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SoCa: Software Catalog

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SoCa: Software Catalog

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***Abstract*—Teaching, learning process and the research at Department of Informatics of the State Polytechnic of Batam produce many software as project based learning teaching method starts to be implemented since 2017. All softwares have been documented as files on a server and in a CD or DVD. These software of a big volume requires good management and documentation in order to get more benefit instead of stack them as archive. This research aims to record further application development such as customization and commercialization of applications as well as versioning for advanced research on certain software products. This study target to handle documentation and publication problem generated from the teaching and research activity at Department of Informatics of the State Polytechnic of Batam in the form of catalogs that accessible online. SoCa is an application developed on web platform to facilitate data access over the internet anywhere and anytime. We used waterfall software development method that starts with data collection through interviews, and observation to complete system specification, design, develop, test and then validate the testing results performed using Black Box technique. The SoCa is equipped with detailed information on applications such as application descriptions, documentation and application's version. It also provides video demonstration of software workflow and its manual book. SoCa is expected to be a solution to realize various software management problem at Department of Informatics Engineering State Polytechnic of Batam.**

***Index Terms*—software, catalog, versioning, software recapitulation**

I. Introduction

Teaching and learning process at Department of Informatics of the State Polytechnic of Batam produce various software. It follows project based learning teaching method which has been implemented since 2017. The software from the student final projects are some examples of the learning output. The final project is a compulsory course that must be taken by a student at the end of their studies. For students of the Informatics Engineering three-year diploma program, the final project course must be submitted in semester 5 and 6, while for the four-year program, it is taken in semesters 7 and 8. This final project is in the form of a project that must be completed independently under the guidance of a lecturer as their mentor. All student projects are collected, both as hardcopy and softcopy (CDs). Furthermore, students must also provide a video demo of their application.

Various party, namely student, lecturer, head of department and business unit, may profits from the software products. Students and lecturers consider the software as the manifestation of their research roadmap and also keep track on their plan for the software upgrade in the future. The head of the department use the information on the quantity and the product categories that have been produced as the department's performance measure. As for the business unit of the institution, they needs to figure out the products that may have economic value and has the potential to be commercialized.

A big volume of software products has been collected and archived since 2011. Students or lecturers can not benefited from these software due to limited information access. Moreover, unstructured documentation and software files makes it difficult to search for any particular software. However, the fact is that all of these softwares have been documented, whether as files on server, CD or DVD. What is left is to provide a good management and documentation in order to get more benefit from them.

Catalogue is a sequential list which contains information about an item or list of items. Catalog concept is suitable to recapitulate and exhibit software product in the simple way. Based on the software management problem previously mentioned, we initiate research about recollecting software product and documentation by creating SoCa (Software Catalog) to manage the softwares in the simple way.

This research aims to record application development such as customization and commercialization of applications as well as versioning for advanced research on any particular software product. This study also aims to handle documentation and publication problem generated from the teaching and research activity at Department of Informatics of the State Polytechnic of Batam by building a catalog that is accessible online. SoCa is developed on web platform to facilitate data access over the internet anywhere and anytime.

II. State of the Art

A. Software Management

Managing software is not obvious task, it is related to the documentation collection and versioning. Recently, All documentation and the source code of application were collected as an archive if it is paper-based documentation otherwise softcopy document were composed to the server. State Polytechnic of Batam has particular website to handle this tasks called digilib.polibatam.ac.id (Fig 1).

