

## **Abstract**

Today, information technology has provided an edge in every industry in the country. Institutions and universities embrace existing trends and use the most modern and computerized their current system to ensure smoother operations in the daily running operation. Academic Advisor System is developed as to give more support for the university to give optimal best operation.

Academic Advisor System (AAS) is designed to enable academic advisor manage their student more efficient. By using this system, academic advisor can view the status of the student and interact with the student checking services that provided by the system. Besides that, the advisory advisor also can access student record of the system. So the student can track the advisor and the advisor can provide service to the student. The system will be designed as to provide more support for the university to give optimal best operation.

## **AAS**

### **Academic Advisor System**

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## Abstract

Today, information technology has pervaded into almost every industry in the country. Institutions and universities today are moving toward paperless environment and computerized their current system to ensure smoother operations in the daily running operation. Academic Advisor System is introduced as to give new impulse for our university to gain competitive advantage.

Academic Advisor System (AAS) is designed to enable academic advisor manage their student more effective. By using this system, academic advisor can view the result of the student and interact with them using chatting service that provided by the system. Beside that, the academic advisor also allows to make announcement at the web. So the student can read the announcement easily. The second purpose of AAS is let the student interact with the academic advisor and provide an alternative way to know their result beside the result slip.

This report introduces the project and provides a description on the topic studied and researched during the literature review. It also describes the software development process that occurred in the project with detail on the system analysis and design.

AAS will be integrates with the existing this because some of the information that is needed already existing in the current system. The system will use the same data resource and this is not only saving the resources but also avoids duplication data in the different database. The duplication of data can cause many problems to the system and make the system fail.



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## Chapter 1: Introduction

### 1.1 Overview

Faculty is an autonomous entity of a university whereby the operations are managed by the faculty itself. For the case study purpose, Faculty of Computer Science and Information Technology (FSKTM) which is one of the faculties of UM has been chosen as primary faculty for developing due to existing support of computer facilities.

Academic advisor System (AAS) is a web-based online application for helping the academic advisor to track the student result by interacts with the existing database. By using this system, the academic advisor can easily keep track result of the student that is under them. By only pressing the keyboard, all the information about the student can retrieve from the database. It makes the procedures become more efficient less time consuming. The system will analyze the record and let the academic advisor view the record according to the their will.

Before we start to develop a system, there is a several thing that we need to pay attention. First, how is the existing system operating? What is the weakness of the existing system? Secondly, how far can the new system improve in executing the same task?

#### **Current state:**

In existing system, the student needs to bring along their result slip to show to the lecturer. The academic advisor cannot sign the registration form, if the student cannot show the result slip.

Secondly, the student also cannot determine that whether the personal curricular was free or not. They will only know that while they reach their personal curricular room. For instance, when the personal curricular was going out station and he/she had no time to



come back to their room to leave message at the door. So the student, which does not know about that, will keep going to the academic advisors' room.

Thirdly, the personal curricular will read the exam slip while the student comes to meet them. They have too little time to understand the student problem and the weakness of their studies. They can only check whether the student registers over credit or have they taken the prerequisite subject.

#### **Desired state:**

The academic advisor can read the student information online. The student needs not to bring along the exam slip to let the personal curricular check their result. By using this system, can view the performance of the student more easily. That will help the academic advisor to understand the student problem.

The academic advisor also can make announcement at the web site. The student can go to the web site and check the announcement or view their previous result. This is an alternative for the student to know their result besides taking out the result slip for all the semester.

Beside that, the lecturer also can use extranet environment to accessing the database. That means the academic advisor can access the resource at any time and anywhere. So the academic advisor can access the database remotely at any place around the world. A forum service will be integrated to the system as an extra service. By using this particular service, the advisor can advise the student at the other side of the word. This will provide a more interactive environment between the personal curricular and the student.

## **1.2 Objective of the project**

Basically academic advisor system is a system that created mainly for the academic advisor use. By using this particular system the academic advisor can manage to control the



student that under their counseling more effect. The student can also using this system to interact with their academic advisor and discuss about their studies online.

There are several project objectives that need to be thoroughly understand and studied to gain information of how and why the system is developed among the objectives are:

***a) Improved processes leading to greater productivity and higher quality.***

At the end of this project, the system will be more efficient compare with the existing system. New system cut down all the unnecessary procedures and minimizes the time to complete the task. So the academic advisor can handle the students under them efficiently and analyze the performance of the students easily.

***b) Provide interaction between academic advisor and students.***

The system let the student interact with the personal curricular to discuss their studies. The appointment can be makes by accessing the Internet and the personal curricular can also make announcement at the web. So the student can get the information or instruction from the Internet, which was uploaded by their personal curricular.

***c) Improve the achievement of the students***

When the academic advisor and the students become more interactive. The students, which having problem in their studies will interact with their academic advisor more often to get some advice from their academic advisor. So more or less they will improve in their studies.

***d) To have a more organized management activities***

This system allows the academic advisor to view the list of the students, which is under them. Then, they can also checking the result and plan for a discussion



section. This helps the academic advisor to manage the students, which is under his/her control.

*e) Improve the faculty image.*

As a computer base faculty, we suppose have a fully computerize system. By developing this system, we can provide paperless system, which allow the academic advisor view and manage their student. Beside that, the academic advisor can use the Internet to access the student information.

### 1.3 Scope of the project

The scope of the project will include the provide students' information, web authentication for personal curricular and discussion section. This project will be focusing on the designing of a system for result checking and tracking.

The AAS implementation as interpreted in this project would be limited and will only covers three parties: Administrator, Academic advisor and Degree students.

#### **Administrator:**

On the system administrators' side, the information about the students under a particular academic advisor is presented. Administrators are allowed to add, delete, modify or search for all records. In this system, the administrator also holds responsibility for the student result information. The administrators can add, delete, modify and search for a particular record to make sure that the information is reliable.

Beside that, administrators will also be in charge of the user registration for the system. All the academic advisors and students must registered with the system administrators to become authorized user of AAS.

#### **Academic Advisor:**

Academic advisor is main user of this particular system. Most of the features of this system create for the academic advisor usage. By using this system, they can easily view



the result of the student that under their counseling. Beside that, academic advisor also can using the forum service to interact with the student regarding their studies and at the same time open the database and view the students' result. This will be a great help to the academic for given advise to student. Beside that, the personal curricular also can make some announcement on the web site. This announcement can be access by the student at by using the Internet.

### **Degree Students:**

Students can view their previous exams' result as well as the announcement that making by their academic advisor. The student can know the update information or announcement at anywhere and any time, as long as there is an Internet connection. By letting the student view the result of previous exam, the students can easily trace their performance and doing some course planning. Beside that, forum service also let the students interact with their academic advisor more easily. Discussion can be done even the academic are outstation and student can get their helps or need through the Internet.

## **1.4 Project Expected Outcome**

At the end of the project, the following functionality will be ready:

### **1. AAS**

At the end of this project, a system which, allows to academic advisor interact with the students will be ready. Beside that, this system can also integrate with the existing database to retrieve the student information or exam result. The feature inside this system are helping the academic advisor to manage the students that under their supervision. If the system are fully utilizes, the students will be able to achieve higher performance in their studies.

### **2. Students' username and password database**



This is a database, which stored the students' username and password. This particular database is very important to a web based application. Every user that login to our system need to be authenticates, before they can use this system. Although, maintaining this huge database needs many resources. But this necessary and it bring a lot of benefit in future. Let take a look at the online system registration at our faculty, is that really efficient? The answer is no because the system is only work on LAN. The problem is our faculty has too many students and the computers at the lab are limited. When we really try to do it at Internet, the students' username and password database will be the essential requirement.

## 1.5 Project Expected Strength

This project is expected to possess a few strengths that enable us to improve or overcome our current problems. Its expected strengths can be categorized and are listed below.

### *i. Easy Accessibility*

This system could be accessed easily using a web browser where it could be downloaded free from any authorized web site such as Internet Explorer from <http://www.microsoft.com>. Moreover, access to the system is made available at all the time, 24 hours a day, 7 days a week and 365 days a year.

### *ii. Enforce Different Access Levels*

This system is expected to enable administrators to have a different access level from the other end users. This is to provide a better and secure environment among administrators. The purpose of this is to enable different users perform different tasks in the system. However, administrators will have the highest access level, followed by the academic advisor and finally the students.



### iii. *System Validation*

This system is expected to provide a validation system for its users. It will validate the user to be either authorized or unauthorized. Certain modules in the system can only be access by the authorized users. This validation system also makes sure the user has the right to change or read the record.

## 1.6 Project Expected Limitation

The system contains a student login database, which are difficult to be maintained. Administrator has to make sure that the integrity of the data and the administrator will also need to handle the issue about the users forgot their username or password. So we need to assign someone as an administrator and take fully responsibility.

This system will integrate with the existing system and most of the information is retrieve from the existing system database. This means the system is not independent by itself, it needed to operate together with the existing system. While the existing system encounter failure, this system will be affected by the failure.

Due to the limitation of time and human resources, this system will be used in FSKTM only. This system can only develop by the faculties that have a complete database for stored the student information and result. Beside that, every database has different structure and it takes times to redesign the system.



1.7 Project Planning

ID	Task Name	2001							2002	
		Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
1	Project Definition									
2	Literature Review									
3	System Analysis									
4	System Design									
5	Implementation									
6	Units Testing									
7	System Testing									
8	Documentation									

Table 1.1 Project planning



## **Chapter 2: Literature review**

### **2.1 Introduction**

A literature review of a project is important as it places the project in the context of other, which might have similar characteristics. It helps the developer to know some of the existing features offered by similar systems.

There is no use of reinventing the wheel that has already been invented. The developer can rather focus on learning the existing system and modify or enhance it into a more powerful feature for project.

Another important purpose of a literature review is to sufficiently equip the developer with some knowledge of the strengths and limitations of several development tools. This can help the developer to choose the right tool to develop the system.

### **2.2 Existing Web Sites Review**

#### **2.2.1 Case studies**

##### **Case Studies 1: Academic advisor system of UPM**

The department of electrical and electronic engineering from University Putra Malaysia created this particular system. The main function of this system is provided information about how to make use of the helps from the academic advisor and answering the frequent asked question. The students can get the list of the academic advisor to check which academic advisor they are under. The URL of this system is <http://www.eng.upm.edu.my/kee/PA.html>.

The strengths of this system are:

- Provided useful information to students about the academic advisor system at University Putra Malaysia.



- The system provided the frequent asked question to let the user easily get the answer, which they needed.
- The system is linking to other sites. For instance, UPM Engineering web sites and EEEng Homepages.

The weaknesses of this system are:

- Cannot consider as a real system, I am more convenience to call it as a web site or web page.
- No user controlling and the system is fully open to all Internet users.
- The system does not provided additional function for the academic advisor or the student.

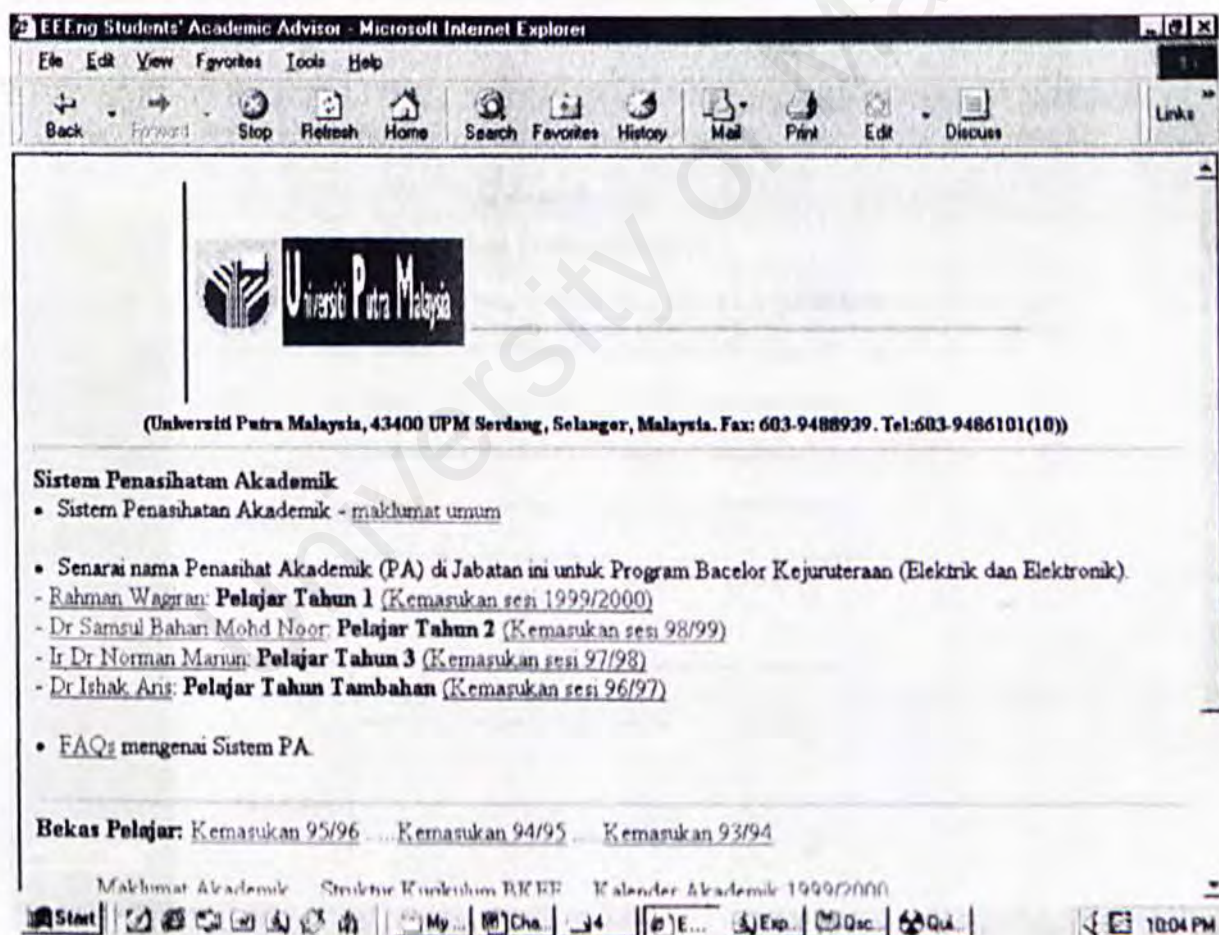


Figure 2.1 Academic advisor system of UPM



## Case studies 2: Advising and Counseling System of South West Tennessee Community College

Actually this system is a sub system of the South West Tennessee Community College System. In this system you can get contact number and the address of the Advising, Counseling and Articulation Center. Beside that, there is an advance feature call online advising service. This feature allows us to fill in a form and then the information will be save in the database while the submit button has been click. The advising center will contact us about our question or request after they proceeded the form. But I cannot analyze the actual procedure to proceed the form the process is hidden from the Internet usage. Below is the form that I had mention and the URL of this site is [http://www.stcc.cc.tn.us/counseling/online\\_advising.htm](http://www.stcc.cc.tn.us/counseling/online_advising.htm).

The screenshot shows a web browser window titled "Online Advising Request - Microsoft Internet Explorer". The address bar shows the URL "http://www.stcc.cc.tn.us/counseling/online\_advising.htm". The browser's menu bar includes "File", "Edit", "View", "Favorites", "Tools", and "Help". The toolbar contains buttons for "Back", "Forward", "Stop", "Refresh", "Home", "Search", "Favorites", "History", "Mail", "Print", "Edit", "Discuss", and "Links".

On the left side, there is a vertical navigation menu with the following items: "Academics", "Administration", "Admissions & Records", "Advising & Counseling", "Athletics", "Career Services", "Corporate & Continuing Education", "Contact Info. & Maps", "Faculty / Staff Directory", "Financial Aid", "Learning Resources", "Partnerships", "Student Information", "Testing", "Workforce Development Center", and a "Quick Link" button at the bottom.

The main content area is titled "Advising and Counseling--Online Advising". It contains the following text: "Need information on specific majors? What about general education requirements? If you've got questions or are interested in courses of study and/or certificates, please complete the following data form and a member of the advising office will contact you regarding your interests."

The form includes the following fields:

- Name:
- Address 1:
- Address 2:
- City:  State:  Zip:
- Phone:
- Email Address:
- Comments:

The status bar at the bottom shows "Internet" and the time "1:42 AM".

Figure 2.2 Online advising form



The strengths of this system are:

- Attractive web page design.
- Online advising let the student and the advisor interact more effectively.
- This system provided a quick link that let the user link to other site.

The weaknesses of this system are:

- No user controlling and the system is fully open to all Internet users.
- The system does not have the frequent ask question.
- Scope of this system is too small.

### Case Studies 3: Academic Advising of Webster University

This web application is the sub system of the Webster University system and this sub system tried to provide the information about the academic advisor system at Webster University. This general information helps the students to make use of the service that provided by the academic advisor. Beside that, the particular of the academic advisor present at this system let us easily contact with the academic advisor. By using the email service the student can send their messages to email account that created for every academic advisor to receipt the request and response from the students. The URL of this particular web site is [http://www.webster.edu/acadaffairs/asp/acad\\_advising.html](http://www.webster.edu/acadaffairs/asp/acad_advising.html).

The strengths of this system are:

- Provided useful information to students about the academic advisor system at Webster University.
- The system let the user send their comment about the system to web master, this helps to improve the system.
- The system let the user to sent e-mail to the particular advisor account using a mailing technology.



The weaknesses of this system are:

- No user controlling and the system is fully open to all Internet users.
- The system does not have the frequent ask question.
- Scope of the system is too small.
- The system does not provided additional function for the academic advisor or the student.

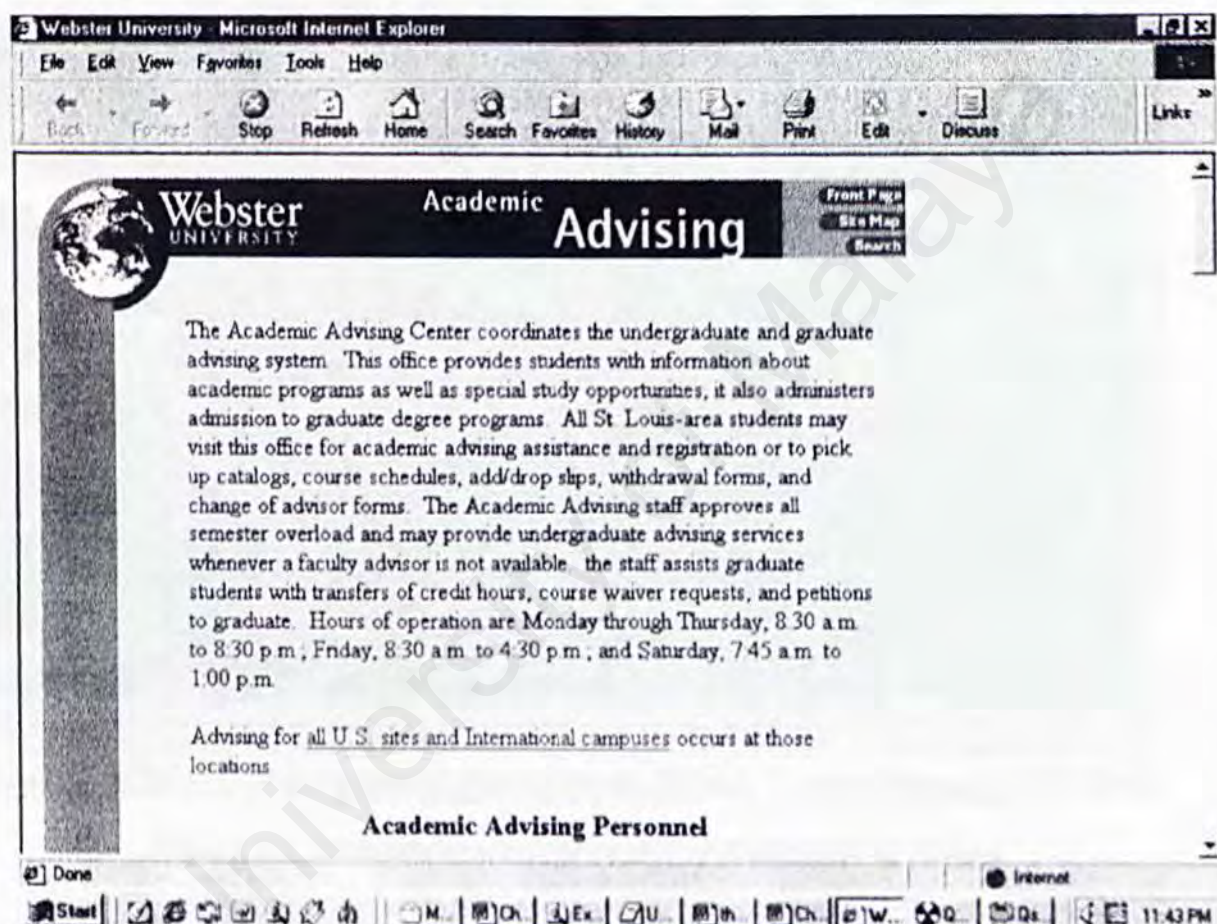


Figure 2.3 academic advising system of Webster University

#### Case studies 4: Advisement services center of university at Albany

This web site provided many services to student and allows the student. This system allows the student get the information that relevant for them to making decision during the registration of courses or choosing their majoring. The modules that you can be find here



are course planning, choosing a major, medicine/dentistry, law school, important date, advisors and GPA predictor. GPA predictor actually is a feature that allows the student to put in their current GPA and the system will predict the GPA for the next semester. The URL of this web site is <http://www.albany.edu/advisement/gpa.htm>.

