FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY
UNIVERSITY OF MALAYA
KUALA LUMPUR

ONLINE GRADUATE JOB VACANCIES SYSTEM

NOREEN NATASYA BT AZIZ AL-RAHIM
WEK 000444
SESSION 2002/2003

Under the supervision of
CIK RAFIDAH MD NOOR

ABSTRACT

Internet is fast becoming an important part of our everyday lives. More and more, people are integrating internet application into their daily lives, whether it's to read and write email, shop, transfer files, listen to music, send pictures, pay bills, look for a house or find a job. As the web culture of the new millennium pervades society, people are increasingly beginning to recognize the advantages and convenience of the internet. Online Graduate Job Vacancies System is designed and developed based on this principal. It is an online employment and recruitment portal that provides recruiting services for both employers and potential employees. The system aims to provide fast, efficient and reliable alternative in job seeking.

In the traditional way, the HR department waits for all applications to come in by the closing date, sorts them, makes copies of the resumes to pass on to those who will be involved in the interview, get feedback on whom to shortlist before finally getting back to the applicants. This whole process is very time consuming and it is not practical in today's pace of life. System eliminates the inefficiencies by offering job matching service that will match candidates to job vacancies based on requirements and preference of both parties.

The development process of Online Graduate Job Vacancies System involves several stages which include literature review, system analysis and requirement and system design. Each of the stage will be described further in the report. The report will also covers the process model, the research plan and methodologies, the analysis on existing system and the design of the new system.

System will be using multi-tier client/server software architecture and ASP as the web programming tool. System will be using Microsoft SQL Server 7.0 for its' database implementation.

ACKNOWLEDGEMENT

First and foremost, I thank God the Almighty for giving me the chance to complete my thesis without any obstacle.

I would like to express my utmost gratitude to my project supervisor, Cik Rafidah Md Noor for her guidance, advice and encouragement throughout the preparation of this project.

I would also like to take this opportunity to thank my moderator, Puan Miss Laiha Mat Kiah and Encik Amirrudin Kamsin for their time during my VIVA session and also for the support and feedback regarding the project.

Finally to my family, love and thank you. Without your enormous help and understanding, all my effort in preparing this project would have not been successful.

TABLE OF CONTENTS

CHAPTER 7: SYSTEM EVALUATION

LIST OF FIGURES

LIST OF TABLES

Chapter One

Introduction

1.1 Project Overview

Online Graduate Job Vacancies System is a web based recruitment system developed with the main objective of implementing the system in the internet as a solution to provide fast, efficient and reliable employment seeking services to users. The primary target users are Computer Science freshly graduate students and employers related to this field.

The system aims to provide easy and paperless recruitment process. With one click of the mouse, candidates may view and apply for job vacancies effortlessly. System will have a wide selection of jobs that can be browsed using the search engine. Candidates may search for suitable jobs based on location, position and specialization. The feature for creating online resume also makes it easier and faster for candidates to start applying for jobs. In addition, the online resume is equipped with innovative and technology savvy feature such as uploading passport size photographs and video clips. Application of jobs can be made through online, through email or by sending mail to the employers.

By posting job vacancies through the system, employers can reach out to potential candidates in the most cost effective and timely manner. The system will accelerate recruitment process by eliminating the hassle of advertising jobs in the newspaper columns and going through numerous resumes to select the best candidates. System will have a systematic matching of job features, to match candidates with job vacancies based on the requirements of employers and preferences of the candidates. Additionally, employers may view short listed candidates for consideration through the system.

Security, reliability and usability are the important aspects that the system will consider. System will also be user friendly and easy to navigate for the ease of users.

1.2 Project Objectives

The main objectives of this project are as listed below:

- To design a web-enabling system.
- To provide systematic matching of job seekers to job vacancies.
- To provide a search engine for job browsing by location, specialization and position.
- To include innovative features in resume writing through uploading passport size photographs and video clips.
- To provide online job posting for employers and recruiters.
- To include additional job vacancies gathered from newsprint advertisements.
- To notify short listed candidates and future employers via email. Employers may also view list of short listed candidates in the system.
- To provide up to date information on recruitments and employments.
- To create an effective and user friendly interface.

1.3 Project Scopes

The scopes of Online Graduate Job Vacancies System are divided into four sections. Each section presents major components in the system. It is further split into several modules with their respective tasks and functions. The project scopes are as follows:

1.3.1 General Section

This section defines the security aspect of the system. There are four modules under General Sections which are the login/logout module, candidate profile module, employer profile module and job profile module. Through login/logout module, users will be given user ID and password to access the system. System will be viewed differently based on the user's status as administrator, candidate or employer. Creation of candidate and employer account is in candidate profile module and employer profile module respectively. Job profile module will allow administrator to include additional job vacancies to the system. These job advertisements which are gathered from other sources will act as supplementary information in addition to the job posted by the recruiters. Figure 1.1 shows the modules in general section.

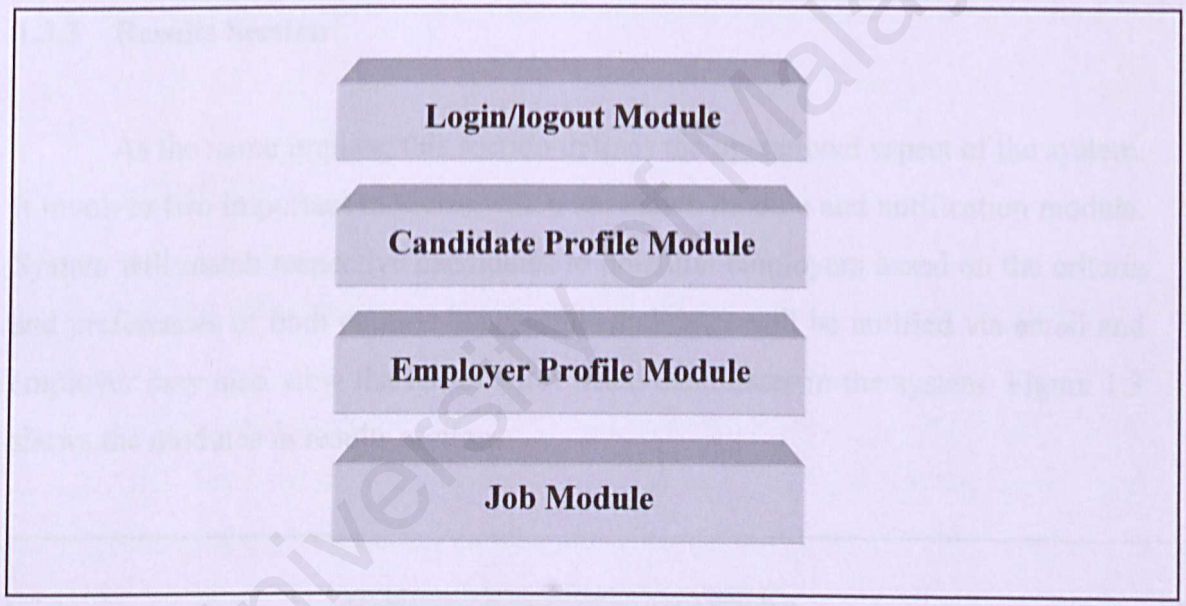


Figure 1.1: Modules under General Section

1.3.2 Recruitment Section

Recruitment section consists of candidate module and employer module. The former describe facilities that the system offers to candidates such as search engine and depositing online resume. The latter describes features for employers and

recruiters such as online job posting and viewing of short listed candidates. Figure 1.2 shows the modules in recruitment section.

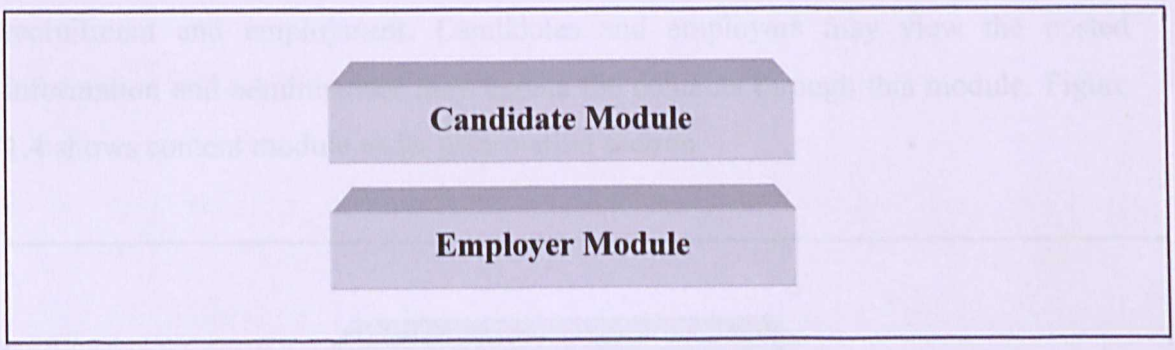


Figure 1.2: Modules under Recruitment Section

1.3.3 Results Section

As the name implies, this section defines the operational aspect of the system. It involves two important modules which are match module and notification module. System will match respective candidates to potential employers based on the criteria and preferences of both parties. Successful candidates will be notified via email and employer may also view the list of short listed candidates in the system. Figure 1.3 shows the modules in results section.

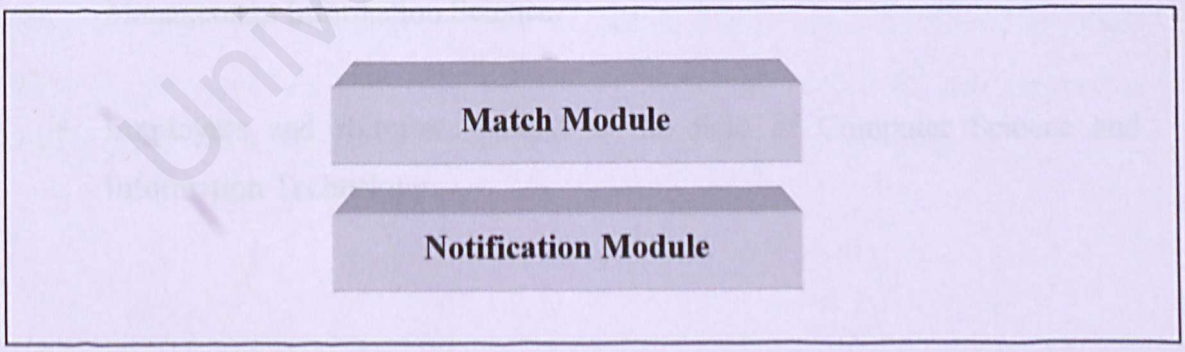


Figure 1.3: Modules under Results Section

1.3.4 Information Section

Information section includes content module that offers articles related to recruitment and employment. Candidates and employers may view the posted information and administrator may update the contents through this module. Figure 1.4 shows content module under information section.

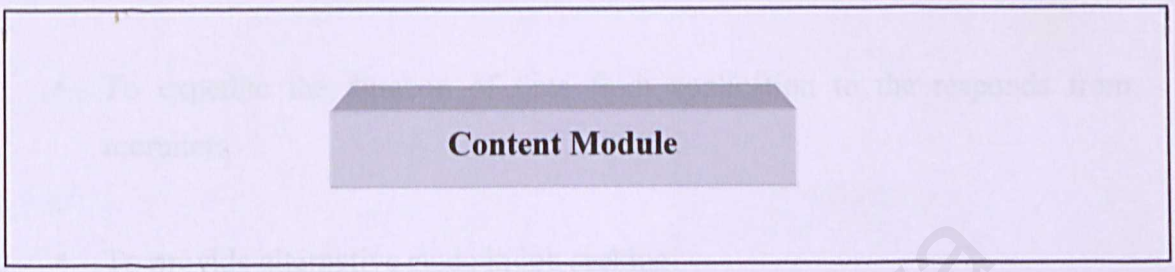


Figure 1.4: Module under Information Section

1.4 Target Users

Online Graduate Job Vacancies System has two prime target users. They are:

- Freshly graduate students of Computer Science majoring in Computer System and Networking, Software Engineering, Artificial Intelligence and Management Information Science.
- Employers and recruiters related to the field of Computer Science and Information Technology.

1.5 Project Limitations

Online Graduate Job Vacancies System provides career seeking services restricted to the Computer Science field. It is designed for specific target users and focuses on Computer Science and Information Technology. System does not advertised jobs related to any other field of studies.

1.6 Expected Outcome

The key contribution of this project would be:

- To provide job opportunities and career enhancements to users.
- To provide fast, efficient and paper-less recruitment process.
- To expedite the duration of time from application to the responds from recruiters.
- To provide alternative mode in job seeking.
- To provide an easy to use and easy to access system without requiring technical computer skills by making the system web-enabling.

1.7 Project Schedule

Project schedule describes the software development cycle for the system by enumerating the phases or stages of a project and breaking each into discrete tasks or activities. It acts as a project time-line that shows when activities will begin and end, and when the related development products will be ready. Figure 1.5 shows the Gantt chart as the system's project scheduler. Time is indicated on the horizontal dimension and description of activities makes up the vertical dimension.

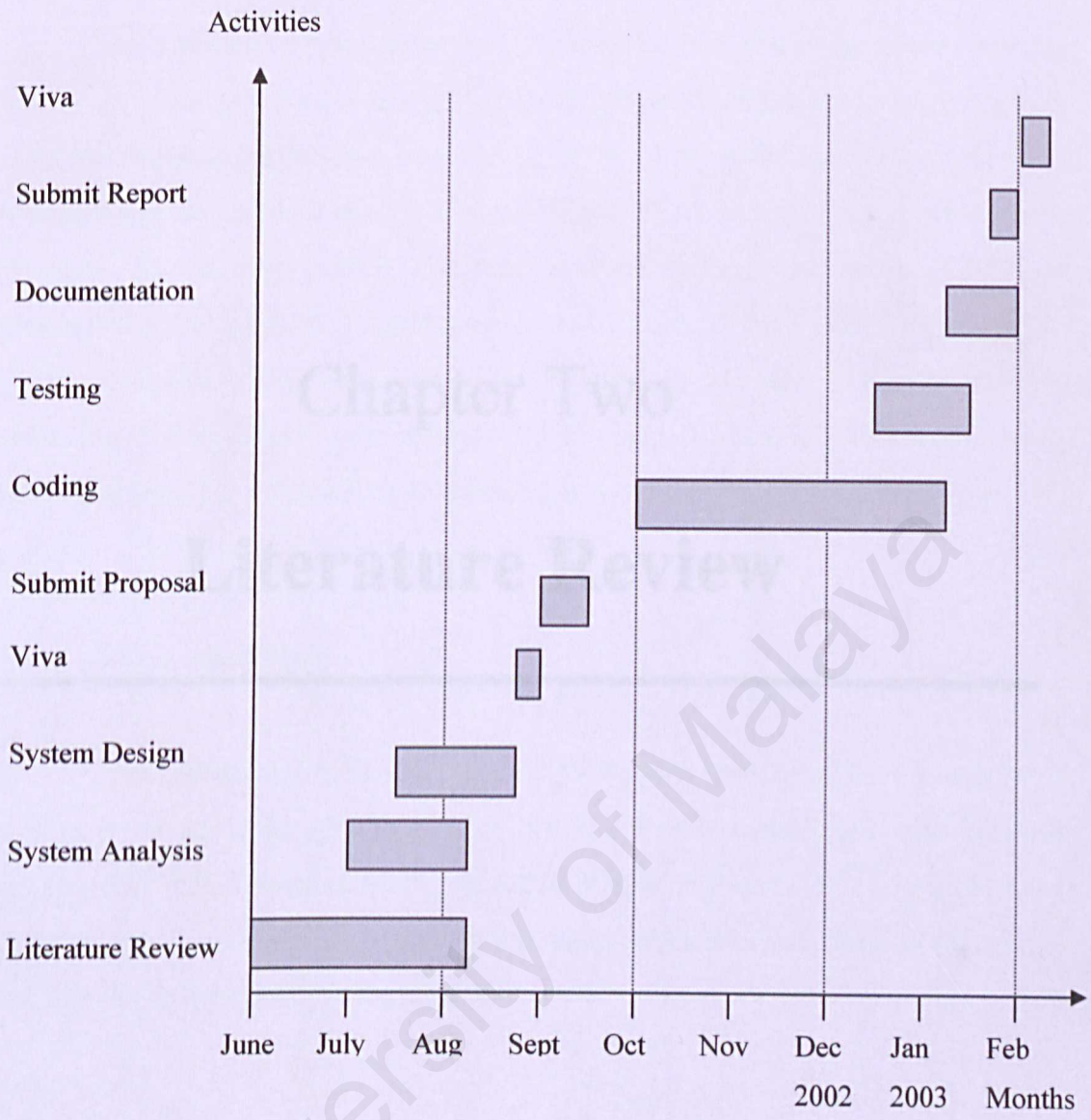


Figure 1.5: Online Graduate Job Vacancies System Schedule

Chapter Two

Literature Review

2.1 Introduction

The approach to this chapter is by dividing the literature review into four main parts. The first part is project definition where an explanation on the meaning of Online Graduate Job Vacancies will be given. The second part will touch on the conventional and traditional ways in seeking for job vacancies. The third part is synthesis on existing system where description, strength and weakness of each system will be analyzed. Additional features offered by Online Graduate Job Vacancies System will also be looked at. The fourth part is consideration of technology that will be used to develop the system. Discussions will be elaborated in order to choose the right and most effective development technology for the system.

2.2 Project Definition

Online system is defined as a computer system that is a part of a large entity such as communication system and the system interacts in real time with the entity and its users. Online Graduate Job Vacancies System is described as a service to seek job opportunities using the Internet. The primary target users are the freshly graduate students in the line of Computer Science.

2.3 Conventional Modes

The following are the conventional modes in searching and applying for jobs and recruitment.

2.3.1 Newspapers and Magazines

Jobseekers will have to read and search for information in the classified and recruitment sections in the newspapers. They have to apply for jobs manually depending on what is being advertised such as application through letters, call up for appointments or walk in interviews. Candidates might miss the job advertisements because it is advertised only in a few days and in a selected media. There are different jobs advertised in different choice of newspapers. Therefore, candidates may not get complete and consistent information as they are various types of newspapers on the market. The majority of job advertised by companies are also printed in small columns in order to reduce the advertising cost. Jobseekers may overlook these job advertisements. In addition, response from potential employers could be slow and unfavourable.

2.3.2 Universities and Colleges

Jobs are advertised on notice boards at the respective universities and colleges. However, these jobs and vacancies are only targeted at a specific group. The jobs available are also very limited.

2.3.3 Recruitment Agencies

Candidates may also refer to recruitment agencies in seeking job vacancies. However, by using this mode it is very time consuming and costly. Candidates have to pay certain percentage of commission to the recruitment agencies when they have successfully secured a job. Furthermore, jobs that are searched by the agencies may not necessarily be suitable to the candidates.

2.4 Synthesis on Existing System

The following are the synthesis on existing systems which include descriptions, strengths and weaknesses of the system.

2.4.1 Electronic Labour Exchange

URL address: http://www.mohr.gov.my

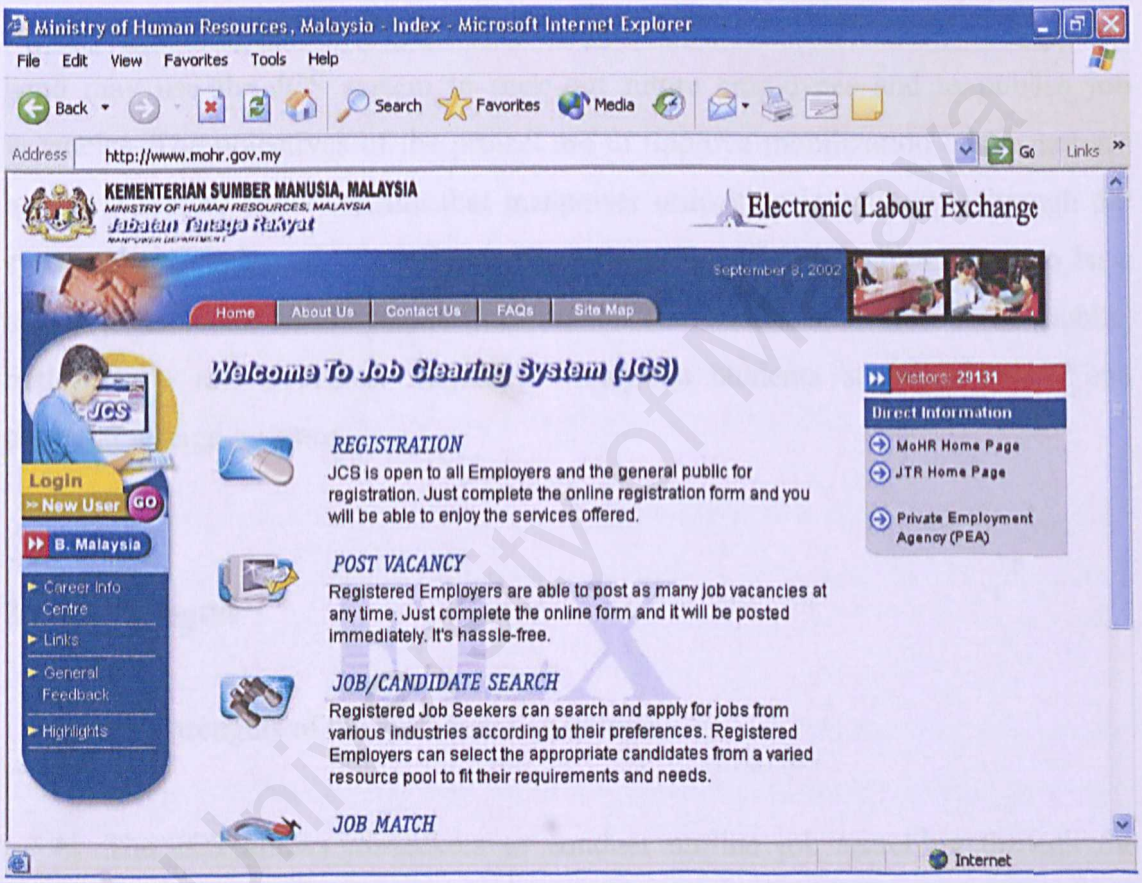


Figure 2.1: Electronic Labour Exchange (ELX) Main Page

2.4.1.1 Description of System

The Malaysian Ministry of Human Resources has officially launched the Electronic Labour Exchange (ELX) on 30th May 2002. Electronic Labour Exchange (ELX) is a project to improve the employment services offered by the Ministry of Human Resources. It highly leverages on capabilities of the Information Technology and Communications.

The Job Clearing System (JCS) is one of the many services offered by this Exchange. A job seeker can use this facility/service to look for jobs. Employers on the other hand may use the JCS system to seek out future employees and to publish job vacancies. The objectives of the project are to improve mobilization of the nation's human resources and to ensure that manpower utilization is optimized through the systematic matching of job seekers to job vacancies. The system also aim to be a one-stop centre for labour market information that will be accessible to the public, both locally and overseas, including Malaysian students studying abroad and potential foreign investors.

2.4.1.2 Strengths

The strengths of the system are as follows:

- The JCS allows jobseekers to conduct on-line job searching through the Internet. Similarly, employers can search for employees via these online facilities.

- JCS provides on-line career guidance to job seekers through a career information system which provides articles on job application, resume writing, interview tips and many more.

- JCS provides electronic data gathering and analysis of the labour market information.

- JCS offers direct links to Ministry of Human Resource and Jabatan Tenaga Rakyat official home page.

- ELX is provided free-of-charge by the Government.

2.4.1.3 Weaknesses

The weaknesses of the system are summarized below:

- Users have to go through a lengthy procedure before able to access other services in the system. Based on Jabatan Tenaga Rakyat requirements, after completing the online registration, users are required to send the following (certified copy) to the nearest Manpower Department office.

  For job seekers, they will need to forward a photocopy of NRIC, photocopy of academic certificates and photocopy of any supporting documents.

  For individual employer they will need to forward a photocopy of NRIC for corporate company a photocopy of ROB / ROC and as for societies a photocopy of ROS.

  Once the officers of Manpower Department have received the above-mentioned documents, they will authenticate it and users will then be able to use the facilities provided in the system.

- The Private Employment Agency (APS) application is still under construction.

2.4.2 JoblinkAsia.com

URL address: http://www.joblink.com.my

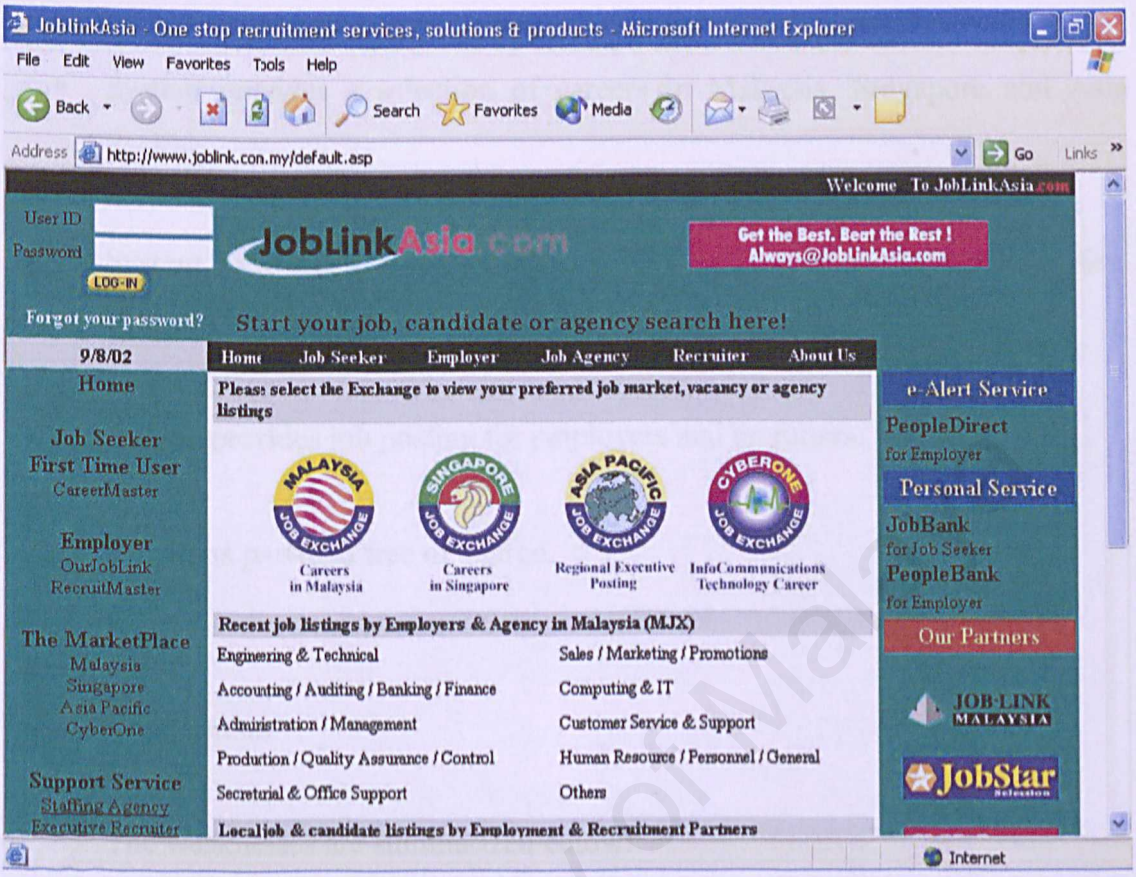


Figure 2.2: Joblink Main Page

2.4.2.1 Description of System

Joblink is a one-stop employment exchange for recruitment products, services and solutions to employers, recruiters and agencies with interactive e-tools at every step of the hiring process. It offers a convergence of services for productive recruitment and hassle free service.

Jobseekers are provided with the benefits of viewing career opportunities, complimentary personal employment services and interactive job application tools.

2.4.2.2 Strengths

The strengths of the system are given below:

- System provides a selection of careers in Malaysia, Singapore and Asia Pacific.

- System provides a feature for users to check on open walk-in interview opportunities in Malaysia and Singapore.

- System provides job posting for employers and recruiters.

- System is provided free of charge.

2.4.2.3 Weaknesses

The weaknesses are summarized below:

- Upon signing up as a new user and trying out their search engine, Joblink Malaysia can only list out a small amount of jobs searched by all types in all location. When the job search was narrowed down to a specific job type for example Computer System field, there were no items to display. Out of the ten core job types that are advertised in the system, only three came out with a result. This limited job vacancies information greatly affects the effectiveness of the system.

- The system offers a listing of temporary jobs for candidates. The temporary jobs are for candidates to apply during school holidays, semester breaks or as additional jobs to gain experience or supplement monthly income. However, there is no information on such jobs displayed in this section.

- There is no feature available to create a proper online resume.

2.4.3 New Straits Times Appointments Online

URL address: http://www.nstappoinments.com

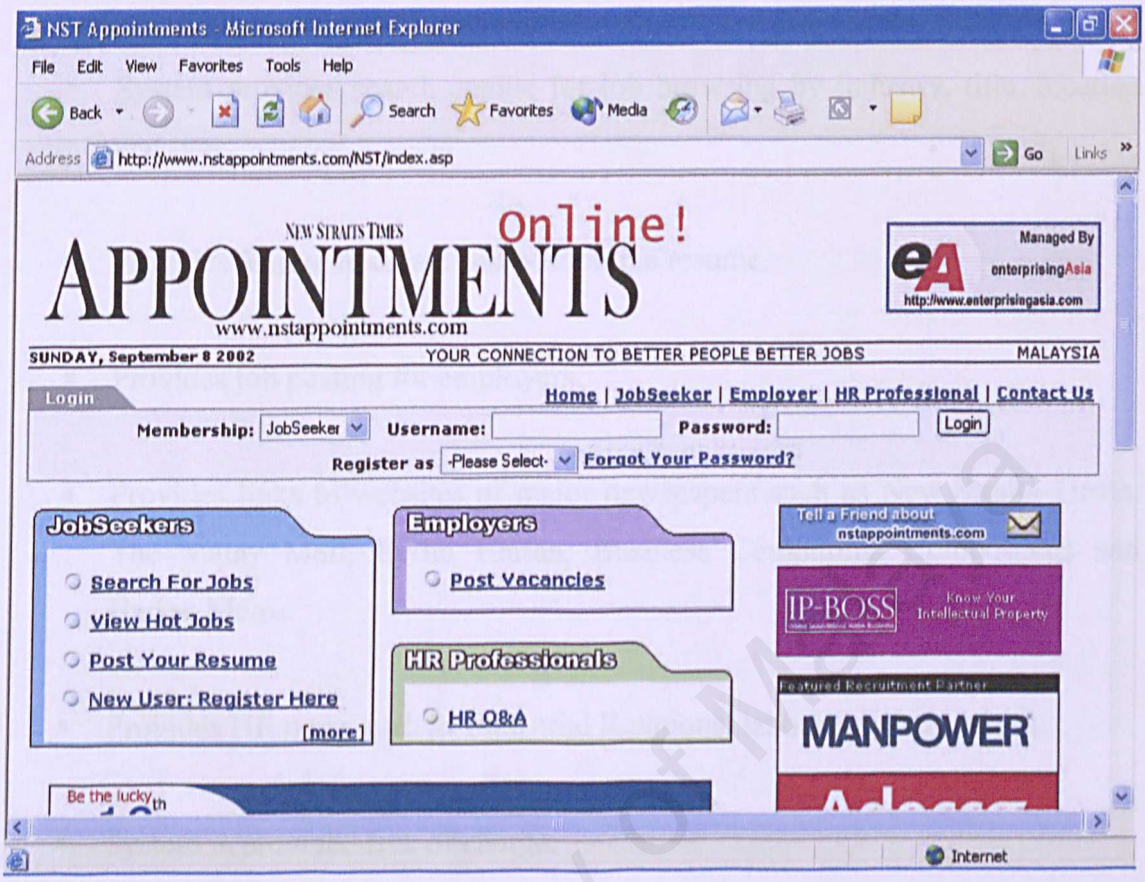


Figure 2.3: New Straits Times Appointments Main Page

2.4.3.1 Description of System

The system was developed by The New Straits Times Press (Malaysia) Berhad. The purpose of the website is to integrate the conservative recruitment mode using newspapers platform with the implementation of the service via online. All of the jobs advertised in the appointments section in the New Straits Times newspapers are offered online. This way, users can access job vacancies easier, simpler and hassle free. Users may also apply jobs online, thus eliminating the normal paper based application.

2.4.3.2 Strengths

The strengths of the system are given below:

- System provides search engine for job browsing by industry, title, location and type.
- Provides feature to create and post online resume.
- Provides job posting for employers.
- Provides links to websites of major newspapers such as New Straits Times, The Malay Mail, Berita Harian, Business Computing, Computimes and Harian Metro.
- Provides HR news such as Industrial Relations, labour laws and others.
- System is provided free of charge.

2.4.3.3 Weaknesses

The weaknesses of the system are as follows:

- System does not provide a facility or description to help users with the navigation of the website. New users may find it difficult to move around the website and to utilize the services offered.
- System does not provide ample information on the process of applying jobs online. The Job alert service is also not well described and the users may not get a clear picture of how effective the service is.

2.4.4 Additional Features of Proposed System

There are additional features offered by Online Graduate Job Vacancies System. The features are elaborated below:

- The services are free of charge.
- System provides innovative resume writing and posting by offering additional services such as uploading passport size photograph and a feature for candidates to upload video clips.
- Provides search engine for candidates to browse job vacancies based on location, specialization and position.
- Provides wide range of job vacancies not only limited to jobs posted by employers but also jobs gathered from various sources such as newspapers, magazines, bulletins and others.
- Provides matching service to match candidates with job vacancies.
- Online Graduate Job Vacancies has a specific scope and target users. The primary scopes are freshly graduate students of Computer Science and employers related to this field. Hence, the system is more focused and the effectiveness can be assured.

2.5 Consideration of Tools

2.5.1 Software Architecture

Software architecture is a high-level structure of a software system, which comprises software components, the externally visible properties of those components and the relationships among them. There are few types of software architectures namely mainframe architecture, file sharing architecture and client/server architecture.

2.5.1.1 Mainframe Architecture

In mainframe architecture all processes is within the central host computer. Users interact with the host through a terminal that captures keystrokes and sends that information to the host. Mainframe software architectures are not tied to a hardware platform. User interaction can be done using PCs and workstations. A limitation of this architecture is that they do not easily support graphical user interfaces or access to multiple databases from geographically dispersed sites.

2.5.1.2 File Sharing Architecture

The original PC networks were based on file sharing architectures, where the server downloads files from the shared location to the desktop environment. The requested user job is then run in the desktop environment. File sharing architectures work if shared usage is low, update contention is low and the volume of data to be transferred is low.

