2.0 LITERATURE REVIEW

2.1 Interactive Features Through Internet

2.1.1 HTML (Hypertext Markup Language)

HTML is by far the most common document format on the World Wide Web. HTML is a form of SGML (Standard Generalized Markup Language), which is primarily concerned with structure, rather than layout or presentation styles. (Nadav Savio, 1997). Thus, though widely used, HTML does not support most of the page layout features found in desktop publishing applications. It does include tags that provide for some forms of presentation, such as tables, and tags to specify fonts and colors. However, these tags are bulky and require extensive coding. A major complaint against HTML is that it does not allow the precise positioning of text and images, as required in desktop publishing. Authors and publishers want greater control over layout so that they can create sophisticated publications that retain the same layout and look regardless of the configuration of a user's browser. Two developments, Cascading Style Sheets and dynamic HTML, have been designed to address these limitations of HTML. (Laura Lemay, 1996)

2.1.2 Cascading Style Sheets (CSS)

Cascading Style Sheets (CSS) address the problem of layout control, putting the power of desktop publishing into the hands of Web publishers. Authors can create pages that display precise margins, various font styles, measured white space around text and

graphical elements, and other desktop publishing-like page formatting controls. In addition to helping authors create the exact layout they want for a page, Cascading Style Sheets allow them to apply a universal look and feel over an entire Web site without the work of inserting new tags and templates into each Web page. (Jeff Kozoris, 1997)

Features and advantages of Cascading Style Sheets:

- Provides precise control over margins, line spacing, element placement, colors, font faces, and font sizes
- Removes the need to re-type HTML style tags each time a new style is needed
- Ensures every user sees the same view regardless of the ways in which the browser's size and colors are configured
- Provides the ability to change the overall look of a Web page or even an entire site by changing a single style sheet.

Alternatively, style information can be contained in a separate, single file to which all relevant HTML files refer. Thus, when a change to a Web site's overall look and feel is desired, changes need only be made to the style sheet file. This aspect is a significant development for those who maintain extensive Web sites. Presently, a change in look and feel across a site requires that each HTML file be opened and the code modified. With CSS information in a separate file, the code changes take place once in a single file. (Que Corporation, 1997)

2.1.3 Dynamic HTML

Dynamic HTML is a combination of Cascading Style Sheets and a scripting language (such as Visual Basic script or JavaScript) that merges the actual HTML document with the style sheet. Using Dynamic HTML, developers will be able to create a Web page that can respond dynamically to user-generated events, such as mouse clicks, by expanding an HTML table, changing the attributes of a font, or moving a graphic across a page. All of this can be done without going to the server or relying on plug-ins or Java applets. (Levitt, J, 2000)

2.1.3.1 Data Binding

One of the key features of dynamic HTML is that the browser does the processing of effects locally, putting less strain on the server and speeding up load time. A very powerful example of this feature is "data binding." Currently, when a user interacts with a database, data are pulled from a system; tagged on the fly with HTML, then send to the user. If a user wants a different view of the data -- for example, sorted by author or by date -- he or she must make another call to the server which sorts the data, reformats it in HTML, and resends the data to the user. With the data-binding feature of dynamic HTML, all relevant data are sent to the user to be sorted, filtered, and modified repeatedly, without having to contact the server again. (Levitt, J, 2000)

2.1.3.2 Fonts

In both desktop and Web publishing, the availability of fonts is a major issue. Currently, Web authors are restricted to using fonts that are commonly present on users' systems. A feature of dynamic HTML is the ability to use virtually any font on a Web page without the need for end users to have it present locally. This feature allows a Web page to retain its intended look when a certain font is specified. The text will not revert to New Times Roman if the font is not present, as is currently the case with standard HTML.

2.1.4 Differences Between Netscape and Microsoft Version of CSS and Dynamic HTML

Netscape Communicator 4.0 supports Level 1 version of CSS (CSS1) under the name "JavaScript Accessible Style Sheets" (JASS), while limited CSS support is now available in Microsoft's Internet Explorer 3.0, to be known as "Dynamic HTML." Both the Netscape and Microsoft versions are recognized under the generic name of "dynamic HTML," with the lower case 'd.' In addition, each company has its own definition of dynamic HTML.

