

**Filing Management System  
With Image Storage  
and Optical Character Recognition  
for Web**

By  
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Dissertation submitted in partial fulfillment of  
the requirements for the  
Bachelor of Technology (Hons)  
(Business Information System)

SEPTEMBER 2012

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CERTIFICATION OF APPROVAL

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Business Information System Programme  
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in partial fulfillment of the requirement for the  
BACHELOR OF TECHNOLOGY (Hons)  
(BUSINESS INFORMATION SYSTEM)

Approved by,

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(Mr Faizal bin Ahmad Fadzil)

UNIVERSITI TEKNOLOGI PETRONAS  
TRONOH, PERAK  
September 2012

## CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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MOHD SYAHMI BIN MOHD JASRIN

## **ABSTRACT**

In an organization data storage is a crucial part of business functions due to fact that it holds key to the success of the particular organization. Data storage through Filing Management System (FMS) will not only involve the information of customers but also regarding the employees plus stakeholders which have a direct effect on organization. The existing system, typical paper-based manually written system, nowadays may not be able to cope with the rapid development in business world. That is why automated FMS ensures the survivability of an organization as it provides an efficient information transfer from within. With the technology of image storing on the database users will be able to browse for files without the trouble of retrieving the original physical document. The Optical Character Recognition (OCR) is implemented on the detection part of the system which involves in storing process. Through the automated system employee will be able to access the system anytime and anywhere with just one click away which is flexible and easy for work purpose.

## **ACKNOWLEDGEMENTS**

First and foremost I would like to take this opportunity to thank God for His help, guidance and giving me strength to finish this project. Also to my supervisor, Mr Faizal bin Ahmad Fadzil for his continuous support, guidance, advice and sharing his experience in helping me not just to complete the project but to boost my confidence in the process.

Next, a big thank you to Universiti Teknologi PETRONAS (UTP) especially the final year project committees and also lecturers for the organization of this course and also for giving the inputs that I needed in what to tackle on for this project. I would also want to express my greatest gratitude towards my friends and course mates especially Mohamad Nasrie bin Ajiji, Flironny Gungat and Lorenzo Hardy Hadymond as without fail able to help me getting the additional information that I needed and solving the problem that I faced throughout the project.

I would like to thank my parents too as with their continuous, endless support and motivation for me to be able to get the project done. Last but not least, I would also like to thank those that are directly or indirectly involved in the completion of this project.

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## **ABBREVIATIONS AND NOMENCLATURES**

FMS	Filing Management System
IRB	Inland Revenue Board
OCR	Optical Character Recognition
RAD	Rapid Application Development
MATLAB	Matrix Laboratory

# CHAPTER 1

## INTRODUCTION

### 1.1 Background of Study

In hectic world of business, Filing Management System (FMS) is an important factor for organization in storing any document that came in to be recorded to cope with the fast pace of information transfer. FMS acts as an archive where employees may take it as reference for daily office work in which information involvement is crucial. The system keeps organization has a smooth flow of business functions through the organized structure in keeping the documents properly stored and sorted. The right filing system produces important tangible results and eliminates costs associated with poor procedures (Why Files Management?, n.d.). It means that a good filing system increase productivity and lower the operating procedures.

The system will be about Filing Management System where manually Filing System is converted to an automated one through the use of web based platform with image storing capability and optical character recognition (OCR). It is made in ensuring the existing filing system in an organization to be easily managed and virtually handled. Basically the system will be focusing on inventory system for documents in an organization where user can scan the document and store it in database and manage it using the web.

Going through the paper readers need to know the two important terms which are frequently used; Document and File. The term 'Document' used as a representation of physical document in existing filing system for organization meanwhile the term 'File' is when the document has been converted into automated system and digitalized. Hence it is safe to say document equals to paper and file would be equal to digital document.

## 1.2 Problem Statement

The typical system of an organization involved recording or updating through a manual system meaning that whenever a document is recorded or updated, it will be done by using a paper-based system. When discussing paper-based system, it makes the flow of the process involving the storage of documents would be hard and as it is known that a disturbed flow may cost the organization not just time but monetary value.

As the existing system goes, the problem that occurs is the matter of information transfer. In terms of filing system, the information transfer can be said about the details considering the process of borrowing and returning of documents. The documents will be used by employees throughout the organization so a particular employee that wanted to use the documents will borrow the particular documents from a particular department which holds the files. In this process, the details of borrower will be hard to find as it requires a thorough research through the papers and there are also cases at some point the information is lost. So, the documents will be returned at a longer time as the information about particular borrower is missing plus in severe incident the file cannot be retrieved and goes missing.

Besides the most important problem that occurs is the slow accessibility. The slow accessibility would be discussing about the time used in having a process for a document to be completed. The slow accessibility can be seen through the process in acquiring the documents. For acquiring purpose an employee in charge needs to browse through all the papers in order to find a specific document and the process is taking quite some time. Furthermore, the process is prone to have human faulty as particular information can be missed out prior to the browsing.

### **1.3 Objectives of study and scope of study**

#### **1.3.1 Objectives of study**

The objective of this project is to develop an automated system of FMS. The system will have the following functions:

- To store documents into automated system with an easy access and browse, add and edit function.
- Keeping track of the file for the details of the borrower.
- Managing the storage of files by indicating the status of the files

#### **1.3.2 Scope of study**

The study will be focusing on the inventory process for a filing management system through the application of OCR with the use of web based platform. The development platform would be the use of PHP and the integration of OCR to the system and image storage on the database. To sum everything up the three focus points on this study are inventory system, OCR and image storage.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Automated Filing Management System Information Transfer**

Kamisli (2004) mentioned in a case study that misplacing information is a problem. Having the right information is not enough; we also have it logically and physically organized so that you can easily access it and make the sense of it. Having the right information and being able to get it quickly will increase productivity. It is told that information transfer is a factor in increasing productivity so with a proper and well structured system employee can have quick response time by using automated filing management system.

In another case study, through the electronic tax-filing system, the Inland Revenue Board (IRB) increases the level of the efficiency for the tax assessment technique, by having an inclined tax collection rate and lowering computation errors. Furthermore, the e-filing system also benefits taxpayers because tax returns are sent electronically to the IRB which saves taxpayers' time (Anna Che Azmi & Ng Lee Bee, 2010). Here it is said that the electronic system saves the taxpayer's time meaning that the process of getting the payment done is faster and efficient. Referring to the study, doing a filing system electronically meaning that an automated one, will make the filing process can be done in a faster way and reduced the error made in existing system.

Furthermore, writing by Cain & Millar (n.d.) stated the country of Mauritania committed over \$1 million in the development of a new automated customs system and now customs declarations are processed in 30 minutes instead of 48 hours where goods clear the ports in one to two days instead of five to twenty. In regards to the writing, automated system has made process for completing work shorter in terms of time when it is compared to the use of unautomated system.

## **2.2 Optical Character Recognition**

Optical Character Recognition (n.d.) mentioned Optical Character Recognition (OCR) is a mechanical or electronic conversion of scanned images of handwritten, typewritten or printed text into machine-encoded text. Advantages of OCR (n.d) wrote that OCR increases the efficiency and effectiveness of office work. The ability to instantly search through content is immensely useful, especially in an office setting that has to deal with high volume scanning or high document inflow.

So in the sense of applying it to FMS it was aimed to provide added value in improving efficiency and effectiveness for the documented files to be managed instead of using the previous method in managing inventory.

