Online Survey System (OSS)

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Abstract

Online survey system (OSS) is an electronic survey system and productivity tool. The system enables the user to conduct a survey at ease which was previously paper-based, and which can be tedious and time-consuming. It can be used or administered from anywhere an Internet browser is available.

The users can create and design their own interactive online survey. OSS provides a fast distribution of survey form to a large geographical area through email. The respondents just need to click on the URL attach with the invitation email to direct them to the survey. After that OSS will generates analysis report based on the responses collected. User will be able to get the results such as the average, percentage, etc. by a mouse click.

Abstrak

Online Survey System membolehkan penyelidik menjalankan survei dengan mudah. Seperti mana yang kita tahu, seseorang yang ingin menjalankan survei terpaksa menggunakan masa yang agak lama semasa menyediakan soalan soal selidik dan menyerahkan soalan tersebut kepada orang lain. Ini bukan sahaja memakan masa tetapi juga membazir kertas dan wang.

Dengan adanya Online Survey System (OSS), penyelidik dapat mencipta dan mereka soal selidik atau survei mereka secara online. OSS membolehkan soal selidik tersebut diserahkan kepada peserta dari merata tempat dengan syarat peserta soal selidik mesti mempunyai email sendiri. Peserta yang ingin menjawab soal selidik hanya perlu click satu kali pada hyperlink untuk menjawab survei tersebut.

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Chapter 1: Introduction

1.1. Project Overview

Online survey system (OSS) is web based survey system which enables the user to conduct a survey at ease by computerizing. The system automates the entire creation of interactive online survey. After creating the survey, the user can distribute it easily to respondents through email. The respondents just need to click on the hyperlink and it can direct them to the survey. After collect the data, the system can produce more impressive tables, charts and text reports instantly from the web browser.

The manual practice of surveying encountered with some problems. There are some major weaknesses faced by researches using traditional survey method such as face to face survey, questionnaire and etc. The traditional surveying is time consuming, high cost and only restrict to certain area. With the online survey system, these problems can be solved easily.

The benefits of Online Survey System (OSS) are:

- **It saves time**

They researches who use traditional survey methods like paper based surveys normally spent a lot of time in prepare the survey form, distributing and collect the feedback from respondents. But it is less effective as it just limit to a small amount of people. It is worst when it comes to face to face interview with the respondent. The surveys may take from several weeks to several months to conduct. The analysis part is the most time consuming part. The researches have to check the survey form manually and analysis the data one by one. Sometimes it will cause some errors in the process of analyzing the data.

With the OSS, the time spend on conduct the survey can be reduced. The researches just need to distribute the survey form to the respondents through email. Besides that, user will be able to get the results such as the average, percentage, etc by a mouse click. It saves a lot of time. So that they can straight away concentrate on the analysis part of the surveys.

- **Reduces paper work**

Through OSS, a respondent can fill up the survey form online and all the data is automatically saved into the database. In fact, report generator is used to generate the report for the analysis of the data. Only the registered users can log in to the system and obtain the most updated information. They can print the report from the system. Thus, a lot of paperwork is reduced.

- **Reduces the expenses**

Since most of the process are conducted automatically. So it will reduce the manpower involve in the survey. Normally the expense for conducting the traditional is very high. It includes the cost of print the questionnaire. For the survey which required a large amount of respondents, the companies have to hire a group of people in helping them to distribute the survey form in order to producing the survey report.

- **Fast distribution of survey form to a large geographical area**

Normally the traditional survey is only focus on certain area due to the constraint of time, cost and energy spent. But with the OSS, the survey form can be distributed to a large geographical area even across countries. This is because with the convenience

of internet, the survey forms can be distributed in a very short time to people around the world with email.

1.2. Project Objectives

The main purpose to develop this online survey system is to solve the traditional survey problems. The objectives for this project are:

- Allow the user to create, design and build the survey feedback form according to their needs.
- Reduce the usage of papers, thus reduce the company's expenses.
- Reduce the time to conduct the survey.
- Allow the user to set, edit or delete the questions dynamically online
- Make use of the idle, unused processing power of the user's computer.
- Provide a nice and interactive user- friendly graphic interface to make the survey more attractive.
- Provide a fast distribution of survey form to a large geographical area through email.
- User will be able to get the results such as the average, percentage, etc. by a mouse click
- Provide instant bar graph and table views of data.
- Save surveys and questions to question library for reuse.
- The results and graphs can be printed by user.

1.3. Project Features

The following will display details of the features that will emphasize:

- Implementation of an interactive web site to attract audiences to answer the survey.
- Implementation of a dynamic user interface that is user friendly to help the user conduct a survey in an easy way.
- Development of mailing system for the user to invite the target audiences to vote for their survey.
- Provide an attractive analysis report for the user such as the average, percentage and etc to help the user analyze the survey from different perspectives. Generate accurate, consistent and well –designed survey analysis report.

1.4. Project Scope

Generally, the scope of Online Survey System includes:

- All the information is available in English only
- The respondent of the survey is limited to those who have email accounts
- The system allows the user to set, edit or delete the questions dynamically online.
- System should be able to draw simple graphs.

1.4.1. Targeted Audience

- To any www visitor who are interested with the survey topics.
- To any company or organizations who want to do marketing research or public opinions polling.
- To any company or organizations who want to conduct a customer satisfaction survey on their products or services provided.

- To help lecturers and researchers to do a survey regarding their academic studies or research.

1.5. Expected Outcome

- The system is user friendly. The user can choose to design the survey with the help of instructions in the system. They can operate the system easily without any training.
- The user can edit or reuse the questions from the previous survey.
- The system can generate accurate, consistent and well - designed survey analysis report.
- Acceptable response time and the audiences can download the survey form in an adequate time.
- The system will validate and verify the data input. If there is any error, the system will send the error message to user.

1.6. Project Schedule

The Gantt chart in the following page contains the detailed breakdowns of every activity that was conducted during the design and implementation of e-Stationery Reporting system.

Information gathering and survey is the first activity of this project. Through this activity, many reviews have been done, and the objectives and scope of the project were determined. Shortly after this stage, the requirement analysis was defined. Requirements analysis was done very carefully. This is because requirement is a feature of the system or a description of things this system is capable of doing in order to fulfill the system's purpose.

System designing took a long period during the whole project. System designing is very important because it is a process that presents data flow, shows the relationship between the entities of system. Functionality, database, input / output and interface design are involved in these process. System design took almost 6 weeks for its completion.

The second part of the project consists of coding, system development, system testing, system review and implementation of system. Coding took the longest period as it lasted from October till the end of December. System testing, review and implementation will do in three weeks time. System documentation is done throughout the whole period.

Table 1.6: Project schedule

No.	Task Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
1	**Information Gathering and Survey**								
	❑ Briefing with lecturer								
	❑ Project proposal								
	❑ Identify project objectives and scopes.								
	❑ Literature review								
	❑ Searching information from various sources								
2	**System Analysis**								
	❑ Determine system development methodology								
	❑ Determine functional and non-functional requirement								
	❑ Dataflow analysis								
	❑ Determine development tools								
3	**System Design**								
	❑ Functionality design								
	❑ Database design								
	❑ Input / Output design								
	❑ Interface design								
4	**Documentation 1**								
	❑ Documentation.								
5	**Coding and Development**								
	❑ Develop system.								
6	**Testing, Review and Implementation**								
	❑ Testing and maintaining the designed system.								
	❑ Implementation of the system.								
7	**Documentation 2 (Report)**								
	❑ Documentation.								

Summary

This chapter gives an introduction to the Online Survey System. The project main objectives are to computerize the survey system and allow the user to create, design and build the survey feedback form according to their needs. Four main scopes in this project are to develop a security system, develop an application to let user create and design an interactive survey, develop a platform to let user distribute the survey to respondents through email and develop a report generator for analyzing the data collected Through this system the user will gain some benefits such as reduce time spent in conducting a survey, reduce paperwork, reduce expenses and survey form can be distributed to a large geographical area even across countries.. This system is very flexible and easy to use. No training is required before use the system. This system is suitable for any user. The last part of this chapter is the project schedule. Project schedule is done to have a very clear guidelines that when this project need to be complete. Figure of project schedule is shown as table 1.6.

Chapter 2: Literature Review

2.1 Introduction to Survey

Surveys are employed to understand the preferences of a broad base of surveys about any existing or potential systems. Survey can use large samples to generate to an entire population. Surveys are inexpensive and generally acceptable for usability tests and expect reviews. Survey also offer advantage that large numbers of people can be reached .So there is the possibility of obtaining statistically significant results. The large respondents give a sense of authority compared to the potential biased and highly variable results from small number of usability testing participants or expect reviewers. Surveys are also useful in collecting user's subjective opinions about the evaluated systems.

With the advanced technologies, online surveys are made possible. Online surveys avoid the cost and effect of printing, distributing and collecting paper forms. Many people prefer to answer a brief survey displayed on screen, instead of filing and returning a printed form.

An important aspect of surveys is that the language must clear and understood in the same way by all the readers. The focus of the surveys is therefore the preparation of unambiguous survey questions. There are two types of possible question structure: closed questions and open questions. For the case of closed questions, the respondent is asked to select an answer from a choice of alternative replies. For the open questions, the respondent is free to provide his own answer. Closed questions usually have some form of the rating scales associated with them. The simplest rating scales

are just checklists comprising basic alterative responses to a very specific question. It could be a 3 point scale of 'yes', 'no' and 'don't know', a multi-point rating scale, a semantic differential scale or a ranked order scale. The responses from surveys are converted into numerical values and statistical analysis is performed.

2.2 Survey Method

There are many different methods in data collection. Each method has advantages and disadvantages.

2.2.1 Personal Interviews

An interview is called personal when the Interviewer asks the questions face-to-face with the Interviewee. Personal interviews can take place in the home, at a shopping mall, on the theater or polling place, and so on.

Advantages

- The ability to let the Interviewee see, feel and/or taste a product.
- The ability to find the target population. For example, we can find people who have seen a film much more easily outside a theater in which it is playing than by calling phone numbers at random.
- Longer interviews are sometimes tolerated. Particularly with in-home interviews that have been arranged in advance. People may be willing to talk longer face-to-face than to someone on the phone.

Disadvantages

- Personal interviews usually cost more per interview than other methods. This is particularly true of in-home interviews, where travel time is a major factor.
- Each mall has its own characteristics. It draws its clientele from a specific geographic area surrounding it, and its shop profile also influences the type of client. These characteristics may differ from the target population and create a non-representative sample.

2.2.2 Telephone Surveys

Surveying by telephone is the most popular interviewing method in the many companies. This is made possible by nearly universal coverage because nowadays many of homes have a telephone.

Advantages

- We can dial random telephone numbers when we do not have the actual telephone numbers of potential respondents.
- Skilled interviewers can often elicit longer or more complete answers than people will give on their own to mail, email surveys (though some people will give longer answers to Web page surveys). Interviewers can also ask for clarification of unclear responses. .

Disadvantages

- Many telemarketers have given legitimate research a bad name by claiming to be doing research when they start a sales call. Consequently, many people are

reluctant to answer phone interviews and use their answering machines to screen calls.

- Cannot show or sample products by phone.

2.2.3 Mail Surveys

Advantages

- Mail surveys are among the least expensive.
- This is the only kind of survey we can do if we have the names and addresses of the target population, but not their telephone numbers.
- The questionnaire can include pictures - something that is not possible over the phone.
- Mail surveys allow the respondent to answer at their leisure, rather than at the often inconvenient moment they are contacted for a phone or personal interview. For this reason, they are not considered as intrusive as other kinds of interviews.

Disadvantages

- Time! Mail surveys take longer than other kinds. The respondents will need to wait several weeks after mailing out questionnaires before we can be sure that we have gotten most of the responses.
- In populations of lower educational and literacy levels, response rates to mail surveys are often too small to be useful.

2.2.4 Email Surveys

Email surveys are both very economical and very fast. More people have email than have full Internet access. This makes email a better choice than a Web page survey for some populations. On the other hand, email surveys are limited to simple questionnaires, whereas Web page surveys can include complex logic.

Advantages

- Speed. An email questionnaire can gather several thousand responses within a day or two.
- There is practically no cost involved once the set up has been completed.
- Can attach pictures and sound files.
- The novelty element of an email survey often stimulates higher response levels than ordinary "snail" mail surveys.

Disadvantages

- Must possess (or purchase) a list of email addresses.
- Some people will respond several times or pass questionnaires along to friends to answer. Many people dislike unsolicited email even more than unsolicited regular mail. We may want to send email questionnaires only to people who expect to get email from us.
- Cannot use email surveys to generalize findings to the whole populations. People who have email are different from those who do not, even when matched on demographic characteristics, such as age and gender.

- Email surveys cannot automatically skip questions or randomize question or answer choice order or use other automatic techniques that can enhance surveys the way Web page surveys can.

2.2.5 Internet/Intranet (Web Page) Surveys

Web surveys are rapidly gaining popularity. They have major speed, cost, and flexibility advantages, but also significant sampling limitations. These limitations make software selection especially important and restrict the groups we can study using this technique.

Advantages

- Web page surveys are extremely fast. A questionnaire posted on a popular Web site can gather several thousand responses within a few hours. Many people who will respond to an email invitation to take a Web survey will do so the first day, and most will do so within a few days.
- There is practically no cost involved once the set up has been completed. Large samples do not cost more than smaller ones (except for any cost to acquire the sample).
- Can show pictures. Some Web survey software can also show video and play sound.
- Web page questionnaires can use complex question skipping logic, randomizations and other features not possible with paper questionnaires or most email surveys. These features can assure better data.

- Web page questionnaires can use colors, fonts and other formatting options not possible in most email surveys.
- A significant number of people will give more honest answers to questions about sensitive topics, such as drug use or sex, when giving their answers to a computer, instead of to a person or on paper.
- On average, people give longer answers to open-ended questions on Web page questionnaires than they do on other kinds of self-administered surveys.
- .

Disadvantages

- Current use of the Internet is far from universal. Internet surveys do not reflect the population as a whole. This is true even if a sample of Internet users is selected to match the general population in terms of age, gender and other demographics.
- People can easily quit in the middle of a questionnaire. They are not as likely to complete a long questionnaire on the Web as they would be if talking with a good interviewer.
- Have no control over who replies if survey pops up on a web page.
- Depending on the software we used, there is often no control over people responding multiple times to bias the results.

The Internet for surveys can be used when the target population consists entirely or almost entirely of Internet users. Business-to-business research and employee attitude surveys can often meet this requirement. Surveys of the general population usually will not. Another reason to use a Web page survey is when the user want to

show video or both sound and graphics. A Web page survey may be the only practical way to have many people view and react to a video.

In any case, be sure the survey software prevents people from completing more than one questionnaire. The user may also want to restrict access by requiring a password (good software allows this option) or by putting the survey on a page that can only be accessed directly (i.e., there are no links to it from other pages)

2.2.6 Summary of Survey Methods

The choice of survey method will depend on several factors. These include:

Table 2.2.6: The factor that influence the choice of survey method

Speed	Email and Web page surveys are the fastest methods, followed by telephone interviewing. Mail surveys are the slowest.
Cost	Personal interviews are the most expensive followed by telephone and then mail. Email and Web page surveys are the least expensive for large samples.
Internet Usage	Web page and Email surveys offer significant advantages, but may not be able to generalize their results to the population as a whole.
Literacy Levels	Illiterate and less-educated people rarely respond to mail surveys.
Sensitive Questions	People are more likely to answer sensitive questions when interviewed directly by a computer in one form or another.
Video,	A need to get reactions to video, music or a picture limits the

Sound, Graphics	options. We can play a video on a Web page, in a computer-direct interview, or in person. We can play music when using these methods or over a telephone. We can show pictures in those first methods and in a mail survey.

2.3 Types of Survey Questions

The choice of question format should be based on knowledge of both respondent characteristics and goals of the study. Three formats are options:

2.3.1 Free-Response or Open-Ended Questions

Respondents answer questions in their own words. Sometimes, in written questionnaires, these are formatted as fill-in-the-blank questions. More often respondents write or speak an answer to a question or a response to a statement. Advantages of this type of question are (1) they are relatively easy to write, (2) they give the respondent freedom to answer in a variety of ways, and (3) they may elicit information or viewpoints not anticipated ahead of time by the researcher.

Major drawbacks are the difficulty these questions present in both recording and scoring.

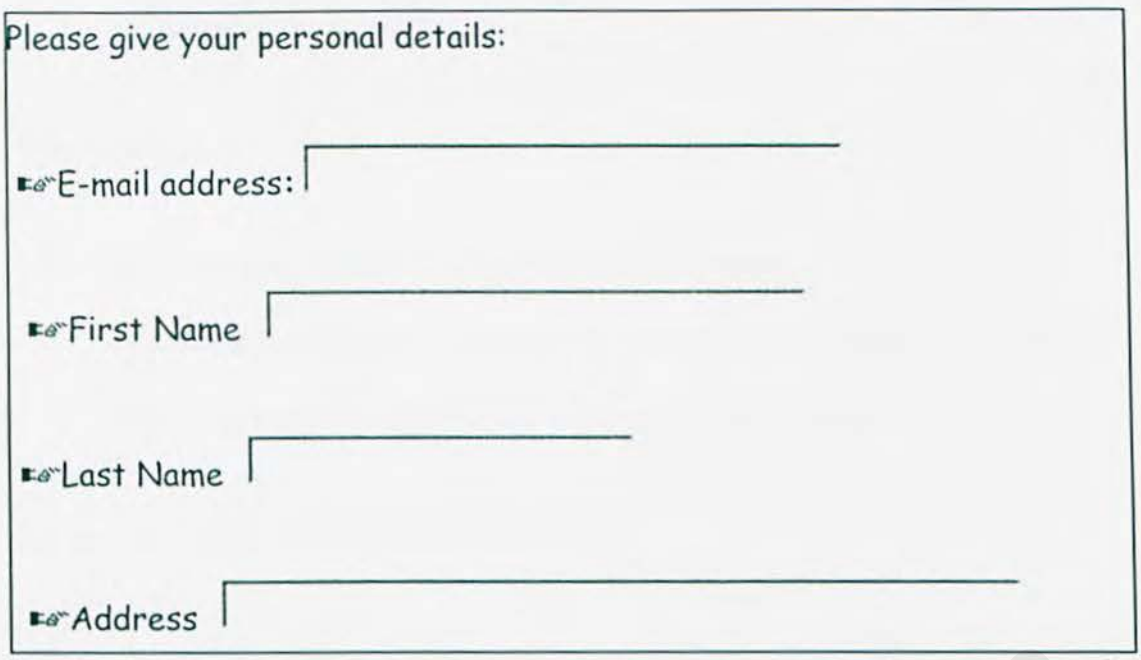

Figure 2.3.1(a) Open ended questions with single line (short answer)

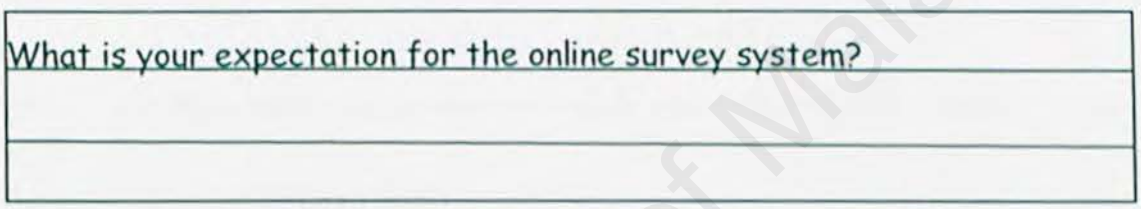

Figure 2.3.1(b) Open ended questions with multiple lines (long answer)

2.3.2 Fixed-Response or Closed-Response Questions

With this format, respondents are required to select among a set of alternative answers. The alternatives may take the form of specially written answers to the question or they may be "True" and "False". The respondent can choose one or more answer from the choices.

Advantages of this format are:

- Respondents can usually answer these questions more easily

- The answers are easier to score.

Disadvantages are

- They are more difficult for the researcher to prepare
- In drafting the alternative answers, the researcher may miss those possibilities which represent the respondent's viewpoint most accurately.

