FYP Proposal Report

Online Enrollment and Administration System

Real World Database Development

by

Kong Koon Kit **Chan Yin Mo**

Law Yu Yeung **Leung Shiu Hong**

Advised by

Prof. Frederick H. Lochovsky

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1. Introduction

The need for powerful and flexible data management systems is increasing in science, engineering, business and the personnel fields. The success of an organization depends on its ability to acquire accurate and timely data about its operation, to manage this data effectively, and to use it to analyze its own activities. In our final year project, a web-based course enrollment system for The Chinese YMCA of Hong Kong will be implemented to manage a vast amount of data, and to answer a given query with the relevant information in as little time as possible. The system is built by applying the techniques of Internet programming, database design and database management.

The objective and purpose of the Course Enrollment System is to provide real-time registration for the members and relevant reports for staff. It helps the staff in the YMCA to input and retrieve data in a more efficient way and the members can do registration of any course or programme in the nearest YMCA centre. The system is also flexible because the user only needs to make a connection with the Internet and use the web browser to access the system server to use the Course Enrollment System.

We studied some materials during the summer vacation to prepare for this project. We mainly searched for web sites that provided the syntax of the programming languages including ASP (Active Server Page), JSP (Java Server Page), DHTML (Dynamic HyperText Markup Language) and PHP (Personal Homepage Programming, Hypertext Preprocessor). One of the web sites is www.php.net. This web site provides the functions and syntax of PHP for reference. Another web site is www.mysql.com, which provides the usage of the MySQL Server. We also found some books for reference. The Core PHP Programming by Leon Atkinson presents the techniques and issues in using PHP. Database Management Systems by Raghu Ramkrishnan and Johannes Gehrke presents the database management skill and design to produce the most efficient database system. Please refer to References, Section 5 of this report, for the full list of background material.

2. Methodology

The YMCA is a well-known organization in Hong Kong and it has over 60 thousand members all over the territory. Nevertheless, their course enrollment data have still not been managed in a rational way. Our group is going to build a new database system for real-time course enrollment and allow data sharing between several centers.

There are some challenges in this project: the course enrollment data varies greatly. For example, there is no fixed format of schedule for different kinds of courses. It is difficult to

build a user-friendly interface and a well-designed database. Since the YMCA has set up a firewall, we cannot make a direct connection from UST to YMCA. All the modules we have finished in UST need to be tested in the YMCA again and there is the possibility that the system in the YMCA is not compatible with our database system designed in UST.

Our goal for the project is to develop a course enrollment system for the YMCA so that the staff in YMCA can do the course registration for members in every center more efficiently. There are 5 parts: database design, permission setting, course registration, database maintenance and visualization. We are going to discuss how we will build the system in different phases.

Design Phase

Database

We will analyze the requirements for the database system and design an entity-relationship schema (ER schema). We will then derive the relational schema based on the ER schema. In order to capture the requirements of the system and ensure that we have not misunderstood the requirements, we will have regular meetings with the IT officers of the YMCA. To have a good design of the database structure, we will seek advice from our advisor Professor Lochovsky from time to time and compare the database performance and the complexity from the open source database.

Administration Centre

The users will be divided into several groups and different rights will be assigned to different groups. Basically, the groups include administrator, senior staff, junior staff and system operator. These groups will be assigned to have different rights to perform the jobs such as viewing record, modifying record, deleting record, setting rights and defining new groups. The administrator has the right to define new groups and update the permission for different groups. After defining all the necessary groups and permissions, all the users will be classified into different groups and thus they can perform different kinds of jobs. We adopted this security scheme as new groups and functions can be added after the system has been put into production.

Course Registration

We will develop a system that provides a user-friendly interface that allows the staff of the YMCA to do the course registration for the members. During the registration process, the system will check whether the requested course enrollment will cause any time conflict with other courses, whether there are any vacancies for the members, and whether the members meet the prerequisites for the requested course.

Database maintenance

The database maintenance involves providing a user-friendly interface for the YMCA staff to modify the database without directly accessing the tables of the database. The actions include adding and deleting data in the relevant tables.

