Development of information systems for academic final projects documentation

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Abstrak. This study aims to develop a website-based student final project guidance application at Universitas Negeri Semarang. This research is a development study with a waterfall model. The results of this study can facilitate students to communicate and consult about theses, both in the form of thesis drafts and the products they will make. With the application of thesis counseling information systems, thesis, and online dissertations, the process of preparing the final project will be more optimal and minimize the use of paper.

1. Introduction

Along with the rapid development of technology, the role of information technology is crucial to support human performance so that it can optimize time better and can handle data processing with information systems [1]. Information systems are collections of elements that are interconnected with each other that form a unity to integrate data, process, and store and distribute information [2].

Information systems can be utilized in supporting the educational process to support conservation policies, namely the paper policy in higher education. The application of conservation with paperless is an efficiency policy step and the prevention of environmental pollution. On the other hand, optimizing information technology-based systems in the learning process [3].

In line with this, Semarang State University, through its academic policies, seeks to design an information system to support the process of preparing students' final assignments, one of which is the thesis.

A thesis is a term used in Indonesia to illustrate a scientific paper in the form of exposure to the results of undergraduate research that discusses a problem or phenomenon in a particular field of science by using applicable rules. The thesis aims to make students able to compile and write scientific papers, following their field of science. Students who can write a thesis are considered able to integrate their knowledge and skills in understanding, to analyze, describing, and to explain problems related to the field of science they take [4].

Thus, the existence of this thesis system is expected to facilitate students to communicate and consult about the thesis, both in the form of a thesis draft and the product to be made. Moreover, this activity
deals with the process of research and doing work done by students that must be kept confidential, so the need for a system capable of handling it.

2. Method
An article by Hardyanto [5] uses the waterfall model to design an application. The waterfall model has flexible design principles in preparing a project. There are several stages in the waterfall method, which consists of analysis, design, implementation, testing, and maintenance [6, 7].

![Figure 1. The stages of the Waterfall Model [8]](image)

2.1. Requirements Analysis
Requirement analysis is part of the application design process that is used to identify and analyze the suitability of the software with the provisions of the stakeholders [9]. Analysis of inappropriate requirements will have a fatal impact on the software designed.

2.2. Design
The design of the software is comprehensive, not only about interface design but also about algorithm design, structural design, concept design, database, and software architecture design. The specification of requirements in the first stage forms the basis of design. The hardware and system architecture requirements will depend on the design.

2.3. Implementation
This stage is the realization of all business requirements and system design into an application. At the implementation stage, all code is written and compiled into operational applications. The implementation phase is the longest stage in SDLC because this stage is the application development stage [10].

2.4. Testing
Software testing has the aim to improve the quality of the software to be as efficient as possible [11, 12]. This testing phase aims to check whether the software meets the requirements and objectives that have been set.
2.5. Maintenance
Software maintenance has undergone very significant changes in the past four decades [13]. Maintenance is a process for modifying software after it is used; this process is used to correct errors and improve the performance and quality of the software.

3. Result and Discussion
The main student menus who successfully log in to the system are shown in Figure 2.

![Figure 2. Main menu.](image)

To continue with the guidance process, students need to press the “Bimbingan” as a monitoring menu on the left side, as shown in Figure 2. The student dashboard will change, as shown in Figure 3.

Figure 3 shows the student monitoring form. First, students need to add monitoring data by pressing the “Tambah Bimbingan” button. Furthermore, students need to complete or fill out forms. The monitoring file needs to be attached. Finally, through the screen, students look for the file to be uploaded as a monitoring file, then press the open button on the screen. Students need to enter information in the monitoring discussion column and then press the save button.

Through the lecturer monitor form shown in Figure 4, the supervisor can provide input or advice to students. The attached files can be opened by pressing the show button, so the display is shown in Figure 5.
Figure 3. Monitoring menu.

Figure 4. The lecturer monitor form
Black box testing has an important role in validating system functionality [14]. Function testing is done by providing input to each function to ensure that the function results are working properly. Black box testing is done based on the user's perspective [15].

Direct testing using the black box testing technique so that it can reduce errors that might occur. The black box testing requires a long computational time because the testers do not know the internal structure of the application, so it requires a lot of effort to find bugs [16,17]. The black box testing results are shown in Table 1.

Table 1. The black box testing

| Process Name            | System response                                                                 | Results |
|-------------------------|---------------------------------------------------------------------------------|---------|
| Login                   | If successfully login, will display the dashboard, if it fails will return to the login page | Good    |
| Manage monitoring data  | If monitoring data succeed in adding data, the success message will appear, and the monitoring data in the table will increase | Good    |
| Manage uploaded data    | If the data is successfully added, a successful message will appear, and the uploaded file will appear | Good    |
| Manage reviews data     | If the data is successfully added, a successful message will appear, and the amount of data in the table will increase | Good    |
4. Conclusion

Based on the results of research that has been done, it can be concluded that the application of the thesis monitoring method through this system will support UNNES policy as a conservation campus. Monitoring with such an online model will ease the burden on lecturers because lecturers do not need to bring documents for review. Then, the monitoring results will be well documented in each revised final project document. Based on the results of black-box testing, it can be concluded that this system has worked well.

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