Welcome to Refrigerator

Introduction to Software Engineering

Date: 1/24/2023

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ABSTRACT / Executive Summary

The Fridge repairing system was fully manual, entries would be written on registers.

Fridge repairing is a shop where customers comes for the repairing of their fridge, because of this payment transaction continue day by day. The customer entries and payment was written on the transaction register and that created some difficulties. So we developed a software to solve these difficulties so now customer entries and payment transactions are done directly on the software. Additionally, technician and vender do automated tasks. And now the system is fully automated.

In future, there will be some updates to this software. It will be that every customer has their own accounts and the client will be able to view the issues with their refrigerator. This will greatly benefit for both the buyer and the system.

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1.7 Class diagram of each use case	Class diagrams are the blueprints of your system or subsystem. You can use class diagrams to model the objects that make up the system, to display the relationships between the objects, and to describe what those objects do and the services that they provide.	
1.8 Class diagram	Class diagrams are the blueprints of your system or subsystem. You can use class diagrams to model the objects that make up the system, to display the relationships between the objects, and to describe what those objects do and the services that they provide.	
1.9 Database diagram	Database diagrams graphically show the structure of the database and relations between database objects.	
2.0 Deployment diagram	A component diagram, also known as a UML component diagram, describes the organization and wiring of the physical components in a system. Deployment diagrams are used to visualize the topology of the physical components of a system.	

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Acknowledgments

Firstly, we are very thankful to Mr. Israr the owner of Welcome to Refrigerator. Who gave us permission to visit his shop related to our project (fridge repairing system). Sir you guided our team so well that we were able to complete the project without facing any problem.

Secondly we proudly say that we are UITians. We especially want to thank our institute, our director and faculty members. Quality education leads to the personality grooming through a balanced blend of mental, physical and moral training. And here, at UIT we as a student enjoys cooperative faculty, excellent facilities and congenial environment, which is second to none. Thank you UIT University.

Thirdly we want to thank our course instructor Sir Usman Waheed. Our gratitude to you for all you have done, which we will never forget. We truly appreciate you and your time you spent helping us in many occasions. Thank you very much for the course you teaches us. We enjoyed every minute of your lecture as well as your marvelous sense of humor. And also thank to our project advisor Amna Shahadat. She guided us throughout the project very well.

At the last, we are very thankful to our parents. Saying "thank you" is not enough for us to express how grateful we are for your support over the years. You are our mentor, and everything we have achieved today is because of you. May Allah grant you a long and happy life (Ameen).

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INTRODUCTION AND OVERVIEW

Introduction to Welcome to Refrigerator:

Welcome to refrigerator is a shop that is responsible to repair refrigerators. They give professional repair services at home. For repairing if the parts of fridge are not available in their inventory they purchase parts from other vendors.

The problem was manual recording of payments received in journals, which is prone to human errors and is very tedious to trace errors and calculate, and it is not economical to in this modern age.

Overview of the project:

The application is in the form of "Website". In the application, User first creates accounts for customers, shopkeeper and technician, then the user can create pages of provide details, problems in refrigerator, place order, vendor payment, and generate bill.

- Provide Detail :

  The customer will enter his/her information along with the information of his/her refrigerator and all the data will be saved in the database.

- Problems in refrigerator :

  The technician will detect the problem and tell the price according to it. The customer after reviewing the price will either accept the offer or reject it.

- Place order :

  If the parts required are not available in the inventory then shopkeeper will place an order to vendor.

- Vendor Payment:

  The vendor will generate the bill of the required part and the shopkeeper will pay the amount either through cash or card and this transaction also save in a database.

- Generate Bill:

The shopkeeper will generate the bill after technician repaired the refrigerator and the customer will receive the fridge and will pay the bill and this transaction also save in database.

Background

There is no existing system in WTR shop. The staff works manually. Shopkeeper met the customer and then technician attain the complaint of the customer. For the customer ease one of the website Welcome to refrigerator offers the customer to complain online and then they send the technician in customer house but there prices are too high that's why they fail to satisfy the customer.

Aim and Statement of Problem

The Aim of the project is to solve organization problem by using problem solving approach.

Performance:

Sometimes when customers come to the shop, the shop is not open.

We solved the customer problem by creating a website. Customer now anytime contact the shopkeeper through the website.

Information:

• Input:

• Customer online request the shopkeeper for testing, then the customer is requested to input his details such as his name address etc.

• Output:

•The technician comes to the customer house for testing the fridge then the technician tells the problems amount to customer. According to price customer accept or reject, if the customer accept then the shopkeeper check his inventory, if repairing parts available in the inventory then the shopkeeper gives parts to technician for repairing the fridge and if the parts not available in the in the inventory then shopkeeper place the order to the vendor. If customer provide incomplete information prompt a message to the customer to provide complete information.

• Stored Data:

• Details of customer

•Details of fridge

• Order details

First customer have to come in the shop for requesting the shopkeeper for testing the fridge but now customer have website for requesting the shopkeeper for testing. We were face a lot of difficulties in the project. We met with the shopkeeper 2 times for customer data collection and facing the difficulty in coding because of the lack of the time.

Economic:

• This project is economically balanced as it will only require our time and effort in creating it and furthermore, we are not using any sort of hardware so our only resource is time.

Control:

• Customer can accept or reject the problems amount.

• Application will run by authorized person i.e., owner

• Data of customer must not be share with others.

Efficiency:

• Using of good data base

• Data of each customer will be stored in a database for easier access

Service:

• Customer can see the total amount of the bill.

• Software should be easy to understand for type of ages

METHODS, ASSUMPTIONS, and PROCEDURES

Structured Analysis and Structured Design (SA/SD) is a diagrammatic notation that is designed to help people understand the system. The basic goal of SA/SD is to improve quality and reduce the risk of system failure. It establishes concrete management specifications and documentation.

STRENGTH OF STRUCTURE ANALYSIS:

- Lower Costs:

TQM lowers costs throughout the business infrastructure and organization. Because it is an all-encompassing quality management program, TQM helps different departments to communicate their needs, problems, and desires with each other, so that workable solutions can be found that will help the organization cut costs throughout the supply chain, distribution chain, shipping and receiving, accounting and management departments without losing productivity or the ability to operate rapidly in the face of change.

The concept of Total Quality Management is rooted in the idea of providing all of the tools, training, and experience necessary to measure the entire quality control of an organization.

Because it is an all-encompassing quality management program, TQM helps different departments to communicate their needs, problems, and desires with each other, so that workable solutions can be found that will help the organization cut costs throughout the supply chain, distribution chain, shipping and receiving, accounting and management departments without losing productivity or the ability to operate rapidly in the face of change.

- Improved Reputation:

TQM programs have the advantage of improving corporate as well as product reputations in the marketplace, because errors and defective products are discovered much more rapidly than under a non-TQM system, and often before they are ever sent to market or found in the hands of the public.

Weaknesses of Structure Analysis:

- Resistance to Change:

Workers may feel that their jobs or occupations within the company are at risk under a comprehensive TQM program, and as a result, they may be slow or resistant to making the necessary changes for the TQM program to work properly. In addition, skilled workers may be lost as they decide to leave because of their unease at the direction that things are headed within the company, or they may not implement things properly, causing increased costs.

- High Cost of Time:

The high cost of implementing a TQM program, and the fact that it may take several years for the program to be fully implemented before results and benefits are seen, can be a huge disadvantage to a TQM program, especially in today's uncertain economic conditions. TQM should be considered a long-term investment.

- Information Engineering:

Information engineering is a family of data-oriented analysis and techniques used to design, develop, and maintain information systems which support strategic missions, decision processes, and daily operations of a company. It is often regarded as a data-oriented methodology rather than a process-oriented methodology.

Advantages

The primary advantage of the IE methodology is that data are identified first, then the functions are identified second. The IE methodology does not foster the complete decomposition of the inputs, processes, and outputs. In fact it can be argued that IE does not hierarchically decompose

the functions in the same way that the traditional methodologies do; this can be seen as an advantage not to have to train users to decompose the functionality of the system.

Disadvantages

The disadvantages of the IE methodology include the fact that users must be trained to understand the models and that users must be able to identify the data of the system first before identifying the functions of the system.

OBJECT ORIENTED:

Object-oriented (O-O) analysis and design is an approach that is intended to facilitate the development of systems that must change rapidly in response to dynamic business environments. Each object is a computer representation of some actual thing or event. Objects may be customers, items, orders, and so on.

Advantages

Focuses on data rather than the procedures as in Structured Analysis. The principles of encapsulation and data hiding help the developer to develop systems that cannot be tampered by other parts of the system. The principles of encapsulation and data hiding help the developer to develop systems that cannot be tampered by other parts of the system. It allows effective management of software complexity by the virtue of modularity.

Disadvantages

Functionality is restricted within objects. This may pose a problem for systems which are intrinsically procedural or computational in nature. It cannot identify which objects would generate an optimal system design. The object-oriented models do not easily show the communications between the objects in the system. All the interfaces between the objects cannot be represented in a single diagram.

AVAILABLE RELEVANT Solutions and Evaluation

1. PROJECT REPAIR AND FABRICATION OF A REFRIGERATOR SYSTEM

https://www.grossarchive.com/project/18598/project-repair-and-fabrication-of-a-refrigerator-system

Introduction

Refrigeration is a branch of science that deals with the process of removing heat from a substance or space in order to make it cooler. Refrigerator is defined as a device that is used in cooling the internal temperature below the room temperature (that is between 250C to 300C). Generally, however, for a space or substance to be cooler, it must loss that heat to another. Also, for a space or substance to get hotter, it must absorb heat from another, which must be at higher

temperature. For both process to occur, heat must be absorbed or lost, thus heat is the characteristics agent of heating and cooling, consequently, for heat flow there is absorbs at a lower temperature region and rejected at a higher temperature region, which is the quantity being determined by the temperature gradient of the two regions. The modes of heat transmission are conduction concretion and radiation of which conduct convection and radiation, of which conduction and convection are extensively involved, in domestic refrigeration. In refrigeration process, there is always a body employed as the heat absorber or indirect contact with the space or substance being cooled depending on the required final effect. Such cooling agents is known as refrigerant, which is known as the refrigerant, which is circulated around the evaporator that id high temperature region) and condensing region (that is higher temperature) in order to maintain a constant refrigeration process. It does it work be evaporating (when it absorbs heat up to the boiling point temperature) and by condensing when it losses the absorbed heat to return to its original liquid state, in the system. These heat when absorbed, may be classified as sensible heat or latent heat depending on its physical effect on the refrigerants.

2. REFRIGERATOR REPAIR PROJECT

https://circuitcellar.com/research-design-hub/projects/refrigerator-repair-project/

The control PCB is basically a relay that enables power to the fridge thermostat or the defrost heater. The defrost heater is used periodically to warm the condenser coils. keeping them free of ice build-up. The defrost thermostat opens, removing power from the heater once the temperature of the condenser has sufficiently increased. Whenever the defroster is ON, the thermostat is OFF and so is the compressor—even if the thermostat should call for a lower temperature and attempt to turn on the compressor. I was a bit surprised to find that the compressor's job was to remove heat from the freezer only. It is the door between the fridge and freezer that cools the fridge by circulating colder air from the freezer.

Analysis AND DESIGN

For our project first we make the visit to the fridge repairing shop then we capture requirements from their manager and instantly make a swim lane diagram which shows how everything work at the shop.

From that swim lane we make a context diagram and after that actor use case diagram which shows what each actor do. After that we write the analysis use case narration against each use case which describes the complete flow. And then we make an object diagram of each use case an after that complete object diagram, according to transaction pattern which contains participant, transaction, transaction line item, item, place etc.

And after that design use case narration which describe the complete flow of our website. And then we make class diagram by extracting verbs and noun from design use case. From design use case we make sequence diagram. And after that component, deployment and database diagram.

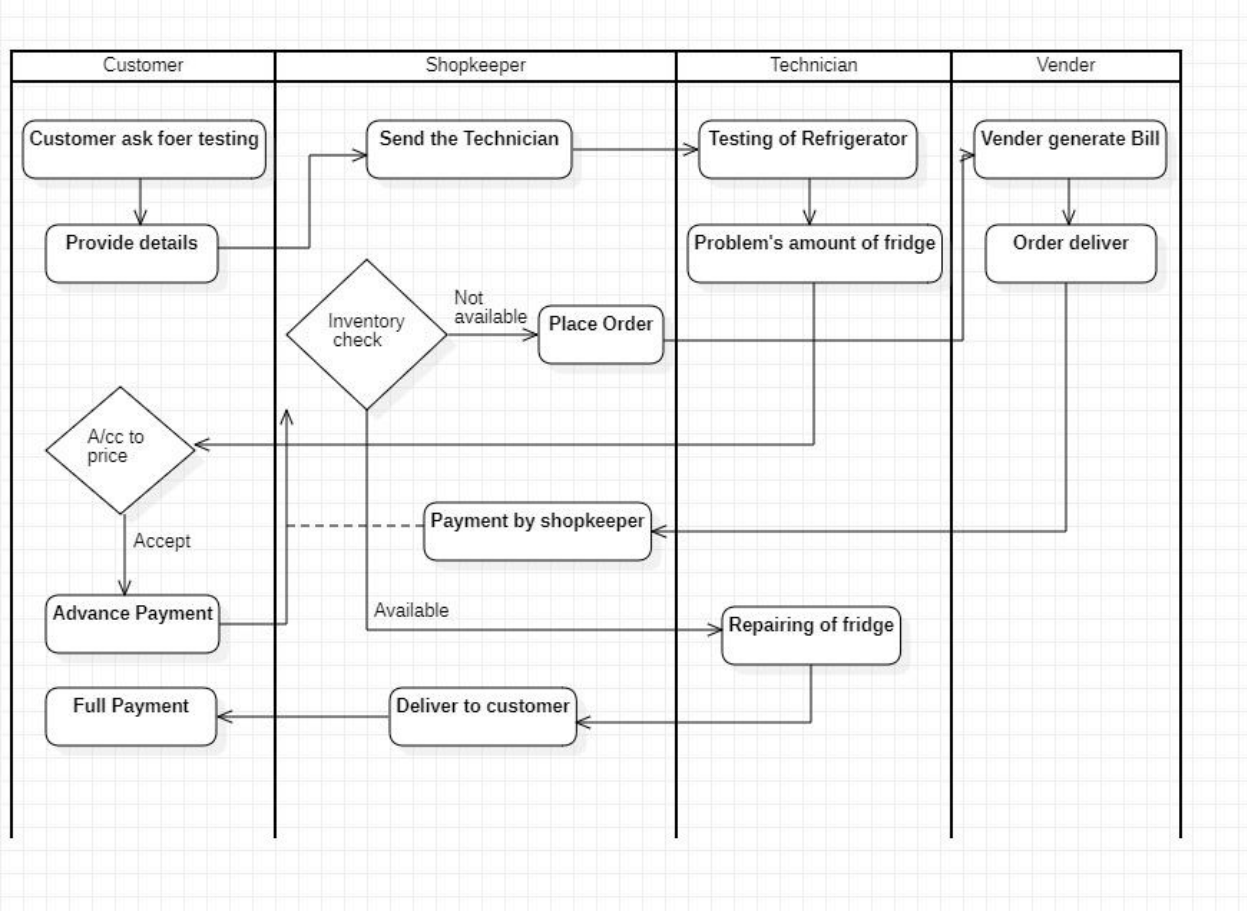


Figure 1.1 Swim Lane Diagram

In the above figure first customer ask for testing and then provide his/her details to shopkeeper. Then shopkeeper send the technician to customer house and the technician test the refrigerator and according to problem's technician tells the problem's amount of fridge, and then according to price customer accept or reject. If customer reject so the procedure is cancelled and if customer accept so give advance payment. Then shopkeeper check his inventory that the parts required for repairing is available or not. If available, then shopkeeper give parts to technician and technician repair the fridge and deliver fridge to shopkeeper. And then shopkeeper give fridge to customer and customer give advance payment. If not available, then shopkeeper place order to vender and then vender generate bill and deliver order, against delivery shopkeeper pay the bill. Now the parts are available in our inventory.

