Online SMART-KIR Application with Waterfall Model

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Abstract

The Testing or inspection towards a certain motor vehicle are often referred to as a KIR testing. KIR testing is commonly performed by Dinas Perhubungan, a government agency in carrying out its duties there are many difficulties, especially in processing data such as applicant data, vehicle data, test result data, reports and it takes quite a long time to process. testing process. This study aims to design and build a Motor Vehicle Testing Application in order to facilitate the testing process, data processing and reports. The system development method used is Waterfall. The programming language used is Hypertext Preprocessor (PHP), and the database uses MySQL. The test method uses Blackbox testing. It is hoped that the system built can assist and facilitate vehicle testing activities.

Keywords: *Road Black box testing; KIR Testing; Waterfall; Ministry of Transportation.*

1. Introduction

As According to [1] "Motor Vehicle Testing is a series of testing activities that inspect parts, motor vehicles, coupled trains, outboard trains and special vehicles in order to comply with technical requirements and roadworthiness". In accordance with the Government Regulation of the Ministry of Transportation Articles 48 to 55, LLAJ Law No. 22 of 2009, and Regulation of the Minister of Transportation PM 133 of 2015, the KIR exam is regulated. Periodic Testing is required for all motor vehicles operated on roads, trailers, and mounted trains. Periodic testing of motor vehicles is known as periodic testing [2]. The purpose of the policy is to minimize the occurrence of accidents and air pollution caused by vehicles that are less roadworthy. Routine tests carried out by the government, especially the Ministry of Transportation, are clearly regulated in Law Number 22 of 2009 concerning Traffic and Transportation (PP LLAJ) and discussed in depth in the Regulation of the Minister of Transportation of the Republic of Indonesia. PM Number 133 of 2015 concerning Periodic Testing of Motor Vehicles [3].

Vehicle testing is a crucial aspect in ensuring the safety, efficiency, and performance of motor vehicles on the road. In this modern era, with the increasing volume of vehicles and the complexity of the technologies used, the need for reliable and effective testing systems is even more urgent. One of the methods used to develop this test system is the Waterfall model, which is known as a linear and sequential approach. According to a study entitled "Vehicle KIR Information System at the Pekalongan Regency Transportation Office Based on Android" published in 2019, in the study at the Pekalongan Regency Transportation Office there are several applicants or people who want to conduct a KIR test who do not know the requirements or flow of the KIR test. Therefore, an information system is needed regarding vehicle KIR tests. This system was created to provide information for applicants who are still unfamiliar or still not very familiar with the requirements for submitting tests and levies related to the KIR test. The information system in the study uses a website to access it. In developing the system, the research uses a test method called Blackbox testing and using programming languages Hypertext Preprocessor (PHP) and the database used is MySQL. The system is expected to help and facilitate vehicle testing activities [4]. MySQL is a software that is classified as a DBMS (Database Management System) which is Open Source.Open source states that this software is equipped with source code (code used to create MySQL), in addition to of course its excutable form or code that can be executed directly in the operating system [5].

The Waterfall model, otherwise known as the waterfall model, is one of the oldest software development approaches that is often used in large and complex projects. This model consists of several stages that must be completed sequentially, namely requirements analysis, system design, implementation, testing, and maintenance. Each stage must be completed before the next stage begins, ensuring clear documentation and approvals before moving on to the next step. The application of the Waterfall model in the development of vehicle testing systems, such as carried out by SMART-KIR Online, provides several advantages. First, a well-defined structure ensures that every aspect of the system is thoroughly tested before being implemented. Second, complete documentation at each stage provides clear references and makes it easier to identify and correct errors. Third, this model allows stakeholders to understand the progress of the project through structured stages, thereby minimizing the risk of miscommunication.

SMART-KIR Online, as a platform engaged in vehicle testing, adopts the Waterfall model to develop a comprehensive and reliable testing system. The platform aims to provide vehicle testing services that are not only fast and efficient, but also accurate and compliant with applicable safety standards. Using the Waterfall model, SMART-KIR Online ensures that every component of the test system, from hardware to software, is rigorously tested and validated before it is widely used.

