WXES3182
PROJEK ILMIAH TAHAP AKHIR

e-Office

LEAVE APPROVAL SYSTEM

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ABSTRACT

Leave Approval System (LAS) is one of the main modules in e-Office project that offers also e-Transaction and Human Resources Management System (HRMS). LAS is a web-based client server system developed with the objectives of implementing the task of leave application and approval on a company or organizations. LAS proves that the possibility to deploy traditional client/server application on the internet.

LAS allows staff / employee the ease of access to apply leave and allows manager to approve leave application easily. LAS consists to apply, to cancel, to approve and to calculate the number of leaves that have been design for both of the staff and administrator. LAS users are categorize to Board of Director (administrator) and Staff (employee). The administrators are allowed to enter all section in LAS. However, the employees are allowed to enter only one section (staff's page) by entering their user ID.

LAS is developed by using FrontPage and Active Server Page (ASP), a client/server application development. It is believed that LAS will gradually become an essential to every company and institutions in the future.

ACKNOLEDGEMENT

First of all, I would like to take this opportunity to express my gratitude to all that have helped and guided me during the system development process. My utmost thanks goes to my project supervisor Mrs. Su Moon Ting, for giving me her useful advices, unlimited support and guidance. Not to forget Assoc. Prof. Dr. Roziati Zainuddin who has been a resourceful moderator throughout this project's assessment.

I would also like to extend my gratitude to my e-Office group members Miss Najiha Yunos and Miss Wardati Najihah for their effort in making this project a dream come true. Special thanks to Mr Azmeer Muhtar for sharing his knowledge and time throughout the whole development stage of my project.

Finally, my deeply appreciation to my family members especially my mom for her prayers and also my late respectful father, allahyarham Mr Jalaludin Abd Rahman who has just passed away within the middle of this project development and not to forget my fellow good friends for their support physically, spiritually and understanding for the past few months. May Allah Taala bless us all always.

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Chapter 1

INTRODUCTION

CHAPTER 1 : INTRODUCTION

1.1 PROJECT DEFINITION

1.1.1 DEFINITION OF E-OFFICE

Today's modern office environment requires the establishment of a technology infrastructure that provides connectivity and the necessary tools to get the job done. Data requirements, having evolved into information requirements, have been further delineated into corporate knowledge requirements.

E-Office is designed to support knowledge workers; individuals for whom the manipulation of information and knowledge is their business. This is possible, because all knowledge workers - engineers, physicians, lawyers, software developers, business analysts, managers, administrative assistants, clerks, etc. - require the same core functionality to do their jobs; *to maintain timely access to information and knowledge in a form suited to the intended use.*

The architecture of E-Office is a step towards supporting the common and universal needs of any office and business environment. Yet, it maintains the flexibility to allow customization; capable of evolving to any specific need. Its purpose is to provide a generic toolkit, one that will enable us to bridge between the *islands of automation* that exist in most working environments.

E-Office has evolved from the confines of document management; to further refine and advance its basic principles. It has brought document management to a new tier; the next evolutionary level. In many ways, it is synonymous with the coupling of intelligence within document management, text retrieval, conferencing, communications and office processes.

In this project, only three modules of document management that will be discussed: Human Resource Management System (HRMS), E-Transaction and Leave Approval System (LAS). This research will focus on **Leave Approval System (LAS).**

1.1.2 DEFINITION OF LEAVE APPROVAL SYSTEM (LAS)

Living in an information age, the rapid growth of Internet and Intranet accelerated the ever-increasing demand for information resources will gain better knowledge and competitive advantages in this new era.

The Leave Approval System (LAS) is an online based application aim at implementing the task of leave application and leave approval on the company web. It is a user-friendly system and designed to let the employees apply leave and for the manager to approve the leave online.

The system consists of two main sections namely the user (employees and manager) and administrator. The employees and manager can apply leave and approve the leave through the net. The administrator's section contains database maintenance function and printing report.

1.2 PROJECT OBJECTIVES

The main objective of this project is to develop and implement an integrate, dynamic and interactive web-based electronic office (E-Office) system. It consists of a main, attractive homepage for authorized employees to surf and a reliable database system to maintain each module in E-Office system.

This system uses the internet as its info transmission medium and the employee can access the info at anytime and anywhere in a secure and convenient environment. Below are the objectives of this project:

1.2.1 OBJECTIVES OF E-OFFICE

1.2.1.1 To provide an ease of use, accessibility and user friendly graphical user interface.

The design of user interface is at user skill level where no command or programming skill is needed to access the system. Users can handle the system very easily as simple as clicking on buttons only. Users do not have to

do a lot of typing; data input is decreased to the minimum. Most of the data are retrieved from database.

1.2.1.2 To ensure the most reliable and the latest information is distributed in the network.

This information is distributed electronically and most of it is retrieved from the database. Once the database is updated, all the info in this system, as can be seen in the web page, will also be updated automatically. The latest news can be reached to everyone in the company.

1.2.1.3 To reduce manpower

By shifting from a manual-paper processing to a computerized processing is able to reduce manpower. Authorized employees can easily manage their own tasks provided in this system instead of depending on one specific employee to cope with all human resource tasks.

1.2.1.4 Cost Effective and Security

With new internet technologies a cost effective and security method to deliver human resources services because it enables employees and administrator easy to access data.

1.2.1.5 User-friendly, attractive and interactive interface

Graphical User Interface (GUI) will boost the user friendliness of the module. The interface will have resemble of those Windows based application to enable user to be more comfortable to look at the interface instead of creating an interface which is odd-looking from the Windows operating system. The interface of the module also has to be similar to those of other modules in the system in order for the user not to get confused and uncomfortable with the change of interface as they 'jump' from module to another.

1.2.2 OBJECTIVES OF LEAVE APPLICATION SYSTEM

1.2.2.1 Develop an easy way to manage the leave application and leave approval through company web.

1.2.2.2 Create a paperless office – replace paper documents with electronic documents.

1.2.2.3 Develop an interactive and secure networking as interface to ASP

1.2.2.4 Provide an efficiency administrator database maintenance to manage the system.

1.3 PROJECT SCOPE

1.3.1 LEAVE APPLICATION SYSTEM SCOPE

The project will cover the areas as specified below :

- Keep track of the leave taken by employees.
- Administrators are allowed to define the employee's leave balance to-date.
- Implement queries capabilities for employees, manager and administrative.

Project Significance

Much more benefits would be gained from the development of this project in terms of :

- To eliminate much of the redundant paperwork and steps in the human resources process by moving the flow of documents from paper format to electronic online system.
- It is to improve communications among the employees and reduce the unnecessary time as they can manage themselves easily.

1.4 TARGETED USER

The main purpose of this project is to develop system to cater most of the area in each department of E-Office. This system is developing in general basis, which have the common functions to users needs to be used in various industries such as manufacturing and merchandising. The main user of this system can be categorized into two groups – the management group and the employees group.

1.4.1 The Management Group

This group consists of the managers, the director or the partners of the companies. They will use this system as a source of information to facilitate them in decision-making.

1.4.2 The Employees Group

This group is called the common user. They use this system to calculate and record the transactions as they manually record them in the bookkeeping. They are able to generate report for the managers according to the manager's requirements.

1.5 EXPECTED OUTCOME

LAS is build to organize workflow electronically, which can review, approve and communicate the information with the click of a button. Additionally, LAS is user-friendly and efficient in terms of:

- Leave Application
- Leave Approval
- Leave Cancellation
- Data management and maintenance

1.6 FACT FINDING

Referring to the method of information gathering, suitable fact finding techniques is essential in order to get the relevant reference documents as well as establishing a high degree understanding towards the project scope and development requirement and at the same time building a strong groundwork in system design. Listed below are the method used to gather the relevant information for the system:

1.6.1 Book Reference

Reference books are the most important source of reference for conducting the research on the system development. The book title varies from the most technical which focus on system design, database to those which emphasis on business rule such as books on intermediate accounting as well as books on Accounting Information System.

1.6.2 Internet Surfing

The largest source of information which the information varies from all areas of the system be it technical or non-technical. As such, the information gathered is on concepts of ERP, e- office, e-business, Leave Information System, Human Resource Management System, Accounting Information System, Design Methodologies and Strategies, system evaluation and others.

1.6.3 Faculty's Document Room

Reference of senior's thesis and research serves as a guideline in conducting research and as a literature review. Referring to their some ideas is become very useful to us.

1.7 PROJECT SCHEDULE

In order to organize the development phase of the system, a schedule is essential in order to develop the system in more proper manner where the development phase follows certain time frame allocated. Table 1.1 shows the project schedule for the system while Figure 1.2 is a Gantt Chart on the development phase schedule along the intended time frame for each phase of the system.

Table 1.1 Project schedule

Activities	Date	
	From	To
Literature review	1/6/2003	10/7/2003
System analysis	1/6/2003	10/7/2003
Methodology	11/7/2003	20/8/2003
System Design	21/8/2003	31/9/2003
Phase II	27/9/2003	31/1/2003
System design	1/10/2003	20/10/2003
Coding	21/10/2003	20/12/2003
System testing	21/12/2003	31/1/2004
Documentation	1/6/2003	31/1/2004

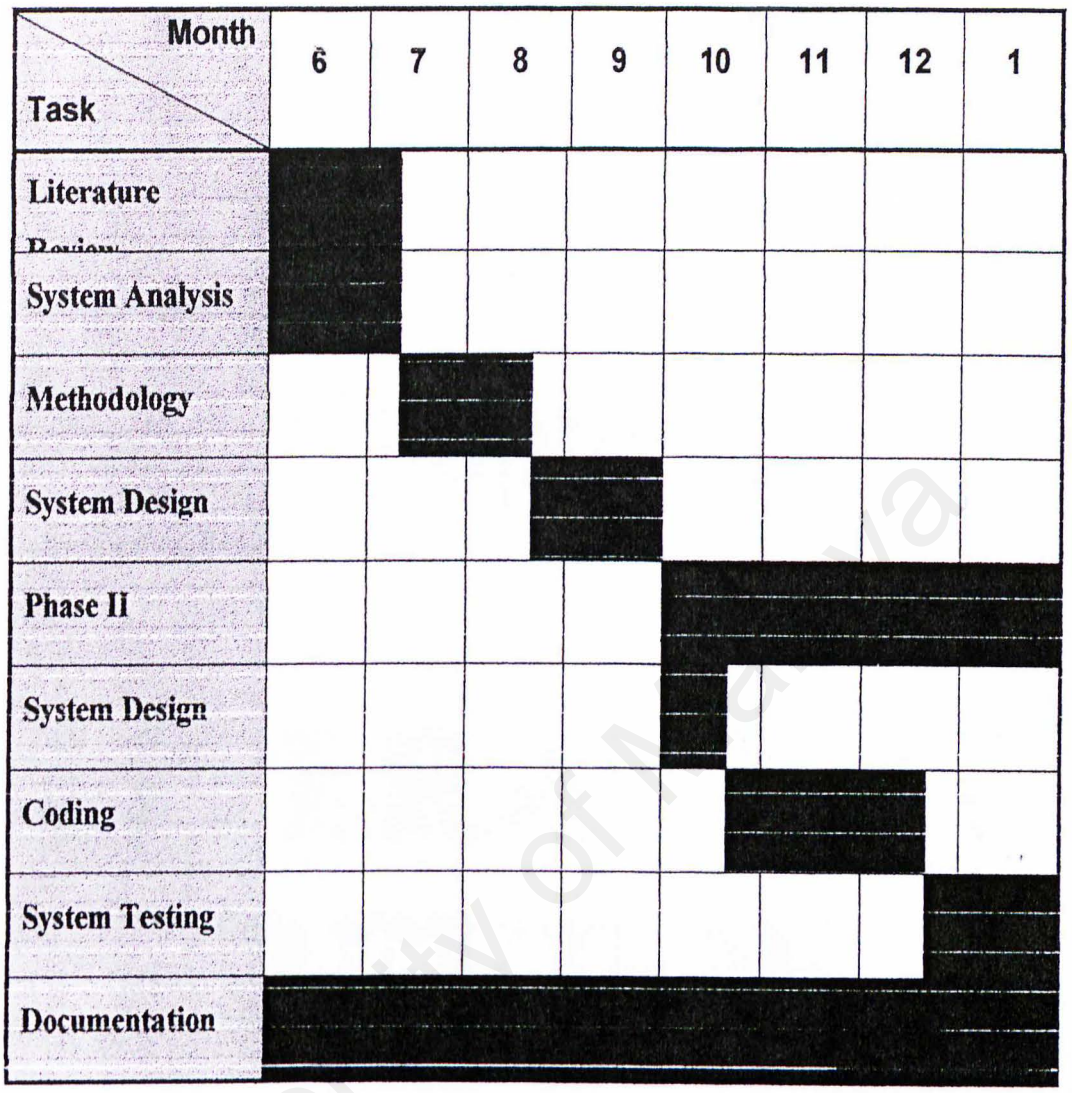


Figure 1-2 Gantt Chart for the development of the system

Chapter 2

LITERATURE REVIEW

CHAPTER 2: LITERATURE REVIEW

Review of literature is a background study about the knowledge and information gained to develop this human resource management system. 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.

During the phase, information relevant with the project is collected through available medium such as books, magazines, internets and others.

2.1 RESEARCH REVIEW

A few ways have been used to do the research in completing this human resource online system as shown below:

- **Purposive Sample and Interview**

  Purposive sample is based on judgment, whereby a group of individuals is chosen based on criteria, but upon choosing them, it is a no probability sample. The criteria chosen based on the mentioned modules. This group of people was interviewed to gather their thoughts, ideas, findings and suggestions that might have for the enhancement and development of the system.

- **Internet research**

  Research on the World Wide Web was done to look for similar human resource online system and new technologies of the current software development tools. The internet search engines those were useful as below :

  http://www.google.com
  http://www.yahoo.search.com
  http://www.msn.com
  http://www.hotbot.com
  http://www.altavista.com

Keyword such as 'Leave Management System', 'E-Office', 'Electronic Office', 'Leave Information System' and 'ERP' were used in this information searching. Upon finding these sites, the features were compared and ideas were absorbed to suit our project.

However, not all the web sites can be accessed, as some page might need the authorized User Id and password to access to the system. Further from this, we can only noticed the features of the leave-system but not be able to view the real user interface and the internal processes it involved.

Besides comparing system, research was also done to find out if the current development software tools could support this project, since the hardware tools are already fixed.

- **Group discussion and brainstorming sessions**

  This method proved to be a productive way in gathering workable suggestions, solutions and new ideas. Sources of information were from project supervisors, moderator, lectures, group members, course mates and certain staff of FSKTM.

- **Newsgroup**

  Newsgroups are also useful to discuss FAQ's, topics such as development tools, system architecture database. Questions can be posted and respondents would give their ideas and suggestions. This source of info was not exactly that useful in terms of comparing similar human resource online system, but many more features of the current development tools were found. The useful newsgroup that we joined is as below :

  a) http://www.intranetjournal.com/ix/

     It is a form for corporate Web adopters, which are the place for both beginners and experts to discuss intranet related questions and issues.

  b) http://www.allexperts.com/

     We can ask advice from the volunteer experts to gather more new info and solve our programming language problems.

  c) http://www.netlibrary.com/

- **References**

  Materials such as books, magazines, journals, newspapers, and the senior's thesis were read through for new ideas and to make comparisons. New technologies were analyzed to see if they are suitable in the current system's environment. Apart from that, since all the system and developments tools are currently being used, it was important to know if they can support the system by developing of new functionalities.

  These sources offer much information regarding the latest technologies currently in the market, but most of them are not applicable to the human resource management system. Nevertheless, the information is useful for future development of the system.

  Below are the descriptions regarding all the information that I have collected for development of human resource management system.

2.2 ANALYSIS OF SIMILAR ONLINE SYSTEM

Currently, some of the company especially small and medium size commercial companies still manage their human resource management process manually or semi-electronically. This method has not only inefficient but also very time consuming.

However, the emergence of internet and intranet has changes the situation. It offers explosion of opportunities for solving the accessibilities problem face by the employees. For example, to apply leave, the employees no longer need to present personally to office or human resource department. Thus, it is discovered that the development of human resource online system helps a lot in the company.

The following showed the examples of the existing human resources online web site:

a. *SISPEN (Sistem Pengurusan Personel Jabatan)*, online intranet in JPA (*Jabatan Perkhidmatan Awam)*, Putrajaya

b. Leave Application System, online intranet in JPA (*Jabatan Perkhidmatan Awam)*, Putrajaya

c. FSKTM Human Resource Online http://fsktm.um.edu.my/sqmail/src/login.php

d. HR online system in University of Minnesota

e. HR Online System in University of Illinois at Chicago

Not all the office automation online system in the private company or government sector can be access by outsiders. For example, the HR online system in JPA (*SISPEN*), only their employee via intranet can access it.

An interview was conducted to study the real case regarding the features and functionality of the online system in a government sector that is *Jabatan Perkhidmatan Awam (JPA) in Putrajaya.*

2.2.1 Case Study – Analysis online system in *Jabatan Perkhidmatan Awam (JPA)* in Putrajaya.

Below is a description regarding the HR system in a government company based on interview with Mr. Zainal Abidin from *Jabatan Perkhidmatan Awam (JPA), Putrajaya. Jabatan Perkhidmatan Awam (JPA)* is a government sector, which is located in Putrajaya, Malaysia.

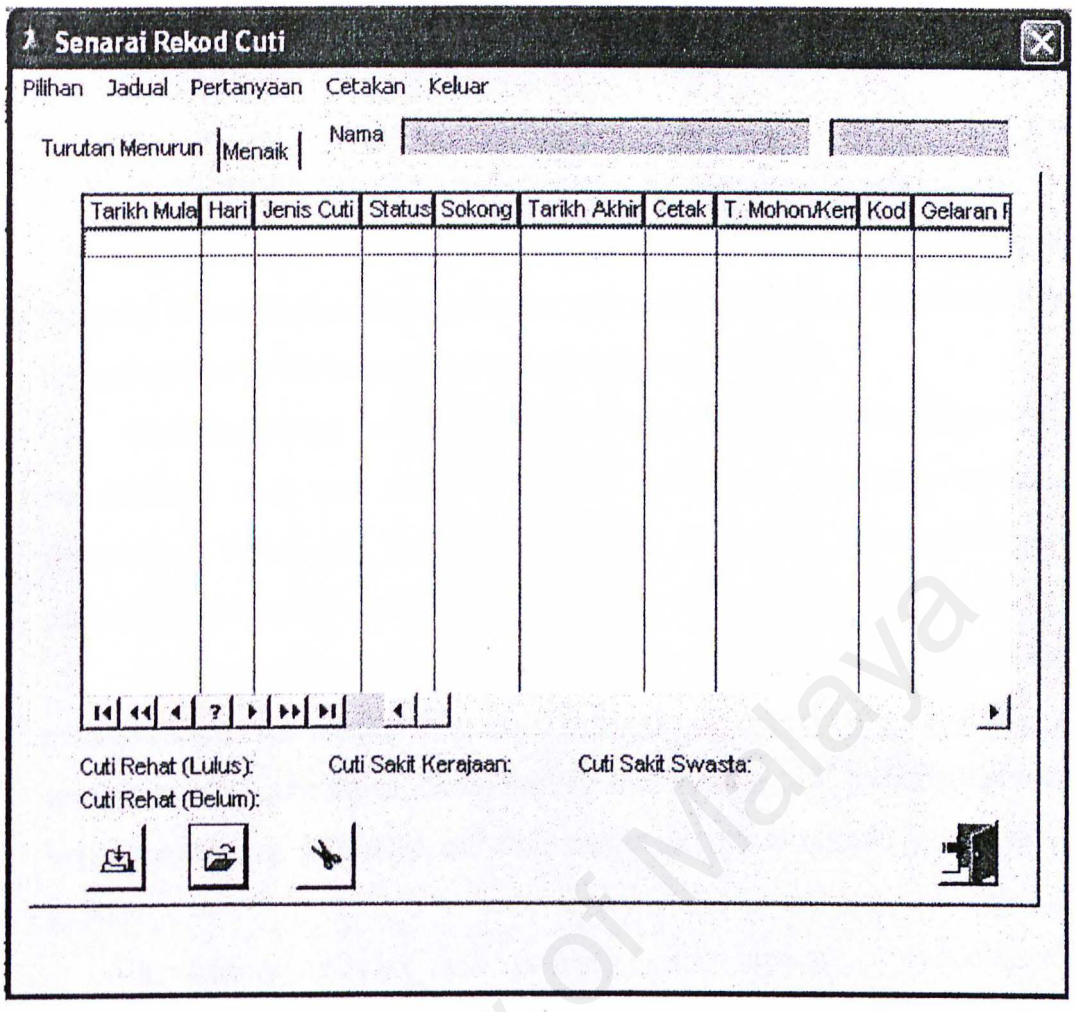
According to Mr. Zainal, they have their in-house development program for the HR system which can only access by the authorized employee. This was created to let them easily update any personal information (*SISPEN*), apply leave (Leave Application System), check status and to manage the schedule too. It's their ultimate one-stop tool to electronically manage themselves.

The system also contains leave management, which means they can apply, approve and plan leave through this system and also check the leave balance from the system. Besides that, they can view some non-confidential information for all the staff, information like he or she is belongs to which department, department head and so on.

They have a simple but effective way to handle their leave management. The system helps a lot to reduce the unnecessary time and simply the task by human resource.

While the Leave Application System in enables employee from all government sectors under JPA apply for leave via intranet. Then, this application will be processing by admin on that government.

Currently, most organizations use only low—level applications that essentially allow employees to access general information. For example, policies and procedures may be provided on a company intranet. A bit more complex are systems that allow employees to access specific information contained in their own employee records, such as retirement plan balances and vacation days accrued. Sometimes, referred to as employee self service, such as systems may also handle purchase requisitions and other simple request.



2.2.2 Comparison between existing online system and proposed system

At most of the company, they handle their leave management system by allowing the employee download the leave form online in adobe acrobat or Microsoft word format. One of the examples is the leave management system in University of Queens land in Australia (http://www.uq.edu.au/staff/). The employees have to hand in the form to the payroll department. But it seems not a good suggestion to do in that way. It slows down the process and it still requires the employee to print out the form, fill in the form and only hand in to payroll staff.

It is good that all these processes can be done online and submits the form via internet. And the staffs can waiting the approval from the supervisor and check their status online. It will be much easier and faster way to complete the leave application processes.

Furthermore, most of the existing systems are not able to send out the latest and updated news or instruction to the employee. In the proposed human resource management system, this function included to make sure the employee can update them everyday. It reduces the unnecessary time by the human resource management.

2.3 OVERVIEW OF INTERNET, INTRANET AND EXTRANET

2.3.1 INTERNET

The internet is a large system of interconnected computer networks that span the globe. It is not just another application; it is neither software nor hardware. It is the environment for the business and communication of the future.

With the internet, we can communicate with other people throughout world via electronic mail; read online versions of newspapers, magazines, academic journals and books, join discussion groups on almost any conceivable topic, participate in games and simulations and obtain free computer software.

The internet has revolutionized the computer and communications world like nothing before. The internet is at once a world-wide broadcasting capability, a mechanism for information dissemination and medium for collaboration and interaction between individuals and their computers without regard for geographic location.

Its history complex and involves many aspects – technological, organizational and community. And its influence reaches not only to the technical fields of computer communications but throughout society as we move toward increasing use online tools to accomplish electronic commerce, information acquisition, and community operations.

2.3.1.1 What internet does for business?

- **Creating a client base**

  The internet is a ready base of several million people from all walks of life. One can easily find new clients or customers from this massive group given that their presence on the internet is known.

- **Product analysis and comparisons**

Organizations can easily find out the person who is more familiar with a product that currently tested or about to purchase. In addition to this, the company gets reports regarding their finding on the internet.

- **Market analysis**

  The large base of internet, users is a prime area for the distribution of surveys for an analysis of the market for a new product or service idea. These surveys can reach a great many people with little effort on part of the surveyors.

- **Expert advice and help**

  Beyond product analysis, there are also a great many experts on the internet who make their presence widely known and easily accessible. Very often the online company can get free advice and help with problems it might have from the same people who are paid highly for their consulting services to large organizations.