## **2.3 Implementation of OCR on the Android Operating System for Business Cards**

Bhaskar, Lavassar, & Green (n.d.) wrote the objective of the report is to utilize the visual capabilities of the Android mobile phone to extract information from a business card. The report showed readers an algorithm for precise recognition of text on business card, given an Android smartphone camera image of the card in different environmental conditions such as variable illumination across the card, various background surrounding the card, rotation, perspective and variable horizontal text flow across the card.

The study is revolved around the working between Tesseract, an OCR engine and Matrix Laboratory (MATLAB) where a MATLAB implementation of the Tesseract algorithm is described in which it is to optimize image for input purpose to the Tesseract OCR engine. The application that they developed is called “OCReader” which allows the user to select an existing image in their Android device gallery or use the device’s camera to snap a new one. After that comes the OCR process, where the image runs through an image rectification algorithm and passes the input image to the Tesseract service. When the process is completed, a string of text is returned and displayed on the main “OCReader” screen where user able to edit it and have several options more towards the results. User then have the option to copy the text to phone’s clipboard, send them via email or create a new contact.

In comparing with the study, the similarities between OCReader and automated FMS are the same in terms of the application of OCR. The OCReader used the image to scan for the information needed to be stored same with the FMS where the scanned or uploaded image are identified and information is gathered. The only difference between these two is that FMS used a simpler context in the sense that the OCR implementation only used in the detection and validation of the information. It would only captured the code name of the document from the image provided and do a comparison at the database for the detection and validation part. Meanwhile, the OCReader used a wider context where the image provided can be read as a whole.

## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1 Methodology**

The methodology for this paper is divided into two categories which are research methodology and development methodology. The methodology basically is the steps taken in solving the problems stated and completing the study.

##### **3.1.1 Research Methodology**

Research methodology is further divided into planning and analysis where data is gathered and analyzed for the next step.

###### **3.1.1.1 Planning**

The planning part is where the data gathering takes place on the study. Empirical research type is used here which relies on experience and observation alone that can verify the conclusion through the data acquired (Research Methodology: An Introduction, n.d.). In this study the data gathered are mostly research papers, journals, articles and reports from website which contain case study and observations from past.



### 3.1.1.2 Analysis

After the data is gathered, it is analyzed. The problems are addressed here according to the data. In lining up the problems the basic model for the system is made.

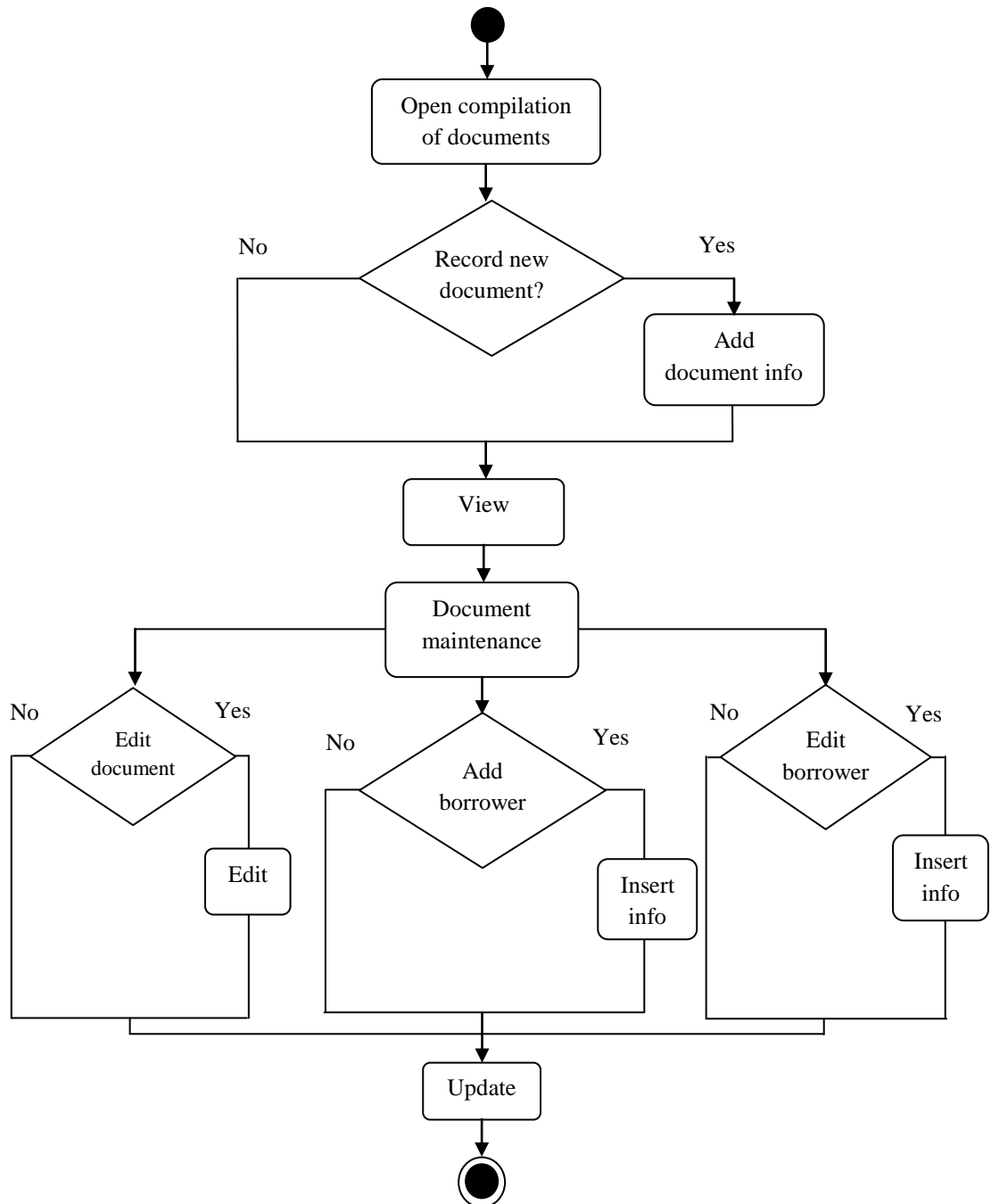


Figure 3.1: Basic flow of inventory system for filing

Figure 3.1 shows the basic flow for inventory in filing system based on the data that has been gathered through observation. The figure is the typical system for filing in organization where user will open the compilation of files which can be said as database but in paper form. User then chooses to insert a new file or not then it moves on to view. View is where the user views the files stored for the purpose of browsing or validating the new inserted file. Then comes the file maintenance part where user has the option for editing the files. User also has the options to add borrower and edit borrower when it comes for someone to borrow a particular file. The last part would be the update in which user is done with updating the files according to previous processes.

### **3.1.2 Development Methodology**

In completing the methodology for solving the problems addressed, the last part would be about development. The development methodology is done based on the analysis being made and divided into design and system development.

#### **3.1.2.1 Design**

For this part the automated FMS is determined to be applied at which point on the basic flow of the system. Considering the problems addressed, the critical point on the system to apply the automated FMS is at storage point where the information for inventory of files are recorded into database. This is the key point in ensuring an organization filing system to be easily managed in terms of the information transfer.

The figure below shows how the system architecture for storage process when automated FMS is to be implemented to the flow of the inventory system.

