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Ionic Framework for Developing Metal Industry Information System

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ABSTRACT: PT Tri SinarPurnama is a metal foundry company that manufactures pipe joints and other products from malleable metal. The research conducted found problems at the time of delivery and checking of goods was done manually, namely the operator checking the suitability of the type and number of goods with the existing packing list. This manual checking obstacle will be overcome by creating an information system for checking goods with an Android-based QR code scan application using the Ionic framework. The results of the system design carried out are able to overcome existing problems so as to facilitate the performance of the operator in checking the goods to be sent to the customer. The application that is built can also inform whether the goods are appropriate or not according to the packing list so that checking the goods is more accurate.

KEYWORDS : ionic, information system, qr code

I. INTRODUCTION

PT Tri SinarPurnama is a metal foundry company in Semarang, Central Java that was founded in 1983, producing pipe joints and other malleable metal products with a workforce of around 1500 people. Pipe joint products are exported to more than 20 countries and are the largest malleable pipe joint manufacturer in Indonesia. PT Tri SinarPurnama is a technology-based company where all transaction activities are backed up by a system. Starting from incoming goods to the production process, a program has been provided where the administration department can update data automatically. The problem that arises is that during the shipping process, the process of checking the goods is done manually, namely the operator checks the suitability of the type and number of goods with the existing packing list. Obstacles in checking manually allow the operator to see the wrong type and size of goods, as well as errors in calculating the number of goods according to the packing list.

II. RELATED WORK

According to a result experiments, calculations were carried out to determine the degree of metal extraction from metallurgical wastewater production. The results are obtained by using a mathematical formula between parameters and functions [1]. The research entitled "Student Attendance System using a mobile QR code" aims to minimize fraud in filling out student attendance lists, streamline the time of Widyatama University students and employees, and reduce errors in student data verification. The system development method used is the waterfall. While the system used is mysql, CSS, Android SDK, Cordova[2]. Another study with the theme "Contact sharing application using QR code for android smartphone" was conducted at PGRI University Yogyakarta. This study develops an application that is expected to simplify the process of sharing contacts and speed up time efficiency used with a reliable android smartphone. The system development method used is a prototype. While the system used is PHP, HTML, CSS, Android SDK, mysql, and Cordova [3]. The next research is entitled "Utilization of QR Code Scanner for Data Viewer Application of Exhibition Collection at Sonobudoyo State Museum Based on Android". The Sonobudoyo State Museum is a unit of the Regional Technical Implementation Office of the Yogyakarta Province Culture Service. Inside the museum, there is already a museum collection management system but only certain people can access the system. Therefore, an application is needed to display information on exhibition collection objects so that visitors get more detailed information about exhibition collection objects. The method used in this research is the prototype method. While the system used is ADT, DVM, Android SDK, XML, SQLite, JSON [4].

The purpose of this study is to develop an information system for checking goods to be sent with an Android-based QR code scan application using the Ionic framework. QR code (Quick Response) is a form of evaluation of the barcode that

we usually see on a product. The QR code is in the form of a black square line shaped like a barcode but with a more compact appearance.

The results of this study are expected to help PT. Tri SinarPurnama to scan the process of checking goods to be sent both export and locally in very large quantities which are currently still being done manually and there is a risk of miscalculation due to the large number of goods to be sent.

III. METHODOLOGY

The Waterfall method is a process of activities from specification, development, validation, and evolution and represents them as separate processes such as requirements specification, software design, implementation, testing, and so on [5].

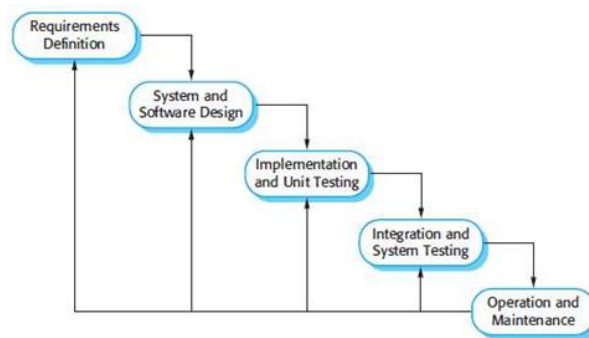


Fig.1. Waterfall Method

The following is an explanation of the stages carried out in the waterfall model as follows :

A. Requirements Definition

In this stage, the service requirements, limitations, and system objectives are defined through consultation with system users so that a search and collection of requirements is carried out in accordance with the system specifications from the user. At this stage also determine the right type of system and can answer problems in the design of the information system scan check goods at PT. Tri SinarPurnama Semarang.