2.5.1.3 Client/Server Architecture

As a result of the limitations of file sharing architectures, the client/server architecture emerged. This approach introduced a database server to replace the file server. Using a relational database management system (DBMS), user queries could be answered directly. The client/server architecture reduced network traffic by providing a query response rather than total file transfer. It improves multi-user updating through a GUI front end to a shared database. In client/server architectures, Remote Procedure Calls (RPCs) or standard query language (SQL) statements are typically used to communicate between the client and server.

2.5.2 Consideration of Operating Systems

2.5.2.1 Microsoft Windows 2000 Server

Windows 2000 Server is a multipurpose, entry level server operating system that can be used to provide network users with file, print, application and web services. Windows 2000 Server provides a well integrated package containing the application development environment, security and scalability.

2.5.2.2 Microsoft Windows NT Server 4.0

Windows NT (New Technology) is a comprehensive server operating system that provides preemptive multitasking services required for a functional server. Windows NT provides excellent support for Windows clients and incorporates the necessary storage protection services for a reliable server operating system.

2.5.3 Consideration of Web Server

2.5.3.1 Microsoft Internet Information Server (IIS) 5.0

Windows 2000 Server uses the strong Web development foundation in IIS 4.0 as the basis of IIS 5.0. Key features in IIS 5.0 Web development support are summarized in Table 2.1 below:

Key Features	Descriptions
Flow Control	▪ Able to transfer request directly to other pages on the server.
Enhanced Error Handling	▪ Able to redirect server error to customized ASP pages by displaying information such as the line number or description of where the error occurred. ▪ Eliminate the process of writing custom error-handling procedure within the script and applications.
Server Scriplets	▪ Allow users to encapsulate common scripts into reusable components accessible from any ASP script or COM-capable application. ▪ Provide easy to use scripting languages without the full scale development environment.

Key Features	Descriptions
XML Support	▪ Allow users to develop server-side XML-based applications without requiring XML support on the client.
COM+ Integration	▪ Provide flexible infrastructure to develop enterprise-level web applications.

Table 2.1: Key Features in Microsoft IIS 5.0 Web Server

2.5.3.2 Apache Web Server 2.0

It is a public-domain Web server developed by a loosely knit group of programmers. Core development of the Apache Web server is performed by a group of about 20 volunteer programmers, called the Apache Group. However, because the source code is freely available, anyone can adapt the server for specific needs, and there is a large public library of Apache add-ons. Key features in Apache Web Server 2.0 include:

Key Features	Descriptions
Multiprotocol Support	▪ Provide infrastructure to support serving multiple protocols.
Better support for non-UNIX platform	▪ Faster and more stable on non-UNIX platform such as BeOS, OS/2 and Windows.

Key Features	Descriptions
Filtering	▪ Apache modules may be written as filters which act on the stream of content as it is delivered to or from the server.
Multilanguage Error Response	▪ Provide error response messages to the browser in several languages using SSI documents.
Simplified Configuration	▪ Many confusing directives such as Port and BindAddress for IP address binding have been simplified.

Table 2.2: Key Features in Apache Web Server 2.0

2.5.4 Consideration of Web Technology

2.5.4.1 Active Server Pages (ASP)

Active Server Pages (ASP) product is Microsoft's framework for building Web-based applications. With ASP, users have the ability to quickly and easily develop and deploy interactive Web applications using script syntax that is as easy as that of HTML.

Implementation of ASP includes many reusable objects for commonly used tasks such as manipulating cookies, maintaining session state, implementing rotating banner advertisements, and accessing server and client information, such as user agent strings.

The advantages of ASP are as follows:

Key Benefits
▪ Suitable for publishing and collecting data on web. ▪ Provides a way for building secure transactions, server based applications and web sites. ▪ Provides Active Database Object, one of the Active Server Component to allow easy and powerful connections to be made to almost any database system. ▪ Provides scripting engine for Microsoft Visual Basic Scripting Edition (VBScript) and Microsoft Jscript.

Table 2.3: Key Benefits of Active Server Pages (ASP)

2.5.4.2 Cold Fusion 4.0

Cold Fusion was developed by Allaire Corporation. Cold Fusion is an application that runs on a web server. Currently, it runs on Linux, Solaris, and Windows Servers. The Cold Fusion Web Application Server works with the HTTP server to process requests for web pages. Whenever a Cold Fusion page is requested, the Cold Fusion Application Server executes the script or program the page contains.

Cold Fusion also acts as a programming language. It can create and modify variables just like any other similar programming languages. Cold Fusion was designed to build complex, high traffic web sites. Cold Fusion can run on multi-processor machine and allows user to build a site that can be run on a "cluster" of servers.

2.5.4.3 Common Gateway Interface (CGI)

It is a specification for transferring information between a World Wide Web server and a CGI program. A CGI program is any program designed to accept and return data that conforms to the CGI specification. The program could be written in any programming language, including C, Perl, Java, or Visual Basic.

CGI programs are the most common way for Web servers to interact dynamically with users. Many HTML pages that contain forms, for example, use a CGI program to process the form's data once it's submitted. Another increasingly common way to provide dynamic feedback for Web users is to include scripts or programs that run on the user's machine rather than the Web server. These programs can be Java applets, Java scripts, or ActiveX controls. These technologies are known collectively as *client-side* solutions, while the use of CGI is a *server-side* solution because the processing occurs on the Web server.

2.5.5 Consideration of Web Database

2.5.5.1 Microsoft SQL Server 7.0

Microsoft SQL Server 7.0 provides the most robust Relational Database Management System for users using the Microsoft Windows 2000 Server and Windows NT Server platform. SQL Server 7.0 is also the easiest database to use for building, managing and deploying business applications. It provides a fast and simple programming model for users eliminates database administration for standard operations and provides sophisticated tools for more complex operations. SQL Server 7.0 also lowers the total cost of ownership through simplified management, automation of routine tasks, event-based job execution and alerting, integrated security and administrative scripting.

2.5.5.2 Oracle8*i*

Oracle8*i* is a database specifically designed as an Internet development and deployment platform, extending Oracle's long-standing technology leadership in the areas of data management, transaction processing and data warehousing to the new medium of the Internet. Built directly inside the database, breakthrough Internet features help developers build Internet-savvy applications that lower costs, enhance customer and supplier interaction, and provide global information access across platforms and across the enterprise.

2.5.6 Consideration of Web Browser

2.5.6.1 Microsoft Internet Explorer 6.0

Internet Explorer 6 is available to users of Windows 98, Windows 98 Second Edition, Windows Millennium Edition (Windows Me), Windows NT and Windows 2000 operating systems.

The key benefits of using Microsoft Internet Explorer 6.0 are:

Key Benefits
▪ New enhanced features such as new browser look and feel as well as innovative browse capabilities including media playback and automatic picture resizing. ▪ More customizable through the Internet Explorer Administration Kit (IEAK 6) for easier deployment and maintainability of the browser. ▪ Provide feature-rich platform for building Web-based applications and developing informative content for users.

Table 2.4: Key Benefits of Microsoft Internet Explorer 6.0

2.5.6.2 Netscape 6.2

Netscape 6.2 is the latest update to the Netscape browser suite. It provides user with the efficiency in completing tasks online, power through more choice and safety with more control.

Netscape 6.2 includes Netscape Navigator, Netscape Mail, Netscape Instant Messenger, Netscape Composer, and Netscape Address Book. Netscape 6.2 also provides applications services that help user get more from the Internet. Netscape 6.2 offers Java for running web applets, Nullsoft Winamp for audio playback, RealPlayer8 for streaming media, Macromedia Flash for high impact web content and Print Plus from Hewlett Packard for easy access to printing services and features

2.5.7 Consideration of Web Authoring Tools

2.5.7.1 Microsoft Visual InterDev 6.0

Microsoft Visual InterDev 6.0 is an integrated development tool for building dynamic web applications accessible by any web browser on any platform. It includes an integrated development environment, database connectivity tools, programmable components, site management and publishing capabilities, a personal Web server, content creation tools and many more.

The key benefits of using Microsoft Visual InterDev 6.0 are:

Key Benefits
▪ Rapid end-to-end web application development which allows users to design, build, debug and deploy cross-platform HTML + Script based web applications faster. ▪ Powerful, integrated database tools which includes a complete set of database programming and design tools for users to build enterprise-class, data driven web application within a single integrated IDE.

Table 2.5: Key Benefits of Microsoft Visual InterDev 6.0

2.5.7.2 Macromedia Dreamweaver UltraDev 4.0

Macromedia Dreamweaver UltraDev is a professional environment for building Web applications. UltraDev is also a professional editor for creating and managing Web sites and pages. Because it incorporates all of Dreamweaver's page design and site management tools, UltraDev makes it easy to create, manage, and edit cross-platform, cross-browser Web pages.

The new features of Macromedia UltraDev are:

New Features
▪ Introduces live objects to speed up development. Live objects let users to create advanced page components at a single stroke. ▪ New code view and syntax coloring make hand-coding ASP and JSP server scripts as well as CFML tags easier and simpler. ▪ Provides tools to build pages that restrict access to the site. Users can build pages that let first time users register on the site and pages that require returning users to log in. It also offers users different access privileges to the site. For example, authorization level for a page can be set to "Administrator" only registered users with Administrator access privileges can view it. ▪ UltraDev offers Server Behaviour Builder to easily create new server behaviours or to customize the code that existing server behaviours insert in pages. For example, server behaviour that sets the time in minutes before a page cached on a browser expires.

Table 2.6: New Features of Macromedia UltraDev 4.0

2.6 Conclusion

Online Graduate Job Vacancies System is a service to provide employment opportunities by utilizing the power of internet. Freshly graduate students and recruiters will have a fast and easy alternative in job seeking. Therefore, dependency on the conventional ways in recruitment and employment may be reduced.

Synthesis is done to determine the strengths and weaknesses of the existing system. This step is essential in assuring the usability and reliability of the proposed system.

In order to develop the system, there are several tools that need to be considered. Consideration of tools covers the software architecture, operating system, web server, web technology, web database, web browser and also web authoring tools. Descriptions, key features and benefits for each tool were elaborated to ensure the right technology will be used for the development of the system.

Chapter Three

System Analysis

3.1 Introduction

System Analysis is the most important phase in a software development life cycle. In this chapter, it will be divided into five different parts, which are, system methodology, information source and findings of the system, system requirements that provides comparison of development tools and elaboration of functional and non-functional requirements, hardware and software requirements for run time purposes and also a conclusion of the chapter.

3.2 System Methodology

System methodology is a project development strategy that describes how the system is developed in actuality. Every system must go through a series of development phases before it can be implemented. The series of steps as the product progresses is called the Software Development Life Cycle. There are various types of life cycle models, for example the waterfall model, V model, spiral model and many more. For the systems' life cycle, waterfall model with prototyping is chosen as the modeling process.

Prototyping development is an idea of developing an initial implementation; expose it to the user for comments and ideas and then refining it through many versions until an adequate system has been developed. Rather than having separate specifications, development and validation activities are carried out concurrently with rapid feedback across these activities.

3.2.1 Waterfall Model with Prototyping

Waterfall Model with Prototyping presents a very high-level view of what goes on during development and describes to users the sequence of events they should expect to encounter.

The first step in the waterfall with prototyping life cycle model is the requirement analysis phase. A requirement is a feature of the system or a description of something the system is capable of doing in order to fulfill the systems' purpose. In this phase, the user is responsible to carry out research and analyze all aspect of requirements of the proposed system. This step is represented in the report through chapter three; system analysis and requirement.

The second stage is the design phase. The system will be constructed based largely on the requirements that we have gathered from the first stage. The documentation for this stage is under chapter four; system design.

Upon completion of the design phase, the construction of prototype model will be implemented. This phase consist of building an experimental system for end users to evaluate. Prototype is a partially developed product that enables user and developer to examine some aspect of the proposed system and decide if it is suitable or appropriate for the finished product. The prototype for the proposed system is represented as user interface designs which are included in chapter four; system design. The report or documentation for WXES 3181 will also ends in this phase.

Program design includes writing the program and implementing the design as code. Code must be written in a way that is understandable for testing purposes. Several guidelines have to be followed such as the control structures, algorithms and data structures.

System will then continue with unit and integration testing phase. Unit testing will verify that the component functions properly with the types of input expected from studying the component's design. In addition, integration testing will verify that the system components work together as described in the system and program design specifications.

System testing is done to asses the system as a whole. The system will be tested to ensure that no flaws or bugs exist. Acceptance test is done with users to assure that the system meets their requirements.

After going through testing of prototype phases, users and developers may evaluate and discuss for any additional requirements to be added to the system. With the help of the prototype system, developers can assess alternative design strategies and decide which is best for the system.

The earlier activities are repeated until all requirements are finalized or until the prototype has evolved into a production system. Once the system is in operation mode, maintenance begins.

3.2.2 Advantages of Waterfall Model with Prototyping

The advantages of implementing waterfall model with prototyping as the process model are summarized as follows:

- It presents a high-level view of what goes on during development.
- It involves simple graphical stages, thus making it easy to explain to clients who are not familiar with software development.
- It reduces risk and uncertainty in development through the forming of prototype model.
- Able to work closely with clients in developing and analyzing interfaces, thus requirements are easily met.

3.2.3 Diagram of Waterfall Model with Prototyping

Figure 3.1 shows a process model representing waterfall model with prototyping.

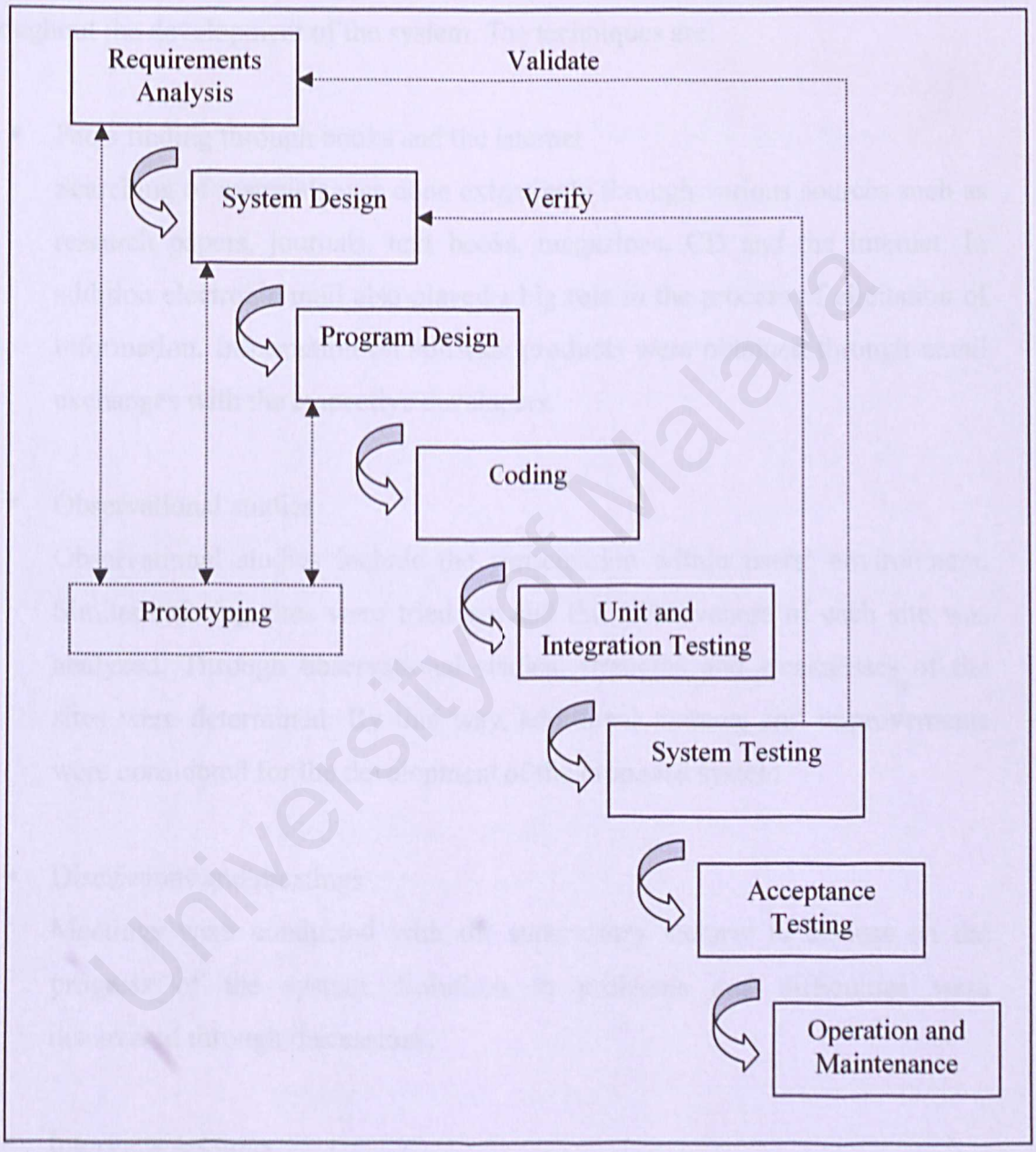


Figure 3.1: Waterfall Model with Prototyping

3.3 Information Source and Findings

One of the most important factors in creating and developing a high-quality system is to first clearly define what the system must do. We achieved this through a detailed analysis of system requirements. System requirements are obtained through information source and findings. Four techniques of facts findings have been used throughout the development of the system. The techniques are:

- Facts finding through books and the internet

  Searching of materials was done extensively through various sources such as research papers, journals, text books, magazines, CD and the internet. In addition electronic mail also played a big role in the process of elicitation of information. Information on software products were obtained through email exchanges with the respective developers.

- Observational studies

  Observational studies include the participation within users' environment. Similar existing sites were tried out and the effectiveness of each site was analyzed. Through observational studies, strengths and weaknesses of the sites were determined. By this way, additional features and improvements were considered for the development of the proposed system.

- Discussions and meetings

  Meetings were conducted with the supervisory lecturer to discuss on the progress of the system. Solutions to problems and difficulties were discovered through discussions.

- Interview sessions

  Interview sessions were conducted with various parties such as developers of existing system, freshly graduate and final year students and employers and recruitment agencies. Information from these interviews is significant in developing a high quality online system.

3.4 System Requirements

In system requirements, there are three main parts that will be explained and elaborated. The first part is the comparisons and discussions of selected tools. The second part is analyzing functional requirement of the system. Similarly, the third part will depict the non-functional requirements of the system.

3.4.1 Comparison between Microsoft Windows 2000 Server and Microsoft Windows NT Server 4.0

There are several advantages that Microsoft Windows 2000 Server has over Microsoft Windows NT Server 4.0. The comparisons are summarized in table 3.1 below:

Features	Windows 2000 Server	Windows NT Server 4.0
File Sharing and Storage Services	▪ Offers Fiber Channel, IEEE 1394, I_2O, dynamic volume, hierarchical storage and removable storage management, disk quotas, junction points, sparse files, distributed link tracking, complete content indexing and a volume change log.	▪ Does not offer these services.

Features	Windows 2000 Server	Windows NT Server 4.0
Web Application Services	▪ Provides additional features such as integration with platform, server scriplets, flow control, enhanced error handling and process isolation.	▪ Provides only basic web application features.
Network and Communications	▪ Offers performance enhancements for TCP/IP based environments. ▪ Allows settings to be changed without reboots.	▪ Does not support TCP/IP performance enhancements. ▪ Requires reboot for certain configuration changes.

Table 3.1: Comparisons between Windows 2000 Server and Windows NT Server 4.0

3.4.2 Comparison between Microsoft Internet Information Server (IIS) 5.0 and Apache Web Server 2.0

Table 3.2 shows the comparison of Microsoft Internet Information Server (IIS) 5.0 and Apache Web Server 2.0.

Features	IIS	Apache	Comments
GUI Support	Yes	No	IIS provides GUI support for server administration.
SSL 2.0/3.0	Yes	Restricted	IIS provides the ability to integrate web server security with windows security features. It offers a module for strong cryptography for SSL 2/3 and TLS 1 protocol.
Log Considerations	Yes	Restricted	IIS provides better integration with Windows OS facilities. IIS provides logging to any ODBC database. Logging on in Apache can only be done through add-on.
Content Management Considerations	Yes	Restricted	IIS provides many additional tools such as HTML page, site wizards as well as HTML templates. Apache only provides basic functions for content management.

Table 3.2: Comparisons between Microsoft Internet Information Server (IIS) 5.0 and Apache Web Server 2.0

3.4.3 Comparison between ASP and Cold Fusion 4.0

Comparisons have been done between ASP and Cold Fusion 4.0. The results are summarized in table 3.3 below.

Features	ASP	Cold Fusion 4.0
Data Manipulation	▪ ASP uses direct through ADO objects. ▪ ASP's record set objects instead of tag parameter are more flexible and powerful.	▪ Cold Fusion uses implicit through tags.
Overhead	▪ Minimum amount of overhead	▪ Requires additional resources for example processing, space and memory from the server.

Table 3.3: Comparisons between ASP and Cold Fusion 4.0

3.4.4 Comparison between ASP and CGI Applications

Table 3.4 shows the comparison between ASP and CGI Applications.

Features	ASP	CGI
Ease of use and more robust environment	▪ Easier way for server to access information in a form not readable by the client such as an SQL database.	▪ CGI is more complicated and has a higher learning curve.
Time and amount of server RAM	▪ Runs in the same process as the web server thus handling client requests faster and more efficiently.	▪ Server creates as many processes as the number of clients' requests received thus it is time consuming and requires large amount of server RAM.

Table 3.4: Comparisons between ASP and CGI Applications

3.4.5 Comparison between Microsoft SQL Server 7.0 and Oracle8*i*

Comparisons gathered between Microsoft SQL Server 7.0 and Oracle8*i* were determined by the users' participation in each of the database's applications and functions. Table 3.5 summarizes the functions and advantages of the database.

Features	SQL Server 7.0	Oracle8*i*
Import Text File into a Table	▪ Allows users to specify the import parameters through a wizard interface, eliminating the reliance on remembering syntax.	▪ Requires users to write a control file in order to get the data from the text file into the database. ▪ Users may not remember the exact syntax for the control file.
Process of Replication	▪ Wizards prompt users through the process of setting up a replication.	▪ Users need to go to different locations in order to create database links, snapshot logs, snapshots and to set up a schedule.
Database Backup	▪ Easy to access the backup dialog box which is directly from the main Enterprise Manager window and the clarity of the options in that box.	▪ Difficult to locate the Backup Manager.

Table 3.5: Comparisons between Microsoft SQL Server 7.0 and Oracle8*i*

3.5 Functional Requirements

Functional requirements are description of activities and services a system provide for its users. For Online Graduate Job Vacancies System, the functional requirements can be divided into four sections. The four sections are General Section, Recruitment Section, Result Section and Information Section. Each of the section will have its own functions and tasks to be implemented in the system. The functional requirements are divided as follows:

3.5.1 General Section

- Login/Logout Module

  System requires user ID and password to be entered before access is given to the user. In the case of new users, they may have to register before logging in. System will be viewed and accessed at different levels based on the user's privileges and status as administrator, candidates or employers.

- Candidate Profile Module

  In this module, candidate will have to register for candidate's user account. All candidates will have a candidate ID and password to access the system. Information such as name, address, email and contact number are required by the system before account can be activated. All of the information will be stored in the system's database. Through this module, administrator is able to add, edit and delete candidate's information.

- Employer Profile Module

  This module allows employer to create employer's user account. Employers will have an employer id and password upon registration. Registration involves providing employers information such as company name, address, email and contact number to the system. All of the information will be stored in the system's database. Through this module, administrator is able to add, edit and delete employer's information.

- Job Profile Module

  In this module, administrator is able to include in additional job vacancies obtained from other sources to the system. Administrator may search for job vacancies from newspapers and magazines. This will improve the quality and quantity of jobs advertised in the system. In addition, administrator will check and verify job vacancies from potential employers to ensure the validity of the jobs.

3.5.2 Recruitment Section

The recruitment section is divided into two modules. The functional requirements for each module are listed in the following table:

Candidate Section	Employer Section
▪ Will have a search engine for browsing jobs by location, specialization and position.	▪ Employer can post their vacancies of jobs online
▪ Candidate may send in their resume via email or create resume using the system's online resume feature.	▪ Employer may view jobs and short listed candidates.
▪ Will provide feature for candidates to upload passport size photographs and video clips.	

Table 3.6: Functional Requirements for Recruitment Section

3.5.3 Results Section

- Match Module

  System will match and shortlist potential candidates with the respective jobs. The process of matching candidates with jobs is based on the requirement criteria from the employers and also the preferences of the candidates. Job vacancies that are gathered from other sources such as newspapers and magazines are for candidates to apply individually. System does not match candidates with these types of advertised jobs.

- Notification Module

  All of the short listed candidates will be notified via email for further information on interview dates and schedule. Employers may view short listed candidates through the system. Employers will also be notified via email.

Figure 3.2 shows the interaction and function of match module and notification module.

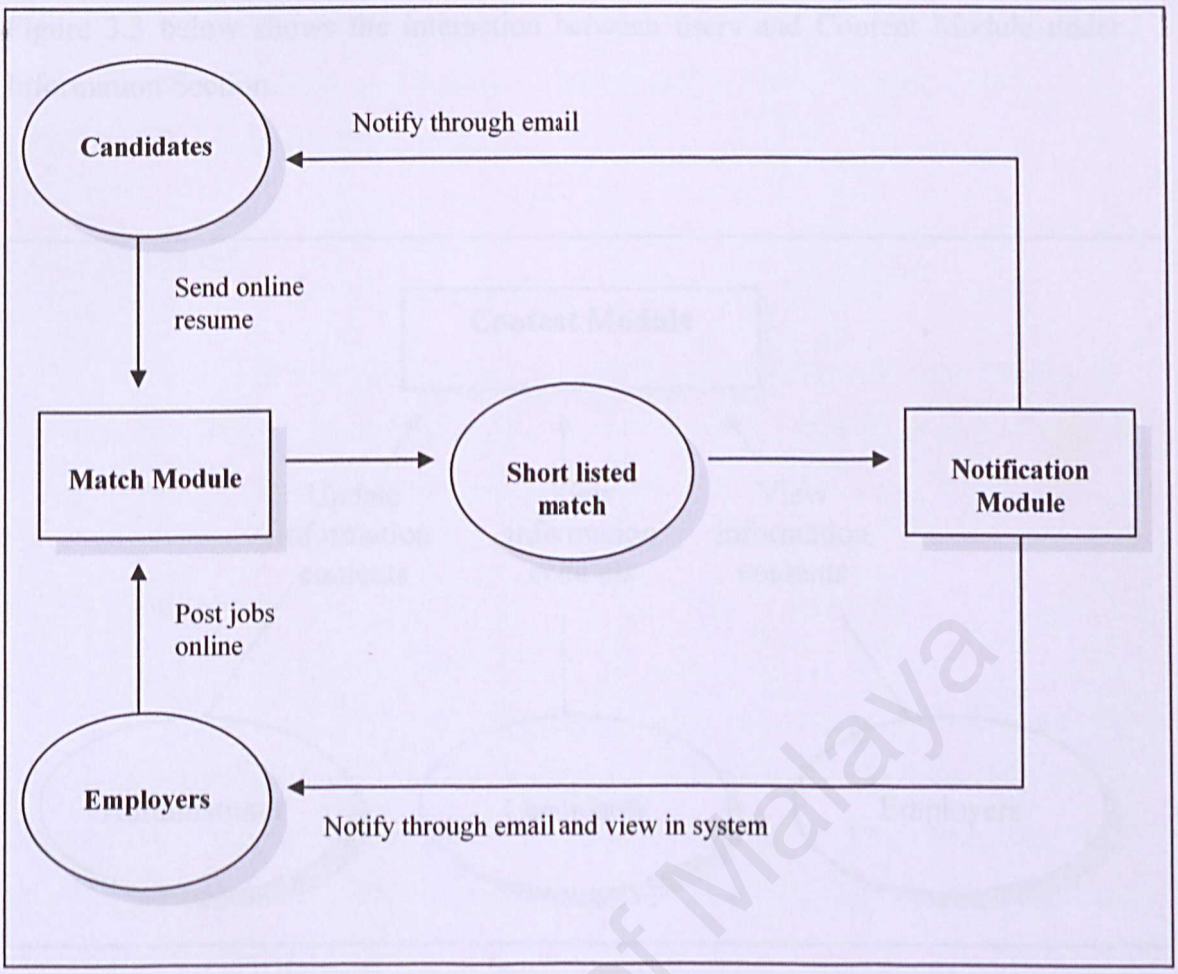


Figure 3.2: Interaction and Function of Match Module and Notification Module

3.5.4 Information Section

- Content Module

  In this module, articles related to recruitments and industrial relations will be posted. In this section users may view articles on labour laws, resume management, preparing for interviews, etiquette in work place and many more. Administrator is able to constantly update the contents of information in this module.

Figure 3.3 below shows the interaction between users and Content Module under Information Section.

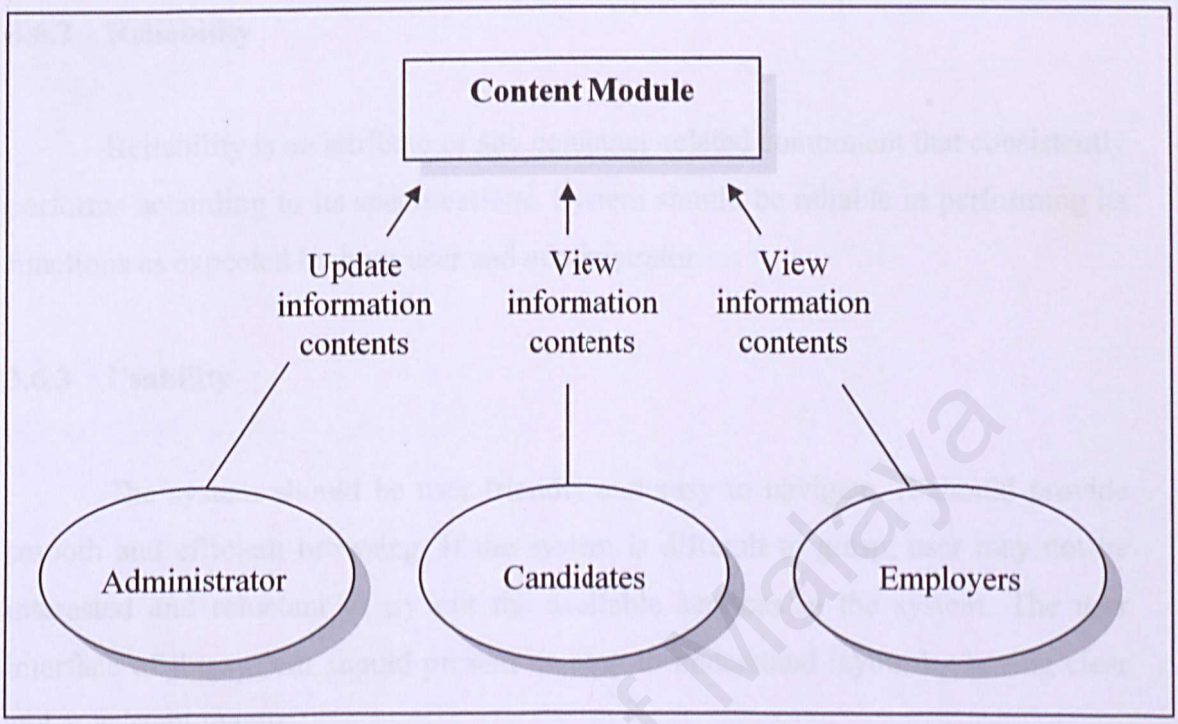


Figure 3.3: Interaction between Users and Content Module

3.6 Non-Functional Requirements

Non-functional requirements are definition of system properties and constraints under which a system must operate. The non-functional requirements for this system are summarized as stated:

3.6.1 Security

Security is the main issue to prevent any unauthorized access to the Online Graduate Vacancies Job System. Users will be required to enter their respective user ID and password before logging in to the system. There are three types of users, who are the administrator, employees and job seekers. The system will be able to identify

the correct login to give access to the right user. This means that the user can only view information related to his status. The system will have to ensure data in the system is secure and strictly confidential.

3.6.2 Reliability

Reliability is an attribute of any computer-related component that consistently performs according to its specifications. System should be reliable in performing its functions as expected by both user and administrator.

3.6.3 Usability

The system should be user friendly and easy to navigate. It should provide smooth and efficient browsing. If the system is difficult to grasp, user may not be interested and reluctant to try out the available services in the system. The user interface of the system should present an easy to understand layout by having clear and consistent menus.

3.7 Run-Time Requirements

3.7.1 Server Hardware Requirements

The recommended hardware requirements for server are illustrated as follows.

Minimum Requirements	
Computer/Processor	Pentium I 166 MHz or higher Pentium compatible CPU
Memory	32 MB of RAM
Hard Disk	2.0 GB hard disk
Input Devices	Mouse, keyboard
Output Devices	Printer
Video Monitor	EGA, VGA or compatible display

Table 3.7: Server Hardware Requirements

3.7.2 Server Software Requirements

To be able to host and run the system, server computer needs to have the following supporting software installed:

Supporting Software	
Platform	Microsoft Windows 2000 Server
Web Server	Microsoft Internet Information Server (IIS) 5.0
Server Scripting Agent	Active Server Pages (ASP)
Database Server	Microsoft SQL Server 7.0

Table 3.8: Server Software Requirements

3.7.3 Client Hardware Requirements

The recommended hardware requirements for clients are illustrated in figure below.

Minimum Requirements	
Computer/Processor	Pentium I 166 MHz or higher Pentium compatible CPU
Memory	16 MB of RAM
Hard Disk	2.0 GB
Input Devices	Mouse, keyboard
Output Devices	Printer
Video Monitor	EGA, VGA or compatible display

Table 3.9: Client Hardware Requirements

3.7.4 Client Software Requirements

The recommended software requirements for clients are illustrated in figure below.

Supporting Software	
Platform	Microsoft Windows 2000 Server
Web Browser	Microsoft Internet Explorer 5.0 or higher

Table 3.10: Client Software Requirements

3.8 Conclusion

System analysis and design is the key step in producing a successful software development system. Each proposed model of the software development process includes activities aimed at capturing requirements. Waterfall model with prototyping has been chosen as the system's process model. There are several advantages in implementing this process model namely, the high level view that it offers the reduced risk and uncertainty and also the opportunity to work closely with clients thus assuring all of the system's requirements will be met.

Elicitation of requirements are achieved through four techniques of facts finding which are information gathering through books and internet, observational studies, discussions and meetings and also interview sessions.