In this context, the research and development of vehicle testing systems using the Waterfall model provides valuable insights into how a systematic and structured development approach can improve the quality and reliability of vehicle testing services. This research will review in depth each stage in the Waterfall model applied to SMART-KIR Online, identify the challenges faced, and the solutions implemented to overcome these challenges. In addition, the impact of the application of this model on the efficiency and accuracy of the vehicle testing process, as well as user satisfaction of the SMART-KIR Online service will also be discussed.

As such, this paper is expected to make a significant contribution to the field of vehicle testing, particularly in the development of test systems based on the Waterfall model, as well as encourage the adoption of best practices in the industry.

2. Research Methodology

In this study, the method used to develop this android application uses the waterfall method (Waterfall), this method implies a systematic and sequential or sequential approach in the development of Android applications. Type [6] Waterfall is one of the SDLC models that is often used in the development of information systems or software. This model uses a systematic and sequential approach. The stages in this model start from the planning stage to the maintenance stage and are carried out in stages. Developers need to know more about how the system development process is if they use the waterfall and also the characteristics of the model waterfall aforementioned [7].

According to [8]in explaining that "the model waterfall also called linear sequence models or classical life flows. The development of the system is carried out in order starting from analysis, design, coding, testing and the supporting stage".
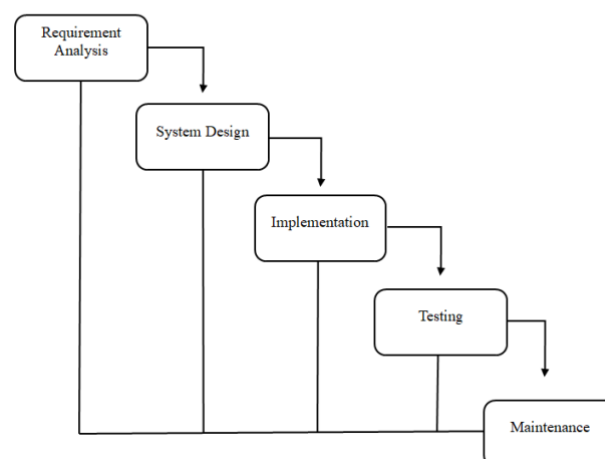
WATERFALL MODEL

Figure 1: Waterfall Method According to Sommerville

Stages of the Waterfall Method

In this study, we use the Waterfall Sommervile version where many improvements and changes include the change of steps from 7 to 5 stages, [9] [10].

In addition to the Waterfall Model, there are also similar techniques, namely Agile or DevOps. Agile techniques are project management techniques that use short development cycles. Alternatively, it can be called a sprint that focuses on continuous improvement in product development or. Agile focused techniques, step-by-step development techniques [11].

The reason for choosing the Waterfall model over other models such as Agile or DevOps. The Waterfall model was chosen because its linear approach allows for complete documentation at every stage, which is essential for projects with clear and stable requirements, such as vehicle testing systems. In addition, the well-defined structure of Waterfall minimizes the risk of changes during the development process.

The following is an explanation of the stages of the Waterfall method in figure 1:

a. Stages of needs analysis (Requirement); The first stage in the waterfall namely preparing and analyzing the needs of the system to be made [12]. In this method, the system, model, design, and software to be used are assessed.

b. System design stages (Design); The second stage in the waterfall method is to create an application design before entering the coding process.

c. Implementation stage; The third stage in the waterfall method is the implementation or translation of the design stage into a programming language through coding. As a result, the application has been created using Mysql databse with PHP programming language

d. Testing stage; The fourth stage in the waterfall method is to test the results of coding carried out in the previous stage. At this stage, the system is tested for errors or damage, not running as desired or bugs in the application.

e. Maintenance stage; The fifth or last stage in the waterfall method is the repair and maintenance of the application.At this stage, the system will be maintained and if there is an update to add features in the program that is made, maintenance is needed or during the running of the system the user finds an error or bug on the website that is created.

