Inventory Storage System

by

Mazuki Mazlan

Dissertation submitted in partial fulfillment of
the requirement for the
Bachelor of Technology (Hons)
(Business Information Systems)

JULY 2007

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CERTIFICATION OF APPROVAL

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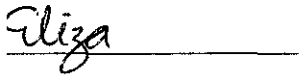

Ms. Eliza Mazmee)

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
July 2007

CERTIFICATION OF ORIGINALITY

I hereby declare that this submission is my own work and that, to the best of my nowledge and idea, it contains no material previously published or written by another person. ny contribution made to the research by colleagues, lecturers with whom I have worked at niversiti Teknologi Petronas or elsewhere, during my research, is fully acknowledged.

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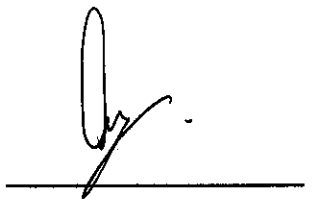

IAZUKI BIN MAZLAN

ABSTRACT

Inventory Storage System is developed for organizations that require an online application to store and maintain documents. For most organizations archived documents and files are important for future reference and maintenance of projects. This project means to provide or implement enhancements on existing shelf storage systems. Manual apparatus' and traditional storage methods rely heavily on the consistency of a human being to follow procedures. This system provides a structured document retrieval process, secure access and elimination of paper trails. This project is developed using PHP in conjunction with MySQL, along with Joomla! as a web platform. There are 4 development stages for this project; Requirements Gathering, Analysis, Logical Design, and Results. Surveys, Questionnaires, Interviews and Scenarios are used to determine the major and minor functions of the system. Based on the research and analysis already done, Inventory Storage System will exceed the functions and utilities of existing systems by eliminating unnecessary processes and provide a solution to simplify document transactions.

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ACKNOWLEDGEMENTS

I would like to express the deepest appreciation to my supervisor, Ms. Eliza Mazmee, who has the attitude and substance of a great mentor: she continually and convincingly conveyed a spirit of determination in regard to research & development, and an excitement in regard to teaching. Without her guidance and persistent help this dissertation would not have been possible.

I would like to thank the many friends and colleagues for their counsel and invaluable advice. A special mention to Mr. Koo Meng Fei, for giving me an insight in regard to web development.

In addition, I thank the Universiti Teknologi PETRONAS, for providing a conducive working and learning environment and the FYP Committee, for giving additional classes on literary research methods and report-writing.

On a last note, I would like to thank my family for spurring me on to academic fulfillment.

ABBREVIATION (S)

EIP	Enterprise Information Portal
CMS	Content Management System
PHP	Hypertext Preprocessor
R&D	Research and Development
ISS	Inventory Storage System
FYP	Final Year Project

LIST OF FIGURES

CHAPTER 1
INTRODUCTION

1.1 BACKGROUND OF STUDY

Many objects have intrinsic value of their own or have value because they enable access to other valuable objects. For instance, jewelry and coins have intrinsic value due to the value of their precious stones or metals, automobiles have intrinsic value due to their ability to provide transportation, and files of business information have intrinsic value due to the content of the information contained within the files. Due to their intrinsic value and the potential for theft and misuse, files are often kept in lockable storage cases or cabinets hence the use of shelf-storage systems.

Regardless of the source of an object's value, its potential for creating legal liability, business owners have sought, over the years, to restrict access to the above described objects/documents, and others by limiting their access to only those individuals who require access to the objects in order to perform their job functions. Typically access has been restricted by first placing the objects in a storage area for which a limited number of individuals can access. Then, control over the retrieval and reinsertion of objects from/to the storage have been maintained by employing manual procedural methods, such as issuing keys for the storage room to selected individuals mainly managers and supervisors, requiring an employee or administrator to request that a manager provide access to the store for object retrieval, and requiring the employee or administrator to sign and be verified for any object/document retrieved.

Unfortunately, such manual apparatus and methods have met with limited success since they rely heavily on the thoroughness of humans to consistently follow designated procedures. Also, such systems are often fraught with the potential for misuse and abuse due to the dishonesty of some individuals and the inability of the system itself to detect misuse. The limited success and inherent problems of manual systems suggest the need

for a system which automatically controls access to and secures the use of various types of objects/documents.

1.2 PROBLEM STATEMENT

During my internship period with Ranhill Berhad, I was assigned to create a functional prototype of Ranhill Bersekutu Storage System. For my Final Year Project, I wish to build on that project and come up with a systematic way for organizations to manage information. They need a system to keep track of their archived inventory be it construction drawings, maps, tracings, discs, diskettes, invoices, quotations and etc. This system will record incomings and outgoings of important documents thus to avoid loss or theft of crucial data. 'The importance of data' needs no introduction. For mostly all firms, archived data are important for future references and or to analyze project maintenance and errors.

1.3 PROBLEM IDENTIFICATION

Basically there are a few features that I would like to implement on this project. These ideas came from unnecessary problems that exist in a conventional shelf-storage system. Here are a few issues that may be solved with Inventory Storage System:

- Enhancement from shelf-storage system

  Inventory Storage System will still maintain the functions of a shelf-storage system but with added features like online access (Intranet), user authentication, system administrator, inventory search and inventory uploads to name a few.

- Secure Access

  Only authorized users will be able to view selected items which will be grouped based on groups/departments/project teams/etc. Views and downloads will be

enabled to users that are deemed authorized by the system administrator beforehand. Users will logon into system using user ID and the system administrator will manage the access authority of the users.

- Black & White to digital

A conventional storage system requires users to fill out an inventory retrieval form and hand it to a store manager to retrieve documents. This system will eliminate paper requirements and processes. All forms are filled using user's own workstation. This system will make full use of an organization's Intranet.

1.4 SIGNIFICANCE OF PROJECT

The significance of this project is to create a simple structured system for employees to use and eliminate paper procedures (black & white) for inventory transactions. For attaining hardware and software, certain aspects need to be looked into. Reliable and easy to obtain software and hardware is the most suitable of the bunch because this would eliminate the cost factor. Because this system works on the basis of a shelf-storage system, it will be relevant for small-sized to medium sized organizations/departments.

1.5 OBJECTIVES & SCOPE OF STUDY

This project was initially requested as an in-house system at Ranhill Berhad's Management Information Systems Department. The objective of said project is to cater to Ranhill Bersekutu's need for a storage system. For my project, I will work on this idea and build on it to make it more efficient. This system will provide:

- A structured retrieval process
- Data management
- Secure access

This system provides a solution to incomings and outgoings of significant documents. Inventory Storage System allows users to view availability of documents and retrieve documents. Also, the system administrator is responsible for additions & disposals and oversees the in-out function. The scope of this R&D is to enhance the present data shelves storage systems to provide a more structured storage system that maintains data availability and security. This Inventory Storage System presents organizations with a secure and structured means to maintain important documents.

The extent of this study is to analyze and evaluate the current situation as well as a scenario whereby the system would be used. For R&D purposes, I have analyzed and conducted research on existing shelf-storage systems to identify unnecessary processes and provide solutions for the betterment of the system. This system is to cater to an organization's need for a simple, structured object/document retrieval process. My main task is to come up with an easy and hassle-free process for users of the system which are the organization's employees.

I have also delved into systems with similar functions such as an E-Learning System or a Medical Supplies System. I have compared these systems and found the best way to simplify the inventory transaction process. The knowledge & experience gained from doing studies on these similar systems have given me an overview of how my system will

work. Studies and research on tools or software that are used in this project have been included as well. The tools have been compared and chosen based on budget, functionality and ease of use.

CHAPTER 2
LITERATURE REVIEW

2.1 INVENTORY CONTROL SYSTEM

According to Wikipedia, an inventory control system is an integrated package of software and hardware used in warehouse operations, and elsewhere, to monitor the quantity, location and status of inventory as well as the related shipping, receiving, picking and put-away processes. In common usage, the term may also refer to just the software components [1].

Modern inventory control systems rely upon barcodes, and potentially RFID tags, to provide automatic identification of inventory objects. Inventory objects could include any kind of physical asset: merchandise, business files, archived documents, consumables, fixed assets, circulating tools, library books, or capital equipment. To record an inventory transaction, the system uses a barcode scanner or RFID reader to automatically identify the inventory object, and then collects additional information from the operators via fixed terminals (workstations), or mobile computers.

2.2 INVENTORY ACCURACY

According to Dave Piasecki, implementing technologies such as bar coding systems, RFID, and pick-to-light are often assumed to be the solutions to inaccurate inventories [2]. If properly implemented these technologies can help reduce errors, however, none of them will eliminate all errors, and a poorly implemented system will be worse off than it was before.

