AUTOMATING THE UMP OPEN REGISTRATION (OR) SYSTEM FOR COURSE TIMETABLING PROBLEM

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I hereby declare that I have read this thesis and in my opinion in this report is sufficient in terms of scope and quality for the award of the degree of Bachelor of Computer Science (Computer Systems & Networking).

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Date :

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Abstract

The open registration (OR) system is different from the “Program-based Registration System” which allows student to register their academic subject based on their own study plan. UMP’s students are required to make the combination of the study plan to make sure their timetable is suitable with their favorite time. There are some methods on solving the timetabling such as Tabu Search (Qu et al.., 2009), Hill Climbing (Appleby et al 2011), Simulated Annealing (Kirkpatrick and Vecci, 1983) and Great Deluge Algorithm (Dueck,1993) which had been used to solve the college or University timetabling problems. These searching methods fulfilled the automated timetabling system and applied on many systems. These researches will benefit the UMP’s student to view the course information with more specific details and convenience the process course registration online.

Abstrak

Sistem pendaftaran terbuka (OR) adalah berbeza daripada "Sistem Pendaftaran berasaskan Program" yang membolehkan pelajar mendaftar subjek akademik mereka berdasarkan pelan kajian mereka sendiri. Pelajar UMP adalah diwajibkan untuk membuat gabungan pelan kajian untuk memastikan jadual mereka sesuai dengan masa kegemaran mereka. Terdapat beberapa kaedah kepada penyelesaian penjadualan waktu seperti Tabu Search (Qu et al .. 2009), Hill Climbing (Appleby et al 2011), simulasi Penyepuhlindapan (Kirkpatrick dan Vecci, 1983) dan Great Deluge Algoritma (Dueck, 1993) yang telah digunakan untuk menyelesaikan kolej atau masalah penjadualan University. Kaedah-kaedah ini mencari dipenuhi sistem penjadualan automatik dan digunakan pada banyak sistem. Penyelidikan ini akan memberi manfaat kepada pelajar UMP untuk melihat maklumat kursus dengan butir-butir yang lebih khusus dan kemudahan pendaftaran kursus proses dalam talian.

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CHAPTER 1

INTRODUCTION

In Semester one, 2011/2012, University Malaysia Pahang develops an Open Registration System that is OR System to University Malaysia Pahang student's for register courses by online. Previously University Malaysia Pahang developed "Program-about Registration System" where a student study plans are pre-determined by the faculty based on the Program Course Structure. The Open Registration System is an easier menu system that allows student to register their subject based on their own timetabling.

An order the University Malaysia Pahang Academic Initializations, students can register their course up to 19 credits hours for each semester. Students have to plan their own timetable because the 12 credits is the lowest credit to register subject. Therefore those who want to register up to 19 credits per semester also can. It allows student to graduate early of the semester and the same time can save their time and money.

Nowadays University Malaysia Pahang student using course catalog to arrange their subject based on timetable. Course catalog content lists of all courses are provided on the certain semester along with their time and location. In Open Registration, most of the subjects are offered in every year. Instead of, the categories of each offered course in normally half of categories of

the student enrolled. For example, if Data Network and Security course (BCN 2023) is a requirement for all Bachelor of Computer Science third year's students with the total 280 students only.

1.1 Problem Statement

Now in the registration system, as students have to manually check their classing and type of courses that available in course catalog. The course catalog included the course, the time and classes. There have many combination of timetable that and really confuses went the students was selecting the most appropriate timetable. In this system, does not appear time went the classes is clashed. However, UMP proposes a student course registration system that able to identify the correct timeslot and classes. As well as calculate the cost value. Objectives and the scopes will present in the next section.

1.2 Objectives

The objective of the system is:

- To develop a prototype of UMP courses registration system allows students to register courses based on section and timetable.
- To develop a system we able to give suggestion of the courses that available in timetable.
- To implement the course time tabling by using solve concept from the soft ump constraints as guides for student satisfaction.

1.3 Scopes

The scope of this system is:

- Only degree students are able to register subject and drop the registered subject.
- Only the courses from faculty FSKKP and university subject available to register.
- The module only include courses from semester I 2011/12 and semester II 2011/12.

1.4 Thesis Organization

In thesis organization include with five chapters. The chapter I will discuss on introduction to system, problem statement of the system, objective and scope of the system. In chapter 2 I will discuss about literature review by using some of the references to do research and describe about the existing problem or solution done by other parties. For the references, we can get from book, journal, conference, proceeding, magazine, thesis or website. Next about chapter 3, in this chapter I will describe about methodology system and also overall approach and framework of research. After that about chapter 4, I will discuss on design on how to convert the development process into the form of a document and also about the project design will be explained also. In Chapter 5, I will conclude what I have done through in the all system.

CHAPTER 2

LITERATURE REVIEW

This chapter briefly describes the review on existing techniques related with attendance system. This chapter comprises four sections: The first section explained more briefly about University timetabling problem. In the second section, describes details on problem statement that applied to solve the timetabling problem. The third section describes about method that use to create timetabling. The fourth section explained on the MATLAB. Fifth section explained on techniques that will be used in this system. Finally, sixth section describes the previous existing system.

2.1 Overview of Open Registration

The open registration (OR) system is different from the "Program-based Registration System" which allows student to register their academic subject based on their own study plan. UMP's students are required to make the combination of the study plan to make sure their timetable is suitable with their favorite time. There are some methods on solving the timetabling such as *Tabu Search* (Qu et al.., 2009), *Hill Climbing* (Appleby et al 2011), *Simulated Annealing* (Kirkpatrick and Vecci, 1983) and *Great Deluge Algorithm* (Dueck,1993) which had been used to solve the college or University timetabling problems. These searching methods fulfilled the automated timetabling system and applied on many systems. These researches will benefit the UMP's student to view the course information with more specific details and convenience the process course registration online.

2.2 UMP Course Timetabling Problem

University timetabling problem is very hard to solve for optimally [3]. It is very difficult to solve with traditional methods and the amount of computation to find optimal solution increase exponentially due to the large enrolment of students every years [9]. The university course timetabling problem involves assigning a set of courses, student and lecturers to a specific number of rooms and timeslots [1] with the weekly assignment of a set of lectures [13]. It is difficult to manage timetable went, there are no time and which subject clash on that time. The constraints that have to be satisfied by a timetable are usually divided into two categories there are hard constraints and soft ones. Hard constraints are those constraints that must be rigidly fulfilled. The following diagram shows an overview of open subject registration which is the reference from [12].

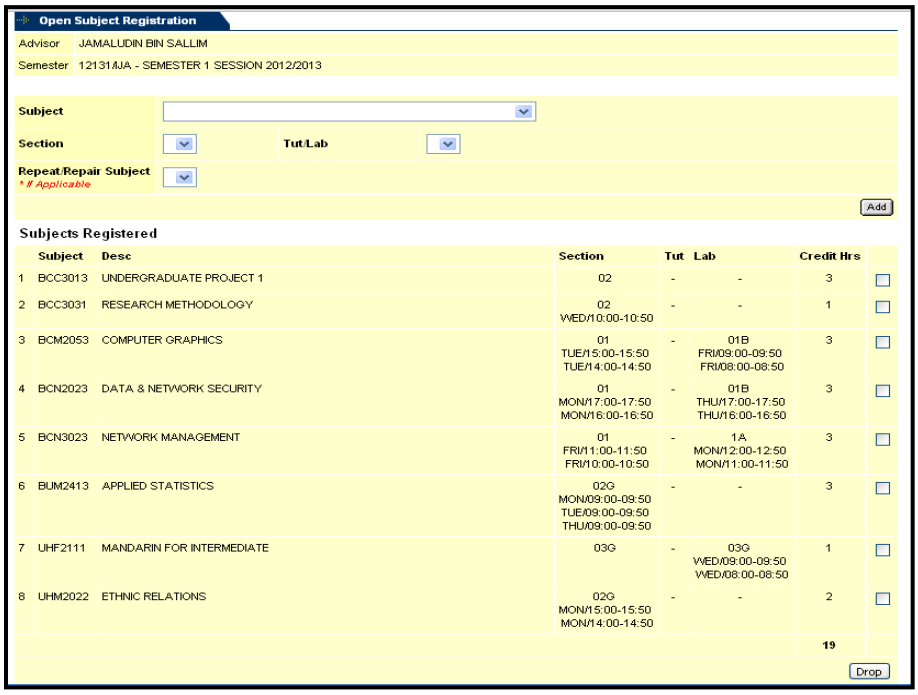
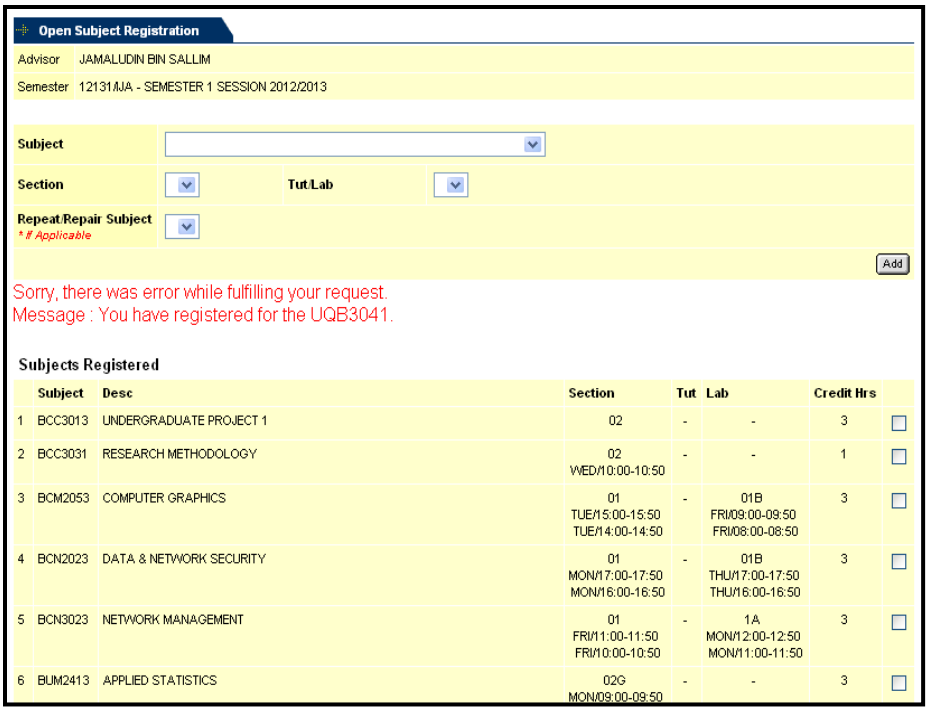


