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Laboratory Management in Improving the Tri Dharma of Higher Education in The Department of Mining Engineering

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Abstract

Improving the quality of laboratory services must always be improved in improving the quality of the tri dharma of higher education. Good laboratory management is one of the supporting factors, for that reason, the Department of Mining Engineering manages the laboratory. Laboratory management, in this case, is the laboratory equipment inventory system and laboratory control system. This system will be used to carry out monitoring data on the use of website-based laboratory equipment where the use of laboratory equipment must be carried out systematically. The first step is to create a web system for administration and inventory in the laboratory. In this study, in conducting website-based lab management, it is also necessary to map the problems faced by students in relation to services and supporting infrastructure in the laboratory.

Keywords: *Inventory, Laboratory Management, Website*

INTRODUCTION

A laboratory is a room where practical work or research activities are carried out supported by a set of tools and complete laboratory infrastructure (water, electricity, gas, and so on). [6].

Laboratory management (laboratory management) is an attempt to manage the laboratory. A laboratory that can be managed properly is largely determined by several interrelated factors. Some sophisticated laboratory equipment and skilled professional staff may not be able to function properly if it is not supported by good laboratory management. Therefore, laboratory management is an inseparable part of daily laboratory activities [7]. The objectives of the laboratory organization can be achieved if a top leader in the laboratory has a good management strategy and process to serve as a reference or benchmark in carrying out operational laboratory activities. This management function is the basis for planning, managing, and evaluating a daily laboratory operational process, including choosing the right strategy and innovation in developing a laboratory. Laboratory Management is a systematic procedure for collecting, storing, maintaining, processing, retrieving, and validating data needed by laboratories about their service activities for management decision making. [5].

This study aims to see the current level of laboratory use, perform laboratory management, create an integrated laboratory equipment inventory system by creating a web system, create an integrated tool lending system with an order system via the web, as well as improve Lab management by applying ISO and SNI standards.

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LITERATURE REVIEW

The laboratory is a place to carry out practical activities that support learning in the classroom, including workshops/workshops, experimental fields, studios, and studios [3]. Laboratory management is one of the efforts in managing a laboratory, see Figure 1. A good laboratory must be equipped with various facilities to facilitate the use of the laboratory in carrying out its activities. A laboratory that can be managed properly is largely determined by several interrelated factors [5]. Some laboratory information system techniques that will be discussed in this study are use case diagrams, class diagrams, entity-relationship diagrams, and coding systems.

Use Case Diagram

There are three user levels at SIMLAB, namely administrators, laboratory assistants, and students who have different access rights. SIMLAB itself aims to assist students in determining practical work scheduling, and this system consists of a use case for the process of taking the practical work schedule by students consisting of input data and viewing data [4]. Here are the respective use case diagrams for admin, PLP, and students:

Figure 1. Laboratory Management System

Use case Diagram Admin

Admin as the system manager has the main access rights, namely managing users according to their access rights. Admin can add, change and delete user accounts, either PLP or students. As pointed out by Figure 2.

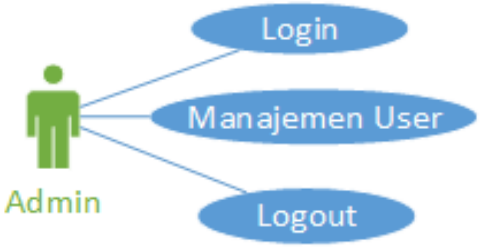

Figure 2. Use Case Diagram Admin [4].

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Use Case Diagram PLP dan Mahasiswa

PLP has access rights, namely course management, room management, scheduling registration management, scheduling management, while students have access rights, namely inputting scheduling registration and choosing a practical work schedule as Figure shows 3.

Class Diagram

Class diagrams are made to explain what classes exist in the system where each class displays the existing variables, properties, and methods on the class and the relationship between classes. The classes contained in SIMLAB are shown in Figure 4.

