Chapter 1

Introduction

1.1 Introduction

Project management is a system of procedures, practices, technologies, and know-how (the skill, background, and wisdom to apply knowledge effectively in practice) that provides the planning, organizing, staffing, directing, and controlling, which are necessary to successfully manage an engineering project [RIC87]. A project management software is a tool, which helps in scheduling, resources leveling, analyzing and reporting. Management principles, functions, and the fundamental activities can be applied to manage any organization or activity. Thereby many of major research efforts and successes in the field of management has been applied to software engineering project management such as: PERT, CPM, WBS, and configuration management [RIC87]. Software projects, especially large projects involve typically thousands of individual tasks performed by many individuals, sometime in groups, and often involving many thousands of dollars.

Software engineering project management is the key to successful software projects and the project manager plays a major role in software and system development. Moreover, the difference between the success or failure between a project being on schedule and on budget, or late and over budget, is often a function of the manager's effectiveness [RIC87]. Therefore, the need for management to define and manage the project and have responsible managers becomes very important. The fundamental task for a project manager is to plan a project. This involves defining each major task, estimating the time...
and resources required, and presenting the framework for management review and control. Thus, as in any other construction process, careful planning in the beginning will guarantee the completion of the project on time and within budget; and will also allow for good progress control with accurate cost control.

1.2 Software Project Management Problems

Indeed, the need for software projects in every day life aspect becomes very clear and the demand on it becomes very extensive. However, software projects are the most expensive projects these days and there are many projects that have been canceled, and some statistics have shown overruns, incompleteness, delays, and poor project quality. It has been reported that the failure of most software projects was due to problems in software management [IAN92], [RED90]. In addition, it has been stated that poor management can increase software costs and reduce the quality of the projects [DER97].

The dynamo of any project is the management. This is due to their responsibilities of making decisions, controlling project, managing and monitoring resources performance, and ensuring the quality of the product. However, there are many problems and difficulties, which cause delays, incompleteness, and poor quality. The following are some of the problems, that this research is attempting to overcome:

♦ Cost and resources estimation are difficult to prepare accurately due to the absence of learning from past experiences [KHA98], [CAR91].
♦ Good management will prevent and avoid areas where problems arise. However, most of the projects still suffer and face the same problems [KHA98].

♦ Behind most of the problems and difficulties are people who lack skills, experience, qualification, and training [ROG97], [KHA98].

♦ Defect removal is the most expensive activity and the information volume associated with the software bugs is the largest of any software artifact, which is still a problem [CAP96].

♦ Reusability is a very important aspect in software development however still some companies complain about the lack of knowledge and experience in this issue [KHA98].

♦ Insufficient experience and knowledge in the use of programming languages may cause delay and increase errors. This leads to produce poor quality product [KHA98], [IAN92].

♦ Difficult and inaccurate estimation of software project is due to difficulties in forecasting staff performance and productivity [CAR91], [ROG97].

♦ Changes in project requirements is one of the most critical problem, and has been for a long time [RAY84], [KHA98].

♦ While software engineering concentrates on building the software product, project management focuses on managing the engineering development. Therefore, software project management tools must be integrated with other tools for better management support and ensure good tracking. This is lacking in the available software project management tools [KHA98].
- Project complexity is still a problem and available tools are insufficient to reduce and minimize it [CAR91], [RIC88], [KHA98].
- There are many software companies competing to add new features, improve old features, and develop new techniques. Examining to determine if old, proven, or new unproven technology is to be used is one of the critical factors which affects the success of a project [DER97].

1.3 Software Project Management Tools

In the late 1950's, the application of computers in project management began by either PERT or CPM [DEA92]. Software projects rapidly develop. Indeed, this development will inherent complexity, problems, and difficulties especially in large, multi person projects due to the pushing of new technology and the market demand for software projects. Thus, the software project management's responsibility to manage and control project development becomes very important. Therefore, the need for effective software project management and tools become evidently clear to support the managers in performing their responsibilities. Project management tools allow the managers throughout the organization to see what is happening and to understand the impact of not maintaining their schedule. They also provide better data for making better decisions. Furthermore, it saves a lot of time spent on scheduling, calculating duration, evaluating cost, and producing reports in standard format. There are many project management tools, each of them designed to handle a specific aspect of project management process. Among the features typically offered by the tools are:
The capability of interacting both textually and graphically such as the duration of the activities and the relationship between each other.

