THE DEVELOPMENT OF DOCUMENT MANAGEMENT WORKFLOW SYSTEM TO SUPPORT INTERLIBRARY LOAN SERVICE

by

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Dissertation submitted in partial of the requirement for the

Bachelor of Information System (Hons)

(Business Information System)

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CERTIFICATION OF APPROVAL

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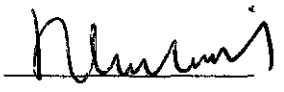
Approved by,



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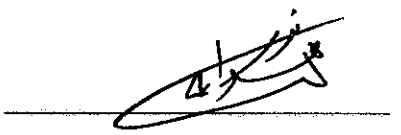
UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

September 2011

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.



NUR HIDAYAH BINTI MUHAMMAD TAUFIK

ABSTRACT

This report describes system that automated interlibrary loan where it's coordinate the application process from fill in the requirement information from user side to review, approval and notification. The author defines workflow management system, interlibrary loan (ILL) and mechanism how ILL, the document driven move from user to librarian. This report describes the hardware and software used, architecture implemented and function available.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Workflow is important in organization .Many company use workflow to make their business process deliver more effectively and efficiently. Library is one of the organization where provide facilities such as Interlibrary Loan (ILL). ILL is is a service whereby a user of one library can borrow books or receive photocopies of documents that are owned by another library.

In Universiti Teknologi Petronas, (UTP) the problem using ILL have been identified as many times a student would call inquiring on the status of their application and librarian could not give them immediate answer.

This project addresses the problem where the objective of this project will automate the ILL and improve the process of review, approval and notification.

1.2 BACKGROUND OF STUDY

Information Resource Centre (IRC), Universiti Teknologi Petronas (UTP) has magnificent business process especially system to search and borrowing books and type of journal. However, there are still a lots of improvement needs to be done in order to enhance the efficiency where some of the unnecessary steps of business process could be eliminate.

Workflow is the automation of a business process, in whole or part during which documents, information or tasks are passed from one participant to another for action, according to set of procedural rules.

One of the facilities in the library services is interlibrary loan, as for understanding is like Document Supply Service Request which entertains the request from patron such as for book, thesis, audio or video facilities, journal, proceeding, patent, standard, report.

Currently, the interlibrary loan was handling through a half manual process. Application is reside in the library webpage, where patron need to download the file which is in word version, fill up the form, then forwarded via respective library's staff email. Once reviewed by the library's staff, the application will be consider approve.

1.3 PROBLEM STATEMENT

One of the good advantage of the current implementation of this services is there are still environment friendly where the form does not have to be print since the form will circulate within the respective email. For example, request made by postgraduate or undergraduate student must be verified by supervisor , so, the form already consider verified when the requestor attach the email of supervisor in the looping email when forward to respective library's staff email. However, the author identified that form movement of this application does not really coordinate in term of review, approval and notification. It leads towards time costing as the requester does not get instant, informed update regarding their application status.

Moreover, currently the review of the each application is done manually by respective staff which the problem of lost or misfiled documents could be happened since there are a lot of thing sent to the same email.

1.4 OBJECTIVES

The main objective of this project is to develop an interlibrary loan application where applicants can submit a paperless, online application that uses the internet to enter information directly into the library services workflow. Therefore, the process will become more faster. Library's staff will be freed from wasting time opening cumbersome application. Cycle time for application processing has been slashes in half. Other objectives of this project are as follow:

1. analyse the current implementation of library services towards patron (student , lecturer , university's staff)
2. Design user interface, database and architecture of an interlibrary loan application.
3. Develop a web-based interlibrary loan that allows user to :
    - Submit the request directly.
    - Getting the notification of the status of application more quickly.

CHAPTER 2

LITERATURE REVIEW

2.1 Concepts of Library

In a traditional sense, a library is a large collection of books, and can refer to the place in which collection is housed. Today, the term can refer to any collection, including digital sources, resources and services. The collections can be print, audio and visual materials in numerous formats, including maps, documents, prints, microform (microfilm/microfiche), CDs, cassettes, videotapes, DVDs, video games, e-books, audio books and many other electronic resources.

Public and institutional collections and services may be intended for use by people who choose not to or cannot afford to purchase an extensive collection themselves, who need material no individual can reasonably be expected to have, or who require professional assistance with their research.

Academic libraries is one the type of library where it must decide what focus they take in collecting materials since no single library can supply everything. When there are particular areas of specialization in academic libraries these are often referred to as niches collection. These collections are often the basis of a special collection department and may include original papers, artwork, and created by a single author or about a specific subject

Therefore, one of the services need by people is interlibrary loan which borrowing any materials from another library in the case our library does not provide and the material does not exist. Patrons may not know how to fully use the library's resources. This can be due to some individual's unease in approaching a staff member ways in which a library's content is displayed or accessed may have the most impact on use .It same goes to case of ILL, the way the service conducted towards user also can be impact on use.

2.2 Concepts of Workflow

A workflow consists of a sequence of connected steps. It is a depiction of a sequence of operations, declared as work of a person, a group of persons and organization of staff, or one or more simple or complex mechanisms. Workflow may be seen as any abstraction of real work. For control purposes, workflow may be a view on real work under a chosen aspect thus serving as a virtual representation of actual work. The flow being described may refer to a document or product that is being transferred from one step to another. The term workflow is used in computer programming to capture and develop human-to-machine interaction.

