Faculty of Computer Science and Information Technology,
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CAMPAIGN MANAGEMENT
of
CUSTOMER RELATIONSHIP MANAGEMENT (CRM)

BY:

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ABSTRACT

Campaign Management is a management process on the campaign launched by the organizations when they want to promote their new products or new services to the marketplace. They do so with the expectation to capture as much attention as possible from the public on their promoted products or services through the launched campaign. Campaign can be launched through multiple types of channels, such as advertisement in mass or printed media etc. Since these kinds of campaigns need much capital to be invested, so the investors' main purpose is to get back their Return-on-Investment (ROI) in the shortest period and generate revenue and profitability from the campaign.

In this thesis, the Campaign Management System consists of four modules, which are Campaign Management Module, Lead Management Module, Customer Management Module and Campaign Analysis & Reporting Module. The functionalities in all of these modules include campaign planning, campaign management, response tracking, budget & revenue tracking, lead generation, lead dispatching, lead distribution, customer profiling, campaign performance analysis, reporting etc.

As for development environment, ASP.NET and VB.NET have been chosen as the application language, and hence, .NET Framework automatically becomes the chosen framework. Meanwhile, SQL Server is chosen as the Database Management System; Internet Information Services (IIS) as the web server and Active Data Object, or ADO.NET as the data access technology.

As overall, there will a high expectation that this system can be designed to be the user-friendly system, with sophisticated graphical representation on data mining and high sensory of critical information, like campaign progress, budget, generated revenue, lead status etc. Hopefully, these features might help some of the small- and medium-sized companies to effectively and efficiently handle their campaign, and hence maximize their ROI and revenue in the shortest period.

ACKNOWLEDGEMENT

First of all, I would like to thank Faculty of Computer Science and Information Technology (FCSIT) to give this opportunity to me to take these meaningful subjects, Latihan Ilmiah WXET 3182. Through this course, I can improve my knowledge on IT and gain experience on how to develop a system. This is very useful to help me in my career in future.

Secondly, I would like to extend my heartiest gratitude to my project supervisor, **Mr. Ang Tan Fong** for his excellent guidance, patience, encouraging advice and willingness to share his precious time, knowledge, experiences throughout the system development. He had spent his precious time on supervised me on my system that I develop and help me to solve my problems that I faced during my report writing. He is always there when I need any guidance. Besides that, his suggested reference and samples on Customer Relationship Management (CRM) also give me a wider sight and the clearer picture of my project scope and requirements. Here I also would like to thank him again for providing all sources, references, documentations, and others to me in completing my project.

Besides this, I would like to express my special thanks to my project moderator, **Mr. Liew Chee Sun** for his constructive criticism with many valuable suggestions and also as being my moderator for this project. His suggestions, which giving more emphasis or focus on database security are very meaningful. He approaches that critical data that

stored in the database system should be encrypted for double level security. I would very thankful on his constructive suggestion.

My sincere appreciation also goes to **Mr. Steven Wong**, the Managing Director of AccelTeam Sdn. Bhd., who has contributed new ideas and suggestions for further enhancement for my project. He is a very knowledgeable person in CRM. Besides the some requirements that I need to develop in my project, he also gives my endless exploration on the current business and market trend nowadays. I strongly believe that the knowledge and ideas he provided is very useful for me, not only for this project, but also for my next involvement in society, after my graduation.

Finally, I also like to thanks to all who had assisted me unconditionally. Their kind support has helped me to pull though the challenges to ensure the success of this project. Without all their help, I am sure that this project will not be as successful as it is planned and smoothly done. So, I am deeply grateful to all of them and I would like to say thanks again.

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1.1 Overview of Customer Relationship Management (CRM)

1.1.1 What is CRM?

CRM is an integrated approach to identify, acquire, and retain customers. The keywords here are "identify, acquire and retain customers". This is because CRM is implemented in the very initial phase, where launching a series of campaigns starts it. Through campaigns, potential customers, or it is sometimes called as leads or prospects can be identified. After they have been identified, the follow-up processes will be done in order to acquire leads as many as possible and convert them into company's customers. After they become the organization's customers, then customer service and support plays a very essential role in retaining customers' loyalty to their company's products or services.

This is a long-term process, and it happens iteratively. From the work of identifying customers from the wide market, then do customers acquisition, and lastly maintain the customers' loyalties to organization, CRM has been integrated with full-implemented features to undergo every single work or job in order to make a long-term relationship with customers.

By enabling organization to manage and coordinate customer interactions across multiple channels, departments, and lines of business, CRM helps organization in

maximizing the value of every customer interaction and drive superior corporate performance.

Today's organizations must manage customer interactions across multiple communications channels—including the Web, call centers, field sales, and dealers or partner networks. Many organizations also have multiple lines of business with many overlapping customers. The challenge is to make it easy for customers to do business with the organization any way they want—at any time, through any channel, in any language or currency— and to make customers feel that they are dealing with a single, unified organization that recognizes them at every touch point.

1.1.2 Why is CRM Necessary?

Several companies are turning to CRM systems and strategies to gain a better understanding of their customer's wants and needs. Used in association with data warehousing, data mining, call centers and other intelligence-based applications, CRM allows companies to gather and access information about customers' buying histories, preferences, complaints, and other data so they can better anticipate what customers will want. The goal is to instill greater customer loyalty.

Other benefits include:

- Faster response to customer inquiries
- Increased efficiency through automation
- Deeper understanding of customers
- Increased marketing and selling opportunities

- Identifying the most profitable customers
- Receiving customer feedback that leads to new and improved products or services
- Obtaining information that can be shared with business partners

1.2 Overview of Campaign Management System

As known, normally a campaign is launched by organizations when the organizations are promoting their new products or services to the market. So, a series of campaigns will be launched in order to get the attention from the public.

As mentioned earlier above, in the process to identify the potential customers in the wide marketplace nowadays, campaign management plays a crucial role to determine the success or failure of the organizations. How far an organization cans goes in term of the revenue generations, profitability and returns on investment, is depend on the campaign launched.

Basically, the campaigns service integrates all marketing activities aimed at building relationships with leads or customers. At the same time, it enables mass email to be sent to all contacts related to a campaign.

Campaign management allows marketing executives to see the impact of their marketing campaigns in real time, including seeing the specific opportunities generated by their efforts.

The campaign management module allows companies to generate quality leads at a lower cost and to work more effectively to ensure that every lead is quickly followed up, which ties higher revenues back to marketing campaigns. In short, the well-managed campaign can increase the lead response rate and customer retention.

1.2.1 How Campaign Management Works?

The process flow of campaign management is as below:

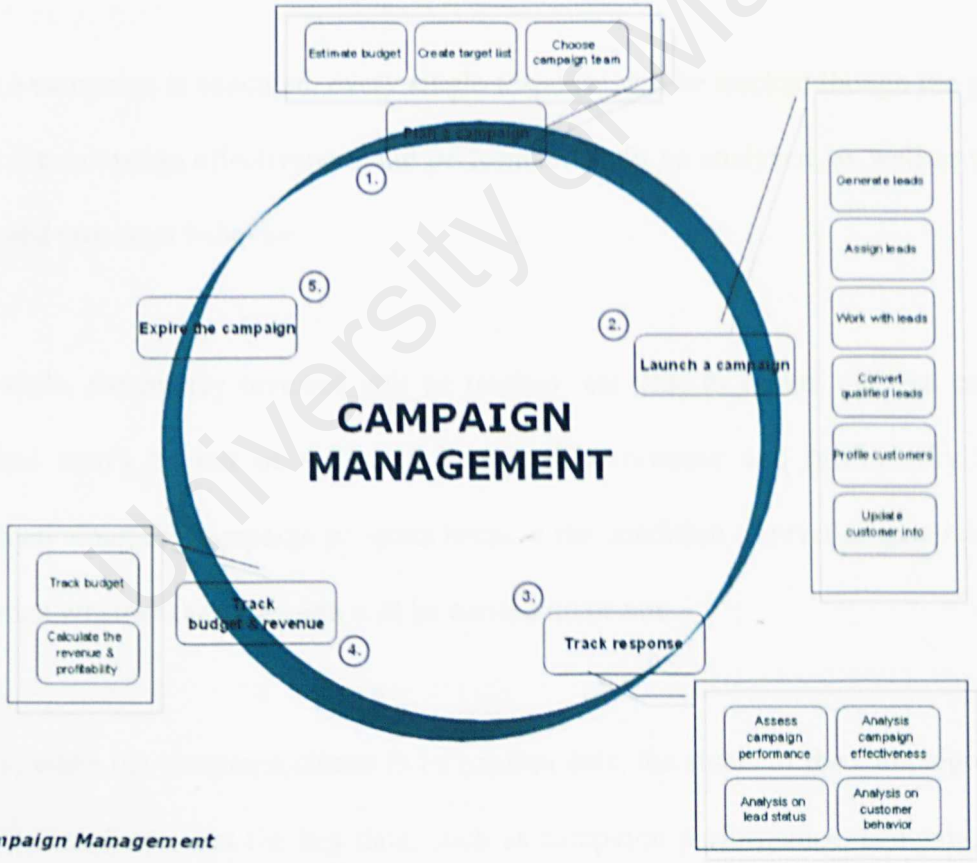

Figure 1.1: The Process Flow of typical Campaign Management System

As shown in the Figure 1.1, typically, campaign management is initiated with the campaign planning, where in this phase, the budget is estimated, target list is determined, and a campaign team will be given responsibility to launch the campaign.

After the campaign is launched, the focus of work is shifted to the Web-based lead generation. Every single lead will be assigned to certain people to do the follow-up procedure. Once the potential lead is identified, then the lead will be qualified to convert to customer level. Of course, when he/she become the company's customer, customer profiling have to be done so that the customer information is updated from time to time.

When a campaign is executed, every single response will be tracked though the process, where the campaign effectiveness and performance will be analyzed, as well as the lead status and customer behavior.

Meanwhile, the money invested will be tracked real time to ensure that the campaign launched won't be out of estimated budget. The revenue and profitability will be calculated along the campaign progress because the condition of revenue generation will determine whether the campaign will be carried on or not.

Finally, when the campaign comes to be expired date, the status of the campaign will be stated as inactivate, but the key data, such as campaign performance, campaign owner and started date will be retained. This process has to be done with the aim for future reference.

1.3 Typical Campaign Problems

Hardly measure the campaign Return-On-Investment (ROI)

Various estimates put the amount of money spent by the Global 1000 on marketing campaign at roughly $100 billion annually, and growingly. Unfortunately, most companies have been seeing a declining return in this investment, in the form of increasingly lower response and acceptance rates to campaigns, higher customer churn rates, and eroding brand loyalty. Thus, more and more money that have been invested into the campaign become less effective.

Uncertainty in measuring campaign effectiveness

In the way of determining whether the campaigns launched are extremely effective, or very effective, or moderately effective, or not very effective, or not at all effective, this might be some conflicts occurred vary on geographical perspective, played role perspective etc. For example, a survey demonstrated by Accenture indicated that the campaign effective definition from marketing executives in United States is slightly different with the marketing executives in United Kingdom.

From a geographical perspective, there are some differences among the respondents' self-ratings in different country. Meanwhile if respondents are given the role as the person who defines the effectiveness of one campaign, should this role give to marketing executives also in a fair situation? Thus, this might be quite confusing in determining the effectiveness of the campaign.

Challenges in measuring campaign performance

There are some metrics in measuring the campaign performance. The metrics like response rate, revenue generation, customer retention and profit generation can be taken into consideration. But problem is arisen when marketing executive want to precisely measure these metrics gathered from the respondents or market. For example, non-financial measure like response rate is very hard to undergo especially when it is cover a wide area and worldwide.

Missing many potential leads

For most of the companies in the worldwide nowadays, they are making their best effort to acquire or capture as many leads as possible through multiple channels, like web-based lead generation, fantastic advertisement in mass media or printed media, seminar or conference held in hotel or public center, and others.

Meanwhile, some of them might not realize that in the process of capturing leads from various sources, they might miss or loss many potential leads, due to unsystematic leads follow-up procedure. When these leads are captured by their competitors then, this is something that very discouraging.

Inaccurate or outdated data

Another disappointing event occurs when the company stores the inaccurate or outdated data. For example, if the customer's telephone number or mailing address is inaccurate, then the company might have the risks that miss a customer. Since the relationship built

between the company with her customer is not longer strong, so how to maintain the customer's loyalty to their brand, products or services?

1.4 Project Motivation

My main motivation encouraging me to develop the Campaign Management System is where users can effectively and precisely measure their ROI on their launched campaign, with the assistance of sophisticated data mining tools. And thus, the users, or the organizations manage to increase and maximize their revenues, as well as reduce operational costs.

This can be achieved if all campaign numeric information is completely transparent, obvious and is continually updated in real time. Everyone who is involved in campaign management – including administrator, campaign manager, lead manager, customer manager, campaign analyst and others can possesses a clear, reliable understanding of every task that might be their responsibility.

Realizing that the power of the Web is paramount for success in today's business environment, many companies are frantically web-enabling their network-based software, and taking the advantages of the latest Web technologies to build up a Web-based system. Of course, CRM and Campaign Management System are among the system that is needed by the organization from all sizes (small, medium or big) and all industries, such as telecommunication, automotive, steel, textile, petroleum and gas etc.

1.5 Project Objectives

Measure and maximize campaign effectiveness

By having the detailed response and revenue tracking, all aspect reporting, and sophisticated analytical tools, the precise measurements on every campaign can be predicted, and thus the return on investment can be easily measured and maximized. Maximum revenue and profitability generations might become the next purpose via the successful and effective campaign.

Increase qualified leads and ensure no leads are dropped

The well-sorted leads information can let user identify the best sources for highly qualified prospects. Besides this, if the high potential lead is interacting with the company, then the system must highlight it so that the lead manager can identify it for further follow-up action.

The ease with which leads are captured, qualified, routed and distributed from any sources indicates that any opportunity will never be missed out. All hard-earned leads need a systematic follow-up procedure on time.

Gain more accurate and fresh data

The data gathered, including the customer and lead information, is accurate and not outdated. This is very important for the companies, especially if they want to make a tight and long-term relationship with the customers.

1.6 Project Scope

As known, Campaign Management is the subset or sub module of CRM. Thus, in my project here, I won't focus on other CRM modules, such as Sales Automation, Customer Service & Support and so on. What I want to cover here might be most of the Marketing Automation in CRM, and will more focus on Campaign Management.

Thus, the scope of my project covers campaign management, lead management, customer management and campaign analysis and reporting.

1.7 Project Constraints

As usual, every project development faces its own set of constraints. The same applies to this project too. However, this is non-commercial software development process but just merely a final year thesis for Computer Science and Information Technology undergraduates, so tight budget is not the major issue for this particular project.

As early as the planning phase, several major constraints have been identified. They are the limited time, inexperience and limited human resources. As can be referred in the project schedule earlier, we have been given roughly two Semester time to finish the project, starting from the feasibility study phase till the project maintenance and operation phase. This excludes the public holidays, examination time and so on.

Also, this project is not a full time development as I also have to concentrate on other subjects which I take in the same time. The subjects taken also have their own

assignments which I need to complete. So, the time allocated is really very limited and tight. Next major constraint is due to my own inexperience. So far, I just learnt all the system development theory and get know with all the software and Computer-Aided Software Engineering (CASE) tool, but don't really know to apply it on system application when doing practical during our lab sessions and assignments. So this is my first time to undertake such a large scale of software development project, by my own, although before this I also had undergone the software development project during my industrial training. Nevertheless, this had been done in team work. Thus, I admit that the project management is not very efficient.

Then, I also admit that I have limited skills and knowledge on this new technology that I am going to leverage. The concept of Campaign Management in CRM is not only very fresh to me, but for the global use, this concept is still in infancy mode. Thus, there are many more things that I have to learn up in order to develop my own Campaign Management.

Apart from these major constraints mentioned, several minor constraints have been identified as well. These are the limited reference books, budget and some technical constraints. When developing the project, I was unable to get the reference books needed from the UM library. They are too new and with limited amounts. So they are either in order process or have been borrowed out.

Limited budget which I am referring here is my personal budget to but reference books and to upgrade my personal computer. The reference books sold are rather expensive

with each of them cost around RM100 and above. So, I have to limit myself to few references only and can't much do more reference more others books which have more details description on the topic that I need.

As this technology is rather new, so greater system requirements is needed in order to run the software. So, I have to upgrade the specifications of my personal computer to the recommended requirements stated in order to run or develop my Campaign Management System.

1.8 Expected Outcome

Expected outcome from Campaign Management Module

I expect this module that can give the outcome that can effectively manage the campaign, from the campaign planning, until the end or expired date of one's campaign. Every process in campaign management will be tracked real-time. The critical data is highlighted so that can give the attention to the users for further action. For example, the response rate of certain campaign will be updated from time to time. Thus, the campaign manager can observe the target list on time and give notice to lead manager to proceed with their work of leads follow-up process.

Expected outcome from Lead Management Module

Outcome that I expect from this Lead Management Module is the sophisticated and user-friendly web page interface so that the lead manager can identify the potential leads at

the fastest time. A pictorial symbol, like an alarm clock will be appeared when the status of lead reached to the negotiate stage.

Expected outcome from Customer Management Module

I expect to have well-sorted customer information in this module. The customer's information, like address, telephone number, behavior and so on will be updated from time to time, so that the process of customer retention would not be failed. Furthermore, the critical data, like the customer behavior will be more emphasized, where an obvious signal will represent every stage of customer behavior. This must be done to avoid the erudition of customer loyalty.

Expected outcome from Campaign Analysis & Reporting Module

Campaign Analysis and Reporting Module is very important because all the metrics, like revenue generation after a campaign is launched, profitability, and response rate are determining the campaign effectiveness and performance. Thus, I expect to use the graphical representation, like bar chart, line chart or pie chart to represent to numeric data collected as the result of launching campaign. This must be done so that the campaign analyst and top management can precisely observe the campaign workflow and profitability.

1.9 Project Schedule

The schedule is rather tight in its nature. As development process of this project is not full time as I also have to cope with other courses as well in the same time, so once in

CHAPTER 2 LITERATURE REVIEW

2.1 Review and Analysis on the Existing Systems

2.1.1 Case Studies Overview

2.1.1.1 Case Study 1 - Entellium (http://www.entellium.com)

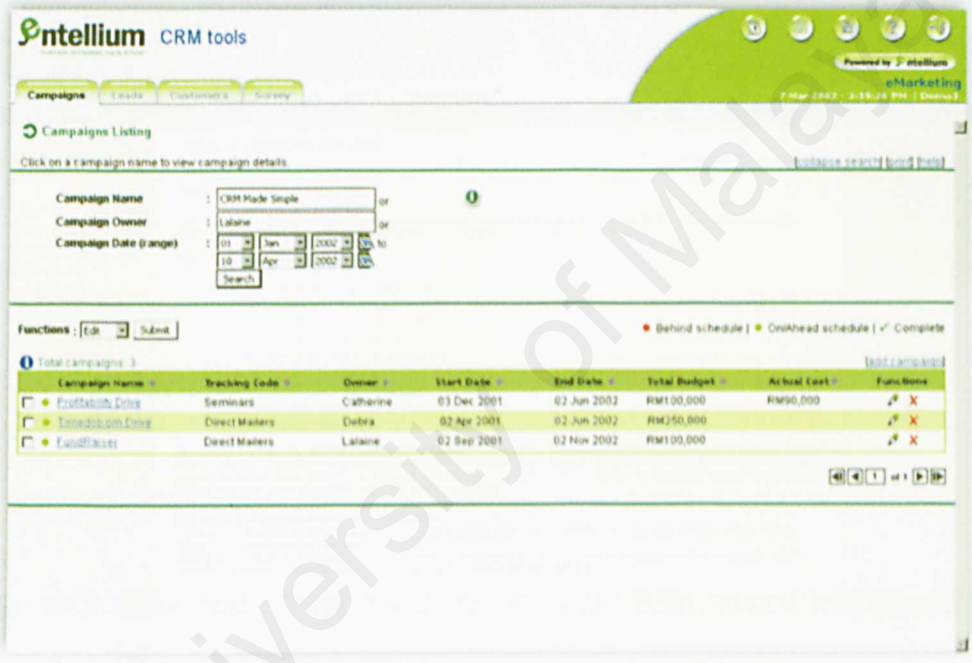

Figure 2.1: The sample page of Entellium

Entellium is a full CRM-implemented company. Its operation started in the early of 1996. The company founder, Paul Johnston has the mission that makes the customer business simpler, accessible and liberating. Thus, he draws up plans to use the Internet as a means to deliver CRM software solutions as simply as the services of the electricity or water company. This means just by turning it on. And finally, he established a CRM

Company and called it Entellium. Until today, Entellium has emerged as one of the leading CRM Company which has about 2,000 companies worldwide as her customers.

2.1.1.2 Case Study 2 - FrontRange (http://www.frontrange.com)

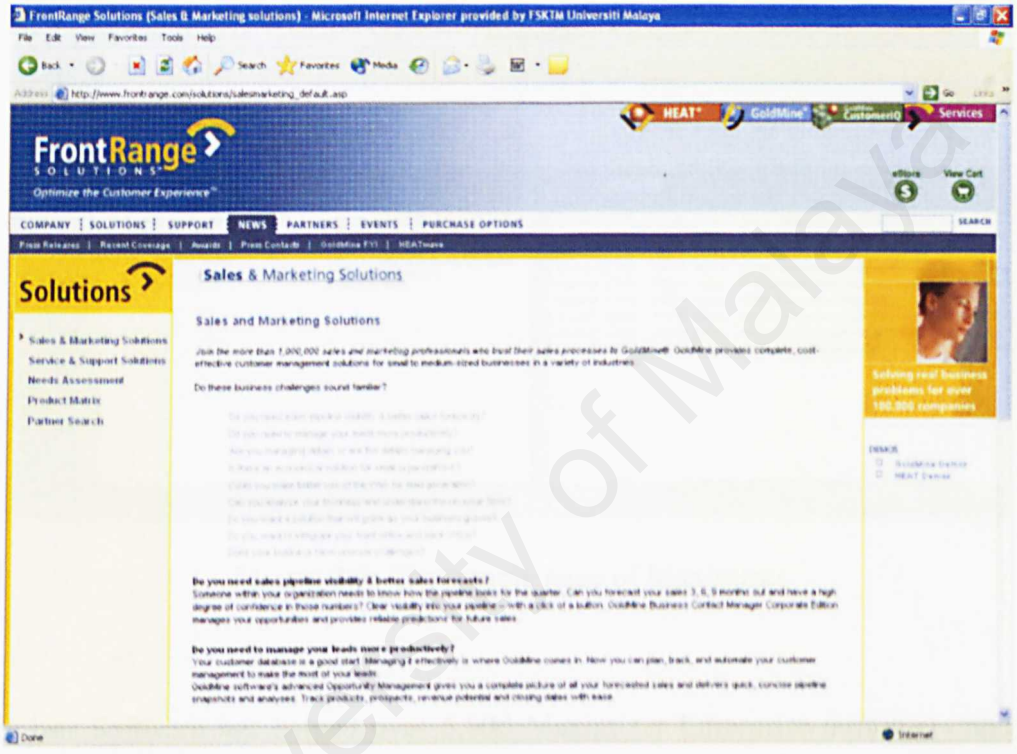

Figure 2.2: The sample page of FrontRange

FrontRange was founded in 1989. As an international leader in business relationship software for nearly 15 years, FrontRange Solutions employs more than 500 people worldwide. This company provides outstanding customer service to the over 100,000 customers and one million plus users. Basically, its products address the needs of customer service and support (help desk), sales force automation (SFA), knowledge management and customer relationship management.