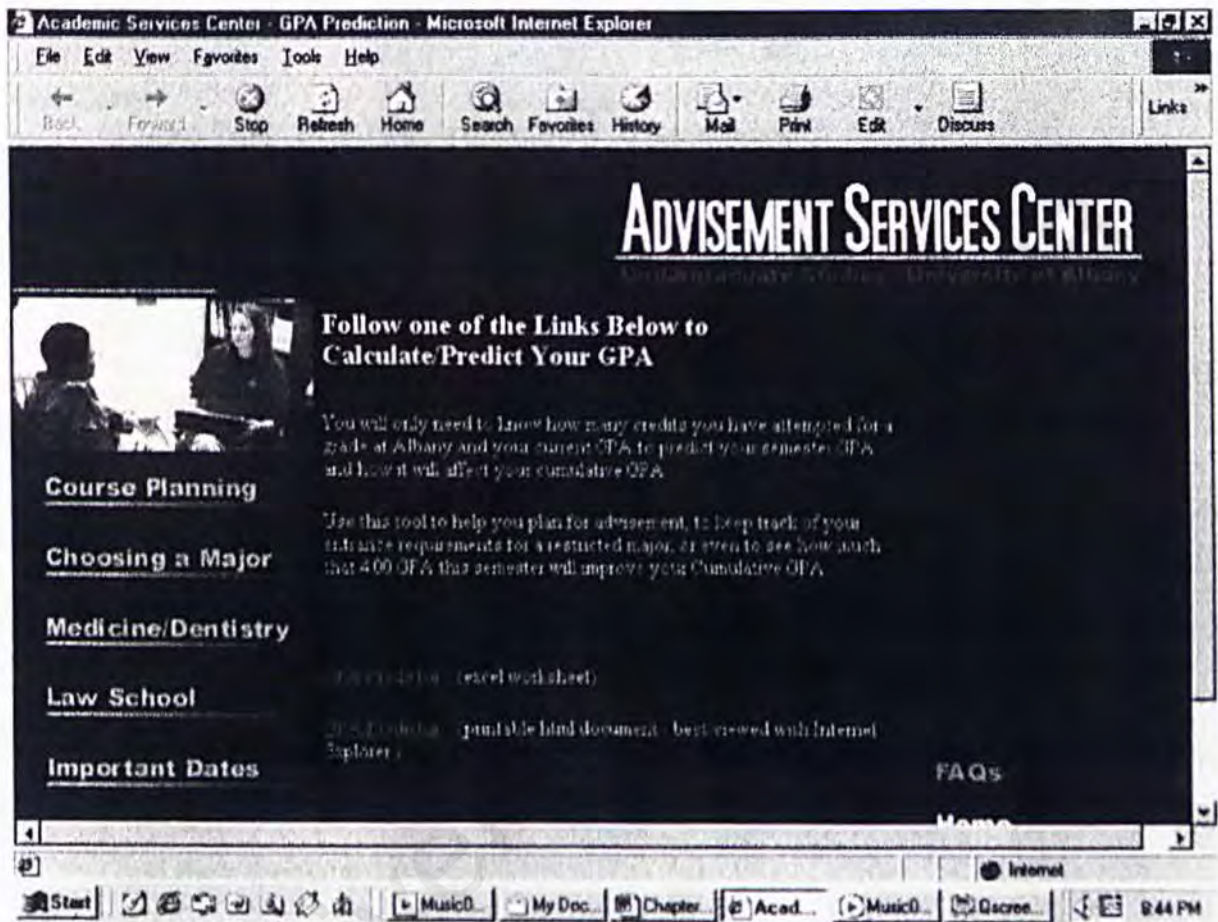


Figure 2.4 Advisement services center of University at Albany

Below is the GPA predictor that I had mention:



A Ygpa explained.htm - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discuss Links

**Step One: Fill in Current Credits and Quality Points**

Number of  
A-E credits  (from transcript)

Current quality  
points  (credits \* gpa)

Current GPA  (from transcript)

**Step Two: Enter this semester's expectations**

Fill in number of  
credits earning  
each of these  
grades

	Expected Grade	Value	Quality Points
<input type="text"/>	A	4	<input type="text"/> (credits * value)
<input type="text"/>	A-	3.7	<input type="text"/> (credits * value)
<input type="text"/>	B+	3.3	<input type="text"/> (credits * value)
<input type="text"/>	B	3	<input type="text"/> (credits * value)
<input type="text"/>	B-	2.7	<input type="text"/> (credits * value)
<input type="text"/>	C+	2.3	<input type="text"/> (credits * value)
<input type="text"/>	C	2	<input type="text"/> (credits * value)

Done Start Exploring - 3M F... Chapter 2 - Mic... A: Ygpa expl... Qscreen capture 2:33 PM

Figure 2.5 GPA Predictor

The strengths of the system are:

- Provided the information that is needed by the student to making decision.
- The particular of the advisors that is available are listed detail including the photo and their specialty.
- GPA predictor that can predict the student GPA for the coming semester.
- Provided the FAQ to let the user get the answers for some of the frequent asked questions.

The weaknesses of the system are:

- No user controlling and the system is fully open to all Internet users.
- The accuracy of the GPA predictor has not been proven, because there are many other factors that can influence the performance of the student.



### 2.2.2 Conclusion of the case studies

After analyze the systems that I mention in the case studies, I had found the strengths and the weaknesses of every system. So I will use this result in designing my system to make sure all the strengths found from the case studies will be shown in my system. Beside that, the weaknesses from the case studies should be avoid or improve in my system. Following is the strengths and the weaknesses that I had collected from the case studies:

#### *Strengths:*

- Be an informative system.
- Attractive web page design.
- Provided links that are related with our system to add the value of our system.
- Lets the users give their feedback according to the services provided by the system.
- Make a system that useful for both students and advisors.

#### *Weaknesses:*

- The users of the system are not authenticated and this means everyone can use the system.
- The scope of the system is too small.
- Make the system more functionality.

## 2.3 client and server computing

This client server approach is certainly appealing a wide range of hardware platforms. Every hardware and software vendor has something to say about this new technology workstation vendor, such as Sun and Hewlett Package begin to churn out products uses as server. Operating system vendor begin to emphasize the client server



operating system, while application level and database management system vendor, such as Sybase and Oracle push client server solutions to cater business problem.

### 2.3.1 Definition

Client server computing is the logical extension of modular programming. Modular programming has as its fundamental assumption that separation of a large piece of software into its constituent parts (“modules”) creates the possibility for easier development and better maintainability. Client server computing takes this a step farther by recognizing that those modules need not all be executed within the same memory space.

### 2.3.2 Evolution of client server computing

In the 1970's, department managers found that relying on central mainframe based application hindered their ability rapidly respond to business demands. Application development time within the central information system (IS) was too slow, and the result was not failures to specific needs of a department. Though the department of PCs enabled workers have computing power and data at their command and enabled department level managers to select needed application quickly, this has its drawback.

In a pure PC environment, cooperation among users was difficult. Even within a department, there needed a department level database and department formatting and data usage standards. The solution to these requirements is departmental level client server architecture. The success of departmental architecture paved the way for the enterprise-level client server computing.

The dominant theme of such architecture is the reestablishment of control over data by control is organization but in content of distributed computing system, hence enter the client server computing concept. Today, the most common type of server is the database server, besides as data storage it also handles requests and responses from the clients.



### 2.3.3 client server models

Garter Group come out with 5 way of describing the different client server styles base on how they split the three components of any application user interface, business or application logic, data management. The five styles are distributed presentation, remote presentation, distributed function, remote data management and distributed data management. Figure 2.1 depicts how the client servers computing are modeled.



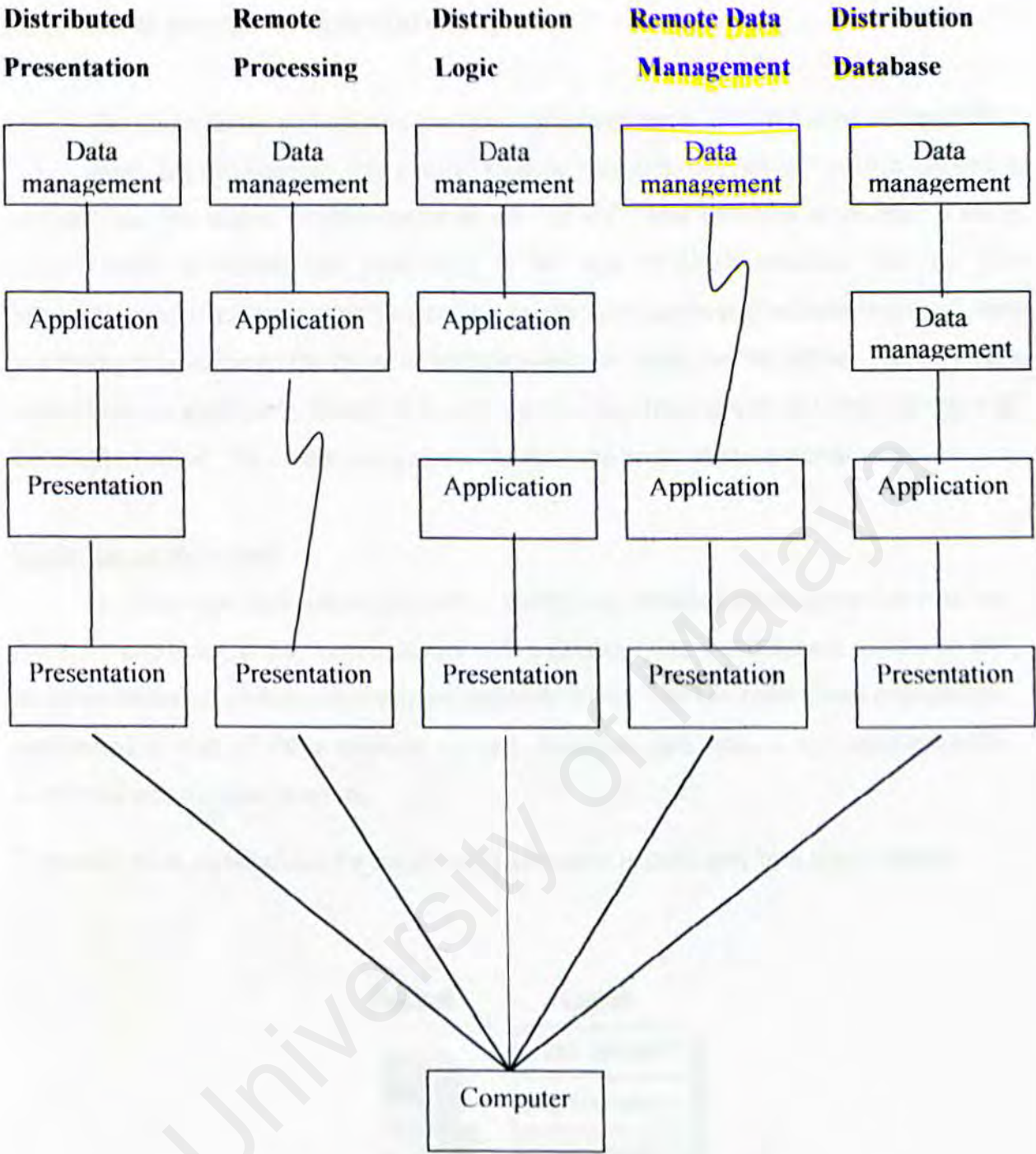


Figure 2.6 Client Servers Computing Model



### 2.3.4 Client Server Architecture [29]

The client server architecture has been called the **model of computing** of the 1990's.

With this architecture, the calling module becomes the **"client"** (which request a service), and the called module becomes the **"server"** (that provides a service). This is usually result in putting the processing to the user or client machine and the data management and storage server. Depending on the application and software used, all data processing may occur on the client or split between the client and the server. The service is connection via a network. Server software accepts data from client and then returns with the result to client. The client manipulates the data and presents the result to user.

#### Single tier architecture

A single-tier application is simply a monolithic, stand-alone program that runs on the user's computer. It may communicate with a database, but that database resides on the same computer (or perhaps on a mapped network drive). The key point about a single-tier application is that all three services — user, business, and data — are architecturally combined into a single program.

Typically, each installation of a single-tier application is used only by a single person.

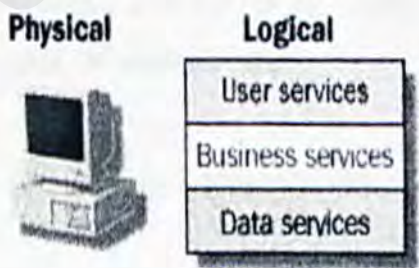


Figure 2.7 Single tier model

#### Two tiers architecture

A two-tier architecture is where a client talks directly to a server, with no intervening server. It is typically used in small environment (less than 50 user).



In this environment, much processing is performed on the client workstation, using the memory space and processing power of the client to provide much of the functionality of the system. Field edit, local lookups, and access to peripheral devices (scanner, printer, and so on) are provided and managed by the client system since almost all processing is done at the client, the client portion is sometime returns as fast as client.

A common error in client server development is to prototype an application in a small 2 tiers environment and then scale up by simply adding more users to the server. This approach will usually result in an ineffective system, as the server becomes overwhelmed. To properly scale to hundreds or thousands of users, it is usually necessary to more to 3-tiers architecture.

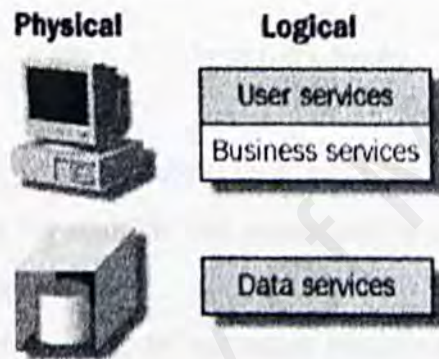


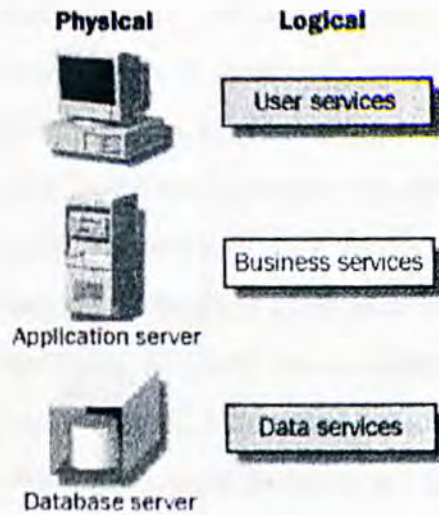
Figure 2.8 two tiers model

### Three tiers architecture

A 3-tiers architecture introduces a server (or an “agent”) between the client and the server. The role of the agent is folds. It cans provide:

- Translation service (as in adapting a legacy application on mainframe to a client server environment)
- Mastering services (as in acting as a transaction monitor to limit the number of simultaneous requests to given server).
- Intelligent agent service (as in mapping a request to a number of different servers, collating the results, and returning a single response to the client).





*Figure 2.9 Three tiers model*

The movement from 2-tiers architecture to 3-tiers architecture or multi user architecture due is to the need for scalable and maintainable system and the wide variety of the clients within a large organization.

In multi user architecture, each of the major pieces of functionality is isolated the presentation layer is independent of the business logic, which in turn, is separated from the data access layer. This model requires much more analysis and design or the front-end, but the dividends in reduced maintenance and greater flexibility pays off. This model exhibits a much thinner client by bringing some processing task back to the server.

### 2.3.5 Characteristic of client server architecture

The basic characteristic of the client server architecture:

1. Combination of a client or front-end portion that interacts with the user, and a server or back-end portion that interacts with the share resource. The client process contains solution specific logic and provides the interface between the user and the rest of the application system. The server process acts as a software



engine that manages shared resources such as databases, printer, modem or high-powered processors.

2. The front-end task and back-end task have fundamentally different requirements for computing resources such as processor speeds, memory, disk speeds and capacities and input/output devices. The environment is typically heterogeneous and multivendor. The hardware platform and operating system of client and server are not usually the same. Client and server processes communicate through a well-defined set of standard application program interfaces (API's).
3. An important characteristic of client server system is scalability. They can be scaled horizontally or vertically. Horizontal scaling means adding or removing client workstation with only a slight performance impact. Vertical scaling means migrating to a larger and faster server machine or multiserver.

### 2.3.6 Services module [29]

When designing your Web site, you can use a service-based application model. The term service-based means that the functionality of an application is specified as collections of services that meet specific user needs.

A service-based application is typically comprised of three categories: user services, business services, and data services.

User services provide an application with its user interface. The user of a service can be a person or another service. Therefore, the interface for a service can provide a graphical user interface or a programmatic interface.

Business services enforce business rules and handle transactions. These services may impose constraints or apply transformations to change user input or raw database information into usable business information.

Data services provide storage and low-level manipulation of data in a database. Examples of data services include create, read, update, and delete, which are used by business services to modify a database. A business service does not need to know where



data is located, how it is implemented, or how it is accessed. These tasks are handled by data services.

The following illustration shows the services model:

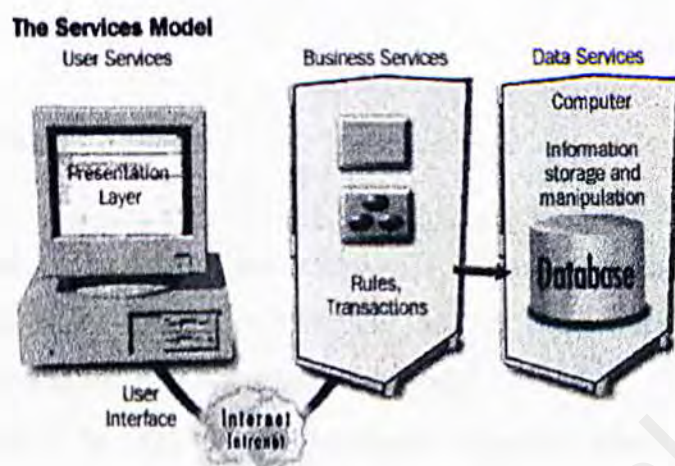


Figure 2.10 Services model

### *Benefits of Using the Services Model*

After determining what capabilities you need for your Web site, you can then decide how to implement the site. Using services to define the division of functionality in your Web site provides the following benefits:

- Clear and consistent development goals

By dividing your Web site into services, you enable a Web development team to easily envision the direction of development. The functionality of each service, implemented as a component, is clearly defined.