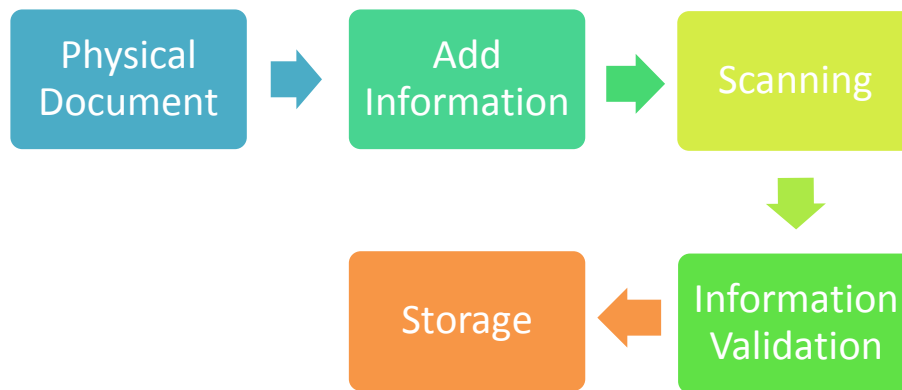


Figure 3.2: Implementation of FMS on storage process

The physical document would be going through add information stage. This is where user will add the information regarding the particular document to the system. By using scanner the physical document is scanned into the system or user may have the option to upload an existing image in computer. After that it goes to information validation where the information regarding the data entered existed or not. Here the OCR is implemented through the validation of the scanned image of the physical document. After the validation part is done, the uploaded document will go through the storage part. This is where the information is stored into the database and also the image is captured.

### 3.1.2.2 System Development

The methodology that will be used for this part in building this project is the Rapid Application Development (RAD) method. RAD is chosen because by judging the duration for the completion of this project, it will only be around 8 months. In Process/Project RAD - RAD - Rapid Application Development Process (n.d.), there are 3 techniques that are most important in RAD to be used for this project which are; prototyping, iteration and time boxing.

Prototyping is an approach to create a demonstrable initial filing system and will be refined through feedback made after the demonstration. Iteration is where the incremental development happened through the refinement from prototyping while time boxing is a technique that focuses on delivery as its top priority within a set of duration.

In choosing this method, the consideration for flexibility is among at the highest level. This is because due to the time constraint RAD allows for any changes to be done during the development phase taking example a review on the system. Furthermore it also allows the system to be rechecked at any other phase of project development. Debugging process is important in a system development and as RAD is used it gives the process flexibility to be completed. The whole project will be categorized into four main phase namely as below:

- Analysis and Quick Design Phase
- Prototyping Cycles (Building, Refining, and Demonstrating process)
- Testing Phase
- Implementation Phase

### **3.1.2.2.1 Development Tools**

The main development tools that are used in building the system are PHP and XAMPP. PHP is used as the language for web-based development platform meanwhile XAMPP is for the web server. Both are open source so it would not be too complicated for developing a system.

## **CHAPTER 4**

### **RESULTS AND DISCUSSIONS**

#### **4.1 Results**

The results are findings from the data that has been gathered. In this study the typical existing system in organization has been found out and with the information process by process charts were outlined to have a clear flow of the new system. The users were also identified in outlining the charts and the processes were divided into specific user. There are two users involved in the system mainly, Admin and Staff.

##### **4.1.1 Admin**

Basically the activity diagrams for Admin are in the file managing process which are 'Add Files' and 'Edit Files'. These two are the main functions in managing the information of the documents involved.

The figure below shows the activity for Add Files process in the function Add. First user (Admin) would log in into the system and if the login failed the process ended. If it is a success, user proceed with scan file which is scanning the document using scanner or upload the existing image of the document into the system. At this stage the image is validated whether the database has stored the same document or not. If there is a file found that particular file is viewed. If there is no duplicate file the next stage is executed where the user add information regarding that document. After adding information it is stored and updated in the database.

