Rapid Application Development In Design Of Library Information System In Higher Education

Muhammad Luthfi Hamzah, Astri Ayu Purwati, Ermina Rusilawati, Hamzah

Abstract: The library is a place that contains books, articles, papers and reading sources that are arranged regularly as a source of information material. Therefore, considering the rapid growth of technology, good management of library is every important for every university. A library is the heart of a tertiary institution as it supports the implementation of the tri darma of a tertiary institution. It is necessary to have a good library management in order to help students and lecturers in finding sources of information. Surely, a professional library management is needed in improving the quality of higher education. Because of that, it is necessary to have a system that makes library information management effective and efficient from changing manual systems to systems using technology. This research method was started from identifying the scope, setting goals, studying the literature, analyzing problems, designing models with UML, Designing a system for managing library information management and testing system. The framework of this research methodology describes the design of library information management application using the Rapid Application Development method. The programming language used in making this library management information system used PHP and MYSQL.

Index Terms: System Information Management, Rapid Application Development, Library Information System.

1. INTRODUCTION

The era of the industrial revolution 4.0 makes all digital-based industries in the form of relation between people, machine, data and internet is found everywhere or it is known as the Internet of Thing (IoT), that all things are connected to the internet and Cyber Physical Systems (CPS) that mean all activities have been replaced by machine that automatically work independently[1]. The development of information technology is very rapidly influenced by the high need to carry out an activity requiring technology, information systems that are accurate, effective and efficient to facilitate carrying out activities both in the business, social and educational sectors. The development of computer technology affects human performance as a system operation so that the transition to computer-based information systems and Smartphone is increasing. In the education sector, it is expected that the technology is able to make and accelerate in handling the college administration, teaching and learning process and the management of the facilities and infrastructure. One of the most vital facilities in a college is a library. Thus, a library must be managed well in order to ease lecturers and students to utilize the library maximally as it is the supporting facilities in teaching and learning process. The main task of the college library is to support teaching and research under the curriculum of each university. In general, the college library has been set well in terms of learning resource, information technology equipment, and the competent staff to provide information service supporting learning activities. The college students are generally ready and interested to learn new things. The colleges students are able to think, comprehend, and explain the abstract ideas effectively. The way how they learn and spend their time in this level affects their learning and development. If their time is spent for something related to their field of study, the academic result will improve. Generally, the students are happy to meet and talk with the instructure outside the class to raise a question that they have not been able to comprehend as the free time (outside class) will not disrupt the learning of others. They also can obtain the knowledge from the library. This research is a model to manage the college university in order to yield facilities that develop and support learning of the students based on the information from instructure, library administrators, librarians[2].

All digital libraries have been transformed quickly by new technology enhancements, evolving from merely digital partners to the physical collection of public libraries in complex networks that are able to support communication and collaboration among user communities around the world such as the use of augmented reality technology on smartphones for context-aware library management[3]. This increase creates the need for integrated systems capable of managing digital libraries with sophisticated functions that are currently not being met. Barbuti, et. al., (2014) suggested the innovative digital library architecture aiming to bridge this gap with new feature such as the technology integration to process document including all phases: acquisition, content extraction, index, search, and happiness. An interesting and prospective prototype system is being developed in order to realize the model of digital library functioning as an integrated system to preserve, manage, and employ the complex digital multimedia object[4]. Considering the importance of the facilities and infrastructure in improving the quality of the university, thus several preliminary surveys have been conducted at Pelita Indonesia University in Pekanbaru related to the way how to manage the library. The result of the surveys found several things such as:

1. The management of the college university has been still done manually for example by using a note in a big book.
2. The data collection that has been applied is not effective at all due to management conducted manually. For instance, there is no data related to the information on a book that will be borrowed neither via website nor desktop.
3. The library needs a system that is based on a technology such as web and Smartphone to ease each person involved and to make the work of the

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organization more efficient.

Based on those problems, a technology design for library management needs to be done. The technology commonly used in its management is to use a web-based system that makes it easy for library staff to manage books in the library both in recording the position, borrowing and returning of the books.

