

**The Hong Kong Polytechnic University**  
**Department of Computing**

**COMP4913 Capstone Project**  
**Final Report**

**An online reservation system for teaching**

Student ID No.: 

Programme-Stream Code: 61434 - BSc (HONS) FINANCIAL  
TECHNOLOGY

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Submission Date: 13/4/2022

## Contents

Background .....	3
Problem .....	3
Objectives .....	4
System Design .....	5
User flow.....	6
Resources Estimation .....	8

## **Background**

In 2019, COVID-19 broke out in Wuhan. This new coronavirus is highly contagious and can spread in the air. It will cause severe pneumonia and even death, so Hong Kong Polytechnic University stopped offline face-to-face teaching to prevent the spread of COVID-19. POLYU arranges online teaching for students to continue learning under the epidemic. Although online teaching may be more flexible for students to learn, there are also some new problems in teaching. In the online teaching mode, some subjects were difficult to take the exams originally in the face-to-face offline mode. Some professors choose to change the face-to-face offline exam to an individual project, but there are some problems with the reserved presentation time. In the following, I suggest establishing a web-based reservation system to solve the problem.

## **Research**

After researching some related tools on the Internet, I found that they cannot fully meet the needs of POLYU. For example, doodle is a common meeting appointment tool, but it can only vote on meeting times and cannot assign time slots to students. Therefore, I think it is necessary to establish an online reservation system. The advantage is that the university completely controls the system, and all data will be stored on the university's server to ensure data security.

## **Problem**

Each student needs to reserve a time slot to present to the teacher in individual project mode. If it is in a small class, it is easy for the professor to talk to each student to reserve a time slot for a presentation. If it is in a big class with more than 100 students, it will waste a lot of time talking to each student to reserve a time slot for a presentation. It is also challenging to handle the problem of a time conflict. For example, if more than one student prefers a time slot, the professor needs to ask the student for a second choice and decide who can get the time slot. It is very inefficient to handle it without a system. In conclusion, reserving time slots for individual project mode exams of online learning is challenging to manage and inefficient.

## **Objectives**

This capstone project aims to develop and implement an online reservation system that is easy to use and efficient for students and professors.

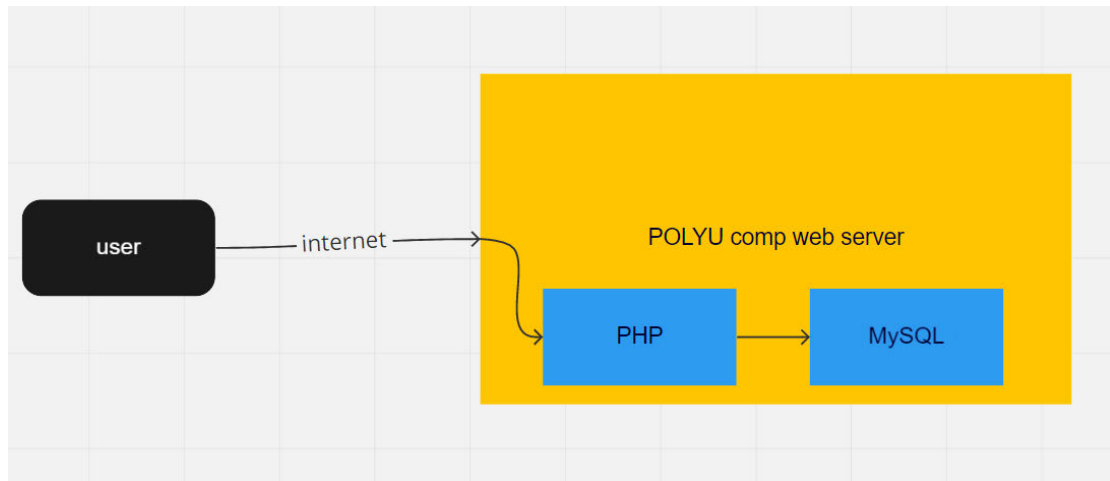
Below are the objectives we need to achieve:

- Providing a web application interface to users
- Create a database to store user data
- Design an algorithm to solve the problem of multiple students choosing the same time slot.

## **Functions Requirements**

- Create a “meeting” with a form
- Hyperlink/code share
- Multiple select and sort
- Allocates time slots fairly

# System Design



## POLYU computing department server

This project will use the computing department server because the system is intended to be used for actual PolyU teaching in the future. The system is only accessible within the PolyU network only because of restrictions of departmental. The web server software of the computing department server is Apache. Apache is a free and open-source web server software. It can work in a different operating system.