Visualization

The data in the database will be analyzed into useful information and will be displayed in a report. There are several kinds of reports including some weekly reports, monthly reports and some other types of reports that are generated when necessary. The statistics of the course enrollment will be reported weekly. The attendance of the members, tutors and the details of the courses offered will be reported monthly. In addition, reports including members enrolled in a particular course, courses enrolled or taken for a particular member, tutor with the corresponding courses will be generated if required.

Implementation Phase

Database

The MySQL database server is the world's most widely used open source database. Its ingenious software architecture makes it extremely fast and easy to customize. Extensive reuse of code within the software and a minimalist approach to produce functionally rich features have resulted in a database management system unmatched in speed, compactness, stability and ease of deployment. MySQL is available for free under the GNU General Public License (GPL). It supports a relational database, which is a collection of data items organized as a set of formally-described tables from which data can be accessed or reassembled in many different ways without having to reorganize the database tables.

Administration Centre and Course registration

Both of these modules will be implemented by using PHP, which is an object programming, server-side, cross-platform, and HTML embedded scripting language. This programming language can reduce the complexity of the server side system greatly. It is very complicated to combine modules together that are written in different programming languages since code reuse and management session will be involved. Moreover, JavaScript and DHTML will be chosen to make page decoration and error checking in the client side.

Database Maintenance

SQL statements will be designed according to the relational schema in the design phase. All the data modification will be done on the web interface with error checking, which is done by using PHP and JavaScript.

Visualization

SQL statements will be customized to generate reports in accordance with the sponsor's requirements. In this module, we will apply PHP and PDFLIB to generate the reports. Machine dependent printer code will be used for printing on a dot matrix printer.

Testing Phase

Database

Stress tests will be applied onto the database for stability and performance tuning. We will develop a simple Visual Basic (VB) program to test the correctness of the database automatically. This program will insert a vast amount of data into the database server. We will make several types of queries to check the consistency of the database and any other hidden problems.

Administration Centre and Course Registration

To test these modules, we will test some boundary cases such as time conflict courses and invalid input. Moreover, we will use a dead link checker to test our web page to determine whether there exist some mistyped addresses or dead links. In addition, we will test the system on different versions of browsers.

Database Maintenance

To test our database maintenance, we will test some boundary cases and repeating cases. We will enter all possible inputs, and test whether the system gives the expected response for the corresponding input. For example, there will be a system message to show the success of the enrollment process if the user enters all input correctly. On the other hand, if the user enters any incorrect field, the system will popup a message to show which field has been input incorrectly.

Visualization

To test the visualization, we will test the correctness of the generated reports by comparing them to the actual data input in to the database.

Evaluation Phase

Database

In order to evaluate the stability and performance, we will analyze the result from the testing phase and the feedback from the YMCA during the demonstration.

Administration Centre and Course Registration

In the evaluation of these two modules, we will be concerned whether the system is user-friendly during the software demonstration. Moreover, the response of the system will be measured through the log files of the web server.

Visualization

We will evaluate the visualization during regular meetings with the sponsor company. Their advice will be considered for further improvements in the project before the code of the project is frozen.

3. Project Planning

All our group members are responsible for doing requirements capture, system design and analysis.

