Faculty of Computer Science &
Information Technology

VISUALIZING STAFF INFORMATION SYSTEM (VSIS)

WONG MOOK LAN
WEK 98050

Supervised By
Associated Professor Dr. Siti Salwah Salim
Bsc. (Kansas), M.Comp.Sc. (Mal) PhD (Manc)

This project is submitted to FSKTM UM
In partial fulfillment of requirement for
Degree Of Computer Science
Session 2000/2001

Declaration

I declare that this thesis is my own work and has not been submitted in any form for another degree / diploma at any university or other institute of tertiary education. Information derived from the published and unpublished work of others has been acknowledged in the text and a list of references is given.

Wong Mook Lan

Jan 2001

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ACKNOWLEDGEMENT

I would like to take this opportunity to express my hearties thanks and appreciation towards my supervisor, Dr Siti Salwah, for her valuable advice, patient supervision, unreserved assistance and encouragement throughout this project. I kindly acknowledge the advices and guidance especially in the field of interviewing and information gathering to prepare myself in the project development.

A sincere thanks to my moderator, Dr Ow Siew Hock for her penetrating criticism and suggestions that help in writing up the dissertation in a proper form.

Appreciation is also directed to the respective company, Global Soft Manufacturing for their co-operation and helpful throughout this period of information gathering. The person in charge is Mr Low Kok Thai and the company staff. Without them, I would not be able to complete my researches here.

Last and not least, a heartiest thanks to Malaya University Library that provides me a place with data, books, and journal, which are the information, collected.

ABSTRACT

The Visualizing Staff Information System also known as VSIS is a system to keep track the personal record of the staff in a company and with effective visual displays which concerned with exploring data and information to gain insight and understanding of the data. The software development tool used are Visual Basic 6.0, Seagate Crystal Report 7.0 and Microsoft SQL Server 7.0 is used as a database management system. Prototype model is conducted in the system development.

Before an interview was conducted, a set of interview questions were prepared and sent to the respective company. Global Soft Manufacturing was one of the correspondent companies. An interview session was carried out with the senior manager who is in charge of the staff personal record and working schedule. The interview has helped in gathering raw data for this system.

The features that are included in the system are user friendliness, flexibility, reliability and security measures. The main objective of this system is to fulfill the needs of the manager or the administrator in order to reduce paper work and process time.

CHAPTER 1

INTRODUCTION

1.1 PROJECT DESCRIPTION

The current software available on Human Resource Management in the market such as Human Resource Management System (HRMS) are suitable for multinational organization or company such as Fujitsu Bhd and Mesiniaga Bhd with one thousand and above number of employees only.

Although this software provide complete service records management, leave management, medical records management, training scheduling & tracking, loan records management, payroll management and workgroup capabilities but it is unnecessary and not suitable for a medium or small size commercial companies to use such a large system to maintain their staff record which contains below one thousand employees.

For a medium or small skill companies, the project manager does most of the work tracking manually. Manually processes have limited the data analysis capability and little or no control on changes to sensitive data. Therefore VSIS is introduced.

VSIS is used to keep track the personal record of the staff in a company and with effective visual displays, which concerned with exploring data and information. The purpose is to gain some deeper understanding of the data and hence promote greater understanding of what the data represents. This system also serves as a central repository that keeps and controls the staff working performance through monitoring and scheduling tasks.

This system is providing a secure and easier way for the users to keep track the status of the task when the project managers assign some task to the software engineers. It is a systematic system that simplifies the work done by the project manager. The system generates timely, accurate and relevant information necessary to effectively monitoring and managing the organization human capital.

Functions such as system security, personal data, detailed data, modifying staff personal details, daily attendance, task and schedule setting, records tracking, reporting and graphical analysis. From these records, this system can visualize staff information and qualification. Besides, this system also generates reports that are important for the project manager or human resource manager to keep track of the staff information and status of the task.

1.2 OBJECTIVE

The project goal is to develop a fully integrated Visualizing Staff Information System, which are visual displays to gain insight and understanding of the data. Then users are able to responsibly and confidently take on even more ambitious tasks and to provide strategic decision support to the general manager and human resource manager.

To attain this goal the project must achieve a number of specific objectives:

1. Satisfy the basic or common requirement of the staff visualizing information through prototype methodology.
2. Ensure a flexible design to accommodate future and potential development like visual display.
3. Easy searching, browsing and understanding of information especially for large amount of data.
4. To reduce the workload of the managers during task assigning and make promotion or selection.
5. To design and develop attractive and interactive interfaces in the end user with user friendly.
6. To help the managers in decision support when making selection and promotion

Aims:

1. Ensure accuracy, integrity and confidentiality since security of the data plays a very important role which the system can update the database and generate reports
2. To maintain personal information on a company and organization meet managerial information requirements
3. To make the staff information detail, benefit and welfare to be more manageable and reachable
4. To make the system more efficient compared to others because the security is in forced by password checking and all the database files are encrypted and only authorized system administrators can view the database and make relevant changes when a staff resigns or when there is a new intake of staff
5. Ensure completeness of tasks that had been assigned to the staff
6. Ensure progress of staffs from their daily attendance

1.3 PROJECT SCOPE

The project scope is the range or extent of the project; scope helps to establish the boundary of the system request. The total project scope comprise of the development approach, functionality of the system and project approach.

1.3.1 Application Approach

Base application used: -

Microsoft Visual Basic	Client end application, Window Base screens and interfaces with ODBC. Visual Basic is used as the front-end (GUI) development languages in the project.

Tools used during the design and development phases: -

Microsoft SQL Server 7.0	The Microsoft SQL Server 7.0 is used as the central/host database.

PC Client/Server	The clients PC are serving as a client as the working program is link to the remote database server using the ODBC driver.

1.3.2 Functionality Of The System

The main functions provided by the system are as follows: -

System security	This system is used to control the users who access to the system. User password is needed to protect unauthorized access to the database.
Employee Record	Personal data, detailed data and modifying staff personal details are kept in this system. Some graphical analysis like age analysis, gender analysis and races analysis can be visual from these data.
Daily Attendance	Keep track of the staff daily attendance record. Punctuality analysis can be done by this system.

Schedule Tracking	The project manager can use schedule-tracking function to keep track the status of the task assign to the staff like percentage completeness.
Report Generator	Generate about 6 to 10 report that provides strategic decision support to the project manager or administrators. Among the report are: (a) User Summary Listing (b) User Detail Listing (c) Task Status (d) Employee Detail Listing (e) Employee Summary Listing (f) Task Analysis

1.3.3 Target User

In VSIS, there are two categories users that have an authority to access the system. There are Administrators and End User. Only user that gets authorized from administrator is allowed to access into the system.

End User

End User is dividing into two types. There are normal user and group user.

(a) Normal users are able to make changes/modifications on the data including all the data maintenance and data entry. They have to ensure the correctness, accuracy and completeness of data in the system as well as to update the data with latest information. Most of them are secretaries or clerks.

(b) Group users are a number of users like software engineers or programmers are allowed by the project manager to access certain interface in the system.

Administrators	The users with highest authority like manager, project manager and human resource manager. Their roles are to give a user authority to access the system and to control the accessibility of the others users. Administrators are not involved in the database maintenance.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Literature review is a research study about the knowledge and information gained to develop this project. Research is a systematic and goal-oriented investigation of facts that seeks to establish a relationship between two or more phenomena. This is because most of the conclusions are based on systematic and goal-oriented research. The materials obtained can be in the form of journals, conference papers, proceeding, symposium technical reports or articles available from Internet.

2.2 TECHNIQUE

An understanding of finding techniques is essential to project success

1. Reading materials

2. Information gathering via Internet

3. All related literatures were collected and review from MU Library. The major sources were gained from journals and magazines section in main library. Information on contemporary information system, information seeks collected from selected journals, articles, text and reference books.

4. Interviewing

2.3 VISUALIZATION

Visualization simply means presenting information in pictorial form and using human recognition capabilities to detect patterns (Eick, Fyock, 1996). Visualization techniques often focus on information that is abstract, which means that many interesting classes of information have no natural or obvious physical representations. Visualization is concerned with exploring data and information to gain insight and understanding of the data.

2.3.1 Concept Of Visualization

Visualization facilitates the conceptualization of the multiple factors involved in understanding complex processes and the associated problem solving. Problem solving involves cognition, and cognition includes perception.

Visualization improves the capability to perceive and, therefore, assists the cognitive process. In the perception of shape lies the beginning of concept formation; it is the grasping of structural features found in or imposed on the stimulus material. When a person perceives a diagram, chart, symbol, word, formula, or some other visualization, he manifests his intelligence and cognition by his ability to understand the implication of what he sees.

In the future of user interfaces is in the direction of larger, information-abundant displays. With such designs, the worrisome flood of information can be turned into a productive river of knowledge.

Visual query formulation and visual display of results can be combined with the successful strategies of direct manipulation. Human perceptual skills are quite remarkable and largely underutilized in current information and computing systems. Based on this insight, star field displays, tree maps, tree browsers, zoom able user interfaces, and a variety of widgets to present, search, browse, filter, and compare rich information spaces can be developed.

There are many visual alternatives but the basic principle for browsing and searching might be summarized as the Visual Information Seeking Mantra: *Overview first, zoom and filter, then details-on-demand.*

2.3.2 Data Visualization Techniques

Visualizations range from simple charts and graphs that depict the relationships between two dimensional scalar data types, to sophisticated multidimensional visualizations that change in appearance with live data feeds. There are various techniques used to analyze the data and display the visualization. Each technique is best suited to display particular types of data called a data domain. Some examples of the common multidimensional visualization display techniques in this section are discussing and providing. Below is the diagram show the data visualization techniques.

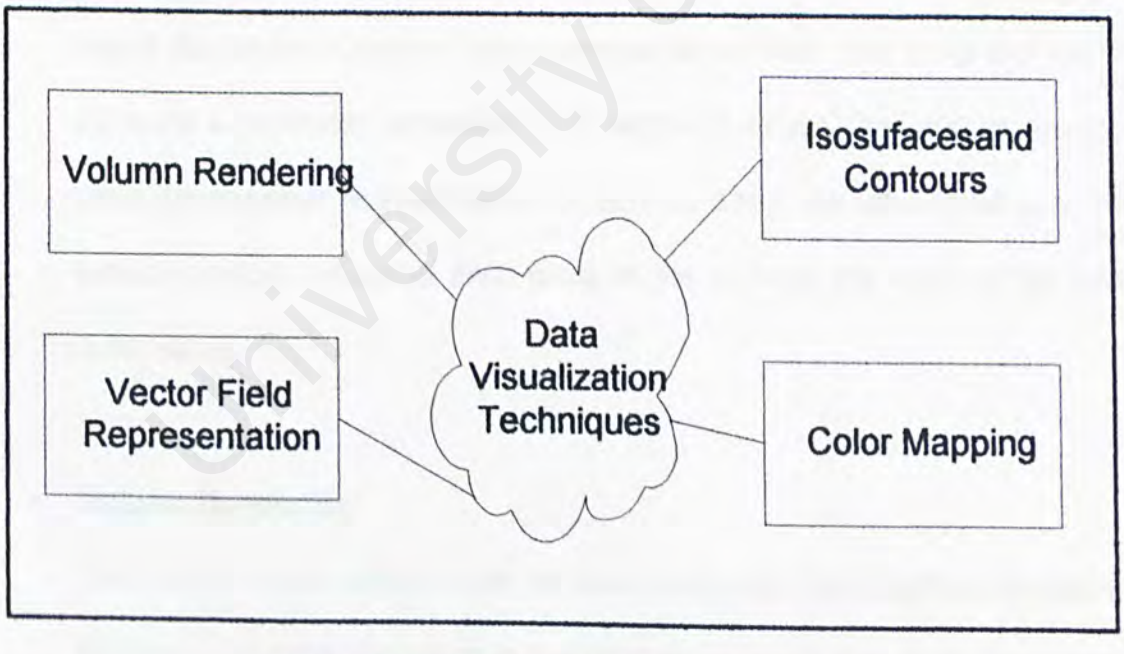


Figure 2.1: Data Visualization Techniques

- ***Color Mapping***

  Color maps present a relationship between a range of data values and a range of colors. In this process, each color is mapped to either a specific data value or a range of data values. Often a continuous color gradient, or color spectrum, is used in color maps. Color mapping is very useful when applied in conjunction with other visualization techniques. For example, a color map can be used with a three-dimensional plot in order to display a relationship between four variables.

- ***Isosurfaces and Contours***

  This display technique is best suited for geographical or other physical object depictions. Contour lines connect data points that have the same value for a particular parameter in a region of values. Isosurfaces are the three-dimensional representation of contour lines. An isosurface is a 3D surface contour, where at each point on the surface, the value of the data is the same

- ***Volume Rendering***

  One of the most active areas in advanced data visualization is volume rendering. Volume rendering is the process of projecting multidimensional dataset onto a two-dimensional image plane in order to gain a better understanding of the internal structure of the volumetric data visualization.

This technique is most commonly used in the medical field, geosciences, astrophysics, chemistry, mechanical and other engineering fields.

- ***Vector Field Representation***

  Vector field representation uses a broad set of techniques to depict the magnitude of data or a direction of flow. These techniques also allow users to depict two data attributes in a single point. Some of the popular vector field techniques are streamlines and glyphs. Streamlines illustrate a general flow and are the lines that are tangential to a velocity field at each point. Glyphs are generic visual objects, such as a sphere, that are used to represent data.

2.3.3 Visualization Development Principles

The development of useful visualizations requires certain characteristics of the software used and adherence to some critical development guidelines. There are no standard methodologies for visualizing large datasets, nor the application of visualization to business data. However, the following features and guidelines are based on the most in-depth research in the field.