Attitude. Maintaining inventory accuracy must be an integral part of the attitude of the organization. Like quality, customer service, and plant safety, accuracy must be

promoted throughout the organization as everyone's responsibility. This attitude must begin at the top levels.

Process Definition. While defining the processes we should be looking for opportunities for errors and implementing changes to eliminate or reduce them. Even the most accurate employee will make an error, Dave suggests placing formal checks in place for critical operations. Get as many people involved in this step to ensure we have a complete and accurate understanding of the processes. Anything missed in this step will require new procedures and additional employee training later so once again "take the time and do it right".

Procedure Documentation. This is the part where we use the previously defined processes to document the procedures as the employees will follow to maintain inventory integrity. The procedures documented here should not be limited to inventory issues; they should be the complete procedure including quality, physical aspects, and safety. This documentation should be as clear and comprehensive as possible. It should be written for a specific task within a specific job responsibility, it should include everything the employee needs to know to complete the task and nothing else. For example: if a stock clerk's responsibility is to notify the supervisor of any discrepancies, that is all it should state in the procedure for the stock clerk even though there will be additional procedures for dealing with the discrepancy. Procedures should also include the correct method for filling out and processing paperwork, the sequence and timing of entering data, and any checks that are required to be performed. If there are any exceptions to a procedure they should be specified in the document, allowing undocumented exceptions to a procedure will decrease its effectiveness. Be realistic, procedures are not a "wish list", they are the documentation of the requirements of a specific task. We must be prepared to enforce compliance to all procedures.

Employee Training. Handing out a written procedure does not constitute employee training. It is important to set a training schedule to go through all of the procedures with groups of employees. We must take whatever time is necessary to ensure employees

have a thorough understanding of the procedures. Make it clear that the procedure document is the only way to perform the task.

Tracking Accuracy. Track inventory accuracy organizationally and individually. Accuracy tracking should always be measured as a percentage of total transactions. Tracking accuracy as flat numbers (number of errors) puts your more productive employees at a disadvantage and at an organizational level will be skewed by variances in business activity. Accuracy tracking should be communicated to staff in a positive manner; it is a tool to facilitate improvement in processes and people.

Accountability. People must be held accountable for following documented procedures. We have spent the time to document the procedures, provide the training, and the testing. If someone is not following the procedures they must be dealt with appropriate disciplinary action. It's that simple. Mistakes are mistakes and everyone makes them, however not following a specified procedure is a conscious decision made by the employee to not do what he/she was instructed to do.

Storage Areas. Crowded unorganized areas become "black holes" for missing objects. Crowded areas also cause increase damage to product that is often disposed of without inventory corrections being made. High density storage makes it very difficult to accurately count the product. Maintaining proper lighting, shelf and product labeling, and organization makes it easier to stock, pick, and count product thus increasing levels of accuracy.

Know the inventory system. Computer systems are regularly blamed for things that are usually turn out to be human error, however, occasionally the computer system can be the source of the problem. Bugs, glitches, hiccups do occur and changes to system parameters to optimize functionality in one area can create havoc in a seemingly unrelated area. The only way to determine the source and correct these problems is to have a thorough understanding of how the system is set up and how the specific functions process the information. Today's larger software systems maintain enormous amounts of data and contain far more functionality than most users realize. Managers need to be

taking more active roles in system set-up and implementations if they want to optimize the system to meet their business needs. The end result in accuracy improvement will be directly related to the effort put forth to achieve it. Building a sound consistent inventory accuracy plan will get people in the habit of being accurate, as the entire organization gets in the habit of being accurate we will find the accuracy plan starts to run itself. Until then it will require a lot of work by those implementing it.

2.3 PHP

PHP generally runs on a web server, taking PHP code as its input and creating Web pages as output, however it can also be used for command-line scripting and client-side GUI applications. PHP can be deployed on most web servers and on almost every OS platform free of charge. The PHP Group also provides the complete source code for users to build, customize and extend for their own use [3].

Server-side scripting

Originally designed to create dynamic web pages, PHP's principal focus is server-side scripting. While running the PHP parser with a web server and web browser, the PHP model can be compared to other server-side scripting languages such as Microsoft's ASP.NET system, Sun Microsystems' JavaServer Pages, mod_perl and the Ruby on Rails framework, as they all provide dynamic content to the client from a web server. To more directly compete with the "framework" approach taken by these systems, Zend is working on the Zend Framework - an emerging (as of June 2006) set of PHP building blocks and best practices; other PHP frameworks along the same lines include CakePHP, PRADO and Symfony.

The LAMP architecture has become popular in the Web industry as a way of deploying inexpensive, reliable, scalable, secure web applications. PHP is commonly used as the P in this bundle alongside Linux, Apache and MySQL. PHP can be used with a large number of relational database management systems, runs on all of the most popular web

servers and is available for many different operating systems. This flexibility means that PHP has a wide installation base across the Internet; over 19 million Internet domains are currently hosted on servers with PHP installed.

Command-line scripting

PHP also provides a command line interface SAPI for developing shell and desktop applications, daemons, log parsing, or other system administration tasks. It is increasingly used on the command line for tasks that have traditionally been the domain of Perl, Python, awk, or shell scripting.

Client-side GUI applications

PHP provides bindings to GUI libraries such as GTK+ and text mode libraries like ncurses in order to facilitate development of a broader range of cross-platform GUI applications.

2.4 MySQL

MySQL, the most popular Open Source SQL database management system, is developed, distributed, and supported by MySQL AB. MySQL AB is a commercial company, founded by the MySQL developers. It is a second generation Open Source company that unites Open Source values and methodology with a successful business model.

The MySQL Web site (http://www.mysql.com/) provides the latest information about MySQL software and MySQL AB [4].

- **MySQL is a database management system.**

  A database is a structured collection of data. It may be anything from a simple shopping list to a picture gallery or the vast amounts of information in a corporate network. To add, access, and process data stored in a computer database, you need a database management system such as MySQL Server. Since computers are very good at handling large amounts of data, database management systems play

a central role in computing, as standalone utilities, or as parts of other applications.

- **MySQL is a relational database management system.**

  A relational database stores data in separate tables rather than putting all the data in one big storeroom. This adds speed and flexibility. The SQL part of "MySQL" stands for "Structured Query Language." SQL is the most common standardized language used to access databases and is defined by the ANSI/ISO SQL Standard. The SQL standard has been evolving since 1986 and several versions exist. In this manual, "SQL-92" refers to the standard released in 1992, "SQL:1999" refers to the standard released in 1999, and "SQL:2003" refers to the current version of the standard. We use the phrase "the SQL standard" to mean the current version of the SQL Standard at any time.

- **MySQL software is Open Source.**

  Open Source means that it is possible for anyone to use and modify the software. Anybody can download the MySQL software from the Internet and use it without paying anything. If you wish, you may study the source code and change it to suit your needs. The MySQL software uses the GPL (GNU General Public License), http://www.fsf.org/licenses/, to define what you may and may not do with the software in different situations. If you feel uncomfortable with the GPL or need to embed MySQL code into a commercial application, you can buy a commercially licensed version from us. See the MySQL Licensing Overview for more information (http://www.mysql.com/company/legal/licensing/).

- **The MySQL Database Server is very fast, reliable, and easy to use.**

  If that is what you are looking for, you should give it a try. MySQL Server also has a practical set of features developed in close cooperation with our users. You

can find a performance comparison of MySQL Server with other database managers on our benchmark page. See Section 7.1.4, "The MySQL Benchmark Suite".

MySQL Server was originally developed to handle large databases much faster than existing solutions and has been successfully used in highly demanding production environments for several years. Although under constant development, MySQL Server today offers a rich and useful set of functions. Its connectivity, speed, and security make MySQL Server highly suited for accessing databases on the Internet.

- **MySQL Server works in client/server or embedded systems.**

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

2.5 Content Management Systems & E-Learning System

An E-Learning System is a comprehensive software package that depends on the WWW for some combination of delivery, testing, simulation, discussion, or other significant aspect. Learning Management Systems are comprehensive suites that include all of the administrative tools that companies need to manage their e-learning programs, including registration, coursework distribution, course design and performance assessment [6].

Content management systems nowadays are used to manage complex publications far more often than some years ago. The basic principles are the separation of structure, content and presentation, an exactly defined workflow management and the management of content in the form of small units. This leads to improved quality, better reusability and reduced costs. I will focus on similarities of CMS-systems and e-learning systems and the possibility to transfer gained experiences from the field of CMS and e-learning systems into my system. This concludes that transferring the principles of content management systems and those of e-learning systems will result in better systems with the improved functionality we already know from a current CMS.