From the results of discussions with the management, several problems were found as follows:

- 1) During the delivery process and the checking of goods is done manually, the operator checks the suitability of the type and quantity of goods with the existing packing list.
- 2) Manual checking constraints allow operators to see the wrong type and size of goods, as well as errors in calculating the number of goods according to the packing list.
- 3) Cases often arise where there is a discrepancy between stock data and physical data of goods, which indicates that the goods sent are not appropriate. This often results in complaints from customers.

From the problems above, an analysis of the previously running manual system was carried out, then the design of an information system for scanning goods checks was carried out using the Ionic framework. The analysis can be seen in table 1 below:

Table 1. Analysis of the running system

No.	Problem	Solution
1.	The process of sending and checking the goods is done manually, namely, the operator checks the suitability of the type and number of goods with the existing packing list.	Designing an information system for scanning goods checks so that the delivery process and checking goods can be done automatically through the method of scanning goods using a QR code.
2.	Obstacles in checking manually allow the operator to see the wrong type and size of goods, as well as errors in calculating the number of goods according to the packing list.	By using the goods check scan information system, the manual process will be replaced by an automatic process using the scanned goods check method with a QR code.
3.	Cases often arise where there is a discrepancy	Stock data and physical data of goods will

	between stock data and physical goods data indicating that the goods sent are not appropriate. This often results in complaints from customers.	automatically appear as a report for checking goods data because since the initial process a scan of goods checks has been carried out using a QR code system.
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B. System and Software Design

At this stage, the process of allocating the needs of both system hardware and software is carried out by forming the overall system architecture. The design identifies and describes the underlying system abstraction relationships. The activities carried out include designing systems using DFD, ERD, database design, and system interface design. From the analysis carried out the software needed to design an information system for scanning goods checks is shown in table 2 below:

Table 2. System Development Software Requirements

No.	Device Type	Device Name
1.	Operating System	Microsoft Window 732 Bit
2.	Web Server	Apache(2.2.4)
3.	Database Server	MySQL(5.1)
4.	Web Browser	Mozilla Firefox60.0.1
5.	Language Programming	HTML, PHP, JavaScript
6.	Support Apps	MobileApps, QR Code Generator, Cordova barcode scanner, and Sistem Android

The hardware needed in the development of a web-based tour package reservation information system at PT. Tri SinarPurnama Semarang, namely:

- 1) Processor Intel (R) Celeron (R) 2957U @ 1.40GHz 1.40GHz
- 2) Memory (RAM) 2 GB
- 3) 14” LCD Monitor
- 4) Android phones

After analyzing the software and hardware requirements, the next step is to design a system using DFD, ERD, and database design on the interface to be built. A Context diagram is a data flow that serves to describe the linkage of flows in data between the system and the outside. Context Diagram can be seen in Figure 2 below:

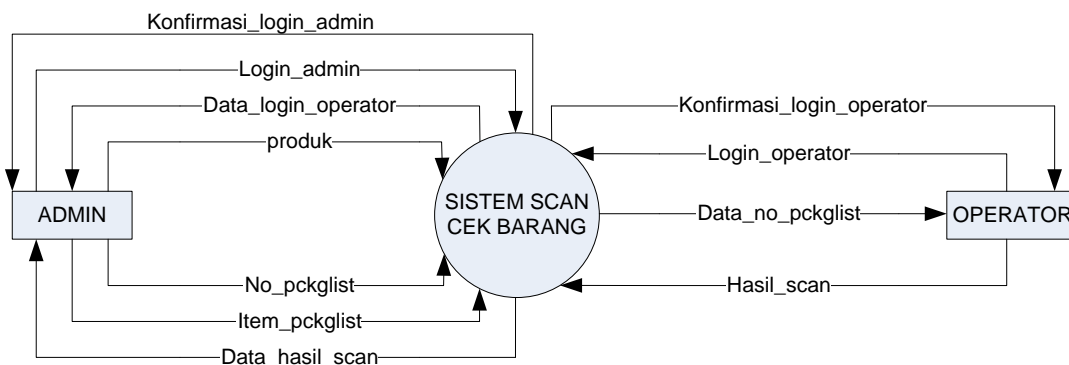


Fig.2. Context Diagram

ERD is used in building a database to describe the relationship or relationship of two files or two tables more systematically. ERD consists of 2 main components, namely entities and relationships. The two components are further described through attributes. The ERD diagram can be seen in Figure 3 below:

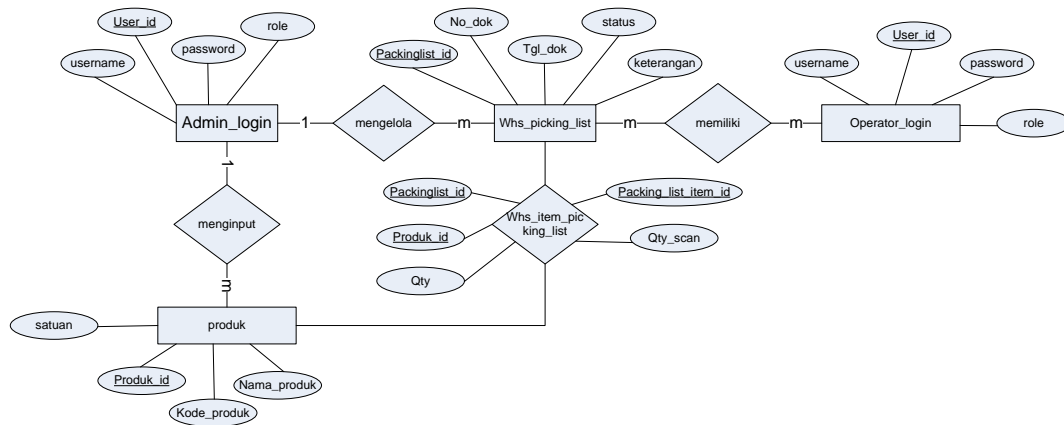


Fig.3. Entity Relational Diagram

Database design is the next stage after the ER diagram design appears. The database is a piece of dynamic information as a place to store data for processing. Database design can be accessed properly by a system [6].

C. Implementation and Unit Testing

This stage is part of realizing software design as a series of programs or program units. Then unit testing is carried out to verify that each unit has been met according to specifications or not. Design and build a scanned goods information system at PT. Tri SinarPurnama using the waterfall method is implemented through the stages of interface design in web page format starting from the login page which is divided into 2 (two) access rights, namely admin and user/operator. The implementation of this software design is built using the Ionic framework.

Ionic Framework is an open-source software development kit used in creating hybrid mobile applications. Built using AngularJS and Apache Cordova. Ionic provides users with all the components, tools, and functions used in the development of native mobile software development tools (SDKs). Developers can design their Apps using the tools and sample code provided by the framework documentation and website help. That installation requires NodeJS and npm which is the built-in package manager for NodeJS, regardless of Windows, Linux, or Macintosh environment. Ionic is a much better platform to use for designing and building apps, because native apps are platform-specific, have their own development tools, are very time-consuming and expensive too. The Ionic framework is devoted to building hybrid mobile applications with HTML5, CSS, and AngularJS. Ionic uses Node.js SASS, AngularJS as its engine. Ionic is equipped with CSS components such as buttons, lists, cards, forms, grids, tabs, and many more. So Ionic is a web technology that can be used to create a mobile application. Because it's a hybrid, the application is only created once but can be released on more than 1 platform aka cross-platform [7].