2 RESEARCH METHOD

This research uses the Rapid Application Development approach in creating its system since this method is a fast project management strategy that is popular in developing software[5]. The main benefit of the RAD approach is the fast completion of the project, making it an attractive choice for developers working in fast-paced environments such as software development[6]. This fast step is made possible by RAD's focus on minimizing the planning stage and maximizing prototype development[7]. Reducing planning time and emphasizing prototype iteration, RAD allows programmers to accurately measure progress and communicate in real time toward problems or changes that are developing. This yields in greater efficiency, faster development, and effective communication[8].

The figure below is the scheme employed in RAD method:

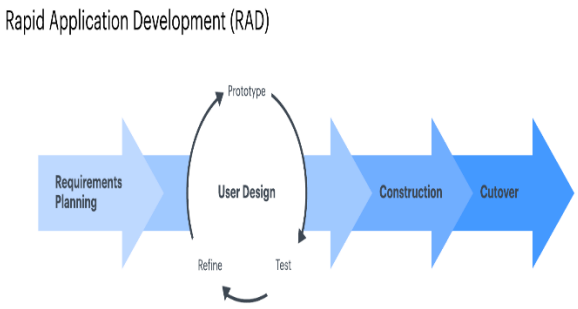

Figure 1. *Rapid Application Development*

Stage 1 : Requirement Planning

During this stage, the head and library staff, and team members communicate to determine goals and expectations of the system to be built as well as current and potential problems that need to be addressed during the construction of the system information of library management. In this stage, all planning in the construction of the system is determined. All existing problems are discussed at this stage so that there will be no further changes to avoid miscommunication and change requests at a high cost.

Stage 2 : User Design

After planning the system requirements is completed, it is time to jump directly into development, building user designs through various prototype iterations. During this stage, clients work hand in hand with developers to ensure their needs are met at every step in the design process. The process is similar to develop customizable software where users can test every product prototype, at every stage, to make sure it meets their expectations.

All bugs and errors are done in a repetitive process. The developer designs the prototype, the client (user) tests it, and then they together communicate on what works and what doesn't.This method gives developers the opportunity to change the model as they leave until they reach a design satisfying their need.

Stage 3 : Rapid Construction

This stage is taking a prototype and beta system from the design phase and convert it into a working model into the system, namely coding.

There are some actions need to be done in this stage such as:

- Preparation for rapid construction
- Development of program and application
- Coding
- Unit, integration, and system testing

The software development team such as programmers, code makers, testers, and developers work together during this stage to make sure everything runs smoothly and that the final results meet the client's expectations and goals.

Stage 4 : Cutover

This is the implementation phase in which the finished product is launched. This includes data conversion, testing and replacement to new systems, as well as user training. All final changes are made as coders and clients continue to find for bugs in the library management information system.

3 RESULT AND DISCUSSION

The modeling of the design system

Use Case Diagram

The use case diagram is the simplest representation of user interaction with the system that shows the relation between users and various usage activities in the system built, the following is a picture of the use case diagram of the system information of the library:

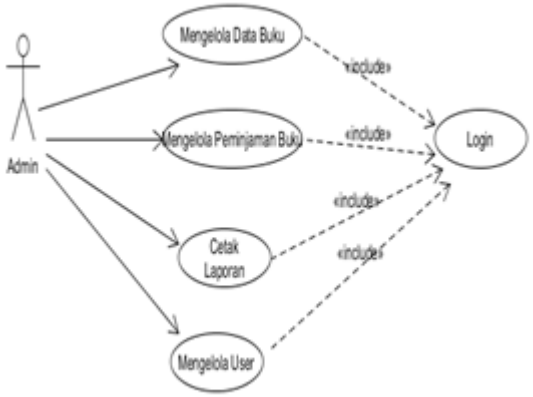

Figure 2. *Use Case Diagram*

Class Diagram

Class Diagram in Unified Modeling Language (UML) is a type of static structure diagram illustrating the structure of a system by showing the system class, its attributes, operations (or methods), and relation between objects. The following picture is a class diagram of a library information system that was built:

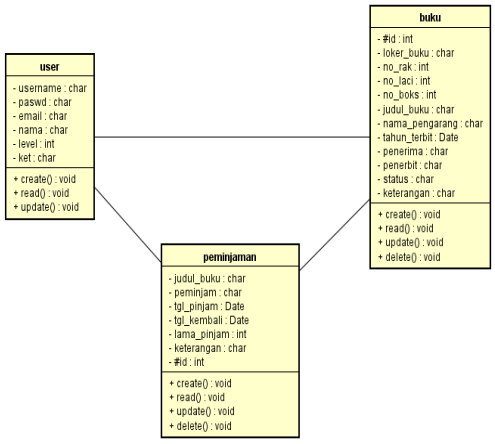

Figure 3. *Class Diagram*

System Implementation

Login user

The Login page is the starting page as a link for users to enter the system. In this page, the admin acts as a user or an actor who plays a role in it. This following picture is a login user page in the system information of the library:

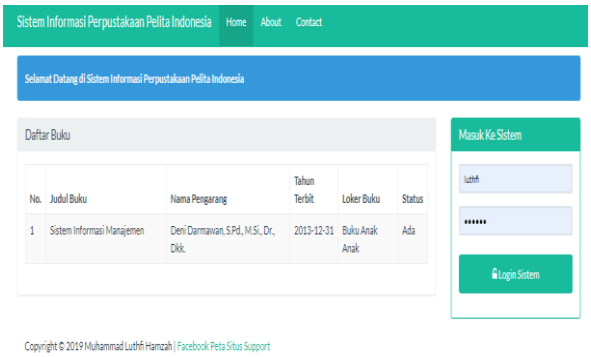

Figure 4. *The Login Page*

Admin Page

After the user logs in as an admin, the system will navigate to the admin page, it contains menu owned by the admin in managing book lists, borrowing, repayment and reporting.

The admin page display is shown below:

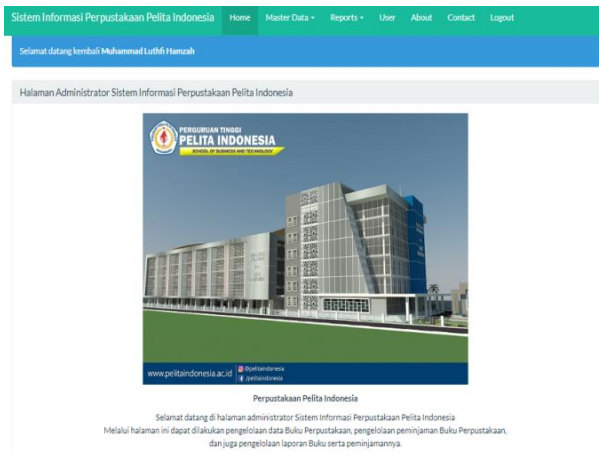

Figure 5. *The Admin Page*

The Book List Page

This book list page contains all books list that have been input by the admin in the system information of the library. The following picture is the display of the book list:

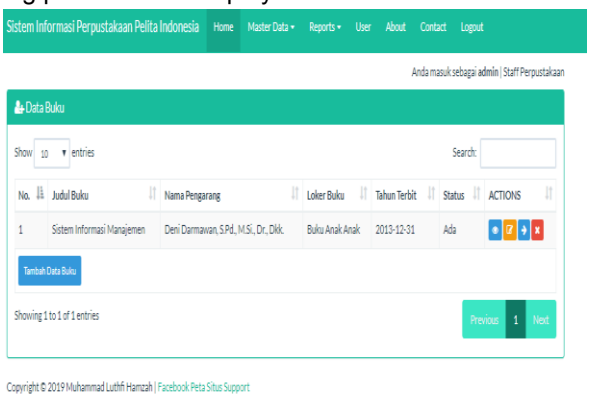

Figure 6. *The Book List Page*

The Display of the book data input

This book data input display is a page for adding book data to the book list containing specifications related to the book such as lockers, book position, title, author and others. The following picture displays the book data input:

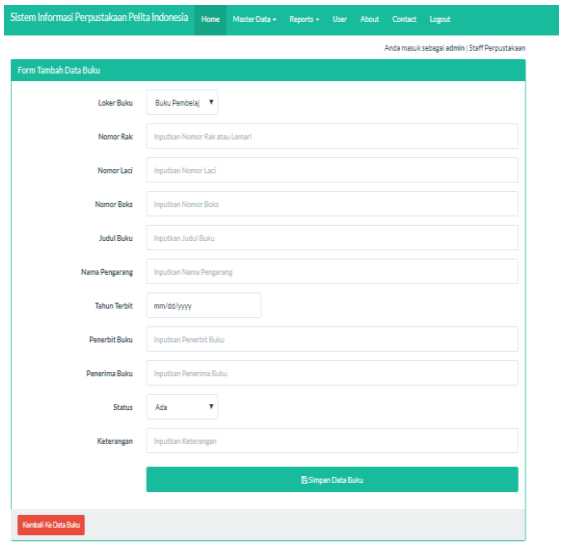

Figure 7. *The Book Data Input Display*

The history list of borrowing books display

The following picture is the history list of borrowing books containing the title of the book, borrower's name, borrowing date, returning date, and menu of edit, delete and update.

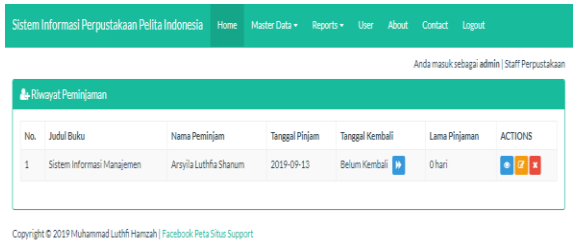

Figure 8. *The history of borrowing book display*

The Display of the book list report

The following picture displays a list of books that can be

printed monthly, annually and in full.

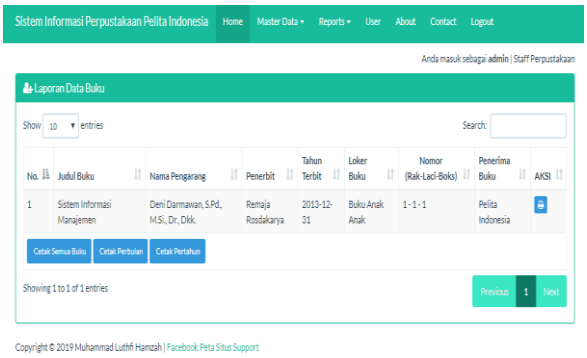

Figure 9. *The Book list Report Display*

The Report of the borrowing book list
This page is for printing a report of the borrowing books. The following picture is the example:

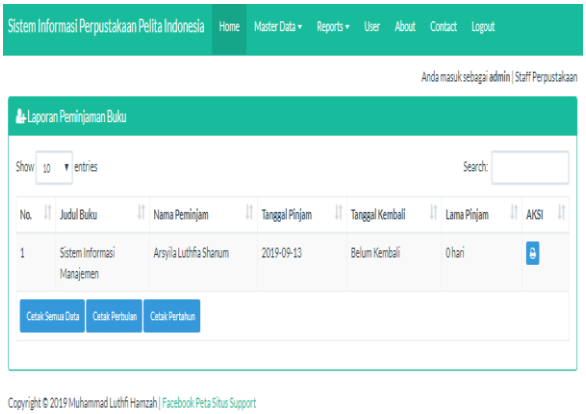

Figure 10. *The Book list Report Display*

The User List Display
The following picture is the user list display inside the system information of the library:

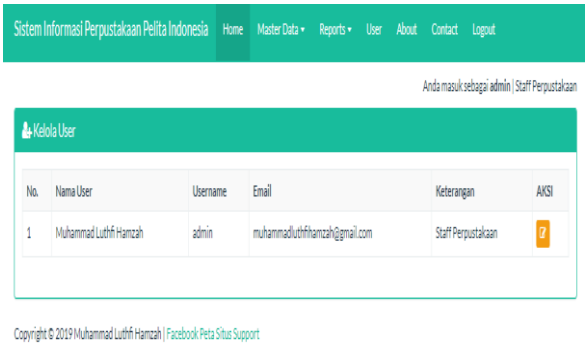

Figure 11. *The User List Display*

4 CONCLUSION

The use of RAD methods in building the system information of the library is proven by a good quality, speed and client involvement in designing and constructing of this system and also the process is timely and it is in accordance with the budget. The system information of the library at Pelita Indonesia University makes the library staff's task more effective and efficient.

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