



澳門理工學院
Instituto Politécnico de Macau
Macao Polytechnic Institute

School of Public Administration
Computer Studies Program

GRADUATION PROJECT REPORT

2006-I-B9

Timetable Management System

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1. Abstract

In this report, we would introduce an application system named “Timetable management system”. Through this system, administrative staff can enter class information and the system can perform basic error checking, e.g. time conflict. In addition, students and academic staff can look up their timetable in real-time, print that out in PDF format, or export the class information to Google Calendar in iCalendar format. In order to ensure stable performance and low costs of the system, we have utilized PHP, MySQL, Apache and CSS in its development.

2. Introduction

At present, Macao Polytechnic Institute provides two types of timetable inquiry services, namely Class Time-Table Inquiry System and Student Information Web (SIWeb). Class Time-Table Inquiry allows users to inquire the class timetable of programs without any login procedures required; SIWeb allows students to login individual accounts to access information such as academic records and class timetables. Although these two systems provide different services depending on the different identities of users, obviously they are not bringing the greatest convenience to users because users have to choose to use a different system according to different requirements. In addition, there is an overlap of functions between the two systems.

In terms of users, both Class Time-Table Inquiry System and SIWeb do not include the academic staff and thus they cannot utilize the systems to look up their timetables for giving lectures.

The objective of designing this system is to take into consideration the need of both the academic staff and the students in looking up their timetables. Apart from providing the existing timetable inquiry functions of the Class Time-Table Inquiry System and SIWeb, several new functions have been incorporated to bring greater convenience. Users can login the system to check their semester timetable easily, and can choose to display the timetable in different formats. Moreover, the timetable can be printed out in PDF format, or exported as iCalendar format to Google Calendar. Furthermore, general users can make inquiries without having to login into the system.

In addition to the functions available, whether the system can be brought into full effectiveness depends on the completeness of information. Therefore, the housekeeping function is also provided to enable administrative staff to perform daily maintenance as a system administrator.

3. Functionality

In this section, the functions available in the system would be introduced:

1. To allow administrative staff to manage data related to class schedules with basic error checking (e.g. time conflict).
2. To let students and academic staff check class information.
3. To generate a dynamic timetable as a calendar for students and academic staff.
4. To generate class schedule into a PDF format for printing out or saving.
5. To export timetable as iCalendar format to work with various applications (e.g. Google Calendar).

4. System Diagram

The following system diagram will give a clear explanation on the operation of the system and the interaction between the users and its main components.

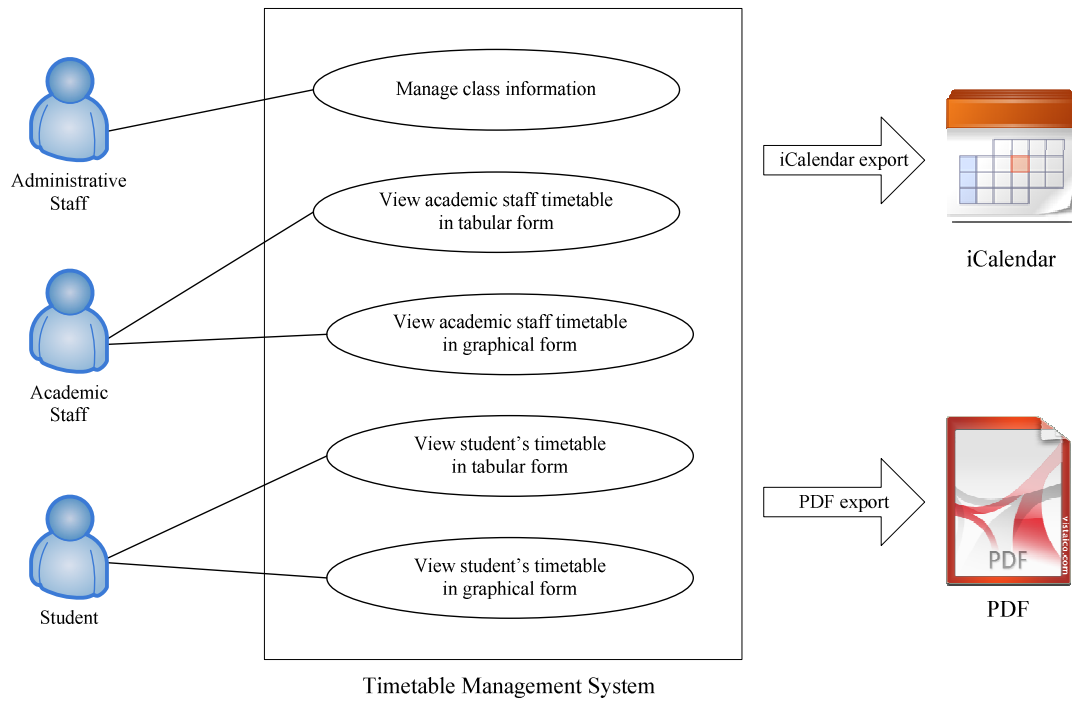


Figure 4.1 – System Diagram

5. System Design

In this section, we will illustrate the system structure, database design and technologies applied.

