Project e-faculty

Office Equipment Inventory System

by

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Abstract

This report was based on the final year project, as a partial requirement for the degree of Information Technology. It's describing the Office Equipment Inventory System that will be developing. This report contains 4 chapters, which are introduction of the project, literature review, methodology and system analysis, and system design.

Office Equipment Inventory System is a sub system of the e-faculty project. E-faculty project is a project that will bring faculty science computer and information technology to the electronic era. The objective of e-faculty is to bring faculty become an electronic, effective and efficiency faculty.

The purpose of develop the Office Equipment Inventory System is to computerized the inventory system which is still manage manually and develop a web-based system that can be used by all the faculty members. With this developed system, staff can manage the inventory information more easily and lecturers can apply the stationery inventory through the online system.

This report will be describe the system that will be develop, methodology that will be use, system analysis and the system design.

Chapter I

Introduction

1.1 Introduction

To achieve the aim to become an e-university, Faculty Science Computer and Information Technology (FSKTM) had begun a project that called e-faculty. Concept of the e-faculty is to optimize the usage of computer system and became an paperless faculty. The meaning of e-faculty not just to became electronic faculty, its also means to became an efficient faculty, an effective faculty and excellence faculty. Under this e-faculty project, there are a lot of system will be computerized and one of the systems is called Office Equipment Inventory System.

Office equipment inventory system at Faculty Science Computer and Information Technology (FSKTM) is a system that manages all the equipment in FSKTM and placing the orders from supplier (vendor). Beside of this, system will also be keeping all the record of office equipment in the database and showing the status of each office equipment.

Office equipment inventory system is an online system, which means users can access this system through the Internet. The users here mean lectures and staff in FSKTM. When the system is an on-line system, users can apply for the inventory through template on the Internet without going to the office to fill in a form manually. The approval process will also be online and records of inventory are updated automatically. This will make thing easier and save a lot of time.

Generally, this Office Equipment Inventory System will be helping staff to manage and maintain the inventory in FSKTM and helping the lectures to apply or check the status of inventory through the on-line system.

1.2 Objective

There are few main objectives to develop this Office Equipment Inventory System. These objectives are shown as below:

✓ To achieve a goal of e-faculty. Became a paperless, efficient, effective and excellence faculty.

✓ Computerize the Inventory System in Faculty Science Computer and Information Technology (FSKTM).

✓ Provide an on-line system for users to access the system more easily. Reduce the manual work and save users time.

✓ Keep all the office equipment information in the database for the tracking purpose.

✓ Provide a system that is users-friendly.

1.3 Scope

The Office Equipment Inventory system is a client server database system. It will provide complete information of users, transaction involved, quantity of inventory, type of inventory, and the status of each inventory. Below are the few scope of this system:

✓ Users that will be using the system are the staffs and lectures in FSKTM. Staff will do the maintenance job and lectures can apply for the office equipment through this on-line system. Each user will be giving personal user id and password. This is to prevent the unauthorized people access to the system.

✓ This system will involve few transaction processes, which are applying for office equipment, approval for applied equipment and update the inventory status.

✓ Maintenance features on some table in the database by the administrator.

✓ Develop an interactive and secure web page as the interface to system database.

1.5 System Constraints and Limitation

Every system has strength and weakness. This office equipment inventory system also has a constraint. The constraint of this system is shown as below:

➢ Online apply features only available for the stationery inventory. It's does not include fixed asset inventory. This is because the procedure of applying fixed asset inventory is more complex.

Chapter II

Literature Review

2.1 Purpose Of Literature Review

Review of Literature is a background study about the knowledge and information gained to develop this project. This chapter indicates findings, summarization, analysis and synthesis of what have been read. The purpose of this review of literature is to get a better understanding on the development tools that can be used to develop a project and also get a better knowledge on the development methodologies used while developing a project.

2.2 Finding And Information Gather

All information gathered for the project can be divided into printed resources and electronic resources. Printed resources are inclusive of books and journals while electronic resources includes web sites, which are founded by using specific keywords on the Internet.

2.3 Introduction of e-University

The concept of the e-University was introduced during the mid-1980s when some colleges and universities, mainly in the US, attempted to make use of networked computer and telecommunication technologies to reach adult learners at a distance. There are several model of e-university have been proposed during the mid- 1990s. These models are:

1. Yenbamrung (1992) associates electronic university with distance education with characteristics of these universities described using various education models, including on-off campus, off-campus, and consortium models.

2. Liang et al.(1998) states " traditional universities were re-engineered to create a paper-less environment in their administrative services, while other trying to provide an integrated information services".

3. The transformation of the University of Akron, USA, into an electronic university required changes to the university's mission (Bee, 1995) whereby the new mission of the electronic university is to extend and enhance delivery of courses, programs of instruction and campus services through sensible and effective use of technology.

4. E-University also can be defined as transform key relationships and services, as well as academic, outreach, and business processes through the use of Internet-age technologies. E-University initiative with identifying and implementing strategies for using information technology to improve the quality of all types of University services while simultaneously reducing costs and providing new revenue streams and practices.

2.3.1 Proposed e-University Model

2.3.1.1 The conceptual model

E-University can best be defined as a conceptual model that incorporates **stability** (*traditionalist*), **opportunities** (*progressivist*), **production efficiency** (*enterprising*), and **values** that meets the expectations of the society (*social constructivism*). The proposed mission of the e-University is stated below:

Mission
"e-University is a university that exploits the potentials of technology to meet educational objectives, foster active engagement of students in community building, and develop civic competency and further career aspirations."

The new e-University will have the following features:

- High availability of ICT

- Integrated and accessible information systems

- A critical mass of technology users (faculty, students, and staff)

- Improved products (teaching and learning materials) and services to internal and external clients

- Improved collaboration with other institutions

The Initiative of e-University is built on five major areas of emphasis:

- ✓ *e-academics* which encompasses technology enhanced learning and distance education

- ✓ *e-research* which can include enabling collaborative research and electronic scholarly publishing

- ✓ *e-business*, or the numerous administrative activities such as purchasing, travel, and supply.

- ✓ *e-outreach* which is including development activities

- ✓ *e-services* which is the implementation of resources and services for students through a campus portal.

2.4 Concept e-faculty

E-faculty is the sub-project of e-University and concept of e-faculty is similar with e-University. The objective of e-faculty is to change the traditional way in faculty into new era, which is called electronic era. Once the e-faculty is implemented, most of the system in faculty will be computerize and also will be integrated with each other through Internet. This will save a lot a time and improve the quality services of the faculty. Objective of efficient and effective will also be achieved. Basically the parties that will be involved in the e-faculty are management, staff, lecture and the student.

2.5 Re-engineering Process/University Process Reengineering (UPR)

Re-engineering Process can be defined as "The Fundamental and radical design of business processes to bring about dramatic improvement in performance."(Hammer, 1990). In a simple way to say is to re-organize the flow of each process in order to achieve the efficient and effective purpose. Changing the traditional University became an e-University involved re-engineering process and here we call it University Process Reengineering (UPR).

UPR stresses the need for an across-the-board shift in thinking and commitment to innovation. To achieve this result, a university must change its focus from a hierarchical structure to one that consolidates related cross-university tasks into cohesive processes.

For example, admitting a student requires more than one person (and more than one department) to find the prospect, review the application, compile the financial aid package, and send the offer letter. An efficient workflow management system speeds this process (and hundreds of others like it) and elevates its quality by automating, simplifying, measuring, directing, and managing the flow of information from department to department across the university.

The UPR methodology also requires the processes and objectives be reengineered. Because it is campus wide, an UPR effort must address all parts of the university: jobs, skills, structure, information technology, management systems, business processes, and even values and beliefs (mindset). An undertaking of this magnitude probably seems overwhelming. However, the UPR methodology is scalable; that is, it can be applied within a single department or process, or throughout the organization. (Mahfuzah Kamsah, 2000).

2.6 Management Information System (MIS)

Management Information systems (MIS) are computerized information system that work because of the purposeful interaction between people and computers. By requiring people, software (computer program), and hardware (computer, printer, etc) to function in concert, management information systems support a broader spectrum of organizational tasks than transaction processing systems, including decision analysis and decision-making.

In order to access information, users of the management system share a common database. The database stores both data and models that help user interpret and apply that data. Management information system output information that is used in decision-making. A management information system can also help unite some of the computerized information functions of a business, although it does not exist as a singular structure anywhere in the business. (Kenneth E. Kendall, 1998)

2.7 Software Engineering

Software Engineering is the application of scientific principles to the orderly transformation of a problem into a working software solution and the subsequent maintenance of that software until the end of its useful life. Software engineering is more than just programming. The software engineering process generally starts long before a line of code is written and continues long after the initial

version of the program has been completed. People and projects were following

the process to approach software development. (Ian Sommerville, 1998)
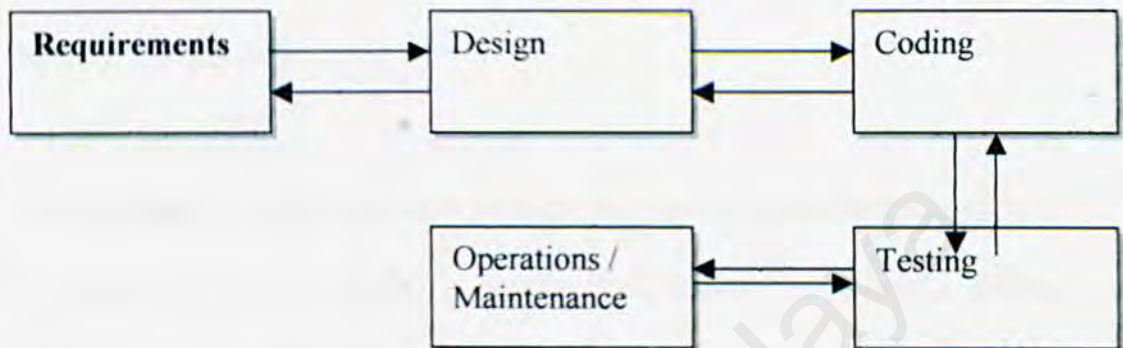
Figure2.1 Software Development Cycle

➤ **Software Requirements**: Include analyzing the software problems at hand
and concludes with a completes specification of the desired external behavior
of the software system to built; also called functional description, functional
requirements and specification by others.

➤ **Design phase**: Decomposes the software system into its actual constituent
(architectural) components and then interactively decomposes those
components into smaller and smaller sub-components. Defines and
documents algorithms for each module in the design tree that will be realized
a code; also called program design by others.

➢ **Coding phase**: Transforms algorithms defined during the design stage into a computer understandable language. This is usually performed in two steps: converting the algorithms into high level computer language (usually performed by people) and converting the high level computer language into a machine language (usually performed automatically by a computer); also called programming.

➢ **Testing stage**: If the human were perfect, the process would be completed at coding stag. Unfortunately this is not the case. Therefore, we need a testing process to uncover and remove the "bugs". Testing phase will be checks each coded module for the presence of bugs. Unit testing purpose is to ensure that each as built module behaves according to its specification defined during detailed design; also called module testing and functional testing.

➢ **Operation**: After final system testing integrated the entire sub-module and compiles it as a completed system. Normally this is the longest life cycle phase. The system is installed and put into practical use. Maintenance involves correcting errors, which were not discovered in earlier stage and Improving the implementation of system units.

2.8 System Inventory

The definition of inventory is "A quantity of goods or material in control of an enterprise and held for along time in a relatively idle and unproductively state, awaiting its intended use or sale." (Love, 1979).

The main purpose of having an inventory system is to control the stock in hand and always keep the stock in balance position. There are few characteristics for a good inventory system shown as below:

✓ Design a good database for keeping the inventory record. This will help users to keep track the record easier.

✓ Can be integrating in the network/internet. Provide an on-line system for users can do the transaction through their desktop without going anywhere.

✓ Reduce the usage of paper and using e-form to replace the old paper form.

✓ Having a level control of users that will be access to the system. Unauthorized people are not allowed to access the system.

✓ Also provide a database that contains all the vendor information. This can help users to place an order through the system without checking the vendor information in other place.

✓ Provide a user-friendly interface system in order to attractive the users use the system.

2.8.1 Weakness of Computerize System inventory

Although it is good news to computerize the System Inventory, but it's also conduct some problem after it's had been computerized. Some problem are shown as below:

✓ *Security issued*. When the system had been became an on-line system, its mean the possibility for unauthorized people access to the system became very high. It was very dangerous when the data or information can be expose easily.

✓ *Rejection of the current users.* Current users maybe cannot accept the changing of computerized system. This is because they have been get used with the old system and re-training them will take time.

✓ *Facilities of computer must be complete.* If the system had been transform into automation system, more computer facilities are required. This indirectly will increase the cost of implementation.

2.8.2 Review Existing Office Equipment Inventory System In FSKTM

Office Equipment Inventory System currently is separate into 2 different systems. One is fixed assets inventory and another one is stationery inventory. The main function of these 2 systems is to keep all the inventory information for management purpose.

2.8.2.1 Characteristics of fixed assets inventory system

➢ It is a computerized system, which is running in the DOS environment.

➢ Database that the system using is the dBaseIV. Size of database file is smaller compare with the Microsoft Access.

➢ System display out the simple screen and very straightforward function menu, which is not so user friendly and graphical. User can only use the keyboard to operate the system.

➢ System only install in one computer at the control room. There is not linking or online function provided in this system.

➢ User of this system is the data entry staff only, other people are not allow to use this system because there are not other features such as view the inventory status provided to other users. Only the staff will know how to use the system.

➢ Reports will be generating from this system to serve the different purpose.

2.8.2.2 Characteristics of stationery inventory system

➢ All the stationery information will be record manually by the staff into the record book. System hasn't computerized yet because numbers of stationery are not so many. It is easier for staff to record manually rather than key in using the computer.

➢ This system involve process apply and approve. Lecturers required to fill in the apply form and pass it to the staff in the office. Then the form will be approving by the assistants registration and lecturers will then get the stationery from the staff. All these processes are running in manually.

➢ Only the office staff will know the quantity of stationery that is still left in the storeroom. It is very inconvenience when lecturers want to apply for particular stationery.

> Office staff needs to always check through the record book to make sure all the stationery is not out of stock. It is very troublesome because data that record in the bookkeeping is not so systematic as computer system.

2.8.3 Stationery Inventory Application System (SIAS)

Stationery Inventory Application System is a system that develops by an ex-student of Faculty Science Computer and Information Technology as his final year thesis project. This system is build to manage the stationery of faculty in the proper manner. It enables staffs and lecturers apply their stationery by the computer on their desk. The approval process will be online and records of stationery inventory are updated automatically.

The Stationery Inventory Application System is an online and integrated menu driven database, like any business inventory, they have to be managed economically and wisely. The system posts receipts, adjustments and transfers of record between files and database. Transaction processes are automatically to ensure stationery management. The SIAS can be installed on a single computer, or the data files can be placed on a network server and accessed simultaneously by more than one user. (Pee Seong Eng, 1999)

2.8.3.1 Advantage Of Stationery Inventory Application System

➢ SIAS is a system that develops using visual basic 6.0, so it is running in Window environment which is more user friendly compare with the system that running in DOS environment. By using this computerized application, user can easily operate the system using GUI interface by selecting or clicking on the button, icons or key in through the input devices which is easy to use.

➢ Provide an online system for lecturers to apply the stationery. This will save lecturers time and reduce the usage of paper. In this process, users required to fill in the stationery name and quantity in the online form. The approval process will also be running in this online system.

➢ This system also will automatic update the status stationery once the apply form is approved. This will give the latest information for the lecturers to view.

➢ The stationery inventory application systems is designed in such a manner that they are loaded from memory in a reasonable amount of time to ensure the users need not wait too long to view the designed user interfaces. Graphics are avoided and ActiveX control is kept in minimum wherever possible during the interfaces design stage.

2.8.3.2 Weakness Of Stationery Inventory Application System

➢ There is not an e-mail notification send to the person that apply for stationery when apply is approved. Although there is a message box in the system to notify the users about the status application, but if the users does not access to the system, they will never get the notification. This problem can be solve with provide a function that auto divert the approval message to the user through e-mail.

➢ This system didn't provide a good backup and restore function. This is because developer did not considered this function in the earlier development stage. This backup and restore function is very important if an accident occurred causing damage to the system and database. So, the contingency planning is need because the disaster will cause loses to the organization.

2.9 Web Architecture

2.9.1 Client-Server Architecture

Here is some of the definition of client-server that still remains consistent although many definition of client-server definition exist, from an Access application with a share database to an all-encompassing transaction processing system across multiple platforms and databases.

1. The server or the service provider is responsible for fulfilling the request and returning the requested information (or completion code) to the client, due to the clearly defined roles and message-based communication. The incoming transaction can be from a Window client, an OS/2 machine or a normal web browser.

2. The client and the server have well-defined roles, with the client requesting services and the server fulfilling the service requests.

3. The client can send a transaction to a service provider and have the request fulfilled without having to be aware of the server that ultimately fulfil the request. A database server, a mid-range data update, or a mainframe transaction might satisfy the data or transaction

4. The communication between the client and server (or the client middle-ware server) is a well-defined set of rules (messages) that govern all communications, which is a set of transactions that the client sends to be processed.

From the definition and in more practical way, Client-Server computing involves breaking up system functionality into layers so that it can be independently developed. It is then deploy across multiple machines and uses a communication mechanisms to allow different layers to co-operate.

The following independent layers that involve in client-server:

Presentation Logics / User Services – This layer will handle how users interact with the application. It is implemented by providing graphical user interface (GUI)

Business Logic / Business Services – This layer will handle business rules of the applications. It is the functional core of the application that all data validation and processing should be handled here. As a middle tier, it will communicates with both Presentation Logic and Data Access Logic

Data Access Logic / Data Services – This layer will handle the storage and retrieval of data. It will communicate with the database.

