



School of Computer Sciences

CAT404 Software Engineering Major Project

Analysis Report

SE23240013: CS One Stop Portal

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DECLARATION

“I declare that the following is my own work and does not contain any *unacknowledged* work from any other sources. This report was undertaken to fulfill the requirements of the Undergraduate Major Project for the Bachelor of Science in Computer Science (Honors) program at Universiti Sains Malaysia”.

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ABSTRAK

Proses pengajaran dan pembelajaran (P&P) merupakan suatu perkembangan yang melibatkan pensyarah universiti dan pelajar sarjana dalam sektor pendidikan tinggi. Proses pengajaran dan pembelajaran yang efektif memainkan peranan yang penting dalam peringkat universiti. Portal Satu Berhenti Sains Komputer USM telah direka untuk membantu pelajar, pensyarah, dan kakitangan dalam menguruskan maklumat yang diperlukan, bahan pembelajaran, pengumuman, atau sumber lain yang berkaitan dengan kursus Sains Komputer USM untuk meningkatkan proses P&P dalam kursus Sains Komputer di Universiti Sains Malaysia. Sistem laman web ini memperkenalkan cara yang terpusat untuk berkongsi dan mengemaskini dokumen penting seperti pengumuman, bahan pembelajaran, jadual waktu, dan templat laporan bagi komuniti Sains Komputer USM. Matlamat Portal Satu Berhenti CS adalah untuk membantu pengguna laman web menyebarkan maklumat penting bagi komuniti Sains Komputer dengan lebih efektif untuk memastikan komunikasi dan pemahaman yang lebih baik.

Kata kunci: Proses pengajaran dan pembelajaran (P&P), Portal Satu Berhenti Sains Komputer USM, cara terpusat, pengongsian dokumen, penyebaran informasi

ABSTRACT

Teaching and learning (T&L) process is an evolutionary process that involves both university lecturers and graduate students in the higher education sector. An effective teaching and learning process plays an important role in universities. In order to enhance the T&L process in University Sains Malaysia Computer Science course, the Computer Science One Stop Portal is designed to assist students, lecturers, and staffs to manage the necessary information, learning materials, announcements, or any resources that related to the USM Computer Science course. This website system introduces a centralized way to share and update the important documents such as announcements, learning materials, timetable, and report templates for the USM Computer Science community. The goal of CS One Stop Portal is to assist the website users in disseminating vital information for the Computer Science community in a more effective way to ensure a better communication and understanding.

Keywords: Teaching and Learning process, Computer Science One Stop Portal, centralized way, document sharing, information dissemination

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LIST OF ABBREVIATIONS AND SYMBOLS

CPU	- Central Processing Unit
CS	- Computer Science
IMS	- Internship Management System
IPS	- Institute of Postgraduate Studies
OBE	- Outcome-based education
RAM	- Random-access memory
SDG	- Sustainable Development Goal
SWOT	- Strengths, Weaknesses, Opportunities and Threats
T&L	- Teaching and Learning
USM	- Universiti Sains Malaysia

1 INTRODUCTION

1.1 Background

In Universiti Sains Malaysia Computer Science community, teaching and learning process represents a dynamic landscape in the development of innovative graduates. In order to achieve this goal, many platforms such as USM online learning application and USM CS official website are developed and utilized by the community. However, there are some problems in the T&L process.

The inefficiency and inconvenience in accessing all the resources is a major problem that must be addressed. For example, the lecturers can only send the latest version of the Bloom's taxonomy to other lecturers by using emails or Onedrive links. It is inconvenient for the lecturers as they need to always find for the specific emails to look for the respective version of document. The same problem will occur to the lecturers who are assigned as the examiners of the final year projects as well. Only the final year project coordinators and final year students are given access to the E-learning platform. The lecturers who are assigned as examiners will face difficulty if they are not granted access. This is because all the final year project related documents such as report templates, toolkits and marking guidelines are all uploaded on Elearn. They cannot access to Elearn to check for the documents if they want to mark students' project. According to a survey that I conducted, 44.3% of respondents stated that it is difficult to access the resources by using the current platforms (refer to Appendix A).

There is not an existing system or portal that assists lecturers on these kinds of documents. I see this as an important issue to tackle to reduce the inefficiency of sharing contents in the Computer Science community. In alignment with the United Nations Sustainable Development Goal 4: Quality Education, I want to develop a website application as a platform for the USM CS students, lecturers, and staffs to keep track of the latest information in a centralized way, as well as promote a better way in disseminating learning resources or contents to guarantee the quality of education.

1.2 Problem Statements

The problem statements based on three communication scenarios which are staff and students, lecturers and lecturers and lecturers and students will be discussed.

The first scenario is the communication between staffs and students. Usually, the staffs will send the details of the latest competitions to the students by using emails. However, this will become an issue when the students are receiving plenty of emails every time. Some students will tend to ignore all the unread emails and they might miss the latest information about the competitions. This phenomenon will become serious if the students do not turn on notifications when they receive a new email.

The second scenario is the communication between the lecturers. The problem occurs in the outcome-based education (OBE) field. The lecturers must have a clear vision on the competencies and levels which students are able to achieve upon graduation [1]. To further explain, lecturers will need to submit file course documents at the end of every semester for the continuous quality improvement (CQI) in order to improve performance of students in academics. Another example of this scenario is the Bloom's taxonomy. Bloom's taxonomy is defined as a method that is designed for the lecturers to discuss and exchange learning and assessment methods. Bloom's taxonomy is divided into six categories which are create, evaluate, analyze, apply, understand and remember [5][6] (refer to Appendix A). The lecturers will utilize Bloom's taxonomy in designing the final examination question. However, there are a lot of versions of Bloom's taxonomy. Currently, the lecturers will receive the latest version of Bloom's taxonomy via emails. However, the lecturers will face difficulties in finding the documents because they receive plenty of emails every time.

Next, the communication issue between lecturers and students will be discussed. I will take the example of third year students. In the USM Computer Science course, it is compulsory for all the third-year students to have the internship program. Before the internship starts in Semester 2, the lecturers will have a briefing on the internship prerequisites. They will also share all the relevant information on a padlet (refer to Appendix A). However, the lecturers need to create several boards to upload the

documents. Besides, the documents are unorganized, and it affects students' readability. Students might face issues in finding the documents.

In conclusion, referring to the above paragraphs, there is not a direct channel of communication between the lecturers, staffs and students regarding the exchange and sharing of materials. The inefficiency and inconvenience of the CS community members in accessing all the relevant resources have become principal problems and causes that led to the creation of this system. Different from the current E-Learn or current platforms, this system allows users to manage their resources in a more organized way without scattering them through multiple channels, they are all managed in an integrated portal. In order to improve the exchange of knowledge and resources among community members, it is necessary to create a centralized one-stop platform that will assist USM CS community members in sharing information more effectively.

1.3 Motivation

The main motivation to create this CS One Stop Portal system stems from the lecturer's suggestion that related to the inefficiency problems in accessing the information faced by students, lecturers, and staffs that I discovered happening in USM CS community. The suggested system is a compelling and actionable solution to directly improve the quality of education, and it will be beneficial for all parties in USM CS community.

It is vital to raise awareness among the USM CS community on the most effective method to have a better communication in terms of contents sharing and dissemination. Besides, it is necessary to ensure that the portal is made easily available for the communities so that they will be well-equipped with the latest information on the ongoing updates that happen in USM CS community.

Besides, there is an overload and scattering of information about all the important announcements, learning resources, and materials that are made available on various platforms such as Padlet, emails, Onedrive links and USM E-Learning portal. This may cause confusion to all the parties involved in USM CS community. Hence, it is

motivated to develop a centralized and reliable website portal to assist the users in accessing information from verified sources so that an effective contents distribution and dissemination can be achieved, in which it leads to a good quality of education.

1.4 System Objectives

1. To develop a centralized portal system for all the USM Computer Science students, lecturers, and staffs to allow them in looking for the respective needed information in a more efficient way.
2. To develop a reporting module that includes displaying dashboards in the system for all groups to allow users in viewing and access the respective files, materials, resources or competitions.
3. To develop event management module in the system to allow the lecturers and staffs to manage all CS related resources.
4. To develop user permissions module for the respective groups of users to access only specific information.

1.5 Proposed Solutions

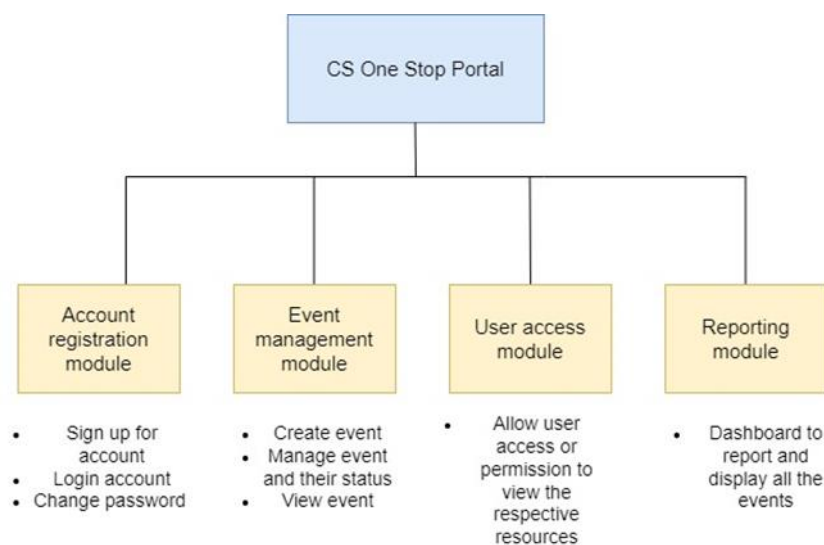


Figure 1: Module breakdown diagram

To implement the USM CS one stop portal website system, a few possible modules will be implemented as shown in the above figure. I will next give a brief explanation on each module. The project will be implemented by using the agile method.

The first module that will be implemented in the system is the account registration module. In this module, when a person visits the website for the first time, the person will be asked to sign up for an account in the system.

The second module that will be included in this system will be event management module. In this module, the lecturers or staffs are able to create events. By creating events, the lecturers are able to upload and share the important resources, learning materials and information.

Next, the user access module will be implemented in the system as well. In this module, users should be given access or permission to view and download respective resources only. For example, all the internship documents such as insurance form, certification letter form and list of company should be made visible to third year students only.

Lastly, a reporting module will be implemented in the system. In this module, dashboards will be developed for all events. On the dashboard, several lists will be displayed, in which list of resources, materials and documents, and list of competitions will be shown to the students. For the competition part, a list of participants will be made available as well. Every event will have one dashboard that displays the respective resources. Dashboards should be made user-friendly and easily accessible to all users.

The further elaboration on the modules will be discussed in Chapter 3.6.1 which is the purpose and functionality of each module.

1.6 Benefits and Uniqueness of the Proposed Solutions

The development of the USM CS One Stop Portal system aligns with Sustainable Development Goal number 4 – Quality Education, which is a significant turning point of the current situation that faced by USM CS community. SDG number 4 ensures an inclusive and equitable quality education and promote lifelong learning opportunities for all [9].