2.1.1.3 Case Study 3 - Maximizer (http://www.maximizer.com)

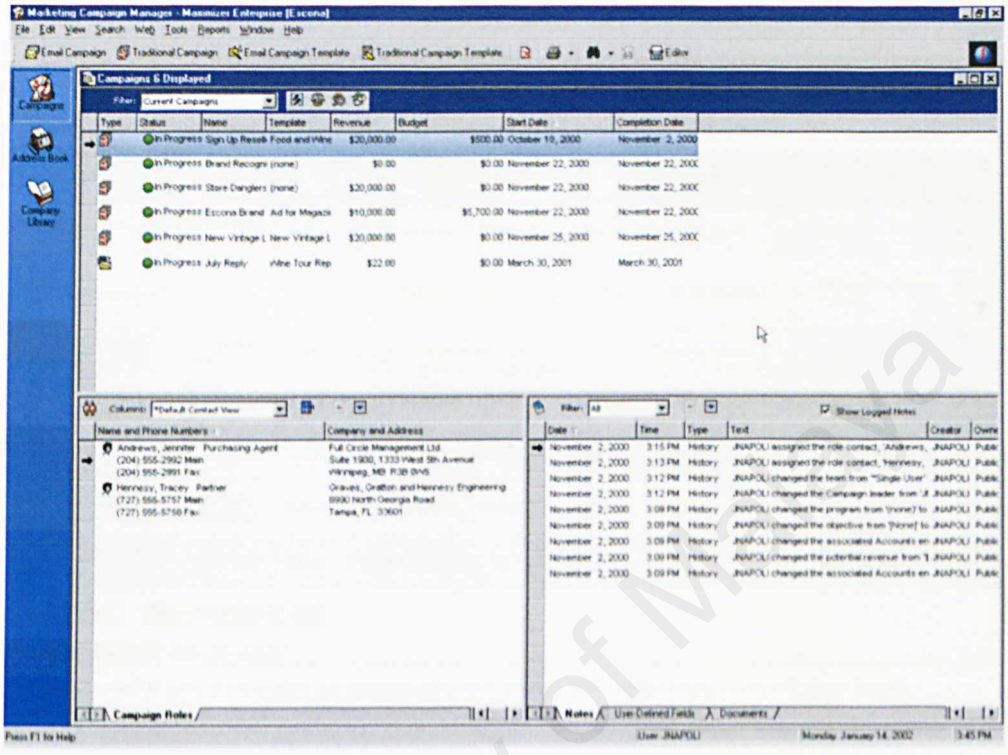

Figure 2.3: The sample page of Maximizer

Maximizer Software has helped over 5,000 Maximizer Enterprise customers and over one million Maximizer users. Maximizer used to be the highest achievement on award-winning solutions.

Basically, its reseller business partners and offices are located in its three regions: Americas, Europe/Middle East/Africa (EMEA), and Asia Pacific. Until now, its customers include leading companies such as Siemens, Nestle Clinical, Ipsos-Reid, Ericsson, HSBC, Singapore Airlines, Cathay Pacific, William Mercer, Hitachi Data Systems, and Bank of New York.

2.1.1.4 Case Study 4 - PeopleSoft (http://www.peoplesoft.com)

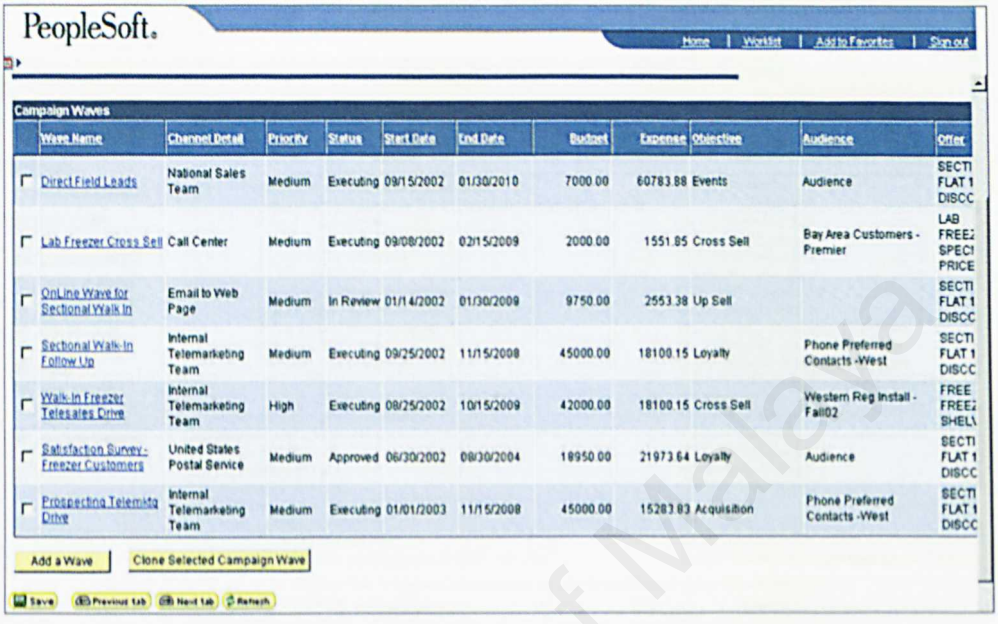

Figure 2.4: The sample page of PeopleSoft

PeopleSoft started its operations in the mid-1980s. In 1998, the company directed the bulk of resources: $500 million and 2,000 developers over two years into their new pure Internet platform for the real-time enterprise. And today, more than 1,000 customers in 144 countries are reaping the real-world benefits of their investment via PeopleSoft's CRM Solution and others business solution.

Peoplesoft is not fully CRM implemented company. Besides CRM, this company also provides some business-based service solution, like Supply Chain Management (SCM), Certified Finance Planning (CFP) and so on.

2.1.1.5 Case Study 5 – SalesForce (http://www.salesforce.com)

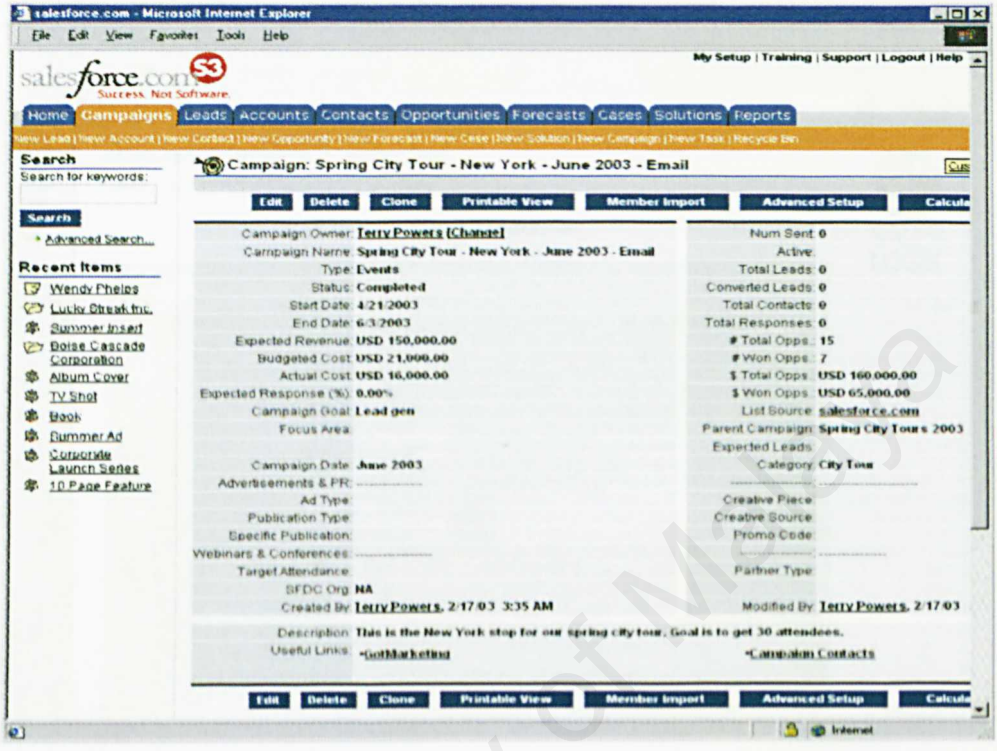

Figure 2.5: The sample page of SalesForce

SalesForce is a full CRM-implemented organization. It was founded in 1999 by former Oracle executive Marc Benioff, who pioneered the concept of delivering enterprise applications via a simple Web site. Her CRM solutions are suited to the companies of all sizes, in all industries, in 110 countries around the globe, Same as Maximizer, SalesForce used to achieve award-winning suite of online CRM solutions. Until today, SalesForce's customers are more than 6,900 companies worldwide, like AOL Time Warner, Autodesk, Avis, Cigna, Daiwa Securities, Dow Jones Newswires, First Union National Bank, Fujitsu, Nokia, Siemens PT&D, Textron Fastening Systems, and USA Today.

2.1.1.6 Case Study 6 – SalesLogix (http://www.saleslogix.com)

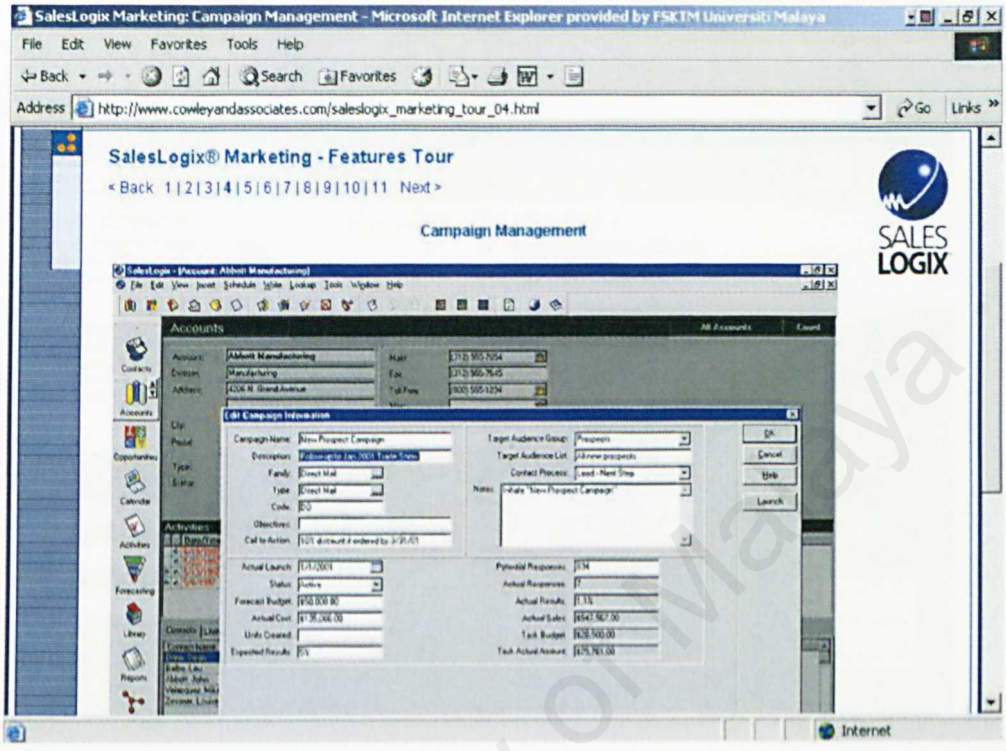

Figure 2.6: The sample page of SalesLogix

SalesLogix was created in 1996 to fill the sales force automation needs of small and mid-sized businesses (SMBs). When time is passed, SalesLogix evolved into a full customer relationship management (CRM) solution and became a logical upgrade for ACT! Users needing to move from contact management to CRM.

Nowadays, SalesLogix's customers list has more than 5,100 companies worldwide, making it the CRM leader for small to mid-sized businesses. Being the full CRM implemented company, SalesLogix has emerged among the leading CRM company in the world.

2.1.1.7 Case Study 7 – SalesNet (http://www.salesnet.com)

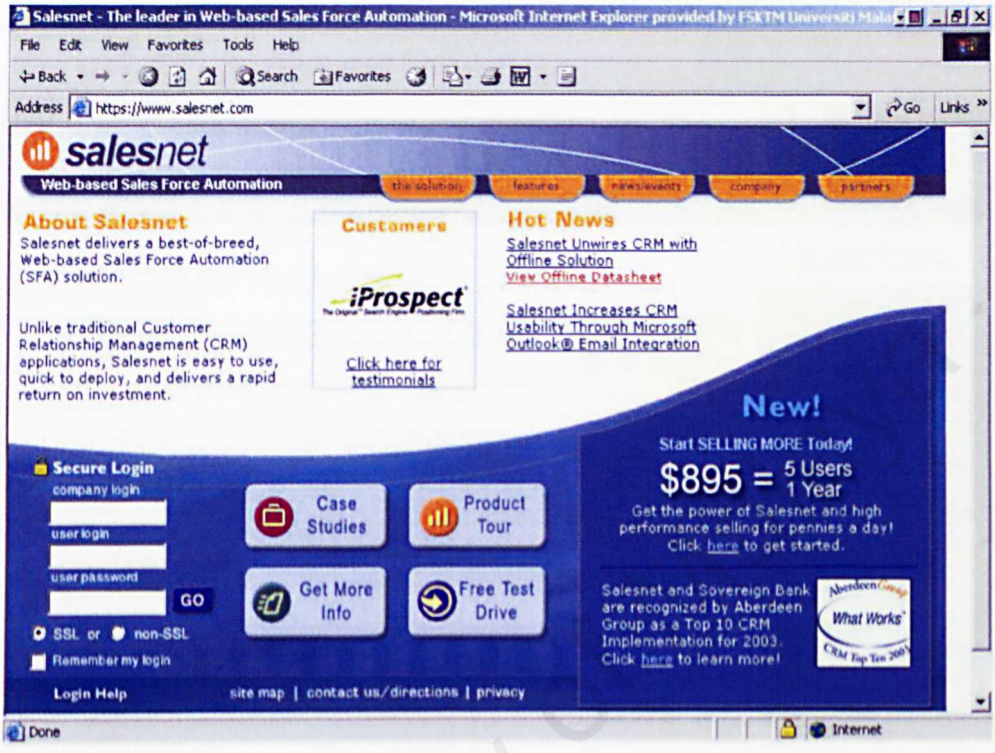

Figure 2.7: The sample page of SalesNet

SalesNet is a full CRM-implemented company. Salesnet's service drives billions of dollars in revenue by thousands of sales professionals at enterprise companies such Software AG, Staples, Inc, Sovereign Bank, and Tellabs.

SalesNet acts as a great quality control system for their customers. And, SalesNet is a great process management tool. The list was easily narrowed to SalesNet's Web-based solution because of its unique Process Builder technology.

2.1.1.8 Case Study 8 – SAP (http://www.sap.com)

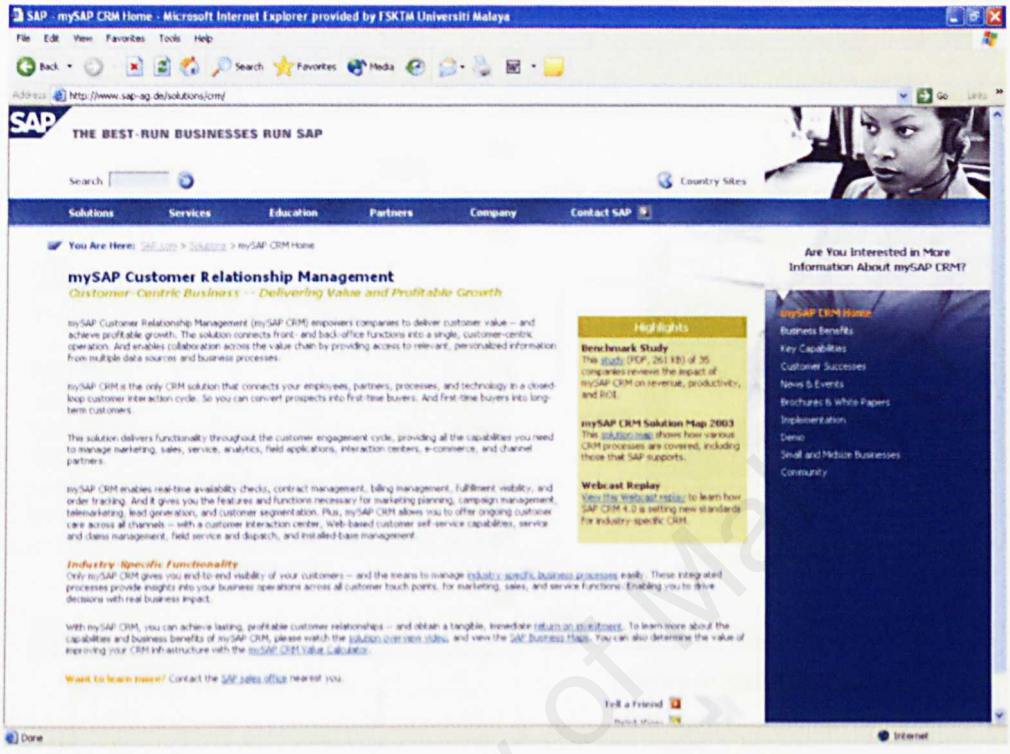

Figure 2.8: The sample page of SAP

SAP was founded in 1972, where it headquartered in Walldorf, Germany, Being the world's largest inter-enterprise software company, and the world's third-largest independent software supplier overall, SAP employs over 28,900 people in more than 50 countries. Until today, SAP has more than 12 Million Users who use its SAP Solution.

SAP is not only focusing in CRM Solutions. This company also successfully produces a lot of business solution to utilize the power of Internet, in order to fulfill their customers' requirements.

2.1.1.9 Case Study 9 - Siebel (http://www.siebel.com)

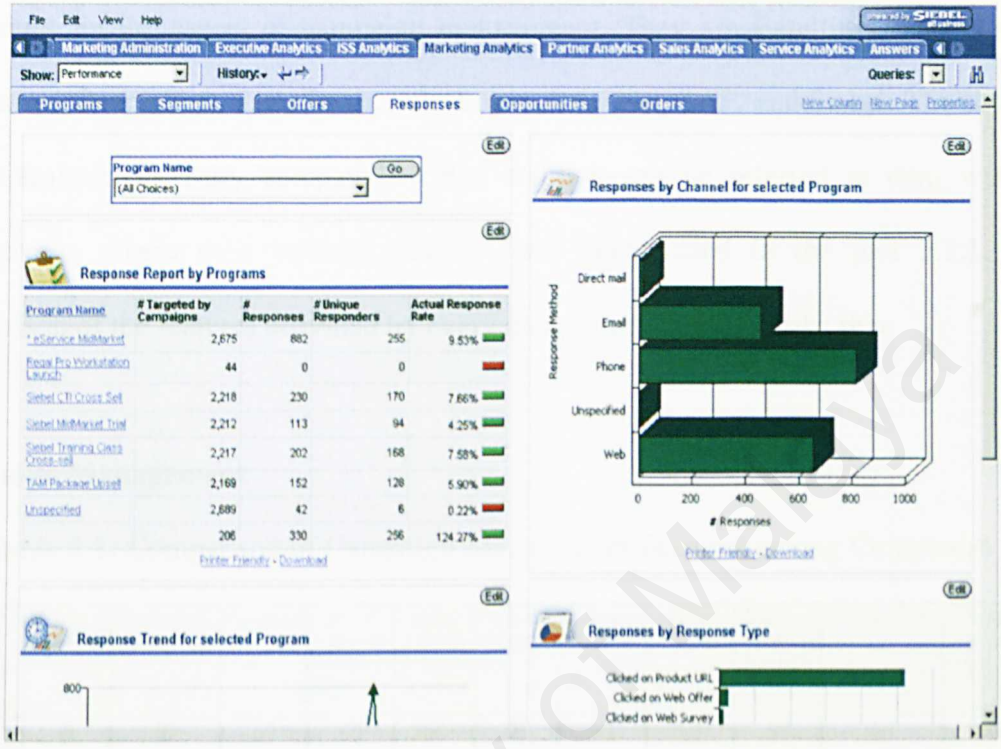

Figure 2.9: The sample page of Siebel

Siebel Systems is rapidly growing and highly under-penetrated market. Nowadays, theis incorporation has more than 3,500 customers worldwide, where Siebel Systems' sales and service facilities are located in more than 28 countries.

In the year of 2002, the organizations spent nearly $25 billion on CRM software. This figure is expected to grow at a double-digit compound annual rate over the next several years. Of that total, only $3.7 billion, or about 15%, was spent on packaged CRM applications. The remainder went to build custom solutions.

2.1.2 Results of Case Studies

I have done some researches on the features integrated in all these top class CRM companies, in the aspect of campaign management. They are Entellium, FrontRange, Maximizer, PeopleSoft, SalesForce, SalesLogix, SalesNet, SAP, and Siebel. The sources of the features in every company's CRM solution can be referred in their website respectively, where their website address have been stated in the part 2.1.1. The comparison of the features provided by every company solutions is like this:

Campaign Management

Table 2.1: Comparison of Campaign Management Features among Companies

Feature / Company	Graphical Campaign Modeling	Campaign Optimization	Campaign Planning	Multi-channel Campaign Execution	Real-time Response Tracking	Financing Reporting	Campaign ROI	Email Campaign	Campaign Response Analysis	Telemarketing	Expired Campaign Inactivation; Key Data Retained
Entellium	O	O	☑	☑	☑	O	☑	☑	☑	☑	O
FrontRange	☑	O	☑	☑	☑	O	☑	O	☑	O	O
Maximizer	☑	☑	O	O	O	O	☑	☑	☑	O	O
PeopleSoft	☑	O	☑	☑	☑	☑	☑	O	☑	☑	☑
SalesForce	O	☑	☑	☑	☑	☑	☑	☑	☑	O	O
SalesLogix	☑	O	☑	☑	☑	O	☑	O	☑	O	☑
SalesNet	☑	O	O	☑	O	O	☑	O	O	O	O
SAP	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	O
Siebel	☑	☑	☑	☑	☑	O	☑	☑	O	☑	O

Lead Management

Table 2.2: Comparison of Lead Management Features among Companies

Feature / Company	Multiple Interaction Channels	Lead Dispatching	External List Management	Web-Based Lead Generation	Automatic Generation of Follow-Up Activities	Lead Distribution	Lead Management Analysis	Central Lead Source Management
Entellium	☑	☑	O	☑	☑	☑	O	☑
FrontRange	☑	☑	O	☑	☑	☑	☑	O
Maximizer	☑	☑	O	☑	☑	O	O	O
PeopleSoft	☑	O	O	☑	☑	O	☑	O

SalesForce	☑	☑	☑	☑	☑	☑	☑	O
SalesLogix	☑	O	☑	☑	☑	O	O	O
SalesNet	☑	☑	☑	☑	☑	O	O	O
SAP	☑	☑	☑	☑	☑	☑	☑	O
Siebel	☑	☑	O	☑	☑	☑	O	O

Customer Management

Table 2.3: Comparison of Customer Management Features among Companies

Feature / Company	Customer Profiling and Segmentation	Personalized Customer Interaction	Flexible Customer Data Modeling	Customer Contact Transformation	Back-office System Integration	Customer Coordination
Entellium	☑	O	O	O	O	O
FrontRange	O	O	☑	☑	☑	☑
Maximizer	☑	O	☑	O	☑	O
PeopleSoft	☑	☑	☑	☑	☑	O
SalesForce	☑	☑	☑	☑	O	☑
SalesLogix	☑	☑	☑	O	O	☑
SalesNet	☑	☑	☑	☑	O	☑
SAP	☑	☑	O	O	O	☑
Siebel	☑	☑	O	O	O	☑

Campaign Analysis and Reporting

Table 2.4: Comparison of Campaign Analysis Features among Companies

Feature / Company	Target Group Analysis	Response Modeling and Analysis	Business Intelligence Tool	Campaign Success Analysis	Lead Analysis	Interactive Dashboard	Campaign Profitability Analysis	Predictive Actionable Analytics	Sophisticated Data Modeling	Interactive Survey	Report Generation
Entellium	O	☑	O	☑	☑	O	☑	O	O	☑	☑
FrontRange	O	O	O	☑	O	O	O	☑	O	O	O
Maximizer	O	☑	O	☑	O	☑	O	O	☑	O	☑
PeopleSoft	O	☑	☑	☑	☑	O	☑	☑	☑	☑	☑
SalesForce	☑	☑	O	☑	☑	O	☑	O	O	O	☑
SalesLogix	O	☑	☑	☑	☑	☑	☑	O	☑	O	O
SalesNet	O	☑	☑	☑	O	☑	O	O	☑	O	☑
SAP	☑	☑	☑	☑	☑	O	☑	O	O	O	O
Siebel	O	☑	☑	☑	O	☑	☑	☑	☑	O	☑

* O – "unknown"

As shown in these few tables above, I categorized the features related campaign management into four tables, which are campaign management, lead management, customer management as well as campaign analysis and reporting.

