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SIPUJO: OSCE Examination Assessment Application for Lecturer of the Faculty of Medicine, State University of Surabaya

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Abstract. Assessment in Objective Structured Clinical Examination (OSCE) is a crucial aspect in medical education to measure students' clinical competence. The Faculty of Medicine, State University of Surabaya (UNESA) currently still uses a manual assessment system based on excel format that is prone to various problems, such as ineffectiveness in data management, recording errors, and limitations in analyzing exam results. To face these challenges, this study aims to develop SIPUJO (OSCE Examination Assessment Application), a digital-based system designed to improve efficiency, accuracy, and transparency in the OSCE examination assessment process. SIPUJO was developed as a web-based application that allows lecturers to enter the assessment point real-time and directly via electronic devices. The system will analyze automatically and easily accessed by academic staff, thus accelerating the process of recapitulation and reporting of exam results. This application offers convenience in data management, increases assessment accuracy, and supports transparency in the evaluation of exam results.

Keywords: Examination Assessment, OSCE, SIPUJO.

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Introduction

In the medical education, evaluating student competency is a very crucial aspect to ensure their capabilities in clinical practice. One of the evaluation methods is the Objective Structured Clinical Examination (OSCE). OSCE is an assessment method designed to test students' clinical skills through various patient-based scenarios. Through OSCE, aspects of communication skills, physical examinations, clinical decision-making, and medical procedures can be assessed systematically and objectively. However, implementation of OSCE at the Faculty of Medicine, State Universi-ty of Surabaya (UNESA), there are still various challenges in its assessment application. Currently, OSCE assessments are done manually using excel-based forms, which has various obstacles, such as ineffectiveness in data management, the risk of document loss or damage, and difficulties in recapitulating and analyzing examination results. In addition, the excel system is also at risk of recording errors that can affect the validity and reliability of student assessment results.

The development of SIPUJO (OSCE Examination Assessment Application) aims to address the challenges in the current OSCE assessment system at the Faculty of Medicine, UNESA. SIPUJO is designed as a web-based application that can be used by examiners to conduct assessments directly through electronic devices. With this ap-plication, assessment data can be directly stored in a secure database and can be easily accessed by academic staff. This system is expected to provide real-time assessment result reports, which allows lecturers to immediately take necessary actions for students who need further guidance or remedial. On the other hand, SIPUJO can also assist in the faculty accreditation process by providing complete and easily accessible assessment documentation. In addition to the efficiency and accuracy aspects, the development of OSCE assessment applications must pay attention to data security aspects. Student assessment data is confidential information that must be managed properly to prevent data leakage or misuse. Therefore, SIPUJO will ensure that only authorized parties can access student assessment data.

Several studies have shown that the application of information systems in OSCE evaluation has a positive impact on the effectiveness of the assessment process. Research conducted at various medical faculties in Indonesia shows that the use of digital systems in OSCE can reduce administrative burdens, increase time efficiency, and increase transparency in the assessment process. Thus, the development of SIPUJO is expected to provide similar benefits for the Faculty of Medicine, UNESA. Previous research at the Faculty of Medicine, Padjadjaran University showed that the digital system can increase assessment efficiency and reduce human error in the evaluation process (Amin, 2021). However, this study still has limitations in the deeper analysis features of the results.

In line with the research above, the implementation of an electronic-based system in OSCE increased examiner and student satisfaction and accelerated the feedback process (Smith et. al., 2020). This study highlights the importance of data security in digital systems to prevent student information leakage. Previously, research about web-based information system for OSCE assessment at a university in Indonesia shows that the web-based system is more accessible to examiners compared to the manual method (Rahman & Dewi, 2019). The weakness of the system is its dependence on the internet network, because a stable connection is required for the system to function optimally (Rahman et. al., 2021). Based on previous studies, it can be concluded that a digital system for OSCE assessment has significant benefits in improving the efficiency and accuracy of assessment. However, further development is still needed, especially in terms of data security, more com-prehensive analysis of results, and integration with other academic systems. There-fore, this study focuses on the development of SIPUJO, which is expected to provide solutions to the obstacles found in previous studies.

Methods

The method used to design the OSCE exam assessment application (SIPUJO) is the waterfall method. The waterfall method is a sequential software development process, where progress is seen as flowing down through the planning, modeling, implementation (construction) and testing phases. This software development model was introduced by Winston Royce in the 70s, adapting hardware development. Waterfall development model is a classic model that is systematic (Pressman, 2015). The waterfall method has advantages, namely that the process stages are fixed, easy to apply and orderly. Then it is suitable for products whose needs are clear at the beginning, so that errors are minimal. In addition, software developed using this method usually produces good quality. The system development method uses the waterfall method as follows.

