

Goods Inventory System Using Visual Basic.Net at PT. Mitra New Grain with Waterfall Method

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Abstract - This research is motivated by the process of making raw material inventory stocks that still use paper and have not been connected to the database. The problems that arise in the company are regarding the stock of goods, the process of reporting incoming and outgoing goods is still by handwriting which results in calculation errors and differences between physical data and record data. The design of this raw material information system uses the Visual Basic.Net programming language and SQL Server as a database. The system development model used is the waterfall model, analysis and design using diagrams contained in UML. While data collection techniques use research methods by means of observation, interviews, and literature studies. The purpose of this research is to design a raw material inventory information system that can support all incoming and outgoing inventory activities in the company. The result of this research is a desktop-based inventory system application that can assist in processing inventory data and reporting data.

Keywords - Inventory, Raw Materials, Waterfall Method

1. INTRODUCTION

Inventory is an activity that is needed for every business actor, because inventory is a stock of needs that will be used for production activities, inventory is also generally in the form of certain goods or certain sub-resources in an organization for the needs of the company's product output [1]. By adopting technology companies can speed up production time, optimize inventory management, delivery and also improve overall operational efficiency. Besides that, technology also has challenges in managing data effectively, ensuring data security and also developing the necessary technological capabilities, so companies must prepare themselves well and continue to innovate to stay competitive in an increasingly competitive market[2].

One of the supporting factors for the ongoing business process is to have an inventory system. With the inventory system the company can calculate the number of incoming goods, outgoing goods, and the final inventory of stock items. Calculations related to goods take quite a lot of time, accuracy, and energy because calculations are carried out per item. The process of calculating goods manually can result in errors and inaccuracies in calculations due to employee fatigue in the calculation process [3].

The company that is the object of research is PT Mitra New Grain which is engaged in the manufacturing industry. The company produces wheat flour premixes for bread making mixes. Based on the data obtained, the process of processing inventory data at PT Mitra New Grain has not been computerized because it still uses a book where when there are goods in and out the operator will write them in a book. Then if you are going to do stock-taking, the operator will see and calculate from the book of incoming and outgoing goods to find out the final stock of goods. After calculating it, the operator will check the physical data in the warehouse. Such a process is less effective because the operator sometimes miscalculates so that the data is not the same as the physical data and must repeat it from the beginning.

From the above problems, the authors have a review of studies in journals whose problems and discussions are almost the same as the problems the authors get, including in the previous research journal from William Renault, et al with the title "Application of Spare Parts Warehouse Administration of PT Lasallefood Indonesia Based on Desktop" which discusses frequent errors in each recording due to data entry requiring a long time, and data storage has not used database files [4].

The author creates a desktop-based system to facilitate the processing and storage of data on incoming goods, outgoing goods, and final stock of goods. The author uses the waterfall method to describe a systematic and sequential approach to software because it has a clear flow, which makes the project work more detailed.

Based on the background described above, the authors decided to conduct research entitled "Goods Inventory System Using Visual Basic.Net at PT. Mitra New Grain with Waterfall Method".

2. RESEARCH METHOD

This research was conducted using two methods, namely data collection and software development methods:

2.1 Data Collection

2.1.1 Interview

In this data collection method, the author conducted interviews with employees of PT Mitra New Grain to find out data related to the title.

2.1.2 Field Observation

Observation in this study was carried out prior to data collection, namely to observe the ongoing warehouse process at PT Mitra New Grain. This is used for consideration in building an inventory system.

2.1.3 Literature Study

This study is used as a comparison or to support information related to research problems. This technique is used to complete the data in order to analyze the problem being studied. In this case, it mainly concerns the problem of application-based data processing of goods. The following are some of the literature reviews that the author uses:

1. First Journal Literature Review

Research conducted by Feri Prasetyo, Agus Dendi Rahmatsyah and Rizal at Warehouse PT. Two Win (2022) ISSN: 2503-054X with discussion The inventory system for goods accessories in the warehouse of PT.Two Win Indonesia is still manual in nature, including recording and calculating incoming and outgoing accessories data on paper media which is then recapitulated into Microsoft Excel, this can result in mismatching the recording of incoming and outgoing goods accessories data with data entry. The results of this research are Making Desktop-based Electronic Goods Accessories Inventory Application with the application of the Waterfall method[1].