The feature that is mostly applied in these companies which related to campaign management is campaign ROI. This feature is integrated with every company CRM solution because the accurate and precise ROI will determine the condition of the campaign. If the ROI is high, then the companies can the corresponding campaign for future reference and re-usage. Besides this, almost every company integrates the campaign response analysis into their CRM solution because they realize that the response tracking must be done in real-time, so that the marketing executive can identify the potential leads in the fastest time.

In the process to well manage on leads, most of the company integrates the fundamental features, such as multiple lead interaction channels, Web-based lead generation, and automatic generation of lead follow-up activities. Multiple lead interaction channels allow marketing executives interact with lead via many channels, like e-mail, telephone, seminar, etc. Web-based lead generation is become common now with the utilization of the power of Internet. Lead information can be captured easily when the leads access to certain websites which acquires them to fill in the Web-based form. After that the automatic generation of lead follow-up activities feature eases the work of lead manager.

Customer profiling become the feature that is integrated in most of the companies, with the aim that customer record and information is always in the fresh and accurate

condition. In order to make a long-term relationship with customer, the companies keep the latest customer records and update their customers about their latest products or services from time to time.

Most of the companies also integrate the campaign success analysis as well as response modeling and analysis features in the CRM solution. These features are usually represented in graphical drawing where common charts are used, such as line chart, pie chart, Gantt chart, network chart etc. Charts are used because they are more easily to analysis on campaign trend and progress, instead of the raw data that had been collected.

2.1.3 CRM-Based Companies in Malaysia

Some of the CRM-based Companies in Malaysia:

Table 2.5: CRM-based Companies in Malaysia

1.	VADS e-Services Sdn Bhd
2.	Axis Systems Sdn. Bhd
3.	Mastek MSC Sdn Bhd
4.	Traveleasi.com Sdn Bhd
5.	Melia Synergy Sdn Bhd
6.	MY Comex Sdn Bhd
7.	Worldwide Infosystems (M) Sdn Bhd
8.	Spirit Interactive Sdn Bhd
9.	Wired For Biz Sdn Bhd
10.	Zenith Software Technology Sdn Bhd
11.	People Associates Sdn Bhd
12.	VP Solutions (M) Sdn Bhd
13.	NDT Software Consulting Sdn Bhd
14.	Lawtech Sdn Bhd
15.	Mercatela (Malaysia) Sdn Bhd
16.	Vantage Point Consulting Sdn Bhd
17.	Allsoft Technologies Sdn Bhd
18.	AccelTeam Sdn Bhd
19.	Aim-Force Software Sdn Bhd
20.	BICS Sdn Bhd

2.2 Review on the Latest Technologies

2.2.1 Software Architecture

There are a few software architectures available now: mainframe architecture, client-server architecture, two-tier architecture and three-tier architecture.

2.2.1.1 Mainframe Architecture

In mainframe system architecture, all operation is within the central host computer. User interacts with the host through a terminal that captures keystroke and sends that info to the host. Mainframe architecture is not tied to a hardware platform. User interaction can be cloning using PCs and UNIX workstations. A limitation of mainframe architecture is that it does not easily supports graphical user interface or accesses to multiple databases from graphically dispersed sites.

2.2.1.2 Client-Server Architecture

Client

Client is a networked information requester, usually a PC or workstation that can query database and/or other information from a server. Clients rely on servers for resources, such as files, devices, and even processing power.

Server

Server is a computer, usually a high-powered workstation, a minicomputer, or a mainframe that houses information for manipulation by networked clients. Server is

dedicated to managing disk drives (file servers), database (database servers), printers (print servers), or network traffic (network servers).

Client-server

Client-server is network architecture in which each computer or process on the network is either a client or a server. Client-server architecture implies a cooperative processing of requests submitted by a client, or requester, to the server, which processes the requests and returns the results to the client. The client manipulates the data and presents the result to the user.

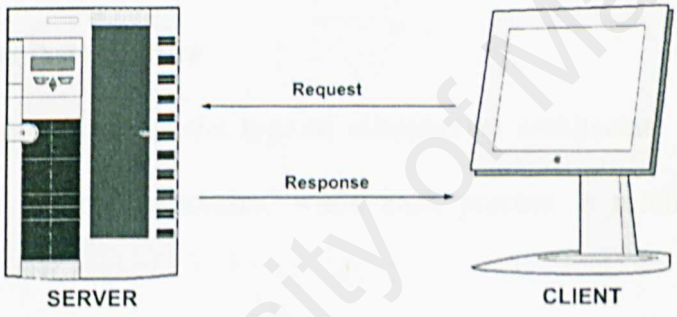

Figure 2.10: One-to-One Client Server

Client-server solutions can be in a many-to-one design that is more than one client typically makes requests of the server.

2.1.3 Two-Tier Architecture

2-tier architecture refers to client/server architectures in which the user interface runs on the client and the database is stored on the server. The actual application logic can run on either the client or the server. There are only the architecturally tiered data server and client.

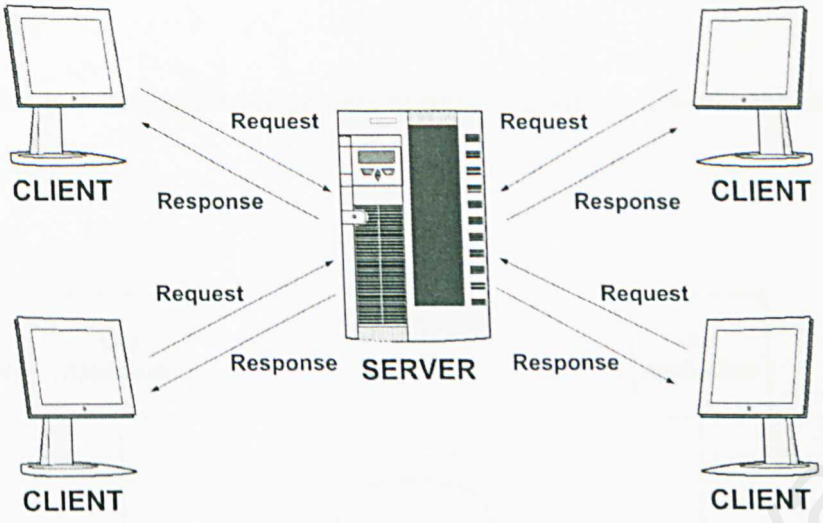

Figure 2.11: Many-to-One Client Server

2.1.4 Three-Tier Architecture

Three-tier architecture is a special type of client/server architecture consisting of three well-defined and separate processes, while each process is running on a different platform:

The three tiers consist of:

Client-tier

Client-tier is the user interface, which runs on the user's computer.

Application-server-tier

Application-server-tier is the functional modules that actually process data. This middle tier isn't present in 2-tier architecture in this explicit form. This tier protects the data from direct access by the clients.

Data-server-tier

Data-server-tier is a database management system (DBMS) that stores the data required by the middle tier.

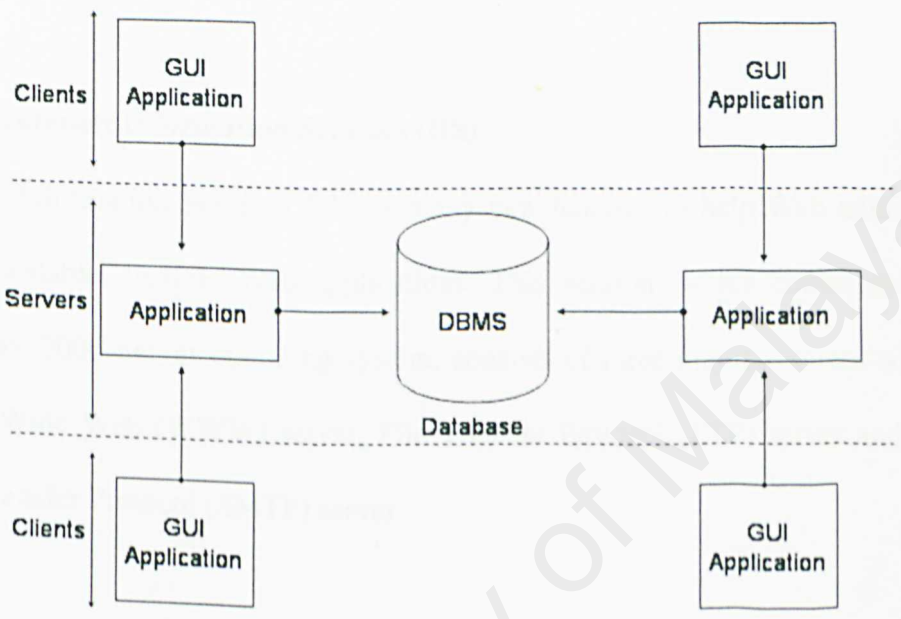

Figure 2.12: 3-Tier Architecture

2.2.2 Web Server

2.2.2.1 Personal Web Server (PWS)

PWS is entry-level/mid-range server for Windows 9x/NT platforms. It is a scaled-down version of the commercial Information Internet Server (IIS) included with the Server edition of Microsoft Windows NT. PWS is a great entry-level Web server that makes it easy to publish personal home pages, serve small Web sites, and share documents via a local intranet.

One of the best uses for PWS is as a platform for testing our Web sites on Windows 95/Windows NT Workstation computers before hosting them on the Internet. This allows users to check the validity of links, scripts, and applications as well as to ensure that the overall organization of the site is functioning correctly.

2.2.2.2 Internet Information Services (IIS)

Internet Information Services 5.1 has many new features to help Web administrators to create scalable, flexible Web applications. This version, which comes as part of the Windows 2000 Server operating system, consists of three major services which are the World Wide Web (WWW) server, File Transfer Protocol (FTP) server and the Simple Mail Transfer Protocol (SMTP) server.

The advantages of IIS can be explained in term of its four major features below:

- IIS 5.1 comes with several industry standard security features such as the digest authentication, secure connection through SSL 3.0 and TSL 1.0, server gated cryptography with strong 128-bit encryption, IP and Internet domain restriction, Kerberos v5, certificate storage, Fortezza, and a security wizard that enables the administrator to easily configure the IIS based on its policy.
- Administration in IIS 5.1 has been improved with support for remote administration, terminal services, accounting and throttling processes, easy start, stop and restart IIS and lastly customizable error messages.

- IIS 5.1 conforms to the latest Internet standard such as HTTP 1.1, HTTP compression, Web Distributed Authoring and Versioning (WebDAV), and multiple sites one IP address feature.
- Programmability in IIS 5.1 has been tremendously improved with the support of ASP 3.0, application protection and ADSI 2.0.

2.2.2.3 Apache

Apache is a powerful, flexible and HTTP /1.1 compliant web servers. It is highly configurable and extensible with third-party modules which makes it very flexible. Apache can be customized by writing "modules" using Apache module API.

It comes with full source code and unrestrictive license. It is able to run on Windows NT/9x, Netware 5.x and above, OS/2, and most versions of UNIX, as well as several other operating systems makes it deployable in various existing environment.

Below are the extra features of Apache:

- DBM databases for authentication allows user to easily set up password-protected pages with enormous numbers of authorized users, without bogging down the server.
- Customized responses to errors and problems allows you to set up files, or even CGI scripts, which are returned by the server in response to errors and problems, e.g. setup a script to intercept errors and perform on-the-fly diagnostics for both users and yourself.

- Unlimited flexible URL rewriting and aliasing may be declared in the config files. In addition, a powerful rewriting engine can be used to solve most URL manipulation problems.
- Virtual Hosts is a much requested feature, sometimes known as multi-homed servers. This allows the server to distinguish between requests made to different IP addresses or names (mapped to the same machine).
- Apache can be configured to generate logs in the format that you want. In addition, on most UNIX architecture, Apache can send log files to a pipe, allowing for log rotation, hit filtering, real-time splitting of multiple hosts into separate logs, and asynchronous DNS resolving on the fly.

2.2.3 Operation System

Operating system (OS) is a platform that performs basic tasks, such as recognizing 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, OS also ensure that different programs and users running at the same time do not interfere with each other. For security, OS ensures unauthorized users can't access the system. OS provides a software platform to allow application programs run on it. The most popular operating systems currently are UNIX, Windows 2000, Windows 98, Windows XP and Linux.

2.2.3.1 UNIX

UNIX is a much older operating system that was created in the late 1960s. UNIX is designed to provide a multi-user, multitasking system for use by programmers. It began as an open source project that became widely used in Universities, scientific labs, and by the U.S. government. 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. Over the years, hundreds of talented programmers contributed their own improvements to UNIX making it extremely robust, stable, and fast. However, UNIX is more difficult to learn and isn't as widely supported as Microsoft Windows 2000 and Windows XP

2.2.3.2 Microsoft Windows 2000

Windows 2000 is Microsoft's latest version of popular Windows NT Operating System. Windows 2000 Server has big improvement over Windows NT 4.0. The changes, both fundamental and cosmetic, have made Windows 2000 faster, more reliable, heavier-duty, and easier to use.

2.2.3.3 Microsoft Windows 98

Windows 98 is based on the popular Microsoft Windows 95 Operating System, and is designed for the consumer market. Windows 95/98 was designed for backward compatibility with older DOS and 16bit programs, as well as providing a platform for the newer (back in 1995) 32 bit programs.

Windows 98 works better by making it simple to access the Internet and by providing better system performance along with easier system diagnostics and maintenance. With Windows 98, users' system plays better as well with support for the latest graphics, sound, and multimedia technologies, the ability to easily add and remove peripheral devices with support for Universal Serial Bus (USB), and it also enables users to watch TV on PC. Besides that, Windows 98 is compatible with more software (including games) and hardware.

2.2.3.4 Microsoft Windows XP

Windows XP is the next version of Microsoft Windows beyond Windows 2000 and Windows Millennium. Windows XP brings the convergence of Windows operating systems by integrating the strengths of Windows 2000—standards-based security, manageability and reliability with the best features of Windows 98 and Windows Me—Plug and Play, easy-to-use user interface, and innovative support services to create the best Windows yet.

2.2.3.5 LINUX

Linux has gradually become a popular operating system for Internet/ intranet serving purposes. With a host of performance enhancements that will benefit Web sites and Internet sites of all sizes, Linux is a stable and high-performance operating system for Internet usage.

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

2.2.4 Data Access Technology

Campaign Management System will require data access technology to enable communication and access to its various databases. A few of the Microsoft Data access strategy and technology is reviewed and considered.

2.2.4.1 Universal Data Access (UDA)

UDA is a high-level specification developed by Microsoft for accessing data objects regardless of their structure. The strategy of Universal Data Access is to assure open, integrated, standards-based access to all types of data that is from SQL to non-SQL to even unstructured data across a wide variety of applications, from traditional client/server to the web. The main components of UDA are ADO, OLE DB and ODBC.

2.2.4.2 Active Data Object (ADO)

Active Data Object (ADO) is the Microsoft's newest high-level interface for data objects that most applications developers will use.

ADO is designed to eventually replace Data Access Objects (DAO) and Remote Data Objects (RDO). Unlike RDO and DAO, which are designed only for accessing relational

databases, ADO is more general and can be used to access all sorts of different types of data, including web pages, spreadsheets, and other types of documents.

ADO provides consistent access to data for creating a front-end database client or middle-tier business object using an application, tool, language, or even an Internet browser. ADO is the single data interface for developers creating 1 to n-tier client/server and Web-based data-driven applications.

2.2.4.3 Open Database Connectivity (ODBC)

ODBC is a standard database access method developed by Microsoft Corporation. The goal of ODBC is to make it possible to access any data from any application, regardless of which database management system (DBMS) is handling the data. ODBC manages this by inserting a middle layer, called a database driver, between an application and the DBMS. The purpose of this layer is to translate the application's data queries into commands that the DBMS understands. For this to work, both the application and the DBMS must be ODBC-compliant -- that is, the application must be capable of issuing ODBC commands and the DBMS must be capable of responding to them. Since version 2.0, the standard supports SAG SQL.

2.2.4.4 OLE DB

OLE DB Providers are the data access engines or services, as well as the business logic components that these applications can use in a highly interoperable, component-based environment.

OLE DB is a set of interfaces that are designed to provide data access to all data, regardless of type, format or location. It effectively "componentizes" database and related data processing functionality, breaking it up into interoperable components that can run as middleware on the client or server across a wide variety of applications. The OLE DB architecture provides for components such as direct data access interfaces, query engines, cursor engines, optimizers, business rules and transaction managers.

The concept of OLE DB is to explode the database into its basic parts. OLE DB delivers components, external to the database, that provide this typical database functionality in reusable component architecture. And these components, because they are not directly linked to the database itself, can be shared across multiple applications, systems and data stores to provide a higher level, universal interface.

2.2.4.5 JDBC

JDBC technology is an API that lets you access virtually any tabular data source from the Java programming language. It provides cross-DBMS connectivity to a wide range of SQL databases, and now, with the new JDBC API, it also provides access to other tabular data sources, such as spreadsheets or flat files.

The JDBC API allows developers to take advantage of the Java platform's "Write Once, Run Anywhere" capabilities for industrial strength, cross-platform applications that

require access to enterprise data. With a JDBC technology-enabled driver, a developer can easily connect all corporate data even in a heterogeneous environment.

2.2.5 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. There are several database servers available currently: Microsoft SQL Server, MySQL and Oracle.

2.2.5.1 Microsoft SQL Server

As the most recent major release of SQL Server, SQL Server 2000 builds upon the modern, extensible foundation of SQL Server 7.0, a critical release in Microsoft's database lineup and one in which much of the SQL Server product was both re-architected and rewritten. Microsoft SQL Server 2000 is the complete database and analysis solution for rapidly delivering the next generation of scalable Web applications. SQL Server 2000 includes rich support for XML and HTTP; performance and availability features to partition load and ensure uptime; and advanced management and tuning functionality routine tasks and lower total cost of ownership. Additionally, SQL Server 2000 takes full advantage of Windows 2000, including support for the Active Directory service, and up to 32 processors and 64GB of RAM.

Besides providing the necessary enterprise "abilities" for data management and analysis, SQL Server 2000 helps deliver agility. Agility is a characteristic of organizations that can rapidly adapt to changing environments for competitive advantage. By going beyond

simple data storage retrieval and offering true business intelligence functionality, SQL Server 2000 allows business analysis to understand their data and act decisively on analysis results. The analysis manager, which is specially integrated in SQL Server, is with this purpose. Anyway, it includes some features and technologies that make it:

Fully Web-Enabled

SQL Server 2000 provides extensive database programming capabilities built on Web standards. Rich XML and Internet standard support give you the ability to store and retrieve data in XML format easily with built-in stored procedures. You can also use XML update grams to insert, update and delete data easily.

Highly Scalable and Reliable

Achieve unparalleled scalability and reliability with SQL Server 2000. With scale up and scale out capabilities, SQL Server meets the needs of demanding e-commerce and enterprise applications.

Deliver Fastest Time-to-Market

SQL Server has long been considered the fastest way to build, deploy and manage e-commerce, line of business, and data-warehousing solutions. Research studies by independent firms have demonstrated not only that SQL Server is easier to use than its primary competitor, but also that it demonstrates significantly lower total cost of ownership.

2.2.5.2 MySQL

MySQL is a relational database management system. MySQL stores data in separate tables rather than putting all the data in one big storeroom. This adds speed and flexibility. The tables are linked by defined relations making it possible to combine data from several tables on request.

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. It is available on a variety of UNIX platforms, Linux, Windows NT, Windows 95/98 and Windows 2000.

MySQL is Open Source Software. Open Source means that it is possible for anyone to use and modify. Anybody can download MySQL from the Internet and use it without paying anything. Anybody can study the source code and change it to fit their needs.

2.2.5.3 Oracle

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.

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 fail over, 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.

2.2.6 Security Technology

Security is an important part in developing a web site. Without a good security system, a web site can be hacked and make the user to loose confidence of web site. SSL is considered for securing the transport of information in DECP.

2.2.6.1 Secure Sockets Layer (SSL)

SSL is a security protocol designed to ensure data moving between a browser and a server remains private. In theory, someone could intercept information, such as a credit card number while it is in transit between the browser and the server. One solution to prevent information from being usable if it is intercepted is to encrypt it. The most widely implemented encryption system for the web at present is SSL.

SSL is an open, non-proprietary protocol developed by Netscape Communication. It uses industry, accepted RSA public key cryptography for authentication and encryption. The SSL protocol was designed to provide a data security layer between TCP/IP and application protocols such as HTTP, Telnet, NNTP or FTP. SSL provides data encryption, server authentication, message integrity and optional client authentication for TCP/IP connection.

The advantage of the SSL Protocol is that it is application protocol independent. A "higher level" application protocol (e.g. HTTP, FTP, TELNET, etc.) can layer on top of the SSL Protocol transparently. The SSL Protocol can negotiate an encryption algorithm and session key as well as authenticate a server before the application protocol transmits or receives its first byte of data. All of the application protocol data is transmitted encrypted, ensuring privacy.

2.2.7 Authoring and Development Tool

2.2.7.1 Microsoft Visual Studio .NET Professional

Visual Studio .NET is the comprehensive tool for building next-generation applications for Microsoft Windows and the Web. With rapid design, development, and deployment support for XML, high-performance data-driven solutions, and server-side visual designers, Visual Studio .NET delivers superior functionality for streamlining business processes, enabling new business opportunities.

Visual Studio .NET also dramatically increases developer productivity, enabling developers to build solutions for the broadcast range of clients, including applications for the Web, Windows, and thin-client devices. Finally, the single, shared Visual Studio .NET Integrated Development Environment (IDE) and a choice of programming languages – including Microsoft Visual Basic, Microsoft Visual C++, and Microsoft Visual C# - allow developers to build powerful applications quickly.

The three most notable features of Microsoft Visual Studio .NET are:

- Build the next-generation Internet. Developers can employ XML web services and built-in Microsoft ADO.NET tools to build high-performance, data-driven applications that target a variety of platforms.
- Develop powerful applications quickly. With an integrated development environment (IDE) for all languages, developers can take advantage of a common toolbox, debugger, and task window, greatly reducing the developer learning curve.
- Create solutions that span any device and integrate with any platform. Visual Studio .NET Professional gives developers the tools for integrating solutions across operating systems and languages.

2.2.7.2 Microsoft Office XP Professional

Microsoft Office is a very complete productivity suite. It contains application such a word processing, spreadsheet, presentation, graphical editor, database management, e-mail, web authoring and much more. This integration provides ample functionalities for many general purposes while providing other advance features such as smart tags, task panes, integrated e-mail, document recovery, and send for review which makes it easier to use, increase your productivity and enabling collaboration with others.

2.2.7.3 Microsoft Internet Explorer

Microsoft Internet Explorer 6.0 is the latest version of web browser from Microsoft. This browser is tightly integrated Microsoft Windows operating systems. Microsoft Internet Explorer is now the most widely used web browser.

The Internet Explorer 6.0 comes with many features such as simple and familiar interface, security and privacy features, content control support, connection wizard, and accessibility for less fortunate groups of users.

And technically, Microsoft Explorer 6.0 supports and conforms to various Internet standards such as XHTML, XML, DOM, CSS, SSL 3.0, TSL 1.0, FTP and many others. It is also support new features by using the latest add-ins or plug-ins such as XML parser, Java Virtual Machine, Shockwave and others.