A workflow management system is a computer system that manages and defines series of tasks within an organization to produce a final outcome or outcomes. Workflow Management Systems allow you to define different workflows for different types of jobs or processes. So, for example, in manufacturing setting, a design document might be automatically routed from designer to at technical director to the production engineer. At each stage in the workflow, one individual or group is responsible for a specific task. Once the task is complete, the workflow software ensures that the individuals responsible for the next task are notified and receive the data they need to execute their stage of the process of the process.

Workflow management systems also automate redundant tasks and ensure uncompleted tasks are followed up. Workflow management systems also may control automated processes in addition to replacing paper work order transfers. This is the concept of dependencies. A workflow management system reflects the dependencies required for the completion of each task.

A workflow component can usually be described using formal or informal flow diagramming techniques, showing directed flows between processing steps. Single processing steps or components of a workflow can be basically be defined by three parameters:

1. input description : info required to complete the step
2. transformation rules, algorithms, which may be carried out by associated human roles or machines, or a combination
3. output description : info produced by the step

2.3 Concepts of Interlibrary Loan

Interlibrary loan (abbreviated ILL, and sometimes called interloan, document delivery or document supply) is a service whereby a user of one library can borrow books or receive photocopies of documents that are owned by another library. The user makes a request with their local library, which, acting as an intermediary, identifies owners of the desired item, places the request, receives the item, makes it available to the user, and arranges for its return. The lending library usually sets the due date and overdue fees of the material borrowed. Although books and journal articles are the most frequently requested items, some libraries will lend audio recordings, video recordings, maps, sheet music. In many cases, nominal fees accompany interlibrary loan services.

Interlibrary loan or resource sharing has two operations: borrowing and lending:

- A borrowing library sends an owning library a request to borrow, photocopy or scan materials needed by their patron.

- The owning library fills the request by sending materials to the borrowing library or supplies a reason why it cannot fill the request.
- If the item is sent, the borrowing library notifies the patron when the item arrives.

2.4 Resource-sharing Environment and Inter-library Loans

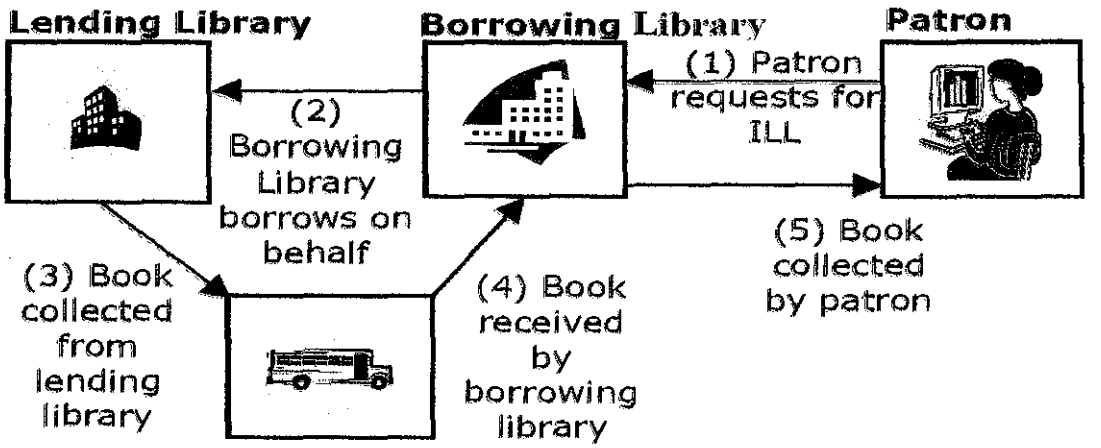

Figure 1: How Interlibrary Loan Process

Inter-library Loan (ILL) service in an academic library may operate under different names, such as inter-library borrowing, inter-library lending, inter-library services, document delivery, resource-sharing, etc. This paper will use inter-library loan or ILL to refer to these services. In most academic libraries, an eligible ILL patron is anyone with a library card in need of a book that the library doesn't have or is loaned out. In most universities, the faculty members and graduate students are the heaviest users of ILL services (L. A. Hilyer, 2002).

Figure 1 shows the ILL process. If a book or item needed by a library patron is not available or is checked out, a registered borrower may have the option of requesting the item from another library (lending library). An inter-library loan works like an ordinary

library loan except that now the borrowing library becomes the 'patron' of the lending library.

Resource sharing generally refers to co-operative activities between libraries designed to maximize service while minimizing costs (N. Krym, and M. VanBuskirk, 2001). Libraries around the world are working together to form a resource-sharing environment. Under such an environment, librarians are looking into an automation system that could assist in their work. Patrons, on the other hand, are looking for better services. Google (www.google.com) and Amazon (www.amazon.com) provide their users with simplicity of information discovery and a one-stop shopping experience.

Library patrons are expecting library services to be 'Amazoogle-like' i.e. providing services on their terms instead of the terms of the library. But these days, with rising costs and shrinking library budgets, libraries are unable to keep up with such expanding patron needs or exploding publishing output (M. E. Jackson, 2005). Even if all libraries were able to spend as much as they wanted on library resources, there would always be some resources, which they need to obtain on behalf of the patrons on an ad-hoc basis. With the growth of Email and the Internet, libraries are able to provide services to one another and share resources.