- Better manageability

Because services divide the functionality of your Web site into distinct tasks, any changes in the implementation of one service will not introduce changes to another service component.

- Isolation of functionality

The functionality of a specific service is encapsulated, so any error in the implementation of a service can be easily traced to the corresponding component.



- Division of labor

Identifying services enables you to determine which member of the Web development team is best suited to build and complete the corresponding component.

## 2.4 Internet

### 2.4.1 Introduction

The Internet evolved from the ARPANET, which was developed in 1969 by the Advanced Research Projects Agency (ARPA) of the U.S. Department of Defense to support military research. It was the first operational network.

The Internet is an international computer network, which connects millions of computers in just about every country in the world. The Internet is a networked formed by cooperative interconnection of computing networks. In fact, the word "Internet" was coined from the words "interconnection" and "network." What this means is that many, many connecting networks, usually made up of differing kinds of computers and different technologies, are interfaced together so smoothly that the individual parts appear to be one network. This is accomplished by connecting networks using the same protocol: TCP/IP (Transmission Control Protocol/Internet Protocol).

There is no central authority, no governing body nor any overall organizational scheme to the vast amounts of information available. The Internet transfers/accesses data in five different ways: gopher, telnet, FTP (file transfer protocol), HTTP (world wide web) and e-mail. Each computer that is connected to the Internet is provided a unique address or URL (Uniform Resource Locator).

### 2.4.2 World Wide Web (WWW)

The World Wide Web is the part of the Internet that uses hypertext to link documents on computers all over the world to one another. Hypertext allows any part of any document to be linked to any other document, no matter where it is, allowing for intuitive, concept-based navigation.



Englishman Tim Berners-Lee invented the World Wide Web in 1990 while working at CERN, the European Particle Physics Laboratory. At first, the Web was set up as a way for scientists to share information with each other. It has since become a worldwide success because it makes it very easy for computer novices to browser through text, graphics, and multimedia.

### 2.4.3 TCP/IP (Transmission Control Protocol/Internet Protocol)

It is a set of protocols, or a protocol suite, that defines how all transmissions are exchanged across the Internet. Also, it describes how the Internet works. There must be some kind of standard rules that everybody follows so that computers can talk to each other. This is it. Computers on the Internet conform to this standard. TCP/IP has been in active use for many years and has demonstrated its effectiveness on a worldwide scale.

### 2.4.4 HTTP (HyperText Transfer Protocol)

It is the foundation protocol of the Web and can be used in any-client server application involving hypertext. The name is somewhat misleading in that HTTP is not a protocol for transferring hypertext; rather, it is a protocol for transmitting information with the efficiency necessary for making hypertext jumps. The data transferred by the protocol can be plain text, hypertext, audio, images, or any internet-accessible information.

## 2.5 Operating system [13]

### 2.5.1 Microsoft Windows NT Server 4.0

Since 1996, Windows NT Server 4.0 has been consistently improved, enhanced and updated to meet those requirements. Today, Window NT Server 4.0 has become the most comprehensive server operating system. Yet at the core is stable code base that has proven



to be a strong and versatile performer for organizations of all sizes, earning broad industry support in the form of products and services. And now, as the vision for Window 2000 Sever has become clear and more widely understood, Window NT Sever 4.0's role as the most efficient path to the future of the enterprise computing has similarly become more evident.

Microsoft Window NT is one of the powerful operating systems for network computing. It combines the ease-of-use of Windows 95 with the power and reliability of Windows NT. Here are some of advantages:

- It is productivity and compatibility as Windows NT ensures high performance for 32-bit programs. All Win16 Windows-based programs have the preemptive multitasking capabilities of Windows NT and can be run in a separate address space for better responsiveness and reliability.
- It meets the reliability standards to run critical line of business programs. It allocates separate memory space for 16 bits applications, so if one 16-bit application fails it won't bring down other applications.
- It is also protects critical operating system code, device drivers, and data from application.
- It is ease-of-use interface that helps to work easier and faster
- It is easy to manage and control as it includes remote management and troubleshooting tools and allows administrators to implement policies and standards for system-wide desktop configuration.
- It allows object linking and embedding (OLE). In other words, it can combine information from several applications into one compound document using the special object linking and embedded capabilities of Windows-based application.
- It has built in tools for internetworking and intranet working like TCP/IP, Microsoft Internet Explorer and Microsoft peer web services.
- It enables the capabilities of integrating application on a single computer or even across multiple computers by using Com and Dcom.

### 2.5.2 Microsoft Windows 2000 Server



Windows 2000 Server is a multipurpose, entry-level server operating system that can be used to provide the network users with file, print, application, or web services. Windows 2000 Server provides a well-integrated package containing the application development environment, security, and scalability. With Windows 2000 Server, users get all the usability features of Windows 2000 professional, plus support for up to two multiprocessors for new installations and up to four multiprocessors when they upgrade from Windows NT 4.0. As the server operating system built for business Internet Windows 2000 Server lets users:

- Use the web to securely connect employees, customers and suppliers anywhere in the world.
- Share selected information without compromising confidential data.
- Expand the network environment as the application needs evolve.
- Internet enables business with essential technologies woven throughout the operating system.
- Cut cost with improved management system for networks, servers and Windows desktops.
- Sustain up time with extensive reliability and availability improvements.
- Take advantage of new hardware with broad support for existing and emerging hardware communication products.

Windows 2000 Server provides comprehensive, standards-based security services including flexible authentication, data encryption, flexible and secure network access, protection of virtual private network (VPNs) using core Internet standards such as IP security (IPSec), secure transaction processing and security extensions for the development platform such as the crypto API.

Windows 2000 also introduces new technologies that let users build richer web applications and solutions, such as the text generation of the Microsoft component object model, COM+. Developers using COM+ find it much easier to create and use software



components, and benefit from a runtime environment and services that are used from any programming language or tool.

Another technology revolutionizing the Internet is the Extensible Markup Language (XML). XML enable easy integration of data from multiple sources, reduced network traffic, granular updates and more meaningful searches. The Windows 2000 XML parser is implemented as a Com component, providing a complete XML foundation for Windows DNA-based applications.

In addition, Windows 2000 include integrated support for streaming media, which allows organization to develop and distribute real time presentations and rich multimedia content to both internal and external audiences imagine being able to send full screen video to your users' desktops on demand, while providing CD-quality audio digital rights management, and great integration with other application software.

### 2.5.3 Windows NT Server 4.0 versus Windows 2000 Server

Windows 2000 Server is newer than Windows NT Server 4.0, surely it will has more advantages than Windows NT. Below are some of the differences:

- Windows 2000 was twice as fast as Windows NT 4.0
- Active Directory's long and wide reach is what make Windows 2000 both compelling and formidable. The Active Directory security model integrates with everything in enterprise, the management components will teach every desktop, and its authorization model affect every user. In addition, other enterprise directories can be integrated into Active Directory.
- In Windows 2000, trust relationship are developed within domains.
- Able to easily delegate authority to change user accounts spread across several Windows 2000 OUs. (Organization units)
- Windows 2000 provides the technologies required to let the Internet application grow without limitations. It allows the most demanding high-end applications to use more computer memory. For example, Active Server Pages scales two to three times better on multiple processors than Windows NT Server 4.0 does.



- Windows NT Server provides many of the some services found in Windows 2000 Server, however it lacks an extensible, hierarchical directory. Although the directory in Windows NT Server 4.0 provides organizations with centralized directory for managing users and groups and single logon services, it is less comprehensive than the feature-set in either Active Directory or Novell Directory Services (NDS).

## 2.6 Web application development tool

### 2.6.1 Microsoft Visual InterDev 6 [1]

Microsoft Visual InterDev, the newest number of the Visual tool family 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 more Microsoft Visual InterDev 6.0 raises the standard for Internet and intranet applications to a new level. This product includes many new features such as buttons and other innovations in the interface. But its scripting object model sets it part from other development tools.

Microsoft Visual InterDev also include a variety of development features for integrating client-server and web technologies. These features are enabled through Visual InterDev's support for ActiveX, seamless database connectivity to any ODBC data source, support for building and testing large system and comprehensive support for the development of web application.

Microsoft Visual InterDev provides a rapid, visual development environment for building ASP. Visual InterDev also can easily integrate ActiveX server components written in Visual J++, VB, Visual FoxPro and Visual C++. Using Visual InterDev with ActiveX server component, a developer can easily create multi-tier web applications. ActiveX server components provide a convenient and effective way to tight integrate a web application with existing Internet system.



Microsoft Visual InterDev delivers a comprehensive set of tightly integrated database tools for web developers. The database connectivity feature are based on the industry standard ODBC, including Oracle, Microsoft SQL Server, Microsoft Access, Microsoft Visual FoxPro, Informix, Sybase, IBM DB/2 and way other. In addition, using Visual InterDev a developer can create scalable database solutions because it leverages ASP. The core database components of Visual InterDev include Active Data Object (ADO), Integrated Data View, Design Time ActiveX Controls, Database Wizards, Query Designer, and Database Design.

A Visual InterDev project consists of a live web site when developers open a project; they are actually opening a live view of a site, as it exists on the web server. The IDE is thus a complete web site management tool that allows the developer to easily modify the structure of a web site and edit, add, move, rename and delete files and folders on the web site. Multi web sites (project) can be open at the same time.

### 2.6.2 Lotus Notes

Lotus Notes is the only groupware solution today that combines four essential technologies:

- Email messaging and scheduling
- A powerful distributed document database
- An open platform system environment
- A rich application development environment

It is the only software product that addresses a comprehensive definition of what groups of office workers have to accomplish and how computers can facilitate these activities. Lotus Notes address all of these aspects of group activity such as e-mail programs, bulletin board and discussion software.

It has document databases and messaging capability as described before. In addition of that, Notes provides a rich programming environment that offers developer a selection of programming languages, from simple (the Notes and function language) to more powerful



and complete (Lotus Script, an ANSI base compliant language similar to Visual Basic; HiTest Tool for C++, numerous third-party programming tools and due to be available in Notes Release 4.5, an implementation of Java).

### 2.6.2.1 Benefit of Notes

- Replicas and replication: Notes lets you keep multiple copies of a single database called replicas on multiple servers or workstations. This lets users on a variety of networks in a variety of locations access the same information. Replication is the process of exchanging modification between replicas. Through replication, Notes make all the replicas essentially identical over time.
- Notes is very customizable: Every applications can be customized in less time that it would take with most other applications.
- Work flow: Notes allows user to set up application to make it easier to route the form to appropriate person.
- Document sharing: Notes makes it easy for several people to work on a document, review it and make comments.
- Rich text document: Any Notes document, including email can have graphics, video and sound along with regular text.
- Web publishing: Almost all the benefits of Notes are now available from the web. Notes database are automatically converted to HTML, in real time making it possible for user to browse or edit information in the database.

### 2.6.3 Microsoft FrontPage 2000 [21]

This program is included as part of Microsoft Office (in addition to being sold as a standalone product), and its Office integration features take advantage of the popularity of



that suite by sharing much of the same interface and many of the same tools. Other features new to this version allow greater collaboration and use of newer Web technologies.

FrontPage 2000 provides a variety of features and is geared for beginning to intermediate users. The Themes (which have been increased to 67) are an especially helpful feature, allowing novices and nondesigners to focus on content rather than on design, and simplifying the process of creating sites with a consistent appearance. FrontPage also includes strong site management features, including the capability to visualize a Web site through multiple views and edit the site via drag and drop.

### 2.6.3.1 Strengths of Microsoft FrontPage 2000

- *Themes Provide Consistent Look and Feel*

FrontPage 2000 now includes 67 professionally created themes, each of which includes features such as buttons, color combinations, and backgrounds. A single theme can be applied to all of the pages in a Web site to provide a consistent appearance for the site or to give pages different themes. Users can position the elements anywhere on the Web site and edit the themes or create their own.

- *Excellent site managements Features*

FrontPage provides strong site management features that are also easy to use, especially since FrontPage Editor and FrontPage Explorer, formerly separate modules, are now integrated. FrontPage can automatically verify, edit, or repair hyperlinks, and broken links can be easily discerned. The product automatically renames pages and reconstructs applicable links when pages are rearranged; users need only drag and drop page icons between folders or tree branches to relocate site content.

### 2.6.3.2 Limitation of Microsoft FrontPage 2000

- *Use proprietary technology*



Some of the more advanced effects in FrontPage are compatible only with Microsoft products, such as Internet Explorer and Active Server Pages, and users must have FrontPage extensions on the Web server in order to use most FrontPage 2000 features.

## 2.7 Programming Languages Consideration

### 2.7.1 Hyper Text Markup Language

HTML is the lingua franca for publishing hypertext on the World Wide Web. It is a non-proprietary format based upon SGML, and can be created and processed by a wide range of tools, from simple plain text editors. User types it in from scratch to sophisticated WYSIWYG authoring tools.

To develop the next generation of HTML as a suite of XML tags sets with a clean migration path from HTML 4.0. Some of the expected benefits include a modular solution to increasing disparate capabilities of browsers and the ability to cleanly integrate HTML with other XML applications. To publish information for global distribution, one needs a universally understood language, a kind of publishing mother tongue that all computers may potentially understand. The publishing language used by the World Wide Web is HTML (Hyper Text Markup Language). HTML gives author the mean to:

- Publish online documents with heading, text, tables, list, photo, etc.
- Retrieve online information via hypertext links, at the click of a button.
- Design form for conducting transactions with remote services for use in searching for information, making reservations, ordering products, etc.
- Include spreadsheets, video clip, sound clips and other application directly in their document.

Most people agree that HTML documents should work well across different browsers and platforms. Achieving interoperability lowers cost to content providers since



they must develop only one version of a document. If the effort is not made, there is much greater risk that the web will devolve into a proprietary world of incompatible formats ultimately reducing the web's commercial potential for all participants.

HTML has been developed with the vision that all manner devices should be able to use information on the web. PCs with graphics displays of varying resolution and color depths, cellular telephones, hand hold devices, devices for speech for output and input, computer with high or low bandwidth and so on.

### 2.7.2 Active Server Pages (ASP) [1]

Microsoft Active Server Pages (ASP) is a server-side scripting environment that developer can use to create and run dynamic, interactive web server applications. With ASP, developer can combine HTML Pages, script Commands and ActiveX components to create interactive web pages or powerful web-based applications. ASP applications are easy to develop and modify.

ASP is a server side-scripting platform supported by Microsoft Internet Information Server (IIS), Microsoft Personal Web Server (PWS), and by other web server via ChiliASP. It provides the same functionality as CGI scripts and is especially useful for integrating data from Windows-based databases (eg. Microsoft Access and SQL Server) and other ODBC (Open Database Connection) compliant databases with client site. ASP is not an application. It is a VB script interpreter that integrated with IIS, together with an interface for other custom component. It is also able to include other web pages component like ActiveX control and Java applets. Therefore, ASP is considered as a glue technology, which binds together other various server-based systems to help build interactive web pages. The advantages of ASP are as below:

- It is suitable for publishing and collecting data on web.
- It provides a way for building secure transactions, server-based application and web site.



- It provides Active Database object, one of the **active server components** allows easy but powerful connections to be made to almost **any database system** for which an Open Database Connectivity (ODBC) driver is **available**.
- It has pre-build Active Server Components, which **provide plug-in** object that will perform specific task.
- It supports client-server programming. Furthermore, the combination of ASP, client-side scripting and objects can be used to create client/server applications.
- It is able to create client side code dynamically on the server.
- In the ASP Pages developer can use any scripting language for which they have installed a scripting engine that follows the ActiveX scripting standard. ASP comes with scripting engines for Microsoft Visual Basic scripting edition (VB scrip) and Microsoft Jscript so that developer can immediately begin writing scripts. ActiveX scripting engines for PERL, REXX, and Python are available through third-party developers.

Because developer scripts run on the server does all the work involved in generating the web pages that have been send to browsers. Developer need not worry whether a browser can process his scripts. The web server does all the script processing. Transmitting standard HTML to browser. Server-side script cannot be readily copied because only the result at the script is returned to the browser. Users cannot view the script commands that created the page they viewing.

### 2.7.2.1 ASP compare to CGI application

ASP provides all of the functionality of CGI applications in an easier-to-use and more robust environment. ASP is a easier way for server to access information in a form not readable by client (such as on SQL database) and then act as a gateway between the two to produce information that the client can view and use.



With CGI, the server creates as many processes as the number of client requests received. The more concurrent requests there are, the more concurrent processes created by the server. However, creating a process for every request is time consuming and requires large amount of server RAM. In addition, this can restrict the resources available for sharing from the server application itself, slowing down performance, and increasing wait times on the Web. ASP instead runs in the same process as the web server, more handling client request faster and more efficient. It is much easier to develop dynamic content and Web application with ASP.

### 2.7.2.2 ASP compare to ISAPI applications

ISAPI applications require all of the programming and layout to contain in a DLL file written in C++. ISAPI applications are thus more difficult to create and maintain. With ASP files, and HTML Writer can script an external component and format the output. ASP separates the layout and design from the business logic.

### 2.7.2.3 ASP compare to PERL

PERL is the most popular programming language for writing CGI scripts. Due to its popularity, power and flexibility, as well as the fact that scripts written in PERL can run easily on most Web servers. PERL is the language that we teach for CGI scripting. Anyway, PERL and other scripting languages are not robust development tools by themselves. ASP provides a familiar framework and objects for building complex applications that require data from relational database and legacy sources. ASP supports virtually any scripting language to build these applications. Third parties are currently developing additional scripting engines, such as PERL, which will be announced when they are ready.



### 2.7.3 Java

Java is an object-oriented, portable, multithreaded, network-aware programming language developed and maintained by Sun Microsystems. Java is a *de facto standard* language. Although Sun ultimately controls Java, its wide-scale adoption has made it a standard for all intents and purposes. Sun has allowed the developer community to exert a good deal of control over the evolution of Java through its Java Community Process.

Java programs are run (technically, they are *interpreted*) by another program called the *Java Virtual Machine*, or Java VM, rather than by the native operating system (Windows 95/98/NT, Unix, and so on). In effect, a Java VM is an operating system inside of an operating system, within which a Java program executes. Java programs, regardless of what platform they are developed on, are written to a common API that is implemented in the Java VM. As long as a Java VM has been developed for a particular operating system, any Java program should (theoretically) *run without modification*. This architecture is the foundation of Java's claim of "write once, run anywhere." The most well known example of a Java VM is the one that comes built into your browser (Internet Explorer, Netscape Navigator).

Java programs typically run as *applets* (mini applications) inside a browser. As an applet, the Java program is integrated into a Web page and is automatically downloaded to your computer with the page, where it executes. Java programs can also run as standalone applications and as "servlets," which perform server-side processing in Web applications (similar to Domino agents).

Java programs (particularly applets) are, as a rule, not allowed to read and write to the hard drive of the system on which they execute.

Domino Designer supports the creation of Java agents either by directly writing them in the IDE or by importing code developed and tested in a third-part Java programming tool. Java is the only method of remotely manipulating objects on a Domino server from a browser interface. Java utilizes CORBA, which is fully supported on the Domino server.



### 2.7.4 Scripting Language

When choosing a scripting language, consider the following two issues:

- Browser compatibility

Web browsers must include a scripting interpreter for the language you choose. Internet Explorer 4.0 and later has interpreters for VBScript, JScript, and JavaScript. Netscape Navigator provides an interpreter for JavaScript.

- Programmer familiarity

Choose a scripting language that is similar to a language you know. If you have Visual Basic experience, you can quickly learn VBScript. If you have Java or C experience, JScript and JavaScript will be more familiar to you.