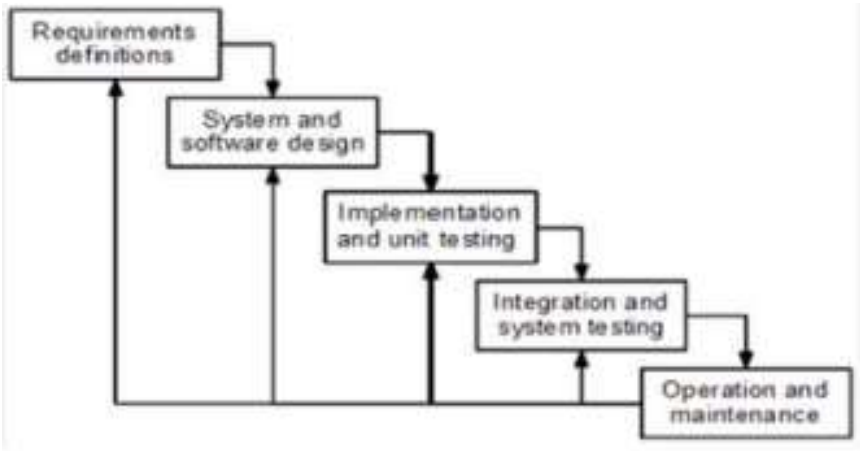

Figure 1. Waterfall model

The stages of system development in this research are explained as follows.

a. Requirement

At this stage, the system needs are analyzed. As much information as possible is needed so that it is in accordance with the objectives. Data collection is done through literature studies and observations on the implementation of the OSCE assessment at the Faculty of Medicine, State University of Surabaya. Information is analyzed to obtain the specifications of the system needs to be developed. At this stage, a user requirement document is produced which is used as a reference in designing and building the OSCE assessment application as an academic value recapitulation application.

b. System and Software Design

The second phase is based on the outcomes of assessing system requirements. A comprehensive picture of the things that must be accomplished is the goal of system design. System developers can use it to prepare hardware for the overall software system architecture. Data flow diagrams, entity relationship diagrams, data structures, and discussions are some of the system modeling tools employed. The system development process is more orderly and organized with the help of system design. An overview of how the business logic included in the analysis will be applied technically is also presented here.

c. Program code writing

This stage is performed program writing Based on the established system layout. In this research using the waterfall method.

d. System testing

Testing the system to check whether or not the system runs well and functions as expected. The system's capabilities and effectiveness will be tested to determine system deficiencies and weaknesses which can then be reviewed to improve the system to make it better.

e. Implementation and maintenance

System implementation can be carried out after testing and the system has passed the test. During system implementation, it is necessary to maintain the system to remain usable.

f. Continuous Improvement

SIPUJO needs to be continuously improved as needs and technology change. Con-sider adding new features, fixing issues, and improving user experience all the time.

g. Results Evaluation

Evaluation of the results achieved through SIPUJO App. Measuring success based on established goals and data on usage. Based on this evaluation, SIPUJO needs to be further customized.

Result and Discussion

The design of the OSCE Examination Assessment Information System (SIPUJO) application at the Faculty of Medicine, Universitas Negeri Surabaya consists of several stages, is the preliminary study stage, application development stage, and testing stage. The preliminary study, aimed at obtaining a system requirements analysis, was conducted using a questionnaire method. The results of the system requirements analysis are presented in Table 1.

Table 1. SIPUJO System Requirements

No	Requirements	Description
1	Assessment Rubric	Scores can be directly input during the exam
2	Score Database	Scores are stored in the application database
3	Exam Result Report	Exam results can be downloaded and printed anytime
4	Exam Participant	Display of exam participants during the active exam period

Based on the system requirements table above, the next step was the development of the SIPUJO application. To use the SIPUJO application, a user case diagram was created. The SIPUJO application use case diagram is shown in Figure 2 below.

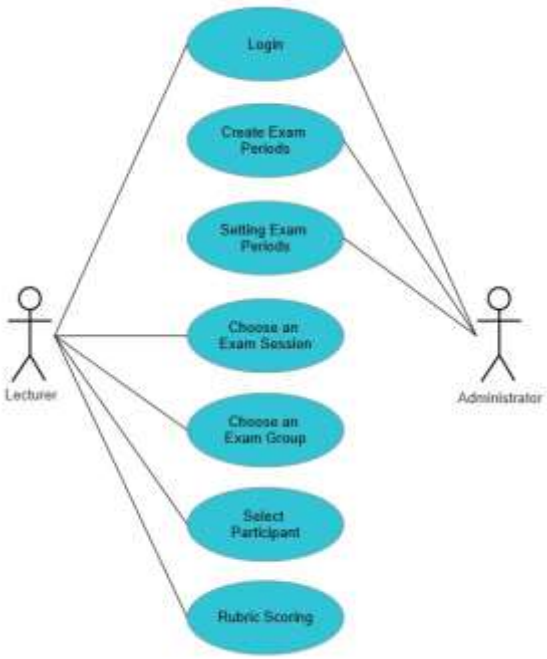

Figure 2. Use Case Diagram of SIPUJO

This application can be accessed online via the website https://sipujo-fk-unesa.my.id/. The initial homepage display can be seen in Figure 3. The administrator and lecturer are required to enter a registered email and password, then click the Log-in button. After logging in, the Dashboard menu appears, as Figure 4.