Microsoft defines DHTML as the HTML document object model a way to control the positioning of elements on a page, a set of multimedia controls for animation, alpha-channel filtering, and other effects and the ability to bind sets of data to an HTML page. (Zelnick, N, 1997)

Netscape, on the other hand, defines DHTML as HTML plus Netscape extensions, JavaScript, Java, and an object model for HTML documents. (Zelnick, N, 1997)

It is very important to note that CSS1 has not yet been coalesced into a common standard. As with earlier versions of standard HTML, Netscape and Microsoft have created their own, idiosyncratic features of dynamic HTML. Both have put forward these ideas to the W3C to be considered for the standard. This divergence causes problems: if these two major companies are developing different forms of dynamic HTML, elements of CSS Web will be browser dependent. This erodes the cross-platform compatibility that has allowed the Web to grow as wildly as it has.

Finally, dynamic HTML is supported only by Netscape Navigator and Microsoft Internet Explorer. There is currently no support for dynamic HTML in older Netscape and Microsoft browsers or browsers of a different type. When non-compatible browsers encounter dynamic HTML, all the information will be displayed, but without the new features. Without a common standard, authors face the possibility of creating three versions of their pages, one with Microsoft Dynamic HTML, one with Netscape JASS, and one without dynamic HTML at all.

2.1.5 Common Gateway Interface (CGI)

CGI defines as a standard for interfacing external applications with information servers, such as HTTP or Web servers. (Internet Connection, 2002)

Basically, CGI enables us to have server-side scripts that are called from HTML documents to provide dynamic content. Some examples of scripts that use the CGI include:

- Site Searches - allow visitors to access the web site to search for words or strings of text.
- Form to Email - gather visitor feedback or any other information from web site, a form to email a script is the way to go.
- Browser Detection/Redirection - to detect which web browser the visitor is using and directs them to an appropriate page.
- Shopping Carts - allow visitors to use a virtual shopping cart while they browse company's online store.

2.1.6 Hypertext Transfer Protocol

The Hypertext Transfer Protocol (HTTP) is the set of rules for exchanging files (text, graphic images, sound, video, and other multimedia files) on the World Wide Web. (Que Corporation, 1997). Relative to the TCP/IP suite of protocols (which are the

basis for information exchange on the Internet), HTTP is an application protocol. Essential concepts that are part of HTTP include (as its name implies) the idea that files can contain references to other files whose selection will elicit additional transfer requests. Any Web server machine contains, in addition to the HTML and other files it can serve, an HTTP daemon, a program that is designed to wait for HTTP requests and handle them when they arrive. Web browser is an HTTP client, sending requests to server machines. When the browser user enters file requests by either "opening" a Web file (typing in a Uniform Resource Locator) or clicking on a hypertext link, the browser builds an HTTP request and sends it to the Internet Protocol address indicated by the URL. The HTTP daemon in the destination server machine receives the request and, after any necessary processing, the requested file is returned.

2.2 Web Application Development

Developing Web-based applications can be very different from other types of programming. Unlike normal client/server applications, web pages are stateless, which means that when the page is called, it grabs the data it needs, and then sends the document to us. A system that developed using Web-based applications will involve many interactive features such as insert, delete, and add features, dynamic database, shopping cart, visa or master payment gateway and others. (Eric A. Smith, 2000)

In traditional client/server development, a client application maintains a connection with its server component. Besides requesting and sending data, the client queries the

server periodically to make sure the connection is still alive. If the server goes down, it will sense this and take the appropriate measures such as sending an error message to the user.

As a Web application developer, I have to deal with the short-lived memory of web servers, with the Internet being a connectionless network. When a browser requests a page, it is serve up and serve out. The server is not going to check and see whether the page and all of its components (graphic, sound and so on) are on the browser.

