
The Design of a Information System of Student Attendance Recording with RESTful Web Service Architecture in SMK Batik 2 Surakarta

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ABSTRACT

Student attendance is one of the important aspects of the education process to assess the level of discipline of students and be an indicator of whether students need specific guidance related to attendance. This research aims to design a web-based information system with RESTful web service architecture to help teachers activities for checking student attendance and recapitulation of data recording with more easily. This research uses the methods of research and development (R&D) and implemented at SMK 2 Batik Surakarta. System development method used in the information system is the Waterfall Model. The steps of the Waterfall Model consist of analysis, design, code, and test. The result of this research is the feasibility of the system based on the results of testing on the aspects of functionality yielded a value of 1 (good) while on the aspects of usability obtained percentage amounting to 81.47% (very high), so it can be inferred that This system is worth to use.

Keywords: student attendance, web-based information system, web service, RESTful

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1. INTRODUCTION

Student attendance is one of the important aspects of the process of teaching and learning. Information about student attendance is a reference for the teacher to assess the level of discipline of students and evaluate the satisfaction of student against the subjects taught. In addition, the data can also be used as an indicator to see if there are students who have problems in attendance and need to get special guidance. Therefore, it takes a good oversight in checking for the student attendance.

But unfortunately, most educational institutions are still used the manual method in recording and storing information about student attendance. Likewise, the student attendance recording system was implemented in SMK Batik 2 Surakarta. This system is less efficient because it takes times and the fee for the provision of book records the presence should always be provided with each new school year for every teacher, every subject, and every grade. The data also be less accurate because it was done manually so there is a possibility of human error as an error entering data, the data is scattered even lost. In addition, there is a lso difficult to do data search process much less time searching old data. This process also assessed less effective because of the time consuming when done the process of management and recapitulation data to achieve the benefits of recording has been explained before.

There's a lot of recording system that already developed by utilizing the latest technology for the sake of process a more accurate data management such as the utilization of RFID (Radio Frequency Identification), QR Code, Fingerprint scans, etc. With the help of these tools, the process of recording can be carried out more efficiently and practically, where attendance data automatically been centralized and input into the system and can be managed in real-time.

However, to implement that system, schools need to invest more funds for procurement of facilities and new technologies. It is finally used as an excuse by the school for not taking advantage of these technologies and retaining the old system.

Look at this condition, the researcher is encouraged to develop a system of recording digital learners who can help the school to be able to do the process of recording and processing of data in computerized learner attendance. Development of a web-based system is the most appropriate solution to this problem because the process can be more effective, the resulting data is more accurate because it leverages the technology database where data is stored in an integrated, can be accessed through a variety of pathways, as well as not cost that much to do procurement tool. The development of architecture Developed utilizing web service so that the system can be accessed by a variety of good desktop interface, Android, Java, iOS, etc. This technology also allows the system to provide services to parties outside the system to utilize components and information systems so that it can collaborate and developed with other systems. In addition, with this system the information security architecture also became more secure as the data that is sent to the user's device is not the data directly from the database but the data already processed in the form of the information with the JSON format. This information will be used in the data provider like input data, search data, sorting data or recapitulate data. This information may also be processed and presented with a more varied so that it can be used as a supporting device for educators or school to take decisions against the attitude of the learners.

The purpose of this study is to undertake the design of information system of student attendance recording with RESTful web service architecture in SMK Batik 2 Surakarta and to find out the feasibility of information system of student attendance recording with RESTful web service architecture in SMK Batik 2 Surakarta has been designed.

2. RESEARCH METHOD

This research use research and development method with the development model of this information system is the Waterfall Model. The step of Waterfall Model (Pressman, 2001:29) include analysis, design, code, and test. The flow of Waterfall Model steps can be seen in Figure 1:

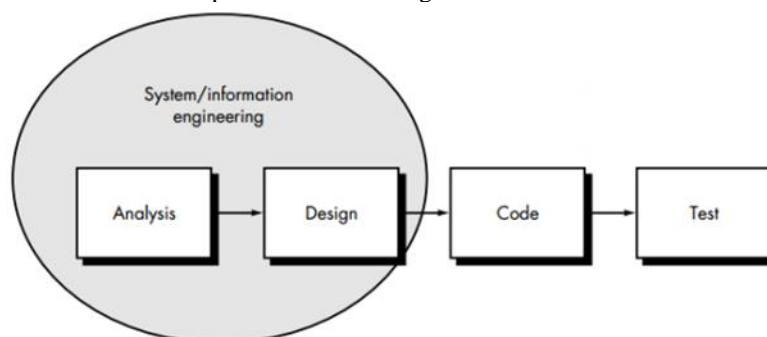


Figure 1. The Steps of the Waterfall Model

Based on Figure 1, the Waterfall Model stages is as following detail:

1. The analysis is the stage that conducts the information collected to understand the needs, behavior, performance, and interface at the system will be created.
2. The design is the stage that conducts the design system by the result of the analysis.
3. The code is the stage of coding to create a system that is by design.
4. The test is the stage of the testing system that was created to measure the level of feasibility.

3. THE RESULT OF RESEARCH AND DISCUSSION

Analysis

This stage is done by the method of interview and literature. The interview method is used to determine the function of the system needs that will be created, while the literature method is used to collect the information that is needed to create the system. The result of these stages is the identification of the needs

of functional and non-functional and also the needs of software and hardware on the system that will be created.

Design

This stage is done by the design of Unified Modeling Language (UML), database, web service, and interface. UML consists of four diagrams: use case diagram, activity diagram, sequence diagram, dan class diagram. Figure 2 below is the design of the use case diagram for this information system.

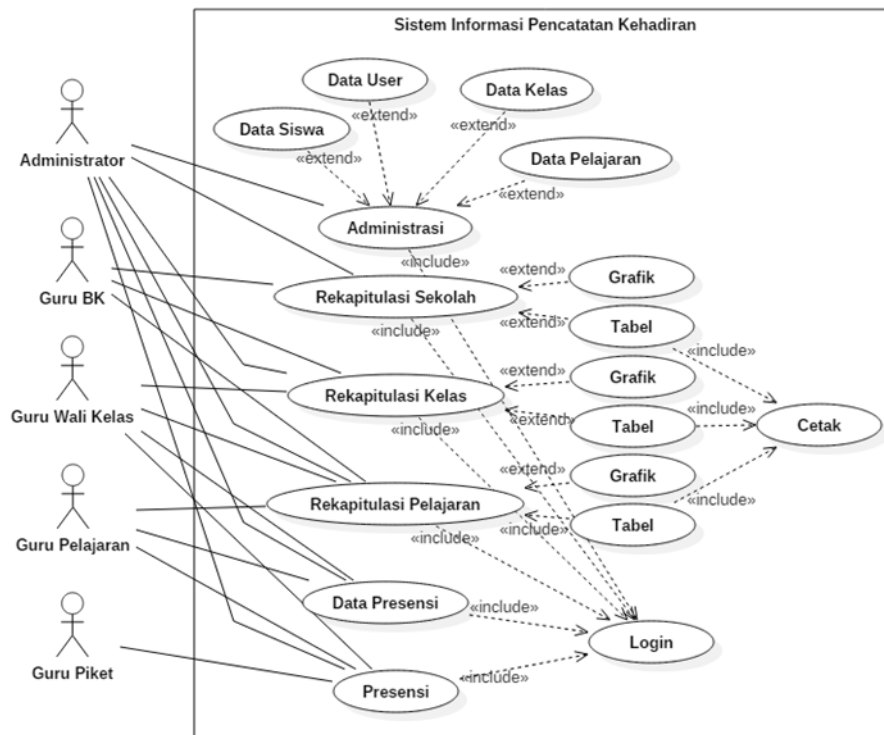


Figure 2. Use Case Diagram

The use case diagram is used to find out the activities that can be done between the user and the system. The diagram above shows that there are five kinds of user with their own activities.

The next step is to create the activity diagram from the use case that has been created. Activity diagram illustrates the workflow of a system or business process. This system has seven activity diagram. Figure 3 below is one of activity diagram that has been created for this information system.