## PHP

This project will use PHP to build the backend system because PHP is the most popular web application language. PHP is free and open-source. It can be easy to deploy on a variety of operations. PHP has a long history, and it has a vast support community. It is easy to find a solution for a common problem on the internet.

## Mysql

This project will use MySQL database because it has high compatibility with PHP. MySQL is an open-source relational database. We will use the MySQL database to store user input data, such as the student choice and time sorts.

## Technical :

### Allocates time slots algorithm

The allocation algorithm of this system refers to the central allocation of the primary one admission system.

First, all students who submitted the choice will get a random order. The random order determines the order of allocation.

```
$studentidarray_random= $studentidarray;  
shuffle( &array: $studentidarray_random);
```

According to the above order, the system will process the first choice first. If other classmates do not occupy the classmate's first choice, he can get this time slot, and the classmate will be removed from the to-be-allocated list. If other students already occupy the classmate's first choice, the system will skip this classmate and then try to allocate a time slot to this classmate until the second choice is processed.

Then, in the second choice's processing stage, the system will process those students who were not assigned time slots in the first choice. The system will continue to repeat the above process until the tenth choice.

```
foreach ($mt_timeslots as $value) {
    $timeslotsarray[$value]=0;
}

$stmt->free_result();
$stmt->close();

for ($x = 1; $x <= $timeslotsnum && count($studentidarray_random)>0 ; $x++) {

    foreach ($studentidarray_random as $y => $value){

        $sql = "SELECT * FROM `choose` WHERE `uuid` = \"{$_GET['uuid']}\" AND `studentid`= \"{$value}\" ";

        $result = $conn->query($sql);
        while ($row = $result->fetch_assoc()){
            if ($timeslotsarray[$row['choose'][$x]]==0){
                $timeslotsarray[$row['choose'][$x]]=$value;
                unset($studentidarray_random[$y]);
            }
        }
    }

}
}
```

After ten rounds of allocation are processed, the remaining students who have not yet been allocated time slots will be randomly assigned time slots with the students who have not submitted their selection.

```
$remainstudent=array_diff($mt_studentid,$studentidarray);

$remainstudent=array_merge($remainstudent,$studentidarray_random);

shuffle( &array: $remainstudent);

foreach ($remainstudent as $value){

    foreach ($timeslotsarray as $y => $value2){

        if ($value2==0){

            $timeslotsarray[$y]=$value;

            break;

        }

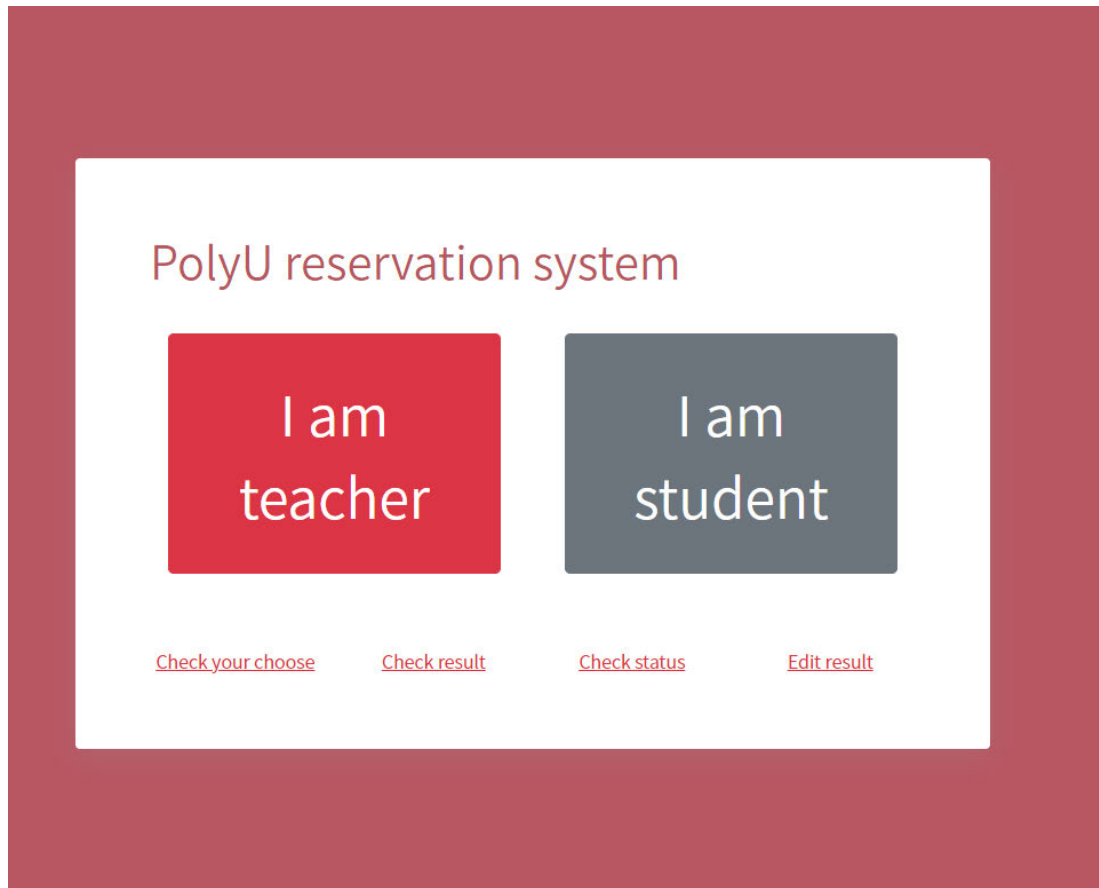
    }

}
```