But ASP (Active Server Pages) and ADO (ActiveX Data Objects) are significant steps in dealing with these issues. It has a memory to "remember" user.

2.3 Database Server

The database server plays a vital role in Internet application development. The database server can be used to store, search, and retrieve information that is stored in a database. This same database that distributes information to Web users can also be accessed and maintained from or within the corporate walls. (Eric A. Smith, 2000)

When using the HTTP server as a connection utility to database servers, there is a slight shift in architecture that differs from traditional application development. For

example, when creating an online classified section for the local newspaper or mechanism that search for vehicles of a particular type. From an architecture perspective, this application will have three components: the requesting browser, the Web server, and the database server (see Figure 1). The browser is responsible for submitting query requests and displaying the results from the database. The Web server is responsible for the database, formatting the results into HTML, and delivering the HTML to the requesting browser. The database server is responsible for accepting requests from the Web server and delivering results back to the Web server.
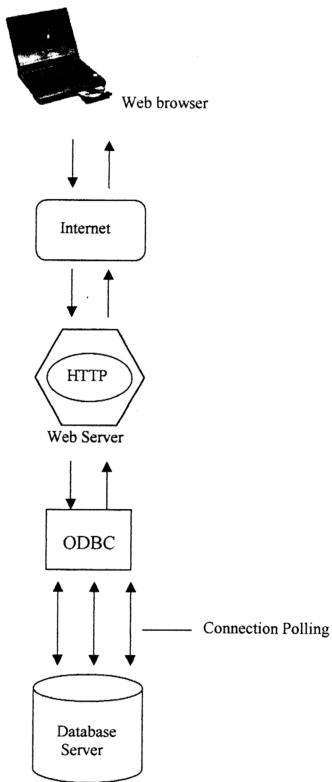
Web browser

Internet

HTTP

Web Server

ODBC

Connection Polling

Database
Server

Figure 1: When accessing database information from a Web browser, the Web server acts as the client to the database server

2.4 Database Management System (DBMS)

DBMS is the software that interacts with the user's application program and the database. Typically, a DBMS provides several facilities. It allows users to define the database, usually through a Data Definition Language (DDL). The DDL allows users to specify the data types, structures and constraints on the data to be stored in the database. (Scot Johnson, Keith Ballinger, Davis Chapman, 2000)

DBMS allows users to inserts, update, delete, and retrieve data from the database, usually through a Data Manipulation Language (DML). Having a central repository for all data and data description allows the DML to provide a general inquiry facility to this data, called a query language. The provision of a language alleviates the problems with file-based system where the user has to work with software management problems.

There are two types of DML, such as procedural and non-procedural, which we can distinguish according to the retrieval operations. The main difference between them is that procedural languages typically manipulate the database record by record. While non-procedural languages operate on sets of records. Consequently, procedural languages specify how the output of a DML statement is to be obtained, while non-procedural DMLs describe only what data is to be obtained. The most common type

of non-procedural language is the Structure Query Language (SQL). SQL is now both the standard and the *de facto* language for DBMS.

DBMS also provides controlled access to the database. For example, it may provide:

o A security system, which prevents unauthorized users from accessing the database.

o An integrity system, which maintains the consistency of stored data.

o A concurrency control system, which allows shared access of the database.

o A recovery control system, which restores the database to previous consistent state following a hardware or software failure.

o A user-accessible catalog, which contains description of the data in the database.

2.5 Data Access Interface Paradigm

2.5.1 ODBC (Open Database Connectivity) Data Source Administrator

ODBC is a programming interface that enables application to access data in database management system that uses Structure Query Language (SQL) as a data access standard. There are three major data sources in ODBC Data Source Administrator: System Data Sources, User Data Sources and File Data Sources. (Scot Johnson & Keith Ballinger, 1997)

In this project, I am using an ODBC File data source. An ODBC File data source allows us to connect to a data provider. The reason that I use File DSN is because it can be shared by users who have the same drivers installed.