Digilib only describes the software description instead of software detail documentation and software detail such as demo and how we can use further any software product in State Polytechnic of Batam (Fig 2). Digilib does not provide

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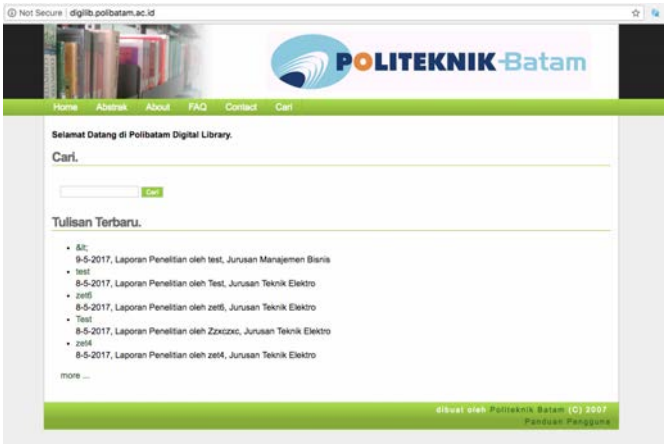

Fig. 1. Digilib home website for all final project report

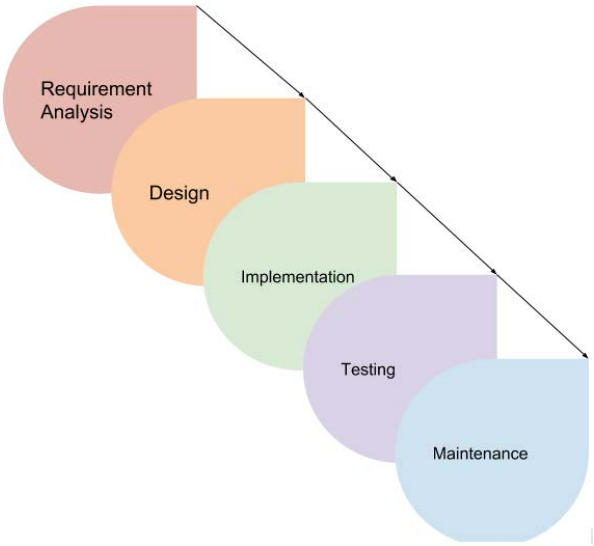

Fig. 2. Waterfall Method Step

any video demo of application and no detail about version of documentation and it lack of software management. The most helpful aspect of the application is Digilib provides software report download feature to know more about the software product. This type of memory not allow user to reuse the source code or documentation. Even though there are always possibility the same type of software will develop more in the future.

B. Waterfall Software Development Life Cycle

The development and implementation phase includes activities related to waterfall software development method [6] [14] [15]. This method start by data collection step. Data is a description of an object, event, activity and transaction that is meaningless and has no effect on the user, the data can be in the form of Value, Image, Text, Audio, Video [11]. the waterfall model is a classic model that is systematic, sequential in building software. The name of this model is actually the ”Linear Sequential Model”. This model is often called the ”classic life cycle” or waterfall model. This model is included in the generic model in software engineering and was first introduced by Winston Royce around 1970 so it is often considered ancient, but is the most widely used model in Software Engineering (SE) (Fig 3). This model approaches systematically and sequentially. Referred to as the waterfall because the step by step must wait for the completion of the previous phase and run sequentially [9].

Waterfall is a software development methodology that proposes an approach to systematic and sequential software that starts at the level of system progress in all analysis, design, code, testing and maintenance. The steps that must be taken in the Waterfall methodology are as follows :

1) Requirement Analysis (Software Requirement): The needs of data collection process is intensified and focused, especially on software. To understand the nature of the program being built, software engineering (analysis) must understand the information domain, behaviour, performance and interface needed. Both system and software needs are documented and seen with customers.

2) Design (System and Software Design): Software design is actually a rare multi process that focuses on four attributes of a different program: data structure, software architecture, interface representation and procedural details [12] [13]. The design process translates the requirements into a software representation that can be estimated for quality before the implementation begin. The design is documented and becomes part of the software configuration. The needs search process is intensified and focused on software in order to find out the nature of the program to be made, the software engineers must understand the information domain of the software, for example the functions needed and user interface, etc.