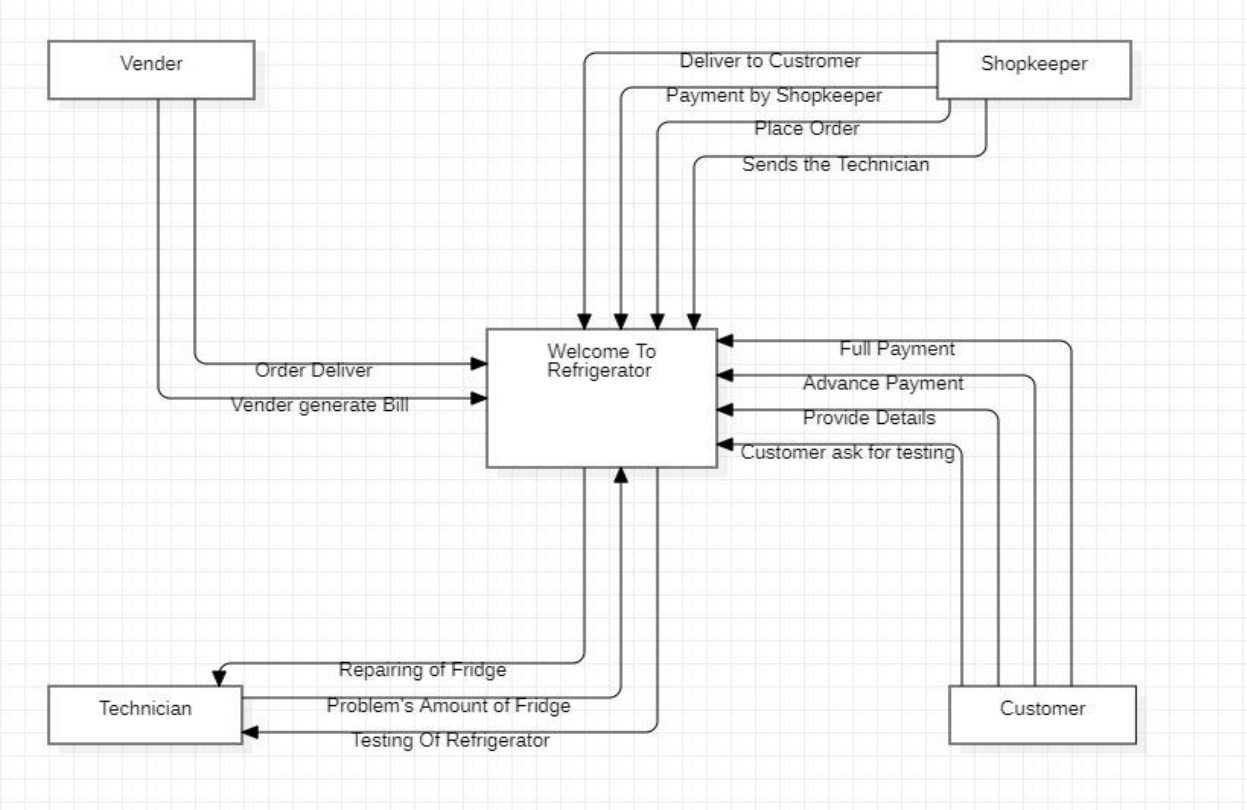


Figure 1.2 Context Diagram

In the above figure first customer ask for testing and then provide his/her details to shopkeeper. Then shopkeeper send the technician to customer house and the technician test the refrigerator and according to problem's technician tells the problem's amount of fridge, and then according to price customer accept or reject. If customer reject so the procedure is cancelled and if customer accept so give advance payment. Then shopkeeper check his inventory that the parts required for repairing is available or not. If available, then shopkeeper give parts to technician and technician repair the fridge and deliver fridge to shopkeeper. And then shopkeeper give fridge to customer and customer give advance payment. If not available, then shopkeeper place order to vender and then vender generate bill and deliver order, against delivery shopkeeper pay the bill. Now the parts are available in our inventory.

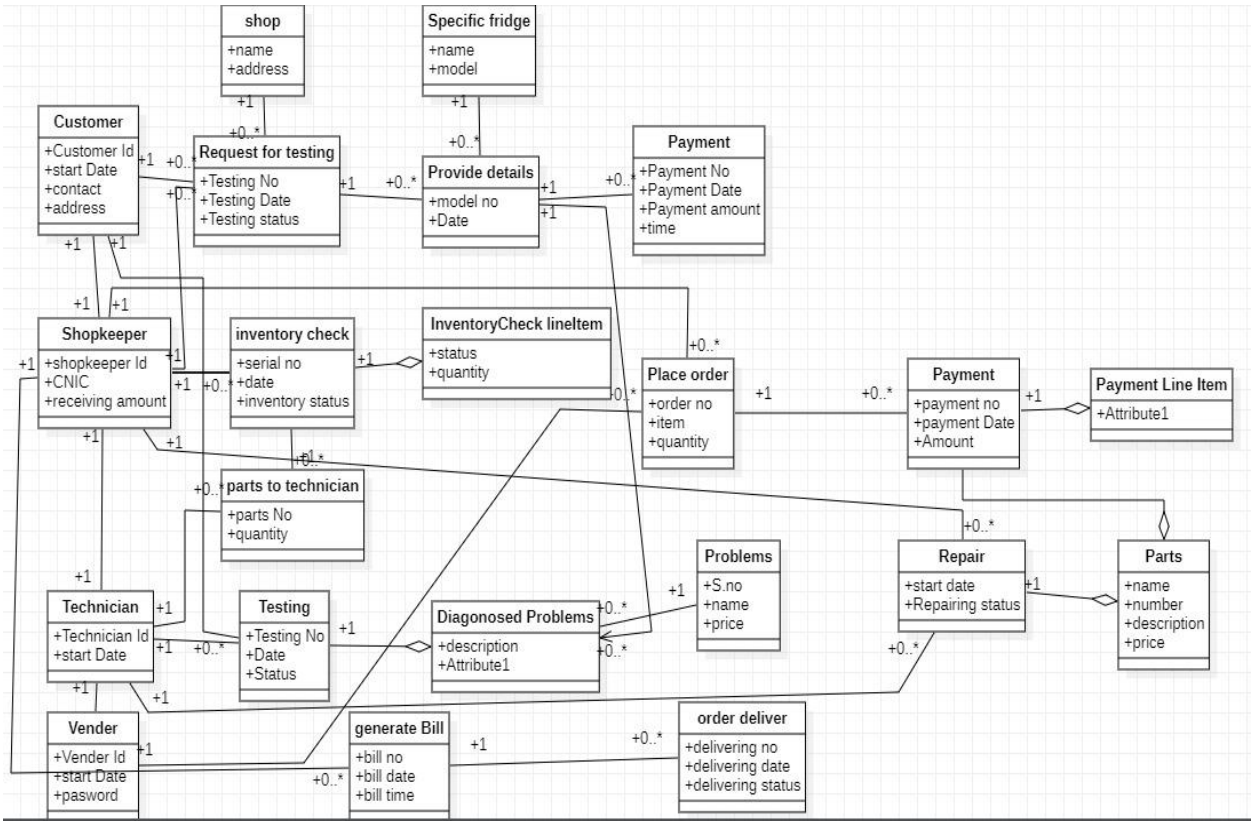


Figure 1.3 Object Diagram(complete)

In the above figure Customer, Shopkeeper, Technician, Vender are the participants. Transaction is request for testing whose subsequent transactions are provide details and payment with the specific item which is specific fridge and place which is shop. Second transaction is Testing whose other associate is Diagnosed problems and problems. Third transaction is Inventory check whose line item is inventory check line item and subsequent transaction is parts to technician. Fourth transaction is repair whose other associate is parts. Fifth transaction is place order whose subsequent transaction is payment and line item is payment line item. Sixth transaction is generate bill whose subsequent transaction is order deliver.

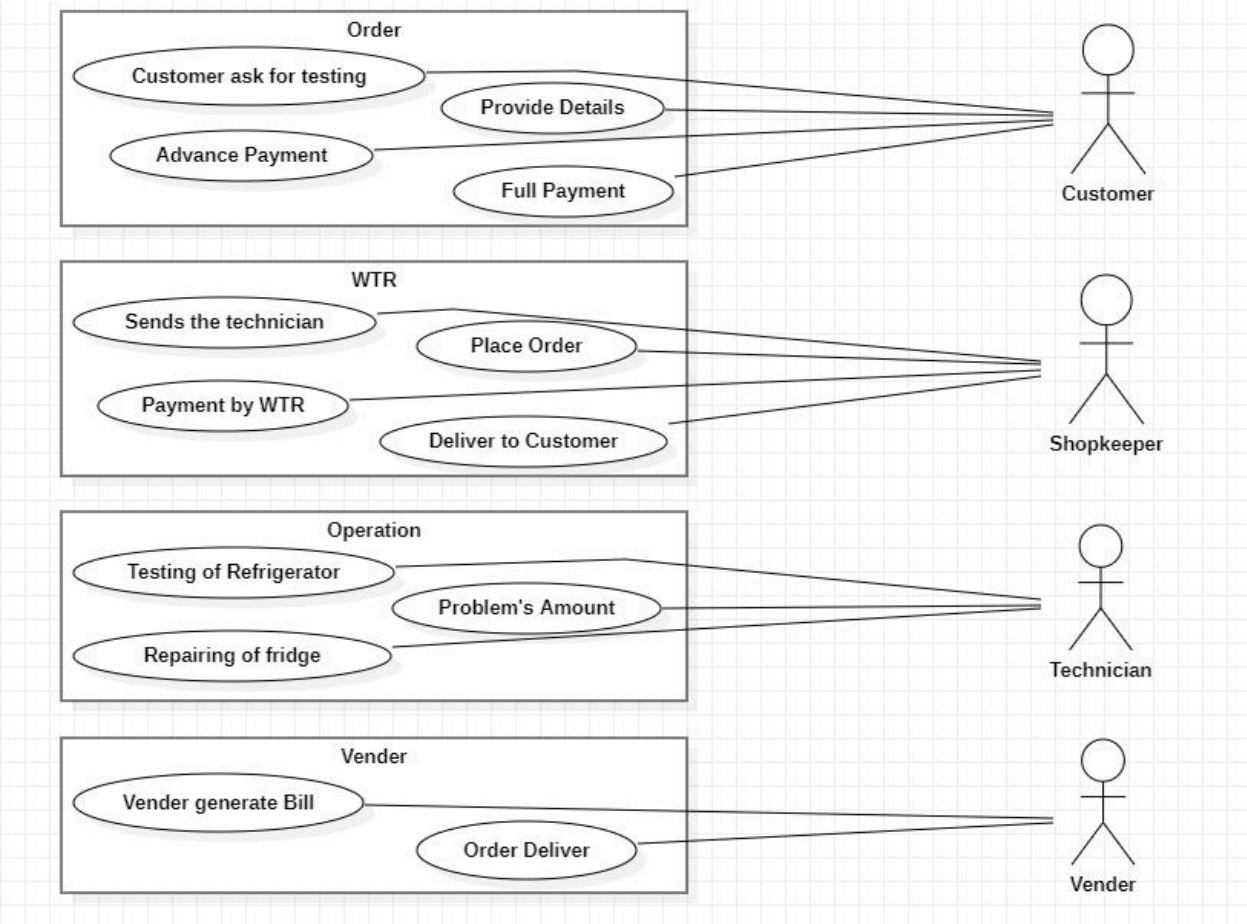


Figure 1.4 Actor Use case Diagram

The above figure represents the initiation of actors, customer ask for testing, provide detail, advance payment and full payment will be initiate by customer. Send the technician, place order, payment by shopkeeper and deliver to customer will be initiate by shopkeeper. Testing of refrigerator, problem's amount and repairing of fridge will be initiate by technician. Vender generate bill and order deliver will be initiate by vender.

ACTOR USE CASE TABLE:

Usecase	Primary Actor	System Actor	Other Participating Actor	Other Interested Stakeholder
Customer ask for testing	Customer	Customer	Shopkeeper	-

Table 1.1 (a) Actor Use case Table

Usecase	Primary Actor	System Actor	Other Participating Actor	Other Interested Stakeholder
Provide details	Customer	Customer	Shopkeeper	-

Table 1.1 (b) Actor Use case Table

Usecase	Primary Actor	System Actor	Other Participating Actor	Other Interested Stakeholder
Sends the technician	Shopkeeper	Shopkeeper	Customer, Technician	-

Table 1.1 (c) Actor Use case Table

Usecase	Primary Actor	System Actor	Other Participating Actor	Other Interested Stakeholder
Testing of refrigerator	Technician	Technician	Customer	-

Table 1.1 (d) Actor Use case Table

Usecase	Primary Actor	System Actor	Other Participating Actor	Other Interested Stakeholder
Problem's amount	Technician	Technician	Customer	-

Table 1.1 (e) Actor Use case Table

Usecase	Primary Actor	System Actor	Other Participating Actor	Other Interested Stakeholder
Advance Payment	Customer	Customer	Shopkeeper	-

Table 1.1 (f) Actor Use case Table

Usecase	Primary Actor	System Actor	Other Participating Actor	Other Interested Stakeholder
Inventory check	Shopkeeper	Shopkeeper	-	-

Table 1.1 (g) Actor Use case Table

Usecase	Primary Actor	System Actor	Other Participating Actor	Other Interested Stakeholder
Place Order	Shopkeeper	Shopkeeper	Vender	-

Table 1.1 (h) Actor Use case Table

Usecase	Primary Actor	System Actor	Other Participating Actor	Other Interested Stakeholder
Generates Bill	Vender	Vender	Shopkeeper	-

Table 1.1 (i) Actor Use case Table

Usecase	Primary Actor	System Actor	Other Participating Actor	Other Interested Stakeholder
Order deliver	Vender	Vender	Shopkeeper	-

Table 1.1 (j) Actor Use case Table

Usecase	Primary Actor	System Actor	Other Participating Actor	Other Interested Stakeholder
Payment by Shopkeeper	Shopkeeper	Shopkeeper	Vender	-

Table 1.1 (k) Actor Use case Table

Usecase	Primary Actor	System Actor	Other Participating Actor	Other Interested Stakeholder
Repairing of fridge	Technician	Technician	Shopkeeper	-

Table 1.1 (l) Actor Use case Table

Usecase	Primary Actor	System Actor	Other Participating Actor	Other Interested Stakeholder
Deliver to customer	Shopkeeper	Shopkeeper	Customer	-

Table 1.1 (m) Actor Use case Table

Usecase	Primary Actor	System Actor	Other Participating Actor	Other Interested Stakeholder
Full payment	Customer	Customer	Shopkeeper	-

Table 1.1 (n) Actor Use case Table

REPORT LIST TABLE:

USECASE	Reports
Customer ask for Testing	**Detailed** List of customers List of customers ask for testing **Summary** Testing summary Testing invoice Customer wise testing Customer Detail **Exception** Customer not ask for testing, many customers ask for testing

Table 1.2 (a) Report List Table

USECASE	Reports
Provide Details	**Detailed**

	List of customers Customer details and fridge details **Summary** Detailed summary **Exception** Detail have not saved

Table 1.2 (b) Report List Table

USECASE	Reports
Sends the Technician	**Detailed** List of customer Details about customer Details about fridge **Summary** Detailed summary Customer wise testing Technician Details **Exception** Technician can't examine problem

Table 1.2 (c) Report List Table

USECASE	Reports
Testing of Refrigerator	**Detailed** List of customer List of fridge for testing Fridge details **Summary** Testing summary Date of testing Customer wise testing Customer and fridge Details **Exception** Technician can't repair fridge

Table 1.2 (d) Report List Table

USECASE	Reports
Problem's Amount	**Detailed** List of customer List of problems List of problem's amount **Summary** Date of testing

	Problem details Problem Amount details Customer and fridge details **Exception** Problem's amount are too high Customer can't afford

Table 1.2 (e) Report List Table

USECASE	Reports
Advance Payment	**Detailed** Detail of customer List of problems Amount to be paid **Summary** Date of payment Advance Payment to be paid in cash to shopkeeper Testing summary Customer wise testing **Exception** Technician did not come for testing Advance payment was delayed Bill was generate with overwriting

Table 1.2 (f) Report List Table

USECASE	Reports
Inventory check	**Detailed** Detail of fridge List of problem Detail about inventory Detail about shop **Summary** Order summary Order invoice Fridge details **Exception** Parts are not available in market

Table 1.2 (g) Report List Table

USECASE	REPORT
Place Order	**Detailed** List of products Detail of Shopkeeper List of Orders **Summary** Order summary Order details **Exception** Product not ordered Shopkeeper haven't ordered any thing Order not delivered on time. Full payment was not given.