2.6 Enterprise Information Portals

Enterprise Information Portals are one of the most popular ways in which enterprises can allow their employees and customers to search and access corporate information. It is a single gateway for users, such as employees, customers and company's partners to log into and retrieve corporate information, company history and other services or resources.

An enterprise information portal, also referred as an enterprise portal, is a web portal for use within an organization. Enterprise information portals are typically secure and private. In the early 2000s, a major industry shift in web portal focus has been the corporate intranet portal, or "enterprise web". Uniting the web communications and thinking inside a large corporation has begun to be seen by many as both a labor-saving and a money-saving technology [7].

EIP's provide a centralized system that may contain a wide range of a company's corporate information and access to online applications. This centralized information system enables customers or employees to easily access information such as reports, application forms or policy documents. Furthermore, it is easy for the individuals within the company to update or edit content.

Information and time is money. A centralized and well organized information system provided by an EIP can help employees get quick response and information that increase employees' productivity. In addition, it can offer customers easy access to resources that may increase the company's sources of customers.

EIP's have one significant feature which is providing a security area that for team or a specific partner to access, which means only authorized users can access restriction information.

2.7 Open Source

In general, open source refers to any program whose source code is made available for use or modification as users or other developers see fit. (Historically, the makers of proprietary software have generally not made source code available.) Open source software is usually developed as a public collaboration and made freely available [9].

Open Source is a certification mark owned by the Open Source Initiative (OSI). Developers of software that is intended to be freely shared and possibly improved and redistributed by others can use the Open Source trademark if their distribution terms conform to the OSI's Open Source Definition. To summarize, the Definition model of distribution terms require that; the software being distributed must be redistributed to anyone else without any restriction, the source code must be made available (so that the receiving party will be able to improve or modify), the license can require improved versions of the software to carry a different name or version from the original software.

The idea of Open Source software is similar to that of a free software concept of the Free Software Foundation. Open Source is the result of a long-time movement toward software that is developed and improved by a group of volunteers cooperating together on a network. Many parts of the Unix operating system were developed this way, including today's most popular version, Linux. Linux uses applications from the GNU project, which was guided by Richard Stallman and the Free Software Foundation. The Open Source Definition, spearheaded by Eric Raymond, is an effort to provide a branded model or guideline for this kind of software distribution and redistribution. The OSI considers the existing software distribution licenses used by GNU, BSD (a widely-distributed version of UNIX), X Window System, and Artistic to be conformant with the Open Source Definition.

2.8 The Joomla! Project

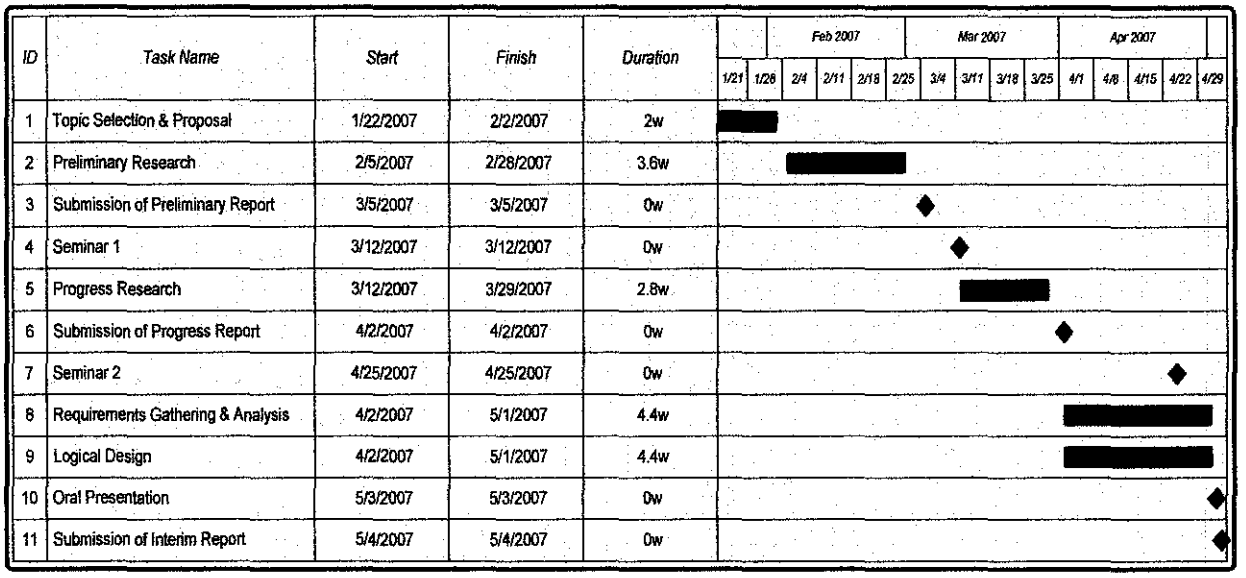
Joomla! is a free, award-winning content management system written in PHP which allows users to easily publish their content on the world wide web and intranets [8]. Joomla is created as an open-source project where individuals and teams contribute their skills to its development as well as its supporting systems. While Joomla! is packed with features, its greatest quality is that it is extremely extensible. Because of its extensible structure, there aren't many things you cannot do with Joomla!. Among its many features include; page caching, web indexing, RSS feeds, blogs, forums, polls, calendars, website searching and many more.

Joomla! helps developers to build websites and powerful online applications. It is used all over the world to power everything from simple, personal homepages to complex corporate web applications. Joomla! can be used for; corporate websites or portals, online commerce, small business websites, non-profit & organizational websites, government applications, corporate intranets & extranets, personal homepages and community-based portals.

CHAPTER 3
METHODOLOGY

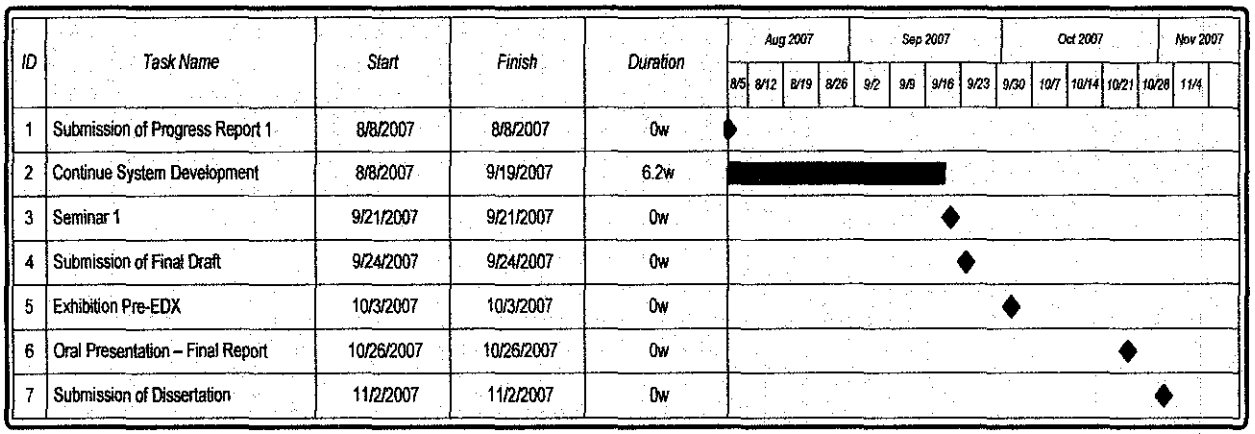
3.1 STAGES OF DEVELOPMENT

To build this system, I have customized a development process to suit the nature and timeframe of this project. The development process is divided into Requirements Gathering, Analysis, Logical Design and Results.



ID	Task Name	Start	Finish	Duration
1	Topic Selection & Proposal	1/22/2007	2/2/2007	2w
2	Preliminary Research	2/5/2007	2/28/2007	3.6w
3	Submission of Preliminary Report	3/5/2007	3/5/2007	0w
4	Seminar 1	3/12/2007	3/12/2007	0w
5	Progress Research	3/12/2007	3/29/2007	2.8w
6	Submission of Progress Report	4/2/2007	4/2/2007	0w
7	Seminar 2	4/25/2007	4/25/2007	0w
8	Requirements Gathering & Analysis	4/2/2007	5/1/2007	4.4w
9	Logical Design	4/2/2007	5/1/2007	4.4w
10	Oral Presentation	5/3/2007	5/3/2007	0w
11	Submission of Interim Report	5/4/2007	5/4/2007	0w

Figure 3.1: Gantt Chart for Semester FYP Part I



ID	Task Name	Start	Finish	Duration
1	Submission of Progress Report 1	8/8/2007	8/8/2007	0w
2	Continue System Development	8/8/2007	9/19/2007	6.2w
3	Seminar 1	9/21/2007	9/21/2007	0w
4	Submission of Final Draft	9/24/2007	9/24/2007	0w
5	Exhibition Pre-EDX	10/3/2007	10/3/2007	0w
6	Oral Presentation – Final Report	10/26/2007	10/26/2007	0w
7	Submission of Dissertation	11/2/2007	11/2/2007	0w

Figure 3.2: Gantt Chart for Semester FYP Part II

3.1.1 REQUIREMENTS GATHERING

Requirements gathering is the process of gathering information about the proposed and existing systems and distilling user and system requirements from this information. Sources of information during this phase include documentations, system stakeholders and specifications of similar systems. I have planned to use interviews, surveys and scenarios to gather information from system stakeholders which are the potential users themselves.