## User flow:

1. Teacher click the “I am teacher” button.



2. The teacher creates a “meeting” with a form and inputs the meeting title, subject title, teacher name, duration of each meeting, deadline time, all the available time periods for student choice, and all student IDs.

The system will automatically calculate the time slot according to the time periods and the duration of each time slot provided by the teacher, so the teacher does not need to input each time slot one by one.

\*Time slot is a designated time when a teacher meets one student or one group of students.

\*Time period is made up of multiple consecutive time slots.

\*Deadline time is the time to announce the allocation result. Also, student can not edit their choice after the deadline.

## Create meeting

Meeting title

Subject title

Teacher name

Duration of each meeting (minutes)

Deadline time

年 / 月 / 日 -- -- : - : 年

Meeting day :

Add

Day 1

Date :

年 / 月 / 日

Time Periods :

Add

Start time:

-- : - : --

End time :

-- : - : --

Student ID

(use commas to separate more than one id, example: 20032741d, 20032743d, 20032752d)

Submit

3. Considering that this system is used for some classes with more than 100 students, the meeting date may be more than one day, so an add button is designed on the form so that teachers can freely add the number of meeting days and time periods

Meeting day : Add

Day 1

Date :

2022/04/30

Time Periods : Add

Start time:

上午 08:30

End time :

上午 10:00

Day 2

Date :

2022/05/02

Time Periods : Add

Start time:

下午 02:00

End time :

上午 03:00

Delete

Finally, the teacher needs to enter the student id of all students in the class, separated by commas between each id.

Student ID

(use commas to separate more than one id, example: 20032741d, 20032743d, 20032752d)

20032742d,20032743d,20032732d,20032342d,20033742d,20042742d,20048744d,20832749d,20012746d,23032742d,29032762d,20532447d,25072842d,26030942d

4. After submitting the form, the system will display a successfully created meeting message. The teacher needs to remember the following meeting code and editing password. Then the teacher needs to share the meeting code with this website with the students.

Meeting created successfully!  
Share the follow code to your student  
Meeting code : 6eaaaf9-646c-4b59-959e-82e441fe6709  
Edit password : d9lt1xf (Please record it for future result editing)

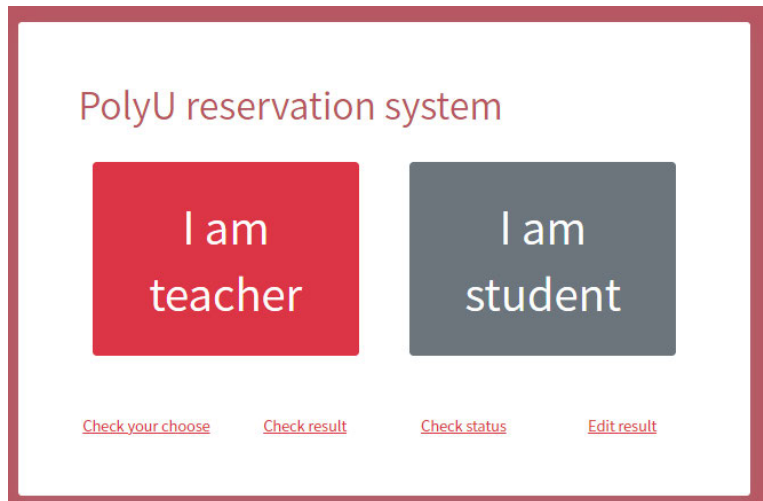
## Meeting state

Meeting title: capstones project present  
Subject title: capstones project  
Teacher name: chan wa  
Duration of each meeting (minutes): 15  
Deadline time: 2022-04-29 00:00:00  
Meeting code: 6eaaaf9-646c-4b59-959e-82e441fe6709