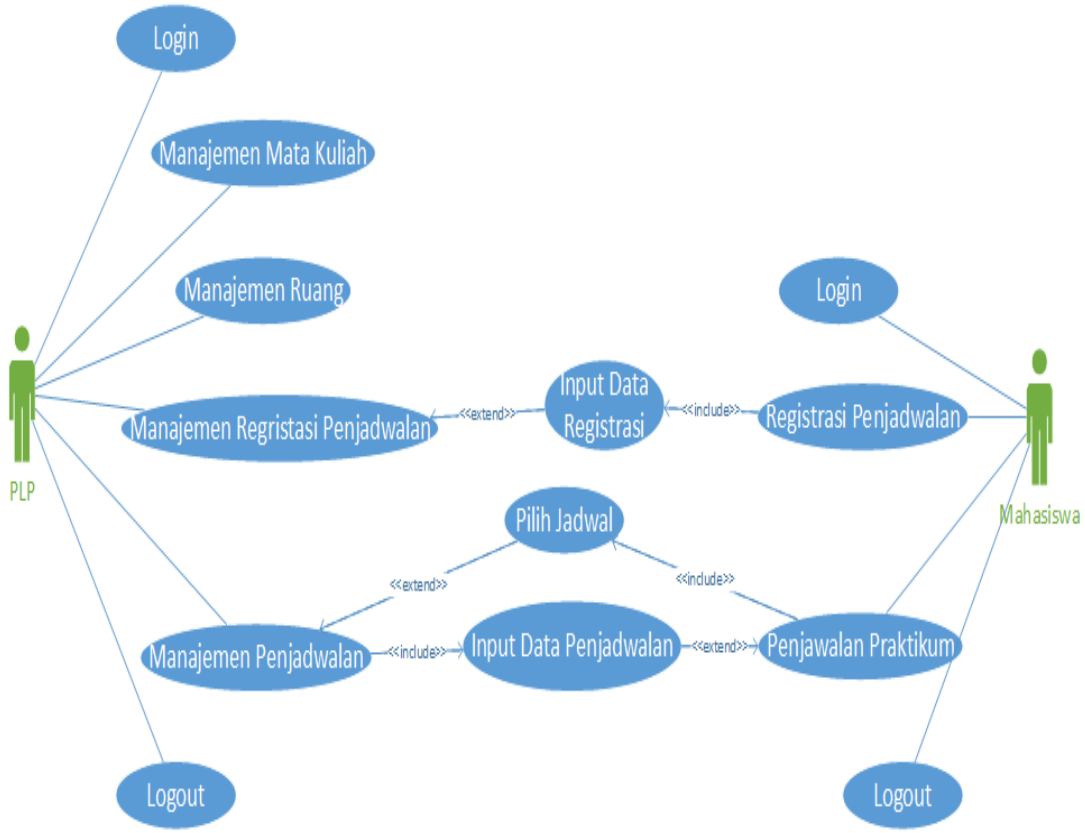

Figure 3. Use Case Diagram PLP and Student [4].