Firstly, the proposed system can promote a better teaching and learning environment for the students and lecturers in USM Computer Science course. By utilizing the system, it is strongly believed that the community can access the resources in a more convenient way. This will directly lead to a more improved education that can ensure a more improved development of knowledge among the community.

Moreover, the proposed system is a centralized and reliable system. The USM CS community needs to depend on other platforms to access the necessary documents, which is very inconvenient. Now, the documents are organized in a centralized system, in which it will help to boost the efficiency of the community in accessing the resources for learning purposes.

Not only that, the CS one stop portal also allows a more dynamic contents sharing and dissemination. The students are always able to get the latest updates by the School of Computer Sciences such as important announcements and competitions. For lecturers and staffs, the system assists them in uploading respective resources to specific groups of students, for example final year project reports templates for lecturers and final year students, internship documents for Year 3 students, all the bloom taxonomy versions for the lecturers, and also timetable for all groups of students.

1.7 Organization of the Report

This section will include the organization of the report. The first chapter discusses about the introduction of the project which consists of project background, problem statements, motivation, proposed solutions and benefits and uniqueness of the project. SDG alignment will be addressed in the first chapter. Next, the second chapter discusses about project background and its related work which incorporates with status of project development, relevant projects, strengths and weaknesses of the existing system and the proposed work. The next chapter addresses the system requirements and design part, which consists of project scope, system capabilities and system limitations. In the project management section, work breakdown structure, Gantt chart and SWOT analysis are discussed as well. Development methodology and detailed requirements of the new system are addressed next. The analysis of the new system which consists of use case diagram, use case descriptions and sequence diagram is included in this chapter. Next, the detailed description of proposed solution such as the functionalities of each module, flow chart and architecture diagram are included. Technology deployed which includes hardware specifications and software specifications are delivered. The last chapter will be the conclusion of the report, followed by references and appendices.

2 BACKGROUND & RELATED WORK

2.1 Status of Project Development

The proposed system - CS One Stop Portal is a newly developed project. It is not a continuation of the previous final year project. It is proposed to maximize and enhance the communication and information sharing among all CS community members which involves students, lecturers and staffs.

2.2 Relevant project

There are some existing projects that are related to the one stop portal.

1. USM IPS system

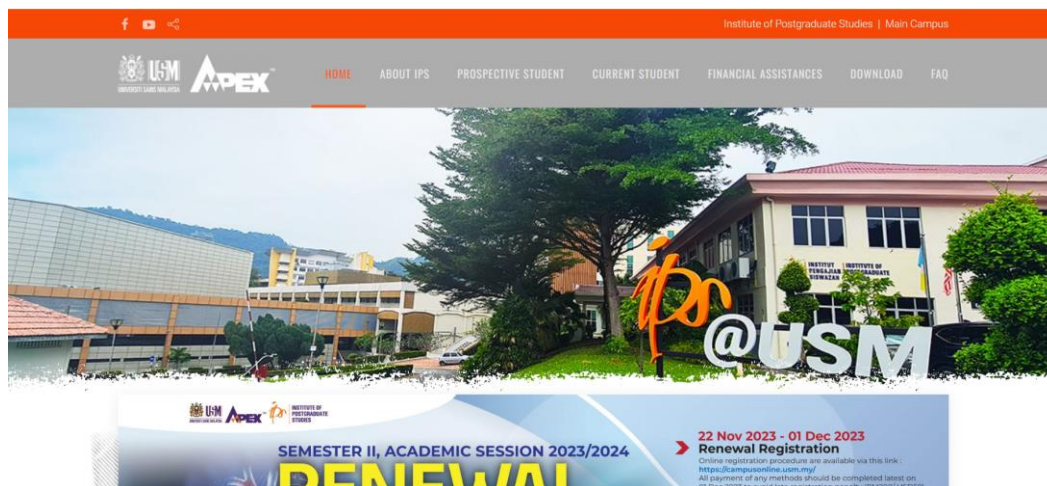


Figure 2: USM IPS system

The Institute of Postgraduate Studies (IPS) of Unisersiti Sains Malaysia (USM) was established in 1970 to address the increase of students enrolled in higher-degree programme [2]. IMS system serves as a platform for the postgraduate students to access all the needed documents such as financial assistances, graduation requirements and check their application status.

2. USM IMS system

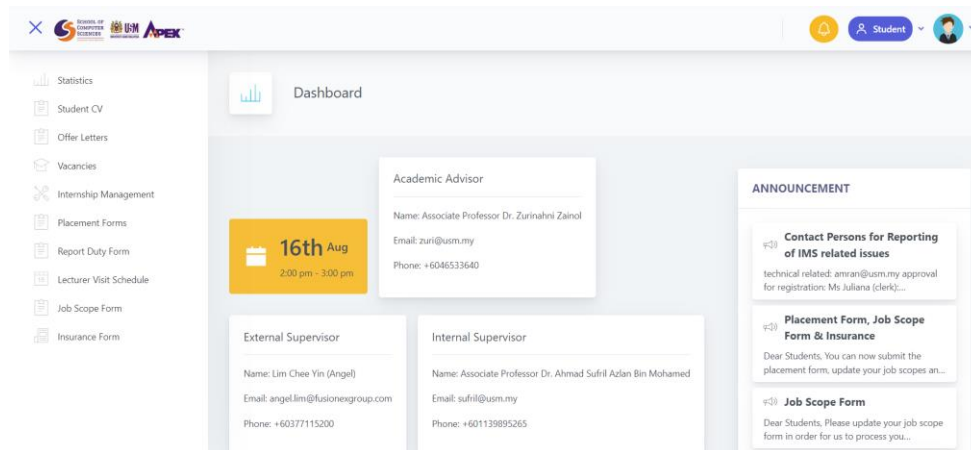


Figure 3: USM IMS system

The USM Internship Management System (IMS) is the system that acts as a platform to manage the computer science internship related affairs for the USM CS third year undergraduates [3]. Students can upload their internship related documents logbooks, report duty forms, job scope forms and insurance forms on the system. The students can also check the supervisors' details and the scheduled internship visit on the system.

3. USM E-learning portal

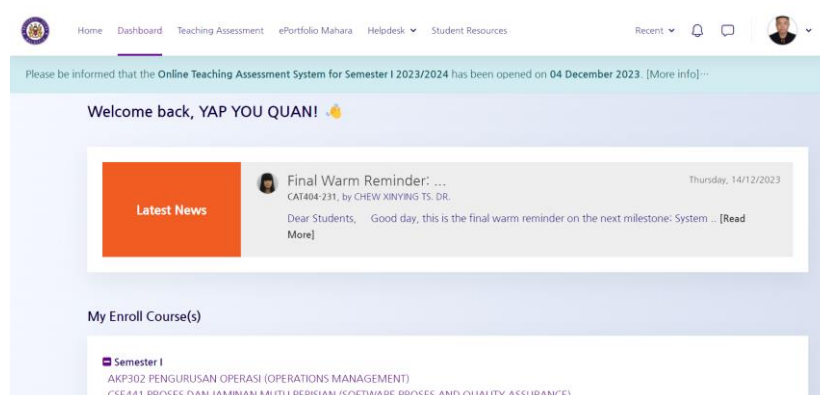


Figure 4: USM E-learning portal

USM E-learning portal is an online platform for all USM students to access their learning resources and materials [4]. They can view their enrolled courses and the latest announcements on the platform.

2.3 Strengths and weaknesses of existing system/work

The following table explains about the strengths and weaknesses of the existing systems.

Table 1: Comparison of strengths and weaknesses between the systems

No.	Systems	Features	Strengths	Weaknesses
1.	USM IPS system	<ul style="list-style-type: none"> Access to postgraduates related information 	<ul style="list-style-type: none"> Assist the postgraduates in accessing documents 	<ul style="list-style-type: none"> Does not contain list of competitions that are available for the postgraduates to join
2.	USM IMS system	<ul style="list-style-type: none"> Upload the internship related documents Notification features 	<ul style="list-style-type: none"> Help the third-year students to organize their internship documents 	<ul style="list-style-type: none"> The original form is not available on the system, students still need get them from the lecturers by emails or padlets
3.	USM E-learning portal	<ul style="list-style-type: none"> Latest new features Search for contents View the enrolled courses list 	<ul style="list-style-type: none"> A learning platform or course management system which is designed to provide lecturers, administrators and students to create personalized learning environments 	<ul style="list-style-type: none"> Only coordinators and final year students can access the final year e-learning platform, other lecturers cannot access the platform without access

2.4 Proposed work

The proposed solution is to provide a more centralized platform for all the CS community members to improve their efficiency in accessing all the necessary documentations. Besides, it also enhances the information sharing among the community members. By developing this system, I hope to promote a more transparent information dissemination in the community in a more dynamic way.

3 SYSTEM REQUIREMENTS AND DESIGN

3.1 Project scope, system capabilities, and system limitations

3.1.1 Project scope

A centralized CS one stop portal will be developed. This portal will have a frontend website page that displays all the functionalities and is connected to the backend which is USM CS database. A note to take is that only the USM CS community members are allowed to access the system. The students, lecturers and staffs are not allowed to do so. The project consists of four major modules, which are account registration module, event management module, user access module and reporting module.

3.1.2 System capabilities

The CS one stop portal allows the users to manage their personal accounts, in which they can create, edit or delete their accounts. It is compulsory for all users to make account registration first before using the system. After creating an account, they can use it to log into the website and it will bring to another capability which is view the website dashboard. The website dashboard contains notification features, in which the users are able to receive and view the latest notification. Users can perform log out action and change their password by clicking on the setting icon on top of the website.

The website contains a sidebar menu that has the functionality which is dashboard, list of resources and list of event. Users can view important announcements such as system maintenance announcements and the person that should be contacted when facing technical issues on the dashboard. In the list of resources, users can manage resources and materials, in which they can upload, edit and delete the resources. Users can also perform access management on the website. They can choose the group of users they wish to grant access to in accessing the documents or remove the users' access for preventing them from viewing the documents. Viewing the documents in the list of resources is possible for those users who have been granted access. They can download the documents for offline view. Another capability is the users can manage event by uploading, editing or deleting the list of competitions. Users must upload all

the relevant competition information such as posters, rules and regulations, and also registration links. Users with granted access can view the list of events and find their interested competitions to join.

3.1.3 System limitations

The system has its limitations in some aspects. Firstly, although the system provides a list of events for the users to join, the users can only retrieve all the relevant information through the portal. Meaning to say, the system is not managing the whole registration process of the particular event, and users are still required to perform registration separately. Besides, the system also only allows users to retrieve the necessary resources. A suitable example will be the internship documents. The system only assists users to access the documents in a more efficient way, however the further action such as the submission of forms and reports still need to be done on the internship management system, not on this one stop portal, as they are separate systems and not integrated.

3.2 Project management

3.2.1 Work Breakdown Structure (WBS)

The diagram below shows the work breakdown structure (WBS) of the project.

