

SE - Smart Logistics in Food Supply Chain Management

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BCS 503

SOFTWARE ENGINEERING

GROUP ASSIGNMENT:

SMART LOGISTICS IN FOOD SUPPLY CHAIN MANAGEMENT

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Phase 1: Initial Problem Description

Introduction

Smart Logistics in food supply chain management.

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Logistics is an efficient transport and storage process from the point of origin to the point of consumption, for the planning and implementation of goods. Logistics is, in general, the management of the flow between the origin and consumption point to satisfy the needs of customers or companies. The method of organizing and transferring resources-people, goods, inventory and equipment-is used more widely in logistics. The processes that describe how food from a farm ends on our tables are referred to in the supply chain management. Production, storage, delivery, use and disposal are all processes involved. It mainly manages the flow from the start to the point of consumption of all processes.

Problem Statement

Traceability or the ability to monitor the food product at all stages in the supply chain are now more a demand than a demand for many consumers. Many consumers now want to find out where all their products and ingredients, including their trace products, come from. One field in which we see a big problem is inventory. Inventory must be carefully managed in order to control costs and maintain quality to reach the customers. It would spoil and waste too much. Too much. Too little and the clients are disappointed. It makes clear that customers are satisfied and that stock and waste are kept low.

Objective

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The network of persons, organisations, resources, operations and techniques involved in the manufacture and sale of a product or service is the food supply chain. The company's alimentary supply chain starts with the acquisition and distribution of the raw material required for production and ends with delivery of the product or service to end consumers. With global markets and networks rising, food supply chain management can become increasingly important to the company. It can enhance customer service, reduce operating costs and improve the company's economic situation through the management of the food supply chain.
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The first goal of the food supply chain is to achieve efficiency. If the company does not have an effective FSC process, it can complicate and costly management of production, transport and logistics for the company.² When manufacturers, wholesalers and distributors cooperate on a food supply chain system, efficiency is made easier for companies and employees. For example, you could share inventory data with your provider and vice versa. It helps inventories to be replenished rapidly to satisfy customer requirements. This efficiency in bringing products to the right site at the right time reduces the inventory costs and meets the customer's demand.

Furthermore, transport and logistics are optimized. Transport and logistics within the company are a key part of the management of the food supply chain. Each company is responsible for its role in ordering, shipping and transport of products in a business environment that is independent, but costs are high and timescales are low. We can arrange optimized transportation and logistics operations as vendors or buyers by managing the food supply chain with suppliers and customers. Orders between a reseller and a seller are automated and suppliers can quickly pull, deliver and pass orders to customers to communicate clearly.

Another goal is to help the food supply chain improve quality. The more closely the company is closer to those partners, the greater the probability of improved customer experience. Retailers are often heard as being the most direct link between customers and products for product quality feedback. Develop a system to provide customer feedback to the company and other food supply chain partners for these distributors through a cooperative food supply chain. This invaluable feedback enables them to solve problems or weaknesses and to focus on constant product improvement.

Lastly, the objective of food supply chain is maintaining long-term stability.²⁰ The business can strive for long-term stability by building powerful trusting supply chain relationships and working towards best distribution practices. Collaborative planning, coordination and distribution operations across various businesses spread the hazards of company choices. As the organisation and those who operate in search of possibilities for enhancement, a prevalent outcome is sector stabilization. Shared interests in meeting the requirements of customers also cause them and other food supply chain businesses to interact about optimizing distribution systems.

List of Core Features

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Inventory management – Tracking and management of available raw materials, stocked goods or spare parts. In addition, this function can support asset management, barcode integration and future inventory and cost projection.

Order management – Automating purchase order procedures. Generate and track orders, schedule shipments for suppliers and build, for example, rates and product settings. **19**

Logistics and shipping status – Enhanced distribution quality and improved customer satisfaction for organized transportation networks.

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Forecasting – Predict product demand and schedule procurement and production procedures accordingly. Good forecasts may lead to eliminating the need to purchase needless raw materials or store surplus finished goods on store carriers, reducing costs. **5**

Return management – For inspection and treatment, and collection of compensation or insurance claims of damaged or faulty goods.

Feedback – At the end of each month, the entire month of operation will require feedback from outside and from the user themselves to increase efficiency.

Monthly report – Providing a self-assessment tool that promotes continual improvement, to document progress to facilitate progress towards achievement of goals and objectives.

