

Web-based Information System for Processing Student Report Grade Using Waterfall Method (Study Case: SMPN 3 Talaga)

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Abstract. Assessment is an activity or method used by educators to measure students' abilities in the processes and learning outcomes at school. Junior Highschool 3 Talaga in its assessment process still uses the conventional method which causes delays in the assessment report process, not minimizing errors in writing on the assessment report is quite difficult. Based on the problems experienced, it is presented as an assessment information system that helps the student assessment process. This information system was created using the waterfall method which produces a ready-to-use system with sufficient features. The information system presented uses the PHP and MySQL programming languages to facilitate and lighten student assessment work. This assessment is used as a reference standard for achieving student competency and a basis for helping students. Not only that, but the assessment is also carried out continuously and aims to monitor the learning process and progress of students. With the existence of an information system, the assessment will be more efficient and can facilitate its implementation.

Keywords: Assessment, Information System, Junior Highschool 3 Talaga, Waterfall

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INTRODUCTION

The development of technology and information will continue to occur due to increasingly advanced times. Of course, this must be used to improve the quality of education [1]. With the development of technology and information, this can be used in several fields, for example, in the field of education in the form of website-based value processing. Grade processing plays an important role in teaching and learning activities to measure student achievement during the school [2]. This grade processing will facilitate, lighten, and help the existing work [3]. Therefore, we built a website-based grade processing system.

Junior Highschool 3 Talaga, which is located in the highlands of the Majalengka district, is a school that is not very active in the use of technology and information. For example, in learning, they rarely use projectors or existing computer laboratories, and a system for recording borrowing/returning books, and evaluating learning activities is still done manually [4]. Doing it manually, will take a long time and is less effective [5]. Doing a manual assessment can result in many errors, especially human errors [6]. Therefore, we need to change the grade processing system which was still conventional to a more effective modern one [7].

The existence of this website-based grade processing will be an important part of Junior Highschool 3 Talaga, all data that has been processed will be stored neatly and can reduce data storage errors [8]. With this system, grade data processing becomes faster and more accurate [9]. This technology can be applied both in processing report cards or other activities and also in encouraging the use of technology in the education sector, especially at Junior Highschool 3 Talaga [10]. We use the popular CSS framework, Tailwind. Tailwind itself will develop features with better optimization [7]. By using tailwind, we hope that the user interface can be user-friendly. We also use semantic HTML for the HTML structure. By using this semantic HTML, humans or machines can read it easily.

The method we used is direct observation. This direct observation will make it easier to collect the required data and can be more detailed through direct communication with the school. With this method, we get more actual data and the behavior carried out by processing grades at the school [11]. We also conduct literature studies from papers, books, and other references related to website design [3]. This method increases knowledge so that it can produce an efficient website.

This Web-based grade processing will make it easier for teachers and homeroom teachers to record the report cards for students at Junior Highschool 3 Talaga [12]. The work of the teacher and homeroom teacher will be lighter and speed up the processing of grades. Not only that, teachers and homeroom teachers won't feel bored filling in grades in a conventional way. In addition, this will familiarize teachers with the use of existing information technology at Junior Highschool 3 Talaga [13].

METHODS

Requirement Analysis

The first stage is requirement analysis. Where at this stage the developer gathers various requirements to build software. At this stage, a communication interaction is used to understand the required system between the user and the software. They are the key to the process at this stage. They know the desired result and how to identify themselves against the software [14]. Developers hold meetings with stakeholders to obtain their needs. When gathering information, developers create documentation. The documentation must contain objectives, current processes, details of expected achievements, and expectations. Information systems will not succeed when their needs are not met, or the developer misses important information. This stage is the most important in the Waterfall method. If this stage does not go well, then the project can be said to have failed [14]. At this stage, the researcher made direct observations by visiting SMPN 3 Talaga to see how grade processing was carried out at the school. Researchers also interviewed several parties/staff involved in processing report cards at SMPN 3 Talaga.

Design

This second stage is in the form of a software architecture design based on the results of the previous stage. This software architecture includes the components used and the relationship between these architectural components. This stage will provide an overview of the display to the development team [15]. In addition, it makes it easy to find out the needs of both hardware and software in the development process. At this stage, it is very important for the development team because they will know the tools and language to be used [16]. At this stage, researchers create a functional system design using use case diagrams to describe what users can do. Because researchers will use a relational database, a database design using an entity relationship diagram (ERD) is needed. Furthermore, create a prototype that describes the system interface.