Presenting Work Break down Structure (WBS), Gantt chart, PERT, CPM, resources driven scheduling, calculating the activity duration (based on the resources assignment and the effort factor).

Displaying the relationship between activities such as (i) Lag which specifies a time delay between two events either positive (to indicate a delay between two events) or negative (to indicate an overlap or load time between two events), (ii) Total Float (TF) which is the length of time an activity can be delayed without affecting the project completion, and (iii) Free Float (FF) which is the length of time that the activity can be delayed before it affects the start date of any successor activities.

Providing the managers with project information and generate progress reports.

1.4 Research Objective

Most of the techniques and the methodologies used in software projects are general management principles and techniques, which are not specific to software projects [CAR91], [KHA98]. However, software engineering project management, even though similar in some aspects to other engineering projects is different. For example, software product is intangible. The project manager cannot see or touch the product but in any other engineering projects the manager can see the product being developed. In software projects there is no clear understanding about the process, while in other engineering projects the stages of development of the project are well understood through its long history [IAN92]. Software project requires rapid innovation and there is no universal
standards for information systems [IGO98]. In addition, software engineering uses different models and techniques, reuse component, and other aspects.

Because of these differences, available software project management tools still do not cover all software project problems and thereby software projects are often late, exceed budget and behind schedule. Therefore, existing software project management tools for developing software projects will enormously help and reduce a lot of problems and will support the management to ensure the quality of the product. This research is an attempt to highlight the reasons for delays and incompleteness in software projects and to minimize them, reduce complexity, accurate estimation and ensure project quality by develop a prototype tool named SoftProMT. This tool will help and support the managers in performing their responsibilities. Thus, what the tool can do is to provide sufficient information in order to reach the right decision. The following are the SoftProMT objectives:

♦ To analyse, compare, and evaluate the problems in past projects to prevent or avoid areas where problems arise, and for accurate resources estimation.

♦ To reduce problems and difficulties caused by unqualified and unknowledgeable personnel.

♦ To provide information for assigning personnel on the basis of their work experience, qualification, and knowledge in specific area.

♦ To provide an example of an integrated system for better management support.

♦ To reduce complexity in software development process by tracking the chosen methodology.
To minimize the acquisition time for the suitable hardware or software component by providing up-to-date information on each product.

To facilitate the process of assigning the right person at the right time subject to their availability.

To keep track of changes in project requirements.

To produce valuable reports such as reports on critical problems, similarity between projects and others.

The research was work carried out by analysing, comparing and evaluating problems in past projects from literature review and comparison of some software project management techniques and tools. Survey on software project management was conducted and analysed to develop the prototype tool.

It is hoped that SoftProMT will pave the way for developing useful project management tools, which can reduce problems, attempt to ensure quality but at the same time keep the cost as low as possible, and to allow for better software project management.

1.5 Thesis Outline

The thesis is organized in the following manner:

Chapter 2 consists of software engineering project management overview and other related subjects such as definitions, problems, prior study, and functions. In addition, it also analyses, evaluates and discusses the limitation of some software project management tools. The result of a survey done in Malaysia has been discussed and presented in Chapter 3. The survey investigates the types of software project management problems, discusses the critical problems of project management, and evaluates the need for development tools to solve these problems. Chapter 4 describes the SoftProMT and
what are its requirements. Analysis, system design, and sample of database, input and output of screen design are presented and showed in Chapter 5. The implementation of the system is presented in Chapter 6. A discussion on how the system has been tested and verified to meet the system requirements is presented in Chapter 7. A summary of this research and the fundamental finding of this thesis are concluded and presented in chapter 8.