2. Second Journal Literature Review

The next research was conducted by Muhammad Faisal in 2019 Journal Infotech, Vol 1 No.1 Juni 2019 E-ISSN: 2715-8160 with a discussion of the procurement of goods such as work equipment, chemicals, fragrances, and tissues in the implementation of Housekeeping, which currently still runs manually. The results of this study are the creation of a desktop-based Housekeeping Inventory Application using the waterfall method[5].

3. Third Journal Literature Review

Research conducted by Eni Pudjiarti, Eka Puspitasari and Aprillia Ananda Septyawati (2019) Vol 04 No. 02 Jusikom. With discussion of the problem is that the inventory system has not been well computerized. Still using paper media to record every transaction that occurs in the company. As a result, there are often errors in working on reports due to the loss of inventory data and proof of transactions. As for the design of the application uses the VB 6.0 programming language and the application development method is carried out using Waterfall method. The result of this research is a desktop-based information system on inventory of goods at PT Ultra Sakti which is already desktop-based[6].

2.2 Software Development Method

The method used in the development of this software uses the Waterfall model. The waterfall method is often called the classic life cycle, where it describes a systematic and sequential approach to software development, starting with the specification of user requirements and then continuing through the stages of planning, modeling, construction, and delivery of the system to customers / users (deployment), which ends with support for the complete software produced [7].

The stages of the waterfall method can be seen in the figure below [8]:

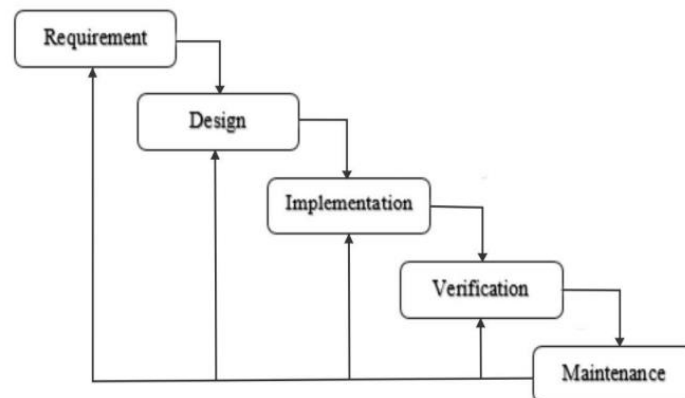


Figure 1. Waterfall Method
(Source: Pressman, 2012)

1. Requirement

At this stage, system developers need communication that aims to understand the software expected by users and the limitations of the software. Information can be obtained through interviews, discussions or direct surveys. The information is analyzed to obtain the data required by the user.

2. Design

At this stage, developers create a system design that can help determine hardware and system requirements and also help in defining the overall system architecture.

3. Implementation

At this stage, the system is first developed in small programs called units, which are integrated in later stages. Each unit is developed and tested for functionality which is referred to as unit testing.

4. Verification

At this stage, the system is verified and tested whether the system fully or partially meets the system requirements, the verification can be categorized into unit testing (done on specific modules of code), system testing (to see how the system reacts when all modules are integrated) and acceptance testing (done with or on behalf of the customer to see if all customer needs are satisfied).

5. Maintenance

This is the final stage of the waterfall method. The finished software is executed and maintenance is performed. Maintenance includes fixing errors that were not found in the previous steps.

3. RESULTS AND DISCUSSION

3.1 Theoretical basis

The results of the analysis of the system that runs on the proposed new system design, the authors carried out the implementation in this study. And the following is a sub-chapter regarding the results and discussion of the goods inventory system at PT Mitra New Grain "Goods Inventory System using Visual Basic.Net at PT Mitra New Grain with the Waterfall Method", namely:

1. Create an inventory application for data processing of goods.
2. Create an inventory application to facilitate the search for stock items used for stock-taking.

