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Web-Based Online Exam Application for Junior High Schools Case Study: SMP Hasyim Asyari Tulangan)

David Eka Ramadhan*, Ika Ratna Indra Astutik

Department of Informatics, Universitas Muhammadiyah Sidoarjo, Sidoarjo, Indonesia

Corresponding Author: 171080200131@umsida.ac.id[1*]

Abstract. Technological developments have had quite rapid consequences in the field of education, the application of technology in the form of information systems, such as the use of online examination systems can be applied in the field of education. The online exam system is part of the distance learning information system via internet technology. The exams held by most educational institutions (in this case schools) are standardized. Like the exam system implemented at HASYIM ASHARI JUNIOR HIGH SCHOOL which still uses manual methods in data management, especially exam data management. HASYIM ASHARI JUNIOR HIGH SCHOOL really needs an information system at this time. This makes the final assessment contain a subjective element by involving human opinion. The aim of creating an online exam application system is to increase the speed and simplicity of the exam evaluation process. Examiners no longer check individual participant answer sheets and then calculate scores, but the software transfers scores to a database with automatic calculations based on participant answers. The method used in this research is the waterfall method and application testing uses the UAT (User Acceptance Test) method. The result of this research is the creation of a web-based online exam application for junior high schools that can provide assessment results in real time.

Keywords: Application, Exam, Hasyim asyari junior high school

1 Introduction

The world of education today cannot be separated from technology, because with the development of the world of technology, the technology of the learning process has also developed, for example, a form of learning through multimedia technology that takes place online with the help of the internet. This shows that the teaching process with the help of technology plays a positive role in the world of education. With the development of modern technology, manual or often conventional examination systems are gradually turning into computerized examination systems [1].

Information systems play an important role in the development of examination systems that will be introduced to improve the quality of schools. This information system can be useful for schools in developing examination systems to make question preparation and answer correction more efficient. The definition of the information system itself is the information system is an internal system of an organization that meets the needs of daily transaction processing, supports operations, is the management and strategic activities of the organization, and provides the necessary reports to certain external parties [2].

Website can be interpreted as a "collection of pages containing digital data information" in the form of text, images, animations, sound and video or a combination of all of them provided via an internet connection that can be accessed digitally so that it is available and can be seen by everyone around the world. Websites are created with a standard language, HTML. This HTML script is then translated and transcribed by a web browser to be displayed as information that can be read by anyone. HTML scripts are changed and manipulated by web browser technology to convey information that can be read by anyone. [3].

The exam is the result of evaluating the activities of learning activities where the exam contains true and false. With an exam system, it is hoped that it can facilitate and assist teachers in managing exam data and results easily. [4] Online exam is an exam system that uses a website as its user interface. With the development of information technology, almost all educational institutions use information systems as a supporting tool in the advancement of the education system. The goal is to improve the efficiency and quality of the teaching methods applied. With the help of an online exam system, it is hoped that it can provide an effective and efficient exam method in the field of education. [5].

Hasyim asyari Junior High School is one of the private schools located in Tulangan sub-district, Sidoarjo

SAGA: Journal of Technology and Information Systems
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district, East Java Province. As in educational institutions in general, Hasyim asyari Junior High School has an exam that is conducted every semester. This exam is still done in a conventional way, using paper as a medium and educators as proofreaders of exam results. This happens because Hasyim asyari Junior High School still has not implemented an information system in the form of an online exam. Therefore, with the research "Web-Based Online Exam Application for Junior High School (case study: SMP HASYIM ASYARI TULANGAN)"

It is hoped that the application and processing of exam results can be done efficiently and quickly.

2 Methods

2.1 Data Collection Method

2.1.1 Observation

Observation is a data collection technique that is carried out by direct observation of the research object. Observation is carried out through direct observation in the field to obtain actual information. The purpose of observation is a description, in qualitative research that can give birth to theories and hypotheses. [6] The author obtained information from the results of observations made in the form of a system implemented by HASYIM ASYARI Junior High School still using a traditional system, where answer correction is still done manually.

2.1.2 Documentation

Data collection using the "documentation method by collecting data from the HASYIM ASYARI Junior High School in the form of teacher data, student data, and exam data.

2.2 Research Methods

The "research method is a way to solve a "problem or as a way to develop knowledge through systematic and logical scientific methods ... [7]. Needs analysis is carried out through observation and interview methods with the intention of finding information about the process of conducting exams and standard "product specifications" needed by the school. [8]

This research uses the waterfall method, the Waterfall Model method involves data analysis, website design, PHP programming language coding, system testing, and system launch. The waterfall method consists of analysis, design and coding, testing and other supporting stages. [9]

2.3 Design

To create a system in stages, flowcharts and use case diagrams must be made that describe the components of the system as well as the relationship diagram that contains the cause and effect of a case.