2.10 Database Approach

There are several type databases in the market that can be used to develop this inventory system. These databases are SQL server 7.0, Oracle8i and IBM DB2 Universal Database version 6.1.

After study all these type of database, SQL 7.0 had been selected to be a database platform for this office equipment inventory system. Benefits of using SQL server 7.0 as shown as below:

✓ This inventory system is a sub system of the project e-faculty and this e-faculty project is using the SQL server 7.0. So it is more suitable to use the same database platform to develop the system. This will make the whole project became more standard.

✓ Cost of implementation and maintenance are cheaper if we are using the SQL server 7.0 compare with other database. Take an example, Oracle8i costs about US40, 000 of software fees and additional US100, 000 for professional set-up fees.

✓ SQL server 7.0 can supported almost every operating system platform such as Window and Linux platform.

✓ SQL server 7.0 can support a very large population and very large database.

2.11 Networking Operating System

Same with database, there are also having few networking operating system that can be using to develop this inventory system. These operating systems are Windows NT, Linux and Unix.

Once again, there will be only one networking operating system selected to develop the system. Finally, Windows NT has been selected to become the operating system platform. The main reason to using this operating system is because it has been set by the e-faculty project. Another main reason is because this Window NT is widely used in the market.

Below are some features that found in UNIX:

➢ UNIX is an increasingly popular operating system. Traditionally used on minicomputers and workstations in the academic community, UNIX is now available on personal computers and the business community has started to choose UNIX for its openness.

➢ UNIX, like other operating systems, is a layer between the hardware and the applications that run on the computer. It has functions that manage the hardware and functions that manage the executing of applications

➢ UNIX includes the traditional operating system components. In addition, a standard UNIX system includes a set of libraries and a set of applications. It includes the file system and process control and a set of libraries.

➢ One of the greatest strength of UNIX is the consistent way in which it treats files. It is very easy for the users to work with files because users don't need to learn special commands for every new task.

➢ Besides UNIX is not known only for its longevity and versatility as an operating system, but also for the variety and number of utility programs that called tool.

2.11.1 Comparison between Window NT Server 4.0 and UNIX

➢ There is a lot of supporting software for Window NT especially the free downloadable option packs.

➢ UNIX is hard to install compared to Window NT 4.0. Sometimes it take two weeks to configure a UNIX machine but only one day to set up a NT box.

➢ NT 4.0 supports the Microsoft Back Office Product but UNIX doesn't. To use a UNIX OS, a lot of command needs to be entered. Compared to NT, it provides user-friendly interface that eases the job of the user.

2.11.2 Comparison between Window NT Server 4.0 and Linux

Premise	Description of Linux	Description of Windows NT
Scalability	It would support full multitasking and 32-bit support.	It would support symmetric multiprocessing (SMP).
Compliance and compatibility	It is compatible with the IEEE POSIX.1 standard and support many others important features as in UNIX.	It would be POSIX-compliant, run existing Windows applications, and support open international standards.
Portability	Support many important standards features.	The system would need to run on different hardware platforms with minimal changes.
Ease of internationalisation	It is as easy as to ported to run in different languages and writing system.	It could easily be ported to run in numerous different languages and writing systems, with minimal modifications to the software
Security	The available source code and the ability for users to modify decrease its security.	It could be locked down through software, meeting NSA's C2-level criteria.
License Fee	Do not require license fee.	Require license fee.

Table 2.1. Comparison between Linux and Windows NT 4.0

Chapter III

Methodology And System Analysis

3.0 Methodology

The term systems methodology is used extensively in this text in the sense of 'a methodical approach to project system planning, analysis, design, construction and evolution'. It is recognized that the term Methodology should be used to mean 'a study of method'.

3.1 Soft Systems Approach

With soft system methodology (SSM), system thinking should be regarded as a contribution to problem solving, rather than as a goal-directed methodology and this applies to all situations where the task itself cannot be entirely and objectively defined.

The process of the SSM is to gather information about the problem domain first, then display and describe the problem situation. After that, a comparison is made between the ideal model generated and the real world. Based on the differences found, one can figure out the changes and the tactics for implementing those changes that are appropriate for the situation.

The usual stages in SSM are as the following:

1. Problem Situation Unstructured

2. Problem Situation Expressed

3. Selection

4. Conceptual Model

5. Comparing Conceptual Models with Reality

6. Definition of Feasible and Desirable Changes

7. Action to Solve the Problem or Improve the Situation

Due to the complexity and uncertainty of a Soft System, the goal of SSM is to make improvements instead of getting optimal results like most of methodologies do. The theory is that during the cyclic facilitation of the SSM, facilitators are going to know the problem domain better, which better helps them to improve the current situation.

Rich picture of the Office Equipment Inventory System is shown in the next page (Figure 3.1).

3.1.1 Root definition:

A system that manage office equipment inventory information in order to satisfy user's need.

3.1.2 CATWOE

Customer: general public, users

Actor: system administrators, system operators

Transformation process: keep the inventory record and running the applying or approval process

Weltanschauung: organization

Owner: faculty (FSKTM)

Environmental constraints: security

3.2 The Waterfall Approach

Besides using the soft system approach, the waterfall approach will be also using to develop the Office Equipment Inventory System. The waterfall approach is the method that develops the system step by step. It is a very suitable method to develop this system because the whole project is divided into several stages, which are system analysis, system design, and implementation and system evolution.

Below is the flow chart for the stage that contain in the waterfall approach.
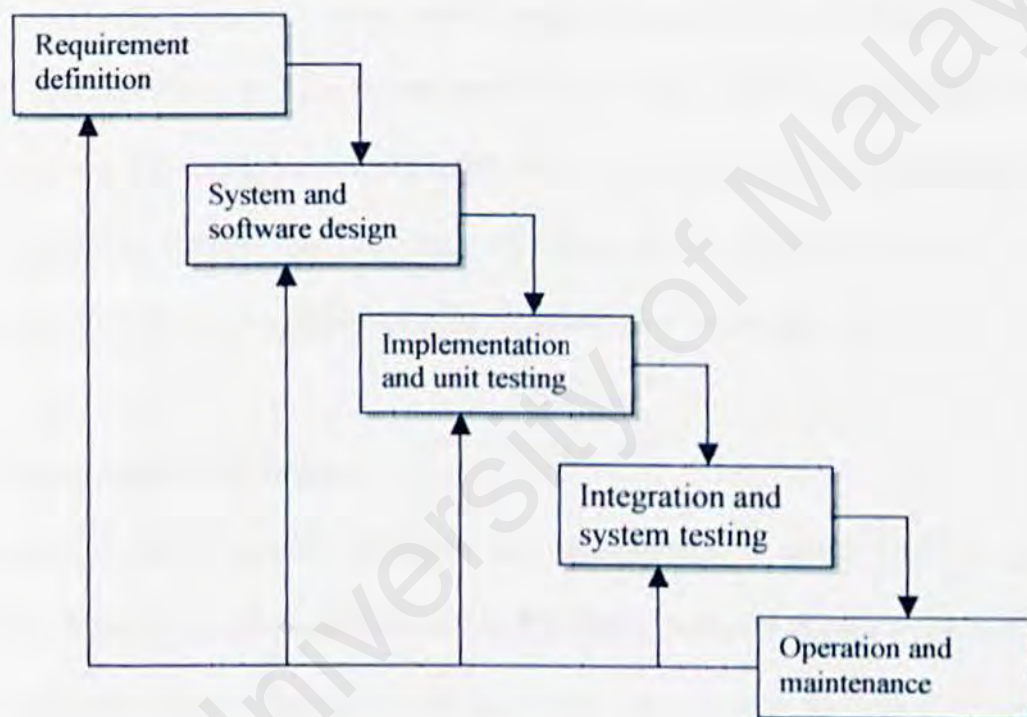
Figure 3.2 Flow chart for Waterfall Approach

There are numerous variations of this process model, sometimes called the model with software life cycle. The principal stages of the model map onto the fundamental development activities:

Requirements Analysis and Definition

The system services, constraints and goal are established by consultation with system users. They are then defined in a manner which is understandable, by both users and developer.

This stage may begin with some analytic work, to determine the information requirement, what system objectives have been identified and focus on the users requirements for the new system. The stage may include a feasibility study to determine the possible alternatives for proceeding further. The stage may also focus on the existing system, their scope and whether they are due for phase out or are adaptable for future use.

System and Software Design

The system design process partitions the requirements to either hardware or software system. It establishes an overall system architecture. Software design involves representing the software system function in a form that may be transformed into one or more executable programs.

A system design stage typically includes the preparation of components of different kinds. It is possible to prepare components of the system design stage in such a way that are

independent of a specific tool that will be used to develop the system. By definition, it involves knowledge of the tools to be used to develop the system.

Implementation and Unit Testing

During this stage, the software design is realized as a set of programs or program units. Unit testing involves verifying that each unit meets its specification.

Integration and System Testing

The individual program units or programs are integrated and tested as a complete system to ensure that the software requirements have been meet. After testing, the software system is delivered to the users.

Before the system can be used, it must be tested. It is much less costly to catch problems before the system is signed over to users. A series of tests to pinpoint problems is run first with sample data and eventually with actual data from the current system.

Operation and Maintenance

Normally this is the longest life cycle phase. The system is installed and put into practical use. Maintenance involves correcting errors which were not discovered in earlier stages of the life cycle, improving the implementation of the system units and enhancing the system services as new requirement are discovered.

Maintenance of the system and its documentation begins in this phase and is carried out routinely throughout the life of the system. Much of the programmer routine work consists of maintenance and spends a great deal of money on maintenance.

3.3 On-line System Approach (Internet)

The Internet is a network of thousands of computers, all of which fall neatly into two categories: *clients* and *servers*. Servers store information and process requests from clients. Then they send the requested information to the clients. This information includes all kinds of data, including images, sounds, and text. Servers also send instructions to the client on how to display all this information. Clients make requests for information and then handle the chore of displaying that information to the end user.

In the new inventory system, this on-line system approach play a big role where its can provide users a system that will be running in the World Wide Web. With this on-line system approach, users can save a lot of time and also can access to the system through any desktop that has a connection to Internet.

Another feature in this online system approach is the online form. This online form will be using to apply and approve process.

3.4 Graphical User Interface (GUIs) Approach

The system that will be developing is running in the window environment. So GUIs became an important factor in this system. In the existing system, it was develop in the DOS-based system, which is not so user friendly and interactive. Using the Graphical User Interface approach, system will became more easy to use and more understandable.

Graphical User Interface allow direct manipulation of the graphical representation on the screen, which can be accomplish with keyboard input, a joystick, or a mouse.

The key to GUIs is the constant feedback on task accomplish that it provides. Continuous feedback on the manipulated object means that changes or reversals in operations can be made quickly without incurring error messages.

The creation of GUIs interfaces poses a challenge, since an appropriate model of reality or an acceptable conceptual several skills in away that stretches the capabilities of most system analysts and programmers.

3.5 System Analysis

During this stage, we had to work on some analysis process like gathering and interpreting facts and diagnosing problems. The result of this process will be used to recommend improvement to the system. (Fertuck, Len, 1995)

Through system analysis, we may add, delete and modify system components toward the goal of improving the overall system. The information gathered during this phase has provided alternative strategies to develop this system.

Following are some of the objectives of the analysis

- To study the problem faced by the user

- To study the problem and find out the best solution to reduced it.

- To study how the new system will give information to the user.

- To acquire knowledge on how this system will be developed with the new emerging technology

- Tools to develop the new system will be chosen among different types of new tools that have been studied and stated in chapter 2.

- To identify the major modules to be included in the system

- To identify what are the modules that are feasible to develop and the knowledge and tools need to have in order to develop them.

The information about Office Equipment Inventory System in FSKTM had been gathering from the interview. All the process and the users of the system are defined from the information that I have gather.

3.5.1 Current Office Equipment Inventory System in FSKTM

In the current Office Equipment Inventory system, there are 2 major inventory parts that is separated with each other. One part is fix assets inventory and another one is stationery inventory. The different person in FSKTM in charges these 2 separate inventories.

For fix asset inventory system, it was running in the computerized DOS-based system. This DOS-based system had been used for several years and the main function for this system is to keep the fix asset record in the database. This system is just for data entry staff to use only. When the management or other person want to know the information for fix assets, they will require to the staff to print out the report from this DOS-based system. All the standard function such as add record, edit record and search record are provided by this system. But the system is not so users friendly and interactive because it is a DOS-system.

For stationery inventory system, it was still running in manually. The staff will keep all the stationery record in the record book. The information that recorded in the record book is very simple. The staff will only record the stationery name, type and quantity. This system is just for record purpose only. If the stationery inventory is out of stock, staff will order the stuff from the vendor. In this system, there is a process for applying the stationery inventory. Normally lecturers and staff FSKTM will make the applying. An applying form will give to the person who wants to apply thing. After that, the forms will be giving to the assistant registration to approve. If the form is approval, person who applies can get the stationery from the staff. All this process is running manually and the lecturers cannot know the stationery inventory status unless they go to office to check.

In the overall, it shows that the currently office equipment inventory system is divided into 2 parts. This is because the persons who are in charge on it are different. Basically, office equipment inventory system in FSKTM is doing the data-keeping job. The main process in this system is for staff to entry the information and for lecturers to apply the inventory.

3.5.2 Analysis Through Current Office Equipment Inventory System

In this Office Equipment Inventory System, there are few disadvantages need to take concern. These disadvantages are shown as below:

1. Fix asset system only will be using by the data entry staff. Other persons such as lecturer cannot access to the computer system to viewing the fix asset information. This is because there is only one computer having that inventory system and that computer is located at the control room in FSKTM. It is very inconvenient for other people such as lecturers to know the fix assets status.

2. Fix assets inventory system still running in DOS-based system, which is not base on GUI concept. If we compare with the web-based system, DOS-based system will required a very technique user to operate the system. This will became constraints when the system is publishing to everyone.

3. For stationery inventory, which is still running in manually will cause a problem when the record book is missing. This will cause staff to go to the storeroom and record the stationery information again in the new record book. It is more safety if the system is computerizing. This is because we can make backup files to prevent data missing.

4. Other users such as lecturers cannot know the current stationery status easily. They can only get the information from the staff in office. It is very inconvenient for lecturers because maybe the staff that in charge stationery inventory is not in the office when the lecturers want to see her.

5. Process for applying stationery inventory is very troublesome in the current system. It was wasting a lot time when the lecturers apply for some stationery stuff. This is because lecturers need to get the apply form from the office and pass it back to the office after they filling it. Then lecturers will waiting the approval from the assistant registration and finally will get the stationery from the office staff. All this process can be done through the on-line system.

6. Both fixed assets inventory and stationery inventory are separate. Users need to go the 2 different systems to getting the information.

7. In the fixed asset inventory system, computer hardware and software information are mix with other fix assets information. This makes the record look very messy. It is

better to categorize the fixed assets information and computer hardware and software into 2 parts.

3.6 System Requirement

System requirement should set out what the system should do rather than how this is done. A requirement may be a functional requirement, which is described a system service or function. Alternatively, it may be a non-functional requirement. A non-functional requirement is a constraint placed on the system (for instance, the required respond time) or on the development process 9such as the use of a specific language standard).

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

After the analysis through the existing system, system requirement for the Office Equipment Inventory are define. Basically these requirements can be divided into 2 categories, which are functional requirement and non-function requirement. These requirements are shown as below.

3.6.1 Functional Requirement Definition

1. Login Function

   The propose system should provide a login function to differentiate the users that login in to the system. The propose system is an online system and it was publishing to everyone. So system needs to have a login function to control the accessible of the users. Any unauthorized access will be denied.

   Office Equipment Inventory System will be dividing into 2 parts. One is for fixed assets and another one is for stationery inventory. There will be 3 types of users and these users are administrator, data entry staff and normal users.

2. Add Record Function

   This function will only providing to the administrator and data entry staff. Administrator only can add the record for the authorized users. For data entry staff, he is the only one can add the inventory information to the database. Normal users are not allowed to use this module.

3. Edit Record Function

   This function also provided to the administrator and data entry staff. The main purpose for this function is to edit the record from the database.

4. Delete Record Function

The purpose of this function is to delete the record that is useless from the database. Only the administrator and data entry staff can use this function. Normal users are not allowed to use this function.

5. Search Record Function

This searching record function will be providing to all the users. The main purpose for this function is to let the users to find the particular record more easily. Users can find the record using any keyword. There also will be few categories for users to search the record in this searching function. These categories are inventory name, type, location and code numbers.

6. View Record Function

The viewing record function is also providing to all the users. The purpose of this function is for users to view the inventory information in the computer screen. Although all the users are allowed to use this function, but the information that will be display are different for the different users. This is because some information is useless or secret for particular users.

7. Printing Report Function

This function also will be providing to all the users. Different users will print out the different report. Staff will print out the complete inventory is required by the asset department. For lecturers, they will print out the report, which

will list out all the fix assets that are locate in their room. In this printing function, there will be a features that provide users to generate the customize report.

8. Applying Function

There will be an online apply function in this develop system. The user will use an online applying form and this form will be giving to the management to approve. All this process did not involve any paper. This function will reduce the troublesome and time when the users apply for stationery.

9. Approval Function

When there is an applying function, there must also have an approval function. This function will determine apply form is approve or not by the management. The user that will be using this function is assistant registration. Notification will be sending back to the person who applies for the stationery through e-mail.

