

DEVELOPMENT OF TIMETABLING PROGRAM

NG KIM SIONG

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF TIMETABLING PROGRAM

NG KIM SIONG

This report is submitted in partial fulfillment of the requirements for the award of
Bachelor of Electronic Engineering and Computer Engineering With Honours

Faculty of Electronic and Computer Engineering
Universiti Teknikal Malaysia Melaka

April 2009



UNIVERSITI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : Development Of Timetabling Program
Sesi Pengajian : 2 / 2008/2009

SayaNG KIM SIONG.....
(HURUF BESAR)

mengaku membenarkan Laporan Projek Sarjana Muda ini disimpan di Perpustakaan dengan syarat-syarat kegunaan seperti berikut:

1. Laporan adalah hakmilik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan dibenarkan membuat salinan laporan ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. Sila tandakan () :

SULIT*

(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)

TERHAD*

(Mengandungi maklumat terhad yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)

TIDAK TERHAD

Disahkan oleh:

(TANDATANGAN PENULIS)

(COP DAN TANDATANGAN PENYELIA)

Alamat Tetap: Block C-10-16, PPR Cochrane 2, Jalan Peel, 55100 Kuala Lumpur.

Tarikh:

Tarikh:

“I hereby declare that this report is the result of my own work except for quotes as cited in the references.”

Signature :
Author :
Date :

“I hereby declare that I have read this report and in my opinion this report is sufficient in terms of the scope and quality for the award of Bachelor of Electronic Engineering and Computer Engineering With Honours.”

Signature :
Supervisor's Name :
Date :

To my beloved mom and dad

ACKNOWLEDGEMENT

First and foremost, I'm very grateful to all those who contributed time, concern and efforts to teach in order to provide and to pass on knowledge. At the same time, I would like to special thanks to my supervisor; Pn Zaiton Bt. Abdul Mutalip, because her comments, critiques, and suggestion were taken seriously to make me understand the world of engineering. Their supports have leaded me to practice and learn more and more from them in order to be an engineer in the future.

I also wish to thank the countless individuals who have shared their suggestion and evaluations in my works all the time. However, the experience that I have gained would not been made possible without the guidance of all engineers, assistant engineers, technicians and operators.

And finally, I also appreciate the flagging support of my friends who had providing lots of constructive criticism and the way of an engineer should be. It would not have been possible to complete a report of this magnitude without the support from them.

ABSTRACT

This report contains the information on Development of Timetabling Program. Timetable is a periodic activity which is schedule for a period of time. Scheduling timetable manually would be having difficulty in arrangement and time consuming. The objectives of this project are to design a reliable clash free timetable and be able to generate the timetable for courses and lecturers. Nowadays, there are a few software can be used to design a timetabling program such as Free Evolutionary Timetable (FET), iMagic Timetable Software, ASC timetable Software, Visual Basic, and SQL server. In this project, I'll be using Visual Basic to design the Graphic User Interface (GUI) in webpage form and SQL as my database. The expected result of the project is being able to generate time table for courses and lecturers with clash free. As a conclusion, the timetabling program is able to display four types of timetables which are course timetable, staff list for course, staff timetable, and staff activity in a list.

ABSTRAK

Laporan ini mengandungi maklumat tentang penghasilan program jadual waktu. Jadual waktu digunakan untuk merancang aktiviti dalam sesuatu tempoh yang tertentu. Untuk membentuk sebuah jadual waktu tanpa menggunakan sebarang program, masalah yang biasa dihadapi ialah kesukaran untuk membahagikan subjek dan mengambil masa yang lama. Projek ini mempunyai dua objektif iaitu penghasilan jadual waktu yang tidak bertindih dari segi subjek dan pensyarah, dan menerbitkan jadual waktu untuk kursus dan pensyarah. Terdapat beberapa jenis perisian komputer yang digunakan untuk menghasilkan program jadual waktu seperti '*Free Evolutionary Timetable (FET)*', '*iMagic Timetable Software*', '*ASC timetable Software*', '*Visual Basic*', dan '*SQL server*'. Saya menggunakan '*Visual Basic*', untuk mereka bentuk '*Graphic User Interface (GUI)*' dalam laman web dan '*SQL server*' untuk dijadikan sebagai pangkalan data dalam projek ini. Jangkaan hasil dalam projek ini ialah penghasilan program jadual waktu yang tidak mempunyai pertindihan dalam subjek dan pensyarah. Kesimpulannya, program ini boleh menerbitkan empat jenis jadual waktu iaitu jadual waktu kursus, jadual waktu pensyarah kursus, jadual waktu pensyarah, dan senarai jadual waktu pensyarah.

