

**DIRECT ENTRY (BITI) TIMETABLE SCHEDULING USING HEURISTIC
SCHEDULING TECHNIQUE**

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HEURISTIC SCHEDULING TECHNIQUE

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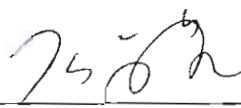
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DIRECT ENTRY (BITI) TIMETABLE SCHEDULING USING HEURISTIC
SCHEDULING TECHNIQUE

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This report is submitted in partial fulfilment of the requirements for the
Bachelor of Computer Science (Artificial Intelligence)

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DECLARATION

I hereby declare that this project report entitled

DIRECT ENTRY (BITI) TIMETABLE SCHEDULING USING HEURISTIC SCHEDULING TECHNIQUE

is written by me and is my own effort and that no part has been plagiarized without citations.

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DEDICATION

To my beloved parents and friends..

ACKNOWLEDGEMENTS

I would like to thank Miss Nuzulha Khilwani for giving me assistant to complete this project successfully..

I would also like to thank both my beloved parents and friends who have been giving me support and motivation throughout my project..

ABSTRACT

The idea of doing this project comes up when direct entry student complaining on the difficulty of scheduling their timetable since they have to face several procedures to schedule the timetable. For example they have to collect all of timetable of other class from academic assistant, head of department or faculty office. The system had been developed used to help the students by providing a tool for scheduling their timetable. In developing the system, heuristic scheduling technique or algorithm is used to have a good result of timetable generated. Heuristic scheduling consists of three approaches which are order-based, resources-based and operation-based.

ABSTRAK

Idea untuk menghasilkan projek ini adalah apabila aduan para pelajar kemasukan terus kerana mereka perlu melakukan beberapa perkara untuk menyusun jadual mereka. Sebagai contoh, mereka perlu mengambil kesemua jadual setiap kelas dalam jurusan yang sama dari pada perunding akademik, ketua jabatan atau pejabat fakulti. Sistem ini dihasilkan bertujuan untuk menyediakan satu kemudahan bagi pelajar untuk menyusun jadual mereka. Dalam menyiapkan system ini, teknik penjadualan heuristik atau algoritma heuristik ini dapat membantu menghasilkan sistem untuk menyusun jadual dengan baik. Penjadualan heuristik ini mengandungi tiga pendekatan iaitu berdasarkan susunan, berdasarkan sumber dan berdasarkan operasi.

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LIST OF ABBREVIATIONS

BITC	-	Bachelor of Science Computer (Networking)
BITD	-	Bachelor of Science Computer (Database Management)
BITI	-	Bachelor of Science Computer (Artificial Intelligence)
BITM	-	Bachelor of Science Computer (Media Interactive)
BITS	-	Bachelor of Science Computer (Software Engineering)
FICT	-	Faculty of Information and Communication Technology
UTeM	-	Universiti Teknikal Malaysia Melaka

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CHAPTER I

INTRODUCTION

1.1 Project Background

Basically, this project is for direct entry students which need to waive certain subjects and schedule the timetable. For the timetable scheduling, subjects will be scheduled according to timetable that already scheduled for other students. Since direct entry students usually do not have exactly the same subject as students who are not direct entry, their timetable will be different from other students. Subjects will be selected and scheduled according to subjects that offered for students to enroll. After subjects had been selected, timetable for current semester will be scheduled and other subjects will be listed out for students to enroll them on next semesters.

This project is under education field which will be used by university that have intake for direct entry. The problem is there is no artificial intelligent element in the existing approach. I choose to implement a Knowledge Base System (KBS) to innovate the system for the problem because study of the KBS greatly interested me, and I decided to take this project as an opportunity to study KBS more than trying to achieve a solution for the problem at hand.

1.2 Problem Statement

There are a few weaknesses in existing approach. The problems and weaknesses can be summarized as follows:

- **Timetable is manually scheduled.**

The existing approach that been used is in manually. Students need to check the timetables of every class to schedule their timetable.

- **Takes a lot of time to finish scheduling.**

Obviously, this approach takes a lot of time for student to plan their timetable. Because of this issue, student will do the scheduling without careful and they might have two classes on same time issue.

- **Big percentage of having two classes on same time.**

Two or more subject that the students enroll could have same lecture time. Whenever this matter happened, students need to reschedule their timetable. They need to start all over again to schedule the time table.

Regarding from those problems, new approach are needed to solve it. This can help avoid the students from having problem on timetable scheduling. In additional, Head of Departments also needs to spend more time to help student handle the problems.

1.3 Objective

Based on the problems from the current approach, the objectives in developing a new approach are:

- **To provide a tool for direct entry students plan their timetable.**
This project can provide tool for student to plan their timetable is easier way instead of write down the subjects on paper form and schedule by their own self.
- **Less time used to plan timetable.**
Student will spend less time to schedule their timetable. So, they did not miss any syllabus in subjects while they are busy planning their timetable.
- **To avoid having two or more classes on same time.**
Whenever there are two or more class happen to be on same time, that subject will be listed on other semester while other subject n other semester that can be enroll on that current semester will be listed in subjects need to schedule.