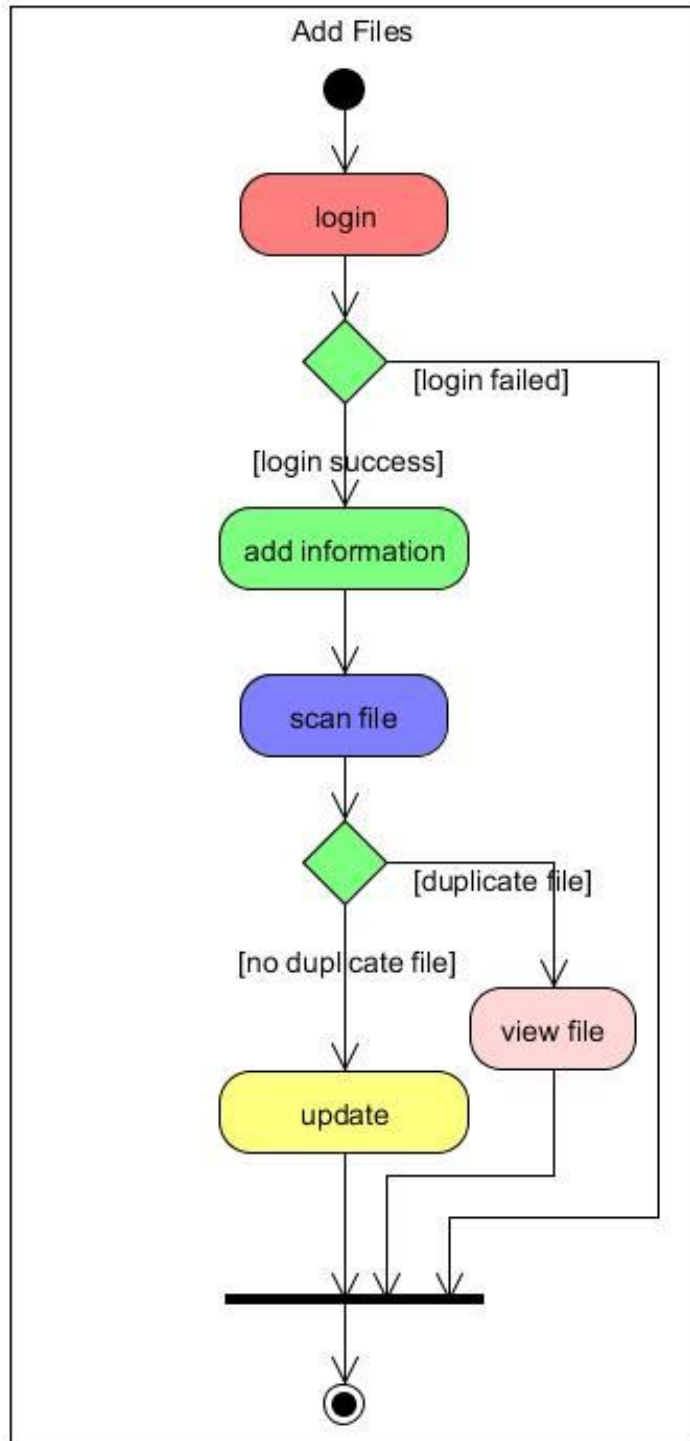


Figure 4.1: Add Files process for user Admin in Add function

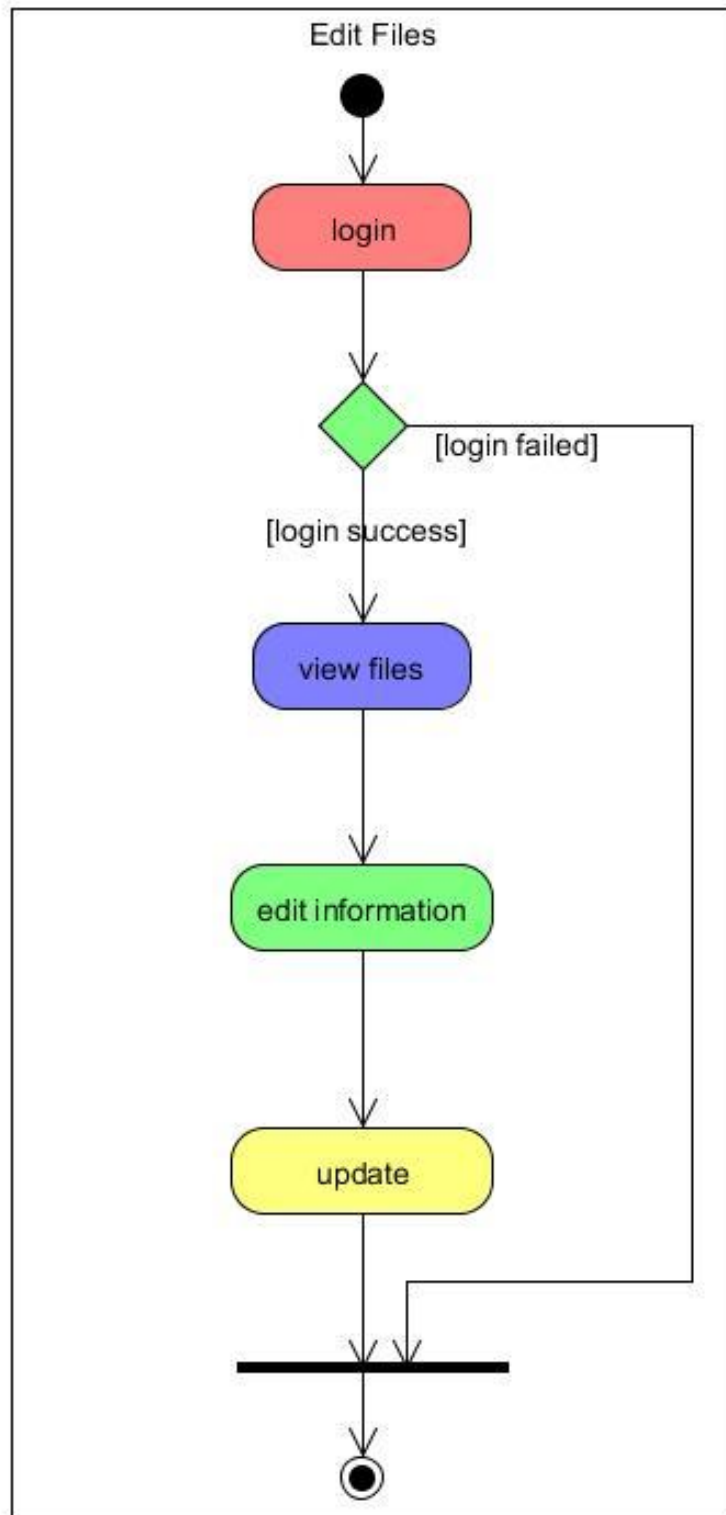


Figure 4.2: Edit Files process for user Admin in Edit function



Figure 4.2 shows the activity for Edit Files process in the function Edit. Like in the Add Files process user would first log in into the system and if it is failed the process would be ended. If user login successful, user would be able to view files in the system then proceed with the editing information. After that the information is updated and stored in the database.

The overall system architecture for Admin is also outlined as the figure below.

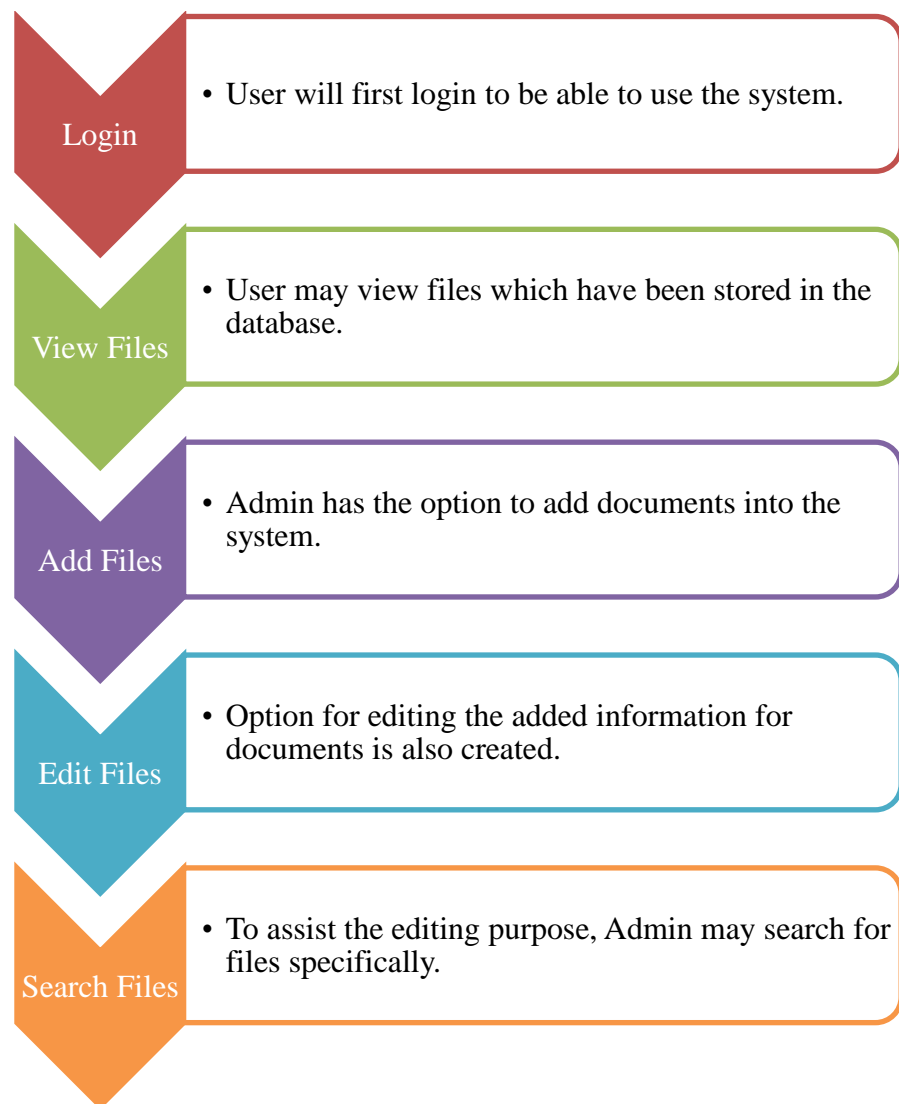


Figure 4.3: System architecture for Admin

User would first start on the Login page as in Figure 4.4, refer to Appendix 1-1. Then if the system has determined whether the user is Admin, user will be directed to the Admin page, Figure 4.5 in Appendix 1-1. User would be able to view files (Figure 4.10), add files (Figure 4.9), edit files (Figure 4.11) and search files as in Figure 4.17.