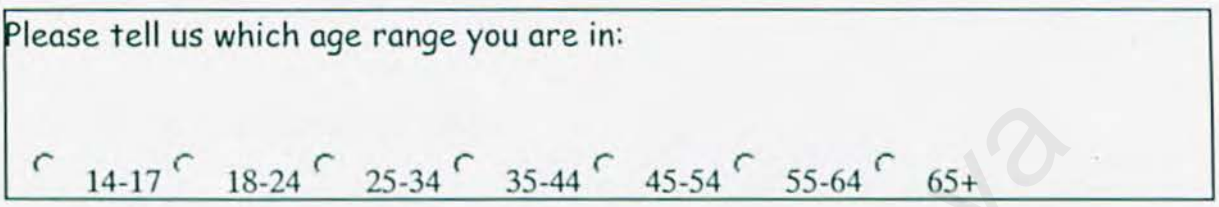

Figure 2.3.2(a) closed ended question with single choice

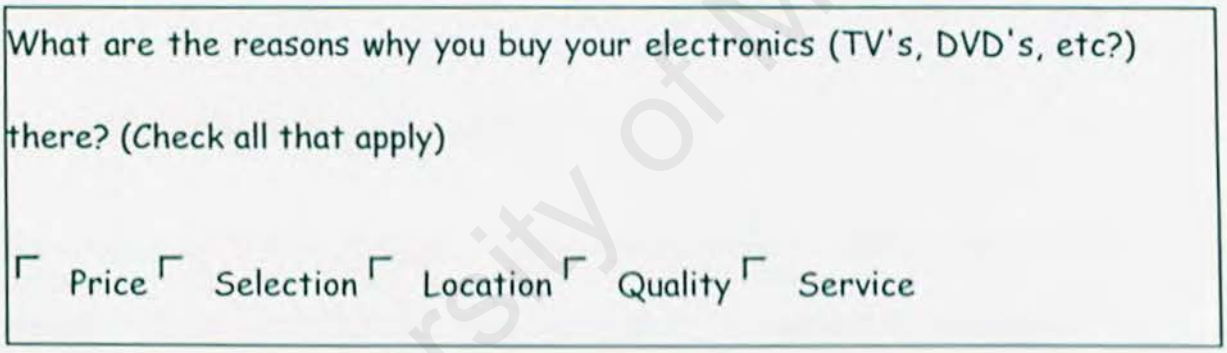

Figure 2.3.2(b) closed ended question with multiple choices

2.3.3 Rating Scales

In this format, respondents are asked to describe their attitudes, feelings or experience using a numerical scale provided by the researcher. They are asked to select a number which best expresses their reaction to statements. For example, respondents might be asked to rate the likelihood that they would vote in the next election on a five-point scale running from 1 ("Definitely will not vote") to 5 ("Definitely will vote").

2.4 Analyzing Survey Results

2.4.1 Preparing a Descriptive Summary of Findings

The most straightforward option for preparing analysis report is to prepare a description of the responses given by respondents. Reporting of every answer given by every respondent would be needlessly time-consuming and probably confusing, so usually a summary of responses is given instead.

2.4.1.1 Open-ended questions

For open-ended questions, the answers must first be coded. The researcher develops a set of response categories which adequately represents the answers given. Then the number of answers that fall into each category is determined

2.4.1.2 Closed-ended questions

The analysis of closed or multiple-choice questions is easier, since a limited set of response categories already has been developed. The researcher, in preparing a descriptive summary, only has to report the number or percentage of respondents which selected each answer. These results can also be presented in text or tabular form.

2.4.1.3 Rating Scales

The results of answers which involved giving a rating are a special case. In these situations, the researcher probably will want to present a single number which represents the overall trend in the answers to each question. The measures of central

tendency that you have used previously are options here: mean median or mode. For example, if a rating scale had been attached to the previous question on student satisfaction with advisement, then the researcher could determine the average (mean) rating given by adding all the ratings, then dividing by the number of individuals who gave an answer to that question.

2.4.1.4 Cross Tabulations

Cross tabulations are used when, in examining survey data, the researcher discovers systematic relationships between respondent characteristics or some other variable and the particular answers given. To communicate such relationships in a clear way, the researcher usually constructs a table which presents the responses for different categories of respondents.

2.5 Analysis Study

The questionnaires had distributed to 50 respondents to collect the information about the user requirements for the online survey system. The respondents consist of lecturer, researcher, programmer, tutor, students and the others. The following is the result for the survey.

I. **Methods used to conduct survey**

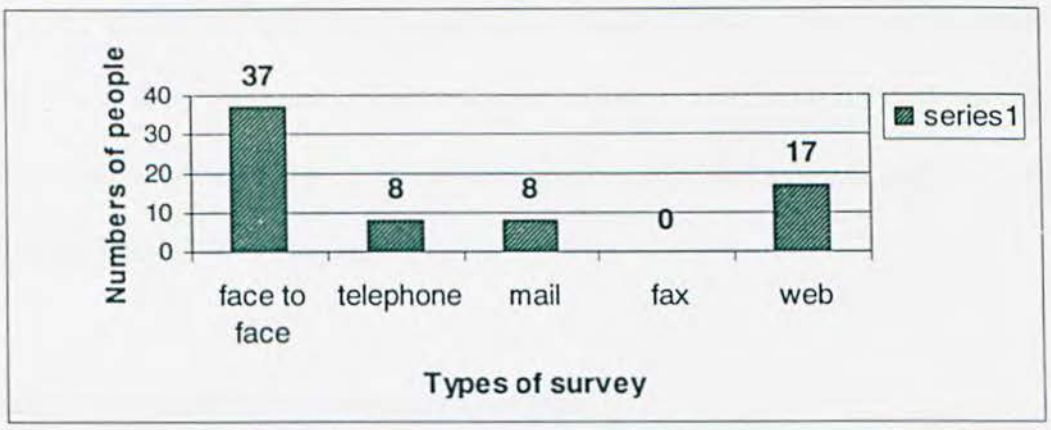

Figure 2.5(a): Graph bar shows the methods use to conduct a survey

From the graph 1, we can know that the most common method used for conducting a survey is face to face. 37 out of 50 respondents (74%) had come across with this method. They choose this method as they can get the respond directly from the respondents. But it is also the most time consuming process. Sometimes the researcher needs to speed most of their time in collecting the information when conducting a survey. It is follow by the web survey 34%. Both the mail survey and telephone survey is 16%. None of the respondent had come across the fax survey. Maybe this is because the fax survey is more expensive compare with other methods.

II. **Effectiveness of current Online Survey System**

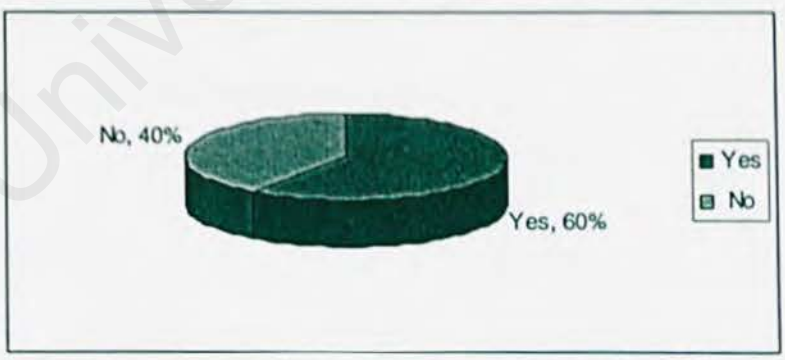

Figure 2.5(b): Histogram shows the effectiveness of current Online Survey System

60% of the respondents agreed with the statement that web survey is more effective compared with other traditional or manual methods of survey mentioned in question 1.But others have different opinions. Some of them think that the web survey is efficient but not effective as some of them people might just ignore it and don't want to involve themselves in the survey.

III. The priority of requirements for OSS

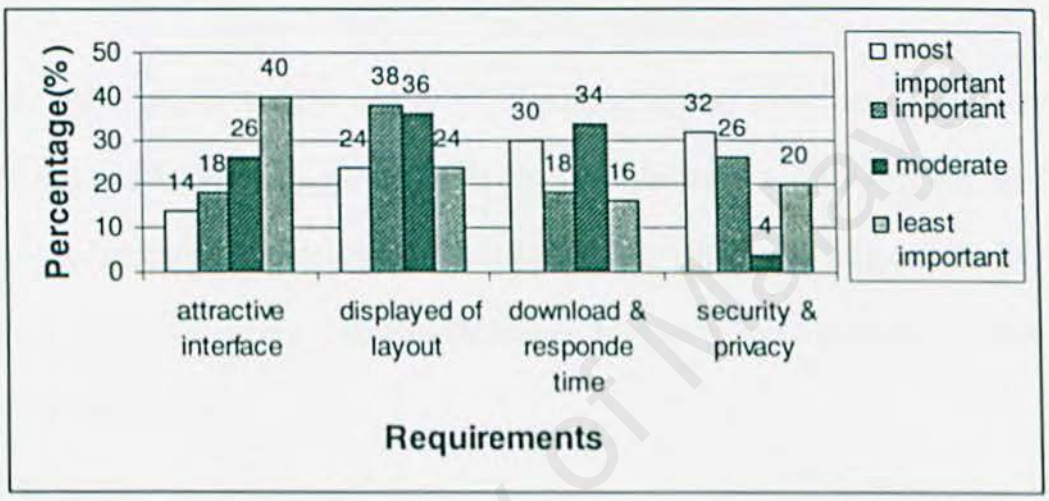

Figure 2.5(c): Graph shows the priority of requirements for OSS

From the graph, we can know that most people think that the most important factor for the online survey system is security and privacy (40%), followed by download time and respond time (26%), displayed and layout of question (18%) and the attractive interface is the least important factor.

IV. Hours access to internet

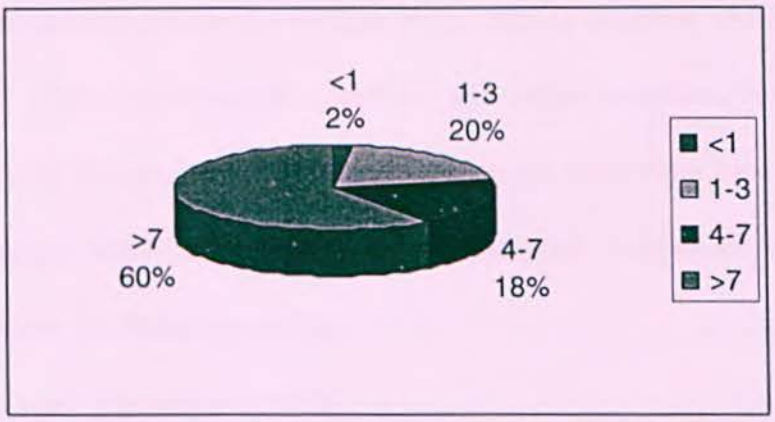

Figure 2.5(d): Pie chart shows the hours

From the pie chart, 60% of respondents (30 people) access more that 7 hours to internet in a week. We can know that internet has become common in our life. Besides that, all the respondents (50 of them) have their own email account. So it is possible to conduct a survey through web survey. Moreover it can save the expense for conducting a survey.

V. The preferred types of survey questions

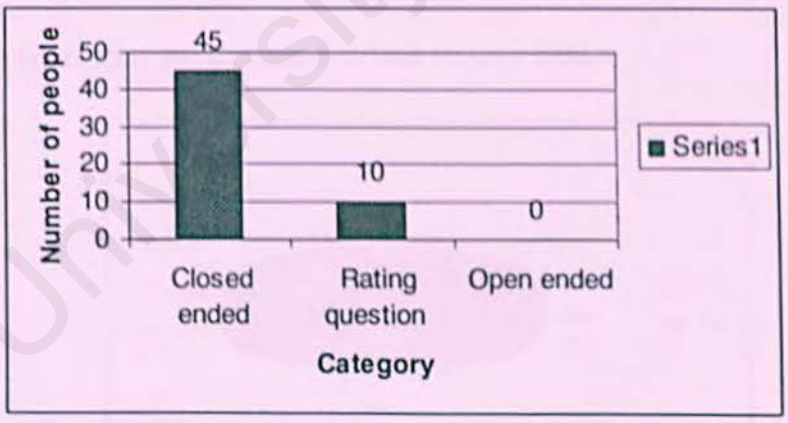

Figure 2.5(e): Graph shows the preferred types of survey questions by the respondents

The graph shows that most of the respondents preferred to answer closed ended

questions in a survey. It consists of single or multiple answers with multiple choices. 45 out of 50 respondents preferred this kind of question in a survey (90%).Some of the respondents chose closed-ended questions and rating question. None of the respondents choose the open ended question as it might take some time to answer this kind of question. Some of the respondents even skipped the open-ended question in the questionnaire distributed by author.

VI. Respondents who support OSS

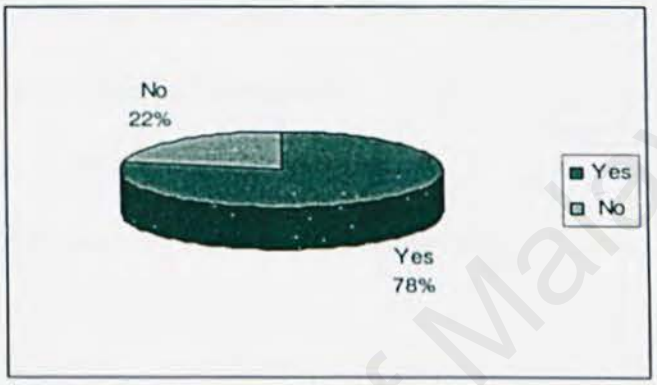

Figure 2.5(f): Pie chart shows the percentage of the respondents who support OSS

VII. Respondents that participated online survey before

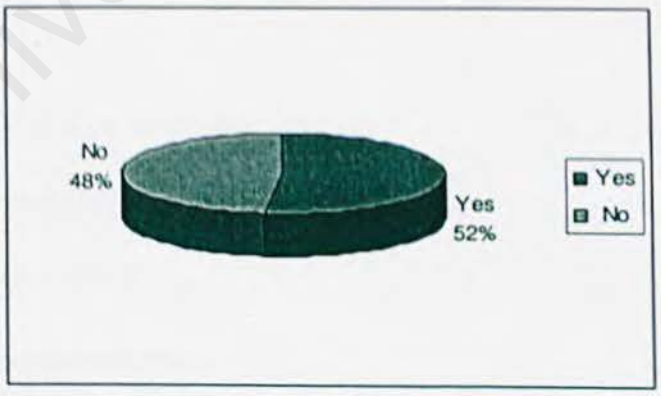

Figure 2.5(g): Pie chart shows the percentage of the respondents that participated in online survey before

Around 78% of the respondents (thus 39 of them) will take part or support the online survey system. From the graph, we also can know that about 52% of respondents (26 people) took part in the survey before.

VIII. Problems faced by respondents when conducting a survey:

- Encountered difficulties in calculating or analyzing the respond.
- The survey was not proper organized
- Reluctant to take part in the survey, refuse to let people know about them, unwilling to give out their personal details

IX. Expectation for the survey system from respondents

Researcher

- Fast respond time
- Find out the method how to make people involve in the survey
- able to reduce cost and time
- more intelligent to use and not need to many commands

Respondent

- focus on privacy and use attractive interface
- make the questions easy to understand and precise
- get effective information
- must have interactive interface
- user friendly interface so that the user no need to figure out how to use it
- help to protect privacy through encryption, remain anonymous if they are unwilling to let people know their names and details

- direct and relevant kind of questionnaires for online survey
- The interface should be user friendly-eg. answer the questions directly by just click the check box
- Short and straight forward
- Not so much images so that the loading of the page would be fast
- The form can be obtain and summit easily
- To unlimited user-can survey more that one person at the same time
- Can do the online survey whenever we like and quickly
- Easier to compound
- provide survey analysis tools
- The data must be truth and can be trusted
- Want to know the common choice for other user.

2.6 Study on existing system

2.6.1 Case Study 1 – Survey system

URL: (http://www.surveysystem.com)

Date accessed: 5-7-2003

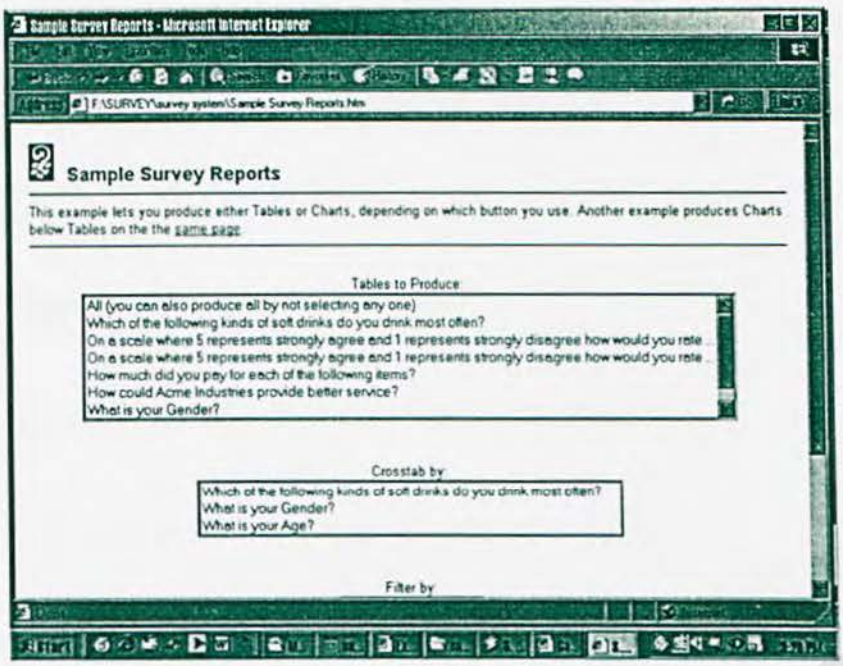

Figure 2.6.1 Sample survey report from Survey Manager

The Survey System is the most complete software package available for working with survey questionnaires. This software is simple enough for occasional users, yet powerful and flexible enough for research professionals. Unlike spreadsheets or general purpose statistics packages, The Survey System was designed specifically for surveys.

The following will display details of the features that emphasize by Survey System:

2.6.1.1 User friendly interface

The Survey System is easy to learn and use. It uses standard Windows pull-down menus and dialog boxes. There are no commands to memorize. The user can use a mouse or keyboard. One keystroke opens a context-sensitive Help window, which explains the options.

A Tutorial takes the user step-by-step through a sample survey. It includes a chapter that helps the novice researcher understand the principles of effective questionnaire design, administration and processing.

2.6.1.2 Reuse survey

The Survey System's philosophy is do the work only once, then reuse it.

- Enter question and answer choice labels only once.
- Use the same instructions to put questions on the screen for data entry and to produce questionnaire forms, tables, text reports and graphics.
- Re-use questions in study after study, without re-typing them.
- Create re-usable custom table and chart formats.

2.6.1.3 Professional Reports

The Survey System's tables are camera-ready for professional presentations. This site features sample tables, charts and other reports produced with this software.

We can produce many different kinds of tables. Most tables can have a "banner" format. A banner is an expansion of the cross-tabbing found in general statistics or database packages. Banners can show answers given by the entire sample and up to 60 sub-groups within the sample on the same page. We can also produce multi-page tables. The Verbatim Module produces attractive reports showing the text of responses to open-ended questions.

Many options allow the user to customize the reports and enhance their visual appeal:

- Use different fonts for different parts of reports.

- Frame tables with top and/or bottom lines on each page and gridlines.
- Incorporate a logo or graphic in your tables.
- Change the content and appearance of individual tables or apply changes globally.
- Use different formats to customize the content and appearance of tables.
- Produce professional quality two- and three-dimensional graphics.
- Show tables and charts on the same page or separately.
- Create basic tables showing the answers to a single question or summary tables showing a series of related questions.
- Rating scales or ranking questions can show Means (averages) or distributions of answers.
- Print questionnaire forms suitable for scanning.
- Edit reports on-screen before printing or export them to other software via the Clipboard or various file formats.

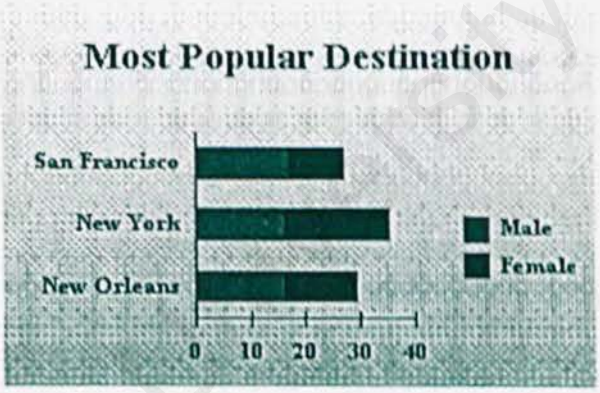

Figure 2.6.1.3 Example Graph Bar generate by Survey Manager

2.6.1.4 Optional Modules

The Survey System has a number of optional modules that enable you to put together a customized software package that exactly fits all of your survey needs. You can add modules to your existing software at any time, as the need arises.

- Internet Module - for Web page and E-mail surveys
- Sample Management Module - for telephone interviewing
- Voice Capture Module - to record respondents answers in their own voices
- Statistics Module - for additional statistics reports

2.6.1.5 The Voice Capture Module

- Records and plays back actual voices.
- Captures the feeling and intensity of responses.
- Creates dazzling presentations.
- Saves time during interviews.
- Playback-only software is available to offer to your clients.

2.6.1.6 The Statistics Module

- ANOVA - Analysis of Variance (One-way, Two-way, Repeated Measures).
- Correlation (Pearson and Partial).
- Multiple Regression (Standard and Stepwise).
- Descriptive Statistics.

2.6.2 Case Study 2-Survey Solutions

URL :(http://www.perseus.com)

Date accessed: 8-7-2003

The Survey Solutions consists of different kinds of web survey such as:

- **SurveySolutions XP Professional**

Advanced branching, multi-sided table questions and piping for Web and e-mail surveys.

- **SurveySolutions XP Enterprise**

  A comprehensive survey system with real-time web-based reporting and analysis featuring a unique combination of ease of use and power.

- **Perseus WebResearcher**

  It is a Web application for professional market researchers. Design, create, deploy, manage, and analyze research projects online without installing any software.

- **PRS and Enterprise Service**

It is a Professional web-survey research and consulting services. The functions are Panel management, questionnaire design, results analysis and report.