Development

The third stage in the waterfall method is development or implementation. This coding process implements the image on the design into a real view. The code or language used is according to the needs of the development team and the company. This stage focuses on technical matters only and the translation of the program code is carried out by a team of programmers or developers. The process in this section has been divided into three different development stages. The first team is FrontEnd (Assigned to the client side), the second is BackEnd (Assigned to the server side), and FullStack (A combination of FrontEnd and Backend) [17]. At this stage, the researcher implements the design that was created in the previous stage, namely by coding using the PHP programming language and creating a database according to the database design that has been created.

Testing

This testing stage is to find out the results of the maintenance process that was previously carried out. The result of this stage is to re-test the application or software that has been made to run according to the

requirements or functionality of the software that has been made. Not only that, in this stage, if there are bugs or problems, they will repeat and change the coding which aims to eliminate existing problems. This stage is carried out by QA and QC [15]. An example of testing that is usually used is black box testing. Researchers tested the system using black box testing, which aims to test the accuracy of the system's input and output. This testing was carried out by related parties at SMPN 3 Talaga, who will be the system's end user.

Maintenance

This stage is the final stage of the waterfall method. Maintenance is carried out to facilitate the development team in maintenance and repair if errors are found in the application and to make sure the application that is made runs well. In addition, it improves the product and allows several better versions to be released. Stakeholders may experience technical problems. If there are still defects remaining, then it's time to address them [14]. After the system is created and tested, the system is published to the relevant agency, SMPN 3 Talaga. As the system is used, researchers will also overcome several errors that the agency may receive. Researchers not only deal with errors but also accommodate databases and website features to improve.

RESULT AND DISCUSSION

Use Case Diagram



Figure 1. Use case diagram

In this grade processing system, 3 users can access the system, they are admin, homeroom teacher, and students. Where each user has their authority such as students who can only see grades, admins who manage student and homeroom data, and homeroom teachers who manage the grades of each student. Figure 1 shows the use case diagram in this research.

Entity Relationship Diagram

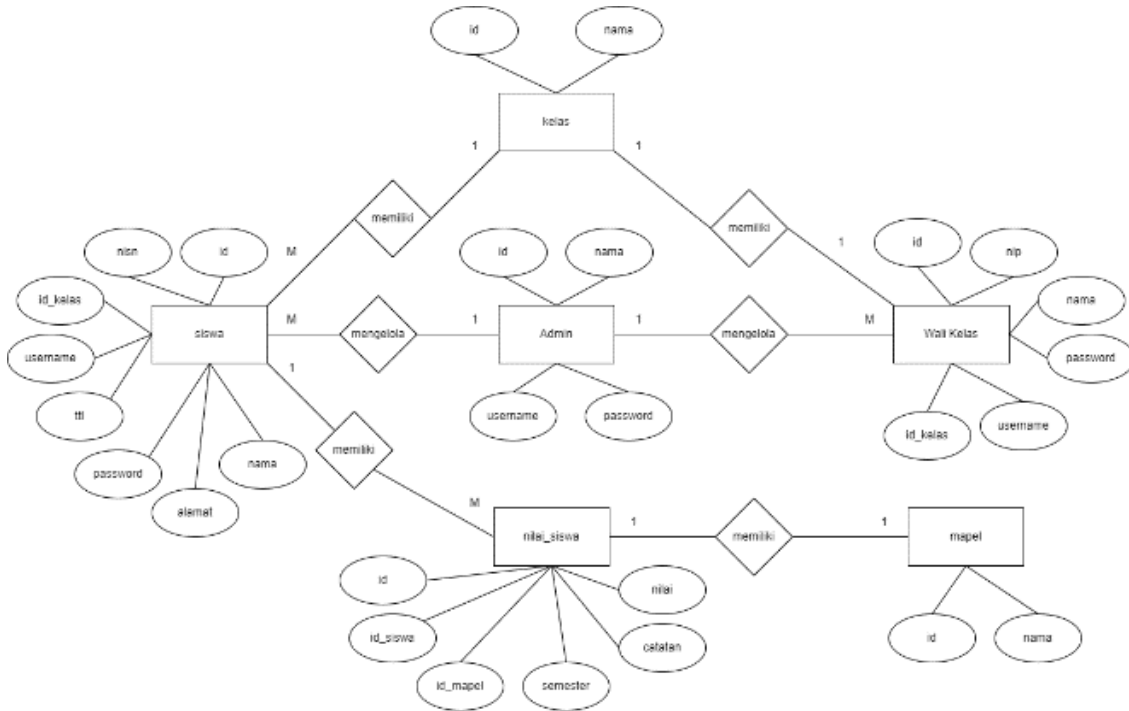


Figure 2. Entity relationship diagram

An entity Relationship Diagram is a design of the relational database. Where in this system several tables are related, namely admin, kelas, wali kelas, siswa, nilai_siswa, and mapel. Figure 2 shows the entity relationship diagram in this research.