3.2 Analysis

3.2.1 Running System

To describe the procedure and explanation of the flow of data from the system that is currently running, therefore I made, what is the process flow of the activity and who are the actors involved in it. The following is a flowmap of the running system:

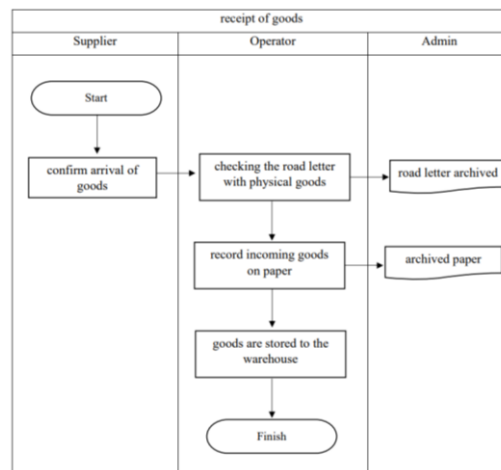


Figure 2. Running System

3.2.2 Proposed System

This proposed system procedure is to improve the process of making inventory reports to be better by implementing a new system[9].

After seeing the current system, the researchers have a system that is considered more effective in processing goods data. The following is a flow chart of the proposed system:

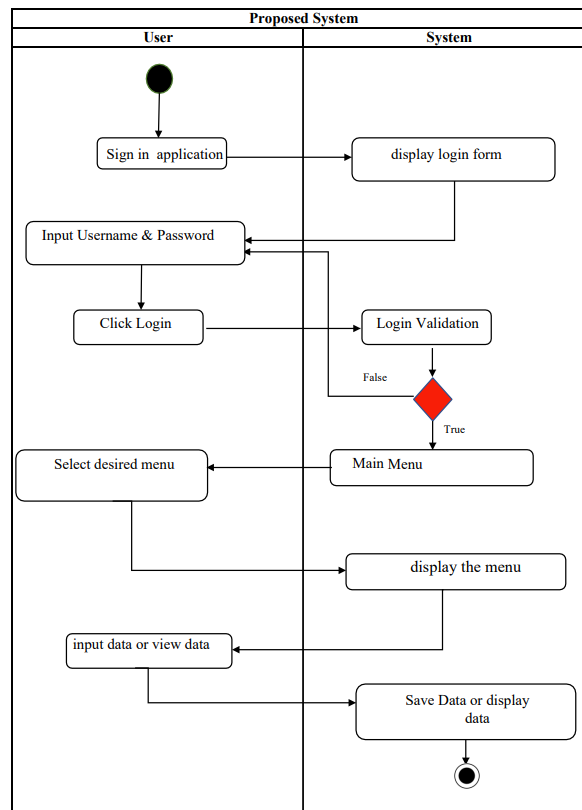


Figure 3. ProposedSystem

3.2.3 System Requirements Analysis

System requirements analysis is an activity carried out to describe user needs related to the information system to be built or developed [10].

3.1.1 Functional Requirements

The type of functional requirement (functional requirement) is a requirement that contains what processes will be carried out by the system. Functional requirements also contain what information must exist and be produced by the system[11].

- a. Perform Login
- b. Can add, edit and delete incoming goods or outgoing goods
- c. Display incoming goods data
- d. Displaying the use of goods
- e. Displaying stock cards

3.1.2 Software

- a. The operating system used is Microsoft Windows 10 Professional
- b. Microsoft visual basic.Net code editor application to process data and write program code.
- c. SQL Server is used to process the database.

3.1.3 Hardware

- a. PC (Personal Computer) or laptop
- b. Keyboard and Mouse
- c. The processor used is Intel Core i5 1.9 Ghz
- d. RAM with a size of 8GB
- e. Hard Disk with a size of 500GB

3.3 Design

3.3.1 Use Case Diagram

Use case is a relationship between one or more actors with the information system that we will create. Use cases are also used to find out what functions exist in an information system and who has the right to use that function[12]. Based on the results of the needs analysis conducted by researchers, the use case diagram of the system to be created is as follows:

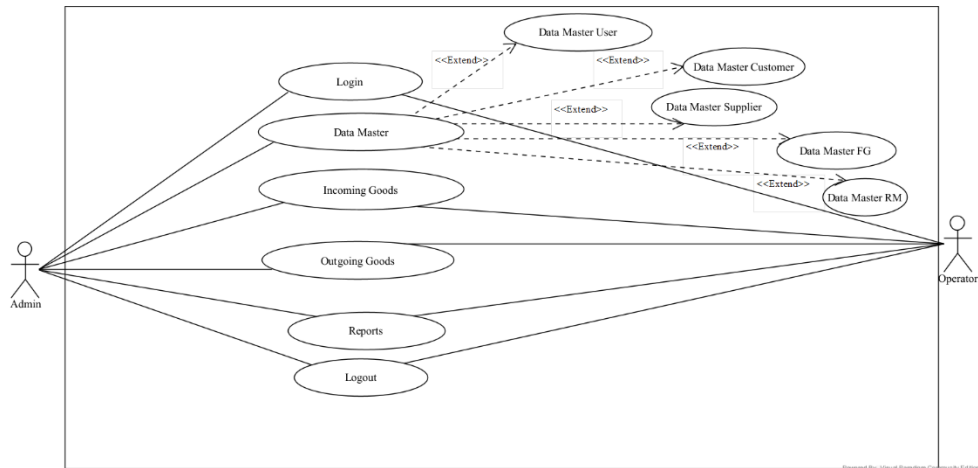


Figure 4. Use Case Diagram

3.3.2 Sequence Diagram

Sequence diagram is one type of diagram in UML that describes object interactions based on time sequence, sequence diagram can also describe the sequence or stages that must be done to be able to produce something like the use case diagram [13].

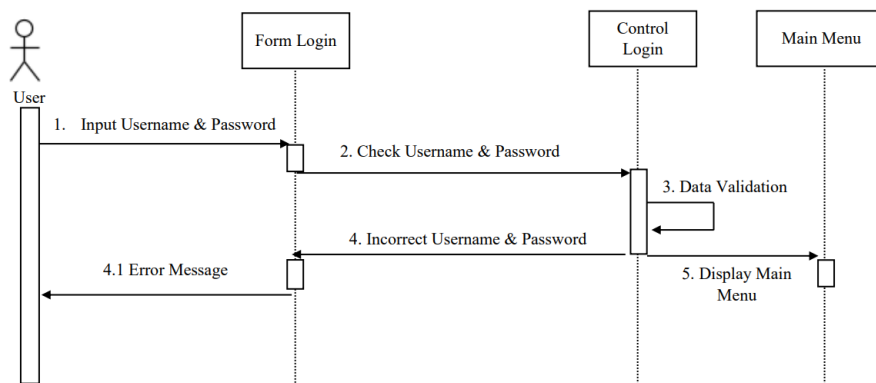


Figure 5. Sequence Diagram

3.3.3 Class Diagram

The class diagram describes the structure of the system in terms of defining the classes that can be created to build the system build the system[14].