#### 4.1.2 Staff

For the user, Staff, the process involving the information for filing activity is the Borrow Files. The figure below shows the activities involved in the process.

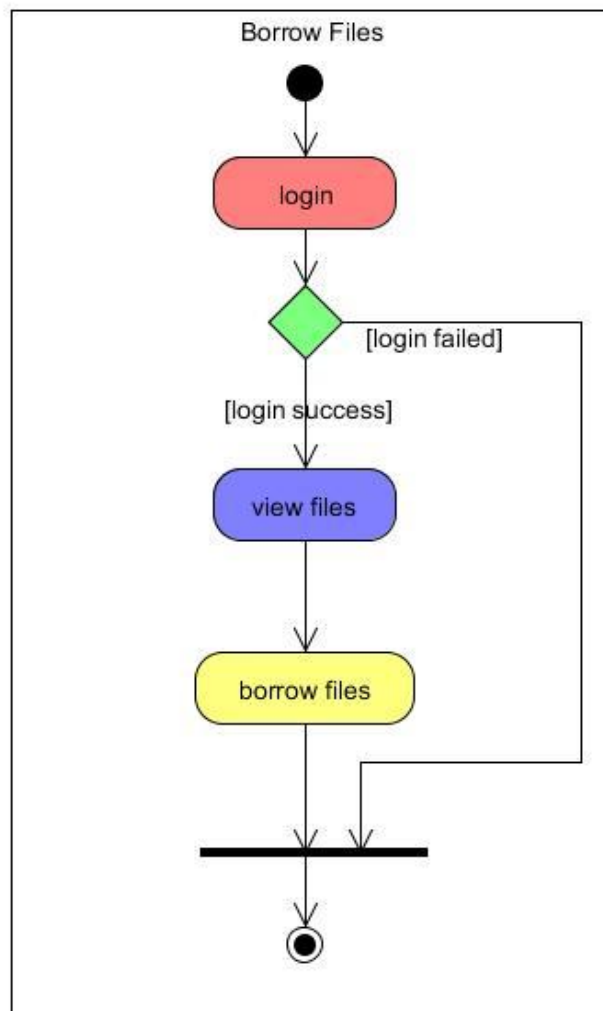


Figure 4.6: Borrow Files process for user Staff in Borrow function

First the user, Staff, would enter the system and if the logging in failed it will end the process. If it is successful user would be able to view available file to be borrowed then will proceed to the borrow files for confirmation on borrowing the documents needed.

System architecture for staff is also outlined in understanding more about the system as below.

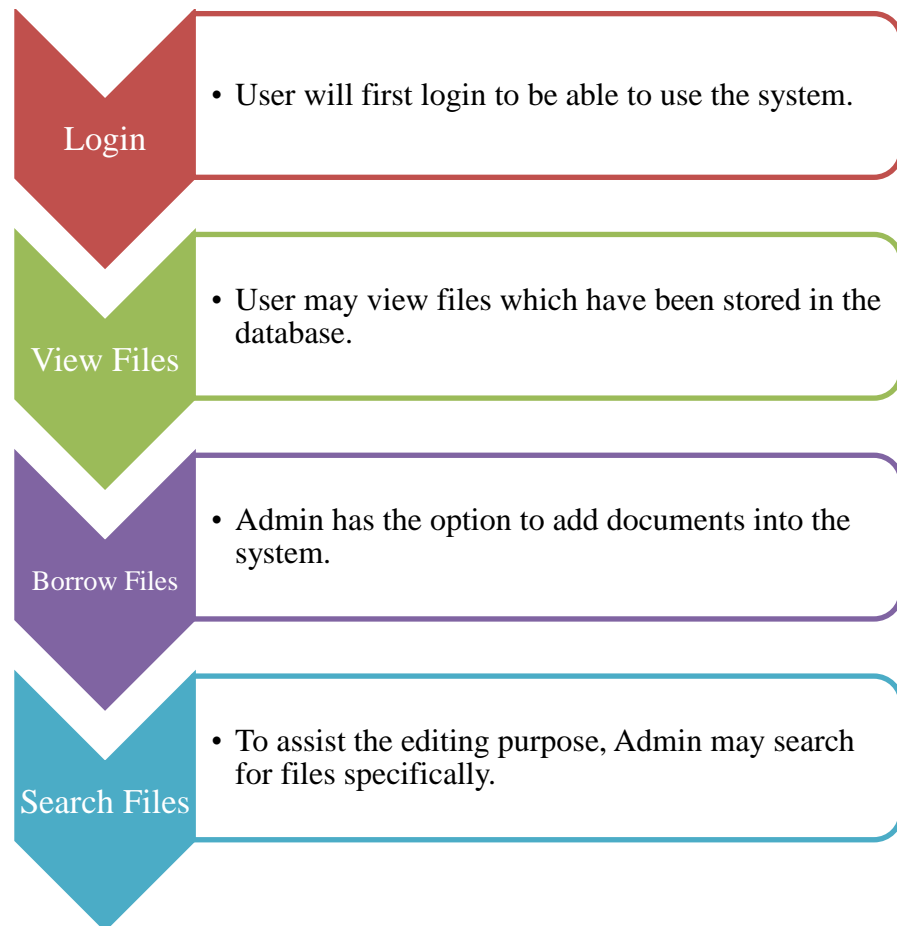
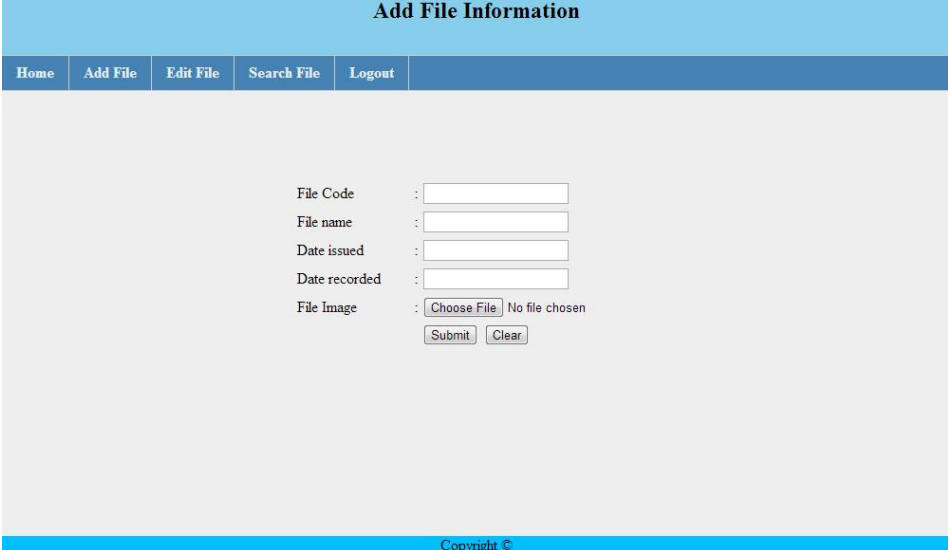


Figure 4.7: System architecture for Staff

User would first start on the Login page as in Figure 4.4, refer to Appendix 1-1. Then if the system has determined whether the user is Staff, user will be directed to the Staff page, Figure 4.8 in Appendix 1-1. User would be able to view files (Figure 4.12), borrow files (Figure 4.13) and search files as in Figure 4.18.

