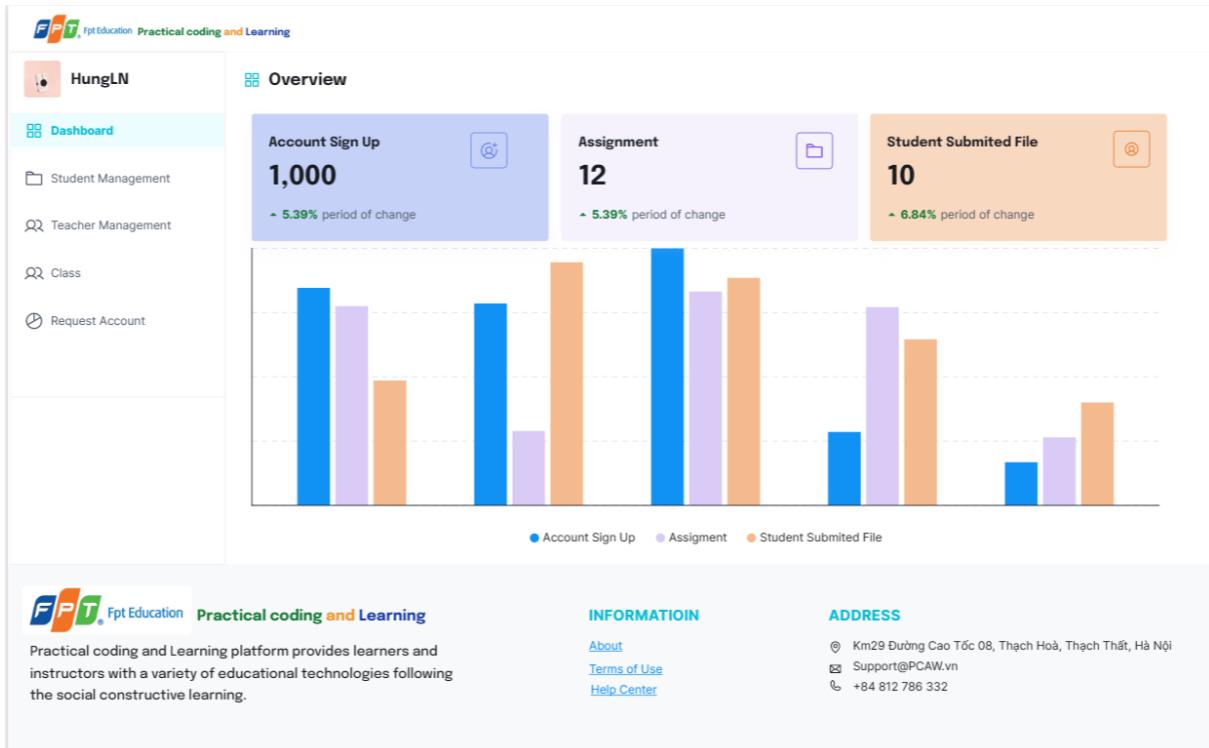


Figure 7 - PCAW dashboard example.

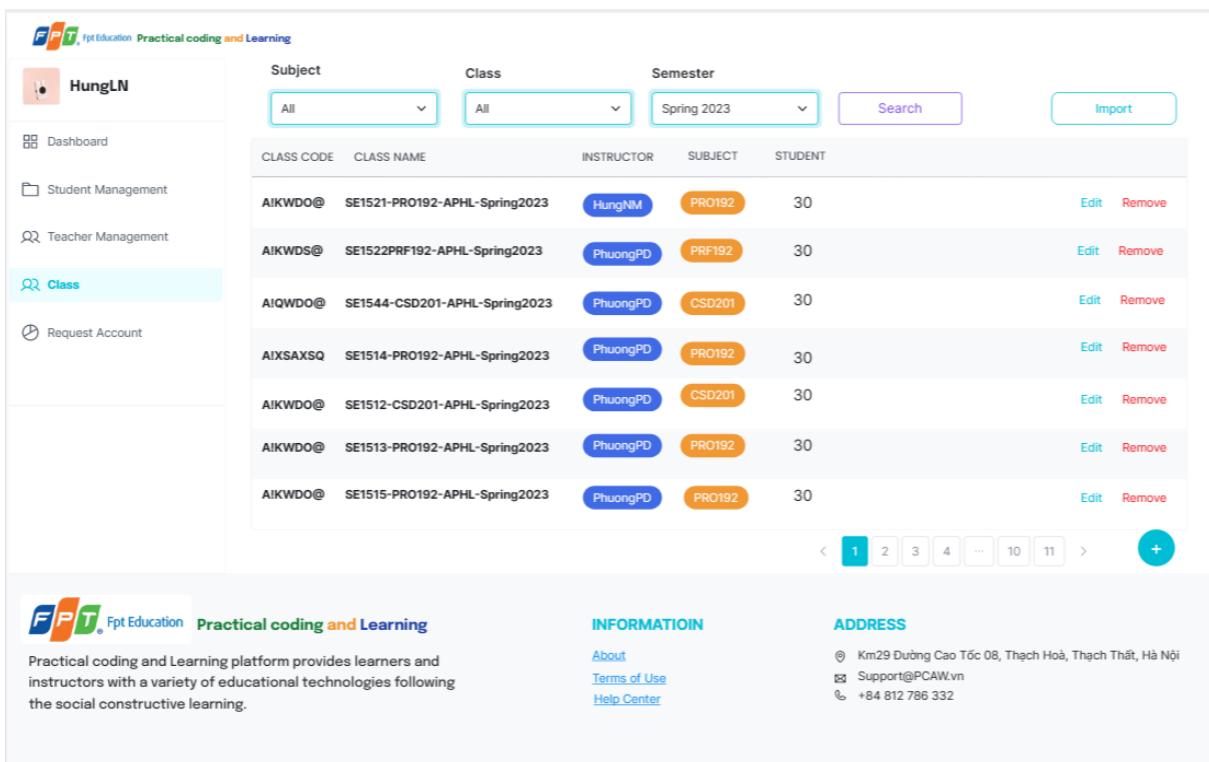


Figure 8 - PCAW class management example.

The screenshot shows a web-based student management system. At the top, there is a header with the FPT Education logo and the text "Practical coding and Learning". On the left, a sidebar menu includes "HungLN", "Dashboard", "Student Management" (which is currently selected), "Teacher Management", "Class", and "Request Account". The main content area displays a table of student records. The columns are "STUDENT CODE", "NAME", "EMAIL", "SUBJECT", and "CLASS". The data includes:

STUDENT CODE	NAME	EMAIL	SUBJECT	CLASS
HE130086	Nguyễn Đức Chiến	ChienNDHE130086@fpt.edu.vn	PRF191	SE1514-PRF191-APHL-Spring2023
HE130519	Nguyễn Thị Hiếu	HieuNTHE130519@fpt.edu.vn	PRO192	SE1514-PRO192-APHL-Spring2023
HE130869	Nguyễn Thị Hiếu	HieuNTHE130869@fpt.edu.vn	PRO192	SE1514-PRO192-APHL-Spring2023
HE140189	Trần Nguyên Anh Quốc	QuocTNAHE140189@fpt.edu.vn	PRO192	SE1514-PRO192-APHL-Spring2023
HE140195	Phạm Thành Tùng	TungPTHE140195@fpt.edu.vn	CSD201	SE1512-CSD201-APHL-Spring2023
HE140639	Trần Việt Long	LongTVHE140639@fpt.edu.vn	CSD201	SE1512-CSD201-APHL-Spring2023
HE140651	Phạm Văn Mạnh	ManhPVHE140651@fpt.edu.vn	Not Assign	---

Pagination at the bottom shows pages 1 through 11.

INFORMATION

- About
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ADDRESS

- Km29 Đường Cao Tốc 08, Thạch Hà, Thạch Thất, Hà Nội
- Support@PCAW.vn
- +84 812 786 332

Figure 9 - PCAW student management example

3. Existing Systems

Nowadays, in the world, there are many websites that help students and even IT employees about compiling code online, code competitively, etc.. For example, CodeLearn and CodeForce are online learning platforms that offer a wide range of resources and tools to help people learn and improve their coding skills. These platforms offer a variety of courses, tutorials, and challenges that are designed to be engaging and interactive, allowing users to learn at their own pace and in their own way. Additionally, CodeLearn and CodeForce have established communities of users who can interact with each other, share tips and resources, and collaborate on projects. With their user-friendly interfaces, comprehensive resources, and supportive communities, CodeLearn and CodeForce are excellent resources for anyone looking to improve their coding skills. They are all big and famous systems.

3.1. CodeLearn

Name: Code Learn

Description: Codelearn is an online platform that provides coding courses and programming challenges to help individuals of all ages and skill levels learn to code. The platform offers a variety of courses ranging from basic programming concepts to advanced topics such as artificial intelligence and machine learning. Codelearn uses a gamified approach to learning, making it an engaging and interactive experience for students. The platform also provides tools such as online coding editors and a supportive community of fellow learners to help students practice and improve their skills.

The screenshot shows the CodeLearn user interface. At the top, there's a navigation bar with links: Learning, Training, Fights, Challenge, Evaluating, Discussion, and Game. On the right side of the header are icons for a user profile, a bell, and a person. The main area starts with a welcome message: "Hello [REDACTED]@gmail.com. Welcome you to CodeLearn. Let's start to explore more!". Below this is a user profile box with a placeholder profile picture, the email address, and a progress bar indicating "0 EXP". It also shows "LEVEL 1" and "LEVEL 2". To the right, there are three performance metrics: "Course 0/19" with "0 certificate", "Training 0/1625", and "Your best position 0/0 fights". Below these metrics is a link "Your badges >" followed by a small circular icon. The next section is titled "Courses" with sub-links: "Suggested courses" (underlined), "In progress (0)", "Completed (0)", and "See all". Four course cards are displayed: "Advanced C++" (Hot), "Object Oriented Programming" (New course), "For Beginners C++" (Hot), and another "For Beginners C++" card.

Figure 1: CodeLearn

System actors: User

Features:

- Online Coding Courses.
- Online Coding Challenge.
- Schedule Course training.
- Online Support from various users.

Pros & cons:

Pros	Cons
<ul style="list-style-type: none"> • Large system with variety services • Ease to learn with optimized course • Friendly to Vietnamese users 	<ul style="list-style-type: none"> • Slow support service. • Sometimes the web slow load or some service can't use.

3.2 CodeForce

Name: Code Force

Description: Codeforces is a competitive programming platform that hosts online contests and training sessions for algorithmic problem-solving. It has a global community of programmers who participate in challenging coding competitions to enhance their skills and knowledge. The platform provides various problem sets of different difficulty levels that require a solid understanding of data structures and algorithms. It also features a virtual contest mode, where users can create their contests and invite friends to compete. Codeforces has a comprehensive rating system that ranks

participants based on their performance, making it an excellent platform for programmers to showcase their skills and learn from others.

The screenshot shows the CodeForces homepage with the following details:

- Header:** Includes the CodeForces logo, navigation links (HOME, TOP, CATALOG, CONTESTS, GYM, PROBLEMSET, GROUPS, RATING, EDU, API, CALENDAR, HELP), a search bar, and language selection (English, Russian).
- Contest Information:**
 - SWERC 2022-2023**
 - Organized by **CODEFORCES**, Sponsored by TON
 - By [dario2994](#), [history](#), 7 days ago,
 - Description: The Southwestern Europe Regional Contest will take place on the 19th of February in Milan. It is the ICPC regional contest (i.e., the winning teams will advance to the ICPC World Finals) for teams from France, Israel, Italy, Portugal, Spain, and Switzerland.
 - Mirror contest: SWERC 2022-2023 - Online Mirror (Unrated, ICPC Rules, Teams Preferred) will be held on Codeforces on Sunday, February 19, 2023 at 18:05 UTC and will last 5 hours.
 - Contest details: The mirror contest will contain the problems from the official competition plus some additional problems. I am the chief judge for the competition and I want to thank:
 - The amazing set of judges who proposed and prepared the problems: [cesmentation_folch](#), [cip999](#) (vice chief judge), [gangstervereggies](#), [Glove](#), [gog.gerard](#), [jinfutu999](#), [Petr](#), [Simon](#), [tap_tapii](#), [Um_nik](#).
 - The MIT team composed of [antontrygub0_o](#), [fantasy](#), [TLE](#) for testing the round and [Philae](#) for proofreading the statements.
 - Everyone involved in the organization of SWERC, in particular [Dariost](#) (director) and [edomora97](#) (technical director).
 - The developers of DOMJudget, the contest system used in the official contest.
 - [MikeMirzayanov](#) for Polygon (that we used to prepare the problems) and for letting us host the mirror on Codeforces.
 - Invitation: I invite you to participate in the contest and I hope that you will like the problems.
 - Difficulty: On the difficulty. The contest features problems with difficulties from div2A to div1F; so anyone can find something at their level.
- Side Panels:**
 - Pay attention**: Before contest [Codeforces Round \(Div. 2\)](#) 5 days
 - Top rated** (Table):

#	User	Rating
1	tourist	3803
2	Beng	3783
3	Radewoosh	3602
4	maroonrk	3575
5	fantasy	3526
6	ko_osaga	3500
7	ksun48	3491
8	Um_nik	3486
9	jiangly	3474
10	orzdevinwang	3461

[Countries](#) | [Cities](#) | [Organizations](#) | [View all →](#)
 - Top contributors** (Table):

#	User	Contrib.
1	awoo	182
2	-is-this-fft-	176

Figure 1.1: CodeForces

System actors: User

Features:

- Online coding support.
- Online code contest

Pros & cons:

Pros	Cons
<ul style="list-style-type: none"> • Large community supporters • Code experience training. 	<ul style="list-style-type: none"> • Still too simple and not easy to look for information • Not friendly to Vietnamese users.

4. Business Opportunity

Online coding websites offer a lucrative business opportunity by providing a platform for individuals and organizations to learn, practice, and improve their coding skills. With the increasing demand for tech talent and the growing popularity of online learning, a well-executed online coding website can attract a large and diverse user base and generate revenue through subscriptions, sponsorships, and advertising.

5. Software Product Vision

Our PCAW aims to be the go-to platform for college students and teachers to enhance their coding skills and knowledge. We offer a comprehensive set of courses, challenges, and resources, tailored to meet the needs of beginners and advanced learners. Our product vision is to create an engaging and collaborative learning environment that fosters creativity, innovation, and growth.

