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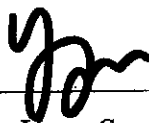
**Integration Tool to Integrate Popular Search Engines as One Main
Search Engine**

By

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CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

REGINA HAYATI RAHIMAN

ABSTRACT

Integrated Search Engine is developed for the usage of Internet users with an objective to enable them to perform information searching. This project is conducted after realizing the importance of integrating the few of popular search engines in the net to be as one. Through the Integrated Tool it will easily integrate, search and generate search result to the user. This Integrated tool also will allow the user to do searching of information efficiently. The development of this integrated tool will focus on web linking and also information retrieval from the search result. The methodology that selected for the system development is Rapid Application Development (RAD). This integrated tool will be based on web application and it will be structured with three-tiered application which is: Presentation Layer, Application Layer and Database Layer. For the analysis, research on the world net users, search engine survey, Meta search engines and dynamic web linking methods where conducted. The expected output from the project will be the implementation of web application that will be use by Internet user in searching information

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CHAPTER 1

INTRODUCTION

1. OVERVIEW OF PROBLEM

1.1 Background Study

This “Integration Tool” is a web application that is similar with Meta search engine which can integrate and coordinate popular search engines as one main search tool. As the amount of information available on the web is growing rapidly with an on going increase of new users in the art of web research, it is important to develop one web application tool that will integrate few of the popular search engines such as Google, Yahoo Search and Altavista into one web page. The purpose of this project will primarily focus on the web linking and also on the search engines architecture. At the same time, it will be able to integrate the search keyword to generate result into the web page. In general, this system will assist all the users in searching and retrieving information easily and fast in the net.

1.2 Problem Statement

1.2.1 Problem Identification

Currently, the most common method used by users when searching or retrieving information are by going to multiple search engine and search for the keywords or phrases. By doing this, users has to go through several result's page before they could arrive on the information needed. When user searches on more than two search engines, the pages will be more, thus making the process tedious and confusing to users.

With the technology changes in worldwide nowadays also has changes the web proliferation. Thus, a better approach should be implemented with advanced integrated tool to be able to cope with the amount of information growth in the net and also as well as the number of new users inexperienced in the art of web research.

1.2.2 Significant of the Project

The significant of this project is that it will integrate several popular search engines on the web into a one single search engine. This will definitely help inexperienced users in the art of web research. Besides that, this Integrated Search Engine will increase the efficiency of web searching and at the same time will give effective results to the user in term of speed and information reliability.

This project integrates three of the most popular search engines only. The Integrated Search Engine will also apply all integration theories in website application development and in all artificial intelligent theories.

1.3 Objectives of Project

The main objectives of this project are:

1. To design web architecture that is be able to integrate and generate multiple search engines results.
2. To integrate three popular search engines that will generate the results into one main search tool.
3. To link the search engines.

1.4 Scope of Study

This project focuses on developing a web based application that will integrate three popular search engines like Goggle, Yahoo Search and Altavista into the Integrated Search Engine. Next, it focuses on web linking and dynamic scripting. This is to ensure that the result from the search engines can be generated and could return the result together with the hyperlink of the resulted web pages.

CHAPTER 2

LITERATURE REVIEW AND THEORY

2. INTRODUCTION

The International Technology Education Association defines integration as '*The process of bringing all parts together into a whole.*' [1] However in terms of system design, integration is defined as '*the process that allows separate functions to use a common technology and database, pass data and information without requiring translation, reformatting or duplicate entry, and enable cross-functional views and management*' [2].

2.1 Web Application Development

Based on FreeDictionary.com, web application is '*...an application delivered to end user via the World Wide Web*' [3]. Besides that authors Deitel, Deitel and Nieto defined in their book that '*...World Wide Web allows computer users to locate and view multimedia-based documents...on almost any subject*' [4]. With these two definitions it definitely shows that web application is different from World Wide Web (www). This is because World Wide Web is the address to locate the web application.

Though many variations are possible, a web application is commonly structured as a three-tiered application. [5] In its most common form, a web browser is the first tier, an engine created using some dynamic web content technology such as PHP, CGI or Java Servlets is the middle tier, and a database is the third tier. The web browser sends requests to the middle tier, which services them by making queries and updates against the database and generating a user interface.

Web applications are popular due to the ubiquity of the web browser as an application client, and also because they can be updated without requiring a redistribution of software (e.g., the company producing the application does not have to redistribute a CD ROM).

2.2 Current Web Architecture

The basic web architecture is two-tiered and characterized by a web client that displays information content and a web server that transfers information to the client. This architecture depends on three key standards: HTML for encoding document content, URLs for naming remote information objects in a global namespace, and HTTP for staging the transfer. However this basic architecture has been evolving to serve a wider variety of needs beyond static document access and browsing. The Common Gateway Interface (CGI) extends the architecture to three-tiers by adding a back-end server that provides services to the Web server on behalf of the Web client, permitting dynamic composition of web pages [6]. Helpers / plug-ins and Java / JavaScript provide other interesting Web architecture extensions, as described below:-

- Common Gateway Interface (CGI) - CGI is a standard for interfacing external programs with Web servers (see Figure 2.1). The server hands client requests encoded in URLs to the appropriate registered CGI program, which executes and returns results encoded as MIME messages back to the server.
- Helpers/Plug-ins - When a client browser retrieves a file, it launches an installed helper application or plug-in to process the file based on the file's MIME-type.
- Common Client Gateway (CCI) - this gateway allows a third-party application to remotely control the Web browser client.
- Extensions to HTTP - an application-level network protocol for the WWW. Tim Berners-Lee, father of the Web, describes it as a "generic stateless object-oriented protocol." *Stateless* means neither the client nor the server store information about the state of the other side of an ongoing connection. Statelessness is a scalability property but is not necessarily efficient since HTTP sets up a new connection for each request, which is not desirable for situations requiring sessions or transactions.

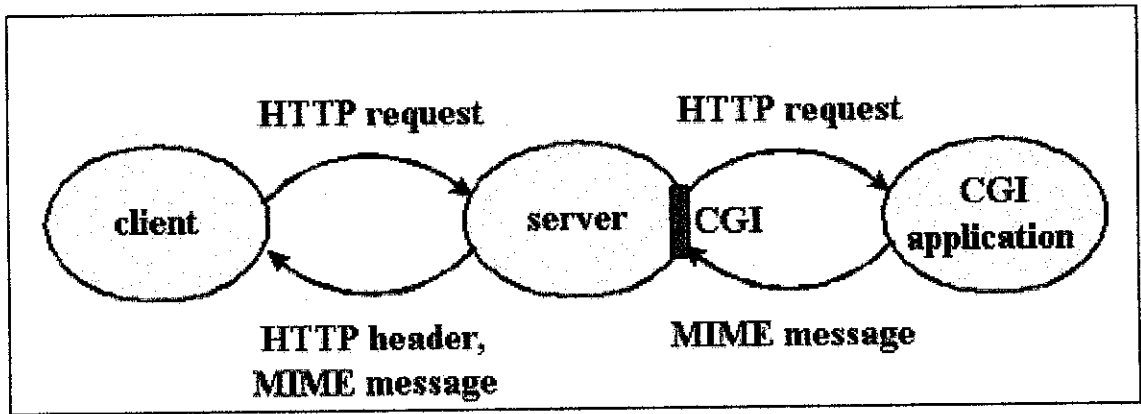


Figure 2.1 Back-End CGI program provides services to WWW server on behalf as the client

2.3 Intelligent Web System

Intelligent web system plays main role in helping users to more efficiently and effectively gather information services from the Internet. Two components that are part of this intelligent web system are the push and pull technology and the intelligent agent

2.3.1 Push and Pull Technology

Push technology includes the usage of internet to automatically deliver news stories, stock data and other information. A dial-up user can click an update button and a push program will collect all the data automatically. The update takes from 30 seconds to 5 minutes. At the end of each time; the modem is disconnected from the internet. Then the news stories and other retrieved data can be read off-line. Pull technology is using a browser to manually go to web sites to get information or in simpler term, reaching out and pulling data out of selected sites. For example, when we use a browser to surf the web, we can enter the URL of the web site to pull data from the host. If we are reaching a topic, we can use search engines like Yahoo, AltaVista, Webcrawler, etc. After that we can visit those sites of interest and pull information out of them.

An analogy may help to distinguish push and pull technologies. Push technology is comparable to TV, while pull technology is comparable to a public library. With TV, the information is pushed at you by the broadcasting networks. With the public library, you have to pull the information out of books, magazines, etc. The beauty of Internet push technology is that you can specify precisely what areas you want to see now. When the Internet becomes broadband (10 Mbps at the user level), push technology will also be able to deliver live video on demand [7].