2.2.7.4 Macromedia Dreamweaver MX

Macromedia Dreamweaver is professional visual editor for creating and managing web sites and pages. It gives developers the productivity of a visual web page layout tool, the control of an HTML text, editor and support for new web technologies, all in software packing.

Developers can use it to create web sites visually, with confidences that HTML being generated is concise and always editable. It includes advanced features that take advantage of the latest innovations on the web, such as dynamic HTML and CSS, while still ensuring that web pages work well in a variety of web browsers. All of the code generated by it is carefully created to work on as many platforms and browsers. Others features include easy integration of Active X components, Java applets, Plug-ins for improved web page interactivity. It also integrates seamlessly with other components of

Macromedia, such as Flash Movies, Shockwave, and Fireworks, which are essential for the development of interactive web pages.

2.2.7.5 Adobe Photoshop

Figure 2.13: Adobe Photoshop

Adobe Photoshop is a professional standard graphical package that various kinds of graphical authoring and editing functionalities. It contains a lot of built in filters that enables graphical manipulation. Adobe Photoshop supports various graphic formats and animation too. Adobe Photoshop can also be used to optimize graphic for web used.

2.2.7.6 Adobe Illustrator

Figure 2.14: Adobe Illustrator

Adobe Illustrator is software defines the future of vector graphics with groundbreaking creative options and powerful tools for efficiently publishing artwork on the Web, in print, everywhere. This image authoring software produces superb web graphics using symbols and innovative slicing options, and explores creative ideas with live distortion tools. Besides that, it also publishes in record time with dynamic data-driven graphics and other productivity features.

2.2.8 Language

2.2.8.1 Active Server Page (ASP)

ASP is a server-side scripting technology. ASP is indeed HTML page with an .asp extension. ASP allows for HTML and a scripting language such as VBScript, JScript or Perl to be interspersed in a Web page. When a browser requests an ASP page, the Web server generates a page with HTML code and sends it back to the browser.

One of the most important features about ASP is that it allows user to easily access data and put it on a Web page. User can simply display data from an ODBC-compliant database, or use ASP to make decisions about what to display on a Web page. User can then format the results in any way that they please.

Another important ASP feature is the ability to use cookies to store and retrieve information. The Request object has a Cookie collection, and user can use this in data processing.

2.2.8.2 ASP.NET

ASP.NET is a unified Web Development platform that provides the services necessary for you to build enterprise-class Web applications. While ASP.NET is largely syntax compatible with Active Server Pages (ASP), it provides a new programming model and infrastructure that allow you to create a powerful new class of applications.

ASP.NET is more than the next version of ASP; it is a unified Web Development platform that provides the services necessary for developers to build enterprise-class Web applications. While ASP.NET is largely syntax compatible with ASP, it also provides a new programming model and infrastructure for more secure, scalable, and stable applications. You can feel free to augment your existing ASP applications by incrementally adding ASP.NET functionality to them.

ASP.NET is a compiled, .NET-based environment, you can author applications in any .NET compatible language, including Visual Basic .NET, C#, and JScript .NET. Additionally, the entire .NET Framework is available to any ASP.NET applications. Developers can easily access the benefits of these technologies, which include the managed common language runtime environment, type safety, inheritance, and so on.

ASP.NET has been designed to work seamlessly with WYSIWYG HTML editors and other programming tools, including Microsoft Visual Studio .NET. Not only does this make Web development easier, but it also provides all the benefits that these tools have to

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ASP.NET has been designed to work seamlessly with WYSIWYG HTML editors and other programming tools, including Microsoft Visual Studio .NET. Not only does this make Web development easier, but it also provides all the benefits that these tools have to

offer, including a GUI that developers can use to drop server controls onto a Web page and fully integrated debugging support.

2.2.8.3 Java Server Page (JSP)

Java Server Pages (JSP) is a web-scripting technology that can mix static HTML content with server-side scripting to produce dynamic output. By default, JSP uses Java as its scripting language; however, the specification allows other languages to be used, just as ASP can use other languages (such as JavaScript and VBScript). While JSP with Java will be more flexible and robust than scripting platforms based on simpler languages like JavaScript and VBScript.

JSP provides a number of server-side tags that allow developers to perform most dynamic content operations. So developers who are only familiar with scripting, or even those who are simply HTML designers, can use JSP tags for generating simple output. Advanced scripters or Java developers can also use the tags, or they can use the full Java language if they want to perform advanced operations in JSP pages.

2.2.8.4 JavaScript

JavaScript is a scripting language developed by Netscape to enable web authors to design interactive sites. JavaScript is different from Java. Although it shares many of the features and structures of the full Java language, it was developed independently. JavaScript can interact with HTML source code to enable web authors to spice up their sites with dynamic content. JavaScript is endorsed by a number of software companies

and is an open language that anyone can use without purchasing a license. It is supported by recent browsers from Netscape and Microsoft, though Internet Explorer supports only a subset, which Microsoft calls Jscript.

2.2.8.5 PHP

PHP Hypertext Preprocessor is a open-source server-side, HTML embedded scripting language used to create dynamic Web pages for e-commerce and other Web applications. In an HTML document, PHP script (similar syntax to that of Perl or C) is enclosed within special PHP tags. Because PHP is embedded within tags, the author can jump between HTML and PHP (similar to ASP and Cold Fusion) instead of having to rely on heavy amounts of code to output HTML. And, because PHP is executed on the server, the client cannot view the PHP code.

PHP offers excellent connectivity to most of the common databases (including Oracle, Sybase, MySQL, ODBC and many others). PHP also offers integration with various external libraries, which allow the developer to do anything from generating PDF documents to parsing XML.

PHP is the natural choice for developers on Linux machines running Apache server software, but runs equally well on any other UNIX or Windows platform, with Netscape or Microsoft Web server software. PHP also supports HTTP sessions, Java connectivity, regular expressions, LDAP, SNMP, IMAP, COM (under windows) protocols. It also

supports WDDX complex data exchange between virtually all Web programming languages.

2.2.8.6 ColdFusion

ColdFusion is a product created by Allaire Corporation of Cambridge, Mass. that includes a server and a development toolset designed to integrate databases and Web pages. Cold Fusion web pages include tags written in Cold Fusion Markup Language (CFML) that simplify integration with databases.

Coding for ColdFusion pages is much more straightforward and intelligible than JavaScript, VBScript, C++ or Java, even while providing high levels of functionality. The tags themselves conform to the basic HTML syntax of tag name followed by tag attributes, and are enclosed in the familiar HTML brackets (<>). Most tags are two-sided, and can be combined with each other and with HTML elements to create custom tags for use in ColdFusion applications.

2.2.8.7 Extensible Markup Language (XML)

XML is the shorthand for Extensible Markup Language, and is an acronym of Extensible Markup Language. XML was conceived as means of regaining the power and flexibility of SGML without most of its complexity. Although a restricted form of SGML, XML nonetheless preserves most of SGML's power and richness, and yet still retains all of SGML's commonly used features. While retaining these beneficial features, XML

remove many of the more complex features of SGML that make the authoring and design of suitable software both difficult and costly.

Development of XML started in 1996 and has been a W3C Recommendation since February 1998, which may make you suspect that this is rather immature technology. In fact, the technology isn't very new. Before XML, there was SGML developed in the early '80s, an ISO standard since 1986, and widely used for large documentation projects. The development of HTML started in 1990. The designers of XML simply took the best parts of SGML, guided by the experience with HTML, and produced something that is no less powerful than SGML, and vastly more regular and simple to use. Some evolutions, however, are hard to distinguish from revolutions. And it must be said that while SGML is mostly used for technical documentation and which less for other kinds of data, with XML it is exactly the opposite.

Structured data includes things like spreadsheets, address books, configuration parameters, financial transactions, and technical drawings. XML is a set of rules (you may also think of them as guidelines or conventions) for designing text formats that let you structure your data. XML is not a programming language, and you don't have to be a programmer to use it or learn it. XML makes it easy for a computer to generate data, read data, and ensure that the data structure is unambiguous. XML avoids common pitfalls in language design: it is extensible, platform-independent, and it supports internationalization and localization. XML is fully Unicode-compliant.

XML allows you to define a new document format by combining and reusing other formats. Since two formats developed independently may have elements or attributes with the same name, care must be taken when combining those formats (does "<p>" mean "paragraph" from this format or "person" from that one?). To eliminate name confusion when combining formats, XML provides a namespace mechanism. XSL and RDF are good examples of XML-based formats that use namespaces. XML Schema is designed to mirror this support for modularity at the level of defining XML document structures, by making it easy to combine two schemas to produce a third which covers a merged document structure.

CHAPTER 3 METHODOLOGY

3.1 Methodology

A methodology is a collection of methods, procedures, techniques, tools and paradigms for solving a class of problem. Or in other words, the system development methodology is a method to create a system with a series of steps or operations or can be defined as system life cycle model. Every system development process model includes system requirements (user, needs, resource) as input and a finished product as output.

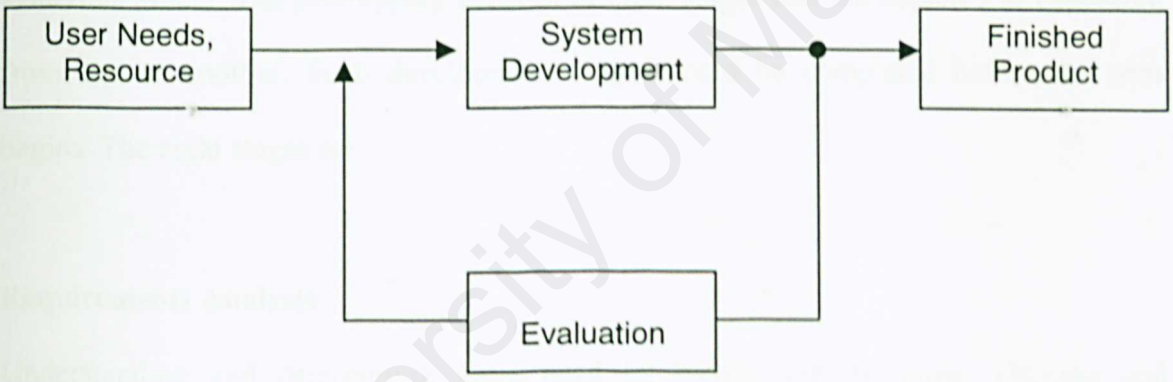


Figure 3.1: System Development Process Model

There are several process models in system development:

1. Waterfall Model with prototyping
2. V Model
3. System Development Life Cycle (SDLC)
4. Spiral Model

3.1.1 Waterfall Model with Prototyping

3.1.1.1 Why Choose This?

Waterfall Model with prototyping is chosen for Campaign Management because:

- A good specification to begin with.
- Easy to use
- Systematic
- Scope of project well understand
- Project risks have been accessed and are considered to be low.

Waterfall Model with prototyping consists of eight stages that are depicted as cascading from one to another. Each development stage should be completed before the next begins. The eight stages are:

Requirements Analysis

Understanding and determining users need by having brainstorming, eliciting and analyzing user requirements by having interview, survey or questionnaire session, collecting and specifying all the user requirements and validating requirements.

System Design

Outlining system functional by having feasibility studies or case studies on current system, determining and specifying hardware or software architecture and verifying system design.

Program Design

Determining and specifying program design and database design and verifying program design.

Coding

Involving programming, personal planning, tool acquisition, database development, component level documentation and programming management.

Unit and Integration Testing

Test units separately and integrate the tested units. Then, testing on the integrated units.

System Testing

Combining all the integrated units into a system. Testing on the system. Specifying, reviewing and updating of the system test and validating of system.

Acceptance Testing

Testing on system completed. The system is delivered.

Operation and Maintenance

Control and maintain the system. Revalidating of system.

The system has to be validated and verified during the stage of system testing. The verification is to make sure that the function in the Campaign Management works

correctly and to check the quality of the implementation. The validation is to ensure that my system has implemented all the requirements in the specification.

Prototyping is a sub-process and prototype is a partially developed product or a simple simulator of the actual system to examine the proposed system and overview on the functionalities. A prototype of Campaign Management will be built regarding to the project scope and the analysis of the system before start to build the actual system.

3.1.1.2 Important of Prototyping

Prototyping is very important because:

- To ensure the system meet the performance goals or constraints.
- To ensure the system are practical and flexible.
- To ensure the system fulfill the users' requirement.
- To have an insight of how the module and sub-modules interact with each other.

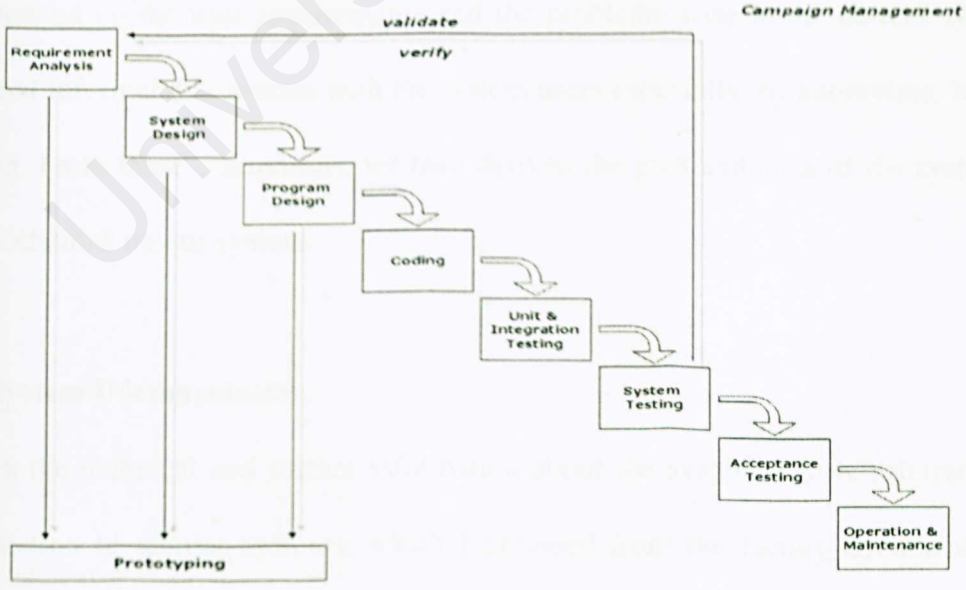


Figure 3.2: Waterfall Model with Prototyping

3.2 Fact Finding Techniques

3.2.1 The Internet and World Wide Web

Most of the information is obtained from the Internet and the World Wide Wed in various kinds of forms such as articles, white papers, product documentations, web casts and e-books. From the Internet and World Wide Web, I managed to obtain a lot of information, new ideas, latest technologies and various kinds of implementation techniques and tools, which I can used to develop my project.

3.2.2 Reference Books

I have also been using several reference books and e-books for more in depth and comprehensive explanation. These reference books and e-books that I referred are bought from the local bookstores, or obtained from friends, or the UM main library.

3.2.3 Discussion with the User

To understand on the user requirements and the problems arise in the current system; I had several informal discussions with the system users especially my supervisor, Mr. Ang Tan Fong. From these discussions, we then derived the pros and cons of the system and user expectations on our system.

3.2.4 System Documentation

To obtain the technical and further information about the system, I have referred to the documentation of similar systems, which I obtained from the faculty document room. From there I can find out the architecture and design of the similar systems.

3.2.5 Trial on the Existing System

I am considered quite lucky to be able to try on the existing system itself. So, from with the experience of using the system, we can then see and judge the system from the users perspectives.

3.2.6 Brainstorming

After getting all the information needed, then it is the time for brainstorming. The brainstorming session are sometimes done individually, with my supervisor and also with other friends and other lecturers. Brainstorming sessions are very much importance in the sense of formulating the system architecture and design, implementation techniques and solve the ambiguities that I faced.

CHAPTER 4 SYSTEM ANALYSIS

4.1 Functional Requirements

Functional requirement is a statement of the service or functions that a system should provide how the system reacts to particular inputs, and how the system should behave in particular situations.

The functional requirement for my Campaign Management consists of 4 main modules, which are Campaign Management Module, Lead Management Module, Customer Management Module and Campaign Analysis and Reporting Module.

4.1.1 Campaign Management Module

As what had been done in every campaign management, for my campaign management module, I initial my system with campaign planning, the after the campaign is launched, the campaign then will be managed. Response will be tracked from time to time. And budget and revenue will also be tracked so that the investment is always within the budget. Basically, the functionalities in campaign management are as below:

4.1.1.1 Campaign Planning

- Coordinate all initiatives to ensure shorten planning and development cycles.
- Estimate budget needed for launching the campaign.
- Estimate the response rate from the target list.
- Assign the appropriate person or team to undergo the campaign.

4.1.1.2 Campaign Management

- Manage and track all aspects of campaigns online.
- Record campaign name, description, status and budget.
- Inactive the expired campaigns but retain key data for future references.

4.1.1.3 Campaign Response Tracking

- View response data to analyze the impact if campaign in progress.
- Assess campaign metrics such as response ratio and associated revenue.

4.1.1.4 Budget and Revenue Tracking

- Gain visibility into campaign budgets and direct revenue impact.
- Assess potential revenue for campaigns launched against target groups.

4.1.2 Lead Management Module

In this lead management module, in first thing that have be done is Web-based lead generation. After the leads have been captured, they will be dispatched and routed to appropriate person to do follow-up process and work with leads. Leads will also be categorized into different group based on some criteria. Basically, the functionalities in lead management module are as below:

4.1.2.1 Web-Based Lead Generation

- Generate leads with customer self-service interactions via the web.

- Prepare a user-friendly web-based form for leads filling up process.

4.1.2.2 Lead Dispatching

- Routes leads or lead bundles to the appropriate/responsible person.

4.1.2.3 Lead Distribution

- Utilizes rules for lead distribution and routing.
- Distribute leads to different categories, based on their buying behavior, range of age, gender, race etc.

4.1.3 Customer Management Module

In customer management module, customer records and information will be profiled. This is done for future customer relationship and interaction.

4.1.3.1 Customer Profiling

- Overviews of customer records, where customer records like name, address, telephone number is stored.
- Ensure that the customer information is up-to-date.

4.1.3.2 Customer Interaction

- Manage customer interactions across all touch points - email, the web, telemarketing and traditional channels.

4.1.4 Campaign Analysis and Reporting Module

In this module, the campaign, lead and customer will be analysis on the result of analysis will be represented into graphical drawing. The fields that will be analyzed are some campaign performance metrics, such as revenue generation, profit generation, customer retention, etc. Besides this, lead status also is analyzed so that the lead manager can identify the most potential lead. Customer behavior will be analyzed too in order to have a better understanding on latest customer need in general, and so that some activities can be done to enhance the relationship between the customer and the company.

4.1.4.1 Campaign Analysis and Reporting

- Analyze the effectiveness of market effort (ROI) and increase efficiency.
- Examine campaign responses, associated revenue and budget.
- Evaluate potential versus actual returns for each lead source or region.
- View analysis of campaign data in graphical representation, such as bar chart, line chart and pie chart.

4.1.4.2 Lead Analysis and Reporting

- Analysis closed-loop lead management including lead source, range of age, gender and industry.
- Identify the campaign that can generate most leads.

4.1.4.3 Customer Analysis and Reporting

- Analysis the customer buying behaviors so that can quickly deliver what they want and prefer.

4.2 Non-Functional Requirements

4.2.1 Reliability

Campaign Management system must operate correctly in all areas in all possible environments including hardware and software compatibility else it provides little value to its users. To obtain this, unit testing, system integration testing and regression testing shall be carried out vigorously to minimize system failure. With correctness achieved, reliability of the whole system shall also be acquired.

4.2.2 Maintainability

Object-oriented paradigm is used to design each campaign module so that it encapsulates the data and behaviors in within the campaign thus providing information and implementation hiding. These campaigns communicate to other system through message passing in the standard data format of XML. This technique is used to enhance the maintainability and manageability by modification of a campaign's implementation does not affect the others as long as the interface remains the same.

4.2.3 User-friendliness

When designing the system, user-friendliness issue, is always put in mind. The interface of the system is designed as simple as possible, which is easy to access feature, and no

deep linking into the system. Lastly, the system will be well documented with the help system provided.

4.2.4 Flexibility

To ensure that flexibility, the campaign modules are designed to be highly modularity but low cohesion. These campaign modules are designed to be as simple as possible and each of them provides very specific functionalities. Each of them is also designed to be as generic as possible.

4.2.5 Security

The design of the Campaign Management also addresses several security issues such as impersonation, unauthorized access, data privacy and data integrity issues. Such compromises are tackled using the techniques of authentication, authorization and data encryption.

4.2.6 Scalability

The campaign management system is designed so that its every module is scalable, and totally base on the developers' and users' requirements. Every module in all sizes can be added, deleted, enhanced to meet the user's need, from time to time.

4.2.7 Interoperability

The major design requirement besides providing the basic functionalities is to enables the interoperability of these web services. They must be able to be used in system across

different network, over different platforms and implementation language and vendor independent.

4.2.8 Reusability

Every module in campaign management system can be reused for future enhancement. These modules are designed in a very flexible way so that the user can use or inherit certain part for reusability.

4.3 Software Requirements

4.3.1 Chosen Development Platform

Windows XP is my chosen server platform because of several identified advantages and necessities to run my Campaign Management System. The advantages of using Windows XP are that it comes along with the Internet Information Service (IIS) Web Server and the Internet Explorer, easy to setup, easy to configure, highly secure and a stable platform for serving my project.

The necessities of using Windows XP are it is the supported platform to install Microsoft SQL Server 2000, Microsoft .NET framework, Microsoft Web Services Development Kit, Microsoft Visual Studio .NET and Microsoft Office 2000.

As for client, the platform recommended is Windows 2000 Professional with Internet Explorer 5.0 and above and .NET framework and Microsoft Web Services Development Kit installed through other operating system such as Windows family, Linux or so on.

4.3.2 Chosen Web Server

The IIS 5.1 is chosen to publish the campaign management module. This is because of several benefits and also the necessity that have been identified. The advantage of using the IIS 5.1 is that it is already built in with the Windows 2000 Professional, easy to configure reliable high uptime, provide various security features and support the latest Internet standard such as HTTP 1.1.

The necessity that has been identified is the support for ASP.NET after the .NET Framework has been installed. Other popular web servers that identified do not support ASP.NET. The additional feature that the IIS 5.1 is the SMTP service that I think it might be useful for the future enhancement of the campaign modules.

4.3.3 Chosen Database Server

I have chosen Microsoft SQL Server 2000 as the database server for this campaign module. This is because of its high scalability, fast performance, security features, and the support for stored procedure.

Other features are the support for XML, easy to maintain, the availability and support of SQL database connection driver in .NET framework, well documented, easy to user interface and easy to maintain while offering all the necessary functionalities.

As conclusion, by using the SQL Server 2000, database design, setup and configuration for the campaign module can be done in a short time without much hassle.

4.3.4 Chosen Data Access Technology

I choose Active Data Object .NET, or ADO.NET as my project data access technology due to some reasons. Firstly, ADO.NET provides consistent access to data sources such as Microsoft SQL Server, as well as data sources exposed through OLE DB and XML. Data-sharing consumer applications can use ADO.NET to connect to these data sources and retrieve, manipulate, and update data.

Secondly, ADO.NET cleanly factors data access from data manipulation into discrete components that can be used separately or in tandem. ADO.NET includes .NET Framework data providers for connecting to a database, executing commands, and retrieving results. Those results are either processed directly, or placed in an ADO.NET DataSet object in order to be exposed to the user in an ad-hoc manner, combined with data from multiple sources, or remoter between tiers. The ADO.NET DataSet object can also be used independently of a .NET Framework data provider to manage data local to the application or sourced from XML.

The ADO.NET classes are found in System.Data.dll, and are integrated with the XML classes found in System.Xml.dll. When compiling code that uses the System.Data namespace, reference both System.Data.dll and System.Xml.dll.

4.3.5 Chosen Web Development Tool

The development tools that will be used for developing my project is the Microsoft Visual Studio .NET. This tools provides a complete and easy to use Integrated

Development Environment (IDE) features that enables developers develop their software much easier, faster and more convenience way.