### 4.1.3 Function prototype

For each of the function that has been found out to be presented, a prototype has been developed. The screenshots for each of the functions mentioned above are as below.



The screenshot displays a web application interface for adding file information. At the top, there is a light blue header with the text "Add File Information". Below this is a dark blue navigation bar containing five menu items: "Home", "Add File", "Edit File", "Search File", and "Logout". The main content area is light gray and contains a form with the following fields and controls:

- File Code :
- File name :
- Date issued :
- Date recorded :
- File Image :  No file chosen

At the bottom of the form, there are two buttons: "Submit" and "Clear". A blue footer bar at the very bottom contains the text "Copyright ©".

Figure 4.9: Add File screenshot

The above screenshot is for the function Add for Admin user. After user has logged in, user will key in information needed to be recorded into the database which are file code, file name, date issued, date recorded and file image for image of the document. After the user has submitted the information the edit function may be started.





Edit File										
Home	Add File	Edit File	Search File	Logout						
File Code	File Name	Date Issued	Date Recorded	Status	Staff ID	Staff Name	Department	Date Borrowed	File Image	Action
file001	Timetable	2012-11-30	2012-12-08	Available						<a href="#">Edit</a> <a href="#">Delete</a>
file004	CV	2012-11-01	2012-11-29	Available						<a href="#">Edit</a> <a href="#">Delete</a>
file002	Certificate	2012-11-01	2012-12-08	Unavailable	11111	Sam	Corporate	2012-12-10		<a href="#">Edit</a> <a href="#">Delete</a>
										

Figure 4.10: Edit File screenshot

The figure above shows how the Edit function is started and it is mainly the view file part for the Admin section. The figure shows the documents that have been recorded and user will have the ‘edit’ and ‘delete’ option under the ‘Action’ column. If user wanted to edit the data of a particular file ‘edit’ option can be clicked and be directed to the screenshot as below.

Edit Data				
Home	Add File	Edit File	Search File	Logout
File Code	file002			
File Name	Certificate			
Date Issued	2012-11-01			
Date Recorded	2012-12-08			
Status	<input type="radio"/> Available <input checked="" type="radio"/> Unavailable			
Staff ID	11111			
Staff Name	Sam			
Department	Corporate			
Date Borrowed	2012-12-10			
<input type="button" value="Save"/> <a href="#">Back</a>				

Copyright ©

Figure 4.11: Edit Data screenshot

Figure 4.11 shows the Edit Data part where user can modify the data of a particular file. The screenshot is the edit function for Admin to manage the documents stored in database which Admin may edit the

File Name, Date Issued and Date Recorded field. Admin also may edit the availability of the document through Status field and when Available option is clicked, Admin may edit the staff information that borrowed the document. The staff information includes Staff ID, Staff Name, Department and also Date Borrowed of the document.

Meanwhile Figure 4.12 is for the function that involved user, Staff which is the Borrow function.

File Code	File Name	Date Issued	Date Recorded	Status	File Image	Action
file001	Timetable	2012-11-30	2012-12-08	Available		<input type="button" value="Borrow"/>
file002	Certificate	2012-11-01	2012-12-08	Unavailable		
file003	Poster	2012-11-22	2012-11-23	Available		<input type="button" value="Borrow"/>

Figure 4.12: View File screenshot

Figure above shows how the Borrow function started. After a staff has logged in, staff will go to View File page to see on the available documents to be borrowed. If a document is available button 'Borrow' will be shown and can be clicked in which staff will be directed to the Borrow File page as Figure 4.13.

The screenshot shows a web interface titled "Borrow File". At the top, there is a blue navigation bar with the title "Borrow File" and four menu items: "Home", "View File", "Search File", and "Logout". Below the navigation bar is a form with the following fields and values:

File Code	:	file001
File Name	:	Timetable
Staff Username	:	staff2
Staff ID	:	
Staff Name	:	
Department	:	
Date Borrowed	:	2012-11-24

Below the form is a button labeled "Borrow". At the bottom of the page, there is a blue footer bar with the text "Copyright ©".

Figure 4.13: Borrow File screenshot

The Borrow File page is where the staff would fill in the information on borrowing a particular document. The details needed would be the Staff ID, Staff Name and also the Department. After that user send the confirmation by clicking on the 'Borrow' button and the system will be updated on the Edit File part with information provided.

## 4.2 Discussions

Based on the result obtained, it is found out that the implementation of OCR would be done at the Add Files process. The figure below shows the specific point of the implementation of the OCR on the process.

