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The Waterfall Method in Designing Information Management Applications Tri Dharma Lecturer in the Information Technology Study Program, Tanah Laut State Polytechnic

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A R T I C L E I N F O

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ABSTRACT

Information Technology is the use of computer equipment created to assist human work. Information technology itself covers various fields including the manufacture of hardware and software. The Tanah Laut State Polytechnic Information Technology study program really needs a system to manage the tri dharma activities of its teaching lecturers. This is caused by not optimal information about tri dharma activities which results in inaccurate reports, slow internal quality audit processes because it takes a long time to collect the required data. To overcome the existing problems a management application was built using the waterfall method. The waterfall method is a software development method that has several advantages including having a clear structure, being able to explain the final results of the software properly and being informative. This application can help the study program manage information regarding the implementation of the tridharma of its lecturers.

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1. INTRODUCTION

The use of information technology in the world of higher education in Indonesia cannot be avoided. In line with the mission of the Ministry of Education, Culture, Research, and Technology, which is to create education that is relevant and of high quality, equitable and sustainable, supported by infrastructure and technology. Tanah Laut State Polytechnic as one of the institutions under the Ministry of Education, Culture, Research, and Technology must support the ministry's mission by continuing to improve management, one of which is utilizing information technology to optimize information storage for the tri dharma activities of its lecturers. The Tri Dharma of higher education is the obligation of higher education institutions to carry out education, research and community service (UU No.12, 2012). The Tridharma of Higher Education includes Education, Research, and Community Service (Chudzaifah, 2021). These three activities are the basis of all lecturer activities. Academic culture should be developed to support the effective and efficient implementation

of the Three Pillars of Higher Education. It aims to be able to prepare graduates with good competence and be able to produce works that are beneficial to society (Lian, 2019).

The three activities in the Tridharma of Higher Education need to carry out a performance measurement. It is intended that the distribution of the three Tridharma implementation indicators (education, research, and service) is in accordance with predetermined standards (Satori, 2016). In tertiary institutions, there is an internal body called a quality guarantor. Quality assurance is carried out by carrying out a systematic testing process, and the test results are documented as data to evaluate university target achievements (Hasbi, 2021). However, the audit process does not always go well. There are various obstacles that may be faced, for example the lack of time schedule in fulfilling the checklist. These problems are often caused by study programs that are not timely in completing all the documents required by the auditor (Febriyanti, 2020).

In the Information Technology study program, Tanah Laut State Polytechnic, there is a problem, namely the not yet optimal track record of tridharma activities, so that it has the potential to hinder the internal quality audit process. For that reason, a step was taken to facilitate the management of information on lecturer tridharma activities with a web-based system using the waterfall software development method.

The Waterfall Software Development Life Cycle (SDLC) model is often also called the sequential linear model or the classic life cycle (Sukamto, 2016). Some of the advantages of this method include being able to accommodate the needs of the software to be developed and it is easier to estimate the development time and use of the software (Silitonga, 2021). In general, the SDLC waterfall method consists of cycles of system requirements analysis, design, system construction, implementation, system testing, and maintenance (Dwanoko, 2016).

2. METHOD

2.1 Waterfall

The Waterfall model is a software development method or SDLC model that is often used in the development of information systems or software. The waterfall model has been widely used by industry and academia because of the simplicity of the method (Kodmelwar, 2022). The waterfall model provides a sequential or sequential software life-flow approach starting from the analysis, design, coding, testing and maintenance stages (Khan, 2020). Developers need to know more about how the system development process is if they use the waterfall model and also the characteristics of the waterfall model (Wahid, 2020). Difficulties in the previous software development stage will be eliminated before proceeding to the next stage so that project success can be achieved (Khan, 2020).