2.3.2 Intelligent Agent

Russell, Stuart and Peter Norvig [8] defines an agent as '*An agent is anything that can be viewed as perceiving its environment through sensors and acting upon that environment through effectors*'. For a web agent the environment is in the World Wide Web. It will perceive by using words of an HTML document acquired from using software sensors that connect to the internet using HTTP. The agent's actions will depend on the goal of the agent like for a search agent it would be seeking a website containing related information about the search string. A web agent is intelligent if it makes a rational decision when given a choice. In other words, when given a goal, it will make decisions to follow the course of actions that would lead it to that goal in a timely manner. After all, the "intelligent" thing to do when have been confronted with a problem is to work towards a solution and not away of it.

There are eight categories of web agents that might have the capability to become intelligent agents based on its goals, [9].

Agent	Goals/Tasks
Accelerators	Accelerators are web agents whose goal to optimize the speed of the internet connection. These agents are normally network applications and rarely have any intelligent component in them.
Meta-Browsers	Meta-Browsers are web agents whose goal is to make the user's experience of web surfing better. These are basically browsers with some added features so as to make surfing easier for the targeted group of people. These agents are also lacking in terms of intelligent component in them.
Downloading	Downloading agents help the user in managing downloads and in some cases increases the speed of download. They are basically network application and rarely have any intelligent component in them.
Offline Browsers	Offline Browsers agents will download and manage web pages so that the user can browse them later when he is offline. In some cases they have intelligent embedded in them.
Filtering	These agents are subcategorized based on their functions like ad removers, anti-spy, child care, cookies filter, mail filters, popup killers. Based on the use they may

	have intelligence in them.
Profiling	Profiling agents will try to learn the user web habits and try to help the user while browsing by providing tips like providing web locations where related information can be found, etc. They normally have an intelligent component in them to learn the user profile.
Form Filling	These agents remember the values filled by the user in filling various forms earlier on the web and help him in filling forms later by using the same information that has been filled before. These agents may or may not have intelligence in them.
Specialized	These agents will do a special work like converting a portion of the web page to speech, or like a toolbar providing various information about the page and offering other features like search, finding similar documents on the web (as in Google and Yahoo toolbar). These agents may or may not have intelligence in them.

Table 2.1 Eight Categories of Web Agents

2.4 Search Engines Architecture

There are dozens of search engines and directories in existence on the web today; however, there are distinction between the true search engines and online directories. The primary difference between the two is in how each collects and stores listings and links to outside web sites [11]. Search engines work by using specialized programs sometimes called “spiders” or “crawlers” to seek out web pages, index the textual content of those pages, and place this information into sophisticated databases. These databases are queried when users perform searches on the host web site. Directories, on the other hand, organize information into a hierarchical taxonomy to create massive categorized lists of other web sites. This service is usually performed by human editors, who process a vast amount of information each day.

Google is currently one of the best and famous search engines in the net [12]. Google has been selected as one of the three search engines that will be integrate by the tool of this project. The Google architecture and major application has been studied to get more understanding on the search engine architecture.

Thorough the studies on the Google architecture, it is found that in developing an integration tool for multiple search engine there are three major application that should be considered or applied. The first application would be web crawlers; web crawling (downloading of web pages) is done by several distributed crawlers. These crawlers are the robots and spiders that browse the World Wide Web autonomously. Crawlers perform many useful services, including full text indexing, link maintenance, downloading, printing, and visualization [13].

After downloading of web pages the second application would be indexing the web pages. Based from David Byers, '*Using this scheme, clients can rank content types in order of preference, and the server chooses a variant based on this ranking.... provides for more flexible types of content negotiation*' [14]. With this statement it defines that indexing will rank the content in order of ranking and this will make it is easier for the search engine to search the content when it is needed. Indexing also will generates database of links which are pairs of document IDs of the results.

Last application would be searching. In Google, the searcher is run by a web server and uses the lexicon built by DumpLexicon together with the inverted index and the PageRanks to answer queries [10]. The searching application should be develop as metadata aware and thus allows searches on several fields including title, document author, and URL [15].

In the web technology, there is one other features knows as META tags. META tags are the hidden HTML tags embedded in pages, are widely considered as a "magic bullet" for helping a site rank high under certain keywords. Search engine databases consider two types of META tags, the META KEYWORD tag and the META DESCRIPTION tag. Most search engine systems ignore the KEYWORD tag, because it is so easily abused, allowing the site creator to list keywords that have nothing to do with the site's content, or to list competitor's names. The META DESCRIPTION tag is used by most search engines. It is useful because the text embedded in the tag appears as the descriptive text that is displayed when the site is listed in a search results page [11].

2.5 Web Linking \ Integration

The Internet, a vast network of computers, makes it possible to access content (i.e., text, graphics, audio, video, etc.) stored in the files of millions of individual computers. Based from Daniel A. Tysver "*A link is simply a connection between the content of two different files (or between different parts of a single file)*" [Daniel, 2003]. A link may lead either to another file in the same web site, or to a file on a different computer located elsewhere on the Internet. Internet browsers automatically decipher the instructions given by links and retrieve the specified file.

Hypermedia was chosen as the user interface due to its simplicity and generality. The same interface can be used regardless of the information source, the flexibility of hypermedia relationships (links) allows for unlimited structuring, and the direct manipulation of links allows the complex relationships within the information to guide the reader through an application. Information within large databases is often much easier to access via a search interface rather than browsing. The Web also incorporated the ability to perform simple queries by providing user-entered data to a service and rendering the result as hypermedia [Fielding and Taylor, 2001] [16].

The HTML was used earlier to program pages on the web, allows two types of links. The first, an HREF ("Hypertext Reference") link, instructs a browser to stop viewing content transmitted from one location, and begin viewing that of another. The link can bring the viewer to a different point on the same page, such as the index links on this top of the web page, or to a different page in the same site. The second type of link in HTML is an IMG ("IMaGe") link. An IMG link instructs a visiting browser to supplement the text on the page with an image contained in a separate image file [16].

Reese, Heimbigner and Wolf [17] states that *“The resulting integrated datawebs are hyperlinked structures that can be searched or navigated using an ordinary Web browser”*. Beside that, in this paper it also mentioned that the supplemental structure that is capable of both classifying data and semantically highlighting relationships among Web-based data would be useful. Such structure would permit a more uniform and logical way to access, integrate, and store these data in order to make them more useful for those needing unified views of multiple datawebs. The Web enables the embedding of semantic and other information within its structures of related data by using RDF, XML, or other schemes. Web information systems that add semantic structure to groupings of related data can make the subsequent challenges of integrating those data less daunting. In addition, by leveraging the standardization of the Web and markup languages such as HTML, XML, and XHTML, it becomes possible to avoid a number of architectural-boundary related problems altogether. By focusing on integration solutions that fully utilize embedded semantic information, an important original contribution to the field of integrating web accessible data is being made.

2.6 Comparison Between server-side scripting technologies, JSP, ASP and PHP

Table 2.2 shows the comparison of three common web scripting language namely: JSP (Java Server Pages), ASP (Active Server Pages) and PHP (HypertextPreprocessor) [18].

JSP	ASP	PHP
<i>Has very steep learning curve and requires the knowledge of Java and Servlets.</i>	<i>Provides easiest environment development.</i>	<i>Popular technology supported by Open Source development.</i>
<i>Capable for handling enterprise sites having few 100 users and a million hits per day.</i>	<i>Best suited for the mini-sites having 100-500 hits per day.</i>	

Table 2.2 Comparison between JSP, ASP and PHP [CSC, 2002]

2.7 Web Server Survey

Figure 2.2 shows that the used of Apache increased from time to time since 1st September 1995. This shows that Apache is very famous to the developers compared to other packages. The second most popular web server comes from the Microsoft product. It is still being used although it is slightly going down at the end of 2003. Other sources like Sun ONE and NCSA has been facing the downturn since 1999.

Figure 2.3 was also taken from the Net craft web site on September 2003, [19]. It shows that the most active server up to September 2003 is Apache follow by Microsoft, Zeus and Sun ONE.