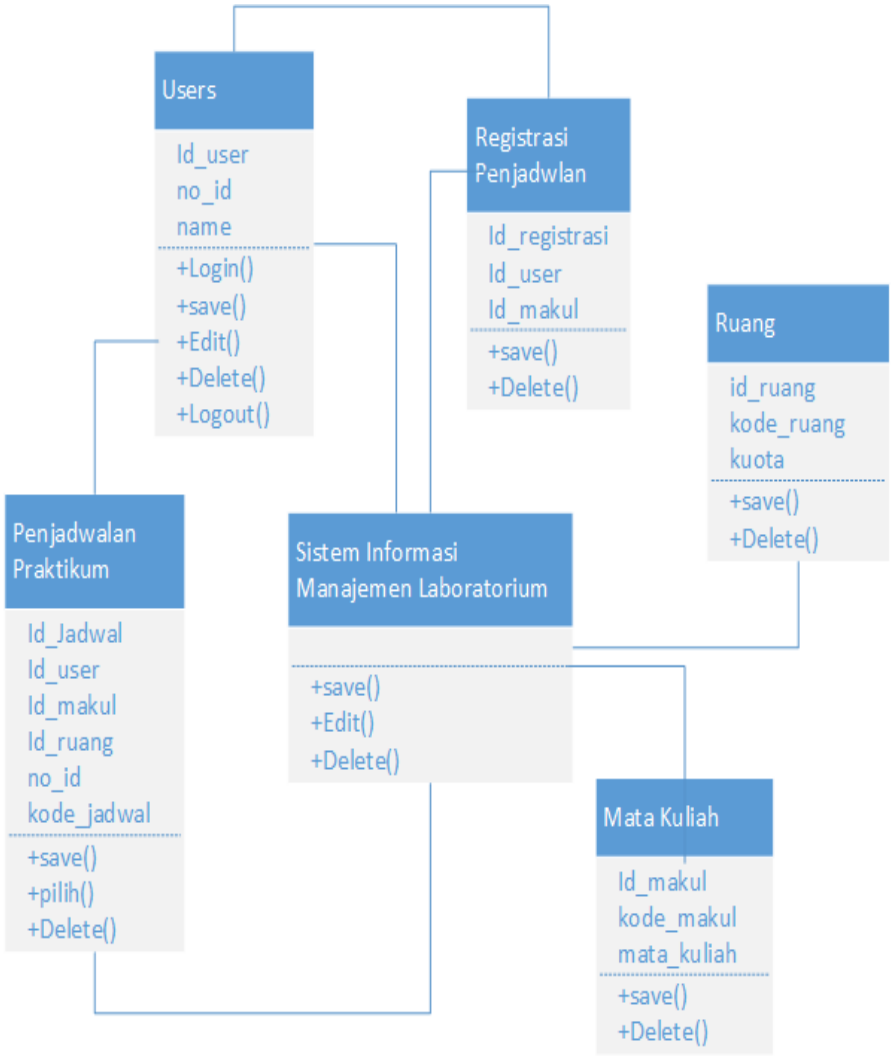

Figure 4. Class Diagram [4].

Entity Relationship Diagram

Laboratory Management Information System in the Department of Mining Engineering, the processing system is centered on a database. The database will later be processed. The database design at SIM Laboratorium uses the Entity-Relationship Diagram (ERD) method to find out the relationship between tables/entities with each other, then ERD is used, see Figure 5. as follows:

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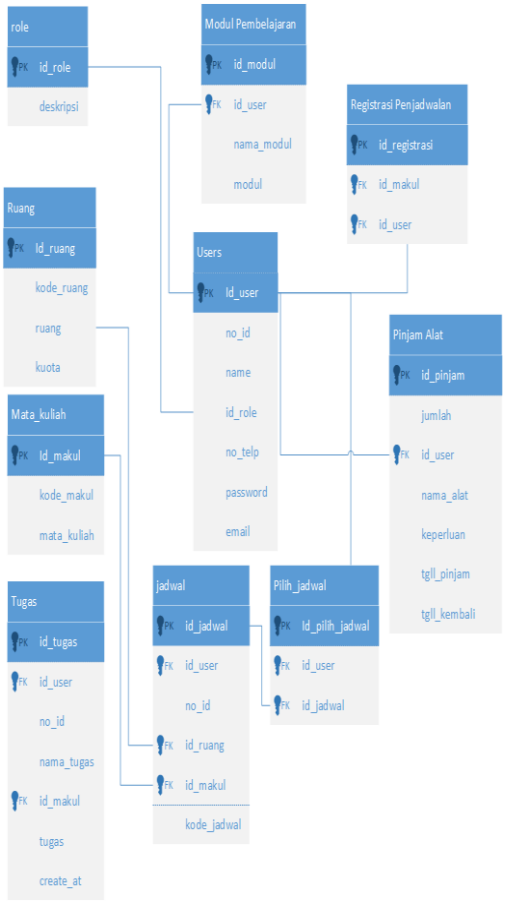

Figure 5. ERD SIMLAB [4].

Coding

Laboratory Management Information System is made using laravel framework. Laravel is a PHP framework with an MVC (Model-View-Controller) design that is used to build website applications. MVC is a concept for encapsulating data along with processing (model), isolating it from the manipulation process (controller), and display (view) to be represented in a user interface. [2]. Figure 6. illustrates the basic relationship of MVC.

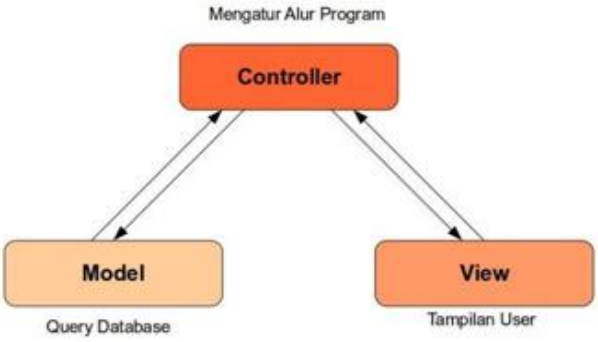

Figure 6. MVC (Model-View-Controller) [4]

RESEARCH METHOD

To carry out this research, the author uses quantitative research, especially surveys. This research begins with a literature study, field orientation, satisfaction survey and continues with electronic data collection to be developed and included in the online system.