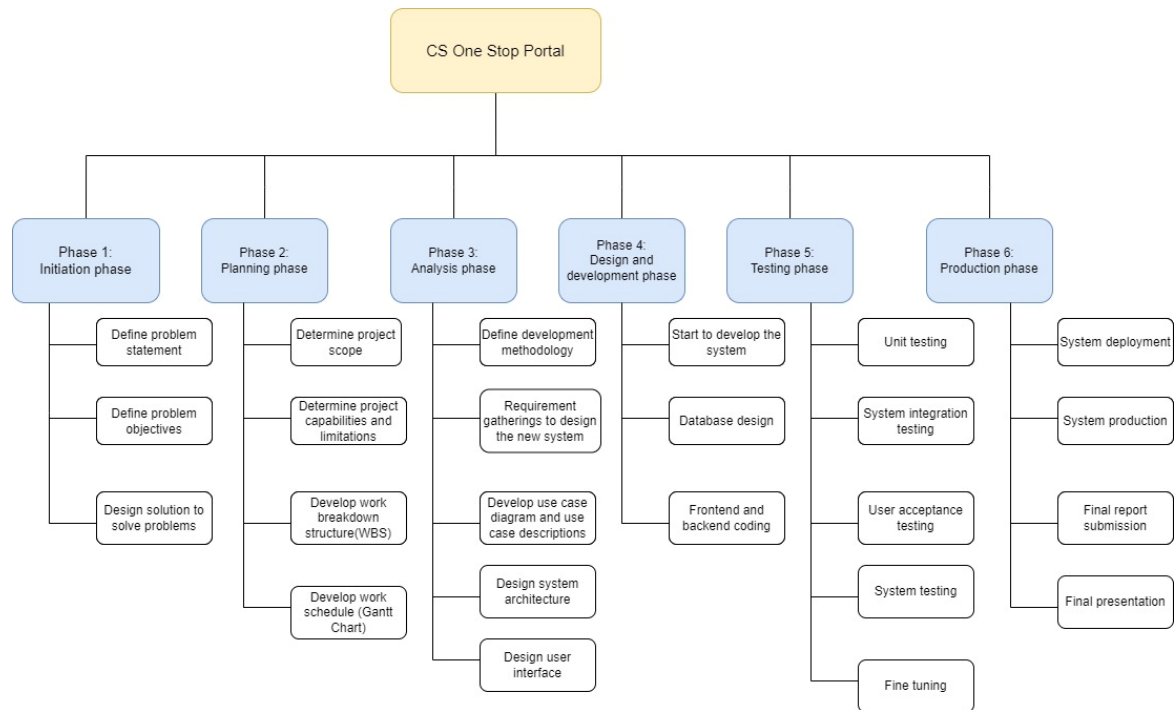


Figure 5: Work breakdown structure

3.2.2 Work Schedule

The figure below shows the work schedule of the project, which is indicated by using Gantt Chart.

Task	October	November	December	January	February	March	April	May	June
1. Initial phase									
a. Define problem statements									
b. Define problem objectives									
c. Design solution to solve problems									
2. Planning phase									
a. Determine project scope									
b. Determine project capabilities and limitations									
c. Determine work breakdown schedule									
d. Develop Gantt Chart									

3. Analysis phase									
a. Determine development methodology									
b. Requirements gathering to design the new system									
c. Develop use case diagram and use case description									
d. Design system architecture									
e. Design user interface									
4. Design and development phase									
a. System development									
b. Database design									
c. Frontend coding									
d. Backend coding									

5. Testing phase									
a. Unit testing									
b. System integration testing									
c. User acceptance testing									
d. System testing									
e. Fine tuning									
6. Production phase									
a. System deployment									
b. System production									
c. Final report submission									
d. Final presentation									

Figure 6: Gantt Chart of the project

3.2.3 SWOT Analysis

The table below shows the SWOT analysis of this project.

Table 2: SWOT analysis

<p style="text-align: center;">Strength</p> <ul style="list-style-type: none">• More transparent information sharing among all community members• Enhance the efficiency in accessing the resources• Convenient and high accessibility• Enable a more adequate dual-way communication among all community members	<p style="text-align: center;">Weakness</p> <ul style="list-style-type: none">• Not integrated with other available CS related systems, such as internship management system• The system only provides the list of available competitions, but not managing the registration process, users still need to perform registration manually• The system cannot recommend personalized contents for the users because it is not engaging with users' behaviors
<p style="text-align: center;">Opportunities</p> <ul style="list-style-type: none">• A centralized solution that can be used by the users in accessing the resources• Use feedback mechanism to continuously improve the portal and implements latest technologies to evolve with the potential educational requirements in future.	<p style="text-align: center;">Threats</p> <ul style="list-style-type: none">• The portal has some similar features with the CS existing systems such as E-learning platform, and it might be easily replaced.

3.3 Development Methodology

For the development of this CS one stop portal, the agile development methodology is chosen. The agile methodology was selected due to its user-centered approach, which facilitates uncertainty management and allows for quick responses to the environment's rapidly changing requirements. The software development process is divided into iterations by the agile technique, which also uses an iterative approach. During these iterations, project components are developed and tested. Every iteration has a completion date by which specific deliverables need to be made. The procedures will be repeated in a loop during agile iterations until an optimal outcome is obtained. Agile methodology is also a systematic model to develop the project because it involves several phases such as project planning, system design, system develop, testing, deploying the project and project review [7]. The following figure shows the overall cycle of agile methodology.

3.4 Detailed requirements of new system

3.4.1 Functional requirements

The system is developed based on the functional requirements below:

Table 3: Functional requirements

Functional requirements	Descriptions
FR-001	The system will allow users to register as a new user of the system so that he/she can access all functionalities in the website.
FR-002	The system will allow users to login to the website using the registered username and password.
FR-003	The system will allow users to view dashboard of the website
FR-004	The system will allow users to change and update password
FR-005	The system will allow users to upload resources and materials
FR-006	The system will allow users to view list of resources and materials
FR-007	The system will allow users to update list of resources and materials

FR-008	The system will allow users to search for contents in the website from search bar
FR-009	The system will allow users to view notifications when there are any updates
FR-010	The system will allow the logged in user (lecturers that act as coordinators) to create access for the lecturers to view resources and materials.
FR-011	The system will allow the logged in user (lecturers that act as coordinators) to remove lecturers access which prevents the lecturers from viewing the resources and materials.
FR-012	The system will allow the logged in user (lecturers) to create access for the students to view resources and materials.
FR-013	The system will allow the logged in user (lecturers) to remove students access which prevents students from viewing the resources and materials.
FR-014	The system will allow users to create list of events that contains competitions for other users(students) to join
FR-015	The system will allow users to view list of events that contains competitions
FR-016	To allow users to update list of events that contains competitions

3.4.2 Non-functional requirements

The website application should be developed and evaluated based on the non-functional requirements below [8]:

Table 4: Non-functional requirements

a) Product Evaluation

Evaluation List	Descriptions
Performance	<ul style="list-style-type: none"> • Every user event request and response time should be less than 3 seconds. • The application start-up time must be less than 3 seconds. • The application should be capable of handling the application process without delay even if the user opens multiple applications at the same time. • The application should be able to save current progress and return to the saved point after being interrupted. • The application should support the latest stable version for Google Chrome, Firefox, Microsoft Edge and Safari browser.
Dependability	<ul style="list-style-type: none"> • The application must not have downtime during normal working hours. • The application must not have more than 3 minutes of downtime per day outside working hours. • The mean time of failure of the application should be 5 minutes. • The application update process must finish within 3 hours, so data is available by 8 a.m. local time after an overnight update.
Space	<ul style="list-style-type: none"> • The application should be able to support the sudden spikes of the user without risking crashing the system
Usability	<ul style="list-style-type: none"> • The application must have a user-friendly and easy-to-understand interface in which the user errors are minimized. • The application must have a user-friendly and easy-to-understand interface in which the user errors are minimized. • The application feature should be able to run similarly in different mobile operating systems
Portability	<ul style="list-style-type: none"> • The application could enable users to use the system either on mobile devices, tablets, or computers.
Recoverability	<ul style="list-style-type: none"> • The application failure fix should be completed within 1 hour when it happens. • The application should allow users to manually backup their data from time to time.

	<ul style="list-style-type: none">• The application should allow users to download all the personal data in the application.
Security	<ul style="list-style-type: none">• The personal information and sensitive data of the user must only be accessed by authorized users.

b) Organizational Evaluation

Evaluation List	Description
Operational	<ul style="list-style-type: none">• The authentication process for user.
Development	<ul style="list-style-type: none">• The software developed using Angular, Express.js, JavaScript, HTML, and CSS.

c) External Evaluation

Evaluation List	Description
Regulatory	<ul style="list-style-type: none">• The application should comply with the The Computer Crimes 1997
Environment	<ul style="list-style-type: none">• The application should be able to run at normal capacity without downtime during raining season

3.5 Analysis of new system

3.5.1 Use case diagram



Figure 7: Use case diagram

3.5.2 Use case description

Table 5: Use case description of Register Account

U001: Register account

Use case name:	Register account	
Scenario:	Register an account to use the system	
Triggering event:	Users want to register account to use the system	
Brief description:	Users fill in the form respectively that includes all the important details such as email address and password.	
Actors:	Students, lecturers, staffs	
Related use cases:	-	
Stakeholders:	Students, lecturers, staffs, developer	
Preconditions:	Users have not registered an account on the system before	
Postconditions:	Users have accounts on the system	
Flow of activities:	Actor	System
	<ol style="list-style-type: none"> 1. Users click on “register as ‘role’” button on the login page. 2. Users fill in the details in the form. 3. Users click the “submit” button. 	<ol style="list-style-type: none"> 1. The system will display the login page. 2. The system will prompt a form for users’ details after users click on the register button. 3. The system will collect, record and save information from the user.
Exception conditions:	<ol style="list-style-type: none"> 1. System cannot display the form. 2. Users enter wrong input in the form. 3. System cannot collect, record and save the information. 4. The login page is not displayed. 	

Table 6: Use case description of Login Account

U002: Login Account

Use case name:	Login account	
Scenario:	Login to the system using the created account	
Triggering event:	Users want to log into the system by using the created accounts	
Brief description:	Users fill in email address and password that used to create their account in the given bar so that they can log into the system.	
Actors:	Students, lecturers, staffs	
Related use cases:	U001	
Stakeholders:	Students, lecturers, staffs, developer	
Preconditions:	Users have already created an account.	
Postconditions:	Users log into the system successfully and are able to see dashboard.	
Flow of activities:	Actors	System
	<ol style="list-style-type: none"> 1. Users fill in their email addresses and password. 2. Users click on the "Login to system" button. 3. Users log into the system. 	<ol style="list-style-type: none"> 1. The system will display the login page. 2. The system will display the dashboard page if users enter correct email address and password.
Exception conditions:	<ol style="list-style-type: none"> 1. System cannot display the login page. 2. Users prompt wrong inputs for email address and password. 3. System cannot display dashboard page even users enter correct email address and password. 	