- **Recruit new employees**

  Internet has many job lists and resume online for employees. New resumes are constantly posted to the UseNet group to inform the availability of new skills.

- **Rapid information access**

  Accessing information over the internet is much faster on most occasions than transmission and transfer via fax or postal courier services. It is easier to access and get the information from countries around the world and make interactive connections to remote computer systems.

2.3.2 INTRANET

Simply put, an intranet is a company-wide software and information distribution system that uses internet tools and technology. It collects and group information for external dissemination. It could be a simple HTML file liked on a

LAN, a full-blown sophisticated system with dedicated server hardware or anything in between.

An intranet can be used to give employees access to company documents, distribute software, enable group scheduling, provide an easy front end to company databases and let individuals and department publish information hey need to communicate to the rest of the company. Typical intranet content could include the corporate directory, a calendar of events, a policy and procedures manual, the health plan and the company newsletter. The most important information will be industry-specific, such as supplier information and databases of products.

By the way, only selected individuals are allowed access through intranet. It is a low-cost way to distribute corporate information. The infrastructure requirements are usually in place if PCs are on a LAN.

2.3.2.1 Advantages of using intranet in the organization

- **Solve the overlcad problem of information**

  Ironically, too much information doesn't cause information overload and the solution isn't to reduce available information. Problems arise when individuals have a little control over the information that comes at them. They're buried under a mountain of data. And it takes mental energy to filter, sort, store and later retrieve all this information, most of which is irrelevant.

- **Cheap**

  One advantage of using internet tools to distribute company information is low cost. The browsers are cheap or free. Even the server hardware, software and middleware are affordable. Any employee with access to TCP/IP backbone can publish.

- **Robust**

  Even though the web is just seven years old and the first graphical browser just three, much of the underlying technology has been in use on the internet for a decade or two and its robust and reliable.

- **Fast**

  One of the great advantages of an intranet is video and sound can load in less than a second. The user can really push the envelope with the hottest available Web technologies without about performance. One using example is Federal Express, which has placed its package-tracking database online for entire world to see.

2.3.3 EXTRANET

Extranets are external networks physically set up outside a company's firewall that provide assistance with business strategy, ordering and product-delivery systems and customer support. Extranets extend the benefits of particular company information to outside groups, such as partners, suppliers and customers without compromising an organization's strategy.

Whereas a company's internet worldwide web site is accessible to all, its extranet can be reached only by a limited number of people or entities because the extranet is protected by security protocols and various authentication methods (User ID's , passwords). They provide scalable, secure, managed access over the internet to connect individuals and companies.

2.3.3.1 Advantages of using extranet in the organization

- **Expand the organization structure**

- **Increase efficiency of traveling employees/ telecommuters**

  Get information quickly, gain access to corporate databases, mail servers and file servers using the internet.

- **Gain access to new markets and create a global extended enterprise**

- **Improve collaboration among business**

  It increase speed of communication and encourages innovative collaboration.

- **Increase organizational efficiency and effectiveness**

- **Create an 'Electronic embrace' around customers and suppliers**

  It increases commerce and builds closer relationships with customers. Besides that, it improves service-customers access information about product availability, pricing or individual accounts and place orders.

- **Reduce costs**

  It improves supply-chain management including more efficient inventory control, ordering and product delivery. It also reduces long distance charges and printing costs.

2.4 OVERVIEW OF E-OFFICE AND MODULES SYSTEM

2.4.1 OVERVIEW OF E-OFFICE

2.4.1.1 What is E-Office?

"E" concept is the use of electronic tools such as computers, software and networks to make job being simpler, more accurate, quicker and cost effective. Recently there is a trend to signify "E" with more than just electronic rather specifically to computerized material. This term would obviously include software but does not strictly specify using a computer or the type of computer.

Information system is a framework by which resources such as computers or peoples are coordinated to convert inputs into outputs in order to achieve the objectives of an enterprise. In this study, there are three types of modules that being the pre-basic in e-office system : Human Resource Management System (HRMS), E-Transaction and Leave Approval System (LAS).

2.4.2 OVERVIEW OF LEAVE APPROVAL SYSTEM (LAS)

2.4.2.1 LAS Concepts Review

Before starting the process of writing or developing the system, an interview has been carried out with Mr. Zainal Abidin, the supervisor of Jabatan Perkhidmatan

Awam (JPA), Putrajaya. The purpose of the interview is to understand about the leave application and leave approval workflow, specification and requirements in order to develop this project. Researches have been carried out such as go through the Employment Act and internet to find out the topic, which led to employees' leave.

2.4.2.2 Employees Leave

Basically, there are two types of leave – leave without pay and leave with pay. There are several important sub types of the leave with pay. The most common types of leaves are:

- Annual Leave – for vacation and necessary personal business
- Sick Leave – to cover illness or visits doctors, dentist etc.
- Compensatory Leave – for irregular hours worked
- Maternity Leave – for female personnel
- Study Leave – for personnel to further study

However, two most common leaves available in a local (conventional) company are annual leave and sick leave. Annual and sick leave shall be taken only with the authorization of the immediate supervisor and/or division/commission head.

2.4.2.3 Annual Leave

Annual leave must be applied by the employee and may be used only when approved by the appointing authority or his designated representative. It shall not be charged for non-working hours. Each appointing authority shall select a method to charge the annual leave records of all employees.

According to Employment Act, 1955 (Act 265), an employee shall be entitled to paid annual leave for eight days for every twelve months of continuous service with the same employer if he/she has been employed by that employer for a period of less than two years. If an employee service year is two years or more but less than five years, the employee will be entitled foe twelve days annual leave for every twelve months. While sixteen days for very twelve months of continuous services

with the same employer if the employer has employed him for a period of five years or more.

If an employee has not completed twelve months of continuous services with the same employer during the year in which he/her contract of service terminates, their entitlement to paid annual leave shall be indirect proportion to the number of completed months of service. Whereas if any fraction of a day pf annual leave so calculated which is less than one-half of a day shall be disregarded, and where the fraction of a day is one-half or more it shall be deemed to be one day.

Further, if an employee absent himself without the permission and reasonable excuse of his/her employer for more than ten percent of the working days during the twelve month of continuous service. The employee shall not be entitled to such leave because he/she is still entitled to such activities accrues.

2.4.2.4 Sick Leave

Regular full-time employees are granted sick leave for protection in time of illness or incapacitation because of injury. Sick leave is a form of insurance – when an employee is sick or otherwise incapacitated, benefits can be drawn upon to offset the loss of wages. Sick leave is a privilege and must be requested by the employee and approved by the supervisor before sick leave can be authorized. Throughout the period of absence, employees must keep the supervisor or department head informed of their physical condition and their estimated date of return. Employees who do not comply with these provisions may have their absence charged to leave without pay or have other disciplinary action taken against them. An employee shall, after examination at the expense of the employer

- by a registered medical practitioner duly appointed by the employer; or
- if no such medical practitioner or, if having regard to the nature or circumstances of the illness, the service of the medical practitioner so appointed are not obtainable within a reasonable time or distance, by any other registered medical practitioner or by a medical officer.
- Then this will be entitled to pay sick leave.

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2.4.2.5 Leave of Absence Without Pay (Unpaid Leave)

An appointing may extend leave of absence without pay to an employee for a period not to exceed one year, provided that such leave shall not prolog the period of his appointment. After presenting justifiable reasons in writing to the Director and with his approval, an appointing authority may extend to a permanent employee leave of absence without pay for a period in excess of one year.

In addition to any disciplinary action, which may be imposed against an employee for an unapproved absence, such employee may be placed on leave without pay by his appointing authority for the period of unapproved absence.

There are many other types leave, but what those types will be available according to the company's policy. In LAS, only leaves which require approval will take to consideration. However, the supervisory staffs that will have the right to approve their subordinates' leaves application in LAS must be defined first. In the absent of the head of department, his assistant that is sub-head will be allowed to approve these requirements.

2.5 CONSIDERATION OF DATABASE MANAGEMENT SYSTEM (DBMS)

2.5.1 WHAT IS A DATABASE?

More organizations are realizing the importance of data as a corporate asset that must be managed carefully. Because of this, the process or methods by which the data are collected, stored and retrieved or disseminated have undergone vast improvements in recent years. This eventually increases the focus on the value of data to the organization particularly those relevant to the management or decision making process as well as long term strategic planning for the organization.

A database is an integrated collection of data, organized and stored in a manner that facilitates its easy retrieval. The structure of a database should corresponds to the need of the organization and should allow multiple or concurrent access database by multiple users and when appropriate, for the use of more than one

application. The concept of a database organizes data into a logical hierarchy based on the degree of the data. This hierarchy consists of 4 elements which are :

i) Database
ii) Files
iii) Records
iv) Data Elements

Although the data are organized within a common structure, the sources of the data collected may come from different sources. Data sources may come from different methods such as :

i. **Internal data** : data which originated from the organization itself such as daily transaction within the organization.
ii. **External data** : data which is from the external source of the organization such as market research, census data and others.

2.5.1.1 DATABASE MANAGEMENT SYSTEM (DBMS)

The database is processed by the DBMS which is used by both the user and system developer. Both can access the DBMS directly or indirectly through application program. A DBMS can be divided into 3 subsystems :

i) Design Tools Subsystem : consists of a set of tools to facilitate the design and creation of a database and tis application. The tools are for creating tables, forms, queries and reports. DBMS also provide programming languages as well as graphical user interface such as macro language embedded in Microsoft Access 2000.

ii) Run Time Subsystem : processes the application components which were developed using the design tools of the DBMS. An example is that Microsoft Access 2000 has a run time facility that processes the application forms as well as connecting the tables inside the database.

iii) DBMS Engine : an intermediary between Design Tools Subsystem and the Run Time Subsystem. The DBMS receives the request of the 2 components and translates the requests into commands for further processing by the Operating System to read and write data on physical media.

2.5.1.2 DATABASE DEVELOPMENT PROCESS

In order to build and effective database and related applications, development team must thoroughly understand the user requirements model. They must build data models that eventually identifies the data to be stored in the database and defines the relationship between the data.

There are 2 general strategies for developing a database :

i) Top Down Development : proceeds from general to specific. Begins with the study of strategic goals of the organization. Then the development team works down towards more detailed description and the models describing the structure of the database.

ii) Bottom Up Development : begin with the need to develop a specific system. The development process will eventually proceed with the team working upwards towards a more general context.

2.5.2 MY SQL

My SQL consists of a server daemon "my sql" and many different client programs / libraries, which is an implementation for the client/ server. It is a true multi-user, multi-threaded SQL (Structured Query Language – the most popular database language in the world) database server.

Speed, robustness and ease of use are major consideration in My SQL. My SQL is built based on a set of routines that have been used in highly demanding production environment for many years. It already offers a rich and highly useful function set while it is still in development.

Database servers typically use some type of a monitor application to do system administration. This application can be character based or graphical and administrators will most likely use both since each has strengths in different areas of system administration.

2.5.3 MICROSOFT SQL SERVER VERSION 7.0

Microsoft SQL Server 7.0 incorporates a world-class features set for distributed client/ server computing. It is the most robust database for the Windows family. The Relational Database Management System (RDBMS) of choice for a broad spectrum of corporate customers and Independent Software Vendors (ISVs) building business application.

Microsoft SQL Server supports a set of features that result in the following benefits:

- **Ease of installation, development and use**

  SQL Server includes a set of administrative and development tools that improve your ability to install, deploy, manage and use SQL Server across several sites.

- **Scalability and High Performance**

  The same database engine can be used across platforms ranging from laptop computers running Microsoft Windows to large, multiprocessor server running Microsoft Windows XP, Enterprise Editor.

- **Data warehousing**

  SQL Server includes tools for extracting and analyzing summary data for Online Analytical Processing (OLAP). SQL Server also includes tools for visually designing database and analyzing data using English-based questions.

- **System integration with other server software**

  SQL Server integrates with e-mail, internet and Windows.

- **Reliable distributed data and transaction**
- **Centralized control of distributed servers**
- **Full programmability and standards support**
- **Open interoperability**

Database is the choice for e-commerce sites and best of breed data warehousing solutions. SQL Server includes OLAP Services, Data Transmission Services and

English Query and works with over 45 ISVs that from Data Warehousing Alliance. By using Windows XP, fastest database for SAP, based on the SAP Retail benchmark.

2.5.4 MICROSOFT ACCESS

Access offers an ease-to-use database for managing and sharing data. Access 2000 brings not only the traditional broad range of easy data management tools but also adds increased integration with the Web for easier sharing of data across a variety of platforms and user levels and additional ease-of-use enhancements to assist with personal productivity.

Benefits of Microsoft Access:

- **Making information easy to find and use**
  Access 2000 continues to offer an easy-to-use tool for easily finding information that provides consistency and integration with the other applications in the office suite.

- **Web-enabled information sharing**
  Access 2000 allows easily sharing information via the corporate intranet and the ability to easily host a database within the browser. This combines the power of a desktop database with the power of the Web.

- **Powerful solutions tools for managing information**
  Power users and developers may now create solutions that combine the easy-to-use of the Access interface (client) with the scalability and reliability of SQL server.

2.6 CONSIDERATION OF SCRIPTING LANGUAGE

2.6.1 JAVA SCRIPT

Java Script is an object-based on scripting language that is designed for developing internet applications. Java Script is not Java. It is merely a simple scripting language that is parsed and executed by the parser. Java Script allows the applications that run over the internet been created, which the client application run in a browser and server application run on server.

Java Script is an extension to HTML that lets users create more sophisticated Web pages then they ever could with HTML alone. It is lightweight in that there isn't a great deal to learn. We can be productive with very quickly, in contrast to much more complex languages such as Java. As a scripting language, Java Script is meant to tell an application what to do. Unlike languages used to create application, it cannot do anything without the application.

Using Java Script, we can create more dynamic HTML pages that process user input and maintain persistent data using special objects, files and relational database. A Java Script page can validate the data entered before it is sent to the server, if the data is invalid, Java script can block transmission to the server. Because all of this work is performed on the client side, Java script codes not waste bandwidth transmitting bad data and then receiving an error page from the server.

Java scripts provide a high degree of user interaction like some other systems including CGI and Java. The Netscape Navigator 2.01 and its later releases support Java Script.

Using Java Script, even less-experienced developers will be able to direct response from a variety of events, objects and actions. It provides anyone who can compose HTML with the ability to change image and play different sounds in response to specified events, such as a user's mouse click or screen exit and entry.

2.6.2 VB SCRIPT

VB Script is an interpreted language, which was designed by Microsoft based on the VB programming. It is a fast, portable, lightweight interpreter for the use in WWW browser and other applications that use Microsoft ActiveX Controls,

Automation Servers and Java Applets. VB Script can be embedded in the HTML pages to build the web applications.

It is natively executed on the Internet Explorer browser and can be executed in other browsers through plug-in technologies. It is default scripting language of the Internet Information Server 3.0 and later. It is particularly interesting for the source code is embedded as text within the Web pages.

Although Microsoft does support Netscape's Java Script (it converts it into its own Java Script), Netscape does not support VBScript. For this reason, VB Script best used for Intranet Web Sites that use the Internet Explorer browser only. It brings active scripting to wide variety of environments, including Web client scripting in Microsoft Internet Explorer version 3.0 and Web server scripting in Microsoft Internet Information Server version 3.0.

VBScript is designed for use Microsoft Internet Explorer browser together either other programming that can be run at the client site, including ActiveX Control, Automation Servers, Java Applets, client site scripting refers to script that can executed in the user's web browser, the web client rather than the web server.

Unlike Java, VBScript and Java code is represented as regular ASCII text within the HTML document. The VBScript code is interpreted and compiled while the browser is downloading it from a web server.

The VBScript is extremely easy to learn and use compare to Java and Java script. It easy to pick up this language if we already familiar with Visual Basic or Visual Basic for Applications.

2.6.3 ActiveXTM SCRIPTING

VBScript talks to host applications using ActiveX Scripting, browsers and other host applications don't require special integration code for each scripting component. ActiveX Scripting enables a host to compile scripts, obtain and call entry points and manage the namespace available to the developer.

With ActiveX Scripting, language vendors can create standard language run times for scripting. Microsoft will provide run-time support for VBScript. Microsoft is working with various Internet groups to define the ActiveX Scripting standard so that the scripting engines can be interchangeable.

2.7 WEB DEVELOPMENT TOOLS

2.7.1 MICROSOFT FRONT PAGE

Microsoft Front Page is focused on making basic Web document publishing and site management easy for business professionals and end users who are not fulltime Web publishing professionals. Using the same visual interfaces as Windows, Front Page like internet Assistants allows users to create multimedia Web sites with just a few mouse clicks. Front Page enables non-expert user to create and maintain sophisticated, interactive site from their desktop with a powerful yet simple "web top publishing" system. From the aspect of integration with Microsoft Office, there is add-ins for Office and it is easy to update Office documents.

2.7.2 MICROSOFT VISUAL INTERDEV 6.0

Visual Interdev is an integrated development environment (IDE) for creating dynamic web sites. It s part of the Microsoft Visual studio family, which consists of Visual Basic, Visual C++, Visual FoxPro and Visual J++. It combines a number of tools into a single package to simplify development chores. There is support for project management; syntax highlighting of different types of web files such as ASP or HTML, automatic synchronization of local files with web server files and integrated databases access.

With Visual Interdev, a developer can assemble pages that use Microsoft's ActiveX technologies and other similar com technologies. Data driven web applications can also be developed using Microsoft's Universal Data Access, which includes ADO (ActiveX Data Objects), ODBC (Open Database Connectivity) and OLEDB. Visual Interdev also provides a robust development environment with a Scripting Object Model, design time control (DCts) and a extensible toolbox for the purpose of rapid design, testing and debugging of web pages. Web terms can now develop pages in isolation and maintain ready access to a master version. In short, Visual Interdev is an excellent all-rounder IDE, both for programmers and non-programmers.

The weakness of Visual Interdev is that the database designers will only works with the SQL server database. The database designer provides Access-like

tools generate Data Definition Language (DDL) commands to design and create SQL server tables and database diagrams.

Visual Interdev integrates the technology of ActiveX and VBScript in a simple point-and-click interface and WYSIWYG tools without need to forego the use of cool new technologies. Such as ASP or DHTML. These are fully supported within the integrated development environments.

2.7.3 DIFFERENCES BETWEEN MICROSOFT FRONT PAGE AND MICROSOFT VISUAL INTERDEV

Visual Interdev is a web development tool designed for programmers, while Microsoft Front Page is a web authoring tool-designed non-programmers. Microsoft Front Page is a member of the Microsoft Office family and looks and works like other office applications. Visual Interdev is a member of the Microsoft Visual tools family, and looks and works like other Microsoft Visual development tools, including Visual Basic, Visual C++, Visual FoxPro and Visual J++.

2.8 ASP AND CGI

2.8.1 ACTIVE SERVER PAGE (ASP)

Active Server Pages is an open, compile-free application environment in which can combine HTML, scripts and reusable ActiveX server components to create dynamic and powerful Web-based business solutions. Active Server Pages enables server side scripting for IIS with native support for both VBScript and Java Script.

An Active Server Page is an html page that includes one or more scripts (small embedded programs) that are processed on a Microsoft Web Server before the page is sent to user. An ASP is a server side scripting. It is similar to the common gateway interface (CGI) application in that all involve programs that run on the server, usually tailoring a page for the user.

ASP are server-generated pages that can call other programs to do things like access database, serve different pages to different browser, basically, anything we used to do with CGI. Typically, the script in the Web page at the server uses input received as the result of the user's request for the page to access data from a database and then builds or customizes the page on the fly before sending it to the requester.

ASP has evolved into an "open technology framework", meaning it is not necessary to use Microsoft product to create code in it. ASP pages can be created using whatever language such as C++, Java or JavaScript. Anyway, the most popular is VBScript. The conversion to VBScript is simple. Besides that, VBScript is the simplest language to use in website. ASP can also take advantage of COM and DCOM (Component Object Model and Distributed Component Object Model) objects with minimum effort.

With ASP, codes can be simply written in HTML page. The HTML tags and codes are side by side. No compiling and no complex interfacing needed. ASP has made it much quicker and easier to create highly interactive websites. It also makes the web easier to maintain and updated in the future.

2.8.1.1 Advantages of ASP

ASP is one of the most popular methods in developing a website. Here are some of the technology's key benefits:

- **Browser Independent**

  An Active Server Pages is executed on a web server and not within a browser. This means ASP is not dependent on the capabilities of a browser. Unlike JavaScript, ASP can be written so hey can work with any browser.

- **Use Scripting Languages**

  An ASP is written using scripts. This means it is easy to modify. If you discover a bug in an ASP, you can open the page with notepad and make a quick moditification without recompiling your application. It allows us to dynamically edit, change or add any content of a web page.

- **Provide Easy Database Access**

We can easily perform complex database task. We can use the same database access technology in ASP as within Visual Basic or Visual C++ (the ActiveX Data Objects). We can access any data or database and return the results to a browser.

- **Integrated in Internet Information Server**
- **Compile Free**
- **Less time to write and debug**
- **Customize a web page to make it more useful for individual users**
- **Simplicity and speed**
- **Provide security since the ASP code cannot be viewed from the browser**
- **Clever ASP programming can minimize the network traffic.**

2.8.2 COMMON GATEWAY INTERFACE (CGI)

The common gateway interface (CGI) is a standard way for a web server to pass a web user's request to an application program and to receive data back to forward to the user. When the user requests a web page (for example, by clicking on a highlighted word or entering a web site address), the server sends back the requested page. However, when a user fills out a form on a web page and sends it in, it usually needs to be processed by an application program. The web server typically passes the form information to a small application program that processes the data and may send back a confirmation message. This method or convention for passing data back and forth between the server and the application is called Common Gateway Interface (CGI). It is part of the web's Hypertext Transfer Protocol (HTTP).

Any script can be called a CGI as long as it is installed on the server end. The majority of CGI scripts are written in Perl, with C or C++ and Java being the next most common. CGI is installed on the server end that makes it able to do things such as submit a form, create a guest book or forum, keep track of and rotate advertisements and much more.

The server also has the capability to redirect data to any email address, persist data, dynamically serve out different content to the browser, among many other things that the browser alone simply cannot do.

2.8.3 COMPARISON BETWEEN ASP AND CGI

ASP provides all of the functionality of CGI applications in an easier-to-use and more robust environment. ASP is an easier way for server to access information in a form not readable that the client and then act as the gateway between the two to produce information that the client can view and use with CGI. As a conclusion, it is easier to develop dynamic content and web applications with ASP.

Chapter 3

METHODOLOGY

CHAPTER 3: METHODOLOGY

3.1 INTRODUCTION

This chapter explains the research approaches taken during the system development. It also discusses the system development life cycle chosen to complete the system.

3.2 RESEARCH METHOD

There are 4 major types of resources referred to carry out the research including the library, the Internet, individuals and personal books or lecture notes.

3.2.1 LIBRARY

References had been done in the library to give a clear comprehension on e-office, the e-office approaches taken to solve similar problems and to gain knowledge on researches done by the e-office's pioneers. There are also a number of projects related to e-office developed by the computer science and engineering students that helped to create new solution to complete this project. The references had been done in University Malaya's Main Library, the faculty's document room and Engineering Faculty's Library.

3.2.2 INTERNET

The Internet is one of the major resources to gain information. Information gathered from the Internet includes the information on currently available traffic routing system, traveling information and programming techniques. The traveling information includes distances from each city in Peninsular Malaysia, available transportation services, fares and estimated time for each route.

3.2.3 INDIVIDUALS

Some individuals had been referred to gain the personal knowledge on their fields of interest. Mostly the knowledge is gained from the lecturers, tutor, friends

and there about the concept of e-office, the project development, and some on the transportation information.

3.2.4 PERSONAL BOOKS AND LECTURE NOTES

Personal books and lecture notes are referred to review some knowledge that helps on the development of the system. They include the some programming guides and project management knowledge.

3.3 SYSTEM DEVELOPMENT LIFE CYCLE

The waterfall model with prototyping has been chosen as the development process model to complete the system. Discussion on two models, which inspired the waterfall with prototyping; the waterfall model and the prototyping model, will be discussed first.

