

School of Data Science  
The Chinese University of Hong Kong, Shenzhen

## Project Description Document

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### CloudLGU

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#### Group 1

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**Version 1.0**  
**March 4, 2022**

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# 1 INTRODUCTION

## 1.1 Project Overview

Our project, CloudLGU (meaning "the Chinese University of Hong Kong, Shenzhen on the cloud") aims to provide a platform for all students and faculty members in CUHK(SZ) to communicate, share and help each other in the hope that every CUHK(SZ)er can meet on the cloud, stand together and feel the warmth of the community especially in this difficult time shrouded by the COVID.

## 1.2 Objective

Our product design idea comes from the online forum "LGULife", which provides a platform for CUHK(SZ) students to post and reply to messages. Our goal is to provide a similar system focusing on information exchange. Our system targets the faculty members as well. We would also include a section showing the covid dynamics, which will focus on Shenzhen and the campus's relevant policies. We hope to provide an online platform with clean and user-friendly UI for students and the faculties where they can get and share information with no barriers.

The system is divided into two parts. One is the front-end part, where users could use and interact with the interface. The other is the back-end part, where the administrators and the developers will deal with data transfer and management.

## 1.3 Expected Customers and Market

The targeted users of our system are students and faculty members of CUHK(SZ). Every one with a CUHK(SZ) email account would be welcomed to join the community.

## 1.4 System Features

Our system is mainly composed of 4 parts, including registration (sign up) and login, pandemic dynamics, office time booking system and forum system.

We have a section showing the pandemic dynamics. We would focus on the situation of Shenzhen. We would also collect the latest policies of the campus.

The professors can post their available time to communicate with students and the students can make appointments with the professors. All the users can post and comment messages as the our system aims to provide an information-sharing platform.

More details of these features will be introduced in later sections.

## 2 BACKGROUND

We observe that due to the unpredictable pandemic situation, the campus's policies regarding preventing and controlling the pandemics, include policy of returning to campus, change very frequently. Many students would ask the tutors in WeChat group for detailed prevention control measures. At the same time, the campus have different policies for students returning to campus from different regions according to the classification of cities by the government. However, the campus won't declare the classification explicitly and the students should check by themselves. All this may cause low efficiency, misunderstanding problems. So we decide to include a section showing the pandemic dynamics in Shenzhen and the campus's detailed policies.

In CUHK(SZ), contact and communication between students and faculties are always welcomed. However, students may find it "hard" to contact the professors. If one student is not familiar with one professor, it is not that appropriate to use WeChat because WeChat's casual social contact product positioning. On the opposite, it is not efficient enough to contact your professor especially when you want to make an appointment with him to request for a meeting, since you need to confirm the time of each other, let alone the email etiquette. Hence we would include a office time booking system.

Another thing that is in demand is a platform to share information. We may see lots of research assistants recruitment advertisements from all kinds of WeChat groups. Or perhaps, we may see many WeChat groups to resell some spare and idle "gadgets." Usually, those WeChat groups are not specific to share those information, so it is relatively easy to miss those information. Hence, we want a platform to pool all those recruitment or "Wanted" to break the "Information Fort" and offers unimpeded information to the students and faculties, so that the users can find all the information they may be interested in without trolling their chat history.

In view of the above issues, we intend to develop an one-stop online information-sharing platform. The platform provides information regarding pandemic dynamics, office time of professors and communication between community members. We hope that our platform, which collects information distributed in different positions, can help CUHK(SZ)ers to get better and more timely information.

## 3 SPECIFICATION

We have divided our system into four parts: User Login and Registration, Pandemic Dynamics, Office Time Booking, Posting and Commenting System.