Table 1.2 (h) Report List Table

USECASE	REPORT
Generate Bill	**Detailed** Details about Shopkeeper List of products Details about company **Summary** Order summary Order invoice Customer wise orders Product wise orders Monthly orders (total numbers, total cost, average order cost,etc.) Order detail **Exception** Product not ordered

	Customer haven't ordered anything Enough Stock was not available

Table 1.2 (i) Report List Table

USECASE	REPORT
Order deliver to shopkeeper	**Detailed** List of products Details about customer Details about vendor Details about company **Summary** Order summary Order invoice Customer wise orders Product wise orders Monthly orders (total numbers, total cost, average order cost,etc.) Order detail **Exception** Product not ordered customer haven't ordered any thing Order not delivered on time. Enough Stock was not available

Table 1.2 (j) Report List Table

USECASE	REPORT
Payment by shopkeeper	**Detailed** Details about company Details about vendor Amount to be paid. **Summary** Date of payment Order summary Order invoice **Exception** Vendor did not deliver the order Payment was delayed Bill was generated with overwriting.

Table 1.2 (k) Report List Table

USECASE	REPORT
Repairing of fridge	**Detailed** Details about customer Details about problems **Summary** Problem summary Customer wise repairing **Exception** Late delivery Parts for repairing not available

Table 1.2 (l) Report List Table

USECASE	REPORT
Deliver to customer	**Detailed** Details about customer Details about shop Details about fridge **Summary** Customer wise orders fridge detail **Exception** Late delivery

Table 1.2 (m) Report List Table

USECASE	REPORT
Full payment	**Detailed** Details about customer Details about shop Amount to be paid. **Summary** Date of payment Payment details **Exception** Shopkeeper did not deliver the fridge on time Payment was delayed Bill was generated with overwriting.

Table 1.2 (n) Report List Table

REPORT DETAILED LIST

Customer ask for testing

<table>
<tr><td>Use Case Name</td><td colspan="2">Customer ask for testing</td><td rowspan="3">Business requirement: System analysis: System design:</td></tr>
<tr><td>Use Case ID</td><td colspan="2">--</td></tr>
<tr><td>Priority</td><td colspan="2">High</td></tr>
<tr><td>Primary Business Actor:</td><td colspan="3">Customer</td></tr>
<tr><td>Primary system Actor:</td><td colspan="3">Customer</td></tr>
<tr><td>Other Participating Actors:</td><td colspan="3">Shopkeeper</td></tr>
<tr><td>Descriptions</td><td colspan="3">This use case describes the event of a customer ask for testing of his/her refrigerator.</td></tr>
<tr><td>Precondition:</td><td colspan="3">There must be a technical problem in refrigerator.</td></tr>
<tr><td>Trigger:</td><td colspan="3">This use case initiated when the customer request for testing.</td></tr>
<tr><td rowspan="2">Typical Course of Events:</td><td>Actor Action</td><td colspan="2">System Response</td></tr>
<tr><td>Step 1: Customer enters the shop.

Step 2: Customer request for testing.</td><td colspan="2">Step 3: Shopkeeper accept the testing.</td></tr>
<tr><td>Alternate Course</td><td colspan="3">--</td></tr>
<tr><td>Conclusion:</td><td colspan="3">The use case concludes when the shopkeeper accept the testing.</td></tr>
</table>

Postcondition:	The customer response has been recorded and customer provide information to shopkeeper.

Table 1.3 (a) Analysis Use case Table

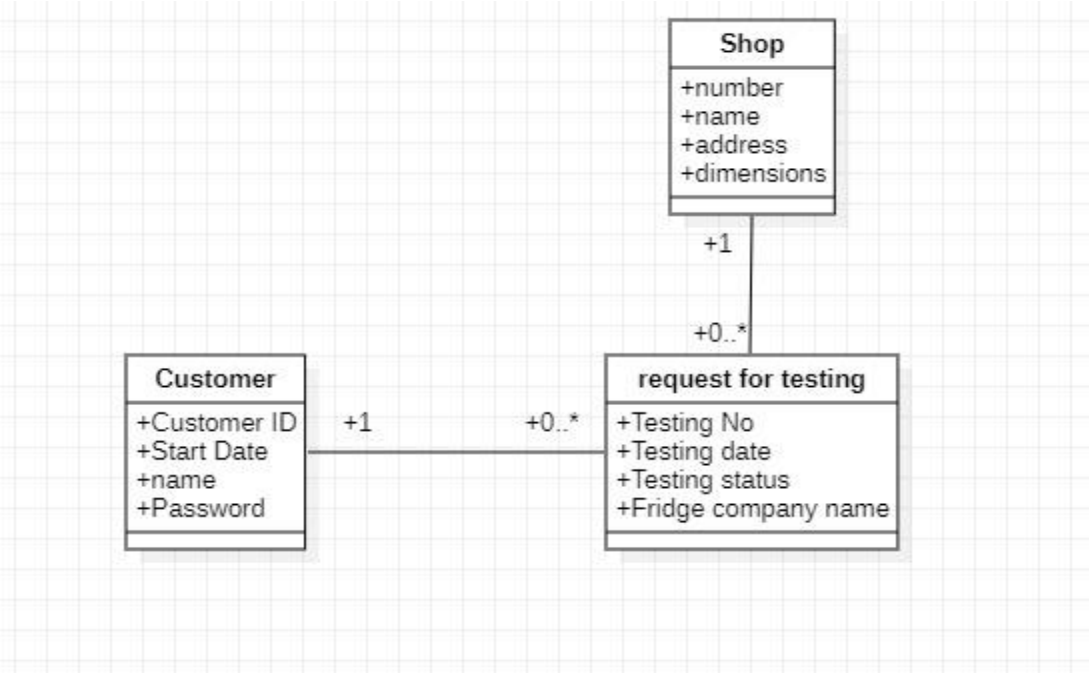


Figure 1.5 (a) Object Diagram

Provide details

Use Case Name	Provide details	Business requirement: System analysis: System design:
Use Case ID	--	
Priority	High	

Primary Business Actor:	Customer	
Primary system Actor:	Customer	
Other Participating Actors:	Shopkeeper	
Descriptions	This use case describes the event in which customer is providing his/her details..	
Precondition:	Customer availability.	
Trigger:	This use case initiated when the customer request is accepted.	
Typical Course of Events:	Actor Action	System Response
	Step 1: Customer provide his/her details like: name, address, phone number and also fridge details (name, model no) etc.	Step 2: Shopkeeper saving the customer details.
Alternate Course	--	
Conclusion:	The use case concludes when the shopkeeper receives the customer information.	
Postcondition:	The customer information has been recorded and shopkeeper sends the technician.	

Table 1.3 (b) Analysis Use case Table

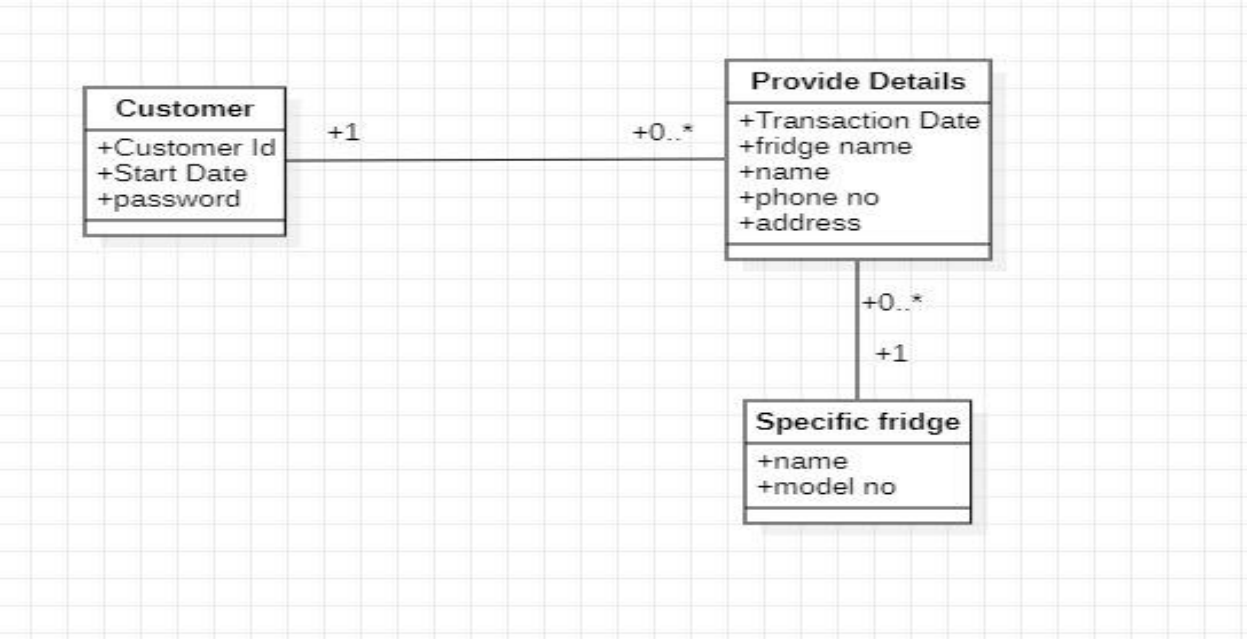


Figure 1.5 (b) Object Diagram

Use Case Name	Provide details	Business require ment: System analysis: System design:
Use Case ID	--	
Priority	High	
Primary Business Actor:	Customer	
Primary system Actor:	Customer	
Other Participating Actors:	Shopkeeper	
Descriptions	This use case describes the event in which customer is providing his/her details.	
Precondition:	Customer must click on the provide detail button.	

Trigger:	This use case initiated when the customer request is accepted.	
Typical Course of Events:	Actor Action	System Response
	Step 1: Customer open the website. Step 2: Customer click on the customer's interface button. Step 4: Customer enter the details and click on the save button.	Step 3: System responds by displaying a window "w1-Provide details" to enter the customer and fridge information such as: Id, name, email, contact, address, gender, fridge company, fridge model, date, problems details. Step 5: Message is displayed that your information has been saved.
Alternate Course	--	
Conclusion:	The use case concludes when the shopkeeper receives the customer information.	
Postcondition:	The customer information has been recorded and shopkeeper sends the technician.	

Table 1.4 (b) Design Use case Table

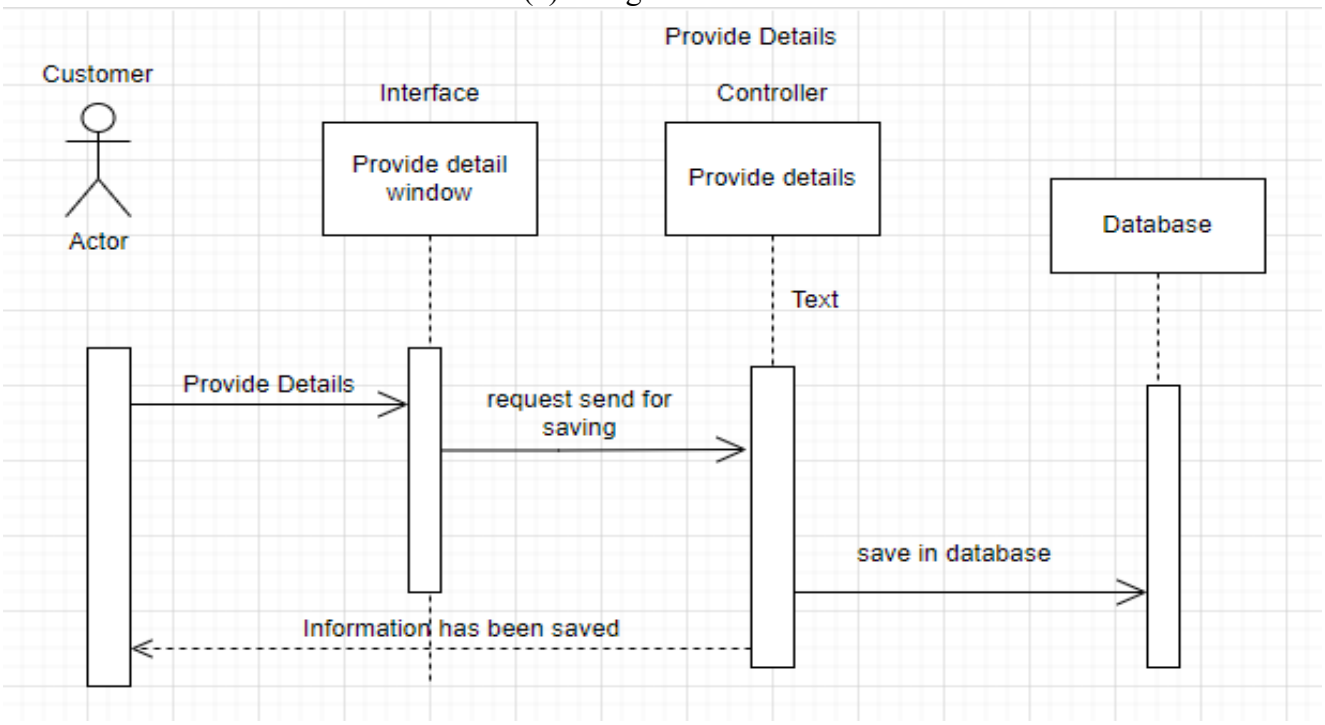
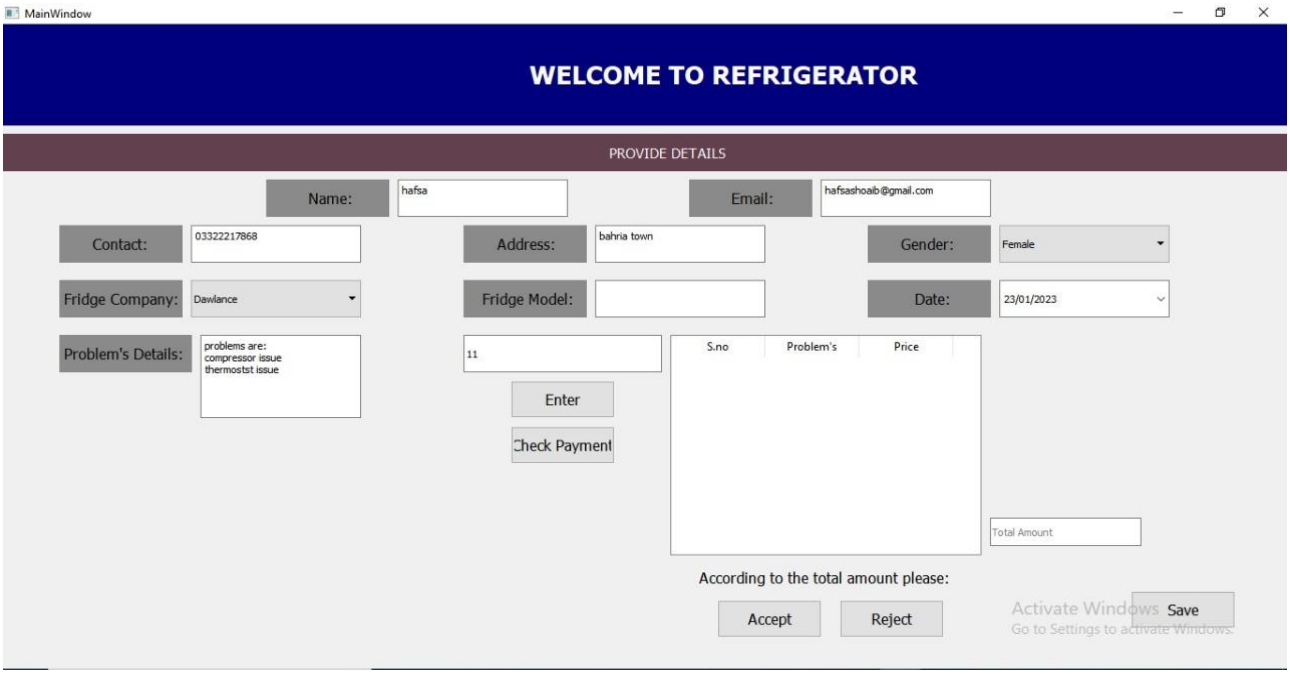