3.3.1 WATERFALL MODEL

The advantages of using waterfall model for this project are:

- It is useful in helping system designer to lay out what he/she needs to do in the project. This model presents a very high level view of what goes on during development.
- It suggest the sequence of events that system designer should expect to encounter.

While the advantage of using this development model is :

- It does not reflect the way code is really developed except for very well understood problems. A system is usually developed with a great deal of iteration.

Conclusion: Inflexible partitioning of the project into these distinct stages. Received system sometimes unusable, as they do not meet the customer's requirement.

3.3.2 PROTOTYPING MODEL

The superior of the prototyping model is:

- It is an approach where a simple running program will be developed first, modified and changed to suit the objective and target.

Although, the feature that not suitable for the project is :

- It is more suitable for the system, which is needed to be developed and use urgently.

Conclusion: Problem with prototyping model is in planning, costing & estimating a project. Although the project can be developed faster, but it is outside of the system developer' experience.

3.3.3 WATERFALL MODEL WITH PROTOTYPING

The advantages of using waterfall model with prototyping method compared to other model are:

- It combines the advantages of some other models, the waterfall model and the prototyping model.
- Better solution for the problem that occurs on their own.
- The development process more visible for the users and designers.
- System prototype can be developed to give end udders a concrete impression of the system capability. The prototype may therefore help in establishing & validating systems requirements.
- Validation and verification are enabled. Validation will ensures that the system has implemented all the requirements, so that each system's function can be traced back to a particular requirement in the specification. Verification will ensure that each function works correctly. It is made in order to get the high quality of the implementation on the system.

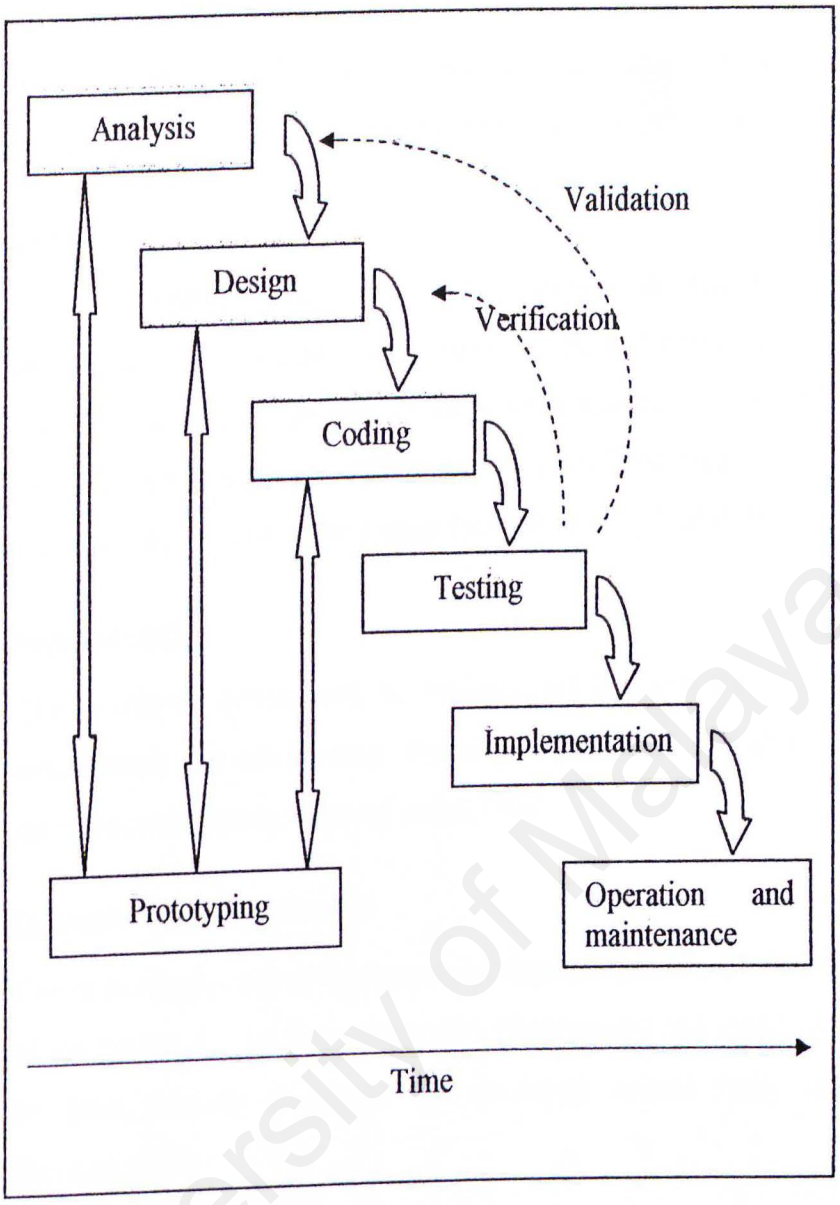


Figure 3-1 Waterfall model with prototyping

3.3.3.1 Analysis

This is the first phase in the system development. This is a critical phase and the success of a system is mainly depends on this phase. The main purpose of this phase is to understand the proposed system according to users requirements.(Gordon,1995)

3.3.3.2 Design

The design phase is where identified requirements are translated to system representative. Collected information will be used to develop system's logical design. (Kendall,1998)

3.3.3.3 Coding

This is the phase which translation and implementation of system's design representative to programming syntax took place. (Kendall,1998)

3.3.3.4 Testing

This is an important phase to ensure the quality of the system that will be developed is satisfying the user's requirements, and efficiently functional. The specification, design and system coding will be reexamined. This is where the verification and validation process will be done. This phase is considered success when the system functions well. (Kendall,1998)

3.3.3.5 Implementation

The developed system will be implemented in hardware and software environment that will be used. The whole system will be tested to ensure the system run without error. (Kendall,1998)

3.3.3.6 Operation and Maintenance

This is the final phase of the system development process. The maintenance of the system will be done constantly. Observations and modification will be done currently to ensure the developed system really satisfying. (Kendall,1998)

3.4 TECHNIQUE USED FOR PROBLEM SOLVING

In this section, various techniques will be explained to provide an in-depth knowledge of the system development. Each of the techniques will be use in different phases of the software development process. Table 3-1 will show a list of the techniques used in the software development respectively.

Table 3-1 List of techniques used in the system development

Phases	Techniques
Capturing requirements	1) Interviews with the potential users 2) Brainstorming 3) Observations 4) Analyzing documents
Modeling system processes	1) Data flow diagram (DFD)
Modeling data	1) Entity-Relationship (ER) modeling

3.4.1 CAPTURING REQUIREMENTS

All of the software development process begins with the analyzing of the systems requirements. Requirements arise when there is recognition that a problem exists and requires a solution or new software arises. It is important to obtain enough information and choose a suitable analysis method to analyze the requirements. This is because detecting and repairing an error during the requirements stage is much faster compare to the maintenance stage. In order to gather the information, various techniques has been used such as brainstorming, interviews with stake holders of the systems, observing the entire operation carried out by the firm and reviews on the existing software.

3.4.2 MODELING SYSTEM PROCESSES

Process modeling involves graphically representing the functions, or processes which capture, manipulate, store and distribute data between a system and its environment and between components within system. Tools such as Data Flow Diagrams (DFD) used to represent the information or the requirements gathered from the user as part of the requirements determination.

3.4.3 MODELING DATA

DFD, which has been explained in the previous section, show how, where and when data are used or changed in the accounting information system, but this technique do not show the definition, structure and relationship within data. Data modeling develops this missing and crucial, piece of the description of an information system.

Data model is the most important part of defining the system requirements. This is because:

i) The characteristic of data captured during data modeling are crucial in the design of database, programs, user interfaces and printed reports.

ii) Data rather than processes are the most complex aspects of the systems and hence require a central role in structuring system requirements.

iii) The characteristics about data (such as length, format and relationships with other data) are reasonably permanent. In contrast, the path of data flow is quite dynamic.

Chapter 4

SYSTEM ANALYSIS

CHAPTER 4: SYSTEM ANALYSIS

4.1 OVERVIEW

System analysis is an activity that seeks to systematically analyze data input or data flow, processing or transformation of data, data storage and information output within the context of a particular business. Furthermore, this is used to analyze and implements in the functioning of business that can be accomplished through the use of computerized system.

System analysis is the study of a current business and information system and the definition of user requirements and priorities for a new information system. It involves three basic phases:

- **Feasibility assessment (Project Survey Phase)**
  The steps involved interviews, define project scope, problem statement and classification proposed project plan.

- **Organization problem statement (Project Study Phase)**
  The steps involved are as below:
  - Project roles
  - Learn current system (use repository)
  - Model the current system
  - Analysis of problems and opportunities
  - New system's objectives
  - New project scope and plan

- **Organization requirements statement Definition Phase)**
  The developers identify requirements, determine model system requirements, discovery prototype, Prioritization and review requirements in this stage.

4.1.1 LEAVE APPROVAL SYSTEM (LAS) ANALYSIS

Analysis of LAS has been carried out since the project been assigned. An interview has been accomplished with *Jabatan Perkhidmatan Awam* to give some recommences of LAS, assesses how leave approval function by examining the inputting and processing of data and the output of information with the intent of improving organizational processes.

Besides that, studies on the types of leaves, calculation of leaves and their approval workflow have given some basic ideas to develop LAS. In addition, studies on development tools also narrowed the scope of tools that will be use in developing the system.

Also, informal interviews with the working people and various companies have been done successfully. The purpose for this informal interview is to know whether LAS is suitable to be applied online upon neither internet nor intranet.

4.2 SYSTEM REQUIREMENT

The system requirement express the system and object states and the transitions from e state to another. In particular, the requirements describe the activities of the system, such as a reaction to input, the state of each entity on the system before and after the activity occurs. It will describe in three ways: functional, non-functional and run time requirement.

4.2.1 FUNCTIONAL REQUIREMENTS

Functional requirements are a set of functions that are required to be included in the system. A functional requirement describes an interaction between the system and its environment. For example, to determine functional requirements, what states are acceptable will be decided for the system to be in. Further, it also describes how the system should behave given certain stimuli.

The functional requirements for each module are in this system are as the following:

4.2.1.1 Table Section

This database explains in-depth on creating, deleting and procedures to maintain the various types of table. The tables refer to master codes which are used during the daily data entry and printing reports. Therefore, the master codes must be defined first. This section contains seven modules:

a) Department

Department refers to a unit of specialized functions within a business or organization like administration, finance, human resource and service. The Department table allows the maintenance of the department master records for selection during data entry. The records exist in this table can be amend and delete depending on the rights given in program.

b) Race

Race is the ethnic group or sub-group the staff belongs to. The records exist in this table is amendable depending on the right given in the program.

c) Religion

Religion refers to the belief or faith professed by the employees. The records exist in this table is amendable depending on the right given in the program.

d) Nationality

Citizenship or employee's status in belonging to a country is placed in this table. The records exist in this table is amendable depending on the right given in the program.

e) Leave Entitlement

This module is used to define the various leave entitlements provided by the organization for the whole year. The company administrators can select whether to compute the leave entitlement by Calendar Year, Financial Year or Anniversary. The administrator can also determine whether the leave type requires any Discretionary (approval) from the supervisor. Prior to the leave entitlement computation, the approval control must be set beforehand via Record Access Control in the System Utilities Section.

f) Public Holiday

Use this module to define the gazette public holidays for a particular year.

g) Personnel Profile

This module is designed to capture information of employees and it allows the administrator to view and change personal details.

4.2.1.2 Data Entry Section

After setting up the Table database, the administrator may proceed with the Data Entry database. This database consists of the following modules :

- Leave Entry
- Leave Cancellation
- My Leave Information

a) Leave Entry

This module keeps track of the leave taken by employees. All registered users (employees) are allowed to access to this module for the leave application purpose. They need to specify a leave type and the range of dates of leave to be taken. In addition, they will also know the balance of leave in current year. When the employee click on the save button, an email will be generated and send to the immediate supervisor for approval. The supervisor can approve or reject the application by click on the link in the email. This will link the supervisor to the application form, after the status has been selected. Another email will be generated and sent to the employee who applies the leave.

b) Leave Cancellation

This module allows the authorized personnel or the employee to cancel the outstanding and approved leave applications partially or fully.

c) My Leave Information

This module allows the employee to keep track the leave applied in future and leave has been cancelled. This module will facilitate employee in order to apply leave or to make a leave cancellation.

4.2.1.3 System Utilities Section

The System Utilities database is for housekeeping purposes. The modules under this section are as below:

- Leave Computation
- Leave Entitlement Adjustment

a) Leave Computation

This module computes the employees' leave entitlement for a New Year. All leave entitlement for all employees will be re-computed, a new entitlement will include the maximum carry forward figure. Make a backup document to a specified database and delete whose document has been backup.

b) Leave Entitlement Adjustment

Execute this program as and when the administrators need to adjust the number of days entitled for the employees which could be due to promotion with the eave eligible changing for the employees. It keeps track of the adjustments made to the leave entitlements computed for the employees. It also allows the option to create new entitlement for each employee.

4.2.1.4 Reports Section

This database explains the procedures to print reports. Three reports are use in LAS, which are Leave Balance Listing, Employee Leave Ledger and Leave Application Information.

a) Leave Balance Listing

Use this module to print the employee's leave balance to-date. It shows the number of leave carried forward (if any), leave entitled, adjusted, taken and lastly the balance of leave.

b) Employee Leave Ledger

This module provides detailed leave information of each employee such as carry forward leave, entitled, adjusted, taken and balance. The different between

Employee Leave Ledger and Leave Balance Listing is that this ledger list out all employees' leave information.

c) Leave Application Information

The administrator and manager use this module to view leave information in a range of date or in a specified month. The information will include number of days, effective date and status. This information is very useful for administration in managing their management.

4.2.2 NON-FUNCTIONAL REQUIREMENTS

A nonfunctional requirement describes restriction on the system that limits the choices for constructing a solution to the problem. It is essential definition of system properties and constraints under which a system must operate.

4.2.2.1 Reliability

The system should not produce any dangerous or costly failures when it is used in a reasonable manner. This means the system has to be able to avoid the risk of loosing information.

4.2.2.2 Response Time

The response time to retrieve the search results must be within a reasonable interval time. Information should be available to users at any point of time.

4.2.2.3 User Friendly

User can perform various tasks by clicking a mouse-type instrument on the hypertext or image. With the suitable and meaningful icon usage, the user can easily use the application with more confidence. The available of help files will help the user when unable to proceed. In addition to make the system become user friendly, the system must display an error massage to inform the user if an error occurs such as invalid password, invalid length, invalid data and even an invalid operation.

4.2.2.4 Maintainability and Expandability

Maintainability may be defined qualitatively as the ease with which software can be understood, corrected, adapted and enhanced. While expendability is the degree to which architectural, data or procedural design can be extended. LAS is designed to be expendable in the future.

4.2.3 RUN TIME REQUIREMENT

4.2.3.1 Hardware Requirements

The hardware configuration based on multi platform capabilities and information system architecture. The servers shall support reliable network communications and protocol. It has the capability to easily upgrade processor performance or to add additional processors, disk storage and communication supports.

To have better performance of this system, the user's computer system should have the following basic requirements as listed below:

- Intel Pentium 133 MHz and above
- 64 MB RAM and above
- 2 GB hard disk with a minimum of 650 MB of free space PS/2 keyboard

4.2.3.2 Hardware Requirements

Software solutions are to address data exchange requirements to handle data types. It also has universal extensibility, portable codes and case tools.

In order to host and run the full of this E-Office system, the user's computer system must have one major operating system and two supporting software as listed below:

Table 4-1 Hardware Requirements

Description	Technologies/ Software
Operating System/ Platform	Windows XP
Web server software	Internet Information System (IIS)
Server scripting engine	Active Server Pages (ASP)
Database server	Microsoft SQL Server 7
Scripting language	VBScript, JavaScript
Web browser	Internet Explorer
Web development tool	Microsoft Visual Interdev

Chapter 5

SYSTEM DESIGN

CHAPTER 5: SYSTEM DESIGN

Design is a creative process of transforming the problem into a solution. A design specification describes the features of the system, the components or elements of the system and their appearance to users.

System design is concerned with how the system functionality is to be provided by the different components of the system. Meanwhile, design defined as the process of applying techniques and principles for the purpose of defining a device, a process or a system in sufficient details to permit its physical realization.

It is the creative process in which requirements are translate into representation of software and transforming the problem into a solution. Initially the presentation gives an overview of the system. Subsequent refinement leads to a design representation that is very close to the source code.

The common steps involved including analyzing, designing, coding and testing the system to ensure that it conforms to the software specifications and requirements. The design of this system can be viewed from the following aspects:

- System architecture design
- System structured chart
- Graphical user interface design (GUI)
- Database design

Active Server Pages (ASP) will be used as the programming language to develop the system. For database management system, Microsoft SQL Server 7.0

will be use to handle the database management for this system. The designation of this system will be based on this two development tools.

5.1 SYSTEM ARCHITECTURE DESIGN

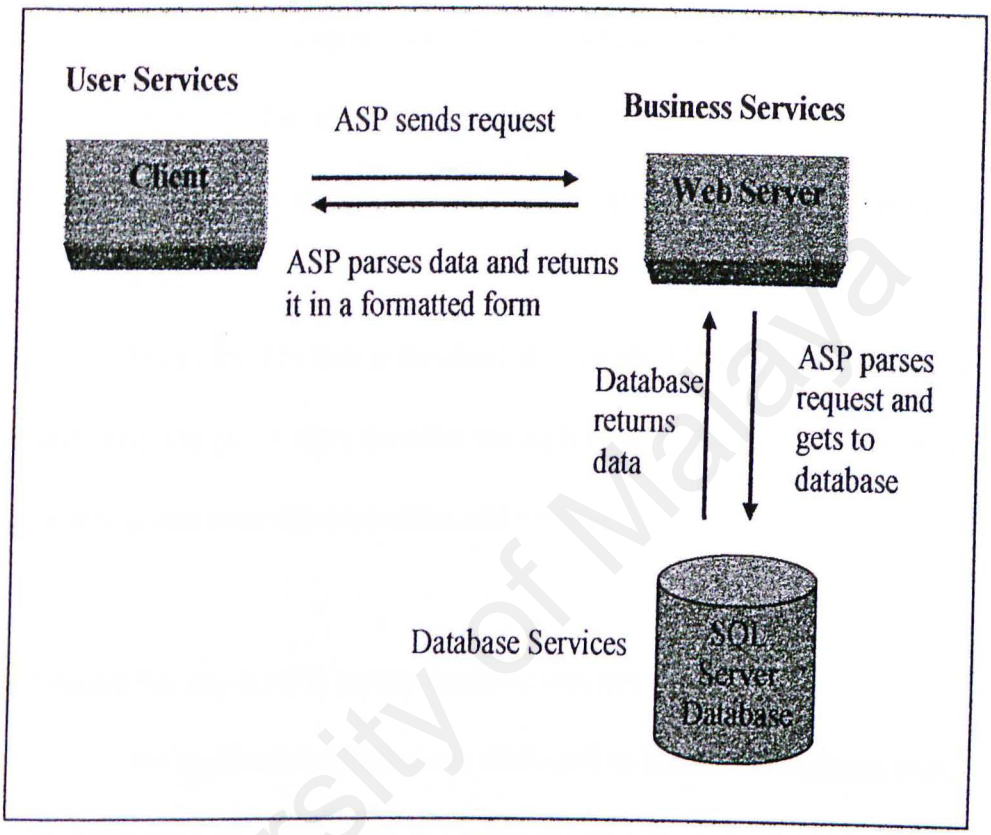


Figure 5-1 Overview of E-Office resources system architecture

Figure above shows the overview of E-Office Management System architecture, which is built after the feasibility study and also the relationship between services and system.

This system will be developed on 3-tier architecture. A 3-tier architecture design is the most common approach used for web application today. It is designed based on client-server architecture and extends it to web. This architecture is divided into three distinct tiers, included services-user, business services and data services.

Each of these services is used in the creation of system solution:

- **First tier-client-User services**

  This tier is responsible for the presentation of data, receiving user events and controlling the user interface. Components in the user services tier provide the visual interface that a client will use to view info and data. Components in this layer are responsible for contacting and requesting services from other components in the user services tier or in the business services tier.

  In this level (which is the client browser (IE 4.0 and above)), there is a component to gather input variables for analysis to the client. This enables the user to access the system anywhere and anytime.

- **Second-tier application server-Business services**

  The application-server-tier is dedicated to handle the business logic. This tier provides the security to protect the data from direct access by the clients. Application server is web server and the program. Active Server components servers web pages to the client and processes request from the client.

  At business services tier, there is an engine that performs the analysis. This tier resides on the machine naming Internet Information Server (IIS). Request and response are controlled by million codes specifying its business rules. Both clients coordinate these rules and server side script, such as exists in an ASP document.

- **Third tier-data server**

  This tier is responsible for data storage. In this system development Microsoft SQL Server will be used as a Data-Server-Tier to manage the database systems. At the data services level, a repository of relevant data stored in the Microsoft SQL server 7.0. Database is available to support the work performed by the analysis engine.

The advantage for this architecture is:

1) Simplified application maintenance, as a result of centralizing the business logic for many end-users into a single application server.
2) Added modularity, which makes it easier to modify or replace on tier-without affecting the other tiers.
3) Business processes run on the server which provides a higher security capabilities compared to the client side. This makes data protection and security is simpler to obtain.
4) Dynamic load balancing: if bottlenecks in term of performance occur, the server process can be moved to other tiers.
5) Clear separation of user-interface-control and data presentation from application logic. Through this separation more clients are able to have access to a wide variety of server applications. The two main advantages for client-applications are clear: quicker development through the reuse of pre built business logic components and a shorter test phase, because logic components and shorter test phase, because the server components have already been tested.

It is an online Internet based application that provides info and implements the task of info management in WWW. It is user-friendly system and designed to appeal and generate strong levels of interaction and the administrators of each module in e-office.

5.2 RELATIONSHIP AMONG THE MODULES OF ELECTRONIC OFFICE (E-OFFICE)

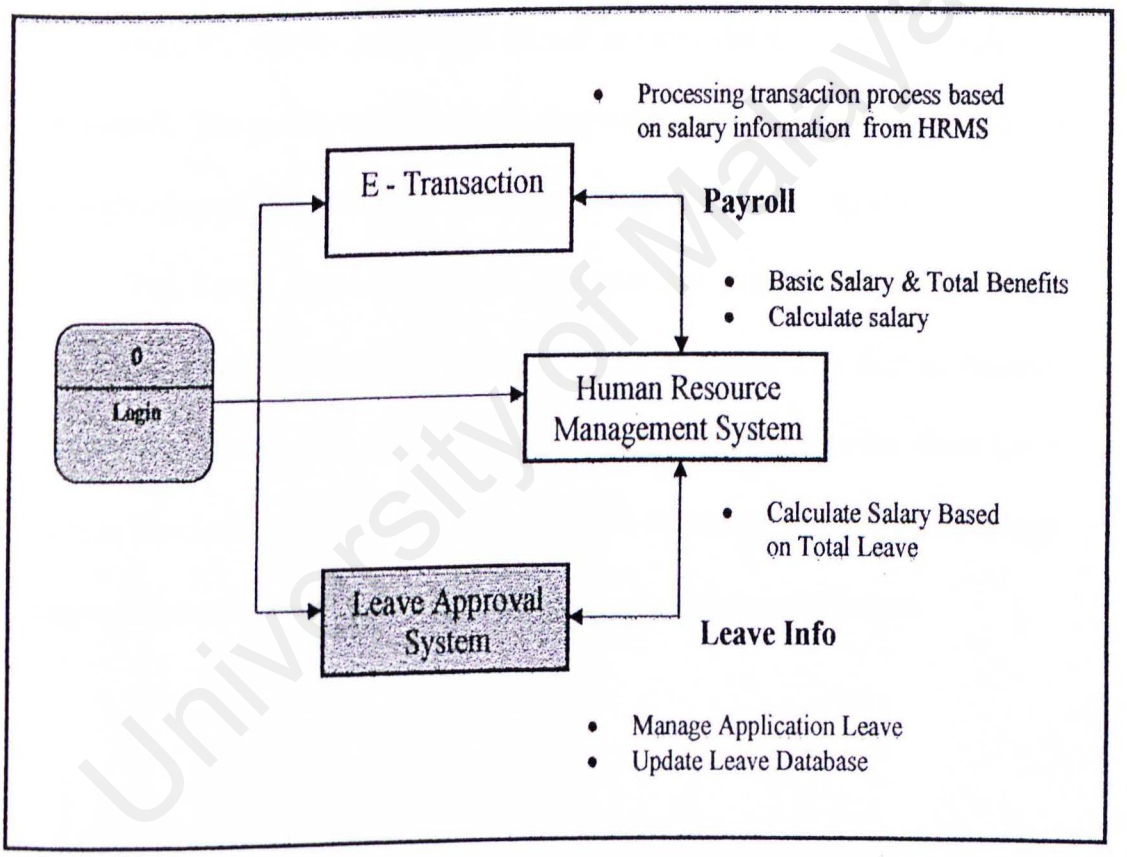


Figure 5-2 Relationship between Modules

Figure above shows the modules connection diagram for this E-Office System. Human Resource Management System is a module in this system and its relating with two other modules; E-Transaction and Leave Approval System. They can share the information and database and also communicate with each other.