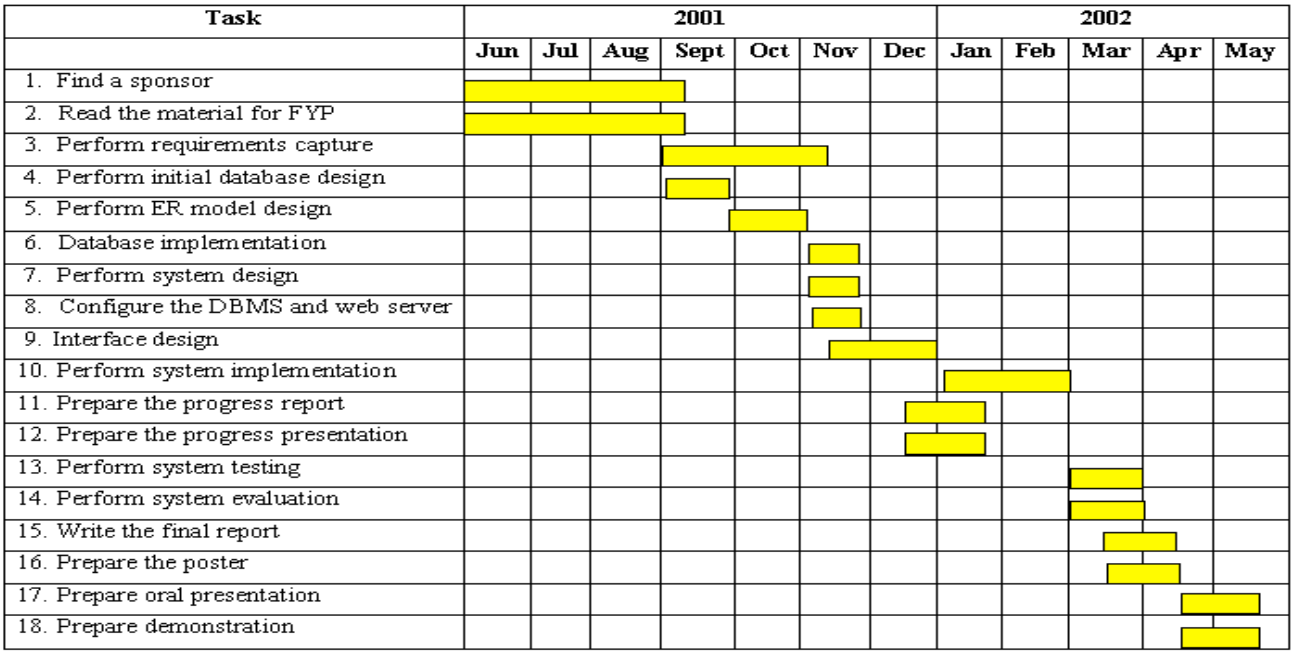
Responsibility of each student

Law Yu Yeung and Chan Yin Mo will be responsible for doing the design of the database and the administration centre. Leung Shiu Hong and Kong Koon Kit will be responsible for doing the database maintenance, course registration and visualization.

Schedule

Date	Deliverables
30/06/01-31/8/01	Find sponsor, search and read the material for FYP.
31/08/01-12/11/01	Requirements capture and refine requirements from YMCA.
03/09/01-27/09/01	Initial conceptual database design and prepare for the proposal presentation.
27/09/01-01/11/01	Completed object/entity-relationship design and initial database requirements and initial application design produced.
01/11/01-29/11/01	Relational database design and system design for the application.
01/11/01-30/11/01	Configure the database management system and the web server in order to start the implementation state.
13/11/01-31/12/01	Initial interface design.
15/12/01-21/01/02	Prepare for the progress report and presentation.
01/01/02-28/2/02	Implementation of the whole system and supported functions.
01/03/02-31/03/02	Test and debug the system thoroughly. And do the evaluation and documentation as a whole.
15/03/02-15/04/02	Prepare to submit the final report and poster.
15/04/02-15/05/02	Prepare for the presentation and the demonstration.

Gantt Chart



4. Required Hardware and Software

The course enrollment system consists of a database server and an application server. The database server needs to handle a vast amount of data, so a large volume data storage and good performance database management system is needed. On the other hand, the application server needs to handle multiple-client access and generate dynamic web page content; as a result, we have chosen a 100Mb Ethernet connection and leased line. The required hardware and software configuration is:

1) Hardware configuration:

CPU	Pentium III 500
Main Memory	256Mb
Storage	30Gb IDE Hard disk
Network	100Mb Ethernet connection and leased line

2) Software configuration:

Operating System	Redhat Linux 7.1
Database System	MySQL 3.23
Software	PHP 4.0.6 stable edition
Software	Apache
Software	Editplus 2.0
Software	Internet Explorer 5.0

5. References

Books

Prentice Hall (1999). The Core PHP Programming. Leon Atkinson (450pages)

McGraw-Hill (1999). Database Management Systems. Raghu Ramkrishnan and Johannes Gehrke.