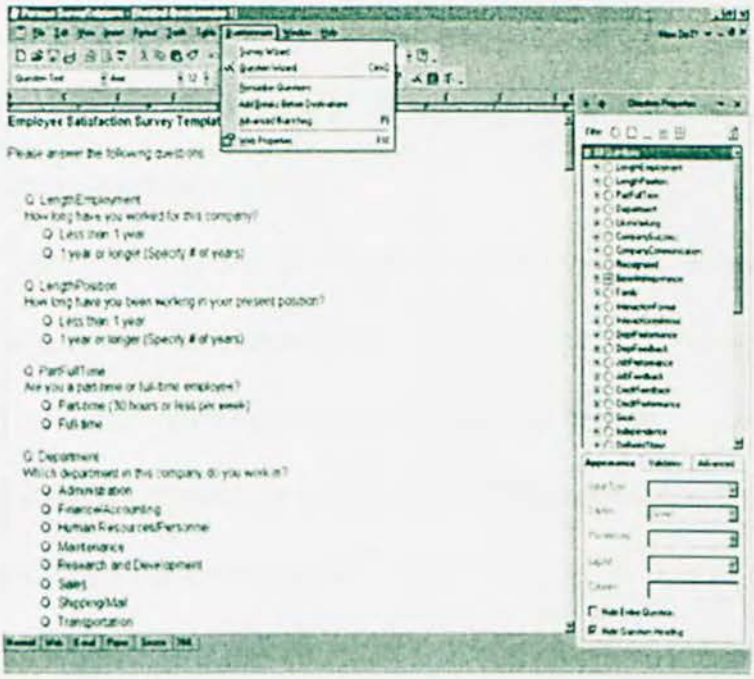

Figure 2.6.2: Interface for Survey Solutions

With new question types, an improved interface, and hundreds of other improvements Survey Solutions is more valuable than ever. New Features:

- **New Multi-Sided Table Questions**

  require less room, easier to fill out

  Reduce partial completes

  Increase response rates

- **Microsoft Office XP-Inspired Interface**

  Familiar environment

  More intuitive

  Easier to use

  Advanced functionality

Strengths:

1. Centralized storage of survey results within an SQL database provides:

- Security and control of survey results
- Centralized repository of all survey results enhancing their value throughout the company
- Ability to link survey results to other corporate information (when installed on your server)

2. Real-time accessibility to survey results from the desktop
    - Desktop accessibility provides users with robust functionality for data management and analysis
    - Ability to view and clean data as it is collected prevents misleading results due to response duplication, obvious response selection errors, and intentional erroneous responses
3. Word processing questionnaire design
    - A full-featured survey design environment based on a common word processing user interface, eliminating the need for training and greatly reducing support requirements
    - Built-in libraries, scales and questionnaire creation wizards help ensure questions are asked properly and appropriate scales are used
4. Cost-effective, Scalable and Flexible
    - SurveySolutions is scalable throughout the company with the addition of client licenses and server licenses available as needed
    - As surveys will undoubtedly propagate throughout the company, implementing a centralized solution will save costs and promote the sharing of knowledge

- SurveySolutions Enterprise is available as a software solution installed on your server using your SQL database or as an outsourced solution hosted by Perseus.
- Browser-based real-time results summaries can be made available to users who do not have access to the desktop software, with a web-based reporting system scheduled for release in the first quarter of 2001
- Surveys cost less and produce better results.

Weakness:

Require a large database to store all the information

Require to purchase the software in order to create a web survey.

2.6.3 Case Study 3 – Zoomerang

URL :(http://www.zoomerang.com) Date accessed: 9-7-2003

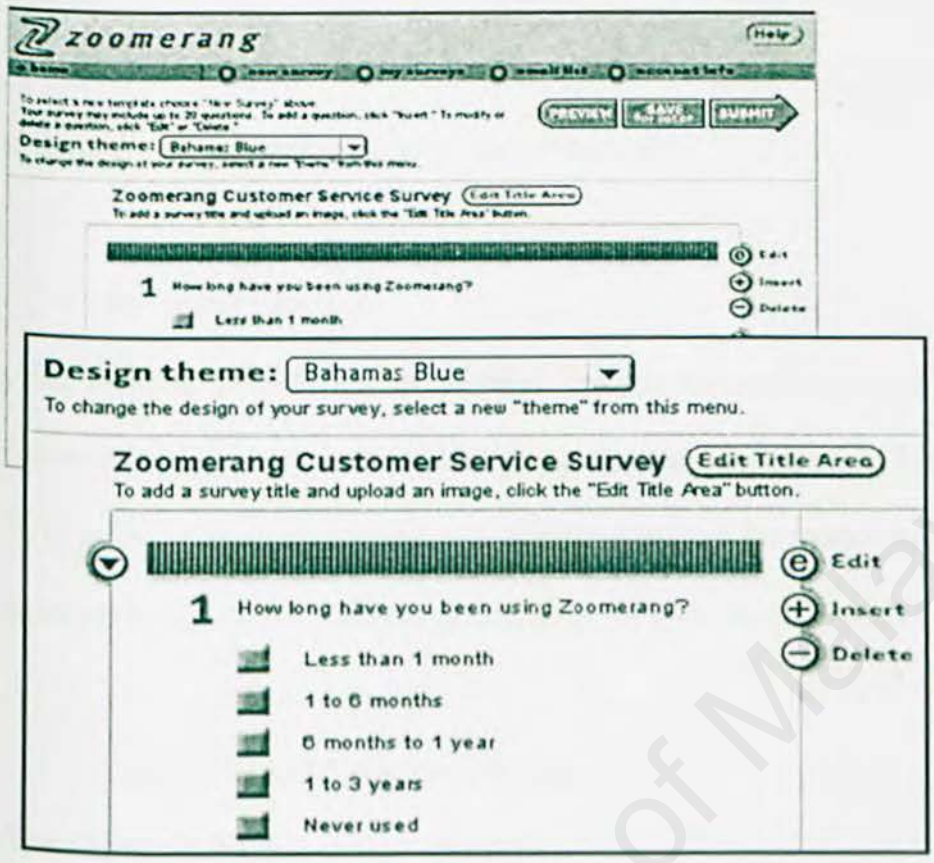

Figure 2.6.3: Interface for Zoomerang survey system

The following are the methods to create a survey by using Zoomerang:

2.6.3.1 Method 1-Create survey

- **Select a survey type**

Creating own survey may sound intimidating, but Zoomerang makes it simple. The user can choose from more than 100 survey ideas - each one contains sample questions in a ready-to-send template. If the user have particular needs or are just feeling creative, they can build their own survey from scratch.

2.6.3.2 Method 2-Customize

- **Select a title and design**

User should select a background design theme. Then write an appropriate title to the survey. Next the user is ready to create new questions or modify the sample questions - it's as easy as clicking the edit button.

- **Write the questions**

After selecting the edit button, the users need to choose from a list of 11 different question types, which vary depending on the response needed. They could select "Yes or No," "Multiple Choice" or a "Comments" box for written responses. It's best to experiment with the different questions to see what works best.

2.6.3.3 Method 3-Address survey

There are three ways to deploy a survey:

- Send to own email addresses
- Email to a sample supplied by Zoomerang
- Place a link on a Web site

With the first option, the user can just type their email list into the space provided. Or they may import email address names directly from their personal address book.

- **Create address book**

Zoomerang has created its own email address book to facilitate sending surveys. The user may enter complete address information into the Email List Manager. If they don't have respondents, they can purchase a list from Zoomerang. Zoomerang have

access to more than 10 million willing survey takers covering most demographic profiles.

- **Use Website**

In addition to emailing the survey, the user may post it on a Web site. This is an ideal way to expand the reach of their survey and invite new respondents. After completing the survey, just follow the clear instructions on the Launch pages.

2.6.3.4 Method 4-Survey intro

- **Email introduction**

When sending a survey, the goal for users is to have maximum participation. The Email Message gives them a chance to make a good first impression. In this initial invitation to take their survey, the users should capture respondents' attention and persuade them to click a link to the survey Web Greeting.

- **Welcome respondent**

Use the Web Greeting to introduce the survey. The Greeting should be no longer than 3-4 sentences that explain the purpose of the survey and offer any incentives for responding. The Start Survey button follows the Greeting and links directly to the survey.

2.6.3.5 Method 5- Control

The link to "Survey Management" allows the user to check on the status of the survey or invite new respondents. The users may also proceed to "View Results."

2.6.3.6 Method 6-View results

- **Analyze Responses**

Answers to survey questions are tabulated in real time and presented in clear graphic charts and tables. The users can begin checking survey responses hours (or even minutes) after deploying the survey.

- **Upload an image into the survey**

The user can place an image or company logo at the top of the survey, giving a brand top billing. The image also is displayed on the results page and Web greeting.

Strengths:

1. **Create**
   - Ask up to 100 questions—that's 70 more than the free version.
   - Capture more data points and valuable insights.
2. **Utilize multiple pages**
   - Display survey questions on multiple pages.
   - Present questions or data to respondents in a more controlled manner.
3. **Enable skipping and branching with logic**
   - Skip respondents to a different page based on a response to a particular question
   - Skip respondents unconditionally, regardless to answers to a question
4. **Receive results in a spreadsheet format**
   - Perform in-depth analysis and statistical testing. Create graphs
   - Place data into presentation software.
5. **Store survey results beyond 10 days**
   - Unlimited access to results.
   - Maintain clean, original set of data for future use

6. **Personalize survey by uploading images**

- Brand surveys with their logo.
- Test ad concepts

7. **Sharing results with others**

- Presented in a colorful graphic format
- Reduces communication barriers

8. **Utilize templates or create a survey from scratch**

- Use one of over 100 templates as a starting point for survey. Benefit from survey design research to send the most effective survey.
- Create a survey from scratch if users already have their survey designed

Weakness:

1. Do not support cell search feature in analysis report

2. Require a large database as there is no expiration data for the survey that have been created. Some of the data maybe not related.

Chapter 3: Methodology

3.1 Introduction

Methodologies may be defined as a collection of procedures, techniques, tools and documents aids. They help the developer to speed up and simplify the development process (Sellappan, 2000). Thus, it is important to choose a suitable methodology while developing the system

3.2 System Development Methodology

Methodology is defined as a set of methods that is used in a particular area of activity. Methodology in system development means "a methodical approach to project system planning, analysis, construction and evolution". Process model is an abstract representation of a software process. It is important to choose an appropriate process model before develop any system to ensure the success of the system.

3.2.1 Waterfall Model

Waterfall model is one of the oldest model, most of the new models are modified from this model. The waterfall model is shown in the following page.

According to this model, one process should be completed before the next begins, which means the developer should develop the system step by step by following the sequence. Thus, when all of the requirements are elicited from the customer, analyzed for completeness and consistency, and documented in a requirements document, then the development team can go on to the system design activities. This model enables the developer to view what is going on during their development phrase.

The waterfall model has been used to prescribe software development activities in various contexts. For instance, it was the basis for software development deliverables in U.S. Department of Defense contracts for many years, defined in Department of Defense Standard 2167-A. (Pfleeger, 2000)

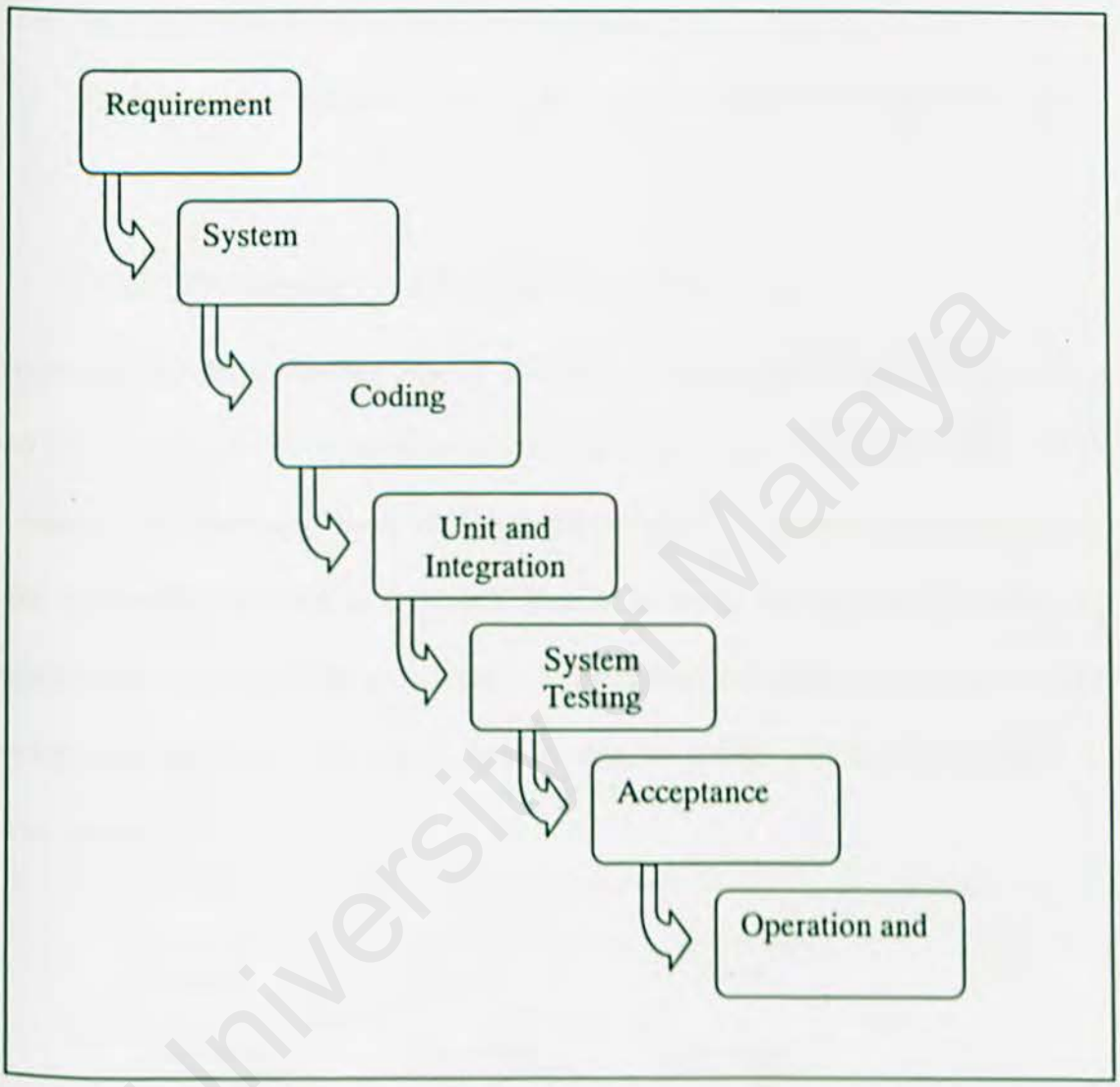

Figure 3.2.1: Waterfall Model

The advantages of using Waterfall Model:

- Simple, familiar to most developers, easy to understand
- This model can increase the confidence of a software developer during the whole developing process.
- Most of the latest models are built or modified according to this model.

- Easy to associate measures, milestones and deliverables with the different stages.

The disadvantages of Waterfall Model:

- Does not reflect how software is really developed
- Not applicable for many types of development.
- Does not reflect the back- and – forth , iterative nature of problem solving

3.2.2 Prototyping Model/ Evolutionary Model

Prototyping Model is another type of effective process model, which allows all or part of the system to be constructed quickly, to understand or to clarify issues. Thus it enables the developer, user, and customer to have a common understanding of what is needed and what is proposed. One or more of the loops for prototyping requirements, design, or the system may be eliminated, depending on the goals of the prototyping. However, the overall goal is also to reduce risk and uncertainty in development.

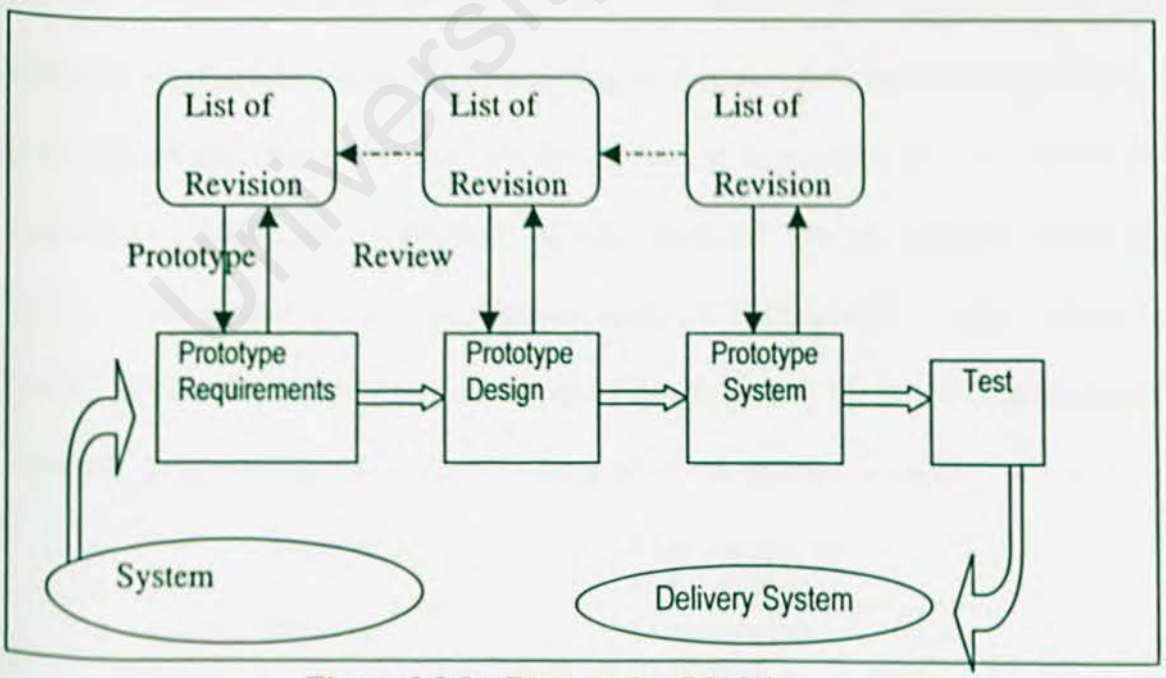

Figure 3.2.2: Prototyping Model

The advantages of Prototyping Model:

- Promotes understanding of problem before trying to implement solution
- Reduce risk and uncertainty in development
- Involves user in evaluating interface

The disadvantages of Prototyping Model:

- Prototyping can use up a lot of resources, especially if the prototype fails completely and must be scrapped
- The extra time spent in prototyping is not warranted for the simple and straightforward user interface.
- The developer may develop the system within unsuitable platform or programs.

3.2.3 Spiral Model

The Spiral Model was designed to include the best features from the Waterfall and Prototyping Models, and introduces a new component – risk-assessment. The term "spiral" is used to describe the process that is followed as the development of the system takes place. Similar to the Prototyping Model, an initial version of the system is developed, and then repetitively modified based on input received from customer evaluations. Unlike the Prototyping Model, however, the development of each version of the system is carefully designed using the steps involved in the Waterfall Model. With each iteration around the spiral (beginning at the center and working outward), progressively more complete versions of the system are built.

Objective setting	Risk assessment and reduction
Planning	Development and validation

Figure 3.2.3: Spiral model

Each loop in the spiral is split into four sectors:

i. Objective setting

Specific objectives for that phase of the object are defined. Constrain on the process and product are identified and a detailed management plan is draw up. Project risks are identified. Alternative strategies, depending on these risks, may be planned.

ii. Risk assessment and reduction

For each of the identified project risks, a detailed analysis is carried out. Steps are taken to reduce the risk, for example if there is a risk that the requirements are inappropriate, a prototype system maybe developed.

iii. Development and validation

After risk evaluation, a development model for the system is chosen.

iv. Planning

The project is reviewed and a decision made whether to continue with a further loop of the spiral .If it is decided to continue, plans are drawn up for the next phase of the project.

The advantages of Spiral Model:

- Explicit consideration of the risk.

3.2.4 Chosen Process Model

Waterfall model is a simple and easy to understand process model but it is still not the ideal development methodology for this system. The problem with the waterfall model is its inflexible partitioning of the project into distinct stages. It is difficult to respond to changing customer requirement. Besides that, the developer must follow

rigidly the sequence of the model. The system cannot be tested and reviewed by the users until the ending of life cycle that is after the coding and implementing. Sometimes there maybe some changes in user's requirements. This may lead to failure of the system and increase the cost in the phase of testing.

In order to overcome the problem, I need to adopt a new approach that enables me to do testing especially during the phase of coding and implementing.

Spiral model can be the solution towards the drawback of the waterfall model. In the spiral approach, a new feature can be added and tested after the program is developed. It makes use of the prototyping mechanism to avoid the delay of the system. In this project, I propose to use spiral model to overcome the drawback of waterfall model, which occurred in the coding and testing phase. Spiral model only will be used in this two phases only. Risks are also explicitly assessed in this model and resolved throughout the process.