Many are also trying to form a community collection in order to assist each other in the reduction of duplicated resources and to maximize the use of the limited amount of funds each library is allocated (C. Boukacem ,2003). It also becomes clear that libraries have to cooperate together regionally, nationally and internationally in order to achieve any real progress (J. Rachinger,2003). Additionally, the idea of having a union catalogue (which lists all the books in participating libraries) could also promote resource sharing among libraries (J. Rachinger,2003), as patrons are able to have access to different catalogues. Therefore, inter-library loan (ILL) plays an important role in the creation of a resource-sharing environment (J.Gatenby, 2003).

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

Chapter 3 describes the scope of study for application. Mainly this project has four stages that need to be completed, there are:

- Planning Phase
- Analysis Phase
- Design Phase
- Implementation Phase

The procedure for each phase above will be discussed below. Figure 1 shows the overall methodology of the project.

3.2 Throwaway Prototyping Methodology

There are several kind of methodologies used to develop a system such as Waterfall development based, Rapid Application Development (RAD) and Agile Development. After having several consideration and comparison with all methodologies, to develop this application, Rapid Application Development is the best and suited methodology that could be used.

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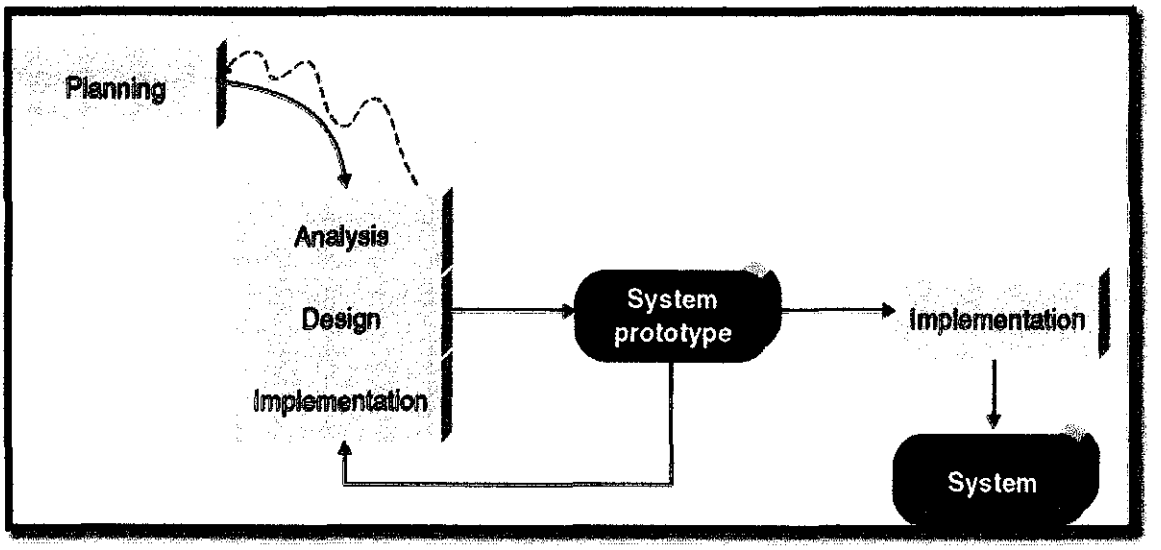


Figure 2: Phases in Rapid Application Development Methodology

3.2.1 Planning

Planning phase is an important stage, whereby fundamental process of understanding of why the project should be carried on and its aims are conducted. During project initiation, several discussions on project feasibility have been done with project supervisor.

In order to work out the proposed project, thorough researches on Interlibrary Loan (ILL) shall be conducted as the pre-requisite, in which the research should give better overview about the project and knowledge on how to go about designing and developing it later. To ensure the project goes smoothly within its scope in timely manner, it should have Gantt chart and key milestone as guidance.

In the next phase, the developer would do analysis towards the current implementation of interlibrary loan. Besides, analyzing the weakness and problems faced by patron while accessing the as- is business process is also vital. This would help the developer to come out with the new ideas that are able to ease patron in accessing this application in future.

3.2.1 Analysis

During the requirements phase, it is important to define exactly what the problem is or what the system will be required to do. In formations have been gathered by asking pertinent questions towards the staff who in charge the interlibrary loan, Pn.Roslina Nordin Ali on 9th August 2011 in the informal interview session. Problem analysis is often blended with information gathering so that a complete understanding of the requirements can be obtained.

3.2.2 Design

Once the requirements have been outlined, the author will start to develop the architecture of ILL. Platform, hardware and network to be used will also be outlined during this phase. ILL will be developed and put inside the available website of library.

3.2.3 Development

When the requirements of the application have been finalized, a number of design processes must occur. Issues such as inputs, outputs, functionality, algorithm design, and module integration are addressed during the design phase. After the software has been designed, it must be implemented. This is accomplished by programming or coding the design specifications into files called source code.

This phase is divided into two subdivision; system design and system implementation. During system design, the interface of ILL will be designed thoroughly based on research conducted in the Requirement Analysis phase. This includes the input form for user to fill in, the setting page, and the main functions of ILL page. Once the design has been finalized, the programming or coding process steps in.