On the other hand, Microsoft Access Driver has been used in the ODBC Data Source Administrator. Microsoft Access Driver is an ODBC driver that allows ODBC-enabled programs to get information from ODBC data sources.

2.6 Client/Server Development

When developing a database-driven application, it will be a very rare case where many users do not access the database at the same time over a network or the Internet. This type of application is called client/server, and it refers to a system in which there is a client program that handles some tasks, and a server program that handles others. The Web is an example of a client/server application. The Web server handles certain tasks, such as finding the appropriate page, while the browser displays the page contents. With client/server database programming, there is, at the very least, a server where the database resides, and several client machines on which a client program is used to access the database server. (Scot Johnson & Keith Ballinger, 1997)

When developing client/server systems, one must consider the tasks and processes that are performed by the server and the client. The very best application is a marriage of tasks between these two components.

Some of the tasks best suited for the client are as follow:

- Display of result sets from the database
- Simple data validation
- Gathering data before querying the database
- Formatting and filtering result sets form the database

Meanwhile, the server is often best used for these tasks:

- Complex data validation
- Indexing data
- Finding and returning result sets to the client
- Maintaining database integrity
- Managing transactions

2.7 Case Studies

2.7.1 Case Study 1

From the article written by Andrew Aird (2000), *"E-commerce in Higher Education: can we afford to do nothing?"* argues that the impact of e-commerce is beginning to

be felt in the non-commercial sector, and reveals the results of a survey of opinion taken after a recent web management workshop. With e-commerce emerging as the driving force behind commercial websites, its impact is beginning to be felt in the non-commercial sector. Those working in Higher Education, in particular, need to prepare carefully if we are to reap the rewards and avoid the pitfalls by establishing appropriate 'business' structures as well as refining technical and managerial approaches. Survey of the 76 Higher Education organizations who responded over 80% claim to have some kind of e-commerce system in place now or plan to by the middle of 2001. (E-commerce here is defined as having an online system for ordering and paying for goods or services, although the method of payment may not necessarily by credit/debit card.) In fact, 70% of the institutions surveyed will continue to use paper-based systems (such as invoice generation, follow-up cheque) rather than online transfer of funds. (Andrew Aird, 2001). Selling publications, payment of fees and alumni goods make up the largest categories of transactions (74%). Other uses included supplying advice and information (5%), sales of concert/theatre tickets and printing/photocopying charges. In many cases it was web staff (60%), although academic departments themselves show significant involvement (13%). Perhaps surprisingly, Finance Departments appeared to be involved in very few cases (6%). Only one institution surveyed had a project officer dedicated solely to e-commerce development. The survey also looked briefly at the online shopping habits of the individual respondents, with the aim of seeing how much our consumer experience might affect our approach as providers. Almost all (98%) of those who had bought goods or services online were satisfied, and most (92%) regarded this as a safe method of making payments. Incidentally, the most poplar sites used were Amazon (62%),

Easyjet (11%) and Go-fly, Expedia and Tesco equal in third place (4%). The survey contrasts sharply with figures given at the Parallel Session by John Williams, CEO of Trustmarque: Taking a world view, 25% of e-commerce transactions are never fulfilled, and 53% of online customers are concerned about security and privacy. Furthermore 'conversion rates' of visitors to buyers currently run at about 1.8%. Evidently the experience of e-commerce in Higher Education is more positive, and this may be an important starting point when planning or running such a system. The 'brand' of Higher Education Institutions (HEIs) already has much global credibility – no one suspects that HEIs is going to steal your identity or defraud your credit card, and they already have a reputation for providing 'quality'. This may help to reassure users in the future who may be paying substantial course fees online, or signing up to an expensive distance learning.