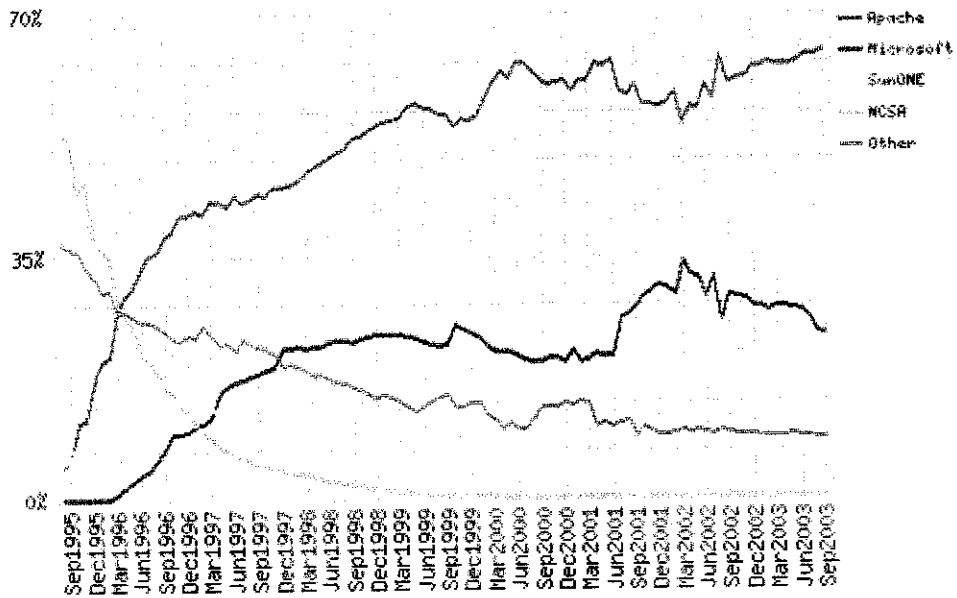


Figure 2.2: Market Share for Top Servers across All Domains August 1995 - September 2003 [Net Craft Web Site, 2003]

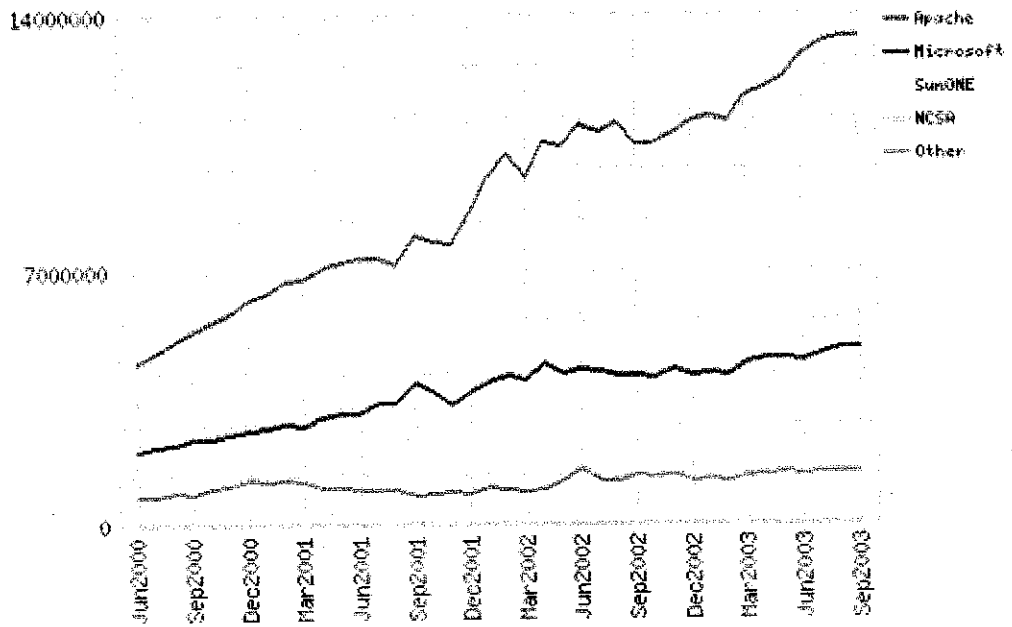


Figure 2.3 Totals for Active Servers across All Domains June 2000 - September 2003 [Net Craft Web Site, 2003]

CHAPTER 3

METHODOLOGY

3. PROJECT WORK OVERVIEW

3.1 Procedure Identification

Figure 3.1 shows the methodology for this project. Methodology is the necessary undertaking steps taken for the research and project work. In response to the faster pace of economy, rapid application development has become a popular route for accelerating system development [20]. With this Rapid Application Development (RAD) technique also known as *evolutionary model* has been used for this project to emphasize extensive user involvement in the rapid and evolutionary construction of working product of the integration tool.

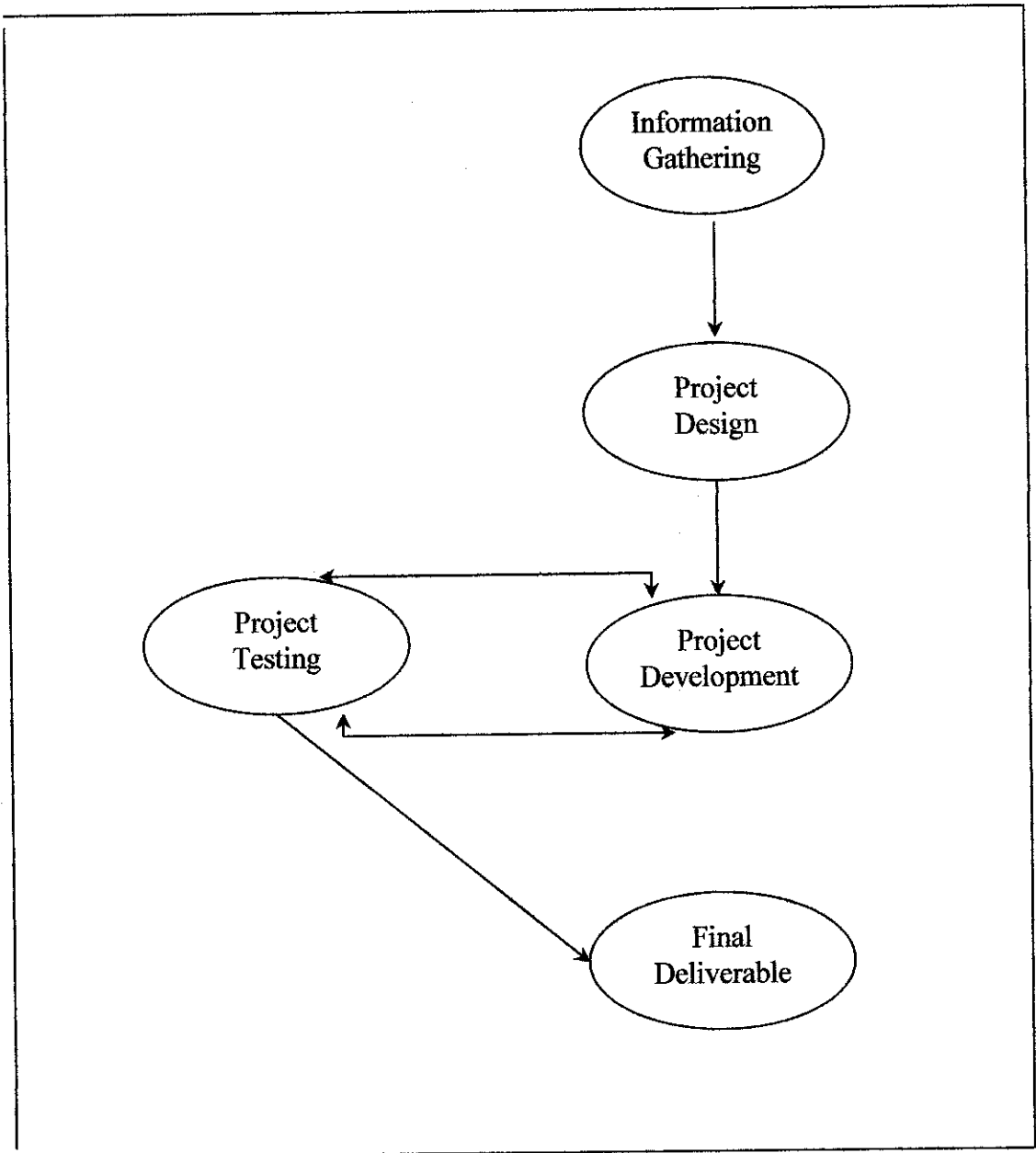


Figure 3.1 Methodology for Integration Tool

3.2 Method

3.2.1 Analysis\ Research

3.2.1.1 Information Gathering

Information gathering is the initial stage of the project that aids in developing from overall view and understanding to the project. The sources obtained are from internet websites, references, white papers and journals. This information gathering is been divided into three subtopics which is:-

1. The first topic would be the overall web application development. This is where all the information on how to develop a web application, the architecture and tools required is determine.
2. The second topic is intelligent web system. The pull and push technology and intelligent agents are two main subtopics for it. Next is search engines architecture. Google search engine has been selected to be the main search engine that will be studied for this project.
3. The third topic would be on web linking or integration of websites.