System Necessities

Logistics is a very crucial component in any business and all of the business owner will acknowledge that they won't able to success without a proper effectively organized logistics. Sometimes, they noticed that implementing an effective logistics strategy will be the key element to keep on pace of customer demands and stands out from other competitors. Plus, with the advancement of technology, and Internet of Things has been introduced to everyone now days, Smart logistics or called logistics 4.0 are becoming more common in logistics industry and it will able to help the logistics industry work more efficiently. As for now in logistics industry we witness that getting things from one point to another with many intermediary steps and this could be overcome if we implement the intelligent and efficient movement across all these steps and add the autonomous in that aspect. This is for sure will help the process will go through faster and more efficient.

One of the example that can be implemented is driverless transportation of container. Human tends to make mistakes from time to time and they might accidentally drop the cargo container when they doing their job or accidentally destroy the cargo that contained in the container while moving it. Driverless transportation of container can help them to reduce this kind of risk as the autonomous robots have more precision and consistency compared to humans. Smart warehousing also can be implemented so all the data of the inventory will be stored in cloud and the control of data will be centralized and duplication of data will not be happened. Hence it can help to save the cost and traceability of the inventory could be improved. Lastly, smart data centre for the human interactions and information exchange in logistical chains. This is help one company to communicate to their suppliers and customers to exchange information easily as the information that stored in the data centre are centralized and this also able to restrict certain information from spreading wide as only authorized members only allowed to access the data and information.

Phase 2: Initial Requirements

Rules for system or conditions:

1. The system should meet the food supply chain management objectives.
2. The system should comply with government policies and local laws.
3. The system should protect client's personal information.
4. The system should run in major Windows PCs platform.
5. The system should support Windows latest versions.
6. The system should support PCs that have the minimum 2GB RAM and above.
7. The system need to monitored in terms of managing the data in an organised way.
8. The system will be under servers that managed by the developing team.
9. The system need to run 24/7 to ensure that the system can support any clients' activities.
10. The system should always generate real-time data to the clients.

Input/output Requirements:

1. The system provides personal account to its users.
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2. The system provides users a platform to register an account.
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3. The system provides users a platform to login to their own existed account.
4. The system provides basics functions that a food supply chain management needs.
5. The system provides printing features so that users can have a hardcopy of each data.
6. The system provides users to logout from their own account.
7. The system only run single interface at a time.
8. The system allows users to customize their own food supply chain management database.
9. The system provides automated calculation method for the users.
10. The system provides users searching ability.
11. The system provides users to check daily activities on previous or real-time dates.

General Requirements

Between Client & Its Suppliers

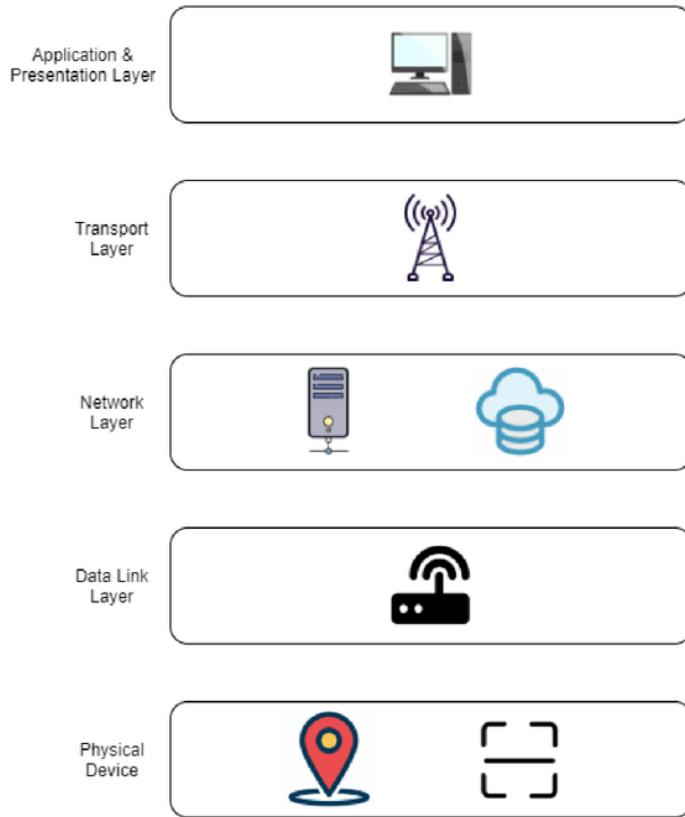
1. The system should provide easy access to full supplier historical data such as the price released by the supplier, last cost paid etc.
2. The system should provide necessary data for continuous assessment of the provider and for the establishment of fresh provider requirements.
3. The system should provide ordering system that can be made manually and automatically.
4. The system should alert both the client and its suppliers regarding the stocks availability.
5. The system should provide real-time data about the transportation activities.
6. The system should provide monthly reports to both client and its suppliers.