Figure 2.2.1 Overview of Open subject Registration part1



Open Subject Registration

Advisor JAMALUDIN BIN SALLIM

Semester 12131/JA - SEMESTER 1 SESSION 2012/2013

Subject

Section Tut/Lab

Repeat/Repair Subject
* If Applicable

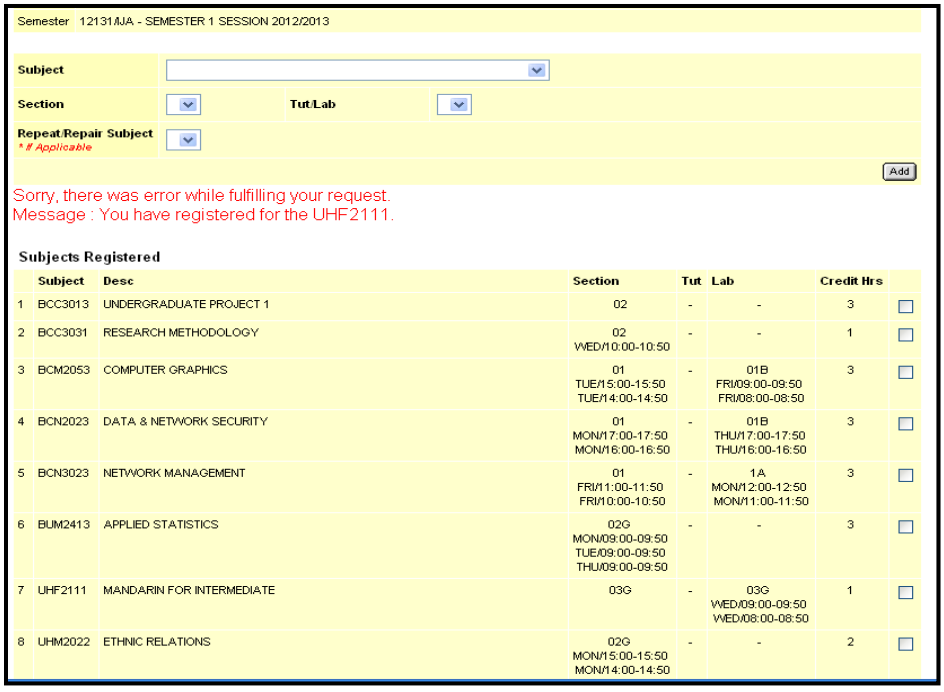
Add

Sorry, there was error while fulfilling your request.
Message : You have registered for the UQB3041.

Subjects Registered

	Subject	Desc	Section	Tut	Lab	Credit Hrs	
1	BCC3013	UNDERGRADUATE PROJECT 1	02	-	-	3	
2	BCC3031	RESEARCH METHODOLOGY	02 WED/10:00-10:50	-	-	1	
3	BCM2053	COMPUTER GRAPHICS	01 TUE/15:00-15:50 TUE/14:00-14:50	-	01B FRI/09:00-09:50 FRI/08:00-08:50	3	
4	BCN2023	DATA & NETWORK SECURITY	01 MON/17:00-17:50 MON/16:00-16:50	-	01B THU/17:00-17:50 THU/16:00-16:50	3	
5	BCN3023	NETWORK MANAGEMENT	01 FRI/11:00-11:50 FRI/10:00-10:50	-	1A MON/12:00-12:50 MON/11:00-11:50	3	
6	BUM2413	APPLIED STATISTICS	02G MON/09:00-09:50	-	-	3	

Figure 2.2.2 Overview of Open subject Registration part2



Semester 12131/JA - SEMESTER 1 SESSION 2012/2013

Subject

Section Tut/Lab

Repeat/Repair Subject
* If Applicable

Add

Sorry, there was error while fulfilling your request.
Message : You have registered for the UHF2111.

Subjects Registered

	Subject	Desc	Section	Tut	Lab	Credit Hrs	
1	BCC3013	UNDERGRADUATE PROJECT 1	02	-	-	3	
2	BCC3031	RESEARCH METHODOLOGY	02 WED/10:00-10:50	-	-	1	
3	BCM2053	COMPUTER GRAPHICS	01 TUE/15:00-15:50 TUE/14:00-14:50	-	01B FRI/09:00-09:50 FRI/08:00-08:50	3	
4	BCN2023	DATA & NETWORK SECURITY	01 MON/17:00-17:50 MON/16:00-16:50	-	01B THU/17:00-17:50 THU/16:00-16:50	3	
5	BCN3023	NETWORK MANAGEMENT	01 FRI/11:00-11:50 FRI/10:00-10:50	-	1A MON/12:00-12:50 MON/11:00-11:50	3	
6	BUM2413	APPLIED STATISTICS	02G MON/09:00-09:50 TUE/09:00-09:50 THU/09:00-09:50	-	-	3	
7	UHF2111	MANDARIN FOR INTERMEDIATE	03G	-	03G WED/09:00-09:50 WED/08:00-08:50	1	
8	UHM2022	ETHNIC RELATIONS	02G MON/15:00-15:50 MON/14:00-14:50	-	-	2	

Figure 2.2.3 Overview of Open subject Registration part3

Hard constraints

- No student can be assigned to more than one course at the same time.
- The room should satisfy the features required by the courses.
- The number of students attending the course should be less than or equal to the capacity of the room.
- No more than one course is allowed at a timeslot in each room.

Soft constraints

- A student should not attend only one course in a day.
- A student should not attend more than two courses consecutively.
- A student should not attend a course in the last period in any day.

Figure 2.2.4 Example soft constraints and hard constraints [9]

In general, the set of constraint can be categorized as hard and soft[18]. Hard constraints are those that are compulsory to be fulfilled. A timetable will not be acceptable if any of the hard constraint is violated. Soft constraints include some non-compulsory requirements. Soft constraints might be violated but the number of violations had to be minimized in order to increase the quality of the timetable. A timetable without any hard constraints violations will be referred to as a feasible timetable[18] in which all courses are assigned to periods and rooms and satisfy all hard constraints[9].

2.3 Heuristic Method

2.3.1 Technology using Heuristic Method

Define a heuristic function, h(n), that estimates the "goodness" of a node n. Specifically, h(n) = estimated cost or distance of minimal cost path from n to a goal state[15]. The heuristic function is an estimate, based on domain-specific information that is computable from the current state description. All domain knowledge used in the search is encoded in the heuristic function h.

2.3.2 How does Heuristic Method Work

Basically, the main technologies used to implement the method If h1 (n) < h2 (n) <= h*(n) for all n, h2 is better than dominates h1. Relaxing the problem such as remove constraints to create a much easier problem, use the solution cost for this problem as the heuristic function [16]. Combining heuristics will take the max of several admissible heuristics and still have an admissible heuristic, and it's better to use statistical estimates to compute lose admissibility. The following diagram shows an overview of heuristic method which is the reference from [17].

Algorithm 1: Pseudo code of the heuristic method DT-ET introduced in Sridharan and Zhou (1996)

Input: $\alpha, \beta, d, n \in \mathbb{Z}, p, r \in \mathbb{Z}^n$.
Output: Sequence π, completion time $C \in \mathbb{Z}^n$ and objective function value $f \in \mathbb{Z}$.
DT-ET($\alpha, \beta, d, n, p, r$)

```
begin
    f ← 0
    for i ← 1 to n do
        Set current time t_0
        Build set S(t_0) of candidate jobs to be sequenced at position i
        foreach j ∈ S(t_0) do
            Consider sequencing job j at position i and find a feasible completion time Ĉ_j
            Estimate the total cost κ_j associated with this choice, considering jobs in S(t_0) \ {j}
        Compute j_min = arg min_{j∈S(t_0)} {κ_j}
        π_i ← j_min and C_i ← Ĉ_{j_min}
        f ← f + α [d − C_i]_+ + β [C_i − d]_+
    return π, C and f
end
```

Figure 2.3.2 Overview of Heuristic Method

2.4 Existing Techniques

2.4.1 Data Flow Diagram

The Data Flow Model consists of a set of integrated Data Flow Diagrams (DFD) which supported by appropriate documentation. DFD will represents the processes (Example: student registration process), data stores (Example: The information will be kept in Access as database), external entities (Example: Student, exam subject, staff) and data flows. Thus, by implementing course registration system, we can able to visualize how this system works. There are some advantages using this data flow modelling as one of the technique. Data flow modelling is a simple graphical technique which is easy to understand. Other than that, data flow modelling helps in determining whether the data store is appropriate for the generated output information as mentioned in [14]. Data flow modelling aids in my project by explaining the logic behind the data flow within the system.

2.4.2 Database Life Cycle

The DBLC is the cycle of development and changes that relational database goes through during the course of its life [6]. The cycle typically consists of several stages. This represents an admission that a full understanding of a problem and its solution is likely to evolve as the various stages of design and implementation proceed. The following diagram shows an overview of DBLC which is the reference from [7].