Figure 1.6 (b) Sequence Diagram



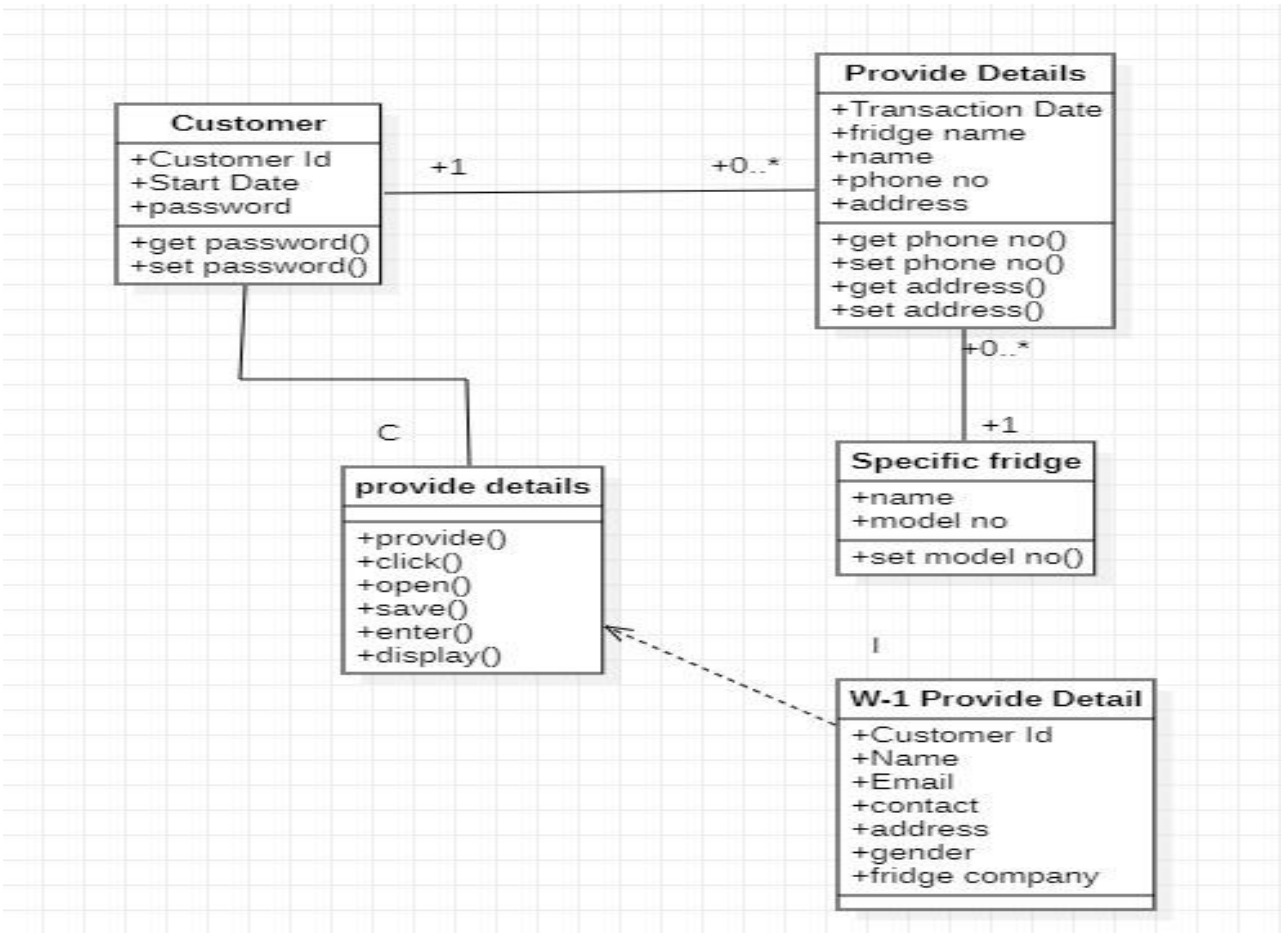


Figure 1.7 (b) Class Diagram

Sends the technician

<table>
<tr><td>Use Case Name</td><td>Sends the technician</td><td rowspan="3">Business requirement:
System analysis:
System design:</td></tr>
<tr><td>Use Case ID</td><td>MST-001</td></tr>
<tr><td>Priority</td><td>High</td></tr>
<tr><td>Primary Business Actor:</td><td colspan="2">Shopkeeper</td></tr>
<tr><td>Primary system Actor:</td><td colspan="2">Shopkeeper</td></tr>
<tr><td>Other Participating Actors:</td><td colspan="2">Customer, Technician</td></tr>
<tr><td>Descriptions</td><td colspan="2">This use case describes the event when the shopkeeper sends the technician.</td></tr>
<tr><td>Precondition:</td><td colspan="2">Technician availability at the shop.</td></tr>
<tr><td>Trigger:</td><td colspan="2">This use case initiated when the customer information is received.</td></tr>
<tr><td rowspan="2">Typical Course of Events:</td><td>Actor Action</td><td>System Response</td></tr>
<tr><td>Step 1: Shopkeeper sends the technician.</td><td>Step 2: Technician go to customer house.</td></tr>
<tr><td>Alternate Course</td><td colspan="2">--</td></tr>
<tr><td>Conclusion:</td><td colspan="2">The use case concludes when the technician go to customer house.</td></tr>
</table>

Postcondition:	Technician reach to customer house and test the refrigerator.

Table 1.3 (c) Analysis Use case Table

Testing of refrigerator

Use Case Name	Testing of refrigerator	Business requirement: System analysis: System design:
Use Case ID	MST-002	
Priority	High	
Primary Business Actor:	Technician	
Primary system Actor:	Technician	
Other Participating Actors:	Customer	
Descriptions	This use case describes the event of a technician testing the refrigerator.	
Precondition:	Technician must have idea about his work.	
Trigger:	This use case initiated when the technician reach the customer house.	
Typical Course of Events:	Actor Action	System Response
	Step 1: Technician test the refrigerator. Step 2: Technician tells the list of problems of fridge to the customer like: compressor problem, water leakage, Thermostat, gas leakage etc.	Step 3: Customer asks for the amount.

Alternate Course	Step 2: If the problem is Compressor problem then the price is 5000 & if the problem is water leakage then the price is 2000 & if the problem is Thermostat then the price is 3000 & if the problem is Gas leakage then the price is 2000.	
Conclusion:	The use case concludes when the customer ask for problem's amount.	
Postcondition:	Technician tells the problem's amount of fridge.	

Table 1.3 (d) Analysis Use case Table

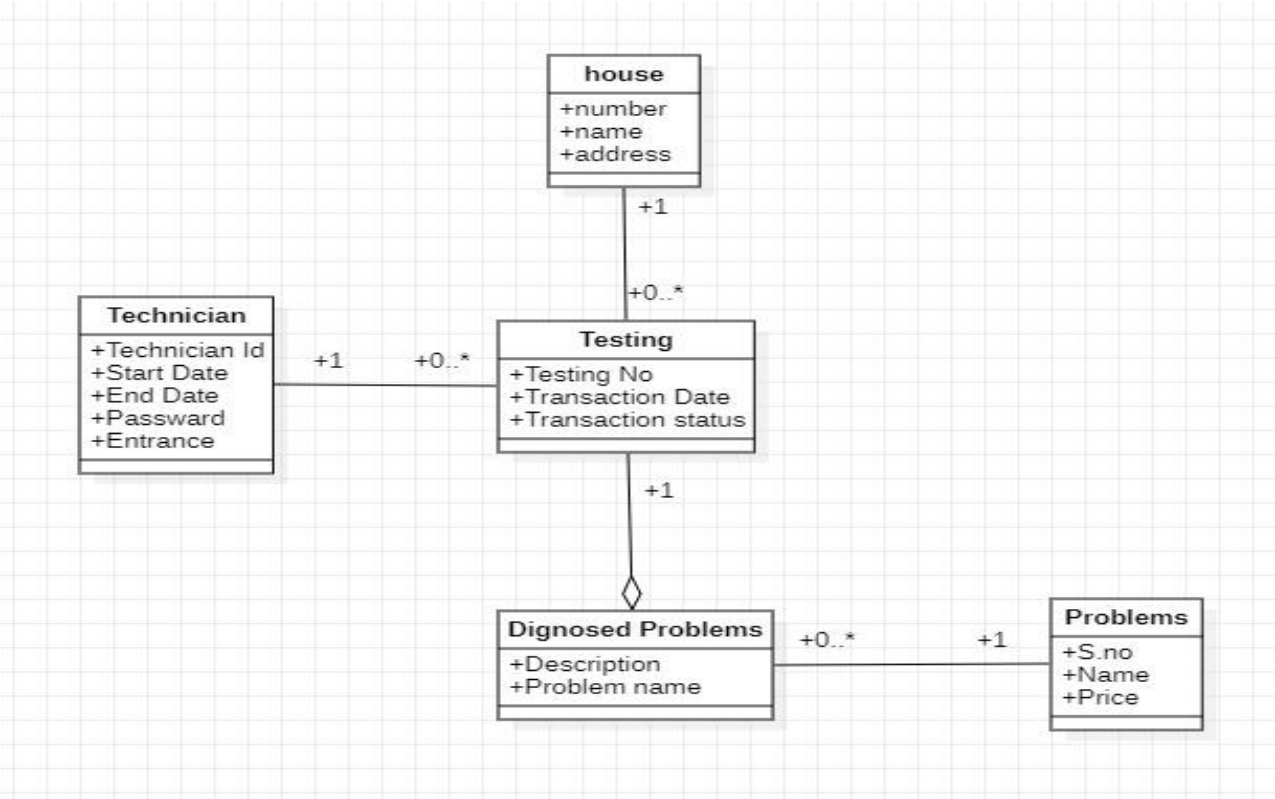


Figure 1.5 (d) Object Diagram

Use Case Name	Testing of refrigerator	Business requirement: System analysis: System design:
Use Case ID	MST-002	
Priority	High	
Primary Business Actor:	Technician	
Primary system Actor:	Technician	
Other Participating Actors:	Customer	
Descriptions	This use case describes the event of a technician testing the refrigerator.	
Precondition:	Technician must have idea about his work.	
Trigger:	This use case initiated when the technician reach the customer house.	
Typical Course of Events:	Actor Action	System Response
	Step 1: Testing is done. Step 3: Technician select the problem's from the list which are in the fridge which display in separate grid.	Step 2: System responds by displaying a window "w2-Problem's list" which contains compressor problem, water leakage, Thermostat, gas leakage etc. and their description and prices. Step 4: Another window is displayed "w3-Total amount" which shows the total amount for repairing and a/cc to that customer accept or reject.
Alternate Course	Step 2: If the problem is Compressor problem then the price is 5000 & if the problem is water leakage then the price is 2000 & if the problem is Thermostat then the price is 3000 & if the problem is Gas leakage then the price is 2000.	

Conclusion:	The use case concludes when the customer ask for problem's amount.
Postcondition:	Technician tells the problem's amount of fridge.

Table 1.4 (d) Design Use case Table

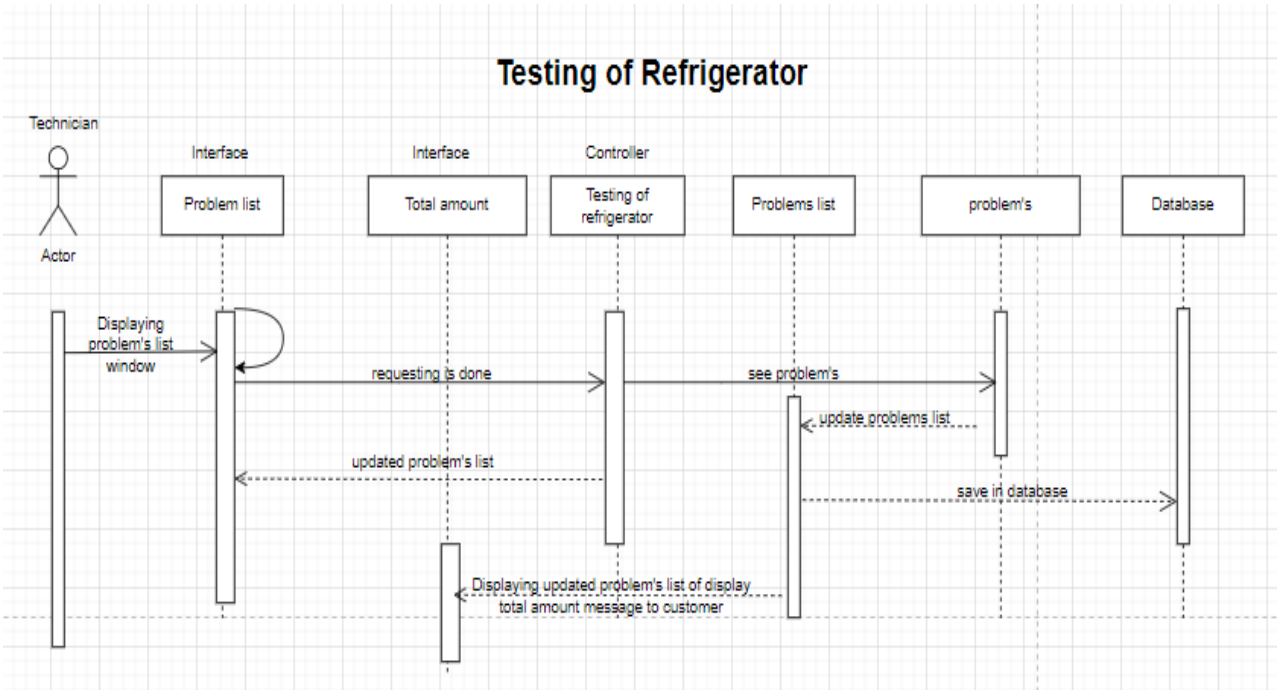
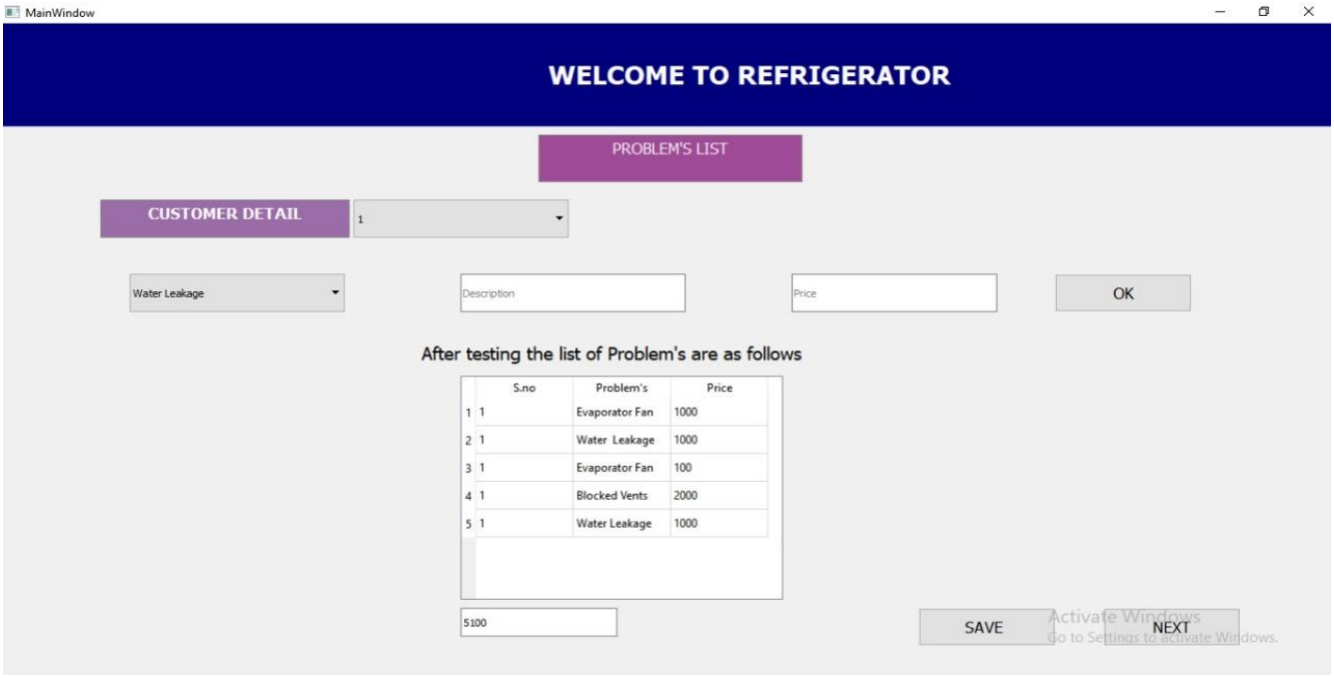