Between Client & Its Customers:

1. The system should allow a method for customers to order request of any products through the clients.
2. The system should automatically convert a receipts to customers and any other real-time data should be through the client itself.
3. The system should take orders with real-time access to inventory availability, process payments and handle return and exchanges.

Phase 3: Model or Architecture of the system

Diagram 1: Layer Diagram



Physical Layer: Consists of devices that needs to be integrated and controlled by the system.

Data Link Layer: Consists of getaway/hub for system to communicate with others.

Network Layer: Consists of server cloud that interconnected with the system. A database server is also included.

Transport Layer: Consists of cell tower that connects everything within related area for the system.

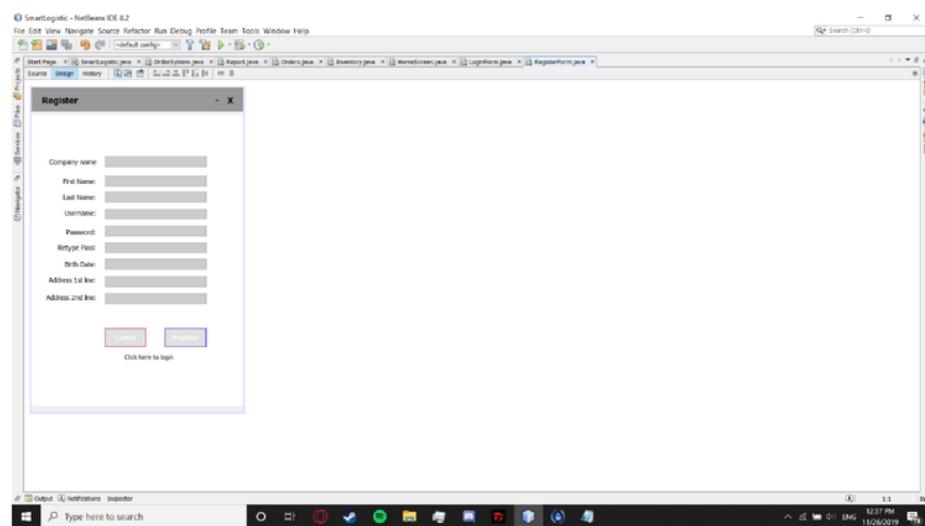
Application & Presentation Layer: Consists of computers that users use to access the system.

Phase 4: Prototype

System Interfaces:

1. Registration

In this interfaces, users will create their own account by entering necessary information about the users. There are 9 empty columns of data that need to enter. Users can either press cancel or register in this interfaces. Once registered, users is required to clink on “click here to login” to login to their registered account.