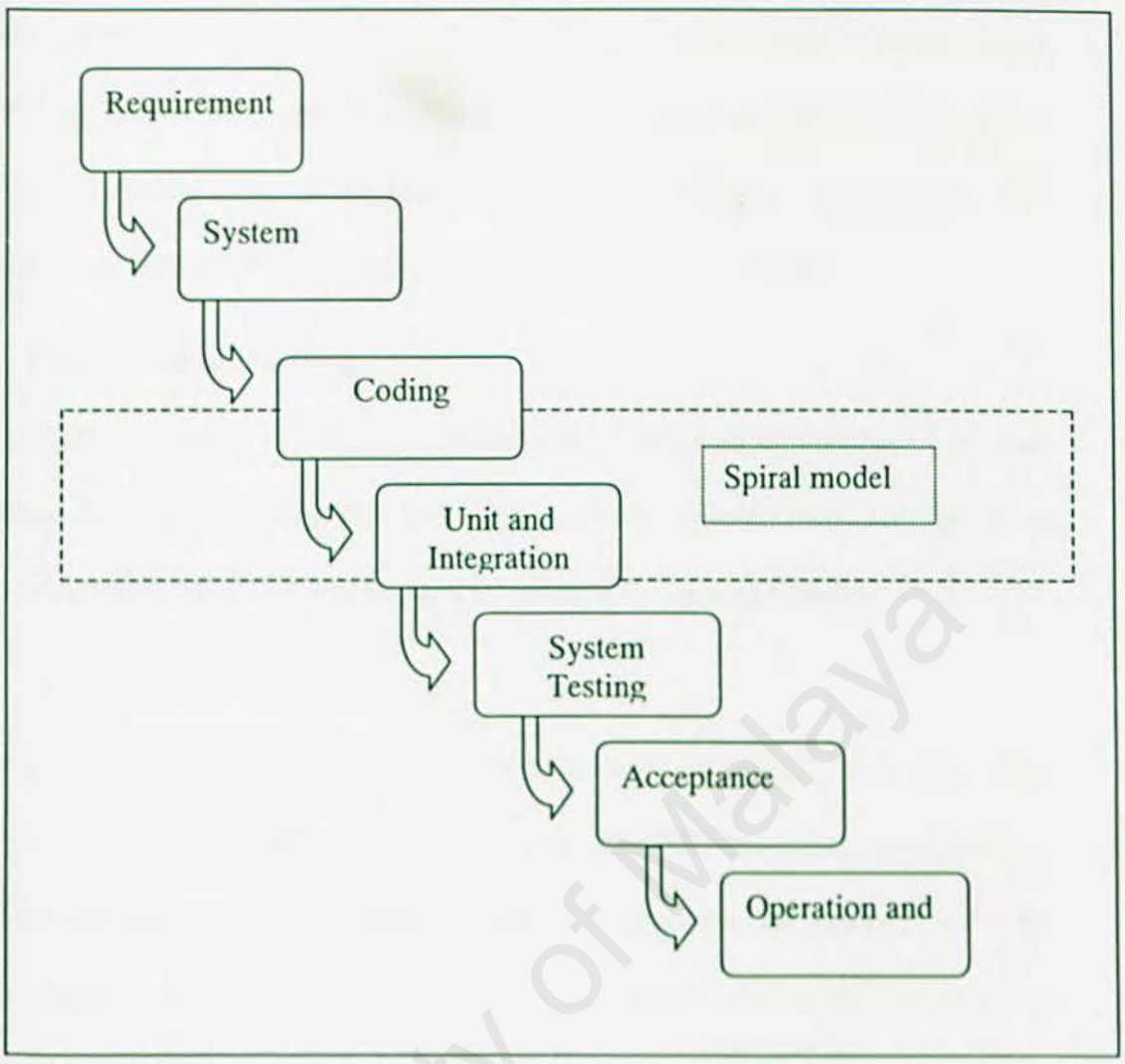

Figure 3.2.4: Hybrid development approach

The fundamental development activities are:

- **Requirements analysis and definition**

The features used and the characteristics of the Online Survey System, constrains and goals of the system are all established by consultation with system users and lecturer. During the stage, the developer and the user will meet together to discuss and define general purpose, objectives and scopes of project. Besides, system boundary and interface are defined. These are done in a manner which is understandable by all users and development staffs (also system developer).

- **System and program design**

Once the requirements are defined, system design can be created. System design involves functionality, database, input/output and interface designs. The system design is drafted on both the functional and non- functional requirements. The drafted modules are discussed in order to check for compatibility.

- **Coding and unit testing**

The Online Survey System is realized as a set of program unit at this stage. Unit testing involves verifying that each unit meets its specification. Additional or proposals from the users will be used to enhance the system features.

- **Integration and system testing**

Each module will be tested for result correctness and accuracy. After unit testing is carried out successfully, the modules program which have been developed are integrated and tested as a complete system to ensure that the system's software requirements have been met. After testing, the system will be implemented and used by its target users.

- **Operation and maintenance**

Usually this is the longest life cycle phase where the system is installed and put into practical use. Maintenance is carried out to correct any errors, enhancing the system's function and also improving the system units.

3.3 Justification of proposed methodology

There are some convincing points and strategies in applying the proposed methodology into development of online survey system:

- Theoretically, the following phase should not start until the previous phase has finished. In practice, these stages overlap and feed information to each

other. The proposed methodology suggests me the sequence of events that I expected to encounter with. During the program design stage, many problems would be encountered. So making the changes may involve repeating some or all previous process stages such as requirement analysis. Therefore it is more suitable to say system development process is net a simpler linear model but involves a sequence of repetition of the activities.

- Since the model is simple and it expect to help me to come out with the system requirements and be familiar with the activities in every stage. Besides that it is also easy to understand by those maybe not familiar with the online survey system.

3.4 Techniques used to Define Requirements

System analysis is the process of gathering and interpreting facts, diagnosing problems and using the information to recommend improvement of the system. Throughout the methodology phase, fact is obtained by a process called requirement determination also known as fact-finding. Fact finding are essential in order to have through understanding of the system to be developed. The fact- finding techniques used included library research, interview, internet surfing, observation and using questionnaire.

The purposes of information gathering are:

- Understand the functions of the current system
- Check the errors for the current system
- To identify the actual need of the user
- Looking for opportunities for improving the effectiveness of the current system.

i. Analyzing pass year thesis

Several pass year thesis documentation have been studied in order to identify any potential mistakes and to gain some skills on software development.

ii. Library Research

I went to library to search books related to survey to have a deeper understanding on online survey system. Reference books especially methodology and system design can be found from library. These books provide sufficient info to gain a better understanding about the concept of choosing the right methodology and system design.

iii. Internet surfing

The Internet is a platform where a lot of information can be acquired. Internet surfing is the major source due to its high speed and up to date information. Therefore, internet is the main source of information seeking. Relevant information on web application, client server and programming tools are been obtained.

iv. Review on existing System

It is an investigation activity on the data that have been produced by current system. This is to understand the information requirement for a particular user. Sometimes, it can make developer more understand a system by observing it in operation–seeing the system in action gives developer additional perspective and a better understanding of the system and its investigate the deficit system on data collection such as the lack of important information or the lack of the information that potential interest to system users.

After review of some existing online survey system, it is found that straightforward presentation of the questions, user friendly online system is needed to build to attract more people take part in the survey.

Investigation and analyst of the existing system available on the market is important. This is critical at the project planning to determine the scope of the planning of the proposed system. The purpose of conduct this research is to ensure that the proposed system will not carry and repeat the same weakness in the existing system.
Existing system also help a lot in giving ideas and guidance in the features of the system that is going to be develop.

v. Interview

An information-gathering interview is a directed conversation with a specific purpose that uses a question and answer format. Several informal interviews with experienced users and expected users have been carried out. It helps in the understanding of user requirements and users' expectation of the system. During the interviews, users' opinions towards the system and other similar existing system were gathered. This helps in developing a more user friendly and helpful system. To have a better understanding of the user requirements, I had interviewed a few lecturers in Faculty Computer Science and Information Technology and Faculty Business and Administration. Besides that, I had conducted some informal interview with a programmer to discuss about the languages that can be used to develop the system.

vi. Discussion

During the whole project development, discussion with the supervisor was vital. Several discussions have been carried out with the supervisor regarding system functionality, development approaches and user requirements. Discussions with colleagues and my friend who is a programmer were also very important in understanding the requirements and design of the system. Precious opinions and ideas were gained from them. Through discussions, views from different angles on the system and development techniques can be obtained. This helps to avoid the blind spots on certain issues due to lack of critical and multi-dimensional analysis.

3.5 Client / Server Architecture

3.5.1 Definition of client/server architecture

Definition: Any network-based software system that uses client software to request a specific service, and corresponding server software to provide the service from another computer on the network.

(http://www.its.bldrdoc.gov/fs-1037/dir-007/_0999.htm)

A client server is any hardware/software combination that generally adheres to a client-server architecture, regardless of the type of application. (http://www.its.bldrdoc.gov/fs-1037/dir-007/_0998.htm.

) The client/server model provides a convenient way to interconnect programs which are distributed efficiently across different locations. Typically, multiple client programs share the services of a common server program. Both client programs and server programs are often part of a larger program or application.

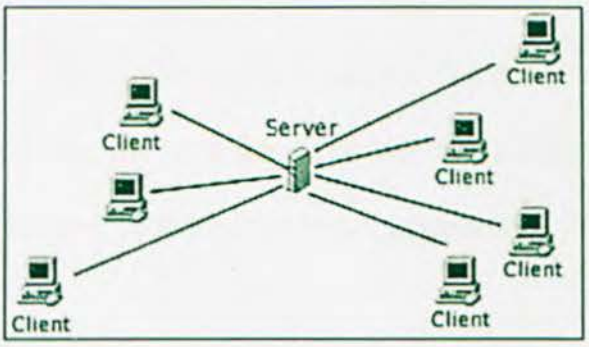

Figure 3.5.1(a): Client Server Architecture Design

To get the idea of client/server-based Distributed Computing on a meta-level, several views can be used. One of them is to see distribution as being based on *tiers*. Tiers are functional layers of entities participating in the distribution.

3.5.1.1 One Tier Architecture/ 1-Tier (Single Host)

The application is centralized in a single well-known environment. It is easy to manage, control, and secure applications of that kind. For example using Microsoft Access on your own unconnected desktop or a dumb-terminal based system could well be considered 1-Tier also.

There are also some disadvantages to this approach:

- **Scalability:**

One-tiered applications are set up for a single processor. Therefore upgrading to a larger machine is the only possibility if the actual machine cannot handle the load-up come any longer. The user has to face the fact that the chosen platform which can only handle data, user or transaction volume up to a certain amount. The costs of porting the system to a platform to meet the new requirements also need to be paid in many aspects.

- **Portability:**

One-tiered applications depend a lot on their hardware based operating environment includes operating systems, file structures, databases and languages. Porting the application means the same as re-writing the whole application.

- **Lack of Flexibility:**

It is very difficult to modify one of the three packed application components within a one-tier application because it always concerns also the other two components. Therefore it is not possible to simply alter e.g. the business component to possibly meet new requirements.

3.5.1.2 Two-Tier Architectures / 2 -Tier (Client Server)

The typical client/server architecture is best described as two-tier, simply because it only consists of two parts working together. In other words: The client directly talks to the server. A web browser talking to a web server is an example of a client talking to a server. There is presentation logic (presentation tier) happening at the client, and data or file access (data access tier) and logic happening at the server.

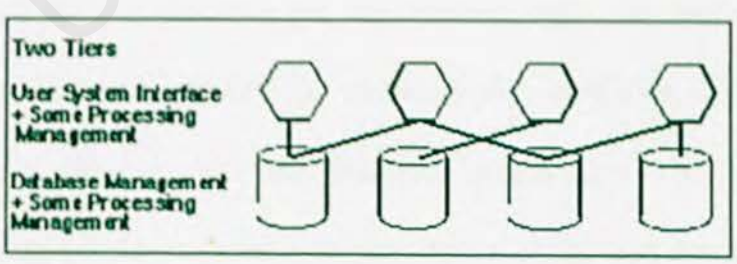

Figure 3.5.1.2(b): Two-Tier Client Server Architecture Design

At one extreme, the workstation is used only to perform the display portion of the presentation component, and the server performs most of the presentation logic and

all of the business and data access logic. This leads to a fat server and can be found e.g. in typical web-applications where the browser has to cope with HTML. At the other extreme, most of the application resides on the workstation, and the server only performs the actual data access services. This leads to a fat client. In net-technologies this is being realized by the use of Java-applets.

The GUI development tools allow faster development and deployment of applications. The hardware-independent database systems allow easy portability between systems, effectively breaking the hold of hardware lock-in.

The two-tier architecture is intended to improve usability by supporting a forms-based, user-friendly interface. It also improves scalability by accommodating up to 100 users (file server architectures only accommodate a dozen users), and flexibility by allowing data to be shared, usually within a homogeneous environment. Finally this type of distributed architecture requires minimal operator intervention, and is frequently used in non-complex, non-time critical information processing systems.

3.5.1.3 Three-Tier Architectures

- Three-tier architecture separates application components into three logical tiers: the user interface tier, the business logic tier, and the database access tier. The user interface tier communicates only with the business logic tier, never directly with the database access tier. The business logic tier communicates both with the user interface tier and the database access tier. For this model:
- The user interface tier is a client only, in that it only makes requests to the business logic tier.

- The database access tier is a server only, in that it only responds to requests from the business logic tier.
- The business logic tier acts as both a client and a server: a server relative to the user interface tier, because it process its request, and a client to the database access tier, because it sends a request to it.
- Communication between each logical tier can be tightly controlled.

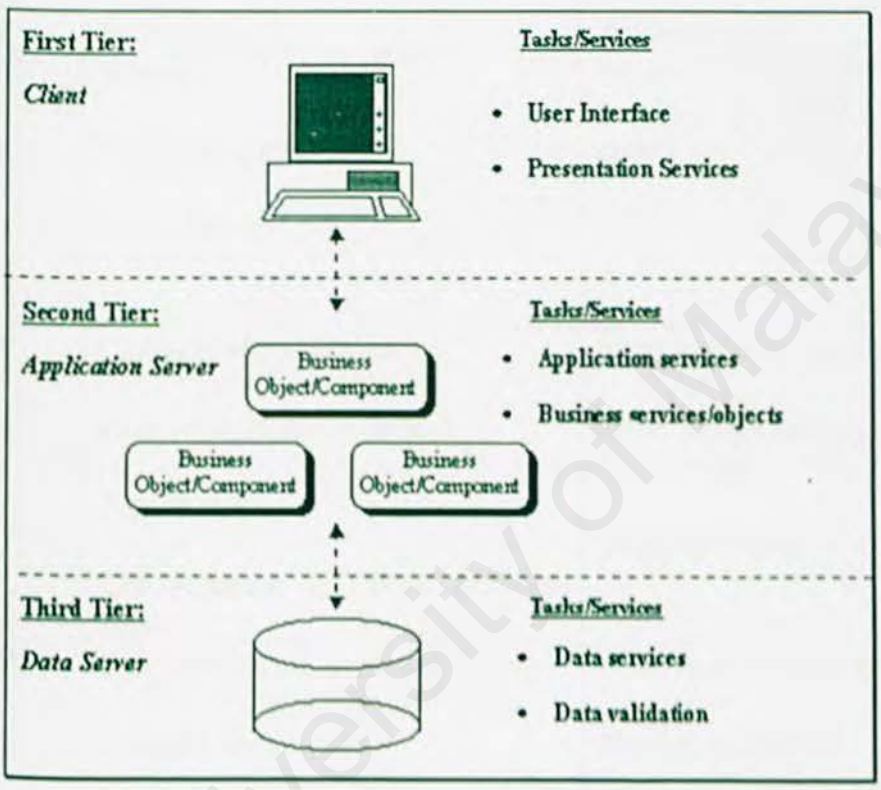

Figure 3.5.1.3(c): Three-Tier Client Server Architecture Design

The third tier (middle tier server) is between the user interface (client) and the data management (server) components. This middle tier provides process management where business logic and rules are executed and can accommodate hundreds of users by providing functions such as queuing, application execution, and database staging. The three tier architecture is used when an effective distributed client/server design is needed that provides (when compared to the two tier) increased performance, flexibility, maintainability, re usability, and scalability, while hiding the complexity

of distributed processing from the user. This architecture has some unique advantages - for example, deployment is made easier because the client is simple and logic is centralized.

Table 3.5.1.3: Comparison of client/ server architecture

Type	Advantage	Disadvantage
1-tier	Simple Very high performance Self contained	No networking-can't assess remote services potential for spaghetti code
2-tier	Clean, modular design Less network traffic secure Algorithms Can separate UI from business logic	Must design or implement protocol Must design or implement reliable data storage Small user base
3-tier	Can separate UI, logic and storage Reliable, replicable, Concurrent data access via transactions Efficient data access	Need to buy database product Need to hire DBA Need to learn new language (SQL) Object-relational mapping is difficult

3.6 Operating System

Operating system (OS) is a platform which can performs tasks, such as receiving input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers. Besides that, the OS makes sure that different programs and users running at

the same time do not interfere with each other. For security, OS ensures that unauthorized users do not access the system. OS provides a software platform to allow application programs run on it.

3.6.1 Windows

Windows puts a graphical working environment on a PC's screen; therefore computer can operate with visual control rather than typed command. Windows gives icons, menus, and button that can click with the mouse to do things such as organize new folders and files, run programs, control printer and online with the modem, browse the Internet.

Basically Windows does two things:

- Let users manage the computer (hardware and software in computer)
- Managing the computer means tasks like installing a new printer or setting up an Internet connection. It also includes activities deleting old files, backing up the collection of documents to diskettes for safe-keeping, or moving all the files for a project into their own folder.
- Running programs

Running programs means that word processor; Web browser or even game can run in Windows. In addition, Windows can open a second program in a separate window and then switch back and forth between programs, so we can do chores like checking the email in an email program while leaving the word processor open in its own windows.

Windows also provides a set of basic features that all programs can use. For example, when you install printer in a Windows, every program can print to it. Besides, Windows provides a mechanism that let the information can transfer from one

program to another without having to go through elaborate importing and exporting procedures. This gives users the ability to quickly and easily move things like passages of text form one program to another.

Windows offer several key advantages over the way PCs used to work with DOS. Before Windows, every program had its own unique screens and commands to learn and remember. Now Windows programs, even those from different companies, look alike and work similarly.

3.6.2 UNIX

UNIX was created in the late 1960s. It was first describe in a 1974 paper in the Communications of the ACM by Ken Thompson and Dennis Ritchie.

UNIX is designed to provide a multi-user, multitasking system for use by programmers. The philosophy behind the design of UNIX was to provide simple and powerful utilities that could be pieced together in a flexible manner to perform a wide variety of tasks. Several reasons have been suggested for the popularity and success of the UNIX system:

- The system is written in a high level language, making it easy to read, understand, change and move to other machines.
- Provides primitives that permit complex program to be built from simpler program.
- Uses a hierarchical file system that allows easy maintenance and efficient implementation.
- Uses a consistent format for files, the byte stream, making application programs easier to write.
- Provides a simple, consistent interface to peripheral devices.

- It is a multi-user, multiprocessors system; each user can execute several processes simultaneously.
- It hides the machine architecture from the user, making it easier to write programs that run on different hardware implementation.

Although the operating system and many of the command programs are written in C, UNIX system supports other languages, including Basic, Pascal, Ada and Prolog. However, UNIX is more difficult to learn and isn't as widely supported as Microsoft Windows 2000.

3.6.3 Linux

Linux was initially created as a hobby by a young student, Linus Torvalds, of University of Helsinki in Finland. Linux is a stable and high-performance operating system for Internet usage. Linux may be used for a wide variety of purposes including networking, software development, and as an end-user platform. Linux is often considered an excellent, low-cost alternative to other more expensive operating systems.

Linux is a remarkably complete operating system and includes a graphical user interface, X Windows system, TCP/IP, and other components usually found in comprehensive UNIX system. Because Linux confirms to the POSIX standard user and programming interfaces, developers can write program that can be ported to other operating system, including IBM's OS/390 running UNIX.

Linux has made progress, primarily in functionality important to Internet infrastructure and Web server capabilities, including a greater selection of drivers, easier installation, GUI-based front ends for Web administration and window

management. Linux was designed to provide personal computer user a free or very low operating system. The other advantages of Linux are its open source, free, secure, virus free, stable, powerful, fast and more flexible than other operating system. However, Linux can be difficult to learn, set up, install and some software may not be available yet.

3.7 Programming language

3.7.1 PHP

Hypertext preprocessor is the exact expansion of PHP. PHP is a web scripting language. PHP is a server side scripting language, which has the capability of executing the script on the server, and serving the output as a HTML File, The main advantage is to interact with the databases and perform all types of server manipulations directly. Server side scripting language is responsible for manipulating the data which is filled in the entire web forms, any where in the net.

PHP is very much compatible with MYSQL and POSTGRESQL Databases. PHP also can be programmed to interact with any database right from a simple text file to DB2. There are a lot of advantages of PHP compared with other scripting languages:

- **Speed**

PHP is considered to be the fastest programming languages especially for the speed when connecting the database and also while using over other important applications. Because of its high performance of speed, PHP is being used for some of the important administrations like the server administration over the web, mail functionalities.

- **Open Source**

PHP is open source where the user is given a free license to remodel or recode PHP, according to their needs. Source code is shipped with PHP.

- **Multi Platform.**

PHP supports various platforms, which mean PHP can be installed on almost every operating system like the Windows, Linux, etc.

- **Easy Syntax**

PHP syntax is quite easy to code, all the syntax are similar to the C language syntax.

Disadvantage:

- **Redirection**

In some of the scripting languages there is a single task to write a piece of code from the client side or the server side - a single function will do so. But in the case of PHP it is done indirectly. Some of the aspects and functionalities in PHP are not being able to complete using the direct functionality.