User requirement definition

System requirements definition

1. User shall need to log on to system using staff ID and password
2. On retrieving document, requestor shall be presented with a form that records details of user and the document request made
3. System shall maintain a log of all requests/transactions that have been made.

3.1.1.1 INTERVIEW

Formal or informal interviews with stakeholders or knowledgeable experts are part of most requirements processes. An interview was scheduled to discuss the requirements, feasibility and overall of the project.

Interviewer: Mazuki Mazlan
Interviewee: Unanimous
Job Designation: Senior MIS Executive
Interview Method: Closed
Summary: After a discussion about the project, the Interviewee suggested I use an open-source software to develop the project as it is more efficient and less time-consuming. Before developing the system, I am advised to do plenty of research on existing & similar systems. Also, the planning phase is the most important as it determines the overall of the project in the long-run.

3.1.1.2 SURVEY/QUESTIONNAIRE

A survey was made based on a questionnaire that was handed out to 15 employees of a reputable company in Kuala Lumpur.

Situation: Currently, your organization uses a shelf storage system to store documents; work files, journals, archived files, white papers and etc. To retrieve these documents, you will have to go to the store, fill in a retrieval form and submit it to a store administrator. I would like to propose an online digital storage system so that all these files can be accessible via your computer. Refer to Appendix-1 for responses to the questionnaire.

Sample questionnaire that was distributed to the employees:

1. Would it be easier for you if all the documents are accessible online via your work computer?
    a) Yes
    b) No

2. If yes, why would it be easier for you?
    a) Convenient
    b) A click away
    c) Elimination of paper trails
    d) Simply because the technology is available

3. How would you like the system to be based on?
    a) Internet
    b) Intranet

4. Should all documents in the new system be separated based on groups/departments/project teams for easy search?
    a) Yes
    b) No

5. For security purposes, each time a document item is downloaded/viewed, the session will be recorded in a transaction log. Do you agree that this is a feasible security measure?
    a) Yes
    b) No

3.1.2 ANALYSIS

This sub-chapter summarizes the findings of the Requirements Gathering process, which was done in the form of surveys and data-mining. The analysis is based on individual feedback and information gathered. This analysis determines the functional & non-functional requirements of the system. I have produced a set of functional & non-functional requirements that is suitable for this project.

Requirements analysis involves a variety of people in an organization. The term stakeholder is used to refer to any person or group who will be affected by the system, directly or indirectly. Stakeholders include end-users who interact with the system and everyone else in the organization that may be affected by its installation. Beforehand, I have made an analysis of several issues regarding user analysis.

- Users often don't know what they want from the system except in the most general terms. They find it hard to articulate what the want the system to do and make unrealistic demands due to the ignorance to the costs of their requests.

- Different users have different requirements, which they express in different ways.

- The economic and technological factors in which the analysis takes place is dynamic. It inevitably changes during different stages of the development process. New requirements may emerge from new users who were not originally consulted.

Based on the survey conducted, I have managed to analyze and summarize the functional requirements of the system:

100% agreed that the system would simplify work processes
80% wanted the system to be web-based (Internet)
100% agreed that files/documents should be separated based on groups
80% agreed that transaction logs should be recorded for security measures

Concluding requirements gathering & analysis, I have listed below the functional and non-functional requirements of which the system will be implemented upon:

Functional Requirements

- User will need to log on to the system using user ID and password given by administrator
- User will only be able to access files/documents that the administrator deems the user is authorised to. (separation into groups/departments/project teams)
- Every transaction shall be recorded via user sessions

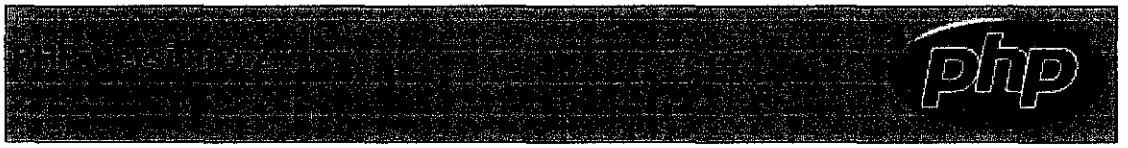
Non-Functional Requirements

- Product Requirement
  - User interface for the system will be implemented using simple PHP (integration with CMS)
- Organizational Requirement
  - The system development process, deliverable documents and the system itself shall conform to the process and deliverables defined in various Acts.
- External Requirement
  - The system shall not disclose any personal information about system users apart from their staff ID for which the system administrator holds authority for security purposes

Property	Measure
Speed	Processed transactions/event response time/screen refresh time
Size	Size of files
Ease of use	Training time/help frames/manuals
Reliability	Probability of unavailability/rate of failure occurrence/availability
Robustness	System restart after failure/probability of data corruption on failure

Figure 3.3: Metrics for specifying non-functional requirements

After thorough consideration, I have chosen Joomla! as the platform for my project. Beforehand, I have already installed and configured php 5.2.2 and MySQL as it is required to run the Joomla! platform.



System	Windows NT TELETRAN-1 5.1 build 2600
Build Date	May 2 2007 19:17:46
Configure Command	cscript /nologo configure.js "--enable-snapshot-build" "--with-gd=shared"
Server API	ISAPI
Virtual Directory Support	enabled
Configuration File (php.ini) Path	C:\WINDOWS
Loaded Configuration File	D:\web\php\php.ini
PHP API	20041225
PHP Extension	20060613
Zend Extension	220060519
Debug Build	no
Thread Safety	enabled
Zend Memory Manager	enabled
IPv6 Support	enabled
Registered PHP Streams	php, file, data, http, ftp, compress.zlib, compress.bzip2, zip
Registered Stream Socket Transports	tcp, udp
Registered Stream Filters	convert.iconv.*, string.rot13, string.toupper, string.tolower, string.strip_tags, convert.*, consumed, zlib.*, bzip2.*

Figure 3.4: PHP configuration index

mysql

Active Persistent Links	0
Active Links	0
Client API version	5.0.37

mysql.allow_persistent	On	On
mysql.connect_timeout	60	60
mysql.default_host	*no value*	*no value*
mysql.default_password	*no value*	*no value*
mysql.default_port	*no value*	*no value*
mysql.default_socket	*no value*	*no value*
mysql.default_user	*no value*	*no value*
mysql.max_links	Unlimited	Unlimited
mysql.max_persistent	Unlimited	Unlimited
mysql.trace_mode	Off	Off