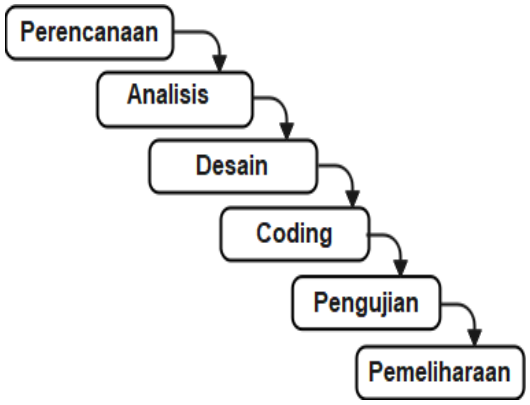

Figure 1. SDLC Waterfall

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In this study, the stages of the waterfall method used are (Silvi, 2019):
(1). Software Requirements Analysis. At the analysis stage, data collection needs to be carried out to build an information management application for tridharma activities. The data collected is in the form of documents, as well as other sources such as the results of interviews with the heads of study programs. The data is then analyzed to get solutions to problems that lead to the design of the software to be made. (2). Software design. The software design stage uses Unified Modeling Language (UML) diagrams and Data Flow Diagrams (DFD). UML is generally divided into two, namely behavioral and structural UML. An example of a behavioral UML is a use case diagram, while a structural UML is a class diagram (Faja, 2021). Meanwhile, DFD is an illustration of how data flows in a built system (Apri, 2020). In this research, software design uses usecase and DFD. (3). Software development. The software development stage is the stage of making software according to the design and needs analysis. The software built is web-based software using php, html, and mysql database programming. (4). Testing. The stages of software testing are carried out to validate whether the software developed is in accordance with the desired standards. The software testing method used is the black box. This method can validate the functionality of the developed software (Febriyanti, 2021). (5). Maintenance. The final stage is to provide support and maintenance for the software that has been made. At this stage the software development team strives for the software that has been created to operate properly.

2.2 Requirement Analysis

Software Requirements Analysis In this needs analysis aims to analyze the requirements needed in the design either in the form of documents or other sources that can assist in determining solutions to existing problems in the Information Technology study program. In this study, software requirements are used referring to standards made by IEEE (IEEE, 1984).

2.3. Use cases

The use case diagram is used to briefly describe the tri dharma lecturer information management application, who uses the application, and what can be done. This diagram illustrates the use case relationship between the actor and the system.

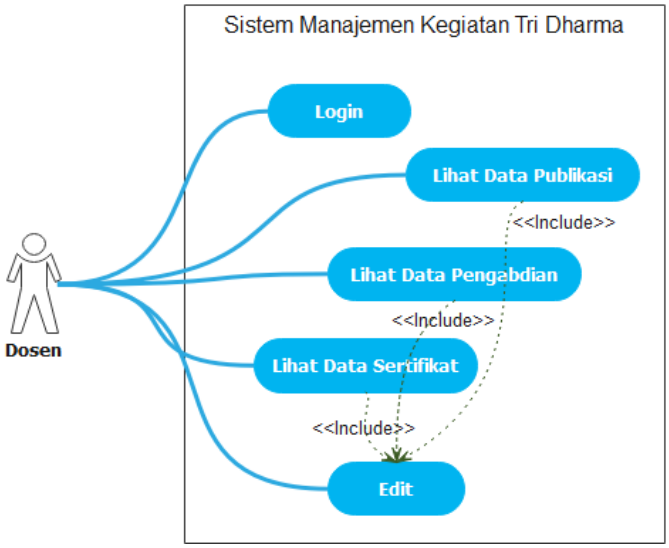

Figure 2. Usecase Diagram

In this use case diagram, there are several actions that lecturers can take as users, including viewing publication data, viewing service data, and viewing certificate data. The publication page displays publication data for lecturers majoring in IT. Users must click the view lecturer publication button from the main page. Devotion page to display data on the dedication of lecturers majoring in IT. The user must click the button to see the lecturer's dedication from the main page. The last one is the certificate page to display certificate data for lecturers majoring in IT. Users must click the view lecturer certificate button from the main page. The certificates displayed include training certificates, competency certificates, and webinar certificates.