2.7.2 Case Study 2

A study to an article on web site http://www.oar.uiuc.edu/current/Default.htm/ shows that University of Illinois at Urbana-Champaign was implemented the UI Direct system for their students to register courses online. The UI Direct system will control access based upon registration time, class size, academic program, maximum credit limit, advising hold (if applicable), and encumbrances. This system has some drawback although the university's students can register their course online. For instance, UI Direct Assistance is available only from 8:30 a.m. until 5:00 p.m. Monday-Friday at the Records Service Center. If an advising hold has been placed on student's record, it must be removed before he/she can register. The students should

resolve all encumbrances as soon as possible. If they have an encumbrance on their record, access to UI Direct to drop or add classes will be blocked approximately three weeks prior to the first day of instruction. If the student has an encumbrance on their record as of 5:00 p.m. on the first day of instruction, their course registration for the term will be cancelled. The student can avoid having their course registration cancelled by resolving encumbrances. Besides that, using this system will facing the problem of fees payment by the students. It is because this system does not have the online payment gateway using visa or master card. UI Direct is a system to register for courses by computer. When the students do so, they agree to pay tuition and fees to the University according to the payment policies and schedules adopted by the Board of Trustees. If they wish to cancel their registration, and thus avoid payment of fees charges, they must do so by 5:00 p.m. of the first day of instruction. Furthermore, the lack of securities of the system is found. Unauthorized use of University of Illinois computer systems, data, or resources; unauthorized use of another individual's identification, account, or password; or an attempt to gain unauthorized access is prohibited by University policy and may constitute a violation of Illinois state law. Access to U of I Direct will be terminated if students are found to be making excessive unsuccessful registration attempts.

2.7.3 Case Study 3

Another study that has been done by Suffolk County Community College (SCCC) at http://www.sunysuffolk.edu/Web/VirtualCampus/ shows that this college is implementing two kinds of course registration and payment system, such as online

registration and payment system or by using the SCCC telephone registration and payment system. If the student wishes to use the telephone registration system, they need to gather the following information: the four-digit section number of the course they wish to take, the name of the campus offering the course, the semester that the course is being offered (use 1 for intersession, 2 for spring, 6 for summer, 9 for fall) and the nine-digit student ID. If the student registers their course online, during the first week of classes they have the opportunity to make changes to their schedule, which will not appear on their transcript. Students can accomplish this by going to the online registration and system or by calling the SCCC telephone registration system.

2.7.4 Case Study 4

A study that have been done by New Brunswick Distance Education Network Inc in Canada at https://www.sis-sia.gnb.ca/test/sis/ shows that before the organization/institution begins using the TeleCampus online registration and payment system (SIS - Student Information System), the organization/institution must be capable of accepting credit card payments. The organization/institution has to make sure that their business accounts are compatible with their PAYWAY Service. Once their business accounts are ready to accept credit card transactions, TeleEducation NB's TeleCampus SIS admin via email and request access to the system. At that point, the organization/institution will be configured in the Test SIS System. If they are not a NB Community College, an institution number will be automatically assigned (by the system) and the courses given course codes. These are used by the system to track the courses and students. Once the organization/institution supplied TeleCampus with the

information needed to track the courses and accept online payment, then they must configure their website to forward registration requests to the SIS. To do this, they simply must embed the application button or link in their page. Each application link must include the respective course code to TeleEducation. After a short testing period and approval of the registration process, TeleEducation will move the course information into the production SIS system. The testing, approval and moving phase may be as short as two days, or as long as they require. Organization/institution is now ready to accept online course registrations and payments.

2.7.5 Case Study 5

Students at Duke University's undergraduate, graduate, and professional schools register for classes online via a custom, Web-based registration application. Duke. (Cisco System, 2002). During registration for the spring semester 2001, Duke's online course registration application became overloaded, and some students experienced delays in registering for courses. At that time, the Web servers handling the registration application received requests through a round-robin Domain Name System (DNS) rotary. This system provided no mechanism to intelligently balance the workload and could not compensate for a "sick" or "dead" server. As a result, groups of students could be routed to a server that was performing slowly or was completely unresponsive. Duke had to stabilize the online registration system to increase performance and guarantee that every student would be able to register in a timely manner while also ensuring that each student's private data was protected. Duke University implemented the Cisco 11000 Series Content Services Switch (CSS) and

the Cisco 11000 Series Secure Content Accelerator (SCA) to enhance the performance of its online course registration application, guaranteeing 100 percent server availability and ensuring secure and successful online registration.