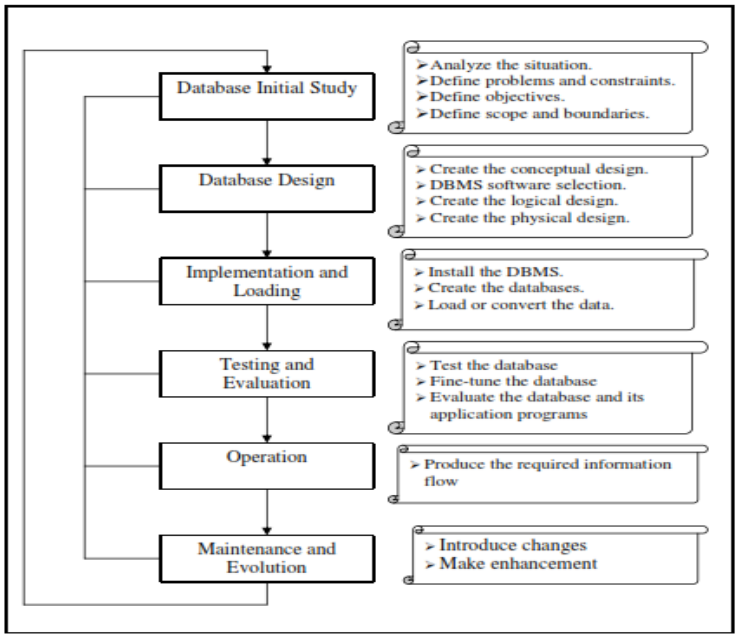


Figure 2.4.2 Overview of Database Life Cycle (DBLC)

2.5 Previous method to solve timetabling problem

2.5.1 Technology using Hill Climbing

Hill climbing is an optimization technique which belongs to the family of local search which was used for the timetabling problem by Appleby et al. (1960) [11]. It is relatively simple to implement and making it a popular first choice the relative simplicity of the algorithm makes it a popular first choice amongst optimizing algorithms. It is used widely in artificial intelligence, for reaching a goal state from a starting node. Choice of next node and starting node can be

varied to give a list of related algorithms. Although more advanced algorithms such as simulated annealing or tabu search may give better results, in some situations hill climbing works just as well. Hill climbing can often produce a better result than other algorithms when the amount of time available to perform a search is limited, such as with real-time systems. It is an anytime algorithm: it can return a valid solution even if it's interrupted at any time before it ends. The following diagram shows an overview of Hill climbing which is the reference from [9].

```
function HILL-CLIMBING( problem) returns a state that is a local maximum
   inputs: problem, a problem
   local variables: current, a node
                    neighbor, a node
   current ← MAKE-NODE(INITIAL-STATE[problem])
   loop do
      neighbor ← a highest-valued successor of current
      if VALUE[neighbor] ≤ VALUE[current] then return STATE[current]
      current ← neighbor
   end
```

Figure 2.5.1 Overview of Hill Climbing

2.5.2 Technology using Tabu Search (TS)

Tabu search is one of the local search techniques that are popular and applied to a lot of aspects of optimisations problems. According to Qu et al (2009) [20], the basic procedure of this technique can be divided into two main phases: intensification phase and diversification phase. This technique works by utilizing its components such as *type of tabu list, aspiration criteria, neighbourhoo*d strategies and etc, with intention to search the best improved solutions. Tabu search uses a local or neighbourhood search procedure to iteratively move from one potential solution to an improved solution in the neighbourhood of, until some stopping criterion has been satisfied generally, an attempt limit or a score threshold. The following diagram shows an overview of Tabu Search (TS) which is the reference from [18].

Algorithm 2 Tabu search for the unweighted MAX-k-SAT problem

Require: X - initial truth assignment, ϕ - boolean formula over n variables in CNF form

Ensure: X - locally optimal solution with respect to the 1-flip neighborhood

```
improves ← true
while improves do
    run oblivious local search
    time_stamp[i] ← 0 ∀i
    improves ← false
    difference ← 0
    for time = 1 to n do
        if max{Δ(X, i) + difference} > 0 then
            improves ← true
            break
        else
            unsat = {i | variable i appears in an unsatisfied clause}
            earliest ← min{time_stamp[i] | i ∈ unsat}
            // recall: variables not in taboo list have time_stamp = 0
            j ← argmax_i{Δ(X, i) | i ∈ unsat and time_stamp[i] = earliest}
            difference ← difference + Δ(X, j)
            X[j] ← 1 − X[j]
            time_stamp[j] ← time
        end if
    end for
end while
```

Figure 2.5.2 Overview of Tabu Search (TS)

2.5.3 Technology using Simulated Annealing (SA)

Once of the most widely studied local search meta heuristics is Simulated Annealing. It was proposed as a general optimization technique by Kirkpatrick et al. (1983) [23] and has been repeatedly applied to solve a wide range of problems. Simulated annealing algorithm, a new point is randomly generated. The distance of the new point from the current point, or the extent of the search, is based on a probability distribution with a scale proportional to the temperature. The algorithm accepts all new points that lower the objective, but also, with a certain probability, points that raise the objective. By accepting points that raise the objective, the algorithm avoids being trapped in local minima in early iterations and is able to explore globally for better solutions. The following diagram shows an overview of Simulated Annealing (SA) which is the reference from [19].

```
function SIMULATED-ANNEALING( problem, schedule) returns a solution state
   inputs: problem, a problem
           schedule, a mapping from time to "temperature"
   local variables: current, a node
                    next, a node
                    T, a "temperature" controlling prob. of downward steps
   current ← MAKE-NODE(INITIAL-STATE[problem])
   for t ← 1 to ∞ do
       T ← schedule[t]
       if T = 0 then return current
       next ← a randomly selected successor of current
       ΔE ← VALUE[next] – VALUE[current]
       if ΔE > 0 then current ← next
       else current ← next only with probability e^(ΔE/T)
```

Figure 2.5.3 Overview of Simulated Annealing (SA)

2.5.4 Technology using Great Deluge Algorithm (GD)

Great Deluge algorithm is the method which accepts every solution whose objective function is less than or equal to the upper limit (level) B [8]. The value B is monotonically decreased during the search and bounds the feasible region of the search space. In a typical implementation of the GD, the algorithm starts with a poor approximation, S, of the optimum solution. A numerical value called the badness is computed based on S and it measures how undesirable the initial approximation is. The higher the value of badness the more undesirable is the approximate solution. Another numerical value called the tolerance is calculated based on a number of factors, often including the initial badness. The following diagram shows an overview of Great Deluge Algorithm (GD) which is the reference from [20].

```
Great Deluge Algorithm
    Set estimated quality of every solution, EstimatedQuality = f(Sol_i) – F_i, where
    (i=1,…,population size) and F is a total force taken from Figure 3;
    Calculate force decay rate, β = EstimatedQuality/NumOfIte_GD;
    Set iteration_GD ← 0;
    for (iteration_GD< NumOfIte_GD)
        Define a randomly selected neighbourhood structure (Nbs1 or Nbs2) on Sol
        to generate a new solution called Sol*;
        Calculate f(Sol*);
        if (f(Sol*) < f(Sol_best))
            Sol ← Sol*;
            Sol_best ← Sol*;
        else
            if (f(Sol*)≤ level)
                Sol ← Sol*;
            endif
        endif
        level = level - β;
        Increase iteration_GD by 1;
    end for
```

Figure 2.5.4 Overview of Great Deluge Algorithm (GD)

After analyze all four method, the result is there are some minus in every method. Even though there are some major problems but the overcome to the attendance process can be done very effectively. Thus as a solution, best feature are sort list to be include in heuristic method. One challenge to the research community is therefore to explore how new search methodologies can underpin the development of more widely applicable timetabling systems. Indeed this is one of the main motivating factors for the current level of interest in hyper heuristic research.

CHAPTER 3

METHODOLOGY

This chapter is the main part of this system because it has the design, prototype, research and related software and hardware for this system. The course registration system is developed by using the concept of System Development Life Cycle (SDLC). SDLC is the process use to create or altering information system and the models and methodologies that wil used to develop the system. Besides that, this chapter includes a detailed study of the business needs of the organization with problem analysis process with performing data flow diagram. In enhance to that the software and hardware requirement has been discovered.

3.1 System Development Life Cycle (SDLC)

An SDLC (System Development Life Cycle) has three primary business objectives:

- Ensure the delivery of high quality systems;
- Provide strong management controls;
- Maximize productivity.

In other words, the SDLC ensure to produce more function, with higher quality, in less time, with less resource and in a predictable manner.

Figure 3.1.1 System Development Life Cycles

3.1.1 The Justification Choosing System Development Life Cycle

The Systems Development Life Cycle (SDLC) is a methodology that is used to describe process for building information systems. SDLC is one of the best way to develop a system as it result in a high quality system that meets or exceeds customer expectations, reaches completion within time and cost estimates, works effectively and is inexpensive to maintain and cost-effective to enhance as mentioned in [1]. SDLC also often used because of it can manage the level of complexity. Besides that, there are quite number of SDLC models which are waterfall, spiral, Agile software development rapid prototyping, incremental and synchronize and stabilize as it is stated in [2].

Furthermore, SDLC is also intended to develop information in a very purposeful, structured and methodical way, repeating each stage of the life cycle. The SDLC originated in the 1960's to develop large scale functional business systems in an age of large scale business conglomerates. Information systems activities revolved around heavy data processing and number crunching routines as it is mentioned in [1].

3.2 The steps of system (System Development Life Cycle)

3.2.1 Planning

At this stage, it develops a planning document which provides the basis for acquiring the resources needed to achieve solution. It also establishes a high-level view of the intended project and determines its goal. A detailed study of this system also included. It analysis gathers the requirements of the system. This phase is one of the important phases is to identify the problem are face by Ump students and administrator in the Open Registration System process. The same time we have done informal interview with the system owner and user. The course summary of the discussion is mention as in section *1.1 problem statements*. Therefore we have determined the appropriate *objective* and the *scope* of the work as in section *1.2* and *1.3*.

3.2.2 Analysis

In the phase, we have to collect the UMP course timetabling constraints from the UMP administrator. The UMP course timetabling constraints are show below in figure 3.2

Hard constraint

1. A student and a teacher can't be in 2 places at the same time.
2. Only 1 course is allowed to be assigned to a timeslot in each classroom.
3. The classroom capacity should be equal to or greater than the number of students attending the course at a particular time slot.
4. The class room assigned to the course should satisfy the features require by a course should satisfy the features require by a course.

Soft constraint

5. Student should not have a single course on a day.
6. Student should not have attended courses with gaps in between on a day.
7. Student should not be scheduled to attend a course that is assigned to the last timeslot of the day.

Figure 3.2.1 UMP Course timetabling constrain

A formal model the problem will develop in PSM2, we collect UMP Course Timetabling Semester 1 2011/2012 dataset which using during testing phase and these technique are described in chapter 2.

3.2.3 Design and Development

In design stage, it focuses on high-level design like such as what programs are needed and how are they going to interact and much more. It describes desired features and operations in detail including screen layouts, business rules, process diagrams, pseudo code and other documentation.

The development phase is the phase to convert a design into a complete information system includes acquiring and installing system environment, creating and testing database preparing test files, coding compiling, refining program, performing test readiness review and procurement activities.

Figure 3.3 Flow chart of Course Registration System

In this project first student need to login in UMP E.com page. From that page click on course registration and add subject by using course catalog after add click on done. Lastly we can view the timetable.