Comparisons of development tools were carried out in order to choose the best tools for the system. Table 3.11 shows the selected tools for the development of Online Graduate Job Vacancies System.

Technology	Name of Tools
Operating System	Microsoft Windows 2000 Server
Web Server	Microsoft Internet Information Server (IIS) 5.0
Web Technology	Active Server Page (ASP)
Web Database	Microsoft SQL Server 7.0
Web Browser	Microsoft Internet Explorer 6
Web Authoring Tools	Microsoft Visual InterDev 6.0 and Macromedia Dreamweaver UltraDev 4.0

Table 3.11: Selected Tools for System Development

Functional requirements of the system are divided into several sections with its' own different modules. The functional requirements are General Sections, Recruitment Sections, Results Sections and Information Sections. Non-functional requirements of the system include security, reliability and usability. Requirements for run time purposes are given at the end of the chapter.

Chapter Four

System Design

4.1 Introduction

System design is a process of defining the hardware and software architecture, components, modules, functionalities and interfaces for a system to fulfill specified system requirements. In order to effectively design a system, it must be able to be modeled and subsequently understood. The process of system design involves several stages. The first stage is by selecting a project architecture that is suitable to the requirements of the system. Second is by subdividing system to modules which can be represented by structured charts. Third is to define system functionality through description of data dictionary. Fourth is to define module functionality using flow charts, context diagram and data flow diagram.

4.2 Project Architecture

Online Graduate Job Vacancies will be using multi-tier client/server architecture. A client is defined as a requester of services and a server is defined as the provider of services. Figure 4.1 shows an overview of Online Graduate Job Vacancies system architecture.

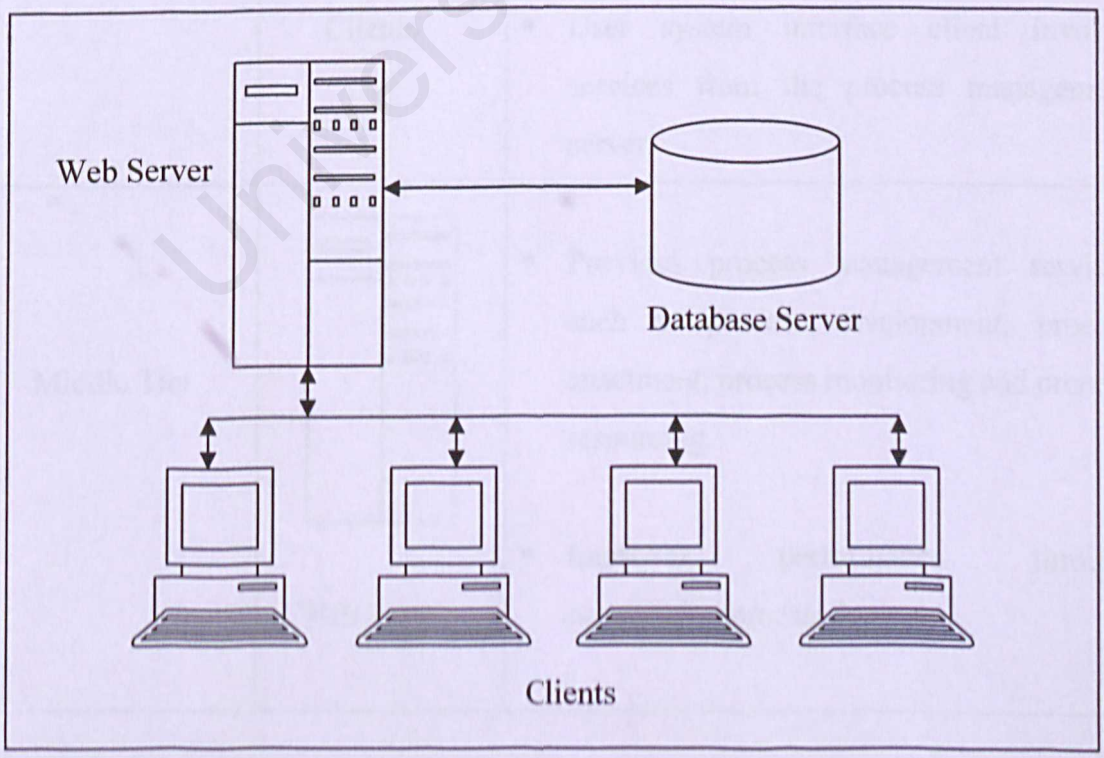


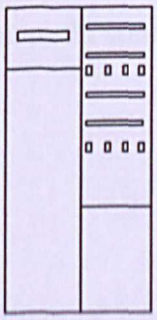
Figure 4.1: Client/Server Architecture

4.2.1 Multi-Tier Architecture

Multi-tier architecture also referred to as the three tier architecture consists of three components distributed in three layers: client, middle server and server. The three components are:

- User system interface
- Processing management
- Database management

Multi-tier architecture provides effective distributed client/server design that subsequently increased performance, flexibility, maintainability, reusability, and scalability, while hiding the complexity of distributed processing from the user. Figure 4.2 shows the functions of the first tier, the middle tier and the third tier.

First Tier	 Clients	▪ User system interface where user services such as session, text input, dialog and display management reside. ▪ User system interface client invokes services from the process management server.
Middle Tier	 Web Server	▪ Provides process management services such as process development, process enactment, process monitoring and process resourcing. ▪ Improves performance through centralizing process logic.

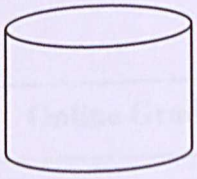
Third Tier	 Database Server	▪ Provides database management functionality and is dedicated to data and file services. ▪ Ensures data consistency through the use of data locking and replication features.

Figure 4.2: Functions of First Tier, Middle Tier and Third Tier

4.3 System Module

System is structured into a number of principal sections. Communications between these sections and its subsections can be identified using structure chart. Structure chart is a technique to depict the high level extraction of a specified system and to recognize the interaction between independent sub-systems.

4.3.1 Structure Charts

The following are the structure charts for Online Graduate Job Vacancies System. Figure 4.1 describes the main structure chart for the system. Figure 4.3, 4.4, 4.5 and 4.6 describe each of the main sections and its related modules.

4.3.1.1 Main Structure Chart

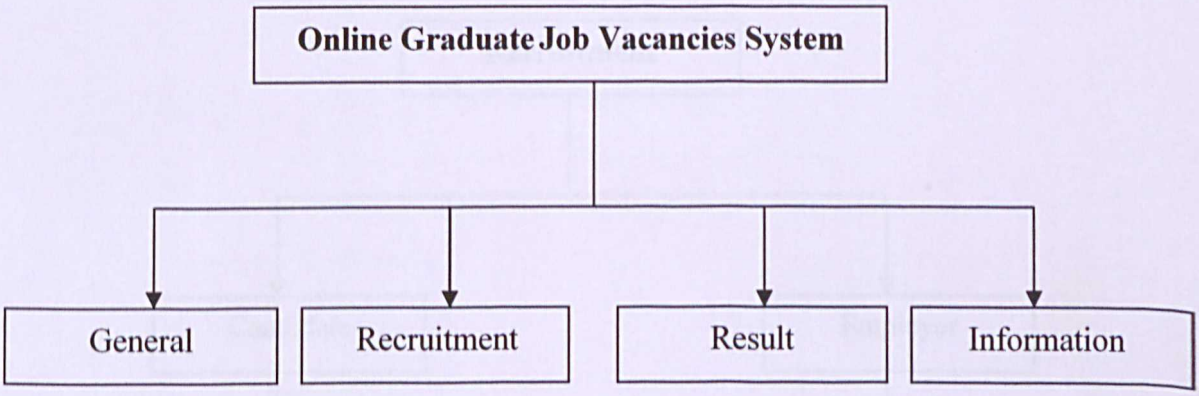


Figure 4.3: Main Structure Chart for Online Graduate Job Vacancies System

4.3.1.2 General Structure Chart

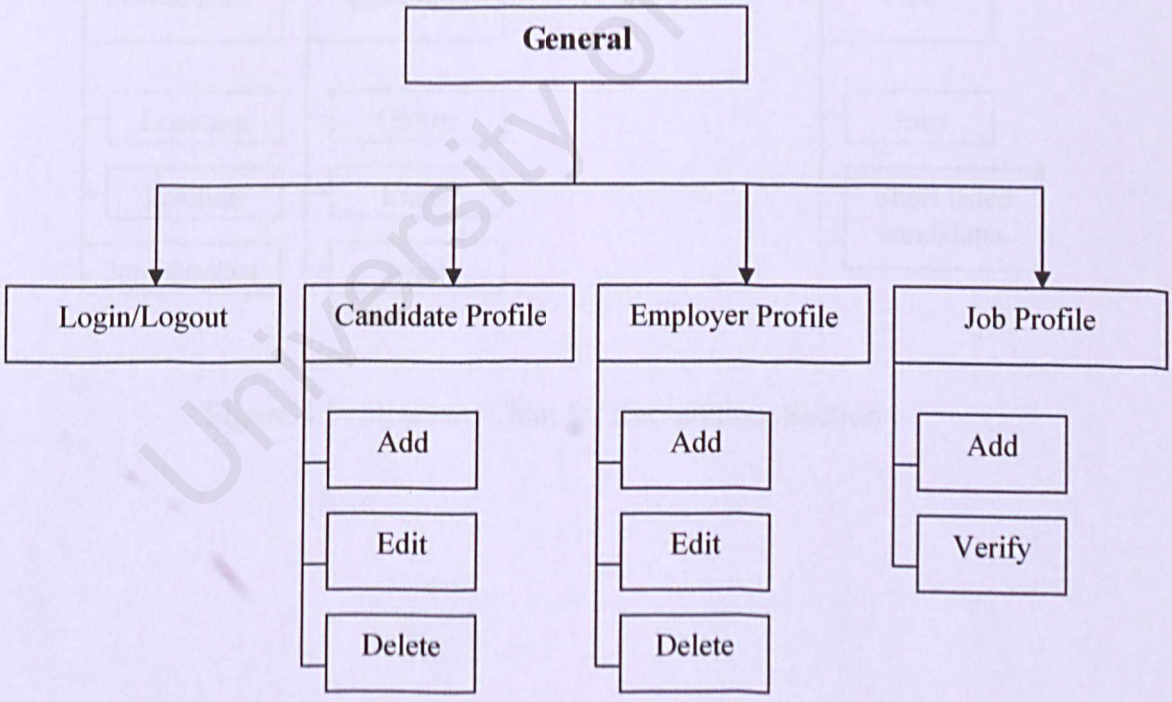


Figure 4.4: Structure Chart for General Section

4.3.1.3 Recruitment Structure Chart

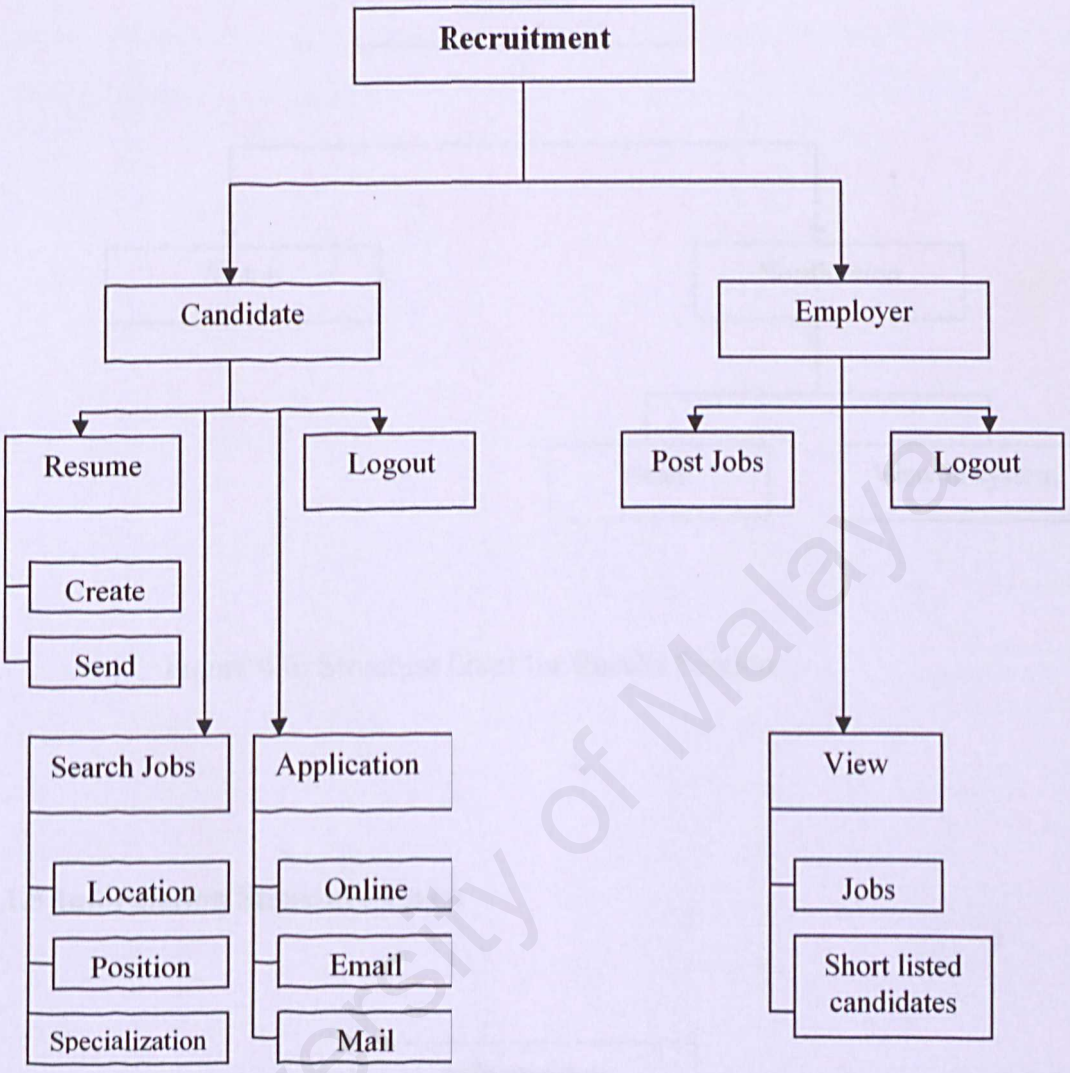


Figure 4.5: Structure Chart for Recruitment Section

4.3.1.4 Results Structure Chart

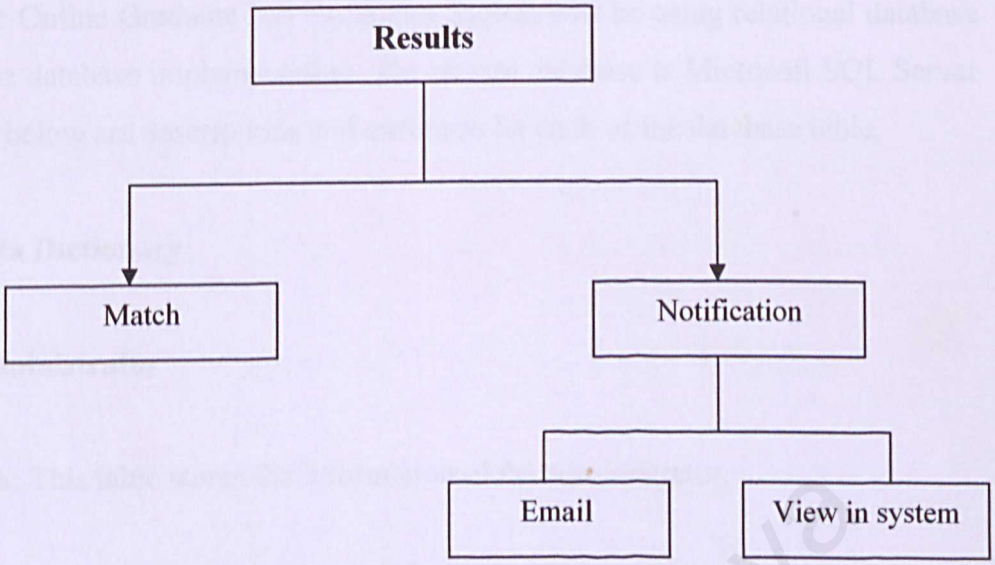


Figure 4.6: Structure Chart for Results Section

4.3.1.5 Information Structure Chart

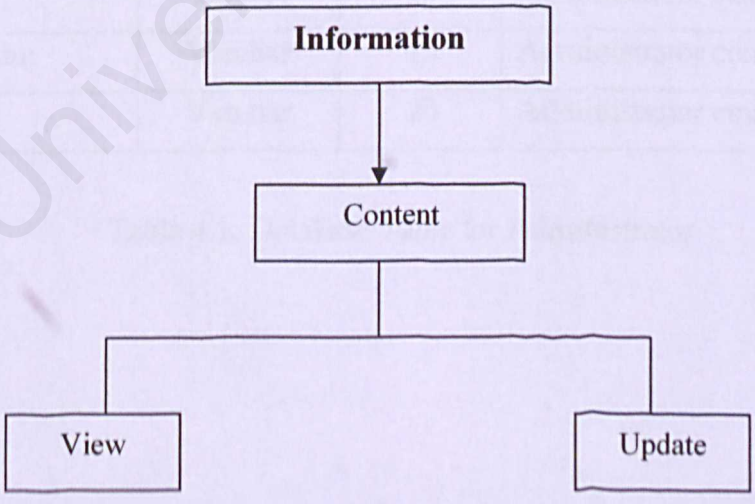


Figure 4.7: Structure Chart for Information Section

4.4 System Functionality Design

The Online Graduate Job Vacancies System will be using relational database model in its database implementation. The chosen database is Microsoft SQL Server 7.0. Given below are descriptions and attributes for each of the database table.

4.4.1 Data Dictionary

4.4.1.1 Administrator

Description: This table stores the information of the administrator.

Fields	Data Type	Length	Description
admID	Int	10	Administrator user ID
admPassword	Varchar	10	Administrator login password
admName	Text	30	Administrator name
admIC	Varchar	15	Administrator IC number
admSex	Varchar	1	Administrator sex
admAdd	Varchar	50	Administrator full address
admPostal	Varchar	10	Administrator postcode
admState	Varchar	15	Administrator state
admContactNum	Varchar	15	Administrator contact number
admEmail	Varchar	20	Administrator email address

Table 4.1: Database Table for Administrator

4.4.1.2 Candidate

Description: This table stores the information of the candidates.

Fields	Data Type	Length	Description
canID	Int	10	Candidate user ID
canPassword	Varchar	10	Candidate login password
canName	Text	30	Candidate name
canIC	Varchar	15	Candidate IC number
canSex	Varchar	1	Candidate sex
canAdd	Varchar	50	Candidate full address
canPostal	Varchar	10	Candidate postcode
canState	Varchar	15	Candidate state
canContactNum	Varchar	15	Candidate contact number
canEmail	Varchar	20	Candidate email address
edu	Varchar	50	Candidate education
major	Varchar	40	Candidate major
CGPA	Varchar	4	Candidate CGPA
OtherEDU	Varchar	100	Other education information
skill	Varchar	100	Candidate skill
jobField	Varchar	40	Preferred job major
jobLoc	Varchar	20	Preferred job location
salary	Varchar	10	Proposed salary
avaiDate	Varchar	20	Available date
Resume	Varchar	10	Keep track of created resume
canImg	Varchar	40	Image
canVideo	Varchar	40	Video

Table 4.2: Database Table for Candidate

4.4.1.3 Employer

Description: This table stores the information of the employer.

Fields	Data Type	Length	Description
empID	Int	10	Employer user ID
empPassword	Varchar	10	Employer login password
empName	Text	30	Employer name
empIC	Varchar	15	Employer IC number
empContactNum	Varchar	15	Employer contact number
empEmail	Varchar	20	Employer email address

Table 4.3: Database Table for Employer

4.4.1.4 Otvacancy

Description: This table stores information on other vacancies posted by administrator.

Field Name	Data Type	Length	Description
otVacID	Int	10	Vacancy ID
otComp	Varchar	40	Name of company
otAdd	Varchar	60	Company address
otEmail	Varchar	30	Company Email
otPosition	Varchar	40	Vacancy position
otSpecial	Varchar	50	Vacancy specialization
otResp	Varchar	100	Vacancy responsibility
otReq	Varchar	100	Vacancy requirement
otStateloc	Varchar	20	Company location
otDue	Varchar	20	Due Date

Table 4.4: Database Table for Otvacancy

4.4.1.5 Article

Description: This table stores information from the uploaded article.

Fields	Data Type	Length	Description
artID	Int	10	Article ID
artFile	Varchar	60	Article file path
artTitle	Varchar	80	Article title
artDesc	Varchar	100	Article description

Table 4.5: Database Table for Article

4.4.1.6 Vacancy

Description: This table stores information on vacancies posted by employer.

Field Name	Data Type	Length	Description
VacID	Int	10	Vacancy ID
VacEmpID	Varchar	40	Vacancy Employee ID
position	Varchar	60	Vacancy position
resp	Varchar	30	Vacancy responsibility
req	Varchar	40	Vacancy requirement
special	Varchar	100	Vacancy specialization
dueDate	Varchar	50	Due Date
stateloc	Varchar	100	Company location
vacCGPA	Varchar	20	Vacancy required CGPA
vacloc	Varchar	20	Vacancy location

Table 4.6: Database Table for Vacancy

4.5 Module Functionality Design

Functions for each module can be described by using flow charts, context diagram and data flow diagram. Flowcharts aid in the understanding and analysis of complex processes. Context diagram is the highest level of data flow diagram which represents the scope and boundaries of the system. A data flow diagram graphically displays the process of moving, changing, or updating information.

4.5.1 Module Flow Charts

The following are the administrator, candidate and employer flow charts. These flow charts provide illustrations of different access level for different type of users. It will give a clear view of the functions and processes offered by the system to its users.

4.5.1.1 Administrator Flow Chart

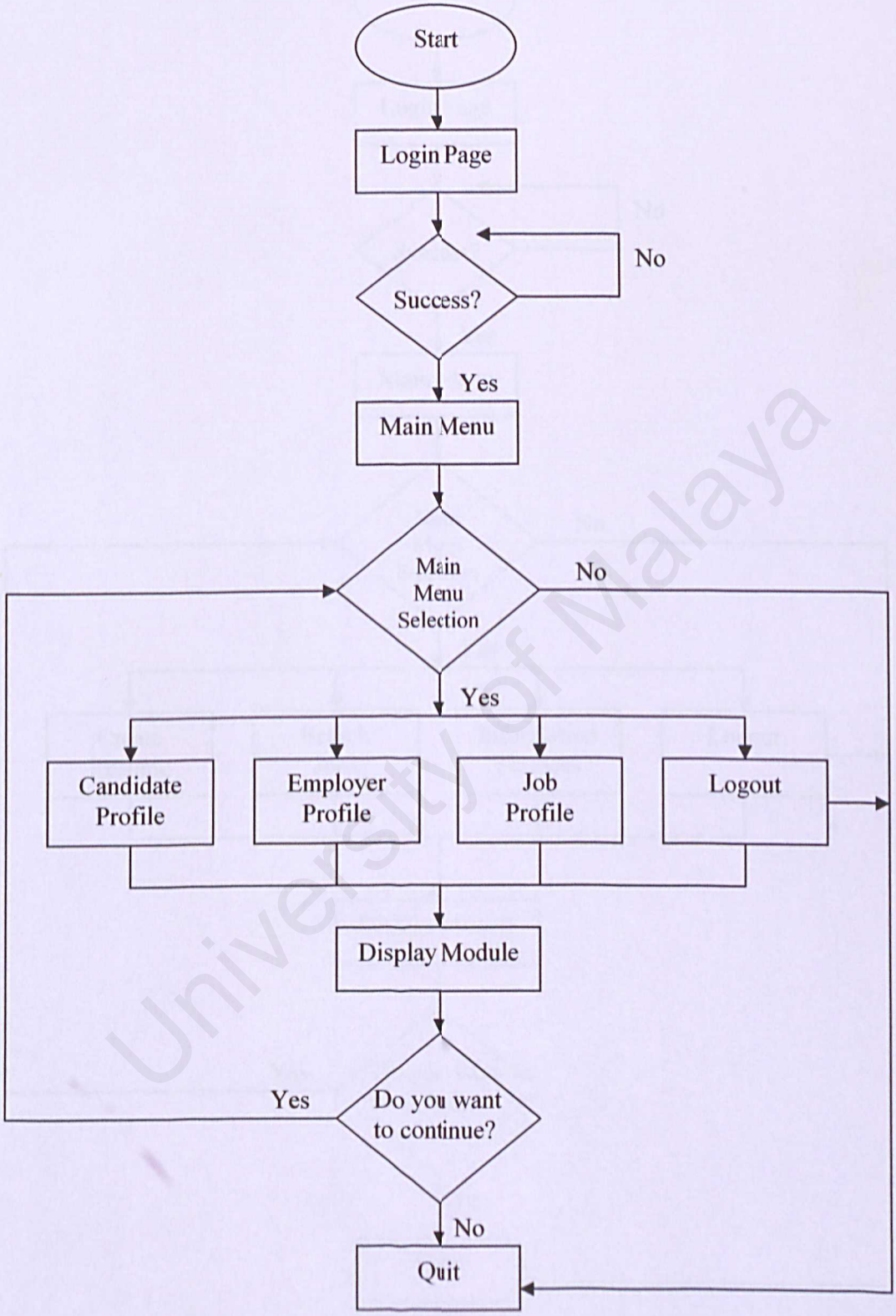


Figure 4.8: Administrator Flow Chart

4.5.1.2 Candidate Flow Chart

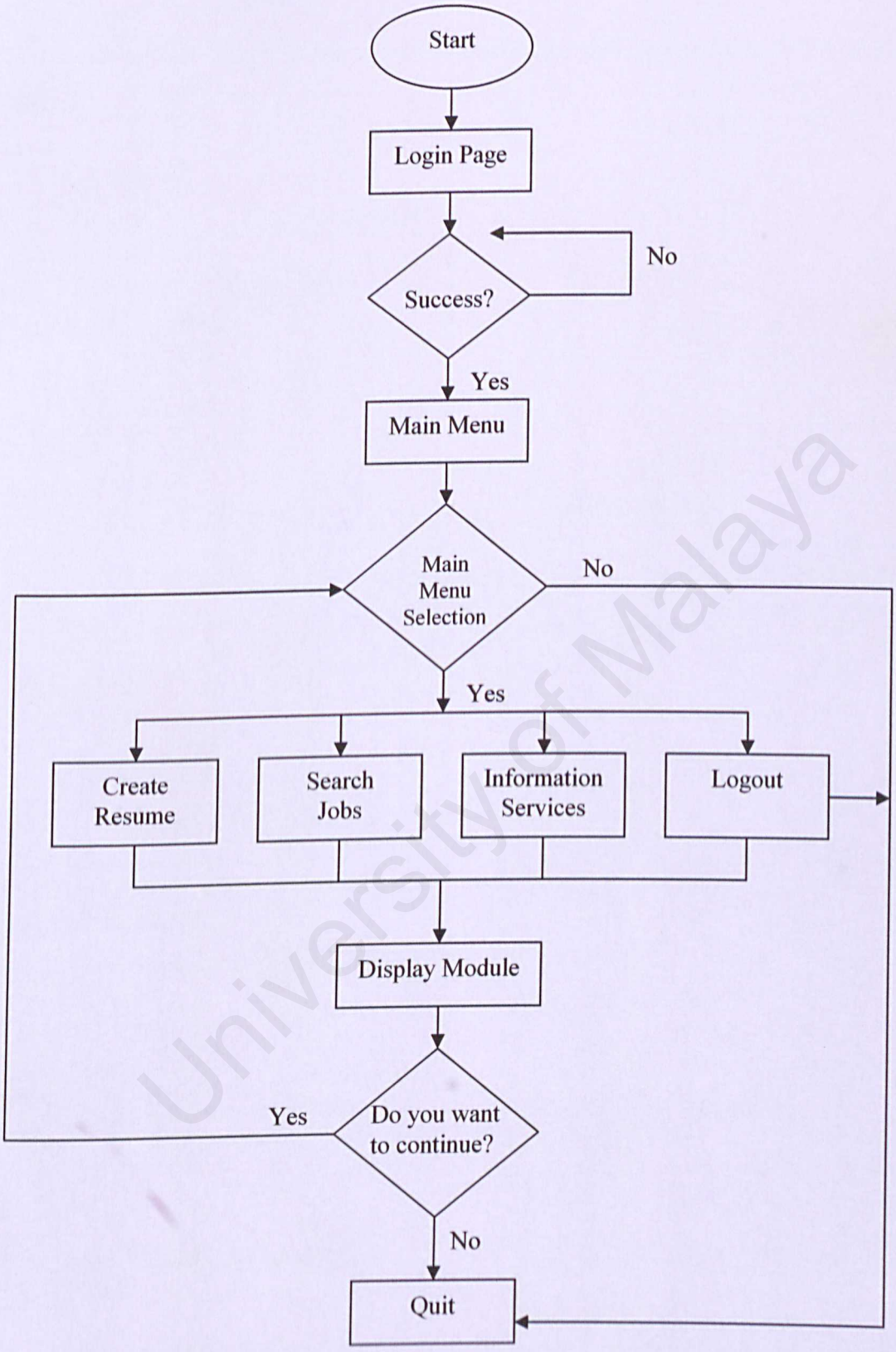


Figure 4.9: Candidate Flow Chart

4.5.1.3 Employer Flow Chart

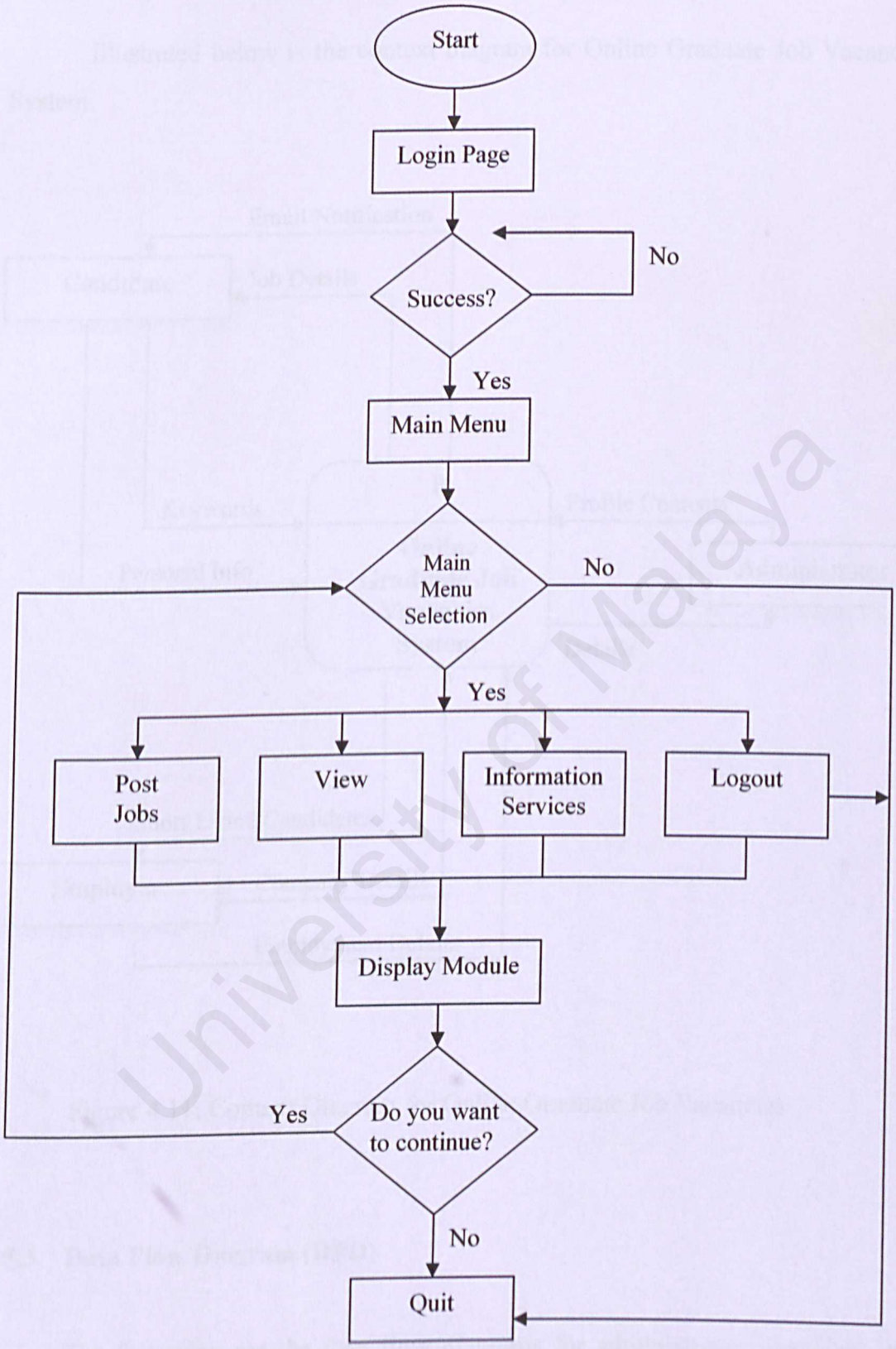


Figure 4.10: Employer Flow Chart

4.5.2 Context Diagram

Illustrated below is the context diagram for Online Graduate Job Vacancies System.