A. Flowchart

Flowchart is a diagram that shows the logical flow of a program or system process. Flowchart is a presentation of a program algorithm in the form of a diagram that shows the direction of the program [10].

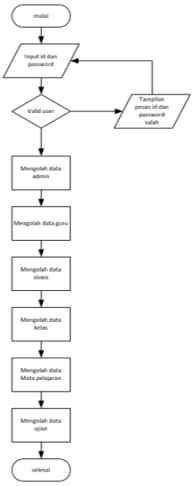

Figure 1. Flowchart admin

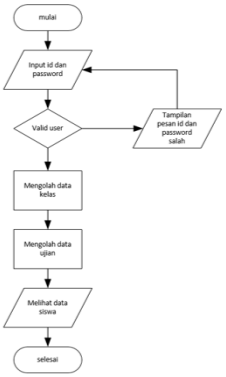

Figure 2. Flowchart Teacher

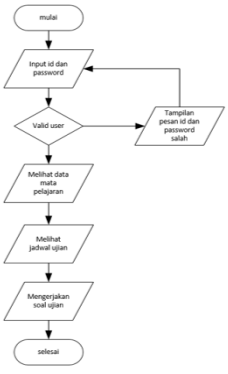

Figure 3. Flowchart student

SAGA: Journal of Technology and Information Systems
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In Figure 1, Figure 2 and Figure 3 are flowcharts for each user. Users can enter the main page if the id and password entered are correct and registered with the system. In Figure 1 for the admin user, if the admin has entered the main page, the admin can process admin data, teacher data, student data, subject data, class data, and exam data. For the teacher user in Figure 2, after logging in, the teacher can process class data, process exam data and view student data. In Figure 3 student flowchart, after the student logs in, the student can access the exam schedule, if he has selected the exam schedule, the student will enter the exam page to work on the questions.

B. Usecase Diagram

UML (Unifield Modeling Language) is an object-oriented system design tool. UML has a function to help describe and design software systems, especially systems built with object-oriented programming. [11] Below in Figure 2.3 is a use case diagram for admin users, students, and teachers.

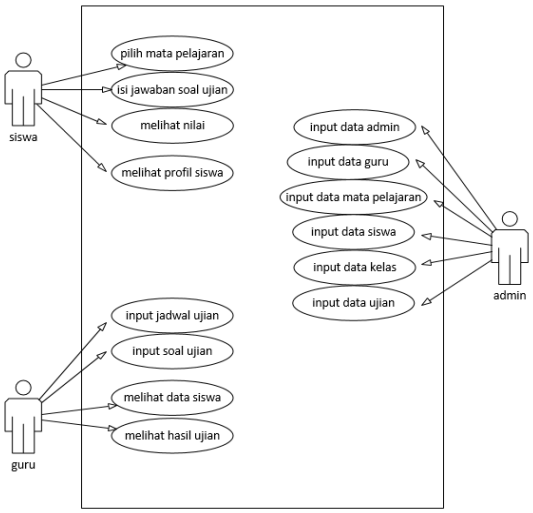

Figure 4. Use case Diagram

C. Relationship Diagram

Diagrams that describe causal relationships, generally a relationship between one set and another set. In this case, the database relationship diagram is useful for managing all incoming and outgoing data on a website.