5.1 System Architecture

MySQL has been selected for development of the system database for several reasons. Firstly, among the various database available in market, MySQL has the characteristic of high speed but small volume. Secondly, it can support many popular operating systems, such as HP-UX, Linux, Microsoft Windows, etc. Thirdly, it provides API for a number of programming languages. Besides, comparing with other large-scale databases such as Oracle, DB2, SQL Server, MySQL requires a lower cost. Yet, it can process tens of thousands records with relatively stable performance.

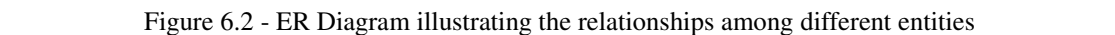
Since Apache HTTP Server enjoys a reputation of being reliable and trustworthy, and its high speed surpasses other servers based on HTTP server, Apache HTTP Server has become the most popular HTTP Server. Owing to these reasons, it has been chosen as the HTTP Server of our system. Moreover, Apache supports a number of common languages such as Perl and PHP. Most importantly, Apache can be operated in the majority of computer OS including Microsoft Windows. This allows it to be installed under Microsoft Windows without having to construct another Linux-based machine.

5.2 Technology Application

To ensure better coordination between the Apache HTTP Server and MySQL database, PHP5 has been used as the programming language. Through the architecture made up of Apache, MySQL and PHP, an inexpensive, reliable, scalable as well as secure web application has been built.

Considering the need of document structure simplification to reduce the use of table so as to increase the download speed, advanced CSS techniques have been applied to the design of document structure. Such application not only simplifies the document structure for higher download speed but also paves way for feasibility of future system expansion. For instance, functions can be added for users to determine the display format of documents. Furthermore, when there is the need to alter the user interface in future, only CSS has to be modified and the original document structure can remain unchanged.

The following ER diagram shows the structure of the system database used for data access, as well as the relationship among the entities.



7. User Manual

Login: All users, including students, academic staff and system administrator can enter username and password logon to the system in the login page.



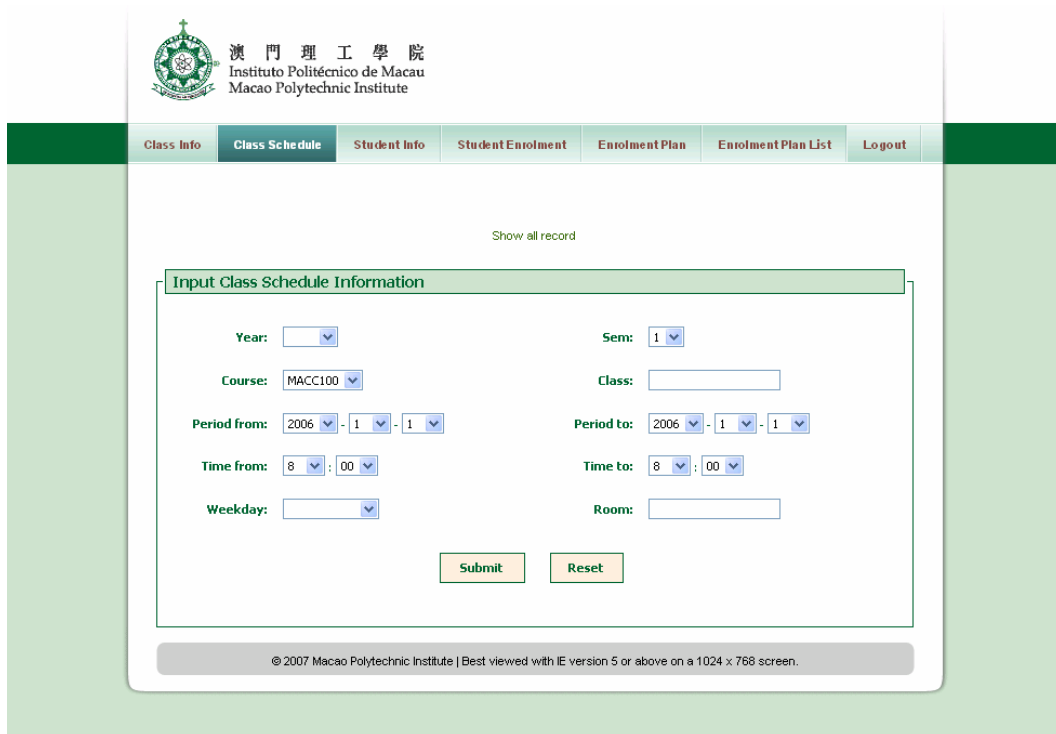
Figure 7.1 – Login Page

Class Time Table Inquiry: All users can go to this page to inquiry class information.