6. Project Scope & Limitations

6.1 Major Features

The list below summarizes the main functions of PCAW and what is in the scope of project:

FE-01: Register, login, log out, modify password and update user profile.

FE-02: Create classes in each semester for teachers and students

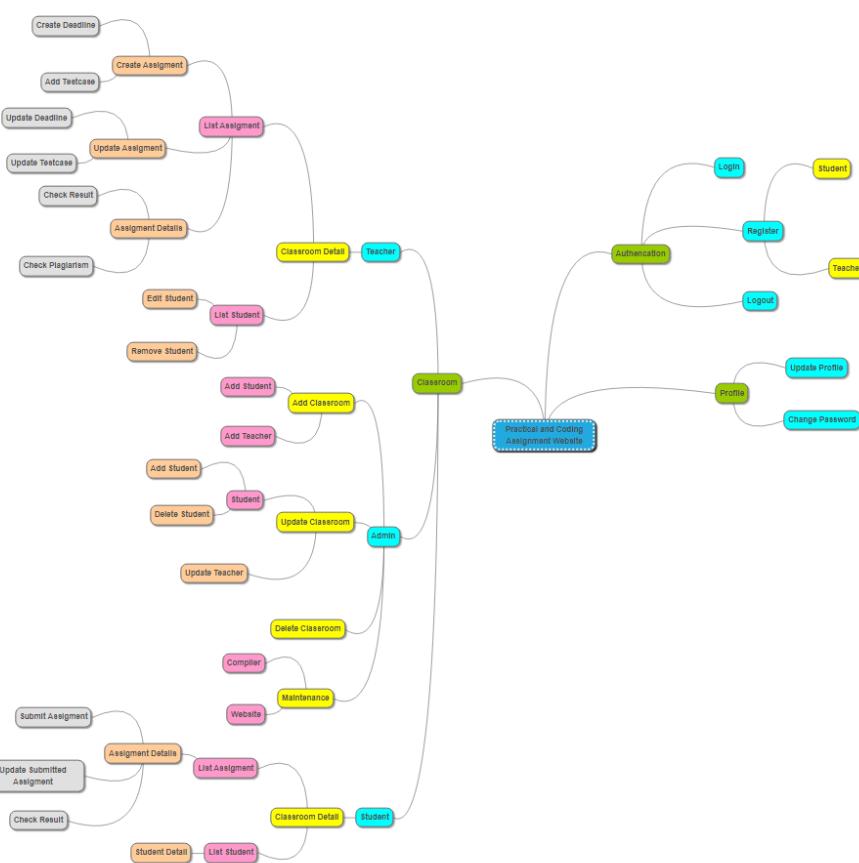
FE-03: A dashboard that shows the user's progress, assigned assignment, and areas for improvement.

FE-04: View/Create schedule assignments.

FE-05: View notification.

FE-06: a built-in auto complier that automatically compiler students submit code, compare to teacher test case then grade student assignment.

FE-07: Check plagiarism assignment of student



6.2 Limitations & Exclusions

- LI-1: May not provide enough hands-on experience, which is crucial for gaining practical skills in coding
- LI-2: The online coding environment may have technical limitations, such as slow loading times, server downtime, and limited features compared to an offline coding environment.
- LI-3: Online coding websites may not offer real-time support or clarification when a student is stuck or has a question.
- LI-4: Limited Networking Opportunities: Online coding websites may not provide networking opportunities that come with offline learning or in-person courses.
- LI-5: Limited Learning Resources: Some online coding websites may not provide comprehensive learning resources, such as textbooks or study materials, which may be available in an offline setting.

END



CAPSTONE PROJECT REPORT

Report 2 – Project Management Plan

– Hanoi, Jan 2023 –

Table of Contents

I. Record of Changes	3
II. Project Management Plan	4
1. Overview	4
1.1 Scope & Estimation	4
1.2 Project Objectives	8
1.3 Project Risks	9
2. Management Approach	10
2.1 Project Process	10
2.2 Quality Management	11
2.3 Training Plan	12
3. Project Deliverables	12
4. Responsibility Assignments	13
4.1 Team & Structures	13
4.2 Roles & Responsibilities	13
5. Project Communications	15
5.1 Communication Plan	15
5.2 External Interface	16
6. Configuration Management	16
6.1 Document Management	16
6.2 Source Code Management	17
6.3 Tools & Infrastructures	18

I. Record of Changes

*A - Added M - Modified D - Deleted

II. Project Management Plan

1. Overview

1.1 Scope & Estimation

#	WBS Item	Complexity	Est. Effort (man-days)
1	Pre-Initiation Phase		5
1.1	Come up with ideas	Complex	2.5
1.2	Determine the role of team members	Medium	1
1.3	Choose topic	Medium	1
1.4	Register Capstone Project	Simple	0.5
2	Initiation Phase		10
2.1	Kick-offs	Simple	1
2.2	Identify stakeholders	Medium	4
2.3	Meet Instructor	Simple	1
2.4	Project introduction	Medium	4
3	Planning Phase		23
3.1	Define project scope	Simple	3
3.2	Choose working model process	Simple	2
3.3	Select tools and techniques	Simple	1
3.4	Project schedule planning	Medium	7
3.5	Risk management plan	Medium	5
3.6	Project organization	Simple	3
3.7	Software project management planning	Simple	3
4	Executing		240
4.1	Iteration 1: Develop main function		160
4.1.1	Requirements Analysis		20
4.1.1.1	User Requirements	Medium	7.5
4.1.1.2	Functional Requirements	Medium	7.5
4.1.1.3	Non-Functional Requirements	Simple	5
4.1.2	Design		25

4.1.2.1	Basic architecture design	Medium	5
4.1.2.2	Detail design	Medium	10
4.1.2.3	Data & Database Diagram design	Complex	10
4.1.3	Coding		75
4.1.3.1	Back-end	Complex	32.5
4.1.3.2	Front-end	Complex	32.5
4.1.3.3	Fix bugs	Medium	10
4.1.4	Testing		40
4.1.4.1	Unit test	Medium	14
4.1.4.2	Integration test	Medium	14
4.1.4.3	System test	Medium	8
4.1.4.4	Acceptance test	Medium	4
4.2	Iteration 2: Develop all function and complete		80
4.2.1	Requirements Analysis		10
4.2.1.1	User Requirements	Medium	3.25
4.2.1.2	Functional Requirements	Medium	3.25
4.2.1.3	Non-Functional Requirements	Simple	2.5
4.2.2	Design		12.5
4.2.2.1	Basic architecture design	Medium	2.5
4.2.2.2	Detail design	Medium	5
4.2.2.3	Data & Database Diagram design	Complex	5
4.2.3	Coding		37.5
4.2.3.1	Back-end	Complex	16.25
4.2.3.2	Front-end	Complex	16.25
4.2.3.3	Fix bugs	Medium	5
4.2.4	Testing		20
4.2.4.1	Unit test	Medium	8
4.2.4.2	Integration test	Medium	4
4.2.4.3	System test	Medium	4
4.2.4.4	Acceptance test	Medium	4

5	Closing		31
5.1	Complete final report	Medium	15
5.2	Prepare for final project presentation	Medium	10
5.3	Present final report	Medium	5
5.4	Project closed	Simple	1
6*	Monitoring and Controlling		23
6.1	Meet instructor	Simple	3
6.2	Control risk scope	Medium	5
6.3	Control cost	Medium	5
6.4	Process report	Medium	10

Total Estimated Effort (man-days) **329**

Figure 1.1.1: Project Plan

* Carried out throughout the project's duration

		Task Mode	Task Name	Duration	Start	Finish	Predecessors
1		▫	PCA W	112 days	Thu 12/1/22	Fri 5/5/23	
2			Project Start	1 day	Thu 12/1/22	Thu 12/1/22	
3		▫	Sprint 1	13 days	Thu 12/1/22	Mon 12/19/22	
4		▫	Vision	5 days	Thu 12/1/22	Wed 12/7/22	
5			Prepare Project Ideas	5 days	Thu 12/1/22	Wed 12/7/22	
6			Delivery	1 day	Thu 12/1/22	Thu 12/1/22	
7			Product backlog	1 day	Thu 12/1/22	Thu 12/1/22	
8		▫	Product road map	8 days	Thu 12/8/22	Mon 12/19/22	4
9		▫	Project Planning	5 days	Thu 12/8/22	Wed 12/14/22	4
10			Prepare PMP	4 days	Thu 12/8/22	Tue 12/13/22	7
11			Delivery PMP	1 day	Wed 12/14/22	Wed 12/14/22	10
12		▫	Project Preparing	3 days	Thu 12/15/22	Mon 12/19/22	9
13			Create Technical Prototype	3 days	Thu 12/15/22	Mon 12/19/22	9
14			Technicael Trainning/Self Study	1 day	Thu 12/15/22	Thu 12/15/22	9
15		▫	Sprint 2	18 days	Tue 12/20/22	Thu 1/12/23	3
16		▫	Analyzing	4 days	Tue 12/20/22	Fri 12/23/22	3
17			Research and sugest requirements	4 days	Tue 12/20/22	Fri 12/23/22	3
18		▫	Design	7 days	Mon 12/26/22	Tue 1/3/23	16
19			Draw overview diagram	7 days	Mon 12/26/22	Tue 1/3/23	16
20			Create SRS Document	7 days	Mon 12/26/22	Tue 1/3/23	16
21			Create Design Document	7 days	Mon 12/26/22	Tue 1/3/23	16
22			Create testing Plan	7 days	Mon 12/26/22	Tue 1/3/23	16
23		▫	Code	7 days	Wed 1/4/23	Thu 1/12/23	18
24			Create Develop Evn	7 days	Wed 1/4/23	Thu 1/12/23	18
25		▫	Sprint 3	14 days	Fri 1/13/23	Wed 2/1/23	15
26		▫	Documents	14 days	Fri 1/13/23	Wed 2/1/23	15
27			Update SRS & SDD for Sprint 3	14 days	Fri 1/13/23	Wed 2/1/23	15
28		▫	Code	14 days	Fri 1/13/23	Wed 2/1/23	15
29			Code for Sprint 3	13 days	Fri 1/13/23	Tue 1/31/23	15
30			Deploy SW Package 1	1 day	Wed 2/1/23	Wed 2/1/23	29
31		▫	Test	8 days	Mon 1/16/23	Wed 1/25/23	
32			Unit Test for Sprint 3	8 days	Mon 1/16/23	Wed 1/25/23	29SS+1 day
33		▫	Sprint 4	14 days	Thu 2/2/23	Tue 2/21/23	25
34		▫	Documents	14 days	Thu 2/2/23	Tue 2/21/23	25
35			Update SRS & SDD for Sprint 4	14 days	Thu 2/2/23	Tue 2/21/23	25
36			Creat STD for Sprint 3	7 days	Thu 2/2/23	Fri 2/10/23	25

Figure 1.1.2: Project Plan

39	➡	Code for Sprint 4	12 days	Thu 2/2/23	Fri 2/17/23	25
40	➡	Deploy SW Package 2	2 days	Mon 2/20/23	Tue 2/21/23	39
41	➡	▫ Test	8 days	Fri 2/3/23	Tue 2/14/23	
42	➡	Unit Test for Sprint 4	8 days	Fri 2/3/23	Tue 2/14/23	39SS+1 day
43	➡	▫ Sprint 5	14 days	Wed 2/22/23	Mon 3/13/23	33
44	➡	▫ Documents	14 days	Wed 2/22/23	Mon 3/13/23	33
45	➡	Update SRS & SDD for Sprint 5	14 days	Wed 2/22/23	Mon 3/13/23	33
46	➡	Create STD for Sprint 4	7 days	Wed 2/22/23	Thu 3/2/23	33
47	➡	▫ Code	14 days	Wed 2/22/23	Mon 3/13/23	33
48	➡	Fix Bugs for Sprint 4	2 days	Wed 2/22/23	Thu 2/23/23	33
49	➡	Code for Sprint 5	11 days	Fri 2/24/23	Fri 3/10/23	48
50	➡	Deploy SW Package 3	1 day	Mon 3/13/23	Mon 3/13/23	49
51	➡	▫ Test	10 days	Mon 2/27/23	Fri 3/10/23	
52	➡	Unit Test for Sprint 5	10 days	Mon 2/27/23	Fri 3/10/23	49SS+1 day
53	➡	▫ Sprint 6	14 days	Tue 3/14/23	Fri 3/31/23	43
54	➡	▫ Documents	14 days	Tue 3/14/23	Fri 3/31/23	43
55	➡	Update SRS & SDD for Sprint 6	14 days	Tue 3/14/23	Fri 3/31/23	43
56	➡	Create STD for Sprint 5	14 days	Tue 3/14/23	Fri 3/31/23	43
57	➡	▫ Code	14 days	Tue 3/14/23	Fri 3/31/23	43
58	➡	Fix Bugs for Sprint 5	1 day	Tue 3/14/23	Tue 3/14/23	43
59	➡	Code for Sprint 6	7 days	Wed 3/15/23	Thu 3/23/23	58
60	➡	Deploy SW Package 4	6 days	Fri 3/24/23	Fri 3/31/23	59
61	➡	▫ Test	8 days	Tue 3/14/23	Thu 3/23/23	
62	➡	Unit Test for Sprint 6	6 days	Thu 3/16/23	Thu 3/23/23	59SS+1 day
63	➡	System test	6 days	Tue 3/14/23	Tue 3/21/23	
64	➡	▫ Sprint 7	19 days	Mon 4/3/23	Thu 4/27/23	53
65	➡	▫ Documents	7 days	Mon 4/3/23	Tue 4/11/23	53
66	➡	Create Stand report for Sprint 6	5 days	Mon 4/3/23	Fri 4/7/23	53
67	➡	Delivery Stand report	2 days	Mon 4/10/23	Tue 4/11/23	66
68	➡	Delivery Final report	2 days	Mon 4/10/23	Tue 4/11/23	66
69	➡	▫ Code	18 days	Tue 4/4/23	Thu 4/27/23	53
70	➡	Fix Bugs for Sprint 6	6 days	Tue 4/4/23	Tue 4/11/23	53
71	➡	Deploy Final Code	8 days	Wed 4/12/23	Fri 4/21/23	70
72	➡	▫ Extension Sprint	10 days	Mon 4/24/23	Fri 5/5/23	64
73	➡	Practice thesis Presentation	4 days	Fri 4/28/23	Wed 5/3/23	64
74	➡	FINAL PRESENTATION	1 day	Fri 5/5/23	Fri 5/5/23	73

Figure 1.1.3: Project Plan

1.2 Project Objectives

#	Testing Stage	Test Coverage	No. of Defects	% of Defect	Notes
1	Unit Test	100%	< 5	< 1%	Reviewing and tests
2	API Testing	100%	< 5	< 1%	Developer creates and tests
3	Integration Test	100%	< 5	< 1%	Tester creates and tests
4	System Test	100%	< 5	< 1%	Tester creates and tests
5	Acceptance Test	100%	< 5	< 1%	User verifies system

Project must be finished before 26/04/2023 with three main deliverables:

- Web App (Cover 100% requirement)
- Project documentation (FPT University capstone project)
- Project presentation slides

No.	Milestones	Completion Date
1	Initiating Phase	17/02/2023
2	Planning Phase	21/02/2023
3	Executing Phase	05/04/2023
4	Project Closed	25/04/2023
5	Project defence	26/04/2023

Table 2.1.2.1: Milestones

1.3 Project Risks

#	Risk Description	Impact	Possibility	Response Plans
1	Team members lack the knowledge, skills and experience to complete a specific task	High	Medium	Members need to be informed about their ability, skill . Plan training as well as members to help each other
2	Conflict between team members	Medium	High	Define, divide the tasks clearly, estimate the time and agree before starting the task. All members meet together to solve the problem
3	Internet connection is broken, unstable and team members cannot exchange, send work or merge code	Low	Medium	Use alternative ways to connect to the internet such as 4G.