3) Coding (Implementation): The design must be translated in the form of a machine that can be read. Code creation steps do this task. If the design is completely done , the implementation can be solved mechanically. The system design should be changed into a form that can understandable by the machine, namely into the programming language through the coding process through algorithm processing. This stage is the implementation of the design phase which is technically done by the programmer.

4) Testing and Validation: The Testing Process is carried out on internal logic to ensure all statements have been tested. Functional external testing to find errors and ensure that input will provide actual results as needed.

5) Maintenance: The software that has been delivered to customers will definitely experience changes. These changes can be due to experiencing errors because the software should adapt to the new environment. For instance peripherals or new operating system, or because customers need functional development or performance. Maintenance of a software is needed, including the development, because the software that is created is not always just like that when it is run, there may

still be small bugs that were not found before or there are additional features that are not yet in the software. Development is needed when there are changes from external parties (company as a customer) such as when there is an operating system change, or other devices [11].

III. Methodology

All of these studies are planned to be carried out for six months. The research stage pursue waterfall approach consists of the preparation stage, data collection, design phase, implementation phase, testing and validation, maintenance phase and reporting phase. The preparatory phase includes exploration and study literature, designing data entry formats, and preparing data collection and preprocessing data.

This research is a qualitative research. Whereas the case study limited to Informatics School as a sample data. The study program that is directly involved in this research are Informatics Engineering and Multimedia Network majors as well as students from other polytechnic or universities.

For testing scheme we will use the Black Box methode. The research instrument was tested for validity using item validity. Testing the validity of the items by giving a questionnaire to the sampling class whose results are analysed using a formula using a linkert scale.

A. Analysis and Design

Following figure describe catalog information system which consist of video demo of software, metadata and software detail and documentation of any software product.

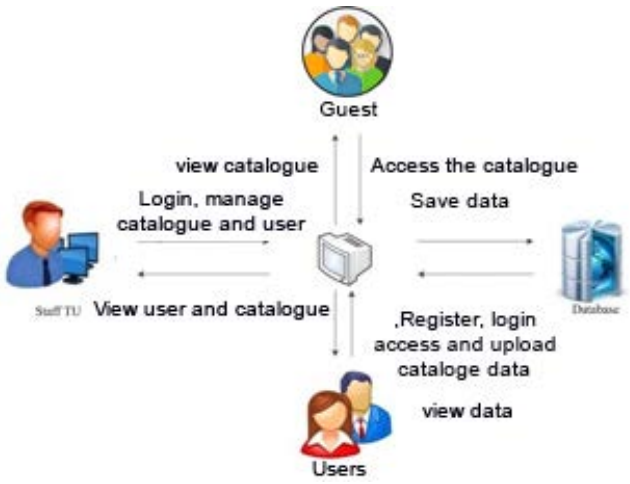

Fig. 3. System architecture

1) Holistic Design: Software design of SoCa consist of :

1) Coordinator and administration officer login to the application. Then coordinator and admin has access rights to manage user data, (view data, insert data, and delete data). coordinator and admin also has access rights to manage catalog data (view data, insert data, edit data, and delete data).
2) General user have access view catalog feature and allow to search through software peoduct and download catalog information.
3) Students can upload only if students have registered to the application and they have privilege to enter and use the system. However, if it has not been registered, students will role general user, which can only search feature and download catalog.

2) System Design: This application designed using DFD that divides to 3 levels which are : Context diagram, Level 1 and level 2 each feature. DFD level 1 explains about seven SoCa main features. DFD level 2 are expresses details of SoCa functionalities.