Figure 3.4 Context Diagram of Course Registration System

In this project student is the only one user. In this course diagram, student will request for their courses and the system will return the schedule.

Figure 3.5 Use Case Diagram of Course Registration System

In this project, which show the graphical overview of the functionally provided by this project in terms of actors, goal and the dependencies between them. As a user can login information, add or drop course and can view timetable after register the subjects.

Figure 3.6 Data Flow Diagram of Course Registration System

In this project how the student interacts with the Course Registration System in database. First user need to login the information, than select course from catalog. After that start to select matched courses and can view timetable. All data will update in database after done course registration.

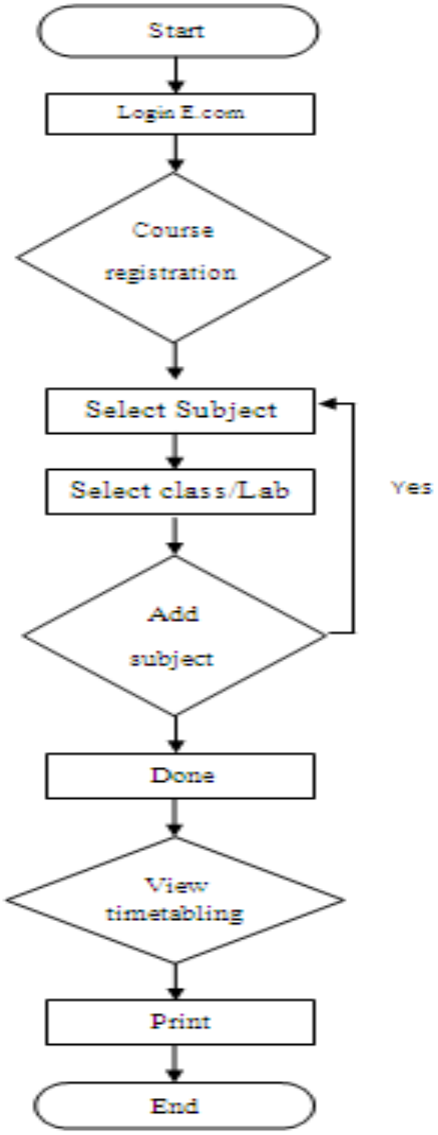


Figure 3.3 Flow chart of Course Registration System

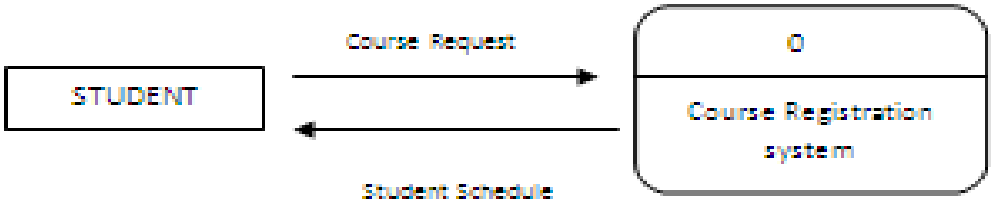


Figure 3.4 Context Diagram of Course Registration System

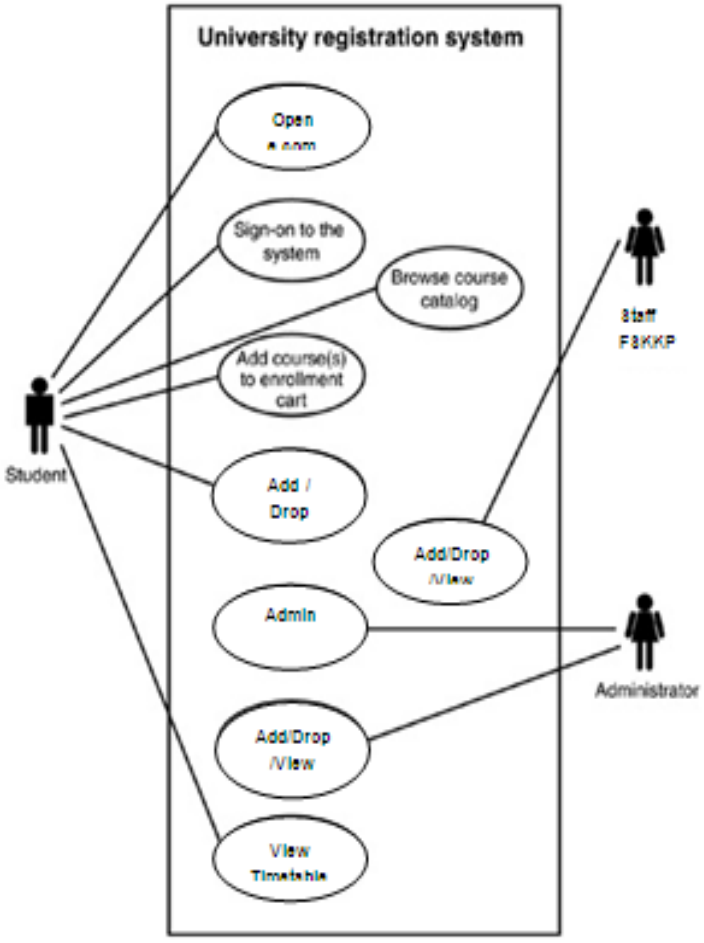


Figure 3.5 Use Case Diagram of Course Registration System

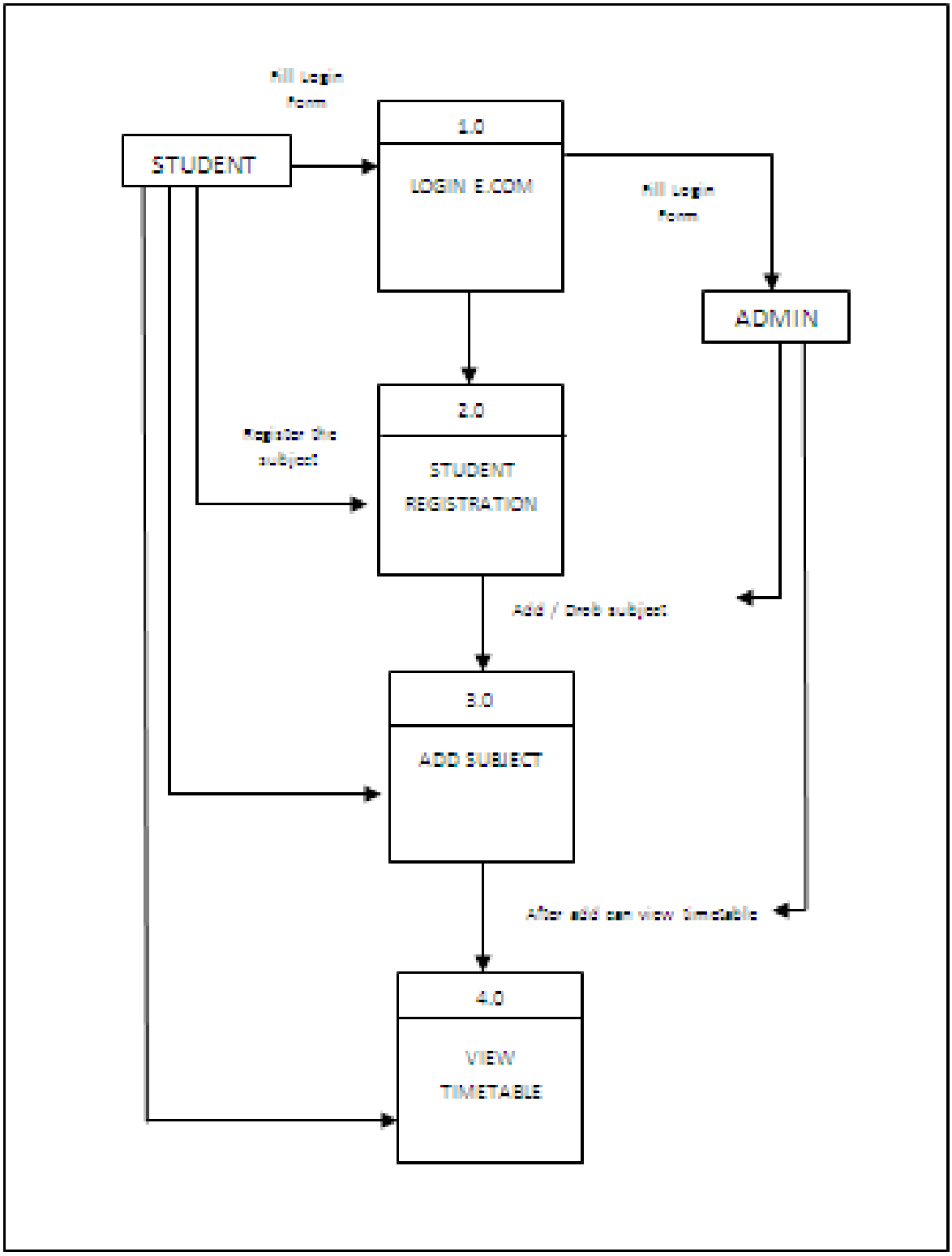


Figure 3.6 Data Flow Diagram of Course Registration System

3.4 Implementation

Visual Basic is the software that will use to implement this system. We will include some concept from literature review technique.

3.5 Testing

The testing will be done by using the first semester student timetable from faculty FSKKP. We also collected 10 timetables from first year students. The collected timetables will use to test the constraints value they made by using this system.

3.6 Evaluation

In this phase, this system describes the end of the system activities. It describe task to operate and maintain information systems in a production environment. Change could happen because of some unexpected input values into the system. Therefore, the software developed to be able to face the changes that could happen during post implementation period. All the documentation, source codes and business plan were also implemented at this stage.

3.7 Conclusion

In conclusion, the Open Registration System (OR) will increase the reliability of the current manual system. Moreover, it also can improve the ability of current system. This system is also expected to meet its project requirement and scope which eventually lead to the new design framework and newly added methods. This will help to determine the appropriate timeslots and rooms as well as calculate the cost to improve the Open Registration System (OR) which carried out by the management.

CHAPTER 4

4.0 IMPLEMENTATION

4.1 Implementation VB 2008

The system was focus on computer-based solution. The main reason to develop this system is for improve Course Registration and implement the course time tabling by using solve concept from the soft ump constraints as guides for student satisfaction. The major activities that will take place in during this phase are evolving the set of analysis representations into design representation.