2. Management Approach

2.1 Project Process

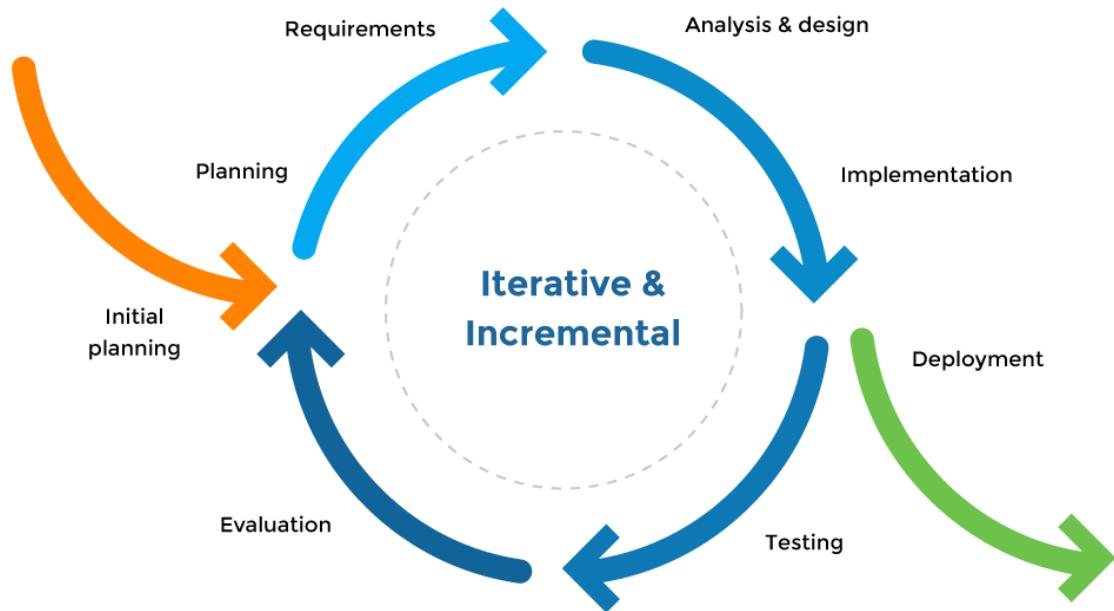


Figure 2.2.1.1: Iterative Software Development Process Model

After researching the software development model carefully, the project will use the Iterative and Incremental Software Process Model. In an Iterative & Incremental model, initially, a partial implementation of a total system is constructed so that it will be in a deliverable state. The Iterative & Incremental model is mostly used when the scope of the project is big, the major requirements are defined clearly, some more details will be added later in software development. By using this software process model, we break down the developing system task into a series of smaller tasks which will be completed separately, allowing us to take advantage of what was learned during the development of earlier parts of the system. The reasons for the project to choose this model are:

- You can develop some main functions that prioritize requirements first.
- Requirements changes can be easily accommodated.
- Testing and debugging during smaller iterations is easy.
- Easier to manage risk easier because risk segments are identified and dealt with during its iteration.
- Customers can provide feedback to each product increment, thus avoiding surprises at the end of development.
- Customers get important functionality early

2.2 Quality Management

2.2.1 Defect Prevention:

- If any defect is found, the related person must be notified immediately at that time.
- Defects must be carefully evaluated such as "How bad is the defect and can it damage the system?", "How long is the time to fix that defect?".
- The deadline for fixing the defect must be specified clearly.
- There is always a plan to prepare for what could happen at any time.

2.2.2 Reviewing:

- The curator must be honest and not biased towards any of the project members. If there is an error, the person must immediately notify the person responsible for the defect.
- Defects should be recorded on the Bug Tracking software with details such as priority.
- The person responsible for defects found must-have solutions to fix the defect as quickly as possible.

2.2.3 Unit Testing:

- The curator must prepare the test cases carefully and accurately and must not ignore any cases. Test cases should be appropriate for the functionality of the system.
- Defects should be recorded on the Bug Tracking software with details such as priority.
- The person responsible for defects found must-have solutions to fix the defect as quickly as possible.

2.2.4 Integration Testing:

- The curator must prepare the test cases carefully and accurately and must not ignore any cases. Test cases should be appropriate for the functionality of the system.
- Defects should be recorded on the Bug Tracking software with details such as priority.
- The person responsible for defects found must-have solutions to fix the defect as quickly as possible.
- Internal modules within the system work smoothly.

2.2.5 System Testing:

- The curator must prepare test cases carefully and accurately. The test cases must match well with the system and system and architecture design.
- Defects should be recorded on the Bug Tracking software with details such as priority.
- The person responsible for defects found must-have solutions to fix the defect as quickly as possible.
- System testing test cases cover the entire system functionality and the communication under development with external systems.

2.2.6 Acceptance Testing:

- The curator must prepare test cases carefully and accurately. The test cases must match well with the system and system and architecture design.
- Defects should be recorded on the Bug Tracking software with details such as priority.
- The person responsible for defects found must-have solutions to fix the defect as quickly as possible.
- The test should cover non-functional issues such as load and performance defects.

2.3 Training Plan

Training Area	Participants	When, Duration	Waiver Criteria
Django	Backend Members	08/02/2023 to 16/02/2023 (1 week)	Mandatory
Angular	Frontend Members	08/02/2023 to 16/02/2023 (1 week)	Mandatory
Gitlab	All Team members	16/02/2023 to 16/02/2023 (1 day)	Optional
Communicate	All Team Members	Throughout	Mandatory

3. Project Deliverables

#	Deliverable	Due Date	Deliverable Scope
1	Project Introduction	08/02/2023	Prepare project ideals/ Intro
2	Project Plan	16/02/2023	Prepare Project Plan, Create Technical Prototype, Technical Training/ Self study
3	SRS	19/02/2023	Write SRS Document and Create Test Plan
4	Design	19/02/2023	Architecture Design, Detailed Design, Database
5	Code and Implement Iteration 1	20/02/2023	Code & Unit test, Integration test and System test
6	Code and Implement Iteration 2	15/03/2023	Code & Unit test, Integration test and System test
8	Report 5 (Test Document)	13/04/2023	Write test documents and synthesize test cases
9	Report 6 (User guides)	15/04/2023	Write user manuals document
10	Final code and report	15/04/2023	Final Code, System test reports

4. Responsibility Assignments

4.1 Team & Structures

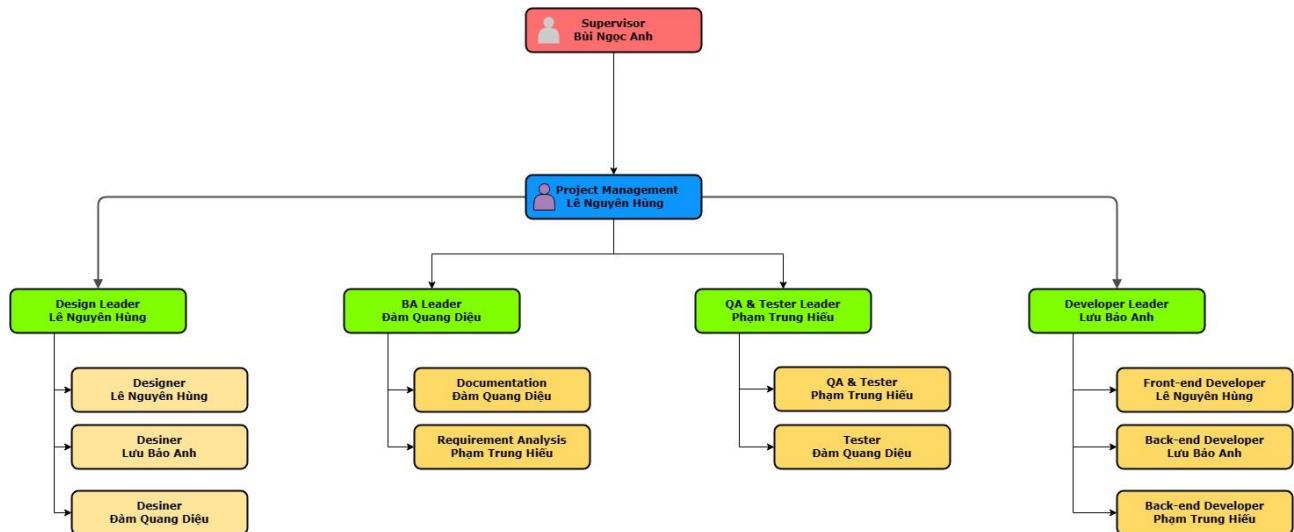


Figure 2.4.1.1: Project Organization

4.2 Roles & Responsibilities

- The organization structure above includes 4 sub-teams: Business Analyst, Technical, QA & Test, Design
- Each sub-team has a leader and members.

This is the detail description about role and responsibility of each member in the organization structure:

Role	Name	Responsibility
Supervisor	Bùi Ngọc Anh	- Verify deliverables - Supervise project team's status
Project Management	Lê Nguyên Hùng	- Project planning - Assign tasks to members - Develop schedules - Coordinate communication - Generally responsible for keeping the team's focus on the main goal - Report work status to the instructor.

Design Team		
Leader	Lê Nguyên Hùng	- Assign task to members - Workflow - Create screen design
Member	Lưu Bảo Anh	- Create design for assigned module
Member	Đàm Quang Diệu	- Create design for assigned module

Business Analyst Team		
Leader	Lê Nguyên Hùng	- Assign task to members - Workflow - Database diagram - System architecture design - Class diagram - Sequence diagram
Member	Lưu Bảo Anh	- Perform assigned tasks

Develop Team		
Leader	Lưu Bảo Anh	- Researched algorithm, Researched new techniques and architecture. - Decide technique and tools to be used. - Guided other team members how to apply new techniques to the project. - Keeping track of development work done by other coding team members - Create coding convention - Deploy web application to host server - Control source code - Merge code
Backend Team	Leader	Lưu Bảo Anh
	Member	Phạm Trung Hiếu

QA & Test Team		
Leader	Đàm Quang Diệu	<ul style="list-style-type: none"> - Create test plan - Responsible for test plan - Assign tasks to members - Controlling testing activities - Create test report - Manage test resources - Create unit test and bug log - Create test case (Integration test) - Execute test case - Report test result
Member	Đàm Quang Diệu	<ul style="list-style-type: none"> - Involve in creating test cases for the product. - Execute test case
Member	Phạm Trung Hiếu	<ul style="list-style-type: none"> - Involve in creating test cases for the product.

5. Project Communications

5.1 Communication Plan

Communication Item	Who/ Target	Purpose	When, Frequency	Type, Tool, Method(s)
Project team meeting	All team members	+ Report team members' current work status, what have done, issues occur and discuss	Daily	Online, Google Meet, Message
Weekly meeting	All team members	+ Review status based on weekly report + Plan for next week	Saturday	Online, Google Meet, Message
Unscheduled meeting	Team members	+ If any team member has problems that he wants to resolve immediately	Unspecified	Online, Google Meet, Message
Supervisor meeting	All team members and Supervisor	+ Report project progress + Seek advice, + Submit documents according to schedule	Weekly	Online and Offline, Google Meet, Message

5.2 External Interface

FU Contacts & Customer Contacts

Function	Contact Person (name, position)	Contact address (email, telephone)	Responsibility
Supervisor	Bùi Ngọc Anh	AnhBN5@fe.edu.vn	<ul style="list-style-type: none">- Provide a document template.- Give instructions to the project team.- Review deliverables.- Supervise project status.- Receive report project and review.

6. Configuration Management

6.1 Document Management

Our project uses Google Drive, Google Doc, Google Sheets to manage project documents.

File management: The Team manages documents through Google Drive web because the app is easy to use, universal, and easy to manage. The Document leader has created folders containing references, questions, and reports to be submitted.