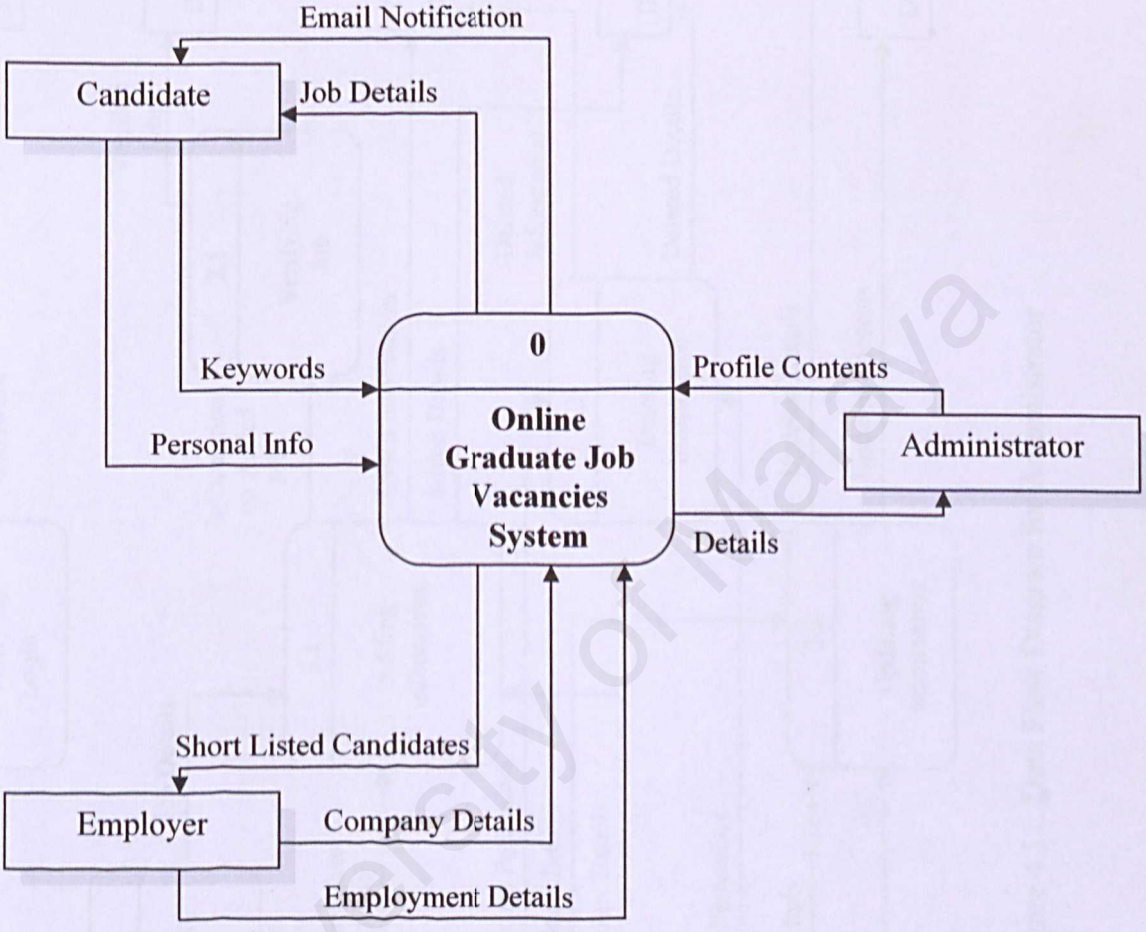


Figure 4.11: Context Diagram for Online Graduate Job Vacancies

4.5.3 Data Flow Diagram (DFD)

The following are the data flow diagrams for administrator, candidate and employer.

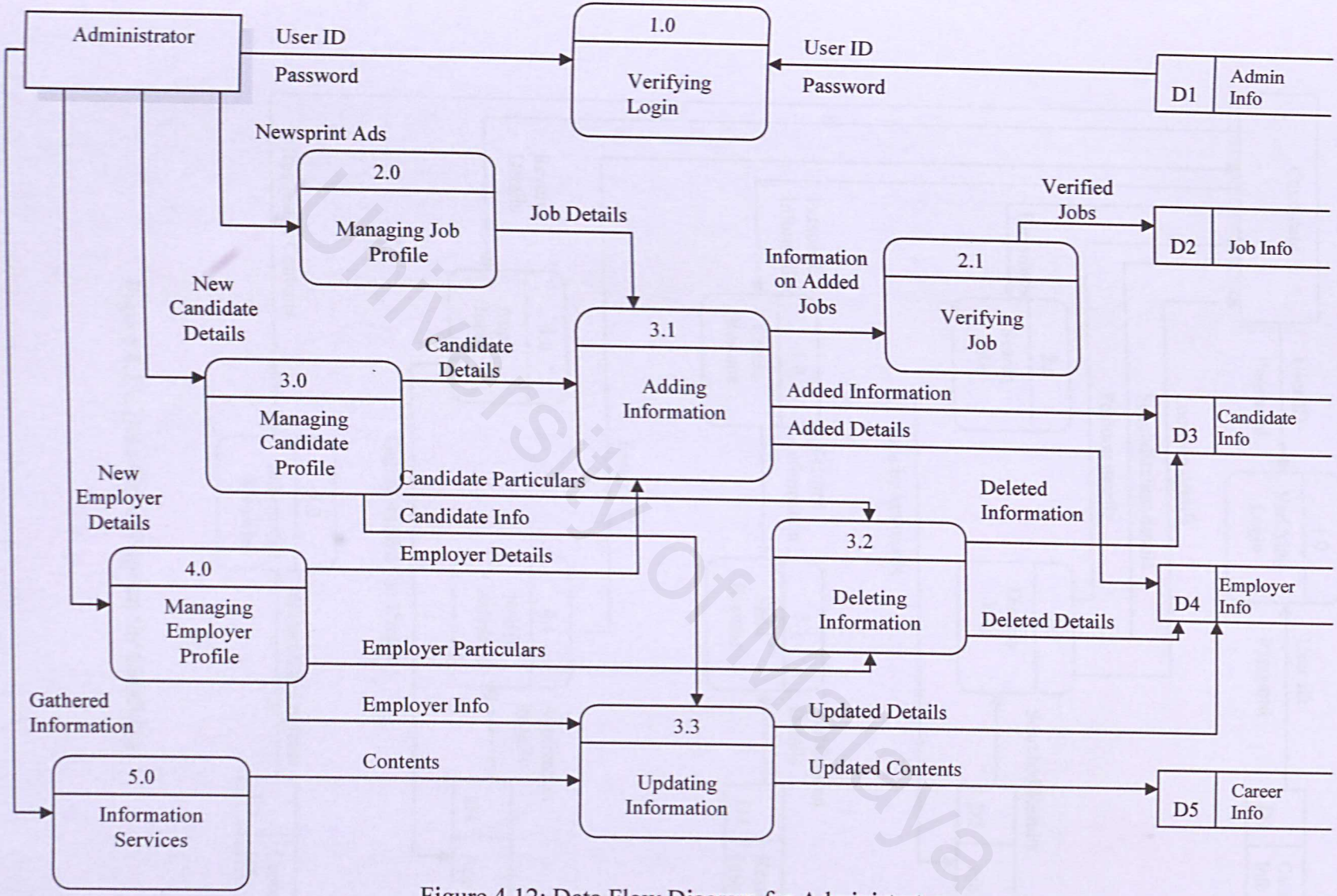


Figure 4.12: Data Flow Diagram for Administrator

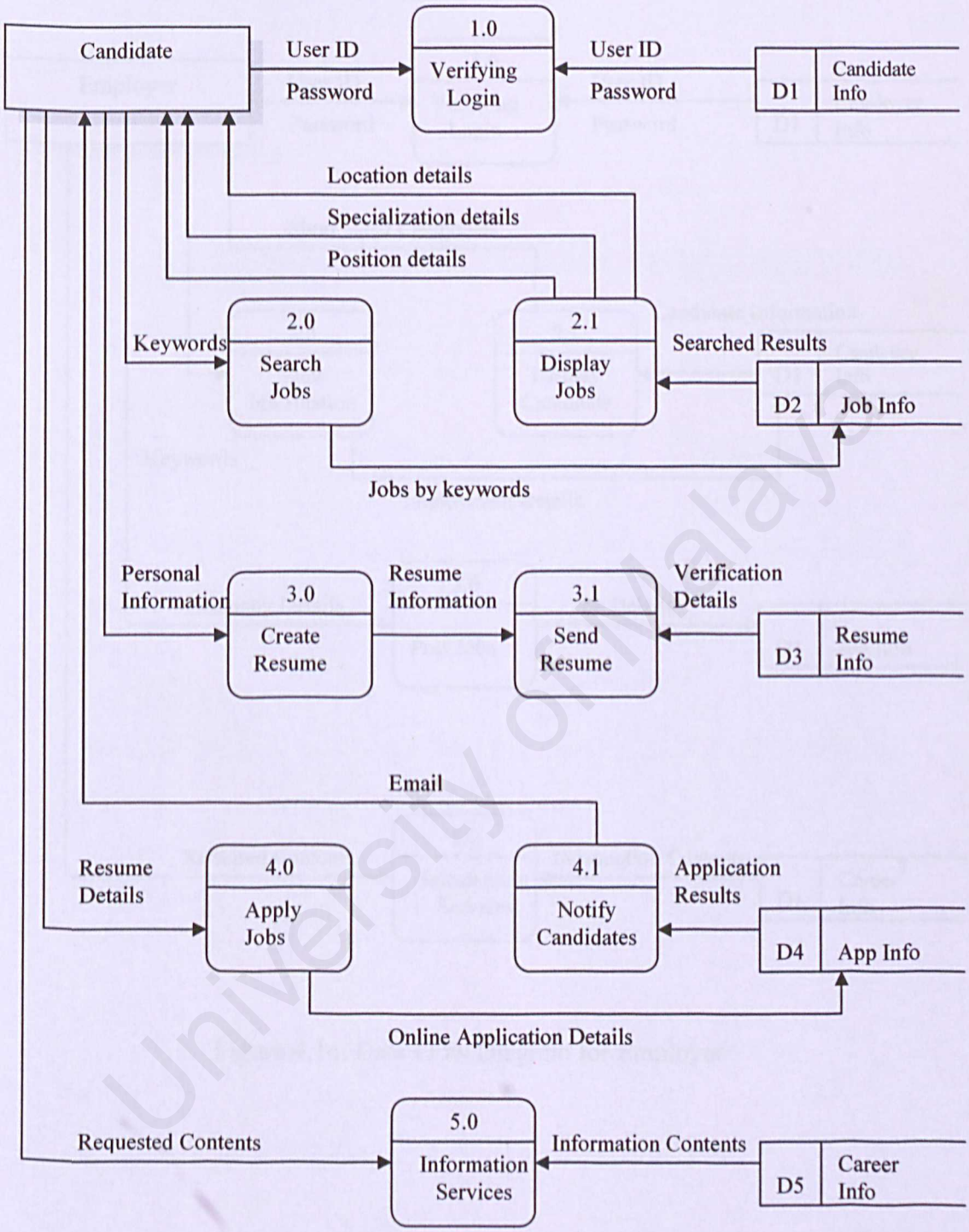


Figure 4.13: Data Flow Diagram for Candidate

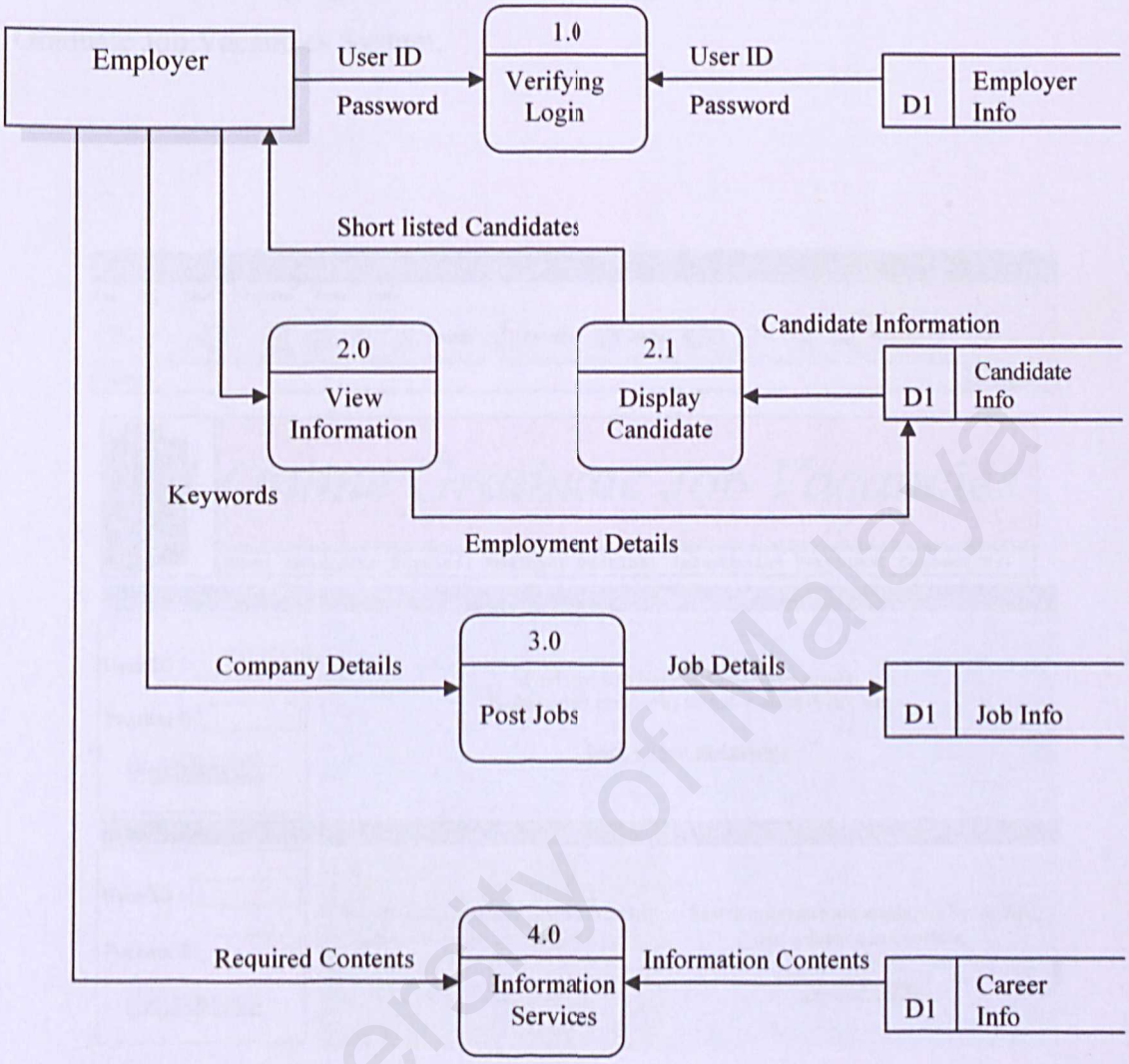


Figure 4.14: Data Flow Diagram for Employer

4.5.4 User Interface Design

The following figures are the screen designs prototypes for modules in Online Graduate Job Vacancies System.

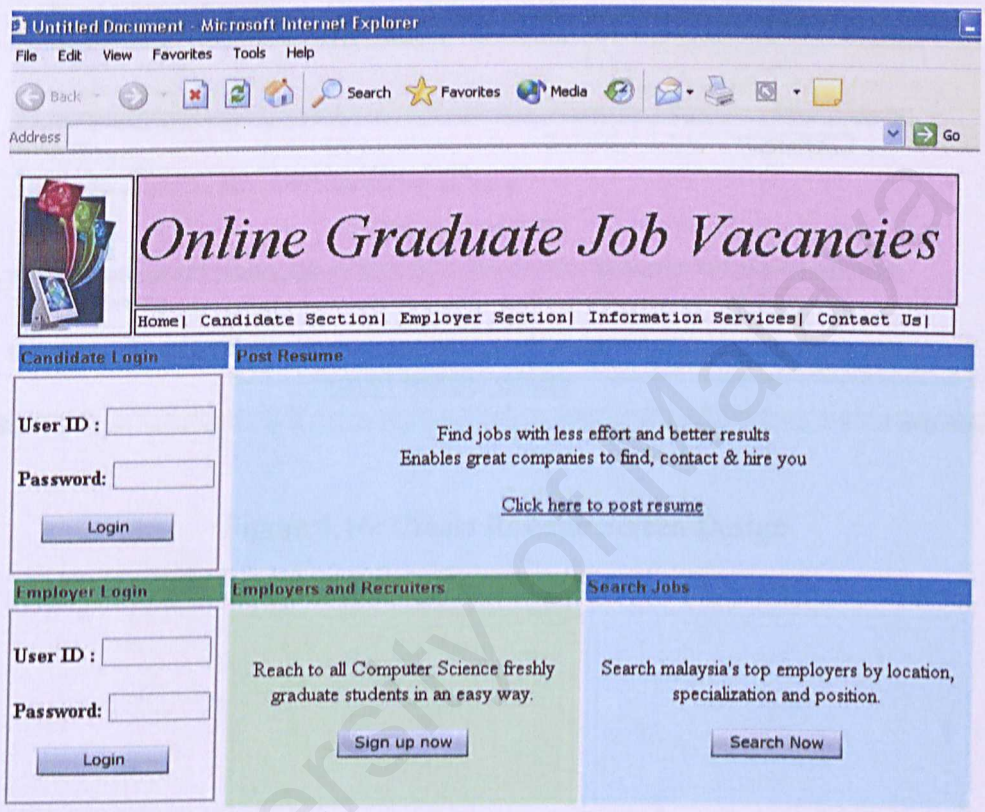


Figure 4.15: Online Graduate Job Vacancies Main Page

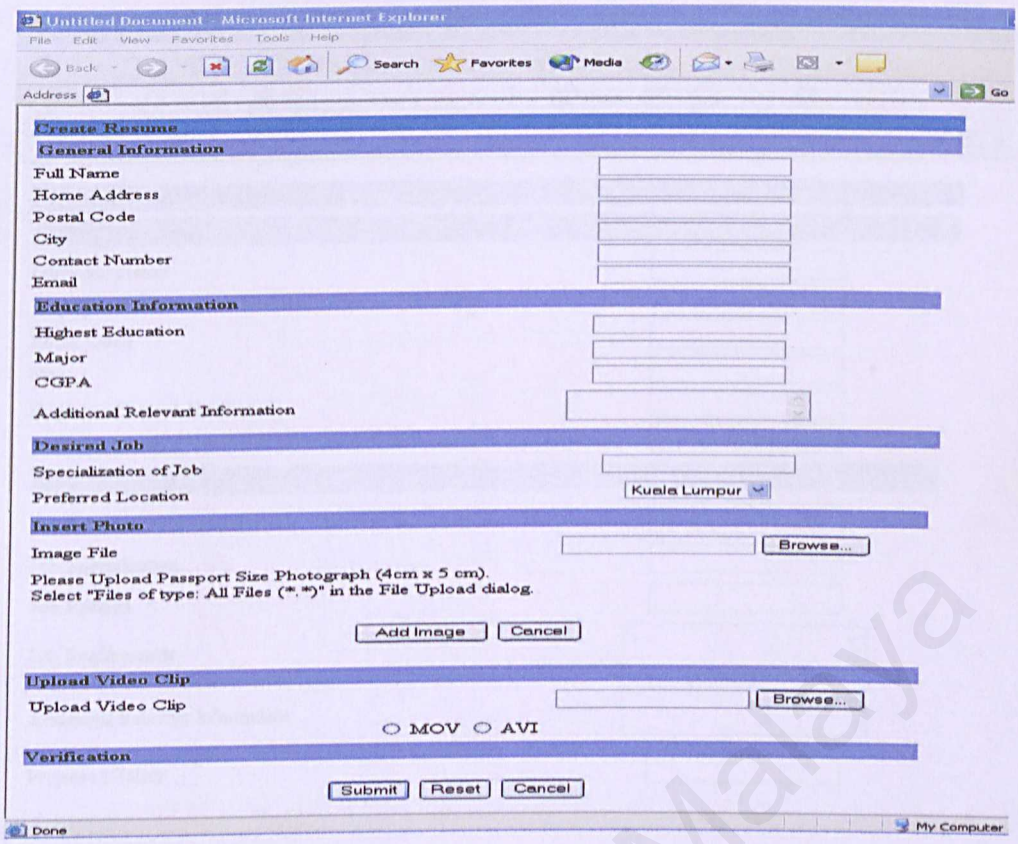


Figure 4.16: Create Resume Screen Design

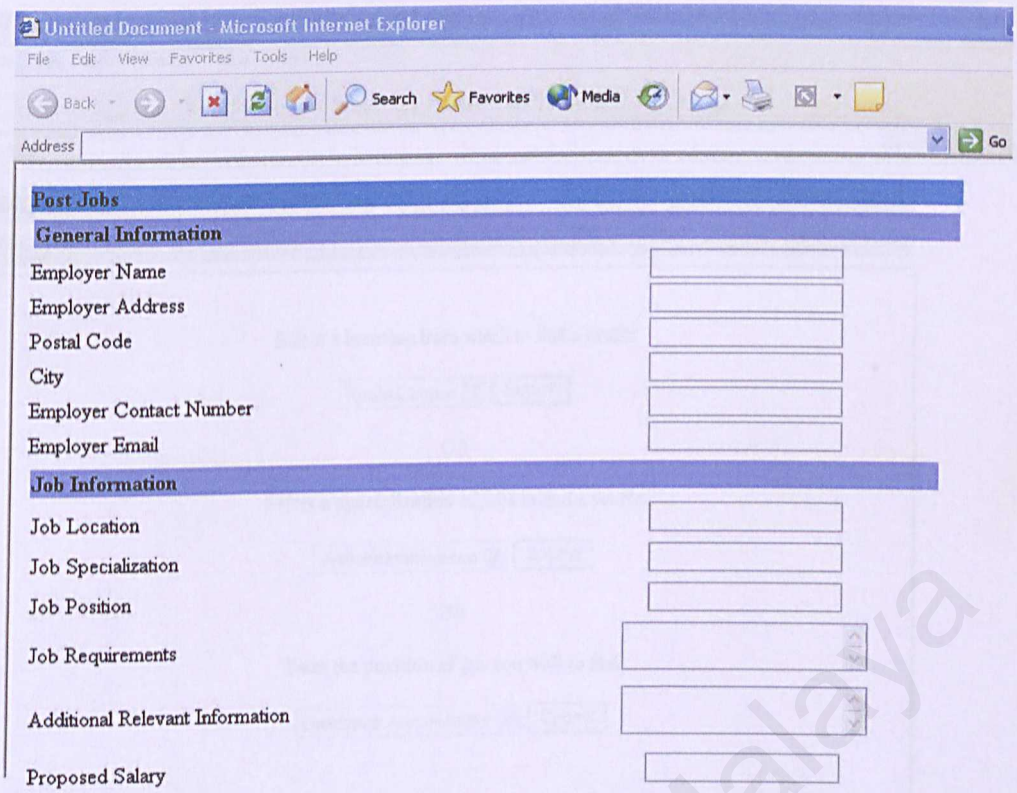


Figure 4.17: Post Job Screen Design

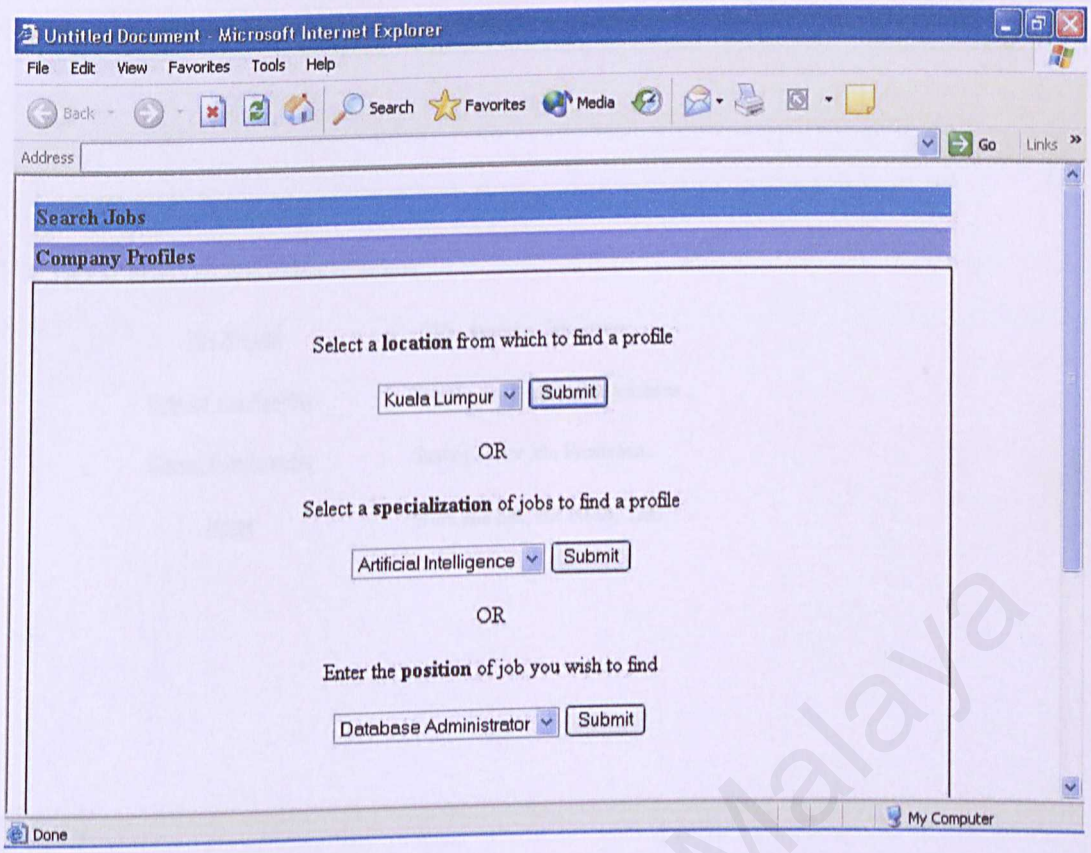


Figure 4.18: Search Job Screen Design

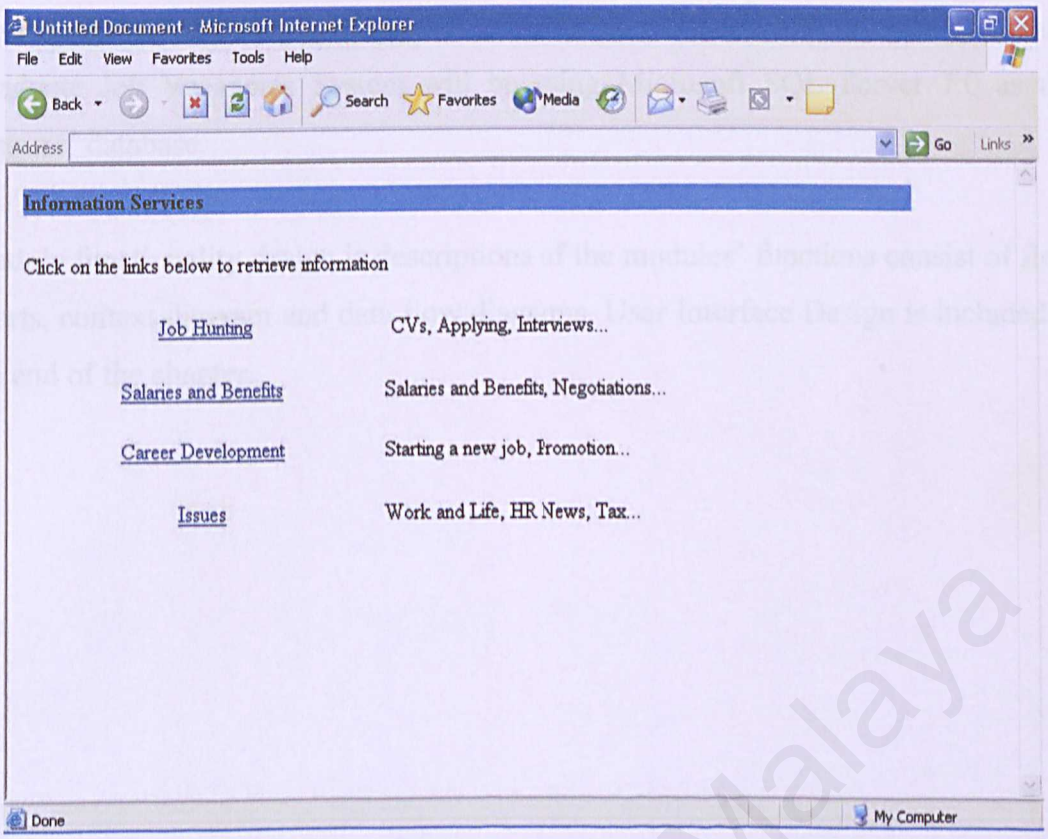


Figure 4.19: Information Services Screen Design

4.6 Conclusion

In chapter four system design, we looked at the system architecture design, system module, system functionality design, module functionality design and user interface design.

The system architecture for Online Graduate Job Vacancies is multi tier client/server architecture. Multi-tier architecture provides effective distributed client/server design that will increase performance, flexibility, maintainability, reusability, and scalability of the system.

System is also divided into several system modules. This is done in the form of structure chart. Structure chart is used to depict the high level extraction of system and to illustrate the interaction between independent modules in the system.

Chapter Five

System Implementation

5.1 Introduction

System Implementation is a phase integrating the designed modules or functions to develop a system based on the given requirements. In order to achieve that, application tools and languages are needed to code the programs. The system was developed using the bottom up approach, which involves building the functions and procedures and subsequently the high level software modules.

5.2 Development Environment

The development tools that were chosen play an important role in determining the usability of the system. The overall tools used for the development of this project and analysis of the usage of technology are given below.

5.2.1 Operating System

Microsoft Windows 2000 Server was used to develop Online Graduate Job Vacancies System.

5.2.2 Web Server

Microsoft Internet Information Server (IIS) 5.0 was used as the web server for the system.

5.2.3 Database Development

The system requires large and powerful database, therefore Microsoft SQL Server 7.0 was chosen. SQL can support unlimited amount of records and it is also equip with strong security features.

5.2.4 User Interface Design

Interface of the system was created using Macromedia Dreamweaver UltraDev 4.0 and CoffeeCup Firestarter was used to provide flash movie.

5.2.5 Web Browser

Online Graduate Job Vacancies System is best viewed in Internet Explorer.

5.2.6 Web Authoring Tools

Visual Interdev and FrontPage were used as the authoring tools for the development of the coding. The former was used mostly for ASP coding as it helps to differentiate between ASP codes and normal HTML codes. The latter was used for HTML coding.

Table 5.1 shows the complete listing of utilization of tools in the respective development area.

Development Area	Development Tools
Operating System	Windows 2000 Server
Web Server	Internet Information Server
Database Development	SQL Server 7.0
User Interface Design	Macromedia Dreamweaver UltraDev 4.0 and CoffeeCup Firestarter
Browser	Internet Explorer 6.0
Web Application Tools	Visual Interdev and FrontPage

Table 5.1: Listing of Development Areas and Tools

5.3 System Coding

Coding is a process that transfers a detailed design representation of software into a programming language realization. System Coding for the development of Online Graduate Job Vacancies System takes about 5 weeks. System coding is divided into three parts which are coding approach, coding style and a brief explanation on the scripting language used.

5.3.1 Coding Approach

Online Graduate Job Vacancies System was developed modularly, using bottom-up approach. The process is to develop functions and procedures before proceeding to higher level modules. These modules are then integrated into a fully functional system. Future modifications and enhancements are easy to be made by applying the modular approach.

5.3.2 Examples of System Coding

The examples of basic coding for Online Graduate Job Vacancies System are given below.

5.3.2.1 Coding for Database Connection

The easiest way to connect to a database is to use a DSN-less connection. A DSN-less connection can be used against any database on the web site. In Online Graduate Job Vacancies System, SQL Server was used as the database therefore we need to specify the database driver (Provider) and its physical path in the coding. As we are uploading the system in the server of Strossoup Lab 2, Faculty of Computer Science and Information Technology, the physical path of the database should be coded as below.

```
Set Conn=Server.CreateObject("ADODB.Connection")
Conn.Open "Provider=SQLOLEDB; Data Source = ANX815\THESIS; Initial Catalog
=jobstreet; User Id=noreen; Password=natasya"
```

5.3.2.2 Coding to Send Information Through Forms

A common use of Internet server applications is to process a form submitted by a browser. With ASP, you can embed scripts written in VBScript directly into an HTML file to process the form. ASP processes the script commands and returns the results to the browser. The Post method is used to send data from the client browser to the Web server.

```
<Form name="candDetail" method="post" action="">
<table width="402">
  <td><b>Register new candidate</b><td>
  <td>UserID</td>
      <td><Input type="Text" name="canID" id="canID"></td>
  <td>Password</td>
      <td><Input type="Text" name="password2" id="password2"></td>
```

5.3.2.3 Coding to Obtain Results From Forms

When the user has submitted the form, data must be processed and inserted into the database. Request.Form is used to extract the data from the form fields. The example below shows extraction of data from the fields of canID, password2 and name2. The data is later inserted into the table fields of canID, canPassword and canName.

```
Dim canID,password2,name2,
canID=request.form("canID")
password2=request.form("password2")
name2=request.form("name2")
Conn.execute ("Insert into candidate (canID,canPassword,canName)
values ('"&canID&"','"&password2&"','"&name2&"')")
```

5.4 Coding Style

Good coding practice is needed to avoid confusion and facilitate the detection of errors. Below are good coding practices that have been implemented in the process of developing the system.

5.4.1 Include Files

We use Include Files when certain codes are repeated. It allows procedures to be available to many ASP files. By using include files it also avoid users with the hassle of correcting all ASP page when a change occur. In Online Graduate Job Vacancy System, include files are used in ASP pages that have identical links to other pages.

```
<!-- #include file="../menucan.asp" -->
```

5.4.2 Comment Codes

Commenting the codes will make it easier for users to understand and troubleshoot the coding. It also helps programmer to recall the coding done previously. In ASP the single quotation mark is used to add a comment.

```
' sample with a physical path
' file.SaveAs("c:\temp\" & file.FileName)
file.SaveAs("imgvideo/" & file.FileName)
```

5.4.3 Indent Codes

It will be easier to read and detect errors if the codes are indented. Indent codes will be useful in control structures such as loop, if-else, do while and select cases.

```
function Submit()
{
        var valid;
        with(document.candDetail)
        {
                if (canID.value=="")
                {
                  alert("Please enter userID");
                  canID.focus();
                  valid = false;
                }
```

5.4.4 Close Connections

Make sure all database connections are closed. This is not only good coding practice but will help speed up ASP pages and with SQL database, closing connections will help prevent corruption of the database.

```
Conn.close
Set Conn=Nothing
End Sub
```

5.4.5 Response.buffer

Set Response.buffer = true. This will tell the server to execute all the code before sending any information to the client. By implementing this, it will help speed up the ASP pages.

```
<%@Language=VBScript%>
<%Option Explicit
Response.Buffer = True
Response.Expires = -1
```

5.5 Scripting Language

ASP was chosen as the server side scripting and VBScript is the default scripting language for ASP. ASP code is always inside the server script delimiter <%.....%>. For client side scripting, JavaScript was chosen because of its flexibility. Further explanation on both scripting languages is given below.

5.5.1 VBScript

Visual Basic Scripting Edition, also known as VBScript is implemented as a fast portable interpreter for use in web browsers and applications that use ActiveX controls, Java applets and OLE Automation Servers. As it was designed to be simple and speedy, it does not support the use of functionality that directly accessed the client machine's operating system or file system. VBScript is a useful, lightweight language scripting language that could manipulate, control and process objects in a HTML webpage.