The chapter included the high-level design which contain the system architecture and end user interface design. The user interface design section divided into three main categories such as navigation design, the input design and the output design. This chapter also defines the database management selection which is to be implemented in the course time tabling of Open Registration (OR) and evaluate the functionality of the selected database management system.

4.2 High-Level Design

A good system design is the base for a good application. The high-level design will describe about the system's structure or system's interior. Rather than that, it also will focus on data strategic planning to produce application projects. High-level design is easy to understand

even for the end-users who are not familiar with the thesis report writing in the information technology. The detail amplification of high-level design is declared in the following session.

4.3 User Interface Design

Interface design is the process of defining how the users will interact with the system and the nature of the input and output which the system will accepts and generates. The new system will be using Microsoft Visual Studio 2008 as the tool to design the graphical user interface, for database will be using Microsoft SQL Server 2008. The user interface and database plays the main role in the system design because the interface is the communication tool between the user and system. The main purpose of a perfect interface design is to convince the student and staff that the system is accurate and reliable. If the system look sloppily built with poor visual design and low editorial standards, it will not inspire the confidence among the user. Good User Interface Design can make a product easy to understand and use, which results in greater user acceptance.

4.3.1 Input Design

This section describes the input design for each interface, input and type. Mostly all the restriction input data are controlled using coding and design setting. Thus it can overcome the error input data.

4.3.2 Output Design

The output design divided into three main parts especially for student, administrator and staff. The output design for Login page to Course Registration page is shown in the Figures. The outputs of the system also have some pop up message.

4.3.3 Successful Login

This message box will appear when the admin successfully key in the information of the staff, staff ID and password in the staff registration form.

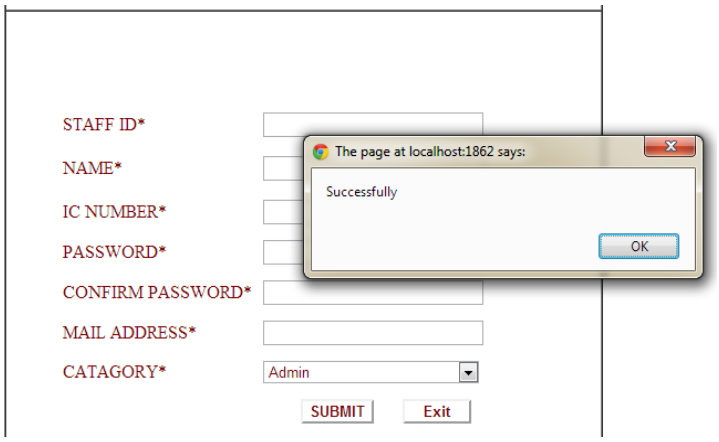


Figure 4.1.1: Successfully Registration by Admin

4.3.4 Login Form

This login Form is made For Security purpose. The authenticated user only can access into the project. There are three types of persons can enter in the project Administrator, Staff and student in Course Registration. Figure 4.2 show Course Registration Login Form, Figure 4.3 show Login Form.

Figure 4.2.1: Login Page 1

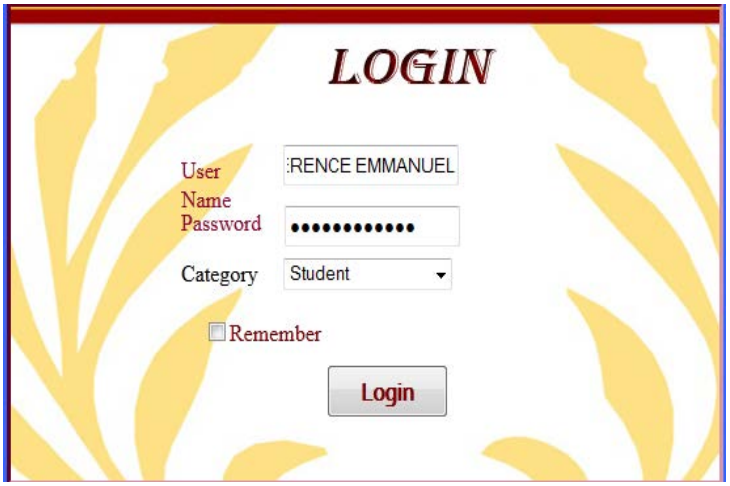


Figure 4.3.1: Login Page 2

4.3.5 Login as an Admin

This form enables the Admin to login. After login the admin key in staff information such as name, staff Id and the information successfully saved in the database when click on submit button. . Figure 4.4 show Login Form for Admin, Figure 4.5 show Staff Registration Form and Figure 4.6 show Staff information Successfully Registration by Admin Form.

Figure 4.4.1: Login as an Admin

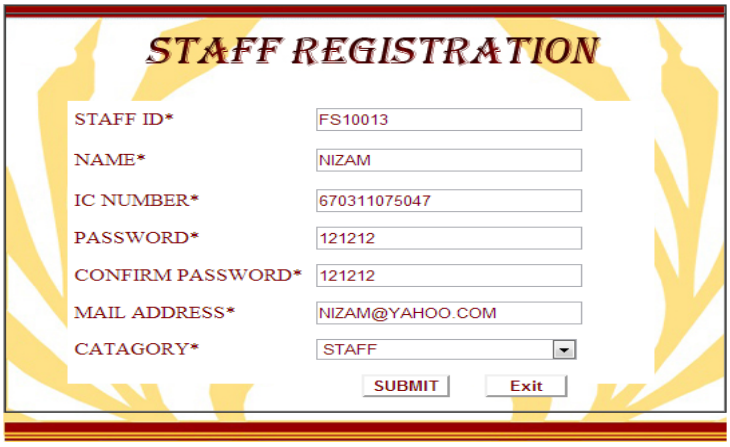


Figure 4.5.1: Staff Registration Form

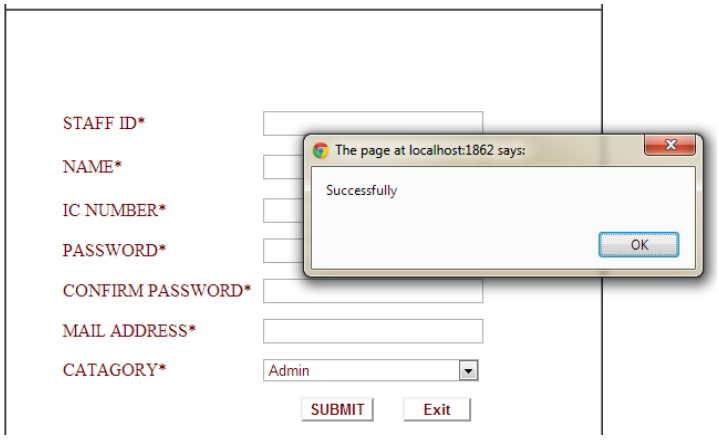


Figure 4.6.1: Staff information Successfully Registration by Admin

4.3.6 Login as a Staff

This form enables the Staff to login. After login the staff name will call back in username. Staff will key in student information such as name, student Id and information of the student then the data automatically saved in the database when click on submit button. Lastly it will appear message box that the student information is successfully saved. Figure 4.7 show Login as a Staff form, Figure 4.8 show Staff Main Page, Figure 4.9 show Student Registration Form and Figure 4.10 show Student information Successfully Registration by Staff.

Figure 4.7.1: Login as a Staff

User Name NIZAM

Figure 4.8.1: Staff Main Page

Figure 4.9.1: Student Registration Form

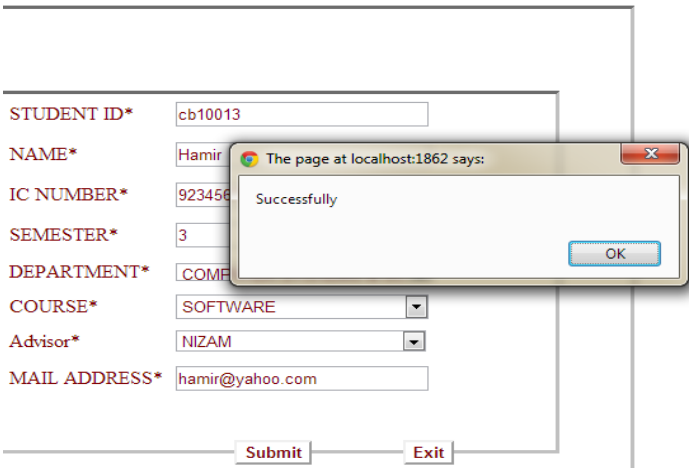


Figure 4.10.1: Student information Successfully Registration by Staff

4.3.7 Login as a Student

This form enables the Student to login. After login the student can register their subject and the same time they can choose the class and lab section together if they have any clash subject or repeat subject will be show by message box. After complete register the student need to click on save button than the student can view the timetable, lastly the data automatically saved in the database when click on done button. Figure 4.11 show pop messages that the student key in wrong password, Figure 4.12 shows Login as a Student, Figure 4.13 show Student Main Page and Figure 4.14 show Course Registration Page.