Figure 3.5: MySQL configuration index

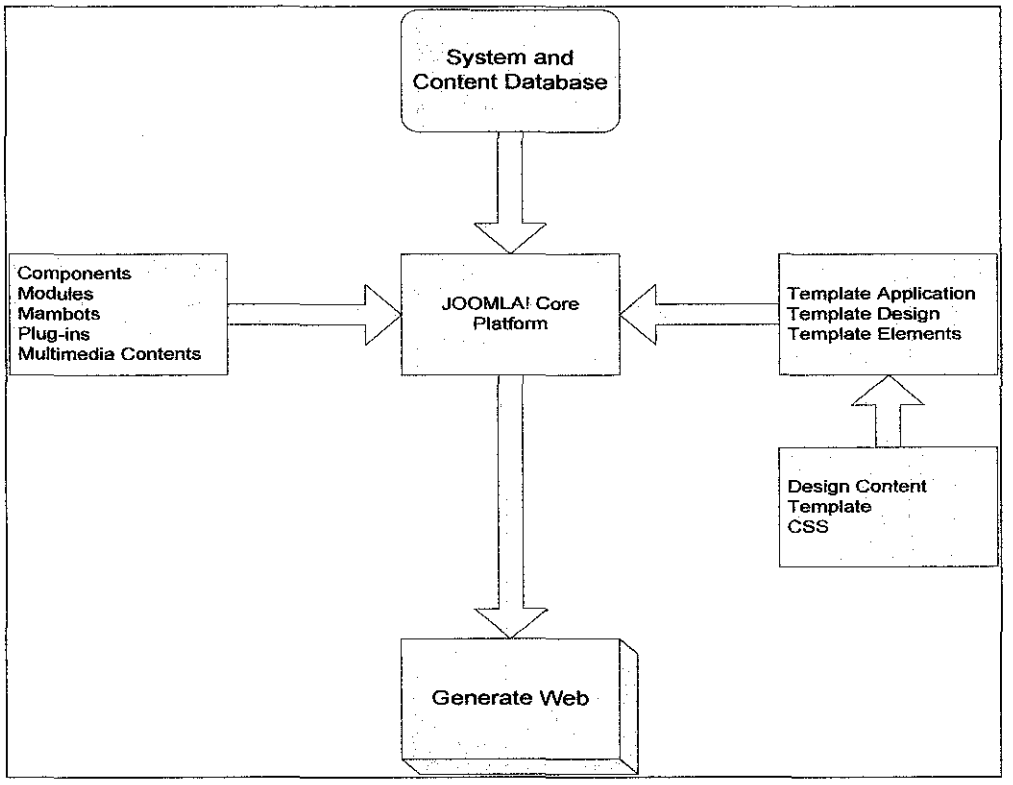


Figure 3.6: Joomla! system chart

3.1.3 LOGICAL DESIGN

Flowchart

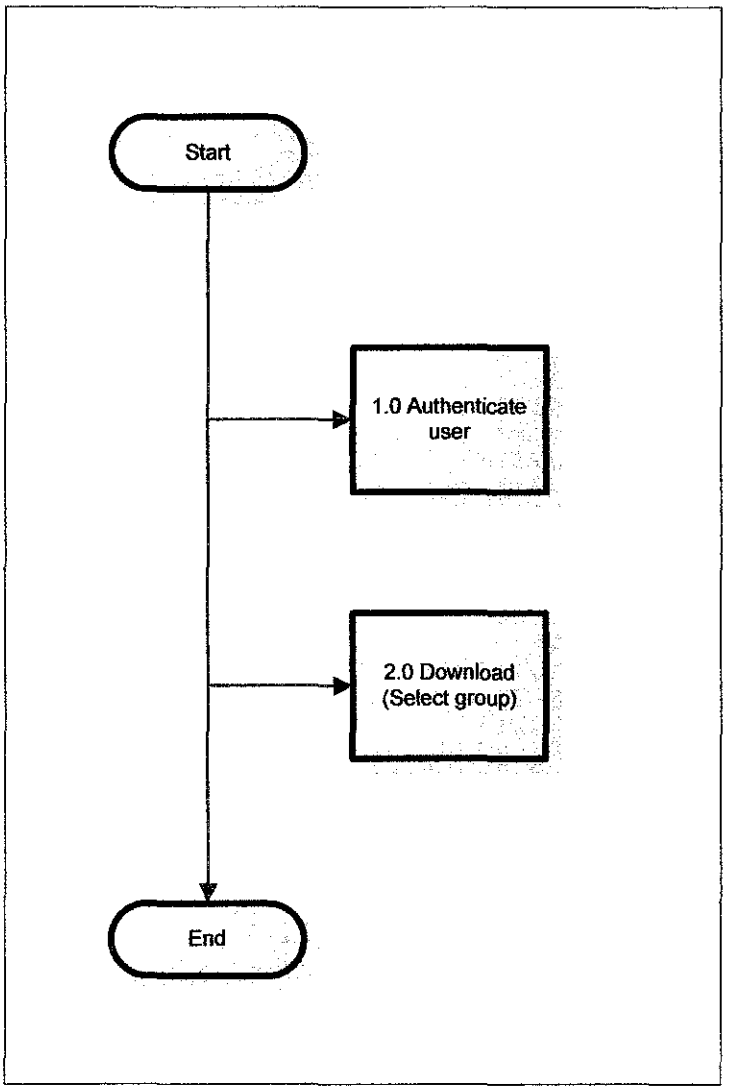


Figure 3.7: System flow chart

Level 1.0 – User Authentication

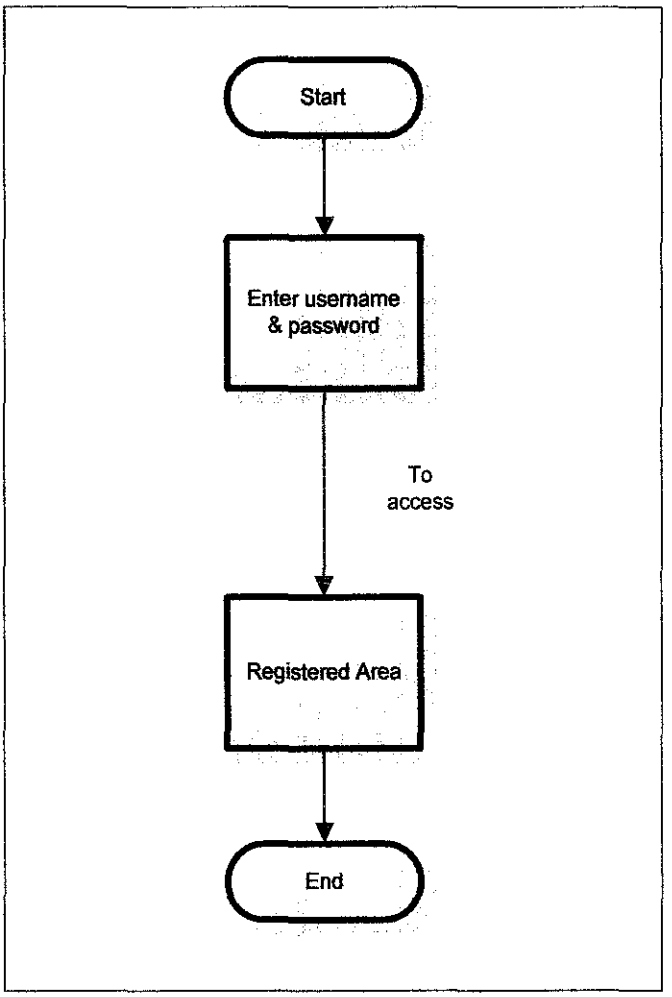


Figure 3.8: User authentication chart

Level 2.0 – Select Group

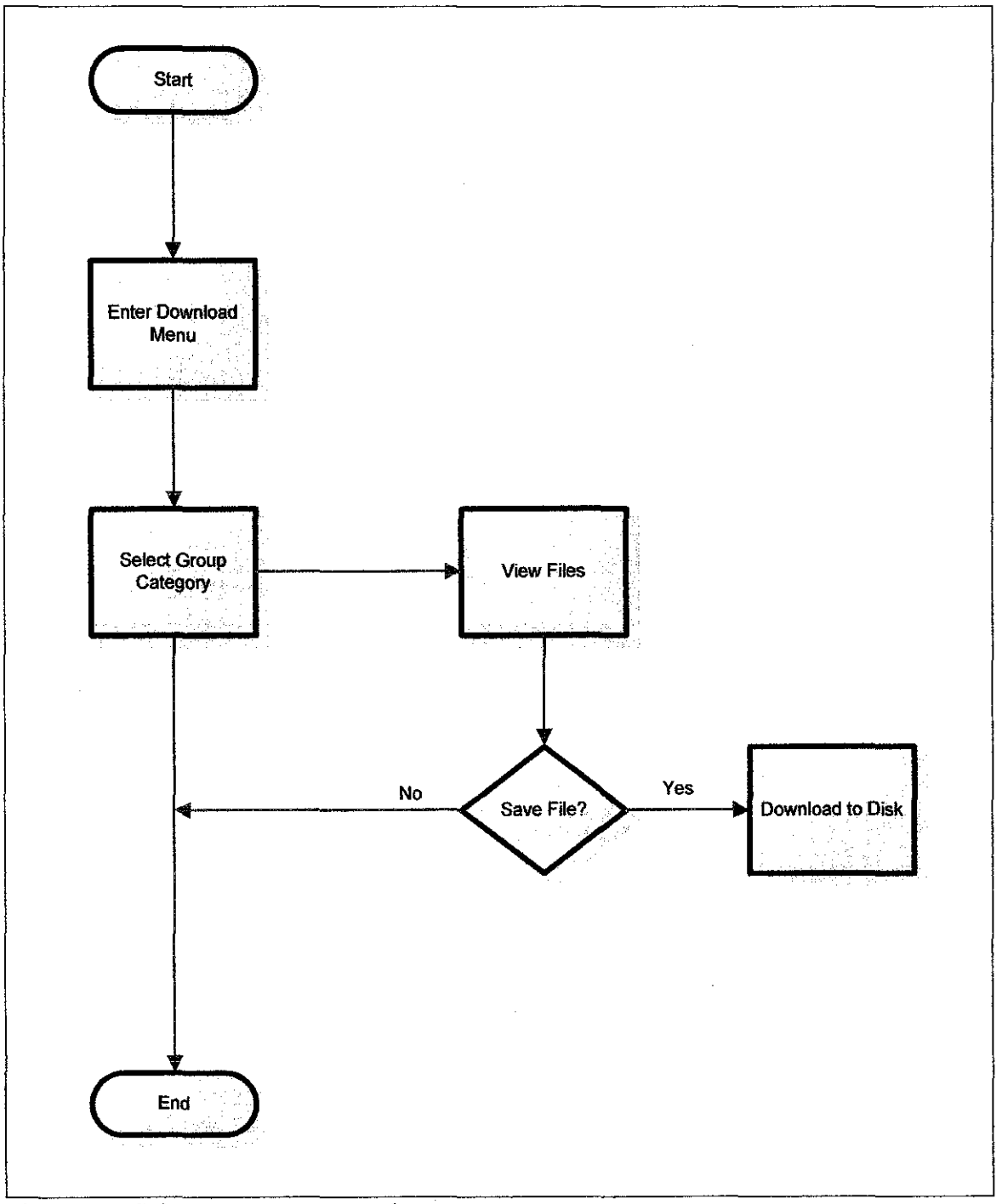


Figure 3.9: Select group category chart

User Change Password

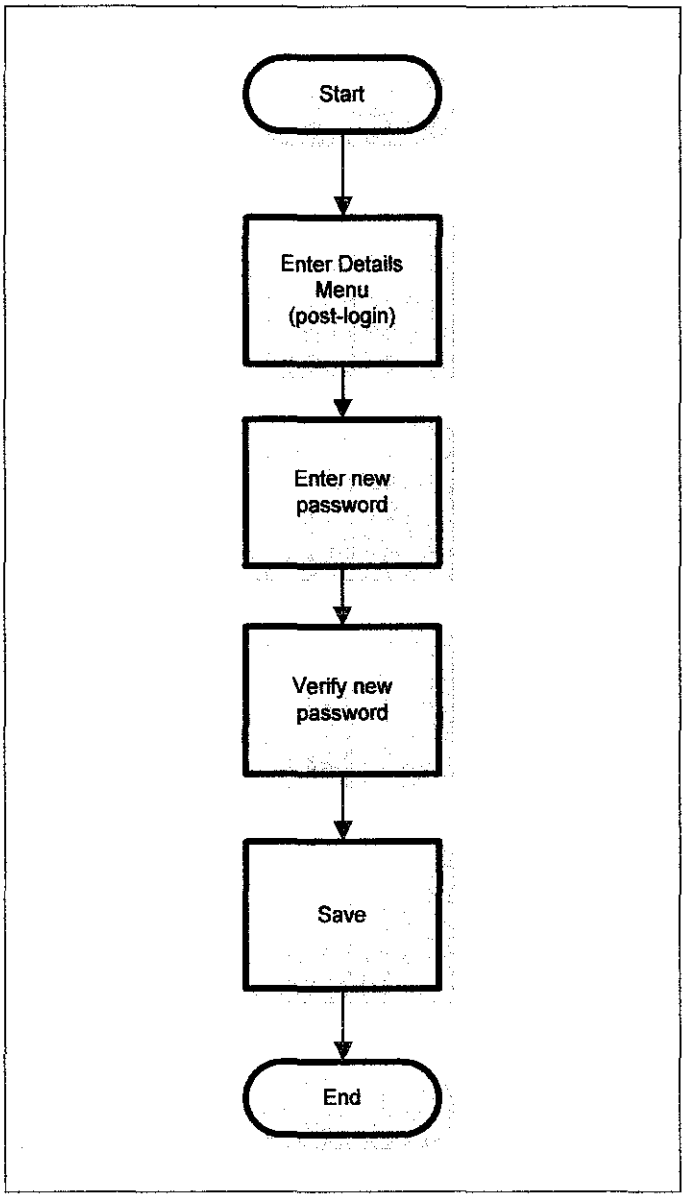


Figure 3.10: Password verification chart

3.2 TOOLS REQUIRED

Hardware:

- Computer