Figure 1.6 (d) Sequence Diagram



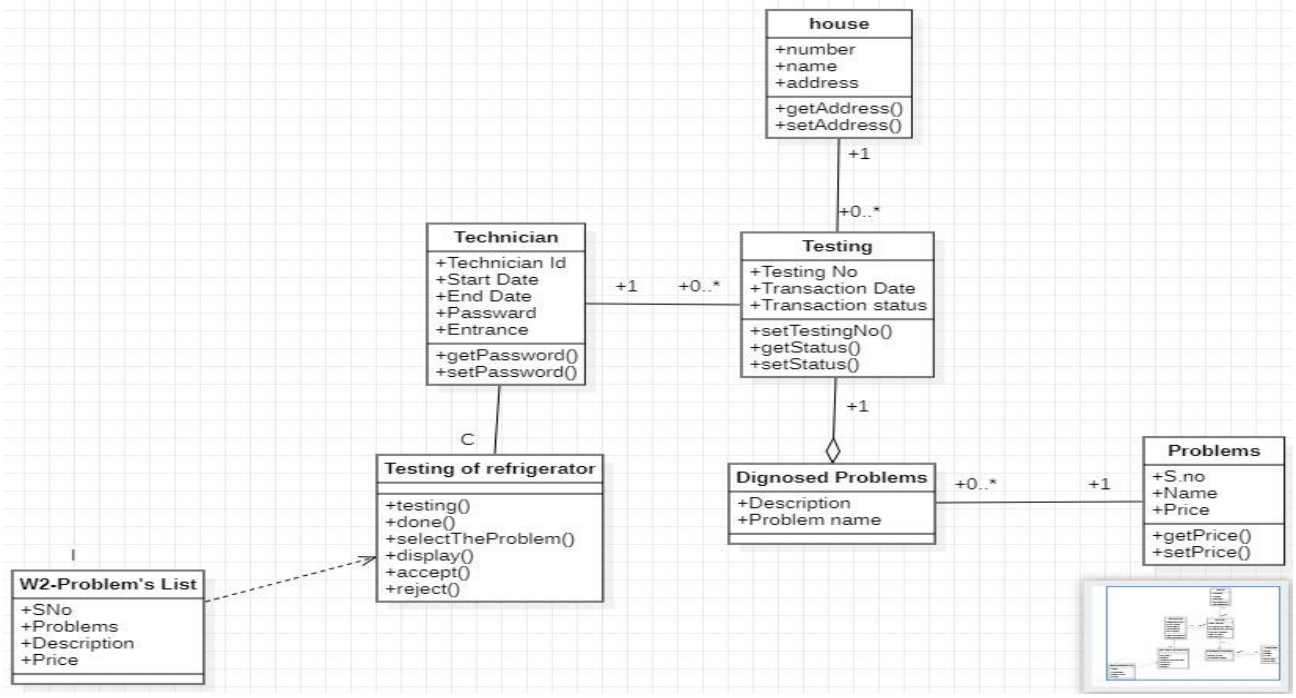


Figure 1.7 (d) Class Diagram

Problem's amount

Use Case Name	Problem's amount	Business requirement: System analysis: System design:
Use Case ID	MST-003	
Priority	High	
Primary Business Actor:	Technician	
Primary system Actor:	Technician	

Other Participating Actors:	Customer	
Descriptions	This use case describes the event in which technician tells the problem's amount.	
Precondition:	Technician should test the refrigerator first.	
Trigger:	This use case initiated when the customer asks for problem's amount.	
Typical Course of Events:	Actor Action	System Response
	Step 1: Technician tells the problem's amount.	Step 2: Customer gives the advance payment.
Alternate Course	Step 2: If the customer does not accept the problem's amount so the procedure is cancelled.	
Conclusion:	The use case concludes when the customer accept the problem's amount.	
Postcondition:	Customer gives the advance payment.	

Table 1.3 (e) Analysis Use case Table

Advance payment

Use Case Name	Advance payment	Business requirement: System analysis: System design:
Use Case ID	--	
Priority	High	

Primary Business Actor:	Customer	
Primary system Actor:	Customer	
Other Participating Actors:	Shopkeeper	
Descriptions	This use case describes the event of an advance payment given by customer.	
Precondition:	Customer should have amount to pay.	
Trigger:	This use case initiated when the customer accept the problem's amount.	
Typical Course of Events:	Actor Action	System Response
	Step 1: Customer gives the advance payment.	Step 2: Shopkeeper accept the advance payment.
Alternate Course	--	
Conclusion:	The use case concludes when the shopkeeper accept the advance payment.	
Postcondition:	After receiving advance payment, shopkeeper check his inventory.	

Table 1.3 (f) Analysis Use case Table

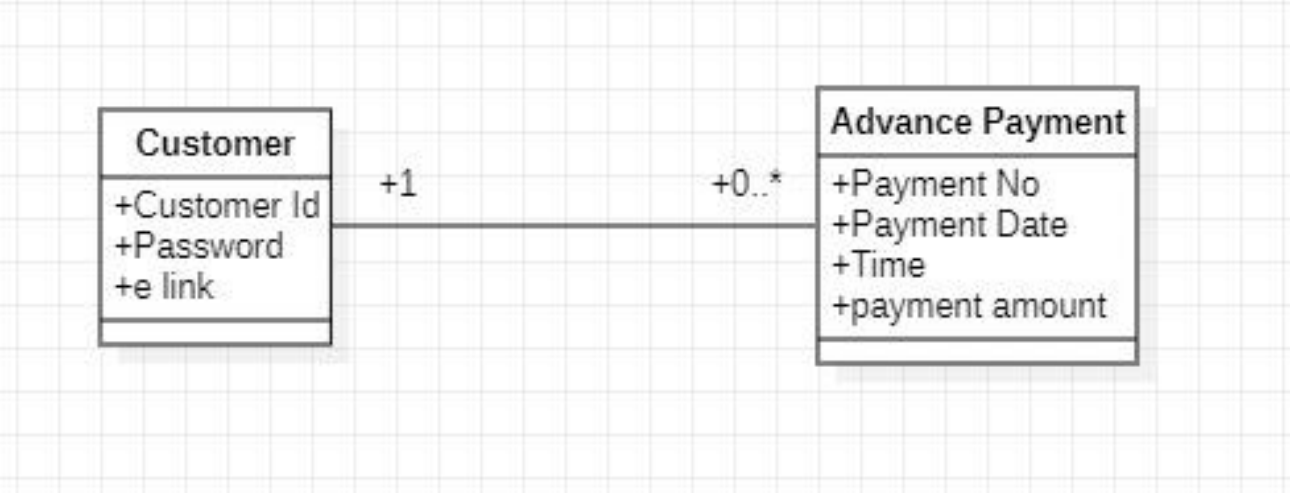


Figure 1.5 (f) Object Diagram

Inventory check

Use Case Name	Inventory check	Business requirement: System analysis: System design:
Use Case ID	MST-004	
Priority	High	
Primary Business Actor:	Shopkeeper	
Primary system Actor:	Shopkeeper	
Other Participating Actors:	--	
Descriptions	This use case describes the event of an inventory check of the shop by the shopkeeper.	
Precondition:	The shopkeeper must be available and aware of the problem.	
Trigger:	This use case initiated when the customer give the advance payment.	
Typical Course of Events:	Actor Action	System Response

	Step 1: Shopkeeper check his inventory.	Step 2: If in inventory parts of fridge are available then shopkeeper give parts to technician.
Alternate Course	Step 2: If in inventory parts of fridge are not available then shopkeeper place order.	
Conclusion:	The use case concludes when the inventory check is done.	
Postcondition:	Shopkeeper place the order.	

Table 1.3 (g) Analysis Use case Table

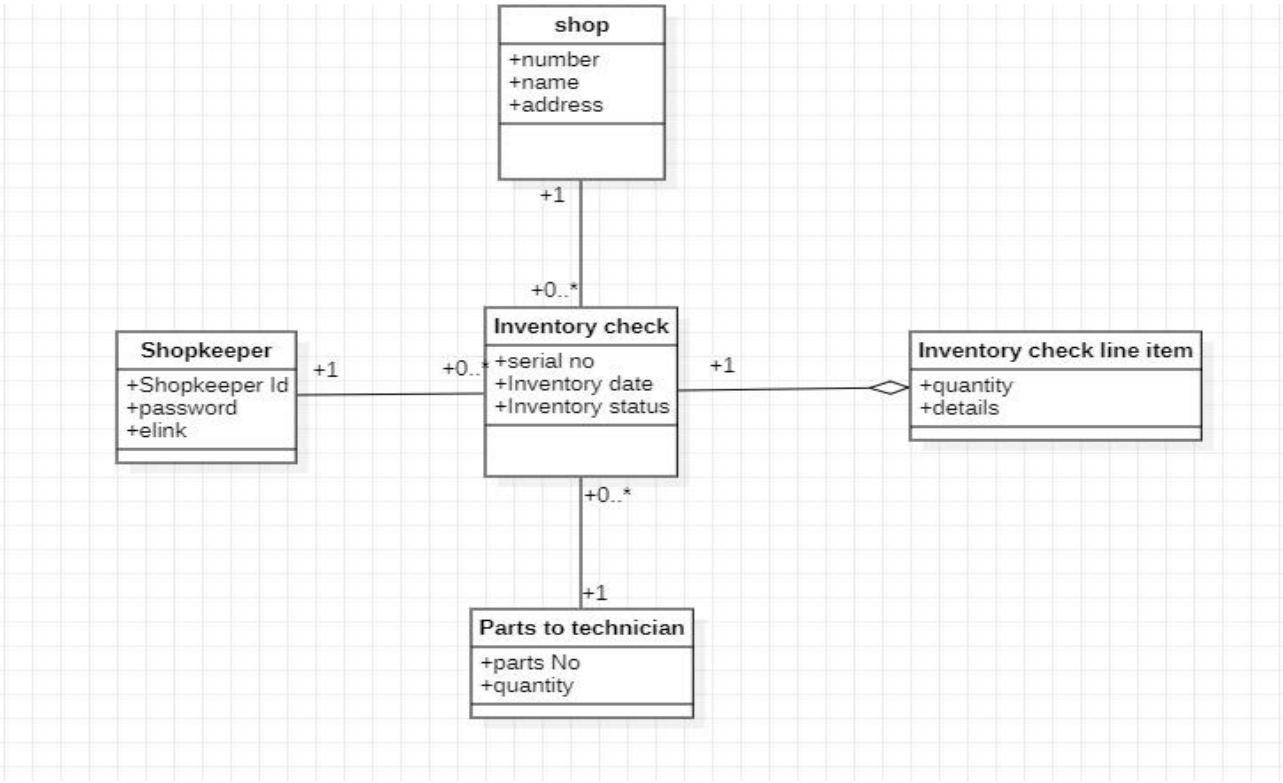


Figure 1.5 (g) Object Diagram

Use Case Name	Inventory check	Business requirement:
Use Case ID	MST-004	
Priority	High	

		System analysis: System design:
Primary Business Actor:	Shopkeeper	
Primary system Actor:	Shopkeeper	
Other Participating Actors:	--	
Descriptions	This use case describes the event of an inventory check of the shop by the shopkeeper.	
Precondition:	The shopkeeper must be available and aware of the problem.	
Trigger:	This use case initiated when the customer give the advance payment.	
Typical Course of Events:	Actor Action	System Response
	Step 1: Shopkeeper check his inventory.	Step 2: System responds by displaying a window "w4-Inventory check" which shows items and status of items. Step 3: If in inventory parts of fridge are available, another window is displayed "w5(a)-Items for repairing" which contains s.no, items and quantity.
Alternate Course	Step 2: If in inventory parts of fridge are not available, another window is displayed "w5(b)-Items to place order" which contains s.no, items and quantity, then shopkeeper place order.	
Conclusion:	The use case concludes when the inventory check is done.	
Postcondition:	Shopkeeper place the order.	

Table 1.4 (g) Design Use case Table

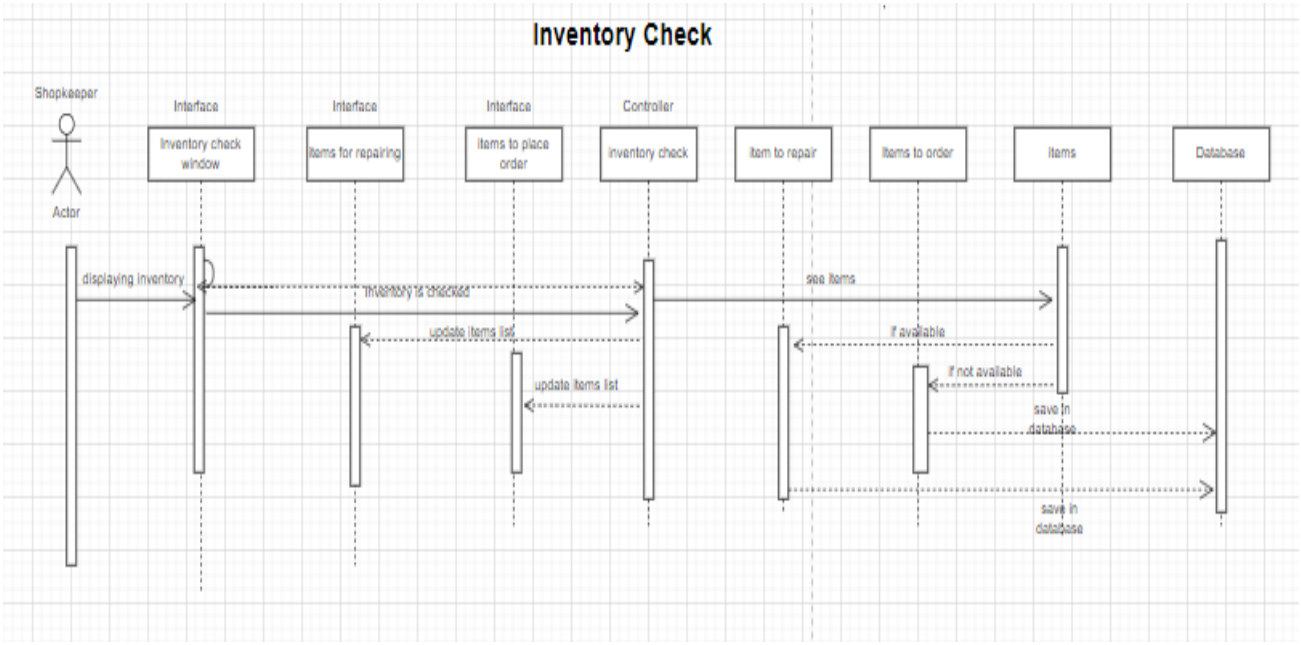
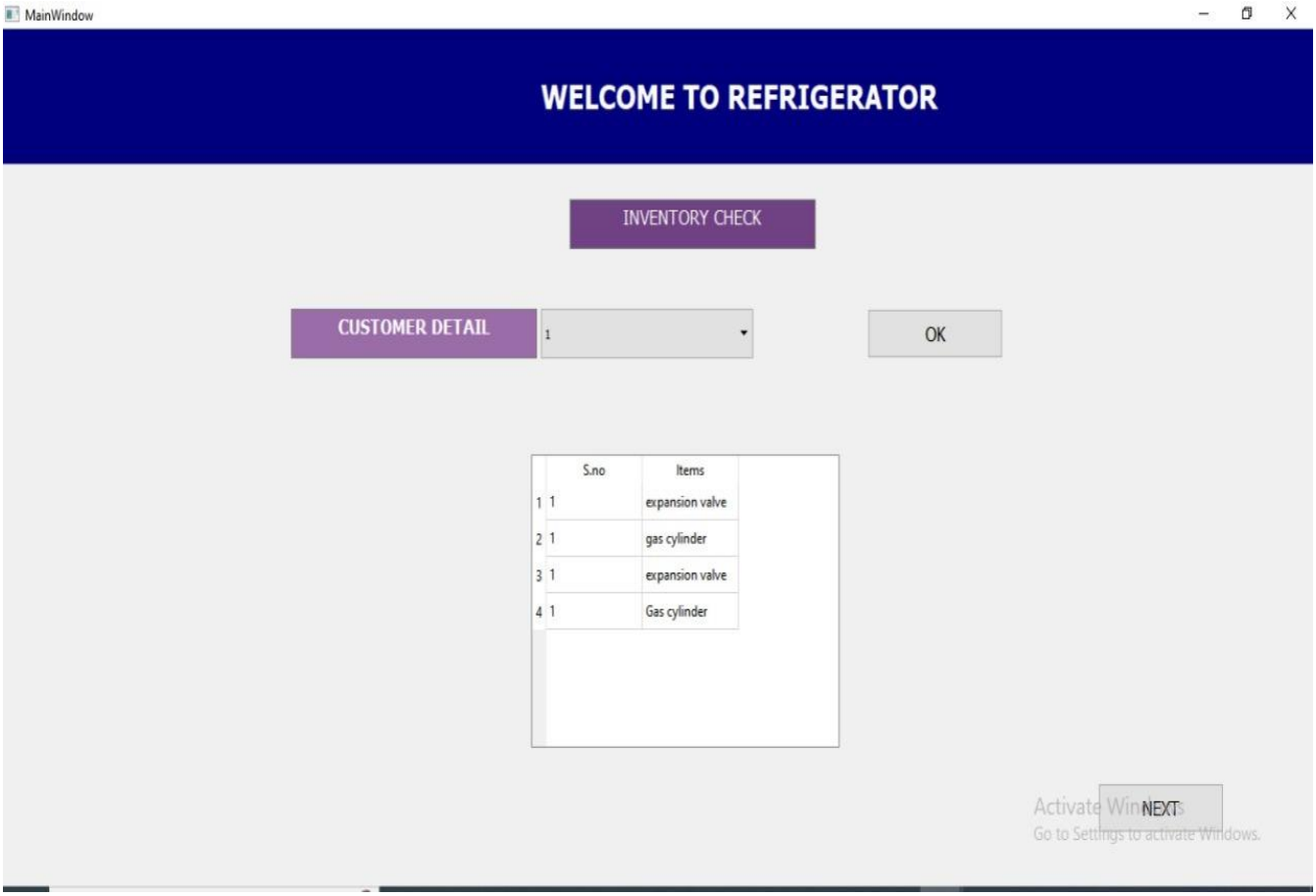