TABLE OF CONTENTS

CHAPTER	CONTENT	PAGE
	PROJECT TITLE	i
	REPORT STATUS	ii
	DECLARATION	iii
	DEDICATION	iv
	ACKNOWLEDGEMENT	v
	ABSTRACT	vi
	ABSTRAK	vii
	TABLE OF CONTENTS	viii
	LIST OF TABLES	xii
	LIST OF FIGURES	xiii
	LIST OF ABBREVIATIONS	xv
I	INTRODUCTION	
	1.1 Background study	1
	1.2 Objective	2
	1.3 Problem Statement	3
	1.4 Scope	3
	1.5 Methodology	4
	1.6 Report Structure	4
II	LITERATURE REVIEW IN TIMETABLING	
	2.1 Introduction	6
	2.2 Free Evolutionary Software (FET)	6

2.3	ASC Timetable Software	9
2.4	iMagic Timetable Software	10
2.5	Conclusion	13

III PROJECT METHODOLOGY

3.1	Designing Process	14
3.2	Flow Chart	14
3.3	Process of collecting data	16
3.4	Process of program development	16
3.5	Process of debugging source code	17
3.6	Process of making correction in syntax error	17
3.7	Process of testing	18
3.8	Process of testing the functionality	18
3.9	Process to generate timetable	18
3.10	Process of displaying the timetable	19
3.11	Flow chart on Main.aspx	19
3.12	Flow chart on Display_Timetable.aspx	20
3.13	Flow chart on AdminEdit.aspx	21
3.14	Flow chart on Edit_Course_1st_Year.aspx	23
3.15	Flow chart on Edit_Course_2nd_Year.aspx	24
3.16	Flow chart on Edit_Course_3rd_Year.aspx	25
3.17	Flow chart on Edit_Course_4th_Year.aspx	26
3.18	Flow chart on Edit_Lecturer_Timetable.aspx	27
3.19	Flow chart on Update_Course_Timetable.aspx	28
3.20	Flow chart on StaffProfile.aspx	29
3.21	User_t table in SQL database	30
3.22	Staff_ID_t table in SQL database	30
3.23	Table_4BENC_S2_t table in SQL database	31

IV	RESULT	
	4.1	Introduction 32
	4.2	Coding 32
	4.3	Main.aspx webpage 37
	4.4	Display_Timetable.aspx webpage 38
	4.5	AdminEdit.aspx webpage 39
	4.6	Edit_Course_1 st _Year.aspx webpage 39
	4.7	Edit_Course_2nd_Year.aspx webpage 40
	4.8	Edit_Course_3rd_Year.aspx webpage 42
	4.9	Edit_Course_4th_Year.aspx webpage 43
	4.10	Edit_Lecturer_Timetable.aspx webpage 44
	4.11	StaffProfile.aspx webpage 44
	4.12	Update_Course_Timetable.aspx webpage 45
	4.13	Course table in SQL database 46
	4.14	Course table in SQL database 47
	4.15	Staff data table in SQL database 48
	4.16	Staff data table in SQL database 49
	4.17	Webpage Graphic User Interface (GUI) 49
V	CONCLUSION	
	5.1	Project Conclusion 53
	5.2	Problems accounted 53
	5.3	Suggestions 54
VI	REFERENCE	56
VII	APPENDIX	57