3.2.4 Testing

When the application has been developed, it is important for the developer to make sure that it runs and functions correctly. The testing phase of the process ensures that the program meets quality standards and functional criteria. Once testing is complete, the program can be given to users.

As for this stage, ILL will be tested to ensure the application generated the desired output for each input.

3.2.5 Deployment

During the deployment phase of the software engineering process, users might need to be trained. Documentation must also be created so that users can utilize the program properly.

In this stage, ILL will be handed to user and an acceptance test will be conducted. Acceptance test gives the users the confidence in using ILL. This stage also will determine whether ILL has met its objectives.

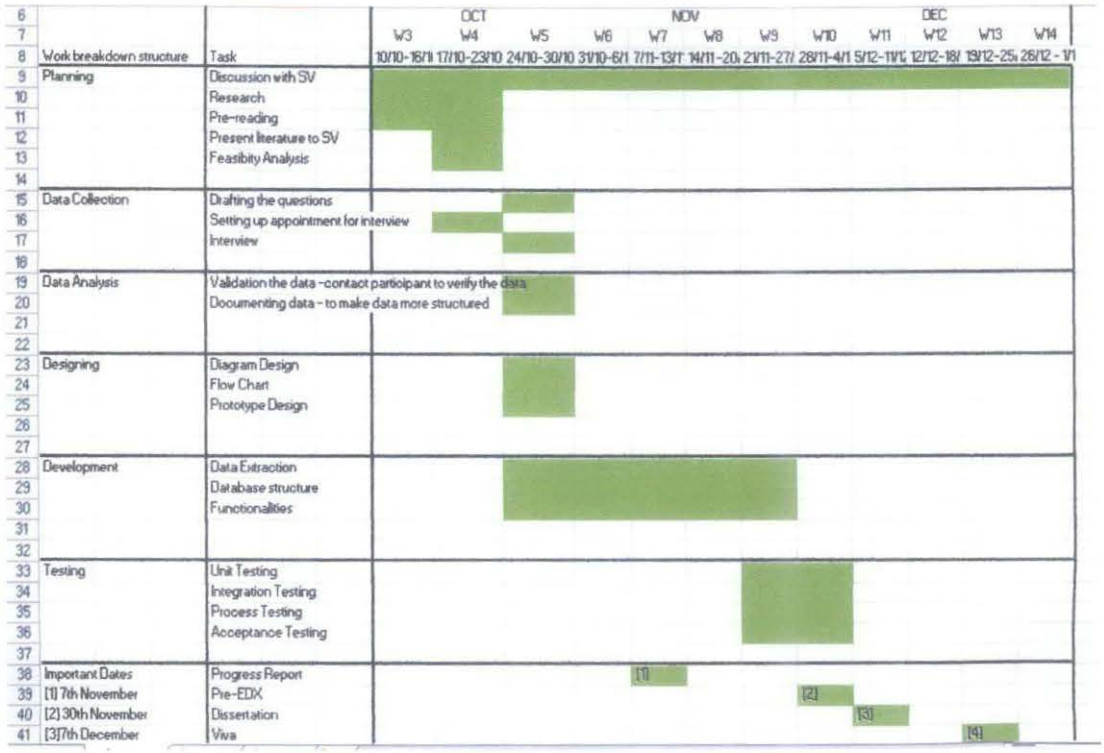


Figure 3: Key Milestone

Figure 3 is the project milestone for ILL. This milestone starts with planning phase where the idea of developing a system is created. The next phase which is an analysis phase, a research or fact finding is conducted to find all the related information for ILL. By the end of this phase, a close view to the actual system can be seen. Development phase is when the developer starts coding and program ILL. Once successfully developed, a system testing will be conducted.

3.3 Summary

Chapter 3 gives details more on throwaway prototyping methodology. This method is requiring to getting clear requirement from end users before moving to the next phase, avoid a lot of time consuming, hedging the risk of having huge loss before delivering.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Current Workflow ILL in IRC, UTP

