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Development of a tracer study system for graduates of the Integrated Science Department, Universitas Negeri Semarang

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Abstract. Tracer study is a mechanism implemented by universities to track graduates to measure the relationship between educational goals and processes with the current condition of graduates. In addition, the results of the tracer study are also used as an assessment for higher education accreditation. For this reason, Department of Integrated Science, Faculty of Mathematics and Natural Sciences, Universitas Negeri Semarang has developed a website-based integrated tracer study system. The system development method used is the Waterfall Model which consists of Requirement Analysis, Design, Development, and Testing. From the results of testing conducted by information systems experts, the system being developed is very feasible both in terms of functionality and usability. The website-based online system can handle graduate data management, able to provide all information about graduates and an overview to the Departmental Council regarding the competitiveness of graduates in the world of work. It is hoped that the tracer study system that has been developed can be continued to see how the competitiveness of graduates in improving department management.

1. Introduction

The success of college graduates in entering jobs is one indicator of learning outcomes and the relevance of higher education for society. Thus, tertiary institutions are responsible not only for equipping graduates with certain competencies (learning outputs) but also obliged to facilitate and bridge graduates into employment. One way to track the whereabouts and progress of graduates after leaving college, especially related to obtaining information related to the transition from college to employment is by carrying out a study known as a tracer study. Tracer study is a study on tracing graduates of higher education providers [1]. The results of the tracer study are also used as one of the requirements for completing University accreditation. Tracer studies can be done in 2 ways, namely manual and online tracer [2].

Several studies that illustrate the importance of a tracer study, namely research conducted by Karyono et al [3] which produced a system capable of managing the results of a tracer study conducted online properly because the data is centralized on one server so that if at any time the data is needed it can be searched easily. Renny et al [4] demonstrated the use and optimization of tracer studies at universities in Indonesia. The result of this research is that universities in Indonesia have not used the internet optimally for their graduates or graduates, most of the tracer studies are still carried out offline, the various features or types of services provided are still incomplete. Even though an online-based tracer study information system can help graduates' data collection and user satisfaction data collection, this system also has the facility to display reports so that it makes it easier to obtain



information about graduates and user satisfaction. The information presented is in the form of tables and graphs. In addition, this system is also equipped with graduates' data search facilities which function to make it easier for users to find out whether the graduates concerned have participated in the tracer study or not [5,6].

Latif et al [7] reported the results of a tracer study to identify significant changes to services provided. The results of this study confirm that online tracer studies make a significant contribution to graduates. The website-based graduate information system is able to handle graduates' data management, is able to provide all information about graduates that can be accessed by all parties who need it, especially stakeholders, and is able to provide an overview of the institution, especially for departments, which are related to the absorption of graduates in work [8].

Due to the importance of a tracer study, the Department of Integrated Science, Universitas Negeri Semarang conducted research on the development of online study system, so that later it will be able to assist in collecting and analyzing the profile of graduates optimally. The online tracer study system also makes graduate users to provide graduate assessments easily. The graduates' profile information obtained will be useful for the benefit of evaluating college outcomes and then can be used to improve and guarantee the quality of college.

2. Methods

The tracer study system development method used is the Classic Life Cycle or Waterfall Model [9]. The method stages are shown in Figure 1. However, in this study, the method stage was limited to the testing stage.



Figure 1. Waterfall Model for System Information Development

2.1. Requirement Analysis

At this stage of analysis, it aims to gain an overall understanding of the system to be developed based on the needs of potential user input. The main result of this analysis is a complete understanding of the system in preparation for the Design stage

2.2. Design

At this stage it aims to determine the form of an architectural system that fulfils all functional and non-functional design, makes an invisible abstraction on system development, and provides visualization or system display design.

2.3. Development

After going through the analysis and design stages, a system is ready to be developed. The development stage must conform to the design that has been made previously, namely the source components, code, scripts, executables and so on.

2.4. Testing

Testing is carried out with a system feasibility assessment procedure by information technology experts. Testing is done by asking experts to fill out a questionnaire to assess the feasibility of the system based on the following indicators:

- Usability Testing: This test focuses on the ease of users in using the application, flexibility in handling controls and the ability of the system to meet its objectives. Usability testing consists of aspects of Operability, Learnability and Understandability, and Attractiveness.
- Functionality Testing: This test focuses on the functions that are attached to the system. Functional testing consists of aspects of suitability, accuracy, security, and compliance.