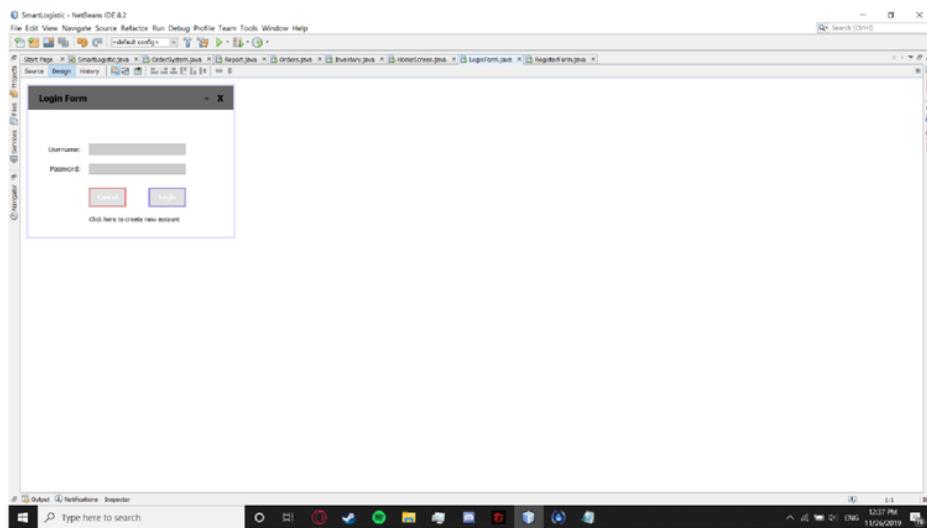


2. Login

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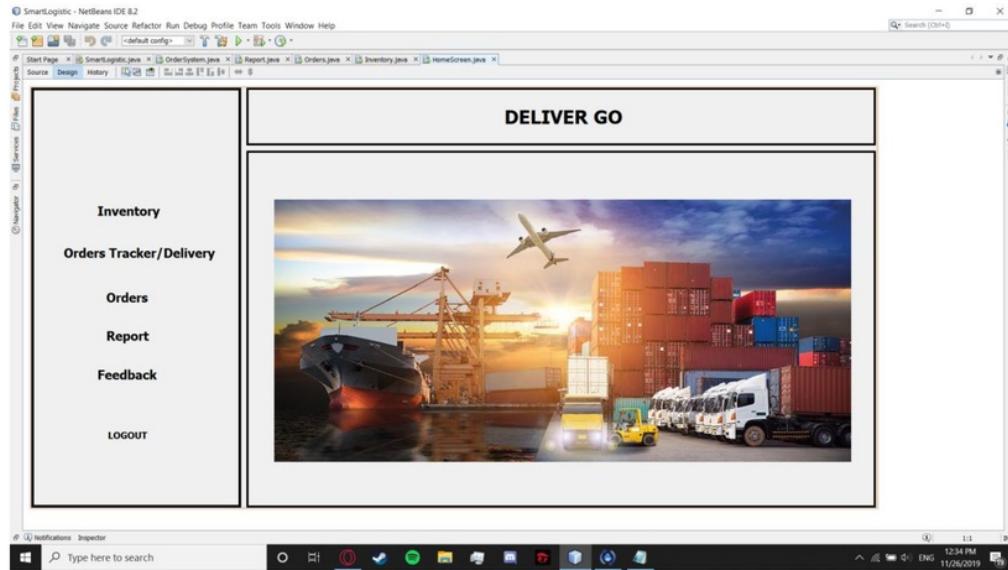
In this interface, users is required to enter their registered account username and password.

Similar to Registration, users can either press cancel or login.



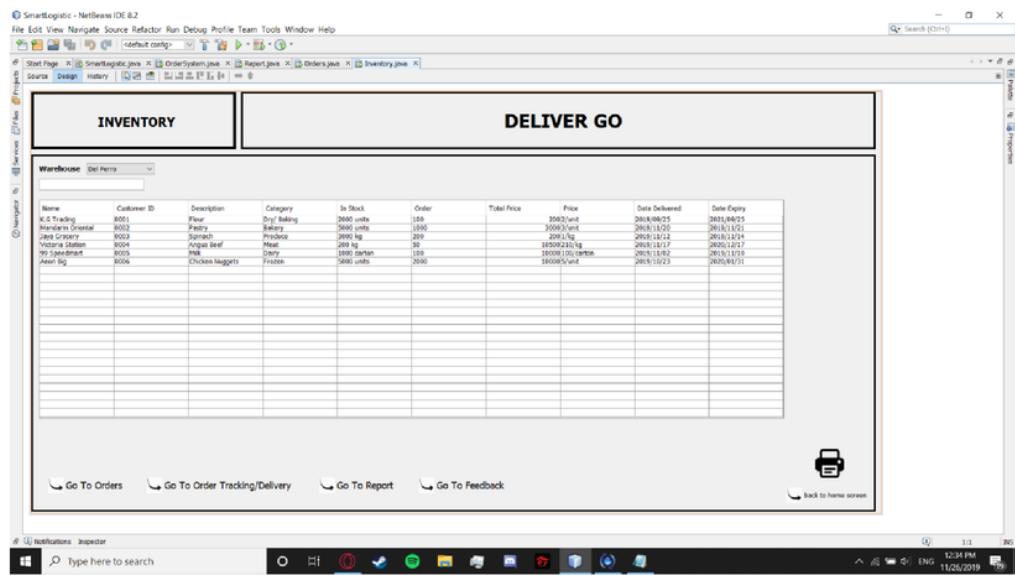
3. Home Screen

In this interface, users able to select the features that they want to access. All features is listed down on the left of the interface. There are total of 5 in-system features and one log out feature that lead to exiting the system.