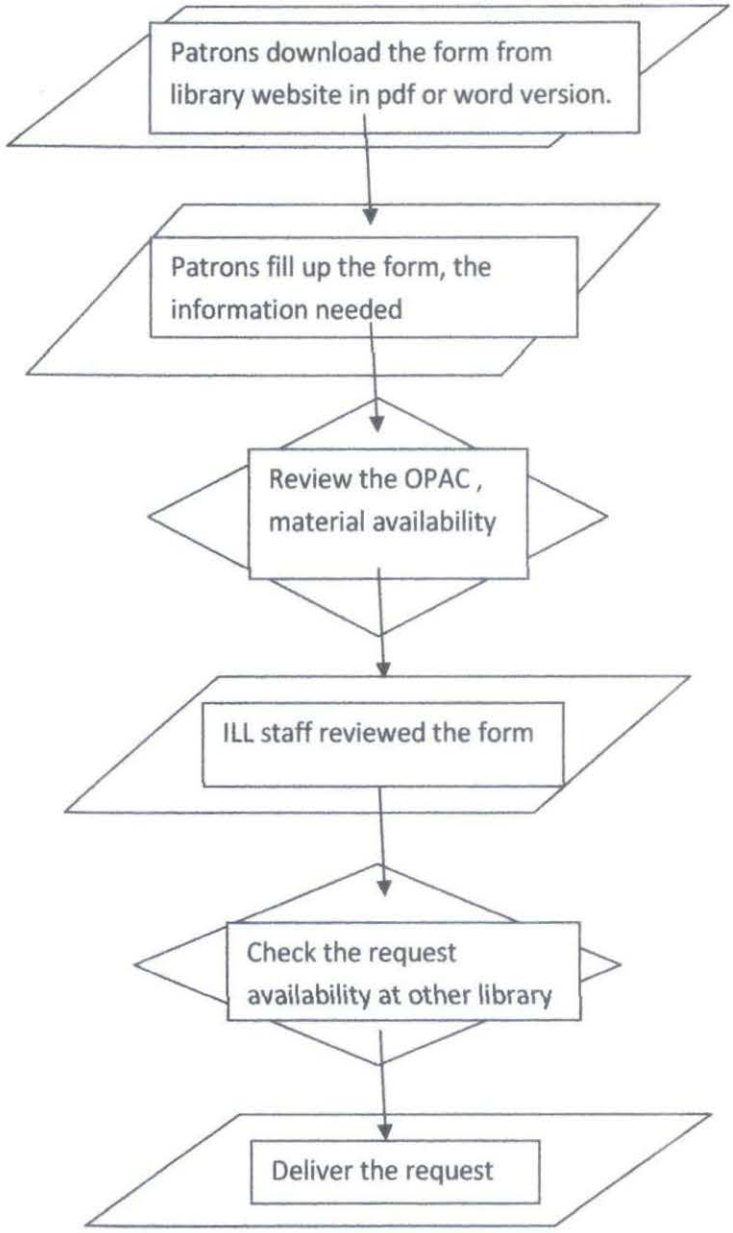
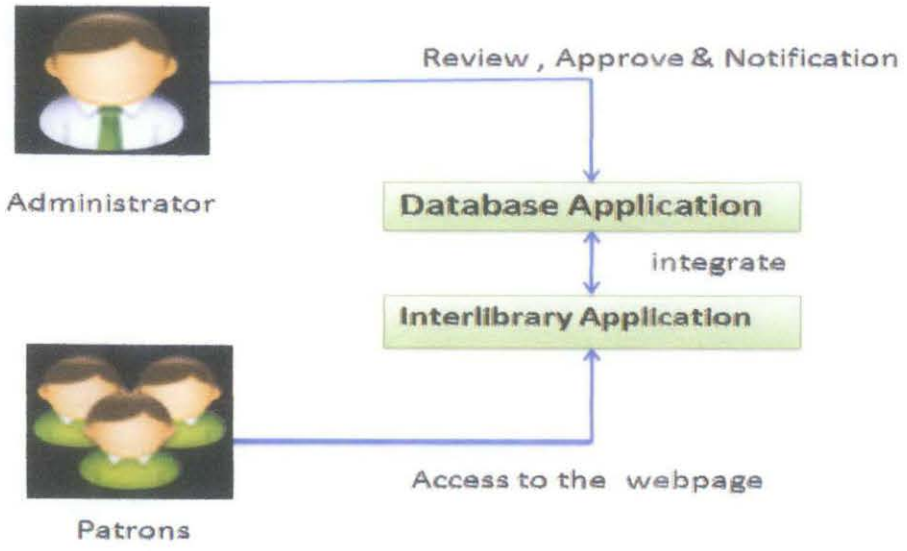


Figure 4: Workflow of the current ILL

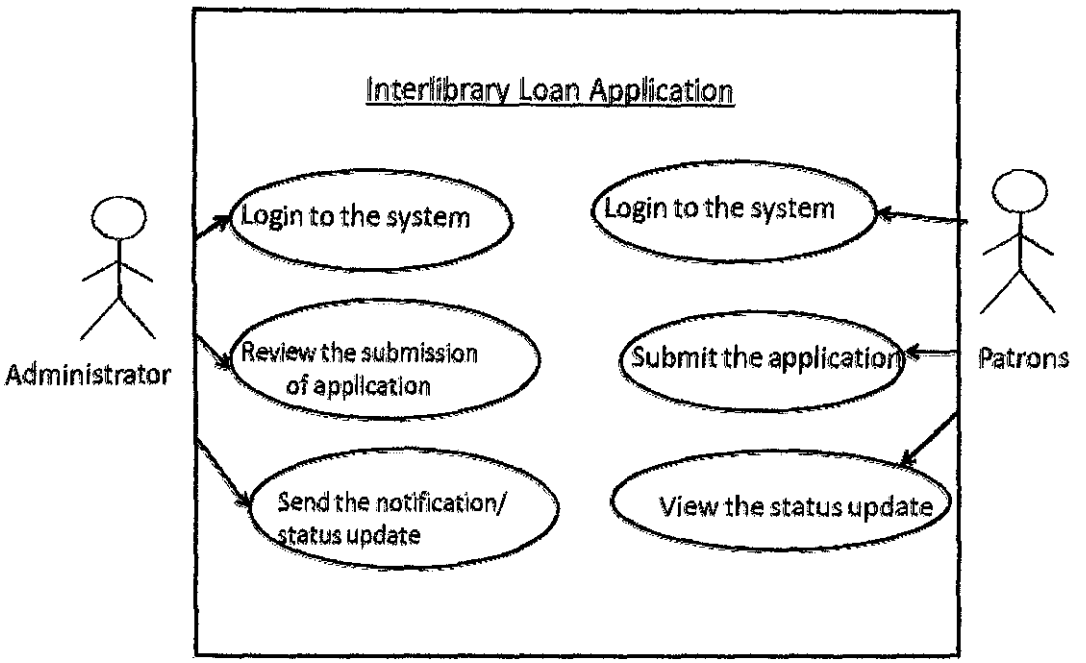
This current workflow process begins by downloading the form in the respective library website. It takes cost of time for patron as the form needed to type manually. Patrons also need to make sure the requested book does not available in the OPAC which is the service to borrowing book where this OPAC provide list of book which are available at the IRC UTP. Then the form will be sent via email to the respective email addresses. Patron will worried and hope the form will be arrived at the right destination as the notification either the form already arrived or review does not exist yet. ILL staff needs to check the ILL email every time on duty since the notification either having a request or not in the ILL staff's inbox. Again, time consuming happened. Once, the ILL staff has been already reviewed the request, they will find the respective list of request to another library. The deliver can be fulfilling if the material request is available.