This tool offers several smart and advance features such as the IntelliSense that will predicts the code that is going to be written by the developers, provides automatic code generations for different kinds of projects, comprehensive help to assist the user, debugger for debugging code, connection to database server and built in web browser.

When developing Campaign Management using the Microsoft Visual Studio .NET, many of the complex coding is generated automatically by this tool without any intervention. To test every module development, this tool will automatically generate the necessary interface for the testing purposes. If the developers are to consume the module instead, then the tool will easily help the developers binding and generating the proxy that will invoke the process automatically. It is much convenient compared with others web development tools.

4.3.6 Chosen Framework

I have chosen to use Microsoft .NET framework for developing the Campaign Management. This is because it supports various implementation languages, provides a lot of reusable classes, provide a stable and secure runtime, very well documented and its highly support for Campaign Management development.

4.3.7 Chosen Language

Various implementation languages are supported in the .NET framework. However, the language that I use in developing my project is the ASP.NET. Meanwhile, I will be using VB.NET as the language that run in the code behind as ASP.NET supports languages like C# .NET, VB.NET and Jscript.NET.

ASP.NET offers several noted features that are very much important to the development of my project such as it readily supports and provides several reusable classes, the common language runtime in which type safety, inheritance, language interoperability, and versioning is supported and compiled code and caching which means faster performance and better security.

4.4 Hardware Requirements

Table 4.1: Estimated hardware requirements for server

Processor	Pentium III 550 MHz or above (or equivalent x86 architecture processor)
RAM	128 MB or above
Hard disk	2 GB
Display	Support VGA (recommended resolution 800x600)
Internet	Connection using network card or modem 56K

The hardware specifications described above is just an estimation server machine. The hardware requirements should depend on the demand and server loads. Usually this can be observed form the response time, processor usage, memory usage, hard disk usage, paging frequency and so on.

Table 4.2: Estimated hardware requirements for clients

Processor	Pentium II 200 MHz or above (or equivalent x86 architecture processor)
RAM	64 MB or above
Hard disk	1 GB
Display	Support VGA (recommended resolution 800x600)
Internet	Connection using network card or modem 56K

The hardware specifications described above is just an estimation end user machine. The hardware requirements also depend on user's machine workload, memory size and the network speed.

CHAPTER 5 SYSTEM DESIGN

5.1 Overview of System Architecture

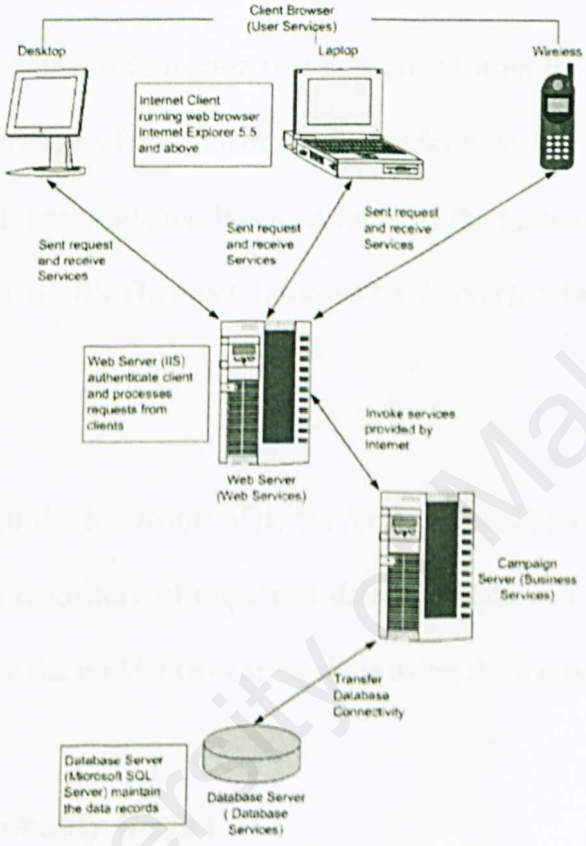


Figure 5.1: Campaign Management Architecture

The Campaign Management will be using a three-tier formation. This three-tier formation can represent three distinct services provided, the user services, the business services and the database services.

The first tier, which is the client or user tier, is where all application needed are resided. The browsers will be the applications in this client tiers. Browsers like Internet Explorer

and Netscape Navigator are used to display the user interface (web pages) to the user of the system. These web pages will have hyperlinks to enable requests from users.

The middle tier is the tier responsible for providing business services or functionality. This tier will take and gather information that is received from the user and will process this information. Processing of information will conform to the business rules of the requirements identified, encapsulating business logic of the system. The processing will then involve the usage of IIS (Internet Information Server), which is the application server for the system.

The third tier consists of the Microsoft SQL Server as the database server. The database server will be place for repository of important data. The data will be stored in the SQL Server and retrieval from the middle tier can be done using the query of the database.

5.2 System Functionality Design

System functionality design is based on the system requirements stated in Chapter 4. It translates the system requirement into system functionality. Basically, this design focuses on the system structure design and data flow design.

5.2.1 System Structure Chart

The objective of system structure chart is to show how the modules in Campaign Management are related to each other.

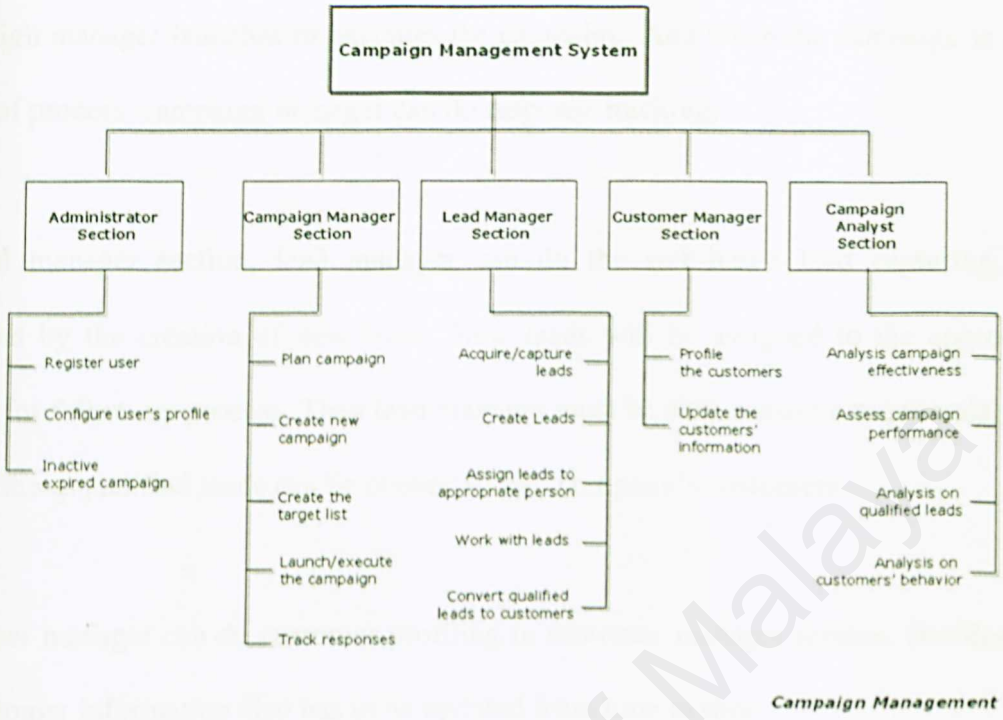


Figure 5.2: Campaign Management Structure Chart

My campaign management consists of five main parts, which are administrator section, campaign manager section, lead manager section, customer manager section and campaign analyst section.

Basically, in administrator section, administrator has right the register all users in the company, with assigning an Identity Number (ID) and password. Besides this, he/she can also do configuration on every user's profile, where the access right for every user is determined by the administrator.

In campaign manager section, campaign manager, with his/her campaign team, is responsible to create a new campaign after doing campaign planning. Target list is

needed also to identify the scope of the market that is targeted. After all preparation, campaign manager launches or executes the campaign. And when the campaign is in the midst of process, campaign manager can do response tracking.

In lead manager section, lead manager can do the web-based lead capturing, then followed by the creation of new leads. New leads will be assigned to the appropriate person for follow-up process. Then lead manager must be very sensitive to potential leads so that these qualified leads can be converted into company's customers.

Customer manager can do customer profiling in customer manager section. Besides that, the customer information also has to be updated from time to time.

In campaign analyst section, campaign analyst can do several of analysis on the campaign effectiveness and performance, besides the analysis towards the lead status and customer behavior.

5.2.2 Data Flow Diagram (DFD)

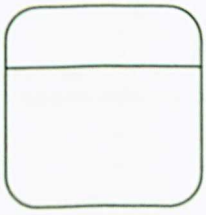
Data Flow Diagram (DFD) is a method used to graphically characterize data processes and flows in my campaign management. DFD will depict the overview of the system inputs, process and outputs.

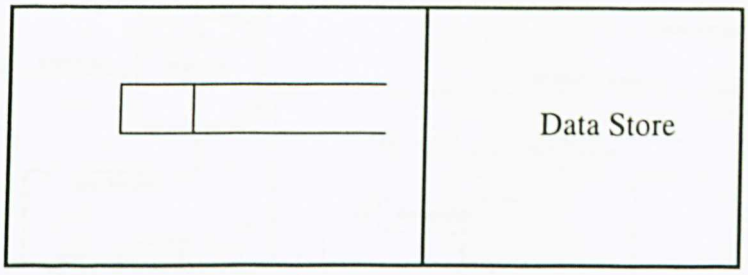
The advantages of using DFD are:

- Further understanding of the interrelatedness of modules and sub modules of Campaign Management.
- Analysis of a proposed system to determine if the necessary data and processes have been defined.

DFD is easy to be understood as it has symbols that specify the physical aspects of implementation. There four basic symbols in DFD: entity, flow of data, process and data stores.

Table 5.1: DFD Symbols

Symbols	Attribute
	Entity
	Flow of Data
	Process



The convention, which is used to design DFD are based on the work by C.Gane and T.Sarson. The data flow is conceptualized with a top-down perspective. So, the Context Level Diagram will be drawn, followed by the Diagram 0. Diagram 0 is an overview process of all the major modules in Campaign Management that includes all the data stores, entities and process involved.

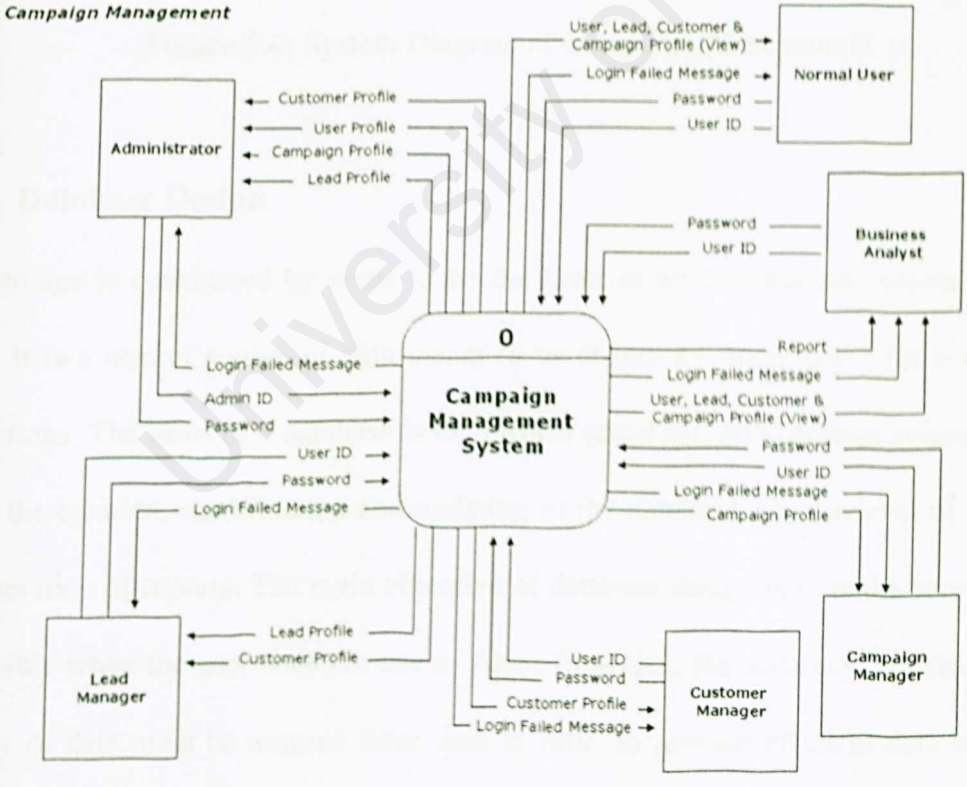


Figure 5.3: Context Level Diagram of Campaign Management

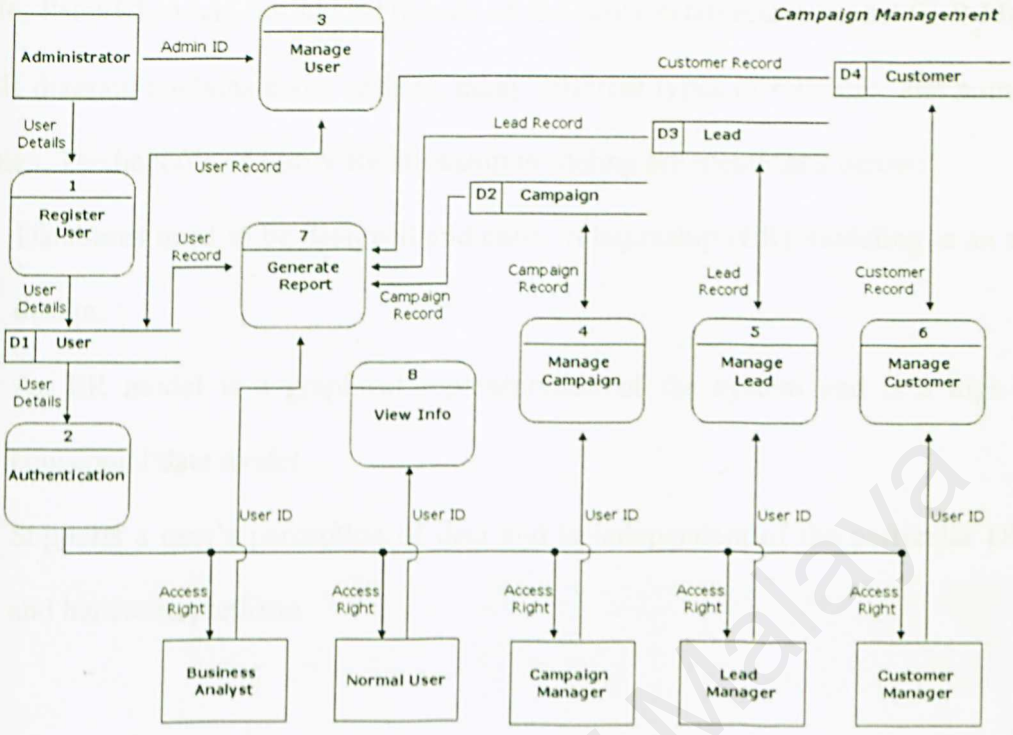


Figure 5.4: System Diagram of Campaign Management

5.3 Database Design

Data storage is considered by some to be the heart of an information system (Kendall, 1996). It is a central source of data meant to be shared by many users for a variety of applications. The heart of a database is the DBMS (database management system), which allows the creation, modification and updating of the database; the retrieval of data; and the generation of reports. The main objective of database design is to make sure that data is available when the user wants to use it. Apart from that, the accuracy, consistency and integrity of data must be assured from time to time, to provide efficient data storage as well as efficient updating and retrieval.

In 1976, Peter Chen had introduced the use of the entity-relationship model (E-R Model). An E-R diagram contains many entities, many different types of relations, and numerous attributes. The benefits of Entity Relationship modeling are mentioned below:

1. Databases need to be designed and entity relationship (ER) modeling is an aid to design.
2. An ER model is a graphical representation of the system and is a high-level conceptual data model.
3. Supports a user's perception of data and is independent of the particular DBMS and hardware platform.

5.3.1 Data Dictionary

Data dictionary or metadata can be defined as descriptions of the database structure and contents. Data dictionary defines the field, field type and descriptions of each table.

In Campaign Management, one database had been defined namely "Campaign Management" and contained 13 tables, which are cm_user, cm_campaign, cm_contact, cm_lead, cm_customer, cm_userProfile, cm_campaignType, cm_campaignStatus, cm_leadSource, cm_leadStatus, cm_leadRating, cm_industry and cm_salutation. The main tables actually are five only, which are cm_user, cm_campaign, cm_contact, cm_lead and cm_customer; meanwhile the rest are the tables emerged after normalization.

Database Name: **Campaign Management**

Table Name: **cm_user**

Table 5.2: Table of cm_user

Field Name	Data Type	Length	Note
IntCUser_ID (PK)	int	4	User ID
StrCUser_userName	varchar	50	Login using user name
StrCUser_password	varchar	50	Login using password
StrCUser_name	varchar	50	Name of user
IntCUser_profileID (FK)	int	4	Normalized user profile

Table Name: **cm_campaign**

Table 5.3: Table of cm_campaign

Field Name	Data Type	Length	Note
LngCCmpgn_ID (PK)	bigint	8	Campaign ID
StrCCmpgn_code	varchar	15	Campaign code
StrCCmpgn_name	varchar	50	Campaign name
IntCCmpgn_createdBy (FK)	int	4	Campaign owner
DatCCmpgn_createdDate	datetime	8	Date create campaign
MemCCmpgn_desc	varchar	500	Campaign description
IntCCmpgn_typeID (FK)	int	4	Normalized campaign type
IntCCmpgn_statusID (FK)	int	4	Normalized campaign status
DatCCmpgn_startedDate	datetime	8	Date start campaign
DatCCmpgn_endedDate	datetime	8	Date end campaign
CurCCmpgn_budgetedCost	money	8	Campaign's budget cost
CurCCmpgn_actualCost	money	8	Campaign's actual cost
IntCCmpgn_targetList	bigint	8	Campaign's target list
IntCCmpgn_expectedResponse	bigint	8	Campaign's expected response
IntCCmpgn_actualResponse	bigint	8	Campaign's actual response
IntCCmpgn_convertedLead	bigint	8	Amount of converted leads
CurCCmpgn_expectedRevenue	money	8	Campaign's expected revenue
CurCCmpgn_actualRevenue	money	8	Campaign's actual revenue

Table Name: **cm_contact**

Table 5.4: Table of cm_contact

Field Name	Data Type	Length	Note
LngCCont_ID (PK)	bigint	8	Contact ID
IntCCont_salutationID (FK)	int	4	Normalized contact salutation
StrCCont_name	varchar	50	Contact's name
IntCLead_age	int	4	Contact's age
StrCLead_gender	char	10	Contact's gender
StrCLead_race	char	10	Contact's race

StrCLead_religion	char	10	Contact's religion
StrCCont_jobTitle	varchar	50	Contact's job title
IntCCont_industryID (FK)	int	4	Normalized industry
StrCCont_phone	char	10	Contact's phone number
StrCCont_mobile	char	10	Contact's mobile number
StrCCont_email	varchar	30	Contact's email address
StrCCont_address	varchar	50	Contact's address
StrCCont_city	varchar	30	Contact's city
StrCCont_state	varchar	30	Contact's state
StrCCont_postalCode	char	10	Contact's postal code
StrCCont_country	varchar	20	Contact's country
BlnCCont_selected	char	10	Indication of contact state

Table Name: **cm_lead**

Table 5.5: Table of cm_lead

Field Name	Data Type	Length	Note
LngCLead_ID (PK)	bigint	8	Lead ID
IntCLead_createdBy (FK)	int	4	The lead owner
DatCLead_createdDate	datetime	8	Date create lead
LngCLead_campaignID (FK)	bigint	8	Lead's campaign ID
LngCLead_contactID (FK)	bigint	8	Lead's contact ID
IntCLead_sourceID (FK)	int	4	Normalized lead's source
IntCLead_statusID (FK)	int	4	Normalized lead's status
IntCLead_ratingID (FK)	int	4	Normalized lead's rating
BlnCLead_converted	int	4	Indication of converted lead

Table Name: **cm_customer**

Table 5.6: Table of cm_customer

Field Name	Data Type	Length	Note
LngCCust_ID (PK)	bigint	8	Customer ID
DatCCust_createdDate	datetime	8	The customer owner
LngCCust_leadID (FK)	bigint	8	Customer's lead ID
MemCCust_desc	varchar	500	Customer's description
CurCCust_annualRevenue	money	8	Customer's annual revenue
StrCCust_fax	char	10	Customer's fax
StrCCust_website	varchar	50	Customer's website

Table Name: **cm_userProfile**

Table 5.7: Table of cm_userProfile

Field Name	Data Type	Length	Note
IntCUProfile_ID (PK)	int	4	User profile ID
StrCUProfile_type	varchar	50	User profile type

Table Name: **cm_campaignType**

Table 5.8: Table of cm_campaignType

Field Name	Data Type	Length	Note
IntCCType_ID (PK)	int	4	Campaign type ID
StrCCType_name	varchar	50	Name of campaign type

Table Name: **cm_campaignStatus**

Table 5.9: Table of cm_campaignStatus

Field Name	Data Type	Length	Note
IntCCStatus_ID (PK)	int	4	Campaign status ID
StrCCStatus_type	varchar	50	Type of campaign status

Table Name: **cm_salutation**

Table 5.10: Table of cm_salutation

Field Name	Data Type	Length	Note
IntCSalutation_ID (PK)	int	4	Salutation ID
StrCSalutation_type	varchar	50	Type of user's salutation

Table Name: **cm_industry**

Table 5.11: Table of cm_industry

Field Name	Data Type	Length	Note
IntCIndustry_ID (PK)	int	4	Industry ID
StrCIndustry_type	varchar	50	Type of industry involved

Table Name: **cm_leadSource**

Table 5.12: Table of cm_leadSource

Field Name	Data Type	Length	Note
IntCLSource_ID (PK)	int	4	Lead source ID

StrCLSource_type	varchar	50	Type of lead sources

Table Name: **cm_leadStatus**

Table 5.13: Table of cm_leadStatus

Field Name	Data Type	Length	Note
IntCLStatus_ID (PK)	int	4	Lead status ID
StrCLStatus_type	varchar	50	Type of lead status

Table Name: **cm_leadRating**

Table 5.14: Table of cm_leadRating

Field Name	Data Type	Length	Note
IntCLRating_ID (PK)	int	4	Lead rating ID
StrCLRating_type	varchar	50	Type of lead rating

5.3.2 Relationship – the Class Diagram

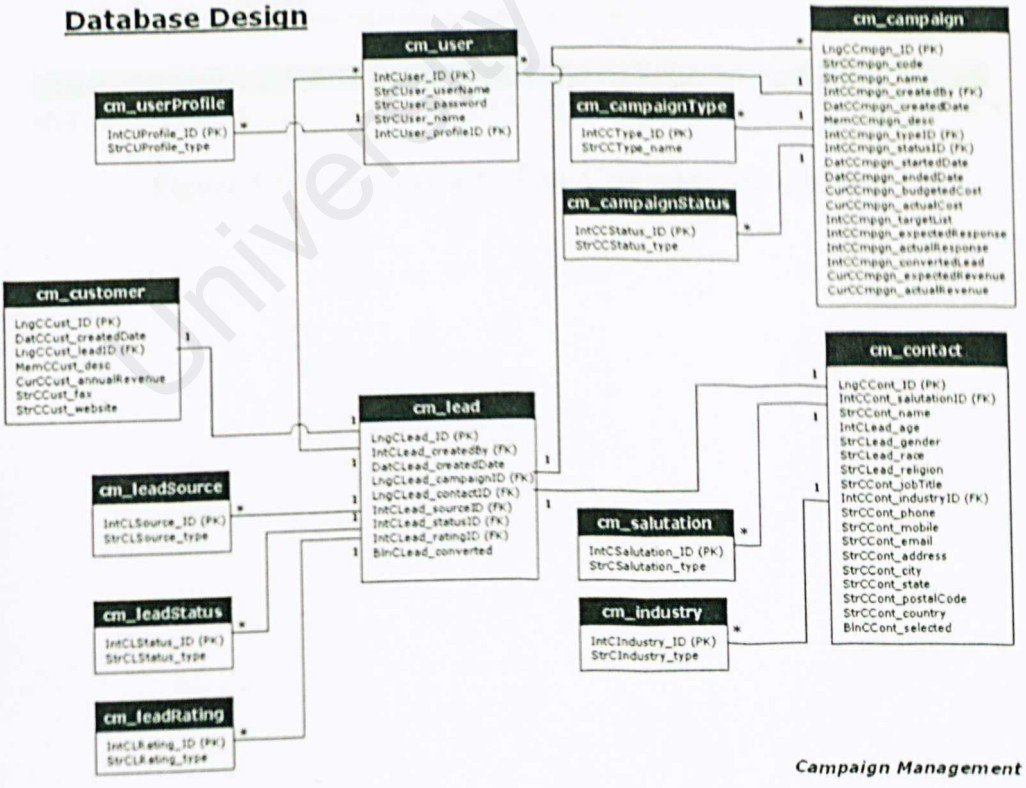


Figure 5.5: Class Diagram of Campaign Management database

There are three types of established inter-table relationships which are one : one (1 : 1), one : many (1 : N) and many : many (M : N). The diagrammatic representation of the campaign management database relationship is illustrated in the Class diagram.