2.3.3.1 Software Features

According to Youngsmith (1998), data visualization software has three features that make it possible to interpret large stores of data:

1. Specialized views, like scattering diagrams that can display large quantities of data on a single page.
2. The ability to instantly highlight exceptions in the data.
3. The ability to display slices of data as visual patterns.

All of these software characteristics are needed to promote swift and feasible analysis of large datasets. The specialized views are a characteristic of visualizations that make them more advantageous than other data analysis techniques. These views contain a lot more information than traditional visualization techniques and facilitate the analysis of multivariate data. Youngsmith's second point provides a mechanism for quick decision-making and

further analysis. When exceptions readily stand out the analysis process accelerates. Furthermore, the ability to display slices of data is useful in pattern generation. Pattern generation can be used to determine subsets of a larger dataset in order to decrease the volume of data being analyzed, while minimizing the chances of overlooking significant results.

2.3.3.2 Guiding Principles

Stephen Eick's research team at Bell Laboratories offers the following *Guiding Principles* when developing data visualizations (Eick, 1996). These guidelines are based upon the team's experience in developing dozens of specialized data visualization views over the past several years and applying them to real life case studies. The goal of these guidelines is to produce systems enabling a user to discover relationships in the data that are actionable. The guidelines and a description of each follow. Below show the diagram of the guiding principles.

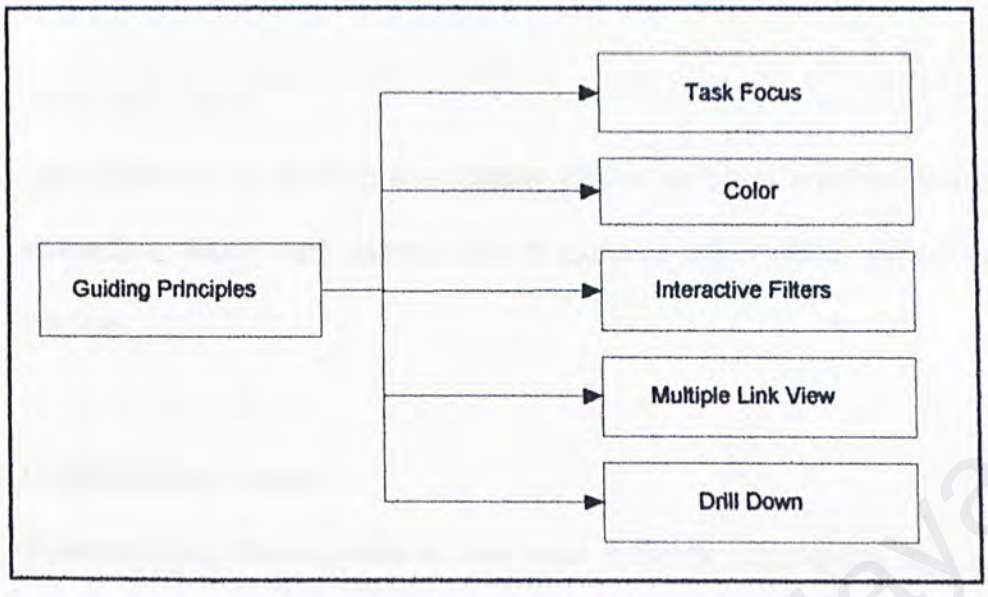


Figure 2.2: Guiding Principles

- Task Focus

  Since the needs of each user are unique, the best visualizations are task-oriented and help frame interesting questions as well as answer them. Building a successful visualization involves understanding the user's tasks and analysis goals, as well as incorporating their domain knowledge.

- Color

  Using color to show details may layer additional information on the display. Color processing in the human vision system is an independent perceptual process making color a natural choice for encoding information. Users also find colorful displays engaging and visually pleasing, increasing the appeal of the system.

- Interactive Filters

  One approach to solving the display clutter problem involves the use of interactive filters that reduce the amount of information shown on the display.

- Multiple Linked Views

  Selecting and filtering data in one view instantly propagates to the other views, thereby providing additional insights. Linking multiple views interactively provides an integrated visualization, which is far more powerful than the sum of the individual views.

- Drill Down

  Users, upon discovering interesting patterns, need access to the actual data values. This process is called drill down. There are two mechanisms for providing detailed data. When the user touches any item in the display with the mouse, the data values for that item are displayed. Detailed information should be available by pointing the mouse-mouse clicks should be unnecessary. The second mechanism is a user-controlled, on demand, scratch pad area for displaying detailed data.

2.4 SOFTWARE ARCHITECTURE

2.4.1 Client / Server Computing

Workstation power, work group empowerment, preservation of the existing investments, remote network management and market - driven bus are the forces creating the need for Client / Server Computing. The technology is here: what is missing is the expertise to effectively apply it.

Client /Server Computer involves splitting an application into task and putting each task on the platform where it can be handle most effectively. The processing for presentation is put to the user / client machine and the data management and storage are on the server. Depending on the application and the software used, all data processing many occur on the client via network server software and returns the results to the client. The client manipulates the data and presents the results to the user. Client / server is a network environment where control of data is established at a server node and is available for access but not update and others nodes.

The client in the client / server model is the desktop workstation. It is a networked information requester that can always query about database

information or any other information from the server. Any workstation that is used by a single user is a client. The same workstation, when share simultaneously by multiple users, is called a server.

The client is primarily a consumer of services provided by one / more server processors. The model provides a clear operation of functions based on the idea of servers acting as service providers responding to request from client. It is important for us to understand that a workstation can operate as a client in some instances. At that same moment, it can also act as a server in other instances. A client workstation usually uses a local operating system to host both basic services and the network operating system interfaces. This operating system may be the same or different from the server. Usually the operating systems are DOS or Window 3.x.

A server is a high power workstation; a mainframe or a minicomputer that needed to be used to turn a computer to a server. Services for client / server application show best results when they are configured with an operating system that supports shared memory, application isolation and preemptive multitasking. This is because an operating system with preemptive multitasking enables a higher priority task to preempt or take control of the processor from a currently executing, lower priority task.

2.4.2 Client / Server Architecture

Client / Server Architecture is categorized according to the number of tier implementation starting from two – tier up to multi – tier found in many of today client or server environment.

2.4.2.1 Two – Tier Architecture

One of the quick ways of building client / server application is to create a two – tier client / server environment. In a two – tier environment, in order to provide the functionality for the system, much processing is being carried out at the client side thus using the resources from the client side, such a memory space and also the processing power. Filed edits, local lookups and access to peripheral devices (scanner, printer) are provided and managed by the client system too.

Due to the fact that most of the processing is done in the client, where it require resources, the client if often regarded as a FAT – Client. In this two – tier architecture, the client has to be aware of where the data resides and what the physical data looks like. The data may reside on one / more database server, on amid – range machine or on a mainframe. The formatting and displaying of the information is provided by the client application as well. The server would

routinely only provide access to the data. The ease and flexibility of these two – tier products to create new application continue to be driving many smaller scale bus applications.

2.4.2.2 Three – Tier Architecture

Three – tier architecture is later to be called multi – user architecture grew out of this early experience with "distributed" application. As a two – tier application percolated from individual and departmental units to the enterprise, it was found that they do not scale very easily. And in the ever – changing business environment, scalability and maintainability of a system is the concerns.

Another factor that contributes to the move from two – tier to multi – tier system is the wide variety of clients within a larger organization. Most organization do not have the luxury of having all of the workstation running the same version of an operating system, much less the same operating system.

This driver a logical vision of the application components, the database component and the bus rules that govern the processes the application supports. In multi – tier architecture, as show in figure, each of the major pieces of functionality is isolated. The presentation layer is independent of the bus logic, which in turn, is separated from the data access layer. This model require much

more analysis and design on the front – end, but the thinner client by bringing some processing tasks back to the server.

Below is a three – tier architecture figure

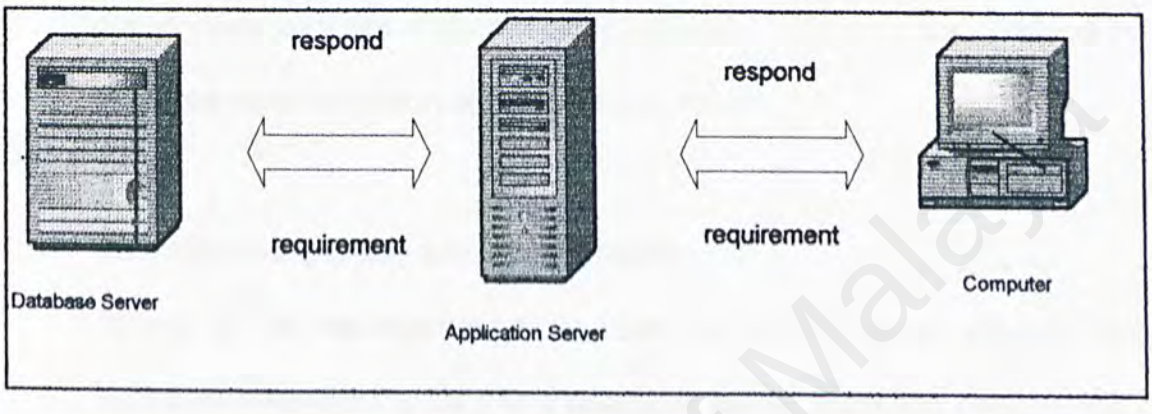


Figure 2.3: Three – tier Architecture

2.4.2.3 Advantage Of Three – Tier Architecture

1. Enhancement of data sharing

   Data that is collected as part of the normal bus process and maintained on a server is immediately available to all authorized users whenever they require for it.

2. Integrated services

   There is no need to change into terminal mode or log into another processor to access information. All authorized information and processes are directly available from the desktop interface.

3. Sharing Resource among Diverse Platforms

   Provides opportunities to achieve open system computing. Application may be created and implemented without regard to the hardware platforms or the technical characteristics of the software but the users may obtain client services and transparent access to the services provided by database communication and application server.

4. Data interchangeability and interoperability

   Almost all the development tools used for client / server development expect to references a back-end database server accessed through SQL. A user or applicant can define a consolidated view of data that is actually distributed between hetero generous, multiple platforms.

5. Masked Physical Data Access

   Users can access information from database anywhere in the hardware provided that SQL is used for data access. From the local PC, local server Wide Area Network (WAN) data access is supported with the developer and user using the same data required.

6. Location Independence of Data and Processing

   Data is accessed through SQL without regard to the hardware, operating system or location providing the data.

2.4.3 Database

2.4.3.1 What is database?

Database is a place where information is stored. Example include formal program that creates database for quantitative analysis or more informal database such as staffs' information, students' information and patients' information. These kinds of informal database help organize knowledge and actions, just as the more formal types of database, for example on population and breast or prostate cancer statistics and find out if there is a increase or decrease in the growth of certain illnesses or others such as employment growth, nursing growth. When we have a profile of the growth or decline of certain measurement then policy makes can make rational decision about allocations of resources.

2.4.3.2 The Effectiveness Objective of the Database

1. Ensuring that data can be shared among users for a variety of application
2. Maintaining data that are both accurate and consistent
3. Ensuring that all data required for current and future application are readily available.

4. Allowing the database to evolve and the needs of the users grow
5. Allowing the users to construct their personal view of the data without concern for the way the data are physically stored.

2.4.3.3 Relational Database

As for the relational database, Microsoft Access 97 and Microsoft SQL Server 7.0 were studied and below is the information about Access 2000-package and Microsoft SQL Server.

Microsoft Access 97 / 2000

Microsoft Access 97 includes three types of class modules—basic class modules, form modules, and report modules. A class module can be thought of as a template for a user-defined object. Within a class module, a developer can add public procedures that define custom methods and properties for the object. When an instance of the class is created, these custom methods and properties can be applied, as they would be for any object.

One of the most powerful features in Microsoft Access is its ability to store Visual Basic for Applications code directly behind forms or reports. Microsoft

Access 97 now creates forms and reports that are "lightweight." These lightweight objects do not have a Visual Basic module behind them, nor are they part of the Visual Basic for Applications project. Thus, when opened, the objects load faster than traditional objects containing code.

If a database contains code written in Visual Basic, saving it as an .MDE file compiles all modules, removes all editable source code, and compacts the destination database. Code written in Visual Basic will continue to run, but it cannot be viewed or edited, and the size of the database will be reduced because the code was removed.

Microsoft SQL Server 7.0

Microsoft SQL Server 7.0 combines the best of traditional mainframe computing—centralized security, data integrity, and control—with the best of today's PCs—ease of use, rich user interfaces, and a variety of off-the-shelf productivity tools. It makes it possible for multiple front ends to share information, enabling the developer to choose the most appropriate tool for the job. SQL Server makes efficient use of networks; because database queries are processed at a centralized server, network traffic is reduced.

Microsoft SQL Server incorporates a world-class feature set for distributed client/server computing. Users using SQL Server will see benefits in the following key areas:

- Reliable distributed data and transactions
- Centralized control of distributed servers
- Very high performance and scalability
- Support for very large databases
- Full programmability and standards support
- Rich desktop integration
- Open interoperability

The benefit of the SQL Server transaction processing design is implicit concurrency control. SQL Server employs Dynamic Locking, a locking architecture that keeps concurrent users from interfering with each other during queries and updates.

SQL Server allows precompiled collections of SQL commands (stored procedures) to be stored in the database, a feature that, in some cases, can decrease query processing times by as much as 80 percent. Stored procedures

can also be used to centralize application logic in the database, allowing the developer to program the server to perform complex queries or updates in response to a simple procedure call.