10. Updating Function

This function is to help the staff to update the quantity of stationery. When the stationery is giving to the lecturer, staff will reduce the quantity of the stationery. This will make other users to know the latest information and users can apply the stationery base on the quantity that are record in the database.
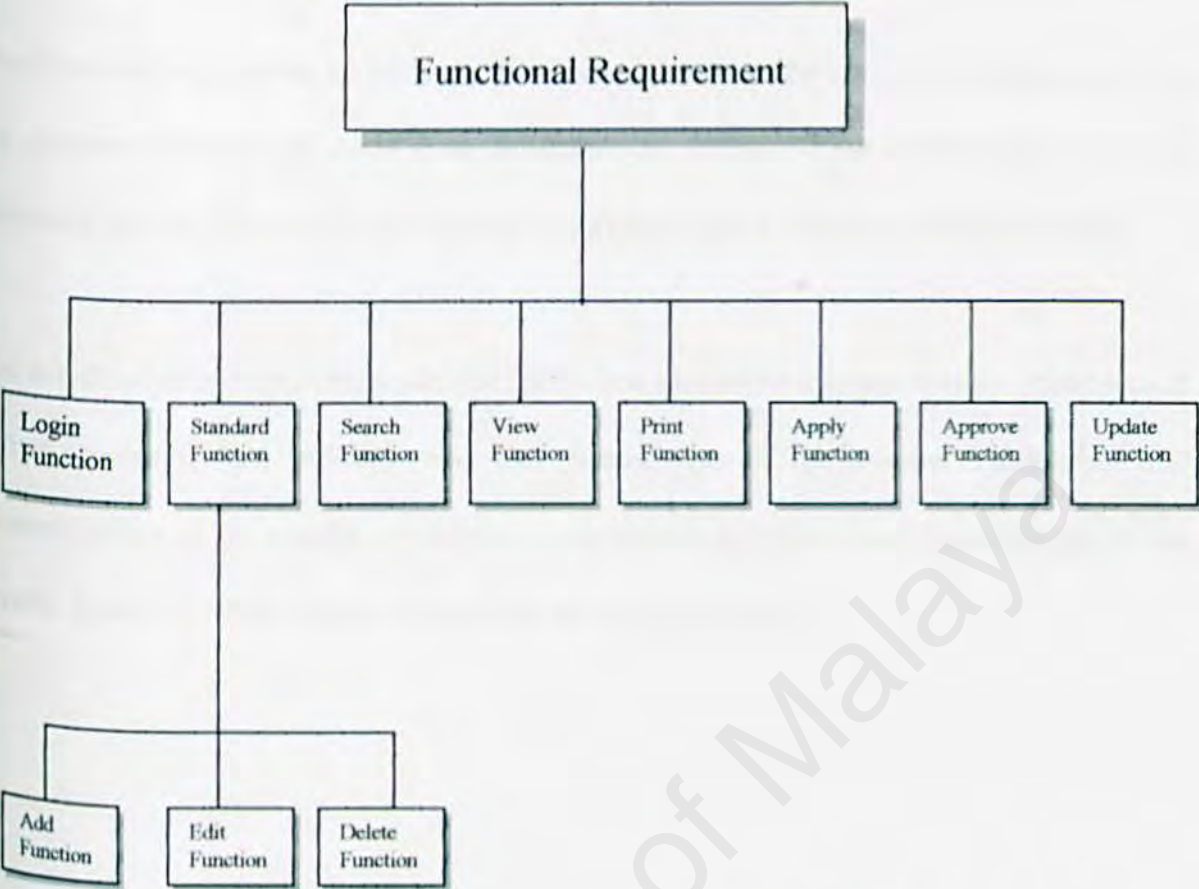
Figure 3.3 shows the Function Requirement Chart for Office Equipment

Inventory System.

3.6.2 Non-Functional Requirement Definition

Non-functional requirements are the other factors that must be taken into consideration in the systems development cycle (Lan Sommerville, 1998). These requirements are very subjective but they play important roles to ensure the system robustness and successful.

The non-functional requirements define the system properties and constraints. Examples of system properties are usability and user friendliness of the system, modularity and maintainability of the system, robustness, consistency, reliability and dependability of the system. Examples of the system constraints are system security.
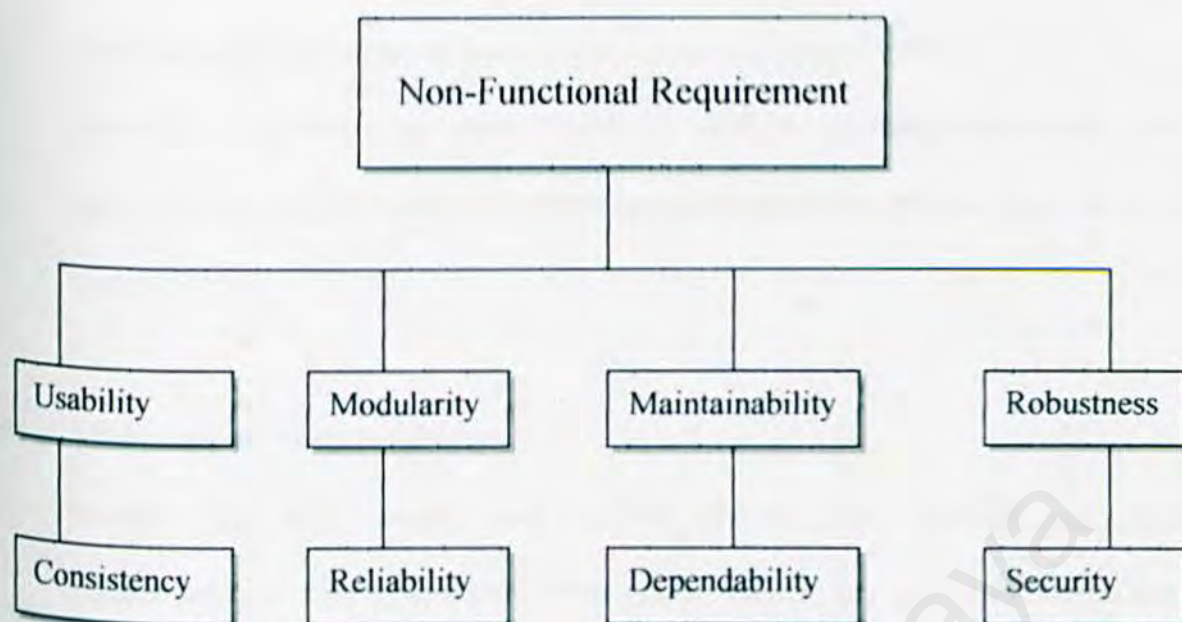
Figure 3.4 shows the non-functional requirement for Office Equipment Inventory System.

Below are the descriptions for non-functional requirement:

i. Usability and user friendliness

Office Equipment Inventory System will be develop base on the Graphic User Interface (GUI). The GUI provides better visual meaning to the user. The interactive and meaningful graphic will help users use the system more easily. Other than that, it also will reduce the risk for users to make the mistake. For an example, an icon that shows a diskette means it is a button for user to save the record. The usable and user-friendly system will make users feel confident when they are using the system.

ii. Consistency

The standard commands such as <Save>, <Exit>, <Add>, <Edit>,

<Delete>, <Previous> and <Next> were use in all the modules of the system. This

will reduce the mistake and confusion when users using the different modules in the

system.

iii. Modularity and maintainability.

System that have design and develop should take consider the factor

maintainability. This is because system maybe will be upgrade in the future time.

To make thing easier and save time, system must have a flexible to be expand.

Office Equipment Inventory System is a web-base system, which is developing by

ASP. ASP is a very powerful web-programming tool, so it would not be a big

problem if the system needs to upgrade in the future.

iv. Reliability and Dependability

A system that has reliability is system does not cause any dangerous or costly when

the users are using it. Office Equipment Inventory System is a reliable and

dependable system because does not cause any physical or economical damage of

system failure. The system can be running after install back the system and the

backup file. This action does not cost much money.

v. Robustness

Office Equipment Inventory System will completely tested to ensure the system had achieved its expectation. The system will be integrated to the e-faculty homepage, so the linking between system and homepage must be take concern. In the e-faculty project, there are many systems, so the integration between the systems is also need to be tested.

vi. Security

This requirement is to prevent the unauthorized people go in to the system. Office Equipment Inventory System is an online system, so it is publish to everyone. But not every person can login to the system, so the login control has been make before users can go into the system. The purpose of security is to protect the integrity data of the system.

3.7 Development Requirement

Hardware Requirement

The minimal hardware requirements for development are:

- At least Pentium II 300 MHz

- At least 64 MB Ram

- At least 2 GB of storage

- Another accessories such as keyboard, mouse and etc.

Software Requirement

The software requirements for developments are:

- Windows NT4.0 and above or Windows 95/98

- Microsoft Access 2000

- Visual Basic 6.0

- Microsoft Interdev version 6.0

- Microsoft SQL server

Programming Tools

The programming tools requirements for developments are:

- Active Server Pages

- VBScript

- HTML

3.8 Development Tools

3.8.1 Active Server Pages (ASP)

An Active Server Pages (ASP) is an HTML page that includes one or more scripts (small-embedded programs) that are processed on Microsoft Web server or other web server before the page is sent to the user. An ASP is somewhat similar to a server side include or a common gateway interface (CGI) application in that all involve programs that run on the server, usually tailoring a page for the user. Typically, the script in the web page at the server uses input received as the result of the users request for the page to access data from a database and then builds or customizes the pages on the fly before sending it to the requestor.

ASP is a feature of the Microsoft Internet Information Server (IIS), but since the server side script is just building a regular HTML page, it can be delivered to almost any browser. You can create an ASP file by including a script written in VBScript in an HTML file and then renaming it with the ".asp" file extension. Microsoft recommends the use of the server side ASP rather than a client side script, where there is actually a choice, because the server side script will result in an easily displayable HTML page. Client side scripts may not work as intended on older browsers, such as JavaScript.

3.8.2 Visual Basic 6.0

Visual Basic is designed, in such a way, which we can immediately design the windows that we wish. It has the ability to create and use self-contained component or objects. Controls are elements you can use when designing a user interface, just like the real life control. These controls can be used to display information or to take action.

A Visual Basic control enables programmers to add features to their programs without having them involved in the details of simple drawing a control that accepts input. Visual Basic 6.0 (VB6) is chosen as the development tool in this system because of the following reason:

1. VB6 is one of the most popular programming tools in windows environment die due to its RAD (Rapid application Development) capability that is associated with it.

2. VB6 is embedded with a search engine (JET engine 1.0) that comes from the family that is similar to the internal engine (JET engine 2.0) of DBMC used.

3. Furthermore, VB6 uses an event driven approach to program the system and is not procedure language. An application developed with an event driven model response to event that happen in the computer environments. Such events include the pressing of mouse button or call function form another application running concurrently.

4. Lastly, the most important here is the FSKTM almost totally using Microsoft product, which support VB6.

3.8.3 Microsoft SQL Server

Data warehouses help users better understand information and look at it in new ways so they can more easily gain insights, see patterns and trends, and make better business decisions. Data warehouses serve the needs of an entire enterprise; in contrast, data marts serve specific business units or functions.

Building on the strengths of SQL Server 6.5, SQL Server 7.0 makes designing, building, and managing data warehouses and data marts even easier. It also provides better tools for gathering data from many sources, building a powerful query environment for using that data, and distributing it across the enterprise—even to mobile users.

These features make SQL Server 7.0 an excellent platform for data warehouses and data marts:

- **Terabyte-sized database support.** SQL Server 7.0 makes it possible to manage the largest data warehouses.

- **Scalability.** Gain the ultimate flexibility for the largest databases, plus provide access to central data sources, across the enterprise to departmental servers and even to laptops that use the 100 percent code-compatible Desktop edition.

- **Microsoft English Query.** Build Web or client/server applications that allow users to pose queries against a data warehouse using standard English.

- **Integrated Online Analytical Processing (OLAP) services.** Multi-dimensional storage and navigation support enables users to perform rapid, sophisticated analysis on large and complex relational databases.

- **Integrated Data Transformation Services (DTS).** Enables you to import, export, and transform data between SQL Server 7.0 and text files as well as heterogeneous data sources supported by Open Database Connectivity (ODBC) and OLE DB. Now all data sources, including Microsoft Excel spreadsheets and mainframe databases, can be easily stored and accessed in a consistent format.

- **Sophisticated replication services.** SQL Server 7.0 supports data consistency in a distributed environment.

- **Advanced query processor.** The processor optimizes and executes typical complex queries, such as star query joins. Intraquery parallelism enables faster performance by breaking a complex single query into component parts, and then distributing the workload to multiple processors.

- **High-performance utilities.** Use these utilities for performance tuning, data loading, and index construction.

- **Microsoft Repository and the Open Information Model (OIM).** SQL Server, together with Microsoft Repository and the Open Information Model, coordinates meta data from SQL Server databases, OLAP Services, and English Query.

- **Visual Data Tools.** These tools make it possible to graphically design and build data warehouse schema.

- **Tight integration with Microsoft Office 2000.** Users can analyze data in Excel.

3.8.4 Windows NT

The word NT is stand for New *Technology*. The most obvious part of Windows is the graphical user interface--the colourful screen and those small, sometimes puzzling pictures referred to as icons.

Below are some of the features of Windows NT:

1. Fault-Tolerance

   Windows NT has many features that provide varying levels of fault-tolerance for the system. Included in NT's list of fault-tolerant features are NT's journal-based, recoverable file system (NTFS), disk mirroring and disk stripping with parity (RAID 1 and RAID 5), disk sector sparing, and support for an uninterruptible power supply (UPS).

2.   Personality/Compatibility

Windows NT was designed to support multiple simultaneous personalities. Its interface became the primary personality. It also supports a POSIX personality, an OS/2 personality, and a DOS/Windows personality. Additional personalities, such as a full UNIX personality can easily be added.

3.   Portability

It is this portability that enables Windows NT to run not only on Intel x86 microprocessors but also on RISC chips, such as the DEC Alpha AXP, the MIPS R4400, and Motorola PowerPC. Part of the key to Windows NT's portability is the hardware abstraction layer (HAL), which hides the difference in actual hardware from the higher-level operating system software. The HAL makes all hardware look essentially identical to the rest of Windows NT.

4.   Localization

Windows NT is available in localized versions for Brazilian, Chinese, Danish, Dutch, Finnish, French, German, Italian, Japanese, Korean, Norwegian, Portuguese, Russian, Spanish, and Swedish. In each of these versions, it was ensured that NT not only communicates in the particular language, but also employs standard idiom, uses correct punctuation in lists, dates, time, and numerical and currency output.

5.   Network Operating Systems

Windows NT is both an operating system and a network operating system. With LAN Manager, OS/2 was the operating system and LAN Manager was the network operating system. This integration of the OS and the NOS has proved to be a formidable combination in Windows NT.

6.   Security

Windows NT was created to meet the United States National Security Agency's C2 level evaluation criteria. By creating Windows NT based on a defined security model, Microsoft was able to guarantee that Windows NT would meet the most demanding corporate security needs.

7.   Flat, 32-bit Memory Model

Windows NT is a 32-bit operating system that uses 32-bit addresses to access objects. This result in many advantages such as it enables NT to address 4,194,304KB (four gigabytes) of memory.

8.   Pre-emptive multitasking and scalability.

The internals of Windows NT were written from scratch and cantered around micro kernel-style architecture similar to UNIX. This microkernel gave Windows NT pre-emptive multitasking. Additionally, Windows NT made use of process *threads*—an idea popularised by Carnagie Mellon's MACH operating system—to support

symmetric multiprocessing (SMP). The internal operations of Windows NT are designed to take full advantage of SMP systems (scalability).

9   Reliability Through Protected Memory Model

In Windows NT's memory model all processes get their own 32-bit address space. This 4GB space is divided in half, and the application can only really use the lower 2GB of space. The upper 2GB is for interfacing with other parts of the system. Every process effectively thinks it is the only thing running. There is no way for a process to read or write outside of its own memory space, either accidentally, or intentionally. This can prevents the system crashes and it provides security for each process.

10.   No more DOS

Although there is no DOS, Windows NT is still able to run the vast majority of DOS programs as long as they don't try to directly access the hardware or require special device drivers. It does this by creating a virtual DOS environment called the NT Virtual DOS Machine (NTVDM). The DOS program runs in this emulated DOS environment. NT traps the DOS calls and converts them to standard Win32 API calls.

11. License fees

However, Windows NT is a copyrighted piece of software that demands license fees when any part of its source code is used. Therefore, it required a sum of monetary outlay to obtain it.

3.8.5 Hyper Text Markup Language (HTML)

HTML is a very useful and easy learning web-programming language. It will conduct a web page without using any compiler. Web page can be view using any web browser such as Netscape and Internet Explorer.

There are many tools to for programmer to write a HTML language. Programmer can use the notepad or Microsoft word to develop a web pages using HTML. Other than that, programmer also can use some HTML editor software to develop the web pages. Examples of theses HTML editor are Microsoft FrontPage and Hotdog.

The advantage of using HTML is because it is simple and easy to use. Some example of HTML tags are <head>, <body> and <frame>.

3.8.6 Microsoft Access 2000

Microsoft Access 2000 is a feature rich and inexpensive database. Microsoft Access is capable of excellent performance with small database and is perhaps the best choice where rapid inexpensive development is essential and the database is not large. All software and manual book information and transactions entered by users to be stored somewhere.

Microsoft Access 2000 allows the users to indicate how the tables should be related to each other. A table can have a one-to-one, one-to-many, or many-to-many relationship. A table that has referential integrity allows only one parent record for each child record. Microsoft Access allows the users to make changes to the structure of a database table. User can add, delete, and rearrange fields in the table structure. User can also control how data will be entered in a table using the Properties sheet or a field.