Figure 4.11.1 Pop message that the student key in wrong password

Figure 4.12.1 Login as a Student

User Name HAMIR

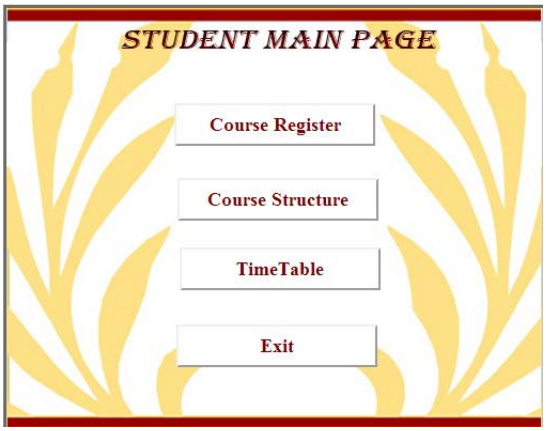


Figure 4.13.1: Student Main Page

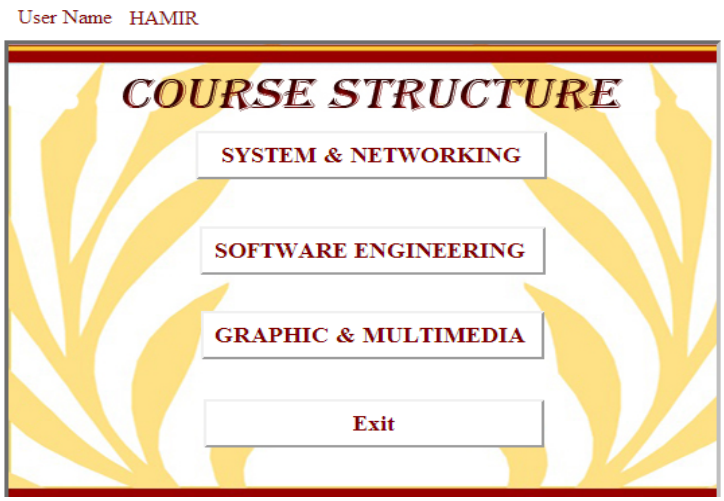


Figure 4.14.1 : Course Structure Page

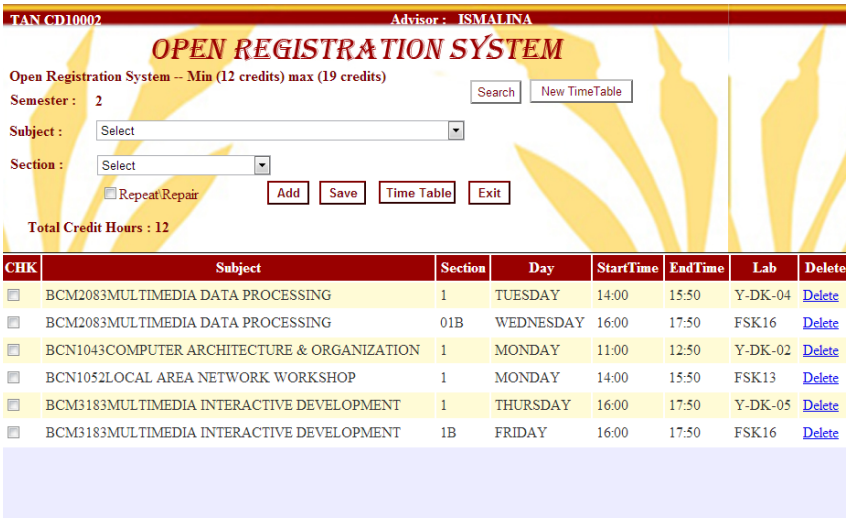


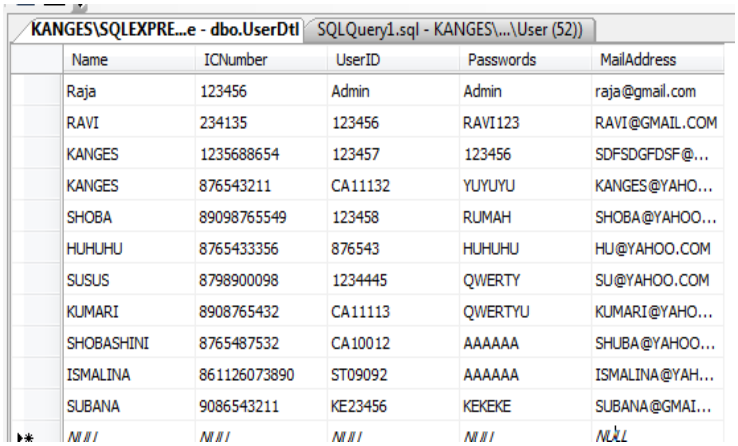
Figure 4.15.1: Course Registration Page

4.3.8 Microsoft SQL Server 2008 Connection

The server name KANGES\SQL\EXPRESS. It uses to connect Database. The Staff information and student information will update in database table after we submit in details form Figure 4.15 show SQL Server 2008 connection form, Figure 4.16 show Database for User

Details, Figure 4.17 show Database for Student Details and Figure 4.18 show Database for Section Details.

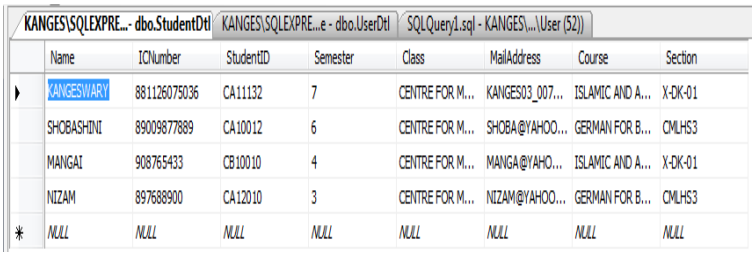
Figure 4.16.1: SQL Server 2008 connection



KANGES\SQLEXPRE...e - dbo.UserDtl | SQLQuery1.sql - KANGES\...\User (52))

Name	ICNumber	UserID	Passwords	MailAddress
Raja	123456	Admin	Admin	raja@gmail.com
RAVI	234135	123456	RAVI123	RAVI@GMAIL.COM
KANGES	1235688654	123457	123456	SDFSDGFDSF@...
KANGES	876543211	CA11132	YUYUYU	KANGES@YAHO...
SHOBA	89098765549	123458	RUMAH	SHOBA@YAHOO...
HUHUHU	8765433356	876543	HUHUHU	HU@YAHOO.COM
SUSUS	8798900098	1234445	QWERTY	SU@YAHOO.COM
KUMARI	8908765432	CA11113	QWERTYU	KUMARI@YAHO...
SHOBASHINI	8765487532	CA10012	AAAAAA	SHUBA@YAHOO...
ISMALINA	861126073890	ST09092	AAAAAA	ISMALINA@YAH...
SUBANA	9086543211	KE23456	KEKEKE	SUBANA@GMAI...
NULL	NULL	NULL	NULL	NULL

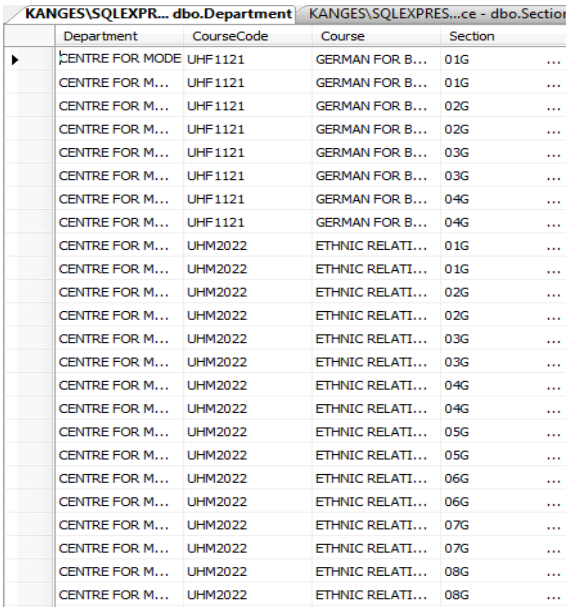
Figure 4.17.1: Database for User Details



KANGES\SQLEXPRE...- dbo.StudentDtl | KANGES\SQLEXPRE...e - dbo.UserDtl | SQLQuery1.sql - KANGES\...\User (52))

Name	ICNumber	StudentID	Semester	Class	MailAddress	Course	Section
KANGESWARY	881126075036	CA11132	7	CENTRE FOR M...	KANGES03_007...	ISLAMIC AND A...	X-DK-01
SHOBASHINI	89009877889	CA10012	6	CENTRE FOR M...	SHOBA@YAHOO...	GERMAN FOR B...	CMLHS3
MANGAI	908765433	CB10010	4	CENTRE FOR M...	MANGA@YAHO...	ISLAMIC AND A...	X-DK-01
NIZAM	897688900	CA12010	3	CENTRE FOR M...	NIZAM@YAHOO...	GERMAN FOR B...	CMLHS3
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

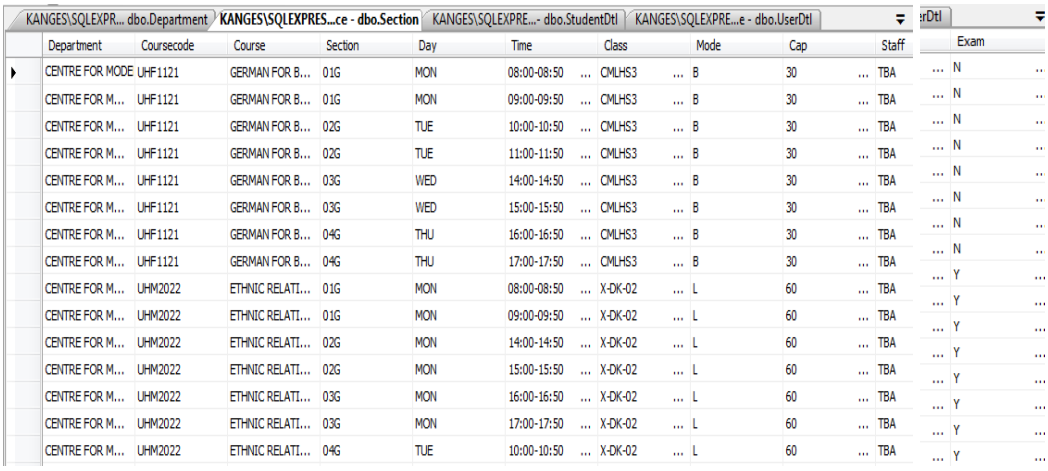
Figure 4.18.1: Database for Student Details



KANGES\SQLEXPR... dbo.Department | KANGES\SQLEXPRES...ce - dbo.Sectio

Department	CourseCode	Course	Section
CENTRE FOR MODE	UHF1121	GERMAN FOR B...	01G
CENTRE FOR M...	UHF1121	GERMAN FOR B...	01G
CENTRE FOR M...	UHF1121	GERMAN FOR B...	02G
CENTRE FOR M...	UHF1121	GERMAN FOR B...	02G
CENTRE FOR M...	UHF1121	GERMAN FOR B...	03G
CENTRE FOR M...	UHF1121	GERMAN FOR B...	03G
CENTRE FOR M...	UHF1121	GERMAN FOR B...	04G
CENTRE FOR M...	UHF1121	GERMAN FOR B...	04G
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	01G
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	01G
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	02G
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	02G
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	03G
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	03G
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	04G
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	04G
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	05G
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	05G
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	06G
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	06G
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	07G
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	07G
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	08G
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	08G