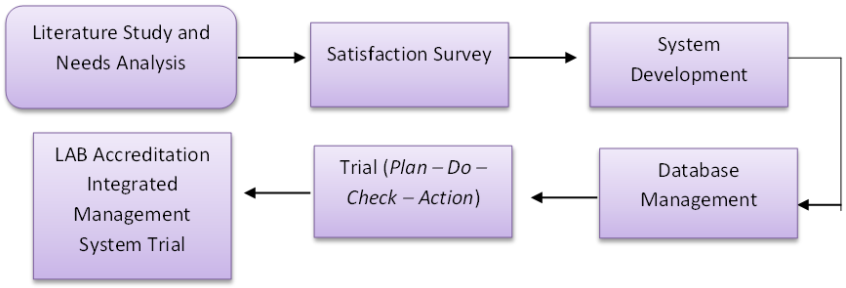

Figure 7. Research Flowchart

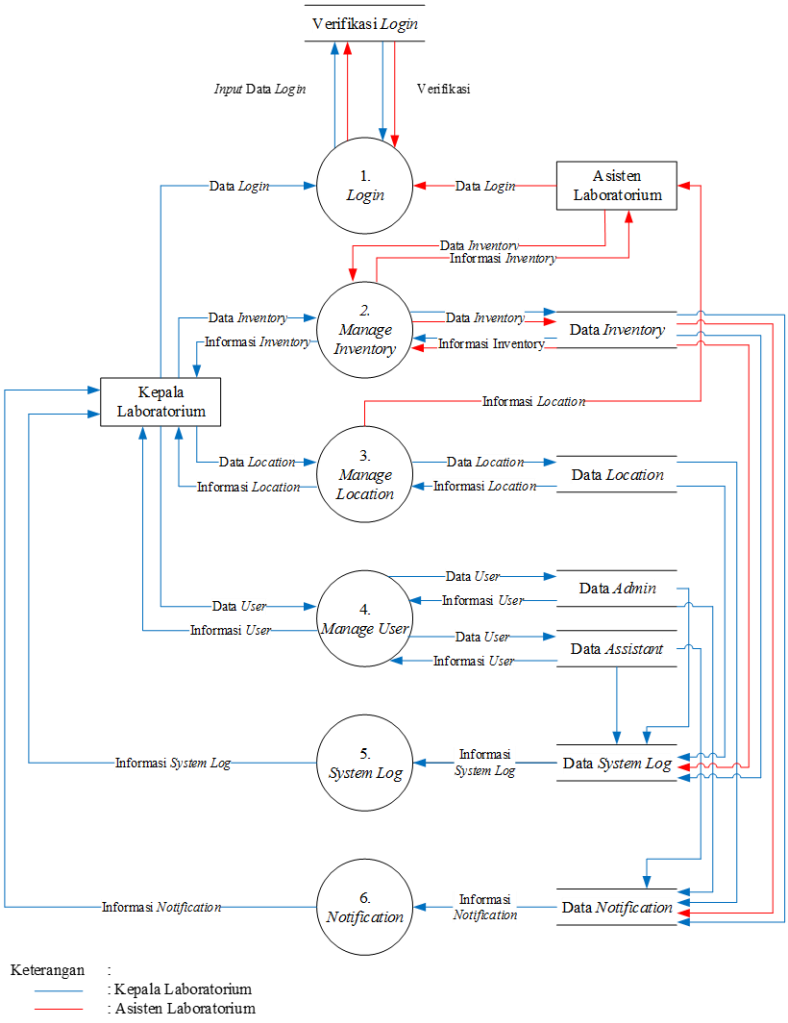

Figure 8. Laboratory Management

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The initial method for the step-by-step system creation is as follows:

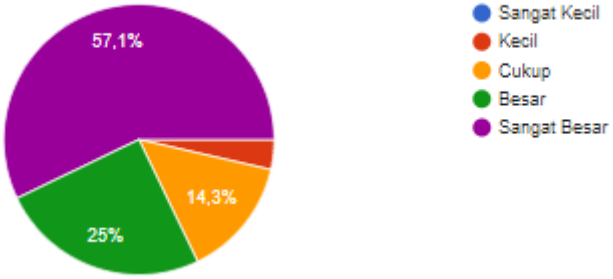
1. Conduct coordination meetings between Labs in the Mining Engineering Department to integrate.
2. Database management by conducting an inventory of each Lab, regarding tools and tool criteria.
3. Making an integrated management system for the existing Lab in the Department of Mining Engineering.
4. Implementation of the integration system and further develop the model.
5. Standardization of Labs in the Mining Engineering Department with ISO.

FINDINGS AND DISCUSSION

Analysis of satisfaction survey

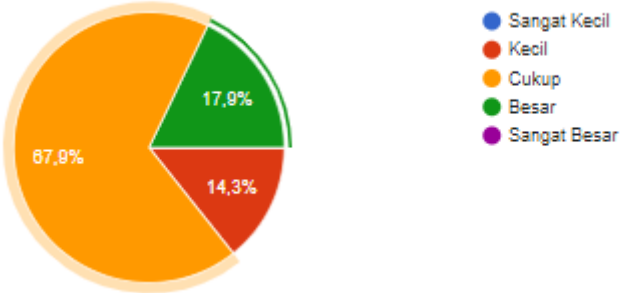
A satisfaction survey was conducted on students as laboratory users, while this survey included satisfaction with the services available in the laboratory, the availability of tools, and service mechanisms applied in supporting the tri dharma of higher education. From the survey results obtained the following data:

a. The number of respondents who answered the survey was 116 people with a distribution of 55 batches of 2020, 33 people from the 2019 batch, seven people from the 2017 batch, and 21 people from the 2018 batch.
b. Regarding the question of the function of the laboratory for learning and research activities, the following results are obtained: :



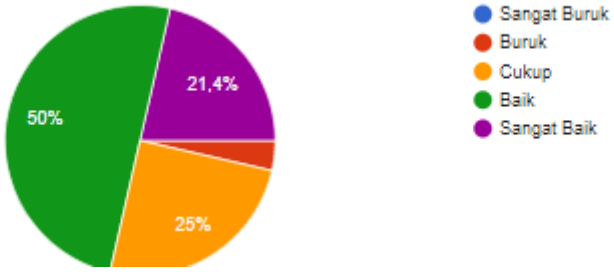
This means that the respondents stated that the function of the laboratory is very large for learning and research activities, so that quality improvement needs to be done. For that, good management is needed.

c. Based on questions related to the availability of laboratory equipment in the Department of Mining Engineering that can support learning and research activities in the laboratory, respondents' answers are as follows:



From the data above, it is known that the availability of tools is sufficient, but it is necessary to update and maintain the tools because there are some respondents who state that the availability of tools is still small in supporting learning and research activities in the laboratory.

d. Regarding the level of service, it can be seen from the survey results that the services provided in the laboratory are good, but it is necessary to improve the service to meet proper laboratory standards.



The service in question is a good management system for student services that will conduct research and carry out data collection activities.

Laboratory Management

Management that needs to be improved is tool inventory management, tool loan management, and testing management. In this case, the mining engineering department will carry out data collection related to the presence and number of tools and the condition of the tools currently available. In relation to test management, it is necessary to make SOPs and work instructions that are clear and easy to understand so that everyone who uses the laboratory can easily and comfortably test. For tool loan management, a website-based application will also be made that will make it easier for borrowers to borrow tools.

In addition, in carrying out laboratory management, comprehensive laboratory integration activities are also carried out so that management carried out in the department can be centralized. Other laboratory management activities are service improvement and laboratory certification.

CONCLUSION AND FUTURE RESEARCH

It can be concluded that from the survey results, it is necessary to carry out the management of the laboratory to improve the quality of the tri dharma of higher education. Be it management for practical work, borrowing tools, and testing, as well as standardizing the equipment owned. Testing activities in the laboratory play an important role in the learning process, so that structured management will create a quality laboratory.

Management that must be carried out is related to equipment inventory, integrated system management, as well as loan management, and website-based tool testing that will facilitate the monitoring and lending system of tools.

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