LIST OF TABLE

NO	TITLE	PAGE
2.2.4	The The generated Timetable using FET.	9
3.21	The User_t table in SQL database	30
3.2.2	The Staff_ID table in SQL database.	31
3.2.3	The Table_4BENC_S2_t in SQL database.	32
4.3	Table_4BENC_S1_t in SQL database	36
4.13	The Course_t table in SQL database.	47
4.14	The Staff_Profile_t table in SQL database.	48
4.15	The Table_00004_t table in SQL database.	48
4.16	The Table_4BENC_S1_t in SQL database.	49
4.17.2	The timetable for 4 BENC S1	50
4.17.3	The staff list for 4BENC S1	51
4.17.4	The example of lecturer timetable	52
4.17.5	The example of lecturer's list	52

LIST OF FIGURE

NO	TITLE	PAGE
2.2.1	Initial GUI of FET Program	7
2.2.2	The examples with less data	8
2.2.3	The examples with more data.	9
2.3.1	The generated Timetable using ASC software.	10
2.4.1	Example of Timetable Creation Wizard for days	11
2.4.2	Example of Timetable Creation Wizard for time	12
2.4.3	Timetable with one hours of time interval	12
2.4.4	Timetable with two hours of time interval	13
3.2	The flow chart of the process	15
3.11	Flow chart of Main.aspx	20
3.12	Flow chart of AdminEdit.aspx	21
3.13	Flow chart of AdminEdit.aspx	22
3.14	Flow chart of Edit_Course_1st_Year.aspx	23
3.15	Flow chart of Edit_Course_2nd_Year.aspx	24
3.16	Flow chart of Edit_Course_3rd_Year.aspx	25
3.17	Flow chart of Edit_Course_4th_Year.aspx	26
3.18	Flow chart of Edit_Lecturer_Timetable.aspx.	27
3.19	Flow chart of Update_Course_Timetable.aspx.	28
3.20	Flow chart of StaffProfile.aspx	29
4.2.1	The DropDownList before selecting the user.	33
4.2.2	The DropDownList after selecting the user.	33
4.2.3	The Login button in Main.aspx webpage	34
4.3	The Main.aspx webpage	38

LIST OF FIGURE

NO	TITLE	PAGE
4.4	The Display_Timetable.aspx webpage	38
4.5	The AdminEdit.aspx webpage	39
4.6	The Edit_Course_1st_Year.aspx webpage	40
4.7	The Edit_Course_2nd_Year.aspx webpage	41
4.8	The Edit_Course_3rd_Year.aspx webpage	42
4.9	The Edit_Course_4th_Year.aspx webpage	43
4.10	The Lecturer_Timetable.aspx webpage	44
4.11	The StaffProfile.aspx webpage	45
4.12	The StaffProfile.aspx webpage	46
4.17.1	The Display_Timetable.aspx webpage	50

LIST OF ABBREVIATIONS

ADO	-	ActiveX Data Objects
DAO	-	Data Access Objects
DBMS	-	Database Management System
FET	-	Free Evolutionary Software
GUI	-	Graphic User Interface
SQL	-	Structured Query Language
HTML	-	HyperText Markup Language
RDO	-	Remote Data Object
UTeM	-	Universiti Teknikal Malaysia Melaka
URL	-	Uniform Resource Locator
VB	-	Visual Basic
VBA	-	Visual Basic Application
XML	-	Extensive Markup Language

CHAPTER 1

INTRODUCTION

1.1 Background Study

Timetable is a periodic activity which is schedule for a period of time. Timetabling periods are divided into shorter periods that are timetabled repetitively. During the academic year, College and University having almost the same standard five day of work per week cycle period. In this project, timetable will be created with the help of Visual Basic 2005 software and SQL server. Timetable software is an important program to help reducing time in scheduling and more effective in schedule the activities with clash free purpose.