Only an authorized user allowed to access to the modules in this system. The employees must register their ID and password. After registration, they can access the module based on their department and ability to view their information.

The E-Transaction system will cooperate with Human Resource Management System in handing the employee's payroll matter. They will share the same payroll database. Human Resource Management System will calculate the employee's payroll based on the payroll details such as basic salary and total of various benefits as offered by the company. Based on information payroll from database, E-Transaction will provide and produce amount of salary that the company should pay to the staffs. The system will then update the payroll database to enable the employee view their payroll details in the human resource page every end of month.

The Leave Approval System generates and provides all reports about employees leave application; all information can be retrieved by human resource management system. The human resource management will consider about leave such as leave without paid to calculate payroll for that employees. All records about employees also can be viewed in the human resource management system.

5.3 SYSTEM STRUCTURE CHART

5.3.1 SYSTEM STRUCTURE FOR LEAVE APPLICATION SYSTEM

As mention in Chapter 3, Las consists of five main components or modules as follow:

- Table Section
- Data Entry Section
- Reports Section
- System Utilities Section

The system structure chart will base on these functionality modules. In addition, the system structure charts also show the differences between administrator and employee. Thus, the following show the system structure chart concerned.

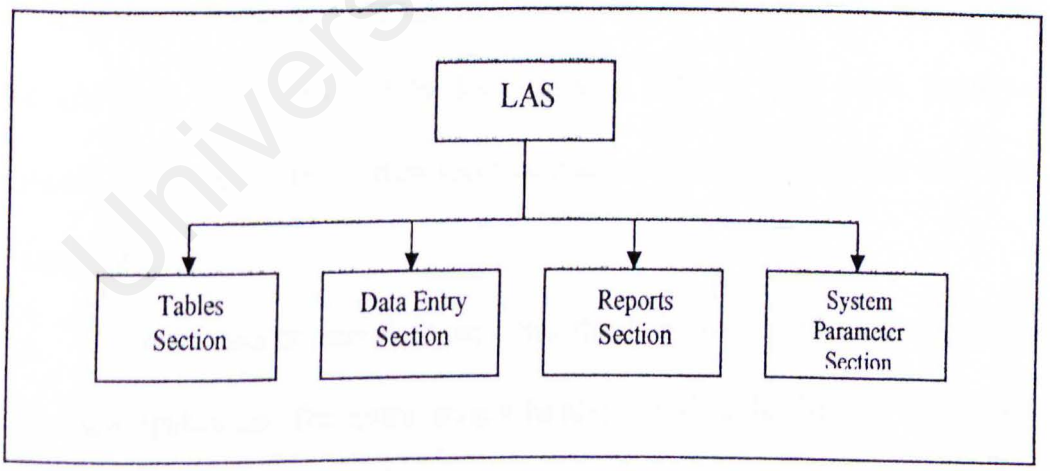


Figure 5-5 LAS System Structure Chart

5.3.1.1 Table Section

The table section should be merely accessible by the administrators. The administrator should allow creating table such as Department, Race, Religion, Nationality, Public Holiday and Personnel Profile. They should be allowed to enter

all the employees' particulars. Besides that, the administrators are also allowed to create more complex leave entitlements.

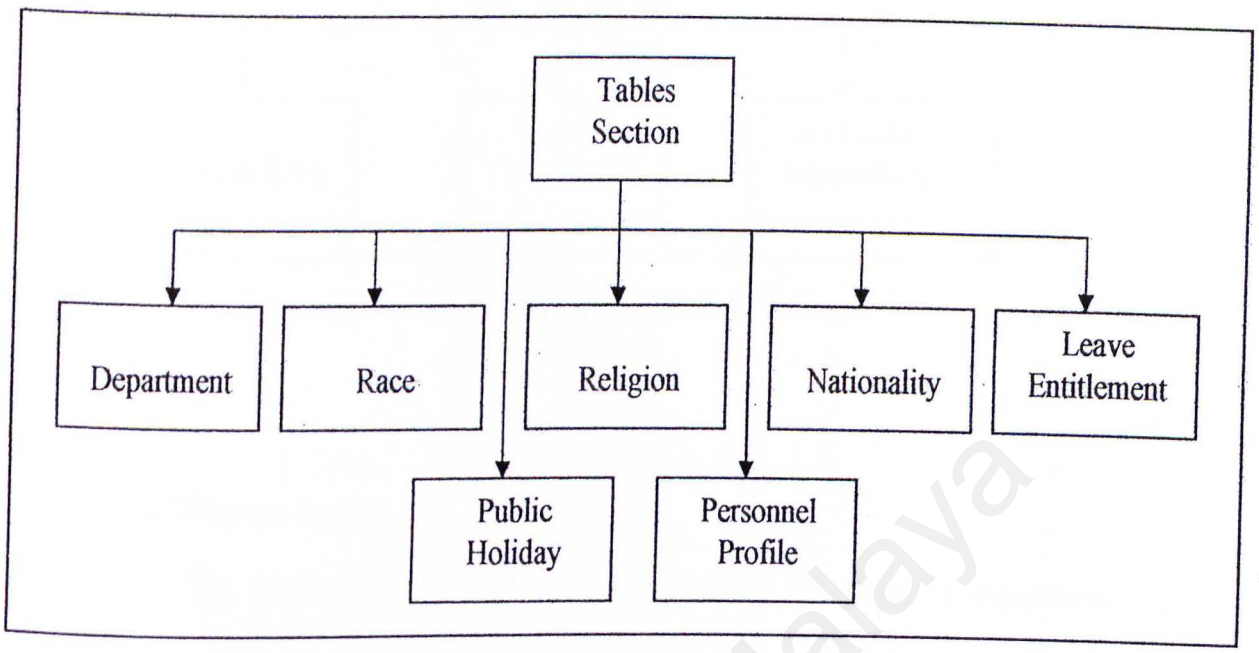


Figure 5-6 Table Section Structure Chart

5.3.1.2 Data Entry Section

This section is accessible to all users. For employees, they should be allowed to choose what type of leave and how many days they are going to apply. They should know the balance and the leave taken in order to apply leave. Employee should be allowed to cancel their leave no matter pending to approve or have been approved.

The manager or authorized personnel should be allowed to approve or reject the leave application. The system should be able to update the database if the leave has been approved. If the manager changes his mind, he should be able to cancel the leave and update the database.

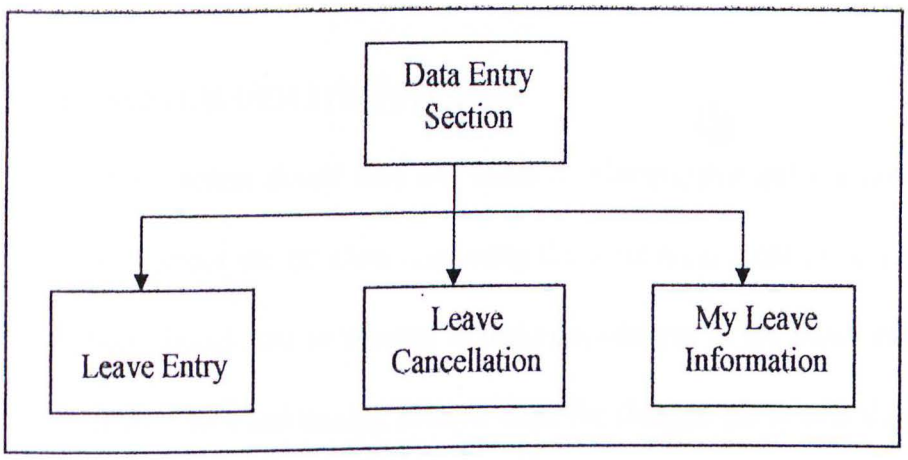


Figure 5-7 Data Entry Section Structure Chart

5.3.1.3 Reports Section

The administrators should be able to choose the range of department, employee and date in order to print report for an employee or certain employees.

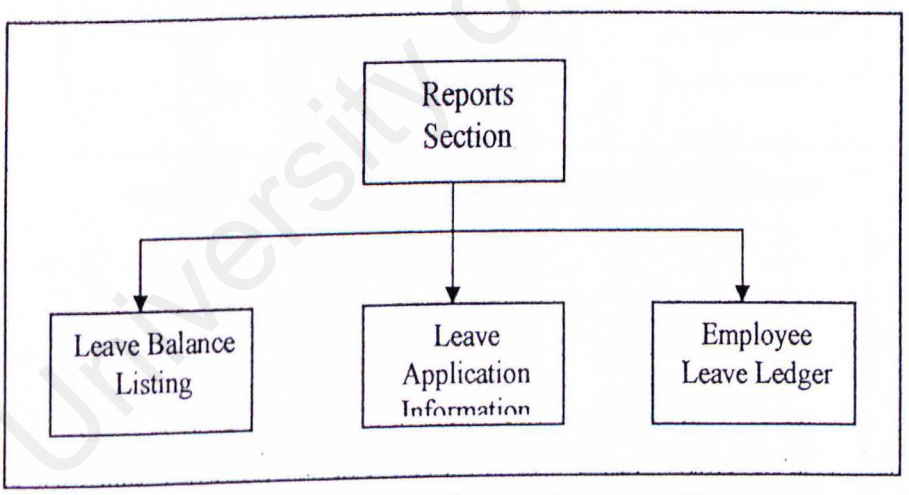


Figure 5-8 Reports Section Structure Chart

5.3.2 SYSTEM UTILITIES SECTION

This section should only accessible to administrator and not the employee. The administrator should allow computing the leave entitlement for a new calendar year. They should also be allowed to make adjustments to the leave entitlement in terms of leave type and number of days. After the changes, the system should be able to update the database automatically.

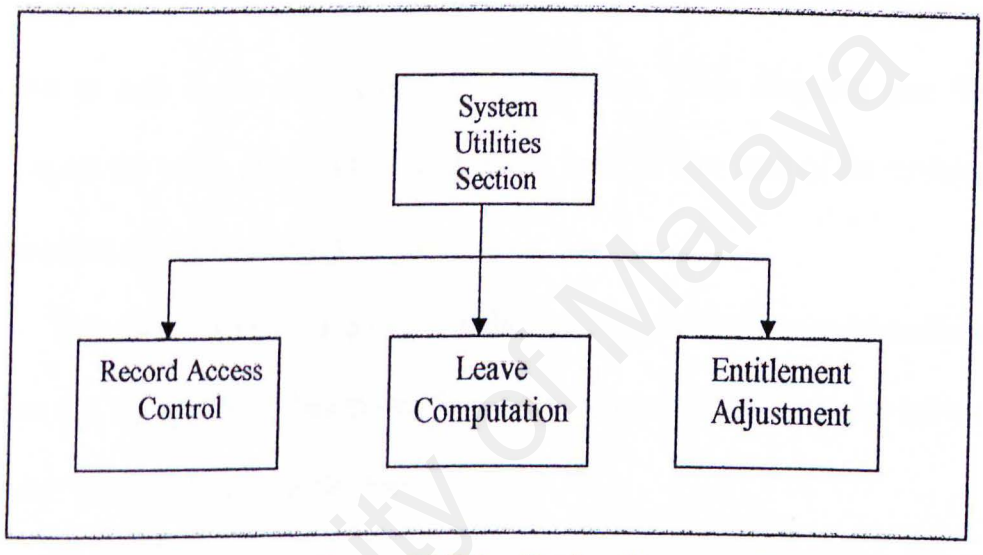


Figure 5-9 System Utilities Section Structure Chart

5.4 DATA FLOW DIAGRAM

There are 3 steps in order to develop the database which include identified the data flow, data modeling and table design.

Identify Data Flow

Before creating any database for the system, the flow of the data in a company should be recognized first. Below is a number of data flow diagrams created to help in the development of the database. These diagrams give the developers the whole picture of the database in terms of how each of the modules passing data among themselves.

Data flow diagram is a graphical technique to depict the flows and transform actions that are applied as data moves from input to output. The DFD is also known as a data flow graph or a bubble chart.

So, it is actually a graphical representation of a system that uses a small number of symbol shapes to illustrate how data flows through interconnected processes. A DFD shows the functional relationships of the values computed by a system, including input values, output values and internal data stores. It's a graph showing the flow of data values from their sources in objects through processes that transform them to their destinations in other objects.

A DFD can be seen as a method of organizing data from its raw state. The data flow approach has 4 chief advantages over narrative explanation of the way data moves through the system. The advantages are:

- Freedom from committing to the technical implementation of the system too early.
- Further understanding of interrelatedness of systems and subsystems.
- Communicating current system knowledge to users through data flow diagrams.
- Analysis of a proposed system to determine, if the necessary data and processes have been defined.

DFD only consists of four symbols. The symbols are used to represent:

- Entity or environmental elements in which system interfaces
- Processes
- Data flow
- Storage of data

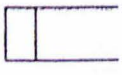
Symbol	Use	Description
	External Entity	Source or destination of data that is external to the system
	Process	Manual or computer process that changes data. In the following text a circle is used to indicate a process
	Data flow	Data transfer in the direction indicated by the arrow. Each arrow should be labeled to indicate what data is being transferred
	Data store	Manual or computer storage of data

Table 5-1 Symbols of Data Flow Diagram (DFD)

Data flow diagrams use only four symbols:

- The square

- The rounded box or circle
- The arrow
- A pair of horizontal lines.

Data Modeling

The main objectives of data modeling is to allow for a complete, formal and understandable description that would be useful for a large category of data from the Boolean to relations and is efficient to describe only the semantics and not the implementation.

Table Design

After identifying the data flow and created the data model, the third step is to create the table and normalize them in order to prevent data redundancy. Table 5-1 shows the field name used to store data in each of the table.

5.4.1 HUMAN RESOURCE MANAGEMENT SYSTEM

In E-Office, employees have to submit their particulars in the human resource management system (HRMS) before they can access their leave proposal in LAS. The DFD for HRMS is showed as below:

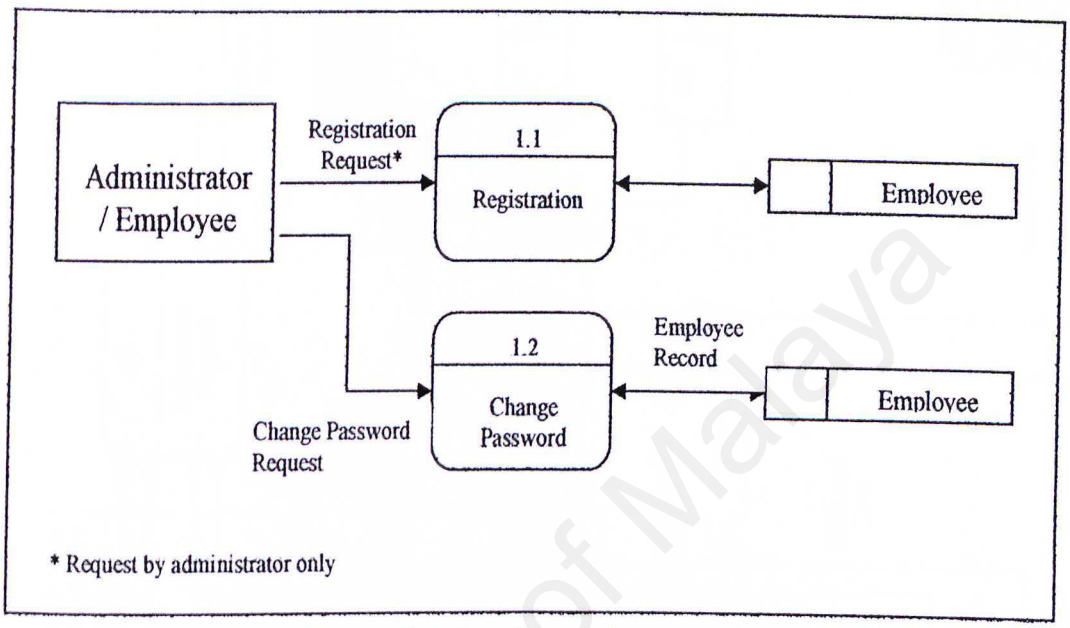


Figure 5-10 Data flow diagram for registration processing

Figure 5-10 as showed above describe sub-module of HRMS; User Registration Module. Registration of employees will be requested by the administrator. Since the employees get their ID and password, they can access the system. Their ID and password should be changed for security.

Figure 5-11 below showed the general flow in HRMS system and other data flow diagram showed detailed processes of each process in figure 5-11.