#### 2.7.4.1 JavaScript

JavaScript is a cross-platform, object-oriented scripting language, which extends the functionality of HTML, developed by Netscape Communications Corporation for developing Internet applications. The original purpose of JavaScript was to enable events on a web page, such as mouse clicks or field navigation, to be responded to. This form of JavaScript is referred to as "client-side JavaScript" because it allows the developer to code a Web page so that it reacts to the actions of a user viewing the page through a Web browser. By using JavaScript in Web applications, server workload and network traffic can be reduced and keeps more of the processing duties on the client-side.

JavaScript is lightweight in that there isn't a great deal to learn and can be productive with it very quickly, in contrast to much more complex languages such as Java. As a scripting language, JavaScript is meant to tell an application what to do. Unlike languages used to create applications, it cannot do anything without the application.



JavaScript can be integrated or incorporated into Visual InterDev application, especially in a process form, which means it can be used as a common scripting language for combination web applications. Common uses of JavaScript in Visual InterDev applications include:

- Input validation
- Confirming actions
- Prompting for input
- Control objects in the browser's user interface.
- Retrieve CGI variables to gather data about the environment and display the results to the user.

**2.8.4.2 VBScript [3]**

VBScript is a member of Microsoft's Visual Basic family of development products. Other members include Visual Basic (Professional and Standard Editions) and Visual Basic for Applications, which is the scripting language for Microsoft Excel. VBScript is a scripting language for HTML pages on the World Wide Web and corporate intranets.

Same as JavaScript, at this time, do not have a debugger or even a way to step through the code. Writing in VBScript is trivial for experienced Visual Basic programmers - the syntax is almost identical.

VBScript acts as both a client-side and server-side programming language. A client-side language is a language that can be interpreted and executed by a browser. On the other hand, a server-side programming is a language that executes on the server with a Web site's files.

The advantage of client-side programming language is that browser does all the work. This places fewer burdens on the server. However, currently, the only browser that can understand VBScript as a client-side language is Microsoft Internet Explorer. The advantage of using VBScript, as a server-side programming language is that the scripts work regardless of the browser being used.



VBScript enables authors to create scripts using subset of the Microsoft Visual Basic language. It does not include functionality that directly accesses the client machine's operating system or file system so it is safe for the WWW. VBScript is implemented as a fast, portable interpreter for use in Web browser and applications that use ActiveX controls, Java applets and OLE Automation Servers.

## 2.8 Database

### 2.8.1 Microsoft Access

Microsoft Access is the relational database management system used to create the relational databases. Together with the ODBC driver for Access, data can be retrieve from the database in client or server based system. It contains facilities to import, export and links table to HTML files, to process hyperlinks into or out of database applications and to publish tables, forms and reports in HTML format. Additionally, forms and datasheets can be saved as ActiveX server pages.

#### 2.8.1 Advantages of Microsoft Access

- Integration with other software

Microsoft Access is closely integrated with the other members of the office suite of business software. As far as accounting software is concerned, the link with the suite's spreadsheet program, Excel, is particular useful.

- Microsoft Access is fully networkable

Microsoft Access is designed for both stand alone and multi-user applications. The program is fully networkable.

- Microsoft Access is Y2K compliant

As might be expected, both Microsoft Access 97 and Microsoft Access 2000 are fully year 2000 compliant.



## 2.8.2 Oracle

### 2.8.2.1 Introduction

Oracle Corporation's reputation as a database company is firmly established in its full-featured, high performance RDBMS server. With the database as the cornerstone of its product line, Oracle has evolved into more than just a database company, complementing its RDBMS server with a rich offering of well-integrated products that are designed specifically for distributed processing and client or server applications.

As Oracle's database server has evolved to support large scale enterprise system for transaction processing and decision support, so too have its other products, to the extent that Oracle can provide a complete solution for client or server application development and deployment. An overview of client or server database system and the Oracle product architectures that support their implementation is as below.

### 2.8.2.2 Oracle 7 RDBMS Server

The Oracle 7 Server is a full-featured RDBMS that is ideally suited to support sophisticated client or server environment. Many features of the Oracle 7 internal architecture are designed to provide high availability, maximum throughput, security and efficient use of its host's resource. Although all these features are important architecture for a database server, Oracle 7 also contains the following language-based features that accelerate development and improve the performance of server side application components.

#### 1. PL/SQL language

A major component of the Oracle 7 server is its PL/SQL (Procedural Language/Structured Query Language) processing. PL/SQL is Oracle's fourth generation language (4GL) that incorporates structured procedural language elements with the SQL language. PL/SQL is designed specifically for client or server processing in that it enables a PL/SQL program block containing application



logic as well as SQL statements to be submitted to the server with a single request. PL/SQL significantly reduce the amount of processing required by the client portion of an application and network traffic required to execute the logic. PL/SQL is extremely flexible because the language used by client is interchangeable with that used by the server.

## 2. Stored procedures

Although version 6 of Oracle supported server-based PL/SQL, Oracle 7 provides the capability to store PL/SQL blocks as database objects in the form of stored procedures, functions and database packages. Calling a stored procedures from a client application generate minimal network traffic. Stored procedures provide a convenient and effective security mechanism.

## 3. Database triggers

Database triggers resemble stored procedures in that they are database-resident PL/SQL blocks. The different between the two is that triggers are fired automatically by the RDBMS kernel in response to a commit time event (such as an insert, update or delete operation). Database triggers greatly reduce the amount of code and processing that is necessary in the client portion of an application.

## 4. Declarative integrity

Constraints are enforced by the server whenever the records are inserted, updated or deleted. In addition to using referential integrity constraints that primary or foreign key relationship, define constraints to control the value domains of individual columns within a table. Server-enforced integrity reduces some of the code required for validation by the client and also increases the robustness of the business model defined within the database. With constraint, you can often improve performance and provide the flexibility to support multiple front-end interfaces.

## 5. User defined functions

PL/SQL blocks in user-defined functions. User-defined functions are similar to stored procedures and also reduce the amount of application code in the client portion of an application. Not only these functions from PL/SQL, but it can extend the set of standard Oracle SQL functions.



### 2.8.3 Microsoft SQL 7.0 [26]

Microsoft SQL server (MSSQL) is multi-user relational database management system (DBMS) that runs on the Microsoft Windows NT operating system. The SQL server driver enables application to access data in Microsoft SQL server databases through the open database connectivity (ODBC) interface. Structured Query Language (SQL) is used to access data in a SQL server database. All the client workstations communicate with SQL server across a network, such as a Windows NT server, Novell, TCP/IP network and etc.

#### 2.8.3.1 Benefit of MSSQL

- *Ease of installation, deployment and use*

SQL server includes a set of administrative and development tools that improve our ability to install, deploy, manage and use SQL server across several sites.

- *Scalability*

The same database engine can be used across platforms ranging from laptop computers running Microsoft Windows 95/98 to large, multiprocessor

- *Data warehousing*

SQL server includes tools for extracting and analyzing summary data for online analytical processing (OLAP). It also includes tools for visually designing databases and analyzing data using English-based questions.

- *System integrates with other server software*



SQL server integrates with e-mail, the Internet, and Windows.

## 2.9 Universal data access [29]

Microsoft Universal Data Access is a platform for developing multi-tier enterprise applications that access diverse relational or non-relational data sources across intranets or the Internet. Universal Data Access consists of a collection of software components that interact with each other using a common set of system-level interfaces defined by OLE DB.

OLE DB is a Microsoft system-level programming interface to diverse data sources. OLE DB specifies a set of Microsoft Component Object Model (COM) interfaces that contain database management system services. These interfaces enable you to create software components that implement the Universal Data Access platform.

Universal Data Access components consist of:

- Data providers, which contain and expose data
- Consumers, which use data
- Services, which process and transform data

Illustration below depicts the structure of a universal data access platform.



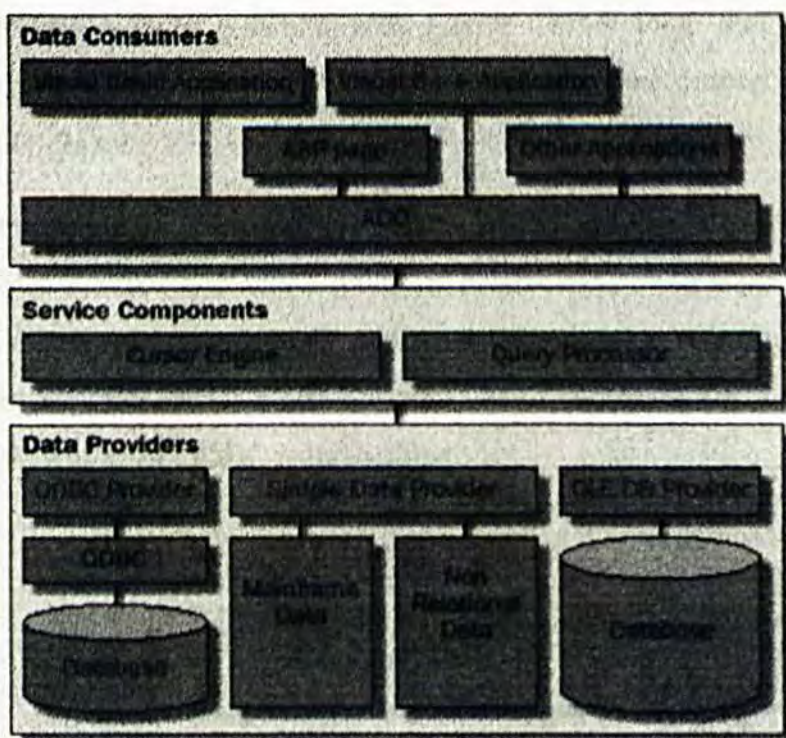


Figure 2.11 universal data access platform

Universal Data Access is supported by two related data access technologies — ActiveX Data Objects and Remote Data Service.

### 2.9.1 ActiveX Data Objects

ActiveX Data Objects (ADO) is the application-level programming interface that allows you to write applications that access data from OLE DB data sources, including ODBC data sources. It is based on Automation. When using ADO with Active Server Pages, all data access and manipulation is done on the server.

#### 2.9.1.1 ADO architecture



ADO provides a layer between your Active Server Page and the underlying database. To work with a database, you write code that sets properties and invokes methods of ADO objects.

ADO communicates with databases using OLE DB. OLE DB can access both SQL and non-SQL databases or data sources. If a database vendor supplies an OLE DB Provider for ODBC, ADO uses the Provider to communicate with the database. If a database vendor supplies an OLE DB Provider, ADO communicates directly with the database. The Provider for ODBC is the default.

The following illustration shows how ADO communicates with databases.

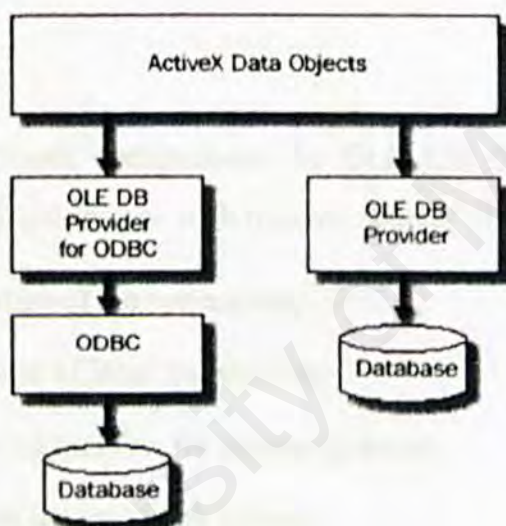


Figure 2.12 Functionality of ADO

### 2.9.1.2 ADO object model

ADO is made up of three top-level objects: the **Connection**, **Command**, and **Recordset** objects. Each of these objects is created and destroyed independently of one another.

The following illustration shows the relationship among these objects.



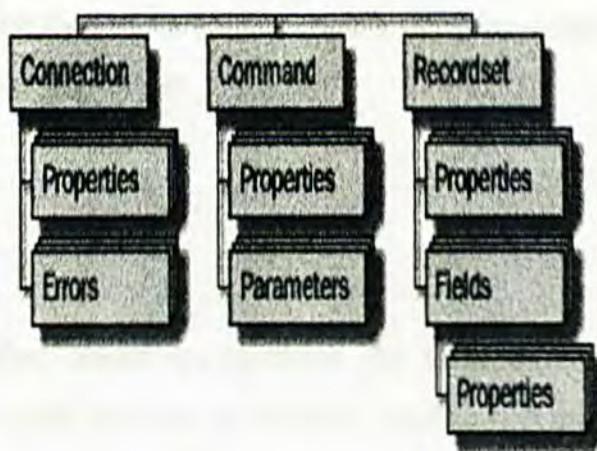


Figure 2.13 ADO's objects

### Connection

The Connection object encapsulates the OLE DB Data Source and Session objects. It represents a single session with the data source. The Connection object:

- Defines properties of the connection.
- Assigns the scope of local transactions.
- Provides a central location for retrieving errors.
- Provides a point for executing queries.

### Command

The Command object encapsulates the OLE DB Command object. The Command object:

- Specifies the data-definition or data-manipulation statement to be executed. In the case of a relational provider, this is an SQL statement.
- Allows you to specify parameters and customize the behavior of the statement to be executed. A collection of Parameter objects exposes the parameters.



- Contains a collection of Parameter objects used for parameterized queries or stored-procedure arguments.

### **Recordset**

The ADO Recordset object encapsulates the OLE DB Rowset object. The Recordset object is the actual interface to the data, whether it is the result of a query or was generated in a different manner. The Recordset object:

- Provides control over the locking mechanism used.
- Specifies the type of cursor to be used.
- Specifies the number of rows to access at a time.

The Recordset object exposes a collection of Field objects that contain information about the columns in the recordset (such as name, type, length, and precision) as well as the actual data values themselves.

Use the Recordset object to navigate through records and change data (assuming that the underlying provider can be updated).

### **2.9.2 Remote Data Service**

Remote Data Service (RDS) allows you to access data on a server and manipulate it on the client, reducing the number of round trips to the server. RDS extends ADO.

Both ADO and RDS are collections of COM objects. They are installed with the Windows NT Option Pack as part of Microsoft Data Access Components. The components of RDS are divided into client-side components and server-side components.



### 2.9.2.1 Client-Side Components

RDS client-side components run in an HTML document to provide **dynamic data** to the user. These components are not visible in the HTML document. **Instead, they** provide data from a recordset in data-bound ActiveX controls that are visible. The following list describes the RDS client components.

- **RDS.DataControl**

The **RDS.DataControl** object runs queries and makes the resulting recordsets available to the data-bound controls on an HTML document. You set properties for the object to identify the Web server, data source, and SQL statement to retrieve records.

- **RDS.DataSpace**

The **RDS.DataSpace** object creates instances of business objects that reside on a Web server. You can write client-side script to use these objects to invoke instances of your own custom business objects on the Web server.

- **ADOR.Recordset**

The **RDS.DataSpace** object creates an **ADOR.Recordset** object when it retrieves records. This type of recordset object is similar to the ADO **Recordset** object, but does not include all of the same features. Because it includes fewer features, it is smaller and can download quickly.

### 2.9.2.2 Server-Side Components

The server-side components of RDS include the **RDSServer.DataFactory** object.

- **RDSServer.DataFactory**



The **RDSServer.DataFactory** object is a business object that has been implemented as a COM server component. This is the default object used by the **RDS.DataControl** object to run queries.

### 2.9.2.3 How RDS Displays a Recordset

The following list outlines the sequence of events that occurs when RDS displays a recordset.

1. User submits a query on an HTML document.
2. The client-side script assigns the query to the **RDS.DataControl** object and calls the **Refresh** method.
3. The **RDS.DataControl** object submits the query by using HTTP to the Web server.
4. RDS routes the query to the **RDSServer.DataFactory** object, which runs the query against the data source.
5. Resulting recordset is sent back to the **RDS.DataControl** object by using HTTP.
6. The data-bound controls on the HTML document display records from the recordset.
7. The recordset is cached on the client side.
8. When a user moves through the recordset, the controls display the data without making another trip to the Web server.

### 2.9.3 Microsoft Data Access Components

The Microsoft Data Access Components (MDAC) is the key technologies that enable Universal Data Access. MDAC 1.5 includes the latest versions of the following components:



- ActiveX Data Objects (which includes Remote Data Service)
- OLE DB Provider for ODBC
- ODBC Driver Manager
- Updated ODBC drivers for Microsoft SQL Server, Microsoft Access and Oracle

## 2.10 Web Security

The most important factor that delays the Internet adoption is concerned with the security. Here, security includes hacker incidents, computer viruses, online theft and the breaking of encryption schemas. The growing trend towards connecting WWW servers with corporate databases raises critical security concerns.

### 2.10.1 Authentication

Authentication is, in computers as elsewhere, based on trust and always relies on the concept of an "authority in common". It is the most important component of any security system because the trust cannot be established without it.

As in computing, it is not theft secure where anyone can just attempt to login to a computer system. The most common authentication mechanism is a password login, in which only the authorized users know the key. However, although this seems to be a secure system, but due to some unethical behaviors of humans lead to its quality degradation.

### 2.10.2 Encryption

Encryption is the process that converts plain text or data into unintelligible form by means of a reversible mathematical computation, which it prevents unauthorized users from reading information not intended for them. Encryption schemes scramble data so that eavesdroppers cannot easily decipher data communicated between two parties. It is particularly useful when sending e-mail or posting a document that is private and/or



confidential. Encryption also protects data in transit from tampering. Once two parties are authenticated, both the client and the server can encrypt data transmitted between them. In all cases, encryption requires making a section of the authorized user's public key.

The American National Standards Institute has endorsed a process called the Data Encryption Standards (DES), a standardized public key by which senders and receivers can scramble and unscramble their messages. Although the DES code is well known, and breakable even with a personal computer, companies still use it because the method makes it quite expensive to intercept coded messages. Thus interlopers are forced to use other methods of gathering data – methods that carry greater risk of detection. [9]

Encryption is an important tool in computer security. User must understand that encryption does not solve all computer security is not used properly; it may have some side effect on the performance of the entire system. However, it is important to know the situations in which encryption is useful and to use it effectively.

### 2.10.3 SSL (Secure Socket Layer)

The Secure Socket Layer (SSL) protocol was developed by Netscape Communications to provide a secure communications channel between a browser and server. All information passed back and forth is encrypted to ensure that no one, barring perhaps a major spy agency, can intercept it. SSL is now supported by all major browsers and is the generally accepted means of providing secure commerce on the net.

SSL provides:

- Server authentication, which allows any SSL-compatible client to verify the identity of the server using a certificate and a digital signature;
- Data encryption, which ensures the privacy of client-server communications by encrypting the data stream between the two entities;
- and data integrity, which verifies that the contents of a message arrive at their destination in the same form as they were sent.



SSL relies on the concept of a secure channel. This channel guarantees confidentiality in that all messages that pass over it are optionally encrypted. SSL does not encrypt any information stored on either the client or server. SSL integrates security beneath application protocols such as HTTP, NNTP, and Telnet. SSL provides a security "handshake" to initiate a TCP/IP connection, resulting in the client and server agreeing to the security level used, and fulfilling any Digital ID authentication requirements for the connection.

University of Malaya



## **Chapter 3: System Analysis**

### **3.1 Introduction**

System analysis is the most important phase in software development life cycle. It is the process of defining a problem, gathering pertinent information, developing alternative solution and choosing among those solutions. This phase involves all the activities necessary to determine and gain the requirement of the system. The methods that I used to gain the information are:

- Feasibility study; gathering the information by reading references books, journals, web sites and user guides that are relevant to project.
- Interview the staff at the FSKTM office to get the information about how the existing system works. (How the students result insert into the database)
- Interview the some academic advisor to get their opinion about the existing system and what is the their expectation for the new system.
- Observed the procedures of students during the registration week. (How they meet their academic advisor)
- Surf the Internet and tried to find the similar system.