Practical cases where such activity arises are, among others, educational timetabling, employee timetabling, sport timetabling, transport timetabling and communication timetabling. In University course timetabling, a group of lecturers must be schedules into rooms and timeslots subjects to constraints. Typical of course timetabling, with respect to school and exam timetabling, the availability of timeslots is limited and the requirements of

- i) allocating lectures only into suitable rooms
- ii) having no more than one lecturer per room, and

- iii) Scheduling lecturers with common students in different timeslots.

Currently UTeM does not have any specific timetable software to scheduling the timetable. Current practice UTeM in scheduling is by using Microsoft Excel which they have to do it manually. This practice have it owns advantage and disadvantage. The advantages are that, it is quite simple and easy to use whereas the disadvantage is that, it easy to overlap with other classes. It means that a lecturer might be having two classes in the same time.

1.2 Objective

The objective of this project is to

- a) Design a reliable clash free timetabling program.
- b) Display the timetable for courses and lecturers.
- c) Plan any extra activities for lecturers.

Clash free for examples, a lecturer would not be teaching two classes at the same time, or a student would not be attending two different subjects in one time and so on. This project will help in scheduling the University timetable with clash free where one student will be assigned to one lecturer only.

Once all of the information had been saved in the database, the timetable can be display for different courses or the lecturer's own timetable. This make it flexible for the lecturers to view their own timetable or the courses timetable that he/she is teaching.

1.3 Problem Statement

The first step in the development of timetabling program is to choose the suitable software needed so that it satisfied the characteristics of the

program. Some of the software is specializing in Viewing and Managing, Web Graphics, Databases and so on. Since the timetabling program needs a database, the chosen software must be able to link or have connection for both of it. Besides that, the efficiency or the time taken for the timetable to generate depends on the software it use and the database managing. The larger the database, the longer time will be taken to search data.

In the mean time, a University without a timetabling program is difficult and a lot of tasks are hard to organize. It is time consuming in constructing the timetables and a lot of cautions need to be taken such as clash free for subjects and lecturers. With a timetabling program, it will reduce time consuming by just key in the data. Besides that, the timetabling programs available in the market are not really suitable for everyone and the pricing are very expensive.

1.4 Scope

The scope of this project is to generate a timetable which is clash free with the help of some software. The equipment and software used in this project are workstation, Visual Studio 2005 and SQL server. The created GUI must be user-friendly in order to prevent user from inserting the wrong data. For example, user will be given a few choices in the drop down list to select instead of inserting data by themselves.

The generated timetable here means that the software program will display a few type of timetable and it is fixed. If the program can be generated a few types of timetables, it will make the program more efficiency and prevent clashes with other classes. In the mean time, lecturer's can view their student's free time and any class replacement or extra class can be made. In this way, it will make it easier for the lecturers to plan any activities with their students.

1.5 Methodology

In this section, it will discuss on the type of software that had been used to develop timetable. For this project, it had been designed by using Visual Basic.NET in the website form and SQL as the database to keep all the information. The timetabling program was designed with two types of user which are 'Admin' and 'General'. The All the data can be inserted and updated by 'Admin' and 'General' user can only view the timetables. There are four types of timetables which are course timetable, staff list by course timetable, staff timetable, and staff activity.

1.6 Report Structure

Chapter one briefly explains the introduction of the Timetabling Program. It consist objectives of the project, research or background study of timetabling that had been done, problems statement of the project, the scope and the methodology of the project.

Chapter two will be discussed about general knowledge on literature review of timetabling. It will be explained on the software that had been used in previous research and also explained on the way of how it works.

Chapter three discussed on methodology in more detail by using the data collection method, data process method, analyzes the data, and flow chart. All this will describe the process in detail of each part starting from the scratch until complete.

Chapter four shows the result and discussion to all initial result, finding and analysis for the whole project. It will explain on the function of the coding that used in the project.

As for the chapter five, it will be covered the entire conclusion on the project that had been done, suggestion or opinion for further research on how the timetabling program can be improve.

CHAPTER 2

LITERATURE REVIEW IN TIMETABLING

2.1 Introduction

This chapter described the literature review in timetabling program. It will explain on the timetable software that is available in the current market. Besides that, it will also explain on the way of the software that had been used to create timetabling program and its advantage and disadvantage.