There are 19 questionnaires filled out by experts in the form of a Linkert scale with a rating of 1-5. The rating results assessed by experts are then averaged according to the aspects assessed and produce the criteria shown in Table 1.

Table 1. Criteria of Tracer study system eligibility

Rating	Criteria
1.00 – 1.80	Bad
1.81 – 2.60	Low
2.61 – 3.40	Moderate
3.41 – 4.20	Good
4.21 – 5.00	Very Good

3. Results and Discussion

The research results are presented in accordance with each stage of the tracer study system development which includes requirements analysis, design, system development, and system testing. The description of the results of each stage is explained as follows:

3.1. Requirement Analysis

The tracer study system uses a website that is integrated with the official website of The Integrated Science Department. The domain address is <http://ipa.unnes.ac.id/tracerstudy>. Analysis of system requirements comes from various aspects that need to be improved for the development of a new system [10]. The results of the needs analysis are presented in Table 2.

Table 2. Analysis of Tracer Study System Requirements

Aspects	Requirements Description
Website domain	The domain of the study tracer system website has expired so it cannot be accessed again. This requires a domain renewal
Data form	Data form in the old system was not in accordance with the requirements for accreditation standards regarding graduates. Graduate data form must be adjusted with accreditation standards
System interface	The system interface is not attractive and current so the display must be improved, there needs to be a graduate testimony slider display
System testing	There have been no system testing activities by experts, especially for functionality and usability
Security	The need for a username and password for administrators, filling codes for graduates and graduate users
Data processing	Data resulting from entries are displayed in tables and graphical statistics

3.2. Design

From the results of the needs analysis, a functional design of the tracer study system was made. While the functional design is arranged in the form of a flow chart that describes the workflow of the system (Figure 2).