Figure 1.6 (g) Sequence Diagram



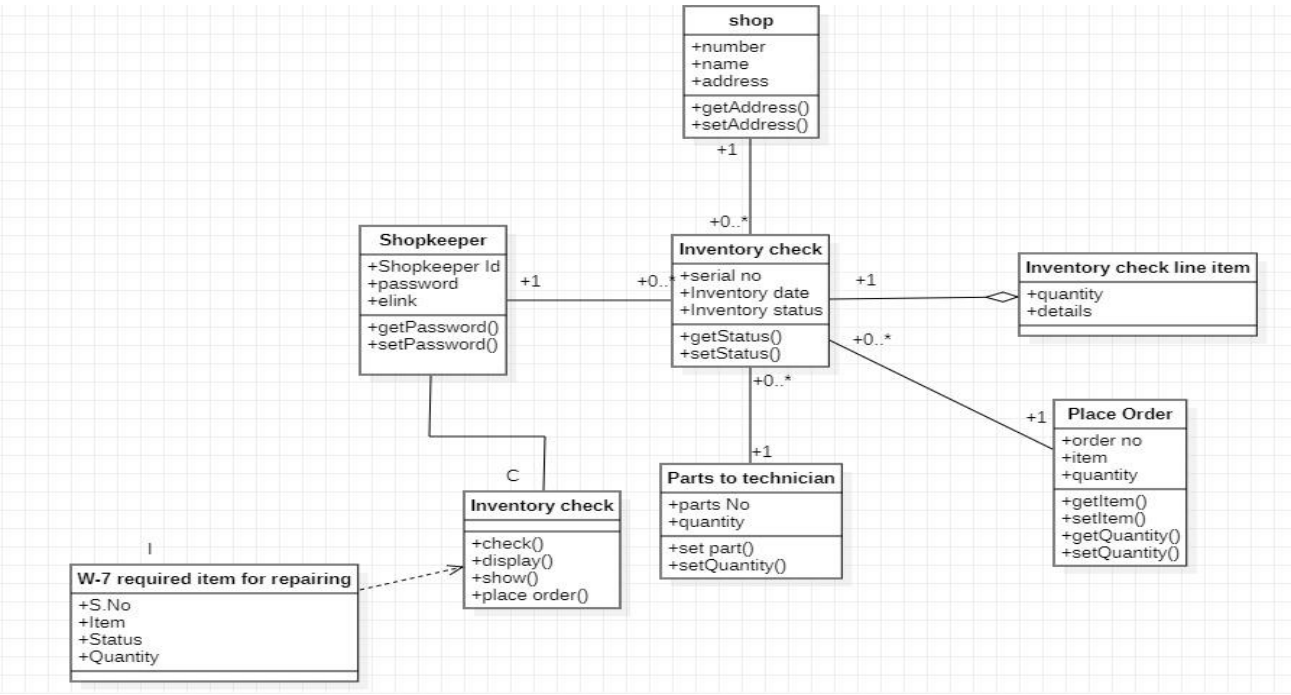


Figure 1.7 (g) Class Diagram

Place order

Use Case Name	Place order	Business requirement: System analysis: System design:
Use Case ID	MST-005	
Priority	High	
Primary Business Actor:	Shopkeeper	
Primary system Actor:	Shopkeeper	
Other Participating Actors:	Vender	

Descriptions	This use case describes the event of a shopkeeper placing order for parts of fridge.	
Precondition:	The parts of fridge are not available in inventory.	
Trigger:	This use case initiated when the inventory is checked.	
Typical Course of Events:	Actor Action	System Response
	Step 1: Shopkeeper place new order like: Compressor, Copper tube, gas thermostat, Bi-meter.	Step 2: Vender ensures all the necessary information has been provided for the product manufacture. Step 3: The documentation of the order is prepared by Vender
Alternate Course	--	
Conclusion:	The use case concludes when the vender prepared the order documentation.	
Postcondition:	Vender generates bill of the order.	

Table 1.3 (h) Analysis Use case Table

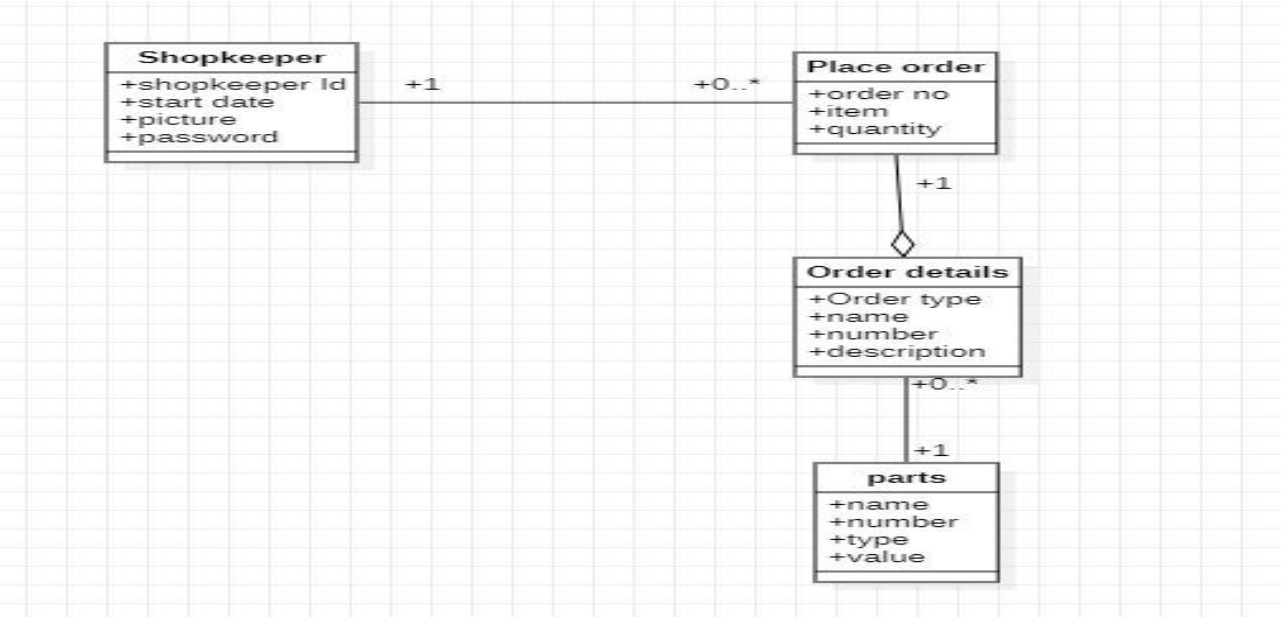


Figure 1.5 (h) Object Diagram

Generates Bill

Use Case Name	Generates Bill	Business requirement: System analysis: System design:
Use Case ID	--	
Priority	High	
Primary Business Actor:	Vender	
Primary system Actor:	Vender	
Other Participating Actors:	Shopkeeper	
Descriptions	This use case describes the event of a vender generates bill of the order.	
Precondition:	Vender should have material ordered by the shopkeeper.	
Trigger:	This use case initiated when the shopkeeper place order.	
Typical Course of Events:	Actor Action	System Response
	Step 1: Vender generates Bill of parts of fridge to shopkeeper.	Step 2: Shopkeeper accept the bill.
Alternate Course	--	
Conclusion:	The use case concludes when the shopkeeper accept the bill.	
Postcondition:	Vender deliver order to shopkeeper.	

Table 1.3 (i) Analysis Use case Table

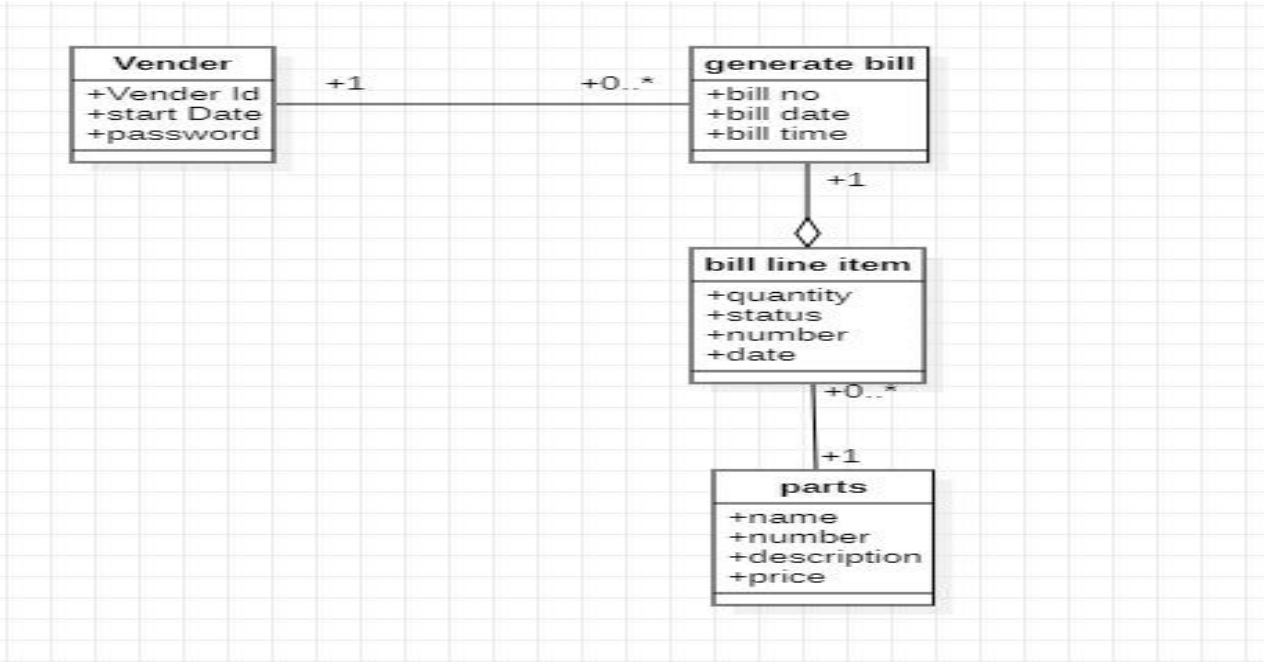


Figure 1.5 (i) Object Diagram

Use Case Name	Generates Bill	Business requirement: System analysis: System design:
Use Case ID	--	
Priority	High	
Primary Business Actor:	Vender	
Primary system Actor:	Vender	
Other Participating Actors:	Shopkeeper	
Descriptions	This use case describes the event of a vender generates bill of the order.	

Precondition:	Vender should have material ordered by the shopkeeper.	
Trigger:	This use case initiated when the shopkeeper place order.	
Typical Course of Events:	Actor Action	System Response
	Step 1: Vender generates Bill of parts of fridge to shopkeeper.	Step 2: System responds by displaying a window "w6-Bill" to Shopkeeper which contains name, bill id, description, quantity and price. Step 3: Message is displayed that Welcome to refrigerator's order has been delivered"
Alternate Course	--	
Conclusion:	The use case concludes when the shopkeeper accept the bill.	
Postcondition:	Vender deliver order to shopkeeper.	

Table 1.4 (i) Design Use case Table

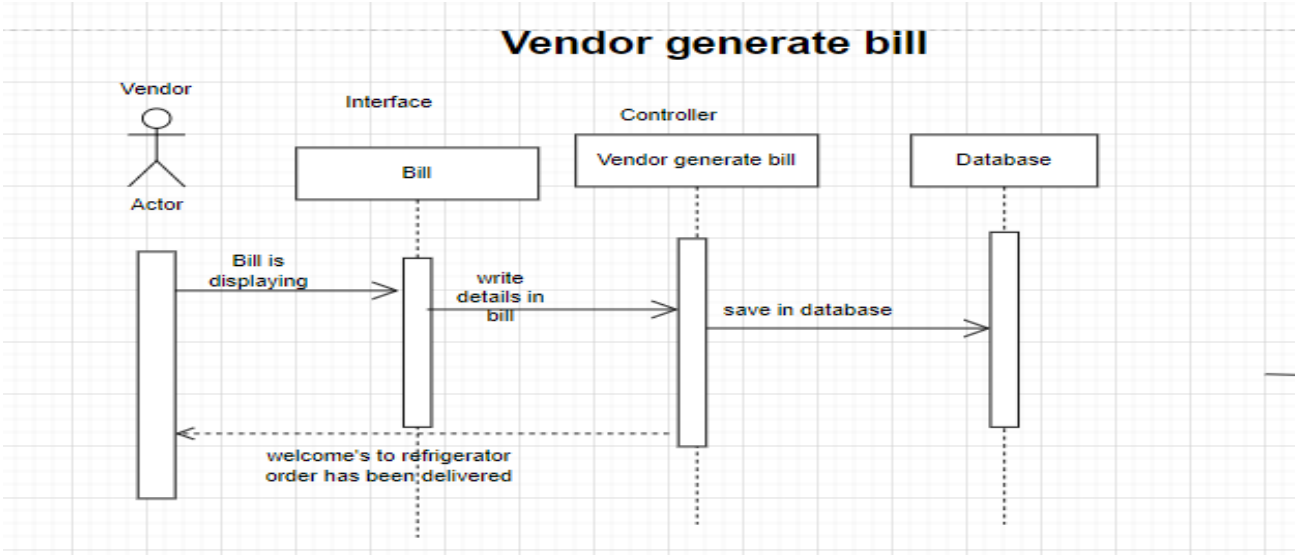


Figure 1.6 (i) Sequence Diagram

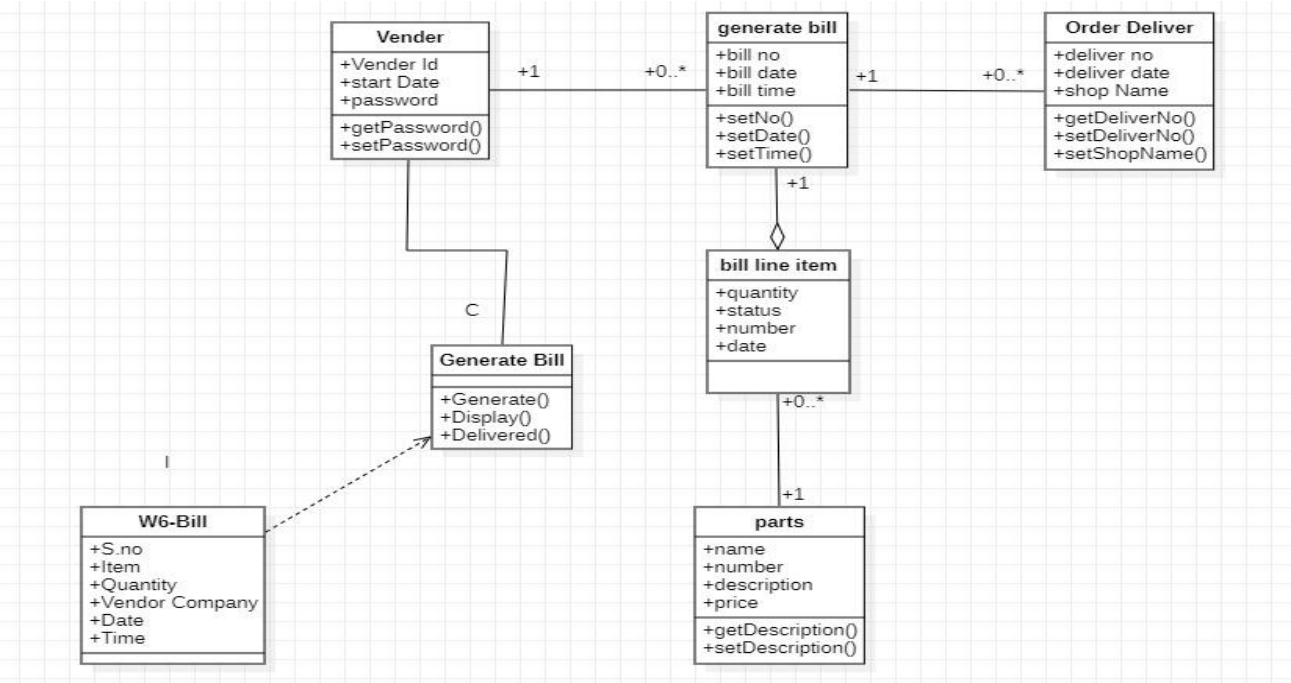


Figure 1.7 (i) Class Diagram

Order deliver

Use Case Name	Order deliver	Business requirement:System analysis: System design:
Use Case ID	--	
Priority	High	
Primary Business Actor:	Vender	
Primary system Actor:	Vender	