Figure 4.19.1: Database for Department Details



KANGES\SQLEXPR... dbo.Department | KANGES\SQLEXPRES...ce - dbo.Section | KANGES\SQLEXPRE...- dbo.StudentDtl | KANGES\SQLEXPRE...e - dbo.UserDtl

Department	Coursecode	Course	Section	Day	Time	Class	Mode	Cap	Staff	Exam
CENTRE FOR MODE	UHF1121	GERMAN FOR B...	01G	MON	08:00-08:50	CMLHS3	B	30	TBA	N
CENTRE FOR M...	UHF1121	GERMAN FOR B...	01G	MON	09:00-09:50	CMLHS3	B	30	TBA	N
CENTRE FOR M...	UHF1121	GERMAN FOR B...	02G	TUE	10:00-10:50	CMLHS3	B	30	TBA	N
CENTRE FOR M...	UHF1121	GERMAN FOR B...	02G	TUE	11:00-11:50	CMLHS3	B	30	TBA	N
CENTRE FOR M...	UHF1121	GERMAN FOR B...	03G	WED	14:00-14:50	CMLHS3	B	30	TBA	N
CENTRE FOR M...	UHF1121	GERMAN FOR B...	03G	WED	15:00-15:50	CMLHS3	B	30	TBA	N
CENTRE FOR M...	UHF1121	GERMAN FOR B...	04G	THU	16:00-16:50	CMLHS3	B	30	TBA	N
CENTRE FOR M...	UHF1121	GERMAN FOR B...	04G	THU	17:00-17:50	CMLHS3	B	30	TBA	N
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	01G	MON	08:00-08:50	X-DK-02	L	60	TBA	Y
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	01G	MON	09:00-09:50	X-DK-02	L	60	TBA	Y
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	02G	MON	14:00-14:50	X-DK-02	L	60	TBA	Y
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	02G	MON	15:00-15:50	X-DK-02	L	60	TBA	Y
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	03G	MON	16:00-16:50	X-DK-02	L	60	TBA	Y
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	03G	MON	17:00-17:50	X-DK-02	L	60	TBA	Y
CENTRE FOR M...	UHM2022	ETHNIC RELATI...	04G	TUE	10:00-10:50	X-DK-02	L	60	TBA	Y

Figure 4.20.1: Database for Section Details

4.4 Conclusion

The Course Registration System is developed using Microsoft Visual Studio 2008 fully meets the objectives of the system which it has been developed. The system is operated at a high level of efficiency and all the students and user associated with the system understands its advantage. The system solves the problem. It was intended to solve as requirement specification.

CHAPTER 5

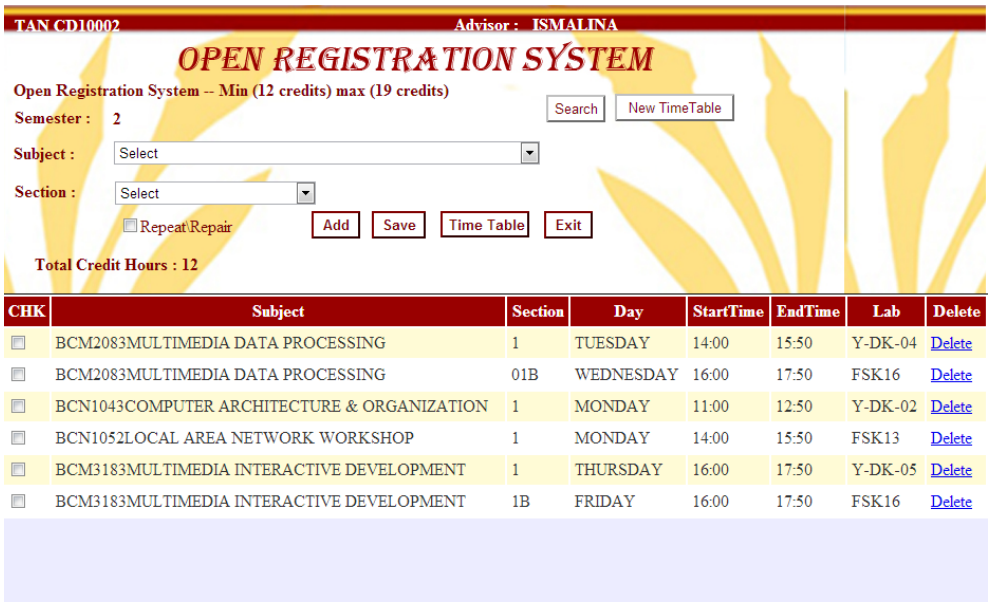
RESULTS AND DISCUSSION

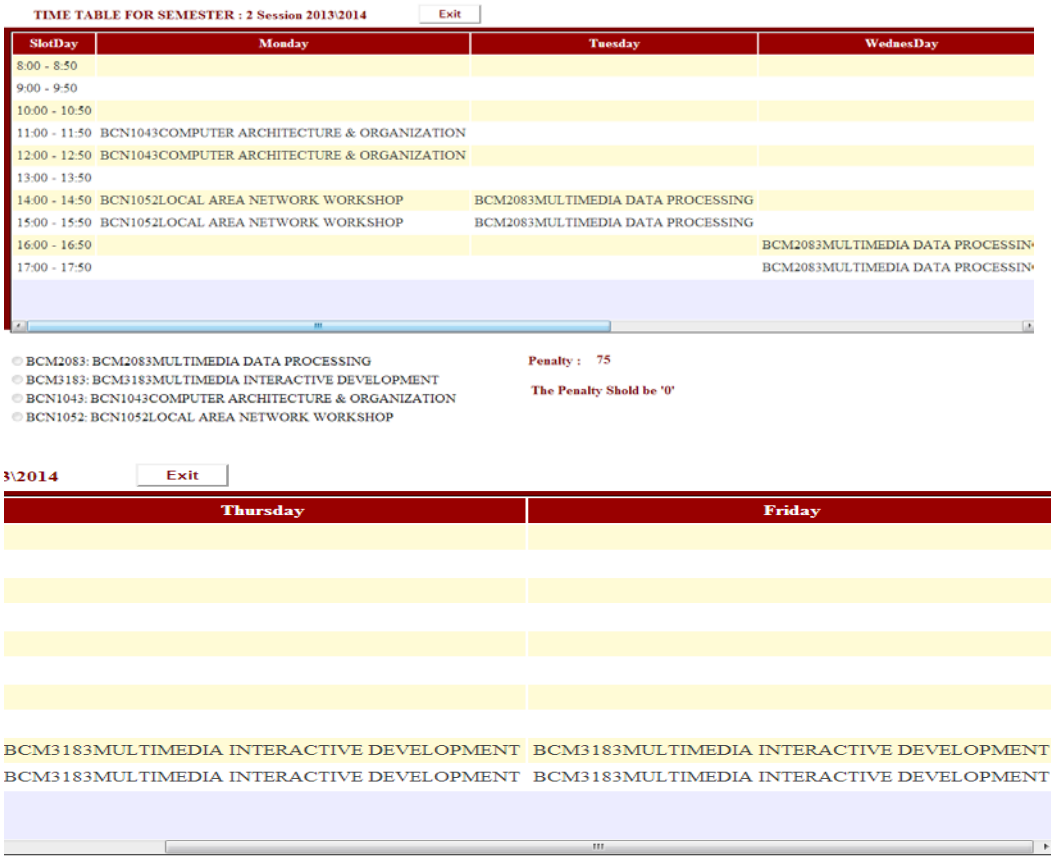
5.1 Introduction

This Course registration system really gives more benefit to UMP student. As a UMP student they can be independent choosing their own subject following by day, section and time. At the same time student can arrange their own timetable by their own wish and they can automatically get know what subject is clash and what subject they cannot take now. By using this system student can easily done their course registration

5.2 Result and Discussion

The analysis of the results based on the objectives of course registration it shown at the table 5.2.1

Form	Explanation
Login Form	The Administrator, Staff and student able to use Login Form by key in Username, password and choose category. 
Course Registration Form	In Course Registration, we can register subject based on our own timeslot and section. At the same time any clash subject and repeat subject will display in message box to remain student. The DELETE button use to drop subject, ADD button to add subject and after Save we can we Time table. 

Time table form	In Timetable we can view the subject we register and the total penalty calculation In timetable if the student take one subject per day it will calculate 15 penalty. 

TIME TABLE FOR SEMESTER : 2 Session 2013\2014 Exit

SlotDay	Monday	Tuesday	WednesDay
8:00 - 8:50			
9:00 - 9:50			
10:00 - 10:50			
11:00 - 11:50	BCN1043COMPUTER ARCHITECTURE & ORGANIZATION		
12:00 - 12:50	BCN1043COMPUTER ARCHITECTURE & ORGANIZATION		
13:00 - 13:50			
14:00 - 14:50	BCN1052LOCAL AREA NETWORK WORKSHOP	BCM2083MULTIMEDIA DATA PROCESSING	
15:00 - 15:50	BCN1052LOCAL AREA NETWORK WORKSHOP	BCM2083MULTIMEDIA DATA PROCESSING	
16:00 - 16:50			BCM2083MULTIMEDIA DATA PROCESSIN
17:00 - 17:50			BCM2083MULTIMEDIA DATA PROCESSIN

BCM2083: BCM2083MULTIMEDIA DATA PROCESSING
BCM3183: BCM3183MULTIMEDIA INTERACTIVE DEVELOPMENT
BCN1043: BCN1043COMPUTER ARCHITECTURE & ORGANIZATION
BCN1052: BCN1052LOCAL AREA NETWORK WORKSHOP

Penalty : 75

The Penalty Shold be '0'

3\2014 Exit

Thursday	Friday
BCM3183MULTIMEDIA INTERACTIVE DEVELOPMENT	BCM3183MULTIMEDIA INTERACTIVE DEVELOPMENT
BCM3183MULTIMEDIA INTERACTIVE DEVELOPMENT	BCM3183MULTIMEDIA INTERACTIVE DEVELOPMENT

5.3 Result Analysis

The main objective of Course Registration that use to implement

- To develop a prototype of UMP courses registration system allows students to register courses based on section and timetable.

  - This Objective refer for course registration, that student able to register their timetable by their own timeslot and the same time they can add, delete, save subject and lastly can view their timetable.

- To develop a system we able to give suggestion of the courses that available in timetable.

  - This objective will show available courses, time, days and lab section for each subject. The student can get know courses based on their timeslots.

- To implement the course time tabling by using solve concept from the soft ump constraints as guides for student satisfaction.