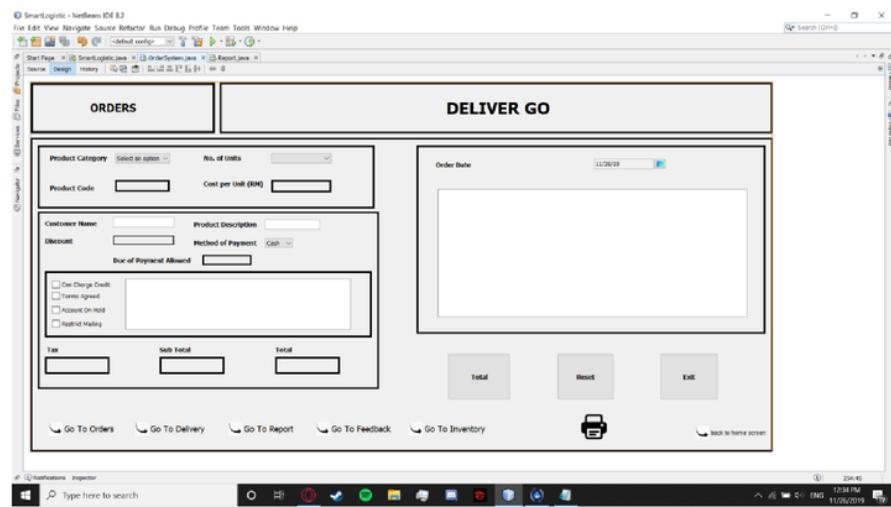
4. Inventory

In this interface, users able to view their real-time inventory. Users can also search the items that they want. Users can also select which category of inventory database that they want to access. Users can also print out the data. Other than that, users able to proceed to other in-system features or exit the current feature itself.



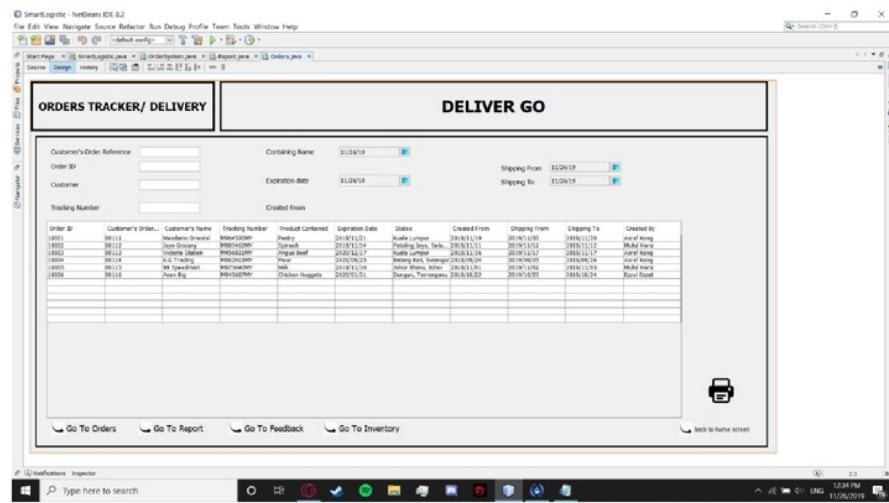
5. Orders

In this interface, users able to create an order for themselves and for other people. First column is where users select products that they would like to order. In this column, users can select product category and number of units. The system will automatically show the product code and also cost per unit (RM). The second column, the users provide details about the buyers or person that ordering. The system also automatically tracks the necessary information about the buyers from previous purchase. The system also shows the total amount include the taxes and sub totals. Users can also check the order date in this feature. Users can find out the total, reset the order and exit from ordering. Users can also print the data related to orders. Users can also proceed to other in-system features.