System Interface Implementation



Figure 3. The home page

This page is the first page when the user accesses the website. This page is accessible to all types of users. Here the user can choose to log in as a student, admin, or homeroom teacher. Figure 3 shows the home page in this research.

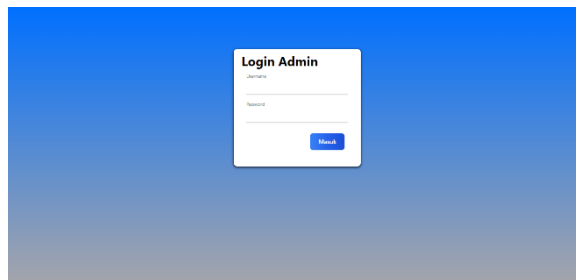


Figure 4. The login page

To be able to access the features on the website, The user is required to log in first by filling in the username and password. Figure 4 shows the login page in this research.

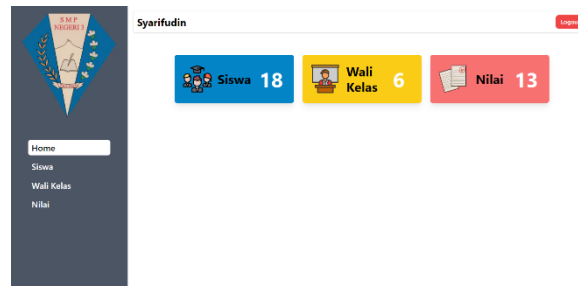


Figure 5. The dashboard page

The dashboard can only be accessed by admin and homeroom-type users. In the admin user type, the grade feature cannot be accessed because it is not the authority it has, deactivating the button to the grade page so that it cannot be accessed by the admin user type. On the contrary, the homeroom user type cannot access student and homeroom features. Figure 5 shows the dashboard page in this research.

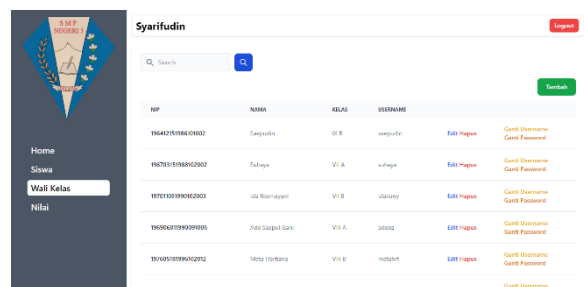


Figure 6. The homeroom user

This page is used to manage homeroom data which can only be accessed by the admin user type. Here the admin can add, delete, edit, and search for homeroom data. Figure 6 shows the homeroom user in this research.

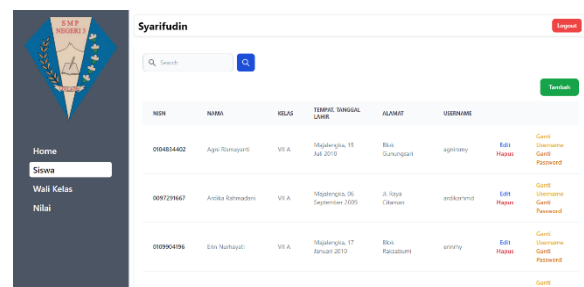


Figure 7. The student data page

This page is used to manage student data which can only be accessed by the admin user type. Here the admin can add, delete, edit, and search for student data. Figure 7 shows the student data page in this research.

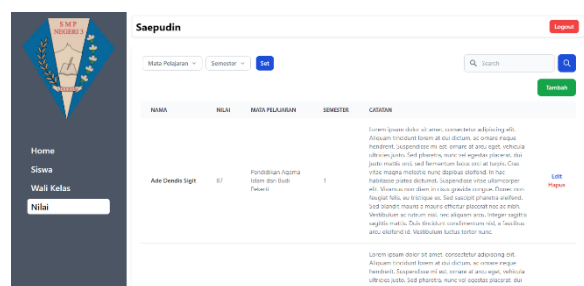


Figure 8. The student score page

This page is used to manage data on student scores from certain classes taught by the homeroom teacher concerned and can only be accessed by homeroom teacher user types. Here the homeroom teacher can add, delete, edit, and search for student grade data from the class he/she oversees. Figure 8 shows the student score page in this research.



Figure 9. The display grades page

This page can only be accessed by student user types which are used to display the grades of these students each semester. Figure 9 shows the display grades page in this research.