  - This objective will show the concept of soft constraints of ump, that as a student should register more than two courses in a day.

5.4 Soft Constraints

i. A student should not attend only one course in a day
   - It's mean as a student if take a single course will give penalty around 20.

ii. A student should not attend more than two courses consecutively.
   - It's mean every gaps between two course will give penalty around 10 including break time.

iii. A student should not attend a course in the last period in any day.
   - It's mean a student attend one course per day will give penalty around 50.

5.5 Limitation

In this system the subject, section and lab should list out in list box and combo box, to easily choose subject. In this system there have Admin, staff and student to implement in course registration. All the information about courses was taken from UMP course catalog.

5.6 Further Studies

This system can improve by using timetable that can generate automatically by selected manual and automatically so we can have least penalty. More penalty means the timetable is not bring good timeslot, if lowest penalty count it refer on soft constraints.

CHAPTER 6

CONCLUSION

6.1 Conclusion of the system

The main objectives of this system to develop UMP open Registration system for course timetabling problem. The main part is to help student to register courses without any clash subject.

As a conclusion, we manage to successfully meet the objective by developing the system to solve timetabling problem. The system allow student to choose their own preferred timetable (i.e. Section and classroom) as well the penalty value (satisfaction on the chosen timetable).

The Interface design is the process of defining how the users will interact with the system and the nature of the input and output which the system will accepts and generates. The new system will be using Microsoft Visual Studio 2008 as the tool to design the graphical user interface, for database will be using Microsoft SQL Server 2008.

The user interface and database plays the main role in the system design because the interface is the communication tool between the user and system. The main purpose of a perfect interface design is to convince the student and staff that the system is accurate and reliable. If the

system look sloppily built with poor visual design and low editorial standards, it will not inspire the confidence among the user.

Good User Interface Design can make a product easy to understand and use, which results in greater user acceptance. Overall the suggestion is to make this system more stable and give user more easy to use the interface and more structured and make all the data easy to view in fast way and can register to their own preference and to make it more convenient to user to register their subject.

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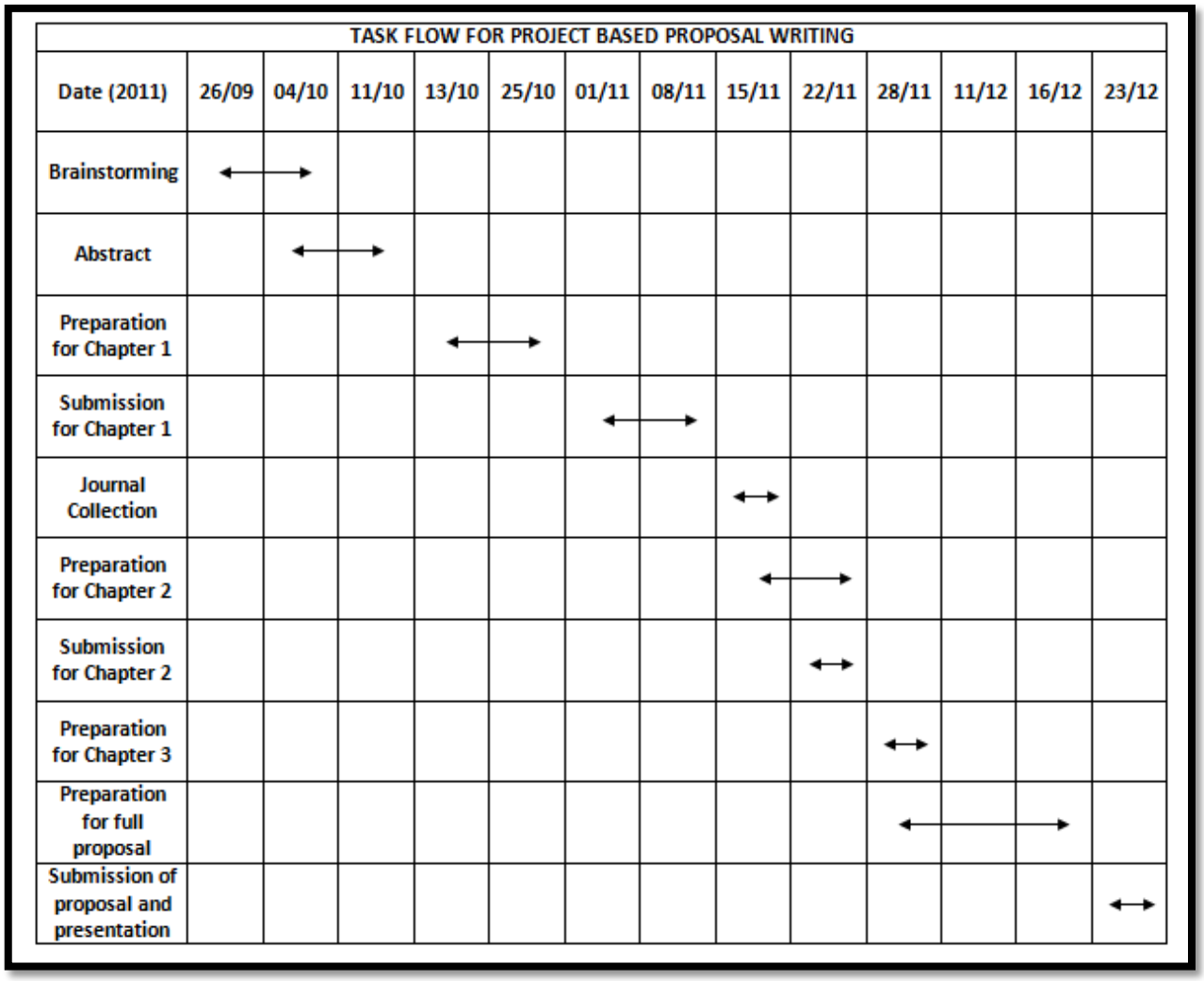
APPENDIX A

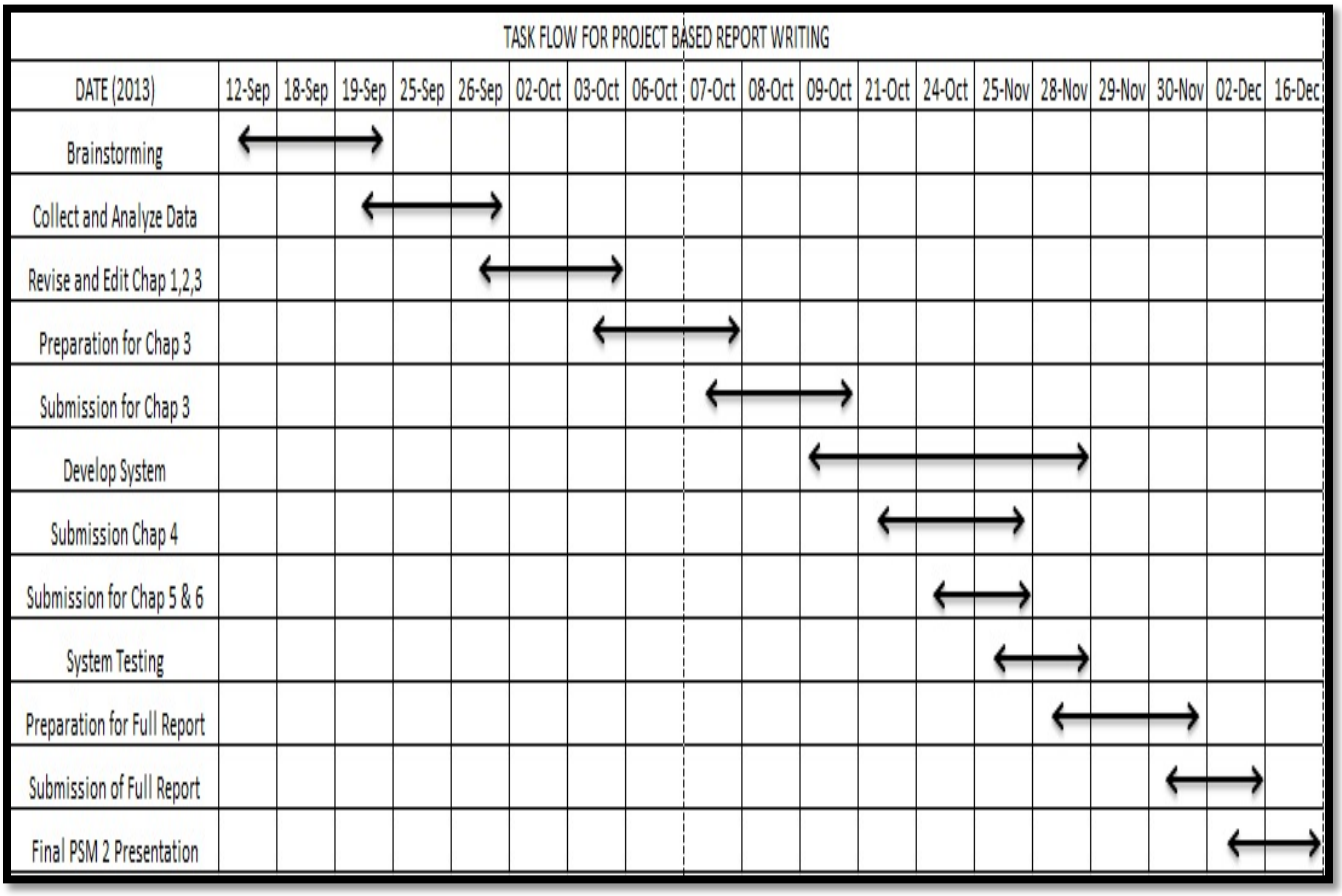
Graff Chart PSM1



TASK FLOW FOR PROJECT BASED PROPOSAL WRITING													
Date (2011)	26/09	04/10	11/10	13/10	25/10	01/11	08/11	15/11	22/11	28/11	11/12	16/12	23/12
Brainstorming	↔	↔											
Abstract		↔	↔										
Preparation for Chapter 1				↔	↔								
Submission for Chapter 1						↔	↔						
Journal Collection								↔					
Preparation for Chapter 2								↔	↔				
Submission for Chapter 2									↔				
Preparation for Chapter 3										↔			
Preparation for full proposal										↔	↔	↔	
Submission of proposal and presentation													↔

APPENDIX B

Graff Chart PSM 2



Turnitin Result