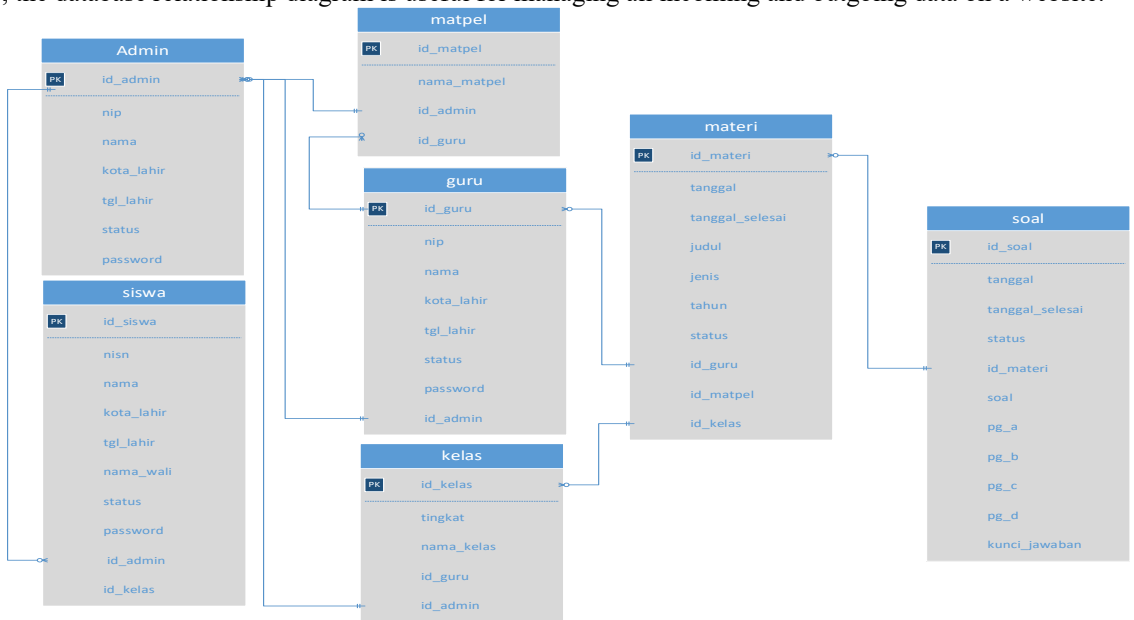

Figure 5. Database Relationship Design

D. Testing

Testers use the blackbox testing method by testing applications on user admins, teachers and students. The author tests the admin, student and teacher login pages. test the admin interface, teacher main page, exam data

SAGA: Journal of Technology and Information Systems
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input page, score page. Black box testing is software quality testing that focuses on software functionality. Black box testing is very important because this technique can identify errors in functionality, interfaces, data models, and access to external data sources. The tested software often suffers from uncertainty during implementation due to dubious testing[13].

Beta testing is a testing process in which end users participate to confirm the usability, functionality, compatibility, and reliability of the developed software. Beta testing prioritizes application readiness before it can be used by users [14]. In this test, the software is tested in the field to ensure its performance meets the expectations of end users. Below in table 1 and table 2 are the results of Blackbox testing on the online exam application. In table 1 is the test result on the admin user, and for table 2 is the test result on the teacher and student users.

Table 1. Blackbox Testing Admin

No	Scenario	Case Example	Expected result	Test Type	Result
1	Login with empty id and password	Nip:- Passwword:-	Display error handling (error)	Blackbox	Success
2	Log in with random id and password	Nip: 123 Password: qqq	Display error handling wrong NIP/password	Blackbox	Success
3	Enter with registered account	NIP:70001 Password123	Enter the main page	Blackbox	Success

Table 2. Blackbox Testing User

No.	Scenario	Case Example	Expected Result	Test Type	Result
4	Display the main page in the form of a class table and exam table	Select the class table	Display student data in the class being taught	Blackbox	Success
5	Display the exam schedule	Choose the Manage questions menu	Display exam question data	Blackbox	Success
6	Manage exam questions	View student exam results	Display the score data from student exams	Blackbox	Success
7	Display exam results	View the exam results of the students	Display the score data from the student exam	Blackbox	Success

3 Result and Discussion

3.1 System Implementation

To explain the design of the application system created, below is an application screen image that explains the design of the application system created by the author.

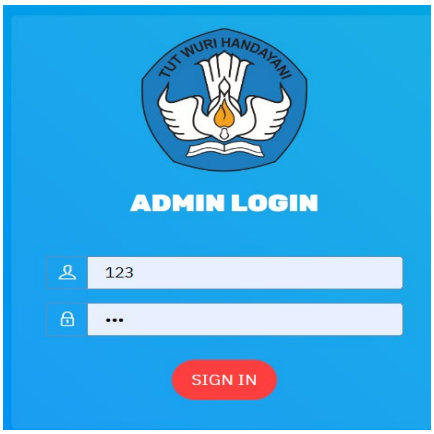

Figure 6. User Login Display

SAGA: Journal of Technology and Information Systems
Vol 3, Issue 2, May 2025, Page 433-443
ISSN: 2985-8933 (Media Online)
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In Figure 6 is a page where the user will enter the Id and password that has been registered with the system. Id and password are needed so that users can enter and access the application.