2.2 Free Evolutionary Timetabling (FET) Software

Free Evolutionary Timetabling (FET) is open source free timetabling software for automatically scheduling the timetable of a school, high-school or university. FET uses a heuristic algorithm, placing the activities in turn, starting with the most difficult ones. If it cannot find a solution it points user to the potential impossible activities, so user can correct errors. The algorithm swaps activities recursively if that is possible in order to make space for a new activity or, in extreme cases, backtracks and switches order of evaluation.

When placing an activity, it chooses the place with lowest number of conflicting activities and recursively replace them. Figure 2.2.1 shows the initial Graphic User Interface (GUI) of FET program where the data in the

menu shows all types of data needed in order to generate a complete timetable.

The efficiency of FET software to generate a new timetable depends on the data inserted into the database. Figure 2.2.2 shows that there are 479 activities generated in only two minutes and twenty one seconds whereas Figure 2.2.3 has 1217 activities and generated in more than thirty minutes. Although FET is free software but it's not user friendly where it is very complex in inserting data. The advantage of FET program is that it is very flexible as it fits all type of timetabling because the day and the time are adjustable. The FET software had been installed and tested. As a result, Table 2.2.4 shows the sample of a generated timetable.

FET software had been designed by using Tablix where it is a powerful software using implementation of parallel genetic algorithms. Tablix is specially used to design timetable and to solve a large set of discreet multivariable optimization problems. Input and output can be can be exported into variety of format especially XML files and HTML files to publish on the web. [1]

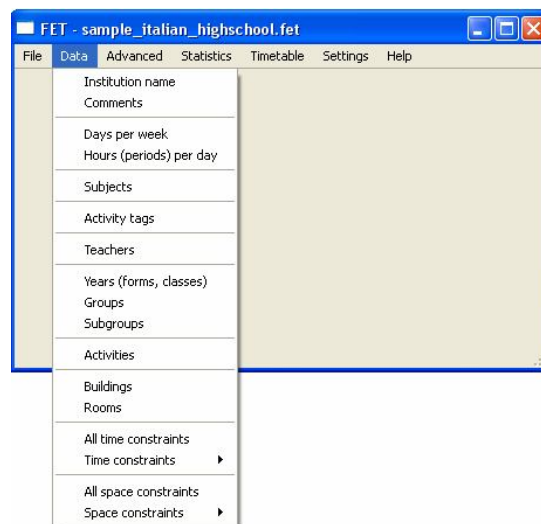


Figure 2.2.1 Initial GUI of FET Program.



Figure 2.2.2 The examples with less data.

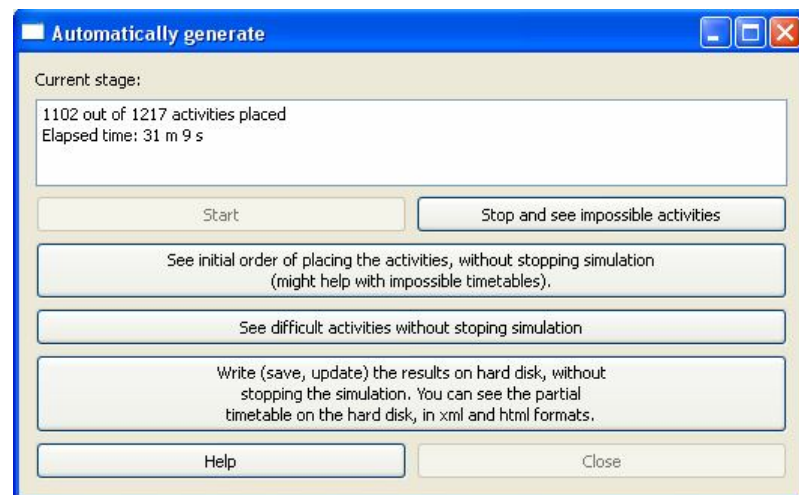


Figure 2.2.3 The examples with more data.