YEAR	CLASS CODE	SUBJECT	IISTRUCTOR	ROOM	PERIOD	TIME	S	M	T	W	T	F	S
3	MACC100-31222	Principles of Accounting	KUAN DANIEL	A301	2006-09-18 2007-01-13	20:30-22:00			●				
				B304	2006-09-18 2007-01-13	20:30-22:00						●	
3	MCCS261-31222	Software Engineering	HO KA CHONG, WILL SHUN	A301	2006-09-18 2007-01-13	21:00-23:00		●					

Figure 7.3 - Class Time Table Inquiry

Record Input: This function allows System Administrator to append new class schedule information to the system.



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Class Info Class Schedule Student Info Student Enrolment Enrolment Plan Enrolment Plan List Logout

Show all record

Input Class Schedule Information

Year: Sem:

Course: Class:

Period from: - - Period to: - -

Time from: : Time to: :

Weekday: Room:

Submit Reset

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Figure 7.3 – Input Class Schedule Information

Show Record: This function is to allow System Administrator to check information as table form.



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Class Info Class Schedule Student Info Student Enrolment Enrolment Plan Enrolment Plan List Logout

Back to Input Class

YEAR	SEM	COURSE	CLASS	OFFERING PROGRAM	SECTION	INSTRUCTOR	CLASS YEAR	DELETE	EDIT
2006	1	MACC100	31222	HDCS	N	danielkuan	3		
2006	1	MCCS261	31222	HDCS	N	wilsonho	3		
2006	1	MCCS282	31222	HDCS	N	johnse	3		
2006	1	MCCS310	31222	HDCS	N	calanachan	3		
2006	1	MMAT110	31222	HDCS	N	edmundyung	3		
2006	1	MSEL101	31522	HDCS	N	jessielkuan	3		
2006	2	MBUS100	32222	HDCS	N	danielkuan	3		
2006	2	MCCS311	32222	HDCS	N	andrewslu	3		
2006	2	MCCS320	32222	HDCS	N	bettylo	3		
2006	2	MCCS390	32222	HDCS	N	philiplei	3		
2008	1	MACC100	a303	BSCS	N	danielkuan	3		

Figure 7.3 – Show Class Information

Timetable Display: Both students and academic staff can view their own timetable as tabular form (Figure 7.4) or graphical form (Figure 7.5).

Please select ...

Time Table format 1 Time Table format 2 PDF Download Calendar

STUDENT TIME TABLE													
YEAR	CLASS CODE	SUBJECT	INSTRUCTOR	ROOM	PERIOD	TIME	S	M	T	W	T	F	S
3	MBUS100-32222	Introduction to Business	KUAN DANIEL	A303	2007-02-28 2007-06-18	21:00-22:30				●			
				A303	2007-02-28 2007-06-18	21:00-22:30					●		
3	MCCS311-32222	Internet Computing Technologies II	SIU KA MENG, ANDREW	A202	2007-02-28 2007-06-18	19:00-21:00		●					
				A202	2007-02-28 2007-06-18	21:00-21:00					●		
3	MCCS320-32222	Multimedia Application Development I	LO SI IUN	A203	2007-02-28 2007-06-18	21:00-23:00			●				
				A203	2007-02-28 2007-06-18	19:00-21:00				●			
3	MCCS390-32222	Graduation Project I	LEI IAT SENG, PHILIP	A204	2007-02-28 2007-06-18	21:00-23:00		●					
				A204	2007-02-28 2007-06-18	19:00-21:00			●				