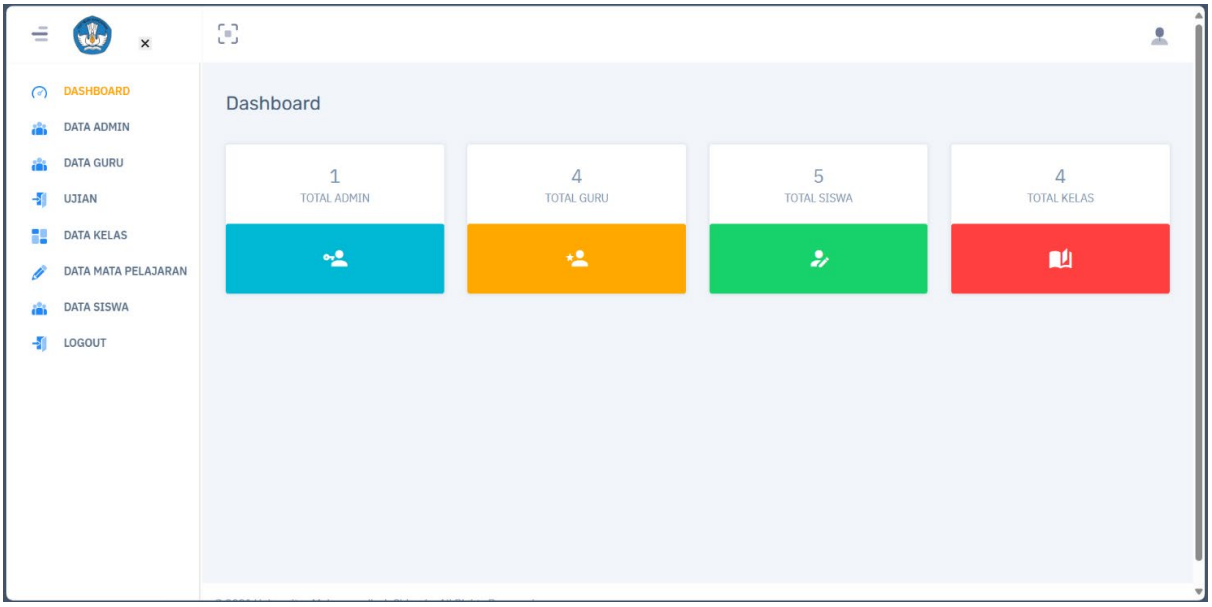

Figure 7. Admin main page view after login

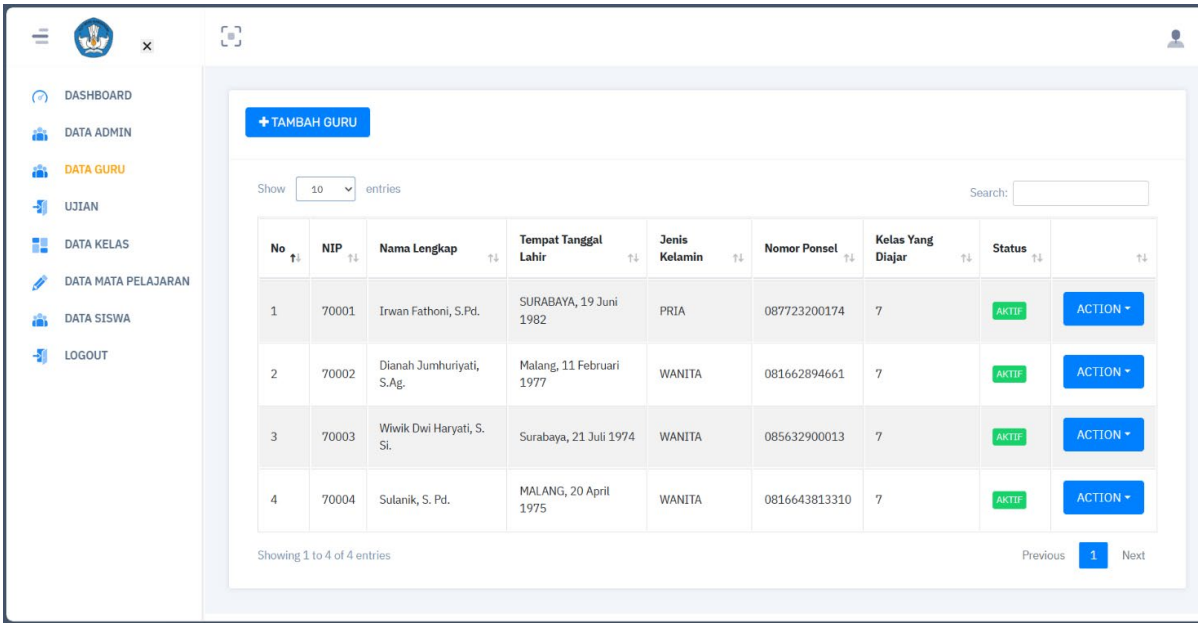

Figure 8. Teacher Data Display

In figures 7 and 8 are pages for processing teacher data, on this page the admin can manage teacher data, such as adding data, deleting and editing data.

SAGA: Journal of Technology and Information Systems
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ISSN: 2985-8933 (Media Online)
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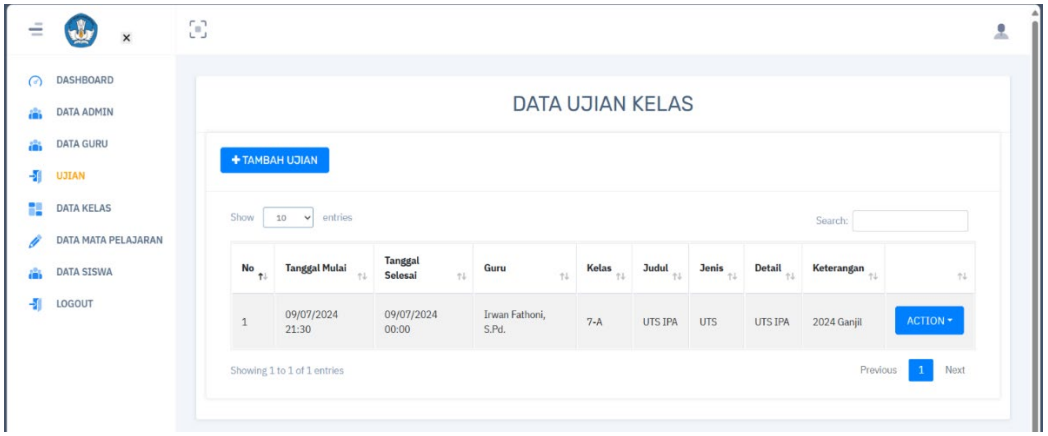