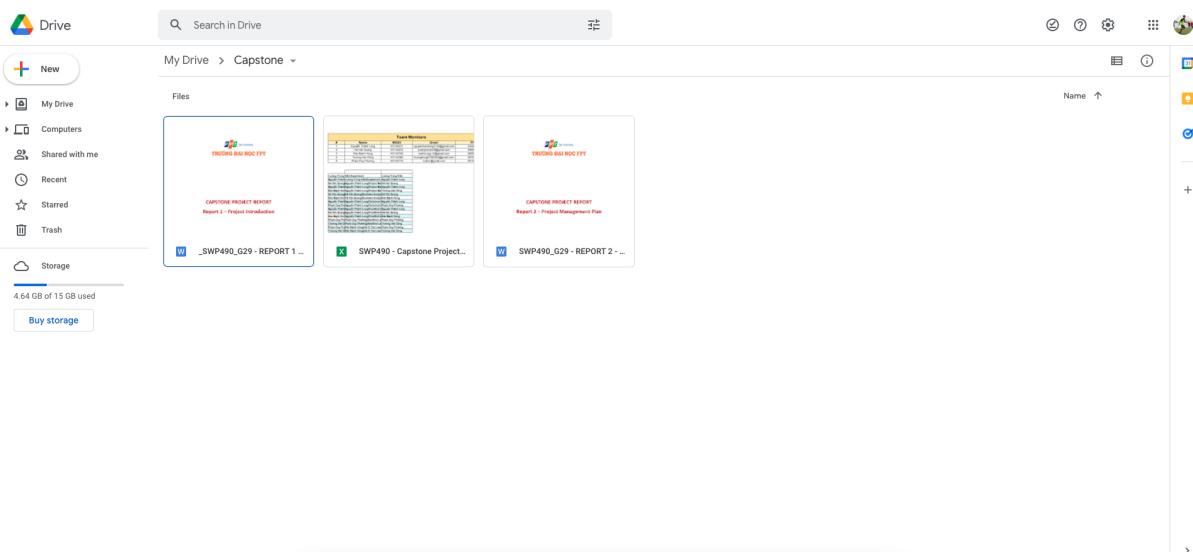


Table 6.1.1: Google Drive

6.2 Source Code Management

GitLab is an open source code repository and collaborative software development platform for large DevOps and DevSecOps projects. GitLab is free for individuals. GitLab offers a location for online code storage and capabilities for issue tracking and CI/CD.

The screenshot shows the GitLab interface for the project 'CAPSTONE SWP491'. The sidebar on the left includes links for Project information, Repository, Issues (1), Merge requests (0), CI/CD, Security & Compliance, Deployments, Packages and registries, Infrastructure, Monitor, Analytics, Wiki, Snippets, and Settings. A modal window titled 'Auto DevOps' is open, explaining its purpose of automatically building, testing, and deploying based on CI/CD configuration. It includes a 'Enable in settings' button. The main content area displays a commit history for the 'main' branch of 'capstone-swp491 / pcaw / pcaw_backend'. The commits are:

Name	Last commit	Last update
..		
pcaw_backend	add change-password api	7 hours ago
.gitignore	setup project base	2 weeks ago
README.md	readme update	6 hours ago
superuser.txt	setup project base	2 weeks ago

Below the commit history is another section for 'README.md'.

Table 6.2.1: GitLab Front-end

This screenshot shows the same GitLab interface for the project 'CAPSTONE SWP491'. The sidebar and commit history are identical to the previous screenshot. The commit history for 'pcaw_backend' is as follows:

Name	Last commit	Last update
..		
accounts	add change-password api	7 hours ago
assignments	add change-password api	7 hours ago
media/uploads/assignments_io	refractor submissions app to assignments	2 weeks ago
pcaw_backend	add change-password api	7 hours ago
permissions	add uniquekey to UserProfile.code	10 hours ago
utils	add change-password api	7 hours ago
.gitignore	setup project base	2 weeks ago
manage.py	setup project base	2 weeks ago

Table 6.2.2: GitLab Back-end

Purposes:

- Free - easy to maintain, fix bugs.
- Storage online source code and capabilities for issue tracking and CI/CD.
- Let others easily follow the project's source code.
- Smarter merge request features.
- Uniform code between team members.

Branches:

- Release: Main branch to deploy production environment
- Develop: Main branch for developer
- Feature/...: Each member coding a new feature, they create a new branch from develop (Ex: feature/login_with_google).
- Stable-develop: Branch to deploy staging environment, using for tester

Review/ Merge code:

- When team members do their tasks then commit source code and create “Pull Request”. Technical leader will review source code and merge to develop the branch.

6.3 Tools & Infrastructures

Category	Tools / Infrastructure
Technology	Angular (Front-end), Django (Back-end)
Database	PostgreSQL
Cloud-based service	BE: Gcloud App Engine, Cloud SQL, Cloud Storage, Google Oauth
IDEs/Editors	Visual Studio Code, Eclipse, Postman, Visibly
Diagramming	DrawIO, Miro, DBVisualizer, Django-Extensions Library
Documentation	Ms Office, Google Docs/Sheets/Slides
Version Control	GitLab (Source Codes), Google Drive (Documents)
Deployment server	Google Cloud Platform
Communications tools	Messenger, Google Meet
Project management	Trello, GitLab (Tasks, Defects)



CAPSTONE PROJECT REPORT

Report 3 – Software Requirement Specification

– Hanoi, Feb 2023 –

Table of Contents

Project Information	5
Project Team	5
I. Record of Changes	5
II. Software Requirement Specification	6
1. Overall Description	6
1.1. Product Overview	6
1.2. Business Rules	6
2. User Requirements	7
2.1. Overview	7
2.2 Use Case Specification	12
2.2.1. Student	12
UC - 01. Sign in	12
UC - 02. Sign out	13
UC - 03. Sign up	13
UC - 04. Forgot password	14
UC - 05. View classes catalog	14
UC - 06. Join classes	15
UC - 07. Taking quizzes and test	16
UC - 08. Submit assignment	16
UC - 09. Un-Submit assignment	17
UC - 10. View assignment's mark	17
UC - 11. Accessing a student dashboard	18
UC - 12. View notification	19
UC - 13. Accessing technical support	19
UC - 14. Submitting feedback	20
UC - 15. Accessing help center	21
2.2.2. Teacher	21
UC - 16. Import student list	21
UC - 17. View student list	22
UC - 18. Manage student group	22
UC - 19. Edit slot details	23
UC - 20. Edit question for each slot	24

UC - 21. Create assignment	24
UC - 22. Edit test cases	25
UC - 23. View assignment process	26
UC - 24. Delete assignment	26
UC - 25. Preview assignment code	27
UC - 26. Grading automation and feedback	27
UC - 27. Curriculum alignment	28
2.2.3. Admin	29
UC - 28. View dashboard	29
UC - 29. Import/Export student list	29
UC - 30. Course creation and management	30
UC - 31. Monitoring activities and progress within courses	30
UC - 32. Teacher management	31
UC - 33. Student management	32
UC - 34. User management	32
UC - 35. Course updates	33
UC - 36. Curriculum development	33
UC - 37. Website updates	34
UC - 38. Platform Development	34
UC - 39. Technical support	35
UC - 40. Feedback management	35
UC - 41. Monitoring compiler usage and performance	36
UC - 42. Managing and configuring the compiler tool	37
3. Functional Requirements	37
3.1 System Functional Overview	37
3.1.1 Screens Flow	37
3.1.2 Screen Descriptions	39
3.1.4 Non-Screen Functions	40
3.1.5 Entity Relationship Diagram	41
4. Non-Functional Requirements	42
4.1 External Interfaces	42
4.1.1 User Interfaces	42
4.1.2 Software Interfaces	42
4.1.3 Hardware Interfaces	43
4.1.4 Communications Interfaces	43

4.2 Quality Attributes	43
4.2.1 Usability	43
4.2.2 Reliability	43
4.2.3 Performance	44
4.2.4 Dependability	44
4.2.4.1 Security	44
4.2.4.2 Safety	44
4.2.5 Supportability	44
4.2.6 Design Constraints	44
4.2.7 Support Documents	45
4.2.8 Purchased Components	45
5. Requirement Appendix	45
5.1 Application Error Messages List	45
5.2 Application Success Messages List	45

Project Information

- Project name: Practice Code And Learning Website
 - Project code: PCAW
 - Group name: SWP490_G9
 - Software type: Website

Project Team

Full Name	Role	Email
Bùi Ngọc Anh	Lecturer	AnhBN5@fe.edu.vn
Lê Nguyên Hùng	Leader	hunglnHE141720@fpt.edu.vn
Lưu Bảo Anh	Member	anhlbSE05203@fpt.edu.vn
Đàm Quang Diệu	Member	dieudqHE130531@fpt.edu.vn
Phạm Trung Hiếu	Member	hieuptHE130222@fpt.edu.vn

I. Record of Changes

*A - Added M - Modified D - Deleted

II. Software Requirement Specification

1. Overall Description

1.1. Product Overview

Our e-learning platform is designed for college students and teachers, offering a seamless and user-friendly experience. With no payment or subscription required, our platform provides access to a variety of courses and features a built-in compiler to help students improve their programming skills. As an admin, you have full control over course creation, teacher management, and student progress tracking. With no chat rooms or social links, our platform focuses solely on academic excellence and offers a distraction-free learning experience.

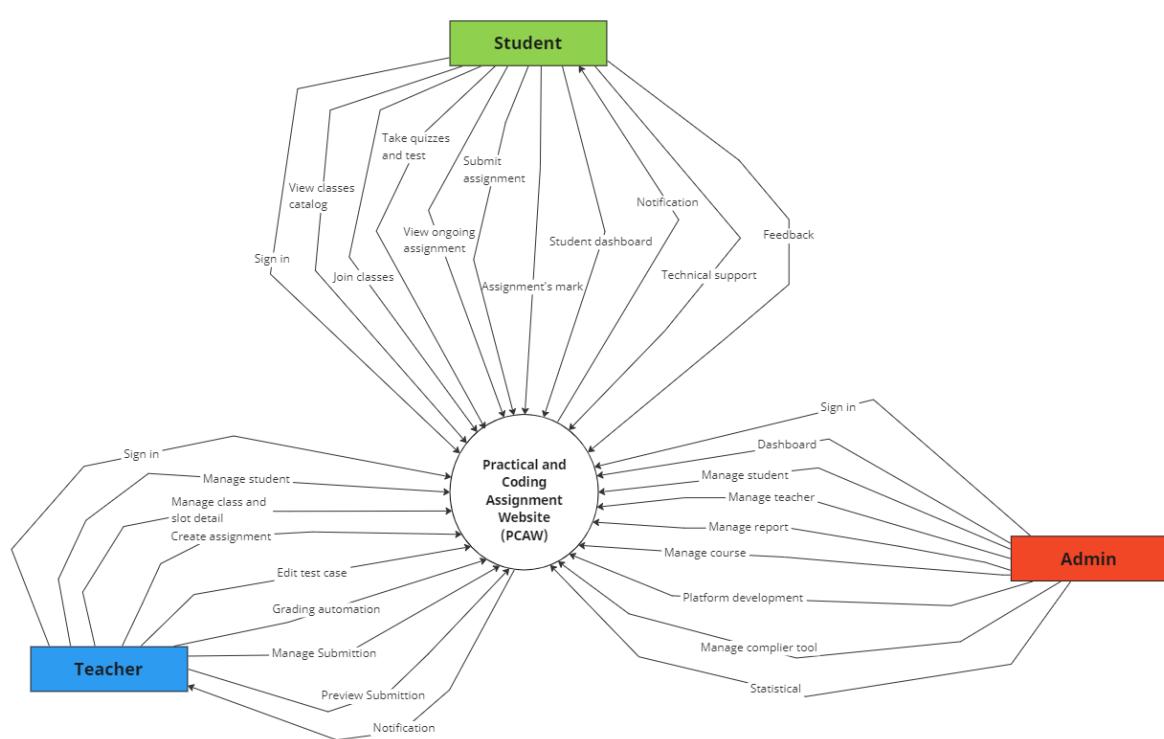


Figure 2.1.1: Context diagram

1.2. Business Rules

ID	Rule Definition
BR-01	Email must be valid.
BR-02	N/A
BR-03	Username must be at least 8 characters and contain no special characters.

BR-04	Passwords must be at least 8 characters, at least one letter, one number and one special character.
BR-05	Passwords must be encrypted.
BR-06	When you register or change your password, you must enter the new password twice
BR-07	Can't register email already registered
BR-08	Can't change email
BR-09	User must enter username and password when Sign In
BR-10	Token keeps logged in for 3 hours.
BR-11	A user can belong to one of the 4 roles: Admin, Teacher, Student.
BR-12	file size should not exceed 20mb
BR-13	Enter all the text boxes
BR-14	Description cannot be left blank
BR-15	File must not be empty/null
BR-16	Users must have Admin Role to be allowed to access Admin screens
BR-17	Users must have Student Role to be allowed to access the Student screens
BR-18	Users must have Teacher Role to be allowed to access the Teacher screens
BR-19	Tokens have not expired yet.
BR-20	Source file shall be checked and read to text before submit
BR-21	The user must log in to the system.