### **3.2 Current System**

In existing system, the student needs to bring along their result slip to show to the lecturer. The academic advisor cannot sign the registration form, if the student cannot show the result slip.

Secondly, the student also cannot determine that whether the personal curricular was free or not. They will only know that while they reach their personal curricular room. For instance, when the personal curricular was going out station and he/she had no time to



come back to their room to leave message at the door. So the student, which does not know about that, will keep going to the personal curricular room.

Thirdly, the personal curricular will read the exam slip while the student comes to meet them. They have too little time to understand the student problem and the weakness of their studies. They can only check whether the student registers over credit or have they taken the prerequisite subject.

### 3.3 Requirement analysis

A requirement is a feature of the system or a description of what the system is going to focus in order to achieve the goals of the system. Requirements are divided into two categories: functional and non-functional requirements. The purposes to determine the requirement of the software-based system are:

- Enable the system engineer to specify software elements, establishes design constraint that the software must meet.
- A complete understanding of software requirements is essential to the success of a software development effort.
- To tell the designers what functionality and characteristics the resultant system is to have.

#### 3.3.1 Functional requirement

Requirements analysis covers the area of functional and non-functional requirements of the Academics Advisor System. The functional requirements probably can be divided into three sections, which are administrator section, academic advisor section and students/visitor section. Each of the section will have its own module that performs different function and task.

##### 3.3.1.1 Administrator



- *Change Password Module*

This module allows the administrator to change password for security purpose. An authentication and authorization process is vital to AAS to ensure that only the authorized user is able to access into the system. The administrator has to key in old password to ensure that a valid user is making changes. The system will verify the old password. If the password is match with the password inside the database, the password will be change. Else the system will prompt you a message to telling you that the password is invalid and the procedure will aborted.

- *Admin Account Module*

In this module, the administrator will create other administrator account for AAS. Administrator account can be created or deleted but not update because the information in this table is only login purpose. The particular of the administrator are very limit.

- *Academic Advisor Profile Module*

In this module, the administrator will create the academic advisor account for using AAS. All academic advisors will be given a username and password. Information such as name and e-mail address is required. All the particular of the academic advisor will be stored in academic advisor module. Administrator is also allowed to edit or maintain the academic advisor account to make sure that the all the information is updated.

- *Student Account Module*

In this module, the administrator can only reset the student account and all the student profile will be retrieve from the master database from the SIS. This function is preventing some student try to register student account for other student. If they know other student matrik number and IC number as well.



- *Student List Module*

This module will be managing the students by assign them to a particular advisor. This makes the advisor manage their students more effectively. The administrator also allows the update the student list under a particular advisor.

- *AAS Forum*

This module will be used to managing the AAS forum by deleting the message that are not needed or stored in the database for a long time ago. Administrator needs to make sure that the AAS forum will not over capacity

### 3.3.1.2 Academic Advisor

- *Change Password Module*

For a security reason, the academic advisor can change their password, when even they think that are necessary. An authentication and authorization process is vital to AAS to ensure that only the authorized user is able to access into the system. The academic advisor need to key in both the new password and the old password. The system will verify the old password. If the password is match with the password inside the database, the password will be change. Else the system will prompt you a message to telling you that the password is invalid and the procedure will aborted.

- *View Student Result*

In this module, the academic advisor is allowed to view the student information that is under their supervision. What they need to do is just click the link for a particular record at their table. Every particular record is one student record that stored the student profile and their result. The record can be view in several way depend on the decision of the academic advisor.

- *Making announcement at the web sites*



The academic advisor is allowed to making announcement at the web sites and the student can go to read this announcement after they login to the system. The academic advisor can edit their announcement and delete the particular announcement.

- *Forum service*

This service will let the students and the academic advisor interact at the Internet environment. This advance feature will let the students and their academic advisor discuss about the problem that they had encountered. Problems can be solved more easily and faster because the discussion section can be held online, which mean anywhere any time as long as there is an Internet connection.

### 3.3.1.3 Students

- *Change password module*

The students' user name and password are save in the student account and this particular will be used in the login section. As the reason of security the students are also allow to change the password, when they think that are necessary.

- *View the previous result*

The student can view their previous result in this system. This is an alternative way for the students get their result in the result slip. The student can choose the style of the data presented.

- *Read the academic advisor announcement*

The student can access the information that their academic advisor had been made. This help the students can the latest information from their academic advisor. So the students can always login to the system and read the announcement that had been made by their academic advisor.



- *Forum service*

This service is a tool that allows the student and their academic advisor discussing some issue online. The student will be more convenience to communicate with their academic advisor at any time and anywhere as long as there is an Internet connection.

### 3.3.2 Non-Functional requirements

A non-functional or constraint describes a restriction of the system that limits our choice for constructing a solution to problem. These requirements are very subjective but are as important as the functional requirements.

#### 3.3.2.1 Inter-operability

Applications and computers from different suppliers will have the capability to work together on a network and to connect to each other, share data and processes as appropriate. By having integration among the application and system, data that stored in a particular database is more consistent and can avoid the redundancy of the data.

#### 3.3.2.2 Reliability

A system is said to have reliability if it does not produce dangerous or costly failures. When it is used in a reasonable manner, that is in a manner that a typical user expects is normal. This definition recognizes that a system may not always be used in the ways that designer expects. So we need to consider the unexpected situation and tried to find a solution or apply error-handling procedures to a particular situation.

#### 3.3.2.3 Accuracy



Accuracy refers to the precision of computations and control. The inaccurate data can cause a failure to the system. This will affect the usability of the system. AAS provides various accuracy measures. For instance, sign up page is able to eliminate duplicate records such as user name and password, therefore always maintaining an accurate database.

#### 3.3.2.4 Maintainability and expandability

Maintainability may be defined quantitatively as the ease with which software can be understood, corrected, adapted and enhanced. Maintainability is the degree to which architectural data or procedural design can extend. AAS is design to be expandable in future.

#### 3.3.2.5 Robustness

The application system shall be able to handle or at least avoid disaster in facing any unexpected situation and data.

#### 3.3.2.6 Security

The security features built in prevents unauthorized access into the full-text of the AAS, user must log in with correct user name and password in order to access the full-text of the AAS. Authorized user can change their password desired. Basically, this system will be protected in 3 layers security. They are web application security (login page), web server security (IIS security) and web server operating system security (Windows 2000).



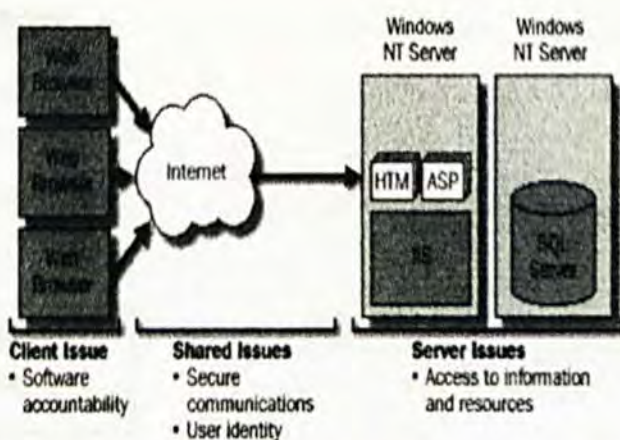


Figure 3.1 Security Issue of a Web Application

## 3.4 Methodology

### 3.4.1 Introduction

Many process models are described in the software engineering literature. Some are prescriptions for the way software development should progress, and others are descriptions of the way software development is done in actuality. In theory, two kinds of models should be similar or the same, but in practice, they are not. Building a process model and discussing its sub processes help the team understand this gap between what should be and what is.

There are several other reasons for modeling a process:

- It forms a common understanding of the activities, resources and constraints involved in the software development.
- It helps the development team find the inconsistencies, redundancies, and omissions in the process and in its constituent part.
- The model should be reflecting the goals of development.
- Every process should be tailored for the special situation in which it will be used.



### 3.4.2 Waterfall Model

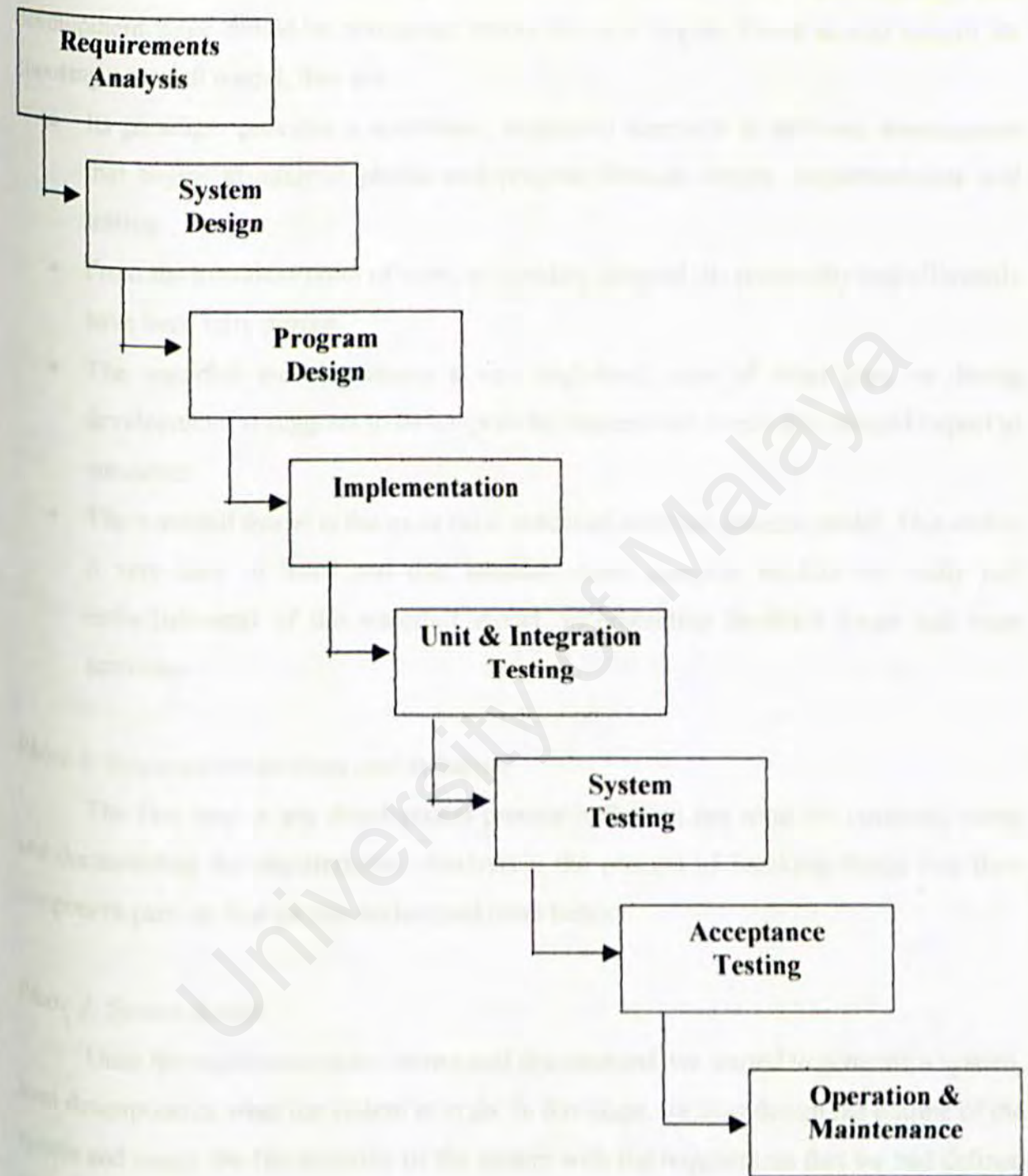


Figure 3.2 Waterfall model



I will use the waterfall model to develop my system. Illustrated in figure 3.1, where the stage are depicted as cascading from one to another. As the figure implies, one development stage should be completed before the next begins. There several benefit for choosing waterfall model, they are:

- Its paradigm provides a systematic, sequential approach to software development that begins at analysis phases and progress through design, implementation and testing.
- From the historical point of view, it is widely adopted. Its practically and efficiently have been fully proven.
- The waterfall model presents a very high-level view of what goes on during development, it suggests to developers the sequence of events they should expect to encounter.
- The waterfall model is the most basic model of software process model. This makes it very easy to learn and use. Besides, more complex models are really just embellishments of the waterfall model, incorporating feedback loops and extra activities.

#### *Phase 1: Requirement analysis and definition*

The first step in any development process is finding out what the customer wants and documenting the requirements. Analysis is the process of breaking things into their component parts so that we can understand them better.

#### *Phase 2: System design*

Once the requirements are known and documented, we started to generate a system-level description of what the system is to do. In this stage, we also design the outline of the system and match the functionality of the system with the requirement that we had defined at the earlier stage.

#### *Phase 3: Program design*



At this stage, we will start to design how to write the code based on the system design. The system design provides us the information about what is the functionality. So we can design the code that match to this functionality.

#### *Phase 4: Implementation*

This is the stage that we generate our code and following what we had designed at the earlier stage. At the end of the stage, the system will be completed. But the reliability of the system is not tested yet.

#### *Phase 5: Unit and integration testing*

The system, which can be define as group functionality need to test in unit and also integration of all the functionality. This is necessary because we need to make sure that the functionality works properly and according to specification.

#### *Phase 6: System testing*

The purpose of this testing is make sure that the final product are match with the requirements of the customer. The requirements that we collected at the beginning of the stages are once again call out to compare with the final product.

#### *Phase 7: System delivery*

This is the stage where we sent our final product to the customer and teaching the customer to use our system in a proper way.

#### *Phase 8: Maintenance*

For many software systems, acceptance by the customer does not mean the end of the developer's job. If faults are discovered after the system has been accepted, a maintenance team need to fixes them.



## 3.5 System architecture

The architecture that I choose is three-tier client/server model. The two-tier client/server model is simply not flexible or powerful (scalable) enough to handle many larger applications. Maintaining a dialog between each client workstation and the central database server can result in high network traffic and poor performance, for example when many users try to do simultaneous access to a database.

Three-tier client server applications help address these issues by putting another layer between the users and the database — the application server. This type of central application service can manage network traffic and database server loads more efficiently.

Typically, the application layer handles most of the business services, and may be implemented on its own server computer, separate from the database. One of the main advantages of a three-tier architecture is the ability to extract the business logic from the user and data tiers and into the middle tier, where it is easier to maintain.

## 3.6 Technology Consideration

### 3.6.1 Programming language

#### 3.6.1.1 Why Choosing Active Server Pages (ASP)

ASP provides an extensive server-side platform supporting compile-free, language-independent scripts and ActiveX components. ASP file is just the same as an HTML file. It contains text, HTML tags and scripts. The script in an ASP file is executed on the server and the ASP file has the file extension “.asp”. The reasons of choosing Active Server Pages are:

- Dynamically edit, change or add any content of a web page.
- Response to user queries or data submitted from HTML forms.
- Access any databases and return the results to a browser.



- Customize a web page to make it more useful for individual users.
- Simplicity and speed.
- Clever ASP programming can minimize the network traffic.

### 3.6.1.2 Why Choosing VBScript

VBScript acts as both a client-side and server-side programming language. A client-side language is a language that can be interpreted and executed by a browser. On the other hand, a server-side programming is a language that executes on the server with a Web site's files. The reasons of choosing VBScript are:

- The advantage of client-side programming language is that browser does all the work. This places fewer burdens on the server.
- The advantage of using VBScript, as a server-side programming language is that the scripts work regardless of the browser being used.
- VBScript can be integrated or incorporated into Visual InterDev application, especially in a process form, which means it can be used as a common scripting language for combination web applications

## 3.6.2 Database

### 3.6.2.1 Why Choosing Microsoft SQL Server 7.0

Microsoft SQL server (MSSQL) is multi-user relational database management system (DBMS) that runs on the Microsoft Windows NT operating system. The SQL server driver enables application to access data in Microsoft SQL server databases through the open database connectivity (ODBC) interface. The reasons of choosing SQL 7.0 are:

- Ease of installation, deployment and use.
- Scalability and supported by Microsoft Windows 95/98 to large.
- System integration with other server software. For instance, email, Internet and Windows.



### 3.6.3 Programming Tool

#### 3.6.3.1 Why Choosing Microsoft Visual InterDev 6.0

Microsoft Visual InterDev provides a rapid, visual development environment for building ASP. Visual InterDev also can easily integrate ActiveX server components written in Visual J++, VB, Visual FoxPro and Visual C++. Using Visual InterDev with ActiveX server component, a developer can easily create multi-tier web applications. ActiveX server components provide a convenient and effective way to tight integrate a web application with existing Internet system. The reasons of choosing Visual InterDev 6.0 are:

- Provides a rapid and visual development environment for building ASP.
- Can easily integrate with ActiveX server component.
- Include a variety of development features for integrating client-server and web technologies.

### 3.6.4 System Platform

#### 3.6.4.1 Why Choosing Microsoft Windows 2000

Windows 2000 Server is a multipurpose, entry-level server operating system that can used to provide the network users with file, print, application, or web services. Windows 2000 Server provides a well-integrated package containing the application development environment, security, and scalability. The reasons of choosing Microsoft Windows 2000 are:

- Windows 2000 is used for businesses because it has a high level of stability and security.
- Cut cost with improved management system for networks, servers and Windows desktops.
- Share selected information without compromising confidential data.
- Expand the network environment as the application needs evolve.



### 3.6.5 Web Server Software

#### 3.6.5.1 Why Choosing Internet Information Server (IIS)

Microsoft IIS is built into the Microsoft Windows 2000 Server operating system. It was designed to deliver a wide range of intranets and the Internet server capabilities for corporate. IIS can be used alone as web server, or in conjunction with compatible technologies to set up Internet commerce, to access and manipulate data from a variety of data source, and to build web applications that take advantages of server script and component code to deliver client-server functionality. The reasons of choosing IIS are:

- Enable to generate dynamic Web pages with HTML templates.
- Provides an easy information searching on the web.
- Provides the facilities to capture specific user information.
- Enable to analyze server log files and site contents.
- Implement security at the web server layer.
- Includes its own Internet Services API.

### 3.7 Run-time requirement

#### 3.7.1 Server hardware requirement

The server computer requirement are:

- A server with at least Pentium 166 Mhz processor.
- At least 32 MB RAM
- Network Interface Card (NIC) and network connection with recommended bandwidth at 10 Mbps or more.
- Other standard computer peripherals.

#### 3.7.2 server software requirement

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



- Windows 2000
- Microsoft Internet Explorer 4.0 or above
- SQL 7 server

### 3.7.3 Client hardware requirements

The client hardware requirements are quite minimal as it has reasonable amount of RAM. The recommended of RAM is 16 MB.

### 3.7.4 Client software requirements

The client software requirements fall on the browser used by users. It requires a system that can run Microsoft Internet Explorer 4.0 or above or any other browser that support VB script.



## **Chapter 4: System Design**

### **4.1 Introduction**

System design is a critical part for the whole project. So, good design is the key to successful software project. This is the stage in the system development process where the requirements for the system are translated into the system characteristics. There are many stages in the design process as follow:

- **Database Design**

The data structures used in the system implementation are designed in detail and specified. In a relational database, a table or relation is a collection of unique instances of similar data.

- **Process design**

Structured design is a process oriented for breaking up a large program into hierarchy chart of modules that result in a computer program, which is easier to implement and maintain.

- **User Interface design**

Services are allocated to different components of the system and the interfaces of these components are designed. This enable user interacts with the system.

### **4.2 Database design**

The database that will be use in this system is SQL 7. There are 10 main tables in the system. They are Admin\_info, Advi\_info, Stud\_info, Advi\_List, Stud\_Result, PNGK, Course\_List Announcement, Main\_Msg and Reply\_Msg.



### 4.2.1 Admin\_info table

This table only contains 4 columns and they Id, Name, Username and Password.

The main purpose of this table is store the information for administrator authentication.