Figure 9. Exam Page Display

In Figure 9, the admin can manage the exam schedule to be implemented. The exam schedule can be created if the teaching teacher data and class data are complete.

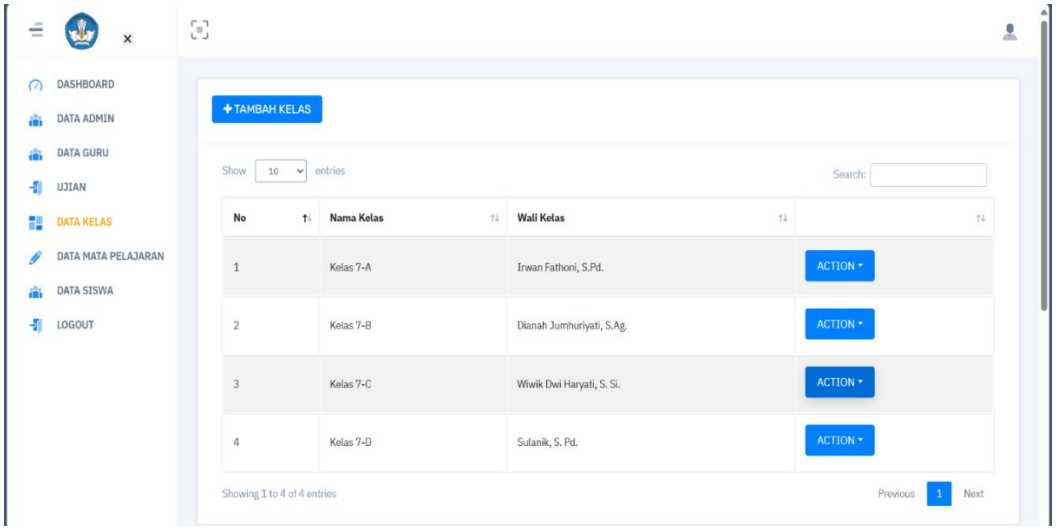

Figure 10. Class data display

In Figure 10 is a class data page, this page will display class data and teaching teachers. Here the admin can add, edit or delete class data.

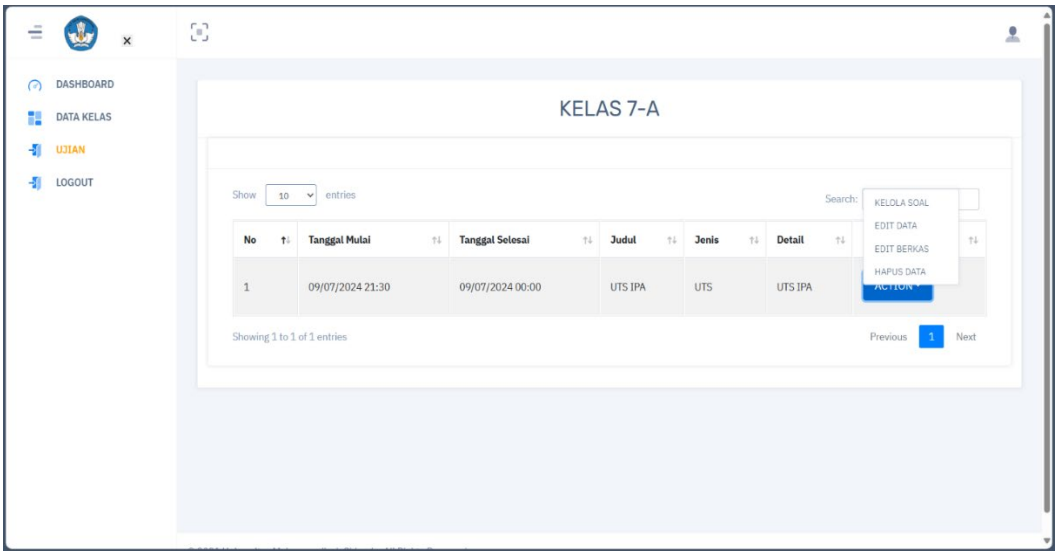

Figure 11. Exam page view

SAGA: Journal of Technology and Information Systems
Vol 3, Issue 2, May 2025, Page 433-443
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Figure 11 is a page for teacher users, here users can manage questions and exam data that has previously been inputted by the admin user.