4.2 Context Diagram



This context diagram shows two side of user who are administrator (ILL staff) and patrons (student, lecturer, or staff UTP). By having this application derived from this project, user does not have to download (to get the form) and upload (to sent back the form) the form. They can easily fill up the requested information and click button submit, therefore it will help to reduce error when key in input if compared with current workflow. The notification will be received when the administrator already review the request. This application will be integrate with database stored in UTP server, it helps the ILL staff to more alert with the current status of the request , by having the application , ILL staff could review and give update status more faster either the request is approved or rejected. Therefore, it reduces the continuous upcoming call from the requester.

4.3 Use Case Diagram



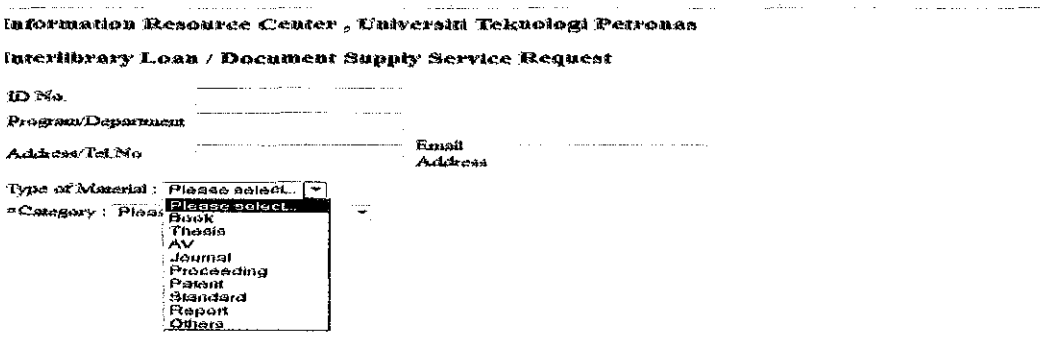
From use case diagram , the administrator and patron will have the log in system which in the practicality they will have the same username and same password when the access any of the system of library , but the purpose of the project it will be different log in , where the admin and patron need to sign up and create their own. The log in feature is very important as once they create their identity, they do not have to redundant do again and again to fill up their profile information such as *programme / department , telephone number and email address* .In addition , for the purpose of the security of user access , in order to make sure the IRC UTP deliver the services towards the authorize person in campus.

Patrons also can easily click submit once they completed the requirement information without hassle to check the right address email to sent to responsible person in charge. Patrons also can more easily view the status of their request from time to time without doubting and waiting the uncertainty. The administrator (ILL staff) also can more quickly review any submission of application and sent the notification.

4. 4 System Interface

After anylse the current workflow, the author identify interlibray loan should have the dedicated platform , in order to make sure the ILL are effectively utilise. The information like how to use the services , what the required procedures are , how the ILL-UTP work and who to contact need to be attach in the dedicated platform so that the user are more easilt to seach the information they needed and help give the brief explaination and review on how the request work.