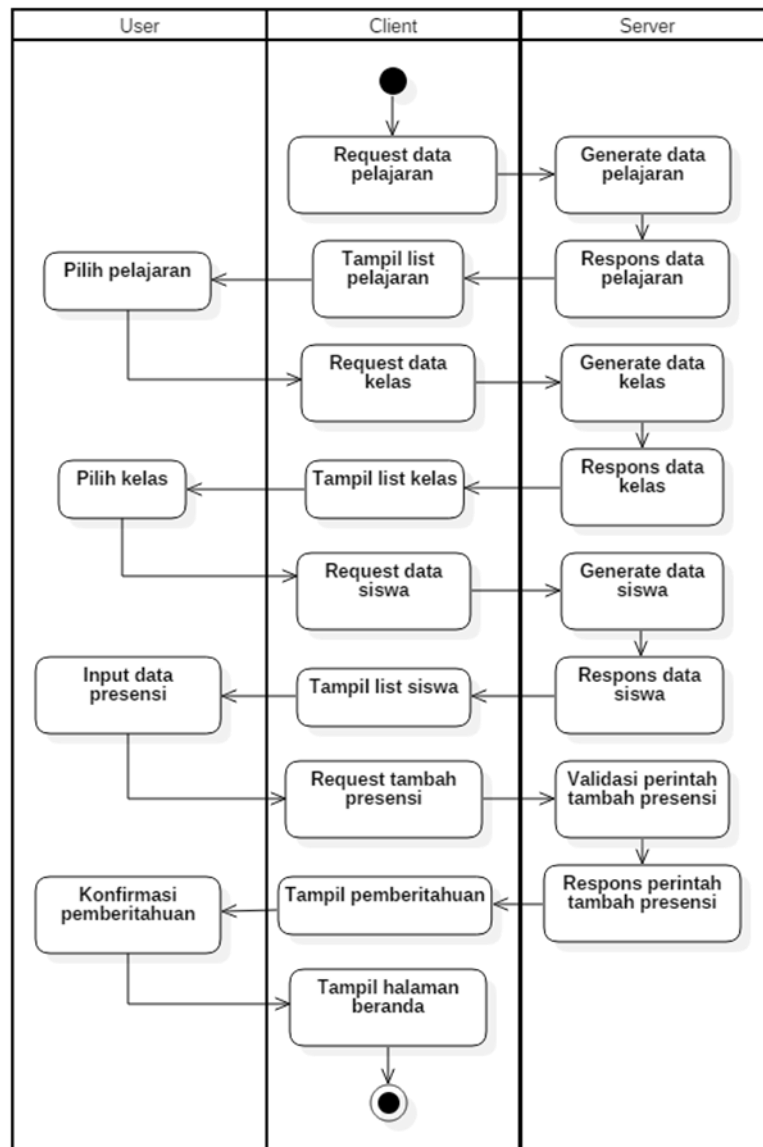


Figure 3. Activity Diagram of Attendance Checking

Database design is needed to map the distribution of data and tables that need to be able to accommodate information from each entity data to be used in the system. At this stage, the design of the database using Entity Relational Diagram (ERD) to describing of each table that will be created, the data type of any of the attribute and how the relationships between the tables to each other. Figure 4 below is an entity relational diagram that has been created for this information system.