5.5.2 JavaScript

JavaScript is a variation of Java language which can be integrated directly into HTML pages and ASP pages. JavaScript works in any version of Netscape Navigator and Microsoft Internet Explorer. Animation, sound and interactivity can be accomplished using this technology. In addition, JavaScript is also downloaded as part of a web page, which means there is no delay in waiting for a JavaScript module to download and begin to run.

5.6 Conclusion

System implementation marks the start of coding and development of the system. Some modifications of design have been done to make sure the system works.

Chapter Six

System Testing

6.1 Introduction

System testing plays an important role in the system development process to assure the quality of the system. It is verification and a validation process. Verification refers to the set of activities that ensure the software correctly implements a specific function while validation refers to activities that ensure the software has been built to user requirements. Testing is performed to make sure that the program are executed correctly and conform to the requirements specified. It provides a method to uncover logic errors and to test the system reliability.

6.2 Test Case Design

Before testing is done, a method should be chosen. These methods provide a systematic approach to testing. More importantly, methods provide a mechanism that can help to ensure the completeness of test and provide the highest likelihood for uncovering errors in software. Two types of test case design were used in this system, white box and black box.

6.2.1 White Box Testing

White box testing is a case test design method that uses the control structure of the procedural design to derive test cases. By using white box testing methods, the test cases that can derive are as follows:

- Exercise all logical decisions on Online Job Vacancies System true or false component

- Exercise all loops at their boundaries and within their operational bounds

- Exercise internal data structures to assure validity

- Guarantee that all independent paths within a module have been tested at least once

6.2.2 Black Box Testing

Black box testing focuses on the functional requirements of the software. A set of input conditions can be derived by black box testing. These conditions will fully exercise the functional requirements for Online Job Vacancies System. Black box testing attempts to find errors in the following categories:

- Interface errors
- Incorrect or missing functions
- Performance errors
- Initialization and termination errors

6.3 Types of Testing

The testing process is implemented throughout the development of Online Graduate Job Vacancies System. It is implemented in stages because the system itself is composed of modules. Testing conducted include unit testing, integration testing and system testing. Bottom up testing strategy was used where testing starts with the fundamental components and later works up the hierarchy of modules until the final module is tested.

6.3.1 Unit Testing

Unit testing focuses on the smallest unit of software design which is the software component or module. Unit tests individual components to ensure that they are operating correctly. These components include functions and subroutines. Each component is tested independently, without other system components. The unit testing includes:

- Testing the interface to ensure that the information flows properly into and out of the program unit

- Testing the boundary conditions to ensure that the component is operating correctly at boundary values

- Make sure that all independent paths in a control structure are tested at least once
- Testing all error handling paths

Throughout the development of the system, unit testing was done after the development of each component. Testing was done with all sorts of ways to check for errors. If it was tested to be functioning correctly, development of the next function will be carried out.

6.3.1.1 Unit Testing on Login Function

Users of candidate, employer and administrator modules in Online Job Vacancies System have to log in with a valid user id and password before they can access the system. The steps of unit testing are shown in Table 6.1: Unit Test for Login Function.

Test Procedure	Output/Error	Analysis of Test Result
Insert a valid administrator userID and password into the login page	Able to login succesfully	Login is successful
Insert an invalid administrator userID and password into the login page	Login is denied	Login is denied and is brought back to the login page. A message stating invalid userID or password is displayed.
Insert a valid administrator userID and invalid password Insert an invalid administrator userID and valid password	Login is denied	Login is denied and is brought back to the login page. A message stating invalid userID or password is displayed.
Click the login button without filling in the userID and password field	Error found	Blank field from the form cannot be processed. A warning sign to ask to fill up the required information is displayed

Table 6.1: Unit Test for Login Function

6.3.1.2 Unit Testing on Search Function

In candidate module, Online Graduate Job Vacancies System allows candidates to search for posted jobs based on location, specialization and position. The steps in unit testing are shown in Table 6.2: Unit Test for Search Function.

Test Procedure	Output/Error	Analysis of Test Result
Click the List All button	System is able to conduct a search	List of all posted jobs are displayed
Choose to search for posted jobs based on the location from drop down menu	System is able to conduct a search	List of posted jobs based on the selected location or a message of no record found are displayed
Choose to search for posted jobs based on the specialization from drop down menu	System is able to conduct a search	List of posted jobs based on the selected specialization or a message of no record found are displayed
Fill in the position field to search jobs based on position	System is able to conduct a search	List of posted jobs based on the position or a message of no record found are displayed

Table 6.2: Unit Test for Search Function

6.3.1.3 Unit Testing on Post Job Function

In employer module, Online Graduate Job Vacancies System allows employer to post job. The steps in unit testing are shown in Table 6.3: Unit Test for Post Job Function.

Test Procedure	Output/Error	Analysis of Test Result
Click the Post Job link in Main Menu	Form is displayed in webpage	The form is displayed. Hyperlink is working
Fill in all related details completely and click the submit button	Data is sent through form	The newly posted job is displayed
Click submit button without fill in all fields	Error found	Blank field from the form cannot be processed. A warning sign to ask user to fill up the required info is displayed

Table 6.3: Unit Test for Post Job Function

6.3.2 Integration Testing

When the components have been unit tested, the next step is to ensure the interfaces among the components are defined and error free. The objective is to take unit tested modules and build a program structure that has been dictated by design.

The bottom up integration was used during the integration of modules. Bottom up integration testing, begins with constructing and testing the modules. Using this approach, the system is constructed and tested in small segments where errors are easier to isolate and correct. In addition, interfaces are more likely to be tested completely.

6.3.2.1 Integration Testing on Administrator Module

The first integration is done to the administrator module. Units for administrator are integrated and tested. Table 6.4: Integration Testing on Administrator Module.

Test Procedure	Output/Error	Analysis of Test Result
Login as administrator with valid user id and password	Administrator is redirected to the account page	Successfully redirected after checking the validity of user id and password
Add, edit and delete the account of candidate, employer and administrator	Administrator is redirected to register new user page Latest personal details are displayed A message of are you sure you want to delete this user? is displayed	New user has successfully been added Latest personal details show that database has successfully been updated User has successfully been deleted from the database

Test Procedure	Output/Error	Analysis of Test Result
Add, update and delete articles	Administrator is redirected to upload new article page	New article has successfully been uploaded
	Administrator is redirected to update article information page	Administrator successfully update title and description of the article
	A message of are you sure you want to delete this article? is displayed	Article has successfully been deleted from the database
Add, edit and delete other vacancy records	Administrator is redirected to add new vacancy page	New vacancy record has successfully been added
	Latest details of vacancy record are displayed	Database has successfully been updated
	A message of are you sure you want to delete this record? is displayed	Vacancy record has successfully been deleted from the database

Table 6.4: Integration Testing on Administrator Module

6.3.2.2 Integration Testing on Candidate Module

The second integration is done to the candidate module. Units for candidate are integrated and tested. Table 6.5: Integration Testing on Candidate Module.

Test Procedure	Output/Error	Analysis of Test Result
Login as candidate with valid user id and password	Candidate is redirected to the main menu	Successfully redirected after checking the validity of user id and password
Create a resume	Candidate is redirected to the create resume page	Candidate has successfully created a resume
List of vacancies	Candidate is redirected to the list of vacancies page	A list of all posted jobs in the system are displayed
Search jobs	Candidate is redirected to the search for jobs page	Results of jobs are displayed based on chosen fields
View information services	Information and articles are displayed	The information has successfully been retrieved from the system

Table 6.5: Integration Testing on Candidate Module

6.3.2.3 Integration Testing on Employer Module

The third integration is done to the employer module. Units for employer are integrated and tested. Table 6.6: Integration Testing on Employer Module.

Test Procedure	Output/Error	Analysis of Test Result
Login as employer with valid user id and password	Employer is redirected to the main menu	Successfully redirected after checking the validity of user id and password
Post jobs	Employer is redirected to the add job page	Employer has successfully posted jobs
View all or shortlisted candidates	Employer is redirected to the list of all candidates page	A list of all candidates who applied for the job are displayed
	Employer is redirected to the shortlisted candidates page	A list of shortlisted candidates are displayed
View information services	Information and articles are displayed	The information has successfully been retrieved from the system

Table 6.6: Integration Testing on Employer Module

6.3.3 System Testing

System testing is a series of different test which the primary purpose is to fully exercise the system. The objective of system testing is to ensure that the system does what the customer wants it to do.

A stress test was conducted in Faculty of Computer Science and Information Technology, University Malaya. There were fifteen end users involved and the test was conducted at Strossoup Lab 2 on 22 January 2003 at 2.00 pm. Questionnaires were given to the testers. Below are the result of the test and feedback from the given questionnaires.

6.3.3.1 Analysis of Results

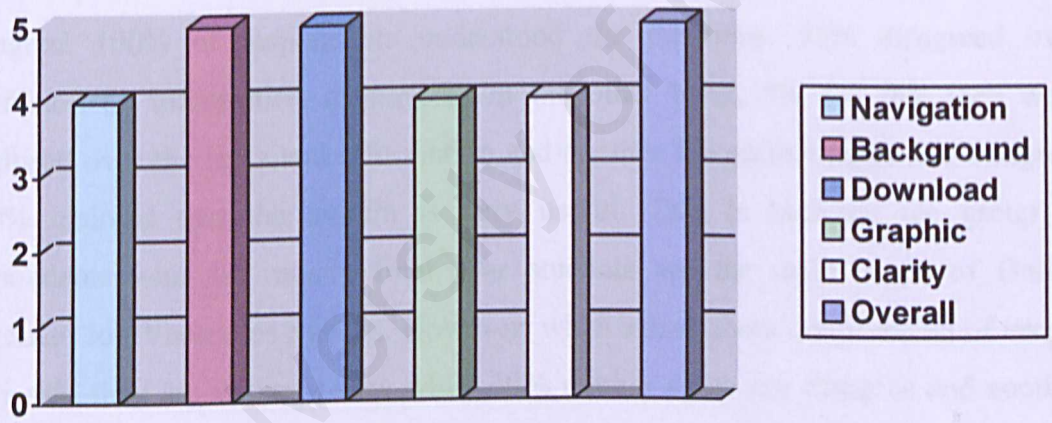


Figure 6.1: Graph of Survey on System Interface

The above graph shows a survey done to determine feedback from users regarding the interface of the system. From the results of the graph, we can conclude that all fifteen users were satisfied with the overall system interface of Online Graduate Job Vacancies System. However, there is a slight fall in grading the navigation, graphic and clarity aspect of the system. The user's feedbacks have been considered and steps will be taken to enhance these aspects of the system.

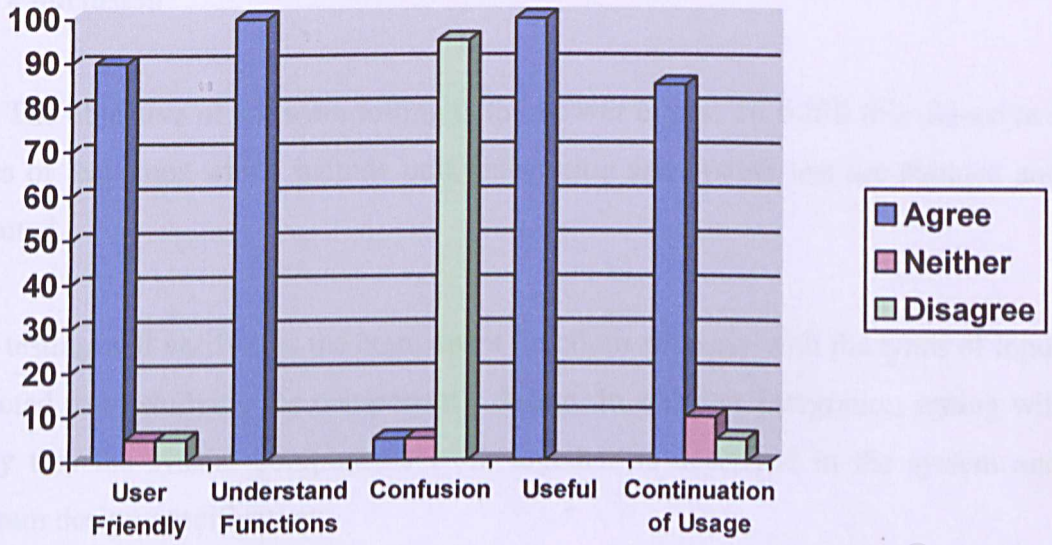


Figure 6.2: Graph of Survey on System Functions

Figure 6.2 shows the results of survey on system functions. 90% of respondents felt that the system is user friendly, while 5% neither agree nor disagree and another 5% disagree. 100% of respondents understood the functions. 95% disagreed over confusion on information displayed. On the other hand, 5% felt that they were confused over the links and information and another 5% neither agree nor disagree. 100% claimed that the system is very useful. This is because, the group of respondents who are mostly final year students are the main scope of Online Graduate Job Vacancies System. However, when asked about continuation of usage, 85% said they are willing to try while 10% neither agree nor disagree and another 5% disagreed. As the system is still new, there are some reservations on the effectiveness of the system. Given time, the system will proved its efficiency with various vacancies posted in the system.

6.4 Conclusion

The objective of software testing is to uncover errors. To fulfill this objective a series of test steps which include unit, integration and system test are planned and executed.

Unit testing will verify that the component functions properly with the types of input expected from studying the component's design. In addition, integration testing will verify that the system components work together as described in the system and program design specifications.

System testing is done to asses the system as a whole. The system will be tested to ensure that no flaws or bugs exist. Testing from end users was carried out and results of the findings will be used as guidelines to further enhance the system.

Chapter Seven

System Evaluation

7.1 Introduction

During the development process, several problems were encountered in hardware, software, interface and logic errors in programming the required functions of the system. System evaluation is a process of evaluating the developed system. This process identifies the problems encountered and solutions, system strengths, system constraints and future enhancements.

7.2 Problems Encountered and Solutions

Problems relating to the development of Online Graduate Job Vacancies System and the solutions taken are given below.

7.2.1 Difficulty in Coding

Minor difficulties were faced in ASP coding. This happened in the early stages of system development. Surfing the net for information, reading up on the concept of programming and constantly practicing and trying are some of the approaches taken to overcome this problem.

7.2.2 Problems in Database

The tables which were planned during WXES 3181 were changed as the latest tables offer a more systematic and efficient way in dealing with data. Many different tables were created in order to keep track of the process and functions of Online Graduate Job Vacancies System.

7.3 System Strength

Online Graduate Job Vacancies System demonstrates some good features in terms of functions and user friendliness. The following features illustrate the strengths of the system.

7.3.1 User Friendliness

The interface of the system was designed to be clean and clusters free, therefore the aspect of user friendliness were maintained. A standard set of GUI control objects has been applied such as command buttons, list boxes and combo boxes. With this, users will be more adaptive and willing to participate in the new system.

7.3.2 Authorization and Authentication

Candidate and employer need to register as a member before login to certain web pages. For those who do not have valid user id and password, they are only allowed to browse certain links. This will prevent unauthorized access to the system.

7.3.3 Uploading of Image and Video

Candidates may upload passport size photographs or video of themselves to the system. This is one of Online Graduate Job Vacancies System's strength as they are not many recruitment websites offer the function of uploading. In addition, the system also provides some form of personalization, as the employer can view the uploaded photograph and video which will be displayed with the online resume.

7.3.4 Power of Choices

Candidate has the ability to choose whether to create a resume using the template in the system or to just mail the resume individually. They are also given choices to search jobs based on location, specialization and position. Candidate may also list all jobs. As for the employers, they may choose to view all applied candidates or just the candidates who are shortlisted by the system. For users who do not register as a valid user, the system will still allow those users to browse links such as vacancy, search functions and view information services.

7.4 System Constraints

Online Graduate Job Vacancies System has some limitations due to the time constraints and the high learning curve of certain aspect in programming. Below are the list of system constraints and limitations.

7.4.1 Forget Password

There is no function to retrieve password if the user forgets the password.

7.4.2 No Online Help Facility

Online Graduate Job Vacancies System does not provide online help facility.

7.4.3 Tracking Applied Jobs

The system does not provide a facility to keep track on the progress of applied jobs.

7.5 Future Enhancements

There are a few future enhancements that can be done to increase the quality of Online Graduate Job Vacancies System. Below are the lists of future enhancements.

7.5.1 Keep Track Page

System can be further enhanced with the incorporation of a keeping track facility. System can provide a page for each individual candidate to check the status of their application. System can also list all posted jobs that the candidate had applied.

7.5.2 Online Help

As mentioned in system limitations, Online Graduate Job Vacancies System does not provide online help for its users. An online help is very beneficial as users may get confused with the functions in the system.

7.5.3 Details of Company

In the future, system should be able to provide details of advertised company, background, mission and vision and a direct link to the company's website. At present, only details of jobs are posted.

7.6 Knowledge and Experience Gained

The most valuable experience is being able to go through the whole development of system life cycle. Various software engineering techniques were applied. Theories learnt in project management and system analysis and design were implemented in the development of Online Graduate Job Vacancies System.

Learning and being able to program in ASP specifically VBScript and JavaScript proved to be very useful. Knowledge on web interface and animation such as Macromedia Flash, Swish and CoffeeCup can be used upon graduation and joining the workforce.

Most importantly, skills involving time management and self discipline were obtained. The ability to work independently with minimum supervision was also acquired. Through this project, there was obvious improvement in skills of finding information and solving problems. Better documentation and report writing skills were achieved.

7.7 Conclusion

Online Graduate Job Vacancies System has been completed successfully with some strength as well as limitations. It achieves and fulfills the system requirements, as stated in WXES 3181.

However, there is always room for improvement as stated in future enhancements of the system. This project has created wide opportunity for individual who is creative and innovative to further modify and tailor the system based on their needs.

REFERENCES

1. A.Keyton Weissinger (1999). *ASP in a Nutshell A Desktop Quick Reference.* O'Reilly & Associates, Inc.

2. Castro, E (1996). *HTML for the World Wide Web.* Peachpit Press.

3. David M. Kroenke (1998). *Database Processing: Fundamentals, Design and Implementation.* 6th Edition. Prentice Hall Inc.

4. Kendall, K.E and Kendall, J.E. (1999). *System Analysis and Design.* 4th Edition. Prentice Hall Inc.

5. Pfleeger, S.L. (1998). *Software Engineering: Theory and Practice.* 2nd Edition. Prentice Hall.

6. Coulouris, Dollimore and Kindberg (2001). *Distributed Systems Concepts and Design.* 3rd Edition. Addison-Wesley.

7. Lan Coley (2001). *How to Use Dreamweaver 4 and Fireworks 4.* Sams Publishing.

8. William Stallings (1997). *Data and Computer Communications.* 5th Edition. Prentice Hall.

9. Behrouz A. Farouzan (2000). *Data Communications and Networking*. McGraw Hill.

10. Microsoft Corporation. http://www.microsoft.com

11. Allaire Corporation. http://www.allaire.com

12. Oracle Corporation. http://www.oracle.com

13. Macromedia Dreamweaver 4 tutorials and training courses. http://www.vtc.com/dreamweaver4.htm

14. Dreamweaver Support Forums. http://webforums.macromedia.com/dreamweaver/

Appendix I

Questionnaire

QUESTIONNAIRE OF ONLINE GRADUATE JOB VACANCIES SYSTEM

The purpose of this questionnaire is to gauge the understanding of users of Online Graduate Job Vacancies System. I would appreciate if you could take a few minutes to respond to this brief survey. As the developer of the system, I would be grateful to learn about what users have found to be both positive and negative in their experience as users of the system. The information that is collected will be used as a guideline in developing initiatives that enhance the quality of Online Graduate Job Vacancies System.

Thank you for taking the time to participate in this survey.

Note: The identity of all respondents will be kept confidential in that no names or e-mail addresses will be associated with a specific response.

A BACKGROUND INFORMATION

1. Year of study

2. Department

3. Faculty

B SURVEY ON THE SYSTEM INTERFACE

Please tick [√] to choose your answer.

Based on the scale of 1-not satisfactory to 5-very satisfactory

1. System Navigation/Hyperlink

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

2. Background Colour/Image

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

3. Download Time

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

4. Image/Graphic

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

5. Straightforward and Clarity of Contents

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

6. Overall system display

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

C SURVEY ON THE SYSTEM FUNCTIONS

1. Do you find the system user friendly?

☐ Agree ☐ Neither ☐ Disagree

2. Do you understand functions in the system?

☐ Agree ☐ Neither ☐ Disagree

3. Do you find the way information/linking displayed confusing?

☐ Agree ☐ Neither ☐ Disagree

4. Is the system useful for you?

☐ Agree ☐ Neither ☐ Disagree

5. Would you continue using the system?

☐ Agree ☐ Neither ☐ Disagree

6. Any comments/opinions?

Appendix II

User Manual

TABLE OF CONTENTS

PART 5: ADMINISTRATOR MODULE

LIST OF FIGURES

Introduction

Online Graduate Job Vacancies System is a web based recruitment system developed with the primary purpose of implementing the system in the internet as a solution to provide fast, efficient and reliable employment seeking services to users. The system aims to provide easy and paperless recruitment process. With one click of the mouse, candidates may view and apply for job vacancies effortlessly.

Project Objectives

The main objectives of this project are as listed below:

- To design a web-enabling system.
- To provide systematic matching of job seekers to job vacancies.
- To provide a search engine for job browsing by location, specialization and position.
- To include innovative features in resume writing through uploading passport size photographs and video clips.
- To provide online job posting for employers and recruiters.
- To include additional job vacancies gathered from newsprint advertisements.
- To notify short listed candidates and future employers via email. Employers may also view list of short listed candidates in the system.
- To provide up to date information on recruitments and employments.
- To create an effective and user friendly interface.

About This Manual

Online Graduate Job Vacancies System user's manual will provide you a step-by-step guide through the application from the process of setting up to using the functions in the system. This manual will be divided into five parts, which consist of:

- Hardware and software requirements which contain the requirements for both server and client's computer.
- How to access Online Graduate Job Vacancies System through the web.
- Candidate Module which consists of candidate registration, vacancy, job application, search function and information services.
- Employer Module which consist of employer registration, post job, view candidates and information services.
- Administrator Module which include account, article and other jobs.

PART 1: HARDWARE AND SOFTWARE REQUIREMENTS

In order for Online Graduate Job Vacancies System to function successfully, the following requirements are recommended:

1.1 Hardware Requirements for Server

- Intel Pentium Processor
- 64 MB RAM or above
- Hard disk space of at least 50 MB free space
- 14.4 Kbps modem or Internet connection
- Other standard peripherals including keyboard, mouse and monitor

1.2 Software Requirements for Server

- Microsoft Windows 2000 Server
- Microsoft SQL Server 7.0
- Internet Explorer
- Microsoft Internet Information Server (IIS) 5.0

1.3 Hardware Requirements for Client

- Intel Pentium Processor
- 32 MB RAM or above
- Hard disk space of at least 50 MB free space
- 14.4 Kbps modem or Internet connection
- Other standard peripherals including keyboard, mouse and monitor

1.4 Software Requirements for Client

- Microsoft Windows Operating System
- Internet Explorer

PART 2: ACCESSING ONLINE GRADUATE JOB VANCANCIES SYSTEM

2.1 Accessing System Through the Web

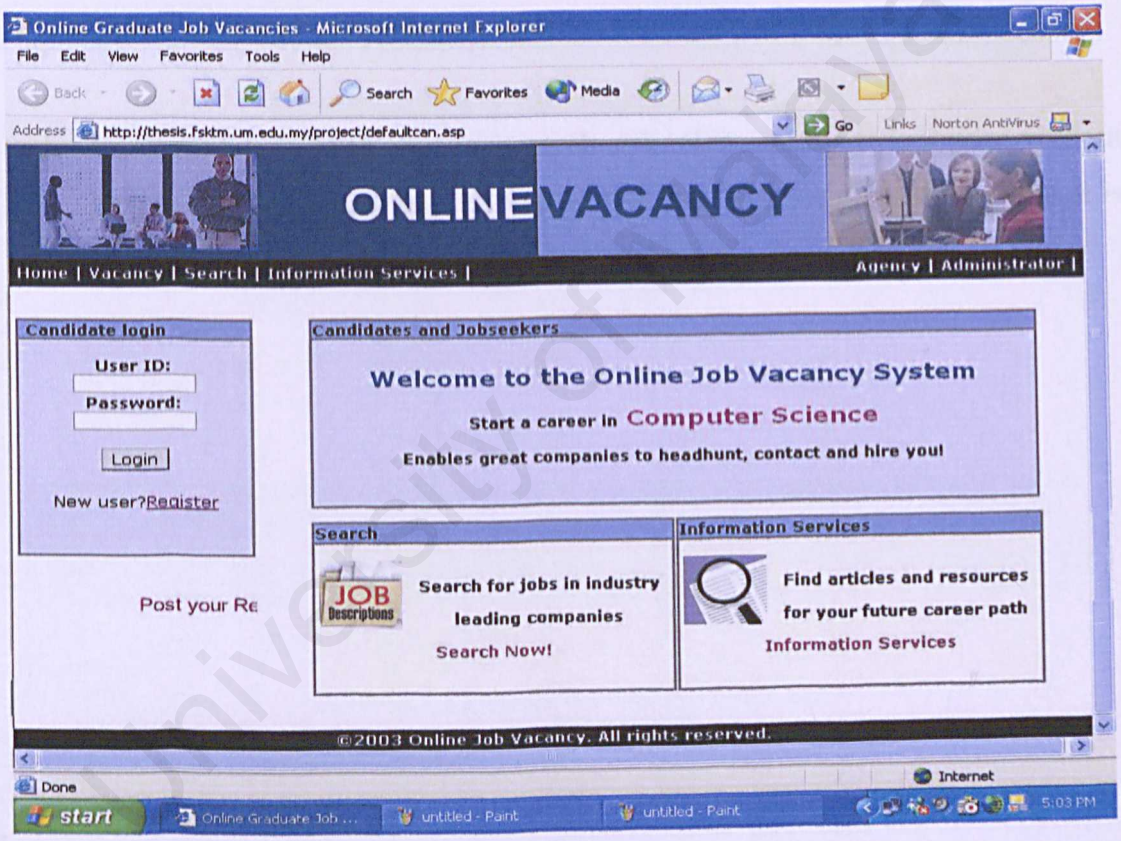


Figure 2.1: Main Page of Online Graduate Job Vacancies System

1. Open web browser, Internet Explorer.

2. Type the URL of the website in the address box and press enter. The URL address is http://thesis.fsktm.um.edu.my/project/defaultcan.asp

3. System's homepage will be displayed. The main page will provide users with information regarding the functions and the scope of the system. Refer to Figure 2.1: Main Page of Online Graduate Job Vacancies System.

4. At the lower section of the banner, there are a few links that will direct users based on the category of users, such as candidate, employer or administrator.

5. Users may browse in vacancy, search and information services page without having to register as a user. However, for further utilization of functions it is highly recommended that user register at the login box.

PART 3: CANDIDATE MODULE

3.1 Candidate Registration

Registration page provide a registration facility for new candidates.

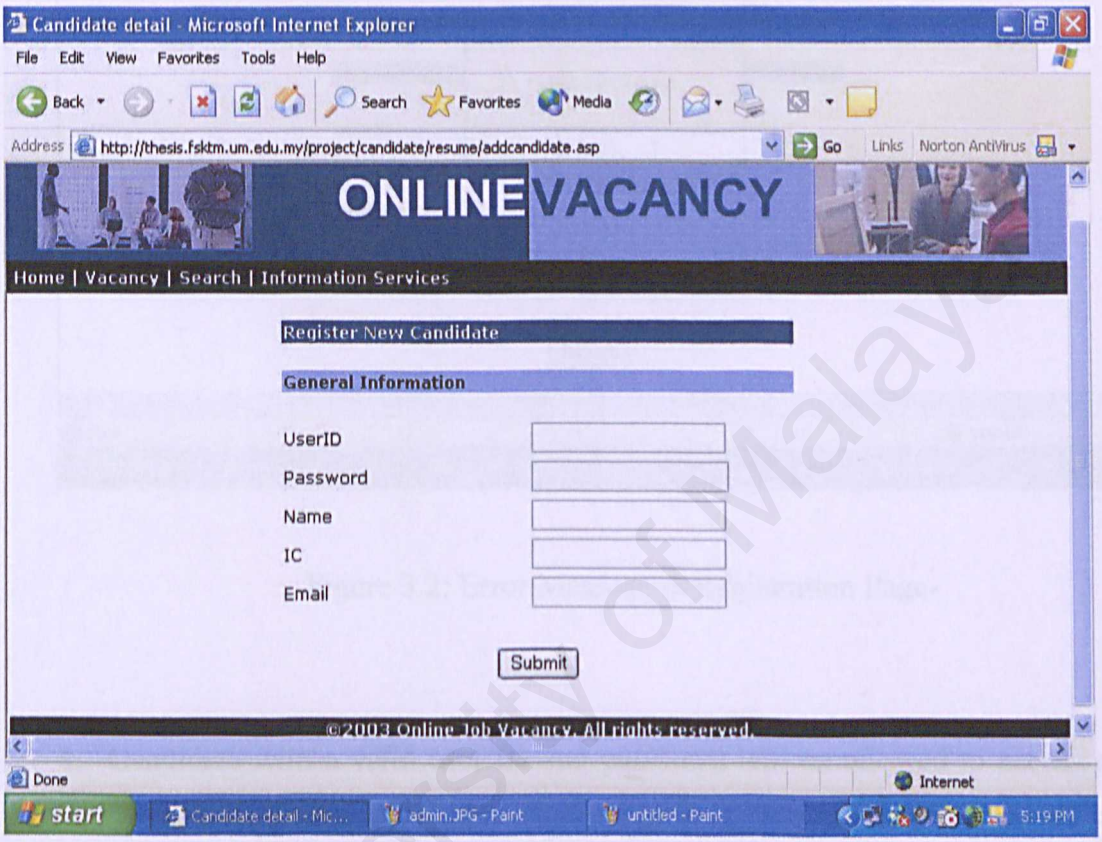


Figure 3.1: Candidate Registration Page

1. Fill in the required field in the form displayed and click Submit button. Refer to Figure 3.1: Candidate Registration Page.

2. Failure to complete all field will result in the system prompting candidate with an error message. Refer to Figure 3.2: Error Message in Registration Page.

3. If successful, candidate will be redirected to the main page for logging in.

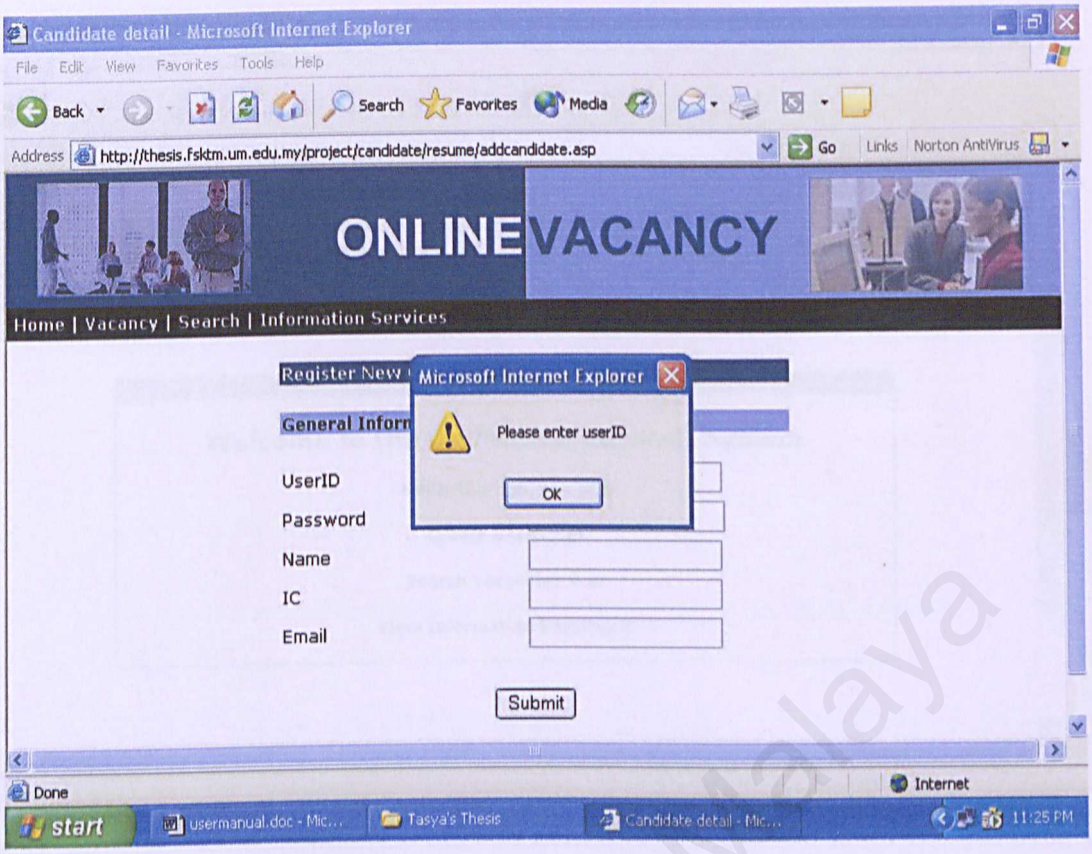


Figure 3.2: Error Message in Registration Page

4. Candidate with a valid user ID and password will be allowed to access and the personalized main menu will be displayed. The candidate's user ID will also be shown in the page. Refer to Figure 3.3: Candidate Main Menu.