Other Participating Actors:	Shopkeeper	
Descriptions	This use case describes the event of an order deliver by vender.	
Precondition:	Shopkeeper must give correct information of shop.	
Trigger:	This use case initiated when the vender generates bill.	
Typical Course of Events:	Actor Action	System Response
	Step 1: Vender deliver order (parts of fridge) to shopkeeper.	Step 2: Shopkeeper accept the delivery of order.
Alternate Course	--	
Conclusion:	The use case concludes when the shopkeeper accept the delivery of order.	
Postcondition:	The order has been delivered and the shopkeeper pays the bill.	

Table 1.3 (j) Analysis Use case Table

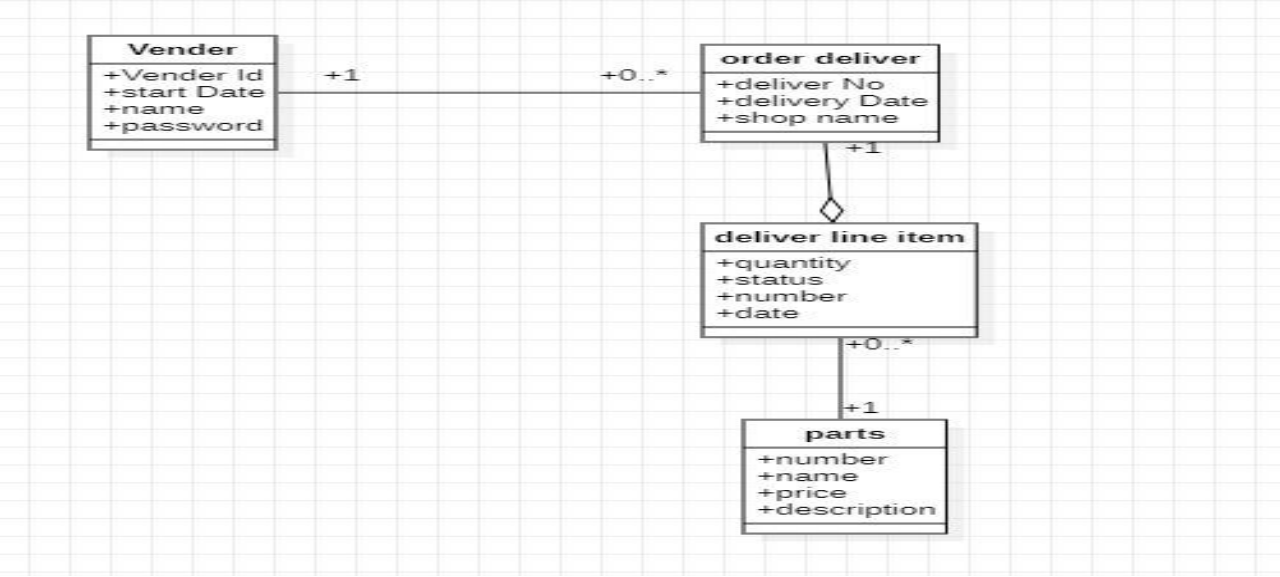


Figure 1.5 (j) Object Diagram

Payment by Shopkeeper

<table>
<tr><td>Use Case Name</td><td>Payment by Shopkeeper</td><td rowspan="3">Business requirement:System analysis: System design:</td></tr>
<tr><td>Use Case ID</td><td>MST-006</td></tr>
<tr><td>Priority</td><td>High</td></tr>
<tr><td>Primary Business Actor:</td><td colspan="2">Shopkeeper</td></tr>
<tr><td>Primary system Actor:</td><td colspan="2">Shopkeeper</td></tr>
<tr><td>Other Participating Actors:</td><td colspan="2">Vender</td></tr>
<tr><td>Descriptions</td><td colspan="2">This use case describes the event of a payment given by shopkeeper.</td></tr>
<tr><td>Precondition:</td><td colspan="2">An order should be placed.</td></tr>
<tr><td>Trigger:</td><td colspan="2">This use case initiated when the vender deliver order.</td></tr>
<tr><td rowspan="2">Typical Course of Events:</td><td>Actor Action</td><td>System Response</td></tr>
<tr><td>Step 1: Shopkeeper give the payment and now parts of fridge are available in our inventory.</td><td>Step 2: Vender accept the payment.</td></tr>
<tr><td>Alternate Course</td><td colspan="2">--</td></tr>
<tr><td>Conclusion:</td><td colspan="2">The use case concludes when the vender accept the payment.</td></tr>
<tr><td>Postcondition:</td><td colspan="2">Technician repair the fridge.</td></tr>
</table>

Table 1.3 (k) Analysis Use case Table

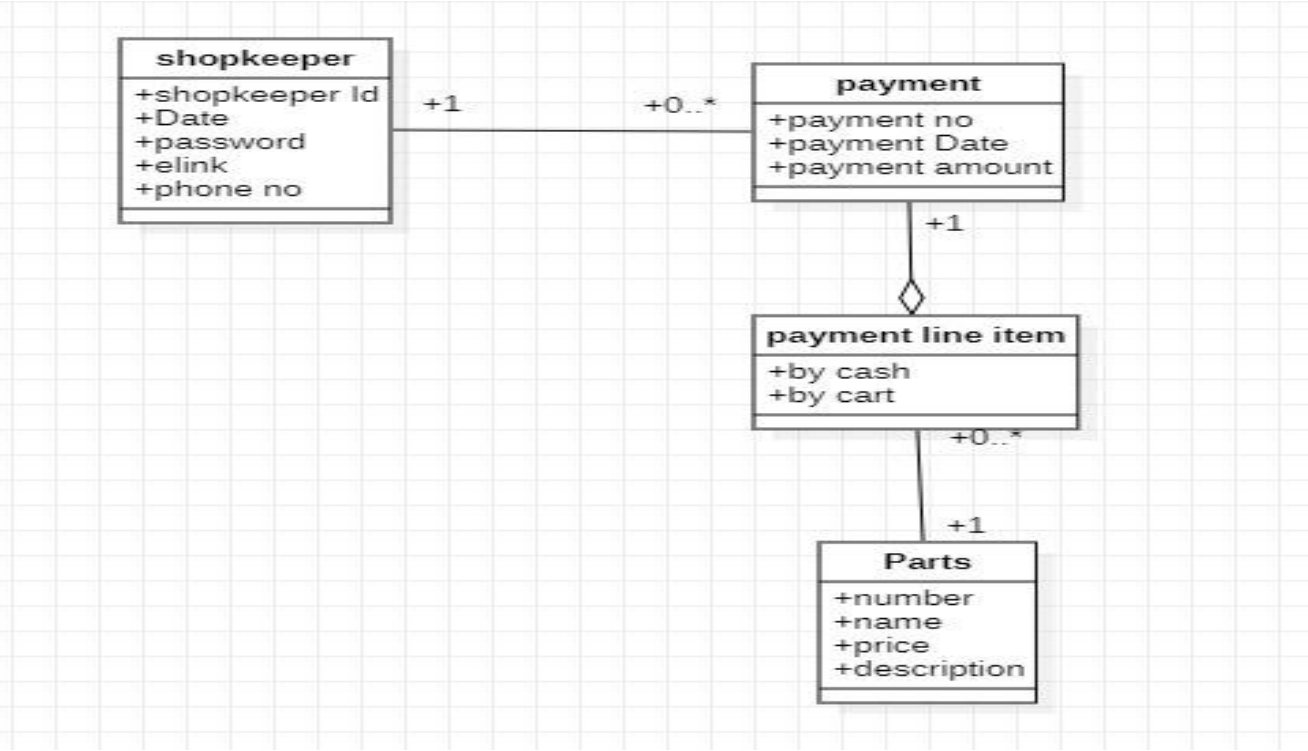


Figure 1.5 (k) Object Diagram

Use Case Name	Payment by Shopkeeper	Business requirement:System analysis: System design:
Use Case ID	MST-006	
Priority	High	
Primary Business Actor:	Shopkeeper	
Primary system Actor:	Shopkeeper	
Other Participating Actors:	Vender	
Descriptions	This use case describes the event of a payment given by shopkeeper.	

Precondition:	An order should be placed.	
Trigger:	This use case initiated when the vender deliver order.	
Typical Course of Events:	Actor Action	System Response
	Step 1: Shopkeeper pay the payment and now parts of fridge are available in shopkeeper's inventory.	Step 2: Bill is displayed and also system responds by displaying a window "w7-Payment" which contains amount, balance, status and mode of payment.
Alternate Course	--	
Conclusion:	The use case concludes when the vender accept the payment.	
Postcondition:	Technician repair the fridge.	

Table 1.4 (k) Design Use case Table

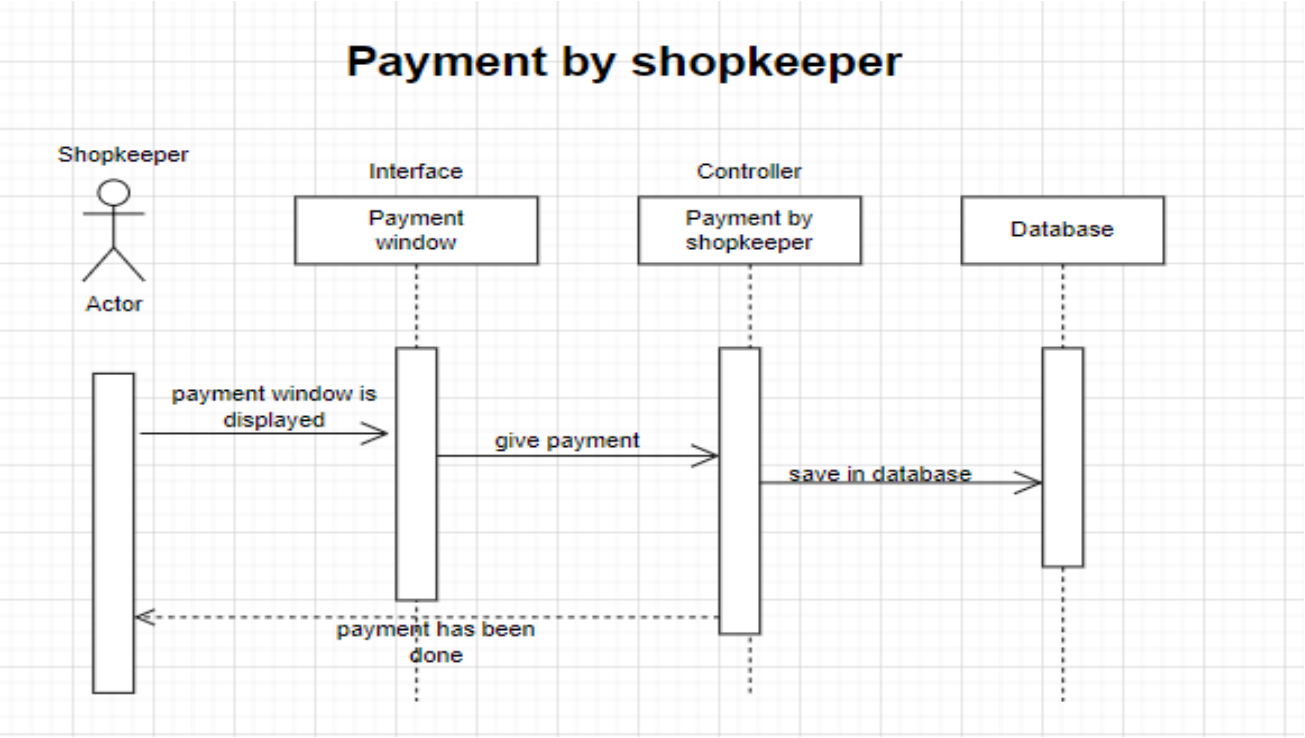


Figure 1.6 (k) Sequence Diagram

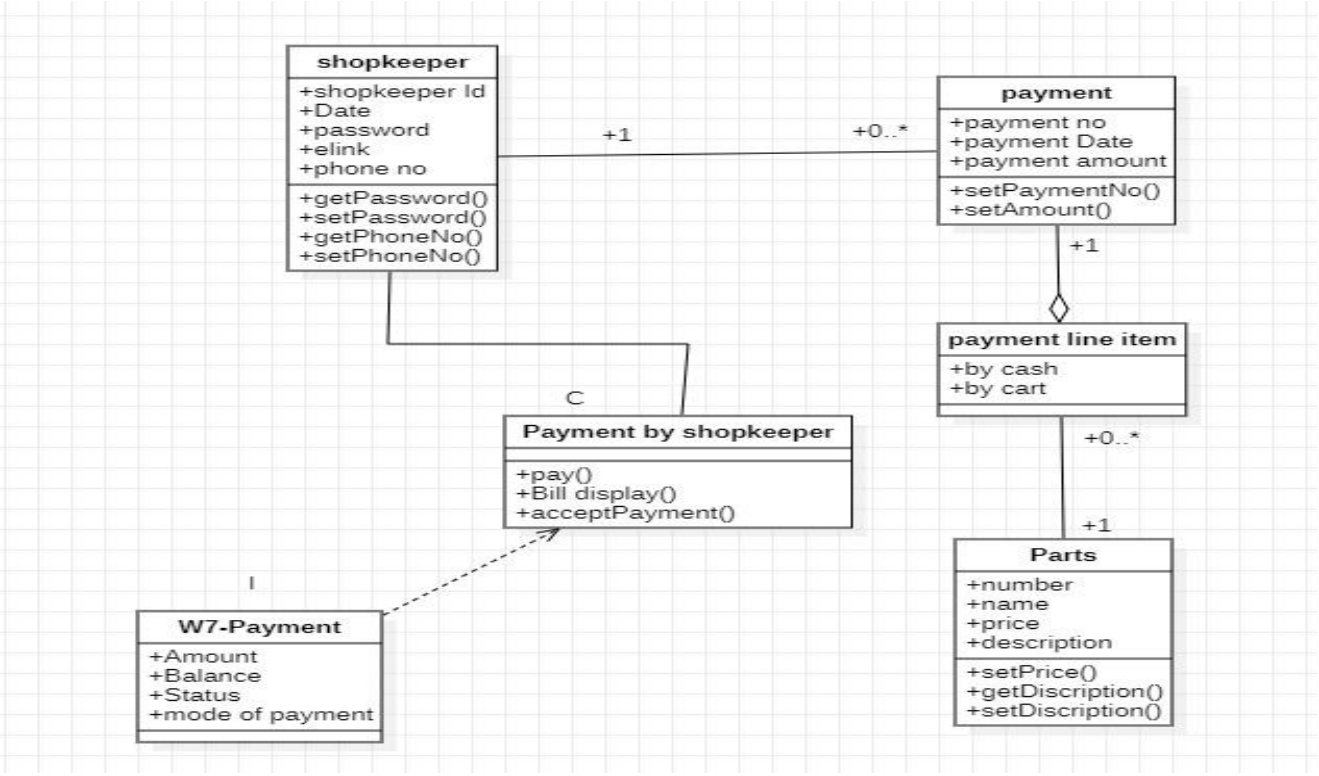


Figure 1.7 (k) Class Diagram

Repairing of fridge

Use Case Name	Repairing of fridge	Business requirement:System analysis: System design:
Use Case ID	MST-007	
Priority	High	
Primary Business Actor:	Technician	
Primary system Actor:	Technician	
Other Participating Actors:	Shopkeeper	

Descriptions	This use case describes the event of a repairing of fridge.	
Precondition:	Technician availability.	
Trigger:	This use case initiated when the parts are available.	
Typical Course of Events:	Actor Action	System Response
	Step 1: Technician repair the fridge. Step 2: Technician give fridge to shopkeeper.	Step 3: Shopkeeper accept the fridge.
Alternate Course	--	
Conclusion:	The use case concludes when the shopkeeper accept the fridge.	
Postcondition:	Shopkeeper deliver fridge to customer.	