2.4.4 Software Development Tools

The development tools that can be used as visualization are Microsoft Excel 97/2000, Microsoft Visual Basic 6.0, Seagate Crystal Report 7.0, Visual C++ 5.0 and Visual FoxPro 5.0.

2.4.4.1 Microsoft Excel 97 / 2000

Microsoft Excel is a powerful platform for building custom solutions to meet specific business needs. Rather than expending resources on writing low-level code, companies are investing in solutions that use the built-in power of Microsoft Excel for data analysis, charting, and presentation.

More than 500,000 solution developers use Microsoft Excel as the platform for building custom solutions for specific business needs. Microsoft Excel 97 will continue to be the best spreadsheet development platform, with

improvements in capacity, end-user programmability, IDE, forms capability, true event-driven programming, support for ActiveX technologies, increased programming control for PivotTable dynamic views, and taking advantage of the Data Map object model.

2.4.4.2 Microsoft Visual Basic 6.0

The Visual Basic programming language is not unique to Visual Basic. The Visual Basic programming system, Applications Edition included in Microsoft Excel, Microsoft Access, and many other Windows applications uses the same language. The Visual Basic Scripting Edition (VBScript) is a widely used scripting language and a subset of the Visual Basic language.

Whether user goal is to create a small utility for personal use or work group, a large enterprise-wide system, or even distributed applications spanning the globe via the Internet, Visual Basic has the tools that support these needs.

- Data access features allow user to create databases, front-end applications, and scalable server-side components for most popular database formats, including Microsoft SQL Server and other enterprise-level databases.

- ActiveX™ technologies allow user to use the functionality provided by other applications, such as Microsoft Word, word processor, Microsoft Excel spreadsheet, and other Windows applications.
- Internet capabilities make it easy to provide access to documents and applications across the Internet or intranet from within user application, or to create Internet server applications.
- Finished application is a true .exe file that uses a Visual Basic Virtual Machine that user can freely distribute.

2.4.4.3 Seagate Crystal Report 7.0

Seagate Crystal Report, acknowledged leader among Windows report writers with more than four million licenses shipped, brings additional ease-of-use, flexibility and powerful reporting technology. Below are the features in the crystal report:

a) Support for SQL database servers has been improved with more operations performed on the server for faster report processing and better use of network resources.

b) Microsoft Office 97 and 2000 users can easily create reports within familiar Microsoft Office environments with new Crystal Reports Add-ins for Microsoft Excel or Microsoft Access.

c) Supports OLE DB for easy connection to data stored in Microsoft SQL Server and other data sources supporting this standard.

d) The enhanced Chatting Expert provides control over chart and legend formatting, charting on running totals and better support for special graph types like bubble charts. Zooming is now supported in the Analyzer, Preview and Drill-down tabs. Tool tips display more detailed information for chart data.

e) Connecting to data is faster and easier with the new Data Explorer – a graphical, Explorer-like interface for selecting data sources.

f) Designed for Microsoft Visual Studio and other COM-based development environments, the feature-rich Report Designer Component (RDC) give developers unprecedented control over report layout and formatting.

2.4.4.4 Visual C++ 5.0

The Microsoft Visual C++ version 5.0 development system is the development tool used to build many of the most well known desktop software applications in the world, including Microsoft Word and Microsoft Excel. Many applications continue to require the language flexibility of C++ and the performance tuning options of a sophisticated C/ C++ language compiler, which makes Visual C++ the ideal tool for the most demanding performance requirements.

New features in Visual C++ 5.0 include important compiler updates that reduce the size of an application by as much as 10 percent. Using new language syntax extensions, developers who use Visual C++ can use Active Scripting syntax together with C++ language syntax so that developers can reuse pre-built components as easily as do Visual Basic and Visual InterDev developers

2.4.4.5 Visual FoxPro 5.0

The Microsoft Visual FoxPro version 5.0-database management system continues the leadership tradition of version 3.0. It features powerful ActiveX extensibility with a new ability to create ActiveX Components using the FoxPro

database language, better forms loading and query performance, improved connectivity features, and an enhanced development environment.

The enhanced development environment shares the functionality of the powerful debugger found in Microsoft Visual C++. Improved support, including the ability to subclass, and the ability to reuse third party ActiveX Controls, extends the power of Visual FoxPro. Developers can build applications with greatly improved connectivity features such as offline views and multi-tier client/server functionality. And through its ability to create ActiveX Server Components, Visual FoxPro applications can now be easily integrated with Web applications.

2.5 SUMMARIZE

Summarization is a briefly statement based on the researcher's work that had been found such as algorithm and architecture. All this research was done mainly to gain information for Visualizing Staff Information System project. This information covers software architecture, client/server architecture, relational database, concept of visualization and software development tools.

The information gathered on software architecture and client/server architecture for the project was analyzed. All these information was obtained from the books.

As for relational database tools and visualization, information was gained from sources like books and WWW. The relational database tool is chose for this project is Microsoft SQL Server 7.0. The reason for choosing this tool is also mentioned in the next chapter.

The information gathered on software development was obtained from WWW. More than three types of software were studied and each has its own unique feature. The software chose for VSIS project is also mentioned in the next chapter.

Well, that concludes review of literature. All these information that was found are used for the development of VSIS effectively and efficiently.

CHAPTER 3

METHODOLOGY

3.1 APPROACH

In order to develop a system or to make a project successful, an approach was choosing. The prototyping approach was choosing for VSIS project.

3.1.1 Prototyping Model

The software development process is help to control the thrashing by including activities and sub processes that enhance understanding. Prototyping is such a sub processes; a prototype is a partially developed product that enables customers and developers to examine some aspect of the proposed system and decide if it is suitable or appropriate for the finished product. This means developers may build a system to implement a small portion of some key requirements to ensure that the requirements are consistent, feasible, and practical. Design prototyping helps developers assess alternative design strategies and decide which is best for a particular project.

Since the prototyping model allows all or part of a system to be constructed quickly to understand or clarity issues, it has the same objective as

an engineering prototype, where requirements or design require repeated investigation to ensure that the developer, user and customer have a common understanding both of what is needed and what is proposed. One or more of the loops for prototyping requirements, design or the system may be eliminated, depending on the goals of the prototyping. However, the overall goal remains the same: reducing risk and uncertainty in development. (Pfleeger, 1998)

The decision is made, based on the advantage of prototyping model. The prototyping model able to demonstrate the feasibility of a system design or approach to understand the user requirement clearly and correctly. Moreover, the prototype developed can be used in the real system and it is suitable for complex system. Prototyping can itself be the basis for an effective process model, shown in figure below.

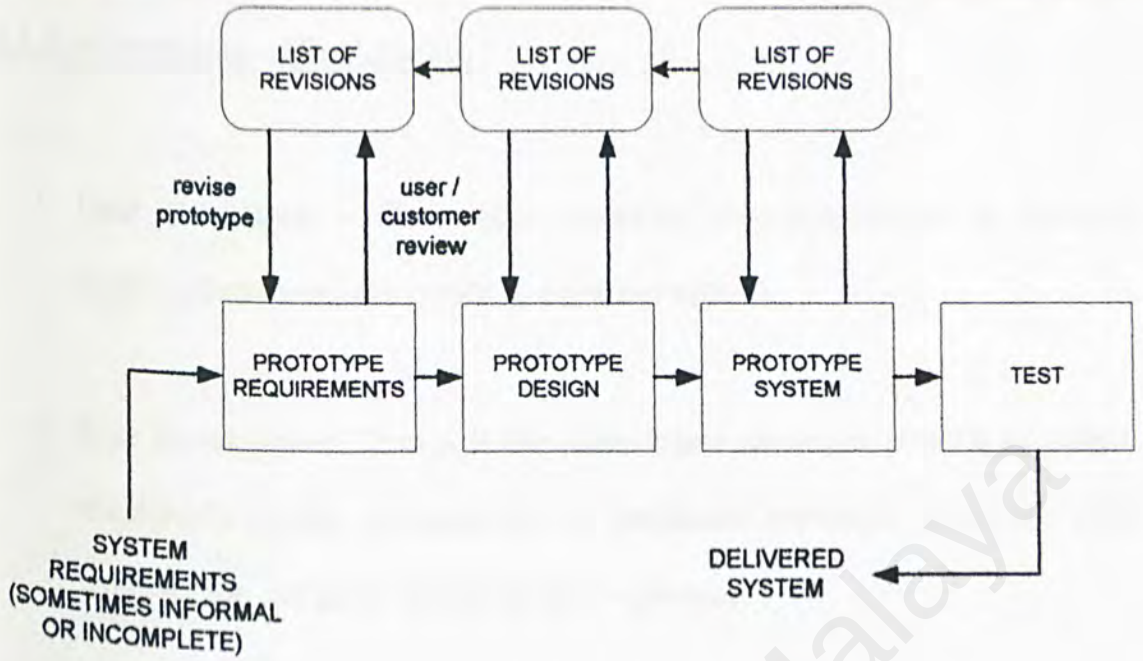


Figure 3.1: Prototyping Model

The prototyping may begin with a nominal set of requirements, collection and determination of system requirement including functional and non-functional requirement. Then a system design is formulated and focuses on the data design will issues. A prototype is build to be tested and evaluated in order to verify or refine the requirement and to ensure all requirement are covered.

After the requirement, data design and system design are identified; the system is then developed and tested. Finally is delivered to clients.

3.1.2 Advantages of Prototyping

1. User Orientation – One major objective of prototyping is to develop systems that meet user needs to a greater extend.

2. Fast Development Time – It can take a few weeks or months to obtain meaningful results, compared to the traditional approach, which can take years for the complete system to be in operation.

3. Fewer Errors – Prototyping allows errors to be detected earlier.

4. More Opportunity for Changes – With prototyping, the user can use and work with the outputs from each subsystem or component as it is being developed, enabling the user to suggest changes during the development process

3.1.3 Development Approach

Three phrases development approach are used:

1st Phase - First Semester Of the project

ID	Task Name	Start	End	Duration
1	Choose project title and planning	6/5/00	6/9/00	5d
2	Research and finding info	6/9/00	7/7/00	29d
3	Interview and collect info from peop	7/3/00	7/8/00	6d
4	Analysis info and procedure	7/8/00	7/15/00	8d
5	Prepare for documentation	7/15/00	7/25/00	11d
6	Viva and prepare final proposal	7/25/00	8/31/00	38d

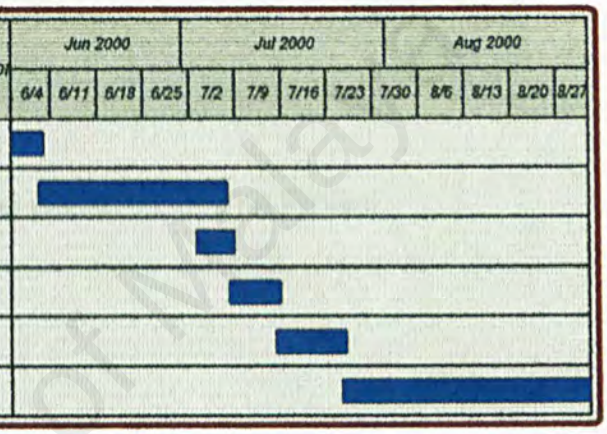


Figure 3.2: First Phase – First Semester Of The Project

2nd Phase – November Holiday

ID	Task Name	Start	End	Duration
1	Coding on all the screen that involved	9/25/00	10/25/00	23d
2	Implementation of the 2-tier server architecture	10/23/00	10/30/00	6d
3	Preparing Test Script	11/1/00	11/3/00	3d

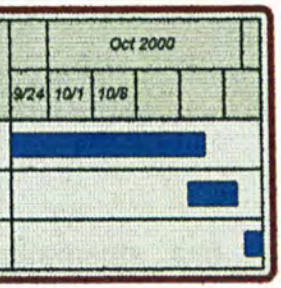
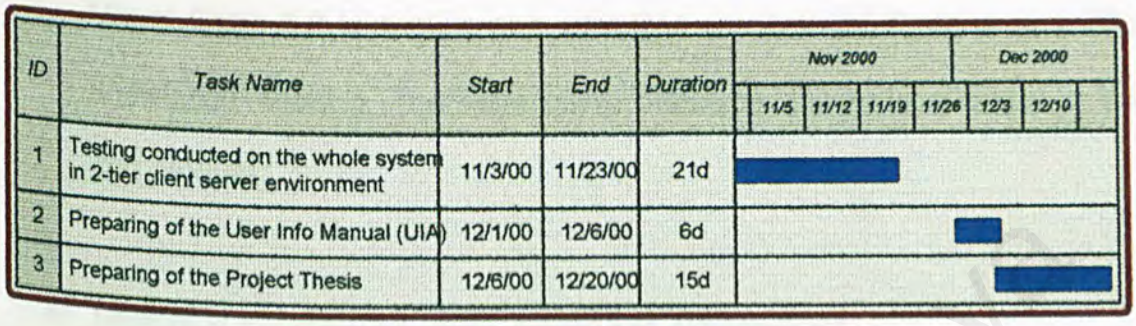


Figure 3.3: Second Phase – November Holiday

3rd Phase – Second Semester Of the Project



ID	Task Name	Start	End	Duration
1	Testing conducted on the whole system in 2-tier client server environment	11/3/00	11/23/00	21d
2	Preparing of the User Info Manual (UIA)	12/1/00	12/6/00	6d
3	Preparing of the Project Thesis	12/6/00	12/20/00	15d

Figure 3.4: Third Phase – Second Semester Of The Project

3.1.4 Justification

As mentioned above, the development model for VSIS project is prototyping model. The reasons for choosing this model are described below.