Table 7: Use case description of View dashboard

U003: View dashboard

Use case name:	View dashboard	
Scenario:	View dashboard page of the website after log into the website.	
Triggering event:	Users want to view the dashboard page of the system.	
Brief description:	Users can view dashboard page of the website after they successfully log into the website.	
Actors:	Students, lecturers, staffs	
Related use cases:	U002	
Stakeholders:	Students, lecturers, staffs, developer	
Preconditions:	<ol style="list-style-type: none"> 1. Users have already registered an account on the system. 2. System display login page. 	
Postconditions:	Users enter correct email address and password.	
Flow of activities:	Actors	System
	<ol style="list-style-type: none"> 1. Users enter the correct email address and password. 2. Users click the “login to system” button. 3. Users are navigated to the dashboard page of the system. 4. Users are able to view all the functionalities that are available on the dashboard. 	<ol style="list-style-type: none"> 1. The system displays a login page. 2. The system displays the dashboard page that contains all the functionalities of the system for the users to view.
Exception conditions:	The system is not displaying dashboard page even if users enter correct email addresses and passwords.	

Table 8: Use case description of Change password

U004: Change password

Use case name:	Change password	
Scenario:	Change and update password to log into the system	
Triggering event:	Users want to change password to log into the system	
Brief description:	Users can change and update password on the login page of the system	
Actors:	Students, lecturers, staffs	
Related use cases:	-	
Stakeholders:	Students, lecturers, staffs, developer	
Preconditions:	The system display login page.	
Postconditions:	Users enters new password in the given space.	
Flow of activities:	Actors	System
	<ol style="list-style-type: none"> 1. Users click on the “change password” button. 2. Users key in the new password in the “New Password” space. 3. Users key in new password again in the “Confirm New Password” space. 4. Users click on “submit” button and new password is updated. 	<ol style="list-style-type: none"> 1. System displays “change password” button. 2. System collects and records the latest password updated by users.
Exception conditions:	<ol style="list-style-type: none"> 1. “Change password” button is clicked but it is not functioning. 2. Users fail to update password after clicking on the “submit” button. 	

Table 9: Use case description of Upload list of resources

U005: Upload list of resources

Use case name:	Upload list of resources	
Scenario:	Upload list of resources and materials on the system	
Triggering event:	Users want to upload resources and materials on the system.	
Brief description:	Users can upload resources such as report templates, marking rubrics and marking guidelines on the system.	
Actors:	Lecturers	
Related use cases:	-	
Stakeholders:	Lecturers, students, developer	
Preconditions:	<ol style="list-style-type: none"> 1. Users have registered accounts on the system. 2. Users are able to log into the system and view the dashboard page. 	
Postconditions:	Users can click on “list of materials” on the sidebar of the website and perform uploading action.	
Flow of activities:	Actor	System
	<ol style="list-style-type: none"> 1. Users click on the “list of materials” on the sidebar menu of the dashboard. 2. Users click on the “upload” button. 3. Users browse for the documents that they wish to upload. 4. Users click on the “save and submit” button. 	<ol style="list-style-type: none"> 1. The system displays dashboard page and sidebar menu. 2. The system displays a section that allows the users to upload documents after they click on the “upload” button.
Exception conditions:	<ol style="list-style-type: none"> 1. The “list of resources” sidebar menu is not displayed. 2. The uploading section is not displayed after users click on “upload” button. 	

Table 10: Use case description of View list of resources

U006: View list of resources

Use case name:	View list of resources	
Scenario:	View list of resources and materials on the system	
Triggering event:	Users want to view resources and materials on the system.	
Brief description:	Users can view resources such as report templates, marking rubrics and marking guidelines on the system.	
Actors:	Lecturers, students	
Related use cases:	U005	
Stakeholders:	Lecturers, students, developer	
Preconditions:	<ol style="list-style-type: none"> 1. Users have registered accounts on the system. 2. Users are able to log into the system and view the dashboard page. 	
Postconditions:	Users can click on “list of materials” on the sidebar of the website and view all the available materials.	
Flow of activities:	Actor	System
	<ol style="list-style-type: none"> 1. Users click on the “list of materials” on the sidebar menu of the dashboard. 2. Users view all the available materials on the website. 	<ol style="list-style-type: none"> 1. The system displays dashboard page and sidebar menu. 2. The system displays list of resources after users click on the “list of materials” menu on the sidebar.
Exception conditions:	<ol style="list-style-type: none"> 1. The sidebar menu is not displayed. 2. The list of materials is not displayed after users click on the sidebar menu. 	

Table 11: Use case description of Update list of resources

U007: Update list of resources

Use case name:	Update list of resources	
Scenario:	Update list of resources and materials on the system	
Triggering event:	Users want to update resources and materials on the system.	
Brief description:	Users can add, reupload or remove the materials on the system	
Actors:	Lecturers	
Related use cases:	U005, U006	
Stakeholders:	Lecturers, students, developer	
Preconditions:	<ol style="list-style-type: none"> 1. The list of resources is available on the website. 2. The edit button is available, and it is only visible and accessible for specific users (lecturers). 3. The uploaded documents should be in specific documents and the given range of size. 	
Postconditions:	Users are able to edit and update list of resources successfully.	
Flow of activities:	Actors	System
	<ol style="list-style-type: none"> 1. Users click on “list of materials” on the sidebar menu of the dashboard. 2. Users click on the “edit” button on the page. 3. Users perform editing action (update or remove) on the resources. 4. Users click on “Save and Submit” button after editing the documents. 	<ol style="list-style-type: none"> 1. System display dashboard page that contains sidebar menu. 2. System prompt editing page for the users after they click on the editing button. 3. System records the latest resources updated by users. 4. System displays the latest list of resources.
Exception conditions:	<ol style="list-style-type: none"> 1. The editing page is not displayed after users click on “edit” button. 2. Users failed to save and submit the updated documents. 	

Table 12: Use case description of Search contents

U008: Search contents

Use case name:	Search contents	
Scenario:	Search available contents on the website	
Triggering event:	Users want to search for specific documents or contents on the website	
Brief description:	Users wants to search for specific documents by entering keywords in the given search bar on the page.	
Actors:	Students, lecturers, staffs	
Related use cases:	-	
Stakeholders:	Students, lecturers, staffs, developer	
Preconditions:	<ol style="list-style-type: none"> 1. The list of documents is available on the website. 2. The search bar is displayed on the website. 	
Postconditions:	<ol style="list-style-type: none"> 1. The search bar is functioning. 2. The documents named with the keywords entered by the users will be filtered out and displayed. 	
Flow of activities:	Actor	System
	<ol style="list-style-type: none"> 1. User enters keyword in the given search bar. 2. Users click on the search button. 	<ol style="list-style-type: none"> 1. System displays search bar. 2. The system gets the input from the users and performs filtering action. 3. System displays the filtered documents.
Exception conditions:	<ol style="list-style-type: none"> 1. The search bar is not displayed on the website. 2. The correct documents are not displayed after users enter the keyword and click on the search button. 	

Table 13: Use case description of View notifications

U009: View notifications

Use case name:	View notifications	
Scenario:	View available notifications on the website	
Triggering event:	Users want to view notifications on the website.	
Brief description:	Users want to view the latest notifications of the latest information and resources on the website.	
Actors:	Students, lecturers	
Related use cases:	U007	
Stakeholders:	Students, lecturers, staffs, developers	
Preconditions:	<ol style="list-style-type: none"> 1. Users receive the latest notification. 2. The notification list is displayed on the website. 	
Postconditions:	Users are able to click and view available notification	
Flow of activities:	Actors	System
	<ol style="list-style-type: none"> 1. Users access to the system dashboard page. 2. Users click on the “ring” icon on top of the website. 3. Users view all the available notifications, including the latest ones. 	<ol style="list-style-type: none"> 1. System displays dashboard page. 2. System prompt a notification list for the users to view.
Exception conditions:	<ol style="list-style-type: none"> 1. The users do not receive any notifications. 2. The notification list is not displayed. 	

Table 14: Use case description of Give lecturers access

U010: Give lecturers access

Use case name:	Give lecturers access	
Scenario:	Give access to the other lecturers in accessing the document	
Triggering event:	Lecturers want to give access to other lecturers.	
Brief description:	Lecturers that act as coordinators grant access to other lecturers to view the documents and resources.	
Actors:	Lecturers	
Related use cases:	-	
Stakeholders:	Lecturers, developers	
Preconditions:	Lecturers that want to grant access to other lecturers should act as coordinators in CS related fields (internship, final year project, researches, students related affairs etc.)	
Postconditions:	Lecturers are able to grant access to other lecturers.	
Flow of activities:	Actors	System
	<ol style="list-style-type: none"> 1. Users upload materials on the portal. 2. Users choose the name of lecturers that they wish to grant access to in the provided name list in the “grant access to” section. 3. Users click the “save and submit” button. 	<ol style="list-style-type: none"> 1. System displays list of materials page. 2. System prompts the “grant access to” section and a name list of lecturers for the users to choose. 3. System prompts “save and submit” button.
Exception conditions:	<ol style="list-style-type: none"> 1. The list of materials page is not displayed. 2. The name list of lecturers is not displayed in the “grant access to” section. 	

Table 15: Use case description of Remove lecturers access

U011: Remove lecturers access

Use case name:	Remove lecturers access	
Scenario:	Remove other lecturers' access in accessing the documents	
Triggering event:	Lecturers want to remove other lecturers' access in viewing the documents.	
Brief description:	Lecturers that act as coordinators want to remove other lecturers' access to view the documents and resources.	
Actors:	Lecturers	
Related use cases:	U010	
Stakeholders:	Lecturers, developers	
Preconditions:	Lecturers that want to remove other lecturers' access should act as coordinators in CS related fields (internship, final year project, researches, students related affairs etc.)	
Postconditions:	Lecturers are able to remove other lecturers' access in viewing the documents.	
Flow of activities:	Actors	System
	<ol style="list-style-type: none"> 1. Users view the list of materials. 2. Users choose the documents and click on the edit button. 3. Users go to the "grant access to" section and choose the name of lecturers that they wish to remove access. 4. Users click on the cross button shown beside the lecturers' names. 5. Users click on "save and submit" button. 	<ol style="list-style-type: none"> 1. System displays list of materials page. 2. System prompts the "grant access to" section and a name list of lecturers for the users to remove access. 3. System prompts a cross button beside the lecturers' name.
Exception conditions:	<ol style="list-style-type: none"> 1. Users cannot access to the list of materials page. 2. Users cannot remove other lecturers' access even they already clicked on the cross button and "save and submit" button. 	

Table 16: Use case description of Give students access

U012: Give students access

Use case name:	Give students access	
Scenario:	Give access to the students in viewing the documents	
Triggering event:	Lecturers want to grant access to the students in viewing the available documents.	
Brief description:	Lecturers give access to students in viewing the available resources.	
Actors:	Lecturers, students	
Related use cases:	-	
Stakeholders:	Lecturers, students, staffs, developers	
Preconditions:	<ol style="list-style-type: none"> 1. Lecturers have the latest students' name list. 2. All students are assigned the correct batch name. (example, Year 3 students are assigned as "Undergrad Year 3 PPSKOMP") 	
Postconditions:	Lecturers are able to grant access to students.	
Flow of activities:	Actor	System
	<ol style="list-style-type: none"> 1. Users upload materials on the portal. 2. Users choose the name of lecturers that they wish to grant access to in the provided batch list in the "grant access to" section. 3. Users click the "save and submit" button. 	<ol style="list-style-type: none"> 1. System displays list of materials page. 2. System prompts the "grant access to" section and a batch list for the users to choose. 3. System prompts "save and submit" button.
Exception conditions:	<ol style="list-style-type: none"> 1. The list of materials page is not displayed. 2. The batch list is not displayed in the "grant access to" section. 	