- **Error Handling**

PHP has very poor handling errors qualities. Even this disadvantage can be overcome by using a feasible advantage solution.

3.7.2 ASP.NET

ASP.NET a next generation of ASP (Active Server Pages) introduced by Microsoft. Similar to previous server-side scripting technologies, ASP.NET allows the user to build powerful, reliable, and scalable distributed applications. ASP.NET is based on

the Microsoft .NET framework and uses the .NET features and tools to develop Web applications and Web services.

Asp.NET provides many features and tools which can develop more reliable and scalable, Web applications and Web services in less time and resources. Since ASP.NET is a compiled. NET-based environment; we can use any .NET supported languages, including VB.NET, C#, JScript.NET, and VBScript.NET to develop ASP.NET applications.

Advantages of ASP.NET

- **. NET Compatible**

. NET compatibility feature of ASP.NET provides applications to use the features provides by .NET. Some of these features are multi-language support, compiled code, automatic memory management, and .NET base class library.

Web applications can be written by using any .NET supported language, including C#, VB.NET, JScript.NET and VBScript.NET. All ASP.NET code is compiled, rather than interpreted, which allows early binding, strong typing, and just-in-time (JIT) compilation to native code, automatic memory management, and caching.

The .NET base class library (BCL) can be accessed from any. NET-supported language.

- **Web Forms and Rapid Development**

Web Forms in VS.NET provides web pages and server side controls, which allows the user to build rapid Web GUI applications. VS.NET provides Windows application similar drag and drop features, which allows the user to drag server side

controls on a page and set control properties and write event handlers by using wizard property page.

- **Native XML Support and XML Web Services**

XML is a vital part of entire .NET framework. . NET uses XML to store and transfer data among applications. The .NET base class library provides high-level programming model classes, which can be used to work with XML.

An XML Web service provides the means to access server functionality remotely. Web services use SOAP (Simple Object Access Protocol) to provide access to clients. Web services can be used to build different layers of distributed applications and different layers can be used remotely.

- **Databases and ADO.NET**

ADO.NET is a new version of ADO (ActiveX Data Objects). ADO.NET allows access different kinds of databases using only one programming model. The user must be familiar with DAO, ADO, ODBC, RDO and other database access technologies previous to ADO.NET. ADO.NET combines features of all of these technologies and provides a single higher level-programming model and hides all details. It makes job much simpler and provides a way to write rapid development

- **Graphics and GDI+**

GDI+ is an improved version of GDI (Graphics Device Interface) to write Windows and Web graphics applications. The .NET base class library provides GDI classes to write graphics applications. The user can write Windows applications and Web graphics applications using the classes.

- **Caching and State Management**

One of the most important factors in building high-performance, scalable Web applications is the ability to store items, whether data objects, pages, or parts of a page, in memory the initial time they are requested. You can store these objects on the server or on the client machine. Storing data on a server or a client is called caching.

- **Enhanced Security**

ASP.NET provides the user to authenticate and authorize users for the applications. The user can easily remove, add to, or replace these schemes, depending upon the needs of the application.

- **Messaging and Directory Services**

ASP.NET uses the Messaging services class library, which is a high-level programming wrapper for MSMQ messaging services.

The .NET base class library also contains class wrappers for Active Directory that enables you to access Active Directory Services Interface (ADSI), Leight weight Directory Access Protocol (LDAP), and other directory services through ASP.NET applications.

3.7.3 C# (C-Sharp)

C# is a new language for Windows applications, intended as an alternative to the main previous languages, C++ and VB. Its purpose is two fold:

i. It gives access to many of the facilities previously available only in C++, while retaining some of the simplicity to learn of VB.

ii. It has been designed specifically with the .NET framework in mind, and hence is very well structured for writing code that will be compiled for .NET.

C# has three different perspectives.

i. As a .NET programming language, that lets users conveniently and easily uses the new .NET framework. This means that in many cases the syntax and features of the language have been designed to make it is particularly easy for the users to take advantage of the features offered by .NET

ii. As an object-oriented programming language that lets users program in a natural object-oriented way. It fully supports inheritance, but the .NET framework also insures that enough information is included in the compiled library files (the assemblies) that the classes can be inherited from and used by other. NET-aware code without requiring access to the source files.

iii. As an intermediate level programming language that combines the best features of the existing pre-.NET languages of VB and C++.

3.8 Web Server

A web server is a program that runs on a host computer that serves up web sites. In other words, the web server program sits around awaiting requests from visitors' web browsers for objects it has in its possession, and then sends these objects back for the visitor's viewing pleasure.

3.8.1 Apache

Apache is fast, reliable and inexpensive. The keys to Apache's attractiveness and popularity lie instead in the qualities listed above and its extensibility, its freely distributed source code, and active user support for the server.

Among the most notable features are its cross-platform support, protocol support (HTTP/1.1), modularity (API), security, logging, and overall performance and robustness. Apache distributes a core set of modules that handle everything from user authentication and cookies to typo correction in URLs.

There are some features about Apache:

- **Feature-Rich** -The Apache server sports a host of features, including: XML support, server-side includes, powerful URL-rewriting, and virtual hosting, to name but a few.
- **Modular** - We can find a module that can add the functionality that we need.
- **Extensible** - Apache is open source, we can write one on our own. In fact, we can even make changes to the inner workings of Apache. All the information we need is right there in the source code and numerous online resources.
- **Free** - This is one instance that no need to pay.

3.8.2 Internet Information Server (IIS) v5.0

IIS is the best Web server available for Windows NT. This version, which comes exclusively as part of the Windows 2000 Server operating system, contains many new features along with performance and reliability enhancements.

IIS v5.0 is good as both a first-time Web server for those familiar and comfortable with Windows operating systems, and a high-end server for hosting providers and large corporate installations. It handles the basics well and is better integrated in Windows than previous versions. IIS v5.0 also comes with performance and feature enhancements that will be attractive for mission-critical tasks

The ideal computer to run IIS on is at least a 200 MHz Pentium with 128 MB of RAM. Organizations should plan on doubling the RAM and CPU speed if they intend to run Advanced Server's clustering, SQL or Transaction services on the same machine as the Web server.

3.9 Database server

A database is a structured collection of data. To add, access, and process data stored in a computer database, a database server is needed.

3.9.1 Oracle

Oracle is referred to as a relational database management system (RDBMS). Most references to a "database" refer not only to the physical data but also to the combination of physical, memory, and process objects. (Oracle DBA handbook)

Oracle is a multi-user database. It provides unprecedented ease-of-user and is pre-tuned and pre-configured for today's dynamic workgroup and line-of-bus environment. An Oracle database stores its data in files. Internally, there are database structures that provide a logical mapping of data to files, allowing different types of data to be store separately. Oracle includes a fully integrated set of easy-to-use management tools, full distribution, replication and web features. Oracle also provides the highest levels of availability through fast failover, easier management,

and zero data loss disaster protection, with Data Guard, the only complete data protection solution available on the market.

Oracle can runs on UNIX, Linux and Windows platform. However, it is expensive and separate licenses are required for each of its database engine.

3.9.2 MySQL

The MySQL database server is the world's most popular open source database. Its architecture makes it extremely fast and easy to customize. Extensive reuse of code within the software and a minimalistic approach to producing functionally-rich features has resulted in a database management system unmatched in speed, compactness, stability and ease of deployment. The unique separation of the core server from the storage engine makes it possible to run with strict transaction control or with ultra-fast transactionless disk access, whichever is most appropriate for the situation.

MySQL is free licensing. The MySQL Database Software is a client/server system that consists of a multi-threaded SQL server that supports different backend, several different client programs and libraries, administrative tools, and a wide range of programming interfaces (APIs).

MySQL is a small, compact, easy to use database server, ideal for small and medium sized applications. It is client/server implementation that consists of a server and many different client programs.

Features in MySQL:

- **ANSI SQL syntax support**

The MySQL database server supports a broad subset of the ANSI SQL 99 syntax, along with extra extensions such as the REPLACE statement and the LIMIT clause for SELECT and DELETE. Alternative syntaxes from other database systems are also supported, to make porting applications easier.

- **Cross-platform support**

It is available on a variety of UNIX platforms, Linux, Windows NT, Windows 95/98 and Windows 2000. We can connect to a MySQL database server from all of the major platforms, using nearly any programming language, with the standard threadsafe client library.

- **Independent storage engines**

MySQL database server's unique independent storage engines let user to choose the type of database storage that is most appropriate for your particular needs.

- **Flexible security system, including SSL support**

The MySQL database server has an advanced permissions and security system, including support for SSL transport-layer encryption. As of version 4.0, the security system also allows user to limit server resources on a per-user basis.

- **Query caching**

Version 4.0 of the server includes a new query cache, which can significantly increase the performance of commonly-issued queries, without requiring any special programming. Performance can be increased by over 200% in typical usage.

- **Full-text indexing and searching**

Full-text indexes allow user to search fields containing arbitrary text for specific words and phrases, including relevance rankings. With version 4.0, fulltext search is available to include exact phrase matching and Boolean search operators, which allows for even more fine-grained control over the search results.

- **Embedded database library**

Using the embedded database library (libmysqld), user can include the full power of the MySQL database server into applications and electronics devices, without end-user having any awareness of the underlying database. The embedded MySQL database is ideal for use behind the scenes in Internet appliances, public kiosks, turn-key hardware/software combination units, high performance Internet servers, self-contained databases distributed on CD-ROM.

3.9.3 Microsoft SQL Server 7.0

SQL Server 7.0 provides a set of tools to create data warehouses. Data warehousing can be viewed in the context of a framework of components and capabilities that are all needed to implement a system. The software components contribute to the process of building, using, and managing the data warehouse system.

Microsoft is developing a framework to make the deployment of data warehouse systems less complex and more efficient. From a software foundation perspective, these systems will

- Build or populate data warehouse databases on SQL Server
- Provide efficient access to many kinds of data via OLE DB APIs
- Share metadata among the system components
- Manage the system with tools such as the Microsoft Management Console (MMC)

Important areas of leadership and innovation in Microsoft SQL Server 7.0 include:

- First database to scale from the laptop to the enterprise using the same code base, offering 100 percent code compatibility.
- First database to support auto-configuration and self-tuning.
- First database with an integrated online analytical processing (OLAP) server.
- First database with integrated Data Transformation Services.
- The Data Warehousing Framework is the first comprehensive approach to solving the metadata problem.
- First database to provide multi server management for large numbers of servers.
- Wide array of replication options of any database.
- Tight integration with Windows NT Server, Microsoft® Office and the Microsoft® BackOffice® family.
- Universal Data Access, Microsoft's strategy for enabling high-performance access to a variety of information sources.

Summary

In this chapter, some model of system development is review. After comparing the advantages and disadvantages of some models, hybrid development approach is chosen to use in this project due to this project just a small-scale project. Thus, hybrid development approach is easier and suitable applied in this project. Before starting developing a system, some information needs to be collected. Therefore which used here are research/review, Internet surfing, interview, discussion, analyzing on pass year thesis and review on existing system.. With these techniques information is collected smoothly

Chapter 4: System Analysis

4.1 Introduction

System analysis is the most critical part in the system development life cycle. Its process includes defining problems, gathering information, developing alternative solutions and choosing the best solution to develop a system. A system is a collection of objects and activities plus a description of the relationship that ties the objects and activities together. (Pfleeger, 2001).

4.2 Requirement Analysis

A requirement definition is a statement, in natural language and diagrams, of what services the system is expected to provide and the constraints under which it has to operate. It is generated using customer-supplied information.

System requirement should point out what the system should do rather than how the system builds. After the analysis of the current system, system requirement of the e-Stationery Reporting System are defined. Basically the requirement can be divided into 2 main categories:

- Functional requirement
- Non-functional requirement

4.3 Functional Requirement

Functional requirement describes a system service or function and the interaction

between the system and its environment. (Pfleeger, 2000) In addition, functional requirement describes how the system should behave under certain given stimuli.

The functional requirements for the system are divided into a several modules:

4.3.1 User section:

- Registration module

The module implements a password protected web site for authorize access for valid user. The user must register before they start to use the system. The system will validate user's password before they log in to the system.

- Question designing module

The module allows the user to do specific function such as:

i. Create a new question and add it to database

ii. Editing the existing questions

iii. Delete questions for own design survey only.

iv. Send invitation mail to the targeted respondents to invite them to join the survey.

v. Distribute email to the respondents and attach the hyperlink in the email to direct the respondents to the survey.

- Data management module

i. Besides that, the user also can create own respondent list to facilitate sending survey. They can add, edit or delete the respondent in database

- Report generator module

i. Can generate analysis report by using the existing data.

4.3.2 Respondent section

- Survey answering module

They can direct to the survey by clicking on the hyperlink in the email. The survey is user friendly. They can submit the survey form easily by just one mouse click.

4.3.3 Administration section

The module allows the administrator to manage the user, respondent and survey. The system can add, edit user details or delete user from the system. The same functions are required for managing the respondent and survey.

4.4 Non-functional Requirement

Non-functional requirement will define the constraints imposed upon the Online Survey System. It will place restrictions on the freedom of design. Besides, it also lists the product and standard process, which must be followed. Non-functional requirement have to be define, as it will clearly affect the operations of the system.

4.4.1 User friendly

- An appropriate user interface and adequate documentation will enable usability of the system. The system provides usability by designing user-friendly interface, an easy to use and easy to understand user manual for customers.
- Appropriate error message should be displayed to avoid the user or respondents left out the questions

- The system minimizes text-based commands to perform various tasks but instead maximizes the use of hypertext linkage to launch commands. Some messages are displayed as guidance during the operation of the system. Furthermore, it provides a better visualization to users and reduces the risk of making mistakes when using the system.
- The system should provide a step to step guideline such as wizard to enable the user use the system easily. No specific training is required for the new user.
- The survey shall be allowed to be conducted through both web browser Internet Explorer and Netscape Navigator.
- The response time and the download time must be low.

4.4.2 Reliability

Reliability extends to which a system can be expected to perform its intended function with required precision and accuracy. Thus, the system should be reliable in performing its functions and operations correctly. A reliable system supposes not to produce dangerous or costly failures when it is in use. It means that the rate of failure occurrence must be low.

4.4.3 Security

The system shall be secure from unauthorized access. All the data in the database shall be kept away from unauthorized users. Registered users are required to key in their password in order to access the survey data. This can protect the survey data.

4.4.4 Maintainability

This application is designed so that the effort required to maintain, locate and fix an error in the program is as minimum as possible. Adequate comment is required to ensure that the application is easy to maintain. The system must be easy to upgraded

and modified to accommodate future enhancement in order to fulfill user requirements or their needs.

4.4.5 Robustness

Robustness refers to the ability of the system to continue in operation despite facing unexpected problems. Online survey system is able to process unanticipated errors by having validation for the input field on the client side before it is sent to the server and saved in database. For example, a user or respondent may accidentally key in alphabets instead of numeric for date. Thus, the system can validate this input before sending to the server. When error is detected, the system will prompt an error message to the user.

4.4.6 Performances

The system must have ability to generate an accurate analysis report from the survey data. The system must able to handle the respondents as many as possible at the same time. It is also a critical to make the respond time for the system as fast as possible. The display time for the survey questions must less than 2 seconds. If the download time is too slow, the respondents will not be interested in doing the survey form anymore.

4.4.7 On time

The system should be developed according to the schedule so that the final product can be delivered before the deadline. All the requirements and system analysis should be completed in time.

4.5 Selected Development Tools

4.5.1 Operating System

As a result of the analysis of the several platforms, Windows XP is selected as the

operating system of choice due to several distinct advantages compared to other OS. Before that, comparison between Windows 2000 and Window XP had been made.

Table 4.5.1 Comparison between Windows 2000 and Window XP

Feature	Windows 2000	Windows XP
Capable of sharing multiple versions	No, only one shared version, or each application has a private version	Yes, install side-by-side. Can share globally.
Using registry for COM activation data	Yes, component can be impacted by updates	No. The assembly is described by a manifest, allowing for isolation of components
Shared component can be serviced globally	Not easily, if installed per application	Yes
Fully isolated, self contained	No	Yes

The following are the advantages of Windows XP:

I. Saves Times

It is least 10 times more reliable than Windows 98 SE.

2. High performance

Window XP will not only launch applications faster, in most cases, user entire system will start up much more quickly.

3. Reliable

XP is more reliable compared to other OS. It also helps the user to recover from system problems more easily.

4. Ease to use

From its fresh, new look to its intuitive, task-based design, XP makes it

easier than ever to use their compute. User will be able to get more done in less time, find items in a snap and arrange files and folders in away that make sense to them.

5. New task-based visual design

The user can get to know their most commonly used tasks quickly.

6. System restores

The user can revert to the system back to the previous state if they encountered any problems with their computer.

7. Advanced performance

XP manages system resources efficiently, meeting the performance standards set by Windows 2000 and exceeding those set by Windows 98 Second Edition.

8. Encrypting file system.

Provide a high level of protection from hackers and data theft by transparently encrypting files with a randomly generated key.

9. Secures data and personal info.

Protect sensitive and confidential data both on their computer and while user are transmitting over a network or the Internet. With the support for the latest security standards and enhanced virus protection, XP also protects from some of the more common types of Internet attacks

4.5.2 Web application Language

HTML remains the default selection for developing web pages. Some web pages achieve its desired objectives of information dissemination although it may be static. The following are the advantages of HTML:

- Provides a standardized way to create pages of formatted information that can be delivered to an ever-increasing global audience by means of the Internet.
- Support a logical information structure
- Single file system (file only)
- Display and prints as appropriate for device.
- Needs only simple tools for generations.

4.5.3 Scripting Language

VB.NET was selected as the scripting language of the choice due to several advantages compared to other scripting language. I had compared between VB.NET and C# before making a decision.

Table 4.5.3 Advantages of VB.NET and C#

VB.NET	C#
Seamless deployment	Object-based type system
More robust code	Access the Microsoft .Net framework
Powerful window-based application	Component–oriented development
Powerful, flexible data access	Standards-based language
Simple component creation	Interactive XML web services
Enhanced component creation	Target any device
Complete, direct access to the platform	Productivity and safety
Provide unprecedented	Power, expressiveness and flexibility
Flexibility in building customized	Extensive interoperability
User control	

The following are the reason of choosing Visual Basic.NET:

- **Seamless Deployment**

VB.NET solves the most pressing issue around windows-based application deployment. New XCopy deployment enables developers to install a windows based application simply by coping files to a directory. With Visual Basic.NET and new auto – download deployment, windows –based application can be installed and executed simply by pointing a web browser to a URL.

- **Powerful, flexible data access**

It provides developers with both ActiveX data Objects (ADO) data access programming model plus the XML-based Microsoft ADO.NET .The developers can gain access to more powerful components such as the DataSet control with ADO.NET.

4.5.4 Database Management

Microsoft SQL server 7.0 is chosen because of the scalable, high-performance database management system designed specially for distributed client/server computing. Microsoft SQL server provides tight integration with Windows and Windows-based applications.

Advantages:

1. First database to scale from the laptop to the enterprise using the same code base, offering 100 percent code compatibility.
2. Universal Data Access. IT is Microsoft's strategy for enabling high-performance access to a variety of information sources.
3. Support auto-configuration and self-tuning. It also automatically maintains statistics on data distribution to improve query performance.

4. Wide array of replication options of any database. It improved administration with the addition of a new interface, more wizards, integrated monitoring and replication agents.

5. Provide multi-server management for large numbers of servers.

6. Integrated online analytical processing (OLAP) server. OLAP services organizes data into cubes with precalculated aggregate information to provide rapid answers to complex analytical queries

7. Integrated with Data Transformation Services.

8. Able to break single queries into multiple steps that can be executed in parallel on multiple available servers, delivering the optimum response time.

9. New storage format. The new page and row formats support row-level locking, are extensible for future requirements, and improve performance when large blocks of data are accessed, because each I/O operation retrieves more data

10. Dynamic space management. Database files can dynamically grow from the originally specified size.

4.5.5 Development Access Technology

The ActiveX Data Object (ADO) is selected as the database connectivity for the system. ADO provides developers with a quick, yet powerful, method of accessing a data source. The outstanding functions in ADO include:

- Asynchronous operations and notifications
- Hierarchical record sets for data shaping

- Provide fastest, easiest and most productive of accessing all kinds of data source including relational and non- relational database, email and file system, text and graphics.
- It provides user-friendly application interface and most powerful data access paradigm, OLE DB. OLE DB provides native data access to the Advantage Database Server and Advantage Local Server directly via ADO, or via ADO.NET.
- Implemented with small footprint thus minimal network traffic in key internet scenarios.
- Easy to use by using the OLE automation interface, available for any tool any language in the market.

4.5.6 Web development server

The Microsoft Internet information Server (IIS) 5.0 is used as the system development server. IIS is to help prevent against attacks directed at the Web server itself. IIS is powerful, much easier to set up and maintain than many of UNIX based competitors.

The following are the advantages for IIS:

- Easy to install
- Any kind of browser can work with it.
- Allow for hosting of multiple sites.
- Integration with existing industry – standard database and other ODBC compliant.

4.5.7 Software Architecture

A 3-tier client –server architecture is chosen for implementing this system. This is because survey system is a client-server environment and not a dumb terminal like 1-tier architecture.

Some of the advantages of 3-tier architecture are as below:

1. **Object reuse:**

   It is a collection of client and server modules that communicate through standardized, abstract interfaces, and when combined they behave like an integrated application system. Each module is actually a shareable, reusable object that can be included in other application systems.