However information gathering will not stop when it proceeds to the next procedure. It will be done continuously with other procedure but it will not be the main task.

a) World Net Users

According to new research by Nielsen-Netratings [21], over half a billion people worldwide now have Internet access. The survey indicates that 580 million people have Net access; as compared to 563 million in the third quarter of 2002. The 11 major Internet markets measured by Nielsen-Netratings experienced a four percent average increase in online population between the fourth quarter of 2001 and the fourth quarter of 2002. About 29 percent of the global Internet accesses are registered in the US, followed by Europe with 23 percent, Asia-Pacific with 13 percent, and Latin America with two percent. This shows that more uses are utilizing and using this technology for

multipurpose activities. The usage of internet and web-based applications are commanding great popularity as compared to the usage of traditional and paper-based system.

World Total	605.60 million
Africa	6.31 million
Asia/Pacific	187.24 million
Europe	190.91 million
Middle East	5.12 million
Canada & US	182.67 million
Latin America	33.35 million

Table 3.1 Online Internet Users [Nielsen-Netratings, 2003]

b) Meta Search Engine

There are three types of search engine namely Meta search engine, crawler-based search engine and directory. Example of Meta search engines are HotBot, Dogpile, Excite and AltaVista. Next, are the crawler-based search engines that have cybercrawler such as Lycos and Google. Lastly, is the search directory. Search directory not real search engine; it will search the result from the updated directory that it has kept before. However this directory must regularly updated their directories so they will provide a good result for the user. Example of search directory is Yahoo Search and MSN Search

Meta search engine is a powerful tool that search other several search engines simultaneously. Unlike crawler-based search engines such as Google, AllTheWeb and others, Meta search engines generally does not build and maintain their own web indexes. Instead, they use the indexes built by others, aggregating and often post-processing results in unique ways. A study conducted by InfoSpace, who is the dominant player in the Meta search engine space found that 86% of the web users had no idea what Meta search was all about.

Meta search engine accepts your entire query, and send them out to multiple search engines at the same time. The process is quite fast, using private "backdoor" servers made available by the search engines. Users will enjoy the privilege status of getting the information accurately with a great speed.

There are several advantages using Meta search engine. The most obvious advantage is getting results from multiple search engines faster without having to visit each of those multiple search engines web pages. Apart from time saving, it gives user to search a broader scope as each individual search engine's index differs from all others.

There are four compelling reasons to use a Meta search engine over a crawler-built engine:

- For quick searches. If the users want a fast answer, they may have better luck querying multiple engines simultaneously.
- For broad and shallow searchers. Meta searching is an excellent approach especially on the purpose of your search is to get an overview of a certain topic.
- To assess potential keywords for an unfamiliar subject. It is a better way to discover search terms than to see how they appear in a cross section of documents across the web.
- To see how different search engines handle the same query. This is an excellent way to get to know the "personalities" of different search engines -- their strengths, weaknesses, and types of queries they could handle best.

Meta search engine presents results in two ways. One way is by listing ten or so results from each engine queried with no additional post-processing. Dogpile works this way, listing results from three engines at a time. Other Meta search engines analyze the results and then rank them according to their own rules, combining results from multiple engines into a single, unified list. IxQuick, Metacrawler and Vivisimo are examples of this type of result aggregating Meta search engine [22].

c) Selection Search Engines

Search engines look pretty much the same up front, but their approach in presenting results varies widely. In evaluating search engines, the quality of results is obviously important. Because search engines query multiple sources, they can often call the best results the web has to offer. But if they don't work well, they can also have an unpleasant multiplier effect, actually amplifying poor or irrelevant search results.

Table 3.2 shows result from survey that has been done by www.searchenginewatch.com [22] of which search engine and directory that are frequently used by the user. This survey has been conducted on 99 user of searchenginewatch.com user. The result shows that Google has been selected as the most frequently use followed by Yahoo Search and Altavista.

Search Engine	No of voters	
AltaVista	11	11%
Yahoo!	21	21%
Google	34	34%
Lycos	3	3%
MSN	5	5%
Excite	7	7%
All the Web	6	6%
Northern Light	3	3%
HotBot	3	3%

Table 3.2 Survey on, which Search Engine and Directory that has been frequently use by user. [searchenginewatch.com, 2004]

The criteria used in selecting the search engines depends on the degree of name recognition and reputation. This is to see some evidence of "sustainability," that a service reviewed today will still be around tomorrow. Part of the way to do this is to check the link popularity of a site. Besides that the comprehensive "about us" information, including data about the company behind the engine, a list of the engines searched, the approach to handling queries and presenting results, and so on also has been analyze in selecting search engines. With this criteria and survey result, three search engines: has been selected which are Google, Yahoo Search and Altavista to be integrate to form the Integrated Tool.

3.2.2 Project Design

3.2.2.1 Project Planning

In this stage the project plan will be developed by using Gantt chart. Besides that each of the submission date will be marked as milestone. This is to ensure that the project will be delivered on time.

3.2.2.2 Project Design

The design phase is one of the critical phases in developing an IT project. Most developer lacked in the design phase and thus encountered numerous problems during the project development phase. Example of project planning is described in [20]. There are pertinent plans on how to develop the project design. One of the main plan that has been stated by him is that *“always remember who your audience is”*.

For this project, the integration tool will be based as web application. This means that the architecture design, process design and interface design are related with the design of web application

a) Project Architecture Design

Architecture design determines how system elements are identified and allocated; it is on element that interacts to form a system, the amount and granularity of communication needed for interaction, and the interface protocols used for communication. The common or basic architecture for web application has three prominent tiers. Figure 3.2 describes the architecture of Integrated Search Engine

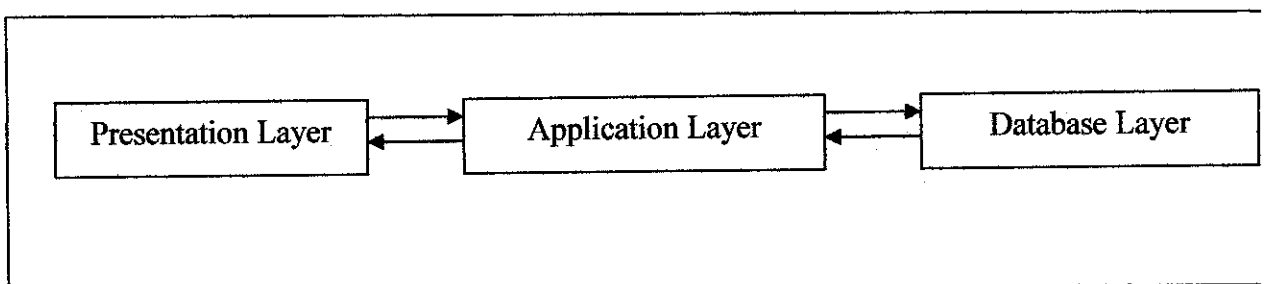


Figure 3.2 Architecture Model of Integrated Search Engine

The first tier is the presentation layer which includes the browser. The browser is an application program that interprets HTML and presents the final Web page. Examples of browsers include: Internet Explorer, Netscape Navigator, and Mosaic.

The second tier is the application layer and it consists of scripting language and server. It is a programming language designed specifically for Web site programming. Examples include JavaScript and VBScript. The scripts, or commands, which are embedded in the web page's HTML, are executed on the web server to generate dynamic HTML pages (example to search results from a database). A Web Server is a software application that uses the HyperText Transfer Protocol. A Web Server usually runs on a computer that is connected to the Internet. A Web Server may host or provide access to Content and responds to requests received from Web browsers. Every Web Server has an IP address and usually a domain name.

The third tier is the database layer. This layer will not be developed in the Integrated Tool. Since this Integrated Tool will only retrieve results from the server so there is no requirement to develop a database.

b) Project Process Design

Figure 3.3 illustrates the process model of integrating the search engines. The first process is where user has to key in the search query. This is similar with the way of searching for other search engines. The search key query then will be sending the query to the integration tool. After that, the integration tool will link the search query to the search engines. The selected search engines will search and return the result. The integration tool will generate the result and display it on its web page. Finally, user is able to view the result from the integration web page.