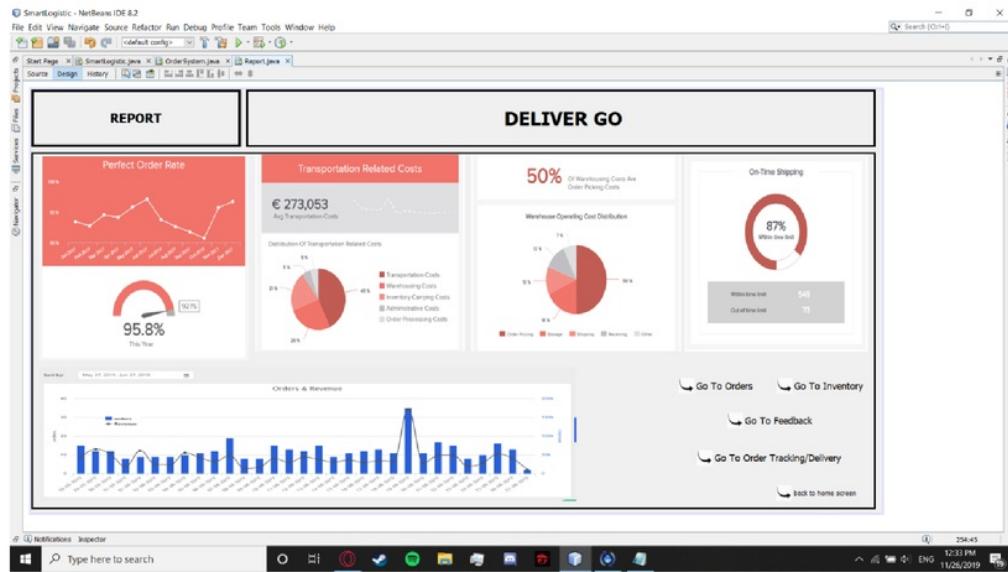
6. Orders Tracker/Delivery

In this interface, the system allows users to check their order or delivery that still on-going or already completed. Users can search by entering necessary information, select which dates, shipping location. Users able to view it in a table form. Users also can proceed to other in-system features, print the table, and also go back to home screen.



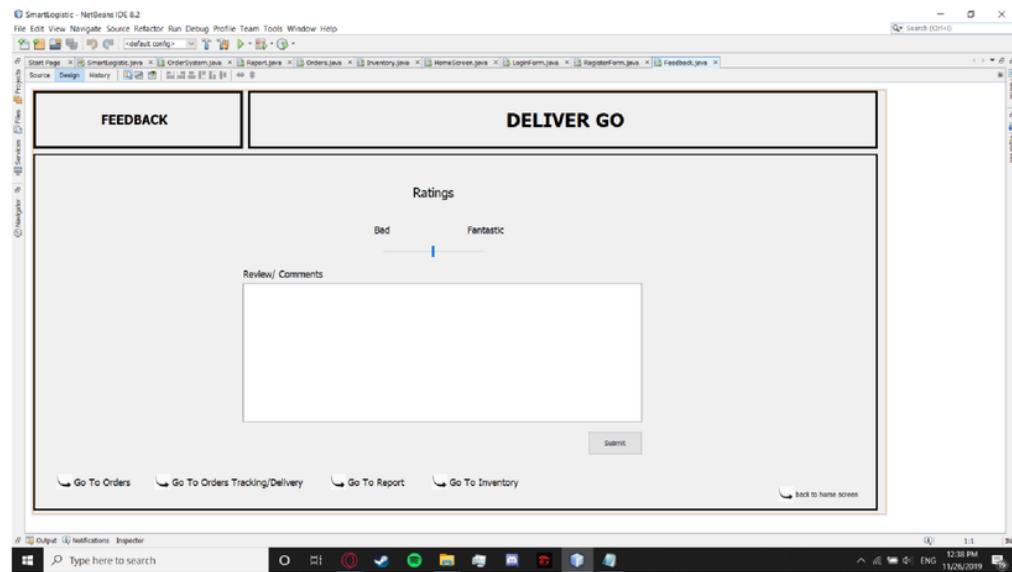
7. Report

In this interface, the system provides a platform for users to overview their monthly report. The overall report is generated by using basic automated calculation system. Users also able to proceed to other in-system features and also exit to home screen.



8. Feedback:

In this interface, the system provides a feedback platform for the users. The users is able to give ratings to the system performance or its effectiveness to the users. Users also able to write their review or comments in a text based column. After completed the feedback, users should press the submit button to submit. Users also able to proceed to other in-system features or exit to home screen.



HCI design principles:

Requirements Engineering

The system is met with the Requirements Engineering in such that all of the features that are proposed are met accordingly. For example, to assign staff to specific room is met with the requirements engineering.

Interaction Design

The system's design is consistent with the design which enables user-friendly experience to be improved and the feeling or experience not met.

Personas

The user must adhere to the design with functionality that allows for certain information.

Disruptive Innovation

A revolutionary design has not yet been developed for the process. We are however introduced with the latest design trends so that consumers can continue to experience the software.

Visual Aesthetics

Optimization allows for the interactive and smooth operation of the system and the design with visual aesthetics to be retained. Thus, the consistency of the system with experience remains the same.

Perceivability

When or if an operation is to be perceived by a system user. In order for users to see what they are to do and where they go next, it should be designed.

Feedback

Feedback from the consumer is essential to HCI development when performing an action. If the user doesn't get the correct reaction, he or she might think that something was incorrect or that he or she didn't do the action. Therefore, he or she will do the action again.

Phase 5: Test Design

³ TEST CASE 1

Test Case ID: TC_S1	Test Designed by: Asyraf Kong
Test Priority (Low/Medium/High): High	Test Designed Date: 15/11/2019
Test Title: Users Registering ³	Test Executed by: Asyraf Kong
Description: Test Registration features of the smart logistics system	Test Execution Date: 15/11/2019

⁴
Pre-Condition: Users is not registered to the system.