2. User Requirements

2.1. Overview

a. Use Case Diagram(s)

- Overview

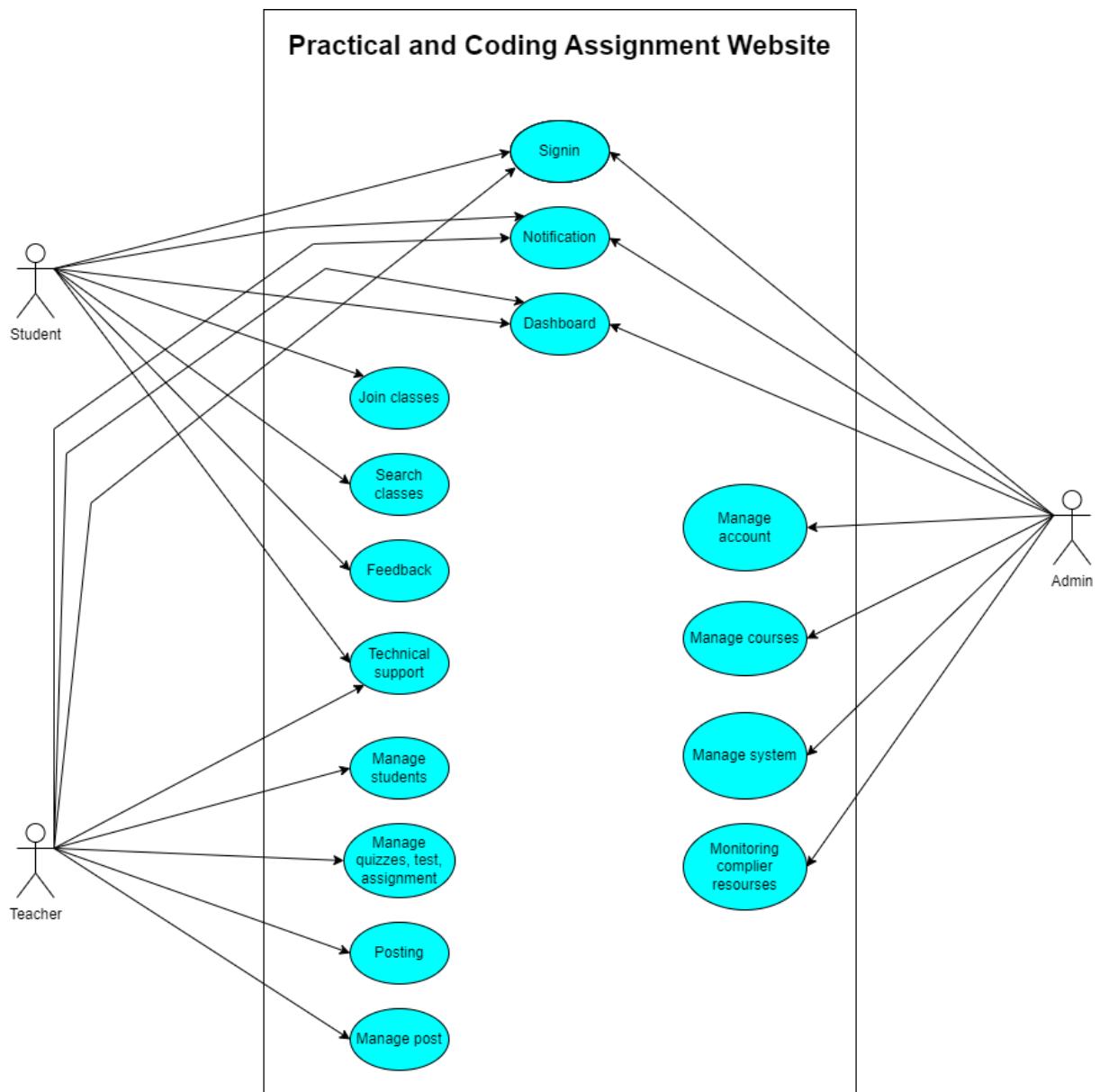


Figure 2.2.1: Use Case overview diagram

#	Actor	Description
1	Administrator	Has an account in the system with admin role and responsible for managing the system
2	Teacher	Has registered as teacher who can manage assignment, student of assigned class by admin
3	Student	Has registered as student who can submit an assignment of assigned class by admin

Table 2.1.1: System Actors

- Student



Figure 2.2.1: Use Case Student diagram

- Teacher

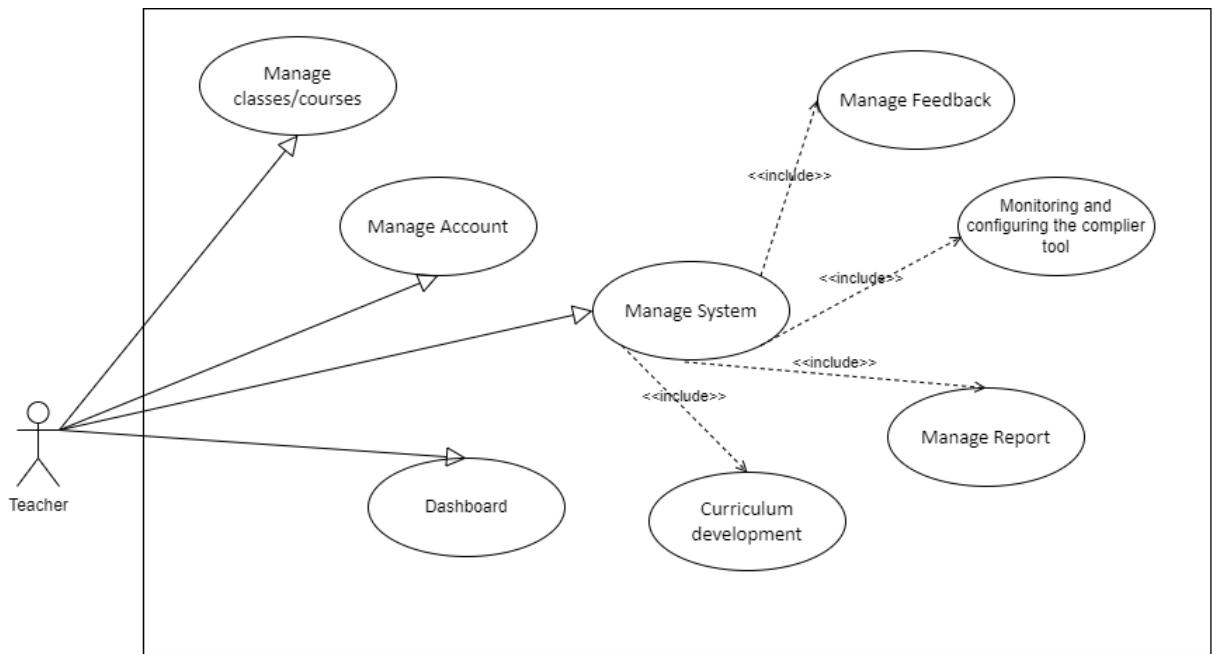


Figure 2.2.1: Use Case Teacher Diagram

- Admin

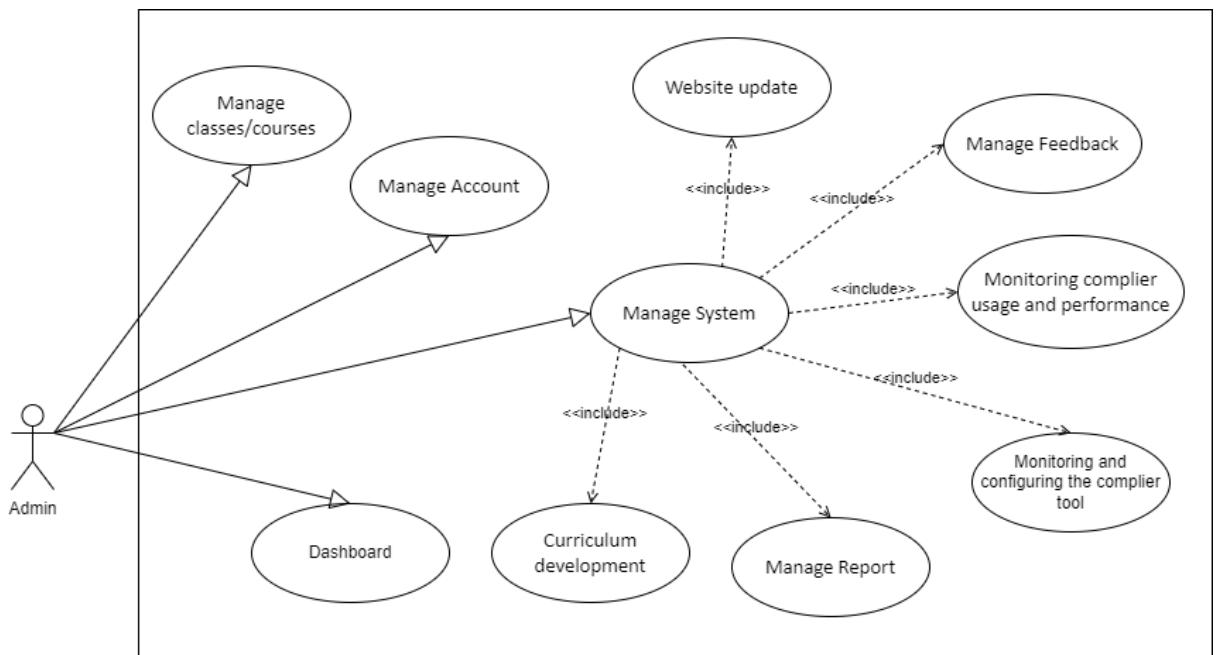


Figure 2.2.1: Use Case Admin diagram

c. Use Cases List

Modules	ID	Use Case	Primary Actors
Authentication	UC - 01	Sign in	All actors
	UC - 02	Sign out	All actors
	UC - 03	Sign up	All actors
	UC - 04	Forgot password	All actors
Student - Class Management	UC - 05	View classes catalog	Student
	UC - 06	Join classes	Student
	UC - 07	Taking quizzes and test	Student
	UC - 08	Submit assignment	Student
	UC - 09	Un-submit assignment	Student
	UC - 10	View assignment's mark	Student
	UC - 11	Accessing a student dashboard	Student
	UC - 12	View all assignment	Student
	UC - 13	Delete favoriteHome page	Student
Student - Support	UC - 14	Accessing technical support	Student
	UC - 15	Feedback	Student
	UC - 16	Report	Student
Teacher	UC - 17	Manage student	Teacher
	UC - 18	Manage class	Teacher
	UC - 19	Create TC	Teacher
	UC - 20	Grading automation and fb	Teacher
	UC - 21	Curriculum alignment	Teacher
	UC - 22	Dashboard	Teacher
	UC - 23	Manage quizzes, assignment	Teacher
Admin	UC - 24	Manage class/course	Admin
	UC - 25	Manage account	Admin
	UC - 26	Dashboard	Admin

	UC - 27	Manage system	Admin
	UC - 28	Website update	Admin
	UC - 29	Mange FB	Admin
	UC - 30	Monitoring compiler usage and performance	
	UC - 31	Manage report	
	UC - 32	Manage and configuring the compiler tool	
	UC - 33	Curriculum development	

Table 2.1.1: Use case list

2.2 Use Case Specification

2.2.1. Student

UC - 01. Sign in

Use Case ID	UC - 01	Use Case Name	Sign in
Created By	HungLN	Created Date	05/03/2023
Primary Actor	All actors	Secondary Actor	
Description	Sign in to the system by google account		
Pre-conditions	PRE-1: User can access the system. PRE-2: User have a google account		
Post-conditions	POST-1: User is logged in to the system. POST-2: User is redirected to the home screen.		
Normal Flow	Sign in: <ul style="list-style-type: none"> ● Go to the Sign in screen ● Choose Campus, Click “Sign in with Google” button. ● Choose an Email user who wants to login . ● Save a token to LocalStorage. ● The system redirects the user to the home page. 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	High		
Frequency of Use	High		
Business Rules	BR-01, BR-16 BR-17 BR-18, BR-09		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 01. Sign in

UC - 02. Sign out

Use Case ID	UC - 02	Use Case Name	Sign Out
--------------------	---------	----------------------	----------

Created By	HungLN	Created Date	05/03/2023
Primary Actor	All actors	Secondary Actor	
Description	User sign out of the system		
Pre-conditions	PRE-1: User has already signed in. PRE-2: User can access the system.		
Post-conditions	User sign out of the system		
Normal Flow	<p>Sign out:</p> <ul style="list-style-type: none"> ● Go to the header of the website. ● Click on the “Sign out” button. ● The system redirect user to the Sign in screen 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	High		
Frequency of Use	High		
Business Rules	N/A		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 02. Sign out

UC - 03. Sign up

Use Case ID	UC - 03	Use Case Name	Sign up
Created By	HungLN	Created Date	05/03/2023
Primary Actor	All actors	Secondary Actor	
Description	User sign up		
Pre-conditions	PRE-1: Users can access the system.		
Post-conditions	User sign up		
Normal Flow	<p>Sign up:</p> <ul style="list-style-type: none"> ● Go to the website. ● Click on the “Sign up” button. ● The system show sign-up form with username, email, password fields ● User enter information into input ● User click Sign-up button ● The system validate information and create a new account 		
Alternative Flow	IF user enter wrong information, the system show message error		
Exceptions	E1 - Information is not valid		
Priority	High		
Frequency of Use	High		
Business Rules	BR-07, BR-13		

Other Information	N/A
Assumptions	N/A

Table: UC - 03. Sign up

UC - 04. Forgot password

Use Case ID	UC - 04	Use Case Name	Forgot password
Created By	HungLN	Created Date	05/03/2023
Primary Actor	All actor	Secondary Actor	
Description	Student can request forgot password		
Pre-conditions	PRE-1: User can access the system.		
Post-conditions	POST-1: New request change password send to personal email		
Normal Flow	View classes catalog: <ul style="list-style-type: none"> ● Go to the website. ● Click on the “Forgot password” button. ● The system will display forgot password screen ● User enter personal email ● The system validate email and send new request change password to email 		
Alternative Flow	N/A		
Exceptions	E1 - Email not found E2 - Email is not valid		
Priority	High		
Frequency of Use	High		
Business Rules	BR-01		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 03. Forgot password

UC - 05. View classes catalog

Use Case ID	UC - 05	Use Case Name	View classes catalog
Created By	DieuDQ	Created Date	05/03/2023
Primary Actor	Student	Secondary Actor	
Description	Student view a list of assigned class		
Pre-conditions	PRE-1: User has already signed in. PRE-2: User can access the system.		
Post-conditions	POST-1: Display a list classes		

Normal Flow	<p>View classes catalog:</p> <ul style="list-style-type: none"> ● Go to the header of the website. ● Click on the “Home” button. ● The system will display all classes ● If no class available, the system will display “No data”
Alternative Flow	N/A
Exceptions	N/A
Priority	High
Frequency of Use	High
Business Rules	N/A
Other Information	N/A
Assumptions	N/A

Table: UC – 05. View classes catalog

UC - 06. Join classes

Use Case ID	UC - 06	Use Case Name	Join classes
Created By	DieuDQ	Created Date	05/03/2023
Primary Actor	Student	Secondary Actor	
Description	Student join a class		
Pre-conditions	PRE-1: User has already signed in. PRE-2: User can access the system.		
Post-conditions	POST-1: Student can join a class		
Normal Flow	<p>Join classes:</p> <ul style="list-style-type: none"> ● From Home screen ● Student click Assignment tab ● Student click “Join class” button ● The system show information of class such as teacher and class code ● Student click “Join” button ● The system will add student to class ● If the class exceeds 30 students, the system will show notification 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	High		
Frequency of Use	High		
Business Rules	N/A		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 06. Join classes

UC - 07. Taking quizzes and test

Use Case ID	UC - 07	Use Case Name	Taking quizzes and test
Created By	DieuDQ	Created Date	05/03/2023
Primary Actor	Student	Secondary Actor	N/A
Description	Student can take quizzes and test		
Pre-conditions	PRE-1: User has already signed in. PRE-2: User can access the system.		
Post-conditions	Student can take quizzes and test		
Normal Flow	<p>Taking quizzes and test:</p> <ul style="list-style-type: none"> ● From Assignment details screen, Choose add file ● Select a file from user PC ● Click “Submit” for submit file to the system 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	High		
Frequency of Use	High		
Business Rules	BR-12, BR-20, BR-17		
Other Information	N/A		
Assumptions	Students have finished their		