### 3.1 User Login and Registration

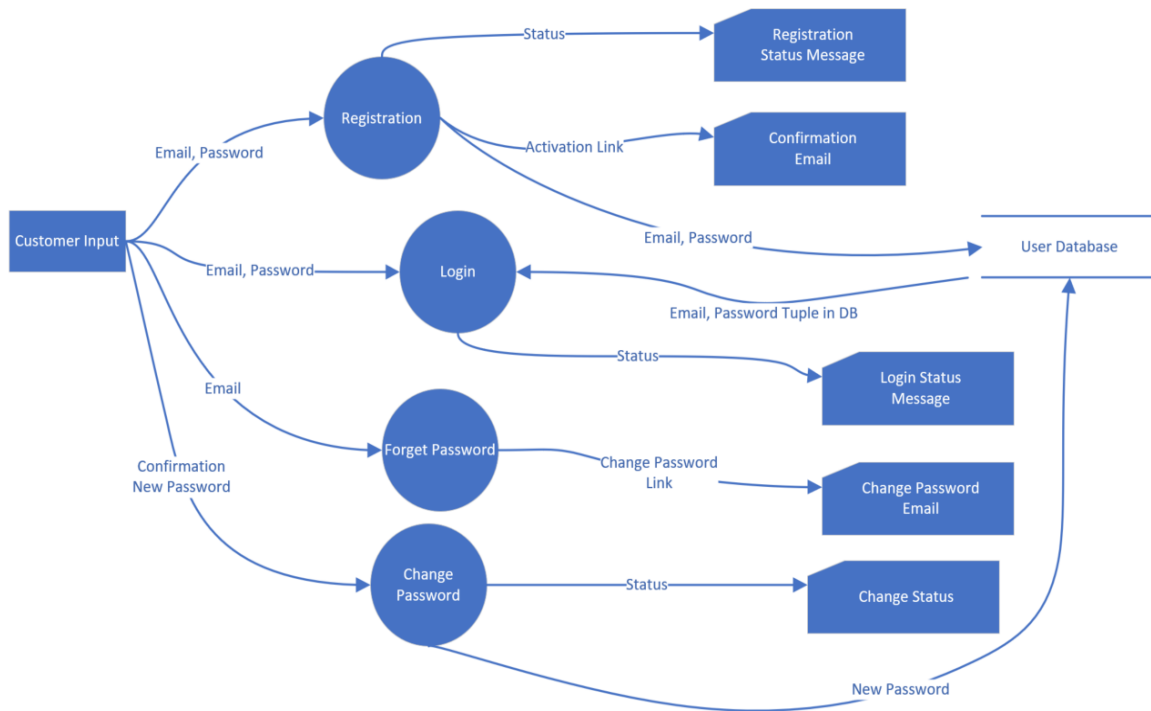


Figure 1: Data Flow Diagram: User Login and Registration System

Users need to go over a user registration process before they could use our system. To create an account, we requires users to enter their CUHK(SZ) email to sign up. The email format should be "xxx@link.cuhk.edu.cn (students email)" or "xxx@cuhk.edu.cn (faculty)". Then, the terminal will send a verification email to the registered email, and they are required to activate their account by clicking on the link provided in the confirmation email.

If users have any login problems, our system provides a function for users to change their password. These users will be asked to type in their email for receiving an email to reset their password. Then by submitting the new password in the link sent with the email, our database will update the user's data in the password field.

### 3.2 Pandemic Dynamics

This subsystem mainly displays the pandemic dynamics and the campus's prevention and control management. The user can check the specific policy of returning to campus by input his/her city name. The DFD is shown as follows:

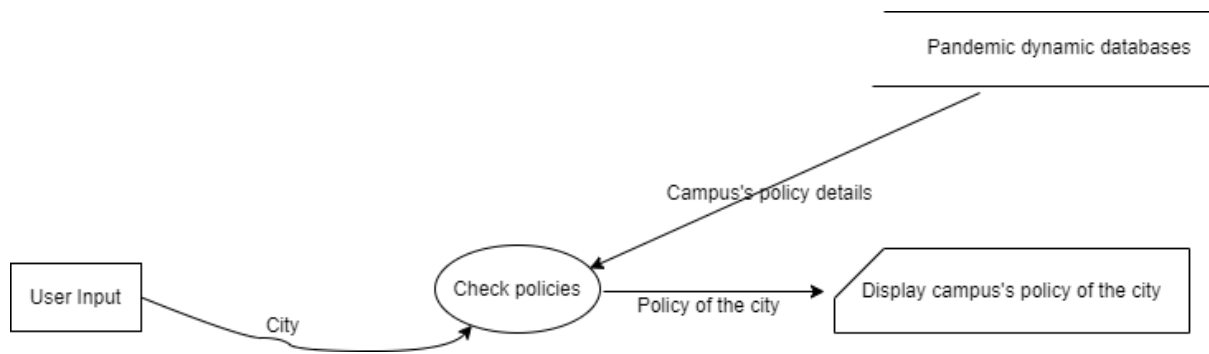


Figure 2: Data Flow Diagram: Pandemic Dynamics and Campus's Policies Systems

### 3.3 Office Time Booking

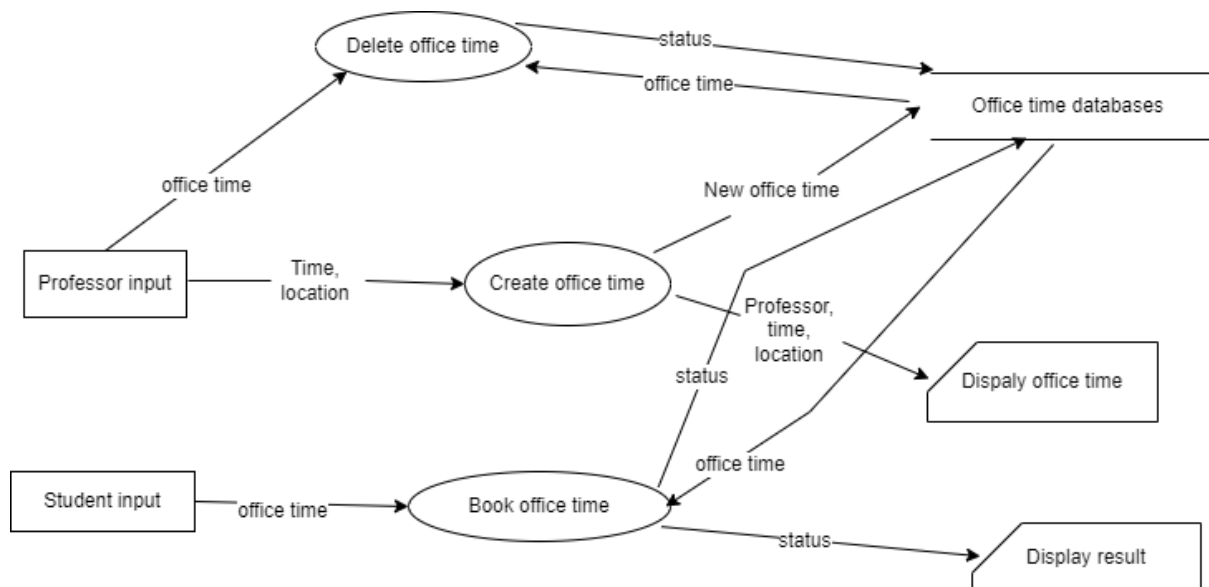


Figure 3: Data Flow Diagram: Office Time Booking System

Only professors or instructors offer office time to students. They should provide time and location of an office time whenever creating one. They can also delete the office time opened. The system will display all available office time for students to book. Each time a student tries to book an office time, the system would check it then return the result of booking.