3. Result and Discussion

The following is the SMART KIR.CO.ID website:

    a.   Home

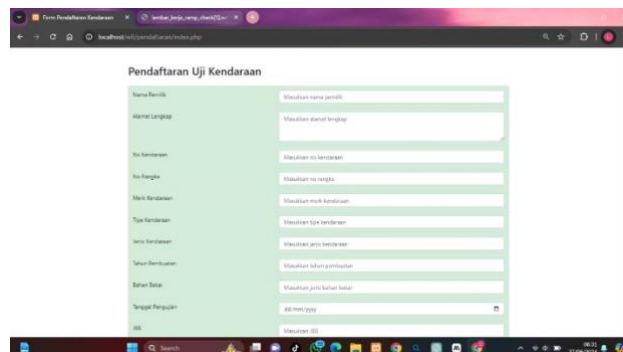**Figure 2:** Main Page View

    b.   Registration

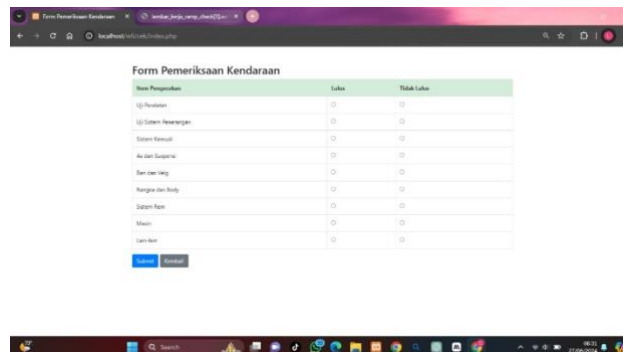**Figure 3:** Registration Menu Display

    c.   Vehicle Check

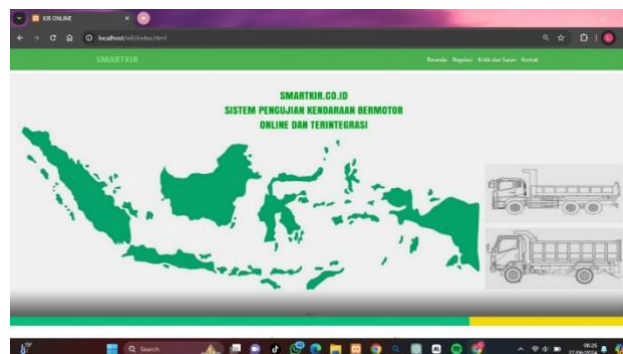**Figure 4:** Vehicle Check Menu Display

    d.   Porch

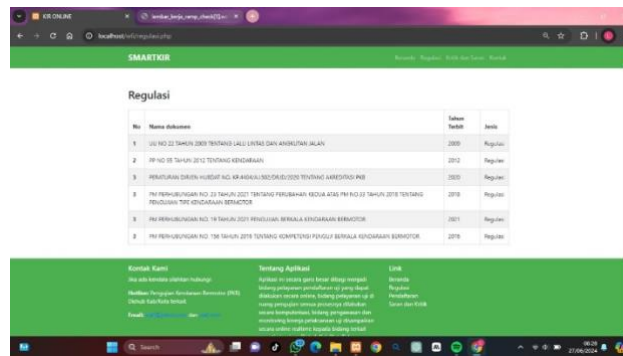**Figure 5:** Home Menu Display

e. Regulation

Figure 6: Regulation Menu Display
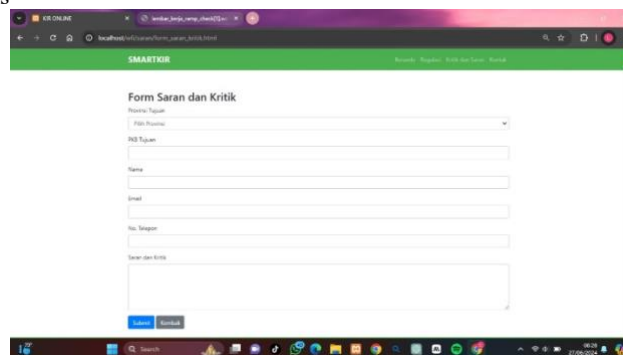
f. Criticism and Suggestions

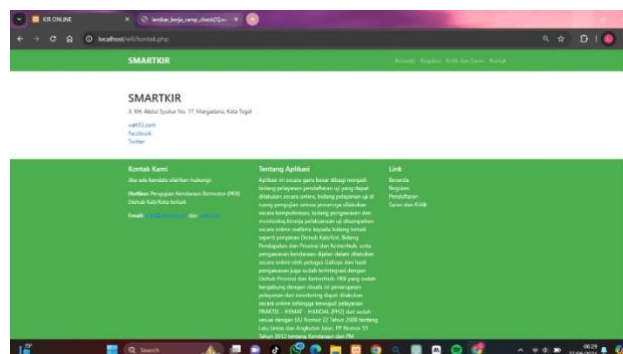**Figure 7:** Criticism and Suggestions Menu Display

g. Contact

Figure 8: Contact Information Menu Display

Black-Box Testing is a software testing technique that focuses on the functional specifications of software. Blackbox Testing works by ignoring the control structure so that its attention is focused on domain information [13].

