CHAPTER 1: INTRODUCTION
1.1 Introduction

Timetable is among one of the specific forms of general scheduling problem, namely, on the movement and gathering of resources against time, for the achievement of an objective based on the constrictions stipulated. The resources are the number of objects classified according to the types.

A feasible timetable is one that is able to fulfill the constrictions stipulated. The constrictions include the group that must be available and the group that need not be available at a specific time. Apparently, if one of the resources existed, hence other resources need not be available or all groups must be involved within a total specified time for each resource. For example, one lecturer can teach for one subject.

In general scheduling process is a process of arrangement of limited resources available, taking into consideration the construction in those resources to ensure that all of the resources are being used to its optimum while minimizing the rate of unsatisfaction of the resources. From around the 60s, problems pertaining to scheduling have been given due attention by researchers. It is a complex process and has been categorized as a “classical Problem”, to this date a specific solution has yet to be attained for this scheduling problem.

Each scheduling problem has its own technique, rule and requirement. Timetable problem may not be classified in the same form, so are the methodology solution taken which do not reflect that other methodologies are not good. For example, the Light Rail Transit (LRT) timetable shows the LRT movement, from one station to another. Unlike
university timetable that uses time as a basis for schedule. It is seen, that the LRT timetable is based on minutes or the smallest time unit. The LRT may be on a specific track and the infrastructure around at a particular time limit. The frequency in giving signal indicates the heavy use of a particular track. The station size and the number of tracks states clearly the number of LRT coaches that may use the tracks at any one time.

A good timetable consists of several quality measures. Among the quality measures are: in the event of a breakdown, how long would it take before the LRT coach is replaced? What is the volume of the LRT with the number of passengers traveling in it? Is there a possibility that the timetable may cause two coaches to run on the same track at the same time? If the quality measures are not given unsatisfactory, hence the timetable maker needs to ask himself if he needs more LRT or not proceed with the service.

An examination timetable is about scheduling of time and students sitting for the examination. White (2000) defines examination scheduling as allotting the examination to a fixed timetable and as such no student will be sitting for more than one examination at any one time. The main difficulties in an examination timetable are that the total period available is limited, to avoid the occurrence of any conflict and fulfilling the low constraints stipulated.

A university timetable is different from that of a school. A university has many departments; each department offers various courses to its students beside other courses conducted by other departments that students are required to take. Each department is
responsible for their own timetable while considering the timetable of other departments. It is different from an examination timetable, which is centrally prepared.

The problem pertaining to the difficult process of preparing a time schedule is seldom discussed by our national educationist. No general guidelines could be formed to assist in the schedule preparation process. This means that those assigned to prepare the schedule process will only rely on their experience in the performance of such duties. Sheibani (2002) made a study on these phenomena. Whereby according to him/her the image of a scheduler is normally that of a person in haste and mostly uses the pencil and eraser, and does a lot of correction here and there in the process of preparing the schedule. This duty will prolong for several weeks.

1.2 Problem Statement

- Timetabling is complicated due to many programs, insufficient amount of lectures, lack of classes and the timetable changes due to many cases.
- There are many lecturers involved in preparing the timetable. It is taking too much of their time.
- To overcome this problem the FCSIT need a timetable system to organize their timetable.
- Knowledge of preparing timetable is not captured or trained to others once he/she left for a long leave. Thus it takes too long to retrain others in most cares.

1.3 Objectives

The objectives of this research are:

- To investigate the current processes, requirements, constraints and problems involved in the task of preparing the timetable.
• To do comparative study of Genetic Algorithm used in the timetabling problems.

• To develop a timetable management system using the most suitable Genetic Algorithm.

• To use Al-Khawarizmi Genetic as a technique to solve the problem as it is able to produce a feasible timetable and fulfill as many constraints imposed.