1. *Prototypes are inexpensive to build*

   The cost of building many prototypes is relatively still less than building a fully working application.

2. *Changing the system early in its development*

   Prototyping enable early correction of application requirements and reduce cost mistakes, as there is specific time frame for VSIS to be completed.

3. *Use of new technology*

   Prototyping is the best method to be used for VSIS because the Microsoft Visual Basic 6.0 is a quite new development tool and there is very little knowledge about it. Therefore using prototype can reduce errors in the end product.

4. *Designing a system for users' needs and expectations*

   Using prototype in development fits better with users' needs and expectation. VSIS project mainly concentrates on the needs of the users specially managers. Furthermore, visualizing application needs to have proper Graphical User Interface (GUI) that are attractive and user friendly. This is because different users or organization have different views, needs and it is very difficult to specify exact requirements at the beginning.

3.2 PLANNING AND PROCEDURE

The diagram below illustrates the general framework of activities conducted for the whole project period. The time, work effort and duration of each activity vary from phase to phase.

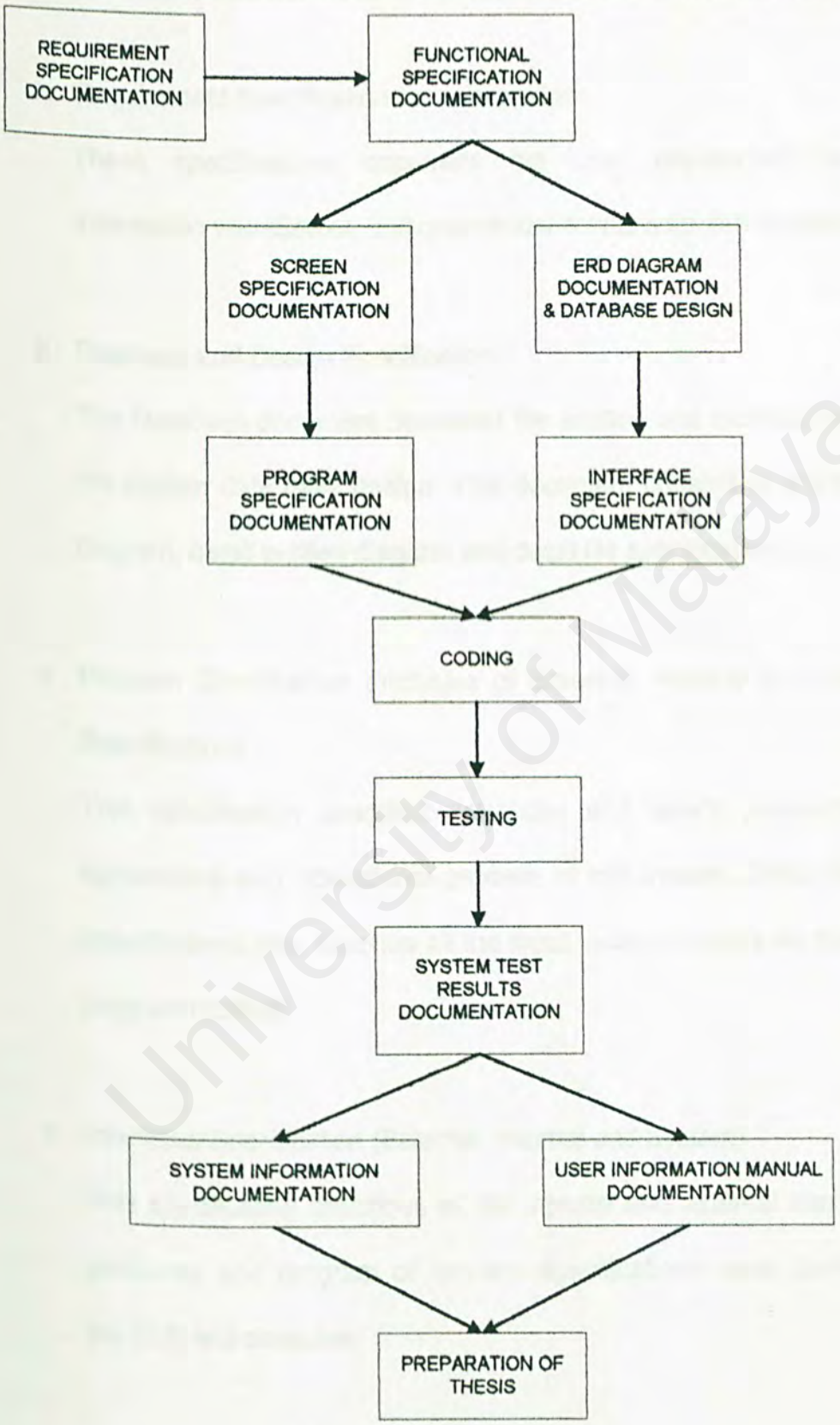


Figure 3.5: Project Plan

a. Requirement Specification Documentation

These specifications document the user requirement to meet information visualization and operational flow to tailor the development

b. Database and Design Specification

The Database document described the entities and technical aspect of the system data base design. This document consists of the overview diagram, detail entities diagram and detail file specifications.

c. Program Specification (inclusive of Screens, Reports and Functional Specification)

This specification specified, from the end user's perspective, the appearance and operational process of the system. Detail functional specifications also describe all the input, output, reports file format and program routines.

d. Interfaces Specification (External, Internal and System)

This specification describes all the internal and external interfaces file structures and program or function specifications when connected to the OLE and database.

e. User Information Manual (UIM)

These are the user functional guides for operating the system. This document described all the screen flow, reports, functional details and operating procedures for user as a reference.

f. System Test Results Document

These documents refer to the test scripts and confirmation of results from systems acceptance testing.

g. The Final Year Project Thesis.

The final year project thesis consisted of compilation of the above documentation, which also includes any other title included that is required by the faculty.

CHAPTER 4

ANALYSIS

4.1 INTRODUCTION

System analysis is an activity that encompasses most of the tasks that collectively call computer system engineering. System analysis is conducted with the following objective:

a) Identify users' need

b) Evaluate the system concept for feasibility study

c) Perform economic and technical analysis

d) Allocate functions to software, hardware, people, database and other system elements

e) Establish schedule constraints

f) Create a system definition that forms the foundation for all subsequence engineering work

In order to understand system and to its requirement, prototyping model is deployed. System requirement have to be clearly defined in the first step in order to develop a correct system.

Thus, the requirement concentrate on these areas and information are gathered by using several techniques like interview, surf net, books and etc. More over, the requirements are categorized into functional and non-functional requirement. Meanwhile, the hardware and software tools requirement are considered in order to come out with a suitable and compact set of development tools.

4.2 REQUIREMENT ANALYSIS

A requirement is a feature of the system or a description of something the system is capable of doing in order to fulfill the system's purpose. Requirement analysis is very important process. Standish Group survey, in 1995 has reported that the incomplete requirement is the main factor where project are canceled before they are complete. This shows that wrong determination or incorrect requirement may lead to a myriad of problems: building a system with wrong solutions, that does not function and as expected, or that is difficult to use and understand. Functional, non-functional, hardware and software requirement of SVPS are described here.

4.2.1 Functional Requirement

Functional requirement describes an interaction between the system and its environment. The functional requirements of VSIS are divided into several modules.

a) Authentication

VSIS is a client / server system, security is important. Thus, authentication is provided to control and they are mainly for administrators, database administrators and end users.

b) Multiple User Access

The system is ability to access by more than one user.

c) Data Maintenance

Data in the database can be maintained by the system. Modification and updating of a criminal data or user access data are handled.

d) Data Visualization

Data that stored in the database can be viewing and visualizing in the graphical analysis form such as chart, graph and bar.

4.2.2 Non-Functional Requirement

Non-functional requirement or constraints are those requirements that describe a restriction on the system that limits the choices for constructing a solution to the problem.

a) User Friendliness

GUI (Graphic User Interface) is designed and it is focus on user friendliness and the ease of learning and understanding by all levels of users.

b) Reliability, Robustness and Accuracy

The system has a robust interface to prevent interface errors from corrupting the system. Besides that, the system is ability to checks on the system input to ensure correct data is provided in order to protect system integrity.

c) Attractive Visualization

The system is ability to analysis or generates the record in an effective visual display, which concerned with exploring data and information to gain insight and understanding of the data.

4.2.3 Software Requirement

The main requirement that needs to be done in order to develop this system is the understanding of software requirement such as Microsoft Visual Basic 6.0, Seagate Crystal Report 7.0 and Microsoft SQL Server 7.0. The understanding of the software requirement is important because its serve as the tools of the system that need to be design.

4.2.3.1 Microsoft Visual Basic 6.0

Microsoft Visual Basic 6.0 is the core programming language use to develop the Visualizing Staff Information System. This is because of the suitability of the language to develop Graphical User Interface (GUI), object and components based programming that support most of the functions needed in this particular system.

Thorough understanding of programming technique in Microsoft Visual Basic 6.0 is needed to develop this system. Besides the need to understand the objects or component prepared by Visual Basic 6.0 is essential so that it can be used appropriately. Among the component in the Microsoft Visual Basic 6.0 that need to studies are:

Object Link Embedded (OLE)

This component is needed to link the embedded object or program that support the functions of software documentation such as Microsoft Word or any other spreadsheet program into the current system.

ActiveX Data Object (ADO)

This component is needed to access the remote database engine such as Microsoft Access, Microsoft SQL Server and others database engine via Open Database Connectivity driver (ODBC) using Microsoft Visual Basic 6.0. Studies need to be done on how the ADO works and also the understanding of the ADO syntax so that the system can connect to the ODBC driver to access a remote database.

Data Report

This component is only available in Microsoft Visual Basic 6.0. This component is used to simplify the programming needed to generate report from the database engine.

Open Database Connectivity (ODBC)

Open Database Connectivity (ODBC) is a standard API for accessing database in both relational and non-relational Database Management System. Studies on how to use the ODBC drivers in connecting need to be done in order to build a two-tier or three-tier client server program.

4.2.3.2 Microsoft SQL Server 7.0

SQL is a graphical Windows-based tool that lets the administrator manage all of an organization's distributed SQL Servers from a single point of control, from a Windows NT or Windows 95 operating system environment. It simplifies complex administration tasks such as storage allocation and permissions management through a Windows-based user interface.

SQL provides graphical management of database objects such as tables, views, stored procedures, and triggers. Visual Basic–based scripting can extend these capabilities to automate remote operations across multiple servers. Other graphical utilities are included for managing security, tape volumes, and client configuration.

Unlike database servers, which run only on proprietary operating systems or support only proprietary network protocols, SQL Server is network independent. Because SQL Server relies on open industry standards, it can run on most popular networks.

4.2.3.3 Seagate Crystal Report

Seagate Crystal Report brings additional ease-of-use, flexibility and powerful reporting technology. Seagate Crystal Report is a comprehensive, scalable web reporting solution providing an easy way to deliver great e reporting.

Besides, it has a powerful development tools for unprecedented flexibility and control in your Windows and web applications. Because of this type of flexibility, it increased report-processing performance. Many business user in need of easy e-reporting, an IT professional creating advanced reports and distributing them over the Web, or a developer integrating reports into their application.

The latest version of Seagate Crystal Report is 8.0, which provide more and more features than what is in version 6.0. This is included new integration

with Microsoft Office and improved report creation, design and usability offer more design and formatting flexibility than ever before. Seagate Crystal Report also supports more image format in BMP, JPEG, PICT, TIFF and Targa picture.

4.2.4 Hardware Requirement

Hardware requirement for running this VSIS:

- Operating System - Microsoft Windows 95, 98, 2000 or Windows NT (Version 4.0 or higher)
- Pentium or higher processor
- Memory – 16MB RAM for Windows 95 or 24 MB for Windows NT version 4.0
- Minimum capability of 600MB storage
- CD ROM
- Standard Keyboard
- 1.44 MB Floppy Drive

4.3 DEVELOPMENT TOOLS JUSTIFICATION

This is the justification of Visual Basic 6.0 that is chose as front end Graphic User Interface in this system regarding the selection.

Selection	VB 6.0	Visual FoxPro	Visual C++	C
Development Period	Very Fast	Fast	Slow	Very Slow
Nature Of Each Language	DB, DR, ODBC	DB, DR, ODBC	Difficult	No
Support Prototyping	Yes	Yes	No	No
Object Based With Built In Components	Many	Little	No	No
Easy to Use and Learn	Very Easy	Quite Easy	Difficult	Difficult

Table 4.1: Table Of Development Tools Justification

Below is the justification of database that is chose for system development.

Features	Microsoft SQL Server 7.0	Microsoft Access 2000
Data capacity	1 terabyte per database	1.2 Gigabyte of database
Solution for transaction-based database of downtime	Rollback automatically, Reduce the expenses of downtime	Do not support automatic recovery, data can be lost
Backup ability	Dynamic backup	Do not have built-in backup capabilities
Degree of security	Offering logon Ids and passwords, user permissions, and encryption	Allow developers to customize security to their needs
Application run time	Fast	Slow
Maximum number of users	32, 767 users connection	255
Distributed transactions	Yes	No

Table 4.2: Table Of Database Justification

4.4 INTERVIEWING ANALYSIS

4.4.1 Interview Result

An interview had been conducted with the senior manager from Global Soft Manufacturing. Below is the result that was found after the interviewing:

(a) They kept the staff record manually

(b) Did not record the staff attendance

(c) Do not know the status of the tasks that had been assigned to the staff

(d) Specific task is assigned to the staff randomly who are not suited to the job

(e) Not very clear about the staff background and experience

(f) Evaluate staff performance regarding their behavior

(g) Promotion of a staff is based on the duration service of the staff

(h) Difficult to appoint the people who is best suited to the job

(i) Simply appoint the people irrespective of their background and experience

4.4.2 Interview Conclusion

- They need a system to help the manager to keep track the status of task, view staff record, make selection, promotion and analysis the staff performance
- They need a system to record the staff daily attendance
- They need a system to substitute the current paper work

CHAPTER 5

SYSTEM DESIGN

Design is the creative process of transforming the problem into a solution and the description of the solution (Pfleeger, 1998). System design involves architecture design, database design and system interface design. The architecture design decomposed a system into subsystem. Each subsystem is further decomposed into modules. The database design identifies the way the data should be stored in the database. The user interface design specifies the use of the user interface controls to implement the architecture design. The user interface controls include menus, textboxes, command button and checkboxes.