2. **Easier system maintenance:**

Since application functions are isolated within small granular application objects, application logic can be modified much more easily than ever before.

3. **More effective use of data and networks:**

   The application logic is no longer tied directly to the database structures or a particular DBMS. Individual application objects work with their own encapsulated data structures, which may correspond, to a database structure, or might be a data structure derived from a number of different data sources. When application objects communicate, they only need to send the data parameters as specified in the abstract interface rather than entire database records, thereby reducing network traffic. The data access objects are the only application components which interface directly with the databases. A

database could be completely migrated from one DBMS to another without adversely affecting the entire application: Only the data access logic would need to be modified.

4. **Higher developer productivity through specialization:**

In a three-tier system, programmers who have excellent user interface skills can concentrate on developing powerful presentation components, and they do not need to know about the inner workings of the applications business logic or how the data is accessed from a database. Meanwhile database analysts who know the best ways to access data from a database do not need to be concerned with how the data is presented to an end user. Business analysts can concentrate on developing business algorithms.

5. The ability to separate logical components of an application ensures that applications are easy to manage.

6. Because communication can be controlled between each logical tier of an application, changes in one tier, for example, the database access tier, do not have to affect the client component tier, which would have to be redistributed if any changes are made to it.

4.5.8 Web Browser

Two browsers are recommended: MS Internet Explorer 4.0 or above and Netscape Navigator 4.0 or above. This is due to the fact that these two browsers are the most widely used and the most popular amongst the Internet community today. Besides, these versions include the features of cascading style sheets. Thus, it makes visual effects a pleasant treat for customers.

4.6 Development Requirement

4.6.1 Hardware Requirement

Computer processor : Pentium II 266 MHz or higher

Hard Disk Space : 2 GB or higher

Memory : 128 MB RAM or higher

Accessories : other standard computer peripherals that includes mouse, keyboard and monitor.

Drives : CD-ROM Drive

4.6.2 Software requirement

Operating System : Windows XP

Database Server : Microsoft 2000 Server 7.0

Web Server : Internet Information Server 5.0

Web Technology : Active Server Pages (ASP.NET)

Web Application Language : HTML

Scripting Language : VB.NET

Web Browser : MS Internet Explorer 4.0 or above
Netscape Navigator 4.0 or above

4.6.3 Minimum Hardware Requirement for client

- Reasonable amount of RAM- to support graphic
- Network connection through existing network configuration or modem

4.6.4 Minimum Software Requirement for client

MS Internet Explorer 4.0 or Netscape Navigator 4.0 or above

Chapter 5: System Design

5.1 Introduction

Design is a meaningful engineering representation of something that is to be built. It can be traced to a customer's requirements and at the same time assessed for a quality against a set of predefined criteria for "good" design. In the software engineering context, design focuses on four data, architecture, interfaces and components. (Pressman, Roger S, 2001). It is important to have a blueprint for the system that is going to be built. At each stage, software design work products are reviewed for clarity, correctness, completeness and consistency with the requirements and with one and another in determining the success of a software project.

In this system design phase, I will cover the following issues:

- System Architecture Design
- Database Design
- System Functionally Design
- User Interface Design

5.2 System Architecture Design

The architectural design process is concerned with establishing a basic structure framework for the online survey system. It involves identifying the major components of the OSS and the communications between these components. The system architecture is chosen based on the scope and complexity of this project. It also depends on the non-functional system requirements such as performance, security, maintainability, and others.3-tier allows any part of the system to be modified without change to other two part of the system.

The client- server architecture which shows how data and processing are distributed across a range of processor has three major components:

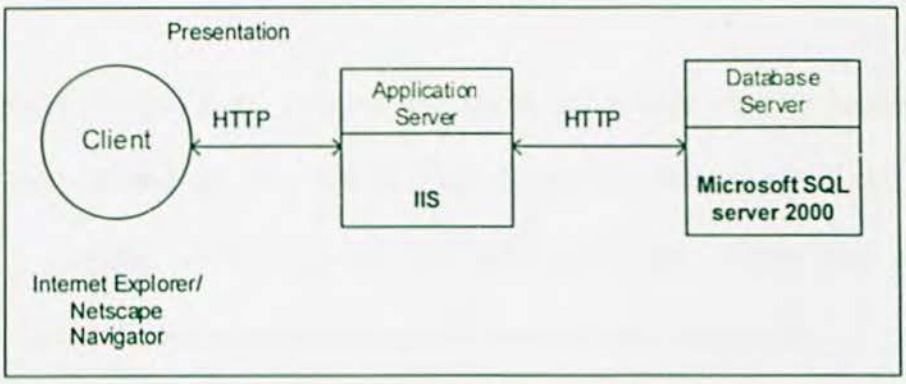

Figure 5.2: Three-tier client server architecture

The first tier is a client where all the application needed is organized. The browser like Internet Explore and Netscape Navigator will be the application in this client tier. The client is simply for running the presentation software. The browser in this system is used to display the user interface (web page) to the user.

The middle tier in OSS is application server. Internet Information Server (IIS) in this system is responsible for data management. IIS process the request from client and return the required result in the web page format. It will also interact will database server.

The Microsoft SQL server 2000 is acts as database server in OSS. It is responsible to maintain the data repository. The use of the three-tier architecture in this system allows the information transfer between the web server and database server to be optimized. The query is used to handle information retrieval from the database and the results will then be passed back to the application server.

5.3 System Functionality Design

System functionality designs are based on the system functional requirements listed in chapter 3. It translates the system requirements into system functionality.

In functional design, large systems are decomposed into simpler modules that provide some related set of services. The reason why modularity is desirable is because a modular system is easy to understand code, debug and maintain. Structured chart is used to present the system functionality graphically.

In this project, design is focused on the system-structured design. It stresses on modularity, top-down design and structured programming. For functionality design, the emphasis is on modularity, loosely coupled and highly cohesive.

5.3.1 Structured Chart

Structured chart is based on the functionality modules. It is issued to depict high-level abstraction on a specified system. Apart from this, structure chart also describes the interaction between modules in a system.

In general, OSS consists of three major parts which are user section, respondent section and administrator section.

The OSS is decomposed to the following modules:

1. User Section
   - Registration module
   - Question designing module
   - Survey distribution module
   - Data management module

2. Respondent Section

- Survey answering module

3. Administration section

- Data management module

    i. Manage user

    ii. Manage respondent

    iii. Manage questionnaire

Each module is further divided into sub-modules. It is very effective in presenting the system structure by using graphical representation rather than process or narrative.

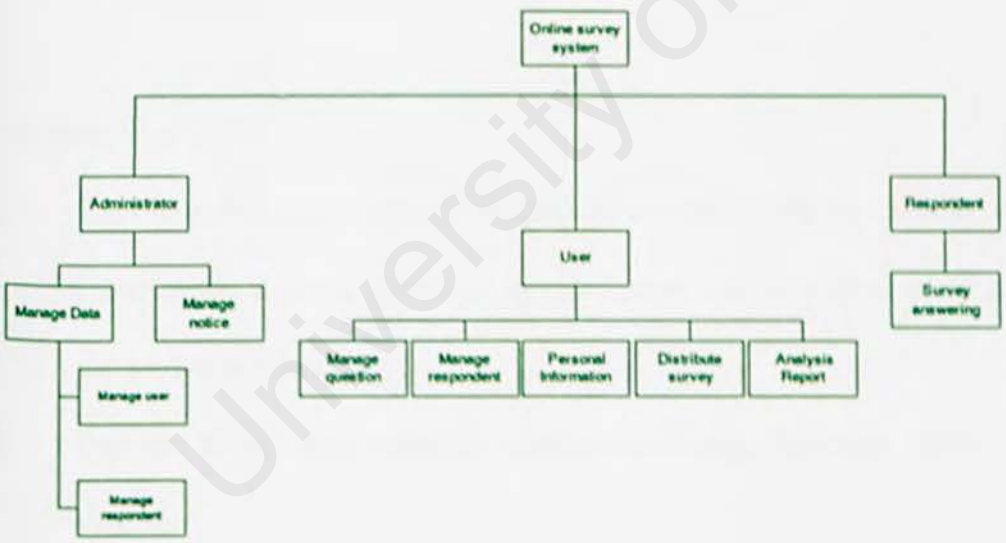

Figure5.3.1: Structured chart of Online Survey System

5.3.2 Data Flow Diagram (DFD)

To understand the system better, a view of flows of data / information is important. Flow of data tells us how the system should be designed to fulfill the requirements. From here, it is able to understand that which process comes first and where the data should be stored. Once we have a very clear picture on the process, then we can design a good system.

A data flow diagram (DFD) is a tool that depicts the flow of data through a system and the work or progressing performed by that system. (Whitten, Jeffrey L, 2001)

The DFD contains four objects which are dataflow, process, data store, and external entity. The dataflow represents packet of data moving to and from processes in the diagram. Data store represents the location where the data is stored, and external entities are used to show the source or destination of data when it is outside the area of analysis.

Advantages of DFD:

1. Easy to understand since only 4 symbols are used. They are rounded rectangles (processes), squares (external agents), open ended boxes (data store) and arrows (data flows)
2. Provide better understanding about relationship between system and sub system.
3. Help to identify the required data or processes of proposed system making sure that they have been defined.

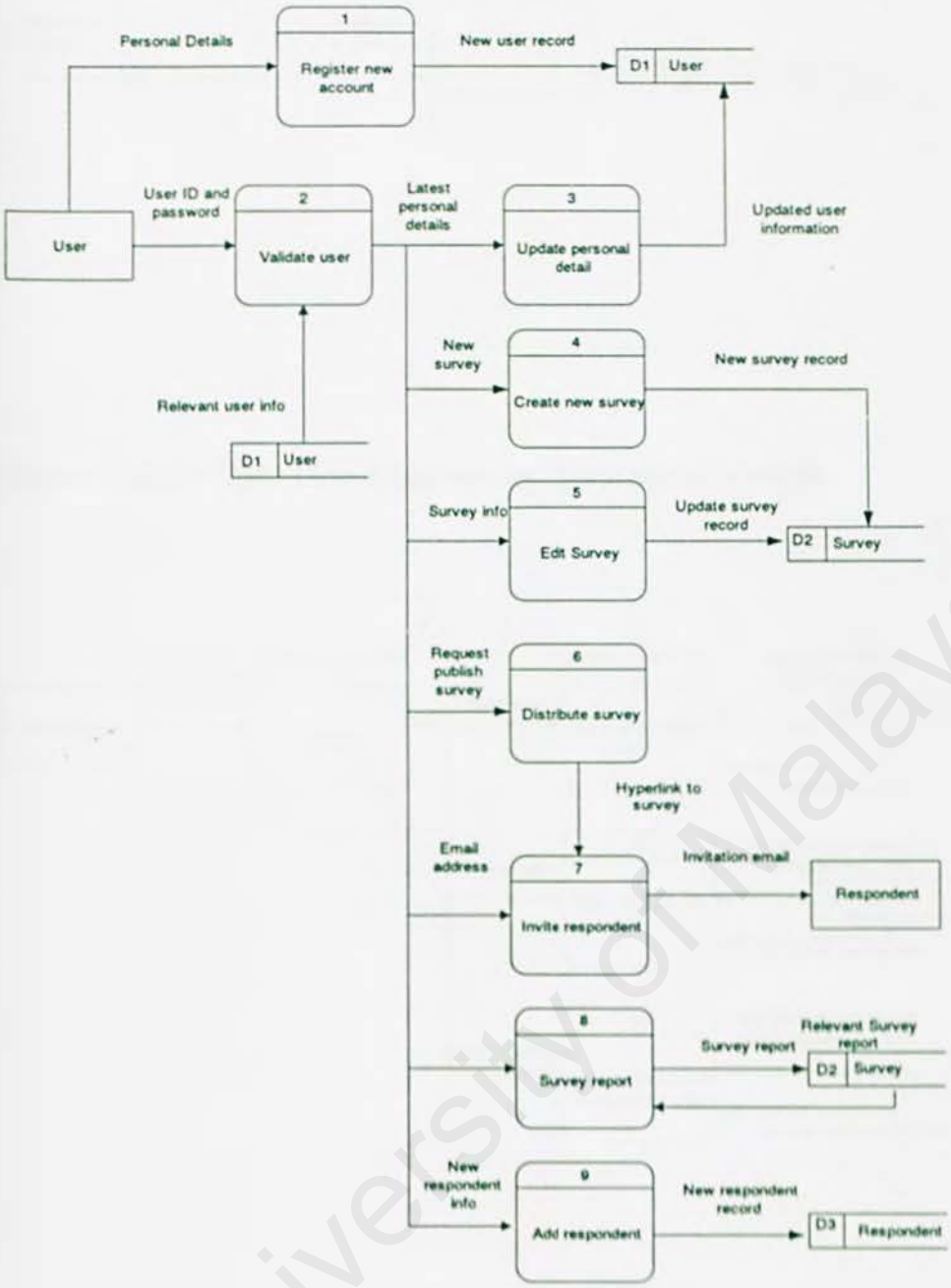

Figure 5.3.2(a): Data Flow Diagram for User Module

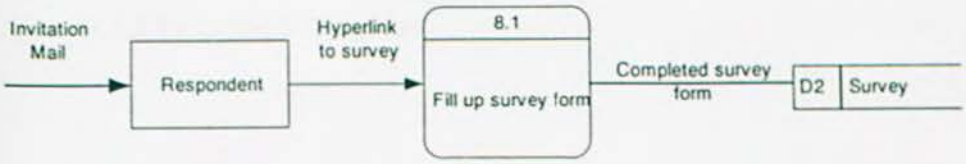

Figure 5.3.2(b): Data Flow Diagram for Respondent Module

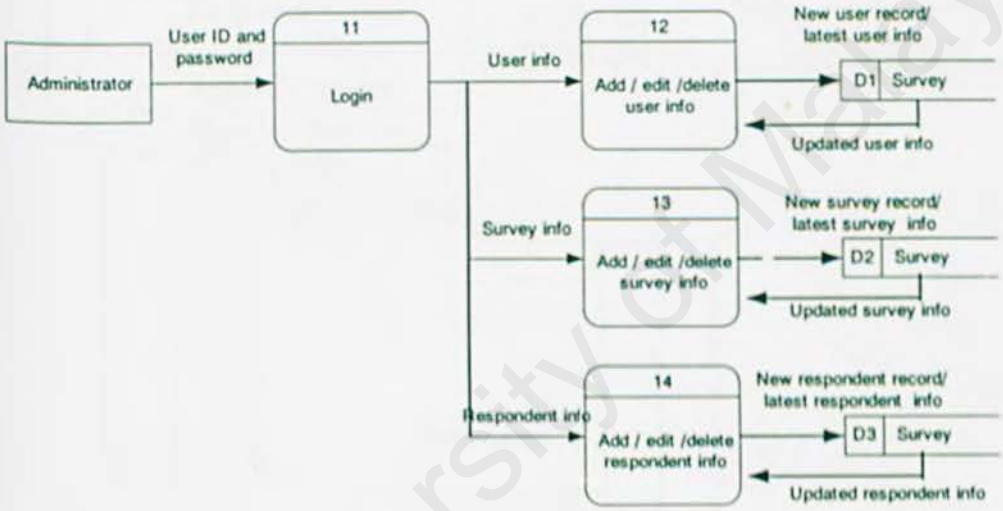

Figure 5.3.2(c): Data Flow Diagram for Administrator Module

5.3.2.1 Context Diagram

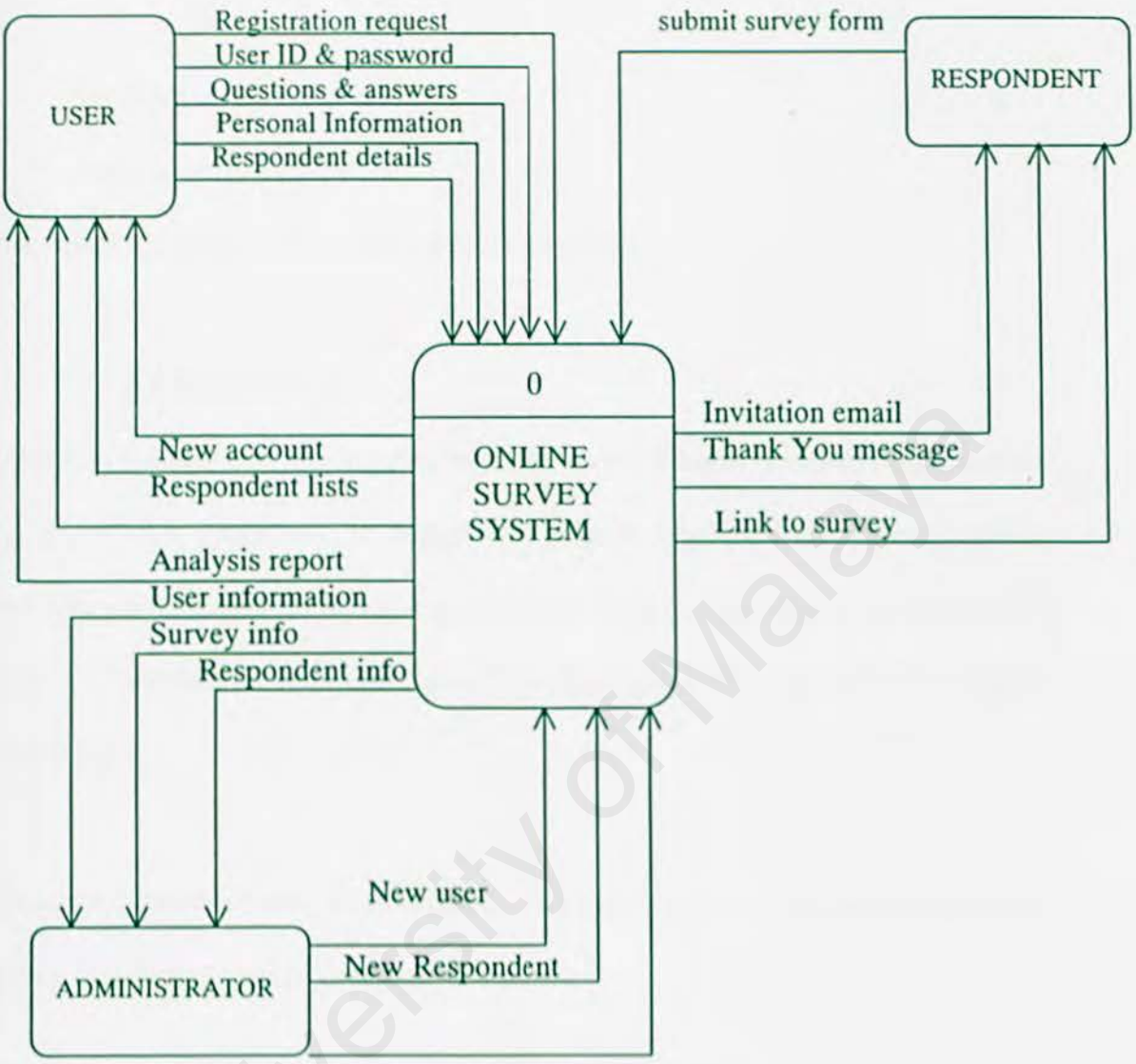

Figure 5.3.2.1: Context Diagram for Online Survey System.

5.3.3 Structured Programming

Structured programming shows the flow of the process in the system. It is a technique to produce accurate output. Furthermore, it makes reading, understanding and updating of the program easier for other developers.

Structured program is a program that contains one beginning and one ending, where every step in running the program will involve three construction programming:

- Sequence
- Decision
- Repetition

The structured flows of the system are shown below.

5.3.3.1 Registration

Registration starts with the logging in of the user. If login is unsuccessful because the password is forgotten, the system will help in recalling the password, and the user will has to return to the login process and login successfully if the password is correct. Otherwise, an error message will be displayed to the user and he will not be able to login.

If login is successful, user ID is verified. The user can access the system and all the survey that he had created previously.