2.4. Data Flow Diagram

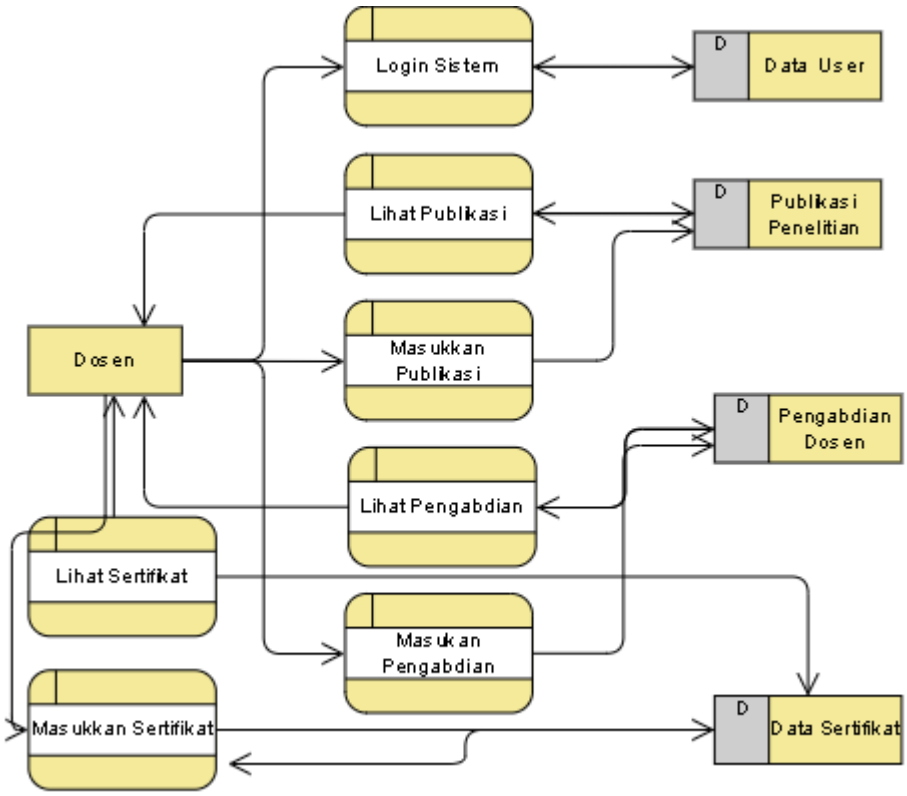

Figure 3. Usecase Diagram

3. RESULTS

Based on the results of the analysis and solutions contained in the design section, the creation of an information management application system for the Tri Dharma activities of lecturers at the Tanah Laut State Polytechnic Information Technology Study Program has 1 (one) main dashboard display and 3 (three) data display menus, namely:
1) Display of Publication Data
2) Pengabdian Data view
3) Certificate data view

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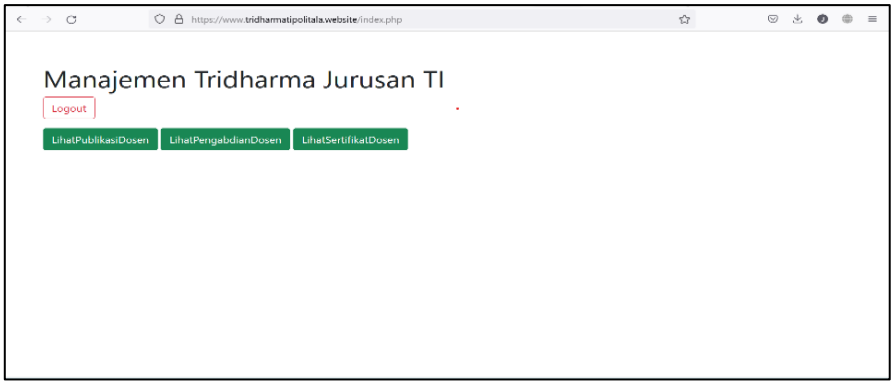
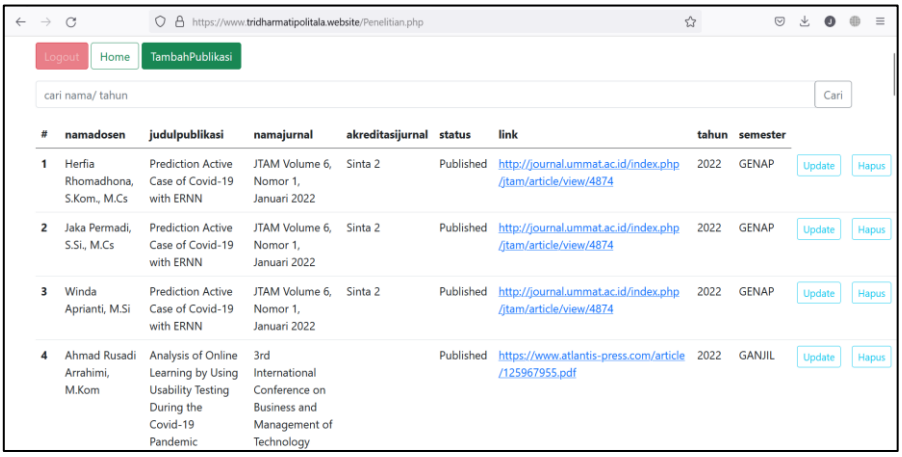