AngularJS is the next iteration of the AngularJS Framework. Angular JS Framework promises better performance and uses the Typescript programming language for secure programming. While Apache Cordova allows developers to create mobile applications using JavaScript, CSS, and HTML instead of using platform-specific application programming interfaces (APIs) such as those on iOS, Android, or Windows Phone. The other side is platform-independent, using HTML, CSS, and JavaScript. The build process is quite fast and developers have direct API access with Cordova.[7].

D. Integration and System Testing

The implementation is the result of the design that has been done previously and then the integration and evaluation of the system are carried out. System testing is done using the BlackBox method, which is an approach to be able to test every function in a program so that it can run properly. Black box testing is specifically designed to find errors by testing the software interface. The purpose of this test is to determine the usability of the software that has been made by checking whether the input is well received, and the output results are in accordance with what is expected and

ensure that the software that has been developed has the quality and is in accordance with what was previously designed. , namely by presenting the main study of the specifications, design analysis, and coding of the software itself [8].

E. Operations and Maintenance

At this stage, the system is installed and put into practical use. The maintenance phase is carried out by correcting errors that are not found in the early stages of each cycle, in order to improve the implementation of system units and improve system services. At this stage, the system that has been handed over to the user to be prepared and operated as well as maintenance is carried out to make corrections if there are errors or deficiencies.

IV. USER INTERFACE

Admin Login Page. The Admin login page is an implementation of the interface design which contains a header where the admin inputs the username and password. The admin login page can be seen in Figure 4 below :

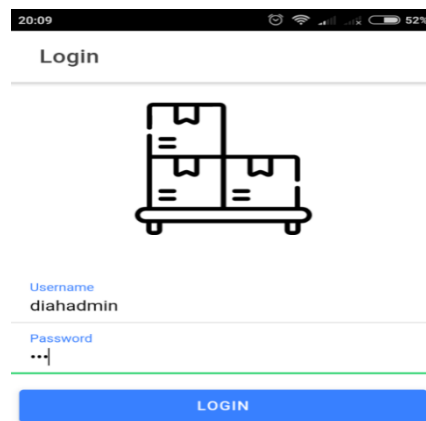


Fig.4. Admin Login Page

Admin Page. The admin page contains a view of the data that will be worked on, those that are running, and those that have been completed. Admin can input packing list data to be done by pressing the (+) button in the upper right corner. The admin login page can be seen in Figure 6 below :

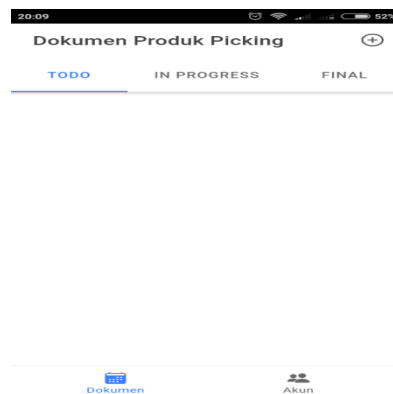


Fig.5. Admin Page

Add Packing List page. On the Add Packing List page, the admin can create a new packing list data by adding products by pressing the (+) button in the upper right corner. The page for adding a packing list can be seen in Figure 7 below :

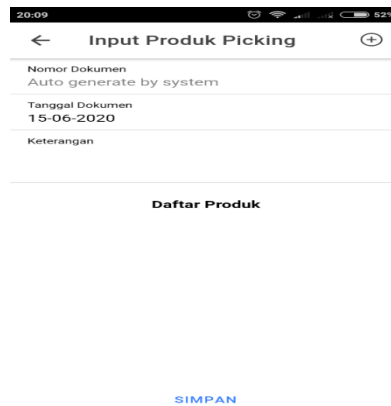


Fig.6. Add Packing List page

Add Product Page. The Add Product page is a continuation of the Add Packing List page. On this page, the admin can add products contained in the database. This product is the content or item in the packing list. The product adds page can be seen in Figure 8 below :