1.4 Scope and Limitations

This thesis focuses narrowly on the timetable for the Faculty of Computer Science and Information Technology (FCSIT). A website will be built in order to improve the process of the current system. This website will provide the facilities for the classroom booking and to provide information on the availability of the class and laboratory in the lecture module. Lecturers and students of FCSIT must register through the Timetable Management System before they start using the system. Besides that, they must have passwords to use the system. They can change the password by using the functionality of “change password” in the system. The limitation of this system is that, non-FCIST students are not allowed to register through the system.

1.5 Research Methodology

It was decided that the research method to be utilized would be conducting interviews, literature review to gather user requirement and developing a prototype of the system. Gathering the information was done through interviews conducted with the coordinator for timetable in FCSIT. Other than the said interview information pertaining to matters such as subjects was gathered from FCSIT guidebook.
Literature review was done to seek the best approach to use in developing the system. The approaches include the heuristic approach, Integer programming approach, Graph Coloring Approach, Network Streaming Approach, Logical Constraints Approach, Knowledge Base Approach, Tabu searching, Annealing Simulation and Al-Khawarizmi Genetic. Al-Khawarizmi Genetic has been chosen as techniques to solve the problem as it is able to produce a feasible timetable and fulfill as many constraints imposed. The output would be a prototype of the FCSIT timetable system.

1.6 Expected Outcome

At the end of the dissertation, a comparative study of the different approaches for developing the timetable will produce and a web based system known as the Timetable Management System is expected to be developed. This web based system should include at least the following features and functions:-

- A web based system which contains the timetable for the lectures and students of FCSIT
- A web based system which contains the master timetable for one semester
- A web based system to show the availability of the classes and laboratory
- A web based system to book for the additional class and laboratory

1.7 Organization Of Dissertation

1.7.1 Chapter One – Introduction.

This chapter contains the introduction and background study of the timetable system. This chapter also explains the objectives of this dissertation in detail. Besides an overview of the dissertation and the objectives, it also includes an outline of the research
approach, the scope of the study, the expected outcome, the research method and the research design.

1.7.2 Chapter Two – Literature Review

Chapter two shows in brief the techniques, the strength and weakness of genetic algorithm used in producing timetable especially with regard to the FCSIT timetable. Various approaches and rules have been presented in solving the said problem. The researcher found that the Al-Khawarizmi genetic is the best approach. Each module in this Alkhwarizmi genetic will be discussed, as it is an important basis in solving the FCSIT timetable problem. In addition, the researcher had also included finding of past research to support the study.

1.7.3 Chapter Three – Research Methodology

This chapter describes the research design for the exploratory study and the manner in which the research was conducted. This chapter will cover the research sample, research method, research instrument, method of distribution and data analysis techniques.

1.7.4 Chapter Four - Requirement Elicitation

This chapter describes the data gathered from the interviews with the chief coordinator of the current FCSIT timetable. Results on the interview will be used to develop the four phases of timetable management system. The preparation of the FCSIT timetable is a long process and involves more than the allotment of subjects to time slot only. Information on scheduling manually by the FCSIT will be shown in detail.
1.7.5 Chapter Five - Development of Timetable Management System Using Genetic Algorithm

A website with an online timetable would be developed in order to improve the process of preparing the timetable for FCSIT. This website intends to help the lecturer of FCSIT to have a one systematic timetable for their faculty. Rapid Application Development (RAD) will be use to develop this system.

1.7.6 Chapter Six – Conclusion

In this chapter, all the findings are summarized and the study is concluded to check whether the objectives have been achieved. Besides that, it highlights some limitation of the system and also includes several suggestions for improvement. This chapter also includes future research recommendations.

1.8 Conclusion

This chapter gave a brief introduction on the dissertation and a conceptual overview of the system. The problem statement of the dissertation was identified. The objectives of the dissertation and system have been established with its scope and limitation specified. Besides that, this chapter also gave an introduction to the research methodology used, expected outcomes, and the organization of the whole dissertation.