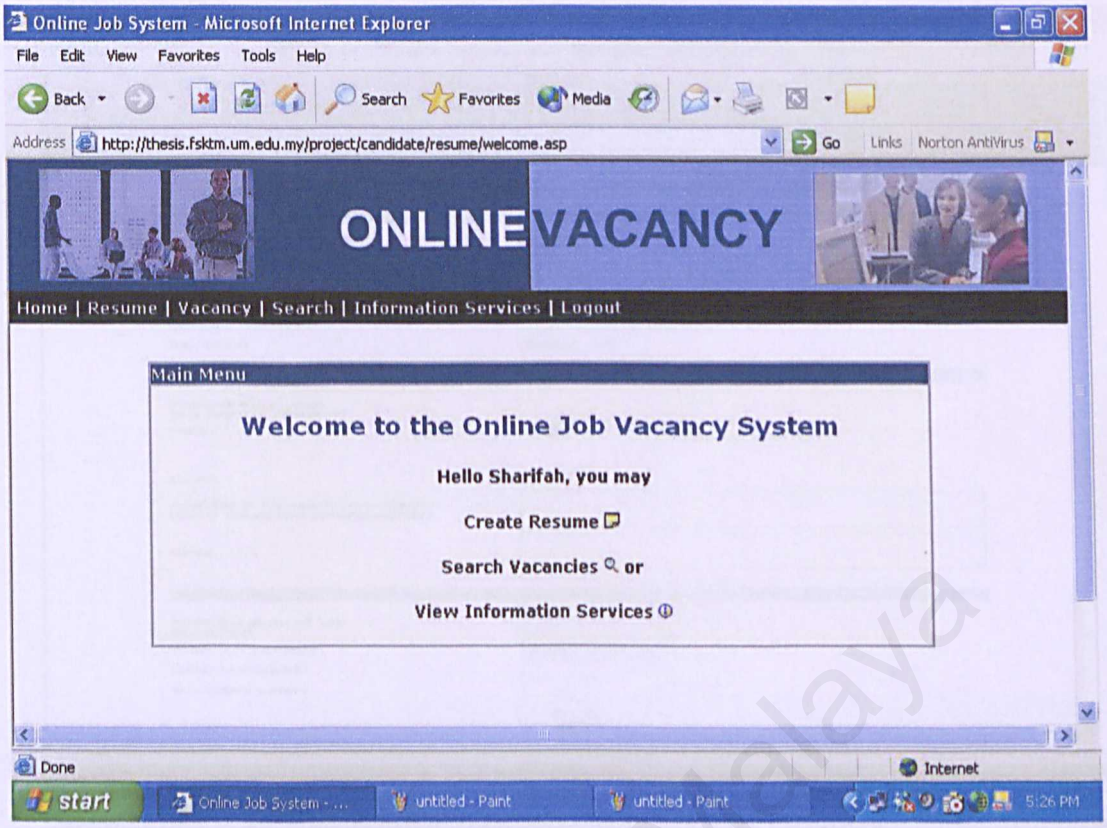


Figure 3.3: Candidate Main Menu

3.2 Create Resume

The system provide an online resume that candidate can fill in with their particulars.

1. Click on the Resume link.

2. Candidate will be directed to Create Resume Page. Candidate may fill in details in the respective fields. After filling in the details, click on Next button. Refer to Figure 3.4: Create Resume Page.

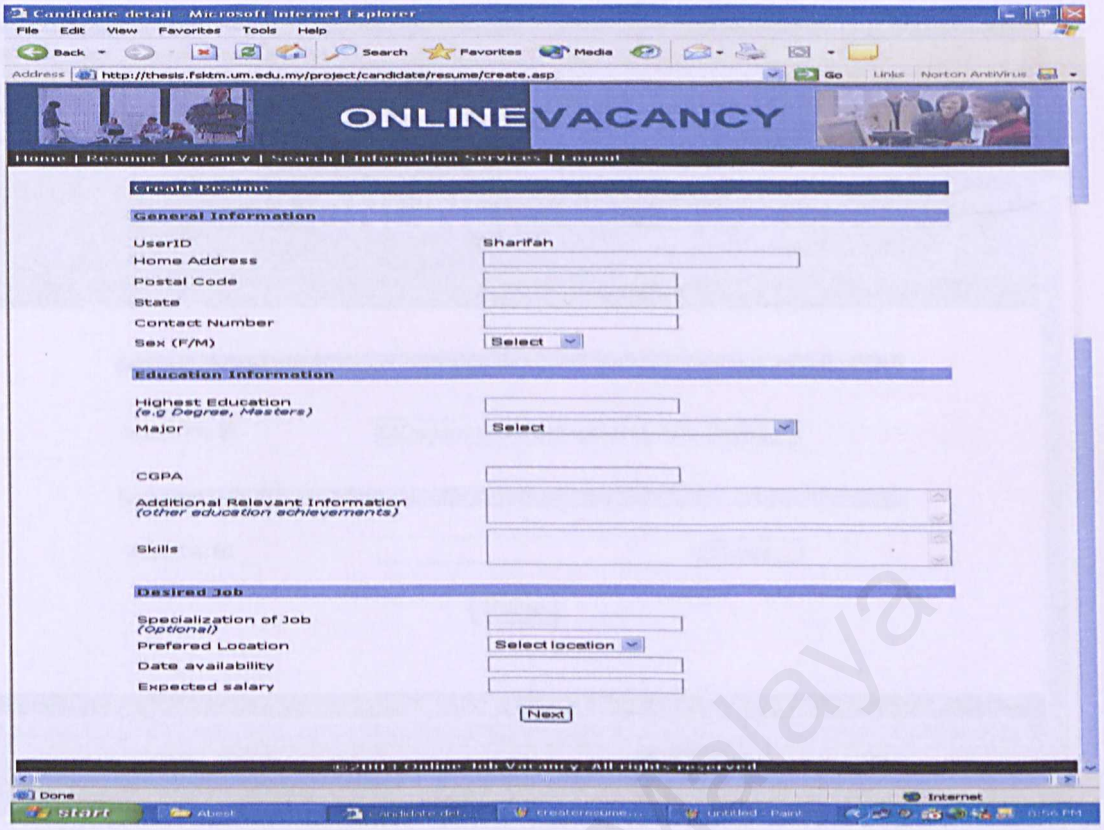


Figure 3.4: Create Resume Page

3. Candidate will be directed to uploading page. Here candidate may upload passport size photograph or video clips into the system. Refer to Figure 3.5: Upload Photo and Video Page.

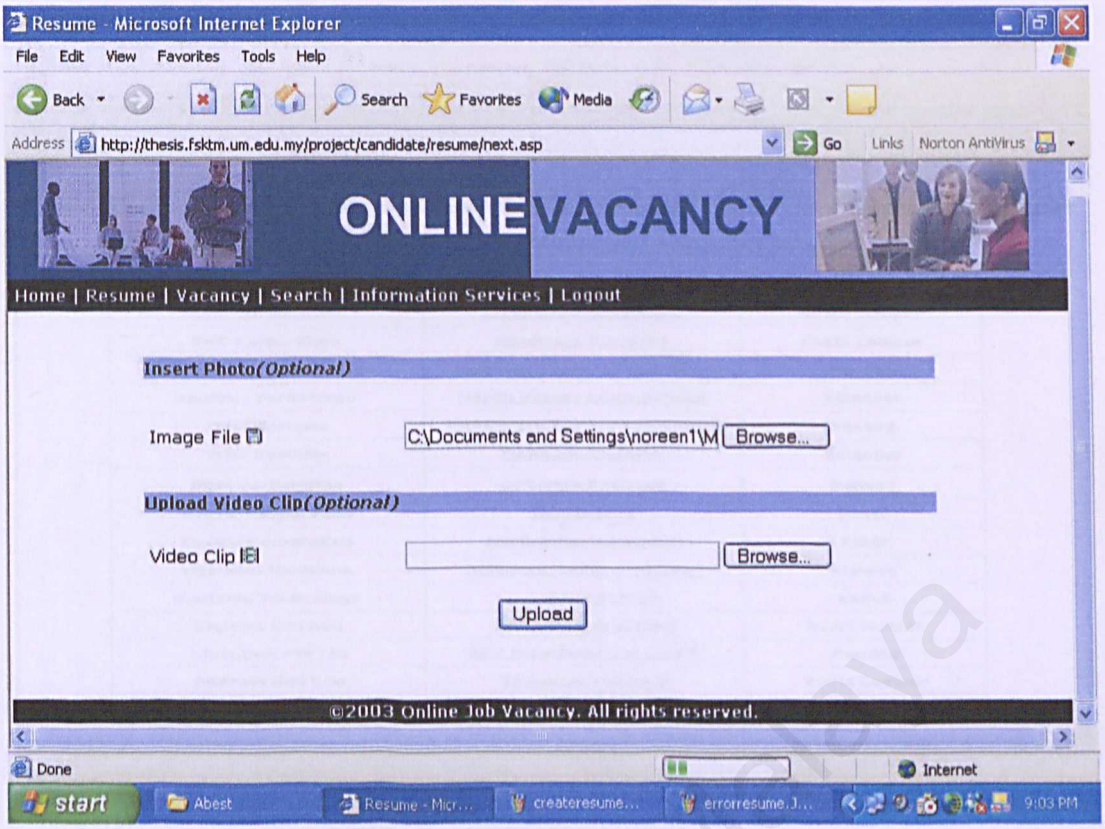


Figure 3.5: Upload Photo and Video Page

3.3 Vacancy

Vacancy page will provide candidate with a list of vacancies posted in the system.

1. Click on the vacancy link.

2. Candidate will be directed to the list of vacancies page. Refer to Figure 3.6: Vacancy Page.

3. Click on the selected position to view further information about the job.

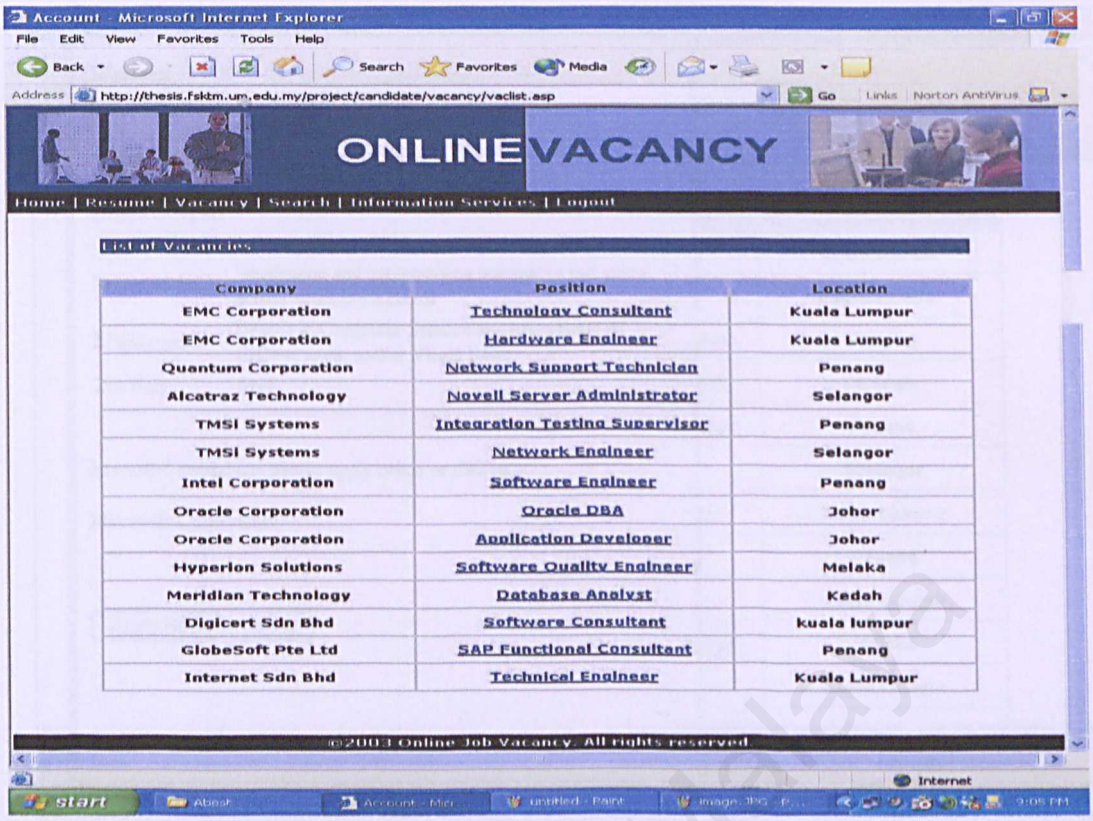


Figure 3.6: Vacancy Page

3.3 Job Application

Job application can be done through the list of vacancies page or the result from search page.

1. Click on the selected position to view information about the job. Refer to Figure 3.7: Job Information Page.

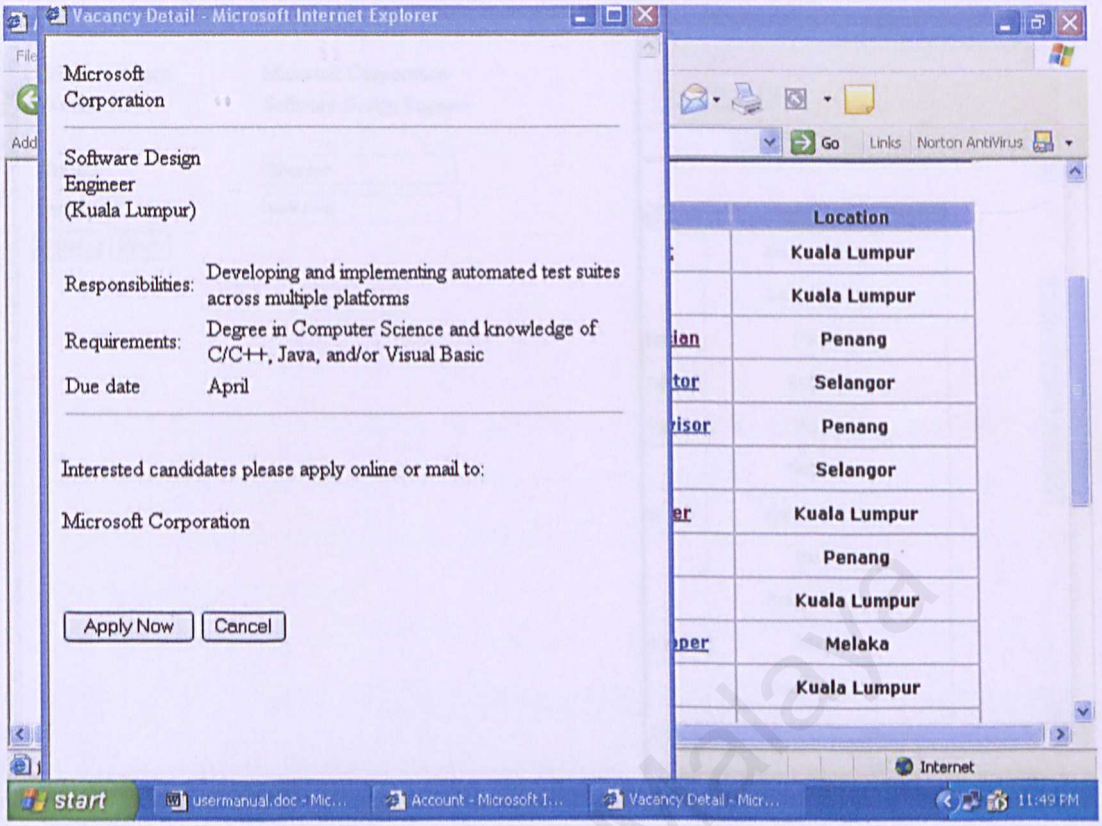


Figure 3.7: Job Information Page

2. If candidate has decided to apply for the respective position, click on Apply Now button. On the other hand, if the candidate is not interested, click Cancel button.

3. The system will need some verification in the form of user ID and password before application can be completed. Refer to Figure 3.8: Verification of Candidate Page.

4. When the candidate has inserted a valid user ID and password, a page stating that the application has been successful will be displayed. Refer to Figure 3.9: Application Successful Page.

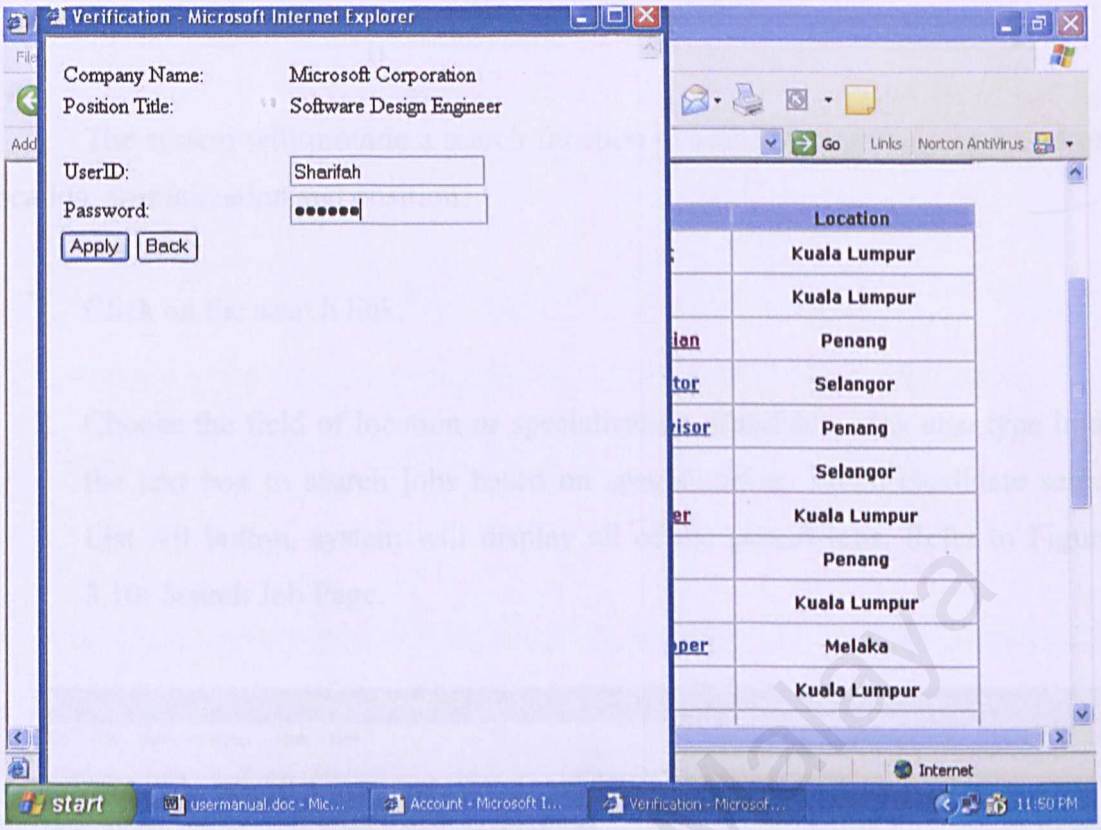


Figure 3.8: Verification of Candidate Page

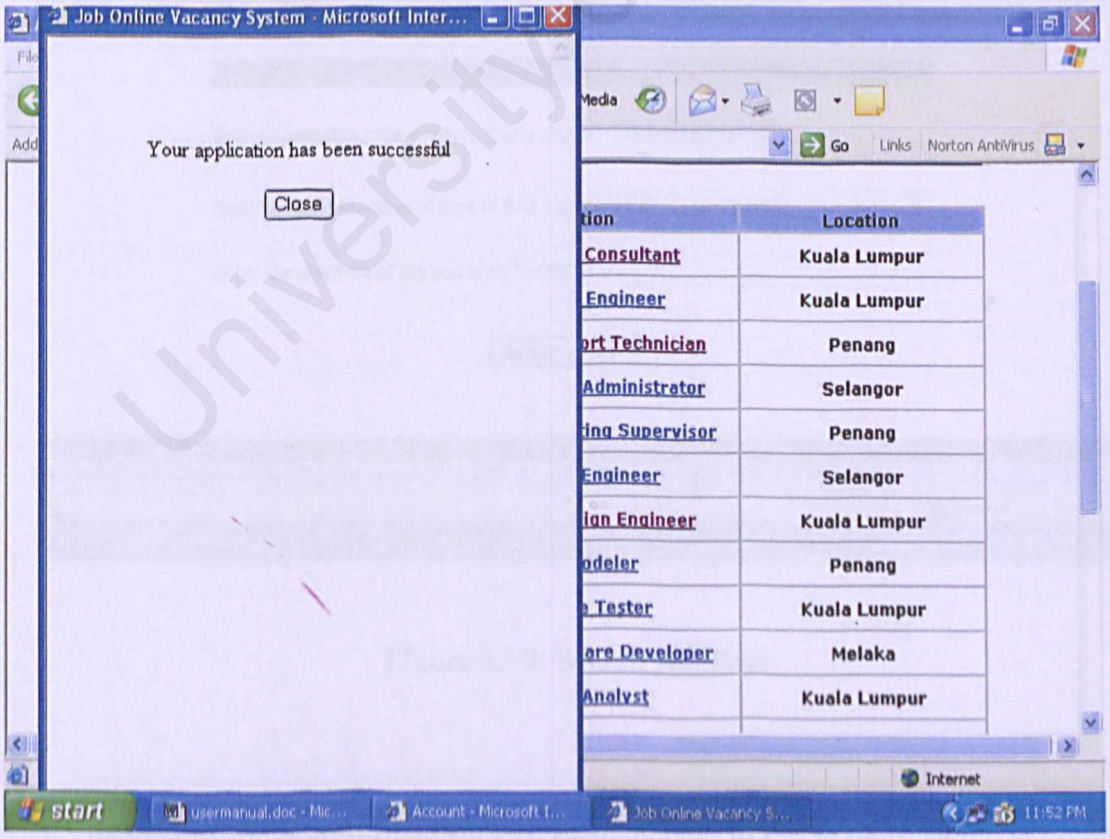


Figure 3.9: Application Successful Page

3.4 Search Function

The system will provide a search function to search for posted jobs based on location, specialization and position.

1. Click on the search link.

2. Choose the field of location or specialization. Candidate may also type in at the text box to search jobs based on specialization. When candidate select List All button, system will display all of the posted jobs. Refer to Figure 3.10: Search Job Page.

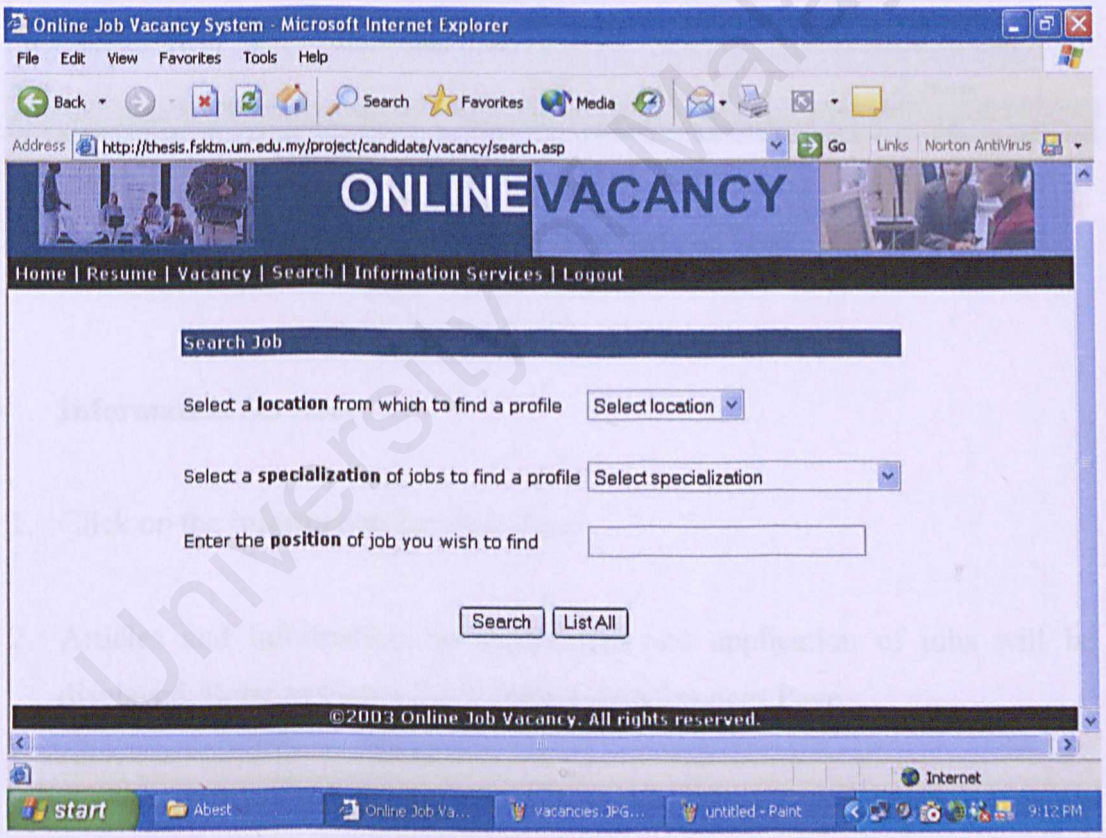


Figure 3.10: Search Job Page

3. Results of the search function will be displayed in the system. Refer to Figure 3.11: Search Results Page.

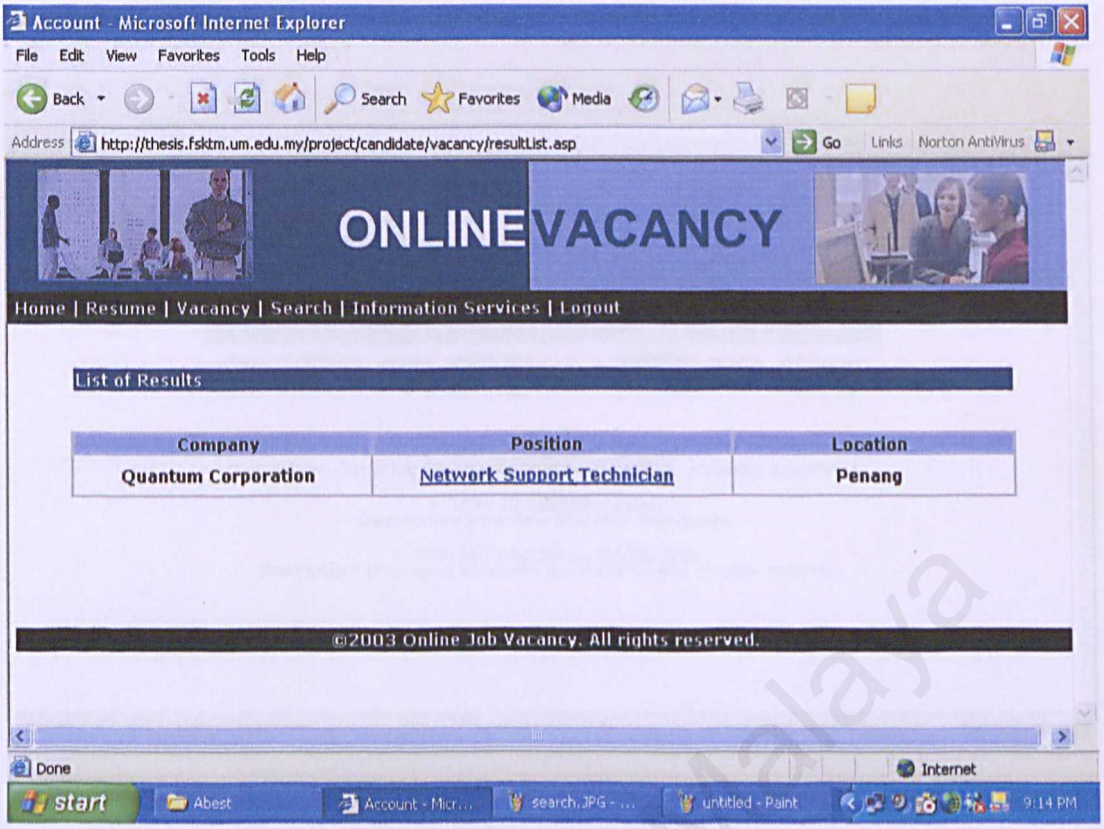


Figure 3.11: Search Results Page

3.5 Information Services

1. Click on the Information Services Page.

2. Articles and information on recruitment and application of jobs will be displayed. Refer to Figure 3.12: Information Services Page.

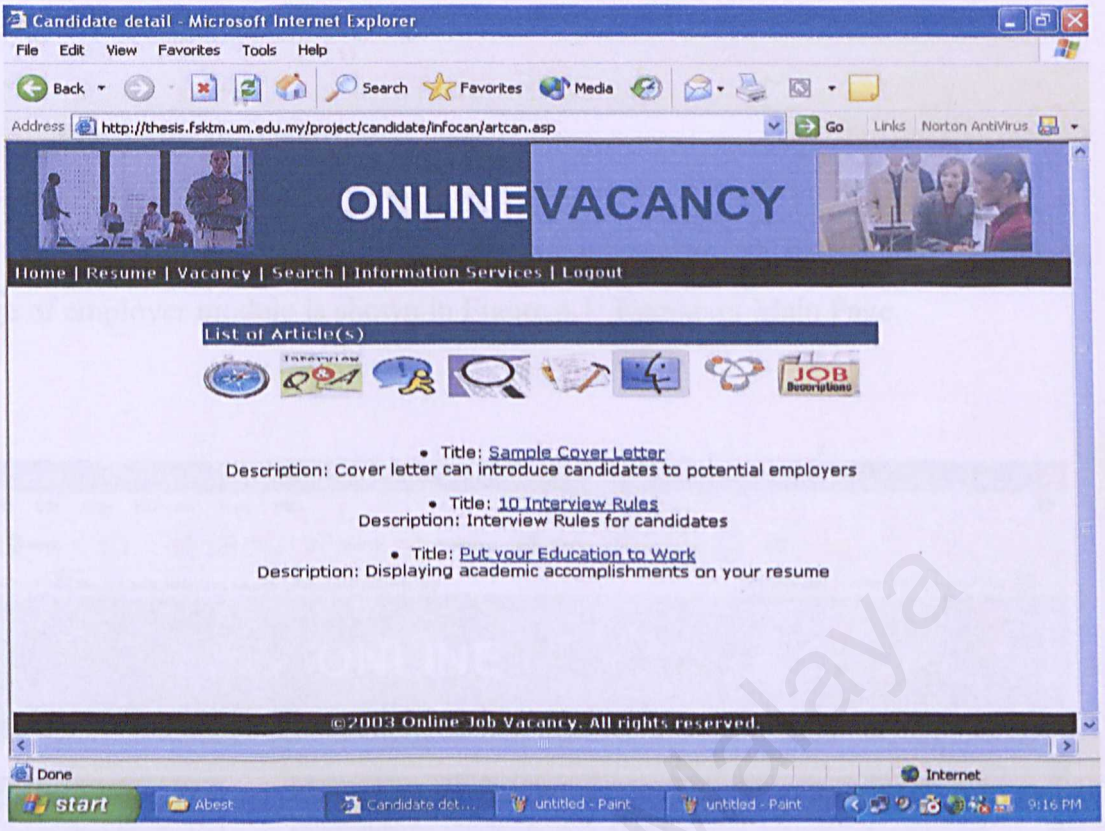


Figure 3.12: Information Services Page

PART 4: EMPLOYER MODULE

4.1 Employer Registration

Registration page provide a registration facility for new employers. Main page of employer module is shown in Figure 4.1: Employer Main Page.

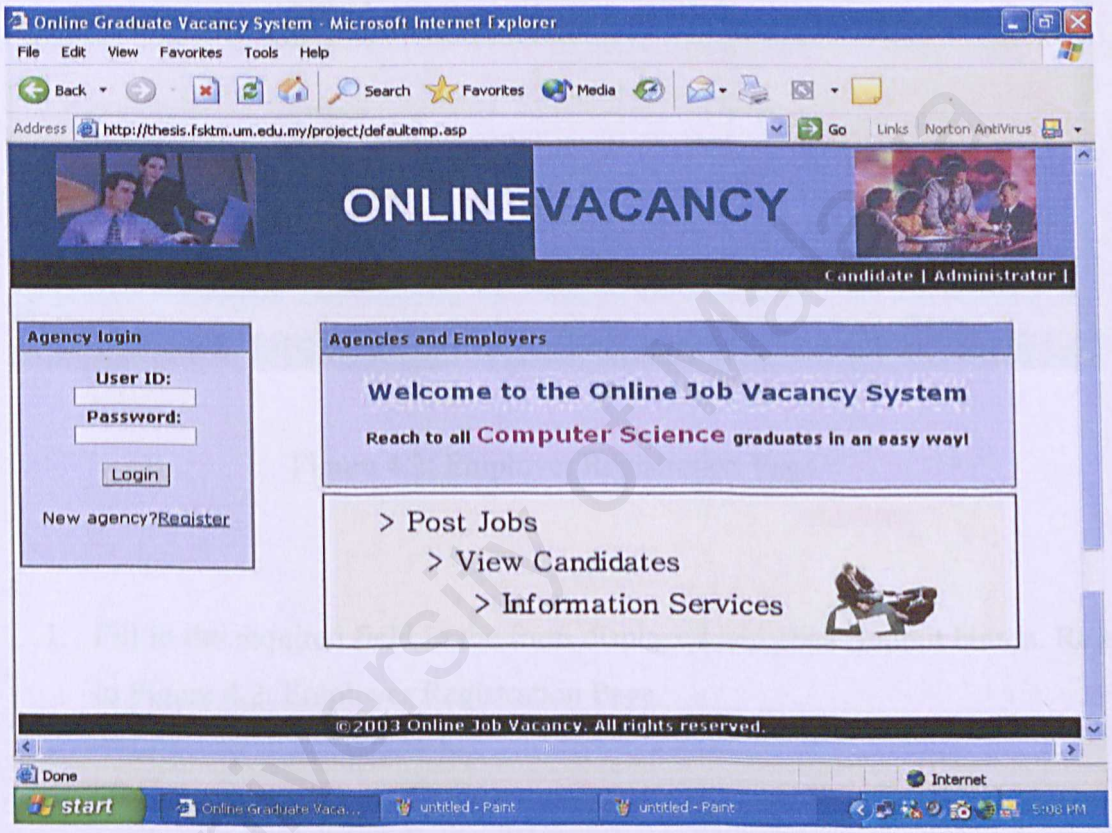


Figure 4.1: Employer Main Page

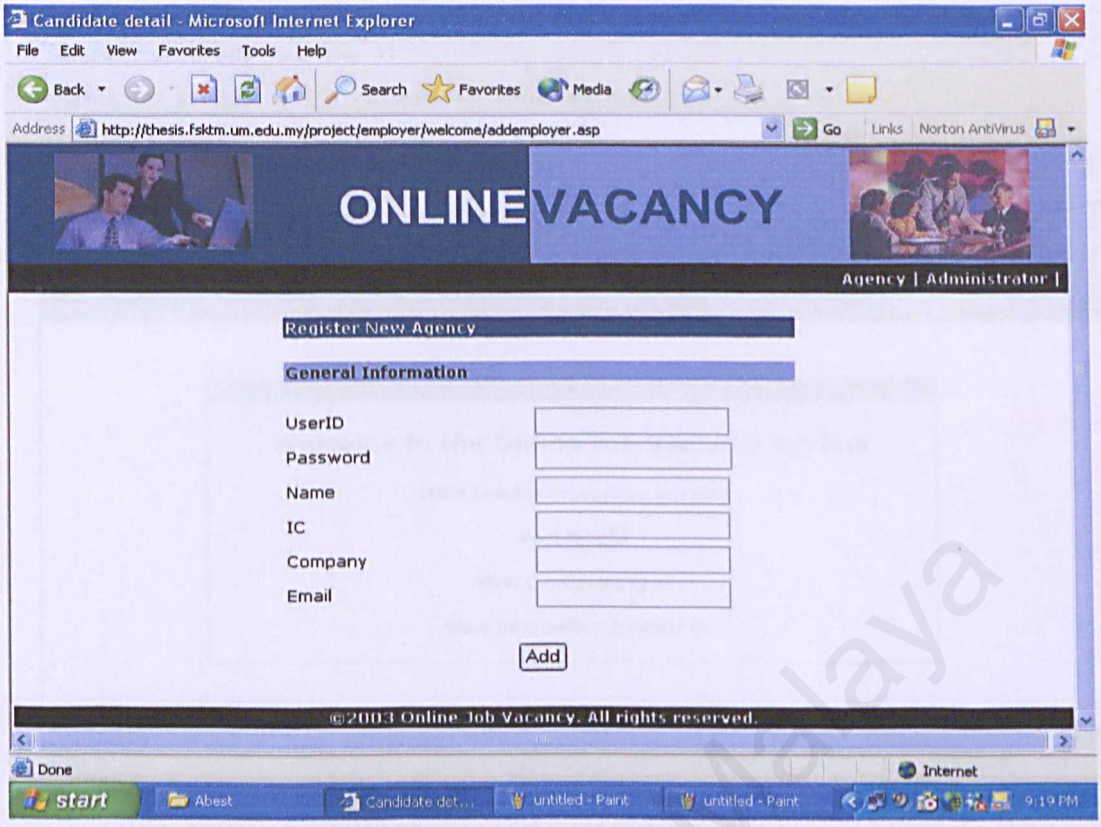


Figure 4.2: Employer Registration Page

1. Fill in the required field in the form displayed and click Submit button. Refer to Figure 4.2: Employer Registration Page.