- Workstation (Intranet)

The software used for the construction and programming purposes are:

- PHP, as programming language
- Microsoft IIS (Internet Information Services)
- MySQL, for database operations
- Joomla! (open-source platform)

CHAPTER 4
RESULTS & DISCUSSION

User Manual

Step 1: On the landing page, enter username and password to be redirected to the registered area of the site.

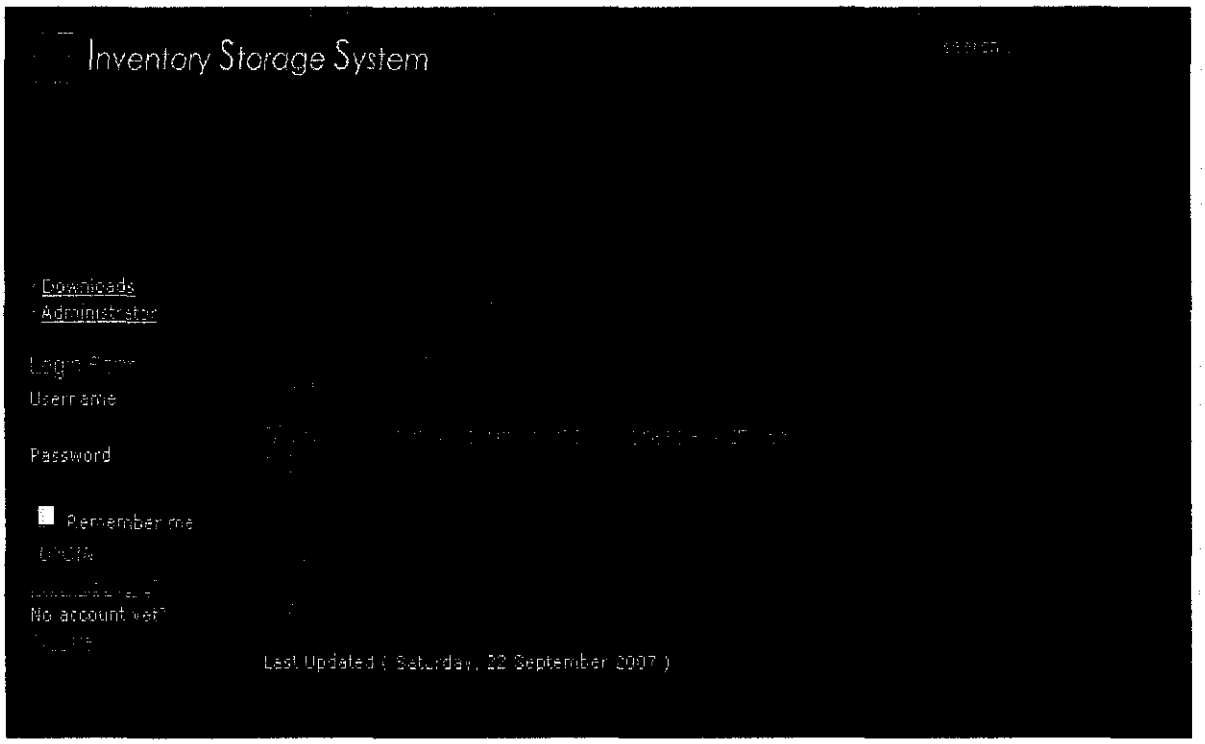


Figure 4.1: Landing page screenshot

Step 2: Next, click on the 'Downloads' link on the top-left menu to be redirected to 'Downloads Home Page'.