2.7.6 Case Study 6

In the article that wrote by Steve Patient, " Reducing Online Credit Card Fraud ", credit card company figures show that 90 per cent of consumers are reimbursed when their cards are used fraudulently, while 75 per cent of online retailers have to eat the cost when they're the victims of credit card fraud. There is currently no way to avoid this ludicrously high risk, though it can be reduced. (Steve Patient, 2002). Unfortunately, online payment remains a major area of Internet immaturity. Payment and data transfer security are allied problems. When buyer and seller meet physically to exchange money for goods, trust is less of an issue than when two entities deal blind online. Though buyers - rightly - distrust online credit card payments, merchants suffer more from credit fraud. This is because most online payment is by credit or debit cards, and the payment protocols for these were originally intended for face-to-face sales where the cardholder and card are both physically present. Physical presence offers security based on a customer signature and card imprint. But the merchant is almost always responsible for losses when sales are made on a 'Cardholder Not Present' basis even when the vendor has obtained authorization from the card issuer.

2.8 Database Consideration

2.8.1 Microsoft Access

Microsoft Access is a relational database management system and can be used in a client/server or an n-tier architecture system. It provides intuitive and user-friendly interface to create a database easily.

2.8.2 Conclusion of The Database Consideration

For database development in this project, Microsoft Access 2000 will be chosen, as it has an easy-to-use visual interface. It enables users to group and sort data. It also can be upsized to SQL database when necessary in the future. Microsoft Access has a simple and complete development environment. Furthermore the cost is much lower compared to SQL Server 7.0. Therefore, using Microsoft Access will significantly reduces the development cost.

2.9 System Application Development Tools Consideration

After choosing the database (Microsoft Access 2000) that will be used in the system, the development tools for developing this system are considered.

2.9.1 Microsoft Visual Basic 6.0

Visual Basic 6.0 is a high-level visual programming version of BASIC. It is able to create a wide variety of component types, including Microsoft ActiveX dynamic link libraries (DLLs), ActiveX Controls and ActiveX Components for deployments in Intranets or the Internet. (Eric A.Smith, 2000)

Visual Basic has a native code compiler and offers the ability to develop ActiveX controls and DLLs; it is a good choice for just about any type of Windows application development. Visual Basic is particularly strong when it comes to file processing and the development of a database front end.

Visual Basic is probably the easiest development tool to use. The environment makes it very easy to build a user interface, and it is easy for just about any programmer to pick up. It is very strong for building database application, especially those that use Microsoft Access database.

2.9.2 Visual C++

Visual C++ is a good choice for building scientific and engineering applications. This is because it still has a large speed advantage over Visual basic when performing these types of tasks. One drawback is that designing a user interface with Visual C++ is not as easy, and developer has to know the C/C++ language in order to use it. Even with

native code compilation, for some application, Visual C++ will still have a hefty speed advantage compare with Visual Basic. Visual C++ has more multithreading ability than Visual Basic, which still remains rather limited in this area. (Eric A.Smith, 2000)

2.9.3 Active Server Pages (ASP)

ASP means to Web-based application development. ASP is a new technology from Microsoft that provides the capability for the Web server to process application logic and then delivers standard HTML to the client browser. The results can then be delivered to a variety of client-side Web technologies, such as standard HTML, ActiveX, Java, browser plug-ins and DHTML. In addition, ASP provides a powerful interface to develop programming logic that can be used to implement and distribute the information through applications across the Web. (Eric A.Smith, 2000)

2.9.4 Microsoft Personal Web Server

Microsoft Personal Web Server (PWS) is the answer to the personal information sharing and Web development needs. PWS is a desktop Web server that makes Web site setup quick and simple, from creating a personalize home page automatically, to drag-and-drop publishing of documents. (Eric A.Smith, 2000)

On the corporate intranet, Personal Web Server can be used to quickly share documents in their native format, or convert documents to HTML, and then use PWS to share them across different operating systems.