2. If successful, employer will be redirected to the main page for logging in.

3. Employer with a valid user ID and password will be allowed to access and the personalized main menu will be displayed. The company name will also be shown in the page. Refer to Figure 4.3: Employer Main Menu.

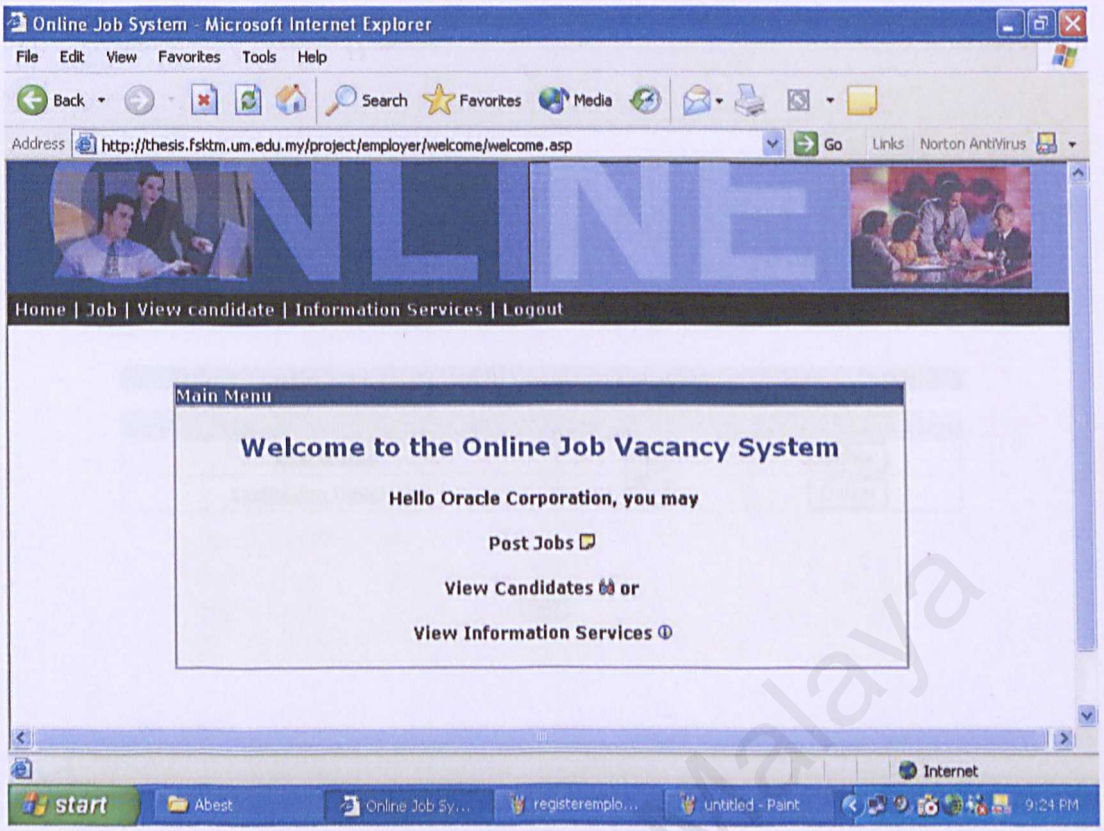


Figure 4.3: Employer Main Menu

4.2 Post Job

The system provides employers to post job in the system.

1. Click on the Post Job link. Refer to Figure 4.4: Post Job Page. Click on Add button.

2. Employer will be directed to Add Job Page. Employer may fill in details in the respective fields. After filling in the details, click on Submit button. Refer to Figure 4.5: Add Job Page.

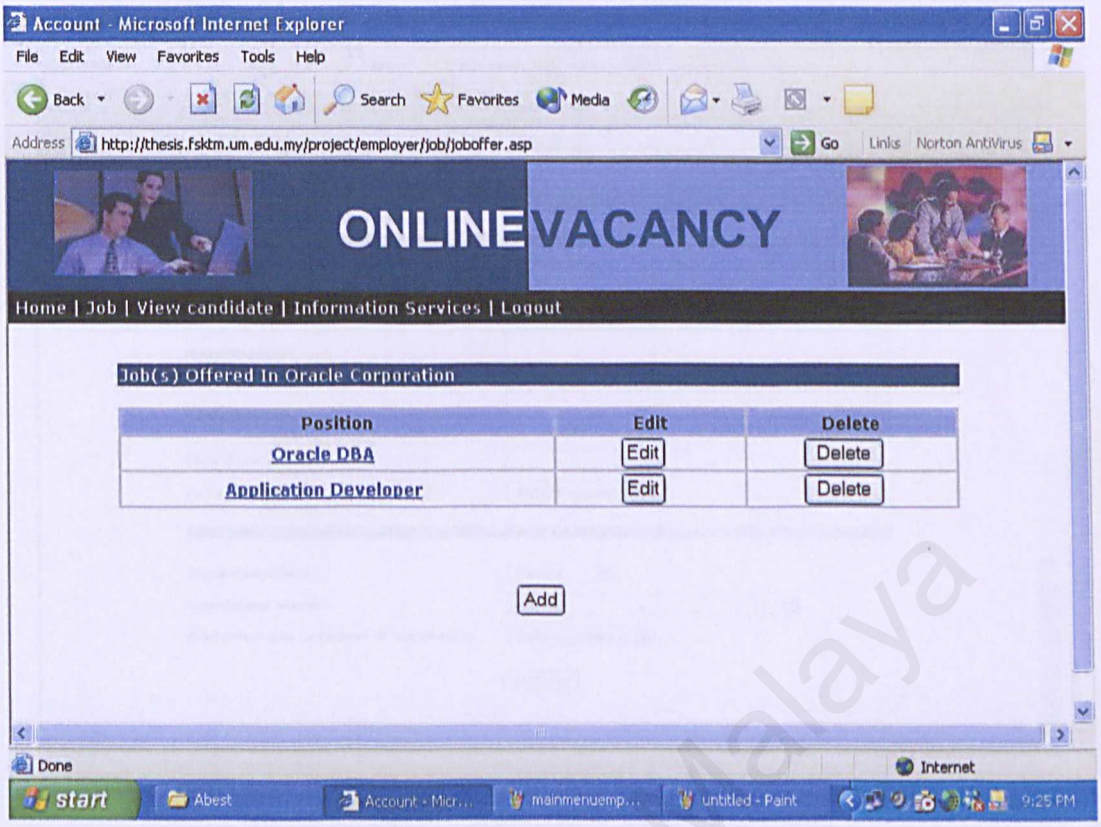


Figure 4.4: Post Job Page

3. In the Add Job Page, employer may specify criteria on which candidates will be shortlisted. The criteria are optional and it includes expected CGPA, candidate major and preferred job location of candidate. System will only match and shortlist candidates if the respective fields are equivalent to the data from the candidate. Refer to Figure 4.5: Add Job Page.

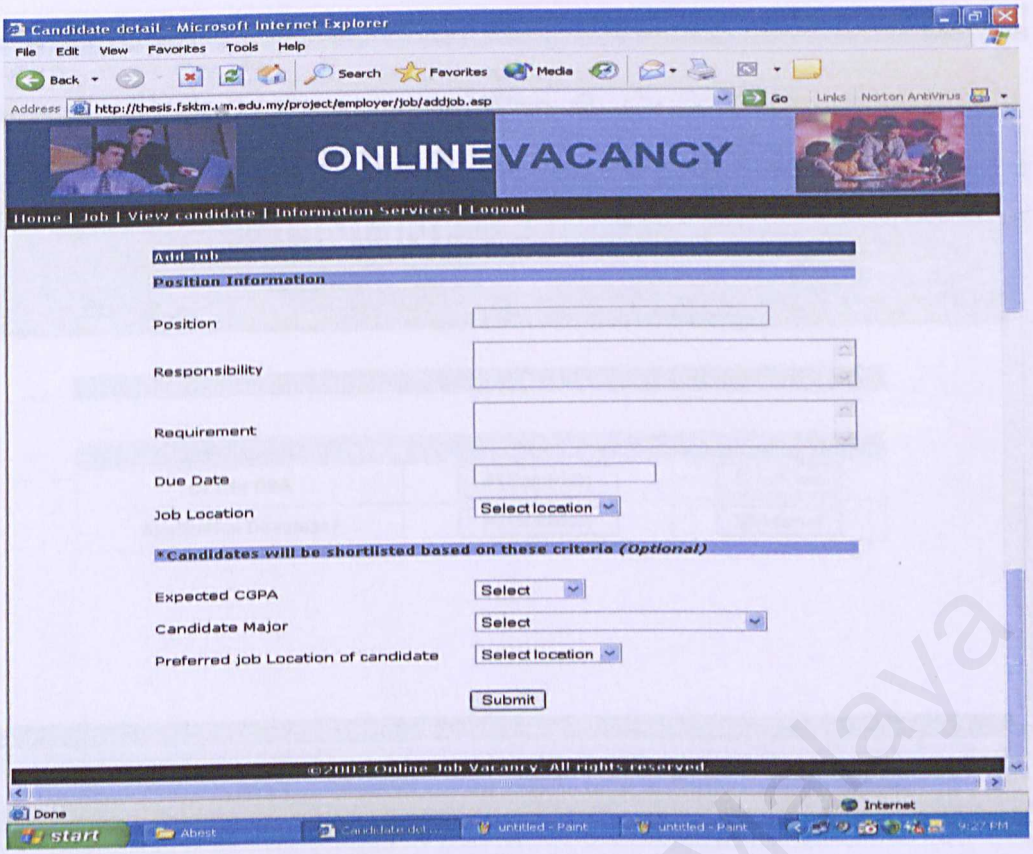


Figure 4.5: Add Job Page

4.3 View Candidates

The system provides employers to view candidates who applied for the posted jobs as well as shortlisted candidates.

1. Click on the View Candidate link.

2. Employer may choose to view all candidates or shortlisted candidates. Click on the respective buttons. Refer to Figure 4.6: View Candidate Page.

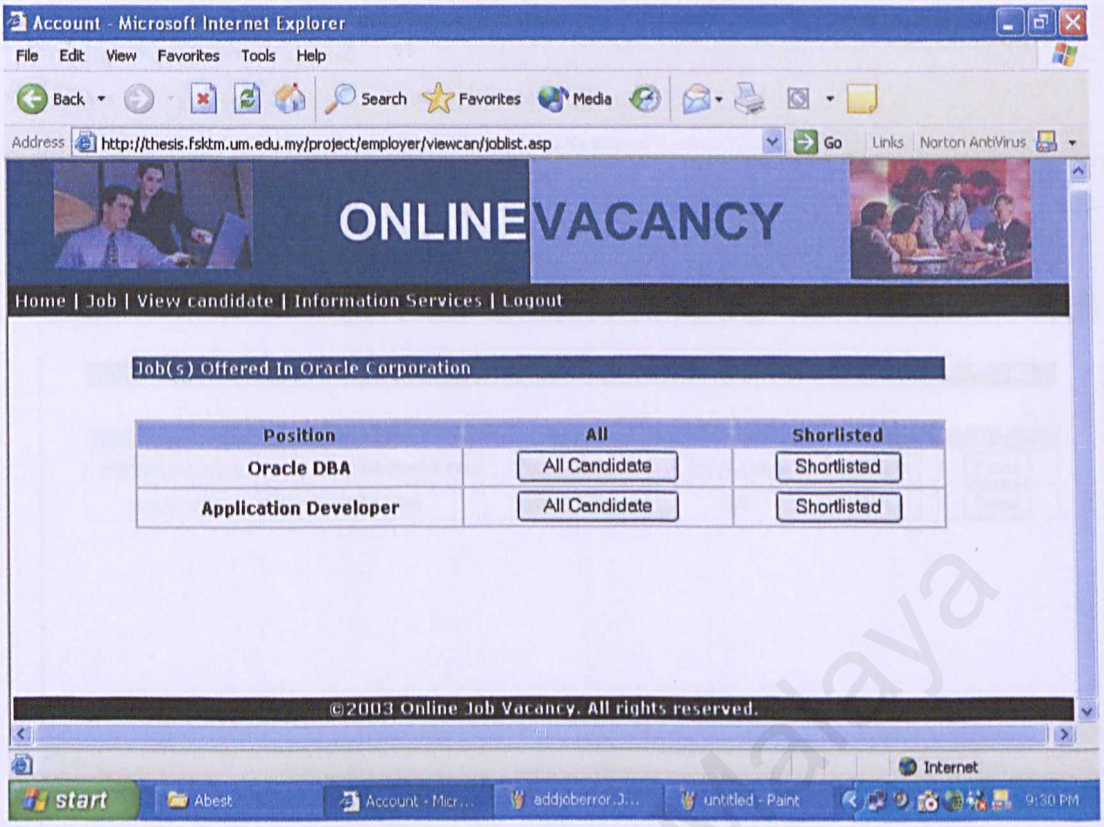


Figure 4.6: View Candidate Page

3. If employer chooses all candidates button, a list of all candidates who applied for the job will be displayed. Refer to Figure 4.7: List of All Candidates.

4. If employer chooses shortlisted button, a list of candidates who successfully has been shortlisted will be displayed.

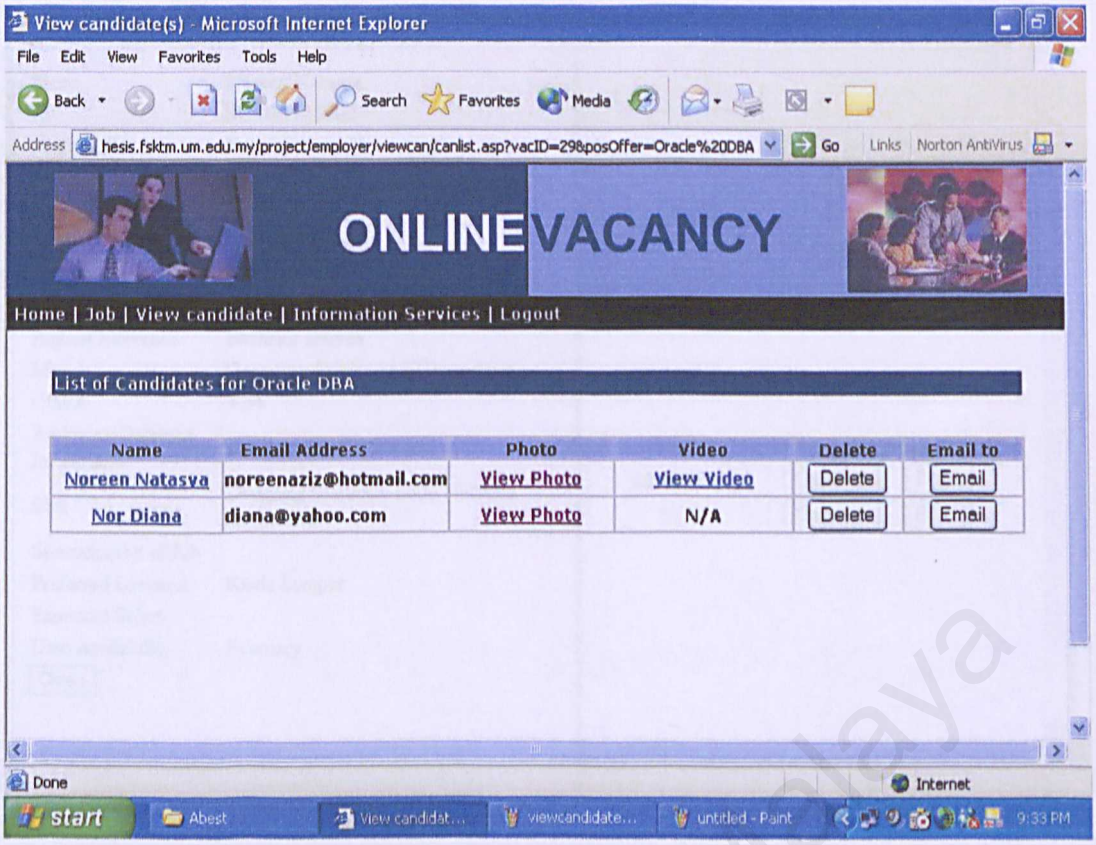


Figure 4.7: List of All Candidates

5. Employer may view candidate's resume by clicking the name of the candidate. Refer to Figure 4.8: Resume Details.

6. Employer may also view photo and video uploaded by candidate. Refer to Figure 4.9: Photo and Video Details.

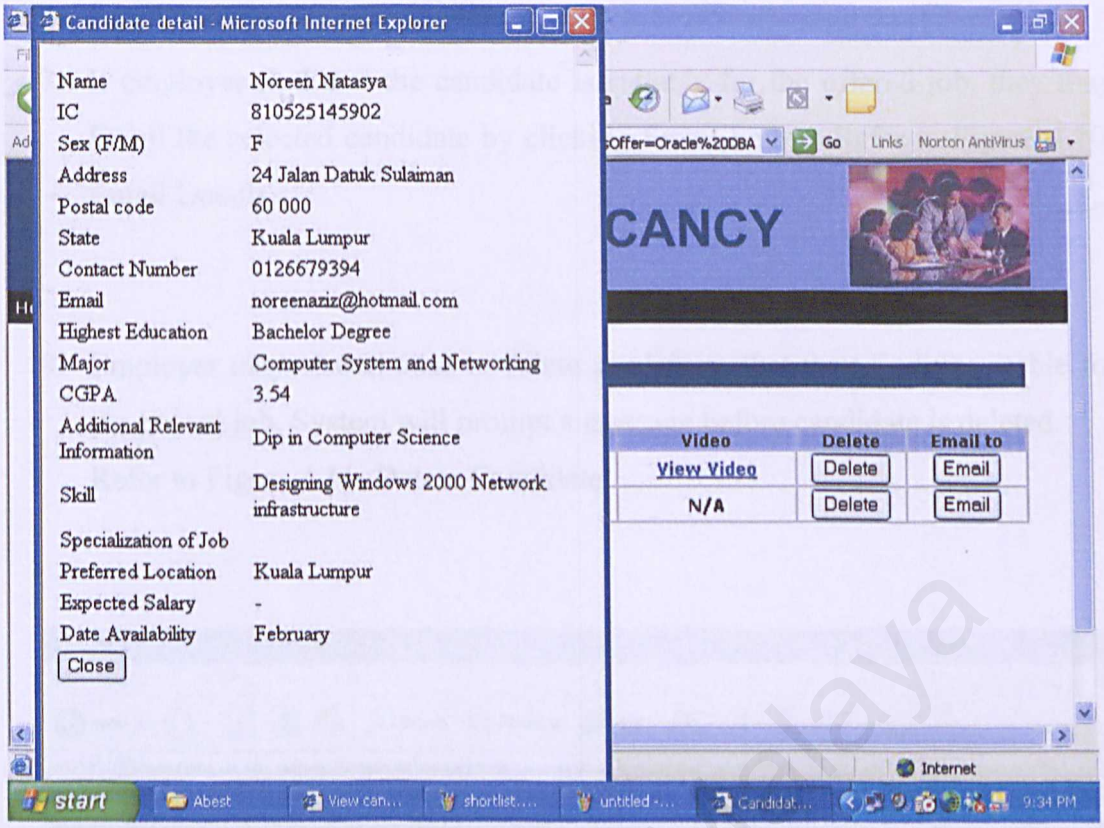


Figure 4.8: Resume Details

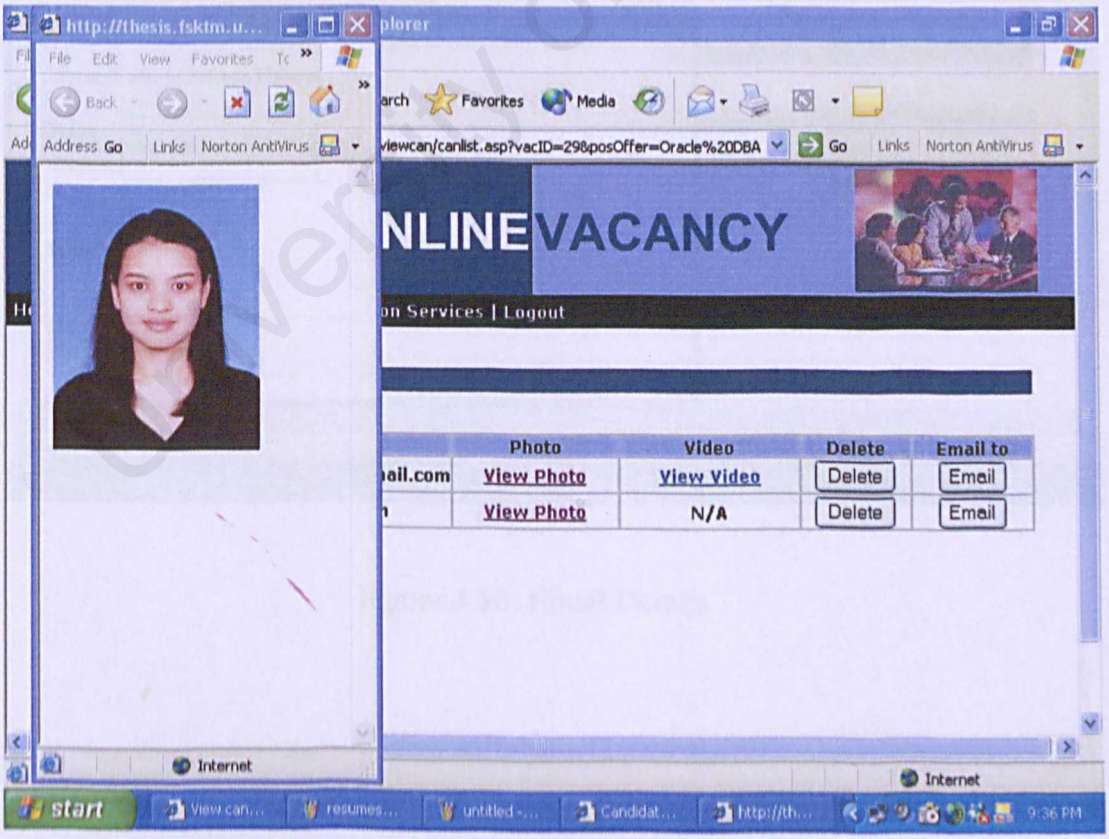


Figure 4.9: Photo and Video Details

7. If employer find that the candidate is suitable for the offered job, they may Email the selected candidate by clicking Email button. Refer to Figure 4.10: Email Details.

8. Employer may also choose to delete candidates that they find unsuitable for the posted job. System will prompt a message before candidate is deleted. Refer to Figure 4.11: Delete Candidate.

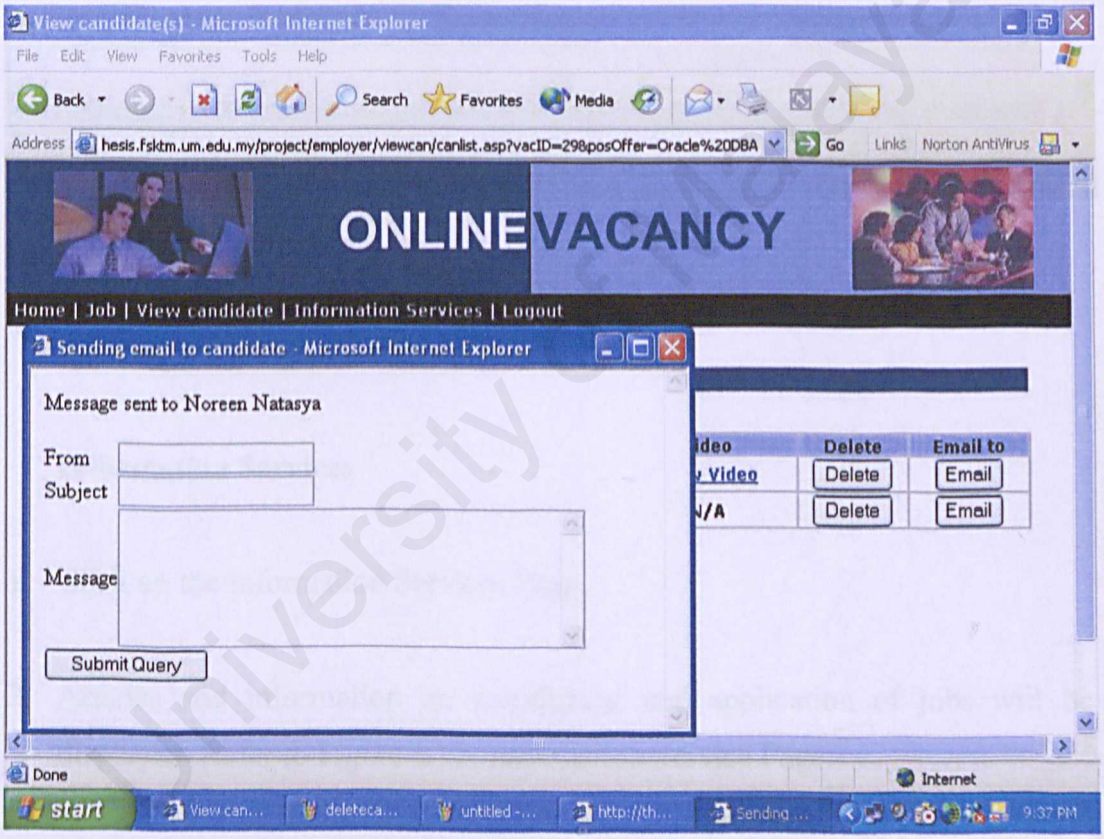


Figure 4.10: Email Details

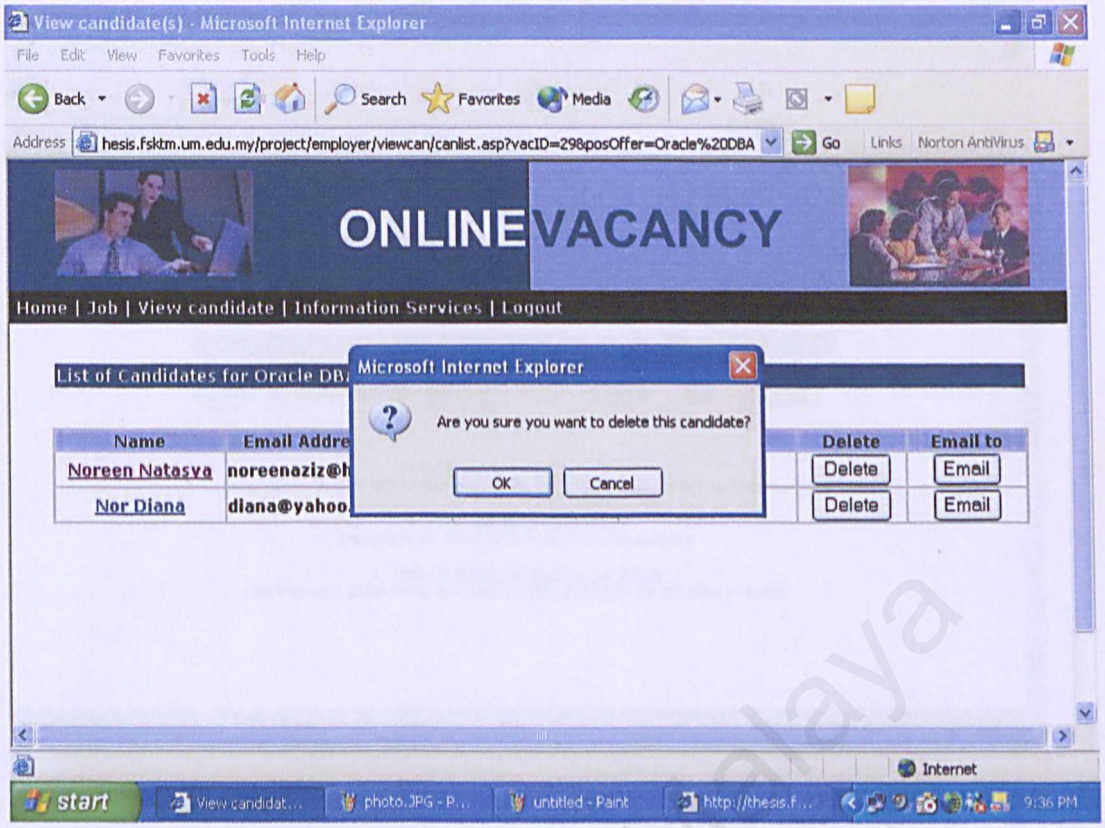


Figure 4.11: Delete Candidate

4.4 Information Services

1. Click on the Information Services Page.

2. Articles and information on recruitment and application of jobs will be displayed. Refer to Figure 4.12: Information Service Page.

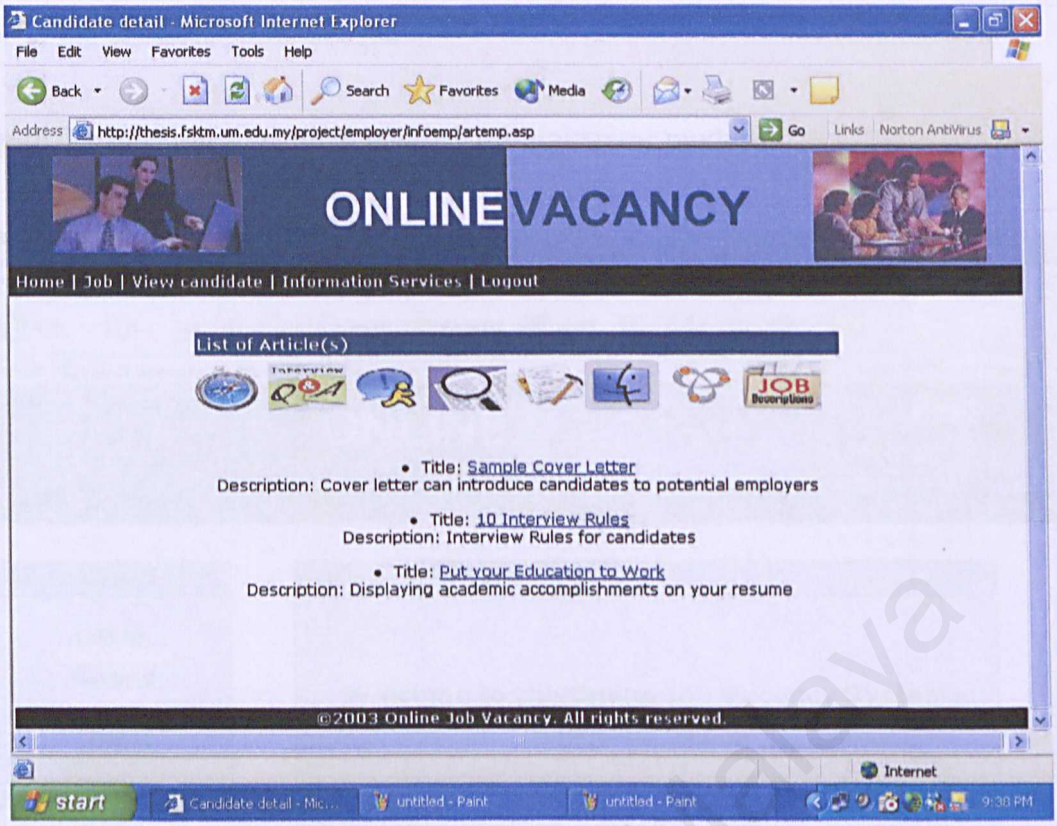


Figure 4.12: Information Service Page

PART 5: ADMINISTRATOR MODULE

Figure 5.1 illustrates the main page of Administrator module.

