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Integration of Motor Vehicle Testing Service System with BLUE Smart Card

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***Abstract*— The integration of the Motor Vehicle Testing Service System in the regions with the application of the Electronic Test Pass (Bukti Lulus Uji elektronik /BLUe) from the Ministry of Transportation is carried out to improve the quality of motor vehicle testing services. The purpose of this application is to support real-time reporting of motor vehicle testing carried out by the Regions to the Center. This application is made partial, it only accepts test result data without an operational system for the testing process, because of that, motor vehicle testing application that is integrated with the application must be provided. This study aims to build a vehicle testing system that can manage test results automatically and is integrated with BLue. The results of this study are based on the implementation process for three months, the real-time integrated testing service system runs well, which is 94,4 %. the factors that affect the value of 5,6% are influenced by the existing infrastructure and manual payment processes. The calculation of the success of this implementation is determined based on the service target which previously reached 60 minutes per vehicle to 30 minutes, the efficiency of using paper is 66,6%.**

***Keywords*— Integration, database, smart card, Motor Vehicle Testing, implementation.**

I. INTRODUCTION

The goal of implementing ICT government is to always have a centralized and updated data source to support appropriate, accurate and fast policy making. The government continues to improve the quality of services by collaborating with local governments to achieve these goals. As in this study, the Ministry of Transportation of the Republic of Indonesia issued a smart card-based BLUe application that must be integrated with regional service applications. The basis for this implementation is the Circular Letter (SE) of the Ministry of Transportation of the Directorate General of Land Transportation Number SE.1/AJ.502//DRJD/2019 concerning changes in the use of proof of passing the periodic test of motorized vehicles, test books, test marks and side signs into cards. test and test mark. Since the enactment of this Circular, the Ministry will no longer provide test books. This is the basis that requires regions to implement BLUe to be able to carry out Motor Vehicle Testing (PKB) services. The BLUe application is an application that processes test results data to be printed on smart cards, electronic certificates and vehicle registration barcodes that can be synchronized at any time with data at the center. From this understanding, the input for the BLUe application is data from operational testing applications in the regions that must adjust to the required data according to the standardization that has been set. This BLUe application will change the KIR method into a barcode form so that this will increase the effectiveness and efficiency of the service process. The main requirement to be able to implement this BLUe application is that the testing body must be integrated.

This research takes a case study at the Badung Regency Transportation Service for Motor Vehicle Testing. The current testing in Badung Regency has used the system in the registration section, inputting test results, printing test books and online reporting. In the previous system, the process of calculating the test results was done manually, then the examiner wrote the test results on the test form and inputted it by the cashier. This semi-computerized process makes the process of testing motor vehicles take a long time. Some of the data structures and data contained in the application do not support the policies of the Ministry of Transportation related to implementing motor vehicle testing services with integrated smart card-based BLUe applications. This new policy also regulates several standardizations such as vehicle type, fuel type, inspection type and inspection item. Previously used applications did not comply with this standard. The application is built on a desktop platform, so its implementation requires installation on the device used. Several cities, such as Yogyakarta, Bandung, Surabaya, Denpasar and several other cities have implemented applications that are integrated with BLUe. Where the operational system they use adapts to the needs and conditions of their respective regions while still following the BLUe standard.

The Ministry gives freedom to the Regions regarding the development of operational applications that can be integrated with the BLUe application according to their respective conditions. Based on this, a Motor Vehicle Testing application was designed and built using the Laravel framework by adjusting the integration needs of the BLUe application. The integration method used in this research is a two-way integration using two databases, namely a database for the operational testing process and a database for printing proof of passing the test which is synchronized in real time with the center. Before the process of printing proof of passing the test in the form of smart cards, certificates and barcodes, data will be synchronized from the Badung PKB application to the local BLUe database. This local BLUe will synchronize data changes at the center and regions at any time. The successful implementation of this system integration is strongly influenced by the internet network because it must synchronize between databases every day or also per transaction. It is hoped

that in the future the operational system in the field, which is integrated in real time with central data, will support the provision of centralized data to support decision making to determine the required policies (Goel et al. 2020). In addition, regions will also have their own data according to what has been sent to the center so if there is a need for integration with Badung Satu Data, this integration development method is very supportive. This application is built using the Laravel framework by considering application security which is in accordance with the results of the Comparative study of PHP frameworks performance which states that web-based applications built with the PHP framework are more secure and stable (Sunardi and Suharjito 2019). Research conducted by Andri Sunardia and Suharjito in 2019 stated that the slim framework is superior to Laravel. In this study, the Laravel framework is used because it has better security and supports database migration and there are more tutorials available, while Slim does not support database migration (Laaziri et al. 2019).

II. RELATED WORK

This research refers to several previous studies that have been conducted, which are described as follows.