Web sites

internet.com Corp. (No date). *phpbuilder.net* [Online]. Available: http://www.phpbuilder.net [2001, Sep 22].

Software

MySQL AB Company. (2001). MySQL 3.23, Stable Edition. Available: http://www.mysql.com [2001, Sep, 22].

Zend Technologies Ltd. (2001). PHP 4.06. Available: http://www.zend.com [2001, Sep, 22].

6 Appendices

Appendix A – Meeting Minutes with the YMCA

Minutes of the 1st Meeting

Date: 8th Aug 2001
Time: 12:30 PM
Venue: 4/F., Conference Room, Administration Building, YMCA

Present:
Johnson Wong (Financial Controller)
Kwan Wai Yin (Assistant I.T. Manager)
Anna Tse (Financial Planning Manager)
Chan Yin Mo
Leung Shiu Hong
Kong Koon Kit
Law Yu Yeung

Minutes Recorder:
Law Yu Yeung

Matters for Discussion

1. We answered the questions about our background information and the information about our Final Year Project for the staff of the YMCA.
2. The staff of the YMCA suggested two database systems for us to develop, which are the course enrollment system and the campsite booking system. Because we need to discuss what database system is more suitable for us to be the topic of the Final Year Project, we need to discuss it with our group members first and choose which database system we are interested in later.
3. We agreed to send the web page link and the schedule of the Final Year Project to them through e-mail
4. We got an Annual Report from the staff of the YMCA so that we can become more familiar with the activities of the YMCA.
5. The next meeting will be held after we select which database system we will choose to develop.

Next Meeting

Date To be confirmed

Time: To be confirmed

Venue: 4/F., Conference Room, Administration Building, YMCA

Adjournment of Meeting

The meeting was adjourned at 2:00 P.M.

Minutes of the 2nd Meeting

Date: 20th Aug 2001

Time: 11:00 PM

Venue: 4/F., Conference Room, Administration Building, YMCA

Present:

Johnson Wong (Financial Controller)

Kwan Wai Yin (Assistant I.T. Manager)

Anna Tse (Financial Planning Manager)

Chan Yin Mo

Leung Shiu Hong

Kong Koon Kit

Law Yu Yeung

Minutes Recorder:

Law Yu Yeung

Matters for Discussion

1. We reported that we had selected the course enrollment system of the YMCA to be our FYP topic.
2. We discussed and captured the initial requirements of the course enrollment system, which includes
   - purpose of the course enrollment system
   - basic flow of the course enrollment system
   - basic requirements of the course enrollment system
   - hardware and software requirements of the course enrollment system
   - languages of the course enrollment application program

Next Meeting

Date: To be confirmed

Time: To be confirmed

Venue:

Adjournment of Meeting

The meeting was adjourned at 12:15 P.M.

Minutes of the 3rd Meeting

Date: 24th Sept 2001
Time: 11:00 AM
Venue: 4/F., Conference Room, Administration Building, YMCA

Present:
Johnson Wong (Financial Controller)
Kwan Wai Yin (Assistant I.T. Manager)
Anna Tse (Financial Planning Manager)
Chan Yin Mo
Leung Shiu Hong
Kong Koon Kit
Law Yu Yeung

Minutes Recorder:
Law Yu Yeung

Matters for Discussion

1. We discussed the initial requirement of the course enrollment system after the last meeting. There were some points and the flow of the system we did not fully understand. Hence, we asked some questions about the system and we discussed the requirements again.
2. We found that security is also important for the course enrollment system. As a result, we decided to implement an Administrative System to ensure that a person who accesses the course enrollment system has his own permission in the system.
3. We asked what kinds of reports we need to generate in the course enrollment system and they said they would give us a reply in the next meeting.
4. We had sent the IP agreement of the FYP to the YMCA through e-mail and they returned the signed contract to us.