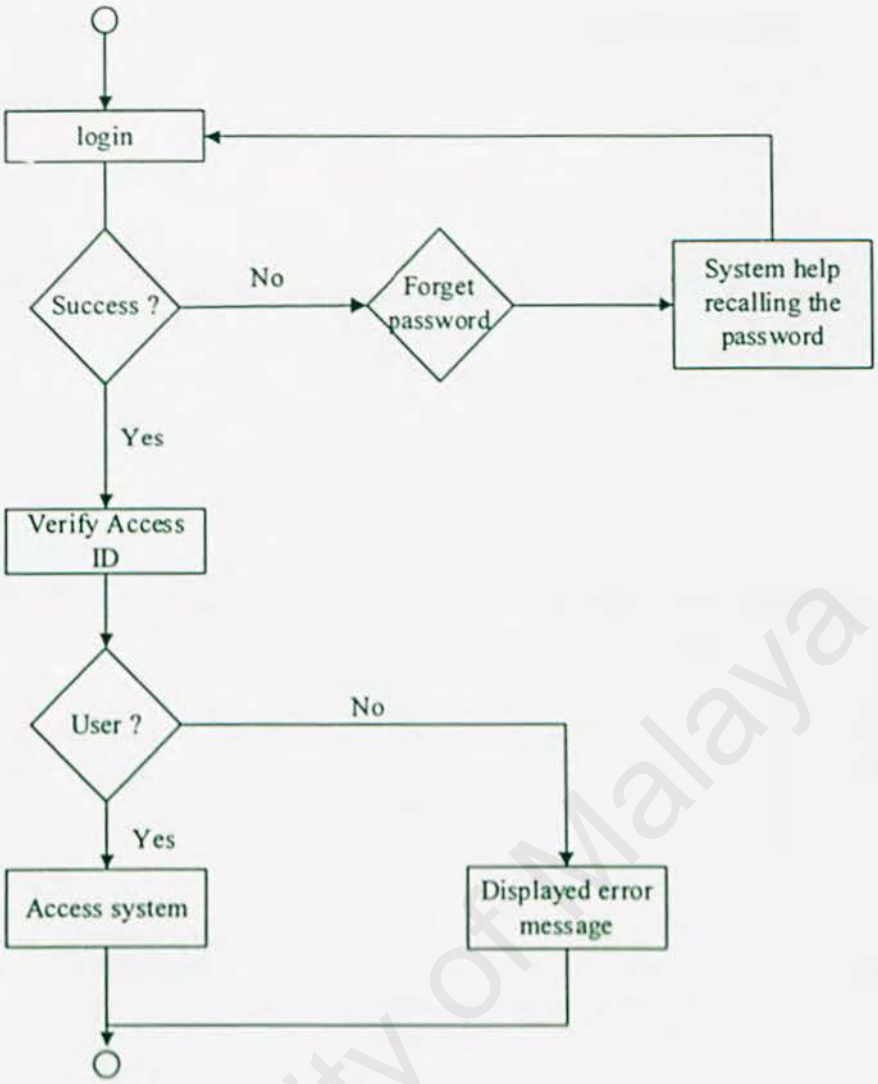

Figure 5.3.3.1: Structure flow of registration process.

5.4 Database Design

Data storage is a critical component of the most information systems. The goals of database design are as follows (Whitten, Jeffrey L, 2001):

- A database should provide for the efficient storage, update and retrieval of data.
- A database should be reliable- the stored data should have high integrity to promote user trust in that data.

- A database should be adaptable and scalable to new and unforeseen requirements and application

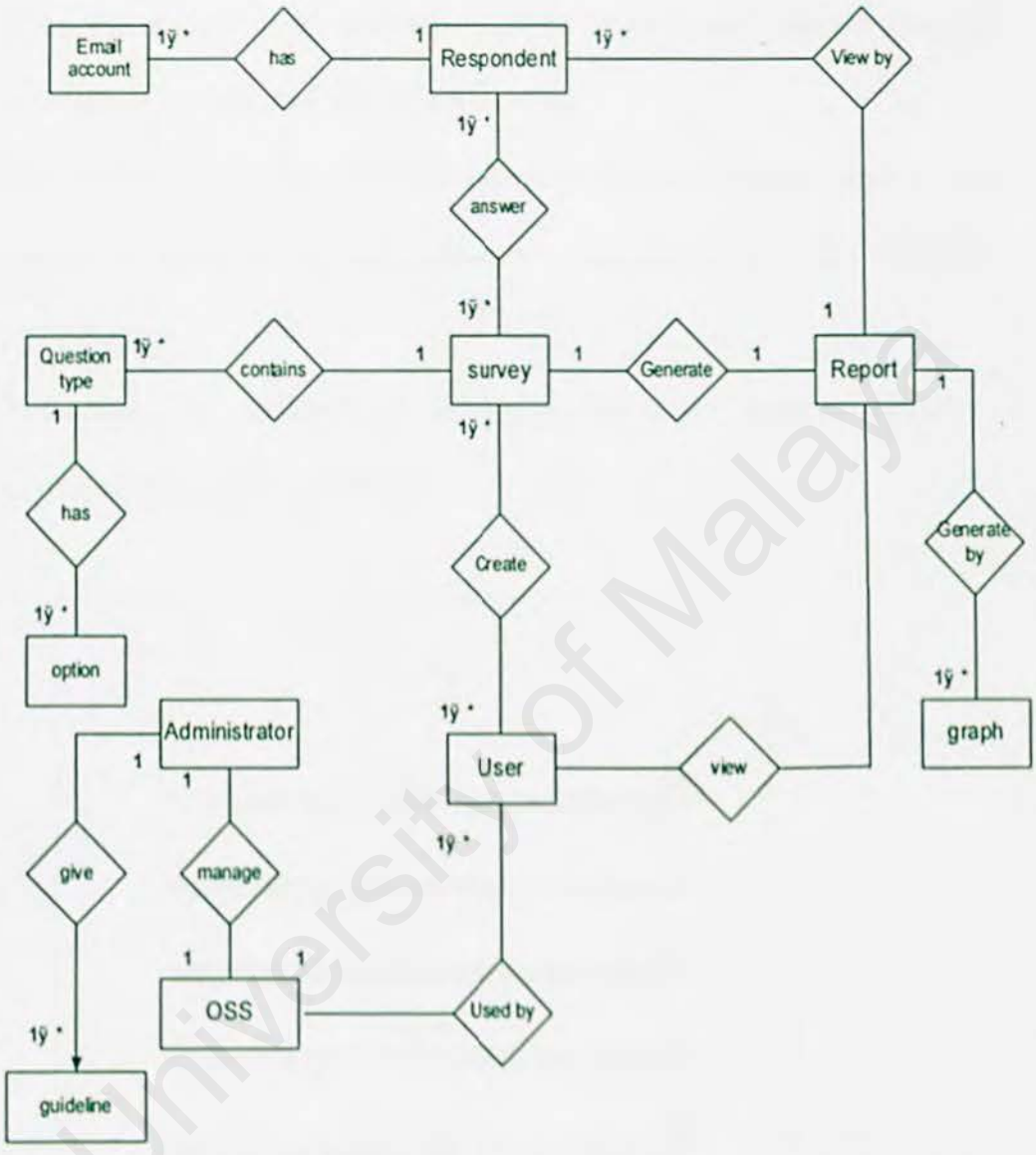

Figure 5.4: Entity relationship diagram of Online Survey System

5.5 User Interface Design

Good user interface design is critical to the success of the OSS system. An interface that is difficult to use will, at best, result in a high level of user errors .At worst, users will simply refuse to use the software system irrespective of its functionality. If information is presented in a confusing or misleading way, users may misunderstand

the meaning of information. They may initiate a sequence of actions that corrupt data or even cause catastrophic system failure. (Sommerville, 2001)

The user interface must achieve the following objectives:

- Efficiency is hoped to be achieved that is by allowing easy and fast data entry and retrieval, simple and consistent interface.
- Effectiveness means how well the interface is able to interact with the user. This is measured by how well users can accept and adapt to the interface to perform tasks.
- Productivity is attained by designing the user interface based on ergonomically proven methods.

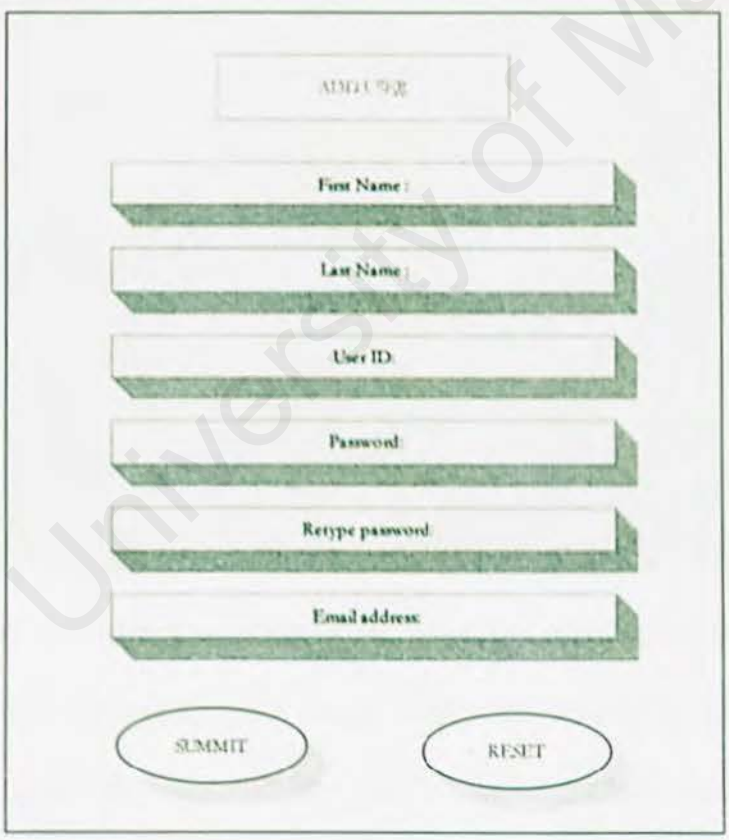

Figure 5.5(a) Using text box for controlling input (add new user to the OSS system)

Figure 5.5(a) shows a form that is used when the new users are sign up to use the Online Survey System. Only textbox is used in this form for capturing data. Text box is very useful in entering alphanumeric data, as well as for those data which values

are unlimited. This is to validate the user's details which will be added to OSS database. The users are required to enter some data like name, email address where the result entries of form will be sent to OSS system and a username and password is needed for future access to their account.

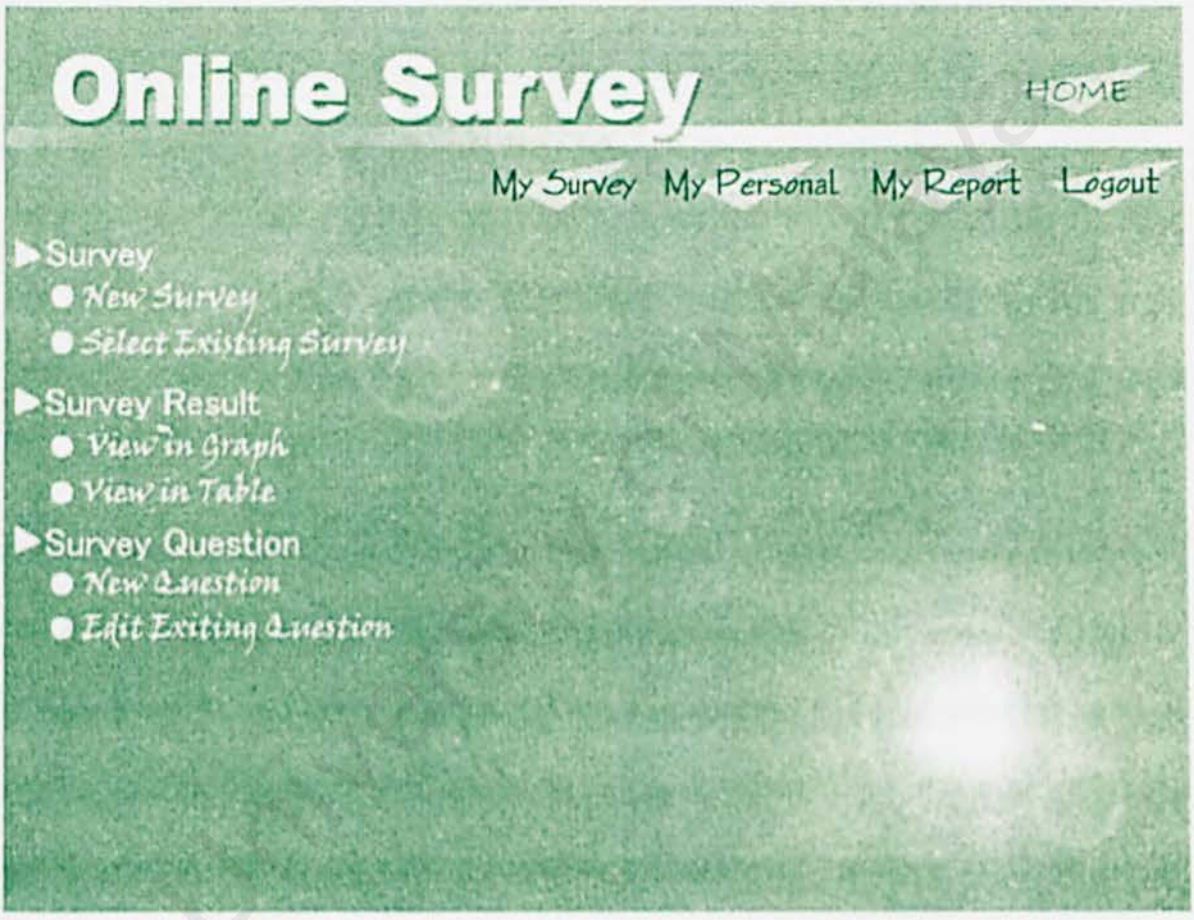

Figure 5.5(b): The Main Menu when the user login successfully

In this project, several types of output design are created to provide the users with better and clear information. The types of output include external output, internal report, detailed output and graphic output and charts. Figure 5.5(b) the main menu for the OSS after the user login successfully. The system will give the guidelines to the new user to design their survey.

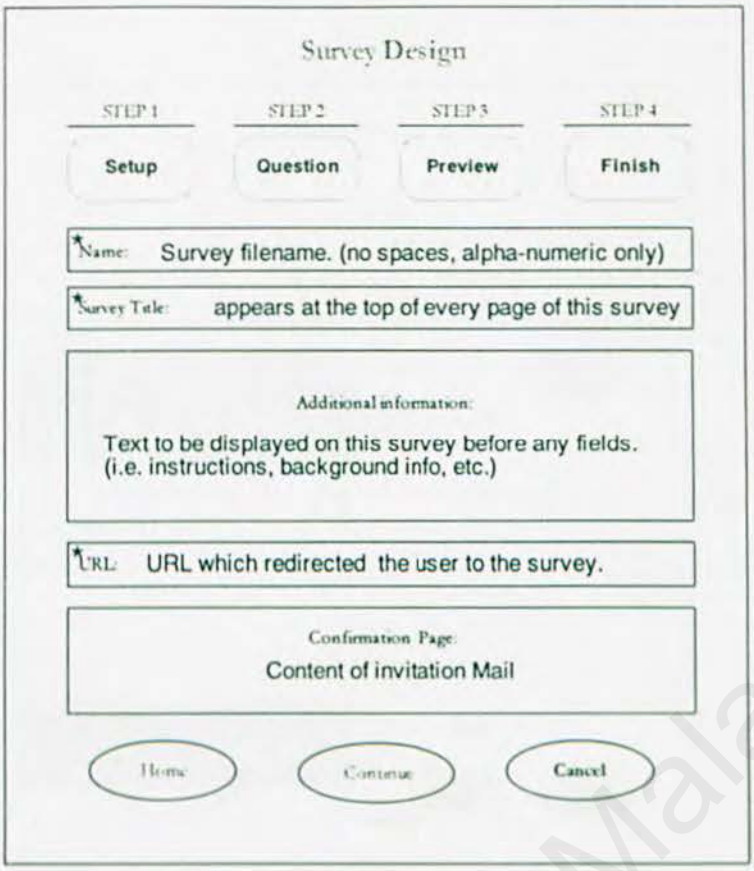

Figure 5.5(c): The setup method in design a survey form

Figure 5.5(c) shows an easy to use data entry interface for the users to create their survey form. Technical knowledge is not necessary to use of OSS system. The use of the tool is explained (mostly in steps). There are no limitations for the questions that need to be added in the survey. With just a few mouse clicks, a web-based form designed according to the user's specification could be created. The user is compulsory to fill in field with the symbol of (*) before proceed to another step. All of the participants will receive a personal e-mail invitation to participate in the survey. There is a hyperlink (URL), which directs the respondents to open the survey. Any location accessible by the respondent's web browser can now be linked into the survey. After filling out the survey the participant will send it back. If a participant does not want to fill out your survey, he or she is even able to give the reason why. It is a general information about the survey that going to be conducted.

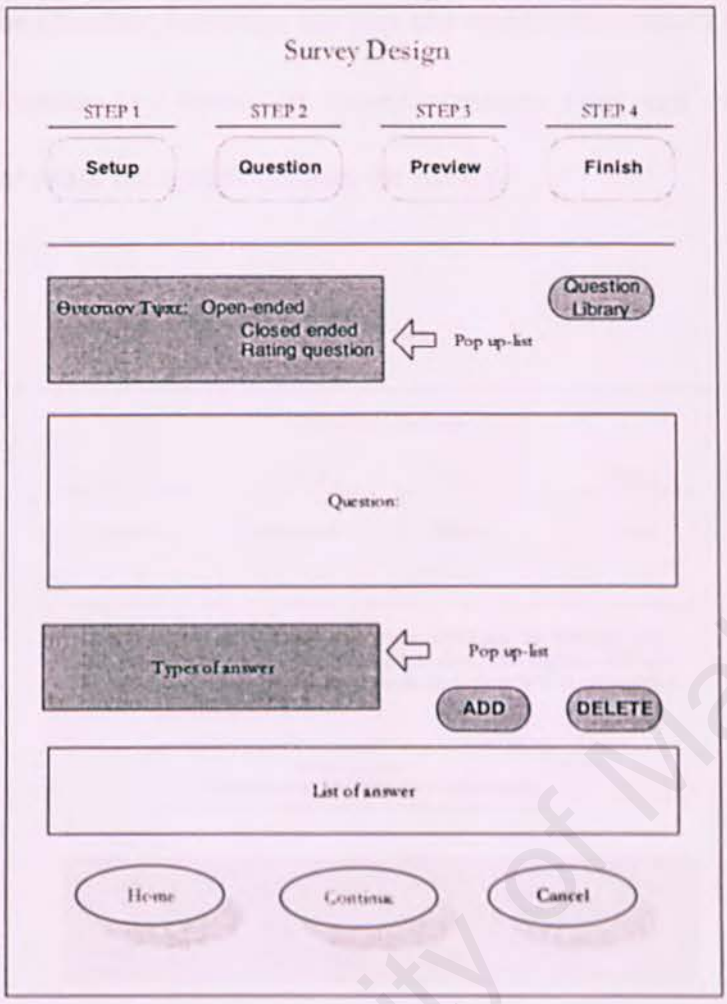

Figure 5.5(d): Set questions in design a survey form

Figure 5.5(d) show the steps for the users to set the questions. There are several types of questions such as Single selection (choose one), Multiple selection (choose many), choose many and specify, rank (sort elements in order of importance), rating, check if yes or no, multiple question tables (in table format), fill in the blank and open-ended question (write an explanation or opinion. Next the user may adds other items to the form like textboxes, checkboxes, list boxes, radio-buttons, comments and images for the field of answer. After that, the user needs to click on the button to add the question into the survey. The process of adding questions will be continuing until the user clicks on the button to continue to the next steps. The question library is used to save the questions to library for re-use. Among them are examples that deal

with the banking, manufacturing, customer service, HR and customer satisfaction. Through the Question Libraries, the user can retains the value of the work of creating survey questions and speed up survey creation. They can either set their own questions or reuse the questions from the library.

Figure 5.5(e): Preview survey form

The user can preview the survey form before send it to the respondents. They can define the layout of the form. Different survey themes are provided in OSS. The attractive survey form can increase the response rate.

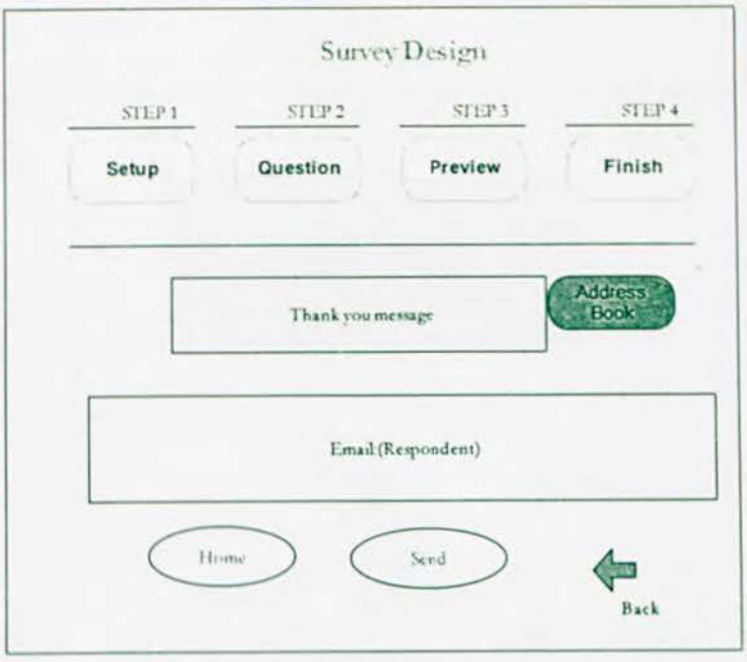

Figure 5.5(f): Send survey form

If there are no changes for the survey form, the user can send it to the targeted respondent. After that, the user will define a 'thank you' message to the respondents. It will appear immediately after someone submits the form. Finally the user can send the survey to the respondent. It is a user friendly respondent selection because the user can choose the respondents according to the group of respondents (for example the marketing department, students, public, employees and etc). The user can create own respondent list or use the list from OSS.