Column	Data type	Length	Allow null	Description
Id	Int	4	Not	To indicate a particular administrator
Name	Varchar	100	Not	The Administrator's full name
Username	Varchar	50	Not	Login name used by advisor
Password	Varchar	20	Not	To ensure the user identity

Table 4.1 Admin\_info table

### 4.2.2 Advi\_info table

This table consists by the academic advisor details and some fields that use to build the relationship with other tables.

Column	Data type	Length	Allow null	Description
Advi Id	Int	4	Not	To indicate a particular advisor
Advi Name	Varchar	100	Not	The advisor's full name
User Name	Varchar	100	Not	Login name used by advisor
Password	Varchar	50	Not	To ensure the user identity
Announce	Int	4	Not	Number announcements made by advisor
Limit Stud	Int	4	Not	Maximum student can be a assign
Stud Num	Int	4	Not	Number of students in the student list



Table 4.2 Advi\_info table

4.2.3 Stud\_info table

This table consists by the students' details and their user id and password.

Column	Data type	Length	Allow null	Description
User Name	Varchar	100	Not	Login name used by the student
Password	Varchar	50	Not	To ensure the user identity
Stud Name	Varchar	100	Not	The student's full name
Stud Matric	Varchar	50	Not	The student's matric number
Department	Varchar	100	Not	The student's Department
IC No	Varchar	12	Not	The student's email address
Registered	Varchar	10	Not	Indicate whether the student are registered or not
Assigned	Varchar	10	Not	Indicate whether the student has been assign to any advisor
Year	Int	4	Not	Indicate the student's years studies at FSCIT

Table 4.3 Stud\_info table

4.2.4 Stud\_Result table

This is a table that stored student result. Actually, this is a dummy table for the system. The actual data is stored the current system, Student Information System (SIS).



Column	Data type	Length	Allow null	Description
Stud Matric	Varchar	10	Not	The student's matric number
Course Code	Varchar	10	Not	The code for a particular course
Semester	Int	4	Not	The period of the course taken
Sessi	Int	10	Not	The sessi of the course taken
Status	Int	4	Not	Indicate how many times had been taken
Grade	Varchar	10	Not	The grade of the course

*Table 4.4 Stud\_result table*

#### 4.2.5 Course\_List table

This table had the information of all the course in our faculty.

Column	Data type	Length	Allow null	Description
Course Code	Varchar	10	Not	The code of a particular course
Course Name	Varchar	100	Not	The name of the particular course
Credit_hour	Int	4	Not	Indicate the credit hour for the course

*Table 4.5 Course\_list table*

#### 4.2.6 PNGK table

This table basically is a table that stored the PNG and the PNGK for the student and will be upgrade after one semester.



Column	Data type	Length	Allow null	Description
Stud Matric	Varchar	10	Not	The student's matric number
Sessi	Varchar	10	Not	The sessi for the PNG and PNGK
Semester	Int	4	Not	The semester for the PNG and PNGK
PNG	Float	8	Not	PNG for the student's
PNGK	Float	8	Not	PNGK for the student's

Table 4.6 PNGK table

4.2.7 Advi\_List table

This table contains 2 columns and they are Stud Matric and Advi Name. The main purpose of this table is builds a relationship between the academic advisor with their student.

Column	Data type	Length	Allow null	Description
Stud Matric	Varchar	10	Not	The student's matric number
Advi Name	Varchar	100	Not	The advisor's Name

Table 4.7 Advi\_List table

4.2.8 Announcement table

This table contains 5 columns and they are Id, Advi Name, Date, Title and Content. This table let the advisor to making announcement to display it to the student.



Column	Data type	Length	Allow null	Description
Id	Int	4	Not	The Id for the announcement
Advi Name	Varchar	100	Not	The name of the advisor that made announcement
Date	DateTime	8	Not	Date of the announcement that been made.
Title	Varchar	100	Not	Title of the announcement
Content	Varchar	500	Not	The content of the announcement

Table 4.8 Announcement table

#### 4.2.9 Main\_Msg table

This table contains 6 columns and they are Msg Id, Author, Date, Title, Msg and reply. This table let the advisor and student to add a forum title .

Column	Data type	Length	Allow null	Description
Msg Id	Int	4	Not	The Id for the main message
Author	Varchar	100	Not	The name of the Author that made message
Date	DateTime	8	Not	Date of the message that been made.
Title	Varchar	100	Not	Title of the Message
Msg	Varchar	500	Not	The content of the Message
Reply	Int	4	Not	Total number of reply

Table 4.9 Advi\_List table



### 4.2.10 Reply\_Msg table

This table contains 5 columns and they are Reply Id, Msg Id, Author, Date and Reply Msg. This table let the advisor and student to reply to the main message from the Main\_Msg table.

Column	Data type	Length	Allow null	Description
Reply Id	Int	4	Not	The Id for the reply message
Msg Id	Int	4	Not	Id for the main message that reply to
Date	DateTime	8	Not	Date of the message that been made
Author	Varchar	100	Not	Author of the reply message
Reply Msg	Varchar	500	Not	The content of the reply Message

Table 4.10 Advi List table

## 4.3 Process Design

The system is structured into a number of principal sub-systems where a sub-system is an independent unit. Communication between sub-systems is identified.

### 4.3.1 Structure chart

Decomposing a system into a set of interacting sub-systems is an important phase. Structure chart is used to depict the high level extraction of a specified system. The usage of structure chart is to describe the interaction between independent sub-systems.

AAS is divided into three major components: Administrator section, academic advisor section and student section. The details of each is presented in the structure chart below:



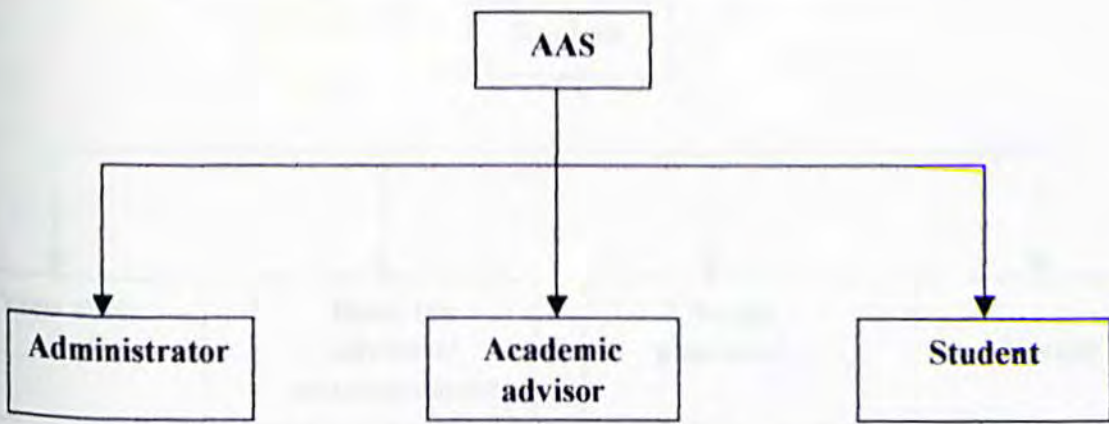


Figure 4.1 Main structure chart for AAS

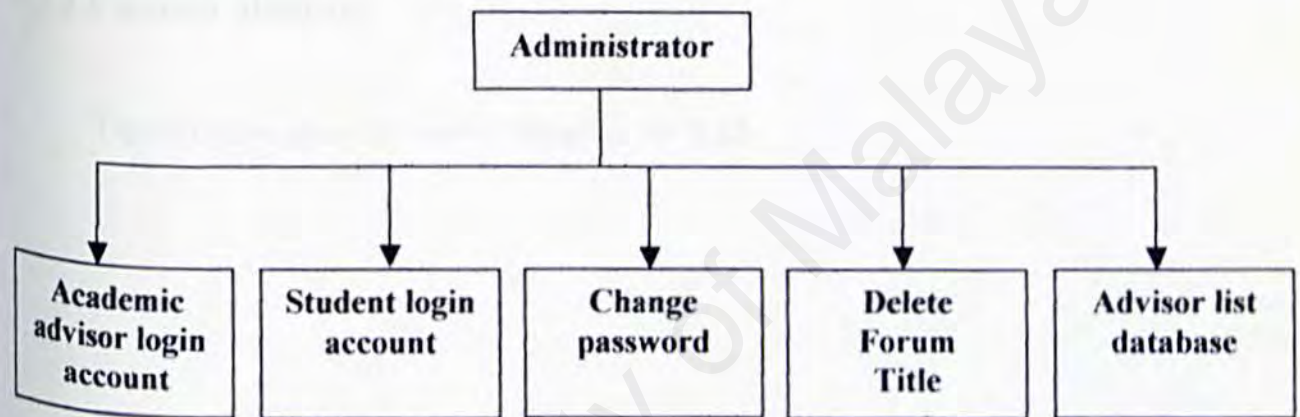


Figure 4.2 Structure chart for administrator section

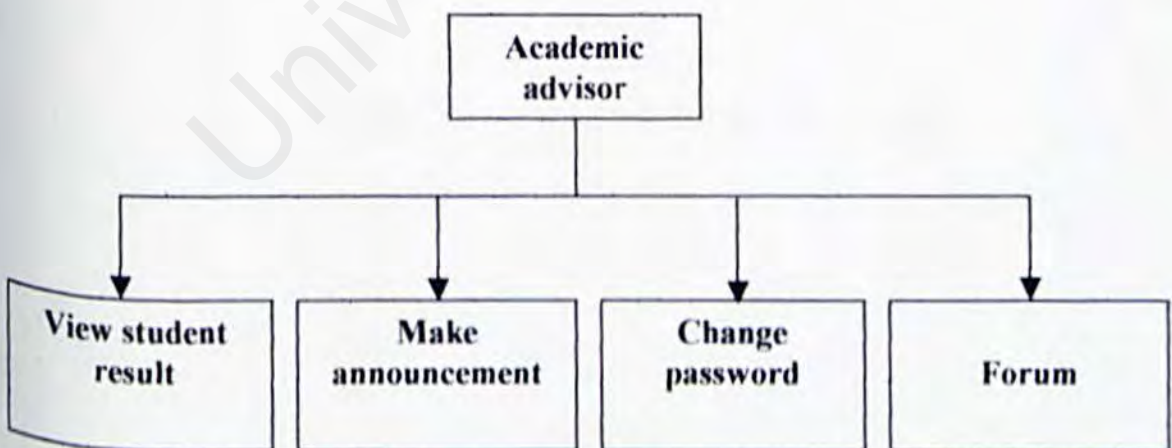


Figure 4.3 Structure chart for academic advisor section



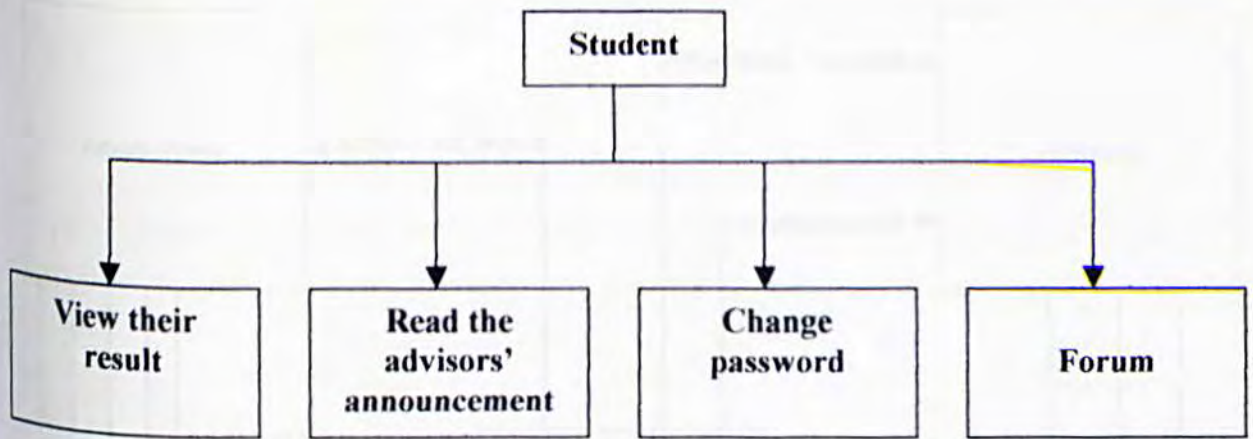


Figure 4.4 Structure chart for student section

### 4.3.2 Context diagram

Figure below show the context diagram for AAS.



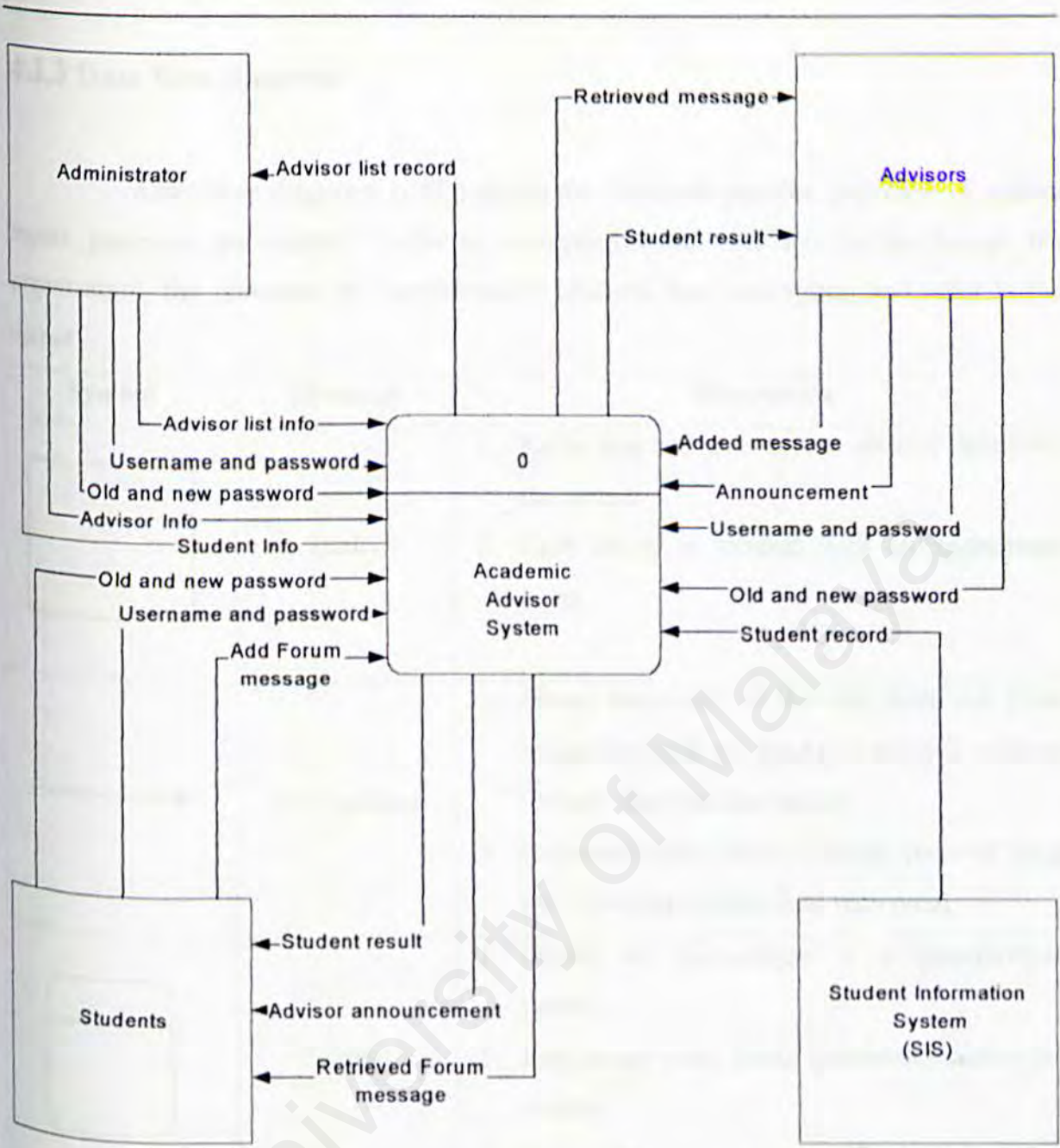


Figure 4.5 Context diagram for AAS



### 4.3.3 Data flow diagram

Data flow diagrams (DFD) depict the broadest possible overview of system inputs, processes and outputs. It able to conceptualize how the data moves through the organization, the processes or transformation that the data undergoes, and what is the output.





Symbol	Meaning	Description
	Entity	<ol style="list-style-type: none"> <li>1. Entity that can send data or retrieve data from the system.</li> <li>2. Each entity is labeled with an appropriate name.</li> </ol>
	Flow of data	<ol style="list-style-type: none"> <li>1. Shows movement of the data from one point to another, with the head of the arrow pointing towards the data destination.</li> <li>2. Represents data about a person, place or thing and it should be described with noun.</li> </ol>
	Process	<ol style="list-style-type: none"> <li>1. Shows the occurrence of a transforming process.</li> <li>2. Represents work being performed within the system.</li> <li>3. It must be given a unique identifying number indicating its level within the diagram.</li> </ol>
	Data store	<ol style="list-style-type: none"> <li>1. Represents a manual store or computerized file or database.</li> <li>2. It is described with noun.</li> <li>3. It must also give a unique reference number to identify its level in the diagram.</li> </ol>