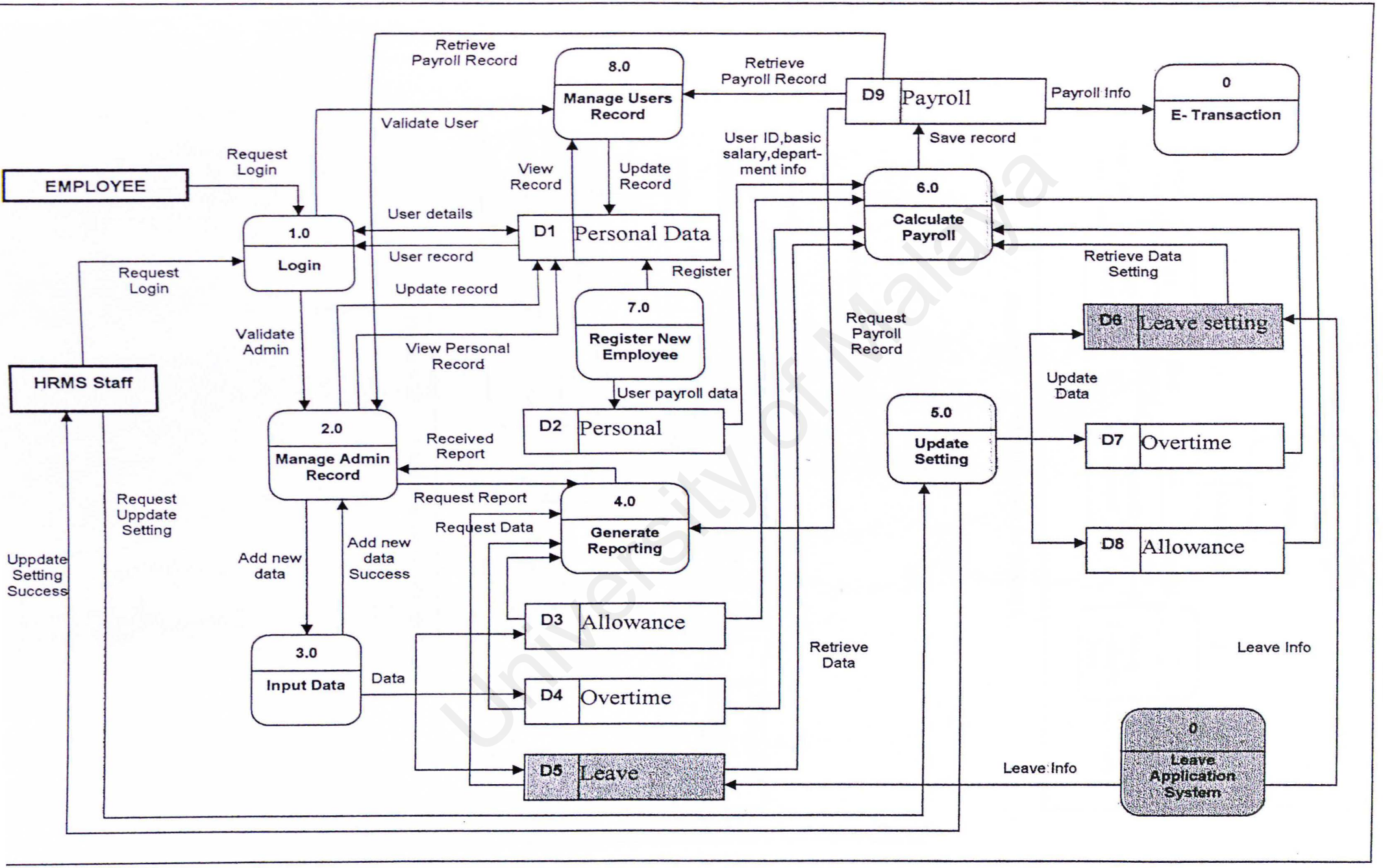


Figure 5-11 Overall Data Flow Diagram for Human Resource Management System

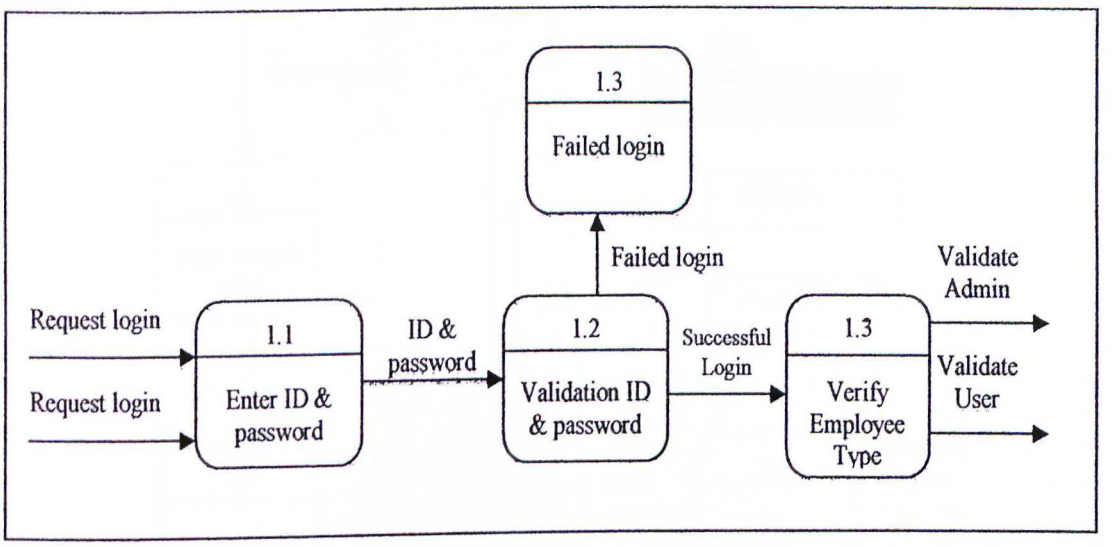


Figure 5-12 Child diagram for process 1

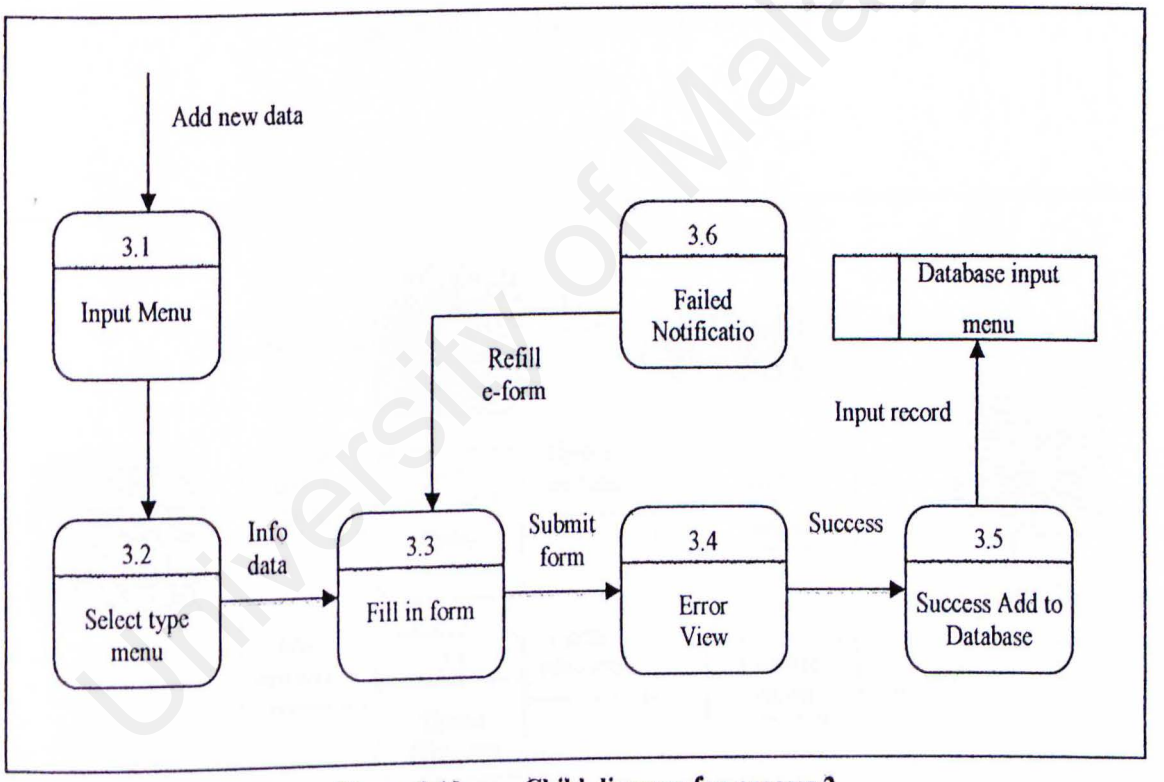


Figure 5-13 Child diagram for process 2

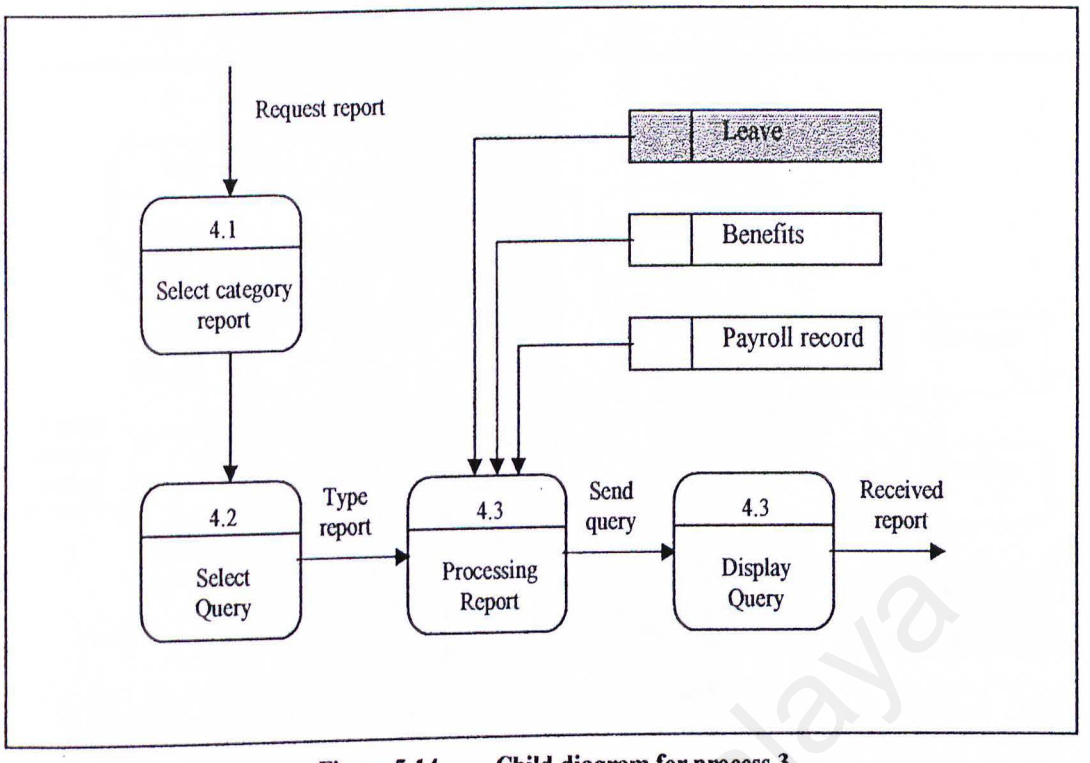


Figure 5-14 Child diagram for process 3

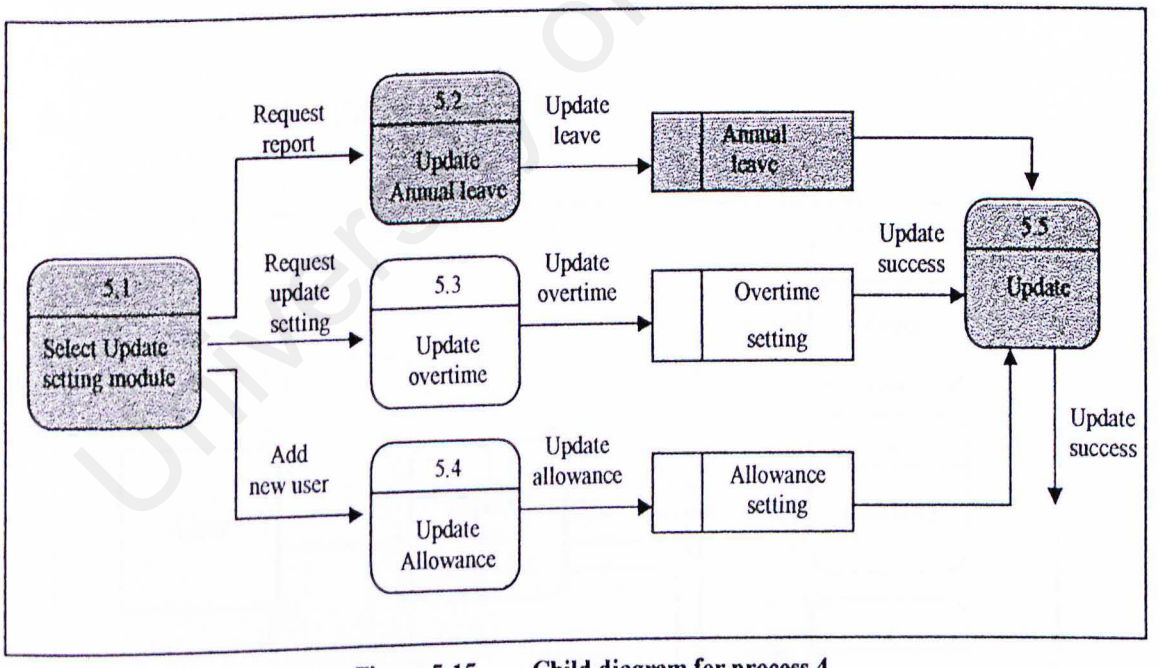


Figure 5-15 Child diagram for process 4

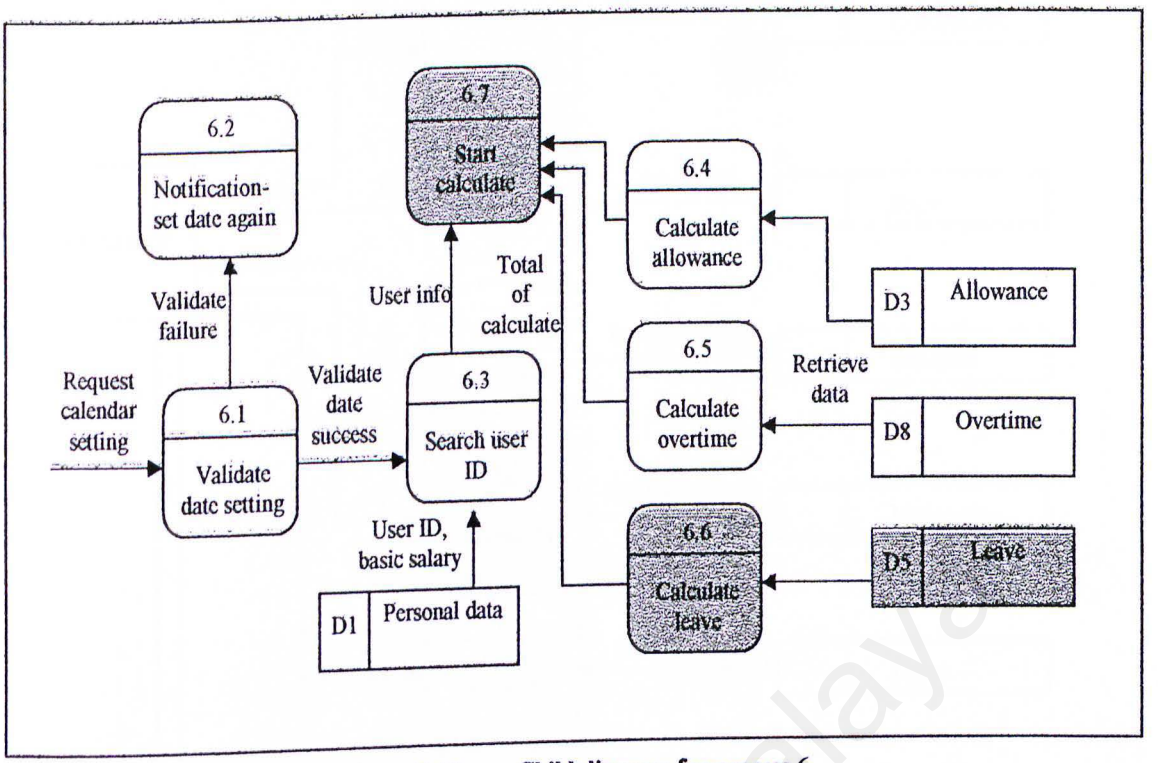


Figure 5-17 Child diagram for process 6

5.4.2 LEAVE APPLICATION SYSTEM

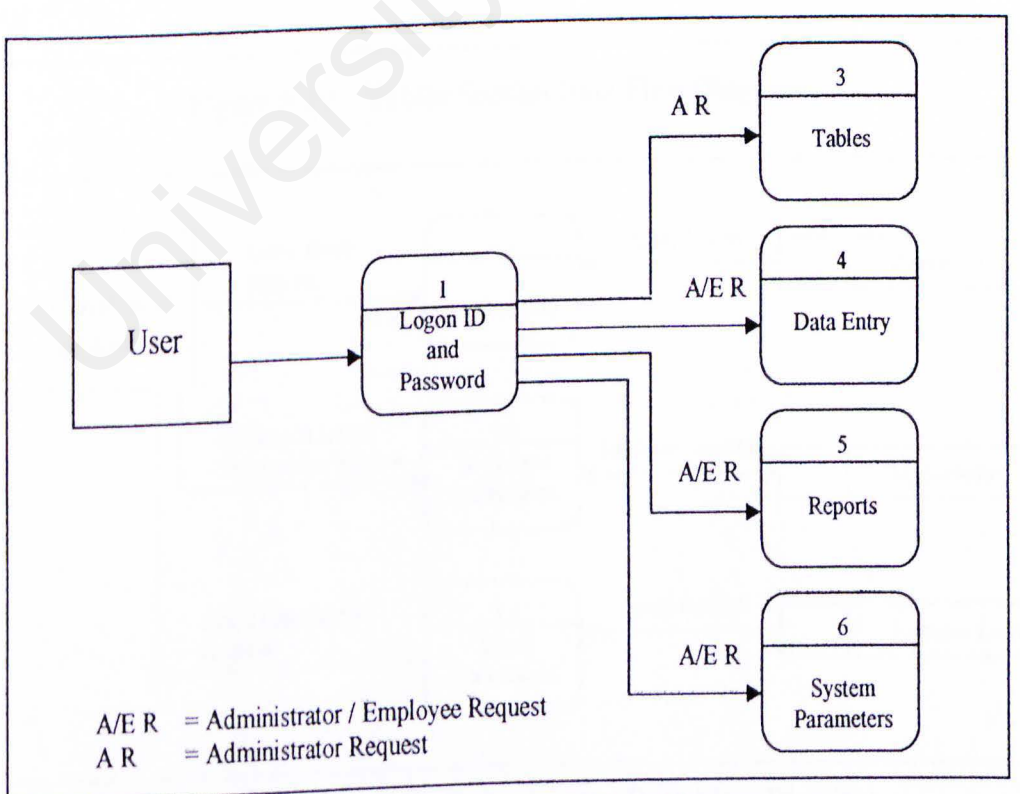


Figure 5-18 LAS Data Flow Diagram

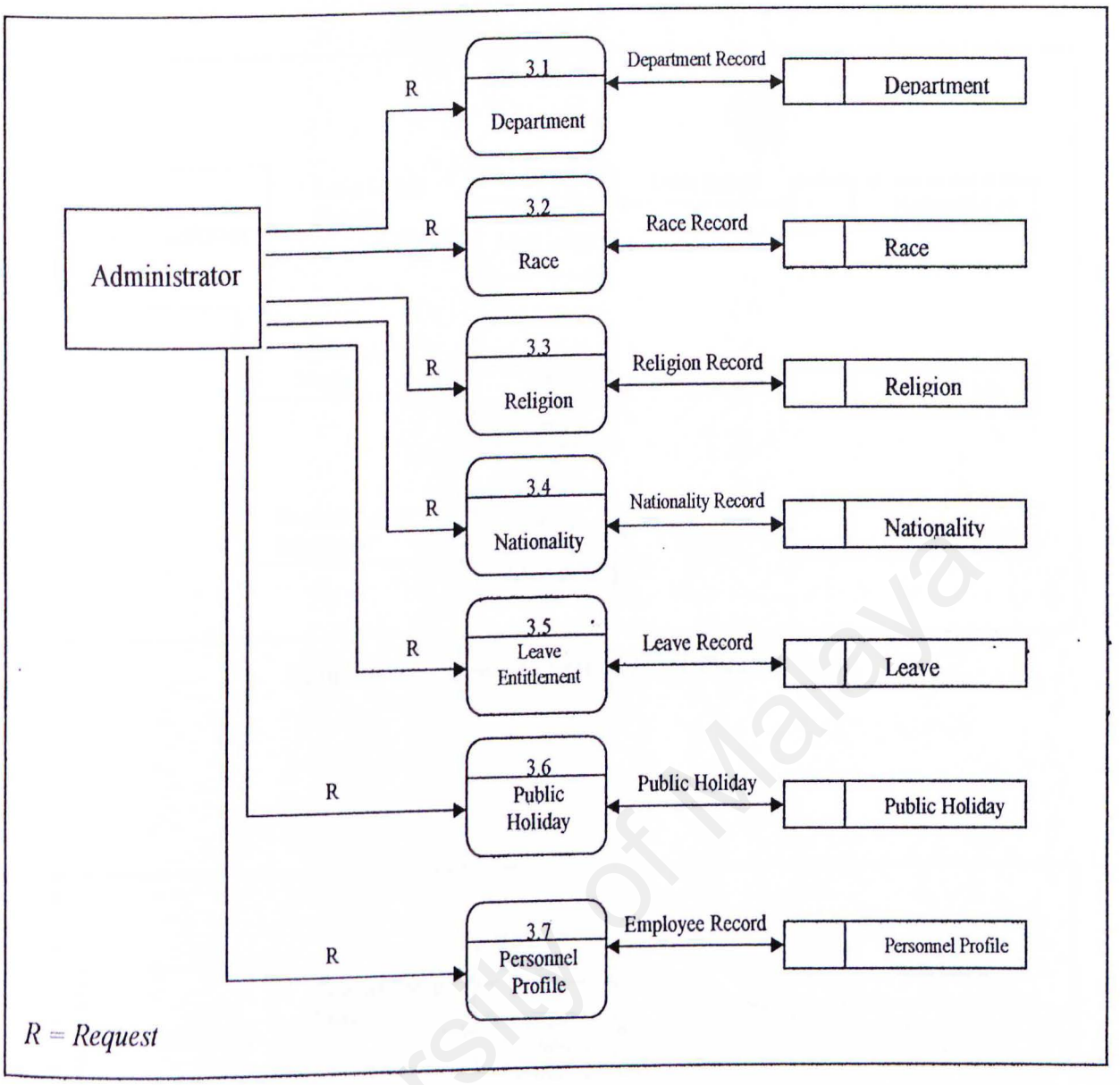


Figure 5-19 Tables Section Data Flow Diagram

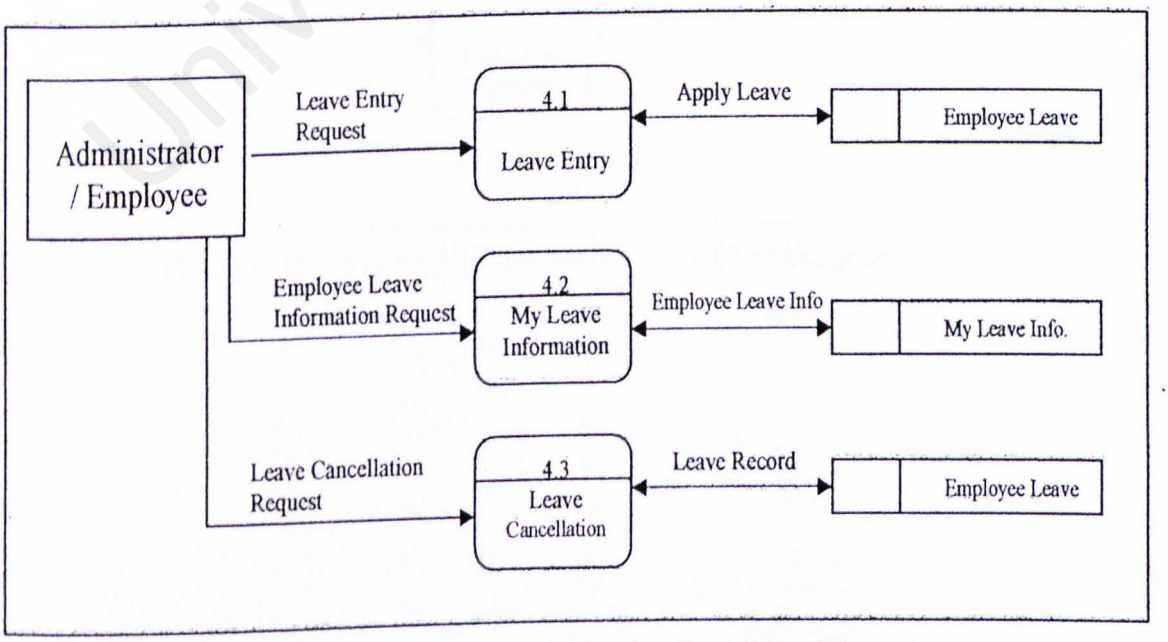


Figure 5-20 Data Entry Section Data Flow Diagram

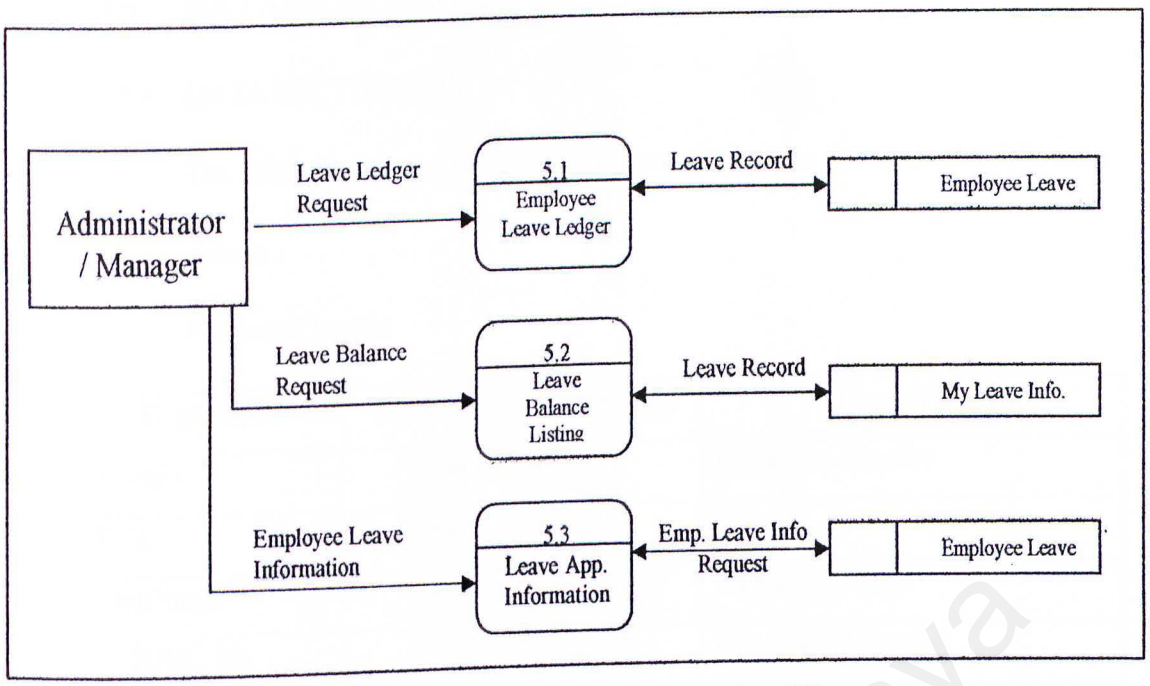


Figure 5-21 Reports Section Data Flow Diagram

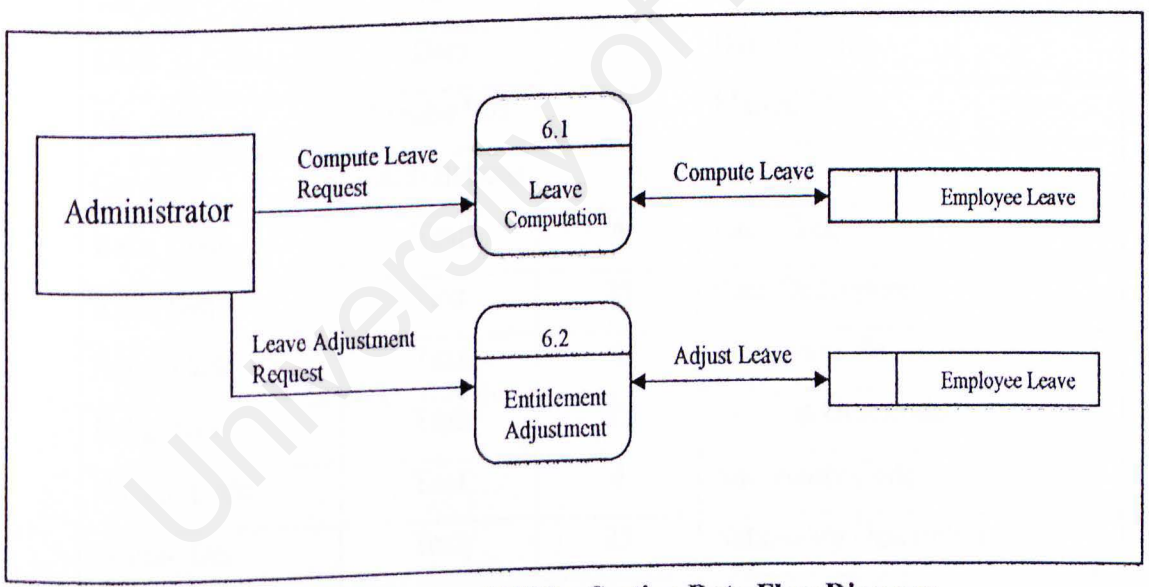


Figure 5-22 System Utilities Section Data Flow Diagram

5.5 DATABASE DESIGN

5.5.1 DATA DICTIONARY

The database structure of LAS relational database is shown in the following section :

a) Personnel Profile

Field Name	Data Type	Field Size	Description
EmpID	Text	8	Employee Identity
Title	Text	8	Title
EmpName	Text	40	Employee Name
N_NRIC_No	Text	25	New NRIC Number
O_NRIC_No	Text	25	Old NRIC Number
Corr_Add	Text	100	Correspondence Address
Per_Add	Text	100	Permanent Address
Tel_No	Text	20	Telephone Number
DOB	Date		Date of Birth
Mar_Stat	Combo Box		Marital Status
Gender	Radio Buttons		Gender
Race_Code	Text	4	Race Code
Race_Des	Text	25	Race Description
Relig_Code	Text	4	Religion Code
Relig_Des	Text	25	Religion Description
Nation_Code	Text	4	Nationality Code
Nation_Des	Text	25	Nationality Description
Dep_Code	Text	4	Department Code
Dep_Des	Text	25	Department Description
ImSup_Des	Text	25	Immediate Superior Description
Date_Joint	Date		Employee Joint Date
Pro_Per	Number		Employee Probation Date
Cdate	Date		Confirmation Date
Emp_Photo	Rich Text		Employee Photo