Table 17: Use case description of Remove students access

U013: Remove students access

Use case name:	Remove students access	
Scenario:	Remove other students' access in accessing the documents	
Triggering event:	Lecturers want to remove other students' access in viewing the documents.	
Brief description:	Lecturers remove other lecturers' access to view the documents and resources.	
Actors:	Lecturers, students	
Related use cases:	U012	
Stakeholders:	Lecturers, students, developers	
Preconditions:	<ol style="list-style-type: none"> 1. Lecturers have the latest students' name list. 2. All students are assigned the correct batch name. (example, Year 3 students are assigned as "Undergrad Year 3 PPSKOMP") 	
Postconditions:	Lecturers are able to remove students' access.	
Flow of activities:	Actors	Systems
	<ol style="list-style-type: none"> 1. Users view the list of materials. 2. Users choose the documents and click on the edit button. 3. Users go to the "grant access to" section and choose the name of batch list that they wish to remove access. 4. Users click on the cross button shown beside the batch name. 5. Users click on "save and submit" button. 	<ol style="list-style-type: none"> 1. System displays list of materials page. 2. System prompts the "grant access to" section and a name list of lecturers for the users to remove access. 3. System prompts a cross button beside the lecturers' name.
Exception conditions:	<ol style="list-style-type: none"> 1. Users cannot access to the list of materials page. 2. Users cannot remove other students' access even they already clicked on the cross button and "save and submit" button. 	

Table 18: Use case description of Create list of event

U014: Create list of event

Use case name:	Create list of event	
Scenario:	Create list of event that contains competition	
Triggering event:	Lecturers want to create a list of event that contains competition.	
Brief description:	Lecturers create a list which contains various type of competitions that student can participate in.	
Actors:	Lecturers, students	
Related use cases:	-	
Stakeholders:	Lecturers, students, developer	
Preconditions:	<ol style="list-style-type: none"> 1. The competition is valid. 2. Lecturers must include posters, terms and conditions and links to participate the competition. 	
Postconditions:	<ol style="list-style-type: none"> 1. Lecturers are able to create a list of event. 2. The list of event is available on the website. 	
Flow of activities:	Actor	System
	<ol style="list-style-type: none"> 1. Users click on the “list of events” on the sidebar menu of the website. 2. Users click on the “upload” button. 3. Users upload posters, terms and conditions and links to participate the competition. 4. Users upload Users click on “Save and submit” button. 	<ol style="list-style-type: none"> 1. System display “list of event” on the sidebar menu. 2. System display “upload button”. 3. System requires user to upload all the relevant competition resources in the uploading section.
Exception conditions:	<ol style="list-style-type: none"> 1. Users cannot access to the list of events page. 2. The uploading section is not displayed after users click on “upload” button. 3. Users can create event without uploading any relevant competition resources. 	

Table 19: Use case description of View list of event

U015: View list of event

Use case name:	View list of event	
Scenario:	View list of event that contains competition	
Triggering event:	Users want to view list of event that contains competition.	
Brief description:	Users view a list which contains various type of competitions that student can participate in.	
Actors:	Lecturers, students	
Related use cases:	-	
Stakeholders:	Lecturers, students, developer	
Preconditions:	The list of competition is displayed on the website.	
Postconditions:	<ol style="list-style-type: none"> 1. Users are able to view the list of event. 2. User are able to click on their interested event and perform further actions (read terms of conditions, register via the given link etc) 	
Flow of activities:	Actor	System
	<ol style="list-style-type: none"> 1. Users click on the “list of events” on the sidebar menu of the website. 2. Users view the list of event that contains various type of competitions. 	<ol style="list-style-type: none"> 1. System display “list of event” on the sidebar menu. 2. System prompt list of competitions after users click on the “list of events” sidebar menu.
Exception conditions:	<ol style="list-style-type: none"> 1. Users cannot access to the list of events page. 2. No list of event is displayed after users click on the sidebar menu, despite they received notifications on a list of competitions is uploaded. 	

Table 20: Use case description of Update list of event

U016: Update list of event

Use case name:	Update list of event	
Scenario:	Update list of event that contains competition	
Triggering event:	Users want to update list of event that contains competition.	
Brief description:	Users update or remove the list of event which contains various type of competitions.	
Actors:	Lecturers	
Related use cases:	-	
Stakeholders:	Lecturers, students, developer	
Preconditions:	<ol style="list-style-type: none"> 1. There are updates on the competition resources. (example: change of registration links, updated poster etc) 2. The event is expired. 	
Postconditions:	<ol style="list-style-type: none"> 1. Users are able to update the list of event. 2. User are able to view the latest list after they perform updating action on the website. 	
Flow of activities:	Actor	System
	<ol style="list-style-type: none"> 1. Users click on the “list of events” on the sidebar menu of the website. 2. Users click on “update” button beside the list of event. 3. Users perform updating action. 4. Users click “Save and submit” button after updating. 	<ol style="list-style-type: none"> 1. System display “list of event” on the sidebar menu. 2. System prompt “update” button beside list of competitions. 3. System prompt “Save and submit” button.
Exception conditions:	<ol style="list-style-type: none"> 1. Users cannot access to the list of events page. 2. The update button is not displayed beside the list of event. 3. The old list is displayed even after users have performed updating action and clicked “Save and submit” button. 	

3.5.3 Sequence diagram

The following figures show the sequence diagrams of some important use cases of the project.