In April 2021, research was conducted with the title Development of System Integration for Weighing Implementing Units, Motor Vehicle Testing and Terminals on Single Vehicle Data by Ichsan Wasiso, Kusrini, Mei P. Kurniawan. The result of the research is that data exchange is carried out using JSON. Officers can use this technology to obtain vehicle data quickly and easily from data sources that have been determined by the government so that double vehicle data entry from several units can be trimmed (Wasiso, Kusrini, and Kurniawan 2021).

In 2020 research was conducted with the title Integration of data analytics with cloud services for safer process systems, application examples and implementation challenges written by Pankaj Goel, Prerna Jain, Hans J Pasman, E.N Pistikopoulus and Aniruddha Datta. The result of his research is that a balanced integrated approach including decision support machines integrated with expert knowledge and available information from various key resources is needed to enable more informed policy, strategy and operational risk decision making leading to safer, reliable, and more reliable operations. and more efficient (Goel et al. 2020).

In 2019, a study was conducted with the title A Comparative study of PHP frameworks performance by Majida Laaziri, Khaoula Benmoussa, Samira Khoulji and Mohamed Larbi Kerkeb. The result of the research is that the final web application created by the PHP framework will be more stable and secure. In the same year, research entitled MVC Architecture: A Comparative Study Between Laravel Framework and Slim Framework in Freelancer Project Monitoring System Web Based written by Andri Sunardia and Suharjito was conducted. The results of this study indicate that the slim framework is superior to the Laravel framework using Apache Jmeter (Sunardi and Suharjito 2019).

In 2017 research was conducted with the title Toward integration of Big Data, technology, and information systems competencies into the accounting curriculum by Deb Sledgianowski, Mohamed Gomaa and Christine Tan. The result of this study is to use the Competency Integration lens for the Accounting Education framework to provide examples of Big Data and the integration of information systems into instructional resources (Sledgianowski, Gomaa, and Tan 2017).

III. RESEARCH METHODE

This research begins by determining the system flow and data integration requirements from BLUe and analyzing the flow and data currently being used. The second stage is the design of the integration process and the design of motor vehicle testing operational applications. Followed by operational and integration application testing.

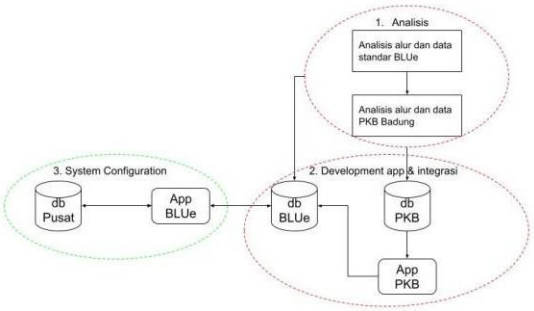

Fig. 1 Research stage

After the integration process is successful, it is continued with the configuration process on the BLUe application and on the hardware used to print smart cards, certificates and barcodes. In the second stage, the process of checking the value limit received by the BLUe database is carried out in accordance with the provisions for passing motorized vehicle testing from the Ministry.

IV. RESULT

This research begins by determining the system flow and data integration requirements from BLUe and analyzing the flow and data currently being used. The second stage is the design of the integration process and the design of motor vehicle testing operational applications.

A. Network Installation

Network installation at the test building site with a Star computer network topology. Servers are placed in the test building area, then use a switch hub to divide the network into individual locations related to the administration and testing process.

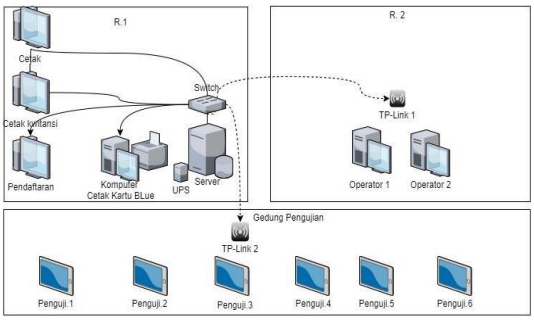

Fig. 2 Networl topology

B. Installed the server

The server is placed in the administrative office of the test building because the BLUe application is a Desktop platform application that will continue to access transaction data when printing test evidence. This causes the Badung server to be unable to use which is located in the Sempidi area which is quite far from the test building, which is ±50 km. The server installation process begins with the installation of the Linux Operating System, then installs the server requirements according to the application to be run. The Badung Motor Vehicle Testing application is placed on a server, where system operations are carried out by accessing the server.

Configure the BLUe application on the device in the Test Building. The BLUe application is installed on the device that will be used to print the results of the test evidence carried out in several stages:

When you first install the ministry's BLUe application, it is necessary to configure data for the synchronization process.

1) Region code
2) Access local database (for testing application select area)
3) Installation printer of certificate
4) Printer Smart Card
5) Connection setup of Card Reader. The Card Reader device functions to read the data of the smart card.
6) Initial Synchronization Process with Central Data (Ministry of Transportation). Initial synchronization is carried out to retrieve all the data needed for the test process as well as the printing of cards and certificates. The synchronized data include Head of Service Data, Area Code Data and Tester Data.