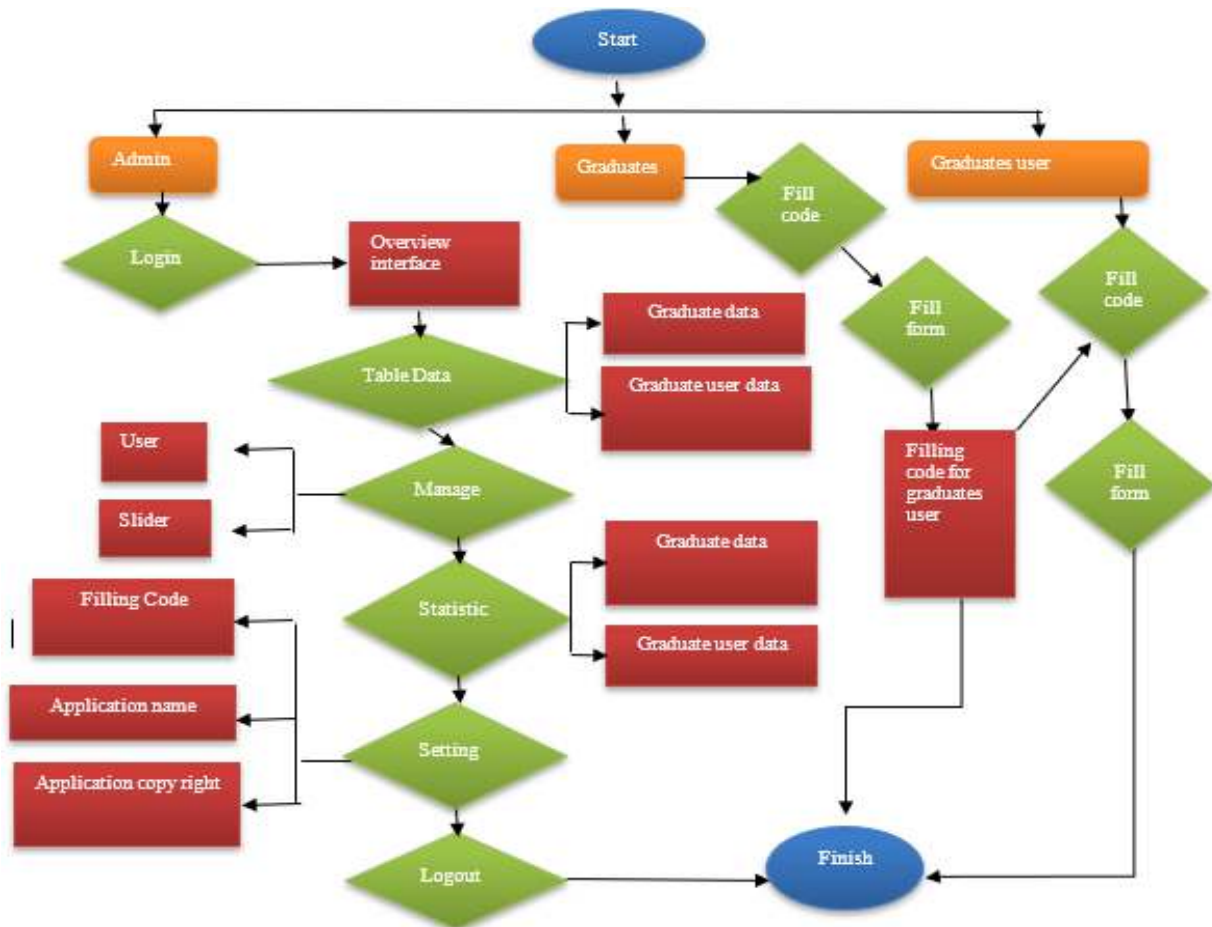


Figure 2. Functional Design of Online Tracer Study System

3.3. Development

At this stage, a website-based tracer study system product is produced with the domain address <http://ipa.unnes.ac.id/tracerstudy>. The front page of the system consists of a description of the system name, the logo of Universitas Negeri Semarang, graduates testimonial in the form of a photo slider, and a login menu for admins, and a data entry menu for graduates and graduate users. The front-page interface is shown in Figure 3.

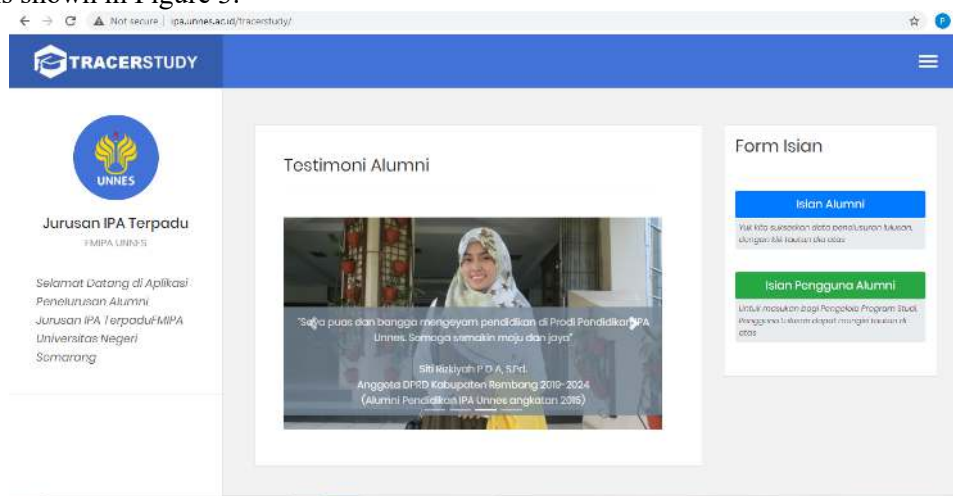


Figure 3. The front-page interface of Online Tracer Study System

Administrators get several features available, including login and logout [11], view overview of data entry, manage data entry, view statistical data, manage users and sliders, set graduates entry code, and name system applications.

The menu display on the administrator is shown in Figure 4. Furthermore, users in the form of graduates and graduate users can only fill out the form provided. For security purposes, users who will fill in data, will get a special code given by the administrator so that not everyone who accesses the website can fill in [12]. The display of the graduate form is shown in Figure 5.