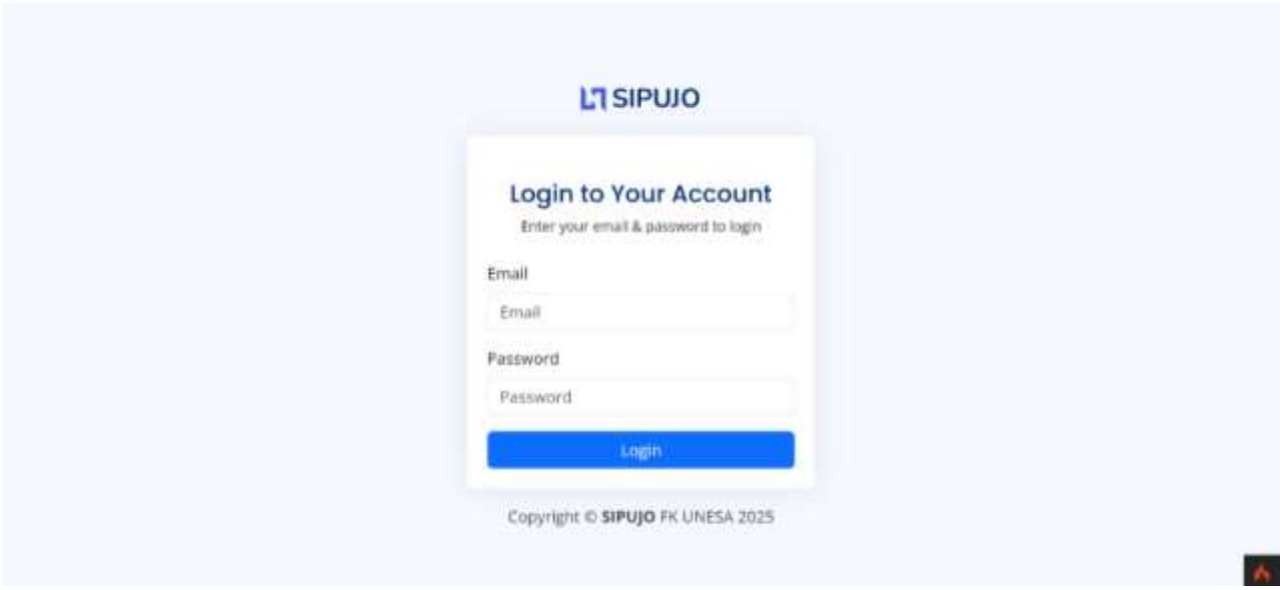

Figure 3. Login Page

Figure 4. Dashboard Page

Menu for Administrator

Participants are input via Data Master. Admins able to add participants individually or by importing *.csv/.xls* files. Edit and search functions are available, as shown in Figure 5. Lecturer data includes name, ID, email, status, and login credentials, as shown in Figure 6. New lecturer can be added through the interface.