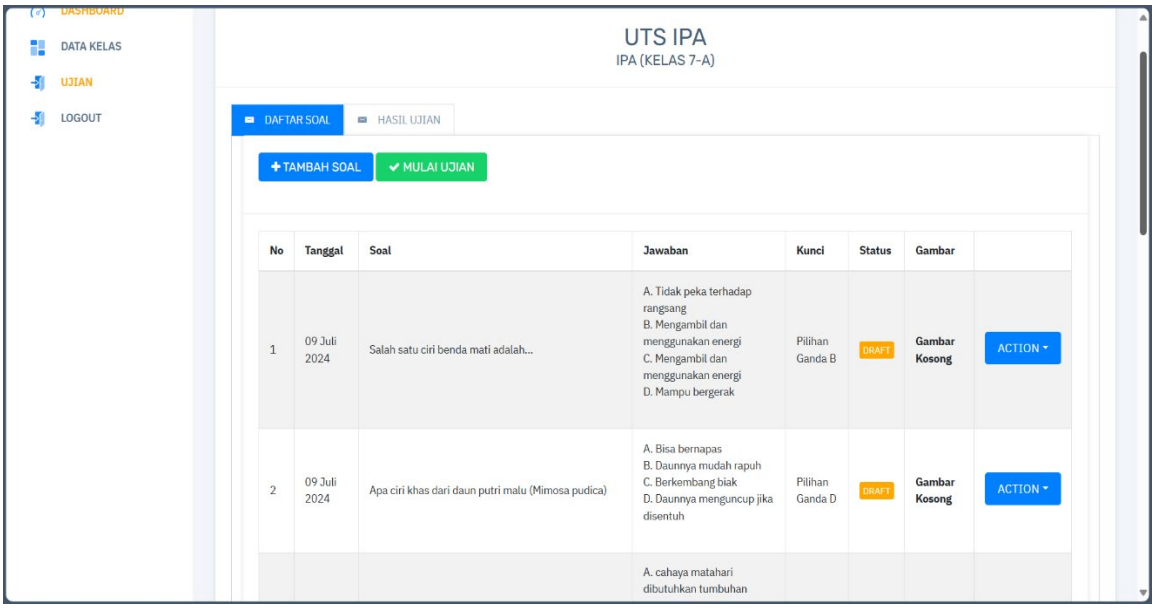

Figure 12. Manage question page

Figure 12 is a page where the teacher inputs questions for the exam. The questions are in the form of multiple choice with 4 answer choices. On this page the teacher can also see the results of student exams which will appear if the student has taken the exam.