Table: UC - 07. Taking quizzes and test

UC - 08. Submit assignment

Use Case ID	UC - 08	Use Case Name	Submit assignment
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Student	Secondary Actor	N/A
Description	Student can take quizzes and test		
Pre-conditions	PRE-1: User has already signed in. PRE-2: User can access the system.		
Post-conditions	Student can submit file		
Normal Flow	<p>Taking quizzes and test:</p> <ul style="list-style-type: none"> ● From Assignment details screen, Choose add file ● Select a file from user PC ● Click “Submit” for submit file to the system 		

Alternative Flow	N/A
Exceptions	N/A
Priority	High
Frequency of Use	High
Business Rules	BR-12, BR-22, BR-17
Other Information	N/A
Assumptions	Students have finished their

Table: UC - 08. Submit Assignment

UC - 09.Un-Submit assignment

Use Case ID	UC - 09	Use Case Name	Un-Submit assignment
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Student	Secondary Actor	N/A
Description	Student can un-submit a assignment from the system		
Pre-conditions	PRE-1: User has already signed in. PRE-2: User can access the system. PRE-3: User has submit file from that assignment before		
Post-conditions	POST-1: Your submitted file will remove from system		
Normal Flow	Un-Submit Assignment: <ul style="list-style-type: none"> From Assignment details screen, Click Unsubmit Click "Yes" to confirm action 		
Alternative Flow	N/A		
Exceptions	E1 - Assignment deadline has expired		
Priority	High		
Frequency of Use	High		
Business Rules	BR-15		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 09. Un-Submit Assignment

UC - 10. View assignment's mark

Use Case ID	UC - 10	Use Case Name	View assignment's mark
Created By	AnhLB	Created Date	05/03/2023

Primary Actor	Student	Secondary Actor	N/A
Description	Student can view assignment's mark		
Pre-conditions	PRE-1: User has already signed in. PRE-2: User can access the system. PRE-3: User has submit from that assignment before		
Post-conditions	Student can view assignment's mark		
Normal Flow	View assignment's mark: <ul style="list-style-type: none"> ● At Home screen, User click Assignment tab ● User click detail assignment ● Assignment mark will be displayed 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	High		
Frequency of Use	High		
Business Rules			
Other Information	N/A		
Assumptions	N/A		

Table: UC - 10. View assignment's mark

UC - 11. Accessing a student dashboard

Use Case ID	UC - 11	Use Case Name	Accessing a student dashboard
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Student	Secondary Actor	N/A
Description	Student can accessing a student dashboard		
Pre-conditions	PRE-1: User has already signed in. PRE-2: User can access the system.		
Post-conditions	Student can accessing a student dashboard		
Normal Flow	Accessing a student dashboard: <ul style="list-style-type: none"> ● From Home screen, Click to an Dashboard ● System show the dashboard for student 		
Alternative Flow	If no any data, system show "no data"		
Exceptions	N/A		
Priority	Medium		

Frequency of Use	Medium
Business Rules	N/A
Other Information	N/A
Assumptions	N/A

Table: UC - 11. Accessing a student dashboard

UC - 12. View notification

Use Case ID	UC - 12	Use Case Name	View notification
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	All actor	Secondary Actor	
Description	User can View notification		
Pre-conditions	PRE-1: User has already signed in. PRE-2: User can access the system.		
Post-conditions	Student can View notification		
Normal Flow	<p>View all assignment:</p> <ul style="list-style-type: none"> At Home screen, student click Notification icon The system show all Notification in latest order 		
Alternative Flow	If no have any notification, the system show "no data"		
Exceptions	N/A		
Priority	High		
Frequency of Use	High		
Business Rules	N/A		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 12. View notification

UC - 13. Accessing technical support

Use Case ID	UC - 13	Use Case Name	Accessing technical support
Created By	HieuPT	Created Date	05/03/2023
Primary Actor	Student	Secondary Actor	N/A
Description	Student can accessing technical support		
Pre-conditions	PRE-1: User has already signed in. PRE-2: User can access the system.		
Post-conditions	N/A		

Normal Flow	<p>Accessing technical support:</p> <ul style="list-style-type: none"> • At Home screen, student click Support tab • The system show Support screen • Students enter question into field
Alternative Flow	N/A
Exceptions	N/A
Priority	High
Frequency of Use	High
Business Rules	BR-14
Other Information	N/A
Assumptions	N/A

Table: UC - 13. Accessing technical support

UC - 14. Submitting feedback

Use Case ID	UC - 14	Use Case Name	Submitting feedback
Created By	HieuPT	Created Date	05/03/2023
Primary Actor	Student	Secondary Actor	N/A
Description	Student can Submitting feedback		
Pre-conditions	PRE-1: User has already signed in. PRE-2: User can access the system.		
Post-conditions	Student can Submitting feedback		
Normal Flow	<p>View all assignment:</p> <ul style="list-style-type: none"> • At Home screen, student click Feedback tab • The system show all Feedback screen • Students enter feedback into field 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	High		
Frequency of Use	High		
Business Rules	BR-14		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 14. Submitting feedback

UC - 15. Accessing help center

Use Case ID	UC - 15	Use Case Name	Accessing help center
Created By	HieuPT	Created Date	05/03/2023
Primary Actor	Student	Secondary Actor	N/A
Description	Student can Accessing help center		
Pre-conditions	PRE-1: User has already signed in. PRE-2: User can access the system. PRE-3: Student already join class		
Post-conditions	Student can Accessing help center		
Normal Flow	<p>Accessing help center:</p> <ul style="list-style-type: none"> At Home screen, student click User guide tab The system show all User guide screen 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	High		
Frequency of Use	High		
Business Rules	BR-14		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 15. Accessing help center

2.2.2. Teacher

UC - 16. Import student list

Use Case ID	UC - 16	Use Case Name	Import student list
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Teacher	Secondary Actor	
Description	The teacher can Import student list		
Pre-conditions	PRE-1: Teacher has already signed up. PRE-2: Teacher can access the system.		
Post-conditions	The teacher can Import student list		
Normal Flow	<p>Import student list:</p> <ul style="list-style-type: none"> At Home screen, user click import class tab The system shows the import class screen. User click Upload student list After upload, all student uploaded is displayed on table If size of list larger 7 items, the system display pagination User can remove student from list by click button remove 		

	<ul style="list-style-type: none"> User must enter class name before submit User click submit import button to import list student
Alternative Flow	N/a
Exceptions	E1: File wrong format E2: No student list is imported
Priority	Medium
Frequency of Use	Medium
Business Rules	BR-05, BR-13, BR-15, BR-18, BR-09, BR-10
Other Information	N/A
Assumptions	N/A

Table: UC - 16. Import student list

UC - 17. View student list

Use Case ID	UC - 17	Use Case Name	View student list
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	User	Secondary Actor	
Description	Teacher can View student list		
Pre-conditions	PRE-1: User has already signed in. PRE-2: User can access the system.		
Post-conditions	Teacher view student list		
Normal Flow	View student list <ul style="list-style-type: none"> At Home screen User click class which to view student list User can view, edit, remove student from list If size of list larger 5 items, the system display pagination If no student, the system show "no data" 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	High		
Frequency of Use	High		
Business Rules	BR-18		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 17. View student list

UC - 18. Manage student group

Use Case ID	UC - 18	Use Case Name	Manage student group
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Teacher	Secondary Actor	
Description	Teacher can Manage student group.		
Pre-conditions	PRE-1: User has already signed in. PRE-2: User can access the system. PRE-3: User has Teacher role		

Post-conditions	Teacher can Manage student group
Normal Flow	<p>Manage student group</p> <ul style="list-style-type: none"> ● At Home screen ● User click Student Management tab ● The system show student management screen ● If size of list larger 5 items, the system display pagination ● If no student, the system show “no data”
Alternative Flow	N/A
Exceptions	N/A
Priority	Medium
Frequency of Use	Medium
Business Rules	BR-18
Other Information	N/A
Assumptions	N/A

Table: UC - 18. Manage student group

UC - 19. Edit slot details

Use Case ID	UC - 19	Use Case Name	Edit slot details
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Teacher	Secondary Actor	N/A
Description	Teacher can Edit slot details		
Pre-conditions	PRE-1: User has access to the home page. PRE-2: User has Teacher role		
Post-conditions	Teacher can Edit slot details		
Normal Flow	Edit slot details: <ul style="list-style-type: none"> ● At Home screen. ● User click class button ● User click edit slot detail button ● The system shows an edit slot detail screen. ● User edit slot and click save ● The system will update slot detail 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	Low		
Frequency of Use	Low		
Business Rules	BR-18		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 19. Edit slot details

UC - 20. Edit question for each slot

Use Case ID	UC - 20	Use Case Name	Edit question for each slot
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	User	Secondary Actor	N/A
Description	Teacher can Edit question for each slot.		
Pre-conditions	PRE-1: User has access to the home page. PRE-2: User has Teacher role.		
Post-conditions	Teacher can Edit question for each slot.		
Normal Flow	Edit question for each slot: <ul style="list-style-type: none"> ● At Home screen ● User click on slot button ● The system show all question of slot ● User click edit button ● The system show detail an question ● User enter a new question to update question for slot ● User click Save button. 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	High		
Frequency of Use	High		
Business Rules	BR-18, BR-13		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 20. Edit question for each slot

UC - 21. Create assignment

Use Case ID	UC - 21	Use Case Name	Create assignment
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	User	Secondary Actor	N/A
Description	Teacher can Create assignment		
Pre-conditions	PRE-1: User has access to the home page. PRE-2: User has Teacher role.		
Post-conditions	Teacher create an assignment		
Normal Flow	Create assignment: <ul style="list-style-type: none"> ● At Home screen. ● User click Class button ● The system display class screen ● User click Add assignment button ● The system show Add assignment screen ● User enter data in all fields ● User click Submit button ● The system will add new assignment 		
Alternative Flow	N/A.		

Exceptions	E1 - Input fields is required.
Priority	High
Frequency of Use	High
Business Rules	BR-18, BR-13
Other Information	N/A
Assumptions	N/A

Table: UC - 21. Create assignment

UC - 22. Edit test cases

Use Case ID	UC - 22	Use Case Name	Edit test cases
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Teacher	Secondary Actor	N/A
Description	Teacher can Edit test cases		
Pre-conditions	PRE-1: User has access to the home page. PRE-2: User has Teacher role.		
Post-conditions	Teacher can Edit test cases		
Normal Flow	Edit test cases <ul style="list-style-type: none"> ● At the Home screen ● User click class button ● The system display class screen ● User click assignment button ● User click edit test case button ● The system will display edit test case screen ● User enter new test case ● User click Submit button ● The system will update test case 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	Medium		
Frequency of Use	Medium		
Business Rules	BR-18, BR-13		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 22. Edit test cases

UC - 23. View assignment process

Use Case ID	UC - 23	Use Case Name	View assignment process
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Teacher	Secondary Actor	N/A
Description	Teacher can view assignment process		
Pre-conditions	PRE-1: User has successfully signed in before.		

Post-conditions	Teacher can view assignment process
Normal Flow	<p>View assignment process:</p> <ul style="list-style-type: none"> ● At Home screen ● User click Assignment tab ● The assignment process is displayed
Alternative Flow	N/A.
Exceptions	N/A
Priority	Medium
Frequency of Use	Medium
Business Rules	BR-18
Other Information	N/A
Assumptions	N/A

Table: UC - 23. View assignment process

UC - 24. Delete assignment

Use Case ID	UC - 24	Use Case Name	Delete assignment
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Teacher	Secondary Actor	N/A
Description	Teacher can delete assignment		
Pre-conditions	PRE-1: User has successfully signed in before.		
Post-conditions	Assignment is deleted		
Normal Flow	<p>Delete assignment:</p> <ul style="list-style-type: none"> ● At Home screen ● User click Assignment tab ● The system will display all assignment ● User click delete button ● The system show notification confirm delete ● IF user click yes, the system will delete this assignment ● IF user click no, the system will back to assignment screen and No delete data 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	High		
Frequency of Use	High		
Business Rules	BR-18		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 24. Delete assignment

UC - 25. Preview assignment code

Use Case ID	UC - 25	Use Case Name	Preview assignment code
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Teacher	Secondary Actor	N/A
Description	Teacher can Preview assignment code of student		
Pre-conditions	PRE-1: User has successfully signed in before.		
Post-conditions	Assignment code of student is display		
Normal Flow	<p>Preview assignment code:</p> <ul style="list-style-type: none"> ● At Home screen. ● User click Assignment tab ● The system show preview assignment code of student ● If no assignment, the system show “no data” 		
Alternative Flow	N/A		
Exceptions	N/A.		
Priority	High		
Frequency of Use	High		
Business Rules	BR-18		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 25. Preview assignment code

UC - 26. Grading automation and feedback

Use Case ID	UC - 26	Use Case Name	Grading automation and feedback
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	User	Secondary Actor	N/A
Description	The Teacher can Grading automation and feedback the assignment of student		
Pre-conditions	PRE-1: User has successfully signed in before.		
Post-conditions	N/A.		
Normal Flow	<p>Grading automation and feedback:</p> <ul style="list-style-type: none"> ● At the Home screen. ● User click Assignment tab ● The system auto Grading assignment of student ● User can feedback result assignment by click feedback button 		
Alternative Flow	N/A		

Exceptions	E1 - If system can not automation grading, the system will show error
Priority	High
Frequency of Use	High
Business Rules	BR-18, BR-21
Other Information	N/A
Assumptions	N/A

Table: UC - 26. Grading automation and feedback

UC - 27. Curriculum alignment

Use Case ID	UC - 27	Use Case Name	Curriculum alignment
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Teacher	Secondary Actor	N/A
Description	Teacher can Curriculum alignment		
Pre-conditions	PRE-1: User has successfully signed in before. PRE-2: User has access to their favorite page.		
Post-conditions	Teacher can Curriculum alignment.		
Normal Flow	Curriculum alignment: <ul style="list-style-type: none"> ● At Home screen ● User click class ● User can Curriculum alignment by create, update, delete assignment of class 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	High		
Frequency of Use	High		
Business Rules	BR-18		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 27. Curriculum alignment