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Because Personal Web Server supports Active Server Pages, it can be used as a development and testing platform for Web sites. Create the web site in the office or at home, and test it by using Personal Web Server, before hosting it on the corporate server or an Internet service provider.

2.9.5 Microsoft Visual InterDev 6.0

Microsoft's Visual InterDev is a development environment in which can create, edit, deploy and manage Active Server Pages. Visual InterDev combines a rich set of database connectivity tools, wizards, and design-time controls to increase the functionality and decrease the development time to build Active Server Applications.

The functionality of Visual InterDev can be categorize into four sections:

- ❖ File and source code management
- ❖ Database connectivity and live-design-time access
- ❖ Active Server Page functionality
- ❖ Client-side functionality

2.9.6 Conclusion of Development Tools Consideration

After surveying the above development tools, I decided that Microsoft Visual Basic 6.0 and Visual C++ is not suitable to use in this project. It is because Microsoft Visual

Basic 6.0 and Visual C++ is not suitable for web application development although it provides a flexible, extensible and friendly development environment to develop database application. Microsoft Visual Basic 6.0 and Visual C++ are only suitable for window application development. But, online postgraduate course registration and payment system is a web application system development.

The reasons I choose to use ASP because it is suitable for existing application developers who have some experience developing client/server applications. Therefore, the application developers can translate their existing experience developing applications into building robust, scalable, Web-based applications using ASP. Besides, ASP gives the ability to deliver more than just HTML. ASP can deliver HTML, client-side scripting, Web controls, and server-side processing and connectivity features. ASP scripts can deliver client-side scripts, such as *VBScript* and *JavaScript*, to be executed on the client's browser. In addition, ASP can also delivers wide range of Web functionality by acting as a transfer vehicle for ActiveX controls, Java applets and other Web components. ASP not only produce a dynamic HTML depending on the client request, but also provides the capability to tap into existing systems, such as databases, document retrieval services, mail servers, and other COM-based information servers.

ASP now act as a HTML interpreter that was once only accessible through native interfaces, such a Microsoft Exchange client, Lotus Notes client, or a customize Visual

Basic application. With the wide range of functionality, ASP act as a medium for porting existing applications to --- and building new applications for --- the Web.

Other than that, Microsoft Personal Web Server and Microsoft Visual InterDev 6.0 are also chosen to support my task.

2.10 Scripting Languages Consideration

Since I decided to use ASP as my development tool, therefore VBScript and JavaScript will be the scripting languages in my project. However, VBScript will be the scripting language that I frequently use in this project.

VBScript was initially created by Microsoft to be a lightweight scripting language to interpret users events triggered within the Internet Explorer browser. VBScript is actually created from Visual Basic for Applications (VBA), a pure subset of Visual Basic. VBScript can be used to create references to control HTML intrinsic object, ActiveX automation objects, ActiveX controls, and Java applets.

Besides, JavaScript is also a lightweight, interpreted scripting language that provides the same functionality as its VBScript counterpart. The syntax of the JavaScript languages is similar to C. JavaScript is a product of Netscape Communications Corporation and Sun Microsystems Inc.

From the security point of view, VBScript was initially designed to be a safe, interpreted language to be executed on the Internet Explorer browser. Designed to minimize possible security violations to the client's file and subsystems, VBScript prevents any file input/output and prevents access to the client's operating system. To further prevent destructive intentions, VBScript uses only one data type, *Variant*. (Johnson, S. & Ballinger, K. & Chapman, 1997)

Finally, I will use HTML (Hypertext Markup Language) and Java Script in web or system design while the server scripting is developed using VB Script.

2.11 Browser Consideration

ASP only supports Microsoft Internet Explorer's server. It does not support Netscape Communicator's server. The Netscape Communicator's server could not understand the ASP syntax. Therefore, the Microsoft Internet Explorer browser is being used in my project.