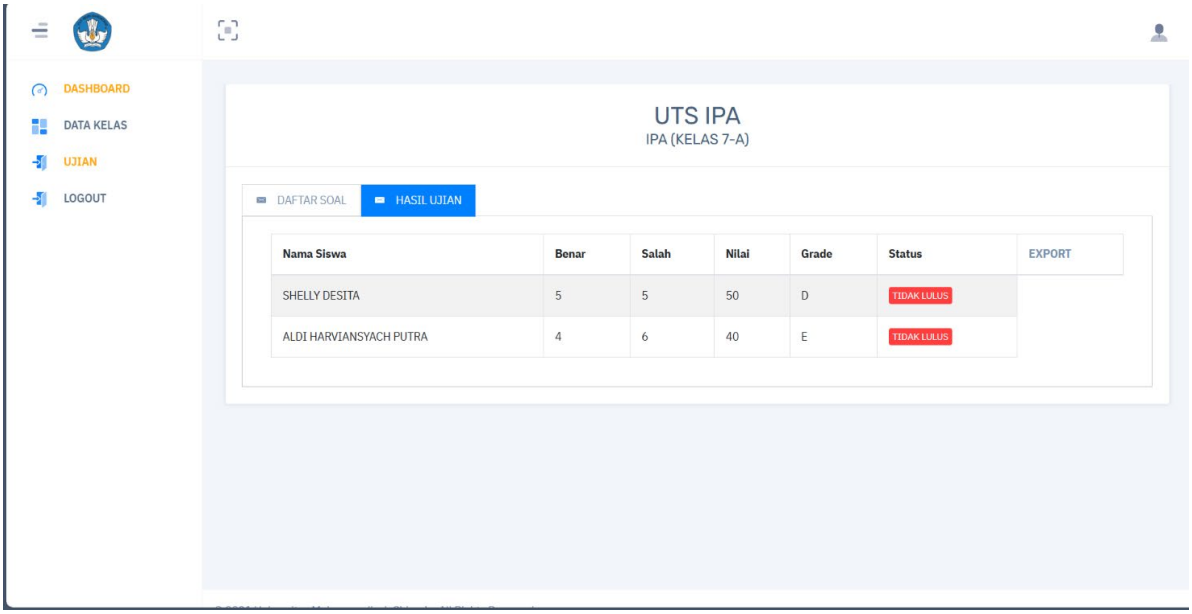

Figure 13. Exam results page

SAGA: Journal of Technology and Information Systems
Vol 3, Issue 2, May 2025, Page 433-443
ISSN: 2985-8933 (Media Online)
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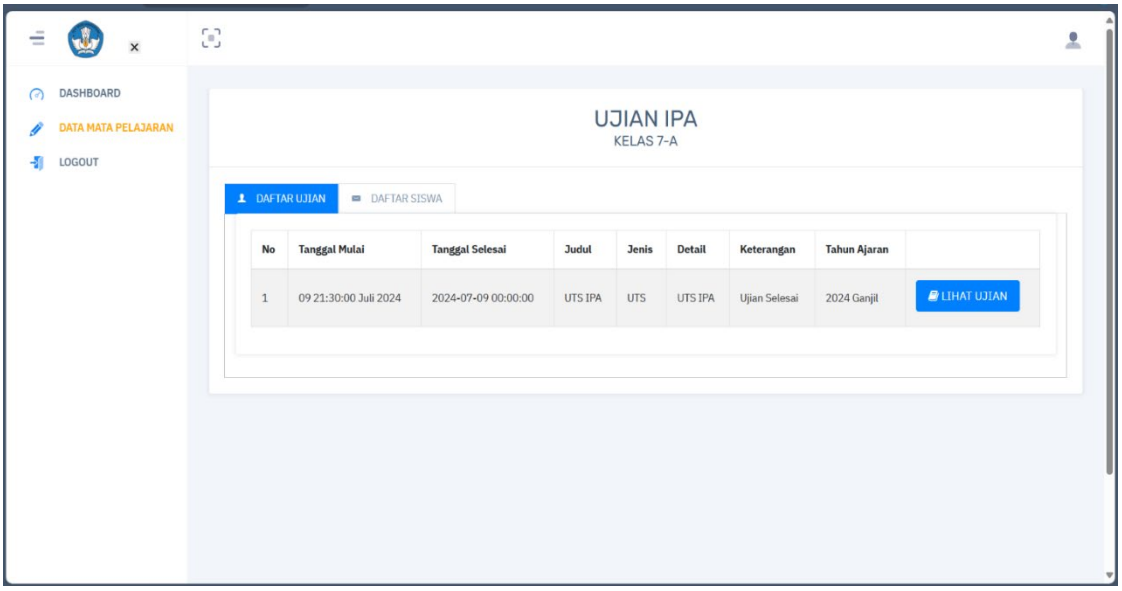

Figure 14. Student Exam List Page

In Figure 13 and Figure 14 is the course data page for student users. students can see the exam schedule on this page, the exam schedule will appear if the exam questions have been inputted by the previous teacher user.

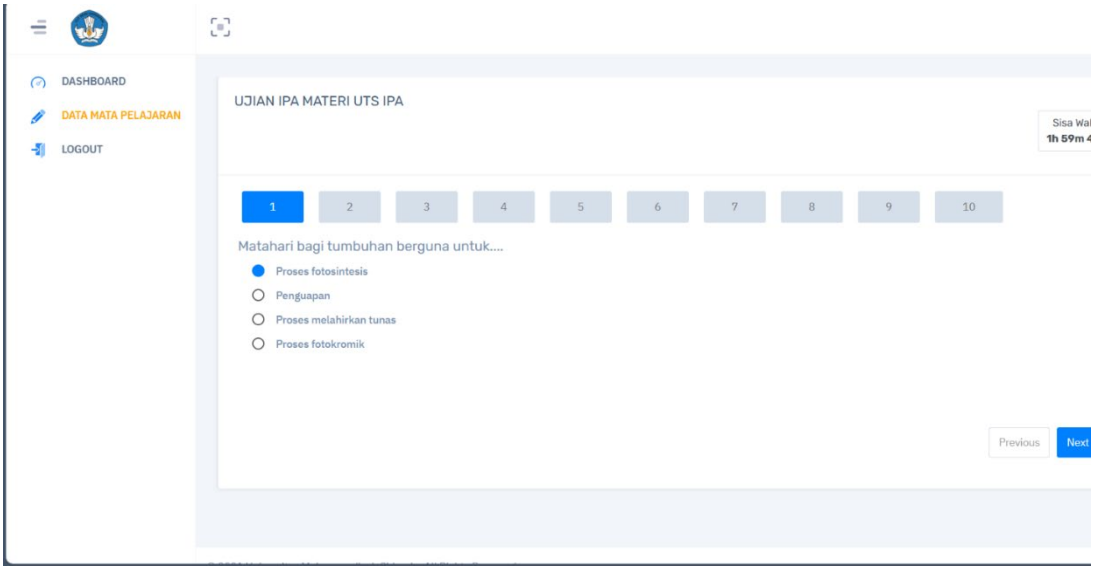

Figure 15. Student Exam Page

Figure 15 is the student exam page. On this page is where students take the exam, the exam is done by choosing the correct answer from the 4 answer choices that have been provided. The number of questions and time has been determined by the admin beforehand, if all questions have not been answered and time has expired, the exam will be completed and the score will be automatically calculated from the number of questions answered correctly.

