CHAPTER 1: INTRODUCTION

1.1 Overview of the System

Since the beginning of formal education, there has always been various means of assessing the performance of students to gauge the effectiveness of instruction. Examinations have been the chief means of providing a view of the overall performance of students. The use of Information Technology to aid in this process has made tremendous progress.

The Internet has driven many new developments in the dissemination of data and information through channels which were undreamed of by the earlier pioneers in Education. With the rise of the Worldwide Web, anyone with an Internet connection can now browse for institutions of learning and pick the courses of choice. As a result, the focus of many of the newer applications has shifted from desktop applications to applications that are distributed and accessible over the Internet. Data can be stored in a central location, and be sharable and made available to many types of applications.

However, the use of the Internet to distribute information regarding examinations results is still in its infancy. There are many reasons that restrict the capability of institutions of learning to disseminate such private information, among them being security and the lack of proper technology. Examination results are restricted information that should be made available to only those people who should be allowed to access. On the other hand, most teachers and educators know many of the methods of processing examination results. However, the methods can be very elaborate and involve multiple calculations that require difficult programming tasks.

Today, we can make use of Web Services to perform a variety of tasks in education. Web Services can put together many of the tedious and routine tasks of examinations results processing in a form that can be easily accessible. The methods of examination processing are common to all institutions of a similar kind, such as all
secondary schools. This is where a set of common tasks can be shared and distributed. Educators from institutions of a similar kind can access these methods to perform mundane tasks.

On the other hand, there can be many forms to distribute and display or report the results. Different institutions wish to deliver their results in various forms, to distinguish them from other institutions. There could be other variations in the external form of examinations that require special customization. It is these variations that make it necessary for each institution to design their own means of examinations results presentation.

Each institution has acquired a wide variety of hardware equipments over the many years of their existence since they were established. These machines run on different hardware processors and different operating systems. Some institutions have set up their own Web Servers, together with firewalls that prevent transmission of complex objects. Web Services is a way to provide important service functions that can be accessible by various hardware and platform, even passing through their firewalls.

Examinations Web Services System (EWSS) is an online examinations marks entry and processing system that will provide this crucial programmable logic, as well as demonstrate various ways of accessing these vital services.

1.2 Project Objective

- The research will focus on developing Web Services to provide examinations results processing services on a central server in a school environment.

The project aims at identifying those types of programmable logic that can be shared and scalable for use by various types of examination result presentation systems. These will be implemented as Web Services so that they can be exposed over an Internet or Intranet environment.
• To study the technologies available to implement Web Services in an Internet or Intranet environment.

The project will focus on the use of Internet protocols such as SOAP (Simple Object and Access Protocol), HTTP, and related protocols. Many of these protocols are new technologies and this project seeks to understand what they are, how to utilize their strengths, and understand their weaknesses.

• To study the new technologies in database access to implement this examination system.

There are some new and improved techniques of database access that is offered in the newer development platforms such as the .NET Framework. These should be included in this project.

• To design, develop and implement Web Services for school examinations systems.

This project seeks to develop a complete system that makes use of these Web Services. The system will be implemented in a real school environment to test its effectiveness and acceptability.

• To develop multiple ways to access these Web Services.

The project will review the various ways to access their services, and develop multiple types of client interfaces for presentation of these examinations results.

• To develop a Web Services environment using the same technologies that are used in real Internet Web Services, so that the techniques developed can be applied to other types of environment, such as in the business and financial environments.

This project aims to explore the use of Web Services. The techniques developed will be valuable, and can be used as a testing platform to develop other Web Services for other environments that can go beyond the school environment.
1.3 Project Scope

The Scope of the project covers the provision and consuming of Web Services over the School Intranet System. This project will cover the development of an examination record keeping and analysis system. The modules to be developed include:

- **Authentication module.**
  This module allows access to different parts of the system by the system administrator, school principal, school administrators, teachers, students and parents.

- **Web Services module.**
  This is one of the most important modules in this project. It covers the identification of what functionality to develop as programming logic that should be exposed by the main Server, and accessible to client applications distributed elsewhere in the school compound.

- **Results Entry module.**
  This module will allow the user to key in the marks of the examination.

- **Results Calculation and Processing Module.**
  This is a mathematical module, involving most of the calculations included in the system to calculate grades, averages, and positioning.

- **Results Presentation Modules.**
  There are various ways to present the results, including viewing the results on-screen, printing result slips and publicizing the results in various forms. The project seeks to study some of these methods and assess the effectiveness of each method.

Examination results over the years will be available to administrators and teachers.
using various types of computer systems distributed in various parts of the school compound. The challenge lies in how to store these data in a database that can reflect the performance of the school over a set of three years or five years. There is the problem to importing data in older formats, and putting them in a form that can be stored in the new system. This project may not cover this aspect of the examination results due to time limitations. However this is an area that must be addressed as a future enhancement.

1.4 Project Limitation

The School currently does not have Internet links with other schools. The school also does not have a permanent Web Site provider to host Web Services over the Internet. This makes it not possible to expose functionality over the real Internet World Wide Web. However, the system should be scalable to handle this future possibility.