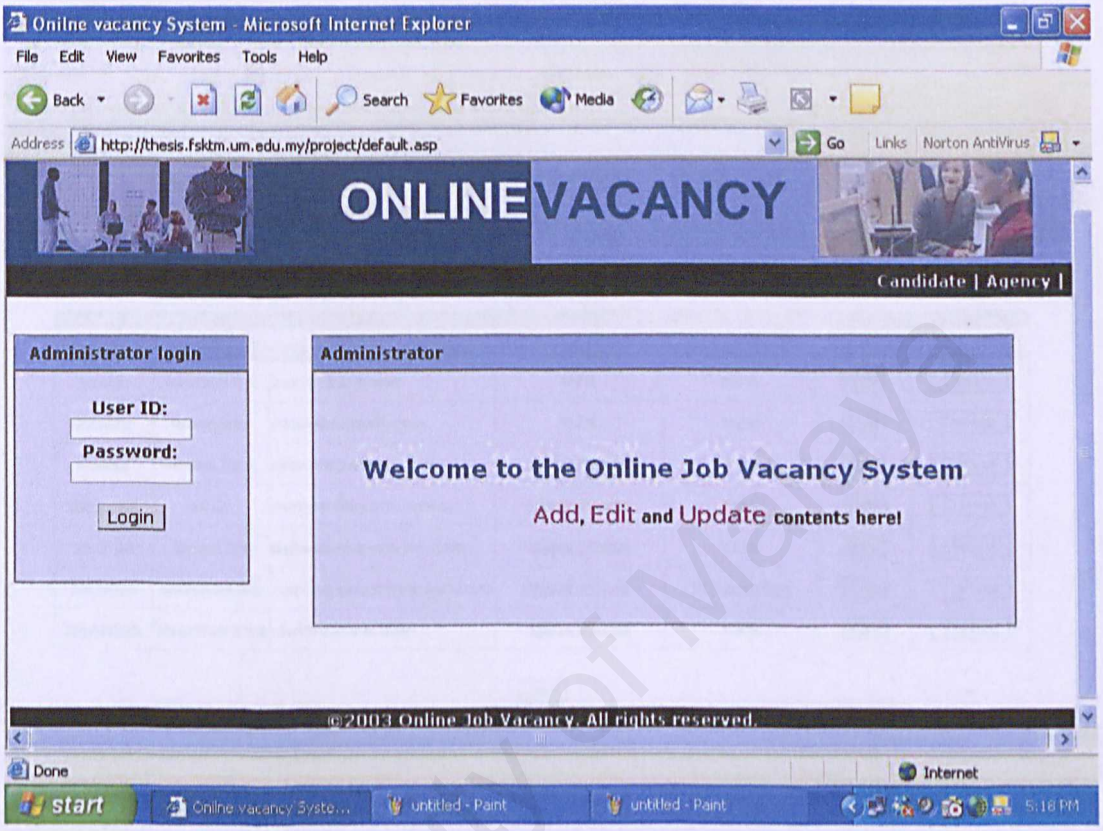


Figure 5.1: Administrator Main Page

1. Administrator will log in into the system using a valid user ID and password.

5.1 User Account

This function enable administrator to add, edit or delete users of the system.

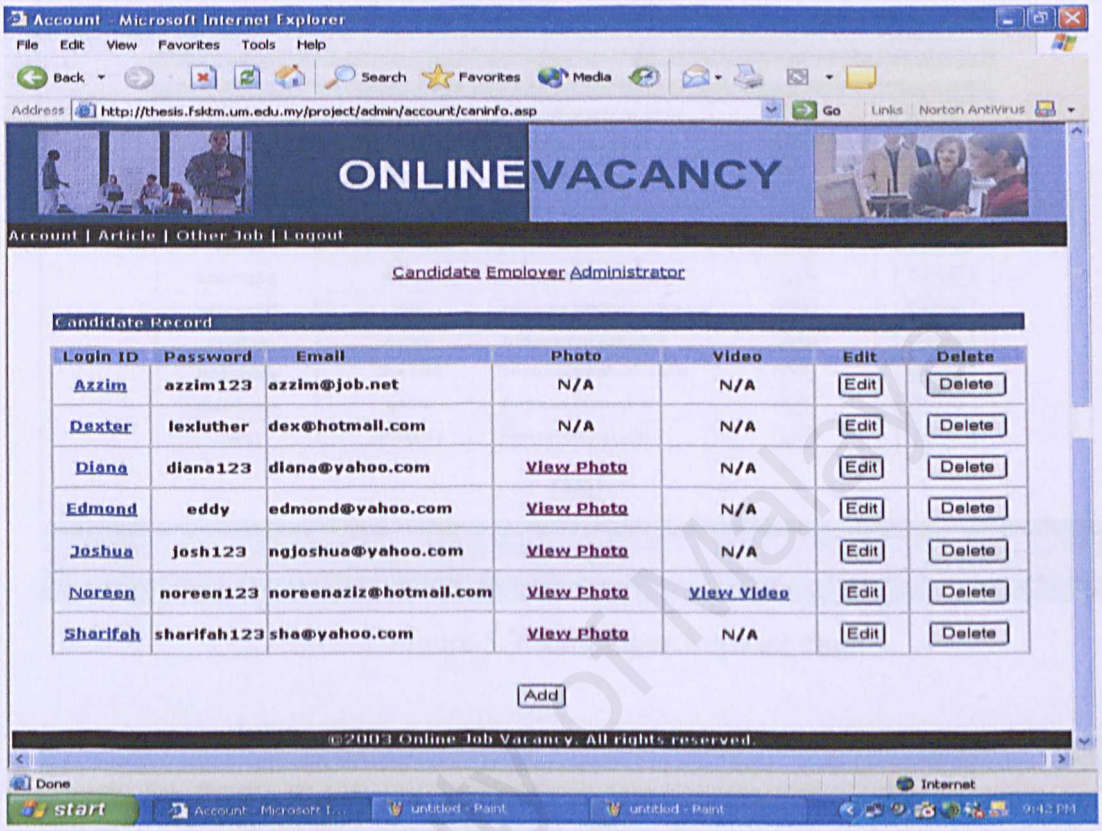


Figure 5.2: Candidate Account Page

1. After logging in, administrator will be directed to account page. Refer to Figure 5.2: Candidate Account Page.

2. Click on the Candidate, Employer or Administrator link on the upper side of the page to view, edit or delete information. Refer to Figure 5.3: Employer Account Page and Figure 5.4: Administrator Account Page.

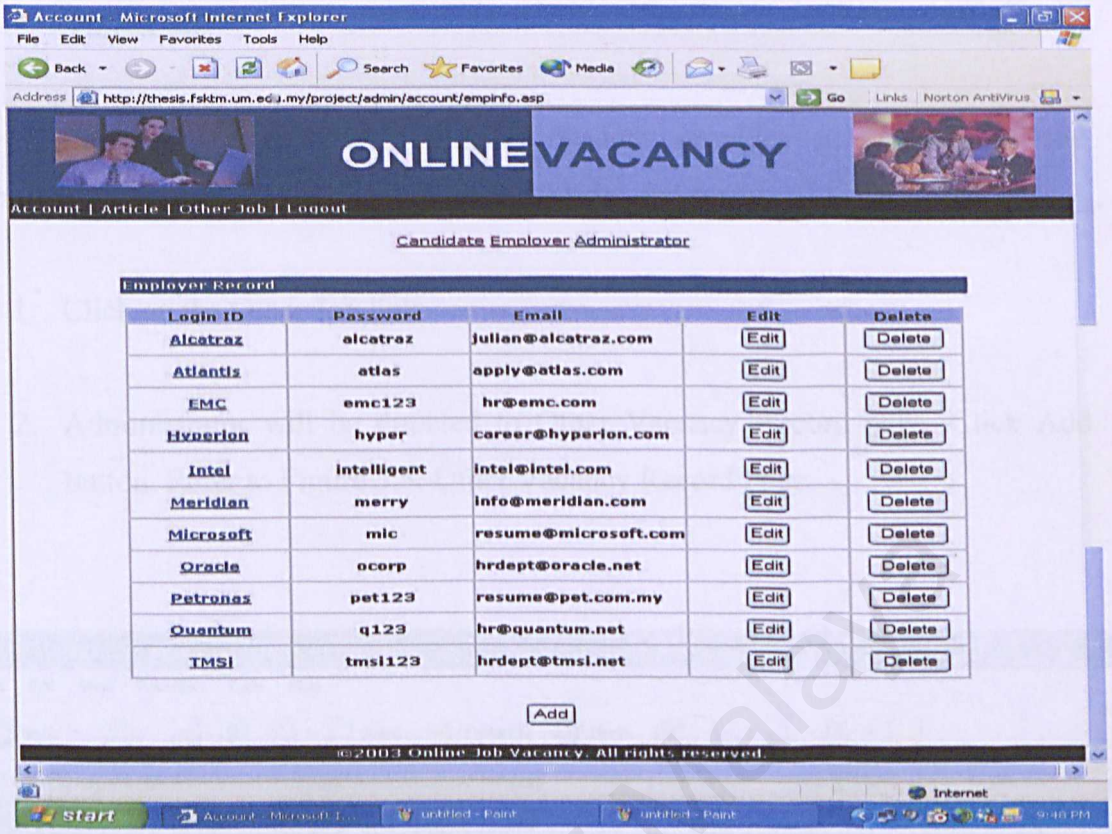


Figure 5.3: Employer Account Page

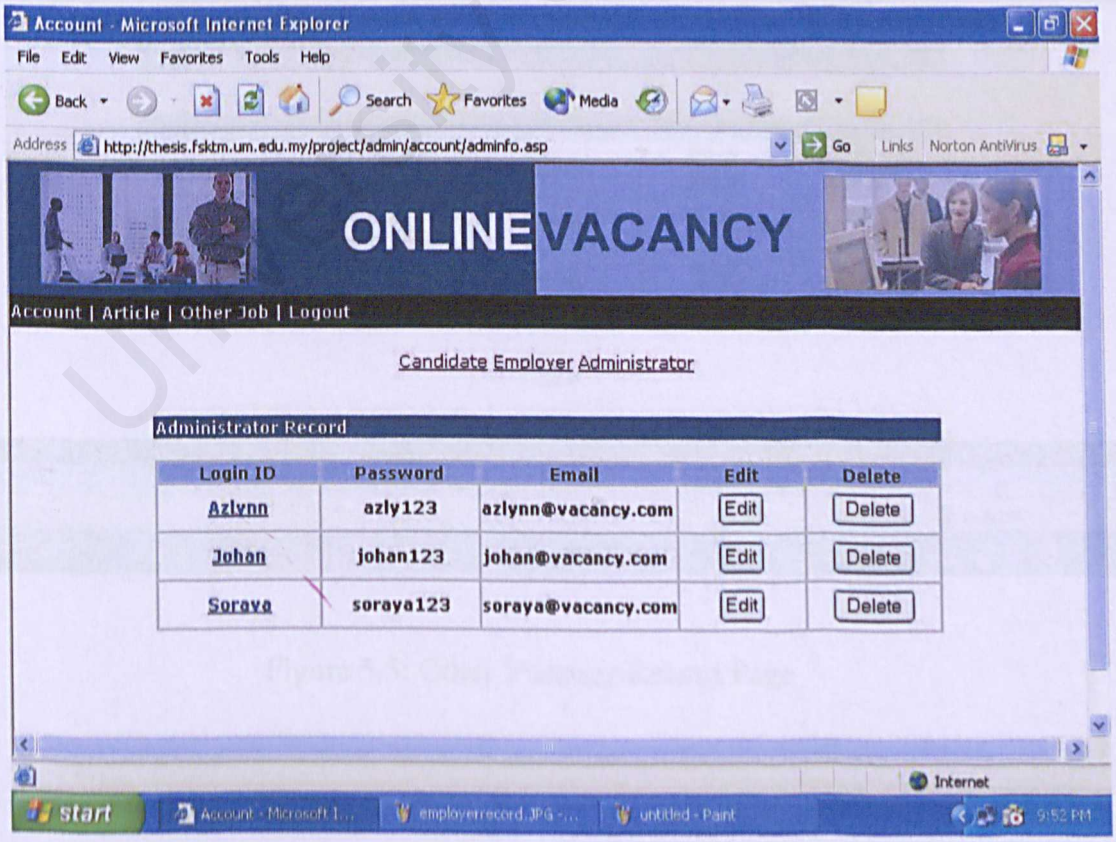


Figure 5.4: Administrator Account Page

5.2 Other Jobs

Online Graduate Job Vacancies System provides a function to the administrator to post jobs gathered from newsprint and media.

1. Click on the Other Job link.

2. Administrator will be directed to Other Vacancy Record page. Click Add button. Refer to Figure 5.5: Other Vacancy Record Page.

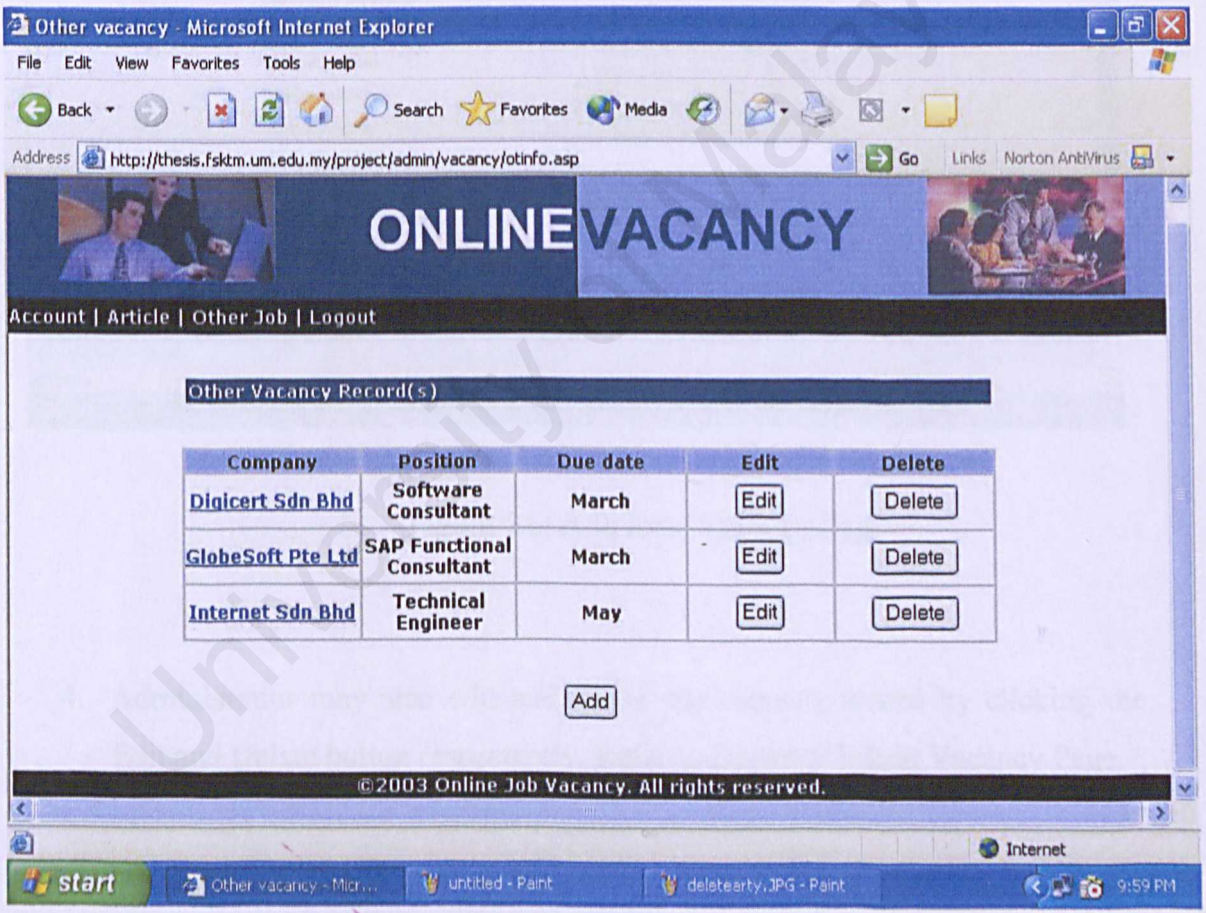


Figure 5.5: Other Vacancy Record Page

3. Fill in all required field in Add New Vacancy Page and then click Add button. Refer to Figure 5.6: Add New Vacancy Page.

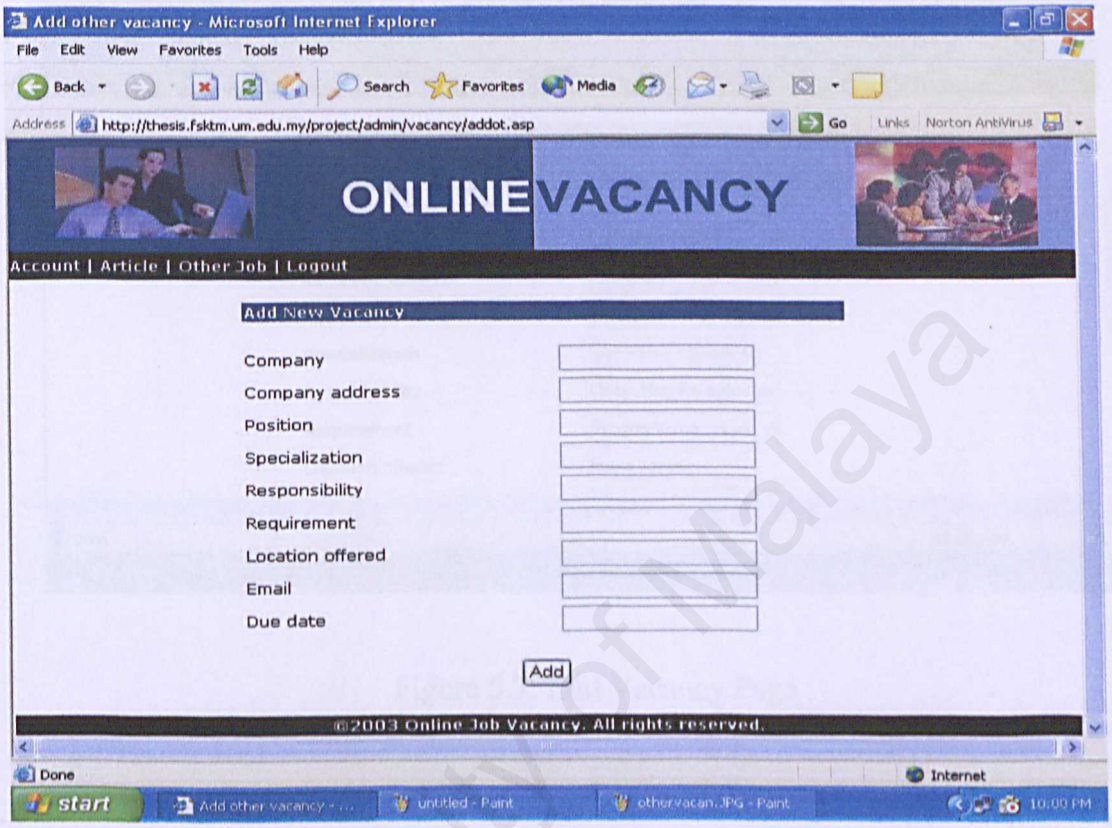


Figure 5.6: Add New Vacancy Page

4. Administrator may also edit and delete the vacancy record by clicking the Edit and Delete button respectively. Refer to Figure 5.7: Edit Vacancy Page.

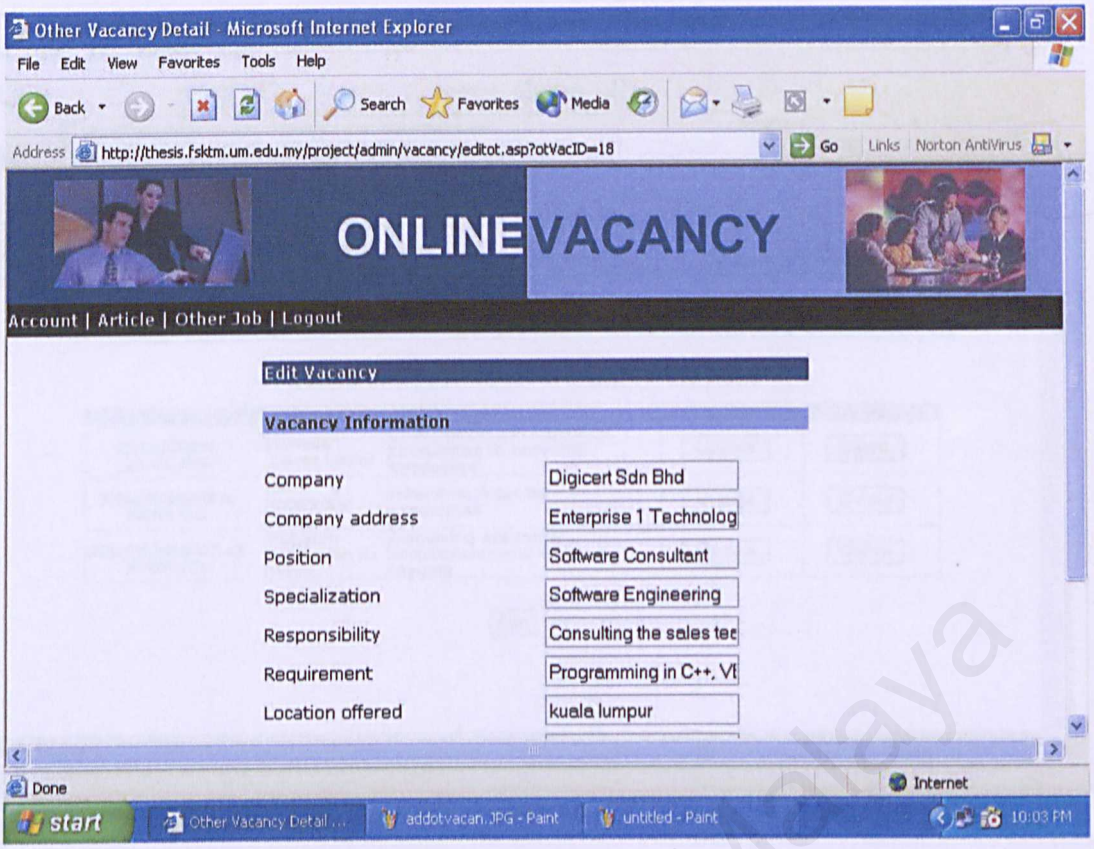


Figure 5.7: Edit Vacancy Page

5.3 Articles

Online Graduate Job Vacancies System provides a function to the administrator to upload articles and information regarding recruitment and application of job. Information services is a module where all information can be viewed by users.

1. Click on the Article link.

2. Administrator will be directed to List of Articles page. Click button Add to upload information or articles. Refer to Figure 5.8: List of Articles Page.

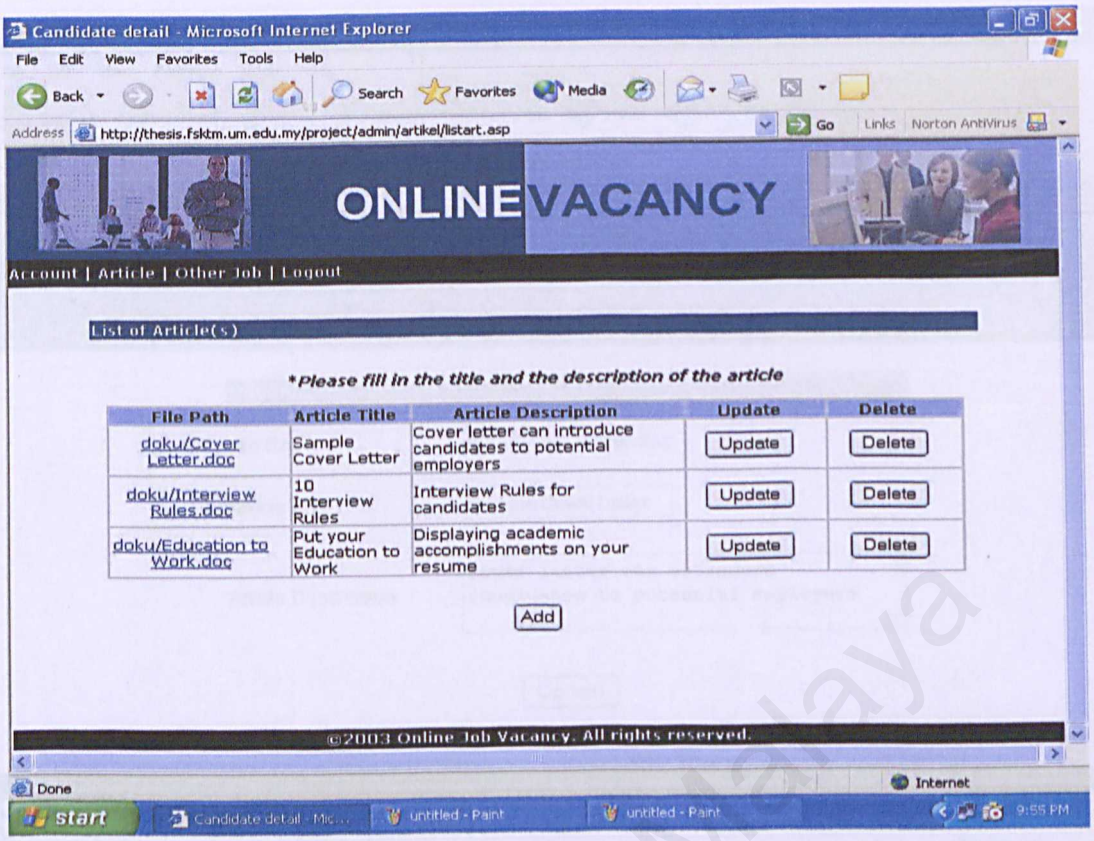


Figure 5.8: List of Articles Page

3. Administrator has to include the article title and description by clicking on Update button. Refer to Figure 5.9: Update Article Page.

4. Administrator may also delete the information by clicking the Delete button. Refer to Figure 5.10: Delete Article.

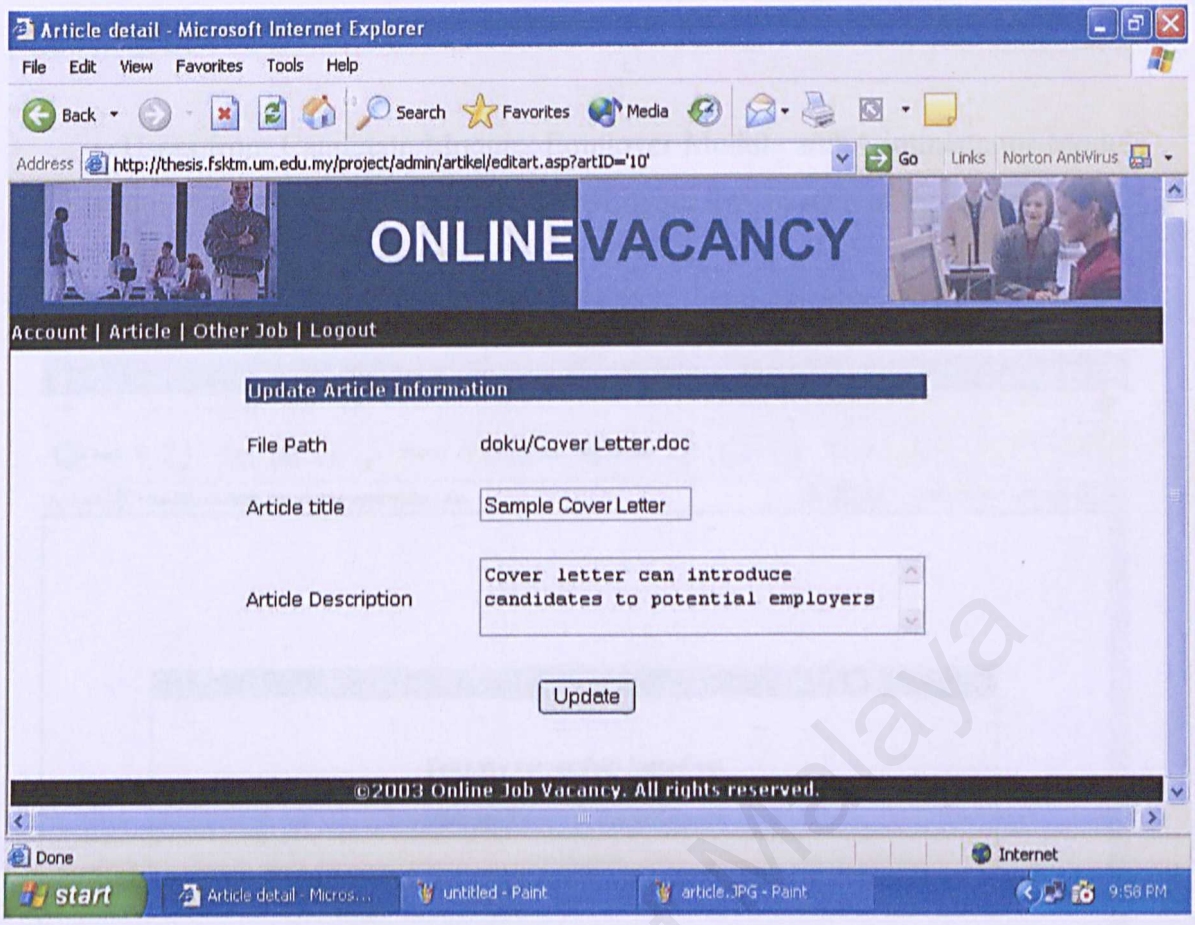


Figure 5.9: Update Article Page

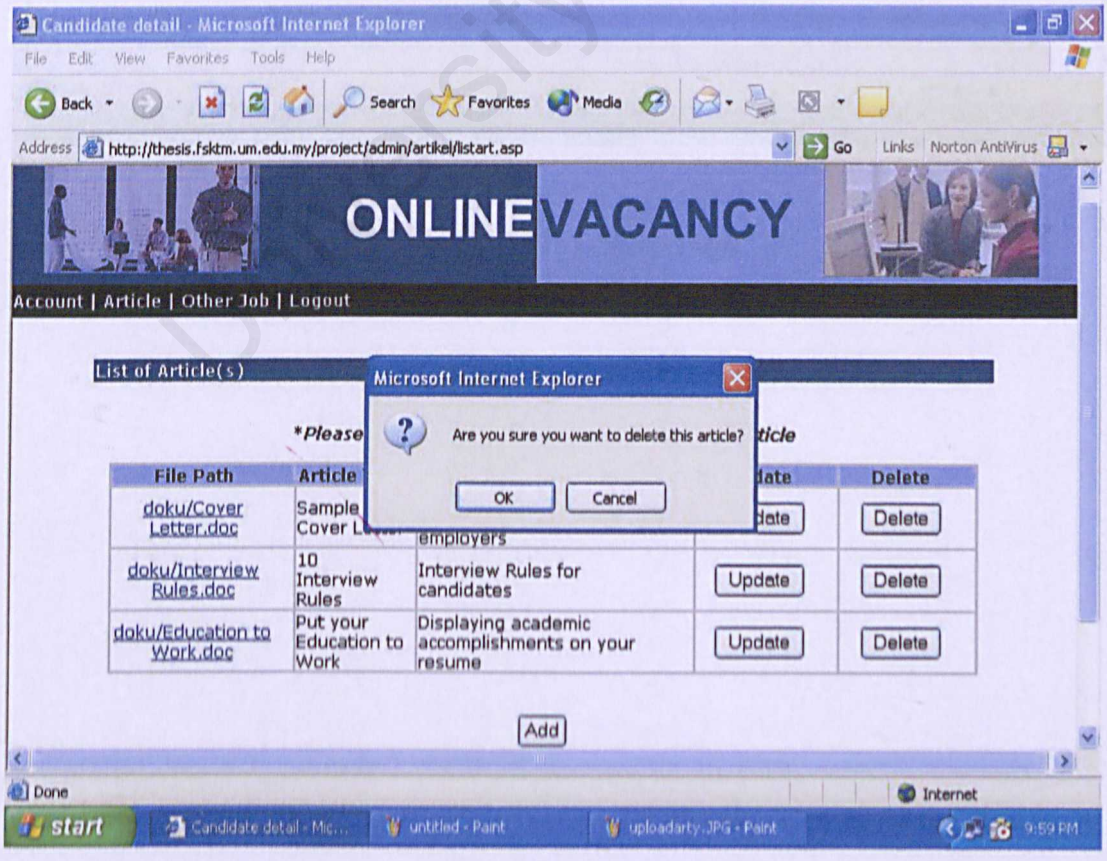


Figure 5.10: Delete Article

5.4 Logout

Users from Candidate Module, Employer Module and Administrator Module will logout of the system by clicking on the Logout link in each of the module. Refer to Figure 5.11: Logout.

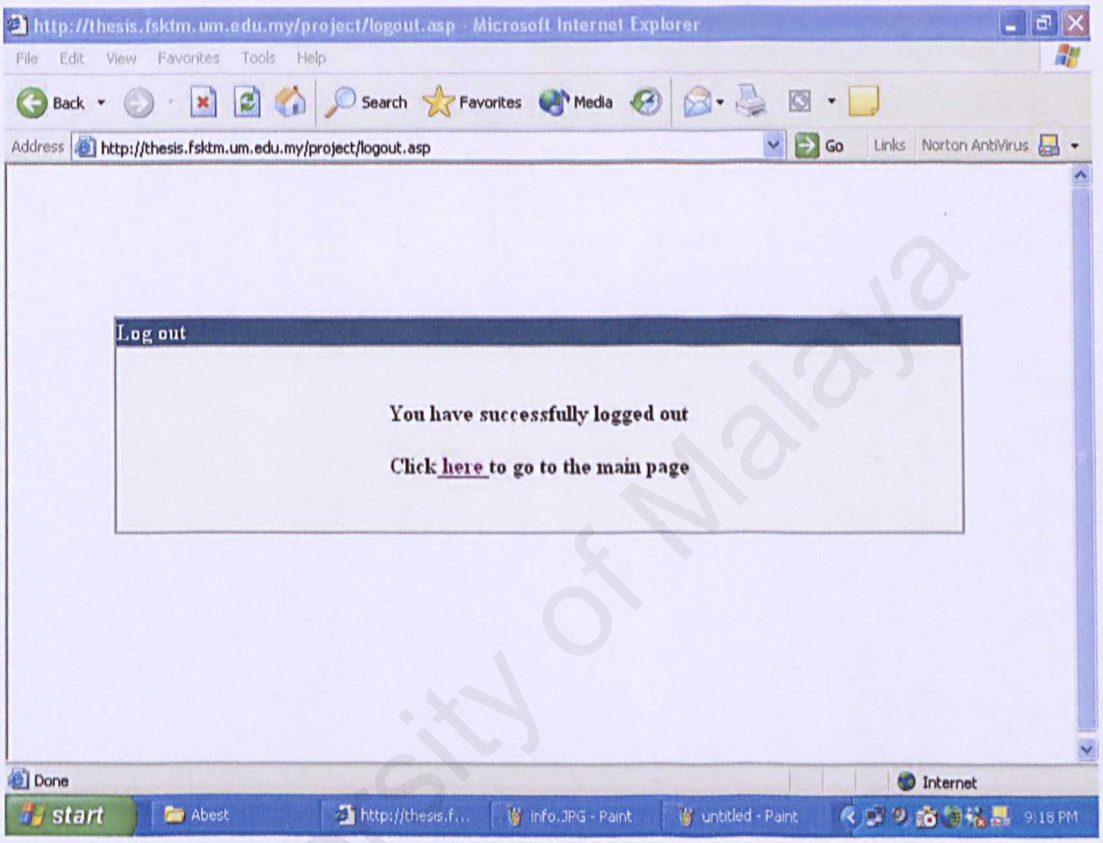


Figure 5.11: Logout Page