Table 5-2 Personnel Profile

The Personnel Profile table contains the information of the employees, the employee's job details. The primary key for this table is EmpName.

b) Department

Field Name	Data Type	Field Size	Description
Dep_Code	Text	4	Department Code
Dep_Des	Text	25	Department Description

Table 5-3 Department

This table contains all units of specialized functions within a business or organization like administration, finance, service or production. The primary key of this table is Dep_Code.

c) Race

Field Name	Data Type	Field Size	Description
Race_Code	Text	4	Race Code
Race_Des	Text	25	Race Description

Table 5-4 Race

This table contains the entire ethnic group or sub-group the staff belongs to. For example : Malay, Chinese and Indian. The primary key of this table is Race_Code.

d) Religion

Field Name	Data Type	Field Size	Description
Relig_Code	Text	4	Religion Code
Relig_Des	Text	25	Religion Description

Table 5-5 Religion

e) Nationality

Field Name	Data Type	Field Size	Description
Nation_Code	Text	4	Nationality Code
Nation_Des	Text	25	Nationality Description

Table 5-6 Nationality

This table contains the entire citizenship or status of employee in belonging to a country. For example : Malaysian, Indonesian, Singaporean and Australian. The primary key is Nation_Code.

f) Leave Entitlement

Field Name	Data Type	Field Size	Description
Leave_Code	Text	4	Leave Code
Leave_Des	Text	25	Leave Description
Comp_By	Combo Box		Compute By
Elig_For	Radio Buttons		Eligible For (On-Probation/Confirmed)
Discret	Checkboxes		Discretionary
Leave_Ent	Number		Leave Entitlement
Max_CF	Number		Maximum Leave Carry Forward

Table 5-7 Leave Entitlement

This table contains the determination of various leave entitlements provided by the organization for the whole year. The primary key of this table is Leave_Code.

g) Public Holiday

Field Name	Data Type	Field Size	Description
PubHoliday	Date		Starting Date
PubHolidayTo	Date		Ending Date
PHDes	Text	50	Public Holiday Description

Table 5-8 Public Holiday

This table consist of the date field and public holiday description field.

h) Leave Entry

Field Name	Data Type	Field Size	Description
EmpID	Text	8	Employee's ID
EmpName	Text	40	Employee's Nme
Ent_Date	Date		Entry Date
Leave_Code		4	Leave Code
Leave_Des		25	Leave Description
Effec_From	Date		Effective From
Effec_To	Date		Effective To
Balance	Number		Balance
Taken	Number		Balance
No_Days	Number		Number of Days Been Taken
Reason		80	Reason Taking Leave
Con_No		20	Contact Number
AppDate_1	Date		Approve Date (only visible in approve section)
Status_1	Radio Button		Status (only visible in approve section)

Table 5-9 Leave Entry

Basically, the Leave Entry table consists of types of leave, dates and number of days that employee wish to apply. It also includes the employee's contact number. The primary key of this table is Leave_Code.

i) Leave Cancellation

Field Name	Data Type	Field Size	Description
EmpID	Text	8	Employee's ID
EmpName	Text	40	Employee's Nme
DateCan	Date		Date Cancel
Leave_Code		4	Leave Code
Leave_Des		25	Leave Description
Effec_From	Date		Effective From
Effec_To	Date		Effective To
CanFor	Radio Button		Cancel For (Myself or Employee)
Taken	Number		Balance
No_Days	Number		Number of Days Been Taken
Can_Form	Date		Cancel Form
Can_To	Date		Cancel To
Can_Days	Number		Cancel Days
Remarks	Text		Remarks

Table 5-10 Leave Cancellation

This table contains dates, number of days has been cancelled and brief remarks for leave cancellation. The primary key of this table is Leave_Code.

j) My Leave Information

Field Name	Data Type	Field Size	Description
Date	Date		Report Date
EmpName	Text	40	Employee's Name
Sfor	Radio Button		Search For
Remarks	Text	80	Remarks

Table 5-11 My Leave Information

This table contains employees' names and the Search For field, which allow you whether to view the Leave Application or Leave Cancellation.

k) Leave Balance Listing

Field Name	Data Type	Field Size	Description
Rpt_Date	Date		Report Date
Leave_Code	Text	4	Leave Code
Leave_Des	Text	20	Leave Description
EmpID	Text	4	Employee's ID
EmpName	Text	40	Employee's Name
DepID	Text	4	Department Code
DepDes	Text	20	Department Description
AuthName	Text	40	Immediate Supervisor Name
LEnt	Number		Leave Entitled
Cfor	Number		Maximum Carry Forward
Adjust	Number		Leave Adjust
Taken	Number		Taken
Balance	Number		Balance
Remarks	Text	60	Remarks

Table 5-12 Leave Balance Listing

This table contains employee's ID, leave code and all information regarding leave for the specified employee.

l) Employee Leave Ledger

Field Name	Data Type	Field Size	Description
Rpt_Date	Date		Report Date
Leave_Code	Text	4	Leave Code
Leave_Des	Text	20	Leave Description
DepID	Text	4	Department Code
DepDes	Text	20	Department Description
Remarks	Text	60	Remarks

Table 5-13 Employee Leave Ledger

This table contains range of department and type of leave to print the detailed of leave information of each employee such as carry forward leave, entitled, adjusted, taken and balance.

m) Leave Application Information

Field Name	Data Type	Field Size	Description
Date			Report Date
SearchBy	Radio Button		Search By (by Date or Month)
Month	Combo Box		Month
DateFr	Date		Starting Date
DateTo	Date		Ending Date
Remarks	Text	60	Remarks

Table 5-14 Leave Application Information

This table contains range of date and month where the leave application information the administrator wishes to print out.

n) Leave Computation

Field Name	Data Type	Field Size	Description
Com_Date	Date	Date	Computation Date

Table 5-15 Leave Computation

This table contains the computation date to computes the employee's leave entitlement.

o) Leave Entitlement Adjustment

Field Name	Data Type	Field Size	Description
Date_Adjust	Date		Date Adjusted
Leave_Code	Text	4	Leave Code
Leave_Des	Text	25	Leave Description
EmpName	Text	40	Employee's Name
New_Ent	Number		New Entitlement
Balance	Number		Balance
Adjustment	Number		Adjustment
Remarks	Text	60	Remarks

Table 5-16 Leave Entitlement Adjustment

This table contains the number of days, which have been adjusted for the employee. The primary key is EmpName and Leave_Code.

Note

The field size for all tables in data type text is recommended in LAS. However, we can enter the text more than the size offered.

5.6 GRAPHICAL USER INTERFACE DESIGN (GUI)

The interface is the system for all users well or poorly designed, it stands as the representative of the system. The objectives in designing user interface are:

a. Effectiveness as achieved through the design of interfaces that allows users to access the system in a way that is congruent with their individual needs.
b. Efficiency as demonstrated through the design of interfaces that allows users to access the system in a way that is congruent with their individual needs.
c. User consideration as demonstrated in the design of suitable interfaces and by providing appropriate feedback to user from the system.
d. Productivity as measured by ergonomically served principles of design for user interfaces and workspaces.

The user interface has two main components:

- Presentation language

The presentation language is the computer-to human part of the transaction.

- Action language

  It characterizes the human-to-computer portion.

Together, both concepts cover the form and content of the term user interface.

5.6.1 The Human – Computer Interface

The human / computer interface has become an important consideration in designing and using computers. The interface is in some sense a mediator between the human and the machine. It is a transmitter of commands, feedback, and instructions between two very dissimilar entities.

A computer mouse, touch screen, program on the Mac or Windows machine that includes trashcan, icons of disk drives, and folders are all examples of advances in human-computer interface design which were designed to make it easier to accomplish things with a computer.

At present, we are more likely to think of the human / machine interface as a symbiotic relationship, which compensates for the respective limits of the human and the machine and enhances the faculties of both.

5.6.2 Rules of Interface Design

- **Strive for Consistency**

  Consistency sequences of actions should be required in similar situations identical terminology should be used in prompts, menus and help screens consistent color, layout, capitalization, fonts and so on should be employed throughout.

5.6.3 Interface Design

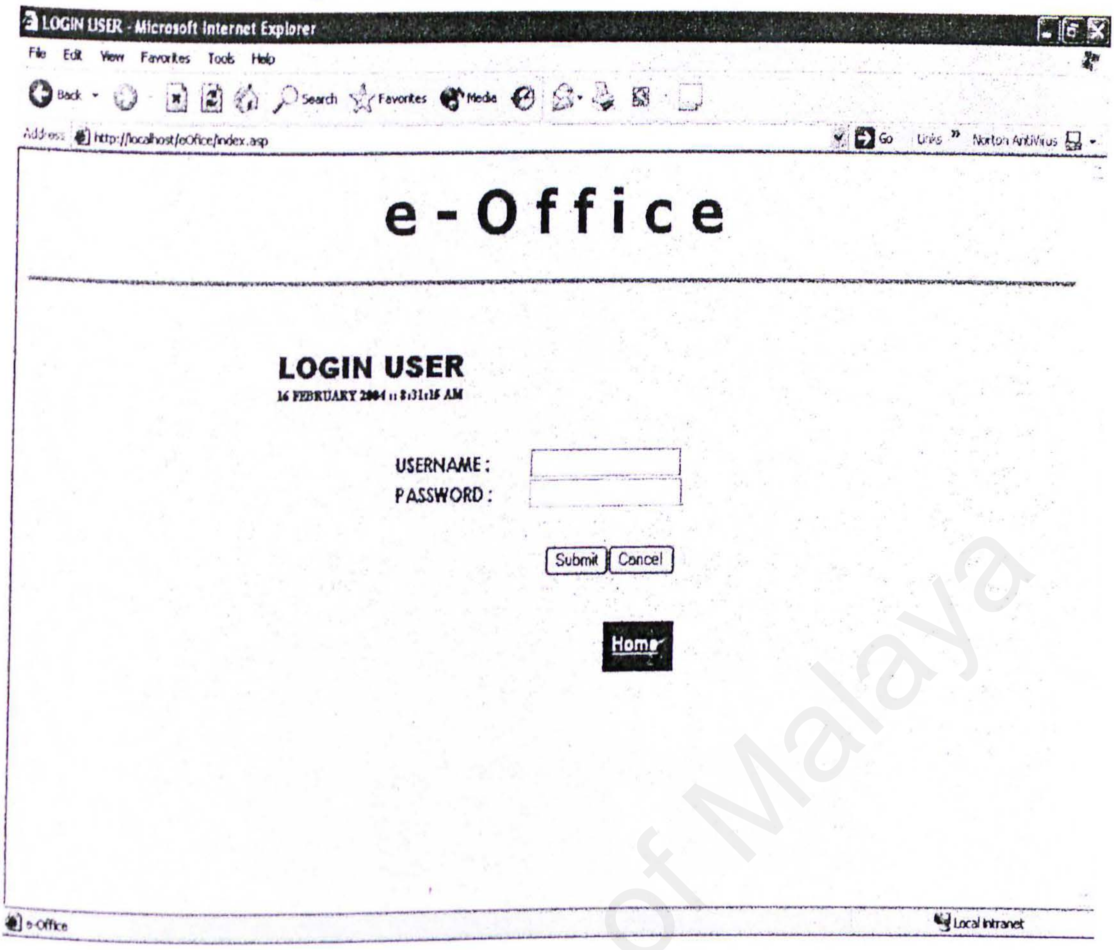
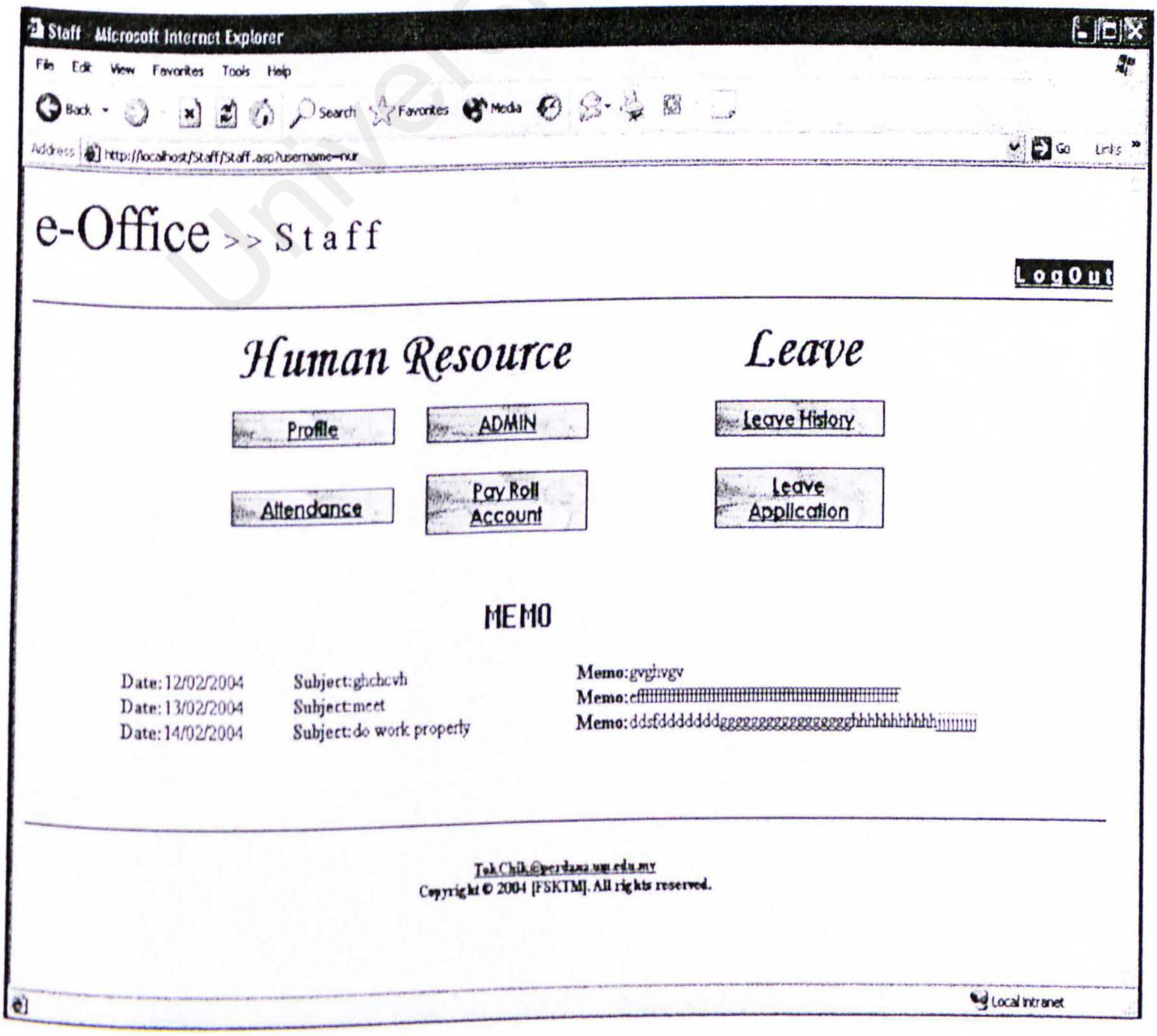


Figure 5-23 Login page for administrator and staff



for Staff – Leave Application System Section

Chapter 6

SYSTEM IMPLEMENTATION

CHAPTER 6 SYSTEM IMPLEMENTATION

6.1 SYSTEM IMPLEMENTATION

In this chapter, the focus is on the implementation on the solution as software. That is to write the programs that implement the design. This task can be daunting for several reasons. This is because the designers may not have addressed all of the of the idiosyncrasies of the platform and programming environment, structures and relationships that are easy to describe with charts and tables are not always straightforward to write as code. Writing the program code is not easy especially in a way that is understandable not only to us when we revisit it for testing but also for others as the system evolves over time.

6.2 DEVELOPMENT ENVIRONMENT

In the FrontPage programming environment, programmer no longer as to punch code line after line. This is because as an event-driven, it consists of embedded scripting language with object-oriented extensions. FrontPage (using ASP format) uses an event-driven paradigm that caused code to run (or not run) in response to events that take place in the page development. For example, opening a database, opening a view, opening a document or clicking a button is all the events that occur as users proceed through the database.

FrontPage write code that automates process, prompts a user for input, checks for data entry errors or prevents certain actions. LAS take this advantage to create a powerful automates program.

6.2.1 DEVELOPMENT TOOLS USED

There are some software that were used to develop LAS, as stated below :

6.2.1.1 Microsoft FrontPage 2000

FrontPage has all the needs onto developing a web-based internet system. It has an easy-to-use interface that makes the work and editing texts and layouts become more faster and easier.

6.2.1.2 Microsoft Access 2000

Microsoft Access is a relationship database management application that allows integration and data sharing nowadays. By using ODBC device for Access, all the data that were stored in the database can be retrieved. This application can also be use in some server environments that needs dynamic communication between the user computer and the server (Laudon, Kenneth, C Management Information System, Prentice Hall, Inc 2000).

The advantages of Microsoft Access 2000 :

- Microsoft Access can give extensive support upon utilizing the internet more efficiently.
- It can support to form design, reports and high class module. The module actually represent as templates for project development. Generally, these templates or module will specify what will happen to the designed object.

6.2.1.3 Active Server Pages (ASP)

ASP is a type of script that will be put into the HTML pages where as it will be processed in the server web before being transmitted to the server as HTML pages. There are four important things that makes this application unique :

- ASP can led server side scripts such as VB, Java Script and J Script being put in and mixed it together. By inserting these types of scripts, the webmaster can generate a dynamic and interactive web page.
- ASP also gives a build-in object element. By using these objects, the webmaster can produce a better script because these objects can let the programmer to access and send information to the server and surfer.
- ASP can be widening its application by adding some more components. ASP is generated together with some build-in Active X components and the one that has been produced by the programmer itself.
- ASP can interact with the database such as Microsoft Access and SQL. By using Active X Data Object (ADO), the programmer can insert SQL in ASP.

ASP application starts when the server sends an ASP request to the Internet Information Server (IIS). IIS will receive this request and then identify the ASP files with the format of .asp. Then the web server will access the ASP files and then automatically processing all the command in it. At the end of the processes, the output will be send to the surfer and the server as the normal common HTML.

6.2.1.4 Visual Basic Script (VB Script)

This VB Script was designed to test the programmer's skills in terms of client side in the Internet Explorer server. VB Script is a member in the Visual Basic family that prepares active scripts for different environments including client server environment.

VB Script can be inserted in the HTML documents. It is easier to learn beside its efficient application in the web based development.

In terms of client's side, the VB Script interaction is with the Active X control that gives an interesting and active environment. While at the programmer's side, the combination between the ASP and HTML application will make a new level of functions that also include online system development.

6.3 PROGRAMMING STANDARDS AND PROCEDURES

6.3.1 CODING STANDARD

Coding standards and procedures are very important to organize our thoughts and avoid mistakes. Some of the procedures involve methods of documenting the code so that it is clear and easy to follow. Such documentation allows us to leave and return to our work without losing track of what had been doing. Standardized documentation also helps in locating faults and in making changes, because it clarifies which sections of our program perform which functions.

6.3.2 OTHER STANDARD

Once LAS program completed, others may be using it in a variety of ways. Another set of people may integrate this software with other programs to build and test subsystems and finally the whole system. Even after the system is up and running, changes may be needed, either because of a fault or because they want to change the way the system performs its functions.

6.4 DOCUMENTATION

Program documentation is a set of written descriptions that explain what the programs do and how they do it. Internal documentation is a descriptive material written directly within the code while all other documentation is external documentation.

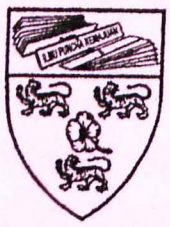
6.4.1 INTERNAL DOCUMENTATION

The internal documentation contains information directed at someone who will be reading the source code of LAS programs. Thus, summary information is provided to identify the program and describe its data structures, algorithms and control flow. In LAS, the internal documentation is placed at every event in each form.

6.4.2 EXTERNAL DOCUMENTATION

External documentation is intended to be read not only by the programmer but also by those who never look at the actual code. For example, designers may review the external documentation when considering modifications or enhancements. In addition, the external documentation gives programmer a chance to explain things more broadly than might be reasonable within my program's comments.

External component documentation is part of the overall system documentation. At the time the component is written, much of the rationale for the component's structure and flow has already been detailed in the design documents section. Describing the problem is essentially important in external documentation. This section will explain what problem is addressed by the component. It sets a stage for describing what options were considered for solutions and why a particular solution was chosen. The problem description is not a repeat of the requirements. Rather, it is a general discussion of the setting, explaining when the component is invoked and why it is needed.



Chapter 7

SYSTEM TESTING

CHAPTER 7 SYSTEM TESTING

Testing is the last activity of the software development process before the software product release to the customer (or so called end-user). That is, the software is evaluated to ensure that it meets the user's explicit and implicit requirements. Testing the system is very different from unit to integration testing.

7.1 PRINCIPLES OF SYSTEM TESTING

The objective of unit and integration testing was to ensure that the code can compile and implemented the design properly. That is, the programmers wrote code to do what the designers intended. In system testing, it has a very different objective, which is to ensure that the system does what the customer wants it to do.

7.2 UNIT TESTING

Unit testing also known as module testing, which is carried out on individual modules. It is used to verify whether a given module has been implemented correctly with respect to its specifications, no matter which modules are interacting with it, provided that these modules are using its interfaces correctly.

Unit testing is used especially to test an automated field by using simple functional in the implementation of LAS. After a formula has been created, unit testing will be carry out by develop test cases to show that the input is properly converted to the desired output. As an example, unit testing will be carrying out to test whether the leave balance can be generated automatically. Unit testing also will carry out to test whether the Staff Code and Name can be generated after the staff switch to their username and password to log into the system. First is to examine the scripts by reading through it, trying to spot algorithm, data and syntax faults. Compare the code with the specifications and with our design to make sure that all relevant cases have been taken into consideration.

7.3 INTEGRATION TESTING

After the individual components are working correctly and meet our objectives, those components will combine into a working system. This integration is planned and coordinated so that when a failure occurs, programmers have some ideas of what caused it. In addition, the order in which components are tested affects our choice of test cases and tools.

The system is viewed as a hierarchy of components, where each component belongs to a layer of the design. Integration testing can begin from the top and work our way down as we test, work from the bottom up or use a combination of these two approaches. Integration testing is used frequently during the implementation of LAS after an event has been created. For example, the calculation made to the leave balance is to retrieve information for a particular staff. Integration testing is used to test whether the system can retrieve correct information from the database.

7.4 SYSTEM TESTING

System testing is the last testing procedure. Once the entire system is validated, it must be combined with other system element such as hardware, database and on the server. System testing verifies that element are functioning properly and the overall system performance and objectives are achieved. As a client server system, it is very important for LAS to do system testing. Testing at different workstation is necessary for LAS to ensure that the system functioning properly instead at a single workstation or server.