Figure 4. Dashboard View



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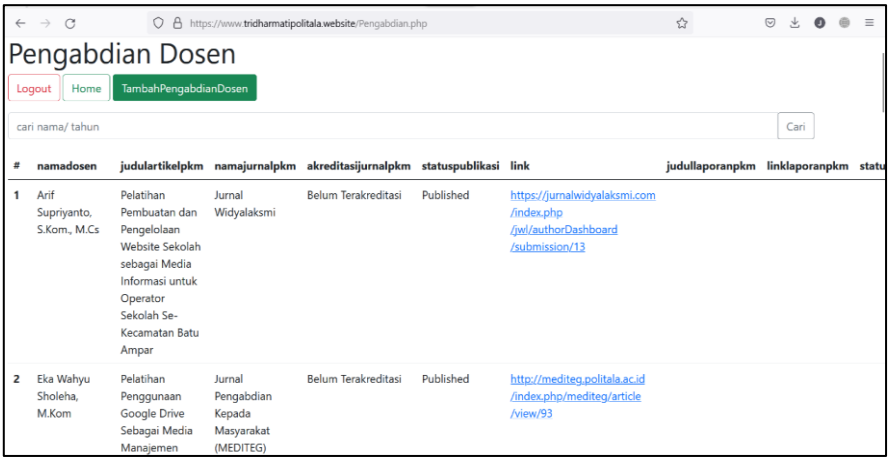
1	Herfia Rhomadhona, S.Kom., M.Cs	Prediction Active Case of Covid-19 with ERNN	JTAM Volume 6, Nomor 1, Januari 2022	Sinta 2	Published	http://journal.ummat.ac.id/index.php/jtam/article/view/4874	2022	GENAP	Update Hapus
2	Jaka Permadi, S.Si., M.Cs	Prediction Active Case of Covid-19 with ERNN	JTAM Volume 6, Nomor 1, Januari 2022	Sinta 2	Published	http://journal.ummat.ac.id/index.php/jtam/article/view/4874	2022	GENAP	Update Hapus
3	Winda Aprianti, M.Si	Prediction Active Case of Covid-19 with ERNN	JTAM Volume 6, Nomor 1, Januari 2022	Sinta 2	Published	http://journal.ummat.ac.id/index.php/jtam/article/view/4874	2022	GENAP	Update Hapus
4	Ahmad Rusadi Arrahimi, M.Kom	Analysis of Online Learning by Using Usability Testing During the Covid-19 Pandemic	3rd International Conference on Business and Management of Technology		Published	https://www.atlantis-press.com/article/125967955.pdf	2022	GANJIL	Update Hapus

Figure 5. Publication data view



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2	Eka Wahyu Sholeha, M.Kom	Pelatihan Penggunaan Google Drive Sebagai Media Manajemen	Jurnal Pengabdian Kepada Masyarakat (MEDITEG)	Belum Terakreditasi	Published	http://mediteg.politala.ac.id/index.php/mediteg/article/view/93			

Figure 6. Pengabdian data view

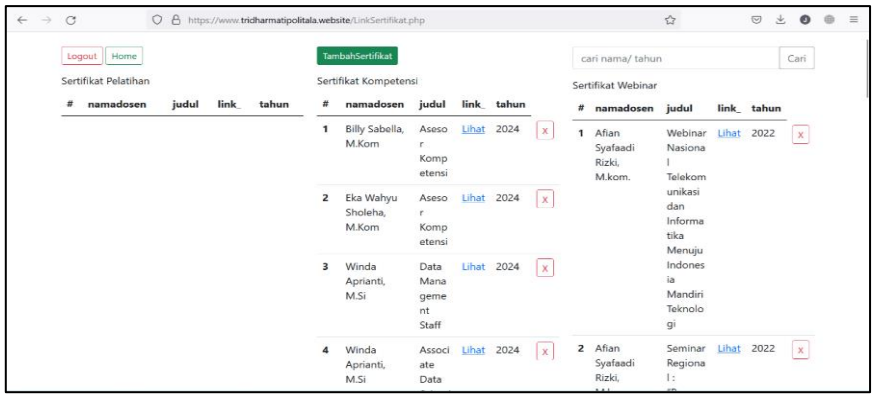

Figure 7. Certificate data view

The information management application system for lecturers' Tri Dharma activities has several supporting features in assisting lecturers in archiving their data into this information system. Some of these features are as follows:
1) Main Dashboard Page
2) Publication Data view (Create, Read, Update, Delete)
3) Pengabdian Data view (Create, Read, Update, Delete)
4) Certificate Data view (Create, Read, Update, Delete)

The above features with 3 (three) data displays that can add, edit and delete data according to the wishes of the lecturer with CRUD steps. CRUD stands for the initial letters Create, read update, and delete. CRUD operations are basic data manipulation for databases (Safitri, 2018), so of course it will greatly assist lecturers in the Information Technology Study Program in managing data on publications and dedications that have been carried out by lecturers and also assist in archiving certificates they have.