However, it is not unforeseeable that this system could act as a basis for providing Web Services for consumption in other schools. There are services that are not related directly to the database structures; these services can be exposed and consumed by other schools. In general, Database-specific services cannot be exposed. However, there are services that involve a database shared by all schools; in fact these would be useful for school-comparison functions.

Owing to the limitation of time, this project would concentrate on a working internal school examination system using Web Services. This project will concentrate on an implementation at Sekolah Menengah Jenis Kebangsaan Chan Wa (SMCW), located in Seremban, Negeri Sembilan.

1.5 Expected Outcome

This system is designed for actual implementation in SMCW for the processing of the internal school examinations Results. The Project will be further enhanced and developed to serve the needs of processing the results of over 2500 students, and used by
over 100 teachers.

The System should provide some useful services that can be used by various computers distributed in the various buildings in the school. These services will be able to access a database of all the examination results, having the rights to retrieve, update and delete records. This provides the main information retrieval capability of the whole project.

The Principal, Administrators and Heads of Departments should be able to run client programs that will extract useful information stored in various departments in the school. Currently, the school administrators have difficulty retrieving examination records from their respective offices. EWSS will change the administrators’ expectations of data retrieval.

The “useful information” in this project will cover internal school examination results, which can be used in assessment and projections of school performance, and in planning and streaming of classes.

1.6 Significance of Project

This is an important project with real benefits to be gained from the development of the whole system. In effect, it is an extension of the efforts done in SMCW over the past few years in the computerization of Examination Results. The significance of the project can be realized in:

- A more modern implementation of a useful system.

This system promises to bring new user interfaces to the existing system, which is basically a DOS-based implementation. Although the DOS-based system is still functional, and has had a very long life span, spanning over 15 years of usage, it uses an out-dated user interface that is becoming an anachronistic artifact of a by-gone age. Students and teachers who used the system have expressed
awkwardness at its use because it is not very user-friendly.

- **Introduction of newer and better technologies.**
  The development of this project will introduce newer technologies such as using a Web Page design using ASP.NET. These technologies are supposed to improve upon older technologies in terms of easy of use and development, and scalability of design.

- **Improvement in the quality of presentation of results.**
  The graphical user interface (GUI) of this new system improves in its aesthetic appeal and familiarity to the younger generation. The current print-outs still use a dot-matrix printer, and the fonts used are limited to the capability of the hardware of the printer. New Windows based GUI and printings are more pleasing to the eye and improve the quality of its output.

- **A more scalable and user-friendly system.**
  Newer technologies promise to deliver presentation of results in better user-interfaces, including Web Page design, and possibility even scalable to presentation on mobile devices. The results are user-friendlier, as they use controls that are more familiar to the current generation of younger users who are net-savvy.

- **Opens up new avenues in examination processing.**
  The design of this new system, with newer techniques could result in developing newer ways of administering and maintaining the examination system as a whole. This may lead to new possibilities that are as yet not thought of by anyone. Certainly, using the Web to process results is a step in the new direction.

- **A better managed system that is centralized.**
  The idea of using Web Service programming logic makes it possible to centralize the type of calculations used in all examination processing. All programs that
consume these services will process results in the same consistent way, instead of having different methods in different applications. A change in the method of examinations processing is also centralized, without having to change all applications. All that is needed is an update of the Web Reference. This helps in the overall management of examinations processing.

- **A more effective use of the school network system.**
  There is now a justification for the use of a school network system, with functionality that can be centralized yet distributable to all applications within the network system. This new usage of the network will make the network more useful.

- **Techniques developed could be applied in other systems.**
  Developing this system will lead to a pattern of development that can be applied in other systems that can benefit from the advantages of using Web Services and the other associated new technologies. The techniques can be applied beyond the boundaries of the school examination system, or even of school administrative systems. The same techniques could be used in various other industries, including commercial usage.

1.7 Project Schedule

The project schedule spans from November 2002 to September 2003. The Gantt Chart in Figure 1.1 shows the tasks and schedules for the Review, Planning and Design, Testing and Implementation and Documentation phases of the project.
1.8 Report Organization

This is a brief explanation of the chapters included in this report to give an overview of what is contained herein.

Chapter 1: “Introduction” gives an overview of the project, project motivation, project objectives, project scope and the project schedule.

Chapter 2: “Literature Review” is a study on existing manual and Internet systems. The study includes all the development paths leading to the core technologies used in the project. There is also a review of the development tools that were considered for use in this system.

Chapter 3: “Methodology” discusses the methodology used in arriving at this system,
the different ways and techniques used to develop the whole system.

Chapter 4: “System Analysis” lays out the details of system requirements, including functional and non-functional requirements, hardware and software requirements. There is also a comparison of the various development platforms, languages and tools reviewed.

Chapter 5: “System Design” shows in detail the system design, database design and user interface design.

Chapter 6: “System Implementation” describes the development environment and strategy.

Chapter 7: “System Testing” lays out the testing process, and the various testing techniques.

Chapter 8: “System Evaluation” discusses problems encountered, system strength, system constraints, future enhancements, and knowledge and experience gained.