Access 2000 makes major strides in many areas. These areas are ActiveX Data Objects (ADO), enhanced SQL Server interoperability, Visual Basic for Applications (VBA) and packaging enhancements, Microsoft Jet engine improvements, and improved Web interoperability.

3.8.7 Microsoft Visual Interdev 6

Visual Interdev is a comprehensive, web-based application development tool. It provides an integrated environment that brings together various technologies to work toward a common goal of building robust and dynamic application for the web. It achieves this

integrated development environment through the use of its Microsoft Development Environment, also employed by Visual J++. User can open and work on Visual J++ projects while simultaneously creating Visual Interdev project. This feature greatly enhances productivity, especially when building components using the Microsoft Component Object Model (COM) and incorporating these objects into the Visual Interdev application. It can also open multiple Visual Interdev project within the same workspace.

Site import capabilities are not one of Visual Interdev strong suits, compared to the polished facilities of control and built-it. It is most natural to use Visual Interdev with built-from-scratch sites and applications created and deployed on local server.

Visual Interdev has also improved the integration of complex web site authoring functions by more fully developing, more intuitive and helpful.

3.8.8 Expected Output

Office Equipment Inventory System will be web-based system, which is a system that can be used by variable users. These users include staff, management and lecturers.
System can stores all the inventory information in the share database. So, users can view the inventory information without refer to the staff. System also will provide an on-line apply function. This will help users to apply the stationery inventory in the easier way.
With this on-line apply function, objective of paperless will be achieve.
The final system will be linking to the e-faculty homepage. This means the users can link to the system through the e-faculty homepage.

3.8.9 Comment Of Moderator

On 17th August 2000, I was giving a presentation about this project to my supervisor, Professor Dr. Mahfuzah Kamsah and my moderator, Cik Nor Aniza Abdullah. During the presentation, Cik Nor Aniza has giving me a suggestion to make this system more complete.

The suggestion was send a notification message to the person who had applies for stationery inventory through the e-mail. This suggestion is good because it can let the users to know the result without go to system. I have put this function into my develop system

Table 3.1   Project Planning and Scheduling

| No	Activity Name	Jun '00				Jul '00				Aug '00					Sept '00				Oct '00				Nov '00				Dec '00				Jan '01				Feb '00			
		1	2	3	4	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	**Preliminary Study and Planning**		■																																			
	Identify Objective		▓																																			
	Identify Problems		▓																																			
	Identify Scope		▓																																			
2	**Literature Study**				■	■	■																															
	Analyze Existing Systems					▓	▓																															
	Platform, Tools and Database Survey							▓	▓																													
3	**Analysis**								■	■																												
	Functional and Non-Functional Requirements									▓	▓																											
	Hardware and Software Requirements										▓	▓																										
4	**Design**											■	■																									
	System Architecture												▓																									
	System Flow													▓																								
	Data Flow														▓	▓																						
5	**System Prototyping**																■	■	■	■																		
6	**Development**																						■	■	■	■	■	■	■									
7	**Testing and Maintenance**																														■	■						
	Modules Testing																														▓	▓						
	System Integration																															▓						
	System Testing																															▓						
8	**Documentation**	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
9	**Implementation**																																		■			

61
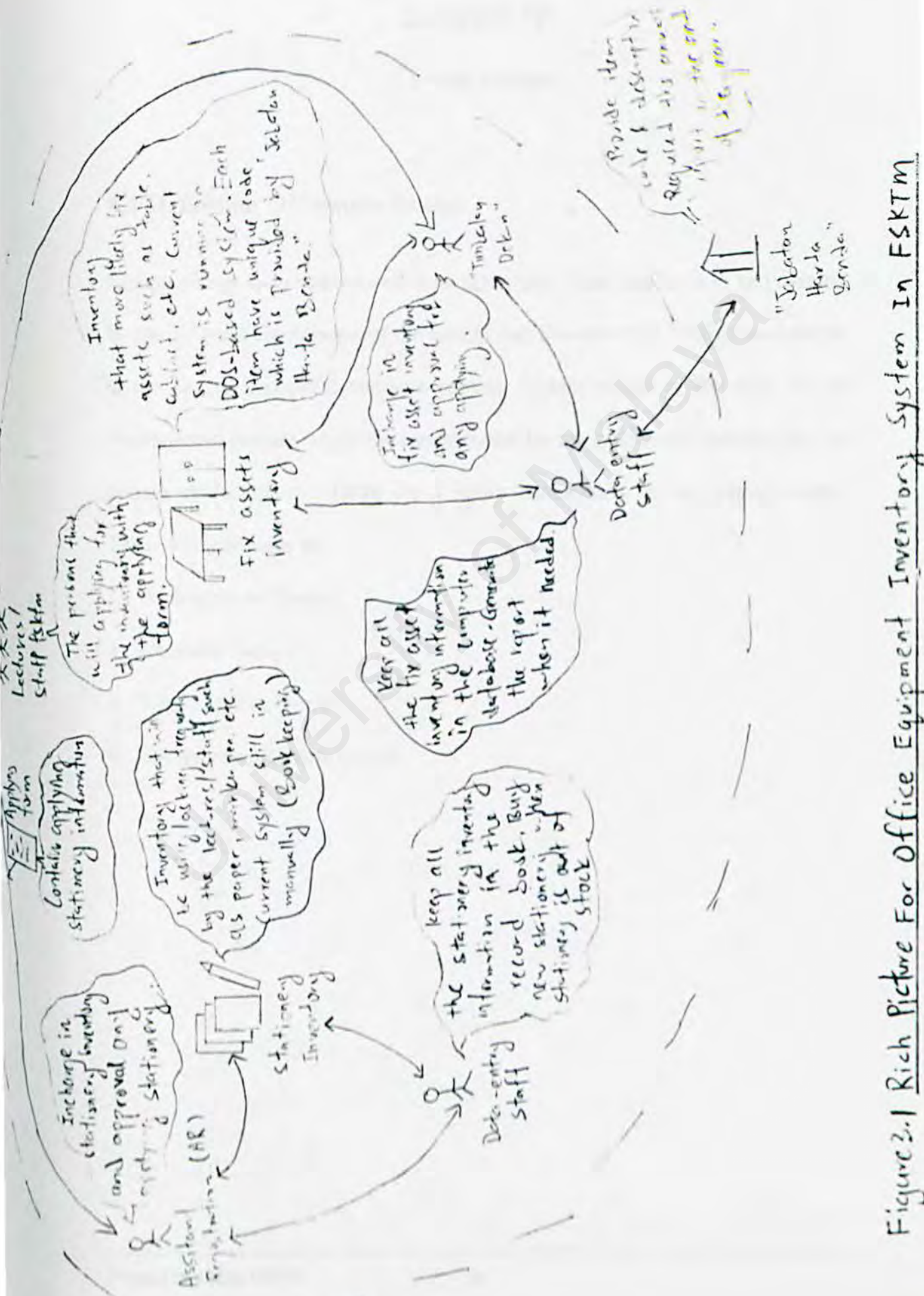
Figure 2.1 Rich Picture For Office Equipment Inventory System In FSKTM

Chapter IV

System Design

4.1 Definition Of System design

System design is concerned with how the system functionality is to be provided by the different components of the system (Ian Sommerville, 1996). Good design is the key to successful software project. System design is the stage in the development process where the requirements for the system are translate into the system characteristics. There are 4 major components in the system design. These 4 components are:

1. Architectural Design

2. Database Design

3. User Interface Design

4. Security and Reports Design

4.2 Architectural Design

System architectural design for office equipment inventory system can be divided into 3 parts, which is administration section, data entry staff section and general users section. Figure 4.1 shows the system structure.
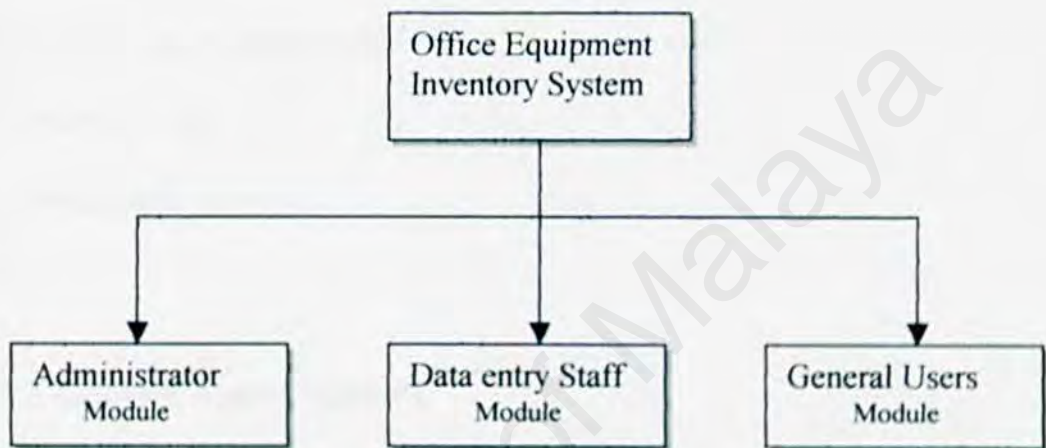
Figure 4.1 Structure of the office equipment inventory system

4.2.1 Administrator Module

Before administrators can go to the module, they need to login to the system first. The features that contains in this module are:

✓ User Maintenance

✓ Database Maintenance

✓ Password Maintenance

✓ View Inventory Information

✓ Applying and Approval Inventory

4.2.2 Data Entry Staff Module

Same with administrator's module, users are also requiring to login to the system before they can use the system. This module provide a few features that are showing as below:

- ✓ Inventory Maintenance
- ✓ View Inventory Information
- ✓ Generate report
- ✓ Change user password

4.2.3 General Users Module

Users are also required to login to the system first before they can use the module. Lecturers are categorized in this general user. The features that contain in this module are:

- ✓ Viewing the Inventory Information
- ✓ Apply for stationery inventory
- ✓ Generate a customize report
- ✓ Change user password
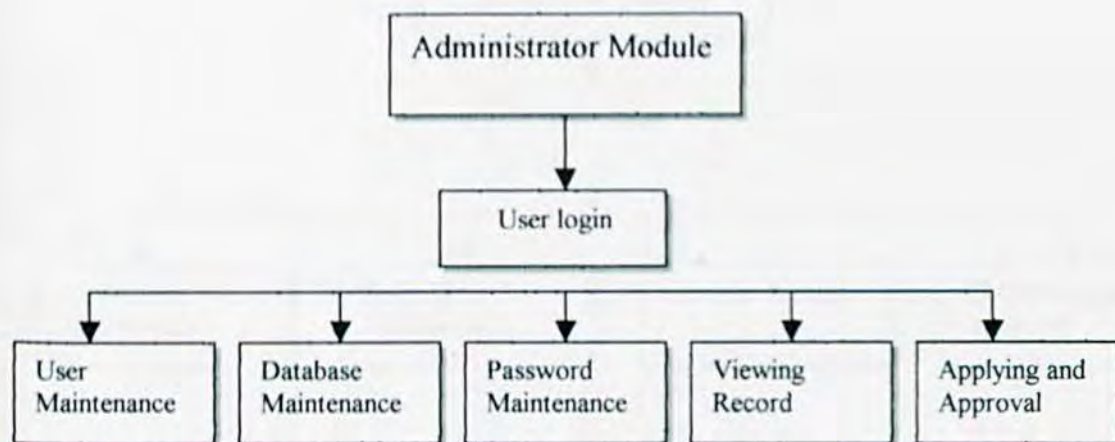
Figure 4.2 Structure Module Administrator
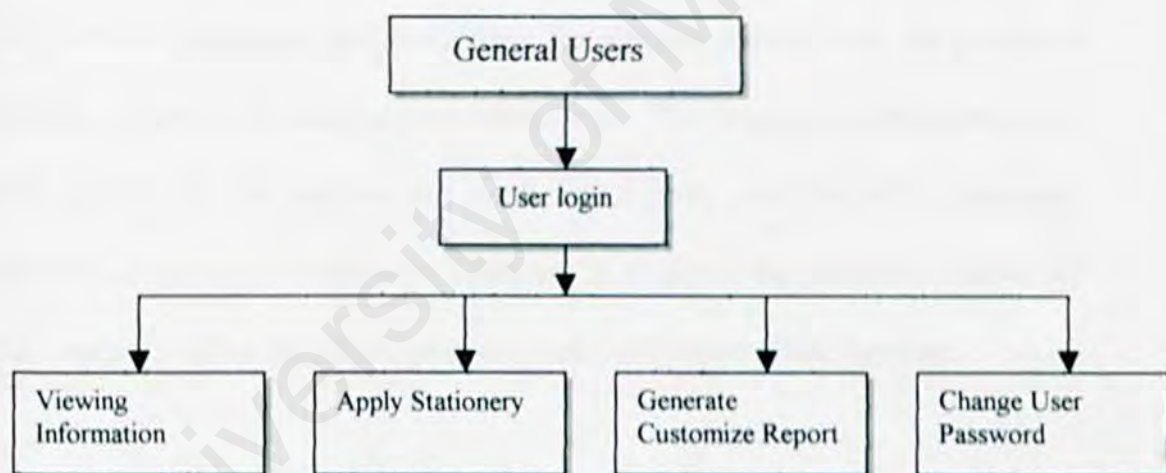
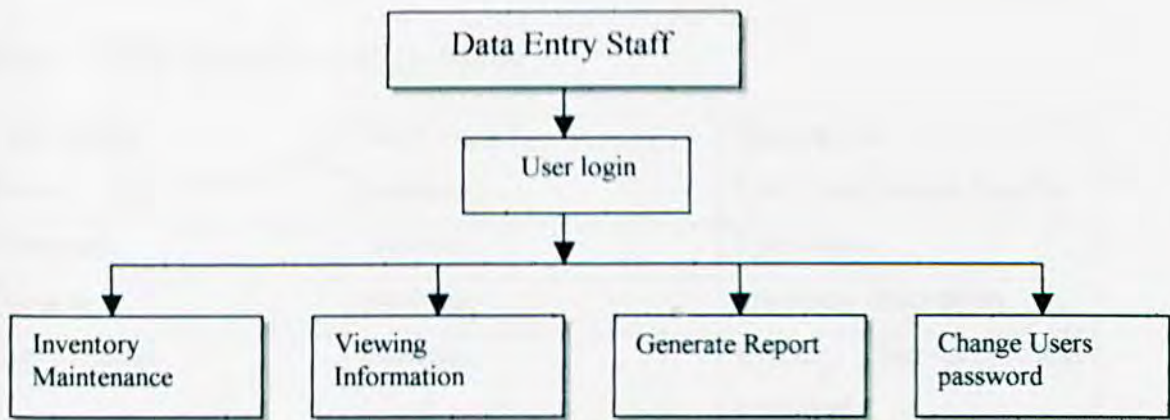**Figure 4.3 Structure Module General Users**

Figure 4.4 Structure Module Data Entry Staff

4.3 Database Design

The Office Equipment And Stationery Application System uses the relational database model in its database implementation. The database is developed using SQL server 7.0. The database can divide into 2 parts, one is for office inventory and another one is for stationery. There are 20 tables in the database, 2 tables for stationery, 15 tables for office inventory and 3 tables are share together.

4.3.1 Tables For Stationery

There are 2 tables for stationery modules and these 2 tables are called "statransaction" and "stationery".

4.3.1.1 Statransaction

This table is use to keep the record that applied stationery. Applied status will be kept in the field call "status". This table has a relationship with the user login

table because system needs to know the userid that apply for the stationery. Below are the descriptions of the tables:

Field Name	Data Type	Description
Userid	Nvarchar	User Identification Number
Username	Nvarchar	User Name
Staname	Nvarchar	Stationery description
Quantityorder	numeric	Quantity Stationery had been apply
Dateorder	datetime	Date Apply
Status	Nvarchar	Applied Status
Dateapproval	datetime	Date Approve
incharge	Nvarchar	Person who approve
maxitem	numeric	Maximum item can apply

4.3.1.2 Stationery

This table is the table that kept all the details of each stationery available. Below are the descriptions for the table "stationery":

Field Name	Date Type	Description
Stadesc	Nvarchar	Stationery description
Quantity	Numeric	Quantity stationery available
Measurement	Nvarchar	Stationery measurement
Maxitem	Numeric	Maximum apply quantity
Status	Nvachar	Status of stationery
Entrydate	Datetime	Date of entry record
Num	Numeric	Autonumber

4.3.2 Tables for Office Inventory

Office inventory contain 15 tables and most of the tables are imported from the old system, which is the DBASE III format. The most important table for the office inventory is table "inventory". This table contain all the information for office equipment such as item code, item tag, room and many more. Below are the descriptions for the table "inventory":

Field Name	Date type	Description
Kod	Nvarchar	Inventory code
Tag	Nvarchar	Inventory tag
Parts	Numeric	Inventory part
Nama	Nvarchar	Inventory Description
Jenama	Nvarvhar	Inventory Brand
PO_Num	Nvarchar	Purchase number
PO_Date	Datetime	Purchase date
Dept	Nvachar	Department code
Bilik	Nvachar	Room
Pembekal	Nvachar	Supplier
No_siri	Nvachar	Inventory serial number
Harga	Numeric	Inventory price
Taraf	Nvachar	Inventory status
Biayai	Nvachar	Funded
Catitan	Nvachar	Remarks
Entrty_Dte	Datetime	Entry record date
Gunasama	Nvachar	Share

4.3.3 Share Tables

There are 3 share tables in the database by the stationery and office equipment. These 3 tables all are user details table. Table "invlogin" is use to verify the valid user. Table "invuserdetail" keep the user details and table "invuserright" is use to control the accessibility of the user.