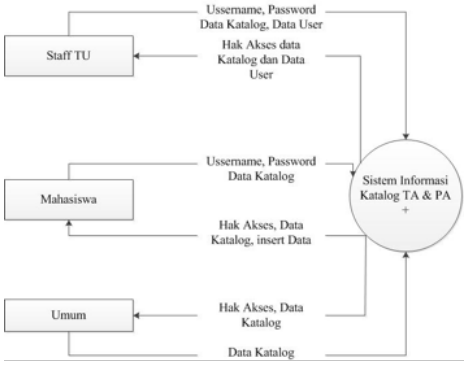

Fig. 4. DFD Context diagram design

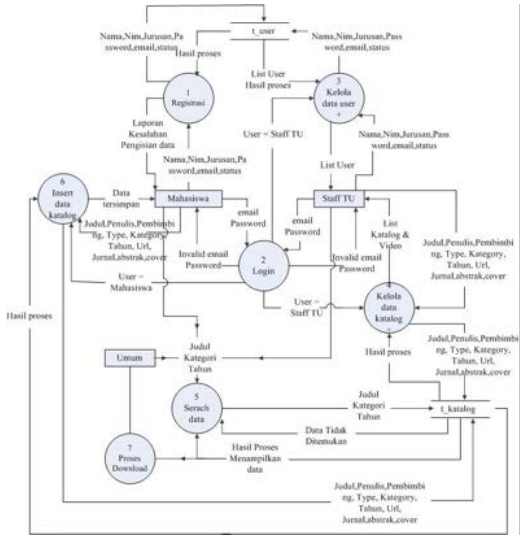

Fig. 5. DFD Level 1

List of SoCa Features listed below :

1) View category
2) Add category
3) Change category
4) Delete category
5) View user
6) Add user

7) Change user
8) Delete user
9) View catalog
10) Add catalog
11) Change catalog
12) Delete catalog
13) Students enter email and password to login
14) Students can manage their own catalog
15) Download catalog data
16) Perform a catalog data search process
17) General users can register

Data flow diagram explains about how system works and each bubble determines each SoCa feature such as catalogue management, user management, upload and download and catalogue categorisation.

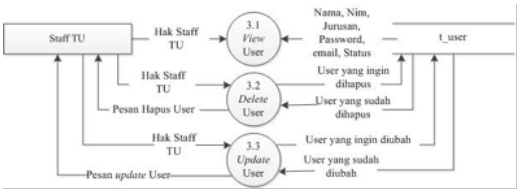

Fig. 6. DFD level 2a

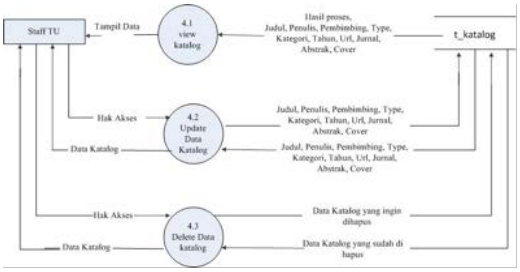

Fig. 7. DFD Level 2b

3) Database Design: To run this catalog application requires an internet connection and must first install XAMPP, where xampp will act as a stand-alone server (localhost).

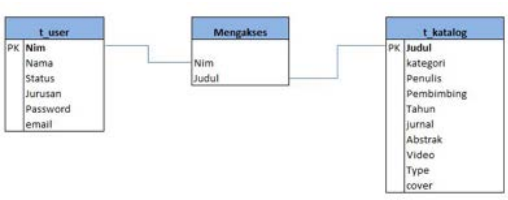

Fig. 8. Database Design

IV. Result and Discussion

Implementation of software development need to validate using testing action. in this research we designate Black Box testing approach. It means that we validate the software feature by test each functionality based on the test case.