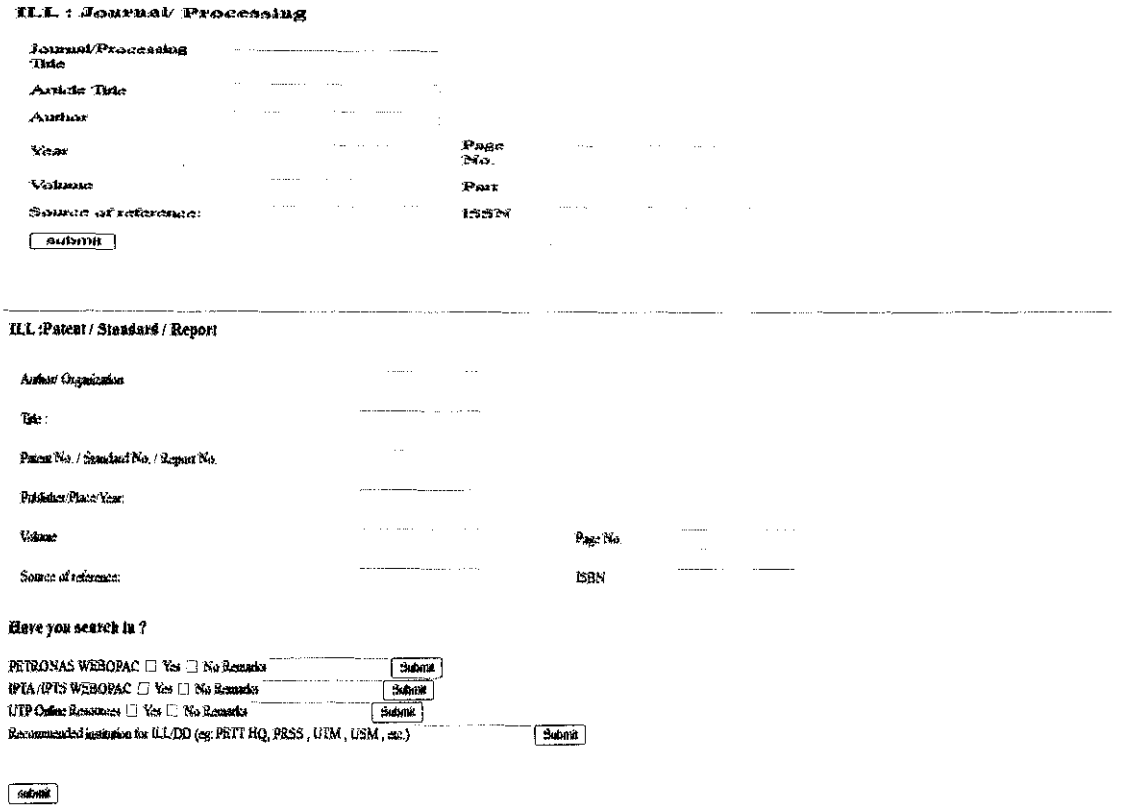
a. Sign up



The user need to sign up before they can access the service provided from IRC. This help ILL staff to identify the respective person who request the material and once the material deliver, it could be more easily to reached the requested person.

b. Section

When user already sign in, they could straight towards to the type of material they needed, in this project , the author managed to show three section , which are i) Journal/Processing and ii)Patent/Standard/Report.



Functionality which recommended in automated ILL:

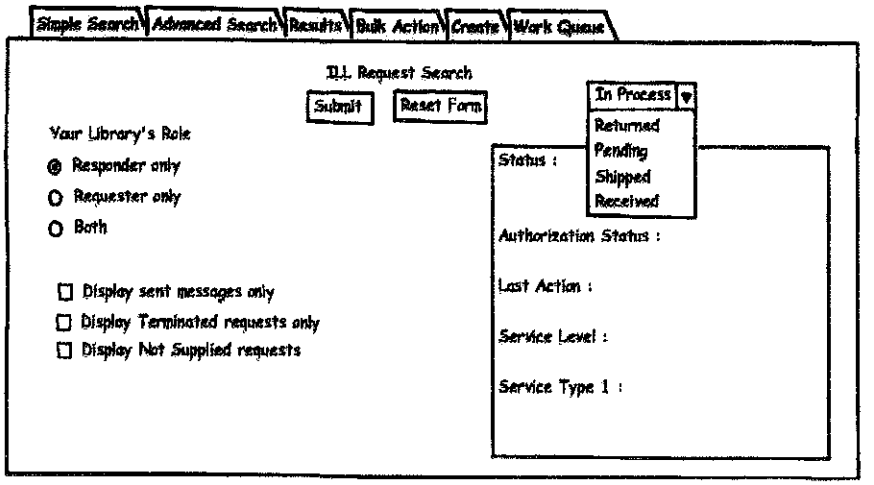
Issue :	**Functionality required in automated ILL**
Patron fill up all necessary information	**E-form** ☐ Online form that allows patron to fill and submit the request. ☐ The form should be validated upon request submission.

Patron verification	**Login** □ A login mechanism that could verify and authenticate the patron, or □ Access to the library patron database.
Justification of the ILL request	**Patron profile** □ Based on the patron profile or past request, determine whether the patron can request for the particular book(s)
Manually checking availability of book from all different lending libraries a time-consuming process	**Search multiple libraries** □ Patron can search into multiple lending libraries and determine where the book(s) is located. □ Based on the request information (e.g. book title), search into different (selective) sources to determine the availability of the book(s) at the lending libraries. □ Present the librarian information on libraries that hold the particular book(s)
Keeping track of passive ILL request manually	**ILL-request-records management** □ Store every request in the database. □ Store, view and update request records. □ Sort, search and display the required