Step	Test Steps	Description	Expected Result	Actual Result	Status
1	Navigate to registration page	User needs to enter from login page	User should able to go to registration page	User is navigated to registration page	Pass
2	Enter necessary information	User needs to enter information in provided empty column	User should able to enter necessary information	The information is entered completely	Pass
3	Press either Register or Cancel	User needs to press either Register or Cancel	User should able to press either Register or Cancel.	User is navigated to log in page.	Pass

Post-Condition:

1. User registration for an account is completed.
2. User is on login page.

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TEST CASE 2

1 Test Case ID: TC_S2	Test Designed by: Asyraf Kong
Test Priority (Low/Medium/High): High	Test Designed Date: 15/11/2019
Test Title: Users Log in 3	Test Executed by: Asyraf Kong
Description: Test Log in features of the smart logistics system 7	Test Execution Date: 15/11/2019

Pre-Condition: Users is registered to the system.

Step	Test Steps	Description	Expected Result	Actual Result	Status
1	Enter correct username and password	User needs to enter username and password correctly	User should able to log in successfully	User is navigated to their own account home screen	Pass
2	Enter wrong username and password	User needs to enter username and password wrongly	User should unable to log in	User remain on log in page to try again	Pass

Post-Condition:

1. User either able or unable to log in to their account.

TEST CASE 3

Test Case ID: TC_S3	Test Designed by: Asyraf Kong
Test Priority (Low/Medium/High): High	Test Designed Date: 16/11/2019
Test Title: Selecting features in home screen	Test Executed by: Asyraf Kong
Description: Test Home Screen features of the smart logistics system	Test Execution Date: 16/11/2019

6

Pre-Condition: Users has log in to the system

Step	Test Steps	Description	Expected Result	Actual Result	Status
1	Select Inventory feature	User needs to press on the inventory text icon	User should able to go to inventory page	User is navigated to inventory page	Pass
2	Select Orders Tracker/Delivery feature	User needs to press on the Orders Tracker/Delivery feature text icon	User should able to go to Orders Tracker/Delivery page	User is navigated to Orders Tracker/Delivery page	Pass
3	Select Orders feature	User needs to press on the Orders text icon	User should able to go to Orders page	User is navigated to Orders page	Pass
4	Select Report feature	User needs to press on the Report text icon	User should able to go to Report page	User is navigated to Report page	Pass
5	Select Feedback feature	User needs to press on the Feedback text icon	User should able to go to Feedback page	User is navigated to Feedback page	Pass
6	Select Log out feature	User needs to press on the Log out text icon	User should able to go to Log out page	User is log out from their account and navigated to log in page	Pass

Post-Condition:

1. User is navigated to selected features page

TEST CASE 4

1

Test Case ID: TC_S4	Test Designed by: Asyraf Kong
Test Priority (Low/Medium/High): High	Test Designed Date: 17/11/2019
Test Title: Accessing features available in inventory interface	Test Executed by: Asyraf Kong
Description: Test features in inventory interface of the smart logistics system	Test Execution Date: 17/11/2019

Pre-Condition: Users choose to enter Inventory.

4

Step	Test Steps	Description	Expected Result	Actual Result	Status
1	Search item based on alphabets	User needs to enter alphabets at searching feature	User should able to search based on the alphabets entered	The items searched is focused.	Pass
2	Search item based on categories	User needs to select existed categories	User should able to search based on categories selected	The items searched is focused	Pass
3	Select either available in-system features	User needs to press either available in-system features	User should able to press either available in-system features.	User is navigated to selected in-system features' page.	Pass
4	Select print icon	User needs to press on the icon	User should able to press print icon	Print complete	Pass

Post-Condition:

1. User successfully access all features.

TEST CASE 5

1

Test Case ID: TC_S5	Test Designed by: Asyraf Kong
Test Priority (Low/Medium/High): High	Test Designed Date: 17/11/2019
Test Title: Accessing features available in orders tracker/delivery interface	Test Executed by: Asyraf Kong
Description: Test features in orders tracker/delivery interface of the smart logistics system	Test Execution Date: 17/11/2019

Pre-Condition: Users choose to enter orders tracker/delivery.