### 3.4 Posting and Commenting System

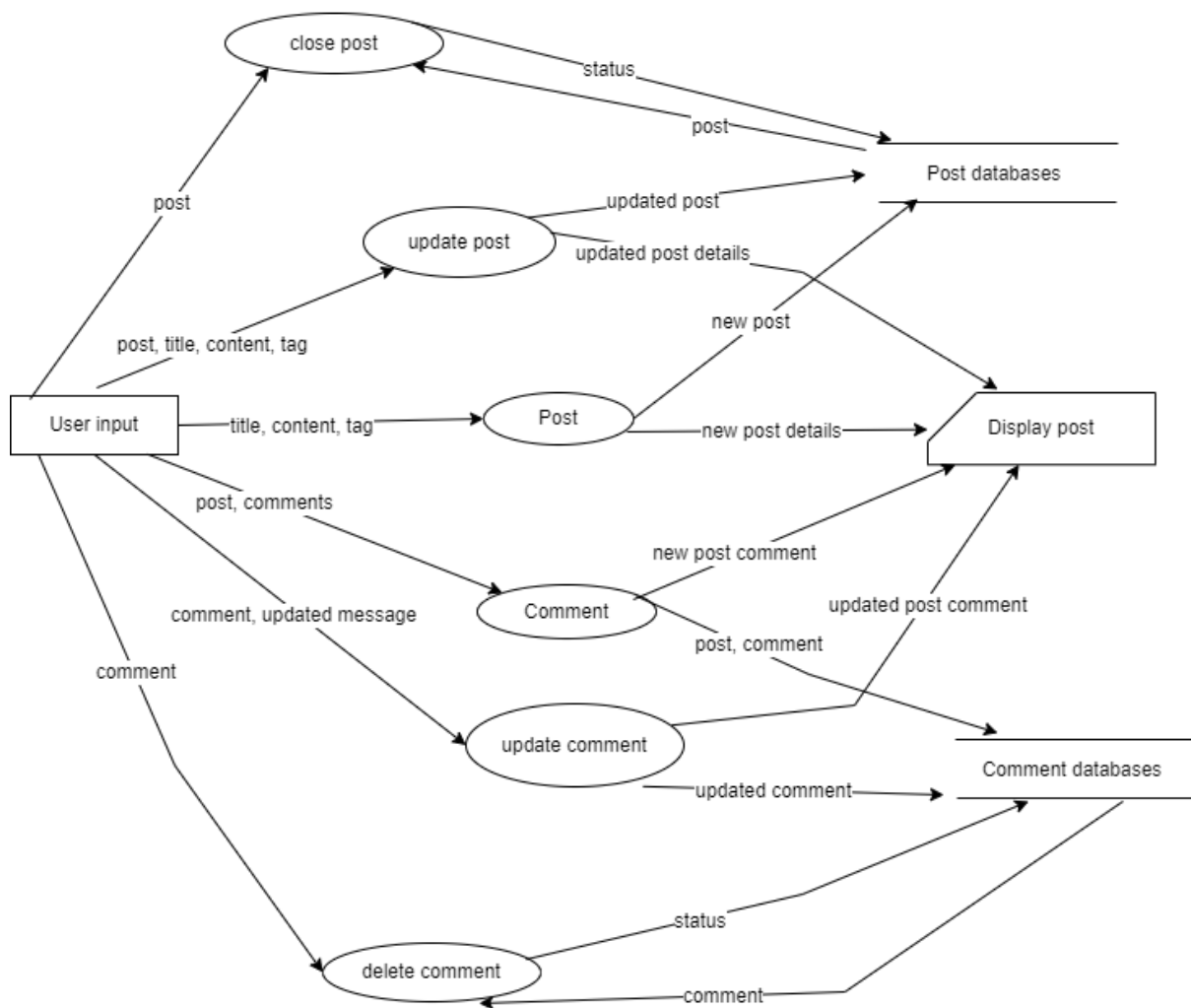


Figure 4: Data Flow Diagram: Posting and Commenting System

Every user of the platform can post new messages and comment on existing posts. They can also update or delete anything posted or commented by themselves.

## 4 SYSTEM ARCHITECTURE

### 4.1 Architecture Diagram & System Components

The functions of our systems have been shown in our DFDs, there is no need to further explain here. Hence we have below technical architecture diagram:

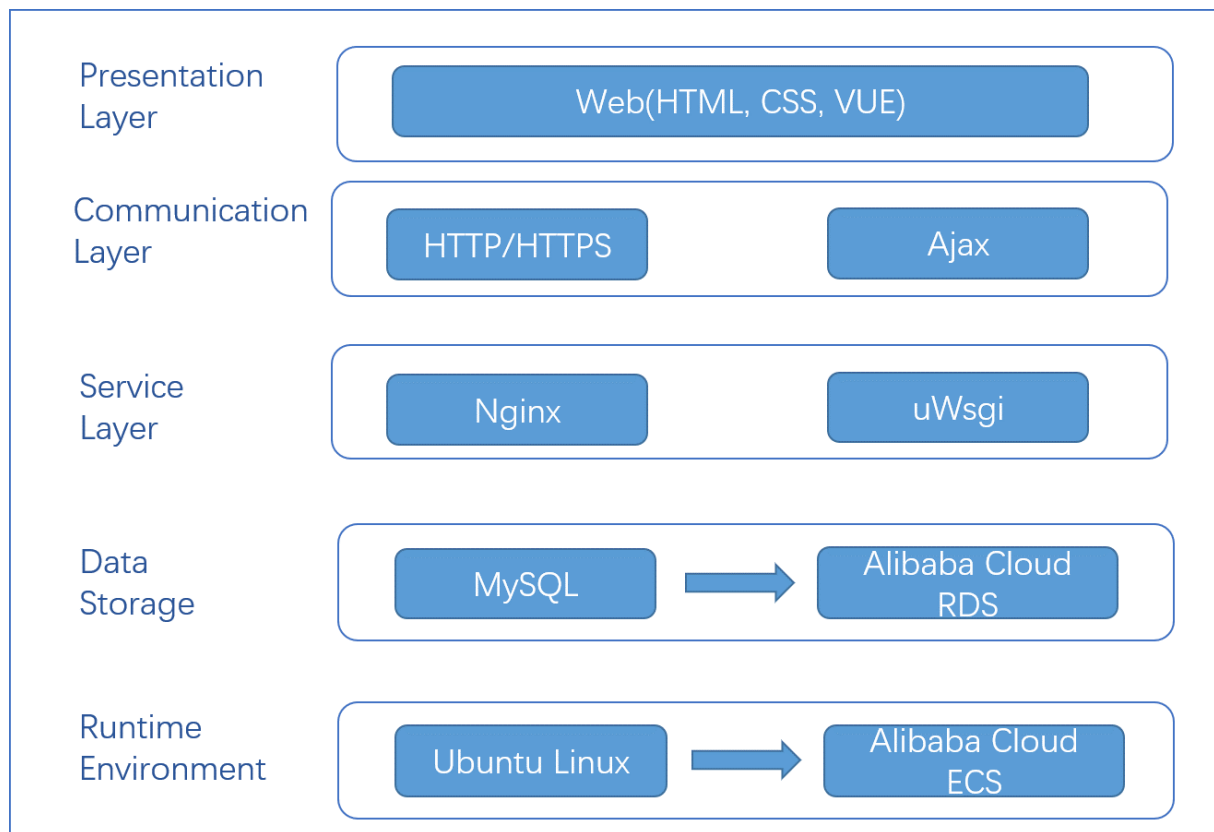


Figure 5: Technical Architecture

Our project will be firstly deployed on the Ubuntu Server on the local area network of CUHK(SZ).

After the functional tests and system tests, we will deploy the project on Alibaba Cloud's ECS.

We will use MySQL to save relevant data for the data storage part. If the back-end performance is not satisfying, Redis may be used to work as a buffer.

The front-end part will be deployed on Nginx, while the Django python back-end part will be first deployed using uWSGI. All the requests to the back-end will be passed to the back-end with the reverse proxy feature of the Nginx server. Also, this kind of architecture has good expandability, where one can easily balance the load by adding more servers.



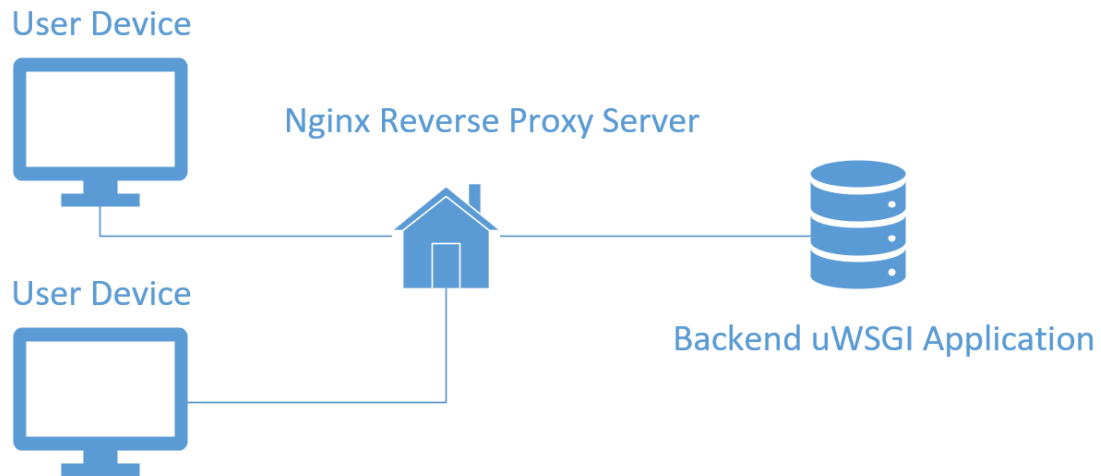


Figure 6: Server-Network Architecture

In the permission management section of the site, Casbin will be used to implement an RBAC access control model.

In the communication layer, we will use Ajax's GET and POST methods to cooperate with the reverse proxy feature to make the request and respond procedure with the back-end server.