By using new approach, those problems can be solved and it can help students handle the subjects and timetable scheduling matter. Even Head of Departments could use less time to help student dealing with timetable issues.

1.4 Scope

This project is under education field which will be used by Faculty of Information and Communication Technology (FICT), Universiti Teknikal Malaysia Melaka (UTeM). Target users obviously will be the direct entry students of BITI course by using existing timetable from BITI. The students need to enroll in range of

more or equal to 11 until less or equal to 20 of total credit hours and with that total amount of credit hours, the students able to schedule their timetable using the system.

1.5 Project Significance

The significance of the project is to overcome planning time and manual scheduling of class timetable. It also gives the benefit to the students and the Head of Departments. This project is been done to ensure that the way of scheduling timetable will be improve and help students plan the timetable with been monitored by Head of Departments.

1.6 Expected Output

I hope this project is success and can be used to help direct entry student plan their timetable. In additional, I will get experience of working on something new using KBS.

1.7 Conclusion

This chapter had explain about the basic idea of the project such as the background of project, why I come up with this project in problem statement, the objective of this project and scope of project. On next chapter, I will be discussing about literature review and project methodology.

CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

This chapter specifies literature review and project methodology that will be opted to optimize the development of to-be application. Literature review includes study and research of published materials like journals, thesis, case studies, technical documents and online library. Generally, the purpose of a review is to analyze critically a segment of a published body of knowledge through summary, classification and comparison of prior research studies, reviews of literature, and theoretical articles. Project methodology describes a set of practices that will be carried out iteratively to produce the application.

2.2 Facts and Findings

Below are some findings in process to build the system.

2.2.1 Domain

This project, scheduling the class timetable for FICT direct entry students (BITI) using genetic algorithm is actually in educational field. This is because it

combines the technology with education purpose. It is a technology because of using the genetic algorithm technique and it change the manual approach.

2.2.2 Existing System

After doing some research, there is no exiting system for direct entry but there is a system to schedule timetable for all students which in current semester not the direct entry.

2.2.2.1 FTMK Timetabling System

Background

This system is actually a good system to schedule timetables. The system was built by team of lecturers and also people from IT department. The system will schedule the timetables for group one and two of year one, two and three for each major course which is BITI, BITM, BITC, BITD and BITS.

Problem Statement

This system has a weakness regarding the situation of student enrolling the subject. The weakness is as follow:

- **No timetable scheduling for direct entry**
Since UTeM has direct entry students, which the students may transfer some credit and start the study from any semester or year. Not like the students who start enroll as the first semester of first year student.

2.2.2.1 Direct Entry Timetable Manually schedule

Background

This manual approach is basically a way where students need to plan their timetable according to subject can be enrolled on current semester. Students need to see the Head of Department to confirm the timetable so that there is no more than one class in a time.

Problem Statement

The weaknesses are as follow:

- **Have more than one class in a time**
Because of this approach is done manually, most of student did not take it seriously. They just randomly select the class without noticing they have more than one class on the same time.
- **Using a lot of time**
Whenever students have more than one class in a time, they need to reschedule the timetable.

2.2.3 Technique

Technique that will be used to schedule the time table is as follow:

2.2.3.1 Knowledge Base System

Scheduling problem can be visualized by AND/OR tree which constructed by the combination of production requirement with the order given and scheduling

horizon. Finding a solution in scheduling is finding a solution of the root node, all successors of an AND node and OR node.