2.2.3. Admin

UC - 28. View dashboard

Use Case ID	UC - 28	Use Case Name	View dashboard
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Admin	Secondary Actor	N/A
Description	Admin can View dashboard		

Pre-conditions	PRE-1: User has successfully signed in before.
Post-conditions	N/A.
Normal Flow	<p>View dashboard:</p> <ul style="list-style-type: none"> At the Home screen, the user clicks the Dashboard tab. The system shows dashboard, includes total account, assignment, student submitted file
Alternative Flow	N/A
Exceptions	N/A
Priority	High
Frequency of Use	High
Business Rules	BR-16
Other Information	N/A
Assumptions	N/A

Table: UC - 28. View dashboard

UC - 29. Import/Export student list

Use Case ID	UC - 29	Use Case Name	Import/Export student list
Created By	HungLN	Created Date	05/03/2023
Primary Actor	Host	Secondary Actor	N/A
Description	Admin can Import/Export student list		
Pre-conditions	PRE-1: Admin has successfully signed in before.		
Post-conditions	Admin can Import/Export student list		
Normal Flow	<p>Import/Export student list:</p> <ul style="list-style-type: none"> The normal flow same the UC-16 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	High		
Frequency of Use	High		
Business Rules	BR-16		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 29. Import/Export student list

UC - 30. Course creation and management

Use Case ID	UC - 30	Use Case Name	Course creation and management
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Admin	Secondary Actor	N/A
Description	Admin can create course and management course		
Pre-conditions	PRE-1: Admin has successfully signed in before.		
Post-conditions	Admin can create course and management course		
Normal Flow	<p>Course creation and management:</p> <ul style="list-style-type: none"> ● At home screen ● User click class tab to management class ● User click import button to import student class such as UC-16 ● User can import class by enter Subject, Instructor, Semester ● User click Submit import ● The system will import data 		
Alternative Flow	N/A		
Exceptions	E1 - File wrong format		
Priority	High		
Frequency of Use	High		
Business Rules	BR-16, BR-12, BR-15		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 30. Course creation and management

UC - 31. Monitoring activities and progress within courses

Use Case ID	UC - 31	Use Case Name	Monitoring activities and progress within courses
Created By	DieuDQ	Created Date	05/03/2023
Primary Actor	Admin	Secondary Actor	N/A
Description	Admin can monitor activities and progress within courses		
Pre-conditions	PRE-1: Admin has successfully signed in before.		
Post-conditions	Admin can monitor activities and progress within courses		
Normal Flow	<p>Monitoring activities and progress within courses:</p> <ul style="list-style-type: none"> ● At the Home screen. ● User click Monitor tab ● The system show all information of system 		

Alternative Flow	N/A
Exceptions	N/A
Priority	High
Frequency of Use	High
Business Rules	BR-16
Other Information	N/A
Assumptions	N/A

Table: UC - 31. Monitoring activities and progress within courses

UC - 32. Teacher management

Use Case ID	UC - 32	Use Case Name	Teacher management
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Admin	Secondary Actor	N/A
Description	Admin can management Teacher		
Pre-conditions	PRE-1: Admin has successfully signed in before.		
Post-conditions	N/A		
Normal Flow	Management Teacher: <ul style="list-style-type: none"> ● At Home screen ● The user click management teacher tab ● The system show management teacher screen ● The system will show list of teacher ● User can Search, edit, remove, assign teacher 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	High		
Frequency of Use	High		
Business Rules	BR-16		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 32. Teacher management

UC - 33. Student management

Use Case ID	UC - 33	Use Case Name	Student management
Created By	HungLN	Created Date	05/03/2023
Primary Actor	Host	Secondary Actor	N/A
Description	Admin can management student		
Pre-conditions	PRE-1: Admin has successfully signed in before.		

Post-conditions	Admin can management student
Normal Flow	<p>Student management:</p> <ul style="list-style-type: none"> ● At Home screen ● The user click management student tab ● The system show management student screen ● The system will show list of student ● User can Search, edit, remove, student from class
Alternative Flow	N/a
Exceptions	N/A
Priority	Medium
Frequency of Use	Medium
Business Rules	BR-16
Other Information	N/A
Assumptions	N/A

Table: UC - 33. Student management

UC - 34. User management

Use Case ID	UC - 34	Use Case Name	User management
Created By	HieuPT	Created Date	05/03/2023
Primary Actor	Admin	Secondary Actor	N/A
Description	Admin can management user		
Pre-conditions	PRE-1: Admin already logged into the system.		
Post-conditions	Admin can management user		
Normal Flow	<p>User management:</p> <ul style="list-style-type: none"> ● At Home screen ● User can management student, teacher of system Such as UC 32, UC 33 		
Alternative Flow	N/A		
Exceptions	N/A.		
Priority	Medium		
Frequency of Use	Medium		
Business Rules	BR-16		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 34. User management

UC - 35. Course updates

Use Case ID	UC - 35	Use Case Name	Course updates
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Admin	Secondary Actor	N/A
Description	Admin can update course		
Pre-conditions	PRE-1: Admin has successfully signed in before.		
Post-conditions	N/A		
Normal Flow	<p>Course updates:</p> <ul style="list-style-type: none"> ● At Home screen ● User click class tab ● User can update course by edit class, assignment 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	Medium		
Frequency of Use	Medium		
Business Rules	BR-16		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 35. Course updates

UC - 36. Curriculum development

Use Case ID	UC - 36	Use Case Name	Curriculum development
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Admin	Secondary Actor	N/A
Description	Admin can Curriculum development		
Pre-conditions	PRE-1: Admin has successfully signed in before.		
Post-conditions	Admin can Curriculum development		
Normal Flow	<p>Curriculum development:</p> <ul style="list-style-type: none"> ● Admin can Curriculum development by update system, update course 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	Medium		

Frequency of Use	Low
Business Rules	BR-16
Other Information	N/A
Assumptions	N/A

Table: UC - 36. Curriculum development

UC - 37. Website updates

Use Case ID	UC - 37	Use Case Name	Website updates
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Admin	Secondary Actor	N/A
Description	Admin can update websites.		
Pre-conditions	PRE-1: Admin has successfully signed in before.		
Post-conditions	N/A		
Normal Flow	Website updates: <ul style="list-style-type: none"> Admin can develop new feature for website and update website 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	Medium		
Frequency of Use	Medium		
Business Rules	BR-17		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 37. Website updates

UC - 38. Platform Development

Use Case ID	UC - 38	Use Case Name	Platform Development
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Admin	Secondary Actor	N/A
Description	Admin can Platform Development		
Pre-conditions	PRE-1: Admin already logged into the system.		
Post-conditions	N/A		

Normal Flow	<p>Platform Development:</p> <ul style="list-style-type: none"> Such as UC 37, admin can develop the platform
Alternative Flow	N/A
Exceptions	N/A
Priority	Medium
Frequency of Use	Medium
Business Rules	BR-16
Other Information	N/A
Assumptions	N/A

Table: UC - 38. Platform Development

UC - 39. Technical support

Use Case ID	UC - 39	Use Case Name	Technical support
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Admin	Secondary Actor	N/A
Description	Admin can view Q/A of Technical support		
Pre-conditions	PRE-1: Admin has successfully signed in before.		
Post-conditions	Admin can view Q/A of Technical support		
Normal Flow	<p>Technical support:</p> <ul style="list-style-type: none"> At Home screen User click Technical support tab The Technical support screen is displayed 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	Medium		
Frequency of Use	Medium		
Business Rules	BR-16		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 39. Technical support

UC - 40. Feedback management

Use Case ID	UC - 40	Use Case Name	Feedback management
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Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Admin	Secondary Actor	N/A
Description	Admin can view Feedback management		
Pre-conditions	PRE-1: Admin has successfully signed in before.		
Post-conditions	Admin can view Feedback management		
Normal Flow	<p>Feedback management:</p> <ul style="list-style-type: none"> ● At Home screen ● User click Feedback management tab ● The Feedback management screen is displayed 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	Medium		
Frequency of Use	Medium		
Business Rules	BR-16		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 40. Feedback management

UC - 41. Monitoring compiler usage and performance

Use Case ID	UC - 41	Use Case Name	Monitoring compiler usage and performance
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Admin	Secondary Actor	N/A
Description	Admin request to view all statistics.		
Pre-conditions	PRE-1: Admin has successfully signed in before.		
Post-conditions	N/A		
Normal Flow	<p>Monitoring compiler usage and performance:</p> <ul style="list-style-type: none"> ● At Home screen ● User click Monitoring compiler usage and performance tab ● The system show Monitoring compiler usage and performance screen 		
Alternative Flow	N/A		
Exceptions	N/A.		
Priority	High		
Frequency of Use	High		
Business Rules	BR-16		

Other Information	N/A
Assumptions	N/A

Table: UC - 41. Monitoring compiler usage and performance

UC - 42. Managing and configuring the compiler tool

Use Case ID	UC - 42	Use Case Name	Managing and configuring the compiler tool
Created By	AnhLB	Created Date	05/03/2023
Primary Actor	Admin	Secondary Actor	N/A
Description	Admin can Managing and configuring the compiler tool		
Pre-conditions	PRE-1: Admin has signed into the website.		
Post-conditions	Admin can Managing and configuring the compiler tool		
Normal Flow	Managing and configuring the compiler tool: <ul style="list-style-type: none"> ● At Home screen ● User click Managing and configuring the compiler tool tab ● The system show Managing and configuring the compiler tool screen 		
Alternative Flow	N/A		
Exceptions	N/A		
Priority	High		
Frequency of Use	High		
Business Rules	BR-16		
Other Information	N/A		
Assumptions	N/A		