4

Step	Test Steps	Description	Expected Result	Actual Result	Status
1	Enter necessary information needed to track	User needs to enter necessary information needed to track	User should able to track the delivery	Real-time information is displayed	Pass
2	Selecting date	User needs to select date	User should able to select date	The information on selected date is displayed	Pass
3	Select either available in-system features	User needs to press either available in-system features	User should able to press either available in-system features.	User is navigated to selected in-system features' page.	Pass
4	Select print icon	User needs to press on the icon	User should able to press print icon	Print complete	Pass

Post-Condition:

1. User successfully access all features

TEST CASE 6

1

Test Case ID: TC_S6	Test Designed by: Asyraf Kong
Test Priority (Low/Medium/High): High	Test Designed Date: 18/11/2019
Test Title: Accessing features available in orders interface	Test Executed by: Asyraf Kong
Description: Test features in orders interface of the smart logistics system	Test Execution Date: 18/11/2019

Pre-Condition: Users choose to enter Orders.

4

Step	Test Steps	Description	Expected Result	Actual Result	Status
1	Enter necessary information needed to order	User needs to enter necessary information needed to order	User should able to order	Order receipt is displayed on the right	Pass
2	Resetting order	User needs to press reset to reset order	User should able to reset order	The page turns back to original	Pass
3	Select either available in-system features	User needs to press either available in-system features	User should able to press either available in-system features.	User is navigated to selected in-system features' page.	Pass
4	Select print icon	User needs to press on the icon	User should able to press print icon	Print complete	Pass

Post-Condition:

1. User successfully access all features

TEST CASE 7

1

Test Case ID: TC_S7	Test Designed by: Asyraf Kong
Test Priority (Low/Medium/High): High	Test Designed Date: 18/11/2019
Test Title: Accessing features available in report interface	Test Executed by: Asyraf Kong
Description: Test features in report interface of the smart logistics system	Test Execution Date: 18/11/2019

Pre-Condition: Users choose to enter Report.

4

Step	Test Steps	Description	Expected Result	Actual Result	Status
1	Producing monthly report	System automatically producing monthly report	System should able to produce monthly report	Monthly report displayed	Pass
2	Select either available in-system features	User needs to press either available in-system features	User should able to press either available in-system features.	User is navigated to selected in-system features' page.	Pass
3	Select print icon	User needs to press on the icon	User should able to press print icon	Print icon is not found	Fail

Post-Condition:

1. User successfully access almost all features except for printing.

TEST CASE 8

1

Test Case ID: TC_S8	Test Designed by: Asyraf Kong
Test Priority (Low/Medium/High): High	Test Designed Date: 19/11/2019
Test Title: Accessing features available in feedback interface	Test Executed by: Asyraf Kong
Description: Test features in feedback interface of the smart logistics system	Test Execution Date: 19/11/2019

Pre-Condition: Users choose to enter Feedback.

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Step	Test Steps	Description	Expected Result	Actual Result	Status
1	User rate the system	User will select between bad and fantastic	Selected rating is determined	Rating is determined	Pass
2	User provide review or comments	User needs to write on provided column	User successfully review or comments	User submit successfully	Pass
3	Select either available in-system features	User needs to press either available in-system features	User should able to press either available in-system features.	User is navigated to selected in-system features' page.	Pass
4	Select print icon	User needs to press on the icon	User should able to press print icon	Print icon is not found	Fail

Post-Condition:

1. User successfully access almost all features except for printing.

TEST CASE 9

1 Test Case ID: TC_S9	Test Designed by: Asyraf Kong
Test Priority (Low/Medium/High): High	Test Designed Date: 19/11/2019
Test Title: Transition between features	Test Executed by: Asyraf Kong
Description: Test transition between features of the smart logistics system	Test Execution Date: 19/11/2019

Pre-Condition: System is opened on home screen.

Step	Test Steps	Description	Expected Result	Actual Result	Status
1	Select features	User will select a feature	Selected feature is performed	Feature is performed	Pass
2	Return to old feature	User needs to select return	User successfully returned to home screen	Returned to home screen	Pass

Post-Condition:

1. System transition is considered as success.

TEST CASE 10

Test Case ID: TC_S10	Test Designed by: Asyraf Kong
Test Priority (Low/Medium/High): High	Test Designed Date: 20/11/2019
Test Title: Printing	Test Executed by: Asyraf Kong
Description: Test print feature of the smart logistics system	Test Execution Date: 20/11/2019

Pre-Condition: System ready to print

Step	Test Steps	Description	Expected Result	Actual Result	Status
1	User press print icon	User needs to press print icon	Printing is operating	Printing worked	Pass
2	Interaction with printing device	User select printing device	User successfully selected	Printing device is selected successfully	Pass

Post-Condition:

1. System printing feature worked

SE - Smart Logistics in Food Supply Chain Management

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