Below are the descriptions for the table "invlogin":

Field Name	Data Type	Description
Userid	Nvachar	User Indentification Number
Loginid	Nvachar	User Login number
Password	Nvachar	User login password
Usergroup	Nvachar	User group

4.4 User Interface Design

User interface design is not an easy. It can be a trick thing to design because different people have different styles of perceiving, understanding and working. Marcus (1993) points out an that an interface should address several key elements.

I make use of those elements below in designing the user interface. Some of the screenshots of the system's user interface is shown in the user manual.

Metaphors: the fundamental terms, images, and concepts that can be recognized and learned.

A mental model: the organization and presentation of data, functions, tasks, and roles.

The navigation rules for the models: how to move among data, functions, activities and roles.

Look: the characteristics of the system's appearance that convey information to the user.

Feel: the interaction techniques that provide an appealing experience for the user.

The user interface of the Office Equipment And Stationery System is important to an interactive web-base system as it gives the "first impression" to most users. The user interface is the mechanism through which a dialogue between the systems and the human is established. Due to the reason that this is a systems the user interface will be designed as simple as possible.

4.5 Security Design

There are 3 types of system users and each user is required to enter their user identification number and login password to access the system. Password will not be display out for the security purpose.

System will determine the menu for the user. 3 different interfaces will be shown depending on the user login.

Users are not allowed access to the system if they key in the incorrect password.

4.6 Component Design

Before starting the coding the system, the process flow of the system should be determine. There are 3 types of different user for this system and each type of users have their own purpose. Office Equipment Staff will do the maintenance job for the office inventory, stationery staff will do the maintenance job for the stationery item and approve the applied stationery form, and lecturer will apply for the stationery item and view the office inventory status. Overall, the structure of the system are shown as below:

Office Equipment Staff

S
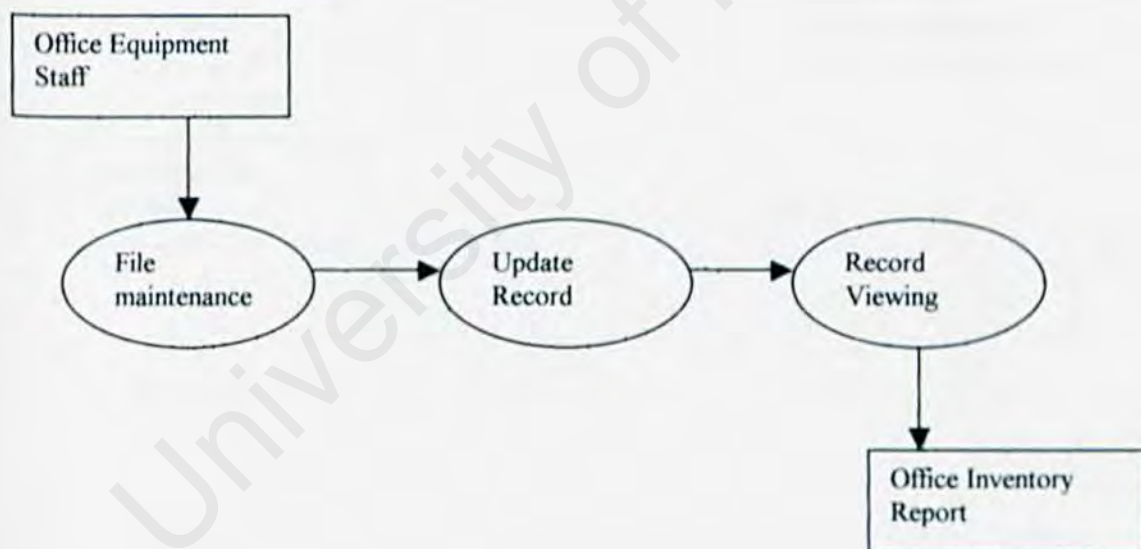
Stationery Staff
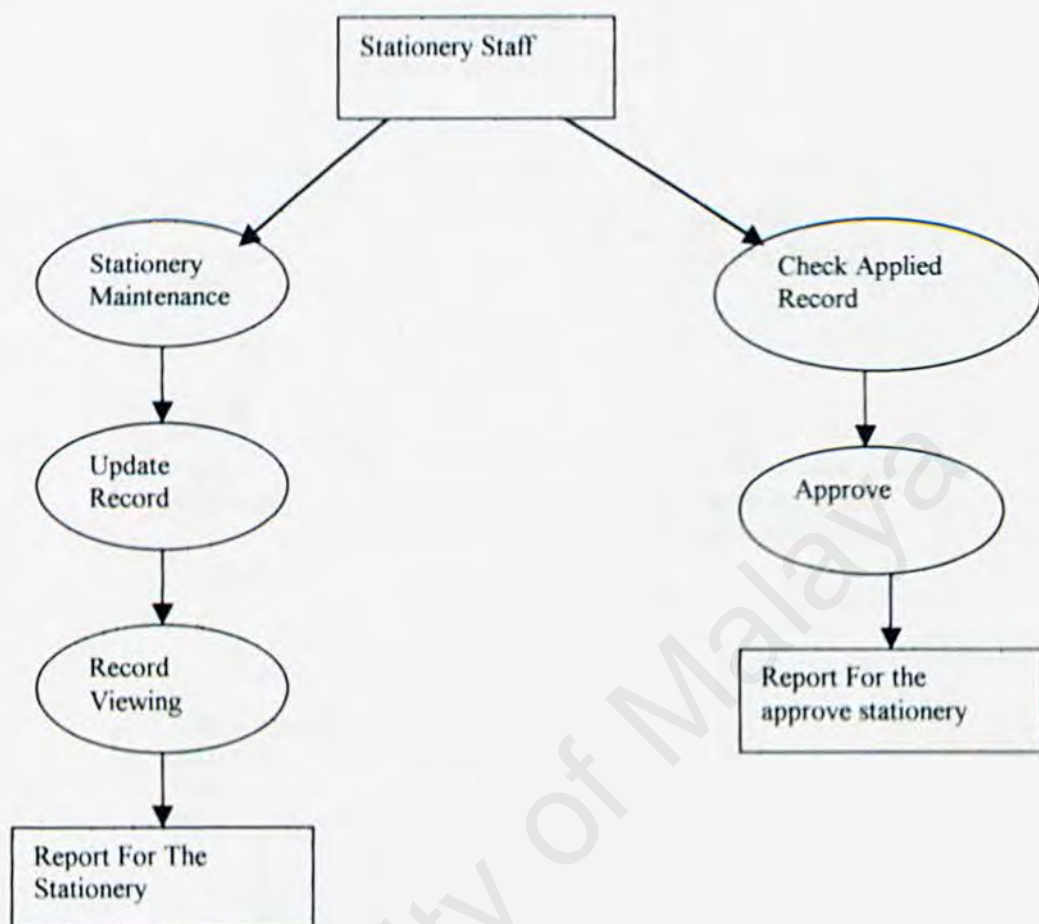
Lecturer
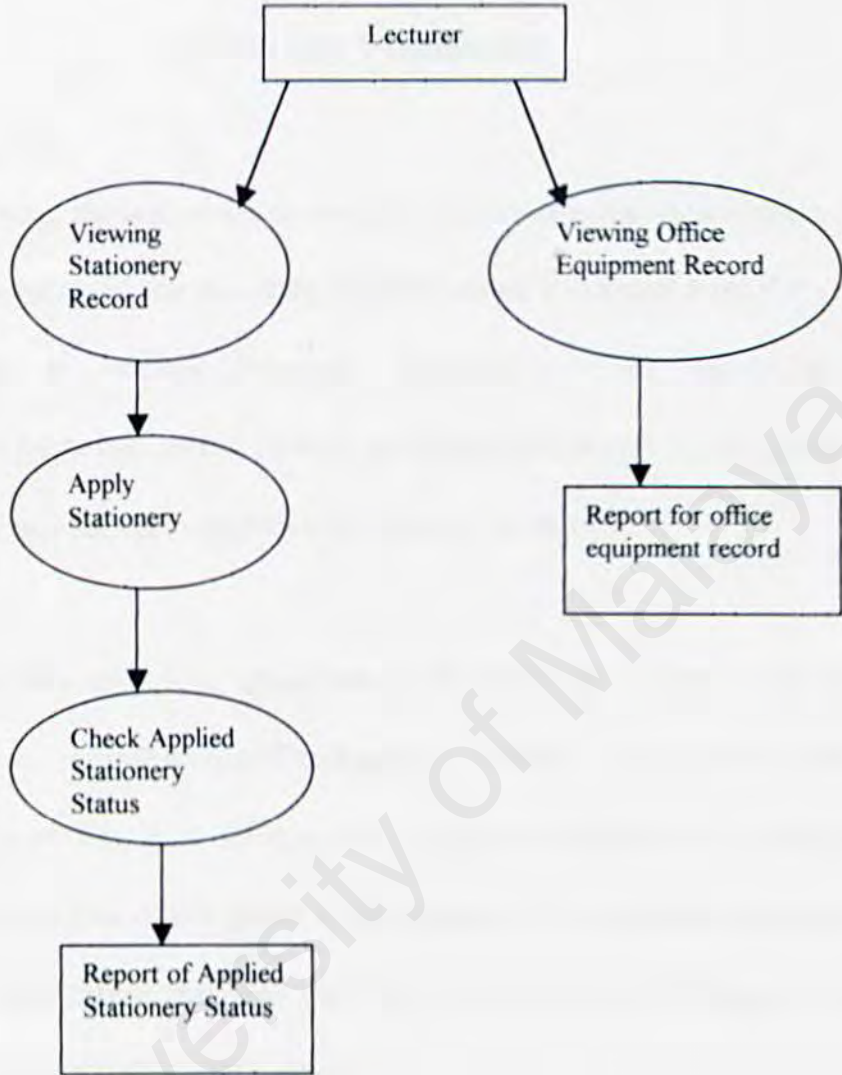
Chapter V

System Implementation

After the design phase, the next phase to develop the system is the implementation phase. Implementation includes all the activities that take place to convert from the old system to the new one. It involves hardware, software and the stakeholder (user). Implementation is important in the system development because in this phase, all the design will be turn into the real program to be used by the user.

The design phases that have been presented to this point are directed towards a final objective: to translate, representation of software into a form that can be "understood" by the computer. The coding is a process that transforms design into a programming language. The primary goal of this phase is the production of a simple, clear source code with internal documentation that will ease the processes of verification, debugging, testing, modification and further enhancement.

5.1 Development Environment

Development environment has certain impact on the development of a system. Using the suitable hardware and software will speed up the system development and it performance. The hardware and software tools used to develop the entire system are as listed follow:

5.1.1 Hardware Resources

From previous system proposal, system will be running in the networking environment, which is web-base system. So, to archive this objective, a proper hardware component should be chosen because this will determines the degree of successfulness of an implementation computerized system, as the e-faculty desired. The computer equipment will become the property of the users. This method is usually the most popular and advisable when the equipment is to be kept 5 years.

Here, we proposed that the FSKTM makes a purchase of the following hardware:

- Intel 233-MHz Pentium II Processor

- 32-MB SDRAM (which can update to 256-MB)

- 1.44-MB Floppy Disk

- 6.8 GB ATA Hard Disk

- 6.1 PS Microsoft Mouse and Windows 95 keyboard

- Preloaded with window 98

- 15' Monitor

5.1.2 Software Resources

A computerized system will not be operated if there is not any software being installed and run in the computer system. These are basically three types of software for a computer system. They are system software (operating system), utility software and programming languages and application software.

This Office Equipment And Inventory System will be programmed using the Active Server Page (*.asp), which is a web page file. Active Server Page has been chosen because file size is small, it free and it widely used in the web environment.

The choice of software has a marked effect on both on the system's flexibility and performance. Software selection criteria are security, reliability, modularity. expandability, flexibility and usability.

5.1.2.1 Software Tools for Development

There are several software have been used during the system development. Some are compulsory such as Windows NT, Internet browser and some are development tools such as Microsoft Visual InterDev. Table 5.1descript the software that have been used to develop the system.

Software	Purpose	Description
Microsoft Windows NT Server 4.0	System Requirement	Operating System (OS)
Internet Information Server 4.0	System Requirement	Web Server Host
SQL Server 7.0	Database	Build the database to store and manipulate the data
Microsoft Visual InterDev	System Development	Coding the web pages
Active Server Pages (ASP)	System Development	Coding the web pages
Hyper Text Markup Language (HTML)	System Development	Coding the web pages
Internet Explore 4.0 or above	System Development	Viewing the web pages
Microsoft FrontPage	User Interface Design	Designing the web pages
Adobe Photoshop 5.0	User Interface Design	Image design and creation

Table 5.1 Summary of Software/Software Tools Used For Office Equipment And Stationery System

5.2 System Development

System development is the process of creating the programs needed to satisfy an information system's processing requirements. System development consists of the following steps: review the system documentation; design the system, coding phase, testing the system and completion the system documentation. Figure 5.1 shown the system development process.
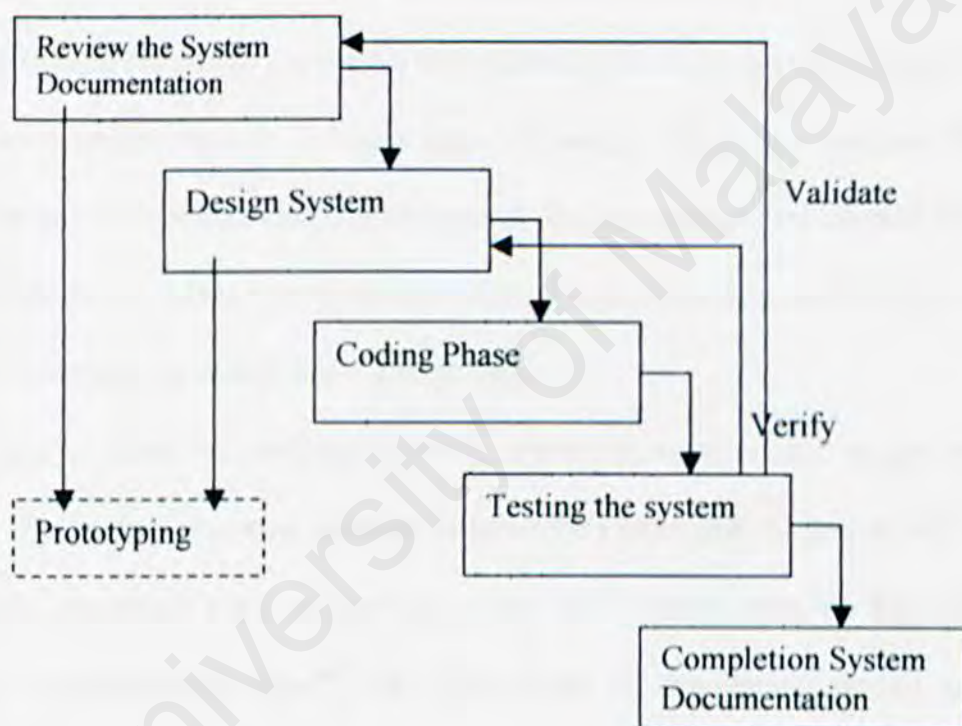

Figure 5.1 System Development Process

5.2.1 Review the system documentation

The first phase in the system development is to review back the documentation that had been prepared during the previous chapter. The documentation of Office Equipment And Inventory System consists of simple process description, report layouts, data dictionary and the source documents. After reviewing the documentation, it helps me to more understand the works that needs to cover during the coding stage.

5.2.2 Design The System

The next phase after reviewing the system documentation is to design the system that can be use. System design consists 3 major types of design, which are database design, logical design and interface design. The purpose of database design is to identify the data fields that might be use in the system. In the database design, we also need to identify the relationship between each data fields (table linking).

Logical design is more on problem solution, which is more related to the system processing. This is very important because without the proper logical design, the whole system will be corrupted. Take an example; if we didn't design properly for the login process, the system cannot identify the valid users. In this logical design, control statement such as *AND, OR, IF, WHILE* are very frequent used during the coding stage. The purpose of the interface design is to make the system became more interactive and more user friendly.

5.2.3 Coding Phase

Coding the program is the process of writing the program instructions that implement the program design. Design specification must be translated into a machine-readable format. The coding step performs this task. If design is performed in a detailed manner, coding can be accomplished mechanically.

All the coding for this Office Equipment And Inventory System are written with Active Server Pages (*.asp). An Active Server Page is primarily a scripting environment. Languages used to develop an ASP are HTML and VBScript or Script.

5.2.3.1 Coding Approach

A program with a technique called top-down, stepwise refinement, an approach that is essential to the development of well-structured program. This approach enables the programmer to terminate the top-down, stepwise refinement process when the pseudocode algorithm is specified.

5.2.3.2 Code Documentation

Code documentation begins with the selection of identifier (variable and labels) names, continues with the composition of connectivity and ends with the organization of the program. Blank lines or indentations are used, so that comments can be readily distinguished from the code.

Internal documentation

Internal comments provide a clear guide during the maintenance phase of the system. Comments provide the developer with a means of communication with other readers of the source code. Statements of the purpose indicating the function of the module and a

descriptive comment that is embedded within the body of the source code is needed to describe processing function.

Naming Convention

Naming convention provides easy identification for the programmer. The naming convention as created with coding consistency and standardization in mind.

Modularity

In order to reduce complexity, facilities change results in results in easier implementation by encouraging development of different parts of a system.

5.2.3.3 Database Connection

ActiveX Data Object (ADO) is used to store and retrieve data from a database. ADO is a group of objects designed to provide a simple programming interface to databases. To make the database available to Active Server Pages, database must be placed on the Windows NT server and create an ODBC DSN that points to its location, named Inventory.