U001: Register account

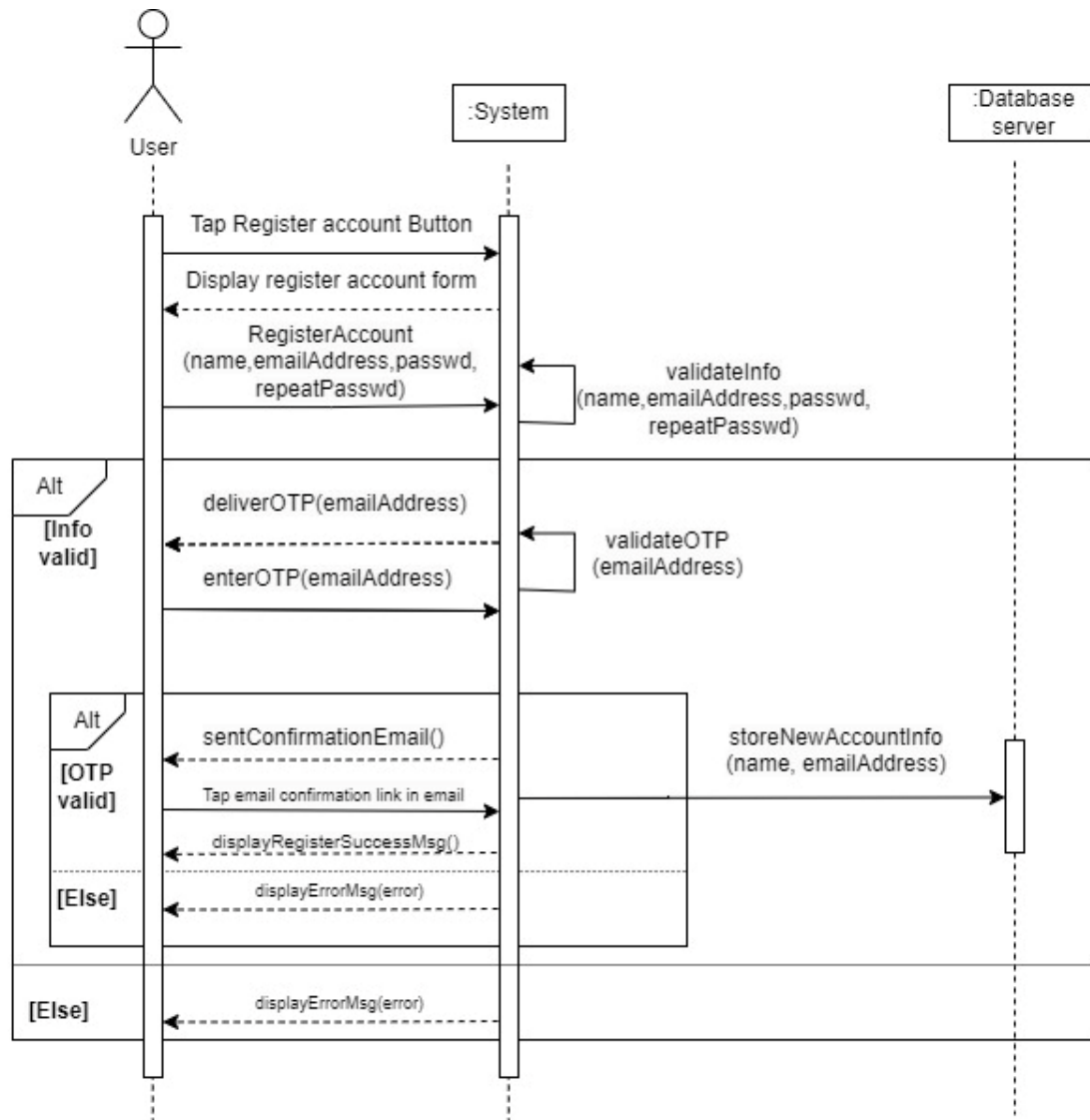


Figure 8: Sequence diagram of Register account

U002: Login account

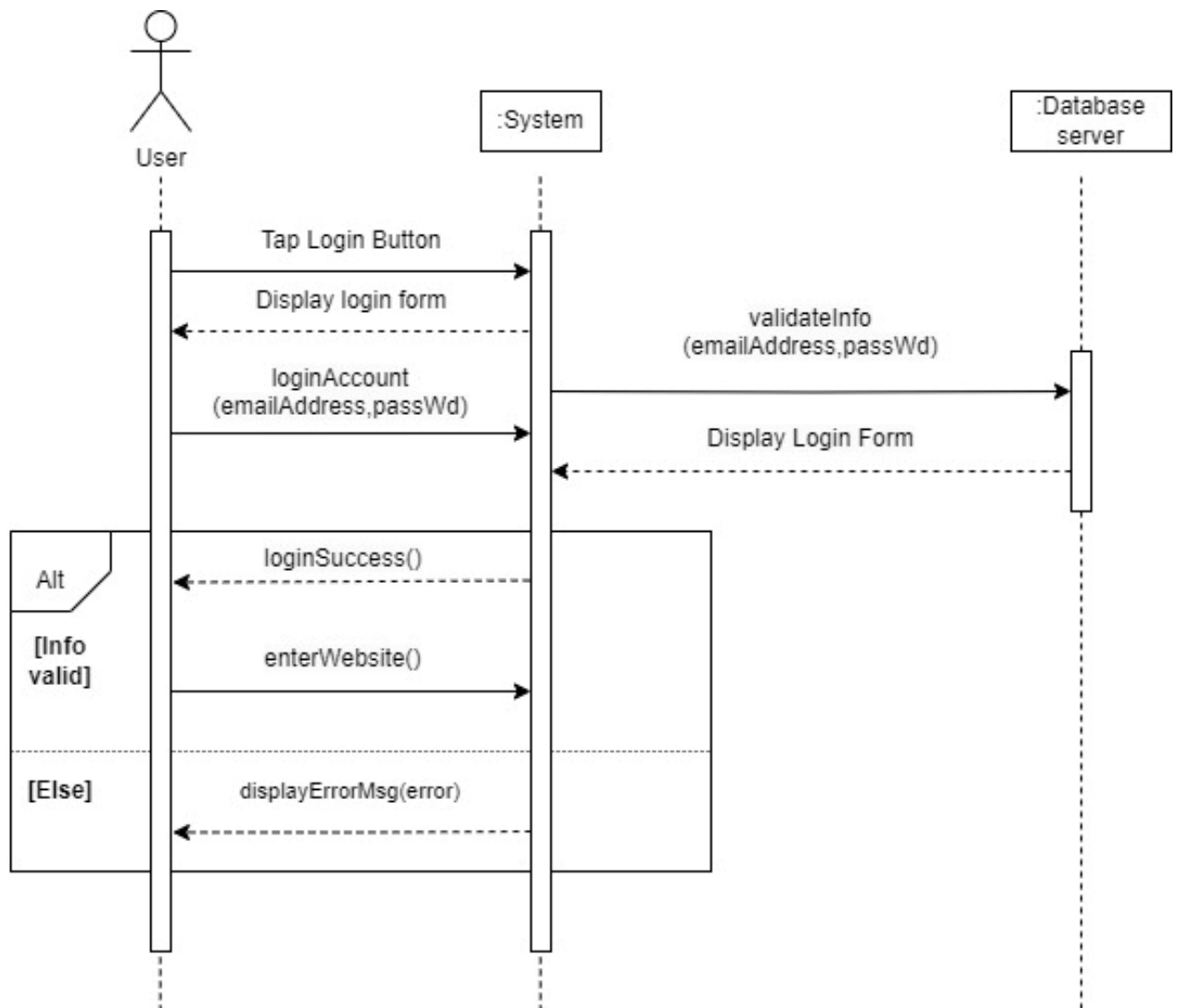


Figure 9: Sequence diagram of Login account

U003: View dashboard

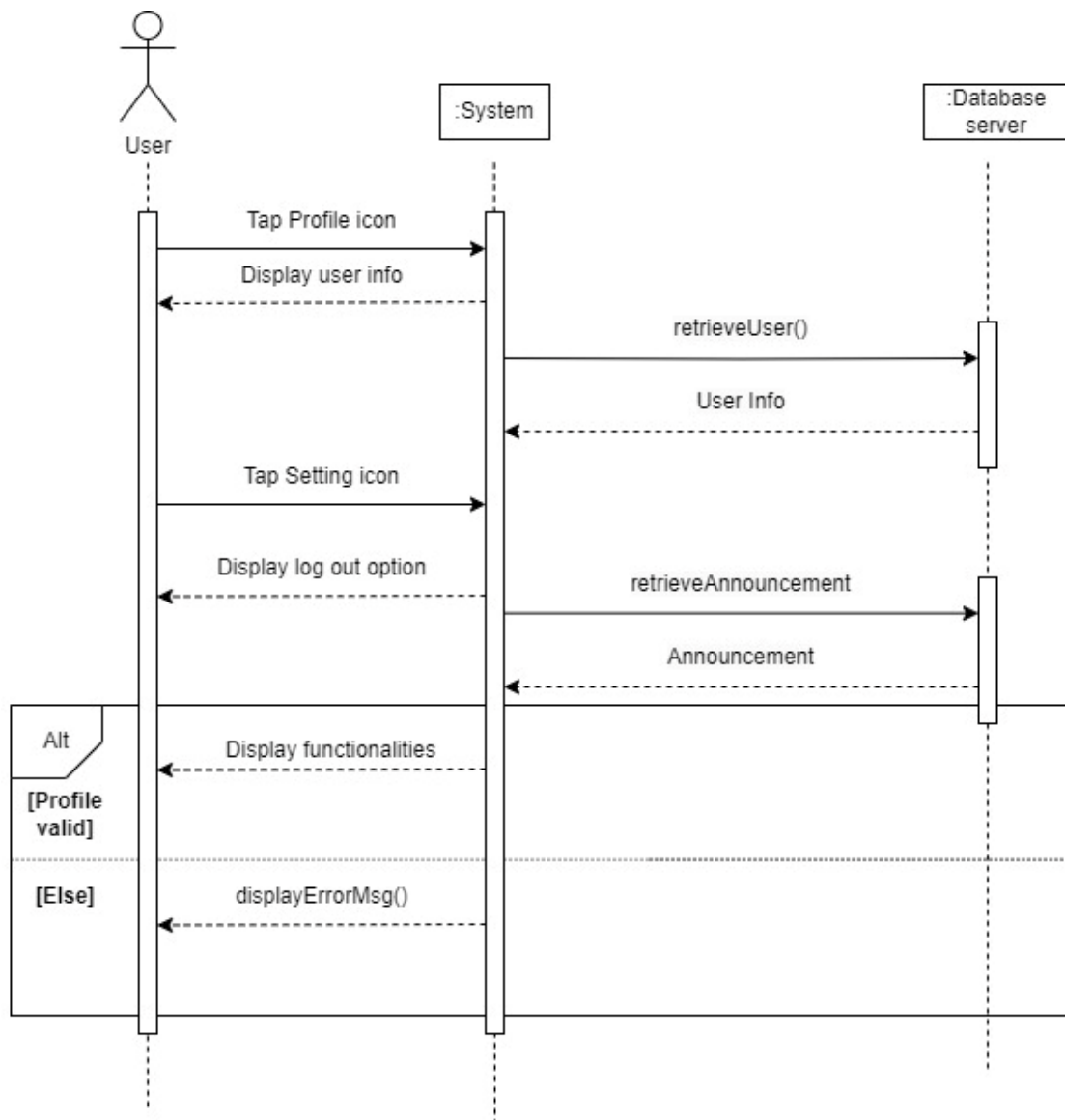


Figure 10: Sequence diagram of View dashboard

U004: View notification

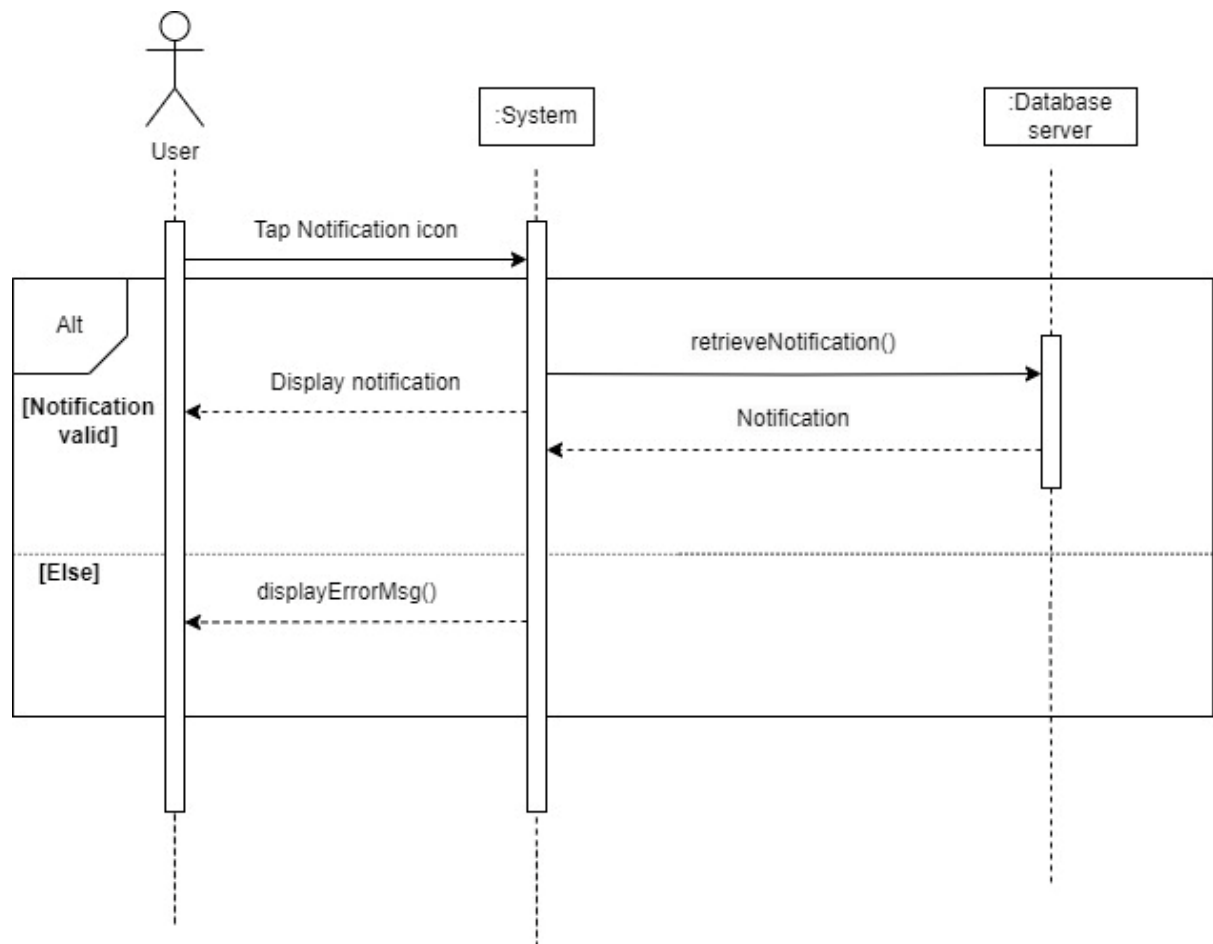


Figure 11: Sequence diagram of View Notification

U005: Manage list of resources

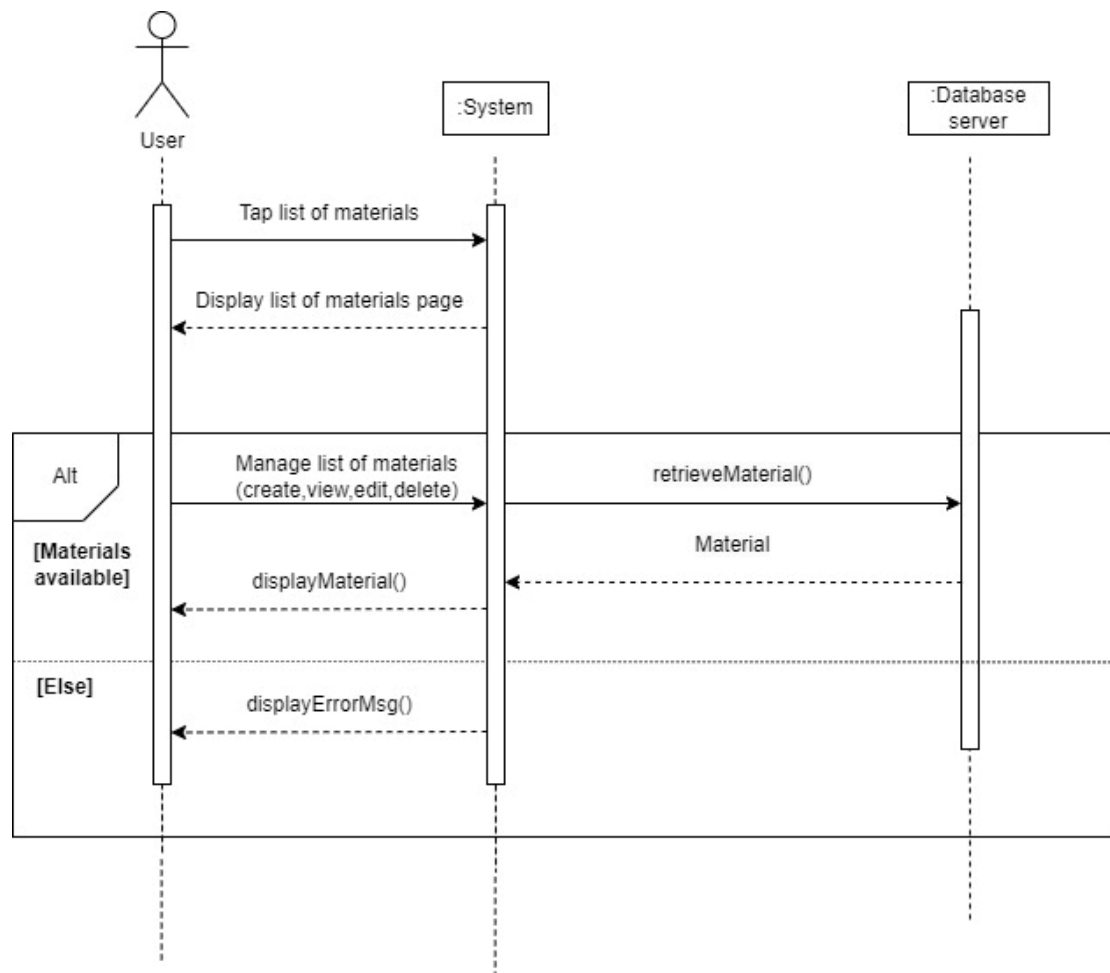


Figure 12: Sequence diagram of Manage list of resources

U006: Manage list of event

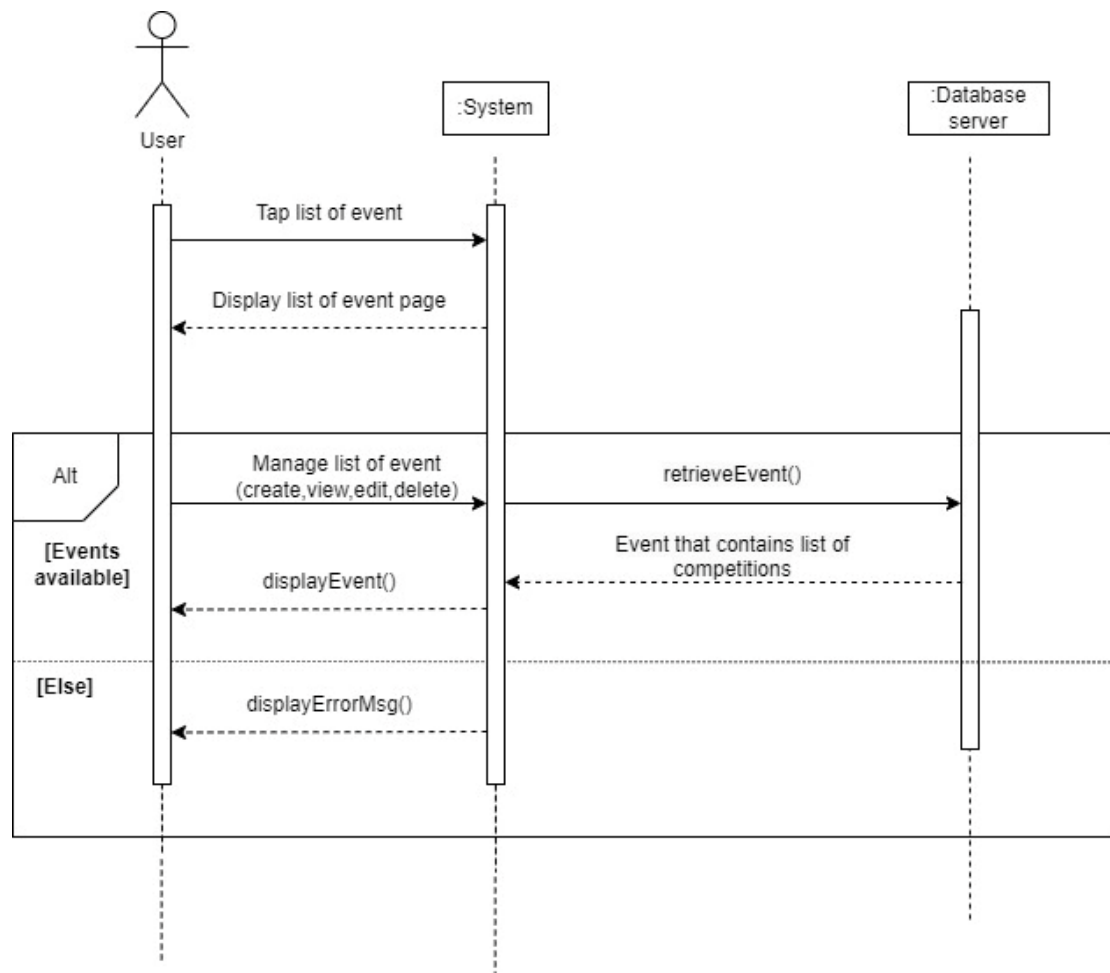


Figure 13: Sequence diagram of Manage list of event

U007: Manage access

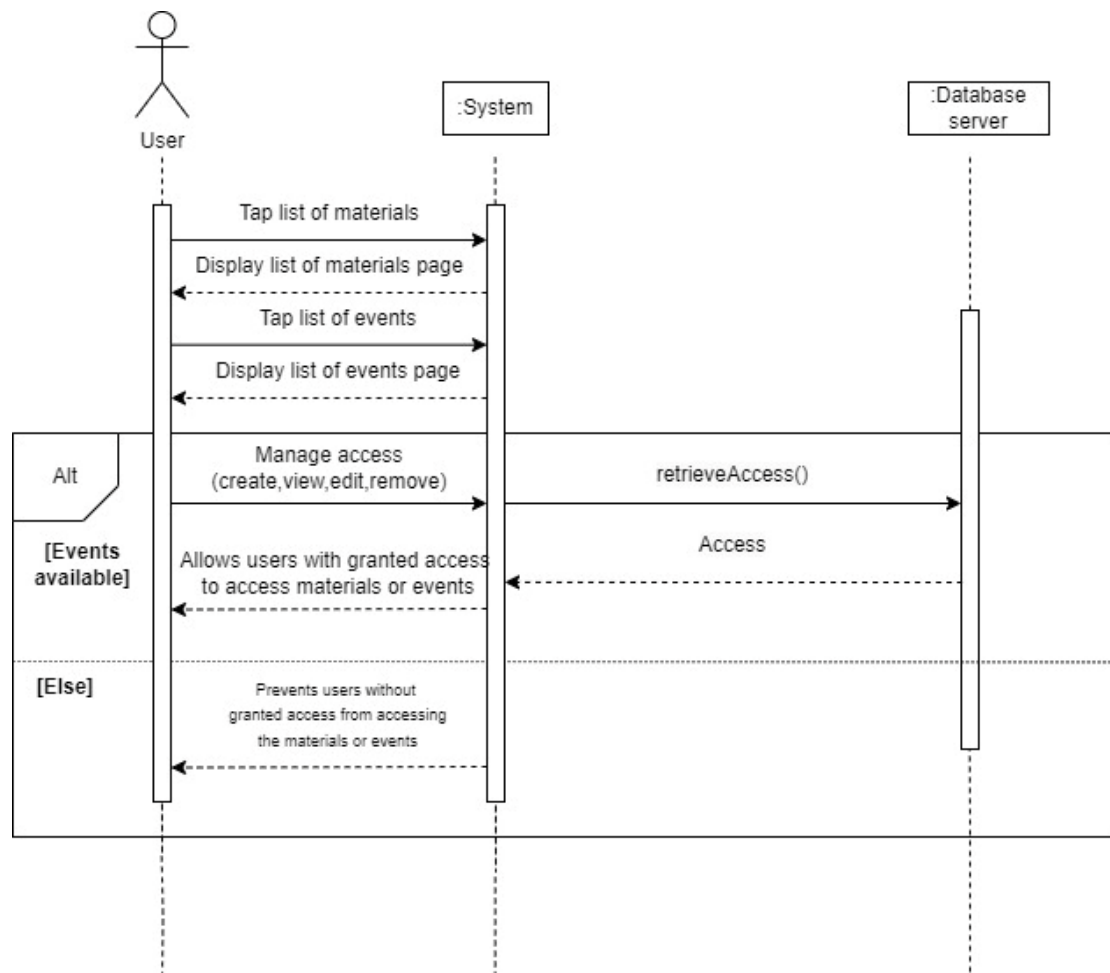


Figure 14: Sequence diagram of Manage access

3.6 Detailed Description of the proposed solution

3.6.1 Purpose and functionality of each module

The first module that will be implemented in the system is the account registration module. In this module, when a person visits the website for the first time, the person will be asked to sign up for an account in the system. The details needed in creating an account will be name, matric number for students, staff ID for staffs and lecturers, and their email addresses. After the user creates an account, the user should receive a message that shows their account creation is successful. They should be able to log in to the system. They are also allowed to change account password. It is necessary to take note that only staffs and student from USM Computer Science course are allowed to create account in the system as it is only designed for USM CS community.

The second module that will be included in this system will be event management module. In this module, the lecturers or staffs are able to create events. By creating events, the lecturers are able to upload and share the important resources, learning materials and information. After this, lecturers should be able to view the list they have created. The edit and save buttons should be made available for the lecturers if they wish to edit or modify any resources or documents. The buttons should only be made visible and accessible only for lecturers and staffs. Besides, the lecturers can also utilize the system by informing ongoing competitions to the students. In this case, event status is needed. If the competition is already ended or the registration deadline is passed, the competition should be deleted, and the students cannot access to the competition details. Notifications should be sent to the students or lecturers when an event is created on the portal.

Next, the user access module will be implemented in the system as well. In this module, users should be given access or permission to view and download respective resources only. For example, all the internship documents such as insurance form, certification letter form and list of company should be made visible to third year students only. Students from other year of study are not allowed to view or access the internship documents. The latest version of bloom taxonomy to design the final

examination questions should be made accessible only for the lecturers, not the students. In this case, restrictions should be made so that every group of users should only access the respective information. However, general information or learning resources will be made available for all group of users in the USM CS community.

Lastly, a reporting module will be implemented in the system. In this module, dashboards will be developed for all events. On the dashboard, several lists will be displayed, in which list of resources, materials and documents, and list of competitions will be shown to the students. For the competition part, a list of participants will be made available as well. Every event will have one dashboard that displays the respective resources. Dashboards should be made user-friendly and easily accessible to all users.