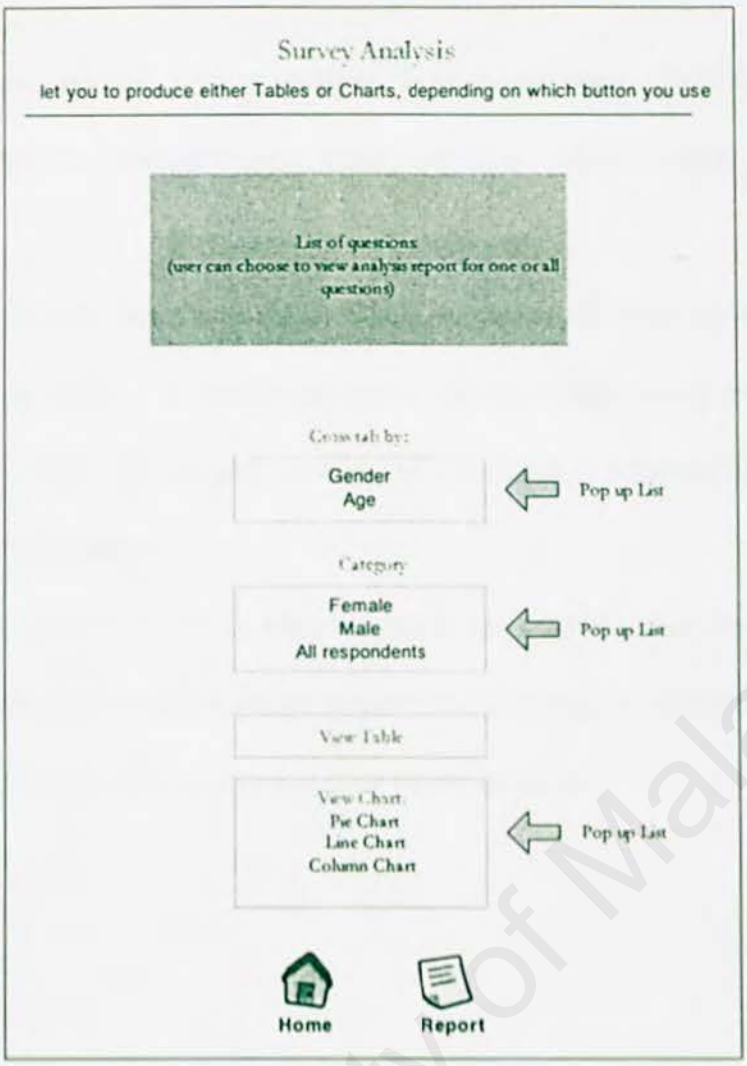

Figure 5.5(g): Analysis report

The OSS will generate real time analysis report after receive the survey form submitted by respondents. The user can choose to generate the analysis report according to gender or age. Analysis can be performed on all the respondents, a group of respondents (for example those who answered yes to question 4) or for one respondent. There are several types of graph in this analysis report.

Summary

In this chapter, several system designs have been done. The designs include functionality design, database design, input / output design and interface design.

Functionality designs are based on the system functional requirements, which are stated clearly in chapter 4. Structured chart and flow chart are used to depict the functionality design. ER diagram shows the relationship between the entities and attributes (logical database

Input / output design is done to ensure system can capture good input and display standard output. And interface design ensures that system will always maintain user-friendliness and have an attractive but easy to use interface.

Chapter 6: System Implementation

6.1 Introduction

The purpose of system implementation is to convert planned system design and requirement analysis into program codes. Well-developed software will be the final product of system implementation. Since this process involves realization of previous planning, modification is considered necessary if better solution of design is discovered.

Structure and relationships of the system those are easy to describe with charts and tables actually always not straightforward to write as code. In addition, many coding problems such as syntax error, runtime error, data connection error etc. may occur during the coding process. Time is exhausted dealing with these problems. Sometimes, it will cause this process take time beyond the schedule. As the system evolves in the future, coding is not an easy task especially in a way that is understandable not only to us, but also to others who revisit it for testing.

6.2 System Development

6.2.1Web Pages Coding

Microsoft Visual Studio .NET is used as the main ASP.NET coding tools. There are many useful features which could positively improve and speed up the development. Web Forms are an ASP.NET technology that can be used to create programmable Web pages. Web Forms pages can be used to create programmable Web pages that serve as the user interface for Web application. A Web Forms page presents information to the user in any browser or client device and implements application logic using server-side code. Web Forms render themselves as browser-compatible

HTML and script, which allows any browser on any platform to view the pages. Using Web Forms, Web pages can be created by dragging and dropping controls onto the designer and then adding code.

In Web Forms pages, the user interface programming is divided into two distinct pieces: the visual component and the logic. The visual element is referred to as the Web Forms page. The page consists of a file containing static HTML, or ASP.NET server controls, or both simultaneously.

The Web Forms page works as a container for the static text and controls the display, by using the Visual Studio Web Forms Designer plus ASP.NET server controls. The logic for the Web Forms page consists of code that created to interact with the form. The programming logic resides in a separate file from the user interface file. This file is referred to as the "code-behind" file and has an ".aspx.vb" or ".aspx.cs" extension. The logic written in the code-behind file can be written in Visual Basic (VB) or Visual C#. For the development of PSCG, I used VB as the logic written in the code-behind file, and all the files have ".aspx.vb" extension.

The code-behind class files for all Web Forms pages in a project are compiled into the project dynamic-link library (.dll) file. The. aspx page file is also compiled, but somewhat differently. The first time a user browses to the .aspx page, ASP.NET automatically generates a .NET class file that represents the page, and compiles it to a second .dll file. The generated class for the .aspx page inherits from the code-behind class that was compiled into the project .dll file. When a user requests the Web page URL, the .dll files run on the server and dynamically produce the HTML output for that page.

In preventing unauthorized user, components at session-level scope are used. Session- level scope means that one object instance will service all request from a single user within their ASP.NET session. In OSS program codes, user ID and password objects are defined as session-level scopes' objects.

6.2.2Database Connection

The database used in PSCG is created using Microsoft SQL 2000, which is named MRMS. There are 29 tables and 4 views in this database. There are few steps to connect to database and retrieve data to ASP.NET page. Firstly, Domain Server Name (DSN) is used to connect to data source. This is done by configuring ODBC Data Source under Administrator Tools dialog which is found under Data Sources (ODBC) in control panel. Among number of types of DSN, System DSN is chosen because it is accessible to all users of the system. After click the 'add' button and select ODBC driver that used to access data store – SQL server, a System DSN is created. The last step is to select the appropriate database file.

Here is a summation of steps required to create a database using SQL Server 2000 Enterprise Manager.

1. Open Enterprise Manager, expand a server group, then expand the server in which to create a database.
2. Right click on database then click -> New Database.
3. Type in the database name.
4. Inside the newly created database, right click on Users to create New Database User. (For this project, the user login name is sa),
5. Enter a Login Name and User Name, and then assign the Database Role Membership for the user created.

6.2.3 Development Tools

As mention in earlier sections, Microsoft Visual Studio .NET (VS .NET) is used to create and manage web-based application in PSCG. VS .NET is a complete set of development tools for building ASP Web applications, XML Web services, desktop applications, and mobile applications. Visual Basic .NET, Visual C++ .NET, and Visual C# .NET all use the same integrated development environment (IDE), which allows them to share tools and facilitates in the creation of mixed-language solutions. In addition, these languages leverage the functionality of the .NET Framework, which provides access to key technologies that simplify the development of ASP Web applications and XML Web services.

Although ASPs are simply text files and can be created in ANSI editor, such as notepad, VS .NET offers better development environment which introduces three work views which are code-view, design-view and combination of both views.

Microsoft Visual Basic, Microsoft C++, and Microsoft JScript have all been updated to meet the latest development needs. Additionally, a new language, Microsoft C#, has been introduced. These languages leverage the functionality of the .NET Framework, which provides access to key technologies that simplify the development of ASP Web applications and XML Web services.

ASP.NET builds on the programming classes of the .NET Framework, providing a Web application model with a set of controls and infrastructure that make it simple to build ASP Web applications. ASP.NET includes a set of controls that encapsulate common HTML user interface elements, such as text boxes and drop-down menus. These controls run on the Web server, however, and push their user interface as

HTML to the browser. On the server, the controls expose an object-oriented programming model that brings the richness of object-oriented programming to the Web developer. ASP.NET also provides infrastructure services, such as session state management and process recycling that further reduces the amount of code a developer must write and increase application reliability.

Microsoft Visual Studio .NET provides project management software solution for high-end Web development. Its significant features are:

- Support for ASP.NET which generates HTML pages on the fly.
- Support for database integration from desktop to high end (ODBC compatibility).
- Support for VBScript and Jscript in HTML files.
- Visual design tools, template and wizards help to generating SQL statement commands with a point-and-click interface.

6.3 Coding Standard

Standardization in coding is stringently implemented in OSS. This is because consistency of coding enables others to understand what and why these program codes are written. Standardization in coding is very important to help in locating faults and making changes. In addition, it clarifies which sections of the program perform which specific functions. Modifications in design are easy to put into operation in the standard coding as the program is designed in structuring code according to standards. Also, standardization helps us to organize our thoughts and avoid mistakes.

For a typical ASP.NET file in PSCG, the following standardization codes are fundamental to include into the file.

```
Imports System.Data.SqlClient
```

This statement provides a connection of database to be imported into the Web Pages

This statement provides a provides a collection of instances of the Import class representing documents to be imported into the Wel

```
Public Class Login
    Inherits System.Web.UI.Page

#Region " Web Form Designer Generated
<System.Diagnostics.DebuggerStepThrough()>
Private Sub InitializeComponent()
End Sub
```

This statement is called "Web Form Designer Generated Code", which required by the Web Form Designer

```
Private Sub Page_Init(ByVal sender
As System.Object, ByVal e As System.EventArgs,
Handles MyBase.Init
InitializeComponent()
End Sub
#End Region
```

This statement declares the connection of database with the Web Pages

```
Dim conn As sqlconnection =
 New sqlconnection
(ConfigurationSettings.AppSettings("constring"))
```

```
Private Sub Page_Load(ByVal sender
As System.Object, ByVal e As System.EventArgs)
Handles MyBase.Load
  'Put user code to initialize the page here
End Sub

.....
.....
End Class
```

This statement declares the function for the Web Pages coding

6.4 Documentation

The purpose of program documentation is to explain to a reader what the program do and how they do it. Program documentation is a set of written description that enables others to continue with present work without losing track of what had been doing. It provides an easy understanding programming guideline for others to do modification or testing in the future. Besides that, system can be easily setup at any time by referring the prepared documentation. Program documentation can be divided into internal documentation: a descriptive material written directly within the code, and external documentation: all other documentation.

6.4.1 Internal Documentation

Internal documentation actually refers to comments within the codes. This documentation is prepared especially for those who will be reading the source codes of Online Survey System (OSS). Thus, summary information is provided to identify the program and describe its data structures, algorithms and control flow.

In OSS, some important section of ASP.NET script functions is commented. This is useful for separates between two different functions and locates the required function rapidly according to the written comment. Comments are written within the comment tag in order that these comments will not be executed as ASP.NET script. The comment tag used by VBScript is '.

For example:

'------ Get the User ID ------

'------ Close the Database Connection -----

6.4.2 External Documentation

External documentation is part of the overall system documentation. The entire system design and analysis requirement has already been written clearly on the documentation.

The obtainable of external documentation let others who may never look at the actual source code refer to it. In external documentation, there is much more useful information that is not stated in internal documentation or source codes of the system. Without external documentation, other will not acknowledge some research background and the motivation to create the system.

External documentation is also valuable for future reference when the system is going to implement on other work field. Modification will be easier since the primitive idea is already established for further development. More to the point, other programmers can refer external documentation to expand the idea on doing the similar system.

Chapter 7 System Testing

7.1 Introduction

Testing is a critical element in uncovering logical error and to test the system reliability.

The primary goal of unit testing is to confirm that the unit is correctly coded and that it carries out the functions it is supposed to carry out. This stage of testing verifies that the component functions properly with the types of input and output expected from studying the component's design. After each component has been tested, the interaction between these components must be tested again to ensure that the components can be integrated.

When the individual components are working correctly and meet the objectives, these components are combined into a working system. Integration testing is done on the groups of integrated modules to verify that the system components work together as described in the system and program design specifications.

System testing is the final testing procedure. A system test is a series of different tests designed to fully exercise the system to uncover its limitations and measure its capabilities. System testing takes place at a higher level, the testing focuses on behavior rather than function or functional structure.

Online Survey System was developed using Hybrid development approach which involves sequences of iteration of the development activities. Testing is carried out repeatedly during system design and coding process. After all unit-testing are completed, these individual modules are integrated and tested as a complete system

to ensure those software requirements have been met. In conclusion, testing is a quality assurance process for OSS.

7.2 Testing Stages

There are several testing stages that needed to carry out to complete a system testing phase, there are listed below.

7.2.1 Unit Testing

Unit testing is the first testing procedure. Unit testing is done after the completion of each function according to functional requirement. The unit testing process is similar as to find faults in components. There were several steps being carried out for this application:

- Examine all the program codes by reading through it. Consecutively, try to spot algorithm, data and syntax faults.
- Compare the code with the specifications and with design to make sure all relevant cases have been considered.
- Publish the web pages in web browser in order to eliminate remaining syntax faults.
- Develop test cases to show the input is properly converted to the desired output.
- Boundary conditions are tested to make sure the functions run at boundaries established for limiting or restricting processing.
- Test all errors handling paths.

Unit testing follow exactly these steps, and one specific unit is examined with them one at a time.

7.2.2 Integration Testing

After satisfied that individual components are working correctly. These components will be combined into a working system. This will be the beginning of integration testing. The integration process is planned and coordinated properly with the intention that the faults which occur during this stage do not rely within the unit of the system. This will be easier for the task to detect the cause of the faults. The emphasis of integration testing is on testing interfaces between modules.

The top down integration approach has been adopted for this system. The top level controlling component is tested by itself. Then, all components called by tested components are combined and tested as a larger unit. This approach is reapplied until all components are incorporated.

Table 7.2.2 Integration Testing and Evaluation

Aspects	Tested	Evaluated
Ease of navigation	√	Good
Linkage	√	Good
Information shared	√	Good

7.2.3 System Testing

System testing is very different from unit testing and integration testing. In unit testing, developer has complete control over the testing process, including prepared test data, and test cases. However, in system testing, the customer also test the system, making sure that it meets their understanding of the requirement, which may be different from the developers. Different from other testing objective, the purpose of system testing is to ensure that the system does what the customer wants it to do. There are several steps in testing a system which are functional testing, performance testing, acceptance testing and installation testing.

a) Functional Testing

System testing begins with function testing which is based on the functional requirements. A function test checks that the integrated system performs its function as specified in the system analysis. In OSS, function testing will be carried out on two main modules which are user module and administrator module.

Table 7.2.3 Functional Testing and Evaluation

FUNCTIONAL TESTING			
(1)	**User Section**		
Aspects		**Tested**	**Evaluated**
a)	**User Register / Login Module**		
	Login	√	Good
	Logout	√	Good
	Register	√	Good
b)	**Question Design**		
	Add, delete, edit question and answer	√	Good
c)	**Email Sending**		
	Send Email to respondent	√	Good
d)	**Add Respondent**		
	Add, delete and edit respondent	√	Good
(2)	**Administrative**		
Aspects		**Tested**	**Evaluated**
a)	**Request For Quotation (RFQ) Features**		
	Add, delete, edit respondent	√	Good
	View Survey created	√	Good

7.2.4 Performance Testing

Performance testing compares the integrated components with the non-functional system requirement. It addresses the non-functional requirements. The non-functional that have been stated during system analysis and design phase will be tested one by one with all function. Thus, for PSCG, the performance test will be focus on the aspect of user friendly, integrity, efficiency and flexibility.

Table 7.2.4 Non-Functional Testing and Evaluation

Non-Functional Aspects	Tested	Evaluated
Attractiveness	√	Fair
Page layout / design	√	Fair
Readability of Text	√	Good
Hyperlink Performance	√	Good
Response Time	√	Good
Retrieval of Data	√	Good

7.2.4 Acceptance Testing

This is the final stage in the testing process before the system is accepted for operational use. It is supposed to be tested with data supplied by the respondents (sample of data entry from respondent using different email account) rather than simulated test data using UM mail only. Due to this, I had failed to get the data from them for testing purpose. So this testing test was merely test the acceptance of the user towards the interfaces. After this testing stage, the interfaces design was improved to fulfill the user needs.

Chapter 8: Discussion

8.1 System Evaluation

System evaluation is a process that occurs continuously at all the phase of the system development. Evaluation phase was to determine the extent to the outcomes of the system that have been realized. The system limitations and the future enhancements also were considered. Lastly, conclusions will be making for this system.

The Online Survey System has unambiguous and straightforward definitions. However the process of developing the system is as challenging and demanding as any other development projects. Various difficulties from minor setbacks to some considerable problems have been faced. But none of them are intricate enough to put as the risk in the system development.

8.2 Problems encountered and recommended solutions

Throughout this project, many problems have kept unfolding one after another as development work progressed due to many reasons.

8.2.1 Determining scope of the system

Problem: Since there is less experience in developing system, it was hard to determine the extent to define the scope of the system at the analysis phase. It is impossible to build a full-scale system due to the time constraints. Furthermore it is difficult to build a system with unfamiliar programming language as it is very time consuming to learn a new language.

Solutions: The problem can be overcome by analyzing and studying the existing system. Besides that, discussions were held with supervisor to clarify the scope of the system.

Opinions from the end users were also considered. After the project scope has been defined, analysis of the system was done and the projected started to develop.

8.2.2 Time constraint

Problem: There was not enough time to study, learn and produce the best solution of design in first semester. This because of inexperience and insufficient knowledge in design and develop the system. Further more, time is needed to learn and explore new technologies and language like VB.NET and SQL server. It is compulsory to know it before apply it in the process of developing and solving problems.

Besides that, some of the suggested module such as analysis of the survey is unable to complete as I faced a lot of problem when doing the analysis report. The result of the survey is depending of the respondents. I was able to generate a simple graph by using the testing data. But it becomes a problem when I try to combine all the modules.

Besides that, the design for the survey system is very simple as I lack of the knowledge in the web designing. I just use same simple flash action in my system.

Solution: The best way is to study as many approaches used by senior with refer to the previous year student's documentation. Besides that, suggestions and advice from

the senior who had developed a system before also led to a better understanding to the system going to developed.

8.2.3 Problems in selecting the system development tools

Problem: There are a lot of good and potential development tools available for the use of developing the system. However, not all the tools are suitable in developing the OSS. Each of the tools has their own strengths and weaknesses. The critical to make a right choice .The task of choosing the right development tools always remain as the toughest question to answer. Moreover, inexperienced towards understanding and knowledge of the selected development tools must also take in consideration.

Solutions: Analysis the system requirements and fact-finding methods had been carried out in order to find the best combination of the development tools. Besides that, Information from internet and discussion with course mates also contributed in finalize the development tools selection.

8.3 System Strength:

- **Dynamic Designing Survey**

Online Survey System Provide an easy way for the user to create a survey. OSS supports dynamic designing survey where the users can create their own question in different type such as open-ended and closed ended.

- **User Friendly**

My system has user-friendly interface that will tell the users how to work with this system. There will be short guidelines for people who are not familiar with this

system. User can handle and perform their task easily. This user friendly interface will shorten the user learning curve.

- **Page restriction access security incorporated**

OSS is mainly divided into three user privilege areas, which are respondent, user and administrator. Thus, it is crucial for the system to have stringent page restriction access security. When a user is logging in, the system will verify that a user has the proper credentials to access a web page before it is displayed on his screen. With this security feature, user will not be able to access to other web page with different user privilege level.

- **Validate on input data and display error message**

Data validation is done prior to submission of a form. If important fields have not been filled, the user will be prompted to refill the form. Client-side data validation will ease the traffic in Internet since validation procedures are done in client-side before any transmission of forms through the network to the server. The user will also be informed by error message when the system encounters exceptions.

8.4 System constraint

8.4.1 Speed for data retrieval limitation

If the system is implemented on any computer model that less than Pentium III and with a little memory space, the process of retrieving the information form database and the display time would be become very slowly.

8.4.2 Browser Limitation

To fully utilize Online survey system, the browser used in the client side (Internet Explorer or Netscape) must be at least version 4.0 or above). If the user's browser is below that version, some of the functions and commands might not be support.

There are some limitations for the system that will be developing:

i. Since the survey is conducting on the network. So without the internet service, the system cannot be implemented.
ii. Current use of the Internet is far from universal. Internet surveys do not reflect the population as a whole. This is true even if a sample of Internet users is selected to match the general population in terms of age, gender and other demographics.
iii. The respondents are limit to those who have email account.
iv. Survey cannot be conducted when server down.
v. The survey only can be done with the cooperation from the audiences.

8.5 Future enhancement

Within the period of the development, several new ideas have arisen and can be addressed in the future development and enhancement. Due to the time constraint and other factors, not all the ideas could be incorporated into the system, It is hoped that the following suggestions could be considerate in future enhancement.

8.5.1 Multilanguage support

Currently all the information is available in English only .Future enhancement for this system should include other language support. The system should enable the information to be displayed in different language such as Malay and Chinese. This

will broaden the usage of the system as the system can be used by the users from different countries .

8.5.2 Interactive and context-sensitive help

Currently, this system does not provide any help function. In future, a help module should be integrated into this system and be an interactive and context-sensitive help so that the user seeking for help can assess the relevant information immediately.

8.5.3 Provide spelling checking capability

The function of spelling checking can be added in the system. So that the user can check for the spelling and grammar mistakes for the questions they had added into the survey form. This is to ensure the expression text in the survey form is in the correct spelling. This would help to reduce the probability in errors in the survey form.

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