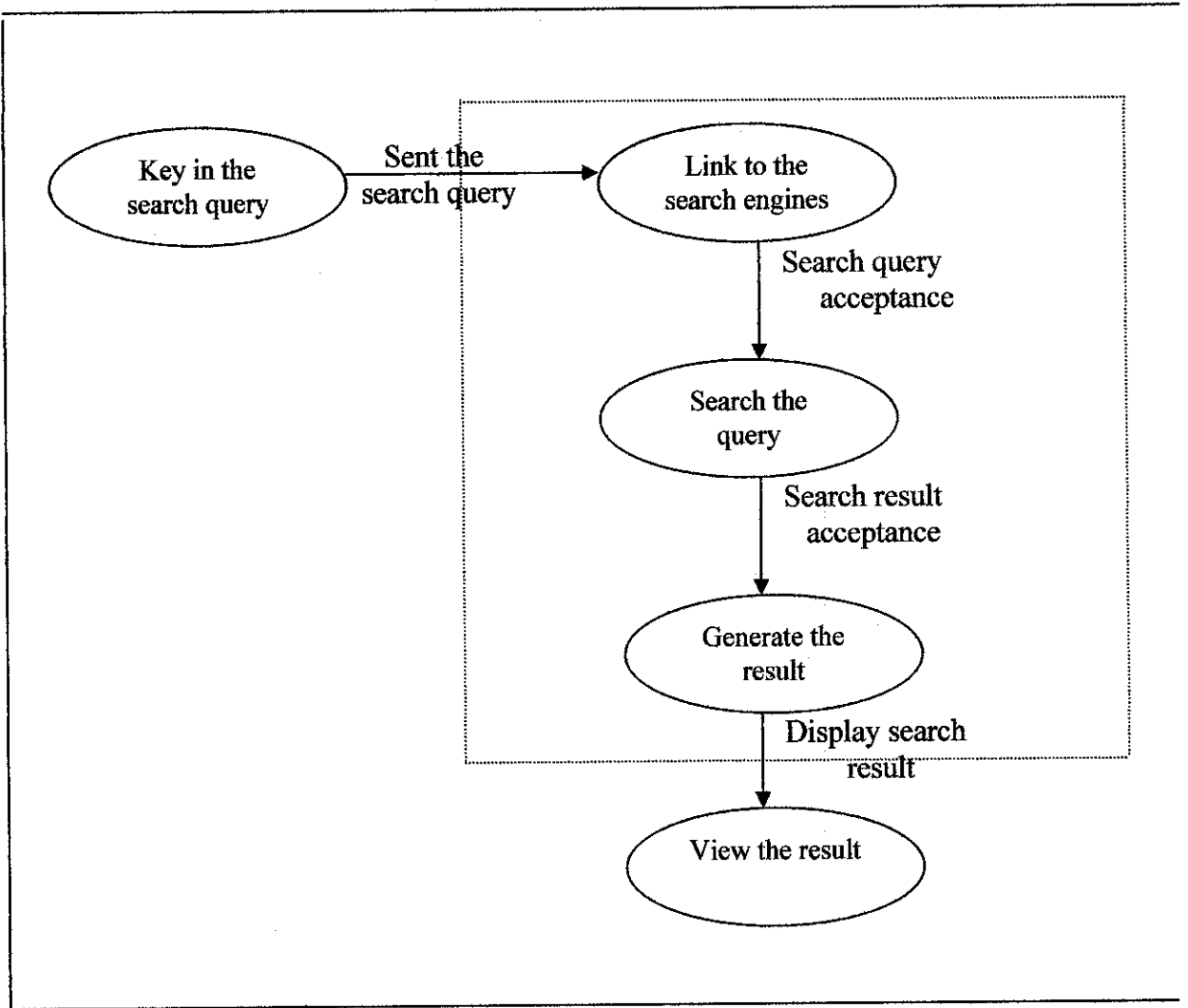


Figure 3.3 Process Model of Integration Tool

c) Project Interface Design

In designing good user interface, there are several different elements that should be taken into consideration. This includes interactive application of a web based application or web based system. One of the most important elements is the layout of the screen. Layout of the screen image often presents information and also acts as the focus for interacting with the application. As the Integration Tool is implemented using a web browser, it uses a forms-based interface. The user interaction for this tool would be the direct manipulation because user will interact directly with objects on the screen. In the integration tool's interface for the index page there would be a text box and a command button. User has to key in the search phrases in the text box and click on the command button to search the result. Figure 3.4 and Figure 3.5 shows the interface design for the integration tool and a table shows the task and event for each element. While Table 3.3 shows the task and event for each of the element in the interface design.

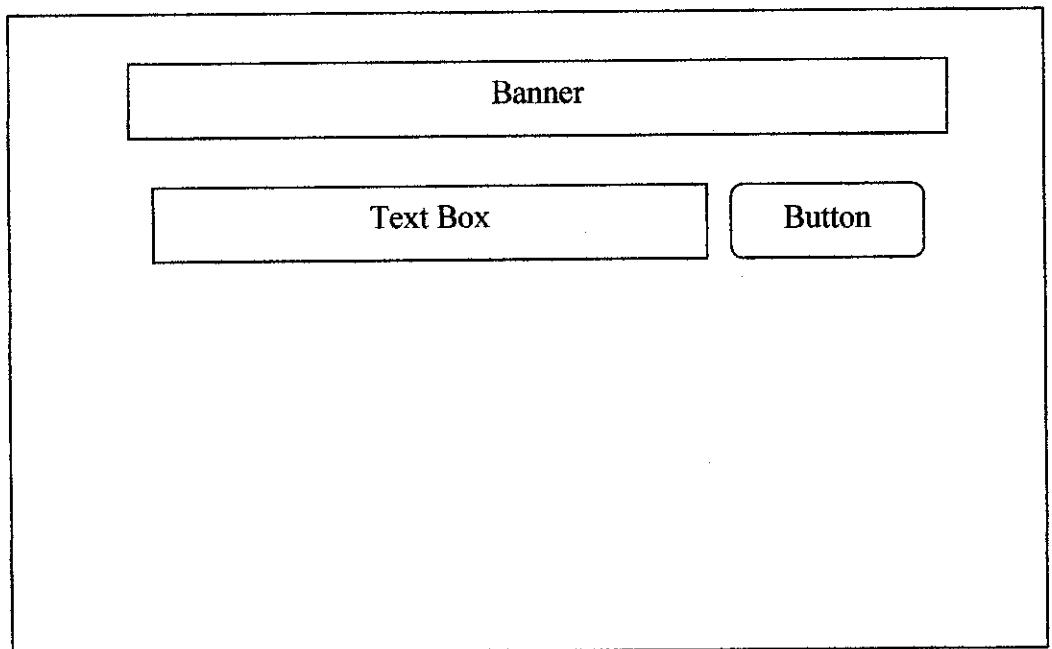


Figure 3.4 Interface Design for the Index Page of the Integration Tool

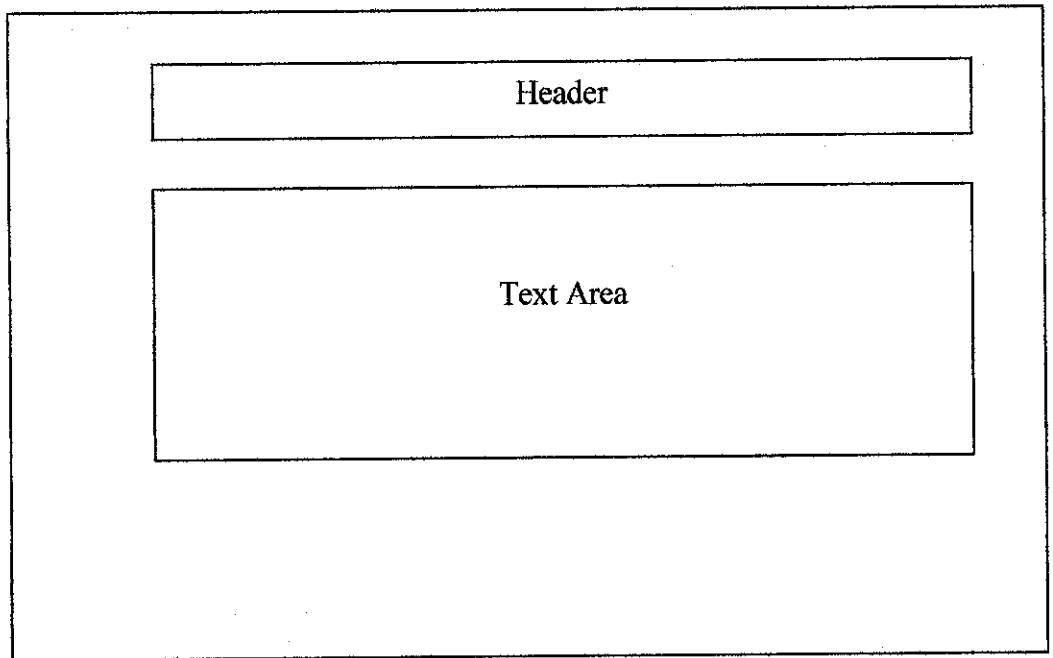


Figure 3.5 Interface Design for the Result Page of the Integration Tool

Element	Task	Event
Banner	To display the title of the web page and the search engines	None
Text Box	To get input (keyword) from the user	Insert info
Button	To search result from the search engines	Click button
Header	To inform the Search Engine	None
Text Area	To display results of the search keyword to the user	Output display

Table 3.3 Task and Event for Each of the Elements in the Interface Design

3.2.3 Project Development

3.2.3.1 Interface Development

The project development phase starts with constructing the Integration Tool's interface. The construction will be based on the interface designs that are developed during the previous phase (project design phase). PHP is used to develop the component of this Integration Tool.