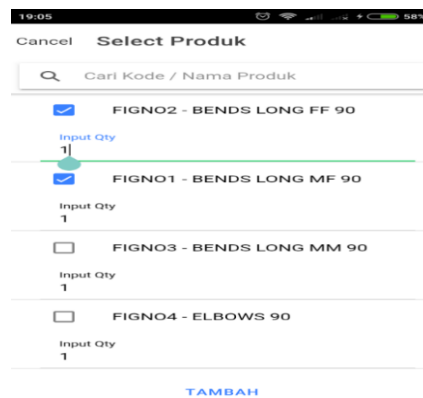


Fig.7. Add Product Page

Packing List Details page. This page contains the product items on the packing list. The packing list detail page can be seen in Figure 9 below :



Fig.8.. Packing List Details Page

Product Scan Page. The product scan page contains instructions to point the camera at the barcode contained on the cardboard sticker of the goods. Automatically if the scan process is successful and fulfills the contents of the packing list, the number of scan results will increase. The product scan page can be seen in Figure 10 below:

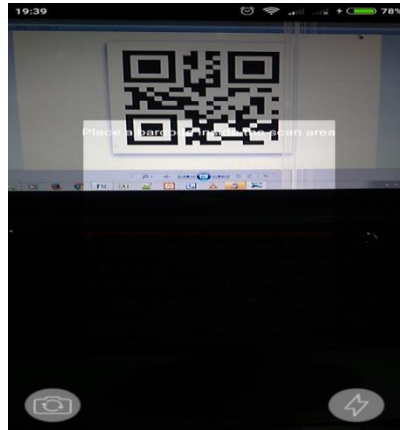
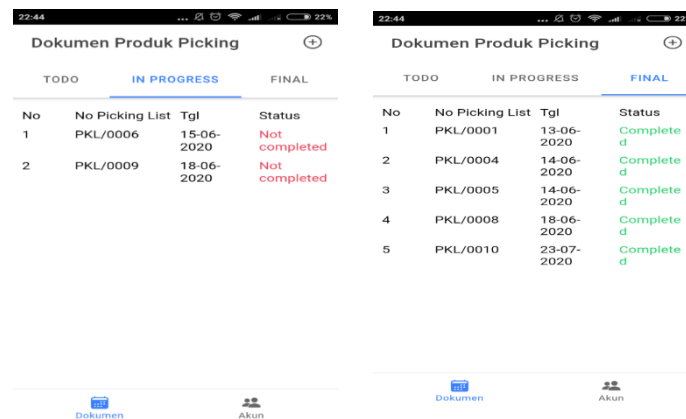


Fig.9. Product Scan Page

In Progress and Final Data Pages. This page contains packing lists that have not been fulfilled and which have been completed by the operator. If the quantity has been met, then the data can be completed and enter on this page. The final data page can be seen in Figure 11 below :



Dokumen Produk Picking			
	TODO	IN PROGRESS	FINAL
No	No Picking List	Tgl	Status
1	PKL/0006	15-06-2020	Not completed
2	PKL/0009	18-06-2020	Not completed

Dokumen Produk Picking			
	TODO	IN PROGRESS	FINAL
No	No Picking List	Tgl	Status
1	PKL/0001	13-06-2020	Completed
2	PKL/0004	14-06-2020	Completed
3	PKL/0005	14-06-2020	Completed
4	PKL/0008	18-06-2020	Completed
5	PKL/0010	23-07-2020	Completed

Fig.10. In Progress and Final Date Pages

V. CONCLUSION

Based on the waterfall stages using the Ionic framework on the information system scan check goods at PT. Tri SinarPurnama Semarang, has produced a system that makes it easier for operators to check goods to be sent to customers. This is proven by the following achievements:

- The operator no longer checks the goods manually by looking at the packing list paper, but only selects the packing list number in the application on the provided android cellphone and checks by pointing the cellphone camera at the QR code sticker found on the goods box. The way the system reads the packing list is by entering the packing list data into the database which is used as a reference for the process of scanning goods.
- This Android-based PT Tri SinarPurnama Semarang Goods Check System application can inform whether the goods are suitable or not according to the packing list. So, checking the goods will be more accurate. In addition, if the goods



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do not meet the amount on the packing list that has been made, then the process of scanning the goods on the system cannot be completed.

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