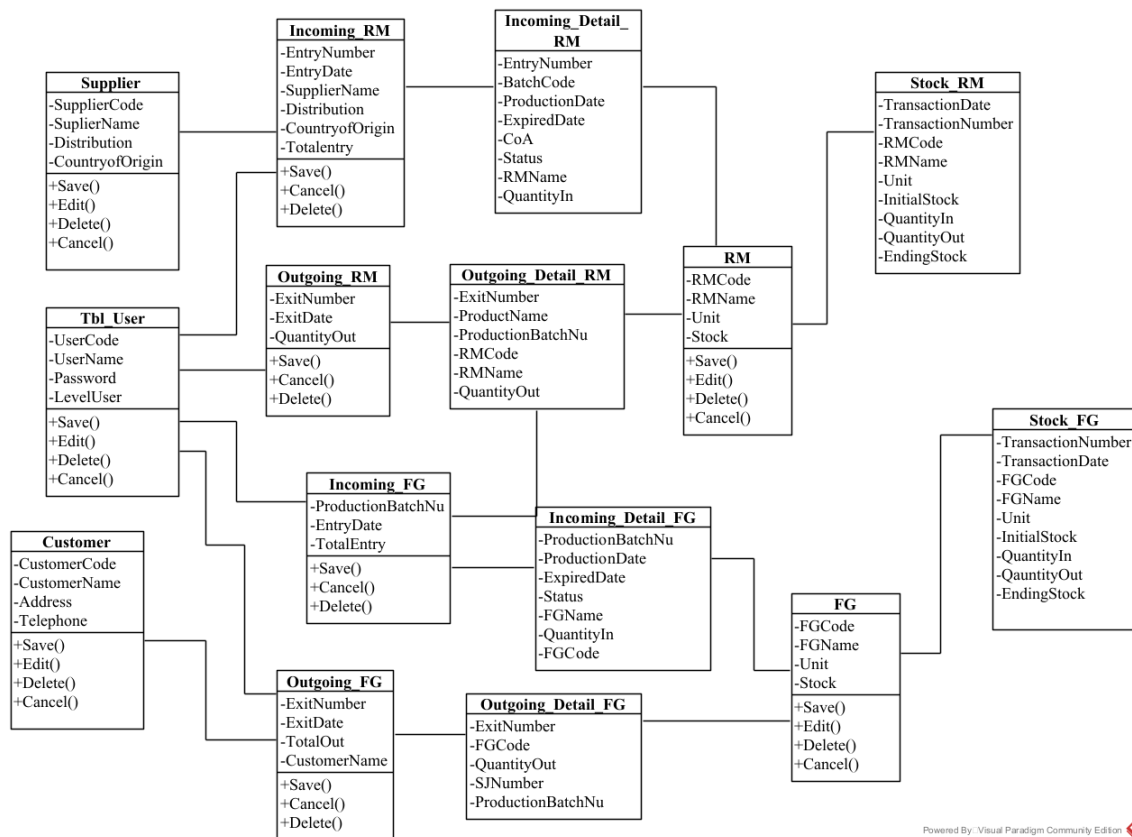


Figure 6. Class Diagram

3.4 System Implementation

a. Login

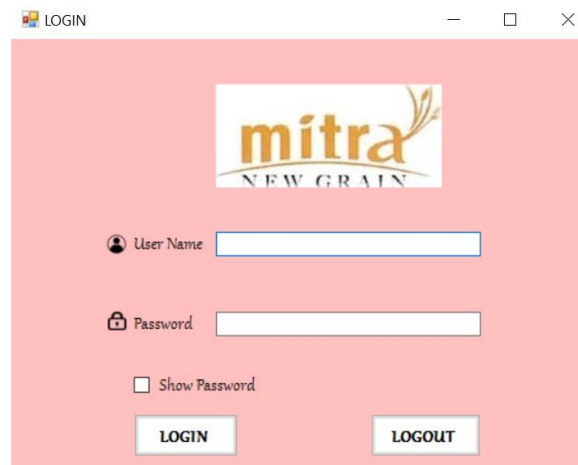


Figure 7. Login

Information about the login form, namely: users will be asked to enter their username and password then click the login button.

b. Main Menu

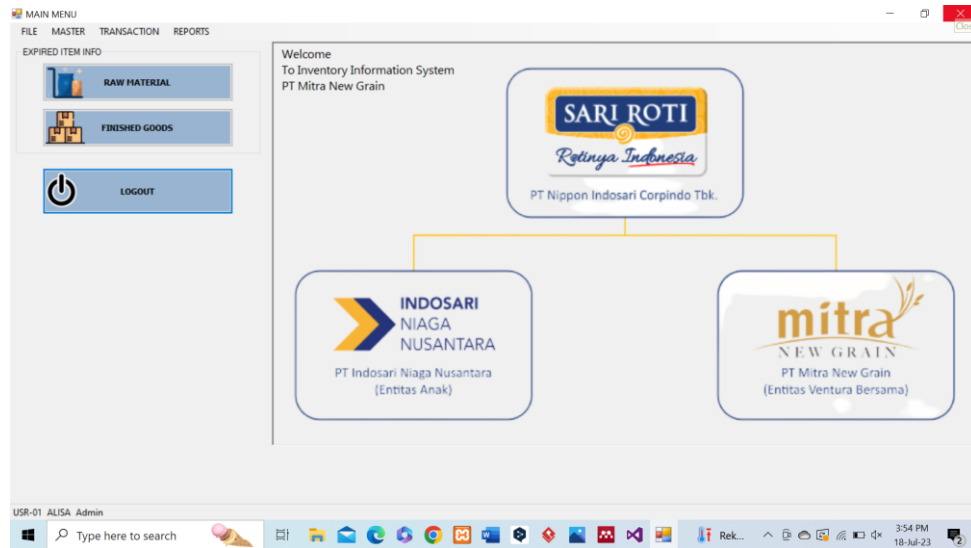


Figure 8. Main Menu

The description of the main menu is:

After successfully logging in the user will be displayed the main menu, here the user menu will be limited between operators and admins.