Testing black box It is a method of designing test data based on software specifications. The test data is executed on the software and then exited the software to check if it is as expected. Sponsor Black Box It can be interpreted as a test that conducts a testing approach to find out whether all software functions have run properly in accordance with the functional requirements that have been defined [14].

Here is the Blackbox test that we use to test the performance of the website we created.

Table 1: Blackbox Test Table

No.	Function	Information	Status
1	Log in to Website	Typing the URL address of a website on google	Successful
2	Home Menu	Pages that display important menu menus including the main page	Successful
3	Vehicle Test Registration Menu	Pages that display Testing and Checking vehicles **Test Procedure:** Enter Personal data and vehicle data	Successful
4	Vehicle Check Menu	A page that displays Vehicle Inspection Form information with several items that have been declared **passed or not passed**	Successful

5.	Regulation Menu	Pages that display vehicle regulations with laws and articles related to vehicle testing from year to year	Successful
6.	Criticism and Suggestions Menu	A page that can be accessed and used by customers to convey their criticism and suggestions to the intended test site for better future	Successful
7.	Contact Menu	Pages that display a number that can be contacted in the event of an emergency such as input failure or non-receipt of a payment.	Successful

4. Conclusion

Based on the research that has been conducted, it can be concluded that the information system in the form of a KIR test check application made for computers can run according to the expected results and in accordance with its function as described in the results of the research and discussion. The application can run smoothly and *the functional tools* can be used as they function. Users can use *the website* by starting from registration to vehicle test checks, and the results can be seen in the form of a database at the *db_kendaraan localphp* link . It is also possible that this system or application can later be further developed to add other functions or features that are further advanced. That way this system can run better, optimally and will be richer in features, for future application development to create an admin *website*, so that it is easy to recap and delete data without going through a localphp link and integrated with the server.

References

[1]   F. Wiyandra, Y., & Yenila, "Expert System for Determining the Quality of Used Vehicles on Bazoka Motorcycles Using the Forward Chaining Method.," 2018.
[2]   A. A. Adityaksa, I. G., Wirdiani, N. K., & Oka, "Design and build a KIR test information system using a waterfall model.," 2023.
[3]   S. A. Yusron and E. Zubaidah, "Penerapan KIR Online Di Kota Pekanbaru," 2024.
[4]   A. Onesis, "Motor Vehicle Testing Information System at the Web-Based Transportation Agency UPTD.," 2018.
[5]   S. and F. H. U. Prahasti, "Aplikasi Pelayanan Antrian Pasien Menggunakan Metode FCFS Menggunakan PHP dan MySQL," 2022.
[6]   H. D. Wicaksono, M. E., & Purnomo, "Android-Based Public Transportation KIR Test Information System Using the Waterfall Method (Case Study: Transportation Agency," 2023.
[7]   A. A. Wahid, "Analysis of Waterfall Method for the Development of Informas System.," 2020.
[8]   U. Firmansyah, Y., & Udi, "Application of the SDLC Waterfall Method in Making a Case Study of Al-Habib Sholeh Islamic Boarding School, Kubu Raya Regency, West Kalimantan.," 2017.
[9]   R. Pressman, "Sofware Enggineering: a Practioner's Approach 7th Edition.," 2010.
[10]   I. Sommervile, "Software Engineering 9th Edition," 2011.
[11]   K. O. S. and A. F. Pakpahan, "Metode Agile Dalam Perancangan Sistem Informasi Reservasi," 2021.
[12]   A. Jayanti, W. E., & Hendini, "Development of Motor Vehicle Testing Software (Tanjidor) with Waterfall Model at the Department of Transportation.," 2021.
[13]   T. S. Jaya, "Application Testing with the Blackbox Testing Boundary Value Analysis Method," 2018.
[14]   A. Fahrezi, A., Salam, F. N., Ibrahim, G. M., Syaiful, R. R., & Saifudin, "Black Box Testing on Web-Based Goods Inventory Application at PT. AINO Indonesia.," *2022*.