5.1 Architecture Design

VSIS has three subsystems, namely login, administrators and end user as illustrated in figure 5.1 shown below.

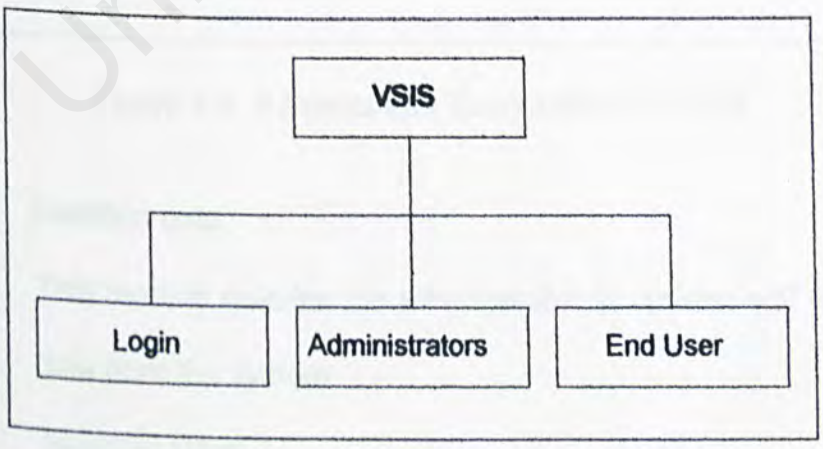


Figure 5.1: Architecture Design For VSIS

(a) Login Subsystem

The login subsystem enables an administrator to login to the Administrators system and the user to login to the End User subsystem.

(b) Administrator Subsystem

Administrator subsystem is used by the administrator only. This subsystem has 4 modules, namely maintain the task, maintain the attendance and maintain the users as illustrated in figure 5.2.

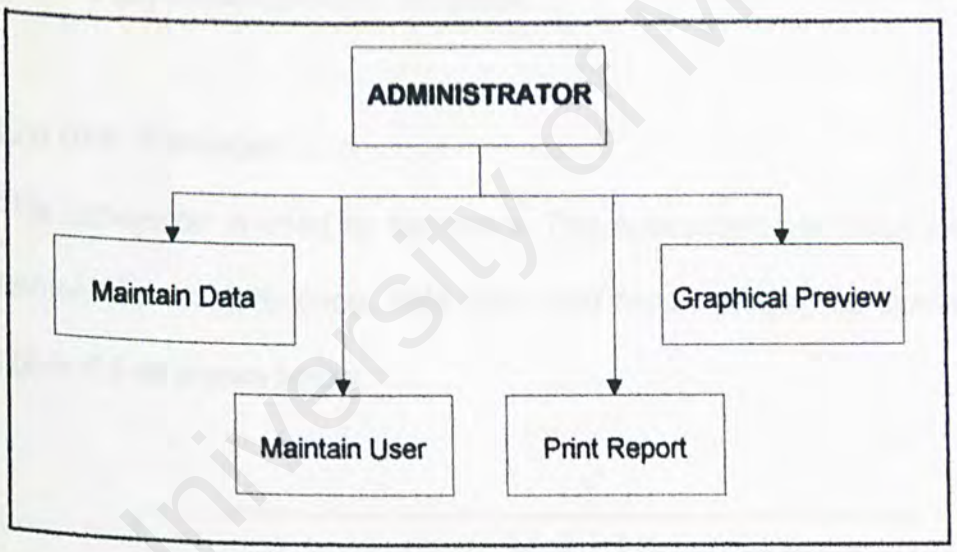


Figure 5.2: Administrator Subsystem For VSIS

(i) Maintain data

This module enables the administrator to update, add new or delete data from the system.

(ii) Maintain User

This module enables the administrator to add new, update existing and delete existing users. This module also enables the administrator to view a report on all the users and their respective detail.

(iii) Print Report

This module enables the administrator to print out the report.

(iv) Graphical Preview

This module enables the administrator to preview the graphical analysis and print out the graph.

(c) End User Subsystem

This subsystem is used by the users. This subsystem has three modules, namely data maintenance, data entry and report printing as illustrated in figure 5.3 as shown below.

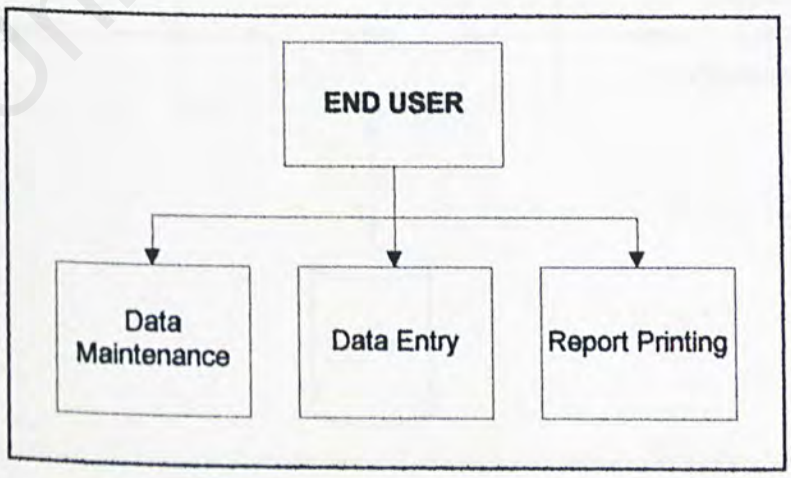


Figure 5.3: Structure Chart For End User Of VSIS

(i) Data maintenance

This module enables the users to update, delete or modify data on employee master form, employee attendance form and task & schedule setting.

(ii) Data entry

This module enables the users to add new data on employee master form, employee attendance form and task & schedule setting.

(iii) Report Printing

This module enables the users to print out the report and check the correctness of the data.

Below show the system architecture and context diagram of VSIS

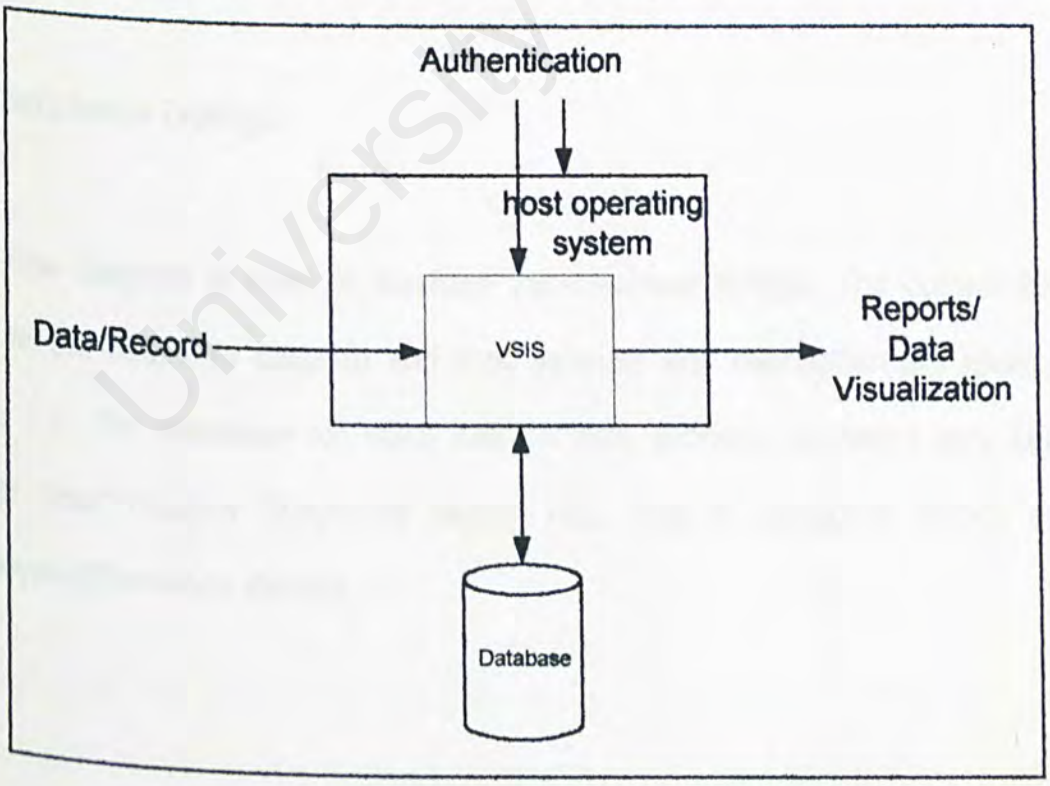


Figure 5.4: VSIS System Architecture

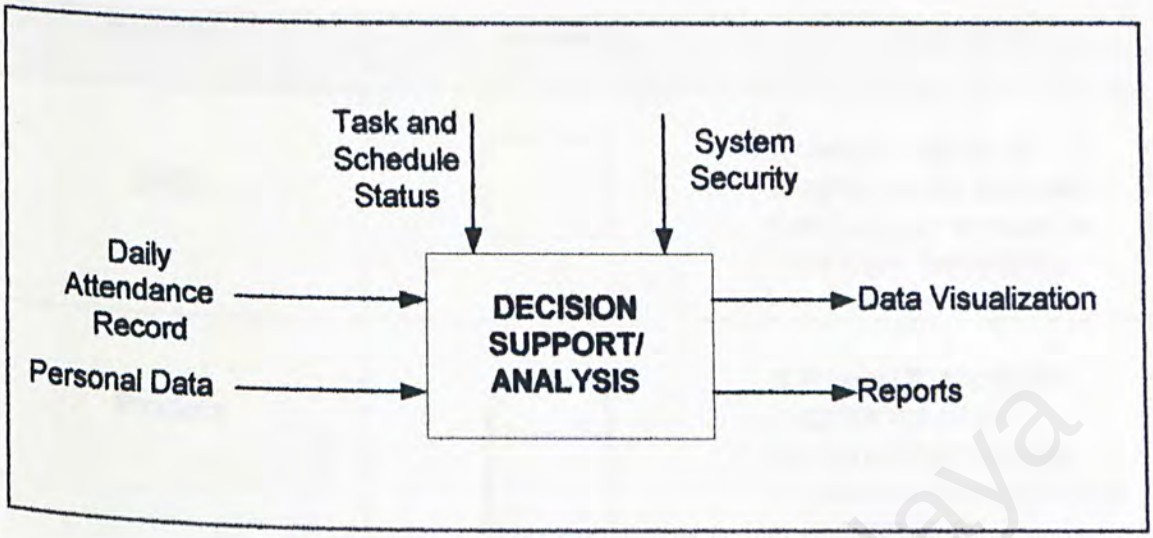


Figure 5.5: VSIS Context Diagram

5.2 Database Design

Data flow diagram is used to illustrate the database design. The components used in the data flow diagram and their symbols and description are given in Table 5.1. The database for VSIS has six data process, namely Login, User Group, User Security, Employee Master File, Task & Schedule Setting and Employee Attendance Record.

Component	Symbol	Description
Entity		It used to depict an external entity that can send data to or receive data from the system
Process		It is used to show the occurrence of a transforming process. Processes always denote a change in or transformation of data
Data Store		It is used to represent a data store
Flow Of Data		It shows movement of data from one point to another, with the head of the arrow pointing toward the data's destination

Table 5.1: The four basic symbols used in the data flow diagrams

Data Flow Diagram Level

First level data flow diagram is graphical technique to describe and analyze the movement of data as shown in figure below.