3.2.3.2 Linking Development

The second phase of project development is the construction of linking and integration of the search engines. Again the construction is based on process design that has been developed from the previous stage. This is a stage where the project is broken down into a few main parts to ease the development process. The sub-parts development helps to focus, concentrate, understand and better manage the project progress and development.

3.2.4 Project Testing

In this phase, several testing such as User Acceptance and Integration tests are being carried out. User Acceptance test will be conducted to ensure the program could run smoothly. The Integration test will be conducted to ensure the Integration Tool (web application) could work smoothly with other applications when they are put together. Below is the testing process that has been conducted by the author.

1. Test case document created
2. Test conducted
3. Test case document collected and answers compiled
4. Answers tabulated by having those with a "Pass" put aside and those which needed to be corrected listed out in the result document.
5. Start debugging process

3.2.5 Final Deliverable

In this final phase the final report will be prepared and the product will be presented to the examiners. Finally the final dissertation will be submitted to the supervisor.

3.3 Tools

3.7.1 Hardware

Table 3.2 shows the hardware requirement of the computer for the development of Integration Tool.

Device	Requirement
Operating System	Microsoft Windows
Processor	Intel Pentium III 120Mhz
Memory	128MB of memory
Disk Space	20GB of free space
Other Peripherals	Screen (1024 x 768), Keyboard, Mouse, CD-ROM drive

Table 3.4 Minimum Hardware Requirements

3.7.2 Software

Table 3.3 shows the software used throughout the development of Integration Tool.

Software	Function
Internet Explorer	Internet Browser
HypertextPreprocessor (PHP 3)	Scripting Language.
Apache 2	Web Server
Winsyntax	Text Editor

Table 3.5 Software Requirements

CHAPTER 4

RESULT AND DISCUSSION

4. INTRODUCTION

Integration Tool is a web application tool that will integrate multiple search engines. This system help users in conducting search on the net more easily. The Integrated Search Engines focuses on three main functions which are to integrate the multiple search engines, to perform searching of the keyword and to retrieve results from the multiple search engines to its web page.

4.1 Findings

4.1.1 Method of Integrating the Search Engine

The major characteristic of this Integrated Search Engine is by which the search engines are integrated and the information compiled from the searching. A method has been developed where the linking of to the web page of the search engine will be made from its URL address. After the linking process, the searched keyword will be submitted to the search engine to the searching. After that the information gathered will be striped to the Integrated Search Engine result's page.

The pseudocode, presented below is an artificial language that helps programmers to develop algorithms that will be converted into structured portions of PHP language programs. The pseudocode can be divided into two parts. The first part of the pseudocode will be the main procedure for Integrated Search Engine. It will describe the main procedure of submitting and retrieving the results from the three search engines. Meanwhile for the second part of the pseudocode will describe the function on stripping the information needed from each of the result's page of the search engine. Each of the search engines will have a different function and procedure to strip the information. This is because each of the search engines has a different web layout, design and style.

Pseudocode

Main Procedure Integrated Search Engine

- Show the main-interface
- Set variable query as function value
- Set 'value' and 'name' to each element's value and name
- Append copies of each_element
- Set variable output equal parsed file
- Echo the value output (our parsed data)

Procedure Query Function for each search engine

- Submit URL of the selected search engines
- Mark begins and removes line breaks
- Remove carriage returns and tabs
- Mark ends
- Strip header and footer for each search engine
- Get link and description (search result)

Explanation procedure for each of the Search Engine Query Function

a) Google

The URL linking for the Google Search Engine is

"[http://www.google.com.my/search?hl=en&q=\(\\$query\)&meta=](http://www.google.com.my/search?hl=en&q=($query)&meta=)"

After the query has been search, the queryGoogle function will mark begin and ending of the information needed to be posted to the Integrated Search Engine. For Google, the mark begin with "<div><p class=g>" and end with "</div>". Then all the information between the marking will be posted to the result's page of Integrated Search Engine.

b) Yahoo Search

The URL for linking the Yahoo Search is

"http://search.yahoo.com/search?p=(\$query)&fr=FP-tab-web-t&toggle=1".

The queryYahoo function then will get the information that mark begin and ending with "". Since Yahoo Search is a search directory so it is easier to determine the starting and ending of the information. This is because it will be listed in a list.

c) Altavista

The URL for linking the Altavista Search Engine is

"http://www.altavista.com/web/results?itag=wrx&q=(\$query)&kgs=1&kls=0"

For queryAltavista function the marking will use a different method from the queryGoogle function and queryYahoo function. This is because Altavista Search Engine is a Meta Search Engine. To get the information needed from the Altavista's result page, queryAltavista need to use count programming structure and set the get information to 0 instead of 1 like the other two previous functions. He marking will be begin at "<hr size=1 noshade color=#93B2DD align=center>" and ending at "<a class=res\".

Figure 4.1 describes the process flow that will be used to develop the critical part of the tool. This is Integration Module where the integration, searching and retrieving key word or phrases will be developed

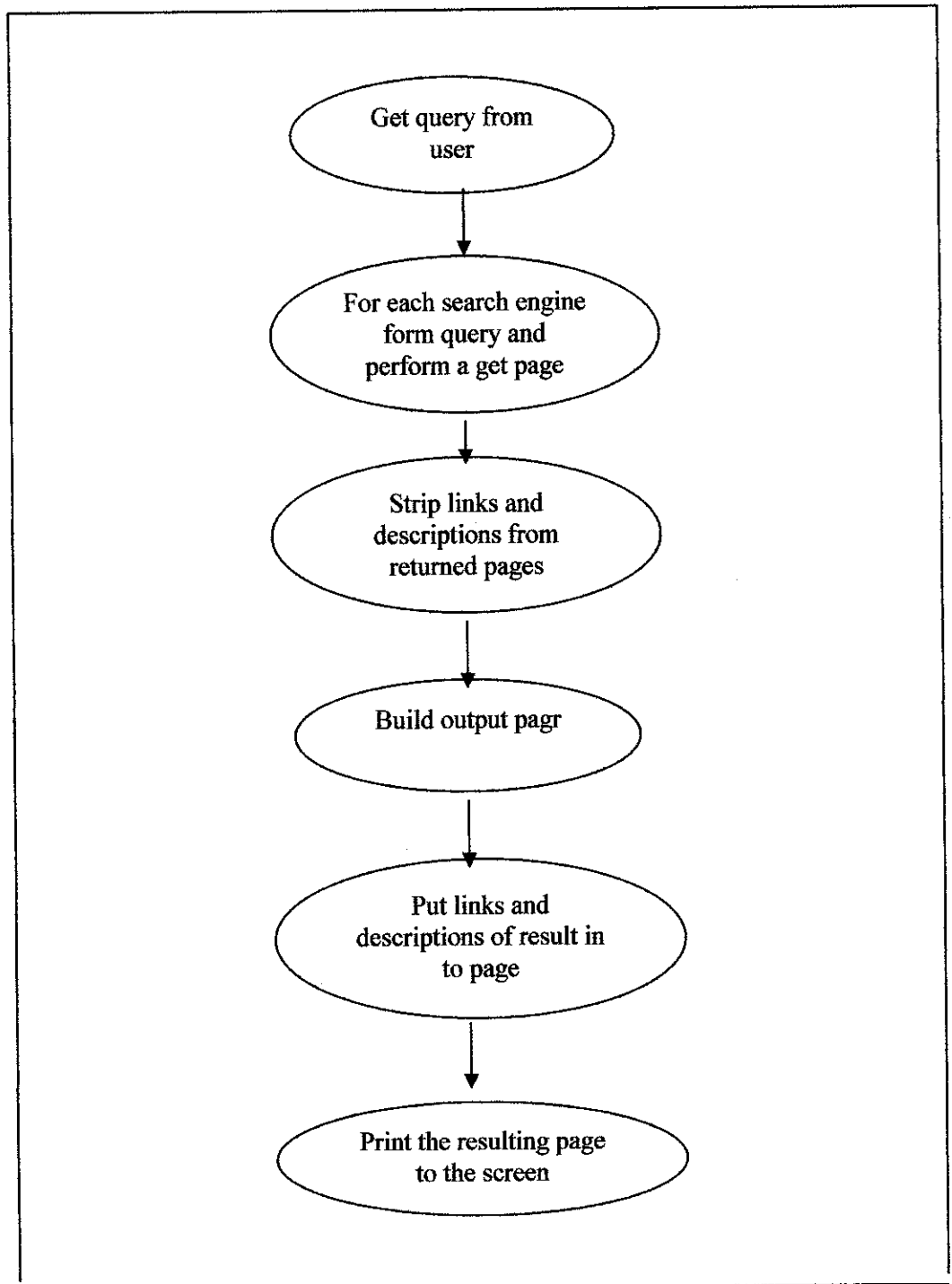


Figure 4.1 System Flow for developing the Integration Module

4.1.2 Integrated Search Engine *versus* Manually Information Searching

Based on the survey that already been done to 50 selected participants who is among the students, the result of the survey of the integrated search engine is indeed very encouraging. This survey has been done to get the feedback from the user on the idea of developing an Integrated Search Engine.