5.4 User Interface Design

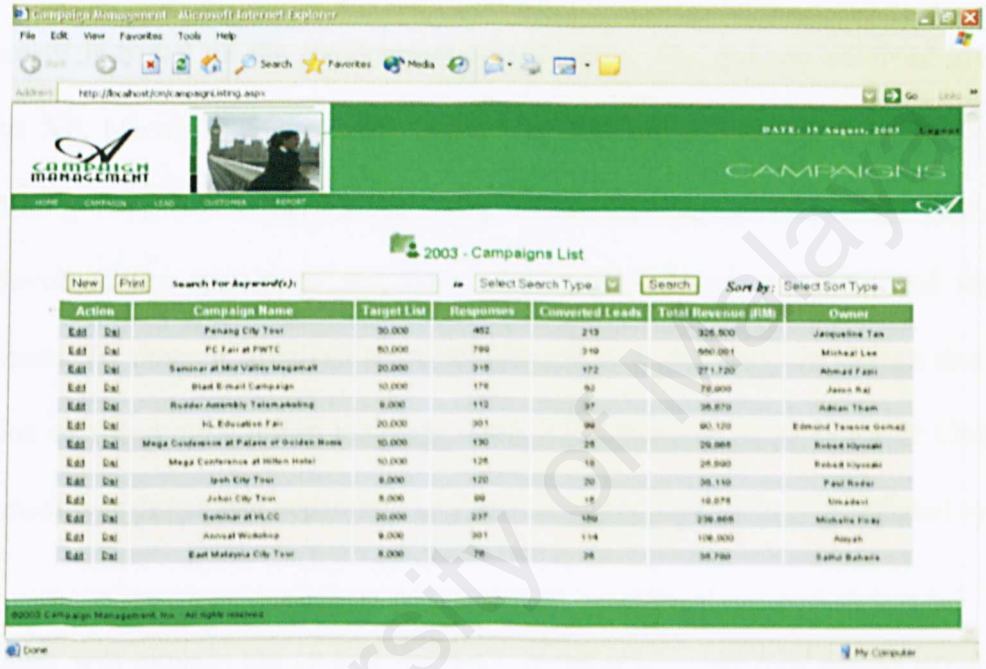


Figure 5.6: User Interface of my Campaign Management

CHAPTER 6 SYSTEM IMPLEMENTATION

6.1 Overview of System Implementation

System implementation is a process that converts the system requirements and system designs into workable program codes. Therefore, the implementation of Campaign Management is based on the requirement specification. The process involved installing Windows XP, Microsoft SQL Server 2000, and Internet Information Server (IIS), web programming using ASP.NET, VB.NET and HTML, debugging and testing. This means that it involved the system development environment, program coding and database development. At times it involved some modifications to the previous design due to the limitations of the programming language used. Each module in previous in Campaign Management was developed separately and later integrated into a fully functional system.

This chapter will explain the coding methods, techniques, important scripts involved in the development or implementation of Campaign Management as well as the functions or effects that are produced by these methods or scripts.

6.2 Coding Approach

Top-down coding method is selected to code the chart and of the Campaign Management. Top-down method is based on the principle of coding the high-level modules first and leaving the lower lever modules called in skeleton form, to be filled in later. The lower modules are only a shell, with an entry and an exit. In other words, as the higher module is being coded, references are made to the lower modules as of they are coded an

available. But in fact, a call to that still uncompleted module that will result in an empty action. This approach is used to allow testing to begin on some of the modules while others are still being coded. By using this approach, the most serious type of errors, are identified early.

6.3 Coding Principles

Several programming principles are applied in the coding the program to ensure the system consistency, maintainability and readability.

- Indenting, formatting and commenting the code helps to increase the program code's readability.
- Using a variable naming convention consistently increase the program's consistency and maintainability.
- Using sub function at the code behind, include file and user control (file.acsx) to allow certain procedures available to many ASP.NET files and HTML page. It eases the messy work of correcting all ASP.NET pages when making changes on the procedures. This ensures the system maintainability.

6.4 Development of Campaign Management

Most of the codes in Campaign Management are HTML tags, ASP.NET and VB.NET. Briefly, HTML is just to create the user interface and design for the system. Besides that, VB.NET is used mainly for validation of user input and handles interactive effects of some modules. In order to make the web pages more dynamic as well as to process or

execute the request from the user, ASP.NET is the script that is used mostly in Campaign Management.

The main functions produced by ASP.NET script are as follows:

- Store the temporary information of a session. For example, storing UserID information in a session variable to keep track which user is working at that particular time and provide a dynamic page that cater for that user.
- Enables user to view their previous campaign records presented by different chart type, which include bar chart and pie chart.
- Enables staff to read, store, edit and delete their customers' or potential customers' records.
- Enables administrator to read and configure all the records and information created by other staff and manager.

6.4.1 HTML

Development stage of Campaign Management involves designing and creating the user-friendly web pages. For example, in the creating the campaign part of Campaign Management, HTML is used to display the suitable form for user input, as well as the specific validation to ensure valid data to be stored into the database. Table is inserted and carefully aligned to suit the outlook of the information and documents. <table> is used to position the display on the web page so that it looks nicer and in order. For example, the HTML tag for table's header is shown in Figure 6.1.

```
<table borderColor="white" cellSpacing="0" cellPadding="2" width="100%"
border="1">
<tbody>
<tr>
      <td width="50%" colSpan="2"><b><font class="hd">Campaign
Information:</font></b></td>
      <td width="15%"> </td>
      <td align="center" width="35%"> </td>
</tr>
<tr>
      <td bgColor="khaki" colSpan="4"> </td>
</tr>
<tr>
      <td align="right" width="15%" bgColor="#90ee90"><font class="nm"
color="#ffffff">Campaign Owner:</font></td>
      <td><asp:textbox class="txt" id="txtOwner" runat="server"
Enabled="false"></asp:textbox></td>
      <td align="right" width="15%" bgColor="#90ee90"><font class="nm"
color="#ffffff">Budget Cost:</font></td>
      <td><asp:textbox class="txt" id="txtBudgetCost"
runat="server"></asp:textbox></td>
</tr>
<tr>
      <td align="right" width="15%" bgColor="#90ee90"><font class="nm"
color="#ffffff">Name:</font></td>
      <td><asp:textbox class="txt" id="txtName"
runat="server"></asp:textbox></td>
      <td align="right" width="15%" bgColor="#90ee90"><font class="nm"
color="#ffffff">Campaign Code:</font></td>
      <td><asp:textbox class="txt" id="txtCode"
runat="server"></asp:textbox></td>
</tr>
<tr>
      <td align="right" width="15%" bgColor="#90ee90"><font class="nm"
color="#ffffff">Start Date:</font></td>
      <td><asp:textbox class="txt" id="txtStartDate"
runat="server"></asp:textbox>
            <a href="javascript:;"
onclick="window.open('popupCalendar.aspx?textbox=txtStartDate','cal','width=250
,height=225,left=270,top=180')">
            <img src="images/SmallCalendar.gif" border="0"></a>
      </td>
      <td align="right" width="15%" bgColor="#90ee90"><font class="nm"
color="#ffffff">End Date:</font></td>
      <td><asp:textbox class="txt" id="txtEndDate"
runat="server"></asp:textbox>
            <a href="javascript:;"
```

```
onclick="window.open('popupCalendar.aspx?textbox=txtEndDate','cal','width=250,h
eight=225,left=270,top=180')">
            <img src="images/SmallCalendar.gif" border="0"></a>
      </td>
</tr>
<tr>
      <td align="right" width="15%" bgColor="#90ee90"><font class="nm"
color="#ffffff">Target List:</font></td>
      <td><asp:textbox class="txt" id="txtTargetList"
runat="server"></asp:textbox></td>
      <td align="right" width="15%" bgColor="#90ee90"><font class="nm"
color="#ffffff">Expected Responses:</font></td>
      <td><asp:textbox class="txt" id="txtExpectedResponses"
runat="server"></asp:textbox></td>
</tr>
<tr>
      <td align="right" width="15%" bgColor="#90ee90"><font class="nm"
color="#ffffff">Expected Revenue:</font></td>
      <td><asp:textbox class="txt" id="txtExpectedRevenue"
runat="server"></asp:textbox></td>
      <td align="right" width="15%" bgColor="#90ee90"><font class="nm"
color="#ffffff">Type:</font></td>
      <td><asp:DropDownList id="ddlType" runat="server"
DataTextField="StrCCType_name" DataValueField="IntCCType_ID" /></td>
</tr>
</tbody>
</table>
```

Figure 6.1: HTML Table Tag

Animated GIF, BMP or JPEG graphics are also included into the documents by using HTML's image tags. For example, the HTML tag for the image is as below.

<asp:Image id= "Image1" runat= "server" ImageAlign= "Middle"></asp:Image>

Besides producing and displaying tables and graphics, it is necessary to use HTML to create and design the user control for users to input information to the server and select information from the server. The following figure present the used of user controls written inside HTML, in order to pass the input into ASP.NET processing page.

```
<tr>
<td align="right" width="15%" bgcolor="#90ee90"><font class="nm"
color="#ffffff">Name:</font></td>
<td><asp:DropDownList id="ddlSalutation" runat="server"
DataTextField="StrCSalutation_type" DataValueField="IntCSalutation_ID" />
<asp:TextBox class="txt" id="txtName" runat="server"></asp:TextBox></td>
<td align="right" width="15%" bgcolor="#90ee90"><font class="nm"
color="#ffffff">Mobile:</font></td>
<td><asp:TextBox class="txt" id="txtMobile" runat="server"></asp:TextBox></td>
</tr>

<tr>
<td align="right" width="15%" bgcolor="#90ee90"><font class="nm"
color="#ffffff">Age:</font></td>
<td><asp:TextBox class="txt" id="txtAge" runat="server"></asp:TextBox></td>
<td align="right" width="15%" bgcolor="#90ee90"><font class="nm"
color="#ffffff">Phone:</font></td>
<td><asp:TextBox class="txt" id="txtPhone" runat="server"></asp:TextBox></td>
</tr>
```

Figure 6.2: The Use of User Controls Written in HTML

Preparation of the HTML and ASP.NET web page involves endless cycle of testing and modifying of the ASP.NET source code, loading the file in the browser for viewing and validating and then go back to make further changes when necessary.

6.4.2 Processing of Form Using ASP.NET Code Behind

After designing and creating form for user to enter the input, the next stage is to insert the ASP.NET code behind into the processing page so that the data entered can be processed by the server and updated to the table in the database. This is very important as only ASP.NET have the capabilities to pass parameter from one page to other web pages. Code behind is the page that we write the function and command such as page load, button click, item command and so on. Code behind is very important and act as a commander to run all the function and command on the web page. Scripting delimiters

<%.....%> have to insert into the HTML page for the server-side execution. Codes located within these delimiters and codes behind are invisible to the client and are only executed in the server.

The following figure shows how the data of a datagrid can be generated by using <%.....%> delimiter.

```
<tr>
<td align="right" width="15%" bgColor="#c0c0ff"><font class="nm"
color="#ffffff">Name:</font></td>
<td><input id="txtName" size="38" value='<%#
DataBinder.Eval(Container.DataItem, "StrCCmpgn_name", "{0}") %>' runat="server"
NAME="Campaign Name"/></td>
<td align="right" width="15%" bgColor="#90ee90"><font class="nm"
color="#ffffff">Type:</font></td>
<td><input id="txtType" value='<%# DataBinder.Eval(Container.DataItem,
"IntCCmpgn_typeID", "{0}") %>' runat="server" NAME="type"/></td>
</tr>

<tr>
<td align="right" width="15%" bgColor="#90ee90"><font class="nm"
color="#ffffff">Start Date:</font></td>
<td><input id="txtStartDate" value='<%# DataBinder.Eval(Container.DataItem,
"DatCCmpgn_startedDate", "{0}") %>' runat="server" NAME="Start Date"/></td>
<td align="right" width="15%" bgColor="#c0c0ff"><font class="nm"
color="#ffffff">Budget Cost:</font></td>
<td><input id="txtBudgetCost" value='<%# DataBinder.Eval(Container.DataItem,
"CurCCmpgn_budgetedCost", "{0}") %>' runat="server" NAME="Budget Cost"/></td>
</tr>
```

Figure 6.3: Using Scripting Delimiter <%.....%> at the HTML Page

6.4.3 Manipulating Data To The Database Using ADO.NET

Manipulating data in the database is the most important area in my charting module. ASP.NET is powerful that it can produce dynamically web pages by allowing the system to manipulate with the database record. Through ADO.NET, user is able to read the

records, find and filter specific records update data as well as create or delete a record in the data store. ADO.NET uses connection object to store the information about the data store connection. The connection object needed to be created first before any access to the records. The following figure shows how to open a connection for inserting new record.

```
Dim conn As OleDbConnection = New
OleDbConnection(ConfigurationSettings.AppSettings("cm1"))

        Dim da As OleDbDataAdapter = New OleDbDataAdapter()
        Dim cmd As OleDbCommand

        If Session("UID") Is Nothing Then
            Response.Redirect("pageExpired.aspx")
        End If

        Page.Validate()
        If Not Page.IsValid Then
            Return
        End If

        txtPassword.Text = HashData(Replace(txtPassword.Text, "'", "''"))

cmd=New OleDbCommand("INSERT INTO cm_user (StrCUser_name, StrCUser_userName,"&_
"StrCUser_password, IntCUser_profileID) " &_
"VALUES ('" & Replace(txtName.Text, "'", "''") & "','" &
Replace(txtUserName.Text, "'", "''") & "', " &_
"'" & txtPassword.Text & "'," & ddlUserProfile.SelectedValue & ")", conn)

        cmd.Connection.Open()
        cmd.ExecuteNonQuery()
        conn.Close()
```

Figure 6.4: Database Connection for Inserting New Record

6.5 Development Tools

Table 6.1 describes the outline of software tools that need to configure into the developer computer and server.

Table 6.1: Development Tools

Software	Description
Microsoft Windows XP	Operating System
Microsoft Internet Information Server	Web Server Host
Microsoft SQL Server 2000	Database Management System
Microsoft Visual Studio .NET	Coding
Adobe Photoshop, Adobe Illustrator	Graphics Design
Macromedia Flash MX, Swish	2D Graphics Animation

6.6 Debugging

Debugging is an activity to find and fix the bugs in the system. If a program does not have any error, it did not mean that it is free of bugs. By doing debugging, a programmer is able to trace the error with minimum time required compared to a programmer without a debugging tool. Therefore, programme needs to carry out this debugging or trouble shooting process to eliminate these bugs. Debugging is considered as the most boring process during the development phase.

There are various types or errors that exist in the system; compile error, run-time error and logic error. Luckily, the Microsoft Visual Studio .NET tool provides the features to identify the compile errors and run-time errors. However, the programmer needs to identify and locate the logic errors by themselves.

The debugger used for the development of Campaign Management is the Microsoft Script Debugger and with the help of Internet Explorer as the web browser. When an error occurs, the browser will display an error type and notifying which file and which line of the program that has error. Figure 6.5 shows the example of error message prompt by the Microsoft Visual Studio .NET.

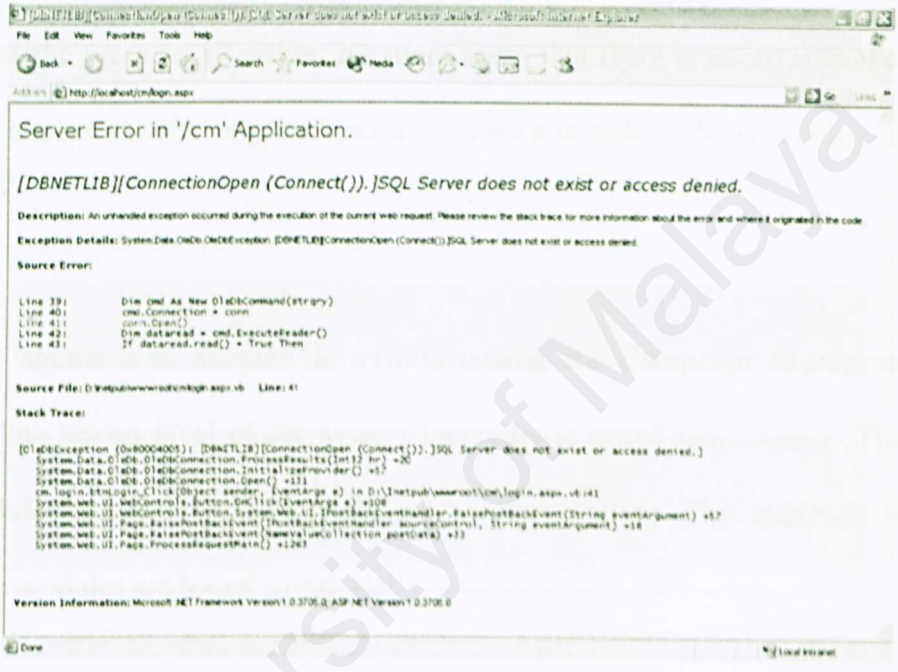


Figure 6.5: Example of Error Page

Sometimes, with this message, an experienced programmer will know the reason of this error. However, a new web programmer will need to debug the program to detect the errors that occurred. This is because the error message is not easily understandable. Then, the Microsoft Script Debugger plays it role. Programmer can put a breakpoint at where the error occurs and traces the error. However, sometimes it is impossible to make a program free of error.

CHAPTER 7 SYSTEM TESTING

7.1 Overview of System Testing

The main function of testing is to establish the presence of defects in a program and to judge whether the program is usable in real application. Nevertheless, testing can only demonstrate the presence of errors. It cannot show that there is no error in the program. Therefore, a more suitable approach must be chosen to reduce the possibility of errors in a program.

Bottom-up approach is adopted in system testing for Campaign Management. Each module at the lowest level of the system hierarchy is tested individually. Then, all the tested modules would be related to the next module testing. This approach is repeated until all the modules are tested successfully.

7.2 Testing Process

In general, the testing process of Campaign Management can be shown in the following figure. All the details will be further explained in subsequent sub-sections.

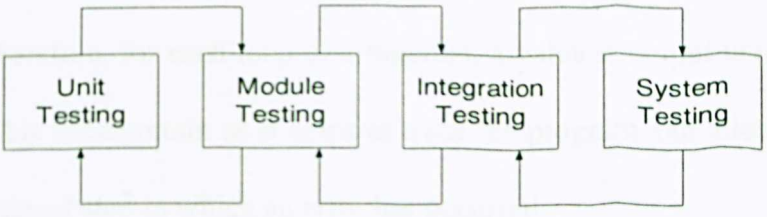


Figure 7.1: Testing Process

7.2.1 Types of Testing

7.2.1.1 Unit Testing

Unit test is the process to test the individual component to ensure that they function properly. Each component is tested independently without the interference from other system components. Unit test is performed concurrently with the development process. Techniques used during the process of performing unit testing are as follows:

Code Review

Before the .aspx file is compiled into its class, codes are reviewed line by line to discover any syntax error as well as semantic error. If errors are discovered, they are corrected immediately.

Compilation of ASP.NET Class

This method is faster compared to code review techniques and it is efficient in discovering errors. During the compilation, the compiler will detect type of errors in a program and display the error type as well as the line number in which the error occurs.

Other techniques

If the error occurs during the loop of a function, then it will be difficult to identify the actual error. Therefore, for each loop of a function, a value is output using the command "<%.....%>". This is important as it helps to trace the program and allows the developer to identify the actual step in which an error has occurred.

7.2.1.2 Module Testing

Module testing is performed without other system modules. A module consists of a collection of dependent components to perform a particular task or function. Different possible test cases are applied to the module and the test results would be verified. Unusual results will be analyzed and they would help in debugging sub-modules in order to produce the desired output.

7.2.1.3 Integration Test

Integration test is needed when all modules are integrated. The main focus in integration test is to navigate the interfaces repeatedly to detect any interface mismatch problem. Several important aspects are checked to ensure that the flow of the data in Campaign Management is well organized and structured and are user friendly to all the system users.

7.2.1.4 System Test

The sub-systems are integrated to make the entire system. Therefore, the main purpose in system testing is to find errors that result from unanticipated interactions between sub-systems. Besides, it is used to validate whether the system meets its functional and non-functional requirement. Problems might occur by the time the new developed system is integrated to existing system. There are few possibilities that might lead to this mismatch and inaccuracy of both new and old system, based on the work that have been processed and kept track throughout the time.

Interface mismatch

As Campaign Management is a totally separate system from the current faculty systems, Campaign Management has its own set of interfaces. Therefore, no interface mismatch occurs.

Data type mismatch

Campaign Management has its own database to store data needed to handle the systems operation. Nevertheless, for the beginning stage, users' personal information including their login name, email and password are retrieved from another database of an existing faculty system.

Finally, a performance test is performed to compare the integrated modules with the non-functional system requirements. These requirements include security, interoperability, flexibility and reliability.

CHAPTER 8 SYSTEM EVALUATION AND CONCLUSION

8.1 Overview of System Evaluation and Conclusion

Evaluation is the ultimate phase of developing a system and an important phase before delivery the system to the end users. Evaluation was related to user environment, attitudes, information priorities and several other concerns that are to be considered carefully before effectiveness can be concluded. At all phases of the system approaches, evaluation is a process that occurs continuously, drawing on a variety of sources and information.

8.2 Problems Encountered and its Solutions

Campaign Management has unambiguous and straightforward deliverables and definitions. However, the process of developing the system is as challenging and demanding as any other development projects. Various difficulties ranging from minor setbacks to some considerable problems were encountered but none are intricate enough to put at risk the system development. The following subchapters will discuss the problems and approaches for solution in the Campaign Management.

8.2.1 Problems in Tools and Language Selection

There are a lot of good and potential development tools available for the use of developing the system. However, not all these are as each and every tool has its own strengths and weaknesses. The task of choosing the right development tool will always remain as the toughest question to answer. In searching for the best combination of

programming language development tools for the system, some information finding methods and the system requirements are analyzed. Authoritative electronic resources form the Internet, advises from lecturers and discussions among the experienced course mates have helped to finalize the development tools selection.

8.2.2 Lack of Knowledge in the Language and Tools Chosen

Due to the time constraint, it is very difficult in learning the chosen language and tools. Without a strong base of the language, it needs more time in looking for solutions to solve technical and non-technical problems that were encountered during the development of Campaign Management. It consumes a lot of time in the beginning stage of development to learn the new programming language. Besides that, to enable some module such as the charting module to function, some components will be needed. All these need some research on the components before knowing how to use the components and how to apply it in the modules.