DFD (First Level – Movement Of The Data)

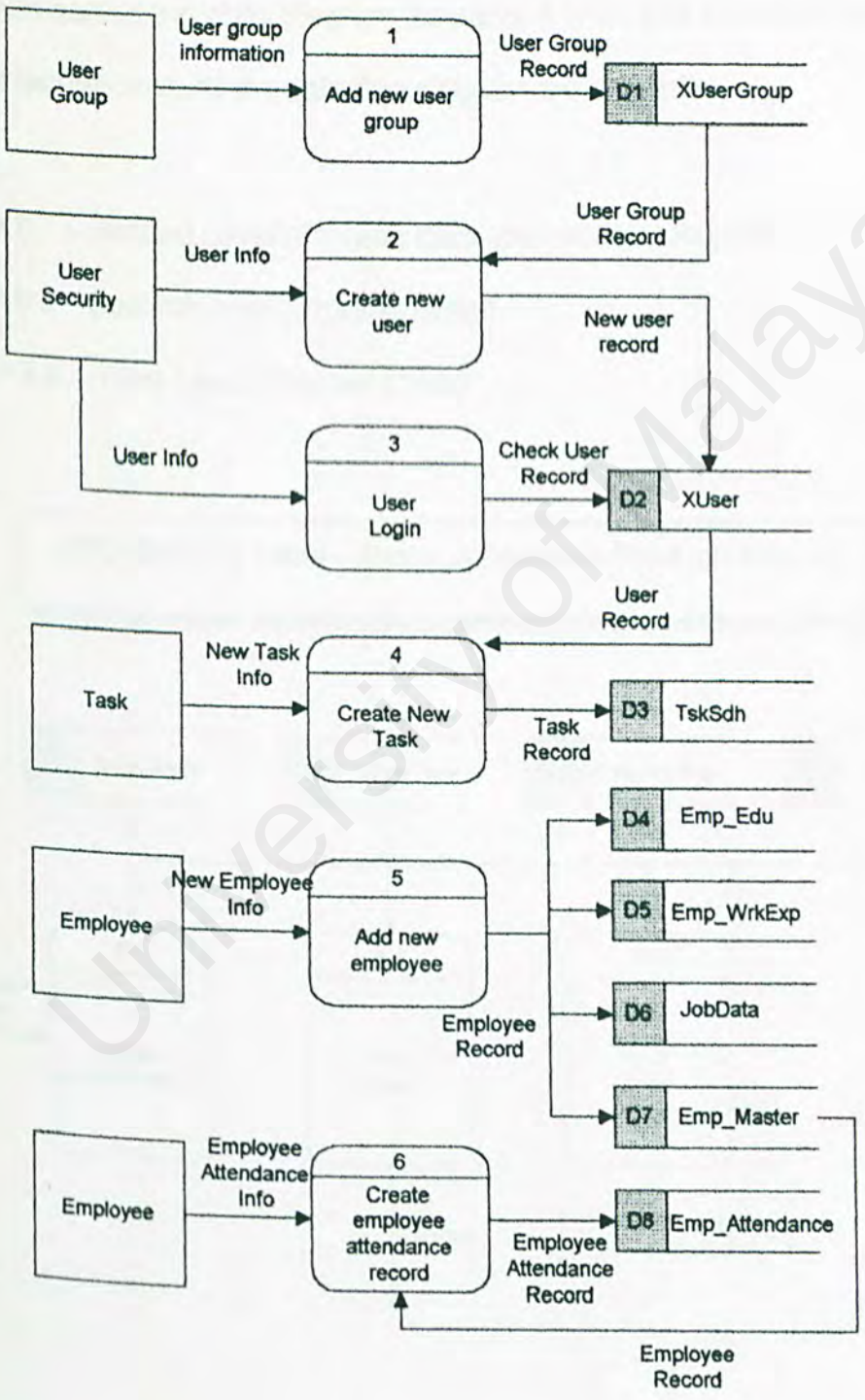


Figure 5.6: First Level Data Flow Diagram

Second level data flow diagram are graphical representation of more detailed processes that are exploded from level one process. However, third level is represented the child diagram for second level that exploded more detail from level two process. All the data flow diagram are shown in

(i) Figure 5.7 – Second Level (Process Data and Produce Report)

(ii) Figure 5.8 – Second Level (Process Utility)

(iii) Figure 5.9 – Third Level (Preview Chart)

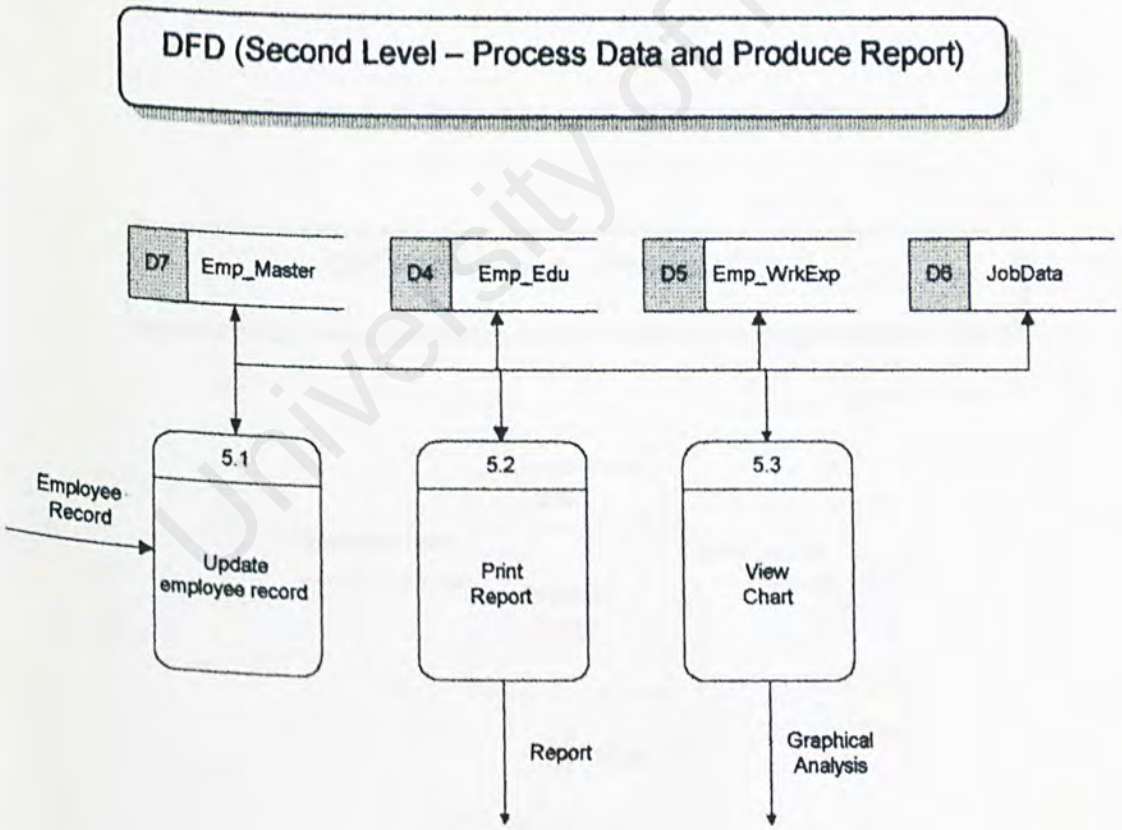


Figure 5.7: Second Level (Process Data and Produce Report)

DFD (Second Level – Process Utility)

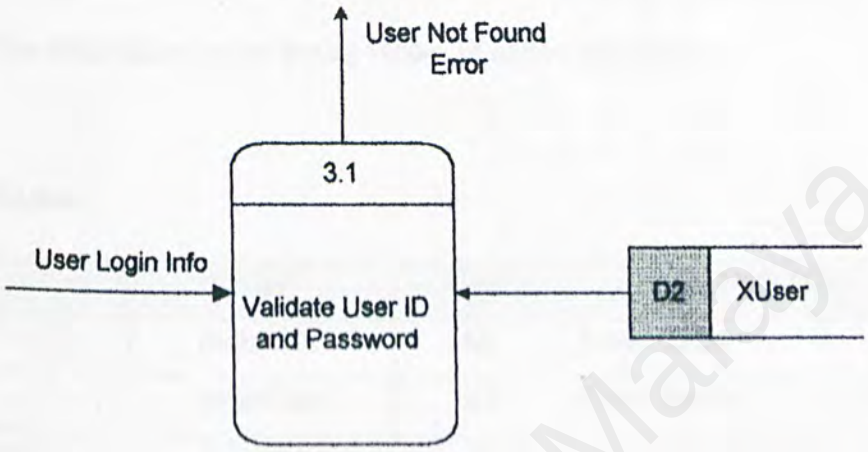


Figure 5.8: Second Level – Process Utility

DFD (Third Level – Preview Chart)

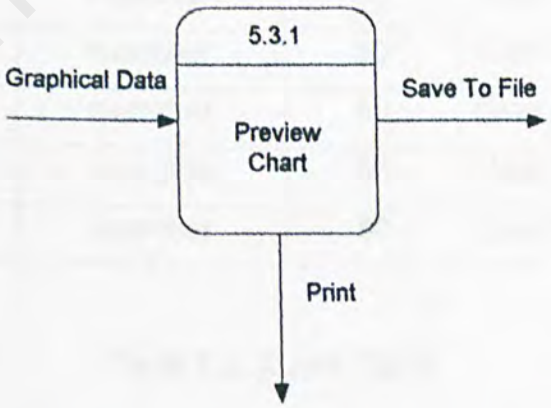


Figure 5.9: Third Level – Preview Chart

5.2.1 Table Specification

VSIS database consists of the following relations (tables), which are in the normal form. The data structure of these tables is explained below.

Table Name: XUser

Name	Type	Size	Description
User_Code	nvarchar	50	User Code
User_Name	nvarchar	50	User Name
User_Password	nvarchar	50	User Password
Id_No	nvarchar	50	User identity Card No
Active	nvarchar	50	Active is true or false
GID	nvarchar	50	User Group ID
Gender	nvarchar	50	Female or Male
Photo	nvarchar	50	Photo path
Last_Update	Datetime	8	Last Update date
Add1	nvarchar	50	User Address
Add2	nvarchar	50	User Address
Add3	nvarchar	50	User Address
Add4	nvarchar	50	User Address
PhoneNo	nvarchar	50	User Phone Number
Email	nvarchar	50	User Email Address

Table 5.2: XUser Table

Table Name : XuserGroup

Name	Type	Size	Description
GID	nvarchar	50	User Group ID
GDesc	nvarchar	50	User Group Description
GRW	nvarchar	50	Read only or read & write

Table 5.3: XUserGroup Table

Table Name: TSKSDH

Name	Type	Size	Description
TaskID	nvarchar	50	Task ID
TskDesc	nvarchar	50	Task Description
TskCreated	Datetime	8	Date Task Created
TskASD	Datetime	8	Actual Start Date
TskAED	Datetime	8	Actual End Date
TskBSD	Datetime	8	Baseline Start Date
TskBED	Datetime	8	Baseline End Date
TskDyAll	Numeric	9	Day Allocated
TskDyUsed	Numeric	9	Day Used
TskStatus	nvarchar	50	Task Status
TskPComplete	Numeric	9	Task Percentage Complete
TskAssignTo	nvarchar	50	Task Assign To
TskLUpdate	Datetime	8	Task Last Update Date

Table 5.4: TSKSDH Table

Table Name: SMNO

Name	Type	Size	Description
SMSystemCode	nvarchar	50	System Code
SMModule	nvarchar	50	System Module
SMDesc	nvarchar	50	System Module Description
SMPrefix	nvarchar	50	System Module Prefix
SMLastNo	nvarchar	50	System Module Last No

Table 5.5: SMNO Table

Table Name: SMCODE

Name	Type	Size	Description
SMCodeType	nvarchar	50	System Module Code Type
SMCode	nvarchar	50	System Module Code
SMDesc	nvarchar	50	System Module Description

Table 5.6: SMCODE Table

Table Name: Emp_Master

Name	Type	Size	Description
EmpID	nvarchar	50	Employee ID
LName	nvarchar	50	Last Name
FName	nvarchar	50	First Name
New_NRIC	Numeric	9	New Identity Card No
NRIC_Color	nvarchar	50	Identity Card No Color

Old_NRIC	Numeric	9	Old Identity Card No
BirthDate	Datetime	8	Birth Of Date
BirthPlace	nvarchar	50	Birth Place
Age	Numeric	9	Age
Sex	nvarchar	50	Gender
Height	Numeric	9	Height
Weight	Numeric	9	Weight
Race	nvarchar	50	Race
Religion	nvarchar	50	Religion
Nationality	nvarchar	50	Nationality
MaritalStatus	nvarchar	50	Marital Status
TelNo	Char	10	Telephone Number
HPNo	Char	10	Hand Phone Number
Add1	nvarchar	50	Home Address
Add2	nvarchar	50	Home Address
Add3	nvarchar	50	Home Address
Add4	nvarchar	50	Home Address

Table 5.7: Emp_Master Table

Table Name: Emp_WrkExp

Name	Type	Size	Description
EmpID	nvarchar	50	Employee ID
SeqNo	nvarchar	50	Sequence Number
EmployerName	nvarchar	50	Employer Name
JoinedDate	Datetime	8	Joined Date
LeftDate	Datetime	8	Left Date
NatureOfBusiness	nvarchar	50	Nature Of Business

Position	nvarchar	50	Position
GrossSalary	Numeric	9	Gross Salary
ReasonLeft	nvarchar	50	Reason Left

Table 5.8: Emp_WrkExp Table

Table Name: Emp_Edu

Name	Type	Size	Description
EmpID	nvarchar	50	Employee ID
SeqNo	nvarchar	50	Sequence Number
SchoolName	nvarchar	50	School Name
JoinedDate	Datetime	8	Joined Date
LeftDate	Datetime	8	Left Date
AcdmLevel	nvarchar	50	Academic Level
Grade	nvarchar	50	Grade

Table 5.9: Emp_Edu Table

Table Name: XGrpModule

Name	Type	Size	Description
GID	nvarchar	50	User Group Description
MID	nvarchar	50	User Group Department

Table 5.10: XGrpModule Table

Table Name: JobData

Name	Type	Size	Description
EmpID	nvarchar	50	Employee ID
Department	nvarchar	50	Department In The Company
Position	nvarchar	50	Position Held
EmpLevel	Numeric	9	Position Level
Salary	Numeric	9	Salary
EmpType	nvarchar	50	Employee Type
JoinedDate	Numeric	9	Joined Date

Table 5.11: JobData Table

5.2.2 Data Dictionary

As most of us know, the volume of data in most information system application is substantial (more than a single analyst can easily keep track of). When teams of analyst work on system, the task of coordinating data definition becomes more complete. Therefore, a data dictionary has to be developed in order to let system analysts and programmers to keep track of data definition used in the system.