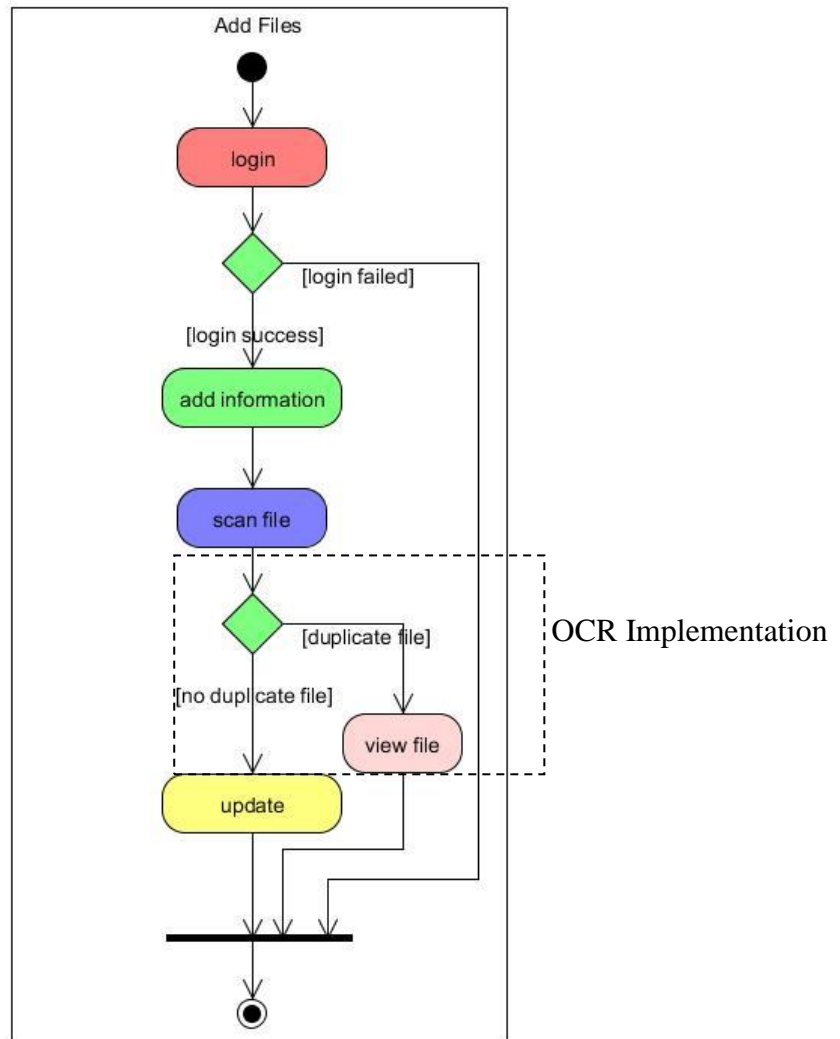


Figure 4.14: OCR implementation on Add Files process



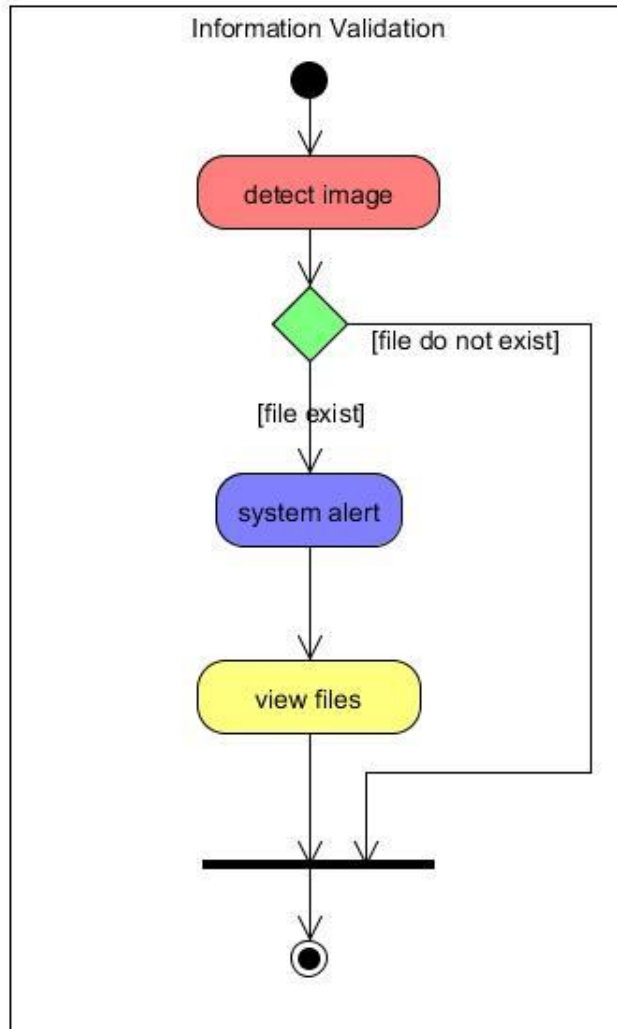


Figure 4.15: Information validation process on Add Files

Figure 4.14 shows the OCR implementation on the Add Files process in the information storing. The specific point is at the scan file stage and Figure 4.15 shows the process of information validation at the particular stage. The OCR is implemented as the detection system when the scan file started. First the image of the scanned or uploaded document is detected and if the file does not exist in the database meaning no duplicated file then the process is terminated and goes straight to add information stage. If a file is detected meaning there is a duplicate for that document, system alert will show user that there is a same document has been stored in the database. After that the information for that document is shown through view files stage.

Furthermore, it is also found out that a 'Search' function should be added for users to browse the files easily. If it comes to the number of the documents that have been stored is high users would need to find specific files, so users would not need to browse one by one on the system. The function is divided into two based on the users which are Admin search function and also for Staff. As for the Admin, the search function would be for the purpose of assisting in the editing process while for Staff it is the assist in borrowing process.

#### 4.2.1 Function prototype

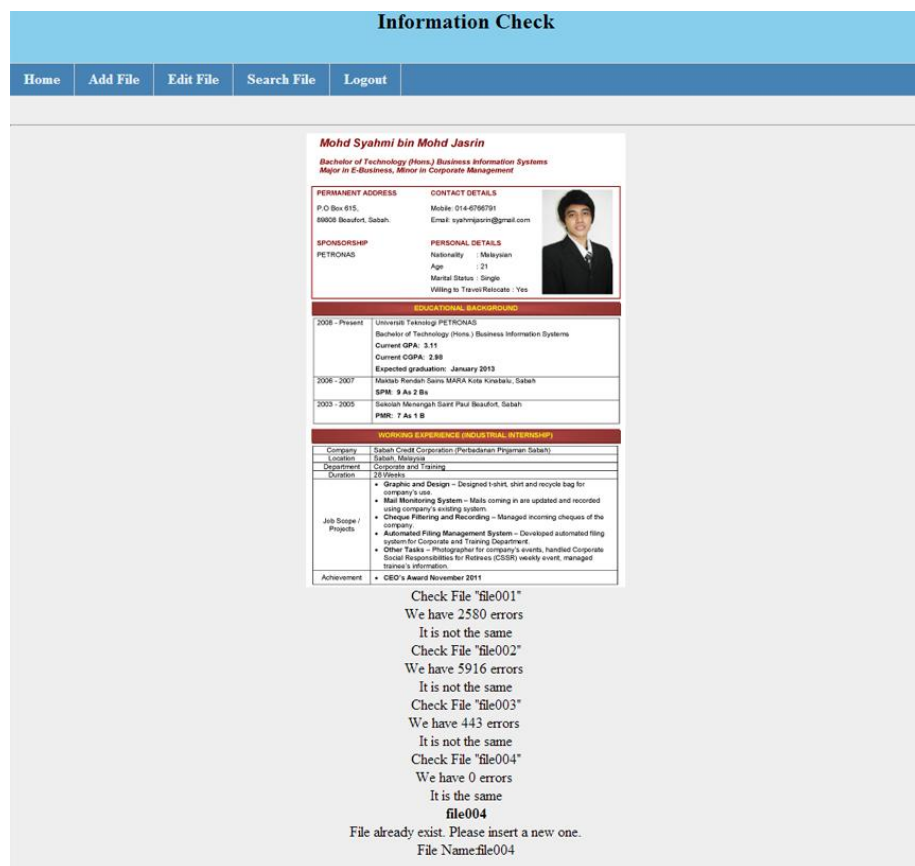


Figure 4.16: Information check screenshot

The figure shows the result of the OCR process which is information validation. The recognition part would detect the image that wanted to be uploaded into the system and check through it whether the file is existed or not. The system will check the image in the system one by one for comparison and shows error for each

comparison made. Then if the errors come to value of zero, the system will display which file is detected to be same as the one uploaded.

As for the Search function, the screenshots are as listed below. Figure 4.17 is the search function for Admin with the result displayed is using the keyword 'Cert'. Admin would be able to target a specific file or specific files for editing purpose. Meanwhile, Figure 4.18 shows the search function for user, Staff and it displays the result for the keyword 'Time'. Staff would be able to specifically browse for a particular file and borrow it easily.

File Code	File Name	Date Issued	Date Recorded	Status	Staff ID	Staff Name	Department	Date Borrowed	File Image	Action
file002	Certificate	2012-11-01	2012-12-08	Unavailable	11111	Sam	Corporate	2012-12-10		<a href="#">Edit</a> <a href="#">Delete</a>

Figure 4.17: Search file screenshot for Admin

**Search File**

Home   View File   Search File   Logout

Name of the file you want to find

Result found for file name "Time"


File Code	File Name	Date Issued	Date Recorded	Status	File Image	Action
file001	Timetable	2012-11-30	2012-12-08	Available		<input type="button" value="Borrow"/>

Figure 4.18: Search file screenshot for Staff

## **CHAPTER 5**

### **CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Conclusion**

As for the conclusion, the browsing of documents for filing in organization has been one of problems as it required quite some time to be accomplished. Applying FMS through the existing system by making it automated, user will only have to wait for response time of the server and the time for browsing would be reduced by around half compared to the existing system. With the ability to search for specific files users would be able to pinpoint which files would they want to browse, manage or borrow. Furthermore with Add and Edit function user would not need to open documents directories and write for the information needed plus if there is an editing session users would not have to write every single of information once again on a new set of documents.