All communication with a database takes place through an open connection. Before any information can be inserted into or retrieved from a database, a connection with the database must be opened. The ADO Connection object serves the purpose. Below are a few steps to follow in order to open a database connection.

1. Create an instance of the Connection object to open a connection with the database.

2. Call the Open method of the Connection object to actually open the connection.

Below is an example:

```
<%
Dim objConn
```

```
Set objConn = Server.CreateObject ( "ADODB.Connection")
objConn.Open "DSN=Inventory"
......
.....
.....
objConn.Close
set objConn = nothing
%>
```

5.2.3.4 Development Tool - Microsoft Visual InterDev

This tool enable easy performance of the many complex programming and database tasks required in the creation of a web site, as well as the incorporation of HTML formatting and layouts, graphics and other multimedia components.

When working on a web site with Visual InterDev and performing tasks like adding files to the site or editing any of he existing files, this tool creates a second copy of the files on the local computer. This is called the working copy. Whenever these working copies are saved, Visual InterDev updates the file on the web server as well

5.2.4 Testing The System

Testing the system also is a very important phase in the system development. This is because it will help me to ensure all the function is running correctly and release system from bug. There are several types of test on the system and all this testing step will be discuss in the section 5.4.

5.2.5 Documentation

Final step to complete the system development is to generate the documentation. Accurate and complete system documentation is essential for the successful operation and maintenance of the system. This documentation includes the system user manual that may be needed by most the users as well as the administrator.

5.3 System Testing

System testing is an expensive but critical process. The most useful and practical approach is with the understanding that testing is the process of executing a program with the explicit intention of finding errors that is making the system fail.

Various data will be applied in the system to ensure all the function is running normally. The data are created with the express intent of determining whether the system will process correctly. The following are the importance of testing:

- Testing needs to be conducted regularly to remedy the shortcomings identified during testing.
- Testing will also provide feedback for fine-turning the network before it becomes fully operational.
- Integrated testing ensures that all parts of the system will function together properly.
- Testing should increase user familiarity with the system.

5.3.1 Unit Testing

Unit testing is a process that verifies all the modules, which are consist in the system. Each module is testing separately and all the possible case or data will be tested in each module. Unit testing was done during the coding phase. The first step of unit testing is to examine the program code by reading through it and trying to spot algorithm, data and syntax faults.

The following step is comparing the code with specification and with the design to ensure that all the relevant cases have been considered. And finally, test cases are developed to show that the input is properly converted to the desired output.

In the development of Office Equipment And Inventory System, unit testing is done concurrently with the prototyping phase. All active server pages will be check because each page is considered as a unit. For example, for the Staff section, there will be file maintenance module, which is, consists add, update and delete function. Each function is coding in the different active server page. I need to test and check each active server page separately to ensure all the function is free of bugs.

5.3.2 Integration Testing

After the unit testing, next step is to combine all the modules into the system for integration testing. Integration testing is the process of verifying that the system components work together as described in the system and program design specifications.

For this Office Equipment And Inventory System, integration between each web page is very important because linking features is important in the web base system. So I need to test all the links between active server pages (web pages) and to make sure all is link to

the correct document. Beside of that, I also need to test all the integration process such as login process, add record process and update process. This is important because each process require a passing parameter from one active server page to another active server page. So, once again , each page need to test and check to make sure that the parameter passing is correctly.

Incremental integration approach was applied during the development of the system. The system was constructed and tested in small arguments, where errors were easier to isolate and correct. Error will be corrected before processing to the next integration.

If all individual modules passed the module testing successfully, there will be no bugs in the module integration testing. The motive of this testing is to ensure that the all modules can be executed as complete module.

5.3.3 System Testing

The last implemented testing procedure is the system testing. There is a different between system testing and previous testing phase (unit testing, integration testing). Unit and integration testing is to ensure that all the modules and process are running properly which is desire in the design stage. But purpose of the system testing is to ensure that the system does what the users want it to do.

System testing verifies that the elements are functioning properly and the overall system performance. Beside of that it also needs to ensure that the Office Equipment And Inventory system objectives are meet.

Office Equipment And Inventory system is tested weather it meets specific performance efficiency objectives in Performance Testing. Data Integrity Testing is used to verify that the data is stored in a manner where it is not compromised under updating, restoration or retrieval processing in the System.

5.3.3.1 Functional Testing

Function testing checks that the integrated system performs its functions as specified in the requirements that were identified during the System Analysis and Design phase.

5.3.3.2 Performance Testing

System performance is measured against the performance objectives set by the user as expressed in the nonfunctional requirement. Performance testing examines how well the calculation is done, the speed of response to user commands, accuracy of the result, and the accessibility of the data are checked against the user's performance prescriptions.

Security testing

Verify the protection mechanism in the system against improper penetration. Unauthorized people are not allowed to access the system. This is important because it can prevent unauthorized people modify the data and cause the database and system corrupted.

5.3.3.3 Internet Browser Testing

All the active server pages will be view in the Internet browser. There are several Internet browsers in the market, such as Internet Explorer (IE) and Netscape. Testing the active server page in the Internet browser is very important because each browser support different script. Some script (javascript or vbscript) can be run in IE but cannot run in the Netscape.

After the testing, I recommended the IE5.0 and above because it more powerful and support more script language.

5.3.3.4 Storage Testing

Determine the capacity of the system to store transaction data on a database or in other files by entering data until the capacity is reached. Comparing the actual and claimed capacities will verify the accuracy documentation on the one hand and allow a judgment about actual capacity at the same time.

5.3.3.5 Performance Time Testing

Determine the length of time system used by the system to process transaction data. This can be done by examine the response time to an inquiry, make a backup copy of a file or send a transaction and receive a response. It also includes test runs to time indexing of restarting of large files of the size the system will have during a typical run or to viewing the record.

5.3.3.6 Data Testing

Data testing is the process that verifies the system for accepting the correct data only. To prevent the unused and idle data, at the data-testing phase we need to applies various possible data into the system. We can identify the problem occur during the data testing. All the problem can be solved with modify the coding or modify the database. For an example, system cannot accept the apply stationery date with value "31/02/2001". So a data error handling should have be done and a message should be prompt to the users state that the date is invalid date.

5.3.3.7 Analysis of the Test Results

From the testing process that has been carry out, it can summarized the test results as follow:

Achieve the main objective of the project

Generally, the main objectives of the project as described in the earlier chapter have been achieved. The system had become a web base system and users can access to the system through the Internet or Intranet. For the inventory staffs, they can maintain the inventory file and view the record through the browser. For the stationery staff, they also can maintain the stationery file and approve for the apply stationery through this online system. Lastly, for the lecturers (general users), they can apply for the stationery through the online system and they also can view the status of the office equipment in the faculty.

Enhancement on the user interfaces

After testing the system, I find that the user interface for the system should be more attractive and user-friendly in order to attract the user to use the system. As some users may not computer-literate, it is important to provide a user interface, which is easy to use as possible. User may reluctant to use a system that is not user-friendly. So the use of graphics or attractive menu link may help to improve the user interface.

5.4 System Convention

System convention is the process that converts the old system into the new system. There are 2 things that have to take notice before we convert the system. First we need to consider the file type to convert and second one is the method of the system convention.

5.4.1 File Convention

The old system is running in the DOS environment, so to convert the system into the web-base system, we need to convert the old database file, which is in DBIII format into a MDF (SQL Server7.0) format.

Beside these old database files, we also need to create few new database tables to support the new features in the new system.

5.4.2 Method Of The System Convention

To convert the old system to new system, I recommend the parallel conversion. Parallel conversion is a suitable approach towards accomplishing the conversion of the new system. With this conversion mode, both the existing and the new system operate simultaneously of concurrently for some period of time. All input transactions are used to update the old files and the database of the new system. Outputs from both systems are compared and difference reconciled.

The advantages of the approach:

a) Risks are relatively low if problem arise in the start-up of the new system.

b) It provides a high degree of protection to the organization from a failure in the new system

c) It is flexible since the old system could be discontinued as quickly or as slowly as the users feel comfortable with the new system.

5.6 Post Implementation Review

After the system is implemented and conversion is complete, a review of the new system is conducted with the following objective:

- Determine whether the system goals and objective have been achieved.

- Determine whether personnel procedures, operation activities and system controls have improved.

- Determine whether the new system is well received and will meet the performance objective that lead to its development.

- Determine whether user service requirement have been met while simultaneously reducing errors.

- Determine whether adjustments are needed.

- Provide the first source of information that is significant for evaluation and maintenance requirements.

Chapter VI

System Evaluation

As mentioned earlier in the first chapter, Office Equipment And Stationery Management System is to develop to achieve the objective below:

- ✓ Fulfilled the e-faculty objective. Provide a systematic system for the faculty to achieve the goal of efficient, effective and excellence faculty.

- ✓ Provided an On-line system for the users of Office Equipment And Stationery Management System. Upgrading the old system to the web environment, which is easier to access.

- ✓ To keep track the inventory and stationery record with a powerful database.

- ✓ To provided a user-friendly system to the users.

6.1 System Strength

6.1.1 User password validation

This is important because there are 3 types of users who will use this Office Equipment And Stationery System. Each type of user has their own module and unauthorized people are not allow to access to system. 3 types of user for this system are administrator, data management staff and lecturers. Each user will be giving the Login Id and password by the administrator. User can change their password through the system after they got the password from the administrator.

Function of administrator is to create the authorized user for the system. Function of data management staff is to do the record maintenance job. Function of lecturers is to view the record and apply for the stationery item.

Once the different type of users login to the system, they will get different interface base on their accessibility to the system. Objective of this user password validation is to prevent intruders from intentionally or unintentionally causing vast damages to the system.

6.1.2 Friendly User Interface

The System is considered to have a friendly user interface. An authorized user is able to access especially data management users is able to access all the function in the system. Graphic User Interface (GUI) components such as command buttons, combo box and navigation button are used to minimize the user actions while performing certain task. The learning curve is to foreseen to be short and a user should be able to use the system within minutes.

6.1.3 Web Base System

This system is a web-base system, which means users can access to the system through any personal computer as long as the computer is connected to the web server. This online function provides more convince to the users, because user can access to the system at anywhere and not need to go to the particular computer the access the system. This will save user a lot of time especially for the data management staff.

Because of the popularity of the Internet, nowadays there are many people know how to use the Internet Browser such as Internet Explorer and they have get used of it. This system required an Internet browser to make it work, so users will find the system not so difficult to use and they will get familiar with the system in a short time.

6.1.4 Relatively Fast Response Time

With the current advanced technology especially fast computer processor, the overall response time definitely can be reduced. The Office Equipment And Stationery System is designed in such manner that they are loaded from memory in a reasonable amount of time to ensure the users need not wait too long to view the designed user interface. Graphics are avoided and ActiveX controls are kept in minimum possible during the interfaces design stage.

6.1.5 Online Apply And Approve Stationery Process

This system provides the users (stationery staff and lecturer) to apply stationery or approve the applied stationery function in the online format. Lecturer can view the stationery status that available and apply for the stationery just submits the electronic form through the Internet Browser. The applied stationary form will be notify to the stationery management staff when he/she login to the system. Stationery management staff also can approve or not approve the applied stationery through the system. Lecturer can login to the system to check the applied status.

All apply and approve process is running in the electronic process and there are not any paper work involve on it. This is to achieve the objective of e-faculty, which is became a paperless faculty.

6.1.6 Database To Keep The Stationery Record

Currently there is not any database or computerized system for the stationery application system. All the record is kept in the bookkeeping. It is very dangerous and unconvinced because problem will arise when the book is lost.

With this new system, stationery management staff can keep all the stationery record in the database and all the data can retrieve easily through the system. This is more safety than keeping the record in the bookkeeping.

Beside of that, system also provides file maintenance function for user to do the maintenance jobs. This will prevent user make the mistake and user can modify the record more easily.

6.2 System Limitations

Due to project boundaries, there are some limitations in the system. The limitations are stated as below:

6.2.1 Browser Limitation

The system can only run in Internet Explorer 4.0 and above. The system requires a browser that can understand VBScript, the default supporting language for ASP. User who used browsers that do not support these features will not be able to use the available functions in this system.

6.2.2 Inventory Management Staff Must Familiar With The Item Code

All the inventories item has a item code that have been fixed by the Government and there are a lot inventory in the faculty. So, inventory management staff need to familiar with all the item code because the item code cannot be change easily. This causes the limitation when the user wants to do the maintenance jobs.

6.2.3 No Print Report Format For Inventory And Stationery Record

For this Office Equipment And Stationery system, user only can print the report using the print function that provide by the Internet Browser. I didn't generate any report for the system because I failed to do the coding for printing function.

User still can view the record and print the record from the browser but the printed record will be different from the standard report format because of browser constraint.

6.3 Problem Encounter And Solution

During the development process, there are several problem arise and these problem need to be solve for generate the working system. The following are some of the major problems encountered from the beginning through the end the system development process.

6.3.1 Difficulties in Choosing a Development Technology, Programming Language and Tools

There are many well-know software tools available to develop a web-based database system currently as stated in the earlier chapters. Choosing a suitable technology and tool was a critical process as all tools have their strengths and weaknesses. In addition, the availability of the required tools for development was also a major consideration. A tough decision was needed to choose from Active Server Pages technology, CGI or Java.

In order to solve this problem, I choose the default programming language that recommend by the project e-faculty, which is Active Server Pages. For the web development tools, I select Microsoft Visual Interdev 6.0 and SQL server 7.0 for the database.

6.3.2 Not Clear With The System And Design

At the beginning stage, I am not very clear with the process and function that contained in the system. Because of not enough information, I cannot design my system properly. In order to solve this problem, I decided to look for user opinion and information. I have

interviewed with Mr. Baharuddin and Ms. Nyah to get more information about inventory and stationery. Beside of that, I also went to Treasure Department to get the information. To make me more understand the system, I also went and look for the old system developer in the Faculty Science.

After I get all the information, I can start design system and develop.

6.3.3 Handling New Operating System

The system will be running in the Windows NT Server and I don't have any experience with this operating system. As a beginning of a new operating system, it took quite some time for me to learn the features in Windows NT Server and what it is capable of doing. I am grateful that other members in project e-faculty is willing to teach me and giving me a guide during the process development.

6.3.4 Inexperience In the Programming Language (Active Server Page)

This is the first time I develop the web project and I am not so familiar with the web development tools. At the beginning stage, I face a lot of problem when I doing the coding.

In order to solve this problem, I need to read a lot of books, which is related with the web development tools such as "Beginning With ASP 3.0". Beside of that, I also went to look for course mate and project members help. They have taught me a lot of coding and help me solve same programming problem.

At the end of the development process, I found that my programming skill in the Active Server Page had been improved.

6.3.5 Unfamiliar With The SQL Statement

In my system, I need to create a database to keep the record. Database that I used is SQL Server 7.0. This is also a first time I use the SQL server 7.0, so I am not so familiar with the SQL statement. I face the database connection problem in the beginning phase. After I read the books and seek help from the project members and course mate, finally I can manage with the SQL statement.

6.3.6 Upload Web Page To The System

System was developing in my personal computer and I need to upload all the web page to the Web Server. During the uploading phase, many problems arise such as failed connection to the database server and cannot browse the page from the server.

In order to solve this problem, I need to debug the coding in the Active Server Page and modify it until it works properly.

6.4 Future Enhancements

I have mentioned the limitation that found in the system in the section 6.2, and now I will discuss the future enhancements for the system. Future enhancement can be done to make the system more advance and ease to use. This system can be further improved and enhanced to include more features and functions to realize the advantages of web-base system.

6.4.1 Provide A Printing Function For the System

As mentioned earlier, system only can print using the Internet Browser. So to make system became more powerful, a print function can be added to the system in the future. This print function can generate a report that in a standard format.

6.4.2 E-mail Notification For The Applier Stationery

Current system only can notification the appliers where they login to the system. System can be upgrade to the stage that status of approving the application is auto divert the approval message to the user.

6.4.3 Attractive Interface

Office Equipment And Stationery Management System will become more attractive and easy to use if its interface is enhanced to be more attractive and interactive by adding more meaningful and user-friendly images, 3D images, animation images and sounds.

6.4.4 Backup And Restore Function

The backup and restore function was not considered earlier due to initial functional requirement. This functional is very important if an accident occurred causing damage to the system and database. So, the contingency planning is needed because the disaster will cause loses to the organization. The backup must be schedule in one proper manner that the important and critical data must backup in daily basis.

Chapter VII
Conclusion

The Office Equipment And Stationery Management System is a computerized system that provides the user to maintain the inventory and stationery record. Beside of that, it also it an on-line apply and approve system for the stationery item. This system was developed to fulfilled objective project e-faculty. Although development the whole system is not an easy task because various objectives has been targeted, but it still can be considered as a contemporary effort to achieve the goals. Overall, this project has achieved and fulfilled the objectives and requirements as determined during the analysis phase. But there are also got some limitation and small problem in the system that had been developed.

In the process of developing the system, I gained a lot of knowledge of programming language, technique how to configure web server, SQL server and learn the process of software engineering. Programming language that I have learned are Active Server Page, JavaScript, VbScript and SQL statement. I also had learned how to used the web development software such as Visual Studio Interdev and Microsoft FontPage. All the knowledge that I have learned during develop this system will help me a lot in the future when I want to develop a new web-base system.

Although this system is not a very complex system, nevertheless the successful development of the Office Equipment And Stationery System is the first step for e-faculty towards the future development of system definitely. The problems and experiences gained during the system development should be useful in my future

endeavors. It is hopes that this system can provide a foundation upon which more innovative and comprehensive system may be built to perform multiple tasks and fulfills various user requirements.