3.6.2 Flow Chart

The diagram below shows the flow chart of the whole system.

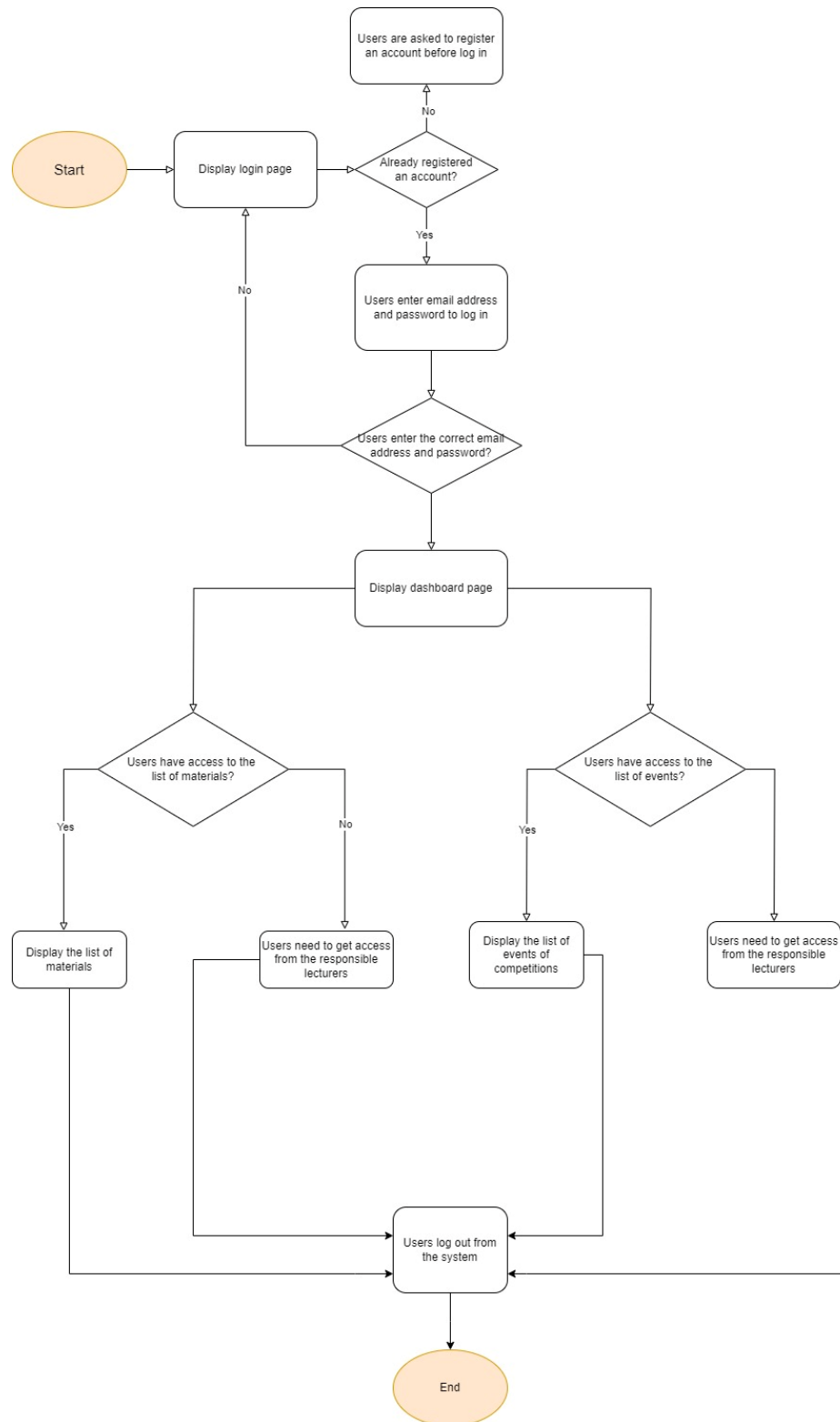


Figure 15: Overall flow chart of the project

3.6.3 Architecture diagram

The following figure shows the architecture diagram of the project.

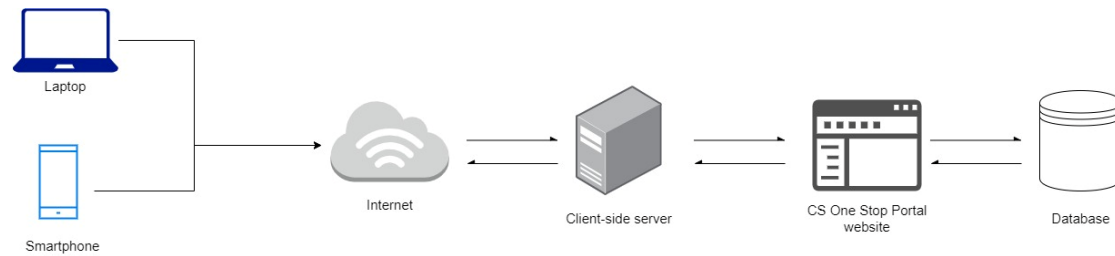


Figure 16: Architecture diagram of the project

Users can use their laptops or smartphones to access the one stop portal. Users need to make sure that they have internet access before visiting the portal. A note needs to be taken is that users can only use web browsers such as Google Chrome and Safari to visit the portal. Then, the Internet will interact with the client-side server. The client-side server which is Angular will then interact with the frontend and backend of CS One Stop portal. The front-end will be mainly responsible for user interactions and functionalities, and the backend will be the technologies implemented such as database. Then, the website will retrieve the data from the database and shows the respective data to the users on the frontend of the page.

3.7 Technology deployed

3.7.1 Hardware specifications

The project is developed by using ASUS Tuf Gaming F15 with the following hardware specifications.

Processor: Intel(R) Core(TM) i5-10300H CPU @ 2.50GHz 2.50 GHz

Memory: 24.0 GB RAM

Storage: 456 GB storage

Graphics: NVIDIA GEFORCE GTX

Operating system: Windows 11 Home

3.7.2 Software specifications

The project is developed with the following software specifications:

a. Visual Studio Code

b. Microsoft Visual Studio 2022

CONCLUSION

In conclusion, this report summarises the system requirement and design for the CS one stop portal. The creation of the CS One Stop Portal is a major step in improving the effectiveness with which all members of the CS community can obtain the necessary materials, including report templates, marking guideline, marking rubrics, and other pertinent information. Students and lecturers can quickly access the documents they need using this centralized one-stop gateway, eliminating the need to search through numerous emails, social media groups, Padlet link, and OneDrive links. Additionally, the portal has a notification system that allows all members to be informed of any updates. Also, without having to search through emails or groups, students may quickly check the list of contests or competitions they can participate in on the portal. By consolidating various information and resources on a centralized portal, I strongly believe that it can promote a more efficient information sharing between the CS community members. It enhances the convenience and accessibility of the CS community and promotes a more collaborative learning environment.

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APPENDICES

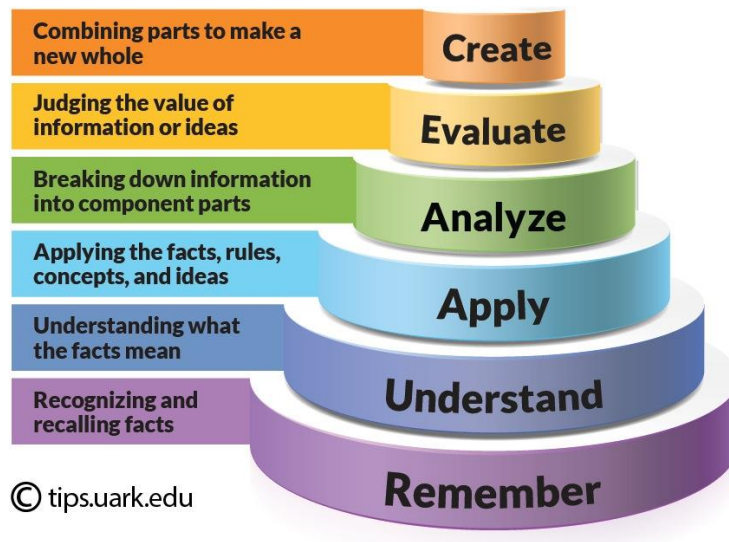


Figure A.1 : Bloom's taxonomy classification

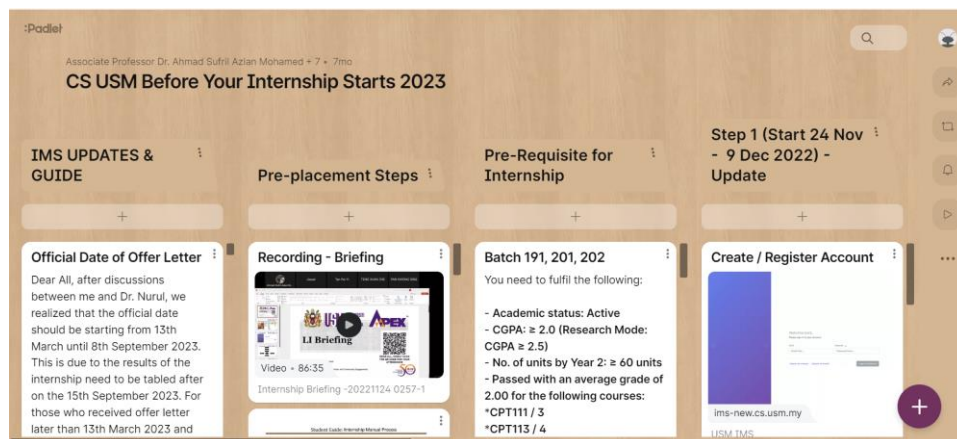


Figure A.2 : USM CS Internship information sharing padlet



Figure A.3: Agile development methodology

Will you find it difficult when you try to search, access and view the information and resources via these platforms?

79 responses

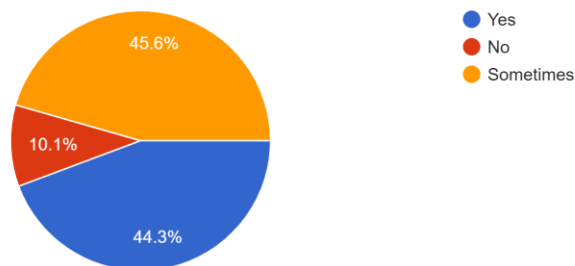


Figure A.4: Pie chart of my conducted survey on the difficulty to access the information via the current platforms

What are your expected features that should be implemented in this one stop portal? (Put a "-" if you have no suggestions)

79 responses

Chat Feature, Forum

Has a notification that will notify users about the latest information

Resources can be downloaded for offline view

Everything that a portal should have =)

can access without wifi too

GPS TO GO LAB/LECTURE HALLS, LAB BOOKING, FACILITIES PROVIDED IN LAB

Figure A.5: Some expectations of features suggested by the participants

Link A.6: Link to Google Form survey for my final year project

<https://forms.gle/8ZRP5Ujph4pczLDu6>

Link A.7: Link to the Google Form responses

https://docs.google.com/spreadsheets/d/1fO_2kQb_UCM1n27-Cr_qX2gfO47YVqgIp_PUTj7uA/edit?usp=sharing