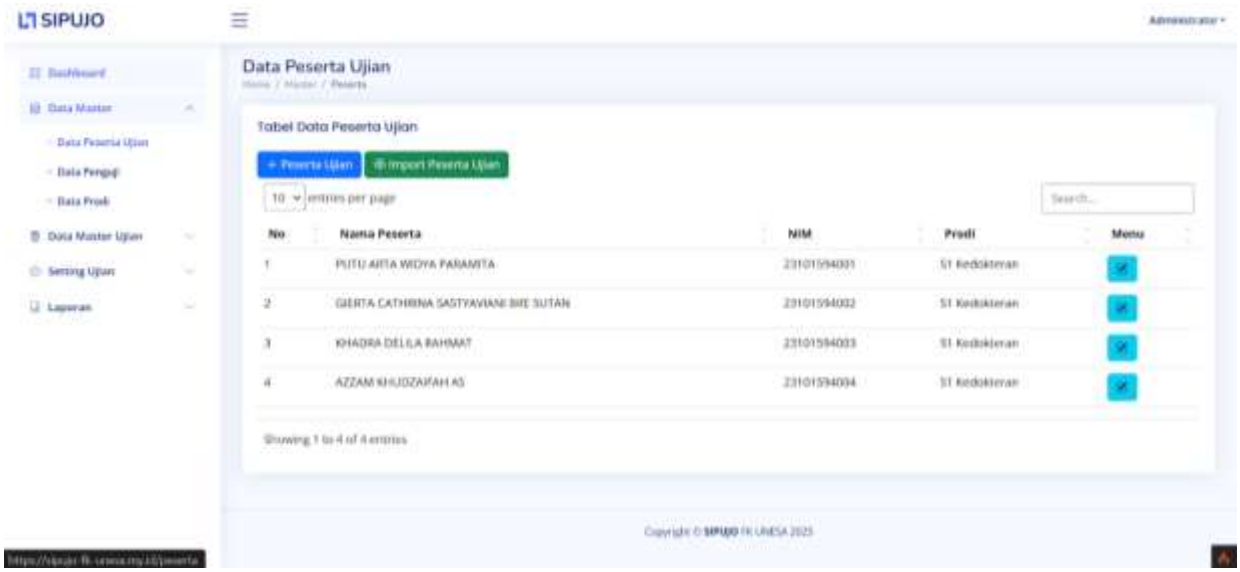

Figure 5. Exam Participant Data Page

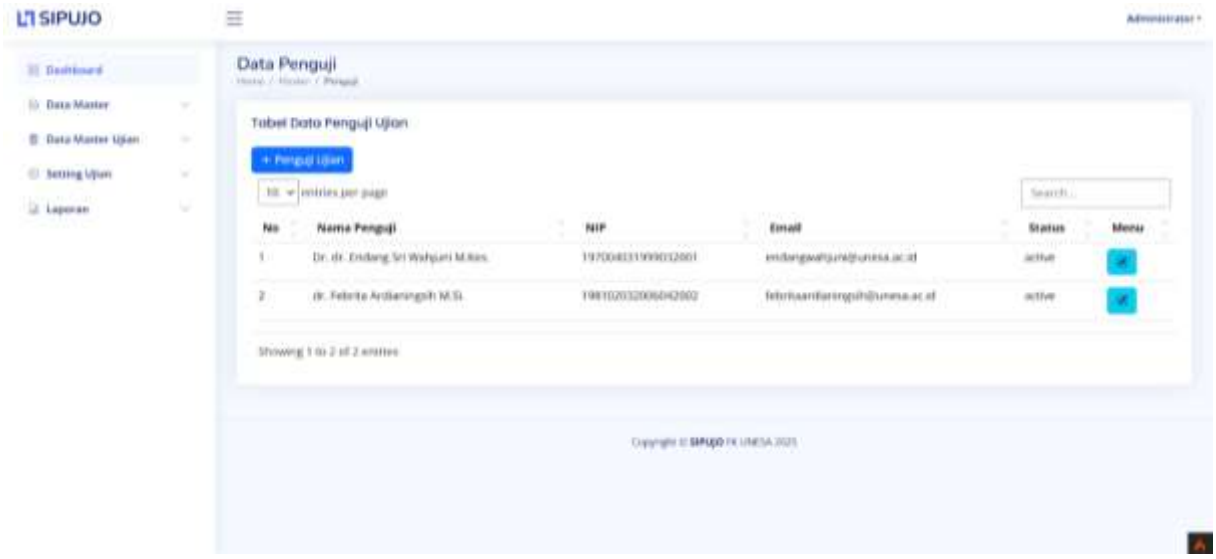

Figure 6. Lecturer Data Page

Administrator able to manage study programs, exam periods, and OSCE stations via exam data master menus, as shown in Figure 7, 8, and 9. Each has search functionality. Assessment rubrics are defined including rubric name, station, and weight. Ad-mins set up exams by linking periods, dates, groups, sessions, stations, and examiners, as shown in Figure 10. All data can be added and edited by administrator.