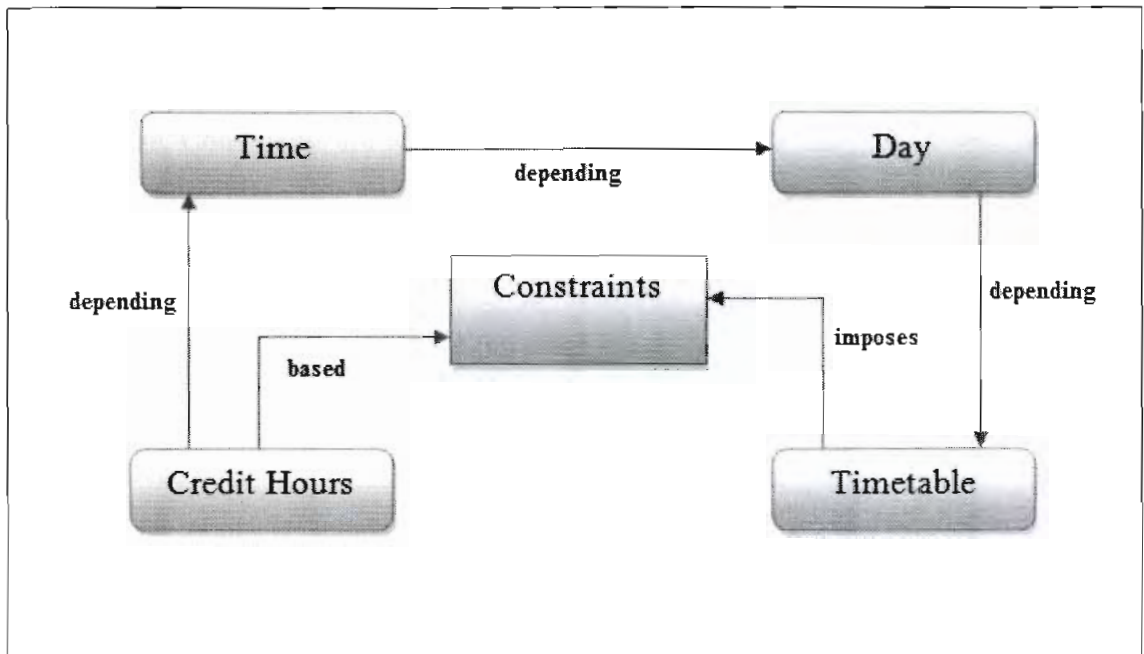


Figure 2.1: Abstract domain model

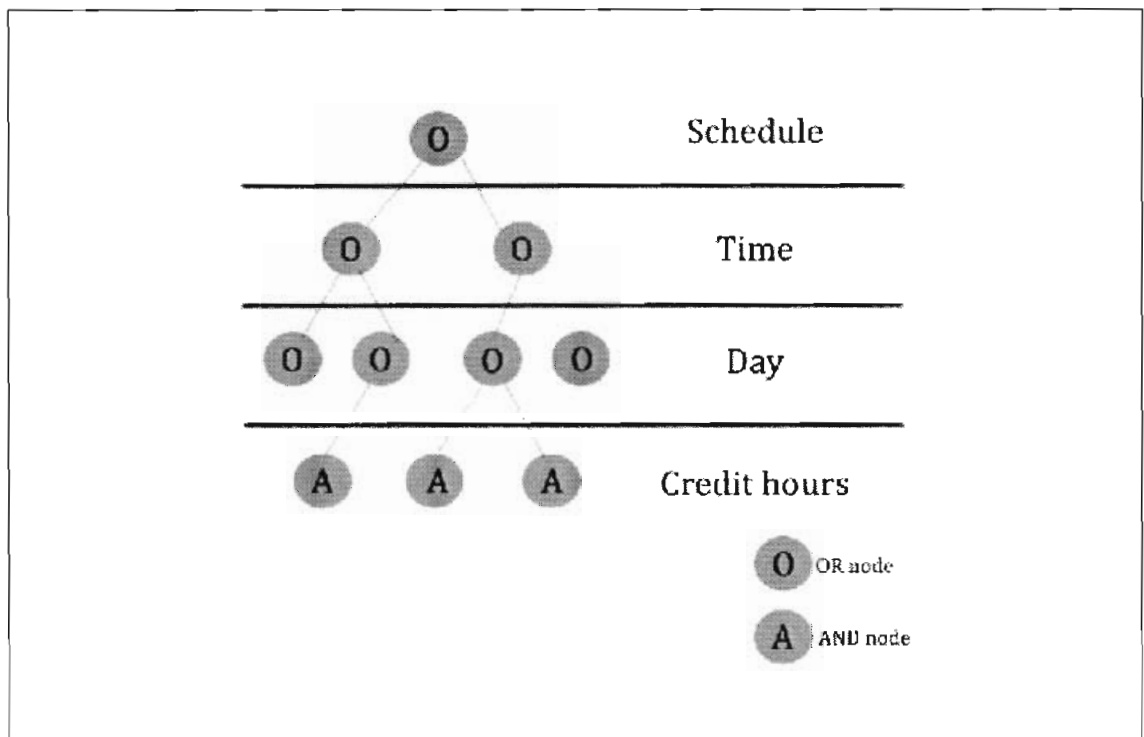


Figure 2.2: Problem space of scheduling

2.2.3.1.1 Heuristic Scheduling

This scheduling technique is one of technique that can be use for knowledge based system. Heuristic scheduling is based on heuristic search technique and general heuristic such as problem decomposition together with problem-specific knowledge. Constraints are widely used to guide the search and the representation of knowledge can be in rule or frame based. Most of the approaches used to scheduling can be categorized by the underlying perspective of the problem decomposition as following:

- **Order-based**

The order is selected from all unscheduled orders and places it as first operation that can be followed with next operation after the first operation is done. Then it will be schedule based on the time the operation takes to finish. For most subject offered for BITI students have 2 hours of class times.

- **Resource-based**

Resource is selected and suitable operation is chosen out of the set of operations. It means the timetables scheduled for direct entry students are based on existing timetable from other BITI students.

- **Operation-based**

Operation after operation is selected and scheduled and it is based on what subject that the direct entry student select to enrol and generate the timetable for them.

Example of using the three approaches can be seen in Appendix A. Following is the algorithm used in this system.