Figure 7.4 – Timetable shown as tabular form

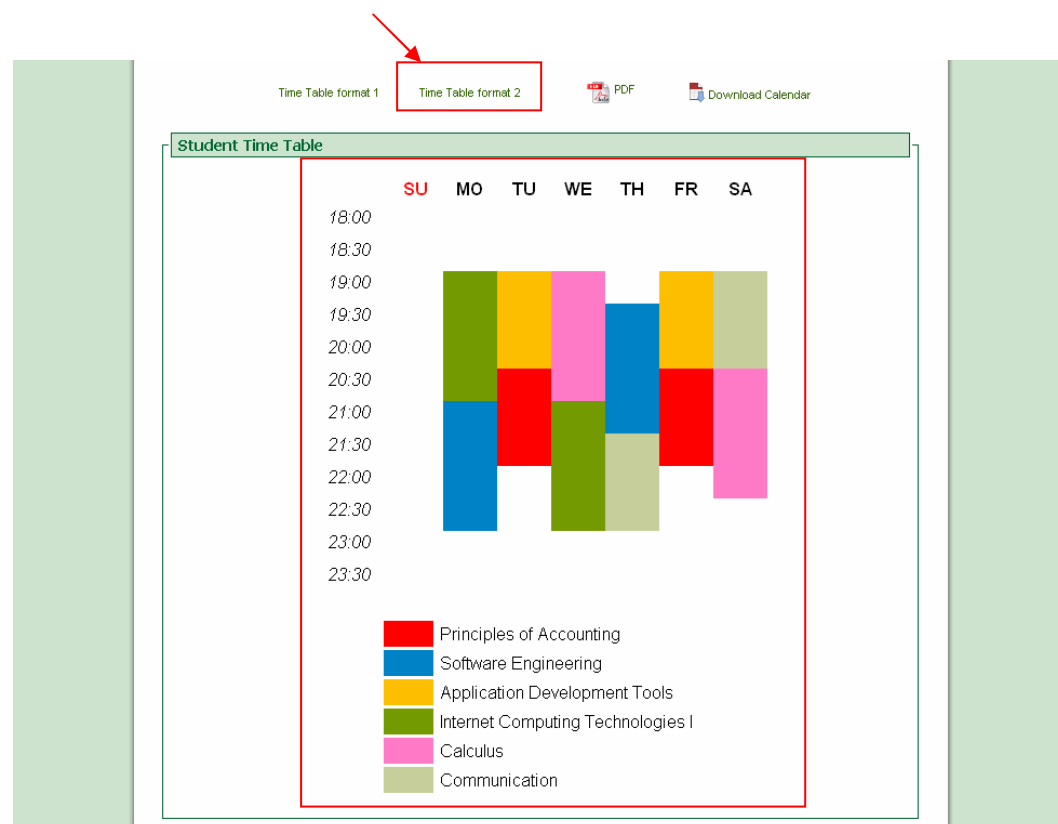


Figure 7.5 – Timetable shown as graphical form

PDF format: Figure 7.6 shows the timetable content in PDF format file.

Student I.D.: p0400954

Student Time Table							
Year	Class Code	Subject	Instructor	Room	Period	Time	Weekday
3	MACC100-31222	Principles of Accounting	KUAN DANIEL	A301	2006-09-18 2007-01-13	20:30-22:00	TU
3	MACC100-31222	Principles of Accounting	KUAN DANIEL	B304	2006-09-18 2007-01-13	20:30-22:00	FR
3	MCCS261-31222	Software Engineering	HO KA CHONG, WILSON	A301	2006-09-18 2007-01-13	21:00-23:00	MO
3	MCCS261-31222	Software Engineering	HO KA CHONG, WILSON	A301	2006-09-18 2007-01-13	19:30-21:30	TH
3	MCCS282-31222	Application Development Tools	SE CHUN WENG, JOHN	A205	2006-09-18 2007-01-13	19:00-20:30	TU
3	MCCS282-31222	Application Development Tools	SE CHUN WENG, JOHN	A203	2006-09-18 2007-01-13	19:00-20:30	FR
3	MCCS310-31222	Internet Computing Technologies I	CHAN MEI POU, CALANA	A301	2006-09-18 2007-01-13	19:00-21:00	MO
3	MCCS310-31222	Internet Computing Technologies I	CHAN MEI POU, CALANA	A205	2006-09-18 2007-01-13	21:00-23:00	WE
3	MMAT110-31222	Calculus	YUNG YAU KONG EDMUND	A301	2006-09-18 2007-01-13	19:00-21:00	WE
3	MMAT110-31222	Calculus	YUNG YAU KONG EDMUND	A301	2006-09-18 2007-01-13	20:30-22:30	SA
3	MSEL101-31522	Communication	KUAN SI WENG	A301	2006-09-18 2007-01-13	21:30-23:00	TH
3	MSEL101-31522	Communication	KUAN SI WENG	A301	2006-09-18 2007-01-13	19:00-20:30	SA