To solve these problems, Internet has become the most vital source of knowledge and stake of mistakes. There are lots of sources codes and free tutorials in the World Wide Web. In addition, forum is also another way to help to solve the problems occurred during the Campaign Management development.

8.2.3 Problems in Reducing Program Code Size

System optimization is always an essential initiative in any system development. The purpose of system optimization is to increase its efficiency or to improve its performance

without major upgrades on any hardware. As for Campaign Management, these optimizations would be in the form of improving its execution and response time. This can be theoretically achieved through a smaller program code size.

The size of ASP.NET which created by the author, is ranging from 2KB to 30KB. The larger files are mainly related to the main list page, which consists of search and retrieval modules, different access level and functionalities. One of the reasons is that these pages contain complex multipart coding with comprehensive internal documentations and commenting codes. Moreover, the larger size is also contributed by various programming conditions, extended SQL queries, event handler and formatting functions.

The system optimization is not practiced during the early stage of the system implementation. It is only applied with minimal attempt when the system is near completion. Although the system is not thoroughly optimized to perform efficiently, the system is checked and confirmed that it did not perform under par.

8.2.4 Difficulties in Designing User Interface

Problem that faced during the early stage of development is lack of knowledge and experience of real system flow and layout of user interface. Therefore, it is difficult in designing the most appropriate logic and user interface in Campaign Management. Moreover, to make the web page more interactive and dynamic, it needs great knowledge of advance scripting language. These eventually make the process of development became slow.

To get more knowledge to the system flow and user interface design, some real commercial web sites and training application were used as reference. Besides this, image editing tools especially Adobe Photoshop was used to generate attractive images. This will make the user interface more presentable and attractive.

8.3 Evaluation by End User

As Campaign Management is proposed to reduce company staff workload and to make the customer acquisition more effective, the final stage of system development which is the system testing becomes critical and it needs feedbacks from all respective users in judging the correctness of these functionalities, precise data flow as well as user friendliness of the system's interfaces.

Anyway, as the scope of Campaign Management is large, development was conducted with the objective to cover the scope briefly, which means that the whole system was developed quickly to have the overall structure and potential of the system but the system was not refined to show its full efficiency.

The overall feedback from the end users is good and Campaign Management is expected to serve the targeted group well after refining. This plays a quite essential role in determining the good developed Campaign Management system that can fully cater users' need and demand.

8.4 System Strengths

The Campaign Management's strengths were recognized and identified, and are described as below:

User-friendly Interface

The Campaign Management has simple user interface, which could be understood and used by new user. There are many features included to make the interface user-friendly such as text box, buttons, links and icons. These features will help the user to navigate and use the system. User-friendly interface will help to reduce the total cost of developing and implementation of the system because the training cost and training time required can be reduced. Most of the web pages are equipped with links and icons to help less effort in navigating the system.

Provide Database Access

Maintenance tables are created to manage multi-value data. All the data collected are stored and organized by SQL Server. It provides a real-time database management. Changes made can be updated as soon as the changes being submitted. Besides this, features and functions of Campaign Management are easily expandable with tables added to its existing database design.

Efficient Data Manipulation

When accessing data or doing the data manipulation, Campaign Management is using some store procedures. This is done to improve performance for the system, where all the

transactions or processes are done at the database level, and hence, it has minimized the waiting time for the user.

System Transparency

The Campaign Management is transparent to the user. The user will have no idea how their requests are being handled and processed, and in fact, the users do not need to know the underlying structure of the system and database in making their request. All they need to know is to submit required data and then view the results. This is quite important to get rid of any confusion among the users.

Fast Response for Information Retrieval

Generally, most of the web pages in Campaign Management are designed to reduce the downloading time. Therefore, the web pages in the system can be loaded within a reasonable time frame. In Campaign Management, the system is properly designed to prevent frequent user access to the server by imposing session objects in some of the modules. Besides this, the connection to the database is strictly managed using web.config file in every page will greatly improve the overall performance of the sytem.

8.5 System Constraints and Future Enhancements

As mentioned before, Campaign Management is still not fine enough to work at its full efficiency. Some refining work needs to be done to the system to increase its usability and reliability. The aspects or constraints that need to be refined are stated and likewise I

also give some suggestions for future enhancement. The examples that are suggested are shown as below:

Static Information in the Main Page

For the time being, the main page of Campaign Management is still uploaded with static information, which is typed exactly in the HTML tags. As a sophisticated CRM system for all-size companies from various industries, the main page is playing a pivotal role in giving a clean yet eloquent message to the users. So in future, the things that can be enhanced are the systematic and in-order layout, as well as the dynamic information or company announcement uploaded or retrieved from server's database directly. Furthermore, the latest announcements and news should be put at the easy-noticed location for users' ease.

Limited Searching and Filtering for Catering Users' Demands

I neither integrate any advanced search functionalities nor filtering in some do parts that in fact need to do so. So, future enhancement will be the addition of searching and filtering functionalities so that the users can effectively find the records that they need without wasting much time.

No Chart Printing

For the time being, there is no printing function for the reports or graphical representations that have been generated based on the parameters key in. I suggest to add

the printing functionality to print the graph, such as bar chart, line chart or pie chart, to ease the work of business analyst in doing their analytical procedures.

Integration of Other CRM Modules

Due to this thesis title of CRM is firstly proposed this year, so the sub part that needs to focus is my Campaign Management. In fact they are other modules in CRM, such as Sales Force Automation, Marketing Automation, Customer Service & Support and Analysis and Reporting. So they are the modules needed to add to my Campaign Management in order to create a comprehensive, sophisticated and powerful CRM system.

No Automatic Intelligent "Notes"

This means that users need to click in the related records for further information. Suggestion was made that for future enhancement, users do not need to click to deeper level to check for fundamental information unless they need to do so for other less important information. What they need to do is merely point their mouse curser to that particular record and an intelligent system will detect user's action and base on the record ID, a small "notes" will appear, showing some fixed essential information.

APPENDIX A – USER MANUAL

Part 1: Introduction

Campaign Management is a web-based and business-oriented application that can effectively manage the launched campaigns for performance track-keeping. The manual is a guide to help user to using campaign management application effectively to achieve the goal.

Part 2: Login Manual

Figure A: Campaign Management login page

This is the main page for my Campaign Management. Basically for this stage, the static information that I put are merely for decoration purpose, which will be enhanced to upload information dynamically by administrator in future. The banner above is created

in flash animation, which is giving a more impressive and clean picture to the user. After that all, user can login to the Campaign Management via the left-top corner, where there is apparently a login section.

Part 3: Campaign Manual

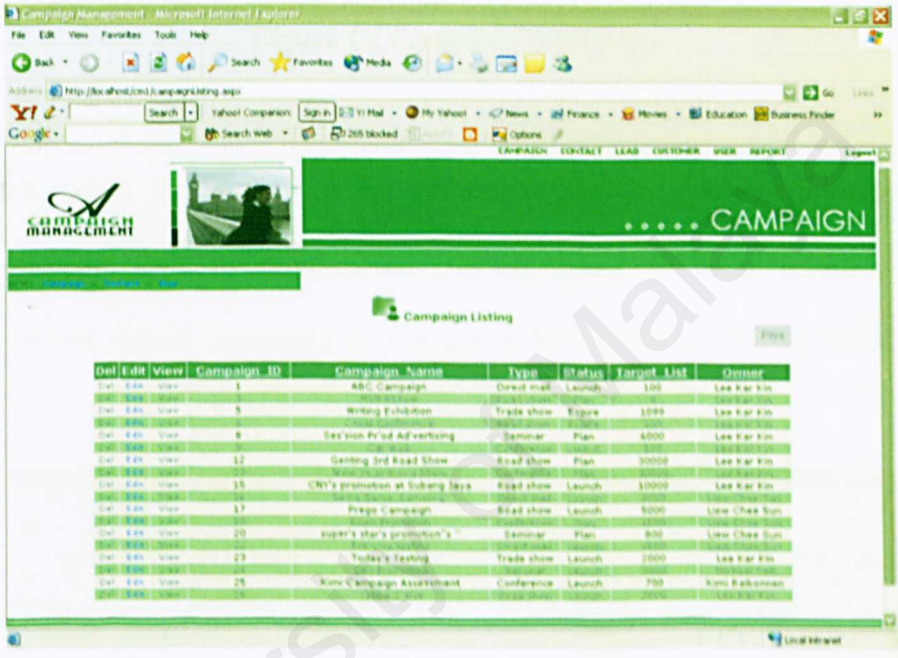


Figure B: Campaign listing page

After user has successfully logged in, they will be brought to the campaign listing page, which it is a page showing all the campaign particulars in a datagrid. As shown in datagrid table, the relevant staff with the correct access right can do deletion, editing or a simple view of certain campaign record. Besides this, all staff can print the whole campaign listing after clicking the "Print" button. They will be prompted with a new window for next action of printing, as shown below.

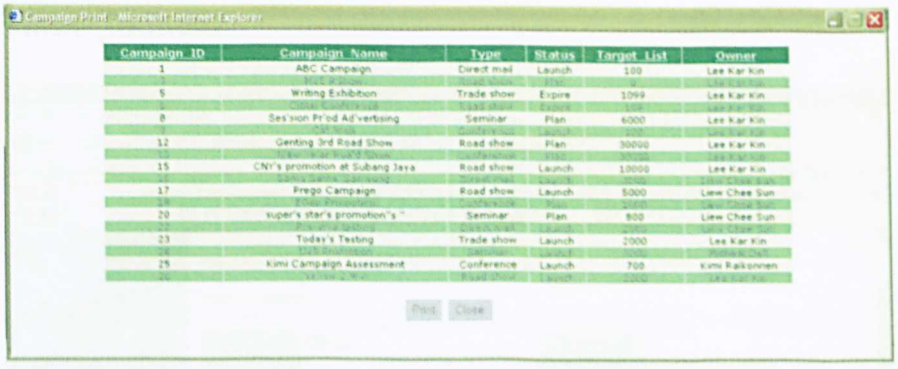


Figure C: Campaign print page

Besides this, when the staff with requested access right, such as administrator and managers click the "edit" hyperlink in datagrid table, they will be navigated to the certain campaign record details according to Campaign ID to further editing work, as shown below.

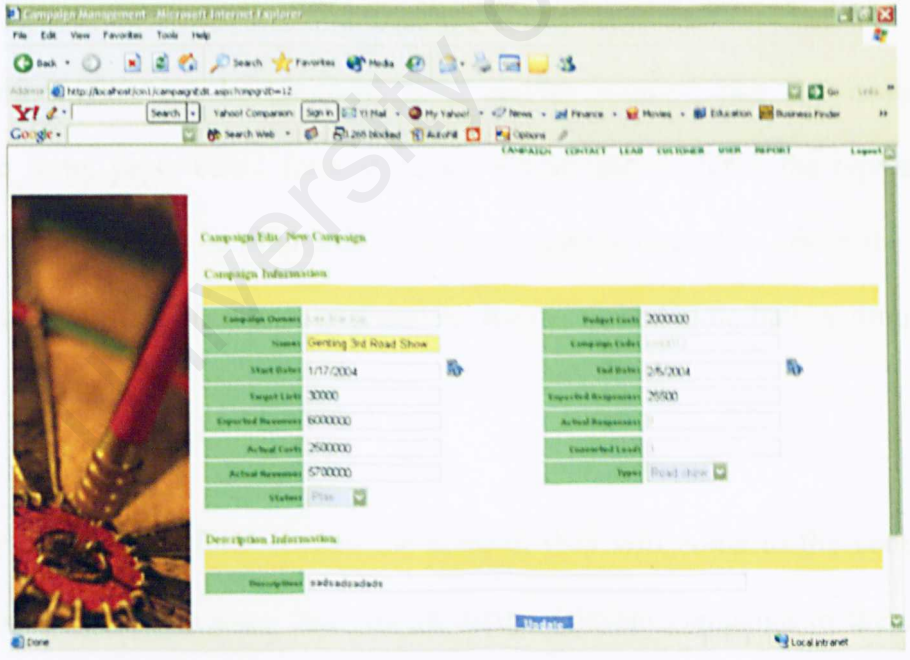


Figure D: Campaign edit page

Part 4: Contact Manual

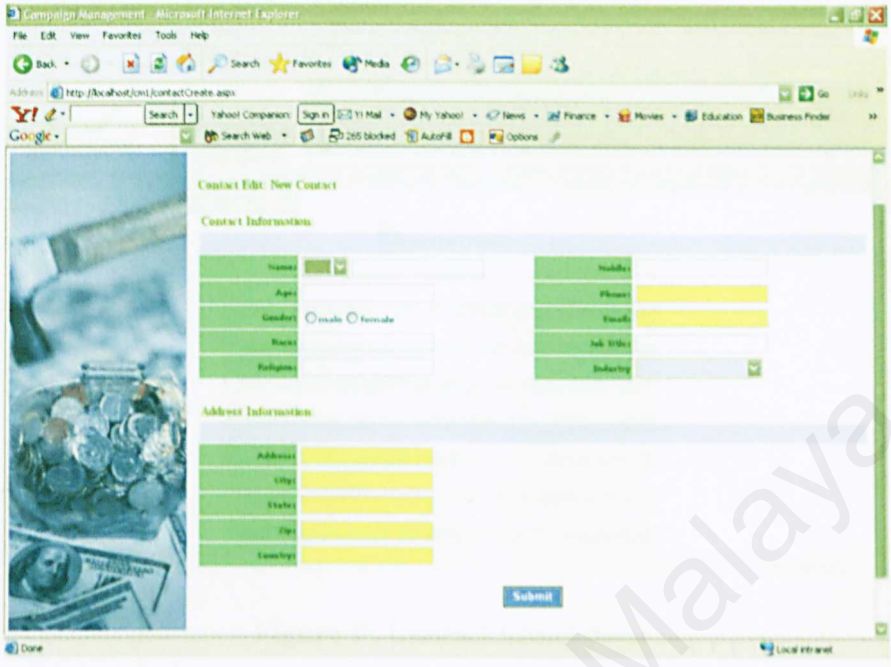


Figure E: Contact create page

Contact information can be garnered from various sources, like call center, online application form, paper-based form et cetera. Figure above shows the typical form to create contact. User will be prompted with error message once they key in the irrelevant data format in particular text box, or abandons the unselected radio button, drop down list et cetera.

After they have successfully created the contact, they will come to the contact listing page, where there is the page user should assign relevant campaign to the contact. In another words, the campaign for which the contact firstly get touched with.

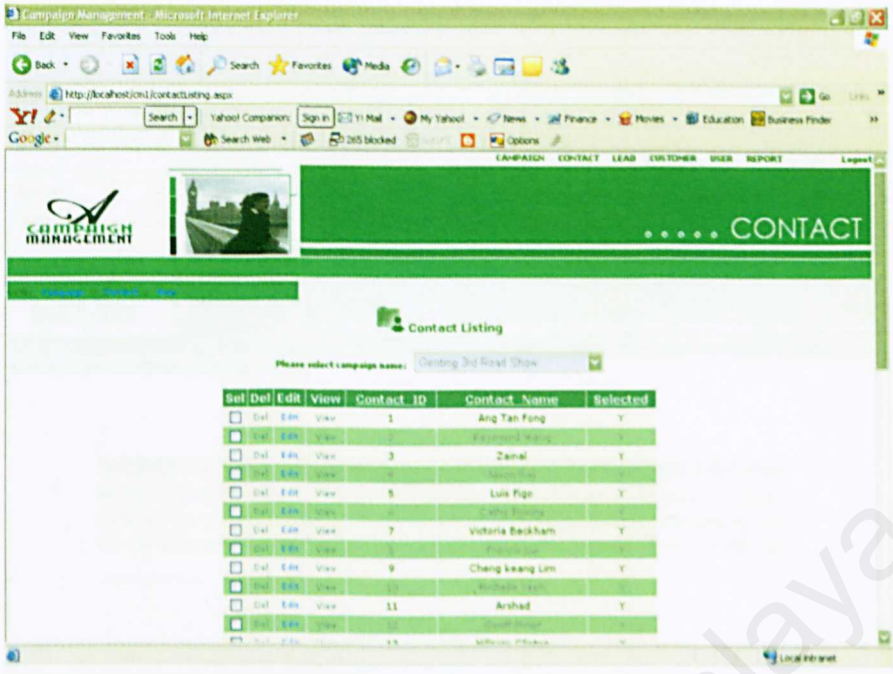


Figure F: Contact listing page

Part 5: Lead Manual

In this part, the lead records will be separated into non-qualified leads and qualified leads.

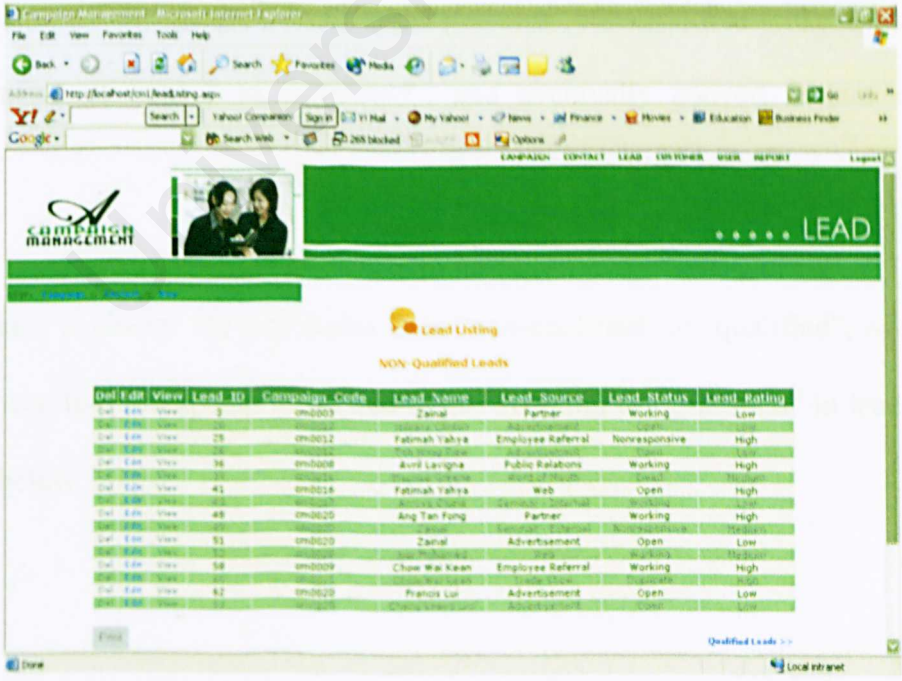


Figure G: Non-qualified lead listing page

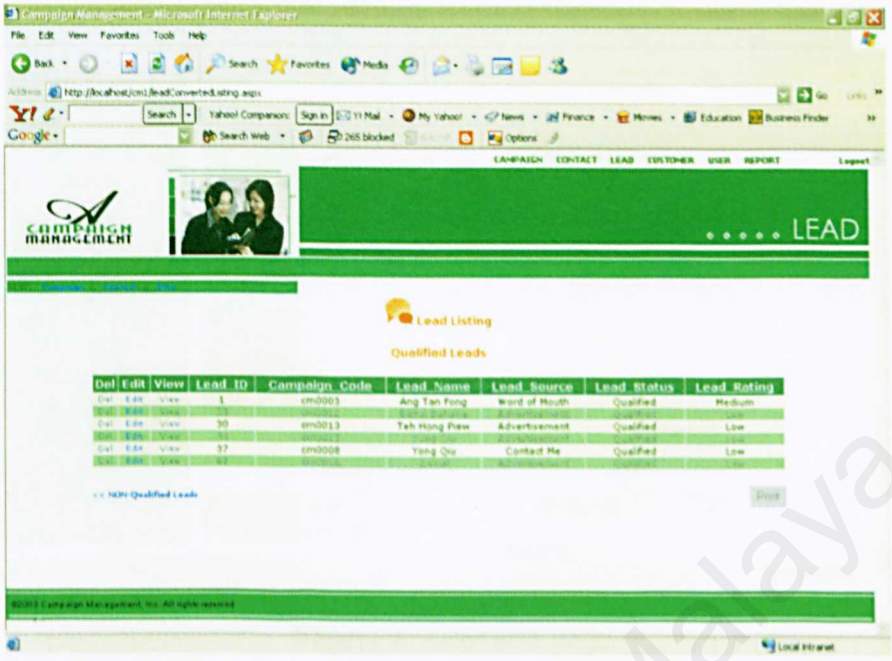


Figure H: Qualified lead listing page

This is the page where the sales persons have to continually keep track with leads' status with one aim – to change the lead from the status of "non-qualified" (like working, open, non-responsive et cetera) to "qualified", and eventually convert it into company's customer.

In the process to change the lead status from "non-qualified" to "qualified", what the staff involved need to do is update the "Lead Status" column to "Qualified" in lead edit page, as shown below.

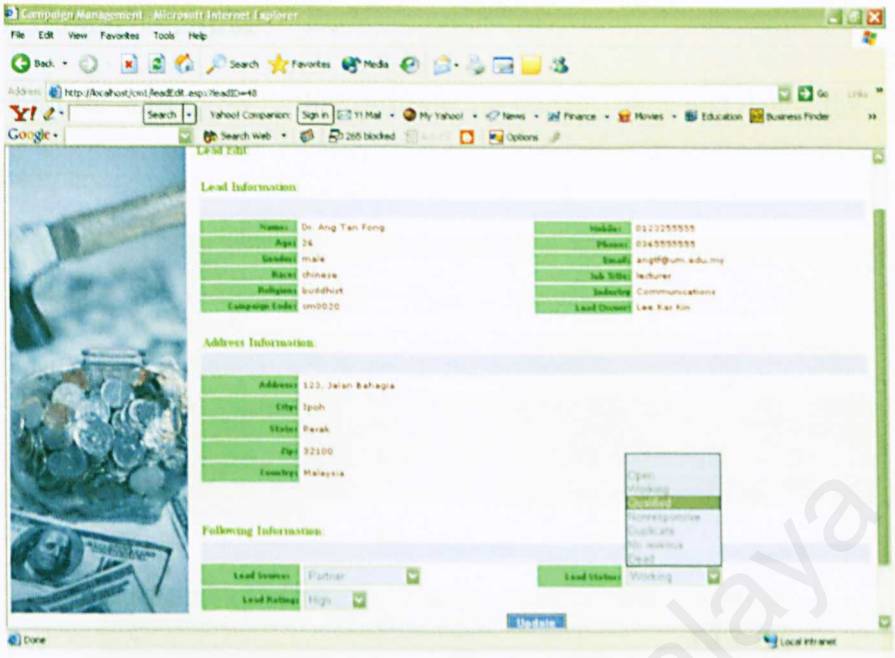


Figure I: Lead edit page

After that, it is the time to convert the qualified lead to company's customer.

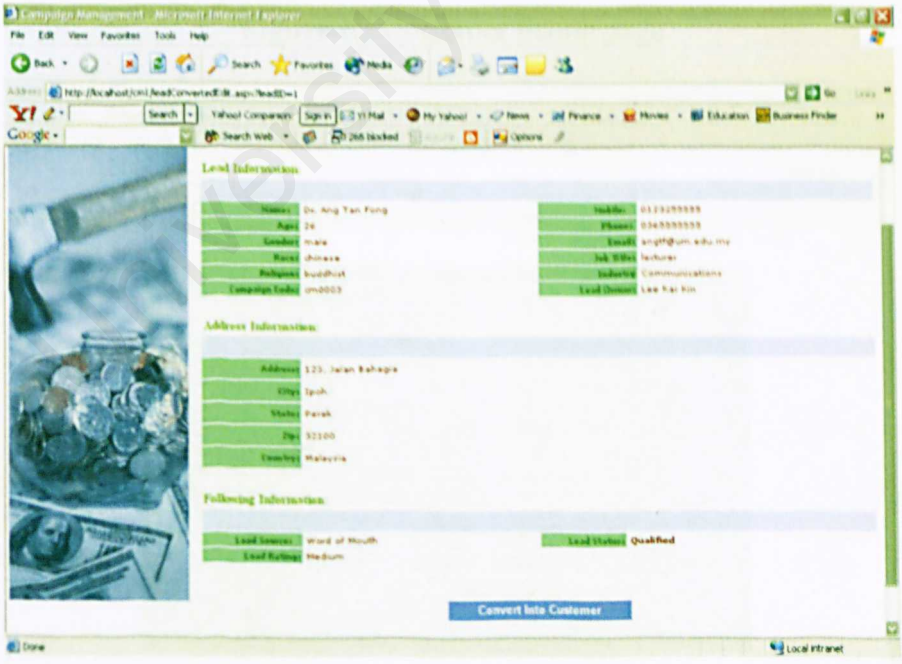


Figure J: Lead convert page

Part 6: Customer Manual

This is the part for staff to do further information update, view and delete the irrelevant or expired customer.