c. Incoming Goods

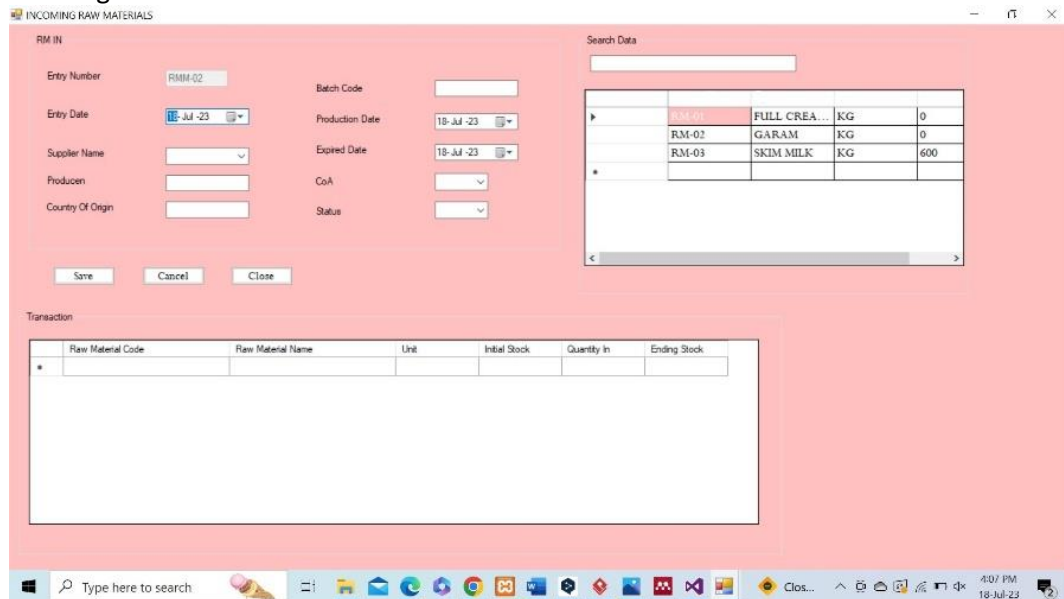


Figure 9. Incoming Goods

Information about the incoming goods form, namely:

1. The operator will be asked to fill in all the required data, if there is one data that is not filled in, a message will appear "please fill in the data completely".
2. Then in the transaction group box the operator will enter the number of incoming goods only by clicking on the item from the group box looking for data, then automatically in the transaction group box the item name and initial stock will appear, after filling in the incoming amount, the final stock will appear automatically.
3. Then when clicking save, the item data in the group box search data the amount of stock will change.

d. Outgoing Goods

RM Code	RM Name	Unit	Quantity
RM-01	FULL CREA...	KG	0
RM-02	GARAM	KG	0
RM-03	SKIM MILK	KG	600

Raw Material Code	Raw Material Name	Unit	Initial Stock	Quantity Out	Ending Stock

Figure 10. Outgoing Goods

Information about the outgoing goods form, namely:

1. The operator will be asked to fill in all the required data, if there is one data that is not filled in, a message will appear "please fill in the data completely".
2. Then in the transaction group box the operator will enter the total outgoing goods only by clicking on the item from the group box looking for data, then automatically in the transaction group box the name of the item and the initial stock will appear, after filling in the amount out, the final stock will appear automatically.
3. Then when clicking save, the item data in the group box search data the amount of stock will change.

e. Reports

Transaction Number	RM Code	RM Name	Unit	Initial Stock	Quantity In	Quantity Out	Ending Stock
RMD-01	RM-03	SKIM MILK	KG	0	1,000	0	1,000
RME-01	RM-03	SKIM MILK	KG	1,000	0	400	600
					1,000	400	

Figure 11. Stock Report

The description of the report page is:

1. Operators or admins can view daily, period and monthly reports.
2. Select the desired date then click view
3. Then the application will display the requested report.
4. If you want to print the report, then just click the printer icon.