In this system testing, there are two types of test involve :

7.4.1 FUNCTION TESTING

This testing is based on the function requirements; it focused on the certain parts of applications' functions. Several tests done in several sections :

- Leave application section
- Leave approval section
- Leave cancellation section
- Leave computation & balance listing section

Every section has been tested individually to determine whether the application can run as expected.

7.4.2 PERFORMANCE TESTING

Performance testing is for application of the non-requirements functions. Types of tests involve are :

- Volume Test – checks the fields and records whether it can accept all sorts of possible data from the user.
- Timing Test – This test is done during the run-time to make sure the system's performance meets the user's requirements. This includes response, memory used and system's efficiency.
- Human Factor Test – The user interfaces and messages checking are to determine the application has the user-friendly traits.
- Recovery Test – Tests were done by failing the system and by making the system failure can be recovered whether it is done automatically by the system or based on user's input.

All these tests will conformed that all the systems' functions can run very well besides making sure the objectives achievable and the system is in good operation.

7.5 ACCEPTANCE TESTING

After all the tests were done, the user acceptance tests must be done in order to get some feedbacks from the users who have tried the system. Besides that, the programmer / developer can take note the level of the user's satisfaction upon using the system.

By implementing the LAS acceptance tests, 15 people from ordinary users have been asked to contribute by using the system and evaluate it in a single form that I have prepared for them. The tests are covered in three sections :

- The System Interface Design
- The System's Functionality
- The Board Of Director (Administrator) Section

From the results that I've analyst, the facts and figures are as stated below :

7.5.1 THE SYSTEM INTERFACE DESIGN

7.5.1.1 The Navigation and Hyperlink Assessment

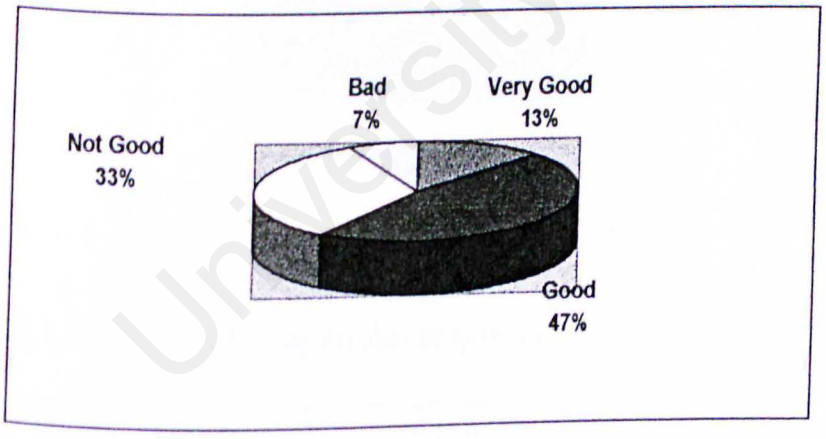


Diagram 7.1 : System Navigation Assessment

7.5.1.2 Background Colour

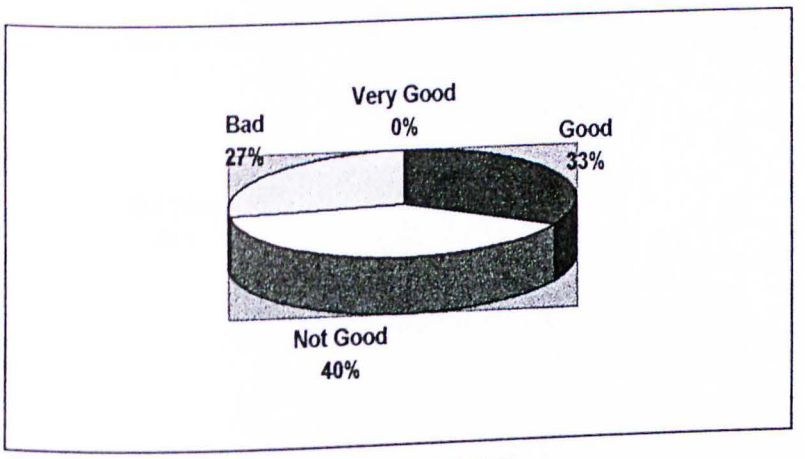


Diagram 7.2 : Background Colour

7.5.1.3 Downloading Timing

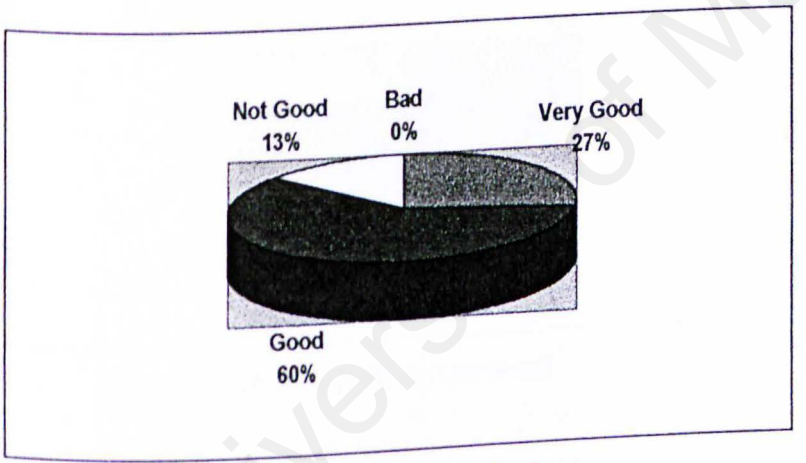


Diagram 7.3 : Downloading Timing

7.5.1.4 Image and Graphic Arrangement

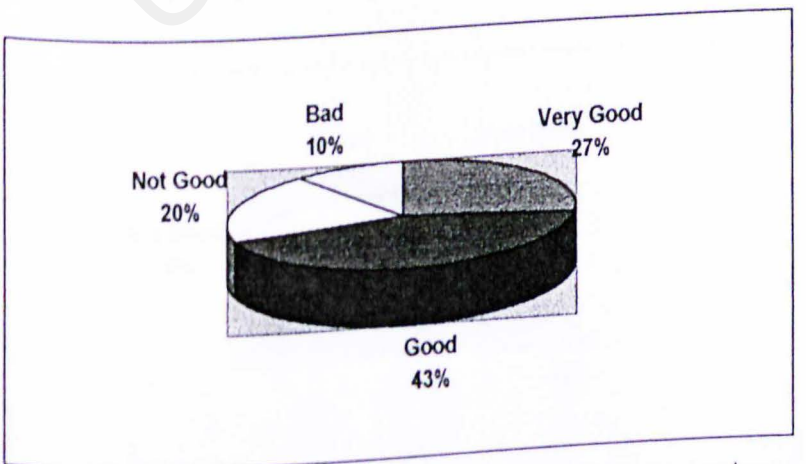


Diagram 7.4 : Image and Graphic Arrangement

7.5.1.5 Colour Combination

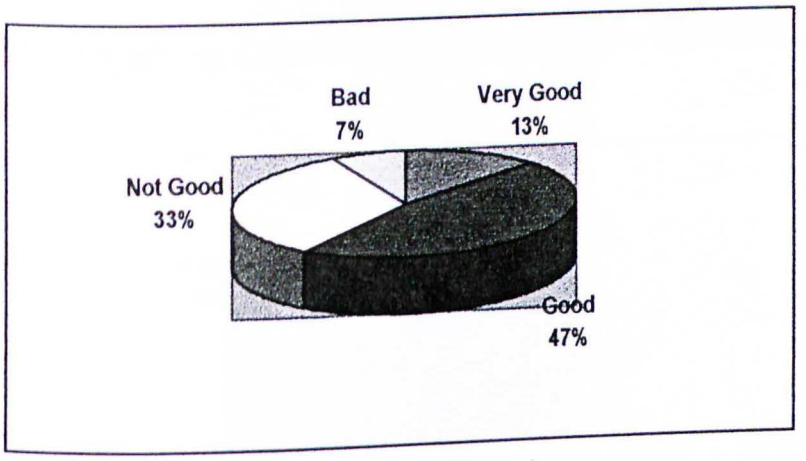


Diagram 7.5 : Colour Combination

7.5.1.6 Overall Assessment

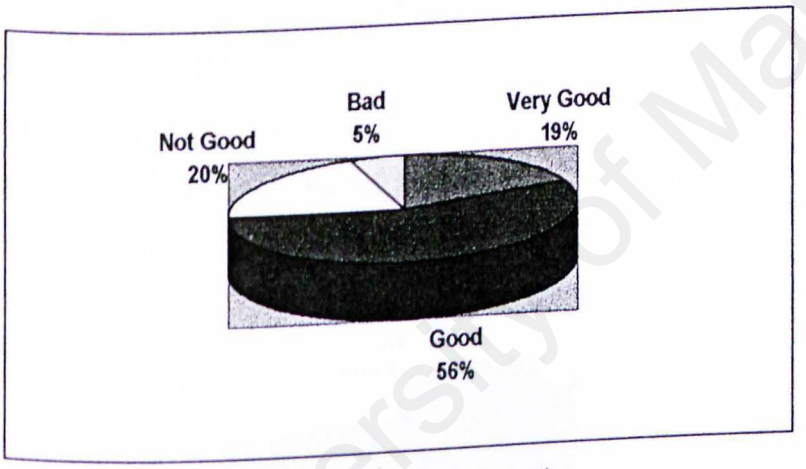


Diagram 7.6 : Overall Assessment

7.5.2 THE SYSTEM'S FUNCTIONALITY

7.5.2.1 User Module Quality

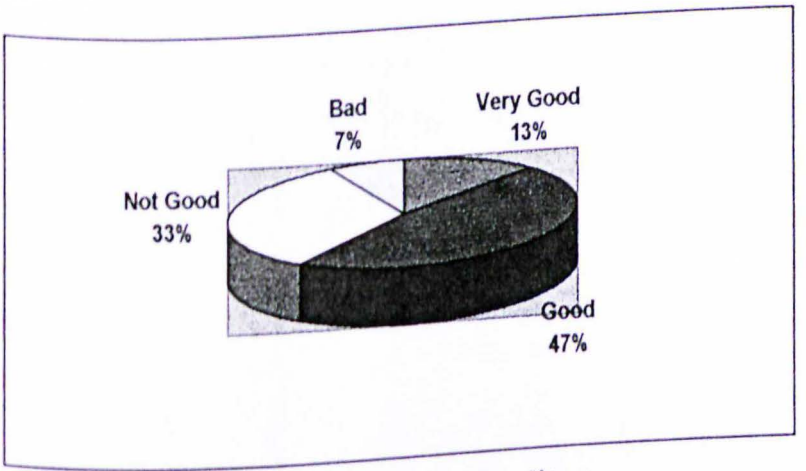


Diagram 7.7 : User Module Quality

7.5.2.2 Applying, Canceling & Approving Leave Module Quality

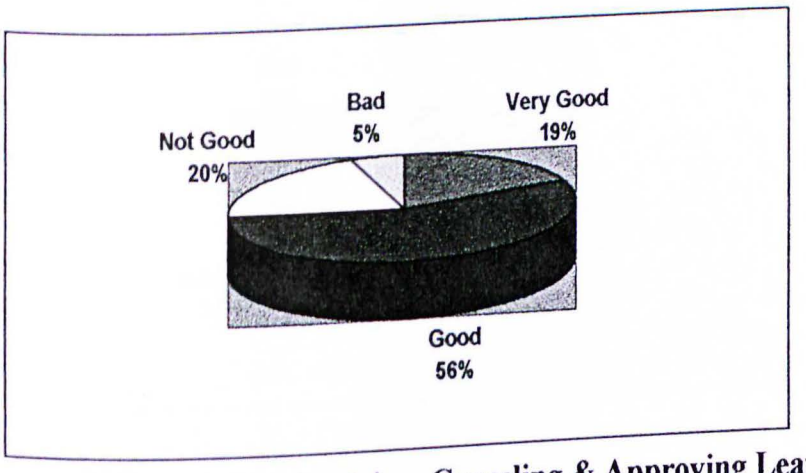
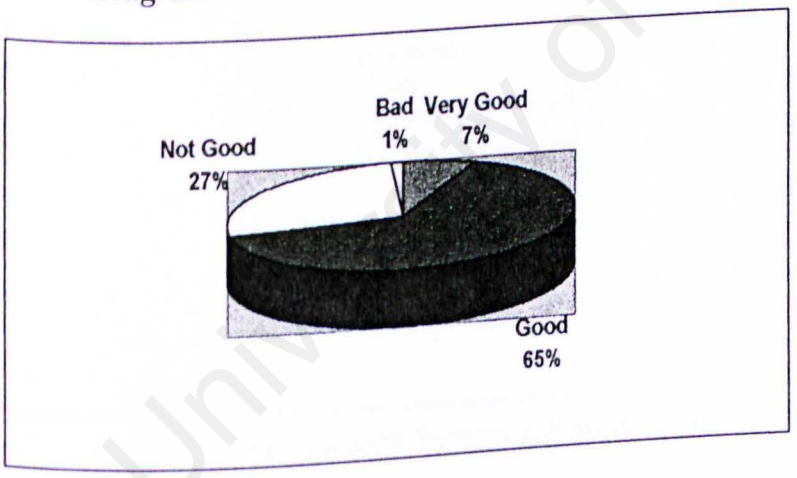


Diagram 7.8 : Applying, Canceling & Approving Leave Module Quality

7.5.2.3 Overall Quality

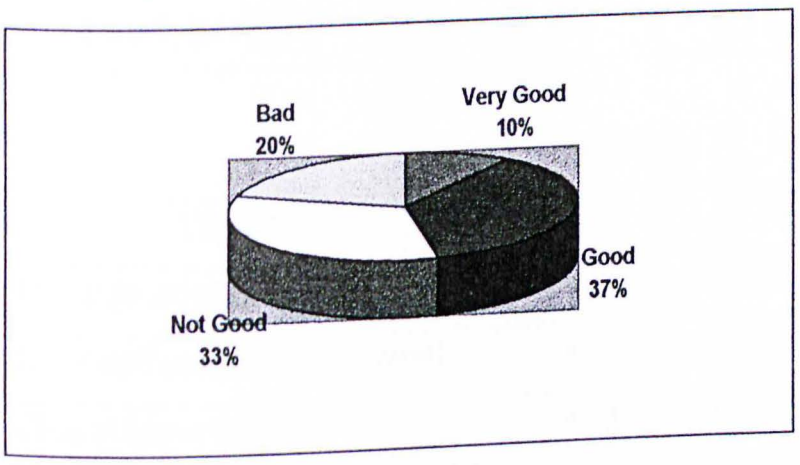
Diagram 7.9 : Overall Quality



7.5.3 THE BOARD OF DIRECTOR (ADMINISTRATOR) SECTION

7.5.3.1 System Security

Diagram 7.10 : System Security



7.5.3.2 Overall System Administration

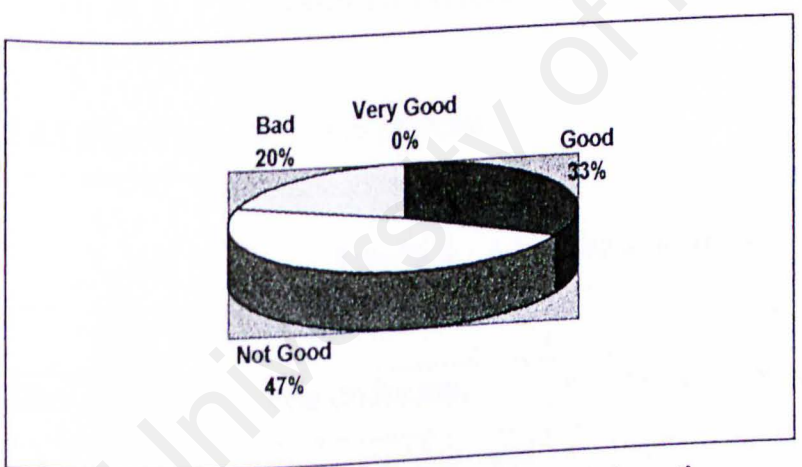


Diagram 7.11 : Overall System Administration

7.5.4 OVERALL TESTING UPON USER

7.5.4.1 User Type : Staff

Test No. : 1 Interface : Staff Menu	
TEST CASE	**RESULTS**
1. User type index address (index.asp)	• User will link to the login page
2. Insert staff username & password	• User goes to Staff Page
3. Click at Leave table	• User can select Application Form
4. Click Application Form	• User can apply & cancel leave
5. Click Leave Approval	• User can check their leave status
Conclusion : All of the results are successfully retrieved	

Table 7.1 : Overall Staff's Menu Testing

7.5.4.2 User Type : Board of Director

Test No. : 2 Interface : Administrator Menu	
TEST CASE	**RESULTS**
1. User type index address (index.asp)	• User will link to the login page
2. Insert administrator username and password	• User goes to Board of Director Page
3. Click at Leave Application List	• User can view leave list and to approve
4. Click "Status"	• To approve leave application
5. Click Leave Approval	• User can check staff's leave balance
Conclusion : All of the results are successfully retrieved	

Table 7.2 : Overall Board of Director's Menu Testing

Chapter 8

CONCLUSION

CHAPTER 8 CONCLUSION

8.1 PROBLEMS ENCOUNTER AND SOLUTION

Develop a system is not easy especially by our own. In the process of developing it, various problems normally will encounter. The following are some of the major problems encountered during the project development.

8.1.1 PROBLEM IN CHOOSING DEVELOPMENT TECHNOLOGY AND TOOLS

Choosing a suitable development technology and tool is a difficult process. There are many technology and tools available in this world. Some of the tools are suitable to develop a web base system, some tools are to build up graphical system and others are relevant in database system. Furthermore, each tool has its strength and weaknesses.

To choose and determine which are suitable, seeking advices from senior, friend and project supervisor are necessary. Reading to corresponding articles also has been carried out to ensure that our decision is correct.

8.1.2 DETERMINE THE SCOPE OF SYSTEM

Leave Approval System (LAS) actually is one of the Human Resource Management System (HRMS) modules. To build this system as a separated module from the HRMS and to determine the scope of it within the given time frame is quite a problem.

To solve this, many discussions were held with my course mates, project supervisor and my ex-colleague to outline the scope of project to be built. Analysis of the existing HRMS and some Leave Management System were done to gain more knowledge regarding the type of leave, approving process.

8.1.3 INEXPERIENCE IN THE CHOSEN DEVELOPMENT TOOL

This problem encounters during my implementation since I have no prior knowledge in using FrontPage and ASP codes to create application. Once again, the time frame limits the studies on the tools.

This problem is not totally solved until the end of the development. Luckily there are some people know to apply the selected tools. This is important to explain the application environment to explain the application environment and concept. Discussions with friends and explore ourselves was a great help to overcome the difficulties.

8.1.4 UNKNOWN ERROR MESSAGES

During the testing processes, FrontPage will prompt an error messages to inform us that our script failed to compile. Normally programmer will know what type of problem by reading the error messages that was pointed out by the tools.

After much research on this problem, it was solved. However, this will slow down the development process due to the unknowing script error messages every time it encountered.

8.2 SYSTEM STRENGTHS

LAS has demonstrated strengths as follows :

8.2.1 SYSTEM SECURITY

LAS was designed as a secure system that is generated with the Human Resource System. The client server-computing model is, by nature, more secure than file-system based system. It is because accesses to data are tightly controlled by the server. An error message will occur when unauthorized user try to access the system.

8.2.2 ATTRACTIVE AND USER-FRIENDLY INTERFACE

LAS interface is very simple but attractive and user-friendly. From the interface, many different interactive tasks are available through a menu scheme, dialog box and radio button. Such menus, boxes and buttons enable the user to perform control and dialog task in a facile manner.

Besides that, such techniques will reduce the amount of typing. This can increase the interaction efficiency of those who are not expert typists and can make computer accessible to users who are keyboard-phobic.

8.2.3 EASY HELP MESSAGES

A good system must have a good help system to guide users whenever it is required especially for a new user. Thus, help is necessary in all system. LAS is not excepted from this instead it provides an easy help message for each field in the form. Once user enters the corresponding field, a help message will prompt to them at the bottom of the form. This is very helpful for a new user and they do no longer have to enter the help file even though they can do so.

However, due to some complication, the help message cannot be generated because of the time frame have limited my time to work on it.

8.2.4 SAFEGUARDING USER PASSWORD

LAS won't let the staff to apply or cancel any leave including for the board of directors (administrator) to do any administration until they entered their correct password. It is crucial that a staff does not apply leave for other staff. LAS works under the assumption that no one else knows a staff password except oneself.

With a correct password and access to the username, a staff can access their page and read their document. However, the administrator will create a user file that contains initial password before a staff can enter to the system.

8.3 SYSTEM LIMITATIONS

The following are the limitations of LAS.

8.3.1 FIELD SIZE CHECKING

The system does not check the size of the field in some form especially in the form where only accessible by the administrator. The system assumes that the administrator will do their work properly and carefully.

8.3.2 INTERNET INFORMATION SYSTEM (IIS) IS REQUIRED

Each workstation must install IIS to be able to run LAS. This is because the FrontPage is an integrated development tools with database and it is impossible to create .asp file as other development tools.

8.3.3 NO SORTING FUNCTION IN REPORT LISTING

The number of user / staff that apply or cancel their leave cannot be sort for administration facilities.

8.3.4 NO DOUBLE CANCELLATION

Cancellation can not be making for second if the staff has canceled his leave partially. This means, once the staff made a cancellation to his leave, he cannot enter the

same document again. LAS assumes that all staff will take seriously in doing their leave application and cancellation.

8.4 FUTURE ENHANCEMENTS

Right now, LAS is integrated with the human resource section in order to combine the database as part as e-Office conceptual plan. There are several enhancements that can be extended on the usability of the developed system.

8.4.1 ENHANCE USER ACCESSIBILITIES

LAS database can be restructured to allow user (staff) to access some of the form. For example, user can access their personal detail form in the Profile but are limited to some of the field. This is because some of the fields are critical and can effect the whole system processing. The administrators will benefit from the enhancement because it can reduce the work in term of changing personal details.

8.4.2 IMPLEMENT A VISUAL INDEX HELP

In future a visual index help system may be added to the current help module. Visual index help is a help index where they contains picture of things that user can do in each area. With visual index help system, it will increase the user friendliness for LAS especially for those who are new in the system.

8.4.3 ADDING ELECTRONIC MAIL (E-MAIL) IN LAS

E-mail is one of the most important and useful features in making the communication smooth. If it is set up in LAS, it will benefits the user by confirming their leave approval, adjustment and cancellation more efficient.

8.4.4 FLEXIBLE SORTING FUNCTION IN PRINTING REPORT

No sorting function in LAS as was mentioned earlier in the System Limitation. In future, a flexible sorting function in printing report will be created where the administrator can print reports sorted by Staff Code, date and leave types.

8.5 CONCLUSION

The main objectives for LAS are to develop an easy way to manage the leave application and leave approval through company internal or external web while creating a paperless office environment to replace paper documents with electronic documents. Finally, LAS has achieved and fulfilled the objectives and requirements as a leave approval system as determined during system analysis. Besides using LAS as applying and approving leaves, the administrators are allowed to do their administration anywhere on the road if they can access to the company server.

For these past few months, there was lots of knowledge gained throughout the development of the system. This includes knowledge about Visual Basic, Visual InterDev, ASP technology and some Java programming regarding their concepts, strengths and weaknesses. Knowledge also includes recognizing client-server system, intranet and internet.

Here, a part of the knowledge that was gained from the courses such as database, system analysis, programming and especially software engineering are useful to develop the system. The undergraduates should appreciate that this WXES3181/2 courses were made compulsory in order to give them the opportunity to apply their knowledge and potential in handling a project.

Finally, there are still many improvements to make in LAS especially in the staff accessibility section. Future enhancements are necessary in order to push LAS as one of the most powerful system.

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LAS

USER MANUAL

User Manual

LEAVE APPROVAL SYSTEM

Chapter 1 Leave Approval System (LAS)

Thank you to choose LAS as your company leaves management system. This system is designed to manage staff's leave taken and approval on the company internal or external web. It is easy to learn and use because all functions in the system can be easily be executed by a simple point and click on the available button and dialog box.