Table 4.8 DFD basic symbols



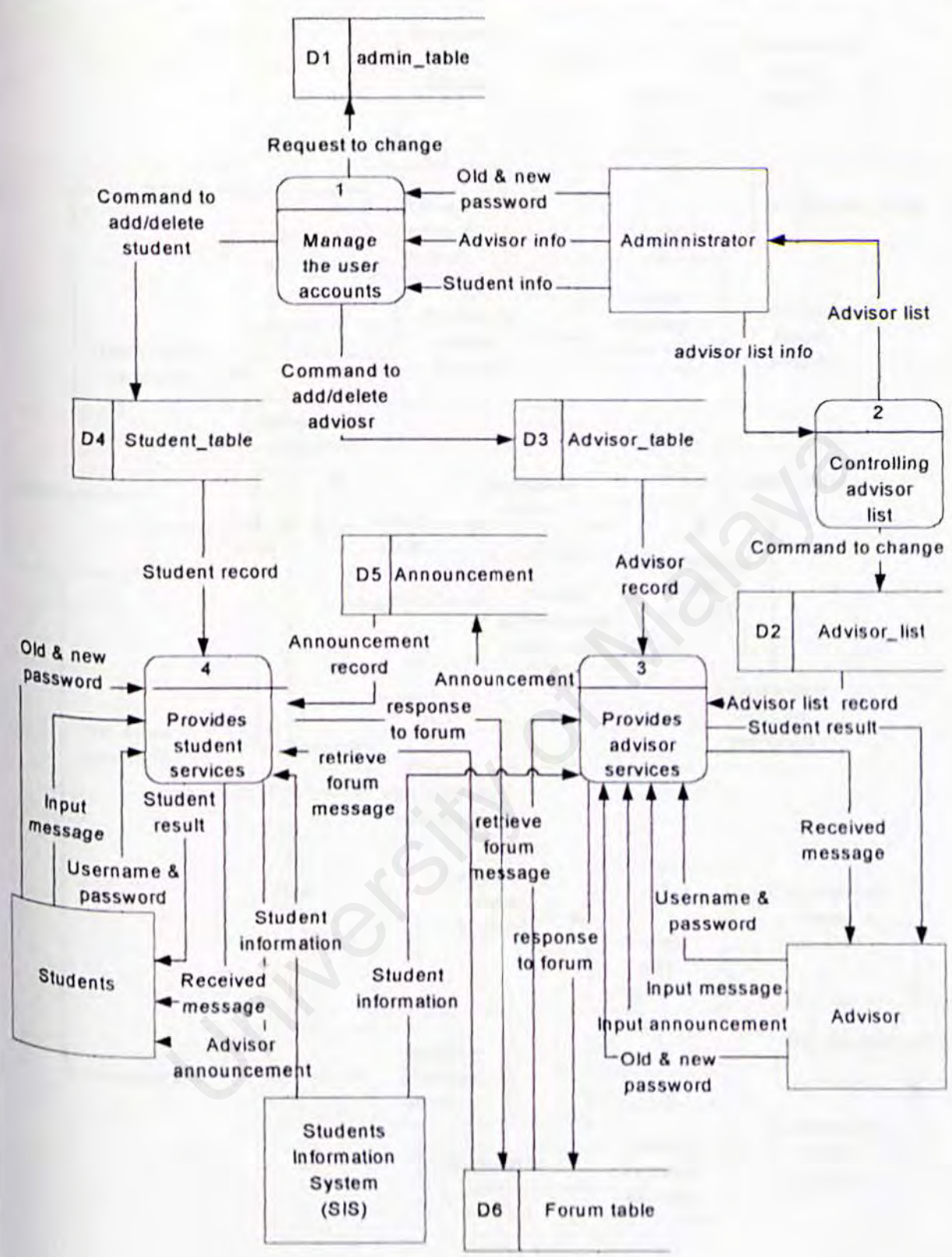


Figure 4.6 Zero diagram for AAS



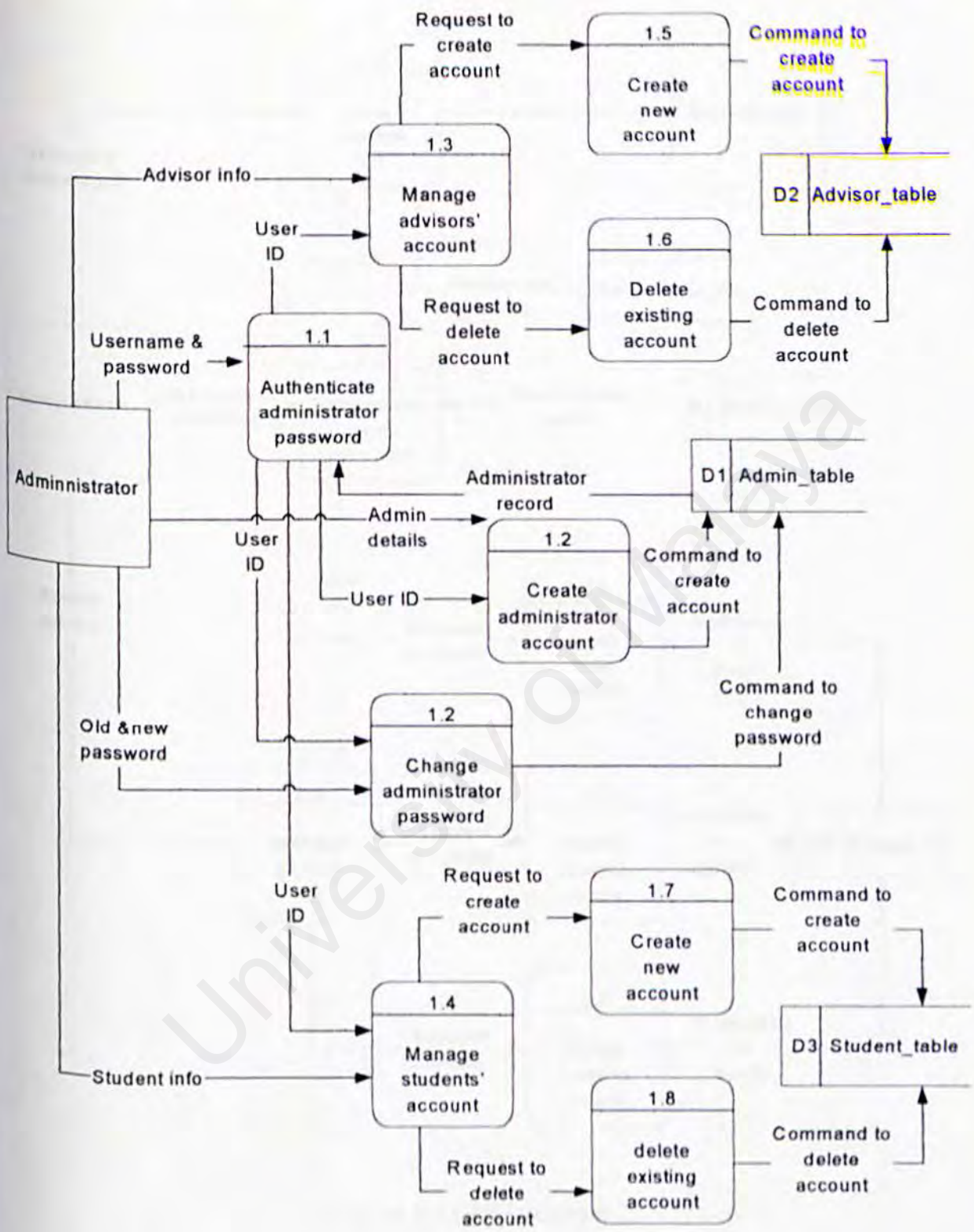


Figure 4.7 Child diagram 1



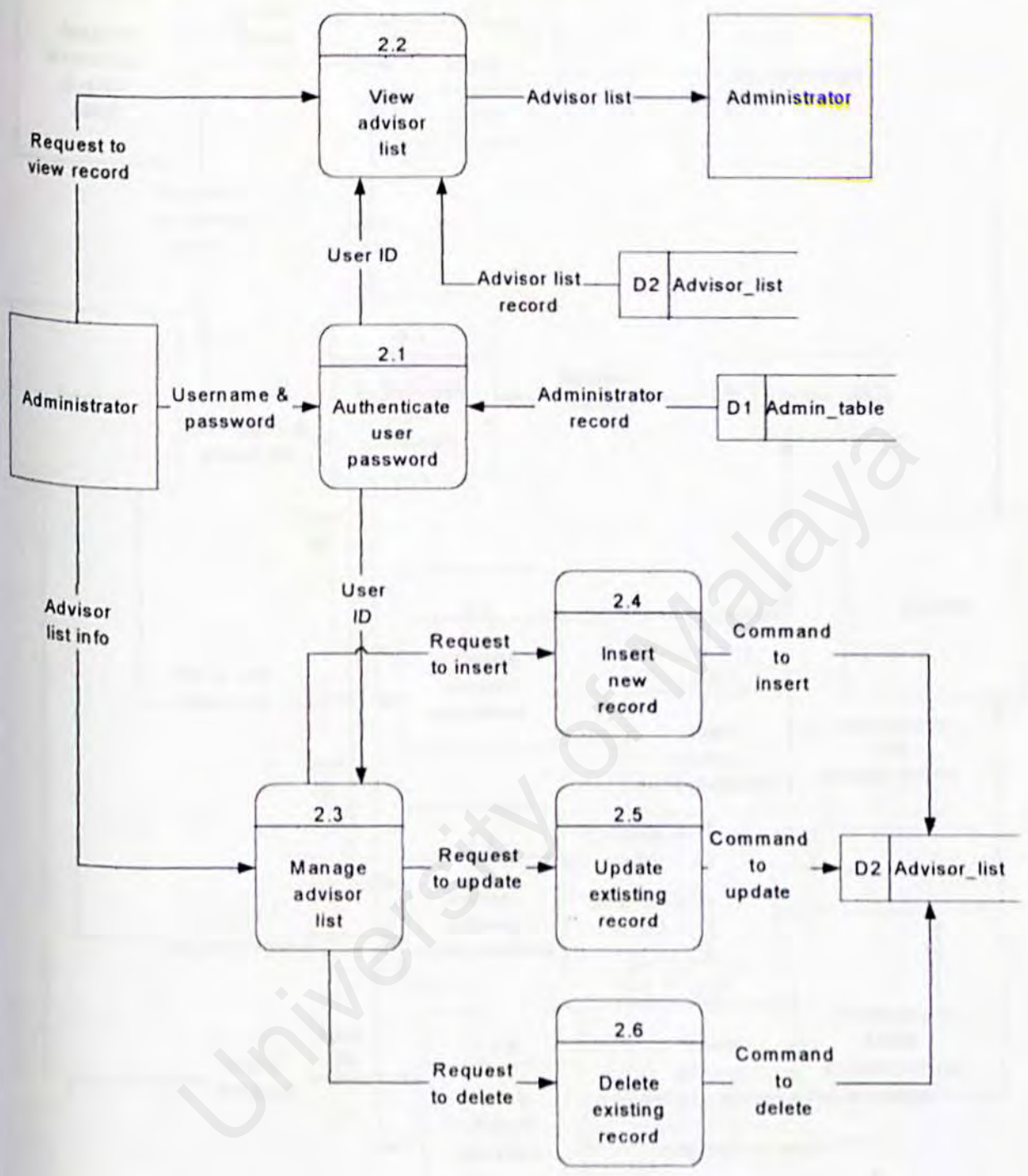


Figure 4.8 Child diagram 2



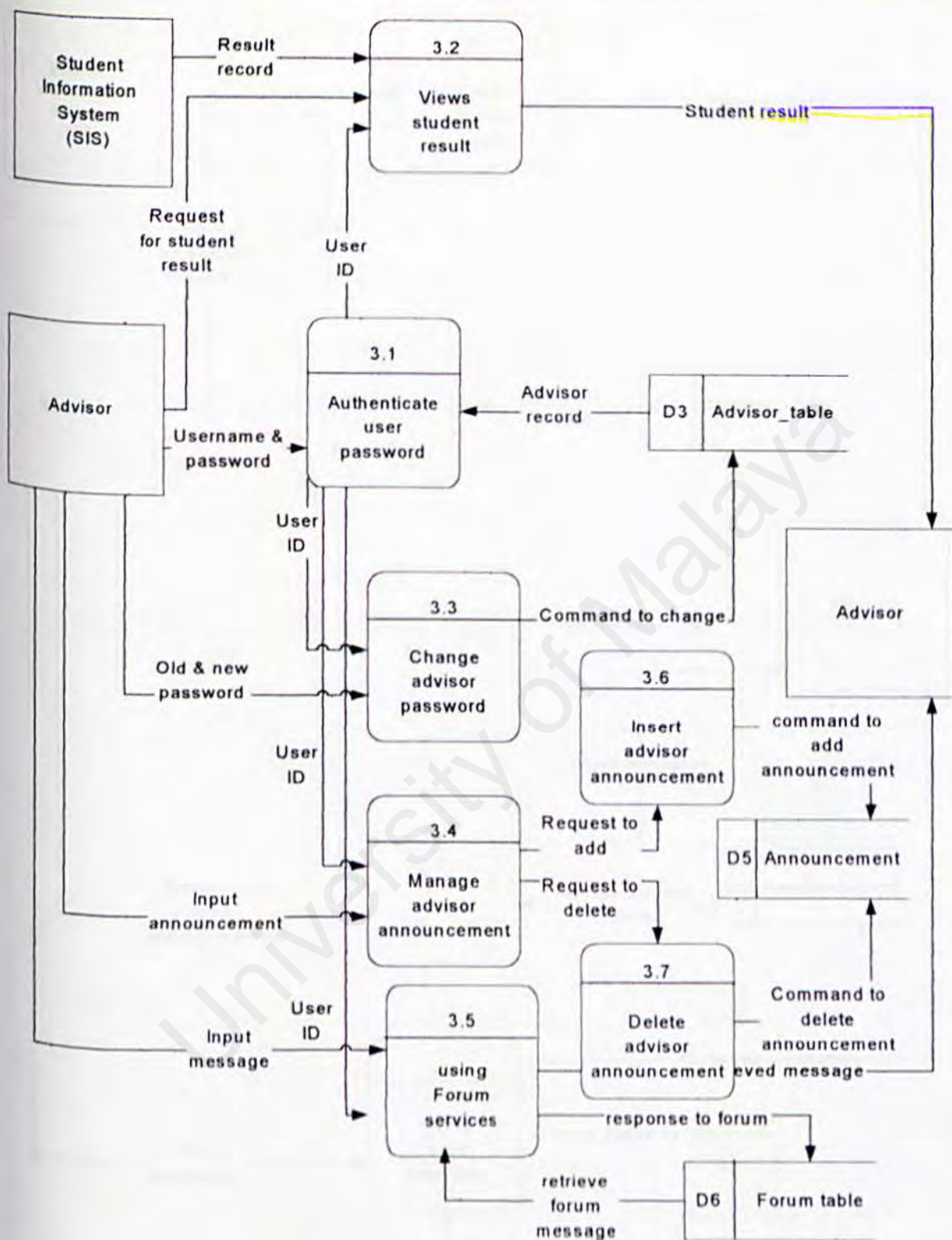


Figure 4.9 Child diagram 3



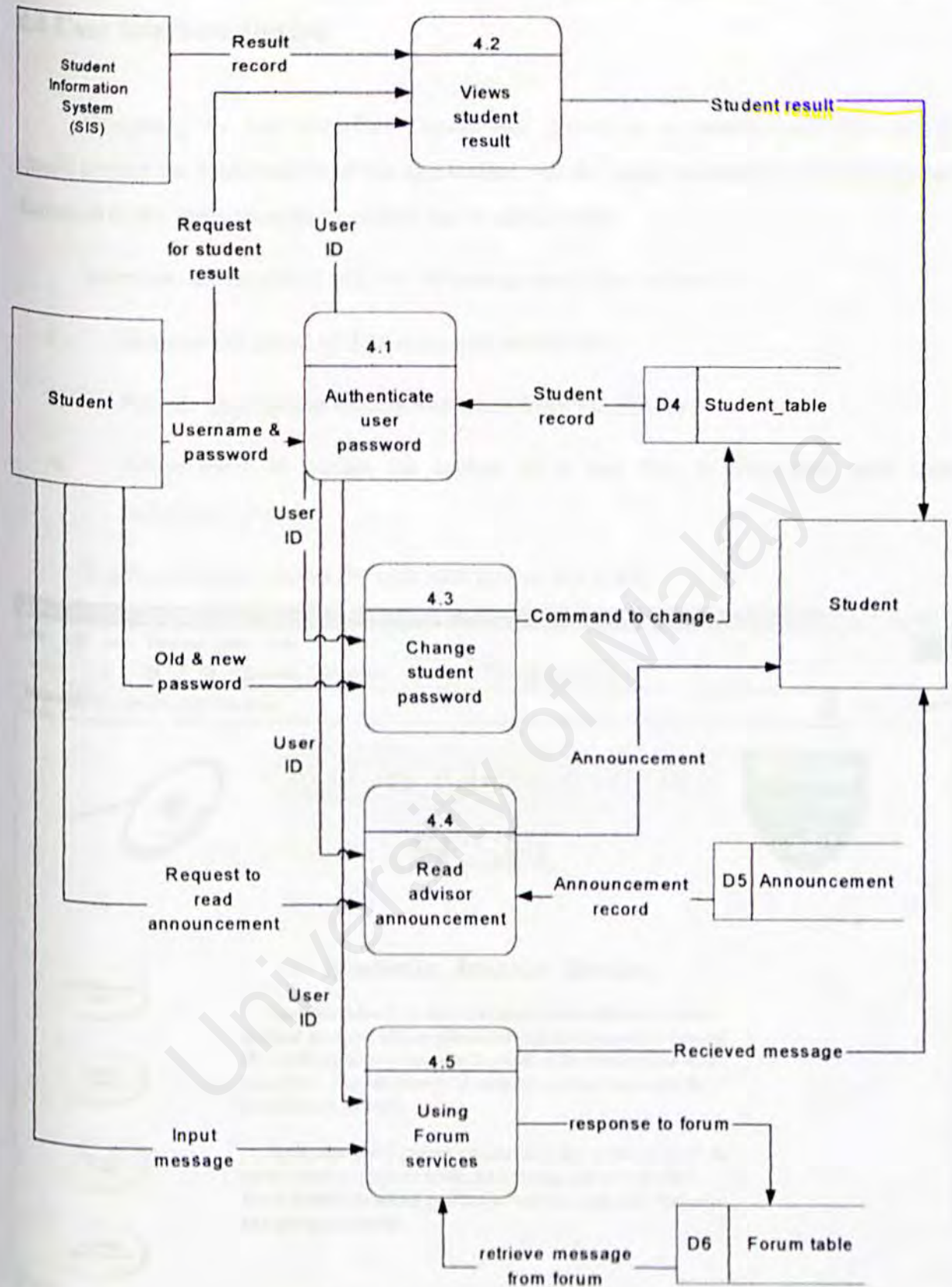


Figure 4.10 Child diagram 4



## 4.4 User interface Design

Designing the User Interface Design was proved as an uneasy task. The design should impact the functionality of the application. All the graphical objects and instructions displayed to the users must be clear and easily understood.

Interfaces are designed with the following objectives in mind:

- i. Increase the speed of data entry and reduce error
- ii. Provide appropriate feedback to users from the system
- iii. Allow users to access the system in a way that is congruent with their individual's needs.

The figure below shows the user interface of the AAS:

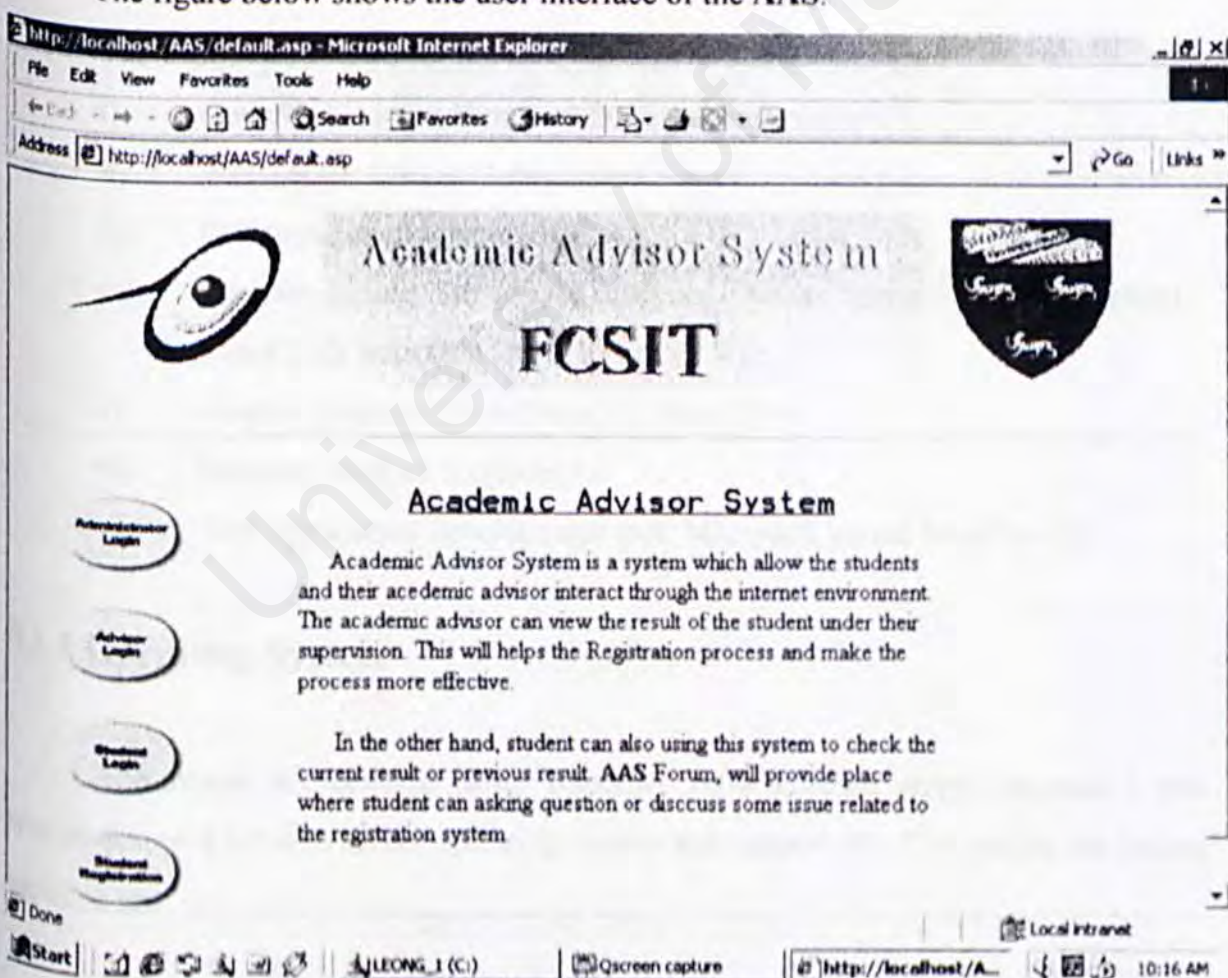


Figure 4.11 Home page of the AAS



## **Chapter 5: 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, appropriate tools and languages are needed to code the programs. A number of software was chosen in this case. This phase at times involves some modification to previous design. AAS was also developed using the bottom-up approach, which involves building the functions and procedures and then high-level software modules.