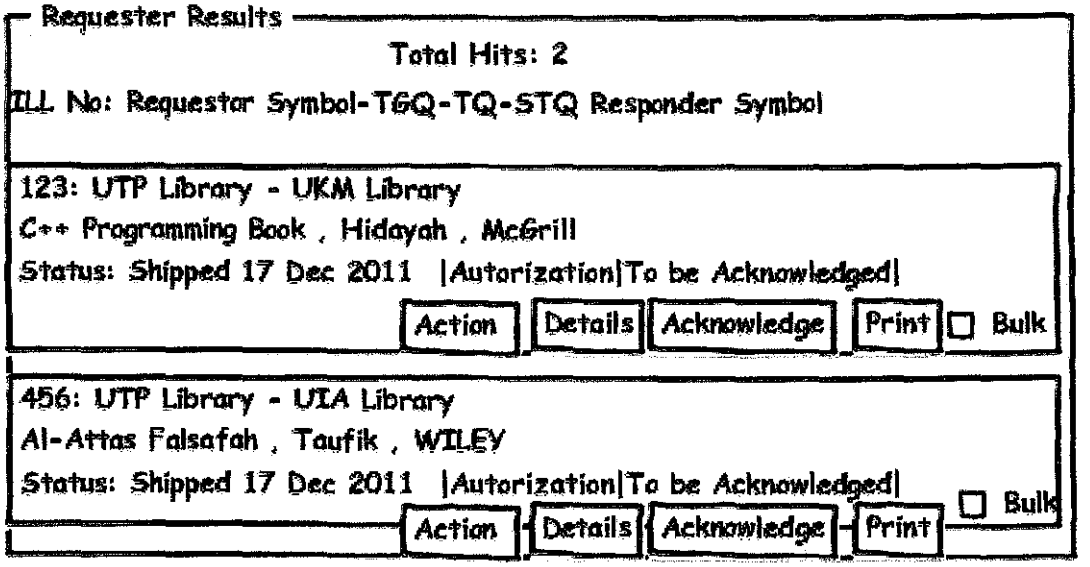
	records or information request on demand from the librarian. □ Ability to keep track of soon-to-be-due book (s)
Keeping track of ILL request from external library manually	**Communication between systems** □ A communication method that allows exchange of request information, status, etc. □ A common method like web services to provide this service. □ External request can be requested by invoking the services provided to submit the request.
Time spent sending individual emails on collection of books or reminders	**Automated reminder messages** □ Upon an event occurring, an email will be generated and forwarded to the patron automatically. □ An event could be triggered by the librarian (arrival of book(s)) or automated (due date).
ILL request reports	**Report generation** □ Based on requests stored in the database, present a break down of the ILL request. □ Present in many different forms that suits the management e.g. monthly, by

	subjects, most popular etc.
Acquiring the book	**Recommendations** □ Providing past ILL requests that can aid in making decision on acquiring a new book.

4.5 Administration Page



Administration Page is only can be view by administrator (ILL staff) where having authorized user name and password. This page is supposedly capable interact with patron. In this page, admin can select the status of the requested material either *in process, returned, pending, shipped or received* for the view of patron



This page display the request from host library which in the scope of project is IRC UTP interact and request to another library like Universiti Kebangsaaan Malaysia (UKM) , like this case , UTP request C++ programming book from author's name, hidayah, from publisher McGrill. The button 'detail' will provide the detail of the material where not only show the attributes (title book, author, publisher). Button 'action' is function to inform the action will be taken like the book in shipped, or in process. Button 'acknowledge', it show either the respective library (eg:UKM) already received the request form , once, they received , button 'acknowledge' need to be click. Button 'print' function if the list need to be show in pdf or word version. 'Bulk' function is help the list of request to be automatically do the needy task for example 'bulk' for print task or 'bulk' for acknowledge task.

Description	Total	Waiting
Cancel Pending	5 link	0
Cancelled	2	0
Idle	6	0
Lost	2	2
Not Supplied	29	0
Not-Received/Overdue	1	1
Pending	1	0
Returned	14	1
Shipped	4	4
Messages		
Standard Received list		21
Standard Returned list		14

Next , this page only can be view from administrative page where it display the work queue need to be handle by admin (ILL staff) either the request are still waiting to be process or it have been already done.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

Automating any part of the ILL operations is influential in increasing efficiency and effectiveness, from having the patron creating the request to delivering electronic copies to their desktop. In 2000, the ILL Benchmarking Study (National Resource Sharing Group) found that the turnaround time was 11.5 days, a significant improvement from 19 days (R. Missingham, 2005). Automation has enabled the ILL unit to accurately estimate dates of arrival for orders and to reduce delivery time (L. Porat, 2001). Automated systems have also increased the fill rate as validation on the information filled by the patrons can be checked automatically. Additionally, due to prior verification of requests before submission to the lending library, the lending library receives lesser incorrect items. With the use of e-mail in automation ILL system, patrons can be readily informed on the arrival or delay of the loan at a faster service ((L. Porat, 2001). Having an automated system implies that the statistics of the requests can be captured and generated into useful reporting information. Subsequently, staff time is freed due to the drop in such time-consuming functions.

Automation ILL will help ensure flexibility and maintainability in the system. Due to increased speed and efficiency of technology, the range and number of items loaded and received will soon increase over time (J. Rachinger, 2003). The concept of using standards, technologies and automation is simple to explain but the difficulties reside in the implementation and encapsulation issues (J. Farrelly, 2003). These factors will also be critical to allow communication across the different computer systems. Automation ILL has brought in the concept of automation and web services to improve the ILL services and allow better communication between different systems.

[6] J. Gatenby, "Inter-library loans and document delivery via EUCAT: a new PICA/OCLC initiative", Interlending & Document Supply, Vol. 31 Issue 2, Jun 2003, pp. 123-129.

[7] National Resource Sharing Working Group, "Inter-library Loan and Document Delivery Benchmarking Study", National Library of Australia, 2001, Retrieved 1St Sept 2011 from http://www.nla.gov.au/initiatives/nrswg/illdd_rpt_sum.html

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