In a data dictionary, a list of all the elements composing the data following through a system can be found. The major elements are data flows, data stores and process. The data dictionary stores details and description of these elements.

There are five reasons why data dictionary are important

(i) To manage the detail in large system

(ii) To document the features of the system

(iii) To locate errors and omissions in the system

(iv) To facilitate analysis of the details in order to evaluate characteristic and determine where system change should be made.

The following shown the data dictionary for VSIS system:

Data Dictionary For VSIS Process

Process	**1.0 Verify Login ID and Password**
Data Input	Login ID, password
Data Output	Valid login ID, valid password
Description	Performs the verification of the user, to determine whether the particular user has the correct / valid login ID and password.

Process	**2.0 New record**
Data Input	ID number and other details of employee key in the information for administrator work
Data Output	New employee detail
Description	Performs data entry activity pertaining to new employee

Process	**3.0 Maintenance Of Record**
Data Input	ID number and other details of employee information
Data Output	Update employee detail
Description	Makes change to existing records. Besides that, record also can be deleted.

Process	**4.0 Deletion Of Record**
Data Input	ID number and session admitted
Data Output	Delete employee details
Description	Restricting only to system administrator

Process	**5.0 Reporting**
Data Input	With option selection or without option selection
Data Output	Results in field listing or chart format
Description	Display and print reports

Process	**6.0 Viewing**
Data Input	Only valid for administrators
Data Output	Results in many types of chart like line, bar, pie, 2D and 3D
Description	Display analysis chart, preview, save in other file and print chart.

Table 5.12: Data Dictionary For VSIS Process

5.3 User Interface Design

The Windows Applications provide controls that are easy to use. There are many users who are familiar with the window application environment. Hence, the user interface of VSIS is designed to look and feel like the standard Windows Applications. The menus, toolbars and shortcuts for the main screen of VSIS is shown in Figure 6.0.

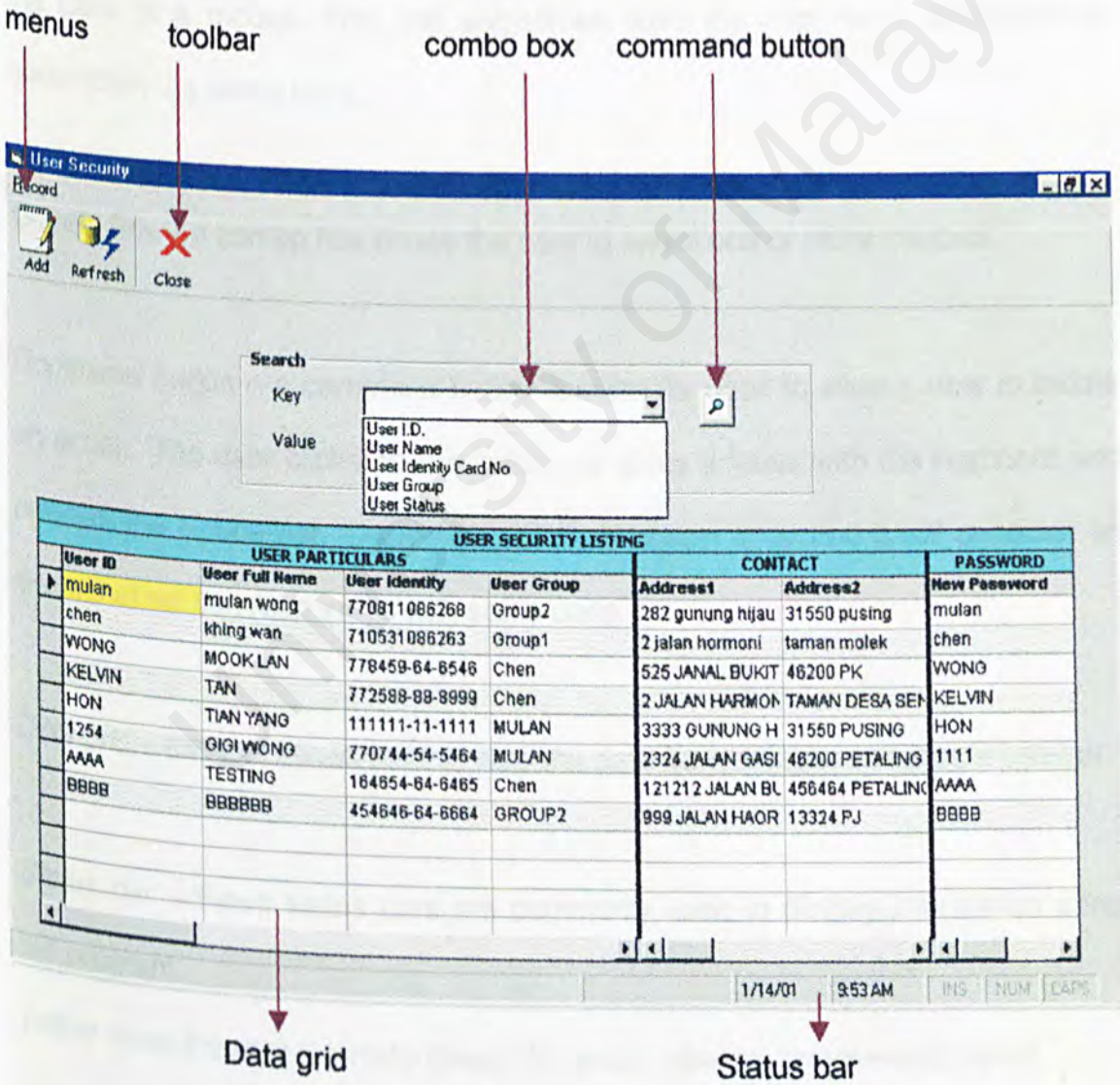


Figure 5.10: User Interface Design

Menus – menus are used to present multiple choices and actions for a user to perform. Menus can be designed for those users who need or prefer to use the keyboard.

Toolbar – a common interface technique in Windows applications is a toolbar. A toolbar has several icons that allow the user to perform common commands with the Click of a mouse. This can sometimes save the user many keystrokes to accomplish the same thing.

Combo Box – a combo box allows the user to select one or more choices.

Command button – a command button is normally used to allow a user to initiate an action. The user clicks on the button, or gives it focus with the keyboard and presses the Space bar. Once the command button is clicked it will generate an event that we can respond to with some code.

Data grid – this tool allows user to view the data from database or drag a column.

Status bar – these status bars are commonly used to display information about the program.

Below show the user interface design for graph viewing, preview and report.

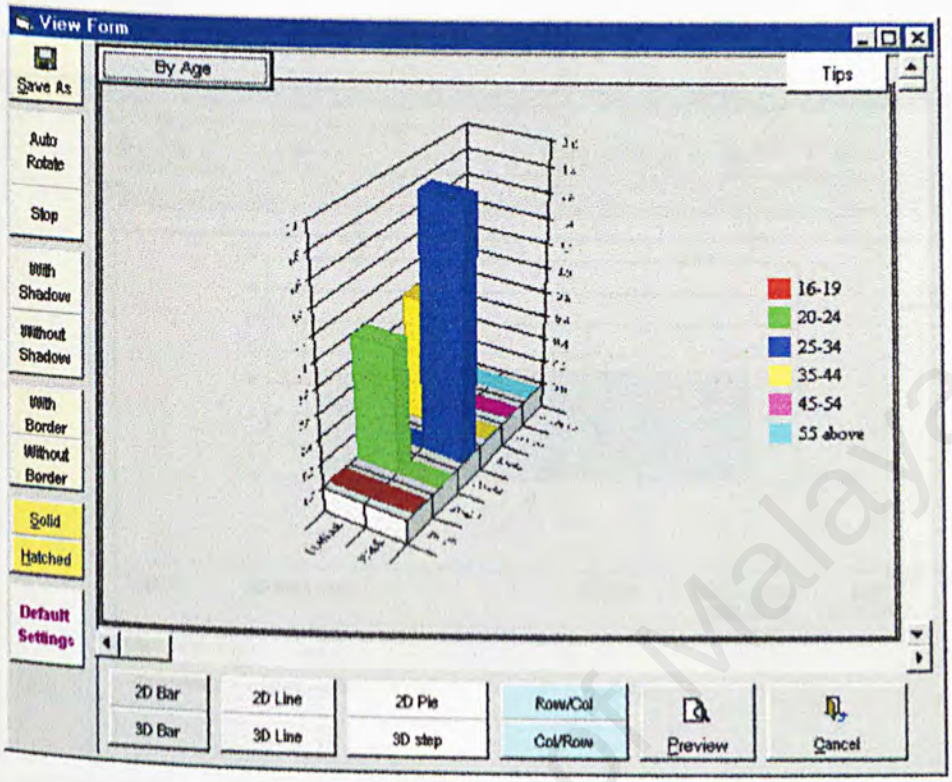


Figure 5.11: View Graph Form

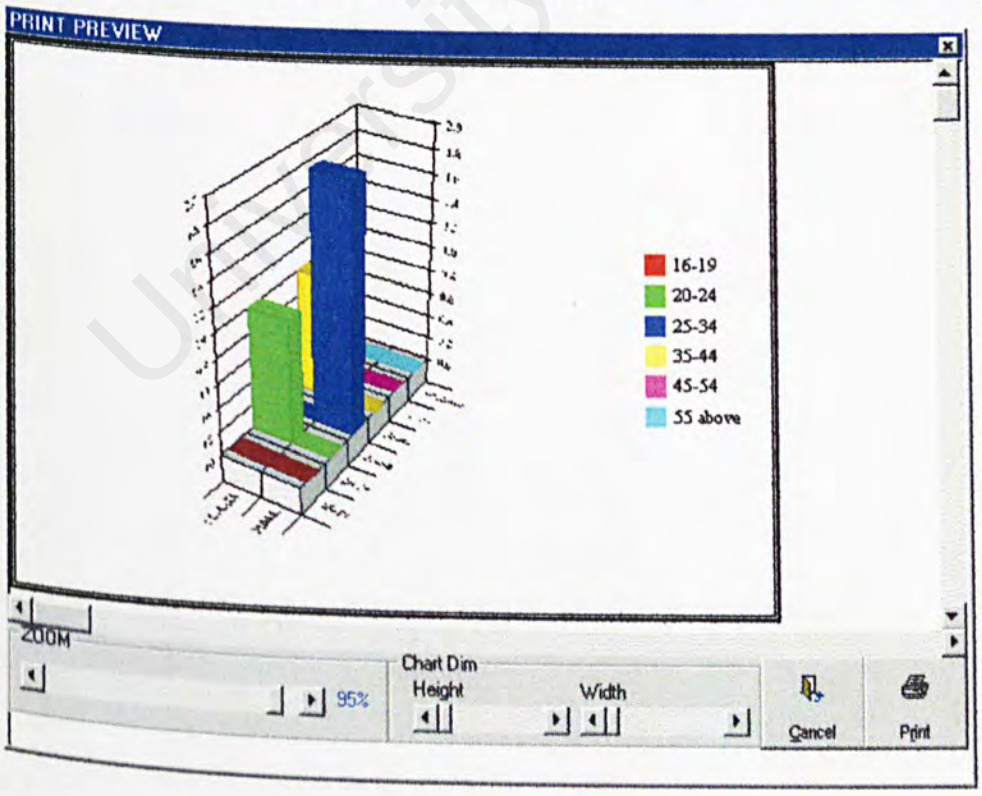


Figure 5.12: Preview Graph Form

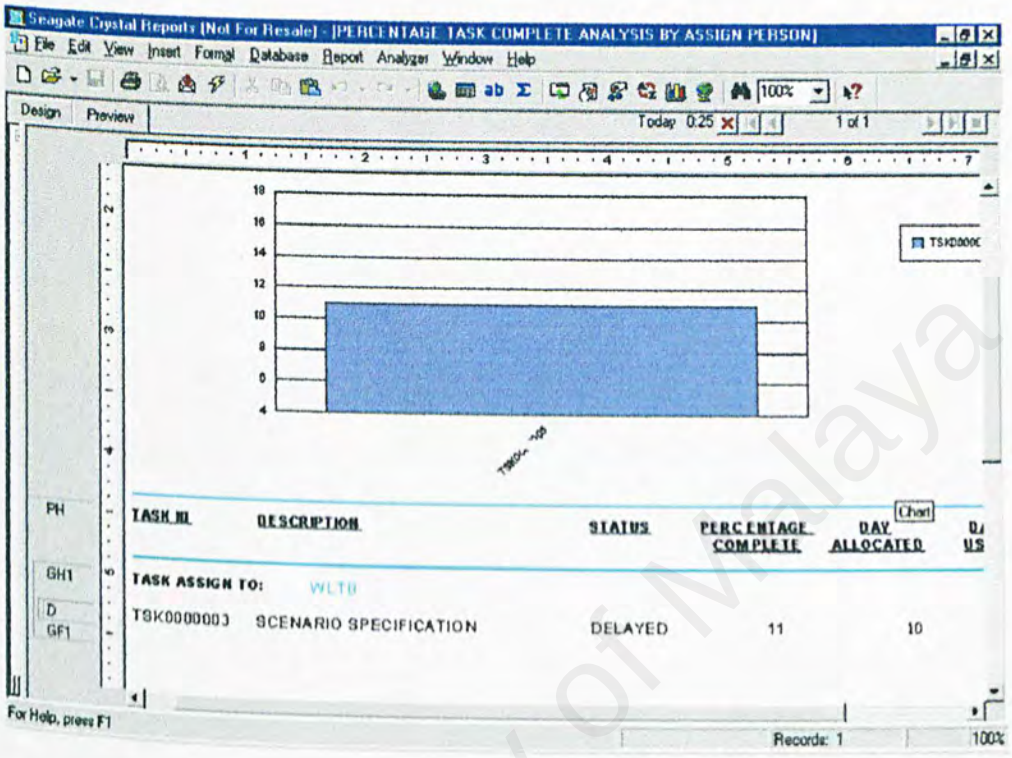


Figure 5.13: Print Report Form

CHAPTER 6

SYSTEM IMPLEMENTATION AND TESTING

6.1 Tools

The tools used to develop the VSIS are shown below. These tools are categorized as follows:

(i) Operating System : Microsoft Window 98

(ii) Development Tool : Microsoft Visual Basic 6.0, Microsoft Visual Studio 6.0 Tools – Package and Deployment Wizard

(iii) Database : Microsoft SQL Server 7.0

(iv) Report Generator : Seagate Crystal Report 7.0

(v) Graphical Tool : Adobe Photoshop 5.0, MS Chart

6.2 Forms

VSIS is developed module by module. Each module consists of a number of forms developed in Microsoft Visual Basic 6.0. These forms are explained in Table 6.1 below.