Figure 7.6 – Timetable content shown in PDF format

iCalendar format: The below figure shows the content stored in a exported iCalendar file.

```

BEGIN:VCALENDAR
VERSION:2.0
PRODID:-//MPI//MPI iCalendar 1.0//EN

BEGIN:VEVENT
DTSTART:20060919T203000
RRULE:FREQ=WEEKLY;UNTIL=20070113T235959;WKST=SU;BYDAY=TU
DURATION:PT1H30M0S
SUMMARY:MACC100-31222 - Principles of Accounting
UID:p0400954-1853820827
DTSTAMP:20070619T145107
END:VEVENT

BEGIN:VEVENT
DTSTART:20060922T203000
RRULE:FREQ=WEEKLY;UNTIL=20070113T235959;WKST=SU;BYDAY=FR
DURATION:PT1H30M0S
SUMMARY:MACC100-31222 - Principles of Accounting
UID:p0400954-357613009
DTSTAMP:20070619T145107
END:VEVENT

END:VCALENDAR

```

Figure 7.7 – Timetable content stored in iCalendar

8. References

- **PHP**
 - **PHP: Hypertext Preprocessor**
<http://php.net/>
 - **[PHP] 免費好用的 PDF Library 大搜集**
<http://www.neo.com.tw/archives/000896.html>
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<http://www.w3schools.com/php/default.asp>
 - **Browse all PHP snippets:**
<http://codedump.jonasjohn.de/browse/lang/php/>
 - **【首頁 / PHP 建構術 / 寫入檔案】**
<http://dob.tnc.edu.tw/themes/old/showPage.php?s=300&t=1&at=>
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 - **iCal file format**
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 - **iCalendar Specification Excerpts**
<http://www.kanzaki.com/docs/ical/>

9. Job Division

In this section, we would explain the job division between the two team members in this project.

- Tom:
 - Project Management
 - System Design
 - System Development – Programming in general functions (such as creation, update and deletion of class information) , PDF export
 - Poster Design

- Conrad:
 - System Design
 - System Development – iCalendar export
 - Database Design and SQL query for data manipulation
 - Layout Design of the System using CSS
 - Project Report Writing

10. Appendix

10.1 Difficulties of Our Work

During the process of the system development, we have applied several programming languages and techniques that we have never learnt to construct the system including PHP and CSS. However, these programming languages and techniques have been popular for quite a period of time, and their information can be readily accessible in the internet or reference books. Nevertheless, as beginners, we inevitably encounter some obstacles. In this section, we would like to share our experience and difficulties in developing this system.

- First of all, it is necessary to install Apache HTTP Server, PHP and MySQL in our system. We are unfamiliar with implementation of these components in Windows. Therefore, we have done a lot of research work in the internet. Fortunately, we managed to come up with a software called “AppServ Open Project”. Its installation is simple and the few mentioned components can be installed simultaneously. In addition, the software itself is stable.
- In constructing this system, apart from supporting information in English, we hope to support access of Chinese information as well. However, when using “Big5” as the database language setting, the Chinese information cannot be displayed properly. After trying to use more than ten languages as the setting, we found that Chinese information could only be properly accessed by using “Latin1_general_ci” as the language setting. In this way, the problem has been solved
- In writing the part of graphical timetable, we must find a way to make each cell in the table to record the lesson time and respective course name correctly. After careful consideration, we have decided to use a 2D array which has the same number of cells as the table for showing information to mark the colour represented by each lesson, and then to record the respective course name by another array. In this way, the timetable of each student and teacher can be completely shown by graphical presentation.
- In writing the programme of iCalendar, owing to our limited understanding in it, we have to do much data collection to enlarge our knowledge. The biggest problem was to distinguish the first lesson date of each class as the starting date of each event. The solution was to use the starting period of each class to

calculate the first lesson date of each class. In this way, the workload of the system administrator would be reduced and he/she does not need to calculate the first lesson date of each class in advance or insert more record columns in the database.

- Although we have tried to utilize CSS to carry out simple typesetting of document before, for example, to define colours and fonts, when we apply advanced CSS to set the document structure, we face some difficulties in making the system user interface have the same display under Internet Explorer and Mozilla FireFox which are two different web browsers. Since these two browsers show different characteristics in handling display format of webpages, the system interface displays different effects in the two web browsers. Despite of this, we managed to overcome this problem several trials.
- Although PHP5 provides a set of library for converting information into the PDF format, the codings involved in the converting process are very complicated. Therefore, we have applied a set of tools found in the internet with the function of PDF conversion to perform this task. It is applicable by including the library of this set of tools in our system. Yet, PHP5 does not offer full support to PDF conversion, and since our system is using advanced CSS technique, we have to design another timetable layout for generating a PDF format timetable.