Next Meeting

Date: To be confirmed
Time: To be confirmed
Venue: 4/F., Conference Room, Administration Building, YMCA

Adjournment of Meeting

The meeting was adjourned at 12:00P.M.

Appendix B – Meeting Minutes with the Advisor

Minutes of the 1st Meeting

Date: 2nd June 2001
Time: 4:00 PM
Venue: Rm. 3464

Present:
Prof. Fred Lochovsky
Kong Koon Kit
Leung Shiu Hong
Law Yu Yeung

Absent:
Chan Yin Mo

Minutes Recorder:
Law Yu Yeung

Matters for Discussion

1. A meeting with our FYP advisor should be held at least twice a month, which includes the group meeting and the meeting with our advisor to report our progress.
2. Presentation of the FYP
   2.1. 1st Oct 10 min presentation of proposal report
   2.2. 2nd Feb 15 min progress report presentation
   2.3. 3rd May 15 min final report presentation
3. The requirements and content that we need to satisfy in this FYP
   3.1. Description of the requirement
      3.1.1. Data requirement
         Represented by a domain model or ER model; we also need to do a description of the data and object model
      3.1.2. Functional requirement
         Represented by a use case model
   3.2. Translate the ER diagram to a relational schema
   3.3. Data Dictionary
   3.4. User Interface

3.5. Acceptance Test
3.6. Decide on the test plan
3.7. Specify the steps and how our group will back up and protect the database for the user
3.8. Provide online help and a user manual for the user
3.9. Decide on the size of the database

Next Meeting

Date: 4th August 2001

Time: 4:00PM

Venue: Rm. 3464

Adjournment of Meeting

The meeting was adjourned at 4:30 P.M.

Minutes of the 2nd Meeting

Date: 4th August 2001
Time: 4:00 PM
Venue: Rm. 3464

Present:
Prof. Fred Lochovsky
Chan Yin Mo
Leung Shiu Hong
Law Yu Yeung

Absent:
Kong Koon Kit

Minutes Recorder:
Law Yu Yeung

Matters for Discussion

1. Each group reported their progress about finding sponsors. Our group had found a company named "TUTELEGE", which is a tutorial center and we will help this company to develop the database and applications for their students, teachers and staff.
2. Our group needs to hand in the proposal of the FYP on 17th September 2001. The guideline of the proposal can be downloaded from http://www.cs.ust.hk/ug/fyp.
3. Our group needs to hand in the draft of the FYP proposal to our advisor in the next meeting.

Next Meeting

Date: 1st September 2001
Time: 4:00PM
Venue: Rm. 3464

Adjournment of Meeting

The meeting was adjourned at 4:20 P.M.

Minutes of the 3rd Meeting

Date: 3rd September 2001
Time: 7:30 PM
Venue: Rm. 3464

Present:
Prof. Fred Lochovsky
Kong Koon Kit
Leung Shiu Hong

Absent
Chan Yin Mo
Law Yu Yeung

Minutes Recorder
Kong Koon Kit

Matters for Discussion

1. Each group reported on their progress in finding sponsors to the advisor. Our group had found an organization named "YMCA", which is a Christian organization that in involved in people development. We will help this organization to develop the database and applications for their staff and members
2. Our group needs to hand in the FYP proposal report on 24th September 2001. In addition, we also need to prepare a FYP Proposal Presentation for the next meeting.
3. The duration of the presentation is about 5-10 minutes with slides.
4. From now on, there will be monthly meetings with our advisor. The meeting time will be fixed at 7:00pm on Thursday. The venue will be Room 3464.
5. Each group has to find Professor Lochovsky individually for ER diagram advice every month.
6. The coming meetings will be scheduled on:
   a) 1st, November
   b) 29th, November
   Time and venue will be 7:00pm and Room 3464, respectively

Next Meeting

Date: 27th September 2001

Time: 7:00PM

Venue: Rm. 3464

Adjournment of Meeting

The meeting was adjourned at 8:00 P.M.