### **5.2 Development tool**

The overall tools used for the development of this project are:

- i) Operating system: Windows 2000 Advance server
- ii) Web server: Internet Information Server
- iii) Database Development: SQL 7
- iv) Program coding: Server side scripting – Active Server Pages (VB Script), Client Side Scripting (Java Script)
- v) Graphic creation: PhotoShop 5.5, Xara 3D 4
- vi) Browser: Internet Explorer 5.0
- vii) Web application development tool: Microsoft Visual InterDev 6.0

#### **5.2.1 Operating System**

The system are develop using Windows 2000 advance server, because it was special designed for web server operating system and support IIS. This makes the system easier to test.



## 5.2.2 Web Server

Internet Information Server was used as the web server to browse the system in the Internet Explorer 5.0. This is necessary because we need to view the result of the coding as well during the implementation stage.

## 5.2.3 Database Development

Microsoft SQL 7.0 was used during the entire program development. It was chosen because of the high capacity and ease to use. 10 tables were created for used by the system. Some of the tables have relationship with some other table and some are not.

## 5.2.4 Graphic Creation

Photoshop 5.5 and Xara 3D 4is used to create buttons and animation text.

## 5.2.5 Program Coding

Active Server Pages is chosen as the server side scripting and VBScript is chosen as the scripting language. VBScript is chosen, as it is the default scripting language for ASP. ASP code is always inside the server script delimiters: `<%...%>`. For client side scripting, JavaScripting is chosen, as it is more widely supported by majority browser. Hypertext Markup Language (HTML) is also used.

## 5.2.6 Browser

AAS is best viewed with Internet Explorer version 5.0.



## 5.2.7 Web Application Development Tools

During the whole development of AAS, both Microsoft Visual InterDev 6.0 and Microsoft Front Page 2000 were used. Microsoft Visual InterDev was used most for ASP coding as it helps to differentiate between ASP codes and normal HTML codes whereas Microsoft Front Page was used for JavaScript and HTML coding.

## 5.3 System Coding

After each function is done, testing is done to check whether it works. Then, error checking will be inserted to make sure that if errors occur, it can be detected.

### 5.3.1 Coding Approach

AAS was developed modularly, mainly by using the bottom-up approach. This approach develops functions and procedures before proceeding to the higher-level modules. Below here are examples of the codes in ASP.

i) Coding to connect to a database

Firstly, a system DSN (Data Source Name) must be created in ASP, to connect to DNS, the code below is needed to connect to the SQL 7.0 database.

```
Dim objConn
Set objConn=Server.CreateObject("ADODB.Connection")
ObjConn.Open "provider=SQLOLEDB;" & "data source= WET990051;"
& "Initial Catalog= AAS;" & "user ID=sa;" & "password=;"
```



In the code, a connection object is created in ASP. This uses the CreateObject method of server object to create an instance of the connection object. It is then given a name, objConn. Then, open the connect. Data source is the server name and Initial Catalog is the database name.

ii) Coding to open a table in a database and query

After connecting to the database, the data store from the database table needs to be kept some place where we can refer to it. This time, the Recordset object is used to store the data captured from the data store. The open method is used to create a recordset. The syntax for the open method is:

*Recordset.Open Source,ActiveConnection,CursorType,Lock,Option*

The source here can be a table name or a query. ActiveConnection refer to the data store connection (As above, ActiveConnection here is objConn). CursorType refer to the type of cursor, for as example, static or dynamic. LockType refer to the locking of the recordset when open a table.

```
Dim rsUser
Set rsUser=Server.CreateObject("ADODB.Recordset")
rsUser.Open "Admin_info", objConn, adOpenForwardOnly,
adLockOptimistic, adCmdTable
```

Below here is an example showing the recordset to store the result of a query.

```
Dim strSQL,rsUser
strSQL= "SELECT * From Admin_info where [User
Name]='"&strUserName&"';"
Set rsUser = serevr.CreateObject("ADODB.Recordset")
rsUser.Open "Admin_info", objConn, adOpenForwardOnly,
adLockOptimistic, adCmdText
```



iii) Coding to get result from form

After the user has submitted the form, the data must be processed and inserted to the database. The method to extract the data from the form is as below.

```
StrUserName=Request.Form("userName")
```

Request.Form is used to extract the data from the form field, username. This is inserted into the field into a variable call strUserName.

iv) Coding on using session object

Session object are used to store information that can be accessed by the client. Session can be used to track users to make sure users are allowed to certain web pages only. In AAS, session object is used to make sure users are registered before they attempt to book. Session object timeout in 20 minutes. To abandon the session, use the "session.Abandon" method. This is used when user logs out from the system. Below here is how AAS use session to make sure they register.

```
If session("UserName")="" Then  
    Response.Redirect "default.asp"  
End If
```

### 5.3.2 Coding Style

Good coding practice is needed to avoid or detect errors easily.

i) Include files

Using include file are like using procedures. It is used when certain codes is repeated again. It allows procedures to be available to many ASP files. Using include files also ease the messy work of correcting all ASP



page when change is done. In AAS, include file are used on ASP pages which needs database connection.

Below is an example how to declare include file in ASP pages.

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

ii) Indent codes

Although it is not necessary to indent the code to ensure that the code works correctly, but it will be easier to read and detect error if the codes are indented. It will be most useful in code which uses many control structure, for example. For loop, if-else, do-while and select case.

iii) Comment code

Commenting the code will make it easier for other people to understand the code. Sometime, it also helps ourselves to understand what we wrote few weeks ago. In ASP, the single quotation mark is used to add comment.

Below is an example of it.

```
Dim strUserName 'String containng the user name
```

iv) Use Subprocedures

Subprocedures is very useful to optimize the code. As more codes are written, more and more ASP code again, the repeated code can be put into asub procedure and then, call it when it is needed.



## **Chapter 6: System Testing**

### **6.1 Introduction**

System testing is the major quality control measure during prototyping. Testing is performed to ensure that the programs are executed correctly and confirms to the requirement specified. It provides a method to uncover logic errors and for testing system reliability.

The objectives of testing are stated below:

- i) Testing is a process of executing a program with the intent of finding an error.
- ii) A good test case is one that has a high probability of finding an as-yet-undiscovered error.
- iii) A successful test is one that uncovers as-yet-undiscovered error.

The testing phase consist of test case design and testing strategies

### **6.2 Test case design**

Before testing is done, a method should be chosen to follow. These methods provide a systematic approach to testing. More important, methods provide a mechanism that can help to ensure the completeness of test and provide the highest likelihood for uncovering errors in software (Pressman, 2201).

Two types of test case design were used in this system: white-box testing and black-box testing.

#### **6.2.1 White-box testing**

White-box testing, sometimes called glass-box testing, is a test case design method that uses the control structure of the procedural design to derive test cases. Using white-box testing methods, the developer can derive test cases that:



- i) Guarantee that all independent paths within a module have been exercised at least once.
- ii) Exercise all logical decisions on their true and false sides.
- iii) Execute all loops at their boundaries and within their operational bounds.
- iv) Exercise internal data structures to ensure their validity (Pressman, 2001)

The testing was carried out at the early stages of the testing process to ensure that the internal operation of the system performs according to specification

### 6.6.2 Black-box testing

Black box testing assumes that the logic structure of the code is unknown. It is a "black box". This point at which the function of a module is tested.

Black-box testing, also called behavioural testing, focuses on the functional requirements of the software. That is, black-box testing enables the software engineer to derive sets of input conditions that will fully exercise all functional requirements for a program. Black-box testing is not an alternative to white-box techniques. Rather, it is a complementary approach that is likely to uncover a different class of errors from those uncovered by white-box methods.

Black-box testing attempts to find errors in the following categories:

- i) Incorrect or missing function
- ii) Interface error
- iii) Error in data structure or external database access
- iv) Behaviour or performance errors
- v) Initialisation and termination errors (Pressman, 2001)

### 6.3 Three stages of testing a system

Testing is a critical phase of its quality control and assurance. Testing represents the complete and extensive review and challenge on application design, specification and codes. Several rules serve well as program testing objective:



1. Testing is a process of program execution with explicit intents to find errors and run-time program bugs.
2. An effective test case is one which contain unexpected testing record sets with high probability of detecting undiscovered errors during the program design and development phases.
3. A successful test is also not which uncovers only few expected errors, it is one which constantly provides new challenges to its programmers over time.

The system has undergone 3 stages of testing. They are unit testing, integrating testing and system testing as shown in the figure 6.1 below.

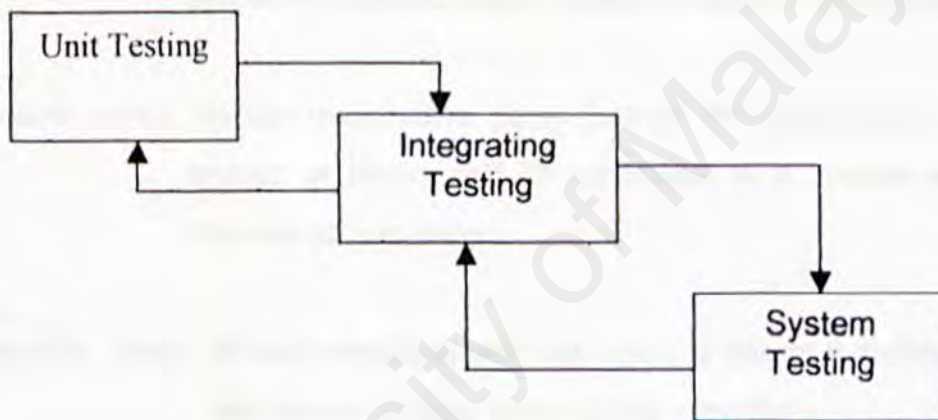


Figure 6.1 Show the testing state of AAS

### 6.3.1 Unit Testing

Unit testing focuses verification effort on the smallest unit software designs that is system module. This step, all important control structures are tested to uncover errors within the boundary of the module by using the component-level design description as a guide.



Unit tests involves 5 important test cases there are:

- a) *Interface*: Module interface is tested to ensure that information properly flows into and out of the program unit under test.
- b) *Local data structures*: Local data structure is examined to ensure that data store temporarily maintains its integrity during all steps in an algorithm's execution and the local impact on global data should be ascertained during unit testing
- c) *Boundary conditions*: Boundary conditions are tested to ensure that the module operate properly at boundaries established to limit or restrict processing.
- d) *Independent paths*: All the independent paths through the program structure are excised to ensure that all statements in a module have been executed at least once.
- e) *Error handling paths*: All error-handling paths are tested to ensure it ability to detect and recover all fatal errors during execution.

### 6.3.2 Integration Testing

Testing a specific feature together with other newly developed features is known as integrating testing. In other words, when the individual components are working correctly and meet the objectives, these components are combined into a working system. Testing the interface of 2 components explores how components interact with each other.

There are a number of different integration strategies available including top-down integration, bottom-up integration, regression testing and smoke testing. Based on the system characteristic and project schedule, a combined approach that uses top-down



tests for upper levels of the program structure, coupled with bottom-up tests for subordinate levels was selected as AAS system integration testing.

Top-down integration beginning with main control module as a test driver and stubs are substituted for all components where modules are integrated moving downward through the control hierarchy. Tests are conducted as each component is integrated. Top-down integration enables the detection of design error early in the testing phase and avoiding extensive redesign or re-implementation.

Bottom-up integration begins construction and testing with atomic module where low-level components are combined into cluster to perform a specific system sub function and tested. Bottom-down integration is an easier test case design because processing required for component subordinate to a given level is always available and the need for stubs is eliminated.

### 6.3.3 System Testing

System testing is last procedure of testing. System testing is different with unit testing and integration testing. System testing is designed to find out bugs that cannot be attributed to individual component and interaction among components and other objects. System testing can test an issue and behaviours that can only be exposed by testing the entire integrated system or major part of it. System testing will ensure functioning properly and all design and development objective are met. Several step to test AAS include function testing, performance testing and acceptance testing.

#### 6.3.3.1 Function Testing

Function testing will be a first step of system testing. This focuses on system functionalities. The function may involve the whole system, sub module and individual



module. The effective function testes will perform high probabilities to detect system fault. AAS function test involve:

- High fault detection probabilities.
- Test all valid and invalid input data type.
- Include stopping criteria.

### 6.3.3.2 Performance Testing

Performance testing assign to the non-functional requirements of AAS. System performance is ensuring the performance of system reach objective set by potential users as highlighted in the non-function requirement section guidelines.

### 6.3.3.3 Acceptance Testing

After completing these two testing (function testing and performance testing), AAS is determined to be able all requirements specified during initial stages of its development. The final testing will involved its potential users. Users lead acceptance testing and define their own real-time business data sets to be used to test cases. This allows users determine usable of system.



## **Chapter 7: System Evaluation**

### **7.1 Introduction**

System evaluation is a process of evaluating the system developed. The process is done by identifying the system strength, system limitations and future enhancement. It also highlights the knowledge gained, the problems encountered during the development of the system and the solutions taken to overcome these problems. Evaluation from the end user also helps to detect some errors and limitations of the system.

### **7.2 System strengths**

#### **7.2.1 User friendliness**

The graphic interface design of the system was designed to let the users feel comfortable and easy-to-use. The GUI ensured user friendliness. Thus, the users should find it easy to use. The system will return error message if it detect inconsistencies.

#### **7.2.2 Paper-less**

Reducing paper use has been the attempt ever since the developments in computerize and much has been mentioned in earlier chapter of this documentation. By reducing paper, it saves long-term cost.

#### **7.2.3 Better management**

By using this system, student will be assign to a particular advisor without worry about the student will assign to more than one advisor because the system will not let other advisor to add the student, if the student already added to one advisor.



### 7.2.4 Data management

In existing system, the students' list of an advisor needs to be updated when it is necessary. So the system will provide functions for us to update and delete the list. This makes the system have data management that maintain database.

### 7.2.5 User level security

In the system, there are several modules. Every module supports some kind of user level. Every page will be preventing users try to access some pages or function that are not under their module.

### 7.2.6 Reliable system with effective errors handling

Input of user is validated and verified to prevent errors caused by invalid input. If there is an error or input failure occurred, an error message is generated and displayed to inform the user about the error. For instance, when the user try to key in matrik number of FCSIT students. The system will verify the format of the input first before it sent the data to server. If the system detected the format of matrik number wrong the system will prompt the user to input again.

## 7.3 System Limitations

However, there are still a number of limitations in this system due to the time and facilities constraint and the limitations of the programming language itself. Among the limitations are listed below:



### 7.3.1 No online help facilities

The AAS did not provide online help facility. The users who require more information may not satisfy with the brief instruction and descriptions. It should be considered to enhance in the future.

### 7.3.2 Forgot password

In AAS, there isn't any function to send the password the user's email. Student's account needs to reset to release the account for the student register again. So the student will register again using their matrik number and their IC number.

### 7.3.3 Database synchronization

AAS was using the data from the SIS database, so any computer disaster happens to SIS will also effect the normal operation of AAS. While we are maintaining AAS we need to make sure SIS also work perfectly.

### 7.3.4 loosely control on the AAS forum

System cannot detect what kind of title that you upload to the forum. The only thing that we can do is deleted is administrator think that the title are not suitable or match with the main purpose of providing this forum.

## 7.4 Future enhancement

Some functionality of the system can be enhanced in order to improve the quality of the system. The following are the functionality that can be enhanced on this system.



### 7.4.1 Maintenance of user interface

The system should provide more useful information and news for the user, like the information of registration procedures. Some important information that is important for every student should be provided. For instance, the final date of register course. The GUI should be updated for a certain period to give the user a fresh and a greater look.

### 7.4.2 Integrate with the registration system

Integrate registration system AAS system, this will make student registration work in a better and faster procedure. This will shorter the time student to register course during the beginning of every semester.

## 7.5 Problem encounter and solutions

Through the development of AAS, a number of problems were encountered. Below are the some sections highlight the problems found during development of AAS and solution of it.

### 7.5.1 Problem in connect to SIS

When I tried to ask the office about how to connect the master database of the SIS database. They tell me that it was impossible for me to connect to the master database because of the security issue.

**Solution:** Using dummy database as an alternative to master database and assume the dummy database as the real database that stored the student profile and result.



### 7.5.2 Difficulty in coding asp script

Although basic knowledge in Visual Basic was acquired through studies, there was some minor difficulty in coding. That happened in the early stages of the project development.

**Solution:** Buying 2 books, one for Visual InterDev and one for ASP.

### 7.5.3 Problem in uploads AAS

When I tried to upload the system to web server, some of the link in my system is not working properly.

**Solution:** Go through the entire system to make the change correct the broken links.



## Final conclusion

After go through the chapter 1 to chapter 4, I had understood the **current system and** determined the option of the technology and method that can be use in my **project**. **By using** literature review, I manage to choose the most suitable technology and **method to develop** AAS. Basically, every chapter has their own purpose and each of the chapter is related with other chapter.

Chapter 1 is Introduction of the system. In this chapter, there are couples of sub topic. They are system overview, system objective, system scope, system expected outcome, system expected strength, system expected limitation and project schedule. This chapter giving the general idea about system and there are no technical term and did not explain about how to deploy the system.

Chapter 2 (Literature review) is about the resource that we use for considered and evaluate the strengths and the weaknesses of the tools that are available for us to develop our project. This chapter helps us to get a brief understanding for all the tools that are available. Beside that, the case studies are also helps us to learn about some similar system and take their strengths as our features and try to solve their weaknesses in our system.

Chapter 3 (System analysis) is the result of the chapter 2, whereby we used the chapter 2 to help us to make decisions. The decisions that I mention here are functional requirements, non-functional requirement, methodology, system architecture and run-time requirement. Beside that, we also justify the chose that we had made.

Chapter 4 (System design) is the part, which we used all the resource from all the previous chapter to design the system. In this chapter, there are three kind of design that we had done. They are database design, process design and user interface design. Each of these designs will be used to develop their part in the system implementation.

Chapter 5 (System implementation) is about how I implement what I had mention in the previous chapter. This chapter also talk about some how I coding my system. For instance, how to using ASP code to set a connection to database and some good manner of programming skills.



Chapter 6 (system testing) will tell us how the testing stages of a system can be done and some important issue that need to be take notes or pay more attention during system testing. This chapter also telling us about how to testing our system in a proper and efficient way.

Chapter 7 (System Evaluation) is about the strengths and the limitation of the system. Beside that, it also mention about the future enhance that can be done to improve the system. While developing the system I also encounter some problem and how I solve my problem is also discuss in this chapter.

As a final conclusion, I found that documented the process of developing a system is very important. It helps us to build the understanding of the system and check whether we miss anything while developing the system. It will also helps other person to understand your system especially when the system are take over by other person or testing as the purpose of determine that whether the system met the requirement that stated earlier.



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