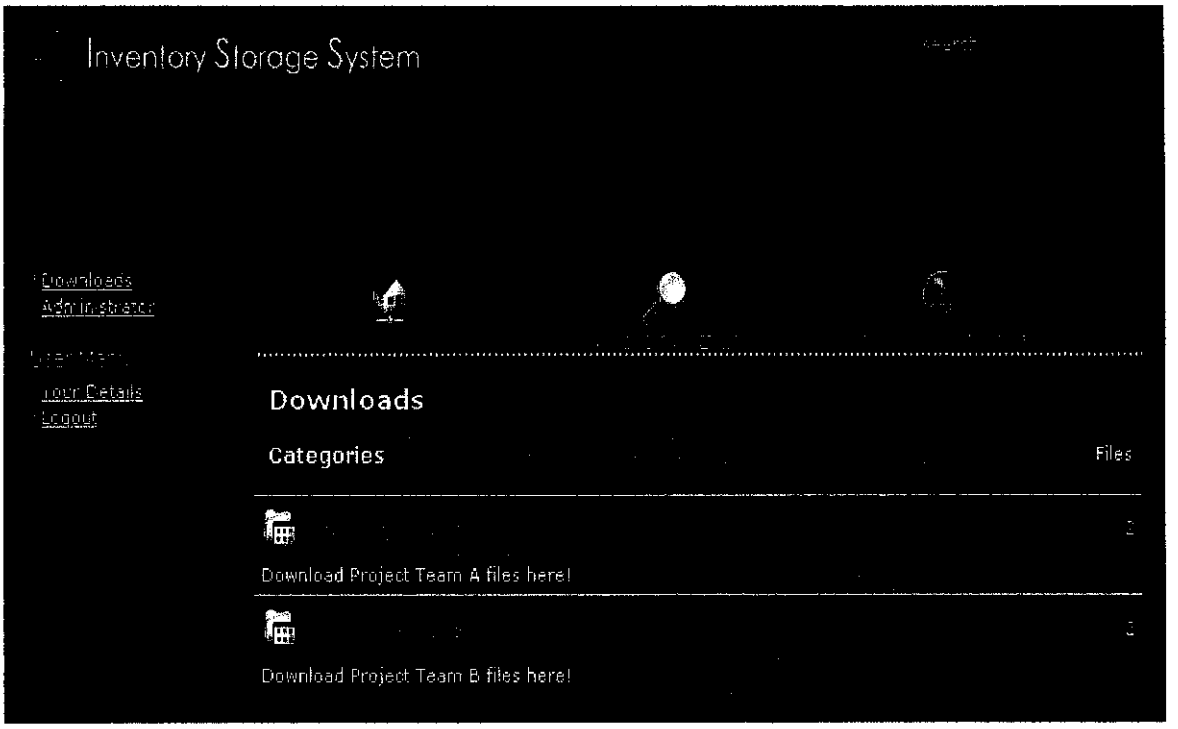


Figure 4.2: Downloads home page screenshot

Step 3: You are then able to view the user group categories. Select a group to view files associated with that particular group.

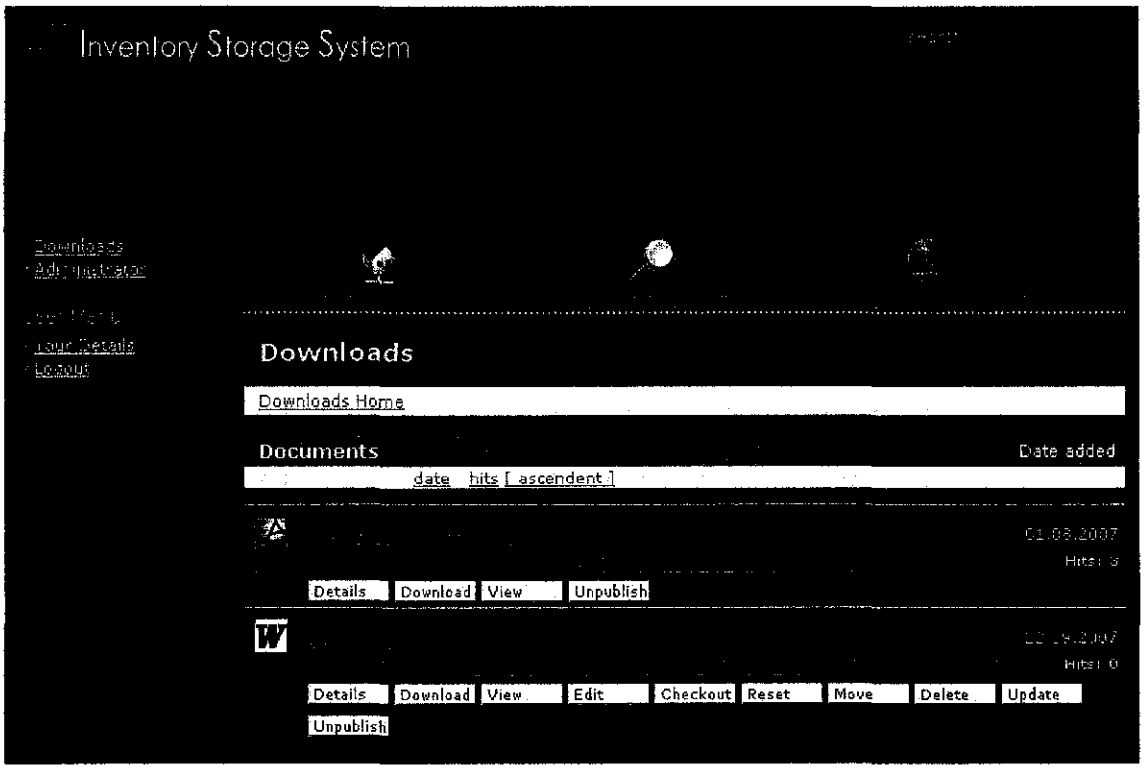


Figure 4.3: Category items screenshot

Step 4: Click on the file name to generate a pop-up window to download file onto your computer. You can also view the file details by clicking on the 'Details' button below the file name.

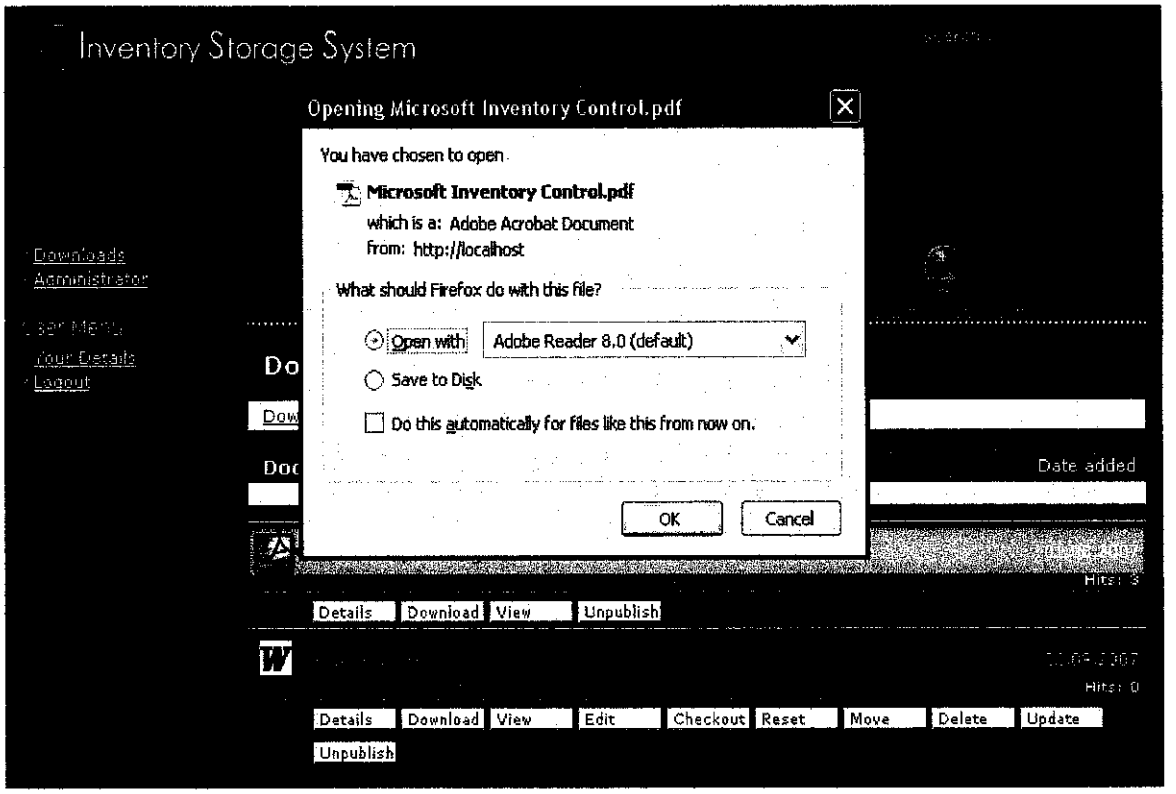


Figure 4.4: Download pop-up screenshot

Step 5: To search for a document, click on the 'search document' link (magnifying glass icon). Enter your query and click on the search button.