1.1 System Requirements

1.1.1 Hardware Requirements

The hardware required to run this system is listed below :

- Intel Pentium 133 MHz and above
- 64 MB RAM and above
- 2 GB hard disk with a minimum of 650 MB of free space PS/2 keyboard
- Compatible server (IBM AS/400 server Model S20 above recommended)
- Keyboard and mouse as input devices

1.1.2 Software Requirements

Listed below are the software requirements to run LAS :

- Windows 2000 or Windows XP (Professional)
- Internet Information System (IIS)
- Internet Explorer
- Microsoft Front Page 2000

Chapter 2 Getting Start with LAS

Make sure that every workstation must meet the minimum hardware and software requirements as stated in Chapter 1.

2.1 Getting Started

Before you install / run LAS, you have to install Microsoft FrontPage and Internet Information System (IIS) into all workstations and server. LAS consists of four section. Once you have copied those files to the server, LAS installation is completed. You can run LAS by opening the LAS database.

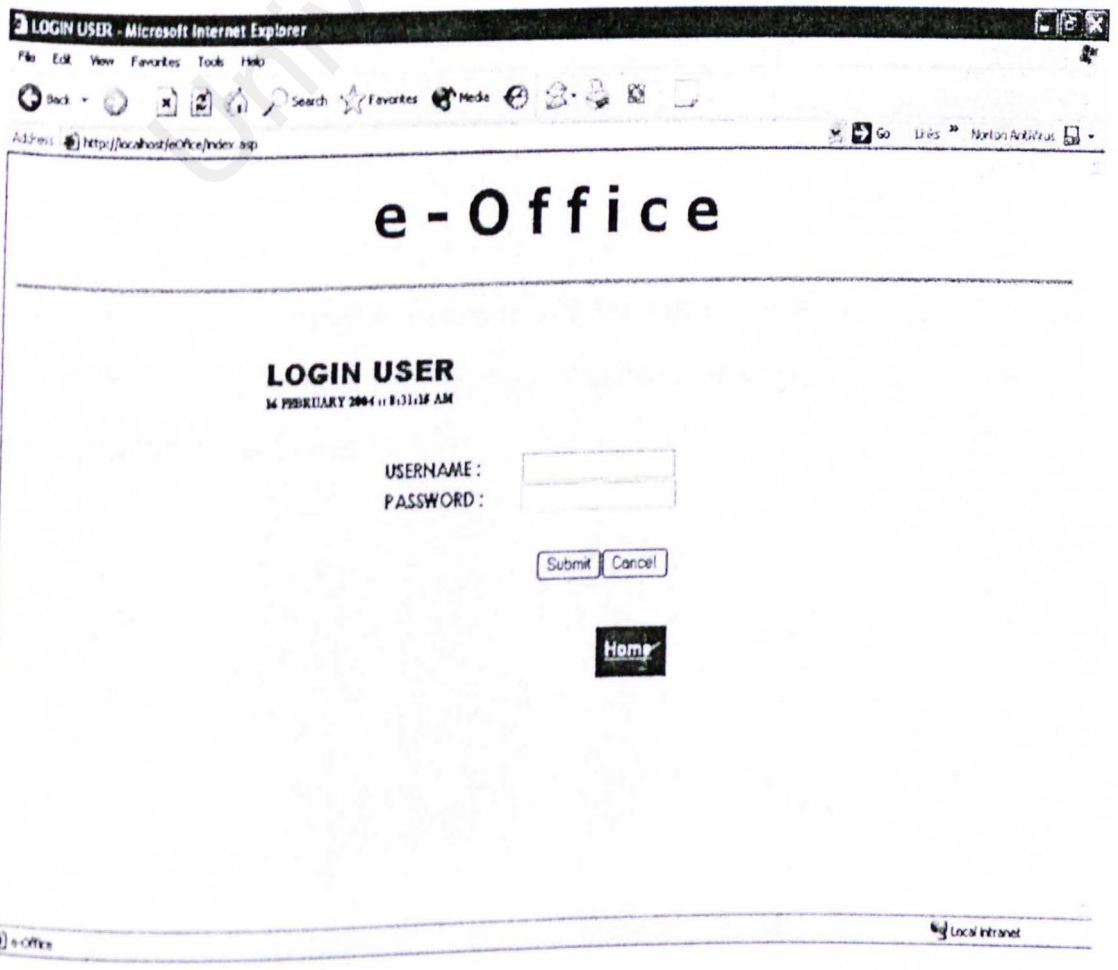
2.2 User Registration

First of all, you have to create your users ID. Each user ID requires a software license; make sure you have purchased a user license for each user to be registered. Eventually, user's ID have been conducted in Human Resources Management System (HRMS).

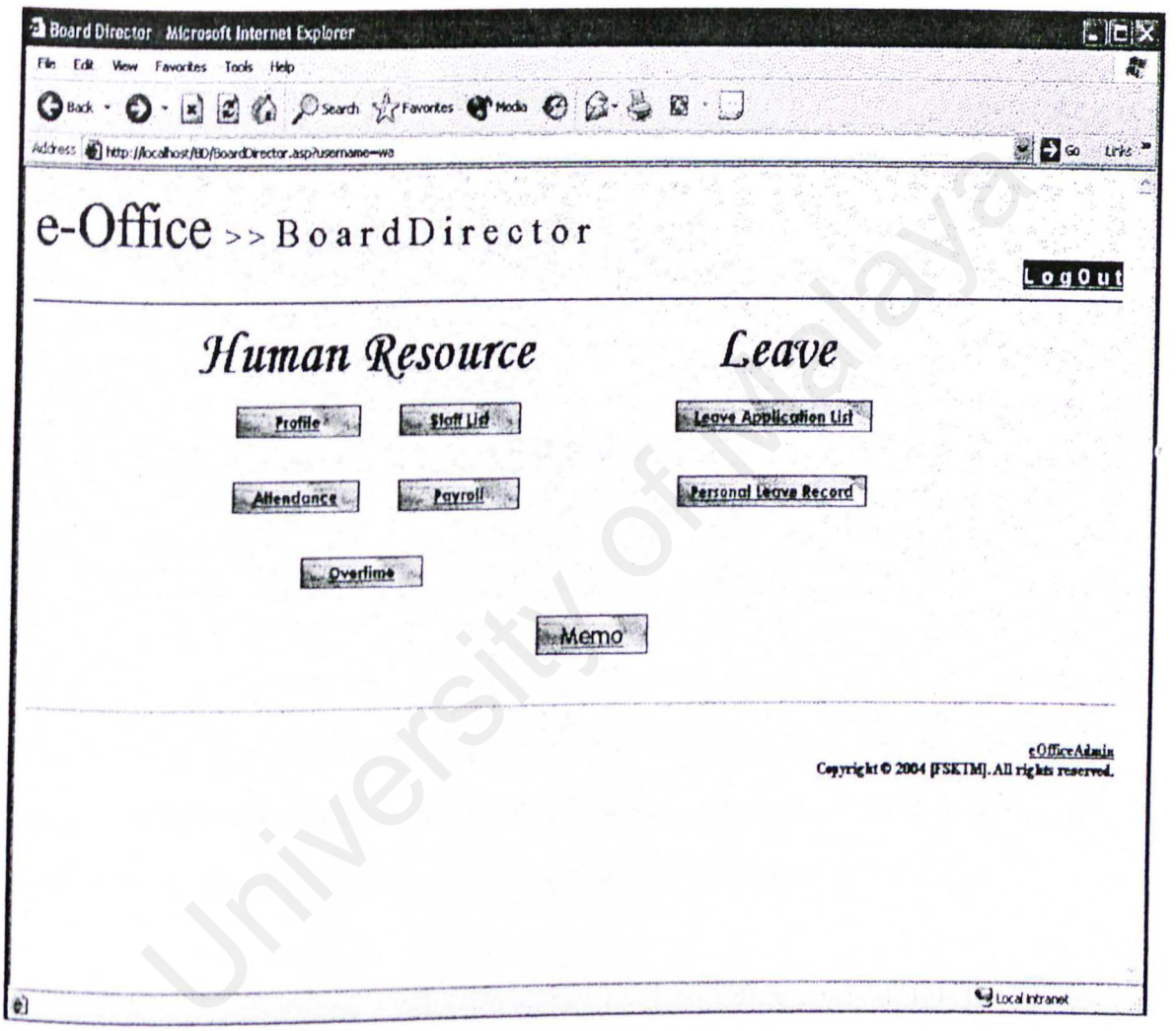
User registration will be done in the Board of Director window. The Human Resource Management System (HRMS) will create an ID file that contains an initial password for every staff. The important thing that you must remember is the staff ID must be entirely the same as the staff name in the Personal Profile. Otherwise the staff will not be recognized in LAS.

Login page

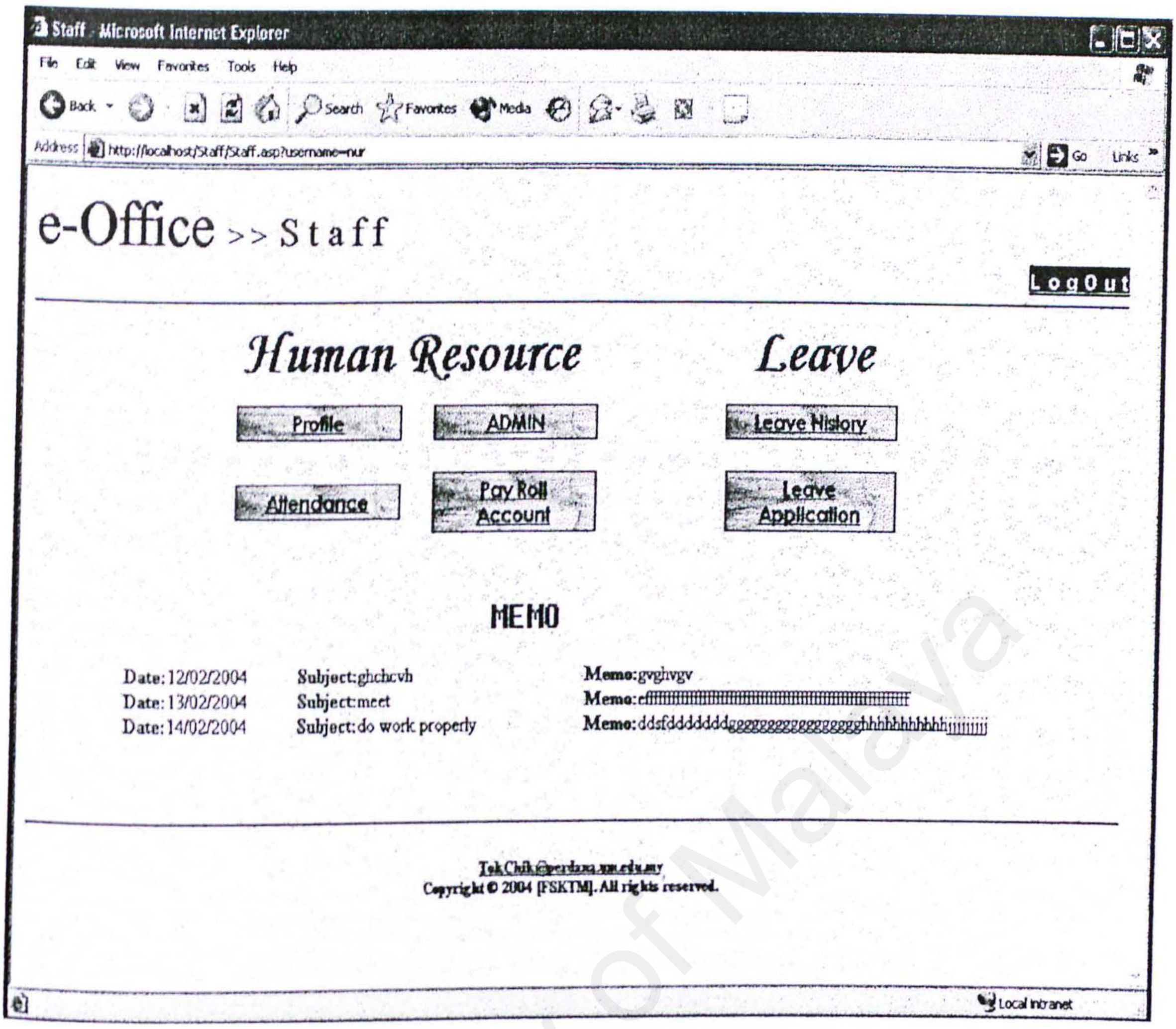
- Button Home – link to e-Office website



This is the e-Office main page. Staff or Board of Director (administrators) need to switch to their own username to connect the either Staff or Board of Director pages. After entering the correct username and password, click [SUBMIT]. Authorized employees will logon successfully if they enter the correct password.

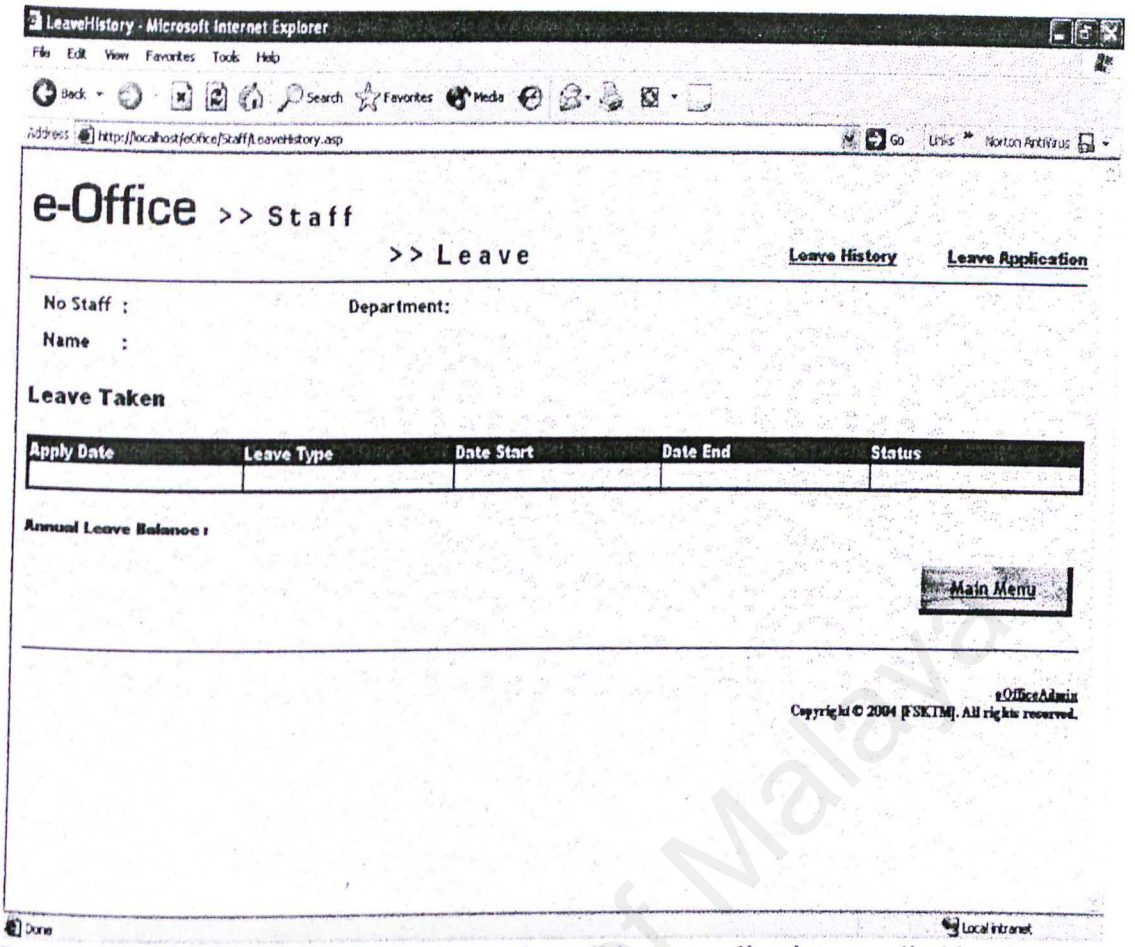


After successfully entering the Board of Director's username & password, this page will prompt to view directly upon Human Resource Management System (HRMS) and Leave Approval System (LAS).



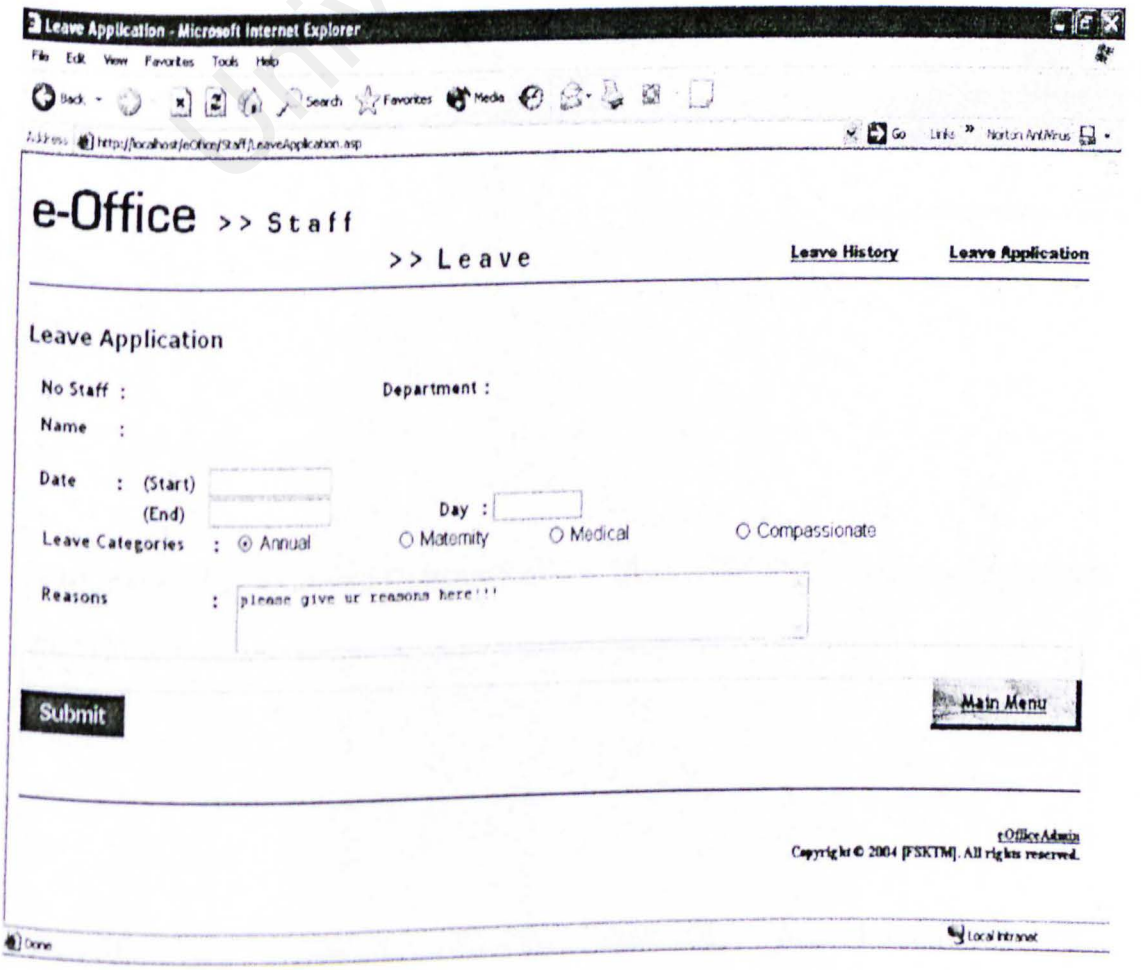
While for employee / staff, they will be entering Staff's page. In LAS, they can view their list of leave that has been taken in Leave History section and can click at Leave Application section for applying, canceling and identify current leave balance.

Staff Section



Leave History page in Staff Section – view all leave applications applied by the user includes the status whether approved, not approved or cancel. No Staff, Department & Name is auto generating due to login user information.

Leave Application Form for Staff Section



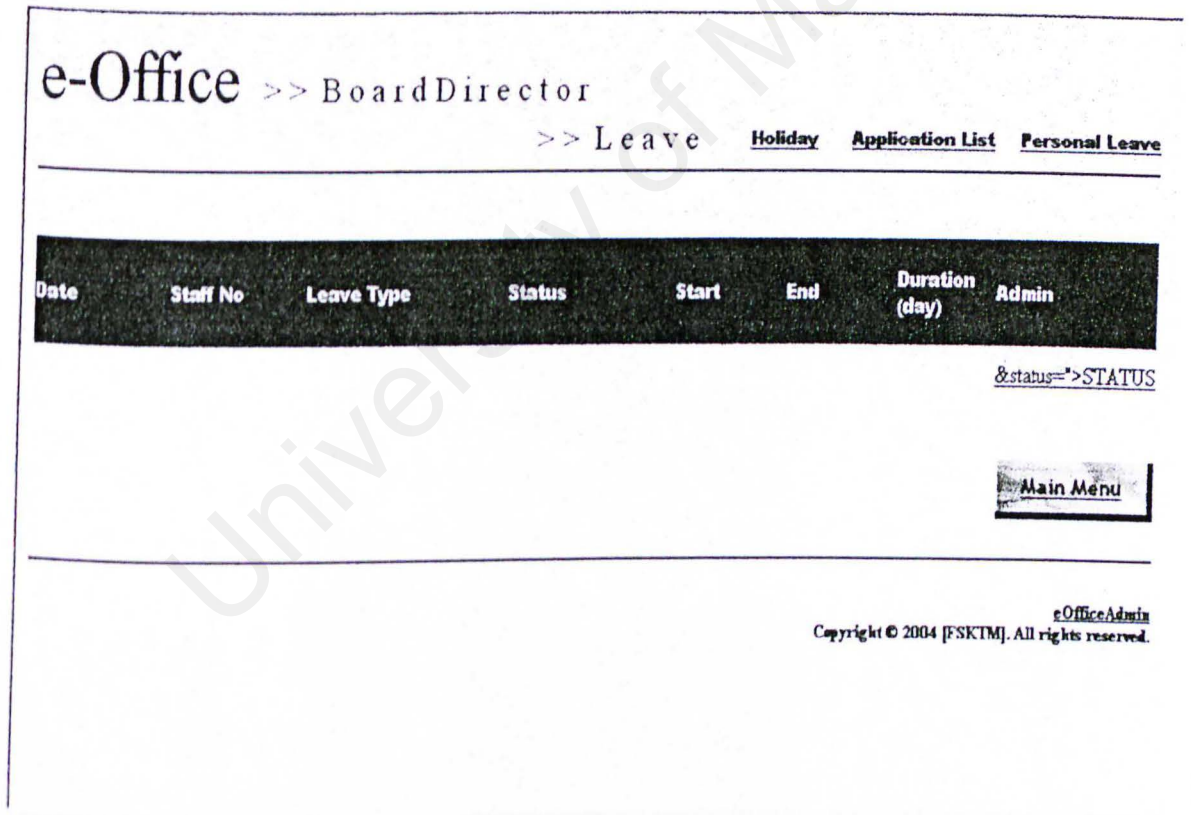
When user fill up the form, they must click [SUBMIT] in order to apply the leave. A "data saved" page will prompt after the [SUBMIT] button was clicked. The data then will link to the Board of Director's page for approving.

In order to view whether the leave have been approve or not, user can click at the Leave Approval section that situated at the right upper corner window. If the Board of Director does not approve yet, page consist "your leave approved your leave is waiting for approval!!! " will prompt to the user.

Besides that, user / applicant can cancel their application by clicking at the [CANCEL] button :-

" CANCEL *press this link to cancel your leave submission."*

Board Director Section



Application List in Board Director Section. Click [STATUS] to approve applicants applications.

When the Board of Director has approved the leave, a page will prompt a message : "YOUR CURRENT LEAVE BALANCE IS " . This page will inform the admin about the leave balance in their staff's accout.