Testing

Table 1. The results of Black box testing

Num	Scenario	Test Case	Expected Result	Test Result
1	All buttons on the landing page can be pressed and go to the login page according to the role.	Press the "admin" button	Navigate to the admin login page.	According to expectation
2	Do not fill in any or all of the input fields in the login form and then press the login button.	Username: admin Password: (empty)	The system will give a warning on fields that are not filled.	According to expectation
3	The user enters the wrong username or password and then presses the login button.	Username: admin (correct) Password: 123 (wrong)	The system will deny user access and display an alert "Incorrect username or password!".	According to expectation
4	The user enters the correct username or password and then presses the login button.	Username: admin (correct) Password: admin123 (correct)	The system receiving user access then displays a page according to the type of user.	According to expectation
5	Displays the sum of all data from each table in the database.	Students data in the database: 16	Displays the number 16 in the place named student.	According to expectation
6	Only certain buttons can be pressed by certain types of users.	User type: admin	Can press the student and homeroom teacher buttons but cannot press the grade button.	According to expectation
7	Buttons on the dashboard that can be pressed by certain types of users can access the intended page.	User type: admin Press the "student" button	A button can be pressed then will navigate to the student page.	According to expectation
8	Displays the desired data according to the keywords in the search and presses the search button.	Keyword: Ade (is in the database)	Data with the name "Ade" in it will be displayed.	According to expectation
9	Add student data where the username already exists in the database.	Username: adityarizn (already exist)	Adding data fails and displays an alert "username already registered".	According to expectation
10	Add student data with a username that has not been registered.	Username: aditns (has not registered)	The addition of student data is successful and will redirect to the page to view student data.	According to expectation
11	Replace the student username with the registered username.	Username: adityarizn (already exist)	Changing the username failed and displays the alert "username already registered".	According to expectation

12	Replace the student username with a username that has not been registered.	Username: faizrz (has not registered)	Change username is successful and will be redirected to the page to view student data.	According to expectation
13	Pressing the delete button will delete the desired data.	The delete button is pressed on the data named "Adi"	Data with the name "Adi" will be deleted from the database and will not be displayed.	According to expectation
14	Displays the desired data according to the keywords in the search and presses the search button.	Keyword: Saiful (is in the database)	Data with the name "Saiful" in it will be displayed.	According to expectation
15	Add homeroom teacher data where the username already exists in the database.	Username: agnarzk (already exist)	Adding data fails and displays an alert "username already registered".	According to expectation
16	Add homeroom data with a username that has not been registered.	Username: lilisrhy (has not registered)	The addition of homeroom teacher data is successful and will redirect to the page to view homeroom data.	According to expectation
17	Replace the homeroom teacher's username with the registered username.	Username: adityarizn (already exist)	Changing the username failed and displays the alert "username already registered".	According to expectation
18	Replacing the homeroom teacher's username with a username that has not been registered.	Username: farasdt (has not registered)	Changing the username is successful and will redirect to the homeroom teacher data viewing page.	According to expectation
19	Pressing the delete button will delete the desired data	The delete button is pressed on the data named "Saiful"	Data with the name "Saiful" will be deleted from the database and will not be displayed.	According to expectation
20	Displays the desired data according to the keywords in the search and presses the search button.	Keyword: Ade (is in the database)	Data with the name "Ade" in it will be displayed.	According to expectation
21	Set the semester and or subjects in the search then press the set button.	Semester: 1 Subject: Bahasa Inggris	Displays only semester 1 data and English subjects only.	According to expectation
22	Add grades with student names that are not registered in student data.	Name: Fajar Sadboy (not exist)	Data failed to be added and displays an alert "Student not registered!".	According to expectation
23	Add grade to the name of the student registered in the student data.	Name: Ade Dendis Sigit (exist)	The data is successfully added and will be redirected to the page to see the grade data.	According to expectation
24	Pressing the delete button will delete the desired data	The delete button on the name "Ade Dendis Sigit" and English subjects was pressed	Data with the name "Ade Dendis Sigit" and English subjects were successfully deleted.	According to expectation

Table 1 shows the results of black box testing. Researchers have carried out black box testing using Boundary Value Analysis. The test table above depicts several thoroughly tested scenarios to obtain true values. The test results show that all the 24 scenarios tested succeeded as expected. Thus, the final test results show that the application functions optimally, reaching a performance level of 100%.

CONCLUSION

From the discussion that has been done, we conclude that using a web-based grade processing system will make the processing of student grade data tidier and more structured. With this system, it is also possible to make report card grades transparent which can be seen by students. This system still has deficiencies in its features, it cannot print student scores and the user can only type the student's name but cannot select

the student when it wants to add grades. For further research, the authors hope to correct deficiencies in this system.

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