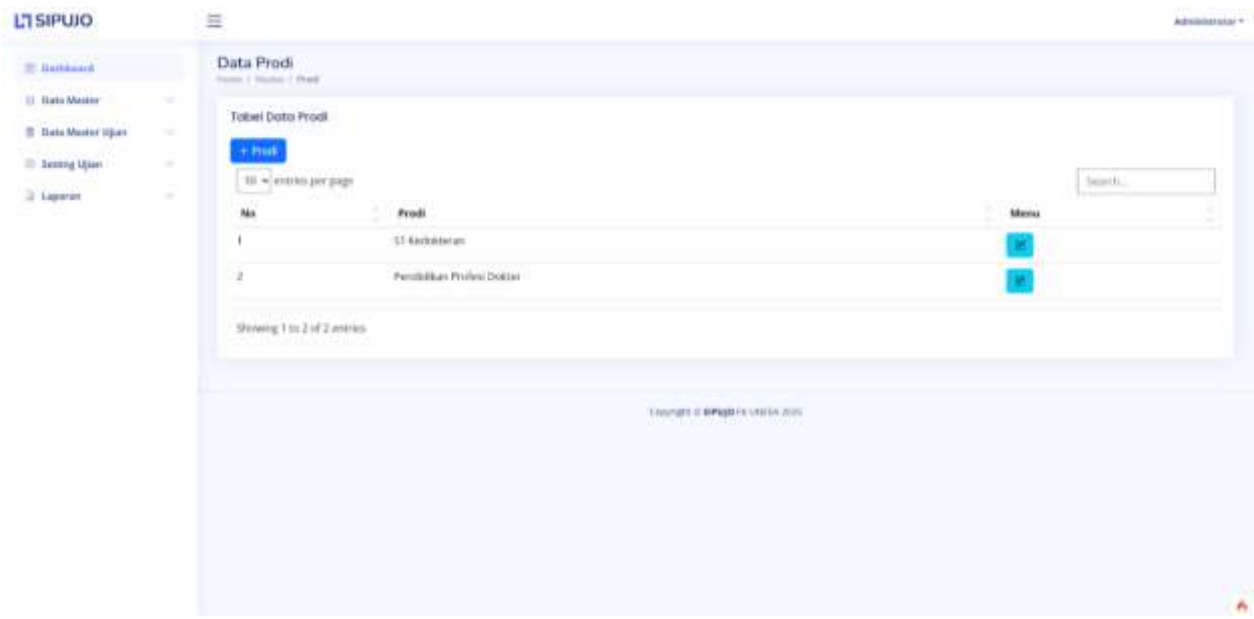

Figure 7. Study Program Data Page

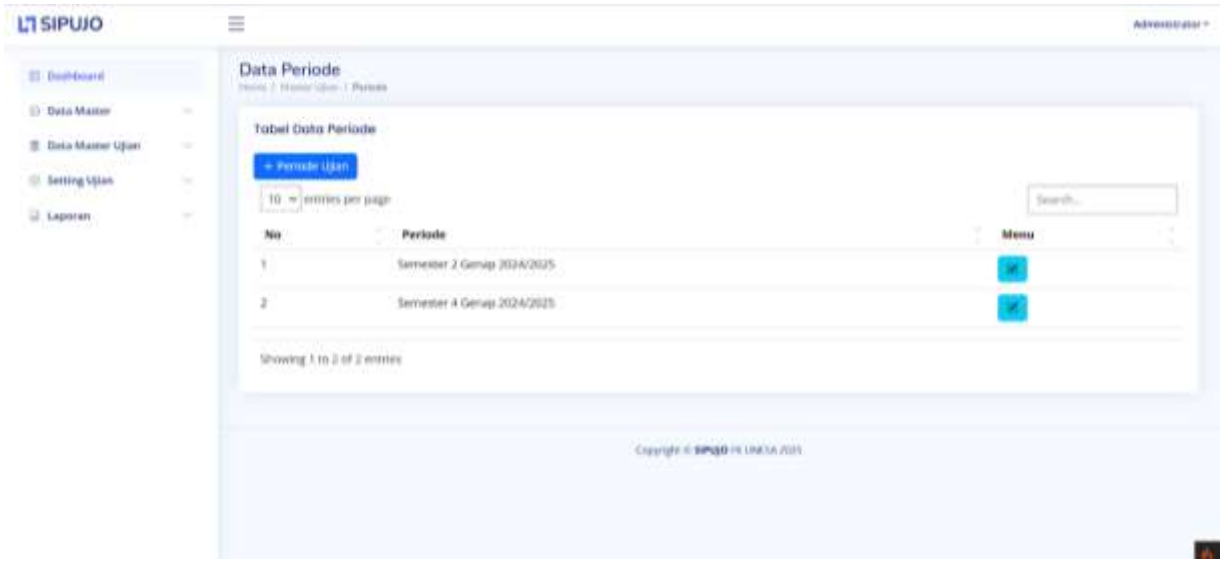

Figure 8. Exam Period Data Page

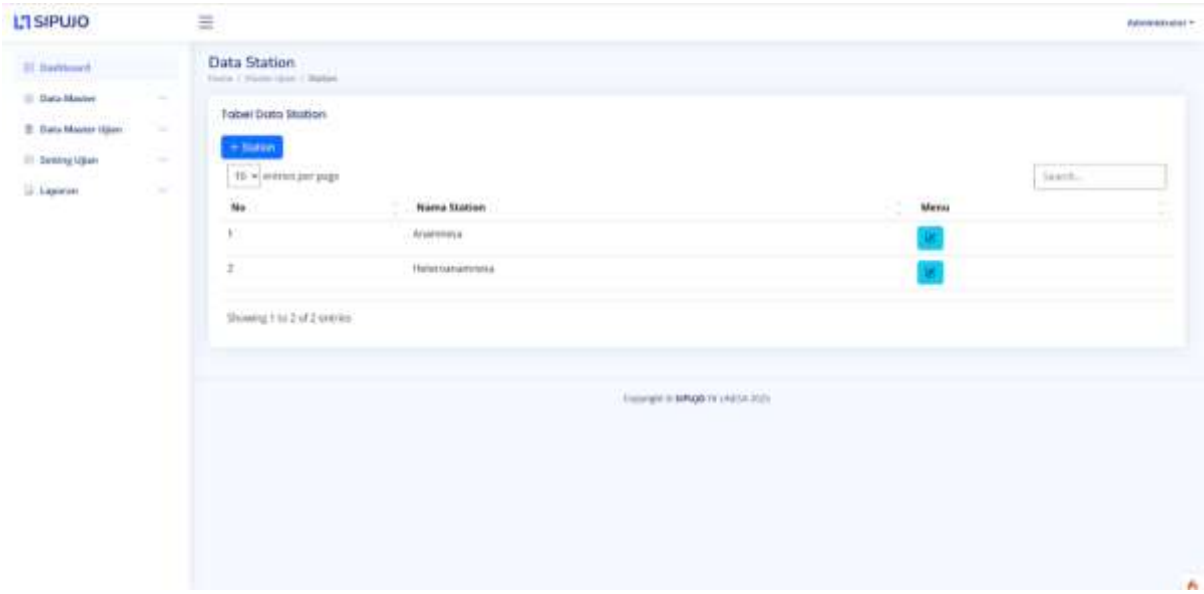

Figure 9. Station Data Page

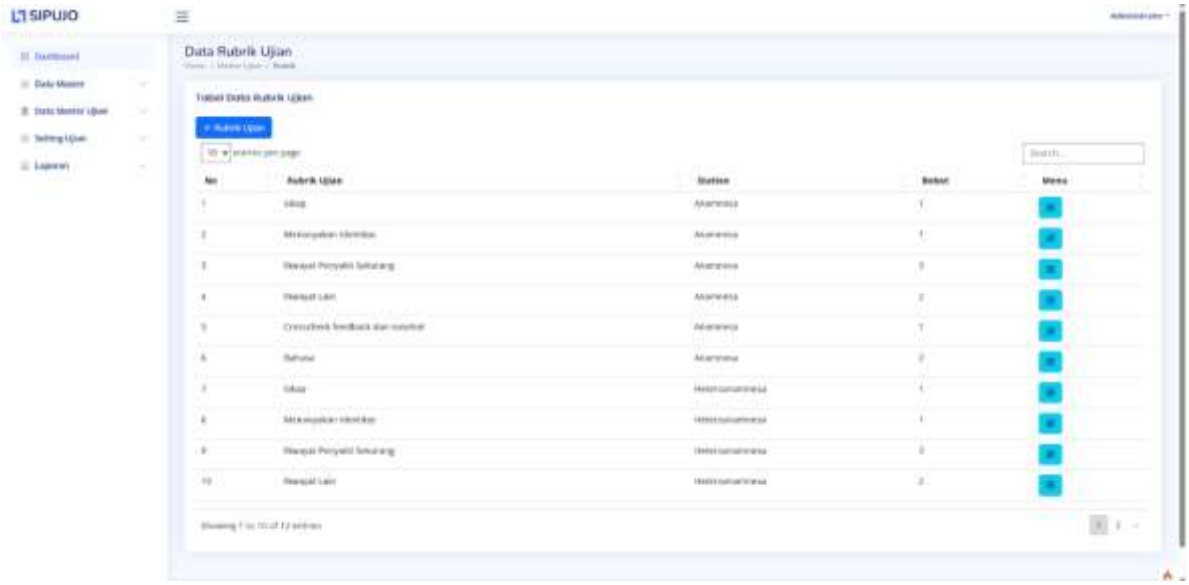

Figure 10. Assessment Rubric Data Page

Last menu for administrator is Examination Setting. This menu displays all exams conducted through the SIPUJO application, including exam participants, the assessed rubrics, score weights, and an action menu for editing, as shown in Figure 11. The admin can also add additional assessment rubrics. Rubrics are applied during exam periods. Admins can manage rubric scores and edit them. Reports can be downloaded and printed per period. Report page shown in Figure 12.