Vue.js will be used to build the user interfaces, which make on top of standard HTML, CSS, and JavaScript, and provide a declarative and component-based programming model.

**Testing and Maintenance** Project code is managed through GitHub to do version control and collaboration. To ensure the code quality, Sonar will be used to scan the Python code, and ESLint will be used to scan the Vue code. Besides, it is necessary to keep the API document since we adopt parallel development of the front and back ends.

For each module, we will conduct the black and white box tests. Also, developers will check the code of each other.

After the basic implementation and module test, we will deploy the application on the server to do relevant system test with functional test and performance test (with Jmeter and PageSpeed Insights).

Finally, we will deploy our project on the ECS server to have a better user experience.

## 4.2 Description of Major System Components by UML

The below class diagram shows the relations between the classes in our software development design process. Students and Professors are accounts that inherit the Users accounts. The difference is the user

identity. All office time, posts and comments will be stored in the corresponding table with an unique ID as the primary key.

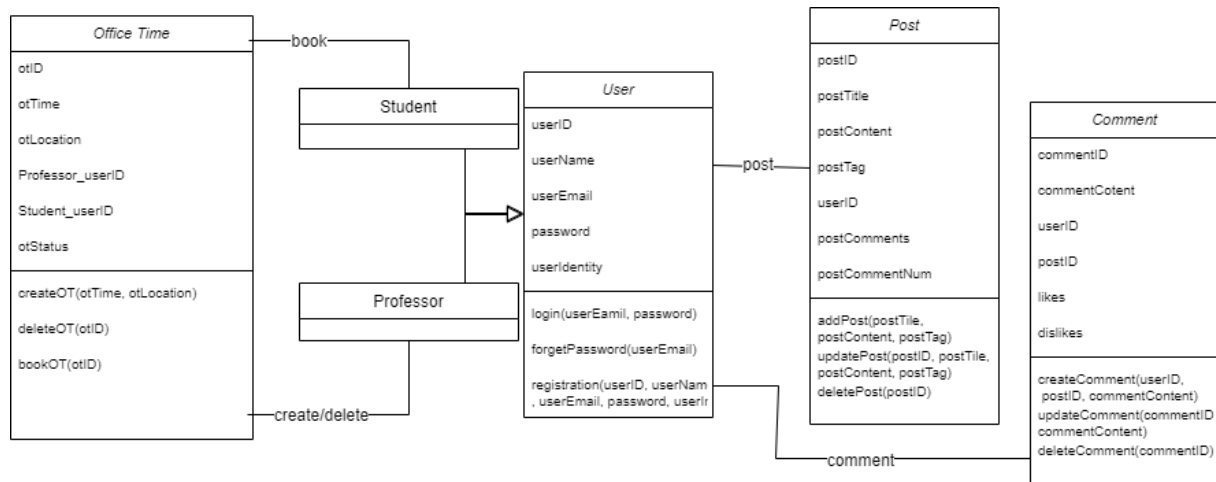


Figure 7: Class Diagram

Figure 8 shows what student and faculty users can do. Both students and faculty need to register their accounts. And only faculty can add office time, while the students can search and book office time. All users can create posts and make comments under any post.