The Table 4.1 summarizes the results gathered from the survey. We could see that 80% of the participants prefer to use search engine to help them in searching for information from the Internet. This is probably because of the increasing number of world Internet users and also web page in the Internet. Another 20% of the participants do not use any search engine to search information from the Internet.

From the survey gathered on the user who use multiple search engines page to obtain more accurate result, 70% of the participants depend on multiple search engines to obtained more accurate result. 30% of the respondents only went to one or none of the search engine to search information. This shows that majority of the Internet user depends for more accuracy result from the search activity.

As for the most common and satisfying method of searching information from the Internet, 60% of the participants satisfied to search information by using multiple search engines while 40% were not satisfied to use multiple search engines. This was probably because the result gained from the multiple search result was more accurate and better than other type of search engine such as crawler-based search engines and search directories.

From the question on participant's opinion on having Integrated Search Engine, 90% of the participants say that they preferred to have Integrated Search Engine as one of the tool for searching information from the Internet, while 10% do not prefer to have this tool.

In response to the last question of the questionnaire, 80% commented that they thought the Integrated Search Engine could ease their daily works while the other remaining 20% claimed it would make no different at all for them.

Survey questions	Yes (Percentage)	No (Percentage)
Using search engine to search information from the Internet	80%	20%
Using multiple search engines page to obtain more accurate result	70%	30%
Participant who satisfied to use multiple search engine as method for searching information form the Internet	60%	40%
Opinion on having Integrated search Engine	Preferable – 90%	Not Preferable – 10%
Think that Integrated search Engine could ease of their daily works	80%	20%

Table 4.1 Result from the survey on the Integrated Search Engine

4.2 Discussion

4.2.1 Problem Encountered

During the development process, there were some several constraints that have been encountered in determining the scope and resources.

This problem had been encountered during the testing phase of this project. It was hard to allocate the resources required in order to test this Integrated Search Engine. This is because the Integrated Search Engine cannot be launched from the personal server and failed to connect it to the UTP server. For this integration tool, it must be connected straight to the network from the server. To make this reliable, the project was uploaded to free web hosting server which is www.ifreepages.com. However, there were also constraint that should be take into consideration which the selected web hosting also must be comply with the PHP version so the program will run smoothly.

There were also limitation from the web hosting side such as server down and slow processing time when loading the page. This will definitely affect the project since time is the main limiting criteria in order to meet the deadline.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5. OVERVIEW

Internet penetration has been increasing dramatically for the past few years. The number of web pages and web application on the Internet are also increasing rapidly and higher demand. Top search engines are need to handle hundreds of millions of queries per day. The way to help users in conducting searching in the net is by integrated multiple search engines as one major Integrated Tool. Such technique has been used by some Meta web crawler and has allowed many users to improve their web searching techniques. It has proven to save time for searching information from the multiple search engines.

5.1 Relevancy to the Objectives

In relation to the objectives stated earlier has been identified as the following:-

- Integrated Search Engine tool allow users to perform the following:-
 - i. Search multiple search engine by using one web page
 - ii. Easy to analyze result since all the search result are show in one page.

- There are three types of Search Engine which are:-
 - i. Crawler-Based Search Engine
 - ii. Search Directories
 - iii. Meta Search Engine

- Meta search engine is better than crawler-based search engines as it allows for:-
 - i. Better search result
 - ii. Quick searches
 - iii. For broad and shallow searches
 - iv. To assess potential keywords for an unfamiliar subject
 - v. To see how different search engines handle the same query.

- Three search engines and directory has been selected to be integrated for this project, which is Google, Yahoo Search and Altavista. These search engines and directory has been selected since it has
 - i. Have a degree of name recognition and reputation
 - ii. Sustainability
 - iii. Comprehensive "about us" information, including data about the company behind the engine, a list of the engines searched, the approach to handling queries and presenting results, and so on.

5.2 Suggested Future Work for Expansion and Continuation

Currently the integrated tool integrates all type of search engines, perform searching keyword or phrases and then retrieve the result to the tool's page. The integration tool can be enhanced and expanded by integrating more search engines. Besides that, the result also can be enhanced by including all the results in one page without any segregation from its search engine. Information retrieval such as filtering can be also included to the system, where the result will be filtered so that there is no redundancy. Again the result can also be ranked and enhanced by including percentage of hits for each of the results.

With this advancement, it is hope that this project will help the users especially in searching and retrieving the right information that they required from the web.

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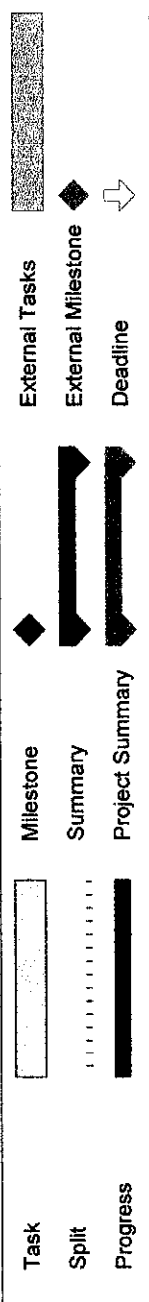
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Appendix

APPENDIX A:

Project Gantt Chart

Day	Task	Duration	Start Date	End Date
4	Topic Assigned	1 day?	Wed 5/26/04	
5	Information Gathering and Facts Finding	23 days	Wed 6/16/04	
6	Preliminary Research	5 days	Mon 7/19/04	
7	Introduction	3 days	Mon 7/19/04	
8	Objectives & scope of project	3 days	Mon 7/19/04	
9	List of reference/literature/case studies	3 days	Wed 7/21/04	
10	Supervisor revision	1 day	Thu 7/22/04	
11	Submission of Preliminary Report	1 day	Fri 7/23/04	
12	Research	6 days?	Mon 7/26/04	
13	Information gathering continuation	6 days?	Mon 7/26/04	
14	Supervisor revision	1 day?	Mon 8/2/04	
15	Project Design	9 days?	Tue 8/3/04	
16	Project methodology	4 days?	Tue 8/3/04	
17	Project planning	4 days?	Tue 8/3/04	
18	Web architecture review	5 days?	Mon 8/9/04	
19	Web design	4 days	Mon 8/9/04	
20	Supervisor revision	1 day?	Fri 8/13/04	
21	Submission of Progress Report	1 day?	Mon 8/16/04	
22	Project Development	29 days?	Tue 8/17/04	
23	Interface development	4 days?	Tue 8/17/04	
24	Project Development	24 days?	Mon 8/23/04	
25	Supervisor revision	1 day?	Fri 9/17/04	
26	Project testing	2 days	Sat 9/18/04	
27	Supervisor revision	1 day?	Fri 9/24/04	
28	Submission of Dissertation Final Draft	15 days?	Mon 9/27/04	
29	Submission to Supervisor	5 days?	Mon 9/27/04	
30	Submission to Supervisor/External Examiner	1 day	Fri 10/15/04	
31	Oral Presentation	3 days	Sat 10/30/04	
32	Submission of Project Dissertation	1 day?	Fri 12/10/04	



Project: FYP
Date: Tue 12/14/04

External Tasks
External Milestone
Deadline

Milestone
Summary
Project Summary

Task
Split
Progress

APPENDIX B:

Questionnaire



Questionnaires

Please circle your answers:

1. Do you use search engine to help you search for information from the Internet?

a. YES

b. NO

2. Do you use multiple search engines page to obtain more accurate result?

a. YES

b. NO

3. Does this method of searching information from the Internet satisfy you?

a. YES

b. NO

4. What is your opinion on having Integrated Search Engine?

a. PREFERABLE

b. NOT PREFERABLE

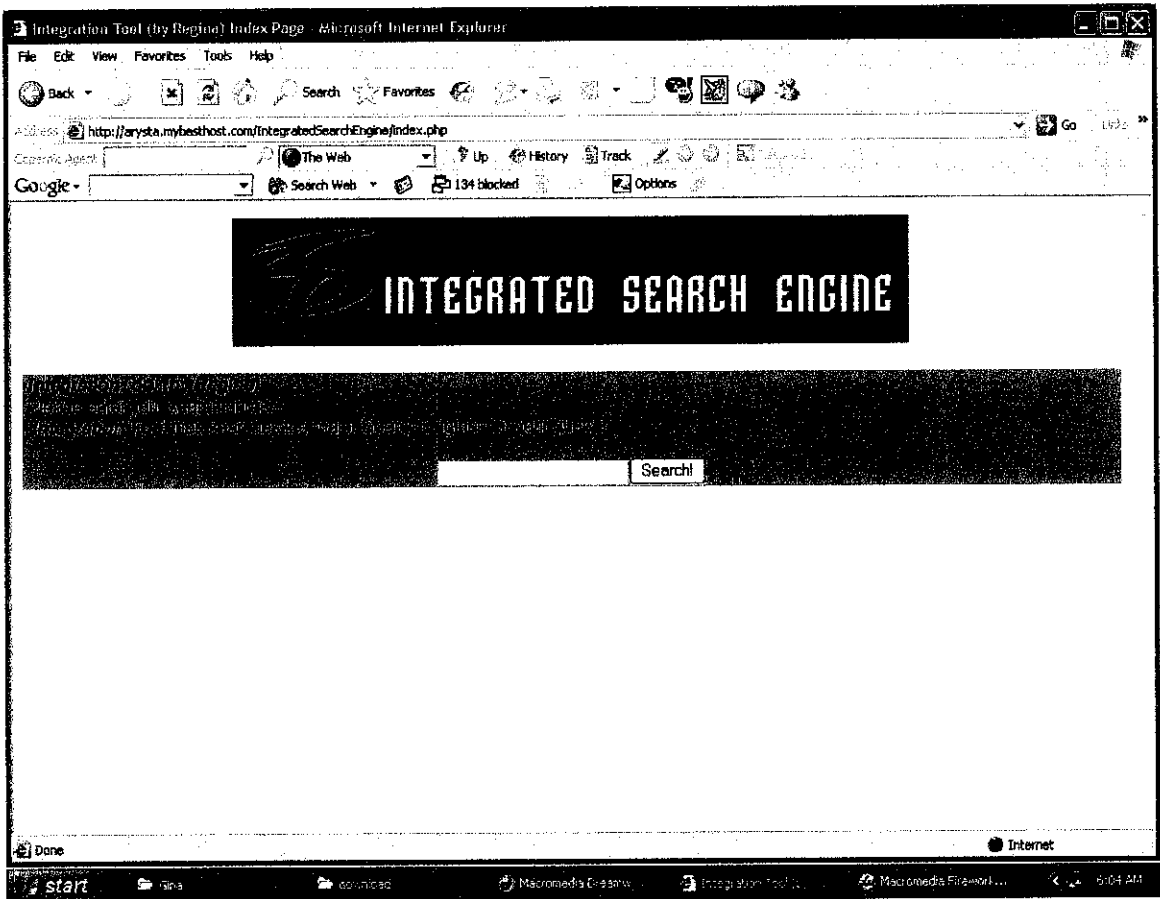
6. Do you think that an Integrated Search Engine could ease of your daily works?

a. YES

b. NO

APPENDIX C:

Integrated Search Engine Interface



Index page of Integrated Search Engine

APPENDIX D:

Integrated Search Engine Source Code

```
//Integrated Search Engine
//A web application on integrating three type of search engine which is Google,
//Yahoo Search and Altavista
//This application was developed by Regina Hayati Rahiman (1397)
//Supervised by Ms. Vivian Yong Suet Peng
```

```
<?php
```

```
//QuerySite function, where it will be the main procedure of Integrated Search Engine
```

```
function querySite($url){
    $url_stuff = parse_url($url);
    $port = isset($url_stuff['port']) ? $url_stuff['port'] : 80;
    $fp = fsockopen($url_stuff['host'], $port);
    $query = 'GET ' . $url_stuff['path'] . "?" . $url_stuff['query'] . " HTTP/1.0\n";
    $query .= 'Host: ' . $url_stuff['host'] . "\n\n";
    fwrite($fp, $query);
    while ($tmp = fread($fp, 1024))
    {
        $buffer .= $tmp;
    }
    return $buffer;
}
}
```

```
?>
```

```
<?php
```

```
//QueryGoogle function, where it will be the query function for the first search engine
```

```
function queryGoogle($query){
    //Query Google search engine
    $buffer = querySite("http://www.google.com.my/search?hl=en&q=( $query)&meta=");
    $temp = explode("<div><p class=g>", $buffer);
    $items = explode("</div><br clear=all>", trim($temp[1]));
    $header = "<center>\n<p>\n<table border='0' cellpadding='0' cellspacing='2' "
width='80%' bgcolor='#00A6DD'>\n<tr>\n<td><font face='arial' "
size='3'><b>&nbsp;<i>Google Results</i></b></font></td>\n</tr></table>\n</center>\n <div
id=queryGoogle><img style='border:0px; float:right;' src='images\google.gif'>";
    $footer = "</div>";
    return $header . $items[0] . $footer;
}
}
```

```
?>
```

```
<?php
```

```
//QueryYahoo function, where it will be the query function for the second search engine
```

```
function queryYahoo($query){
    //Query Yahoo search engine
```

```

        $url = "http://search.yahoo.com/search?p=($query)&fr=FP-tab-web-t&toggle=1";
        $pre = "<div id=yschweb><div class=yschhd><h2>WEB RESULTS</h2></div><ol
start=1>";
        $post = "</ol>";
        $header = "<center>\n<p>\n<table border=\"0\" cellpadding=\"0\" cellspacing=\"2\"
width=\"80%\" bgcolor=\"#00A6DD\">\n<tr>\n<td><font face=\"arial\"
size=\"3\"><b>&nbsp;<i>YahooSearch
Results</i></b></font></td>\n</tr></table>\n</center>\n <div id=\"queryYahoo\"><img
style='border:0px; float:right;' src='images/yahoo.gif'/></ol>";
        $footer = "</ol></div>";

        $buffer = querySite($url);
        $temp = explode($pre,$buffer);
        $items = explode($post,trim($temp[1]));
        return $header . $items[0] . $footer;
    }
?>

```

<?php

//QueryAltavista function, where it will be the query function for the third search engine

```

function queryAltavista($query){
    //Query Altavista search engine

    $buffer =
querySite("http://www.altavista.com/web/results?itag=wrx&q=($query)&kgs=1&kls=0");
    $temp = explode("<hr size=1 noshade color=\"#93B2DD\" align=center>", $buffer);
    $items = explode("<a class=\"res\"\"",trim($temp[0]));
    $count = count($items);
    for($i = 1; $i < $count; $i++){
        $body .= "<a class=\"res\"\" . $items[$i];
    }

    $header = "<center>\n<p>\n<table border=\"0\" cellpadding=\"0\" cellspacing=\"2\"
width=\"80%\" bgcolor=\"#00A6DD\">\n<tr>\n<td><font face=\"arial\"
size=\"3\"><b>&nbsp;<i> Altavista Results </i></b></font></td>\n</tr></table>\n</center>\n
<div id='queryAltavista'> <img style='border:0px; float:right;' src='images/altavista.gif'/>";
    $footer = "</div>";
    return $header . $body . $footer;
}
?>
<?php

```

//All the strip information will be echo to the Integrated Search Engine's result page

```

echo "<center>" . queryGoogle($query) . queryYahoo($query) . queryAltavista($query) .
"</center>";
?>

```

```
<style>
```

```
//CSS for Google
```

```
#queryGoogle{  
    margin:3px;  
    padding:3px;  
    width:600px;  
    border:1px solid #EFEFEE;  
    text-align:left;  
    font-family:verdana;  
    font-size:12pt;  
    font-weight:normal;
```

```
}
```

```
#queryGoogle A{  
    color:#0033FF;
```

```
}
```

```
#queryGoogle A:hover{  
    color:#FF0000;
```

```
}
```

```
</style>
```

```
<style>
```

```
//CSS for Yahoo
```

```
#queryYahoo{  
    margin:3px;  
    padding:3px;  
    width:600px;  
    border:1px solid #EFEFEE;  
    text-align:left;  
    font-family:verdana;  
    font-size:12pt;  
    font-weight:normal;
```

```
}
```

```
#queryYahoo LI{  
    list-style:none;  
    list-height:20px;  
    margin-left:-30px;
```

```
}
```

```
#queryYahoo A{  
    color:#0033FF;
```

```
}
```

```
#queryYahoo A:hover{  
    color:#FF0000;
```

```
}
```

```
</style>
```

```
<style>
```

```
//CSS for Altavista
```

```
#queryAltavista{  
  margin:3px;  
  padding:3px;  
  width:600px;  
  border:1px solid #EFEFEF;  
  text-align:left;  
  font-family:verdana;  
  font-size:12pt;  
  font-weight:normal;
```

```
}
```

```
#queryAltavista A{  
  color:#0033FF;
```

```
}
```

```
#queryAltavista A:hover{  
  color:#FF0000;
```

```
}
```

```
</style>
```