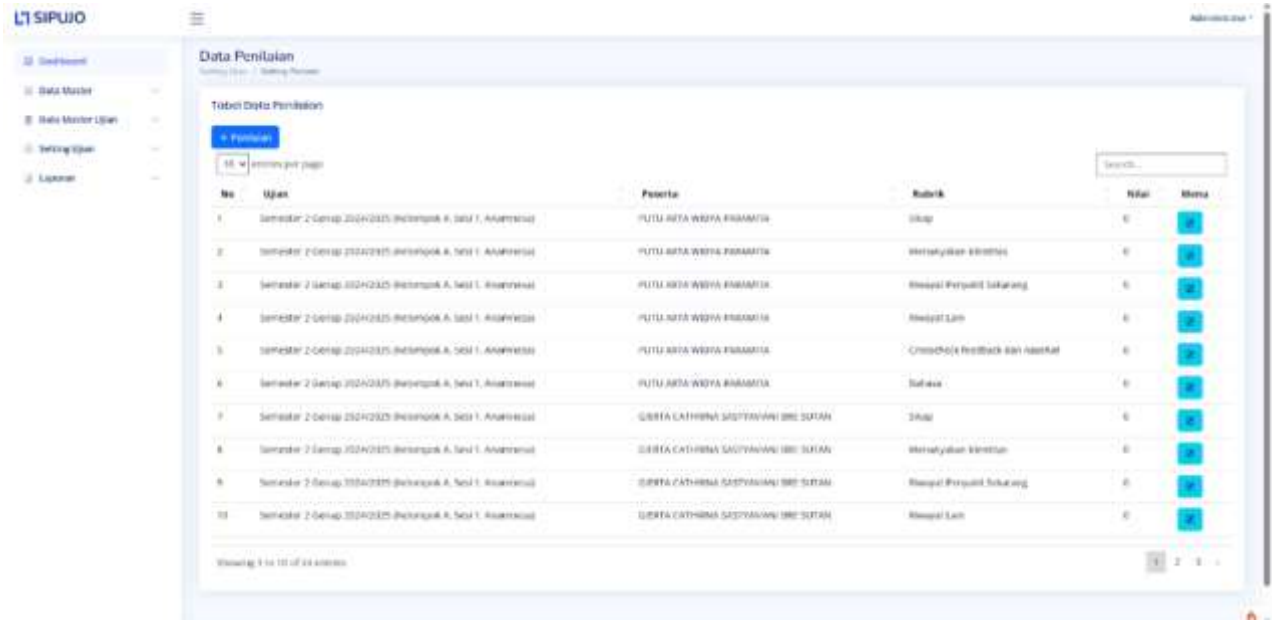

Figure 11. Assessment Rubric Settings Menu

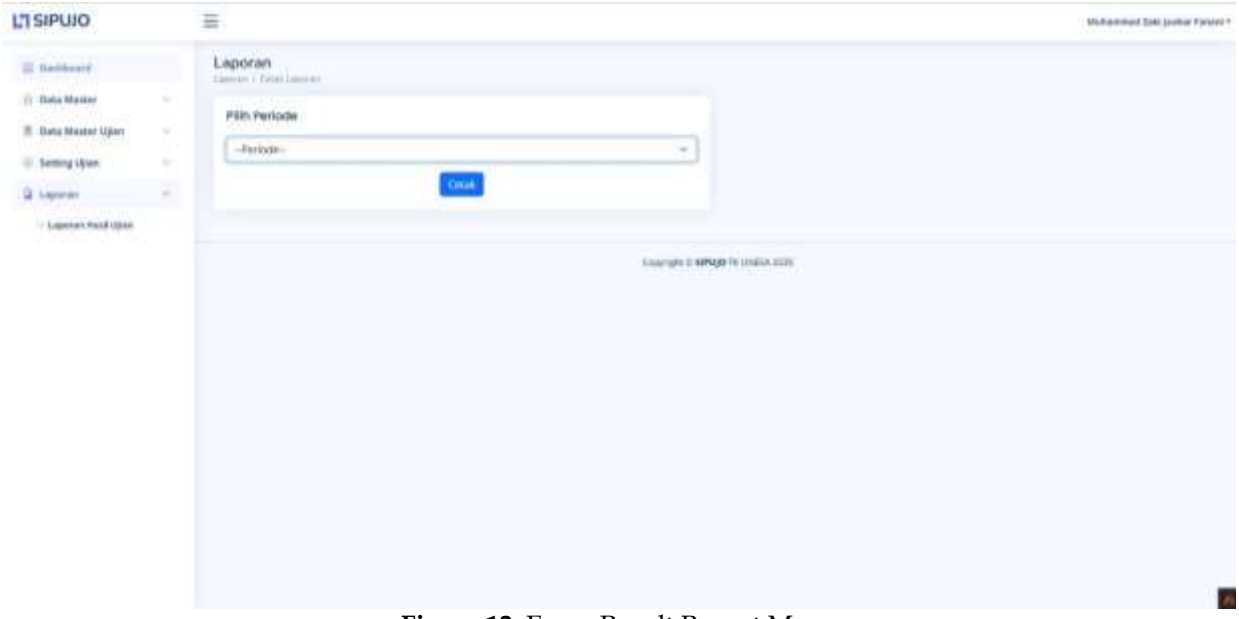

Figure 12. Exam Result Report Menu

Menu for Lecturer

After the login page, menu for lecturer is only one. It is Lecturer Assessment Rubric Menu, as shown in Figure 13. In this menu, the assessment rubric for each student is displayed along with the competencies being evaluated. The scores given by the lecturer are also shown for reference. An 'Edit Score' button is provided in case score modifications are needed, with the lecturer approval. A global rating is also displayed to indicate the ranking within the ongoing exam period. It shown in Figure 14.