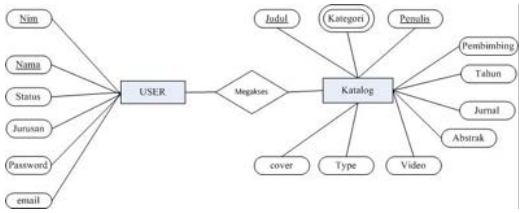

Fig. 9. Database PDM

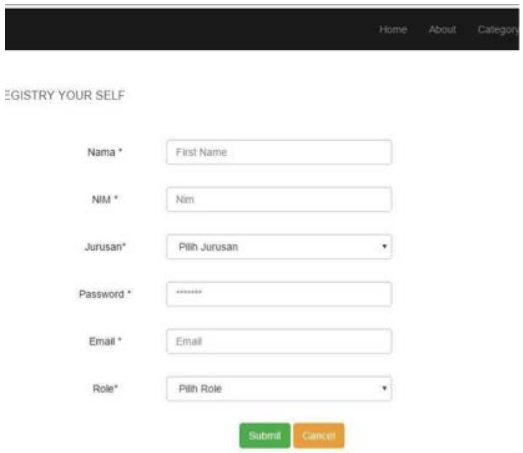

Fig. 10. Implementation Registraion Page

Fig. 11. Implementation Video Demo

Fig. 12. Implementation Software List

With reference to the assessment, use the percentage category below:

TABLE I
RESPONDENT RESPONSE RESULT

No	Question	Response					Sum	Avg	Cat
		1	2	3	4	5			
1	Reliability	0	0	40	40	40	120	24	Very good
2	Usability	0	0	10	50	40	100	20	Good
3	UX	0	0	10	60	40	110	22	Very good
4	Functionality	0	0	10	50	40	100	20	Good
5	UI	0	0	0	70	30	100	20	Good

Analysis of the testing concluded that the average of all items get the percentage category with a score at least 20 or more which is in the good and very good category. Furthermore, SoCa implement based on the design and the result of the test mostly as good as we expect.

TABLE II
RANGE AND SCORE CATEGORY

Category	Range (%)
Very Good	More 77%
Good	76 % - 100 %
Neutral	56 % - 75 %
Bad	40 % - 55 %
Very Bad	Less than 39 %

From the results of the questionnaire shows that the average user answers agree and strongly agrees with the use of the final project catalog application and this final project.

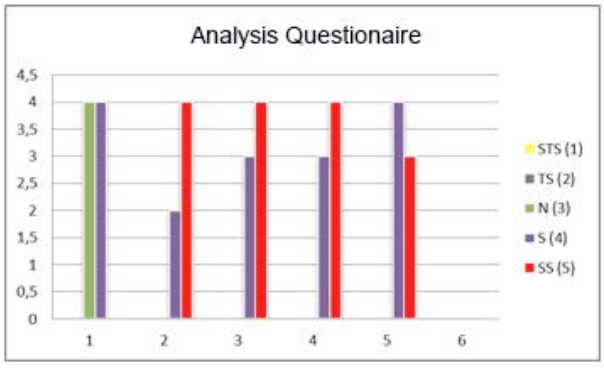

Fig. 13. Testing Analysis Result

And there is only one statement answered by four respondents with a neutral assessment. With this we can conclude that this final 80% catalog can be used easily and respondent have positive feedback after testing this application.

V. CONCLUSION AND FUTURE WORKS

From the research that has been carried out on the State Polytechnic of Batam, the following conclusions are obtained:

1) SoCa is very helpful for students, lecturer, head of department to track and figure out project references for future software development and maintenance phase of software engineering. It provides helpful features for users such as advance searching and software demo to accelerate document exploration and understanding based on software keyword.
2) SoCa perform appropriate method to apply some features such as Registration, Login, Profile management, Catalog management, Advance search, update and delete data.
3) Various party have different needs of software product namely student, lecturer, head of department and unit business organiser have tested the application and they have got what they need about software documentation and software versioning information.

The future development of this research:

1) Because currently this system is only web-based, it is expected that further development can be designed based on mobile environment to add accessibility of application by users.
2) This research can guide and direct in the context of more detailed research as part of advanced research in the field of software versioning and software engineering.
3) But there are some limitations based on the result of the application development and testing, that is the process of collecting documentation and software categorisation is still done manually, preferably in future research, it can use point determination automatically and can implement automatic data preprocessing as well.

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