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USER MANUAL

1.0 Introduction

This user manual is useful for users from difference background to use the Office Equipment And Stationery Management System (OEIS). This user manual consists of the guideline and example to help users use the system in correct way. There are 3 type user will be using this system and all guide will be given in this user manual. By the end of this user manual, users are enable to use the system.

2.0 Objective

The objective of this user manual is to enable users to uses the modules through the web in a correct way.

3.0 Requirements And Web Address

To access the OEIS system, users are required to have the Internet Browser in their computer. Internet Explorer 4.0 and above is recommended. Other Internet Browser such as Netscape also can access the system.

There are 2 ways user can access to the system. One is go to the e-faculty homepage and click the link for OEIS system. Another way is type the web address for the OEIS system in the address bar, which is at the Internet browser.

Web Address for e-faculty and OEIS are given as below:

e-faulty : http://efaculty.fsktm.um.edu.my

OEIS   :http://efaculty.fsktm.um.edu.my/oeis

4.0 Type Of System User

This OEIS system has 3 types of users. These 3 types of user are:

1. Office Equipment/Inventory management staff

2. Stationery management staff

3. Lecturer/general user

Each type of user will have a different type of system interface when they login to the system. Modules and functions that provide by the system are also different of each type of user. These modules and functions will be explained in the "User Instruction" section.

5.0 User Instructions

In this section, users can get the information how to use the system correctly. This section will explain all the modules and function that provides by the system. System user can be categorized into 3 types which are office equipment management staff, stationery management staff and lecturer. Some main screen in the system will be shown in this section.

5.1 User Instruction For Office Equipment/Inventory Management Staff

The main purpose for this OEIS system is to let the office equipment staff do the maintenance jobs for all the inventory that exists in the faculty. To access the system, users are required to login to the system. User will be given a login Id and password by the database administrator when they want to login to the system in the first time.

5.1.1 Login Module

Figure UM5.1 show the login screen for OEIS system. Users are require to key in the login Id and password for the purpose to access system. If login Id or password are incorrect, then the message will be prompt out and users are require login again. There are not any limitation for login tries, users can login as many as they can until they successful login to the system.

Figure UM 5.1: User Login Page

5.1.2 Home/Main Page for the inventory staff

After user had login successful to the system, screen in figure UM5.2 will be display out. The page have 2 frame, which in the left hand side is the navigation menu and the right hand side is the page that user want to browse to. There are 5 major modules in the navigation menu and each modules contains others modules. These 5 major modules are file maintenance, record viewing, record searching, master file and personal.
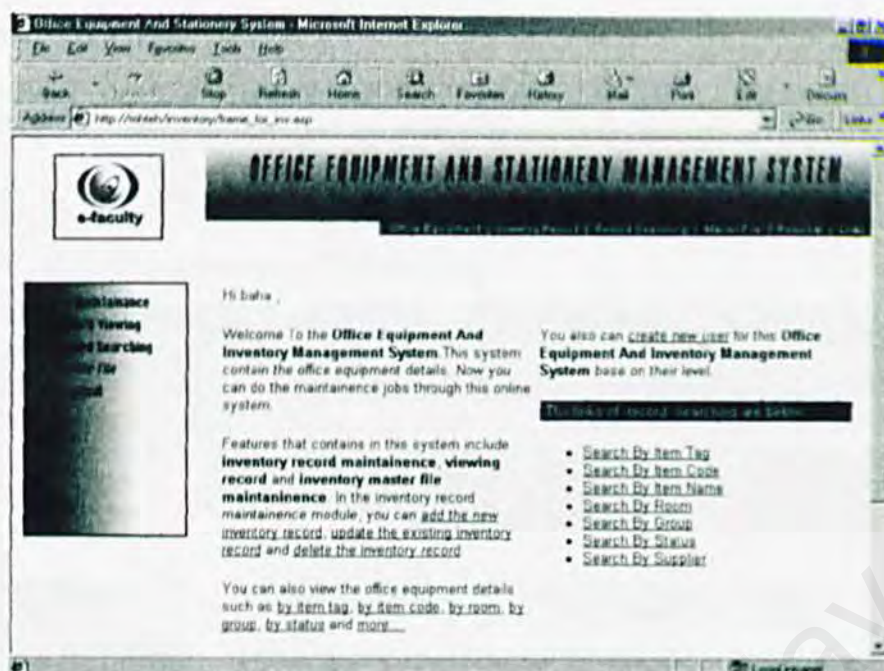
Figure UM 5.2 : Main page for inventory staff

5.1.3 File Maintenance

In the file maintenance module, user can add, edit and delete the inventory record. User also can do the maintenance jobs for the inventory part under this module. Figure UM 5.3 show the example form of adding the inventory record.

Figure UM 5.3 : Example of adding inventory form

5.1.4 Record Viewing

Record viewing contain various report that user can view. These inventory report include list by tag, list by code, list by group, list by room, list by group, list by supplier, list by status, list by deleted item and customize report. Figure UM 5.4 show the example of record viewing list by item tag.
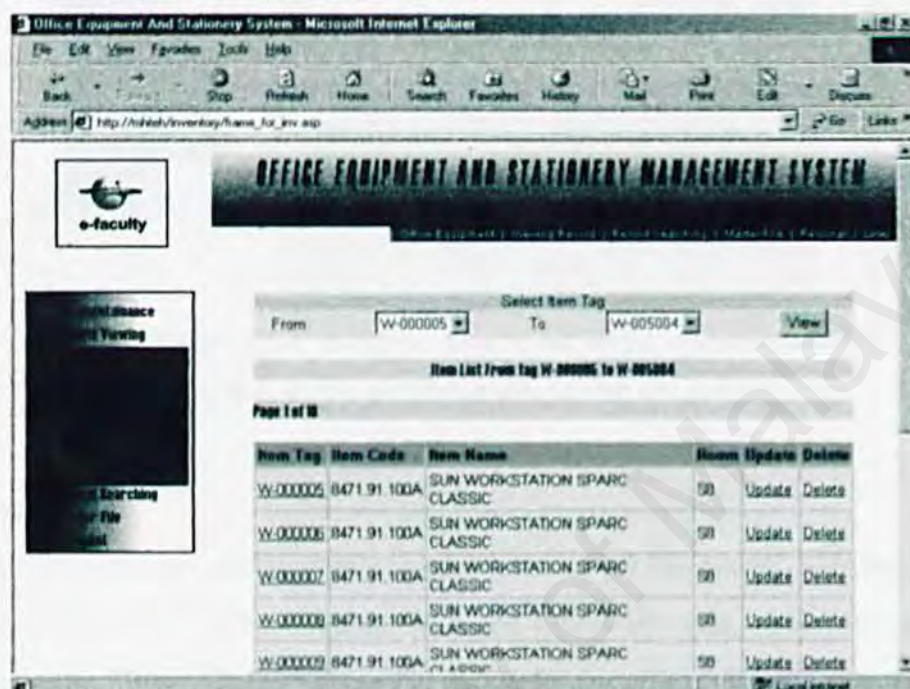
Figure Um 5.4 : Example of record viewing page

5.1.5 Record Searching

In this record searching, users can search the inventory record by keying the search word or select from the list that had been provided. Users can search the record by tag, code, name, room, group, supplier and status. Figure UM 5.5 show the example of searching the record by inventory group.
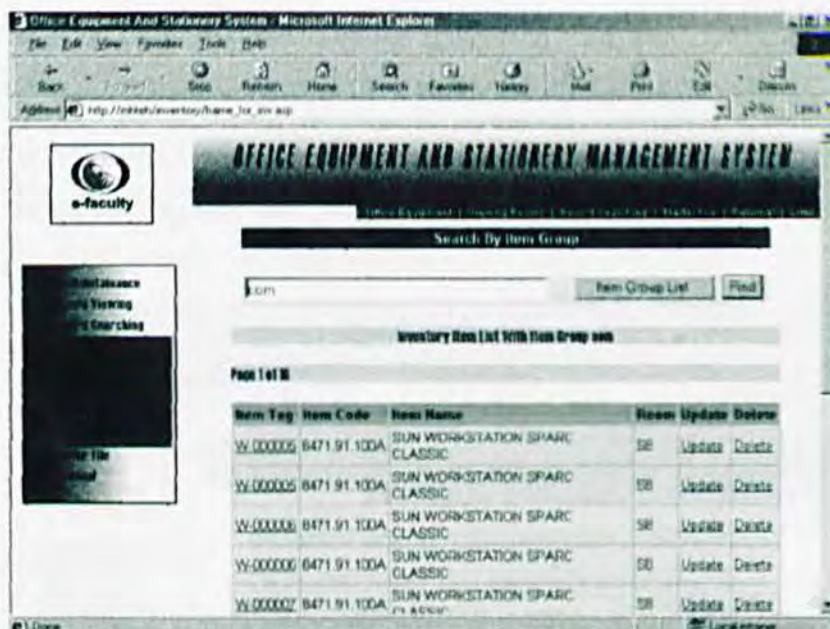
Figure UM 5.5 : Example of searching record module

5.1.6 Master File

In this module, user can do the maintenance jobs for all the master file that will be use by the inventory record. These master files are inventory code, room, inventory status and system user. Figure UM 5.6 show the example page for updating inventory code.
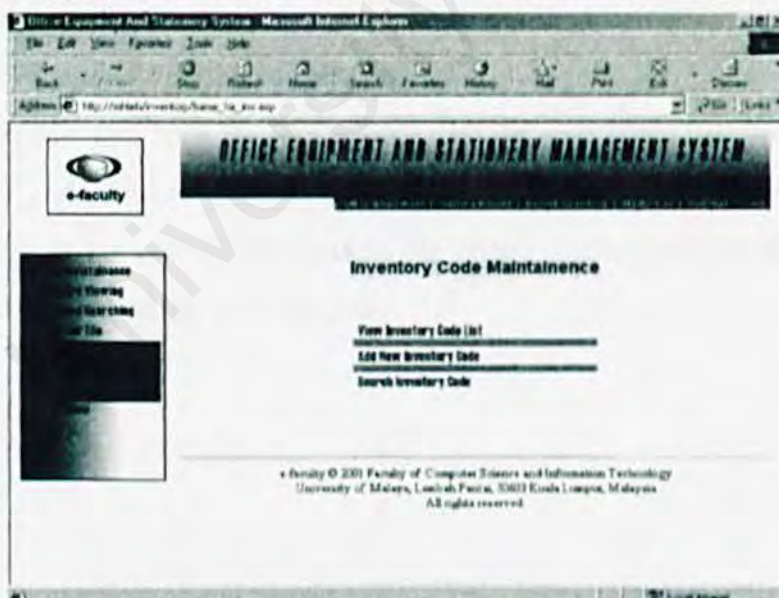
Figure UM 5.6 : Example page of updating Inventory code

5.1.7 Personal

Users can update the personal details from this module. Users can change their personal details such as login Id, password, name and other details. User also can logout from they system using the logout link in this module. Figure UM 5.7 show the example page for user to update their personal details.

Figure UM 5.7 : Example page for updating the personal details

5.1.8 Create and updating system user details

Users can create the new user for this system. But the user types that will be created are inventory staff and lecturer only. Users need to go to the system user maintenance which is include in the master file module for create a new user. Figure UM 5.8 show the example page of creating the new user.

Figure UM 5.8 : Example page of creating the new user

5.2 User Instruction For Stationery Management Staff

The main function for the stationery management staff in this system is to maintenance the stationery record and approves the applied stationery by the lecturer. The interfaces that will be getting by the user are purely base on the stationery record only. There will be no any inventory record in the interface.

5.2.1 Login Module

Users are required to login the system first before they can access to system. The procedures of login module are same with inventory management staff. (please refer to section 5.1.1 in the user manual)

5.2.2 Home/Main page for the stationery staff

Once the users have login successfully to the system, the page that show in figure UM 5.9 will be display. The page is divided into 2 frames. Left frame contain the navigation menu, which will be used to browse the page in the system. Right frame show the description of the system. In the right side of the right frame there will be a list of applier, whose have apply for the stationery. User can click the applier name to go to the approval form.

In the navigation menu, there are 3 majors module, which are file maintenance, record viewing and personal.

Figure UM 5.9 : Main page for stationery staff

5.2.3 File Maintenance

In this file maintenance module, user can add, edit and delete the stationery record. User also can approve the applied stationery from this module. In the approve form, user can view the status of the stationery and the make the decision from the information that shown in the approve form. Figure UM 5.10 show the example approves form.
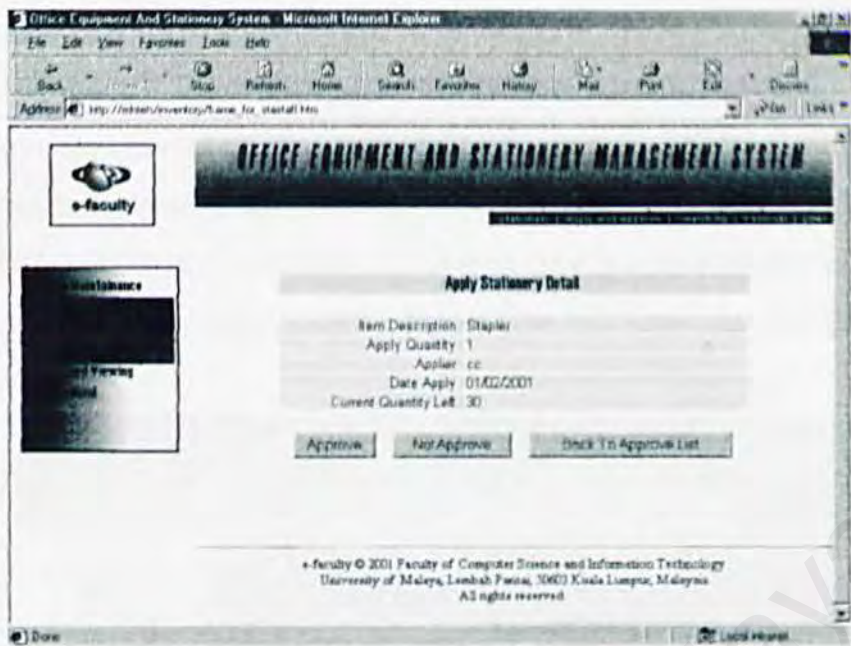
Figure UM 5.10 : Example of approves form

5.2.4 Record Viewing

User can view the various stationery reports from this module. These report are
stationery details, applied stationery and approve stationery. Figure UM 5.11 show the
example page of stationery list.
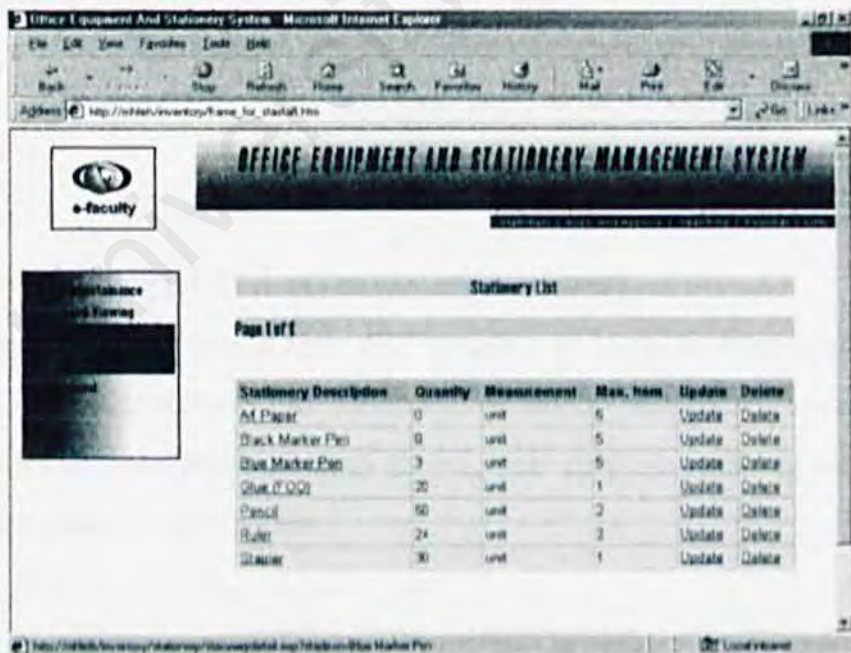
Figure UM 5.10 : Example page of stationery list

5.2.5 Personal

In this personal module, users can update their personal details and change their password. User also can create the new users for the system which are under the stationery staff or lecturer group. User can only edit the users detail who is in the stationery staff or lecturer group. Users also can logout from the system by clicking the logout link which is contain in the menu. Figure UM 5.11 show the example page of user details.
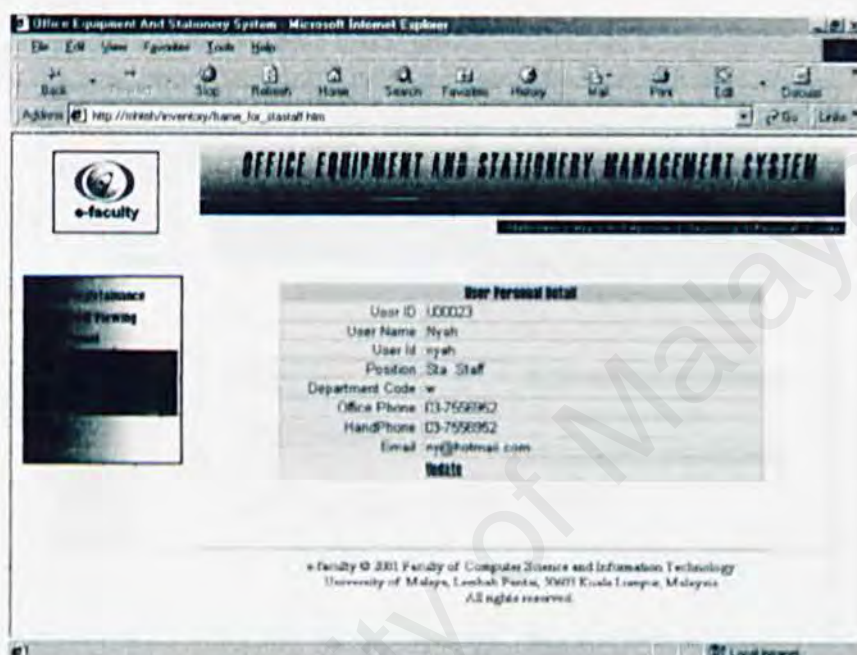
Figure UM 5.11 : Example page of user details

5.3 User Instruction For Lecturer/General user

The main function of lecturer in this OEIS system is to apply the stationery and viewing the inventory and stationery record. There will be not any modification can be done by the user toward the inventory/stationery record. User only can updating the apply stationery and personal details only.