C. Implementation of integration

The processes carried out in this implementation are as follows. There are two processes of integration are local integration between PKB application and database BLUe local. The second integration is database of BLUe local and database of center data at Ministry of Transportation.

D. Evaluation of the integration of the PKB system with BLUe

The process of storing the test results data is carried out by the PKB application which is an application designed and built in this study running well, after being tested the alpha and beta have worked 100%. The output of this application consists of two parts, namely:

1. Test results, where the calculation process based on the standard limit of the test value has been processed automatically by the system. This value is then sent to the BLUe database to be processed for printing test evidence and sent to the center in real time.
2. Reports needed for needs in Badung district and for the Center.

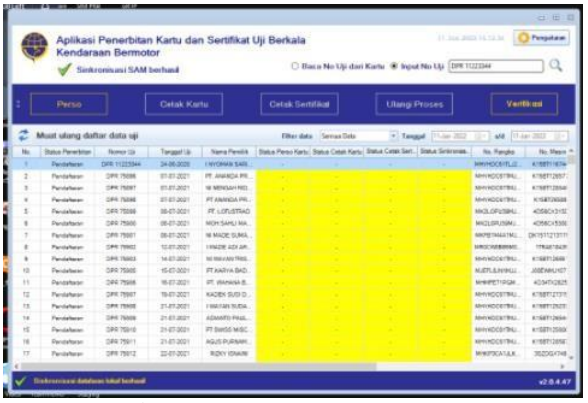

Fig. 3 Result of synchronization application PKB and local BLUe

The evaluation is calculated from the success of synchronizing PKB data with local BLUe, which has been carried out properly. Where during the synchronous process the data can move according to the design.

E. Evaluation of the integration process of local BLUE with central data at the ministry of transportation

Evaluation of the integration process of local BLUe with the central data at the ministry of transportation is taken from data for 90 days the system is used with an average of 75 vehicles per day. The synchronous process is carried out 6750 times. There were 375 times the synchronous process could not be carried out due to network problems during the sync process so that the supporting files from the BLUe application were corrupted. The process of overcoming this problem was carried out for 3 days, starting from coordination, problem tracking and problem solving. From these results, it is obtained that the success of the integration is 94.4% and the failure is 5.6%, which is caused by the network infrastructure.

This network issue was resolved by doing an increase in bandwidth at the test site and now it's working fine.

F. Time efficiency evaluation

Evaluation of time efficiency is calculated from the results of operational testing of services from the registration process to the submission of proof of test results, which is 30 minutes. The process before using the PKB-BLUe system is 60 minutes or more. The indicators that make this process more efficient are:

1. The process of calculating test results is automatic in the system, the tester team only needs to input test result data.

2. The process of white paint on the vehicle is replaced with a barcode printout.
3. The test book has been replaced with a smart card and certificate so that the next test process simply scans the card to see the vehicle data and the test.

TABLE I
STANDARD OPERATIONAL PROCEDURE OF MOTOR VEHICLE TESTING SERVICE

Activity	User	Output	Time
Registration	Operator1	Proof of registration	3 minutes
Visual test	Visual tester	Visual test results	4 minutes
Mechanical test	Mechanical tester	Mechanical test results	7 minutes
Test results	Supervisor	Test pass/fail results	5 minutes
Payment	Cashier	Proof of payment	3 minutes
Synchronization	Operator 2	Synchronization state	1 minutes
Print test results	Operator 3	Barcode printed	7 minutes

G. Paper efficiency evaluation

Evaluation of the efficiency of using paper can be calculated from each process carried out, namely:

1. The registration process is directly inputted into the system by the officer, without using paper. Previously used 2 sheets of paper.
2. Test process directly input to the system without paper. Previously used 5 sheets of paper.
3. The payment process is directly input to the system, previously recorded using 2 pieces of paper, while currently only 1 A5 size paper is enough for proof of payment.

The test evidence before it was a test book has now been converted into a smart card and a test certificate along with a test barcode sticker.

The total amount of paper used per transaction is 9 sheets of paper. After using the system, it only uses 3 pieces of paper, namely proof of payment, test certificate and barcode sticker. Then the efficiency of using paper is 66,6%.

V. CONCLUSIONS

The conclusions that can be drawn based on the results of the above discussion are as follows.

1. The motor vehicle testing application can be well integrated with the BLUe application from the data center at the ministry of transportation. It is obtained that the success of the integration is 94.4% and the failure is 5.6%,
2. The process of synchronizing local data with data centers at the ministry of transportation in real time can be carried out properly.
3. After implementing the system, 50%-time efficiency can be achieved.
4. The efficiency of using paper after system implementation is 66,6 %.

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