Student who have made a choice

# 0/14

5. Students need to click “I am student” and input the meeting code and student id.



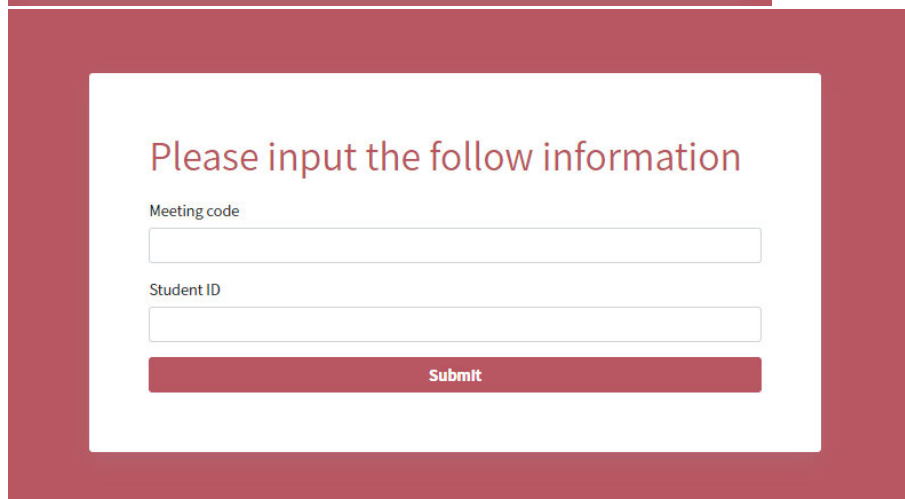
PolyU reservation system

I am teacher

I am student

[Check your choose](#) [Check result](#) [Check status](#) [Edit result](#)

This screenshot shows the login interface of the PolyU reservation system. It features a title "PolyU reservation system" at the top. Below the title are two large buttons: a red button labeled "I am teacher" and a grey button labeled "I am student". At the bottom of the interface, there are four links: "Check your choose", "Check result", "Check status", and "Edit result".



Please input the follow information

Meeting code

Student ID

Submit

This screenshot shows a form for inputting information. The title is "Please input the follow information". There are two input fields: "Meeting code" and "Student ID". Below the input fields is a red button labeled "Submit".

6. Students can select their preferred time period in this form and arrange them according to their preference.

This form also has a reselect button. When a student accidentally makes a wrong selection or want to change their choice, they can click this button to clear all selected time slots to reselect.

## Please select time slots by your preferences

Meeting title: capstones project present  
Subject title: capstones project  
Teacher name: chan wa  
Duration of each meeting (minutes): 15  
Deadline time: 2022-04-29 00:00:00  
Meeting code: 6eaaaaf9-646c-4b59-959e-82e441fe6709

First choose

Click to select time slots

2022-04-30\_08:30-08:45

2022-04-30\_08:45-09:00

2022-04-30\_09:00-09:15

2022-04-30\_09:15-09:30

2022-04-30\_09:30-09:45

2022-04-30\_09:45-10:00

2022-04-30\_16:00-16:15

2022-04-30\_16:15-16:30

2022-04-30\_16:30-16:45

2022-04-30\_16:45-17:00

2022-05-01\_14:00-14:15

2022-05-01\_14:15-14:30

2022-05-01\_14:30-14:45

2022-05-01\_14:45-15:00

Sixth choose

Click to select time slots

Seventh choose

Click to select time slots

Eighth choose

Click to select time slots

Ninth choose

Click to select time slots

Tenth choose

Click to select time slots

Reselect

Submit

7. The system will enable the next choice when students complete the first choice select menu. The next choice select menu will not include the previous choice time slot to avoid selecting the same time slot and provide a better user experience.

First choose

2022-04-30\_09:15-09:30



Second choose

2022-04-30\_16:15-16:30



Third choose

2022-04-30\_16:30-16:45



Fourth choose

2022-04-30\_16:00-16:15



Fifth choose

2022-04-30\_09:30-09:45



Sixth choose

2022-04-30\_09:00-09:15



Seventh choose

2022-04-30\_09:45-10:00



Eighth choose

2022-04-30\_16:45-17:00



Ninth choose

2022-05-01\_14:00-14:15



Tenth choose

Click to select time slots



2022-04-30\_08:30-08:45

2022-04-30\_08:45-09:00

2022-05-01\_14:15-14:30

2022-05-01\_14:30-14:45

2022-05-01\_14:45-15:00

8. After students submit their selections, a successful submission message is displayed. The teacher can also check the status of the meeting to see how many students have submitted their choices.