Module Name: System

No	Form Name	Description
1	FrmLogin	This is the login screen to login an administrator to VSIS Administrator and to login a user to VSIS End User.

2	FrmSplash	Display system name and welcome screen
3	FrmServerName	To adman the database server name

Module Name: System Administrator

1	FrmUserSecurityMain FrmUserSecurityDetail	This screen enables the administrator to add new, update existing and delete existing users.
2	FrmUserGroupMain FrmUserGroupDetail	This screen enables the administrator to add new, update existing and delete existing group.

Module Name: Employee Master File

1	FrmEmpMain FrmEmpMaster	This screen enables the administrator or users to add new, update existing and delete existing employee record.
2	FrmViewEmpMaster FrmGraphEmpMaster	This screen enables the administrator to view the graphical analysis, print out the graph and save it into file.
3	FrmTips	This screen enables the administrator to read the tips while viewing the graphical analysis.

Module Name: Employee Attendance

1	FrmEmpAtt FrmEmpAttDetail	This screen enables the administrator or users to add new, update existing and delete existing employee attendance record.

2	FrmViewEmpAtt FrmGraphEmpAtt	This screen enables the administrator to view the graphical analysis, print out the graph and save it into file.
3	FrmTips	This screen enables the administrator to read the tips while viewing the graphical analysis.

Module Name: Project Manager

1	FrmTskSch FrmTskSchSet	This screen enables the administrator or users to add new, update existing and delete existing task that assigned to employee.
2	FrmViewTskSch FrmGraphTskSch	This screen enables the administrator to view the graphical analysis, print out the graph and save it into file.
3	FrmTips	This screen enables the administrator to read the tips while viewing the graphical analysis.

Module Name: Reporting

1	FrmCrystalReport FrmReportViewer	This screen enables the administrator to choose option for printing report and preview report before printing.

Table 6.1: Form Description For Each Module

6.3 Reports

The report for each module is developed with Seagate Crystal Report 7.0. The report for each module is illustrated as table below.

Module Name: System Administrator

No	Report Name	Description
1	UserDetailListing.rpt	This report is list out the detail of the user security
2	UserSummaryListing.rpt	This report is list out the summary of the user security

Module Name: Employee Master File

1	EmpSummaryListing.rpt	This report is list out the summary of the employee record
2	EmpDetailListing.rpt	This report is list out the detail of the employee record.
3	EmpEduListing.rpt	This report is list out the employee education background record.
4	EmpJob.rpt	This report is list out the employee job data in the company
5	EmpWrkListing.rpt	This report is list out the employee working experience record.

Module Name: Employee Attendance

1	EmpAttendance.rpt	This report is list out the employee attendance record.

Module Name: Project Manager

1	TaskAnalysis.rpt	This report is list out with graph analysis whether the task are completely done by the employee
2	TaskListing.rpt	This report is list out the task that had assigned to the employee.

Table 6.2: Report Descriptions For Each Module

6.4 Database

Database is developed with Microsoft SQL Server 7.0 as its database name "VSIS" and the data source name is the existing server name. It is implemented following the database design described in chapter 5. There are eleven tables namely XUser, XUserGroup, XGrpModule, Emp_Master, Emp_Attendance, Emp_Edu, Emp_WrkExp, JobData, TskSdh, SMCODE and SMNO. The database relational table is illustrated as shown below.

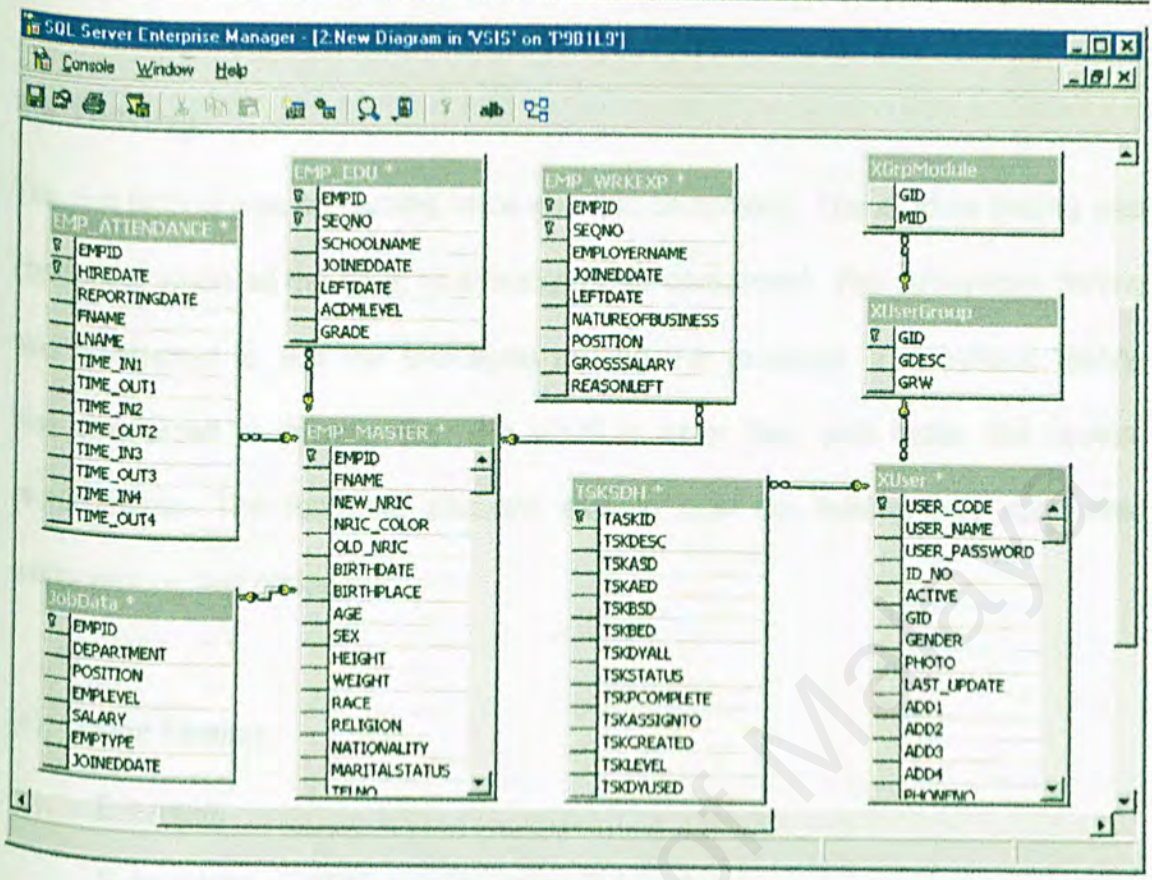


Figure 6.1: Database Relational Diagram For VSIS System

6.5 Images

Adobe Photoshop 5.0 is used to design and manipulate the VSIS logo and interface for the main form.

6.6 Testing

The unit testing was conducted once a unit is completed. The module testing was conducted when all the units in a module was completed. The subsystem testing was conducted to test the interfaces among the modules. The system testing was conducted to ensure that the VSIS is error free and fulfills the system requirements. The following sections explain how the testing was conducted using various test cases.

(a) Unit Testing

Example:

Subsystem : VSIS Administrator Subsystem

Module : System Security

Unit : Add new user and user group

Description : Add new user and user group to the database if and only if The user code and user group does not exist

Test case : (i) A unique user code and user group

(ii) A redundant user code or user group

(b) Module Testing

Example:

Subsystem : VSIS End User Subsystem

Module : Employee Master File

Description : The new record are show in the employee master main if and only if the record is saved into the database.

Test case : (i) The save button is pressed

(ii) The record is added into the database

(c) Subsystem Testing

Example:

Subsystem : Administrator Subsystem

Module : Employee Attendance

Description : If option is chose for selection in printing report, the report should display based on the selection.

Test case : (i) Select another option and display again

(d) System Testing

A system test is a series of different tests designed to fully exercise the system to uncover its limitations and measure its capabilities. The objective is to test an integrated system and verify that it meets specified requirements. Performance and recovery testing were conducted for VSIS system.

(i) Performance Test

The performance test checks the run-time performance of the software within the context of an integrated system [Pressman, 1992]. For VSIS, there are two operations that require a long duration to be completed. The first operation is to check the validation for each field. The second operation is to generate reports. Currently, these operations require less than 8 seconds to be completed with an Intel Pentium III processor. Therefore, the duration required is still reasonable.

(ii) Recovery Test

Recovery test checks whether the software failure recovery is properly performed [Pressman, 1992]. Every procedure and function has error handling procedure to prevent run time errors that can cause VSIS to cease functioning. For example, if there is an attempt to add a redundant record in the database, an error message stating the problem will be displayed.

CHAPTER 7

DISCUSSION AND CONCLUSION

This chapter discusses the problem encountered during the establishment of the VSIS for the understandability of data and gains insight the information. The limitations and weaknesses of the established VSIS and the future enhancements for the established VSIS are also discussed. This chapter also discusses the system strength as well.

7.1 Problem Encounter

These are some of the problems or issue that likely to face before the project start and these entire problems have been categories into 3 categories.

7.1.1 The System Flow Issues

There were intensive studies to be done in order to design the whole system flow that effective, efficient and dynamic. Issues such as access control, program control and database control has to be considered. The program flow from screen to screen and from one parameter to the other parameter needs to be study. How the documents are control also serves as another problems as the documents and the database are different. Question on what are the data need by the system to validate certain event also arise.

7.1.2 The Technical Programming Issues

The technical programming issues that posed the most problem are the triggering of OLE in the system. Intensive research and studies need to be done on this part, as the OLE triggering is the core functions in the system. The schedule tracking function need a lot of validation check on date and on the user login. To make this system Y2K compliance, the date has to be store in the string data type, which posed problems in calculation of days and other functions involved. The uses of triggering another mail program such as Microsoft Outlook need special consideration as its uses the Visual Basic for Application (VBA). The interfaces between these three programs such as the system, Microsoft Outlook and another third party spreadsheet program posed a very big issue here.

7.1.3 The Database Design Issues

The database design is quite a complex one. There is a lot of control involved on the database access, as all this has to be hard coded on the front end (GUI). Parameter files has to be identify to make the database easier to control. Multiple accesses on different files in one screen made the design of control harder as the integrity of the data has to be kept.

7.2 System Strength

(a) Ease Of Use

The VSIS is an application designed with the GUI. It looks and feels like the Standard Windows application. There is no need to type any command to execute a function. The VSIS also provide shortcuts to the frequent task and hence, is an easy-to-use measurement tool.

(b) Authorization and Authentication

The administrator provides every user with a user login ID and password. The VSIS allows only the authorized users to access the system. Every user accesses the screen that he or she has right only.

(c) Informative Messages

The VSIS provides error message when a user or an administrator attempts to perform illegal actions. It also provides messages after a certain task has been completed. These messages enable a user and a administrator to understand what is currently going on and keep them informed of what has been done.

(d) System Transparency

The system transparency refers to the situation where the users and the administrator do not need to know the following

(c) Inflexible Graphical Analysis

The view function only limit to a number of graphical analysis and it is very inflexible for the user while they want to view others type of graphical analysis.

(d) No On - Line Connection

The record from others company branch cannot real – time update the database in the main company because there are no on – line connection provided from this system.

7.4 Future Enhancement

With reference to the limitations and weaknesses discussed in the previous section, it is hoped that the following ideas can be considered in the future.

(a) The VSIS can be enhancing to enable a user and an administrator to select the fields to be displayed in a report. For example, a user can select the fields to be displayed in a report.

(b) The VSIS also can be enhancing to enable a user and an administrator to select the fields and the type of analysis to be displayed in a graph.

(c) The VSIS should be upload into a fully on – line system. For example, an on – line register.

7.5 Conclusion

The final year project is solely an independent project to be undertaken by undergraduates as partial fulfillment of the requirement for the Bachelor of Computer Science.

Two semesters are allocated for us to conduct initial studies, analysis, design and implementation, testing and delivery. Advises and guidance provided by the supervisor are really helpful.

The sole purpose of this project is to provide a system, which are easy for the user to gain insight and understanding of a large number of data. The process of undergoing all the various phase of system development definitely does provide valuable experience.

In addition, this project is enriching undergraduates' knowledge and understanding of the computer science theories and technology.

In brief, my personal experiences acquired during this project development include: -

(i) Developing a mature and independent personality

(ii) Enhanced communication skills and self-confidence

(iii) Resolving technical problems arise with the best solution

In conclusion, this project has met his chief objective of developing an application system using Microsoft development tool. The knowledge gained would indeed be beneficial and might pave the way to developing other systems in the future.

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