f. Logout

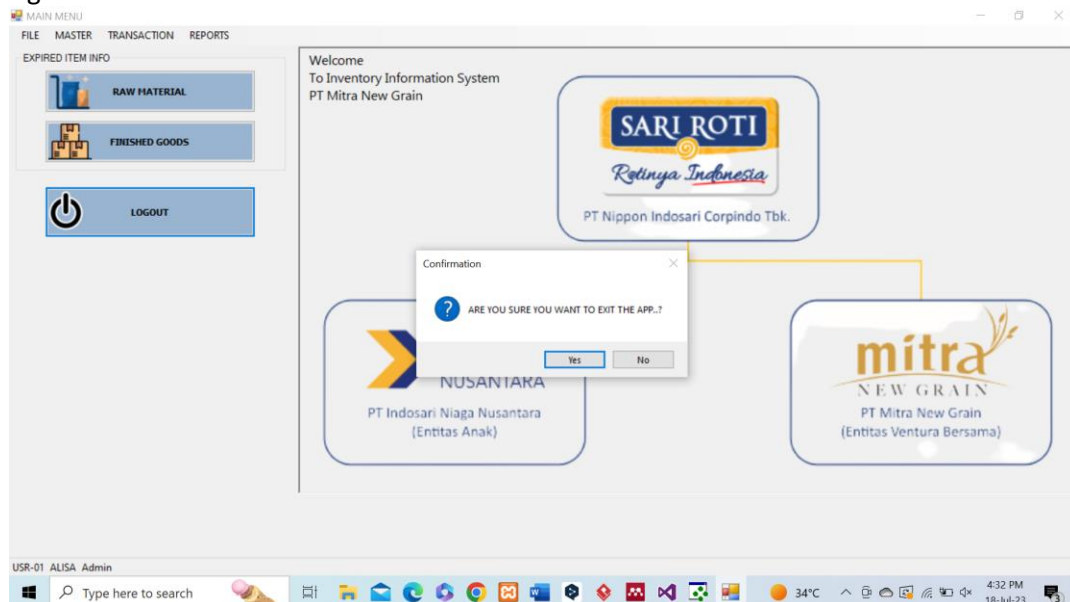


Figure 12. Logout

The description of the logout page is:

When the user clicks the exit button, a notification will appear "Are you sure you want to exit the application?" if you choose yes, you will exit the application but if you choose no, you will be returned to the main menu.

3.5 System Testing Results

Software testing aims to ensure that the software that has been developed is running according to the functionality expected by the end user. Software developers conduct special sessions to test the software so that errors can be detected early. Software testing ensures software quality which is part of the software development life cycle[15]. The following are the results of testing the system using Black Box Testing:

Tabel 1. System Testing Result

Tested Items: Login Feature		
Test Description	Expected Results	Testing Results
Input Username and Password correctly	The system processes the login access and will redirect to the user dashboard	Valid
Empty username and password	A message appears please enter username and password	Valid
Input with one of the wrong data	The system will display a notification message that the username or password is incorrect.	Valid
Tested Items: Main Menu Features		
Test Description	Expected Results	Testing Results
Select master	Display the master data menu	Valid
Select transaction	Display the incoming and outgoing goods transaction menu	Valid
Select a report	Display the item report menu	Valid

Continued Tabel 1. System Testing Result

Tested Items: Item Transaction Feature		
Test Description	Expected Results	Testing Results
Incoming goods	Can add data on incoming RM and FG items and stock items will increase	Valid
Outgoing goods	Can add data on outgoing RM and FG items and stock items will be reduced	Valid
Tested Items: Logout		
Test Description	Expected Results	Testing Results
Click logout	Displays the message box "Are you sure you want to exit the app?" and when clicked ok it will exit the app.	Valid

4. CONCLUSION

From the results of the analysis and the system made by the author from the beginning to the testing process, it is concluded that:

1. The application of the inventory information system at PT Mitra New Grain can facilitate the preparation of up to date and computerized reports and data searches to be easier.
2. With the existence of a goods inventory information system at PT. Mitra New Grain is expected to minimize errors in the process of calculating stock of goods in making stock-taking reports.

Taking into account the inventory information system that has been created, here are some ideas for improving this system for future research:

1. For future researchers, it is hoped that the inventory information system can add a warning feature for goods that will expire within the next month and can also add a barcode scan feature to speed up the data entry process.
2. The design of the interface and the resulting stock inventory report are not well structured, so it is hoped that there will be development to be able to improve the shortcomings that exist in this inventory application.

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