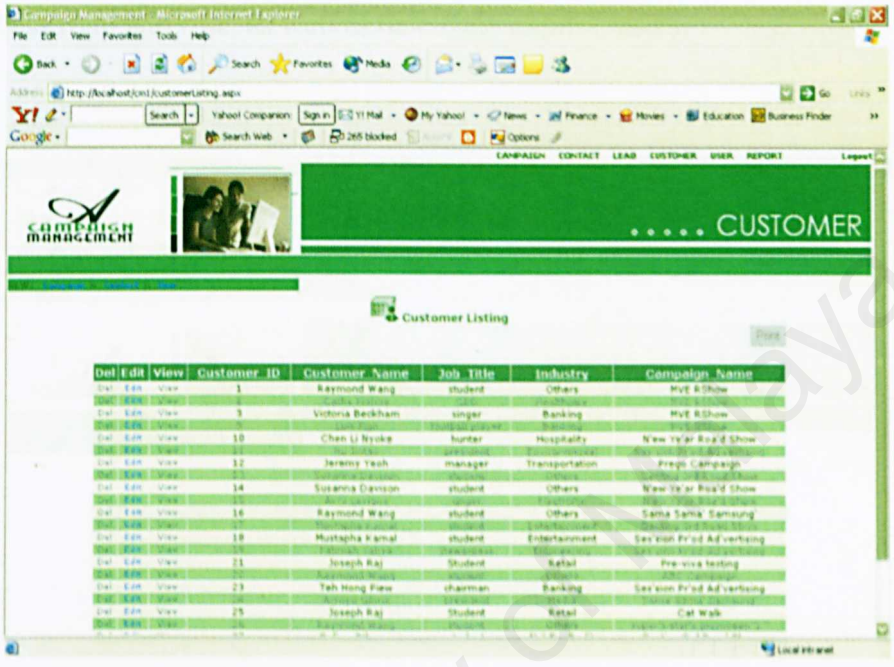


Figure K: Customer listing page

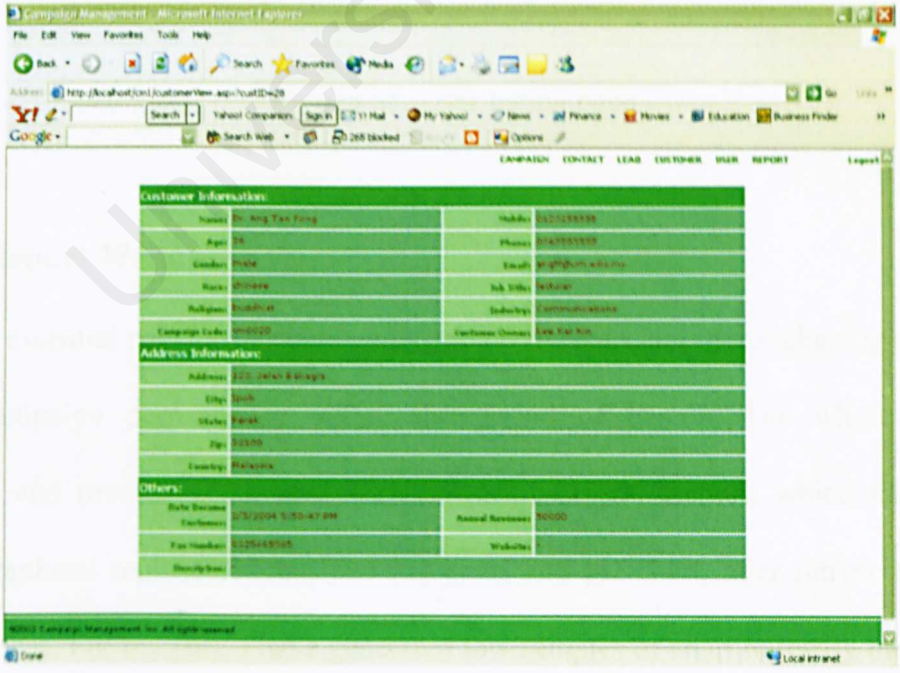


Figure L: Customer view page

Part 7: Staff Manual

This is the part which is just restricted to administration access. Only administrators have the right to enter this page to create other users' records, edit information and determinate others' access right and role, as well as delete the expired users.

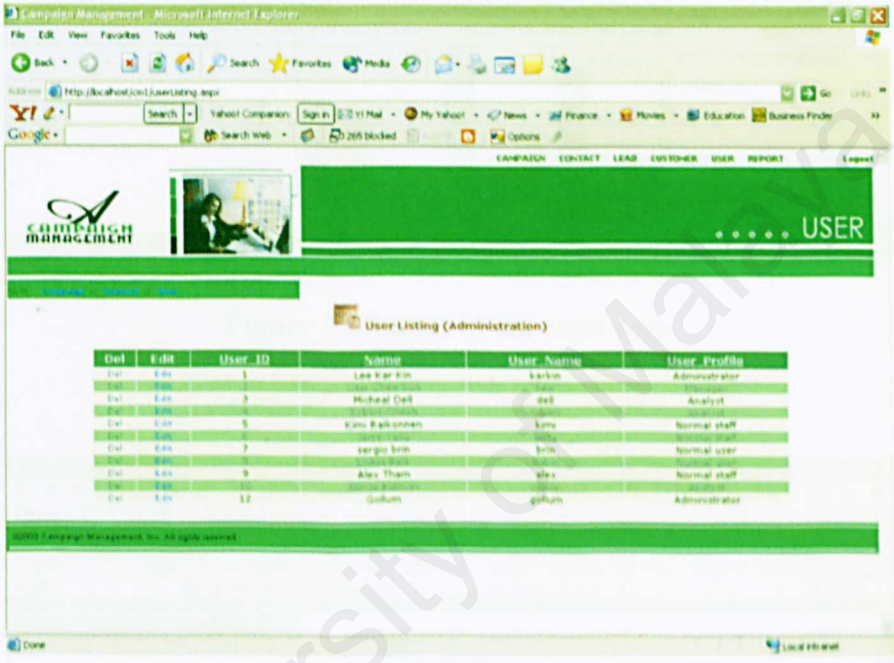


Figure M: User listing page

Part 8: Report Manual

This is an essential part for business analyst to do rigorous and thoroughgoing analysis on certain campaign performance within the period of launch. The whole analytical procedure and process is assisted with powerful Crystal Report, which can generate various graphical representations, like bar chart and pie chart, after retrieving the data from database. For my part, I have generated tow samples of chart to testify the campaign effectiveness and general performance.

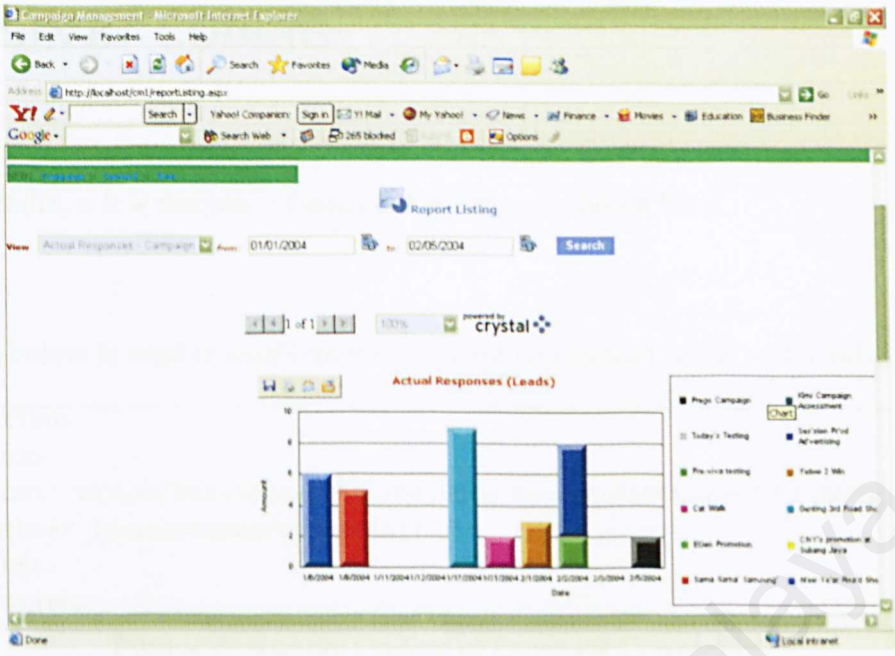


Figure N: Report in bar chart page

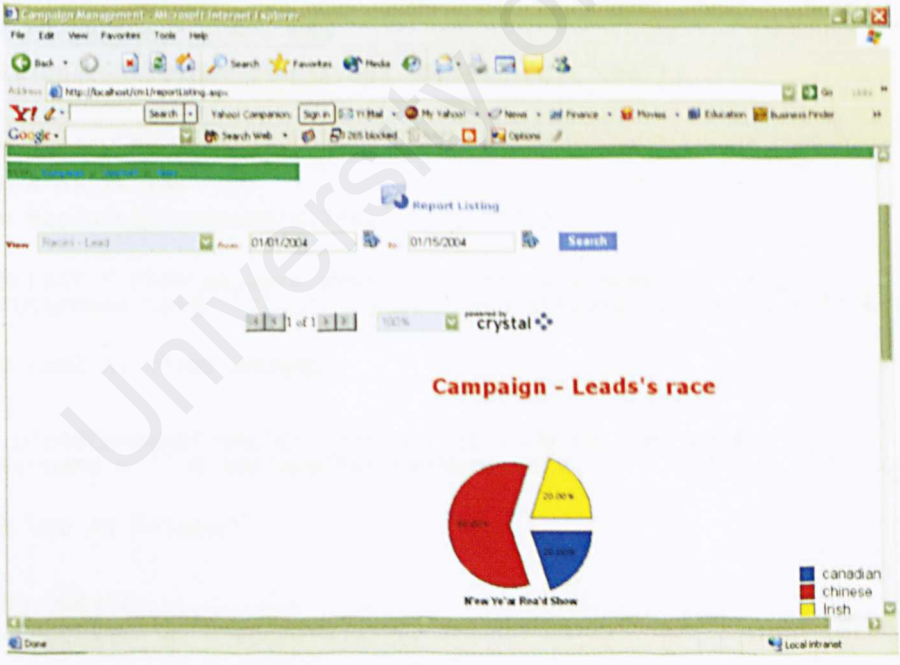


Figure O: Report in pie chart page

APPENDIX B – CODING

In this appendix, a few samples of essential coding are shown here.

The coding below is used to establish the database connection in the web.config.

```
<configuration>
<appSettings>
<add key="cm1" value="Provider=SQLOLEDB;Data Source=RANGKAIAN2003\RADB; Initial
Catalog=cm;User id=sa;Password=good4all"/>
</appSettings>
</configuration>
```

Figure P: Sample Coding of Database Connection

The coding below is used to login into the application.

```
Dim conn As OleDbConnection = New
OleDbConnection(ConfigurationSettings.AppSettings("cm1"))

        Dim strqry As String
        Dim a As String
        a = Replace(txtPassword.Text, "'", "''")

strqry = "SELECT * FROM cm_user WHERE StrCUser_userName = '" & _
Replace(txtUserName.Text, "'", "''") & "' and StrCUser_password = '" & a & "'"

        Dim cmd2 As OleDbCommand

cmd2 = New OleDbCommand("SELECT IntCUser_ID FROM cm_user WHERE
StrCUser_userName = '" & Replace(txtUserName.Text, "'", "''") & "'", conn)

        Dim UID As Integer

        conn.Open()
        Dim myReader As OleDbDataReader
        myReader = cmd2.ExecuteReader()
        If myReader.Read() Then
            UID = myReader.GetValue(0)
        End If
        conn.Close()

        Dim cmd As New OleDbCommand(strqry)
```

```
        cmd.Connection = conn
        conn.Open()
        Dim dataread = cmd.ExecuteReader()
        If dataread.read() = True Then
            Session("UID") = UID
            Response.Redirect("campaignListing.aspx")
        Else
            lblInvalid.Text = "Invalid user name or password."
        End If
        dataread.close()
```

Figure Q: Sample Coding of Login

The coding below is used to display the campaign records in datagrid.

```
Dim conn As OleDbConnection = New
OleDbConnection(ConfigurationSettings.AppSettings("cm1"))

        If Session("UID") Is Nothing Then
            Response.Redirect("pageExpired.aspx")
        End If

        If Not (IsPostBack) Then
            BindGrid("Campaign_ID")
        End If

Dim cmd As New OleDbCommand("SELECT cp.LngCCmpgn_ID AS Campaign_ID, "& _
 "cp.StrCCmpgn_name AS Campaign_Name, " & _
 "ct.StrCCType_name AS Type, cs.StrCCStatus_type AS Status, " & _
 "cp.IntCCmpgn_targetList AS Target_List, us.StrCUser_name AS Owner " & _
 "FROM cm_campaign AS cp, cm_campaignStatus AS cs, cm_user AS us, " & _
 "cm_campaignType AS ct WHERE cp.IntCCmpgn_createdBy = us.IntCUser_ID AND " & _
 "cs.IntCCStatus_ID = cp.IntCCmpgn_statusID AND " & _
 "ct.IntCCType_ID = cp.IntCCmpgn_typeID")

        cmd.Connection = conn
        conn.Open()
        Dim dataread = cmd.ExecuteReader()
        MyDataGrid.DataSource = dataread
        MyDataGrid.DataBind()
```

Figure R: Sample Coding of Displaying Data in Datagrid

The coding below is used to retrieve the data tables like "cm_campaignType", "cm_campaignStatus", "cm_campaign" et cetera to populate the data in the textbox and drop down list in campaign edit page.

```
If Not Page.IsPostBack() Then
Dim conn As OleDbConnection = New
OleDbConnection(ConfigurationSettings.AppSettings("cm1"))
            Dim cmd As OleDbCommand
            Dim cmd2 As OleDbCommand
            Dim cmd5 As OleDbCommand
            Dim dataread As OleDbDataReader

            Dim da As OleDbDataAdapter
            Dim ds As New DataSet

            Dim cmd6 As OleDbCommand
            Dim UID As Integer = Session("UID")
            cmd6 = New OleDbCommand("SELECT IntCUser_profileID " & _
                                    "FROM cm_user " & _
                                    "WHERE IntCUser_ID = " & UID, conn)

            If Session("UID") Is Nothing Then
                Response.Redirect("pageExpired.aspx")
            End If

            Dim userProfile As Integer

            conn.Open()
            Dim myReader5 As OleDbDataReader
            myReader5 = cmd6.ExecuteReader()
            If myReader5.Read() Then
                userProfile = myReader5.GetValue(0)
            End If
            conn.Close()

If userProfile <> 1 And userProfile <> 2 Then
   Response.Redirect("errorPage.aspx")
Else
   Dim cmd3 As String = "SELECT * FROM cm_campaignType ORDER BY StrCCType_name"
                da = New OleDbDataAdapter(cmd3, conn)
                da.Fill(ds, "cm_campaignType")

                ddlType.DataSource = ds.Tables("cm_campaignType").DefaultView
                ddlType.DataBind()
                ddlType.Items.Insert(0, "")

Dim cmd4 As String="SELECT * FROM cm_campaignStatus ORDER BY StrCCStatus_type"

                da = New OleDbDataAdapter(cmd4, conn)
                da.Fill(ds, "cm_campaignStatus")


             ddlStatus.DataSource = ds.Tables("cm_campaignStatus").DefaultView
```

```
            ddlStatus.DataBind()
            ddlStatus.Items.Insert(0, "")

cmd = New OleDbCommand("SELECT cp.StrCCmpgn_name, cp.StrCCmpgn_code, " & _
    "cp.MemCCmpgn_desc, " & _
    "cp.IntCCmpgn_targetList, cp.IntCCmpgn_expectedResponse, " & _
    "cp.DatCCmpgn_startedDate, cp.DatCCmpgn_endedDate, " & _
    "cp.CurCCmpgn_expectedRevenue, cp.CurCCmpgn_budgetedCost, " & _
    "cp.CurCCmpgn_actualRevenue, cp.CurCCmpgn_actualCost, u.StrCUser_name, " & _
    "cp.IntCCmpgn_statusID, cp.IntCCmpgn_typeID " & _
    "FROM cm_campaign as cp, cm_user as u " & _
    "WHERE cp.IntCCmpgn_createdBy = u.IntCUser_ID AND " & _
    "cp.LngCCmpgn_ID = " & Request.QueryString("cmpgnID"), conn)

conn.Open()

Dim myReader As OleDbDataReader
myReader = cmd.ExecuteReader()
If myReader.Read() Then
  txtName.Text = myReader.GetString(0)
  txtCode.Text = myReader.GetString(1)
  txtDesc.Text = myReader.GetString(2)
  txtTargetList.Text = myReader.GetValue(3)
  txtExpectedResponses.Text = myReader.GetValue(4)
  txtStartDate.Text = myReader.GetValue(5)
  txtEndDate.Text = myReader.GetValue(6)
  txtExpectedRevenue.Text = myReader.GetValue(7)
  txtBudgetCost.Text = myReader.GetValue(8)
  txtOwner.Text = myReader.GetString(11)
  ddlStatus.Items.FindByValue(myReader.GetValue(12)).Selected = True
  ddlType.Items.FindByValue(myReader.GetValue(13)).Selected = True
  'Conditional Error
  If myReader.GetValue(9) Is DBNull.Value Then
      txtActualRevenue.Text = ""
  Else
      txtActualRevenue.Text = myReader.GetValue(9)
  End If

  If myReader.GetValue(10) Is DBNull.Value Then
      txtActualCost.Text = ""
  Else
      txtActualCost.Text = myReader.GetValue(10)
  End If

End If
conn.Close()

cmd2 = New OleDbCommand("SELECT Count(l.LngCLead_ID) " & _
       "FROM cm_lead as l, cm_campaign as cp " & _
       "WHERE LngCCmpgn_ID = " & Request.QueryString("cmpgnID") & " AND " & _
       "l.LngCLead_campaignID=cp.LngCCmpgn_ID", conn)
```

```
conn.Open()

Dim myReader2 As OleDbDataReader
myReader2 = cmd2.ExecuteReader()
If myReader2.Read() Then
   txtActualResponses.Text = myReader2.GetValue(0)
End If

conn.Close()

cmd5= New OleDbCommand("SELECT Count(ct.LngCCust_ID) " & _
      "FROM cm_customer as ct, cm_lead as l, cm_campaign as cp " & _
      "WHERE cp.LngCCmpgn_ID = " & Request.QueryString("cmpgnID") & " AND " & _
      "l.LngCLead_campaignID=cp.LngCCmpgn_ID AND " & _
      "ct.LngCCust_leadID=l.LngCLead_ID", conn)

conn.Open()

Dim myReader3 As OleDbDataReader
myReader3 = cmd5.ExecuteReader()
If myReader3.Read() Then
   txtConvertedLead.Text = myReader3.GetValue(0)
End If

conn.Close()
End If
End If
```

Figure S: Sample Coding of Data Retrieve and Population

The coding below is used to update the campaign record based on the Campaign ID.

```
Dim conn As OleDbConnection = New
OleDbConnection(ConfigurationSettings.AppSettings("cm1"))
        Dim da As OleDbDataAdapter = New OleDbDataAdapter
        Dim cmd1 As OleDbCommand
        Dim cmd2 As OleDbCommand

        If Session("UID") Is Nothing Then
            Response.Redirect("pageExpired.aspx")
        End If

cmd2 = New OleDbCommand("SELECT cp.IntCCmpgn_createdBy FROM cm_campaign as cp,
cm_user as u WHERE cp.IntCCmpgn_createdBy = u.IntCUser_ID AND " & _
"u.StrCUser_name = '" & txtOwner.Text & "'", conn)

        Dim owner As Integer

        conn.Open()
```

```
        Dim myReader5 As OleDbDataReader
        myReader5 = cmd2.ExecuteReader()
        If myReader5.Read() Then
            owner = myReader5.GetValue(0)
        End If
        conn.Close()


cmd1 = New OleDbCommand("UPDATE cm_campaign SET StrCCmpgn_name = '" &
Replace(txtName.Text, "'", "''") & "', " & _
"IntCCmpgn_actualResponse = " & txtActualResponses.Text & ", " & _
"IntCCmpgn_convertedLead = " & txtConvertedLead.Text & ", " & _
"CurCCmpgn_expectedRevenue = " & txtExpectedRevenue.Text & ", " & _
"DatCCmpgn_startedDate = '" & txtStartDate.Text & "', " & _
"DatCCmpgn_endedDate = '" & txtEndDate.Text & "', " & _
"CurCCmpgn_budgetedCost = " & txtBudgetCost.Text & ", " & _
"CurCCmpgn_actualCost = " & txtActualCost.Text & ", " & _
"IntCCmpgn_targetList = " & txtTargetList.Text & ", " & _
"IntCCmpgn_expectedResponse = " & txtExpectedResponses.Text & ", " & _
"IntCCmpgn_createdBy = " & owner & ", DatCCmpgn_createdDate = '" &
txtStartDate.Text & "', " & _
"MemCCmpgn_desc = '" & Replace(txtDesc.Text, "'", "''") & "', " & _
"StrCCmpgn_code = '" & Replace(txtCode.Text, "'", "''") & "', " & _
"IntCCmpgn_statusID = " & ddlStatus.SelectedValue & ", " & _
"IntCCmpgn_typeID = " & ddlType.SelectedValue & ", " & _
"CurCCmpgn_actualRevenue = " & txtActualRevenue.Text & " WHERE LngCCmpgn_ID = "
& Request.QueryString("cmpgnID"), conn)

        cmd1.Connection.Open()
        cmd1.ExecuteNonQuery()
        conn.Close()

        Response.Redirect("campaignListing.aspx")
```

Figure T: Sample Coding of Record Update

The coding below is used to generate report based on the parameters that have been chosen in the filtering phase.

```
oRpt.Load("..\\campaignView2.rpt")
Dim crLogonInfo As CrystalDecisions.Shared.TableLogOnInfo
crLogonInfo = oRpt.Database.Tables(0).LogOnInfo
crLogonInfo.ConnectionInfo.ServerName = "RANGKAIAN2003\RADB"
crLogonInfo.ConnectionInfo.DatabaseName = "CM"
crLogonInfo.ConnectionInfo.UserID = "sa"
crLogonInfo.ConnectionInfo.Password = "good4all"
oRpt.Database.Tables(0).ApplyLogOnInfo(crLogonInfo)

If txtDateFrom.Text = "" Or txtDateFrom.Text Is Nothing Then
    oRpt.SetParameterValue(0, Nothing)
Else
    oRpt.SetParameterValue(0, CType(txtDateFrom.Text, DateTime))
End If
```

```
If txtDateTo.Text = "" Or txtDateTo.Text Is Nothing Then
    oRpt.SetParameterValue(1, Nothing)
Else
    oRpt.SetParameterValue(1, CType(txtDateTo.Text, DateTime))
End If

campaignView.ReportSource = oRpt
campaignView.HasDrillUpButton = False
```

Figure U: Sample Coding of Report Generation

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