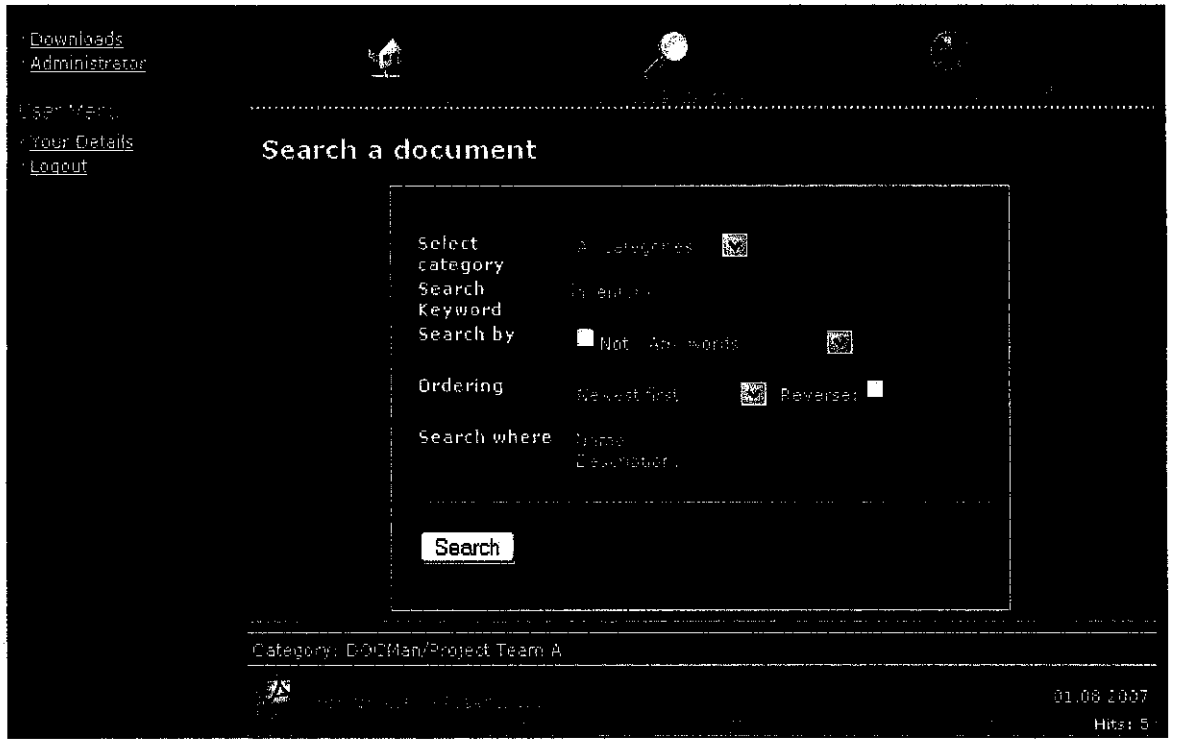


Figure 4.5: Search items screnshot

Step 6: To logout, click on the 'Logout' link in the top-left corner to be redirected to the logout page.

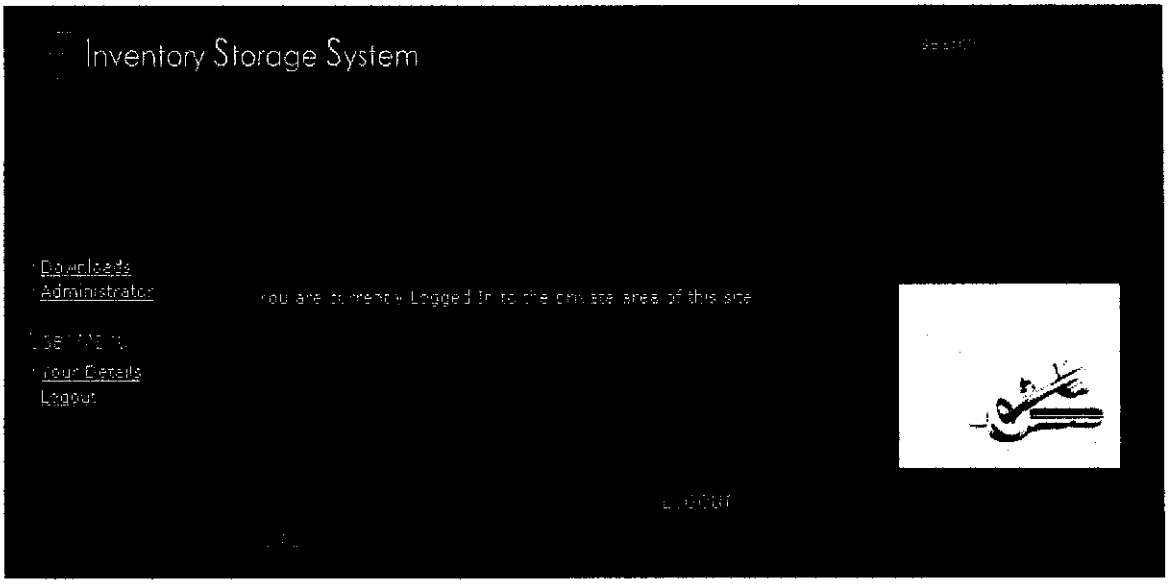


Figure 4.6: Logout page screenshot

CHAPTER 5
CONCLUSION & RECOMMENDATION

To conclude, Inventory Storage System will be a step forward from existing shelf-storage systems. As if to emphasize, this system will eliminate manual methods of document retrieval and transactions in addition to the elimination of paper trails; document retrieval forms, authorization forms, approval forms and the like. Since user authorization is set by system administrator beforehand, users are allowed access documents only for which the user needs to carry out job functions. Also, by allotting documents into different groups for example department or project team, the system provides a portal for potential users. All in all, this system will help speed up work processes and inevitably contribute to the overall success of an organization.

Since this system will function across an organization's Intranet, it could be integrated with the organization's portal to fully utilize inter-department relations & exchanges. Also, this system could be further developed to be a portal on its own. Using Joomla! as the web platform, many other features could be added such as RSS feeds, directory services, calendars, data collection & reporting tools and web searching.

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APPENDICES

APPENDIX-1: Questionnaire returned by potential users

Mock Survey

Situation: Currently, your organization uses a shelf storage system to store documents; work files, journals, archived files, white papers and etc. To retrieve these documents, you will have to go to the store, fill in a retrieval form and submit it to a store administrator. I would like to propose an online digital storage system so that all these file can be accessible via your computer.

1. Would it be easier for you if all the documents are accessible online via your work computer?
   a) Yes
   b) No

2. If yes, why would it be easier for you?
   a) Convenient
   b) A click away
   c) Elimination of paper trails
   d) Simply because the technology is available

3. How would you like the system to be based on?
   a) Internet
   b) Intranet

4. Should all documents in the new system be separated based on groups/departments/project teams for easy search?
   a) Yes
   b) No

5. For security purposes, each time a document item is downloaded/viewed, the session will be recorded in a transaction log. Do you agree that this is a feasible security measure?
   a) Yes
   b) No

Kitchen co-ordinator

Mock Survey

Situation: Currently, your organization uses a shelf storage system to store documents; work files, journals, archived files, white papers and etc. To retrieve these documents, you will have to go to the store, fill in a retrieval form and submit it to a store administrator. I would like to propose an online digital storage system so that all these file can be accessible via your computer.

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   b) No

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   a) Yes
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Reservations Agent

Mock Survey

Situation: Currently, your organization uses a shelf storage system to store documents; work files, journals, archived files, white papers and etc. To retrieve these documents, you will have to go to the store, fill in a retrieval form and submit it to a store administrator. I would like to propose an online digital storage system so that all these file can be accessible via your computer.

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E-COMMERCE EXECUTIVE

Mock Survey

Situation: Currently, your organization uses a shelf storage system to store documents; work files, journals, archived files, white papers and etc. To retrieve these documents, you will have to go to the store, fill in a retrieval form and submit it to a store administrator. I would like to propose an online digital storage system so that all these file can be accessible via your computer.

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Accounts Assistant

Mock Survey

Situation: Currently, your organization uses a shelf storage system to store documents; work files, journals, archived files, white papers and etc. To retrieve these documents, you will have to go to the store, fill in a retrieval form and submit it to a store administrator. I would like to propose an online digital storage system so that all these file can be accessible via your computer.

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Mock Survey

Accounts officer.

Situation: Currently, your organization uses a shelf storage system to store documents; work files, journals, archived files, white papers and etc. To retrieve these documents, you will have to go to the store, fill in a retrieval form and submit it to a store administrator. I would like to propose an online digital storage system so that all these file can be accessible via your computer.

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COST CONTROLLER

Mock Survey

Situation: Currently, your organization uses a shelf storage system to store documents; work files, journals, archived files, white papers and etc. To retrieve these documents, you will have to go to the store, fill in a retrieval form and submit it to a store administrator. I would like to propose an online digital storage system so that all these file can be accessible via your computer.

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Ramesh Binwani

Mock Survey

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Executive Secretary
Executive Office, CPKL

Mock Survey

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Secretary

Mock Survey

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Catering Sales Executive

Mock Survey

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