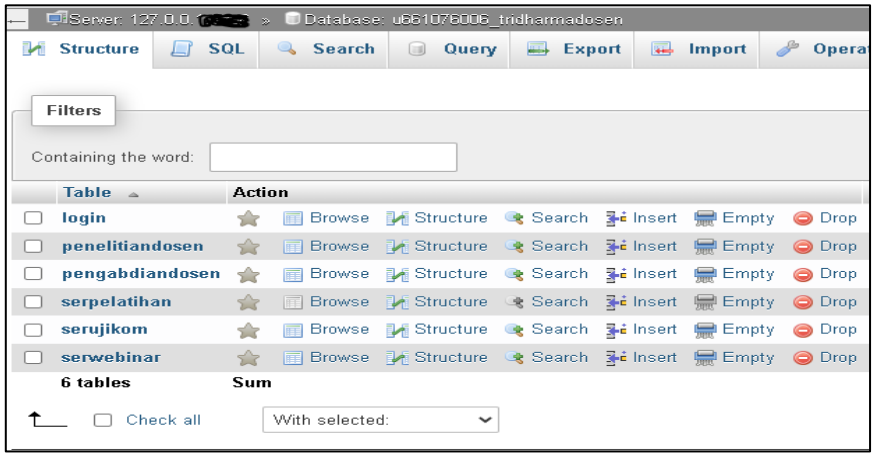

Figure 8. Database view

Figure 8 above displays a table in the application database created. Based on the DFD made, there are at least four data tables, namely research, dedication, and certificates. However, in implementation, the certificate data is divided into three tables according to the type of certificate, namely training certificates, competency tests, and webinar certificates. Figure 9 shows the contents of the displayed database.

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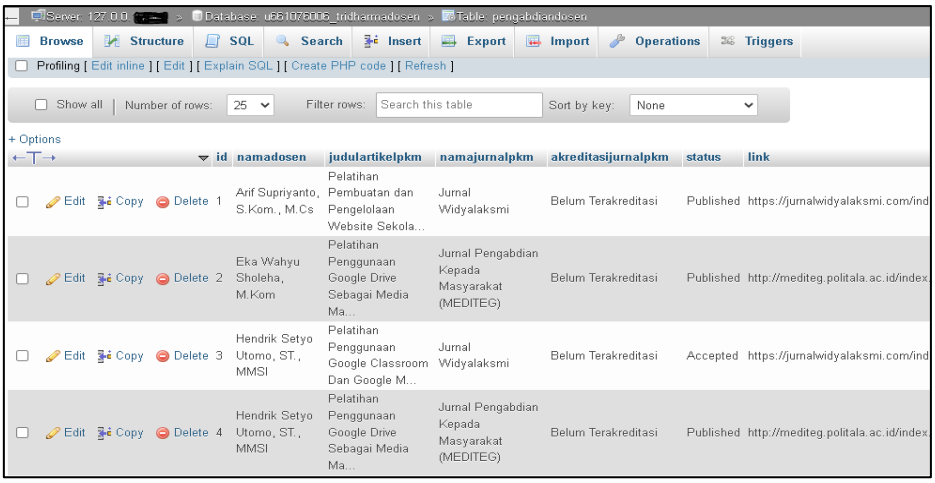

Figure 9. Database view

4. CONCLUSION

The information management application system for the Tri Dharma activities of lecturers at the Information Technology Study Program at the Tanah Laut State Polytechnic was developed based on Article 1 Paragraph 9 of Law No. 12 of 2012 Concerning Higher Education (UU NO.12, 2012). In its development the system was developed using the PHP programming language and using the MySQL database. The application system developed is web-based so that all user lecturers can access it from anywhere. This system can also be applied by other Study Programs, so that it can assist lecturers in the management of the Tri Dharma of Higher Education. The suggestions for system development are as follows: 1) The information management application for lecturer tri dharma activities that has been made must continue to be maintained and evaluated. Applications cannot be left alone without updating. 2) In the future, system integration can be carried out with other lecturer applications so that the existing system is not standalone.

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