When a document is borrowed by a staff, there are some cases that the document cannot be tracked because there is no information on the borrower. Often, these cases resulted in loss of that particular document as it cannot be traced. Implementing automated FMS into the existing system, it provides the admin to be able to keep in track of the borrowers' information regarding checked out files. Admin would know who is borrowing the exact file and reduce the possibility of loss as it will be easier to retrieve the documents.

In existing system users would not know the availability of documents, whether it has been borrowed or not and users would need to go through compilation of documents to confirm the process. Automated FMS, provides the users with status of availability of the files stored in the system. If files have been borrowed, status will be indicated as unavailable while if files are not borrowed, it would be available and users may fill in information to complete the borrow process.

## 5.2 Recommendations

As recommendations, in the future more studies and research should be made in developing FMS with OCR because as of now the knowledge on developing the system is limited. The implementation of OCR should be made in wider context meaning that more information should be captured when an image is provided so the rate of efficiency can be increased. In developing it suitable algorithms should be presented in implementing the OCR. The choosing of algorithm is important because different algorithm provides different ways in implementing the OCR. There are some that provide the application by single letter recognition and there are some provide recognition by the shape of the text itself. So choosing the right algorithm will ensure an accurate reading and segmentation for information to be stored plus in a wider context.

Based on the methodology presented, scanner may also be used in retrieving the image to be stored into the system. As an improvement, the implementation of hardware, using scanner should be considered as it would add value to the system. Using the scanner, the system will only need to scan the documents and converted it into image directly to be stored into the system then directly go through the file recognition part. This is because right now the prototype depends on image of documents that are already in the computer (scan and convert it into image) and upload it to the system which only then be scanned for the file recognition part. By using scanner, the process for adding documents and file recognition can be done in one cycle instead of doing it part by part.

In reviewing the prototype, database for the details of borrowers can be added in storing information regarding staff that has borrowed documents. In regards to the information, function for borrowers section can be added such as when a staff clicked on the 'Borrow' button, information of that particular staff can be added automatically. In the prototype staff would need to fill in their information one by one and there is a tendency for the filling process to have mistakes so if this function is implemented staff would not need to go through the process thus reducing the percentage of mistakes made.

For the system, in the future too, development of the system into mobile application would be recommended. This is because nowadays a lot of people are using smart phones so implementing the system into the phones would be a smart way in increasing the efficiency and effectiveness of the system. The storage for the documents would be easier as people would only need to use smart phones in handling and managing the system. By the capability of using the system through smart phones, it would add the value for FMS and would be good to market the product in the future.

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# Welcome to FMS

Login

Username

Password

Figure 4.4: Login page screenshot

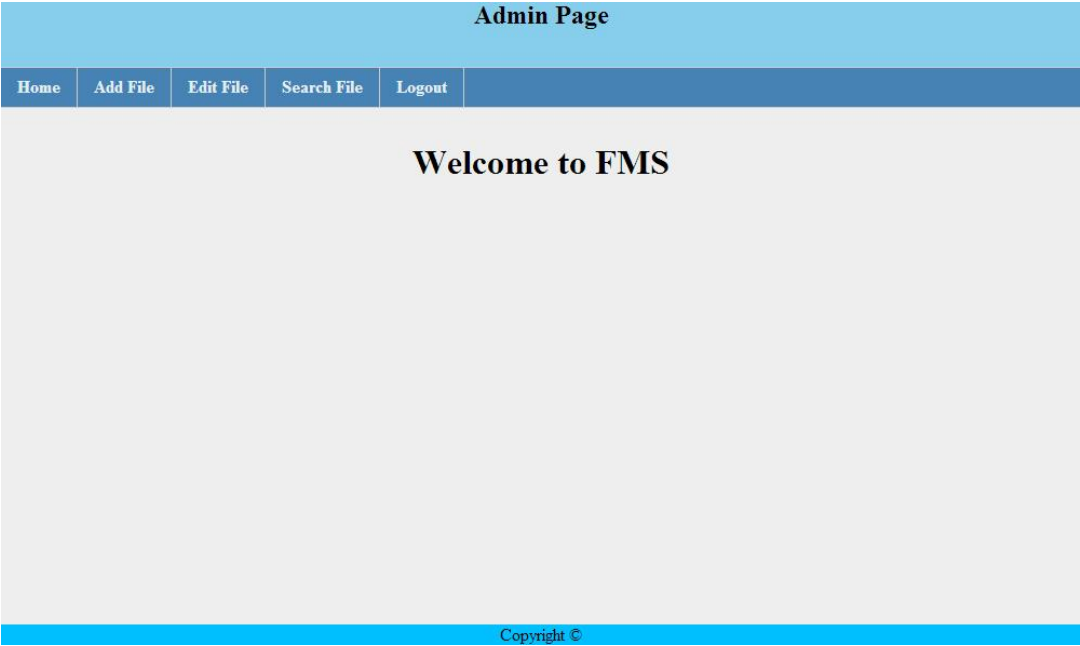


Figure 4.5: Admin page screenshot

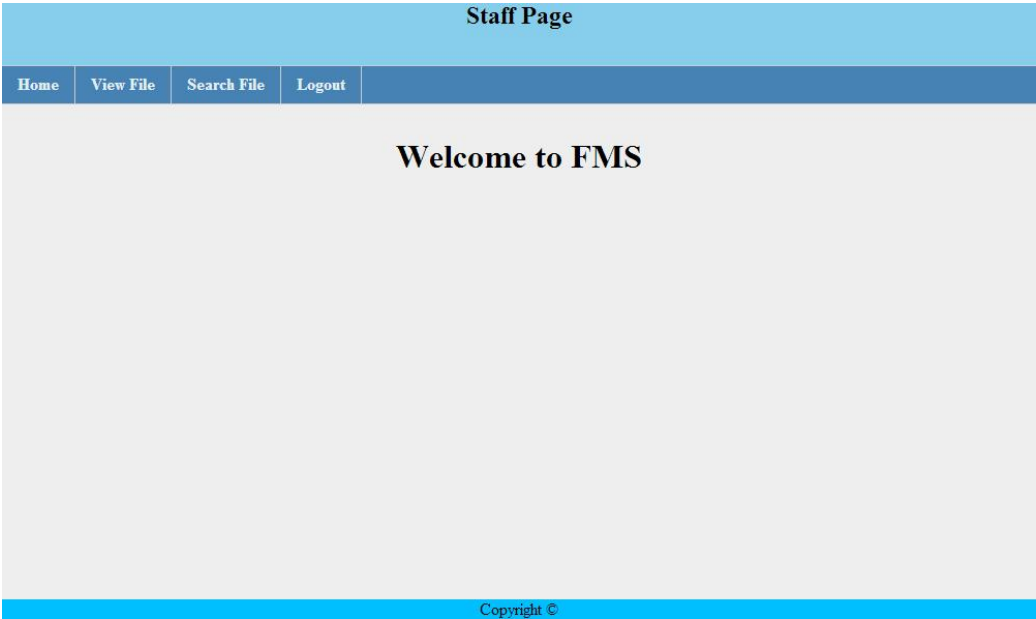


Figure 4.8: Staff page screenshot