3.2 UAT Testing *(User Acceptance Test)*

User Acceptance Testing (UAT) is a test of interactions between users and the system directly which serves to test features in the system that the features have run according to user needs. [15].

3.2.1 There are No Sources in the Current Document

Researchers conduct online exam application tests on users, respondents will be expected to give an assessment on statements about the features in the application using UAT testing. The answer options that respondents can choose are in table 3 as follows:

SAGA: Journal of Technology and Information Systems
Vol 3, Issue 2, May 2025, Page 433-443
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Table 3. UAT Answer Options

Answer Options	Description	Weight
A	Very Suitable	4
B	Suitable	3
C	Moderately Suitable	2
D	Not Suitable	1

The conclusion of the results of the UAT answer choices above is in table 4 below as follows:

Table 4. UAT Percentage

No.	Statement	Frequency of Answers				Percentage			
		A	**B**	**C**	**D**	**A**	**B**	**C**	**D**
1	The online exam application has a display that is easy to understand	5	4	1	0	50%	40%	10%	0
2	The online exam application makes it easy for users to conduct exams.	2	8	0	0	20%	80%	0	0
3	The online exam application is stable and smooth	5	5	0	0	50%	50%	0	0
4	Online Exam application provides convenience for users	7	2	1	0	70%	20%	10%	0
5	The Online Exam application provides quite complete content	6	2	3	0	60%	20%	30%	0
6	The online exam application shows exam results in realtime	10	0	0	0	100%	0%	0	0
7	The online exam application has a fashionable design and is not boring	7	1	2	0	70%	10%	20%	0
8	I think the online exam application can replace the conventional exam system.	9	1	0	0	90%	10%	0	0

Table 5. UAT scores

No.	Statement	Frequency of Answer				Total Score
		A x 4	B x 3	C x 2	D x 1	
1	The online exam application has a display that is easy to understand	20	12	2	0	34
2	The online exam application makes it easy for users to conduct exams.	8	24	0	0	32
3	The online exam application is stable and smooth	20	15	0	0	35
4	The Online Exam application makes it easy for users	28	6	2	0	36
5	The Online Exam application provides quite complete content	24	6	5	0	35
6	The online exam application shows exam results in realtime	40	0	0	0	40
7	The online exam application has a fashionable design and is not boring	28	3	4	0	35
8	I think the online exam application can replace the conventional exam system.	36	3	0	0	39

Based on table 5 above, the final score results are obtained by the formula Score = total score divided by the number of respondents. And the percentage result = total score /4 x100%. Until the final value is obtained including the following:

SAGA: Journal of Technology and Information Systems
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a In the first statement, the total value obtained is 34, so the score value obtained is $34/10 = 3.4$, then the percentage result obtained from the first statement is $.3.4/4 = 85\%$
b In the second statement, the total value obtained is 32, so the score value obtained is $32/10 = 3.2$, then the percentage result obtained from the second statement is $.3.2/4 = 80\%$
c In the third statement, the total value obtained is 35, so the score value obtained is $35/10 = 3.5$, then the percentage result obtained from the third statement is $.3.5/4 = 87.5\%$
d In the fourth statement, the total value obtained is 36, so the score value obtained is $36/10 = 3.6$, then the percentage result obtained from the fourth statement is $.3.6/4 = 90\%$
e In the fifth statement, the total value obtained is 35, so the score value obtained is $35/10 = 3.5$, then the percentage result obtained from the fifth statement is $.3.5/4 = 87.5\%$
f In the sixth statement, the total value obtained is 40, so the score value obtained is $40/10 = 4.0$, then the percentage result obtained from the sixth statement is $.4.0/4 = 100\%$
g In the seventh statement, the total value obtained is 35, so the score value obtained is $35/10 = 3.5$, then the percentage result obtained from the seventh statement is $.3.5/4 = 87.5\%$
h In the eighth statement, the total value obtained is 39, so the score value obtained is $39/10 = 3.9$, then the percentage result obtained from the eighth statement is $3.9/4 = 97.5\%$

4 Conclusion

The results of this study are as expected so that several conclusions are drawn in the design and development of this website-based online exam application, for example:

a. The results of blackbox testing on this web application system, it can be concluded that this web application has passed the possibility of errors or bugs that the admin will encounter when managing data.
b. The results of testing using UAT on this web application can be concluded that this web application can outperform conventional exams in terms of accuracy and speed.
c. Data storage and management can be more efficient with guaranteed security.
d. The design of the web application needs to be improved to make it easier for users to access it.

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