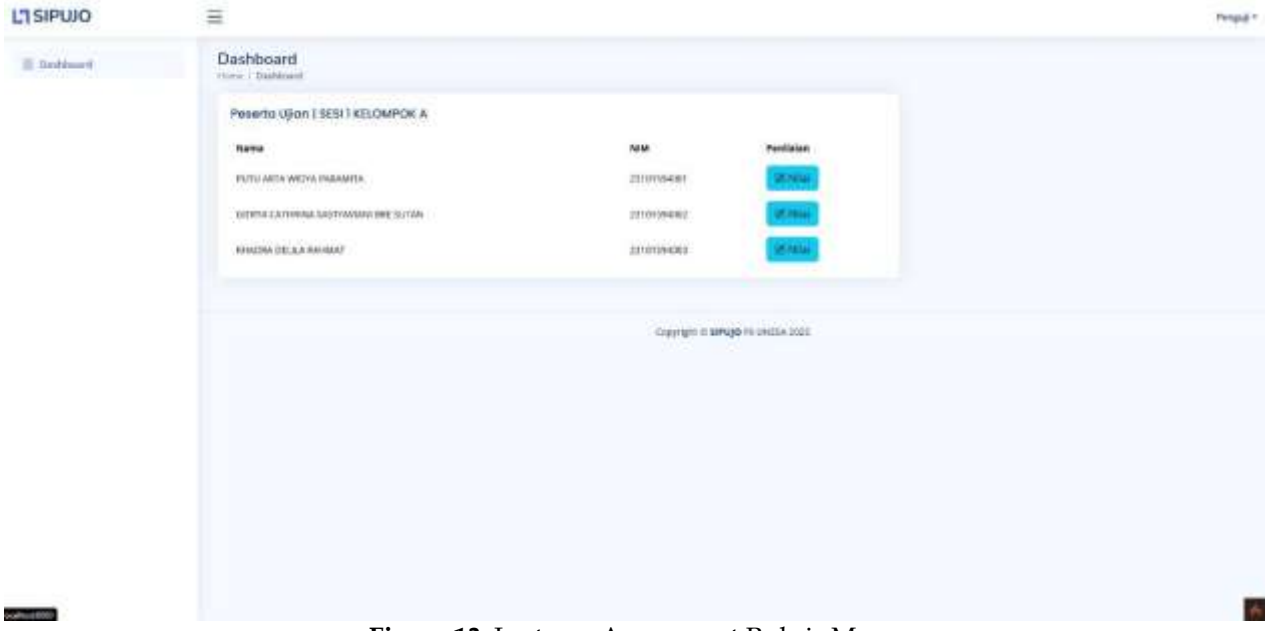

Figure 13. Lecturer Assessment Rubric Menu

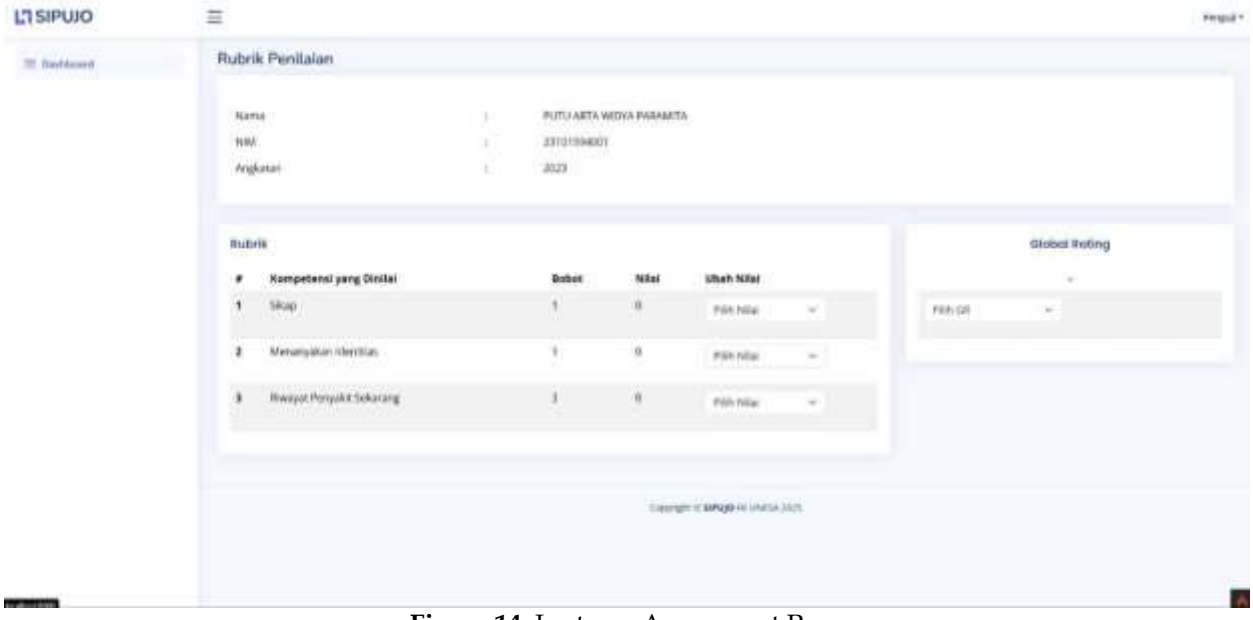

Figure 14. Lecturer Assessment Page

Both administrator and lecturer are able to log out by clicking the 'Logout' button at the top-right corner of the application, as shown in figure bellow.

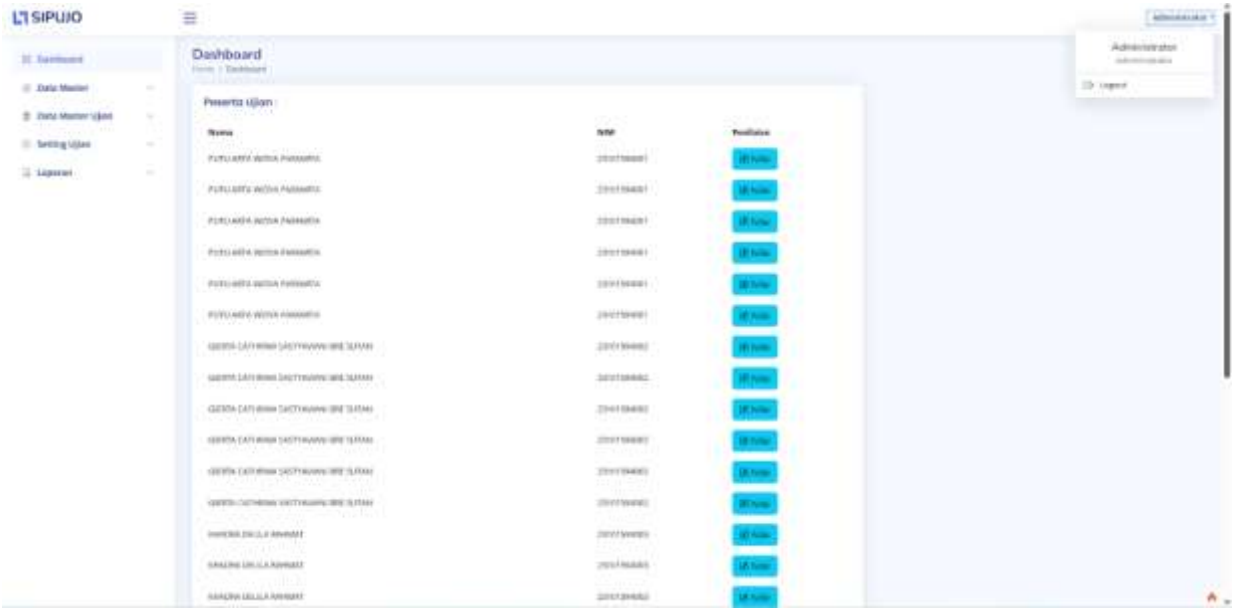

Figure 15. Logout Menu

Testing

This step is conducted to test whether the information system is running in accordance with its function. Each menu that has been developed is tested. Table 2 contains the test results.

Table 2 System Test Results

No	Requirements	Menu Name	Results
1	Login	Login	Success
2	Main Page	Dashboard	Success
3	Data Master	Data Master	Success
4	Exam Data Master	Exam Data Master	Success
5	List/Type of Participants	Participant List	Success
6	List/Type of Lecturer	Lecturer List	Success
7	Assessment Rubric	Rubric Score	Success
8	Exam Result Report Download	Report	Success

Conclusion

The development of SIPUJO (OSCE Examination Assessment Application for Lecturer) has successfully addressed various issues previously encountered in the OSCE assessment process at the Faculty of Medicine, Universitas Negeri Surabaya. The previously used manual Excel-based assessment system proved to have many limitations, such as vulnerability to data entry errors, inefficiency in data management, and a lack of support for transparency and accuracy in assessments. Using the waterfall development approach, SIPUJO was developed as a web-based digital plat-form that allows lecturer to input scores directly and real-time, while also enabling academic staff to access and automatically summarize assessment data.

SIPUJO offers key features such as participant and lecturer data management, exam period configuration, assessment rubrics, exam result reports, and OSCE station management. It is expected that SIPUJO will not only bring positive impact within the Faculty of Medicine at Universitas Negeri Surabaya but also serve as a model for OSCE assessment information systems that can be adopted by other medical education institutions across Indonesia. Furthermore, SIPUJO is designed to be integrated with other academic systems, expanding its benefits in the management of medical education.

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