Your choose have been successfully submitted

### Meeting state

Meeting title: capstones project present

Subject title: capstones project

Teacher name: chan wa

Duration of each meeting (minutes): 15

Deadline time: 2022-04-29 00:00:00

Meeting code: 6eaaaaf9-646c-4b59-959e-82e441fe6709

Student who have made a choice

**1/14**



9. Students can review their submitted selections at any time after submitting their choice by clicking the “check your choice” link and can change their choice at any time before the deadline.

## The following is your choose

If you want to update your choose, click this [link](#)

Meeting title: capstones project present

Subject title: capstones project

Teacher name: chan wa

Duration of each meeting (minutes): 15

Deadline time: 2022-04-29 00:00:00

Meeting code: 6eaaaf9-646c-4b59-959e-82e441fe6709

First choose

2022-04-30\_09:15-09:30



Second choose

2022-04-30\_09:30-09:45



Third choose

2022-04-30\_16:00-16:15



Fourth choose

10. The system allocates time slots according to students' preferences after the deadline. The system will randomly assign time slots for students who do not submit their selections before the deadline.

Teacher and student can check the result by clicking the "Check result" link and inputting the meeting code.

## Time slot allocation results

Meeting title: capstones project present

Subject title: capstones project

Teacher name: chan wa

Duration of each meeting (minutes): 15

Deadline time: 2022-04-01 00:00:00

Meeting code: 6eaaaf9-646c-4b59-959e-82e441fe6709

Time slot	Student id
2022-04-30_08:30-08:45	26030942d
2022-04-30_08:45-09:00	29032762d
2022-04-30_09:00-09:15	20042742d
2022-04-30_09:15-09:30	20032742d
2022-04-30_09:30-09:45	20532447d
2022-04-30_09:45-10:00	20032743d
2022-04-30_16:00-16:15	20012746d
2022-04-30_16:15-16:30	20032342d
2022-04-30_16:30-16:45	20033742d
2022-04-30_16:45-17:00	20032732d
2022-05-01_14:00-14:15	23032742d
2022-05-01_14:15-14:30	25072842d
2022-05-01_14:30-14:45	20048744d
2022-05-01_14:45-15:00	20832749d

11. If students need to change the time slot, they can contact the teacher. The teacher can use the edit password to change the result.

### Edit results

Meeting title: capstones project present  
Subject title: capstones project  
Teacher name: chan wa  
Duration of each meeting (minutes): 15  
Deadline time: 2022-04-01 00:00:00  
Meeting code: 6eaaaf9-646c-4b59-959e-82e441fe6709

Time slot	Student Id
2022-04-30_08:30-08:45	<input type="text" value="20032743d"/>
2022-04-30_08:45-09:00	<input type="text" value="29032762d"/>
2022-04-30_09:00-09:15	<input type="text" value="20042742d"/>
2022-04-30_09:15-09:30	<input type="text" value="20032742d"/>
2022-04-30_09:30-09:45	<input type="text" value="20532447d"/>
2022-04-30_09:45-10:00	<input type="text" value="20032742d"/>
2022-04-30_16:00-16:15	<input type="text" value="20012746d"/>
2022-04-30_16:15-16:30	<input type="text" value="20032742d"/>

## Time slot allocation results

Edit result successfully!

Meeting title: capstones project present  
Subject title: capstones project  
Teacher name: chan wa  
Duration of each meeting (minutes): 15  
Deadline time: 2022-04-01 00:00:00  
Meeting code: 6eaaaf9-646c-4b59-959e-82e441fe6709

Time slot	Student Id
2022-04-30_08:30-08:45	20032743d
2022-04-30_08:45-09:00	29032762d
2022-04-30_09:00-09:15	20042742d
2022-04-30_09:15-09:30	20032742d

## **Conclusion**

This system uses PHP language to write and uses MySQL database to store data. The system will run on the University's servers. The system uses a fair algorithm to assign time slots to students and has features for students to view and change their choice and for teachers to edit results.

## **Resources Estimation**

### **Hardware**

1. Computer for development
2. Web server

### **Software**

1. IDE (phpstorm)
2. PHP
3. MySQL
4. Apache
5. Phpmyadmin