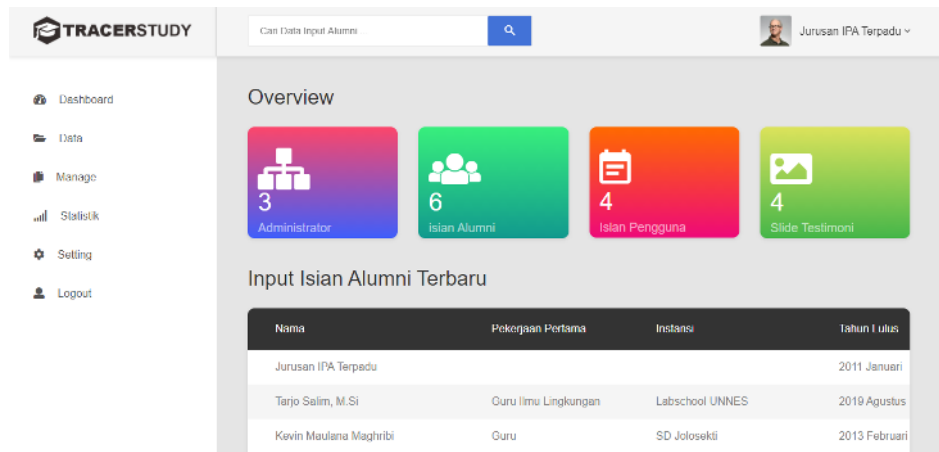


Figure 4. The menu display for the administrator

Figure 5. Display of the form data for graduates

3.4. Testing

The system developed has been tested by information technology experts. The aspects tested are functionality and usability. The results of the validation rating are shown in Figure 6 and Figure 7. Based on the results of system validation by tracer study experts, it gets a score of 4.87 (very good) for functionality and 4.93 (very good) for usability. Excellent functionality shows that all functions in the system run very well [13], while excellent usability shows that the system is easy to use by users [14].

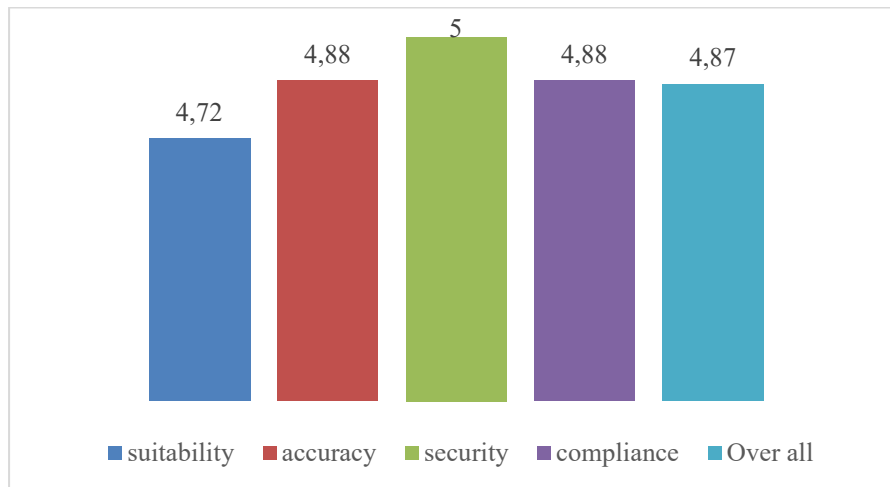


Figure 6. Test results on the functionality indicator

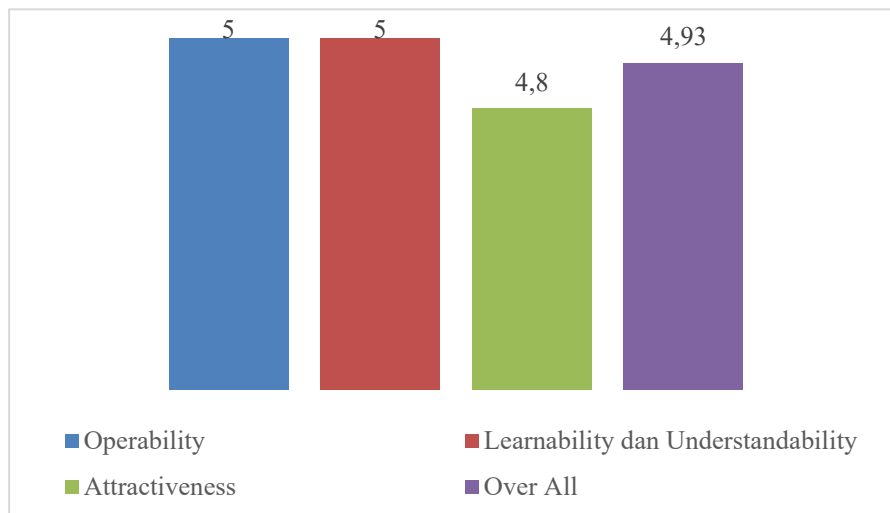


Figure 7. Test results on the functionality indicator

4. Conclusion

An online tracer study system has been developed to trace data on graduates of the Integrated Science Department, Universitas Negeri Semarang. The system was developed based on a website with the domain address <http://ipa.unnes.ac.id/tracerstudy>. The results of testing by information technology experts show that the system is very good at indicators of functionality and usability. Furthermore, the system needs to be implemented to users, namely graduates and graduate users. So, department board can immediately obtain graduate data and graduate user feedback.

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