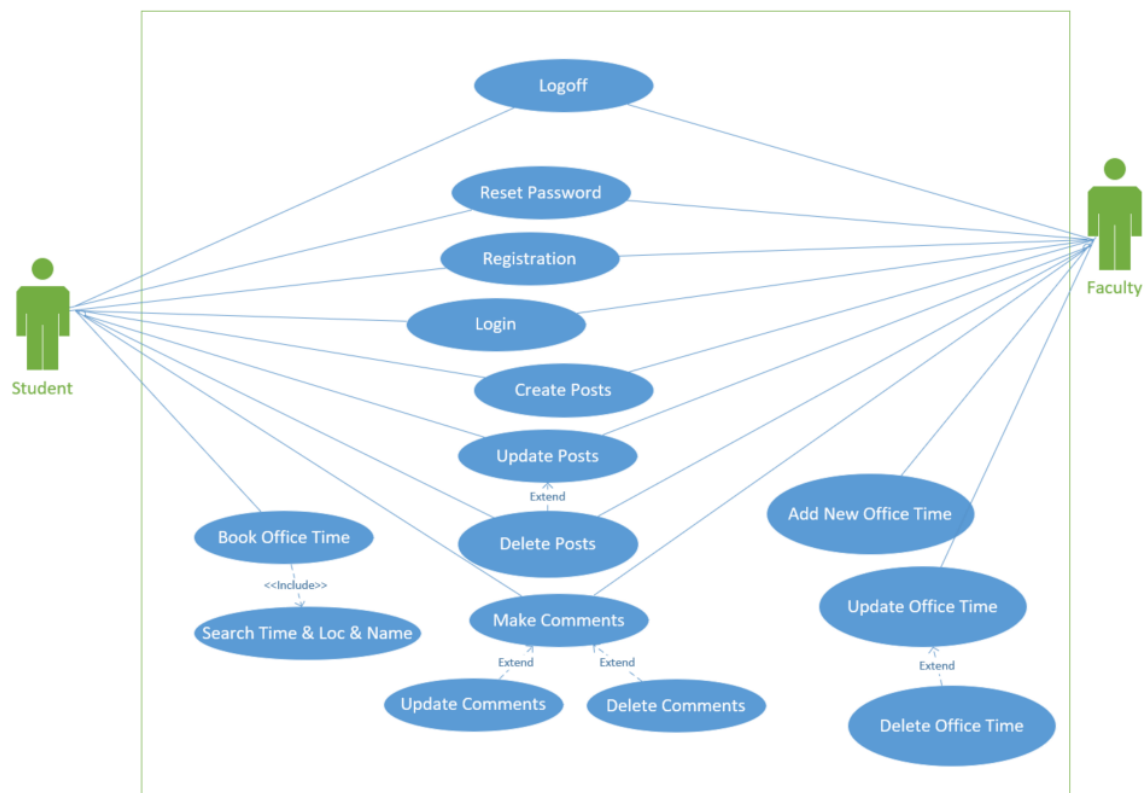


Figure 8: Use Case Diagram

Figure 9 and Figure 10 are two UML timeline graphs describing the two major system components: Office Time Appointment System and Forum System.

Figure 9 shows the timeline of the office time appointment system. Firstly, the instructor will post their time and location. Also, the instructor can update or delete the unoccupied time slots. After the professor post their office time slots, students can search by name, time, and location to find available office time and make appointment. Then, the student will get the confirmation, and the instructor will receive notification that one time slot is booked.