5.3.1 Login Module

Users are required to login to the system before they can access to the system. Login procedures are same with inventory management staff (please refer to section 5.1.1 in the user manual).

5.3.2 Home/Main page for the Lecturer

When users have login successfully into the system, a main page with 2 frames will be display. Left frame contain the navigation menu and right frame show the description of the system. In the right hand side of the right frame show the status of the stationery that have been applied. Users can know the results of applied stationery from the list that display in the main page. In the navigation menu, there are 4 major modules. These modules are stationery, record viewing, office equipment and personal Figure 5.12 show the main page for the lecturer interface.
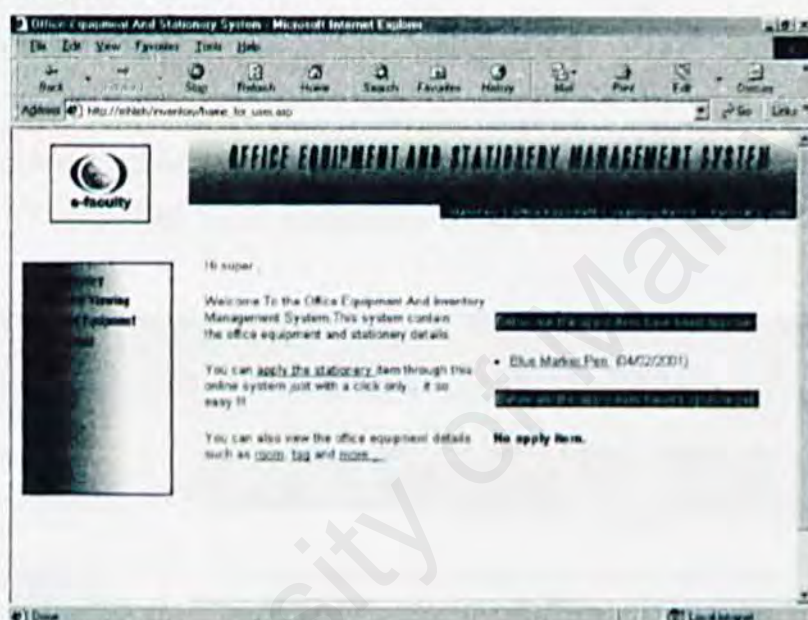
Figure UM 5.12 : Main page for the lecturer interface

5.3.3 Apply Stationery Module

The main function of lecturer in this system is to apply the stationery. Procedures of apply the stationery item are shown as below:

1.) Select the inventory item from the stationery list. Figure UM 5.13 show the stationery list that will be apply by the users.

2.) Then, users are require to select the apply quantity and submit the apply form. Figure UM 5.14 show the form that require users to select the apply quantity.

3.) An apply stationery list will be display to the users and users is told to wait for some time for the approval. Figure UM 5.15 show the example page of confirmation after submit the apply form.
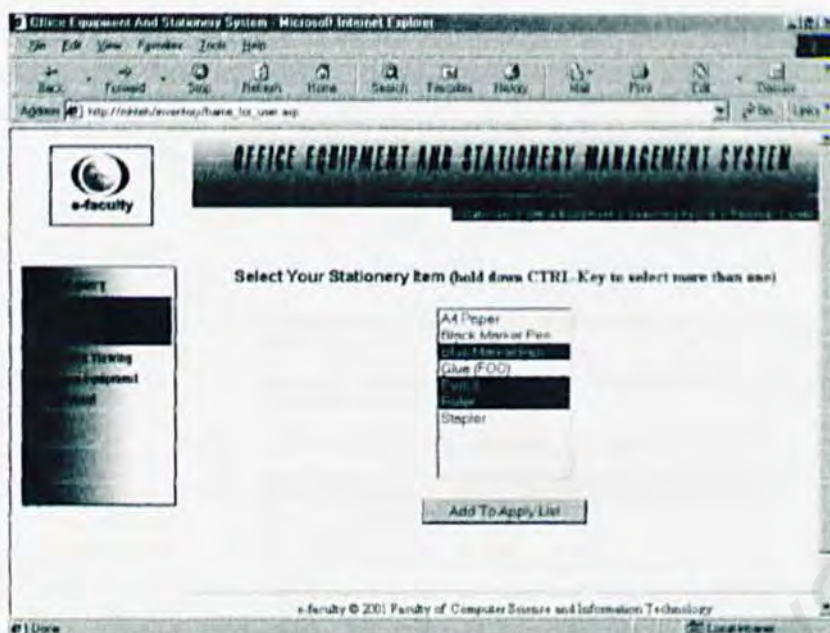
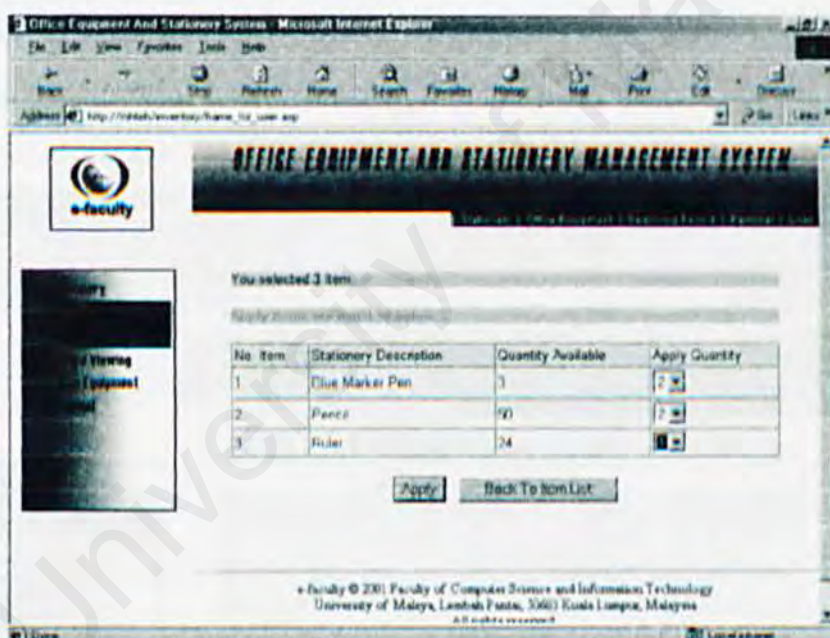Figure UM 5.13 : Example page of apply stationery list

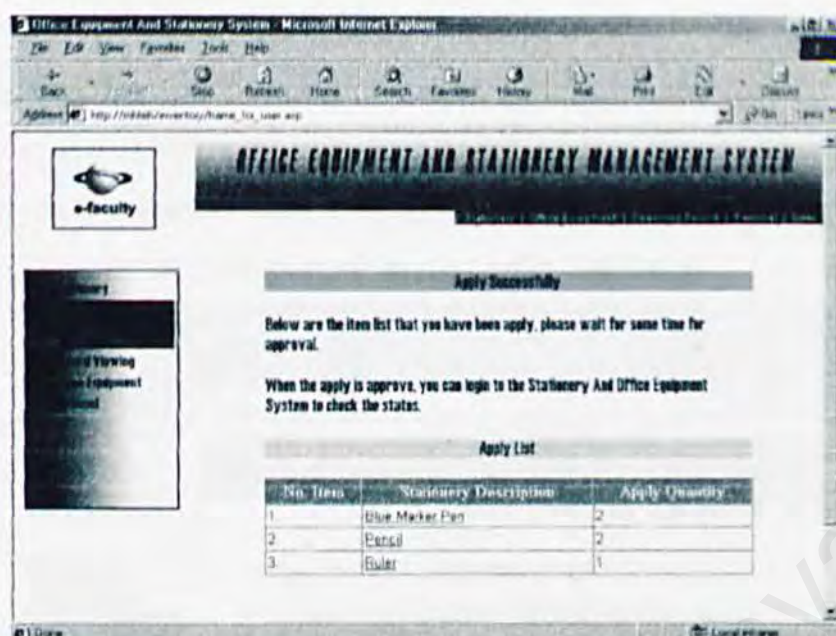Figure UM 5.14 : Example page of choose apply quantity

Figure UM 5.15 : Example page of confirmation apply item

5.3.4 Stationery

In this stationery module, user can apply the stationery item, update apply item and delete apply item. Figure UM 5.16 show the example page of updating the apply item.
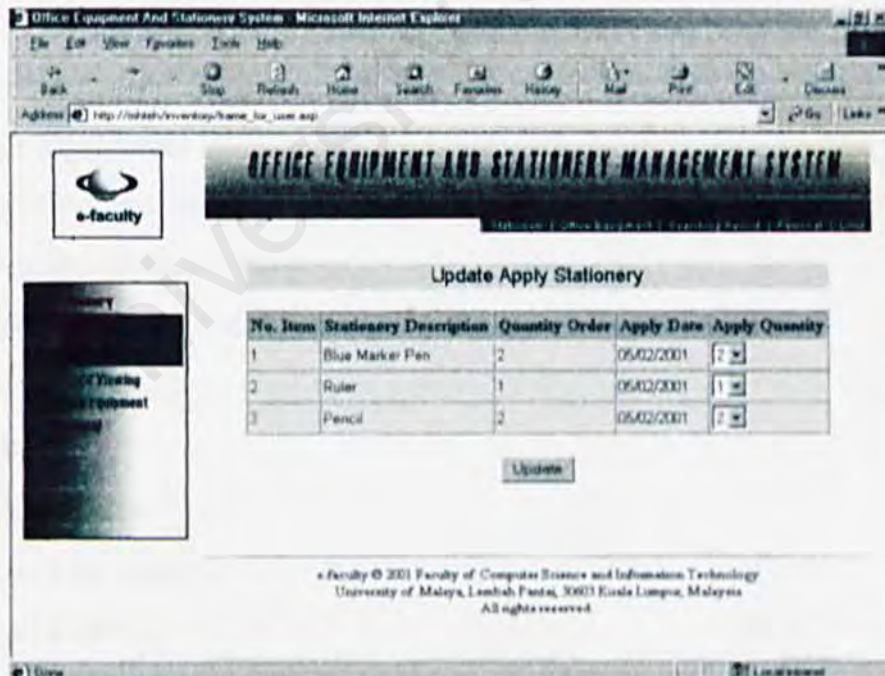

Figure UM 5.16 : Example page of updating apply item

5.3.5 Record Viewing

In this module, user can view the stationery record, applied record and approved record. User also can use the search function in this module to view the apply stationery record. Figure UM 5.17 show the main page of search applies stationery.
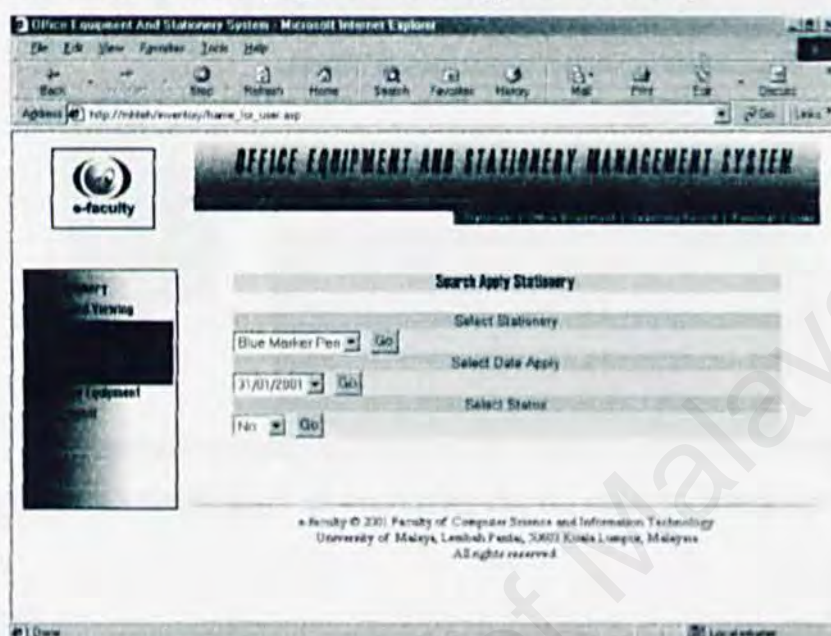

Figure UM 5.17 : Example page of search applies item

5.3.6 Office Equipment

This module contains the various reports for the office equipment/inventory. Option in this modules are shown as below:

- List By Room
- List By Code
- List By Tag
- List By Name
- Search By Room
- Search By Tag
- Search By Code
- Search By Name

Figure UM 5.18 show example page of searching the inventory record by room code.
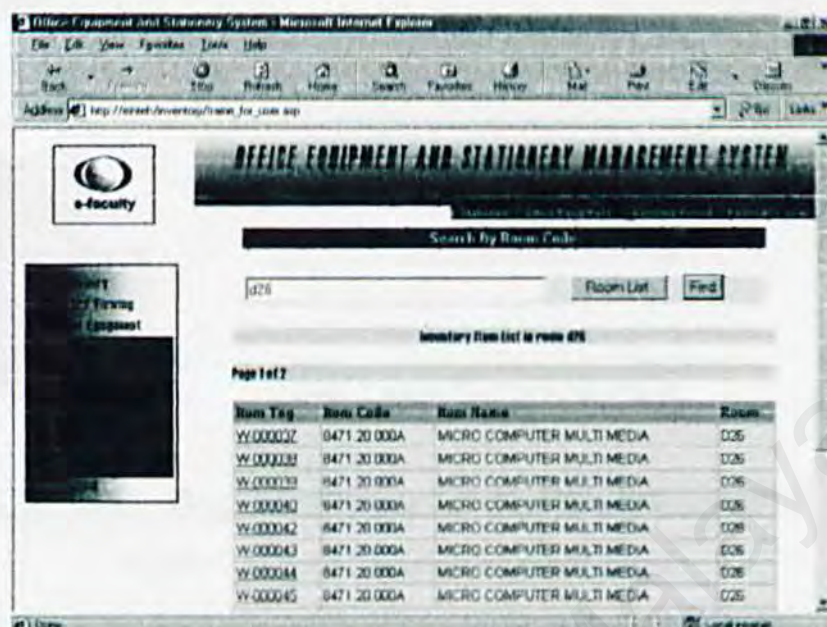

Figure UM 5.18 : Example page of searching the inventory record by room code

5.3.7 Personal

Users can updating their personal details and change the password using this personal module. Users also can logout from the system by clicking the link that provided in the menu.

6.0 User Session Expired

Once the users have login to the system, system will generate the temporary session for the users. If users did not activate the system in the particular period (did not browser the web page in a long time), this temporary session will be lost and system cannot be running. When this situation happened, users will get the session expired page and users are required to re-login again to the system for using back the system. Figures Um 5.19 show the session expired page.
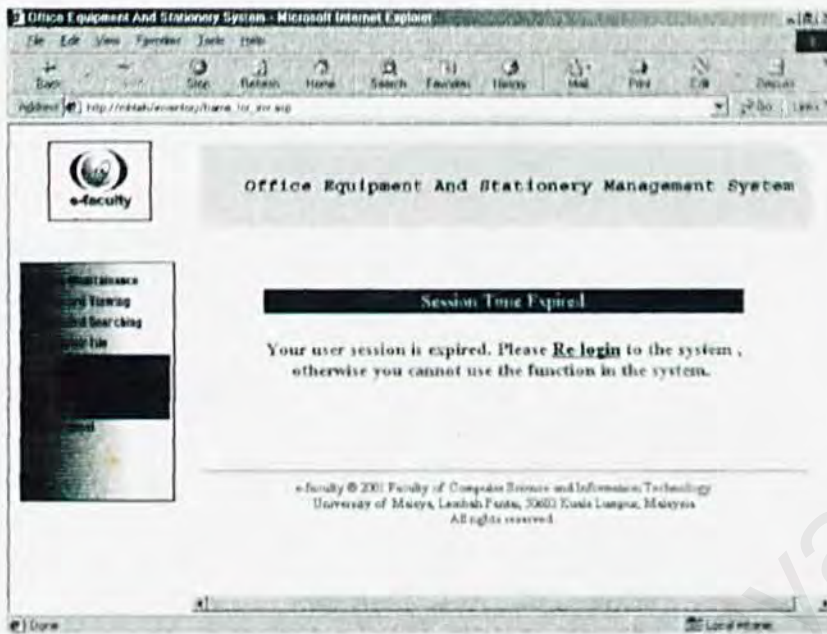
Figure UM 5.19 : Session Expired Page

8.0 Problem/error facing

If users face the problem or error while they browse the web page. Users can do the following thing:

- Try other Internet browser

- Logout from the system and re-login again

- Go to seek for help from the database administrator if the problem is occur because of the database