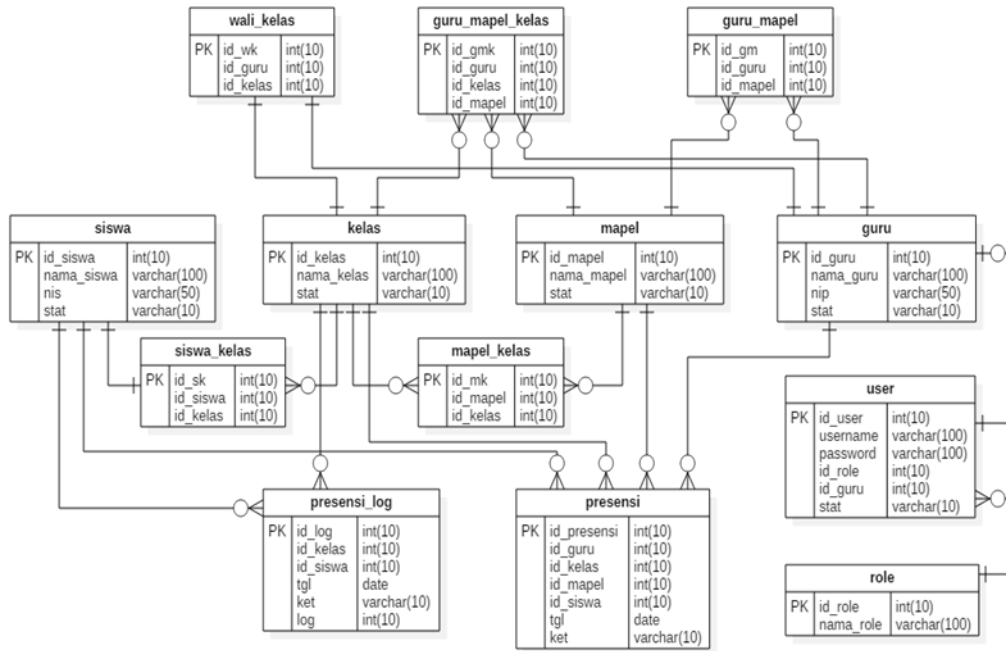


Figure 4. Entity Relational Diagram

This system used architecture RESTful web service for construction of the server-side. Design the web service done several stages: resource identification, mapping Uniform Resource Identifier (URI), and design of response code. Figure 5 below is template URI used by server-side of this system.

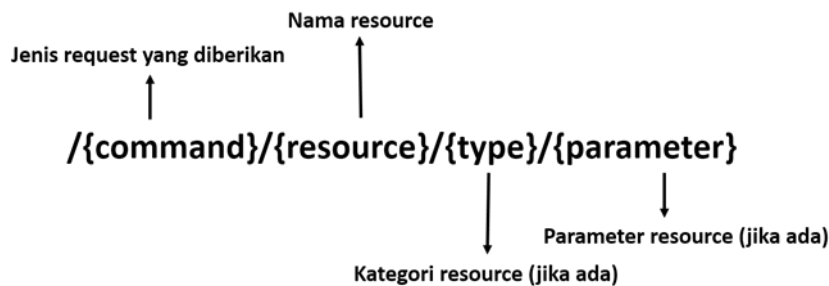


Figure 5. Template URI

The last stage is the design of the interface. The design of the interface needed to give an overview of the system provider will be the guidelines to make the layout and menu tree of the system.

Code

This stage is done by encoding program to create an information system of student attendance recording with RESTful web service architecture that has been designed. In the process of drafting the code done translating design into the code, on the server-side in the form of quiet web services with PHP programming language which uses the Slim framework and for client-side web application form with the JavaScript programming language using jQuery and framework Bootstrap. The display of the main page of creating an information system of student attendance recording can be seen in figure 6.

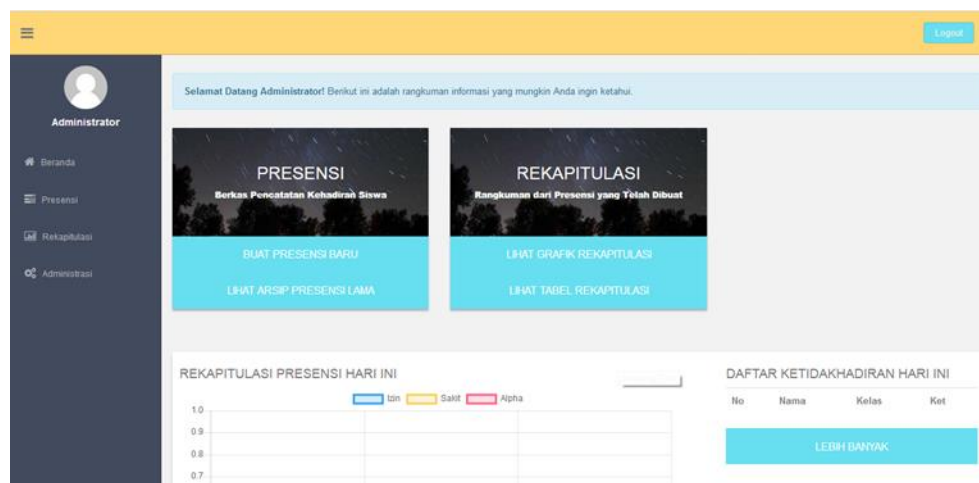


Figure 6. Main page

Test

Testing refers to the standard ISO 9126, however on this research tests conducted limited to just two aspects, namely its functionality and usability. Testing on aspects of the functionality performed by expert system design information, while testing on the aspects of usability is performed by the user, in this case, the user is an administrator, homeroom teacher, subject teacher, etc.