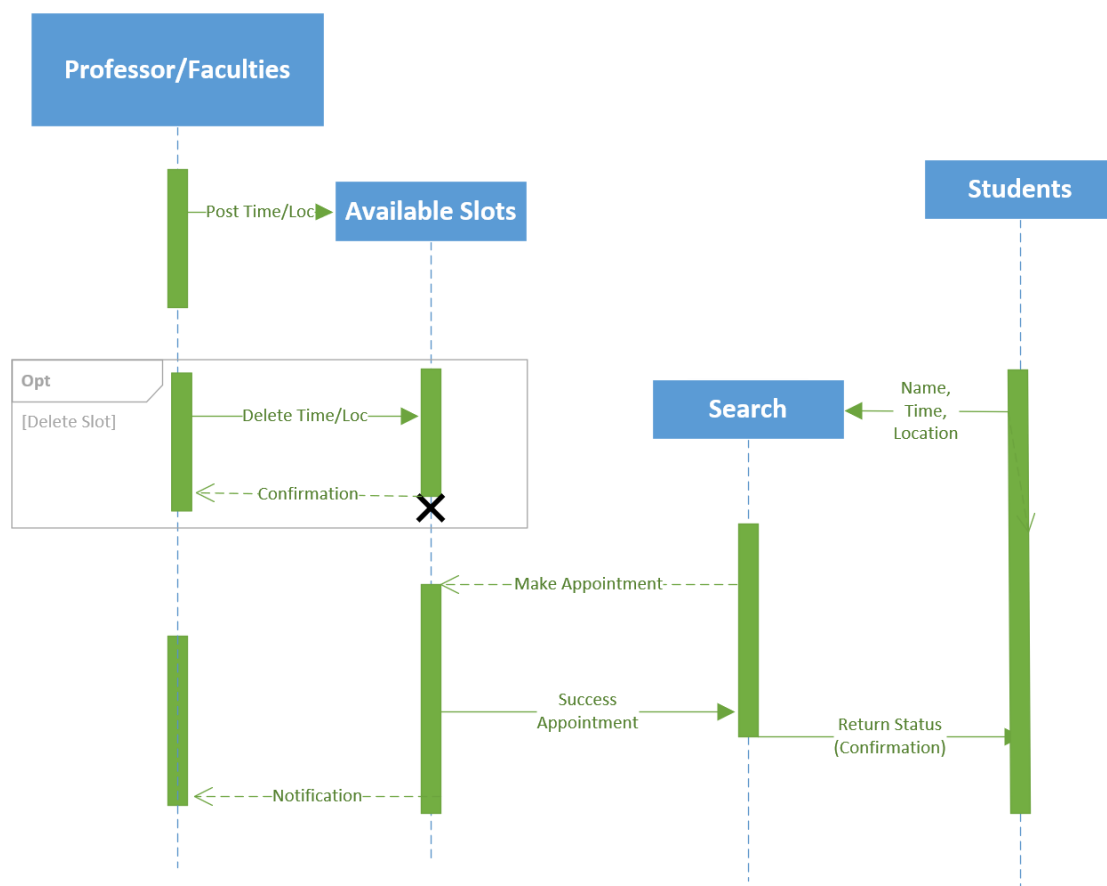


Figure 9: Office Time Booking Sequence Diagram

Figure 10 shows the timeline of the forum system. Any user can create their posts, and the poster can update or close their posts at any time. Other users can make comments under the posts. Also, they can update or delete their posts. All the comments belong to the post. If the post is close, other users cannot make new comments under that post.

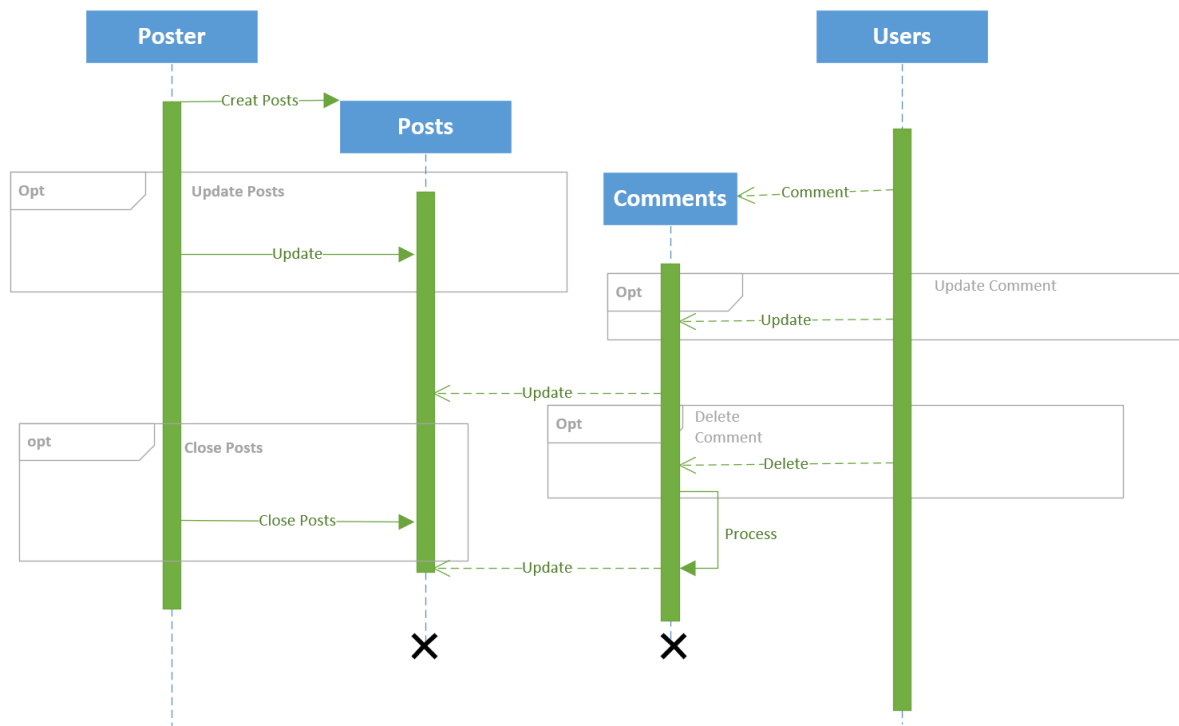


Figure 10: Post and Comment Sequence Diagram