Table: UC - 42. Managing and configuring the compiler tool

3. Functional Requirements

3.1 System Functional Overview

3.1.1 Screens Flow

Student screenflow

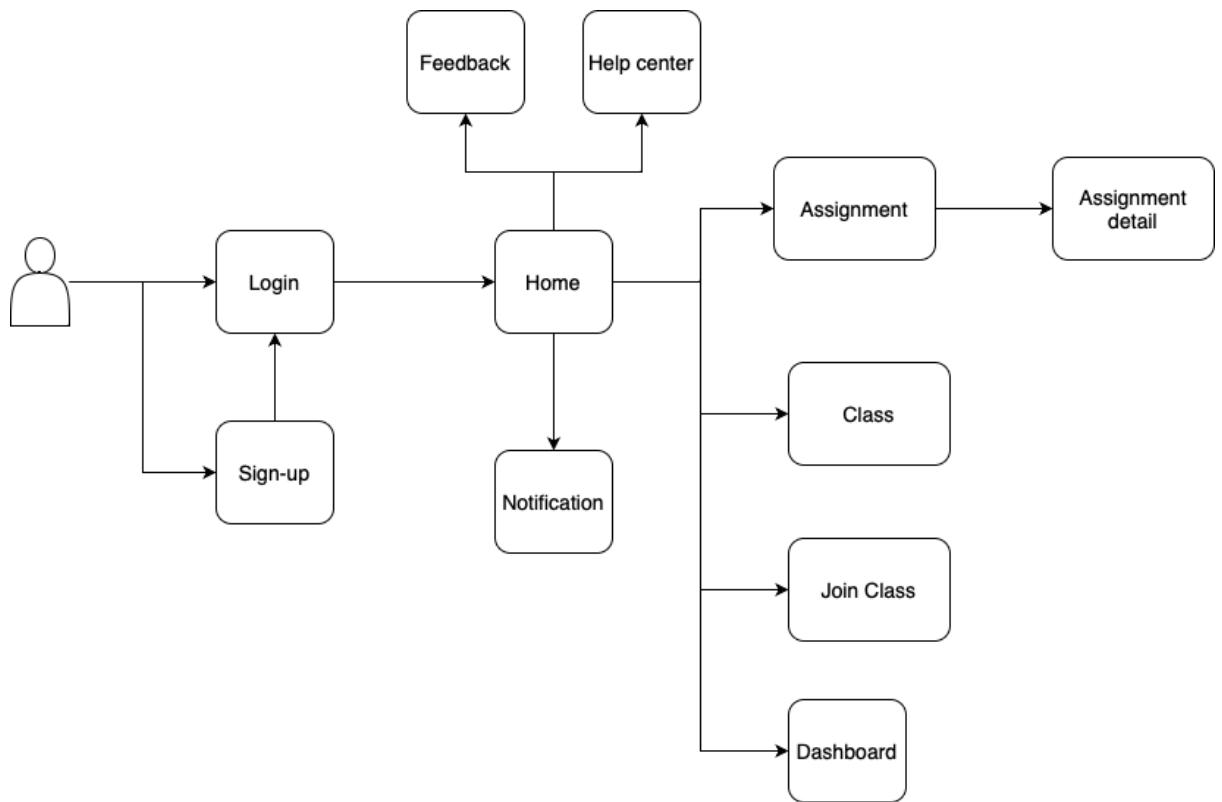
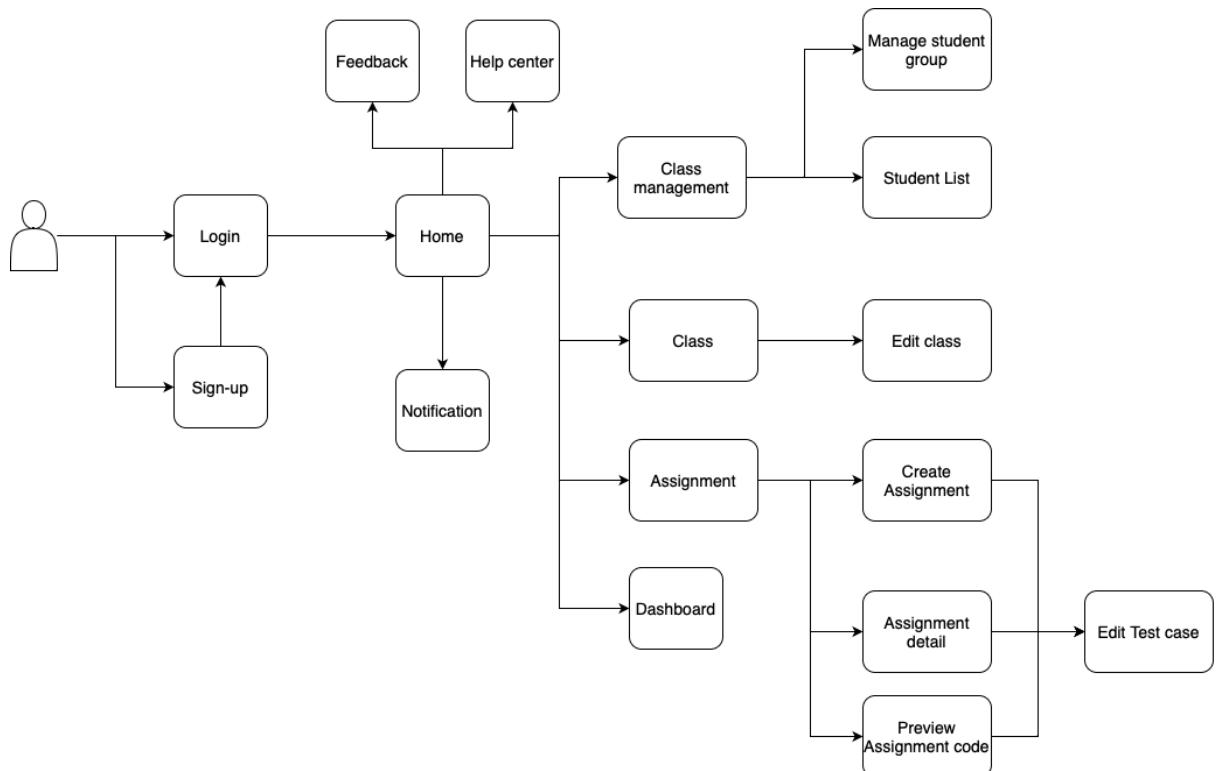
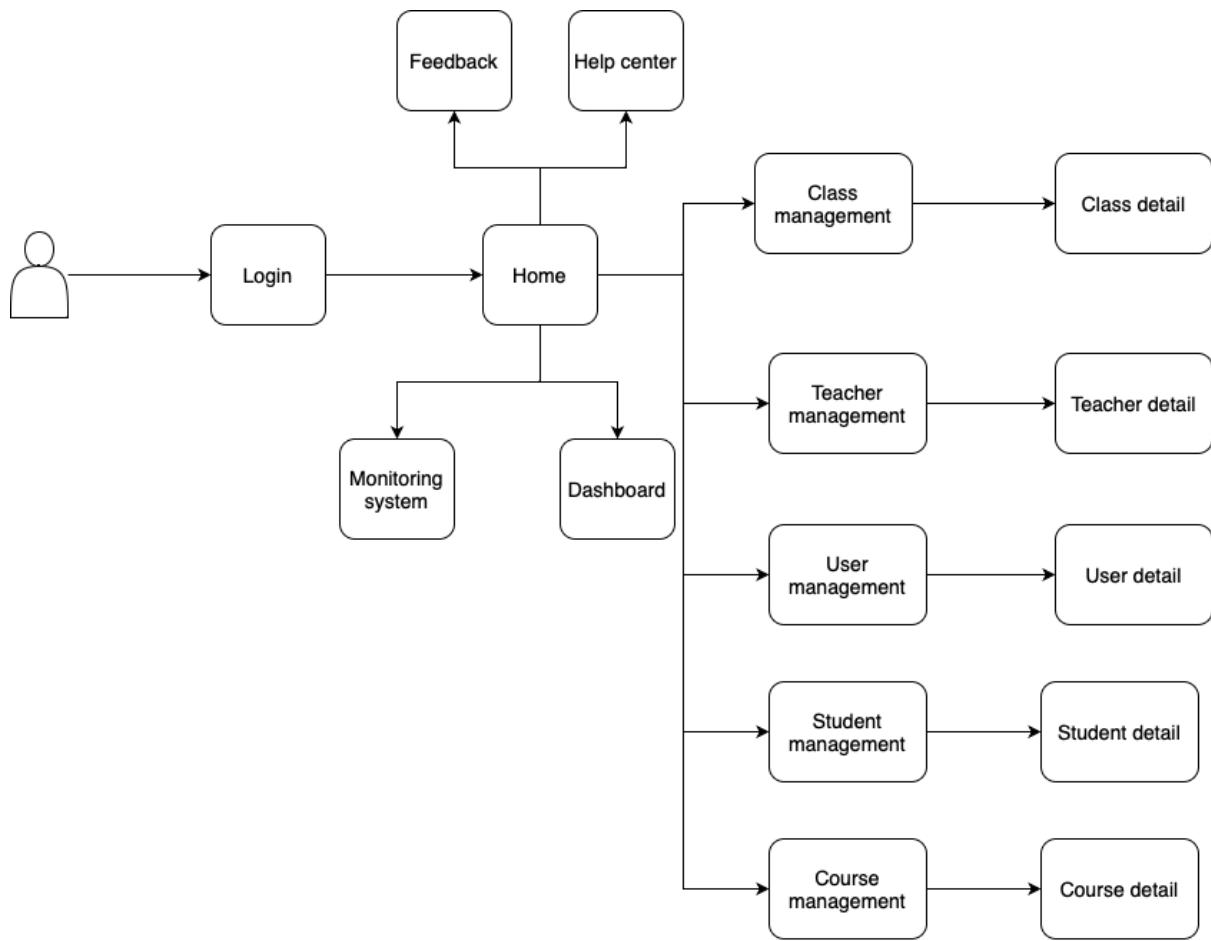


Figure 3.3.1.1.1: Screens flow

Teacher screenflow



Admin screenflow



3.1.2 Screen Descriptions

Role	Feature	Screen	Description
All	Authenticate	Sign up	Users don't have an account yet and create new accounts.
	Authenticate	Sign in	Users already has an account and sign in to the system
	Dashboard	Dashboard	User can view dashboard
Student	Assignment	Assignment list	Users viewers Assignment list
		Assignment detail	User view detail from Assignment list
	Class	Class List	Display all class available

		Class detail	Display information of class
Teacher	Management student	Student List	Display all list student
		Import class	Teacher import class
	Slot	Edit slot	Teacher can edit slot
	Assignment	Edit Assignment	Users can edit assignment
		Add assignment	Teacher add assignment
		Assignment process	Teacher view assignment process
		Assignment preview code	Teacher view code of student
		Create test case	Teacher create/ edit test case
		Add question for assignment	Teacher adds question for assignment
Admin	Dashboard	Dashboard	Admin view dash board of system
	Management student	Management student	Admin can create, update, remove student
	Management teacher	Management teacher	Admin can create, update, remove teacher
	Management course	Management course	Admin can create, update, remove course
	Management class	Management class	Admin can create, update, remove class
	Management system	Management system	Admin manage the system
	Feedback	View feedback	Admin can view feedback
	Technical support	Technical support	Admin view Technical support

3.1.4 Non-Screen Functions

None

3.1.5 Entity Relationship Diagram

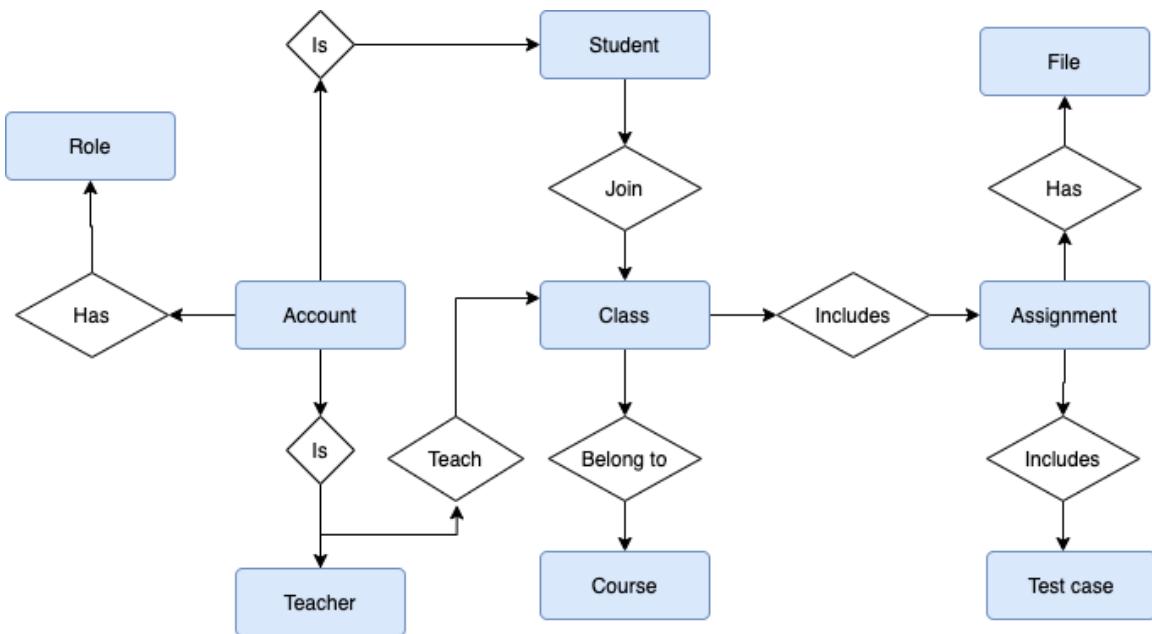


Figure 3.3.1.6.1: Entity Relationship Diagram

Entities Description

#	Entity	Description
1	Role	Defined role.
2	Account	Defined account of system
3	Student	Student, an actor in system, who practice assignment
4	Teacher	Teacher, an actor in system, who manage assignment and student
5	Class	A Class have many student and one teacher
6	Course	A Course is holding information about course
7	Assignment	An Assignment holding information about assignment
8	File	A File holding information about file which student submitted

4. Non-Functional Requirements

4.1 External Interfaces

4.1.1 User Interfaces

- UI-1: The application has a user interface friendly and is easy to use.
- UI-2: The page layout of the screen is streamlined, clearly, easy to operate, and implement for the user.
- UI-3: Have a responsive layout for Desktop, Tablet, Mobile screen.
- UI-4: Buttons have distinctive features and colors, based on the standard of UI layout.
- UI-5: Active button or link direction when user is on a screen or function, sync with the interface.
- UI-6: Notifications displayed based on events the user has done on the screen have a banner outlining the content for the user.
- UI-7: Use icons to provide visual insights to users.

4.1.2 Software Interfaces

Require Web Browsers - Web Application

- SI-1: Require Web Browsers that have HTML5 / CSS3 / Javascript supported

Web / Mobile Browser	Infrastructure Classic Console and Applications Console
Microsoft Internet Explorer	11 or later
Mozilla Firefox	52 or later
Google Chrome	63 or later
Apple Safari	10 or later
Microsoft Edge	35 or later
Safari, Chrome, Firefox on iOS (iPad and iPhone)	Latest

Chrome, Firefox on Android (Phone and Tablet)	Latest
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4.1.3 Hardware Interfaces

HI-1: To use an application, a smart device such as a phone, computer, laptop or tablet is required.

HI-2: Because the application runs on the Internet, the device has to connect to the Internet

4.1.4 Communications Interfaces

CI-1: The communication architecture must follow the client-server model.

CI-2: Communication between the client and server should utilize a REST-compliant web service and must be served over HTTP Secure (HTTPS).

4.2 Quality Attributes

4.2.1 Usability

- Main languages: Vietnamese (English Optional)
- User interfaces are friendly, easy to use and should be elegant.
- All the titles or names of features, function should be easy to understand and reflect the purpose of the function.
- Error messages should be clearly and detailed.
- Direction or links are easily recognizable and can be clickable.
- Buttons, checkboxes, dropdowns, etc are easily clickable.
- The Front-end web application should support almost all Web Browsers.

4.2.2 Reliability

- Availability:
- MTBF (Mean Time Between Failures): 1 month
 - **MTBF = # of operational hours ÷ # of failures**
- MTTR (Mean Time To Repair): 30 minutes (It includes both the repair time and any testing time)
- Accuracy:
- Maximum Bugs: 10% (No fatal, user interfaces or server error, only automatically recoverable)
- Bugs Rate or Defect Rate:

- Minor: Error in back-end that rarely happen and automatically recoverable
- Significant: Error that usually happen but automatically recoverable
- Critical: Error that leads to data loss, system down.

4.2.3 Performance

- Response time for a transaction:
 - **Average:** 3s
 - **Maximum:** 5s
- The number of customers visiting the system can accommodate: 1000 users.
- The application's action should feel snappy, responsive and needs to be light-weighted and not use much memory or resources.

4.2.4 Dependability

4.2.4.1 Security

- The password must be encrypted.
- The user in any role will only display the screen according to that role.
- Using Token-Based Authentication to secure requests from and to the server.

4.2.4.2 Safety

- Using multiple hardware server to store back-up version of the database in case of failure
- This product is a web application that will not affect any other application, which may lead to data loss or system damage.

4.2.5 Supportability

- The system will have maintenance periods to improve user security.
- The system will update content updates for users.
- The system has counselors to support users if they have any problems.

4.2.6 Design Constraints

- Support languages: English.
- Development and Debugging tools are limited to only the developer team.
- Programming Language:
 - Back-end Framework: Django
 - Front-end Framework: Angular
 - Database Engine: PostGreSQL

4.2.7 Support Documents

- Web Application Manual

4.2.8 Purchased Components

- No purchased components have been identified

5. Requirement Appendix

5.1 Application Error Messages List

Error Messages		
Code	Type	Content
EM1	Text under field	[Field name] is required.
EM2	Text under field	Please enter a number greater than 0
EM3	Alert box	Server error. Please try again!
EM4	Alert box	[Field name] is invalid
EM5	Alert box	Your file submission was unsuccessful. Please try again.
EM6	Alert box	Please sign in your account
EM7	Alert box	The data is not found
EM8	Alert box	The data is invalid
EM9	Alert box	File size is exceeding [size]MB
EM10	Alert box	File format is invalid

5.2 Application Success Messages List

Success Messages		
Code	Type	Content
S1	Popup	Login successfully
S4	Alert Box	Create assignment successfully
S5	Alert Box	Update assignment successfully
S6	Alert box	Delete assignment successfully
S7	Alert box	Import class successfully
S8	Alert box	Create student successfully
S9	Alert box	Update student successfully
S10	Alert box	Delete student successfully

S11	Alert box	Create teacher successfully
S12	Alert box	Remove teacher successfully
S13	Alert box	Create test case successfully
S14	Alert box	Create course successfully
S15	Alert box	Create class successfully