Functionality testing is done using the research instrument based on the needs of the functionality that has been analyzed before and be tested by a Professor in Educational Informatics and Computer Engineering Universitas Sebelas Maret.

Calculation of the testing functionality using the formula from ISO/IEC 9126 as follows.

$$\begin{aligned} A &= \text{function does not work properly} \times \text{number of testers} \\ &= 0 \times 1 \\ &= 0 \end{aligned}$$

$$\begin{aligned} B &= \text{the entire number of functions evaluated} \times \text{number of testers} \\ &= 19 \times 1 \\ &= 19 \end{aligned}$$

$$\begin{aligned} \text{So,} \\ X &= 1 - A/B \\ &= 1 - 0/19 \\ &= 1 - 0 \\ &= 1 \end{aligned}$$

Based on the test results, it can be concluded that $X = 1$ so that the system information meet the aspect of functionality according to ISO/IEC 9126.

Usability testing is done using the research instrument Post-Study System Usability Questionnaire (PSSUQ) developed by IBM. Testing is done to the user in this case teachers who are teaching in SMK Batik 2 Surakarta.

Percentage of the total score can be calculated using the formula:

$$\text{Percentage of the total score} = (\text{number of Total Scores}) / (\text{Maximum Score}) \times 100\%$$

The maximum score is if all respondents answered "strongly agree" (SS) 5. So the maximum score is calculated by:

$$\begin{aligned}\text{Maximum score} &= \text{total number of statements respondents} \times \times 5 \\ &= 10 \times 19 \times 5 \\ &= 950\end{aligned}$$

$$\begin{aligned}\text{Percentage of the total score} &= 774/950 \times 100\% \\ &= 81.47\%\end{aligned}$$

The test results are then converted into scale qualitative thus obtained as a result of "very high" and meet the usability aspect.

4. CONCLUSION AND SUGGESTIONS

Conclusion

Based on the result of research and discussion, it can be concluded that (1) this research produces information system of student attendance recording with the architecture RESTful web service at SMK Batik 2 Surakarta which can be accessed by using a web browser either via a computer or smartphone. In this study, developed information systems to assist the teacher checks and monitoring the student attendance more effectively to detect student who has problems with attendance (2) testing the feasibility of information system of student attendance recording with the architecture RESTful web service at SMK Batik 2 Surakarta is done using standard ISO 9126 on aspects functionality and usability. Testing on functionality produces a value of 1 (good) while on the aspects of usability generate a percentage amounting to 81.47% (very high). Based on the results of these tests are eating can be inferred information system recording learners with the architecture of the web service Developed at SMK 2 Batik Surakarta worthy of use.

Suggestion

Based on the weakness of the product on the final product review, the suggestions that can be given for the next step of development and research are as follows: (1) the need for the design of specific interface on separate servers to manage data in anticipation when the interface from the client-side guilty or not accessing the web service (2) the need for development for the security of the web service authentication credentials such as a user and provisioning tokens when a client device to access the web service. So not all the incoming request to the web service will be served but the only client that includes the token (3) development of an interface for the client side could be developed with other platforms that support the exchange of information with fire like Android, iOS, and so on (4) software testing techniques that are more diverse so that obtained more accurate test results.

REFERENCES

- [1] Doake, C. B. J. (2000). *Object-oriented system development : a gentle introduction*. New York: McGraw-Hill.
- [2] Kadir, A. (2003). *Pengenalan sistem informasi*. Yogyakarta: Andi.
- [3] Rosa, A. S., & Shalahuddin, M. (2015). *Rekayasa perangkat lunak terstruktur dan berbasis objek*. Bandung: Informatika.
- [4] Utomo, D. B. S. (2015). *Pembangunan Model e-Marketing Bersama Tingkat Provinsi dengan Memanfaatkan Web Service*. Universitas Sebelas Maret.