Table 1.3 (l) Analysis Use case Table

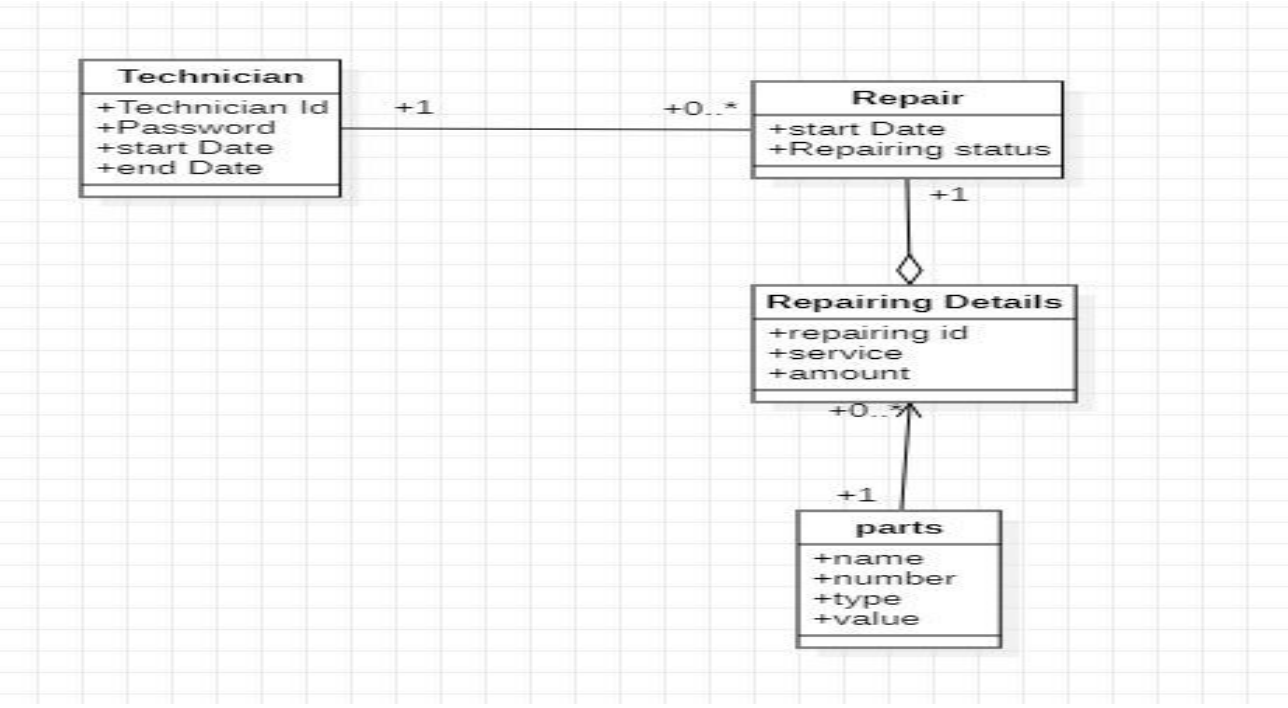


Figure 1.5 (l) Object Diagram

Use Case Name	Repairing of fridge	Business requirement:System analysis: System design:
Use Case ID	MST-007	
Priority	High	
Primary Business Actor:	Technician	
Primary system Actor:	Technician	
Other Participating Actors:	Shopkeeper	
Descriptions	This use case describes the event of a repairing of fridge.	
Precondition:	Technician availability.	
Trigger:	This use case initiated when the parts are available.	
Typical Course of Events:	Actor Action	System Response
	Step 1: Technician repair the fridge.	Step2: System responds by displaying a window "w8-Repair status" which shows a message that repairing of fridge is done and fridge is deliver to shopkeeper.
Alternate Course	--	
Conclusion:	The use case concludes when the shopkeeper accept the fridge.	
Postcondition:	Shopkeeper deliver fridge to customer.	

Table 1.4 (l) Design Use case Table

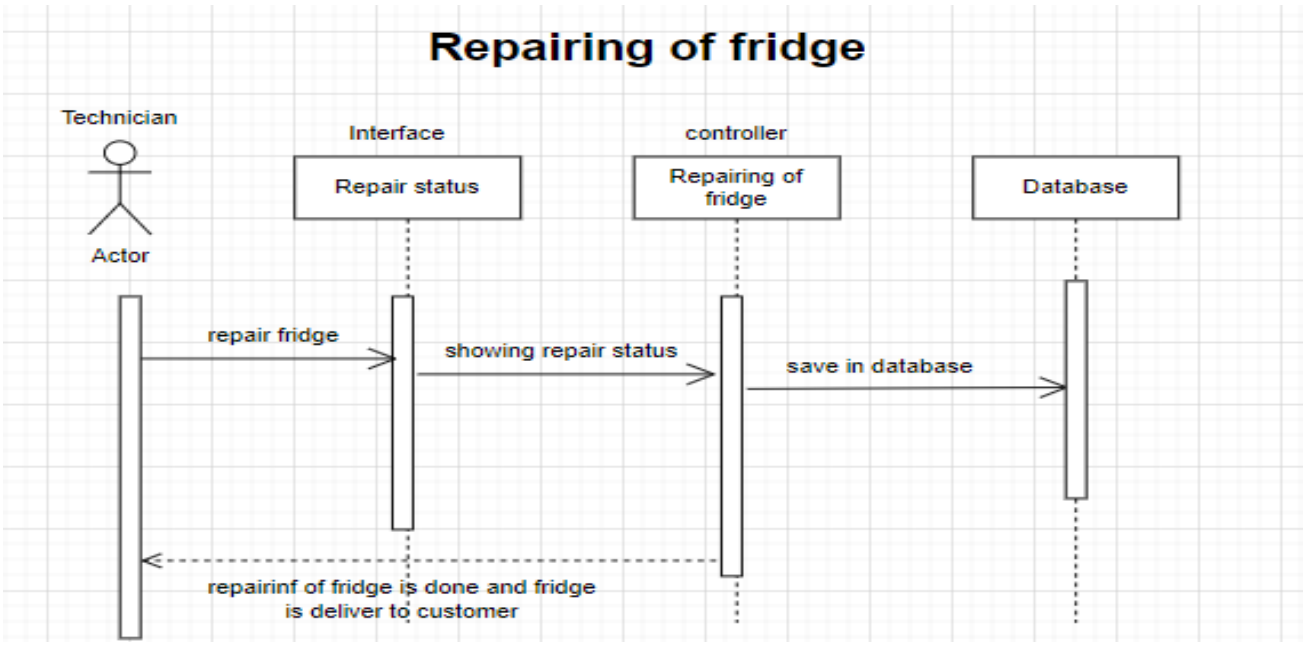
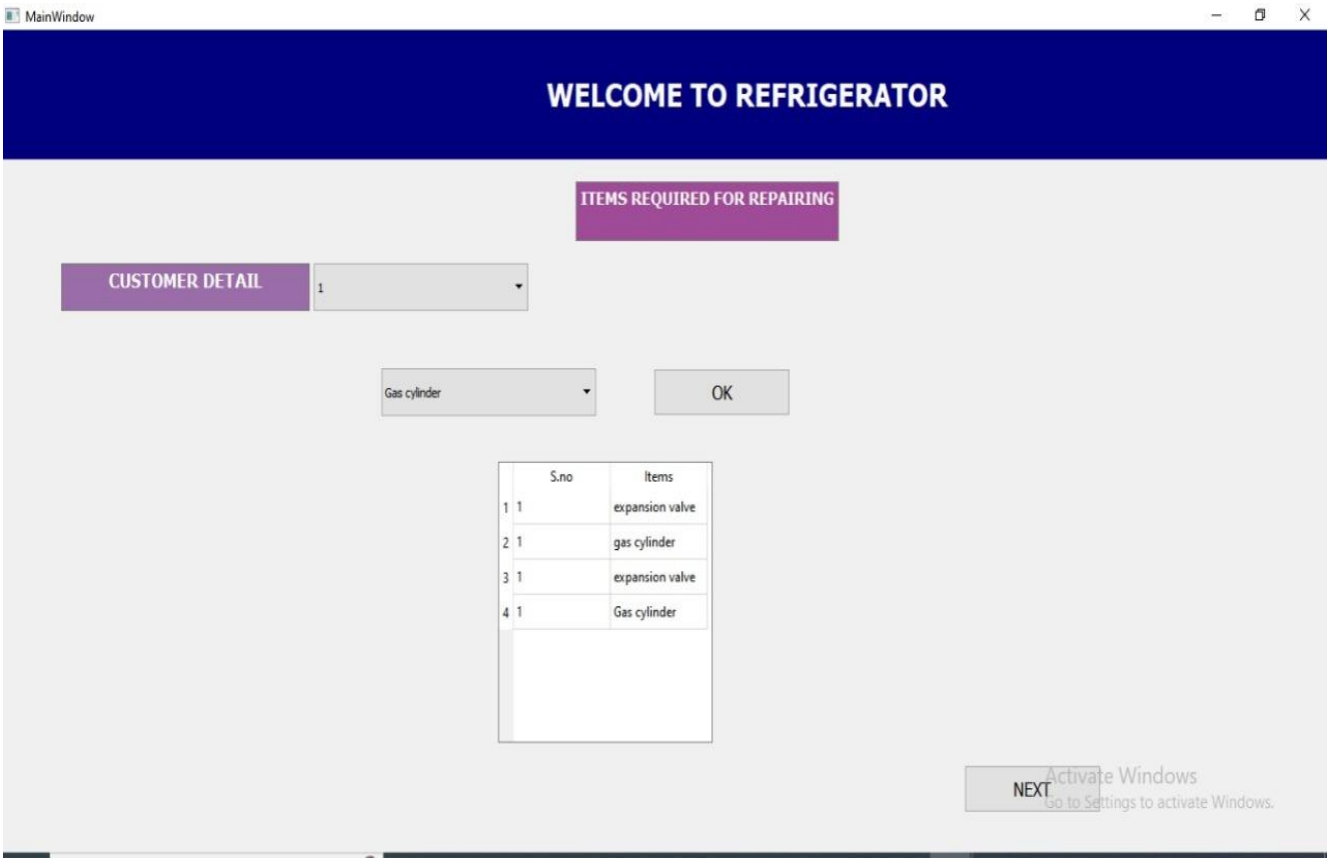


Figure 1.6 (l) Sequence Diagram



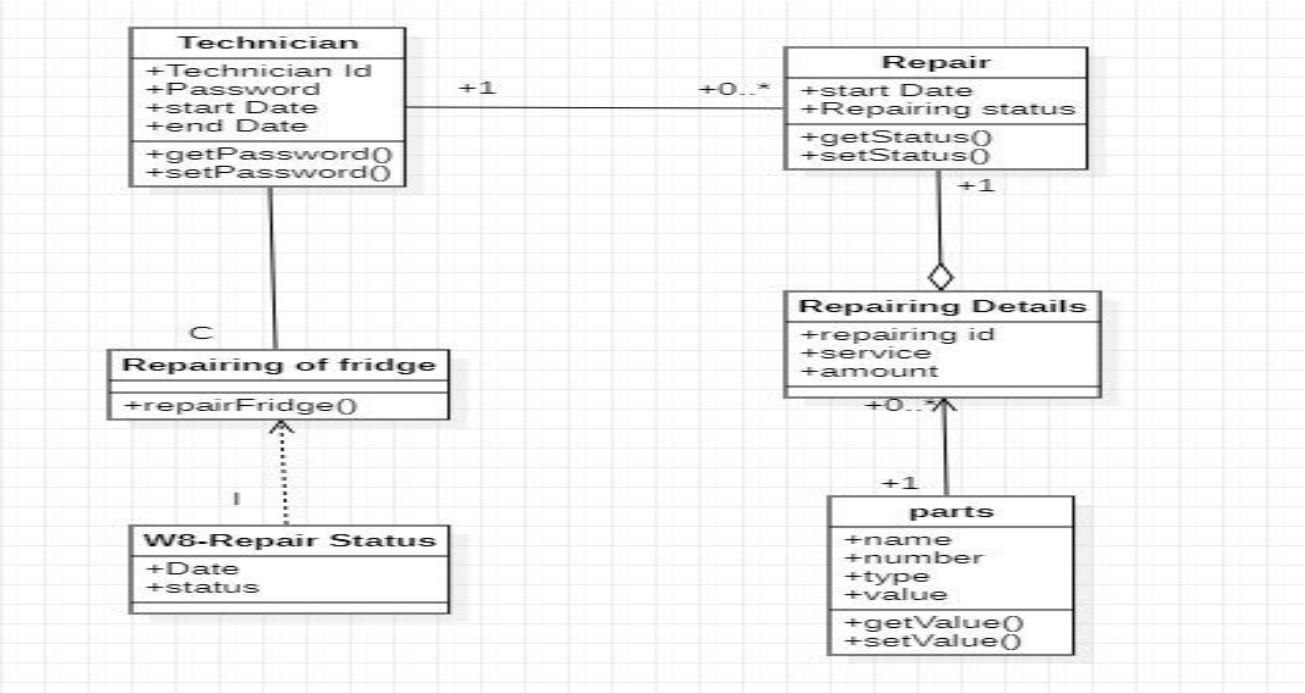


Figure 1.7 (l) Class Diagram

Deliver to Customer

Use Case Name	Deliver to customer	Business requirement:System analysis: System design:
Use Case ID	MST-008	
Priority	High	
Primary Business Actor:	Shopkeeper	
Primary system Actor:	Shopkeeper	
Other Participating Actors:	Customer	

Descriptions	This use case describes the event of a shopkeeper deliver fridge to customer.	
Precondition:	Customer information must be correct.	
Trigger:	This use case initiated when the technician repair the fridge.	
Typical Course of Events:	Actor Action	System Response
	Step 1: Shopkeeper deliver fridge to customer.	Step 3: Customer accept the fridge.
Alternate Course	--	
Conclusion:	The use case concludes when the customer accept the fridge.	
Postcondition:	Customer give full payment.	

Table 1.3 (m) Analysis Use case Table

Full payment

Use Case Name	Full payment	Business require ment: System analysis: System design:
Use Case ID	--	
Priority	High	
Primary Business Actor:	Customer	
Primary system Actor:	Customer	
Other Participating Actors:	Shopkeeper	

Descriptions	This use case describes the event of a full payment given by customer.	
Precondition:	Repairing of the refrigerator must be done successfully.	
Trigger:	This use case initiated when the fridge is delivered to customer.	
Typical Course of Events:	Actor Action	System Response
	Step 1: Customer give full payment.	Step 3: Shopkeeper accept the payment.
Alternate Course	--	
Conclusion:	The use case concludes when the shopkeeper accept the payment.	
Postcondition:	--	

Table 1.3 (n) Analysis Use case Table

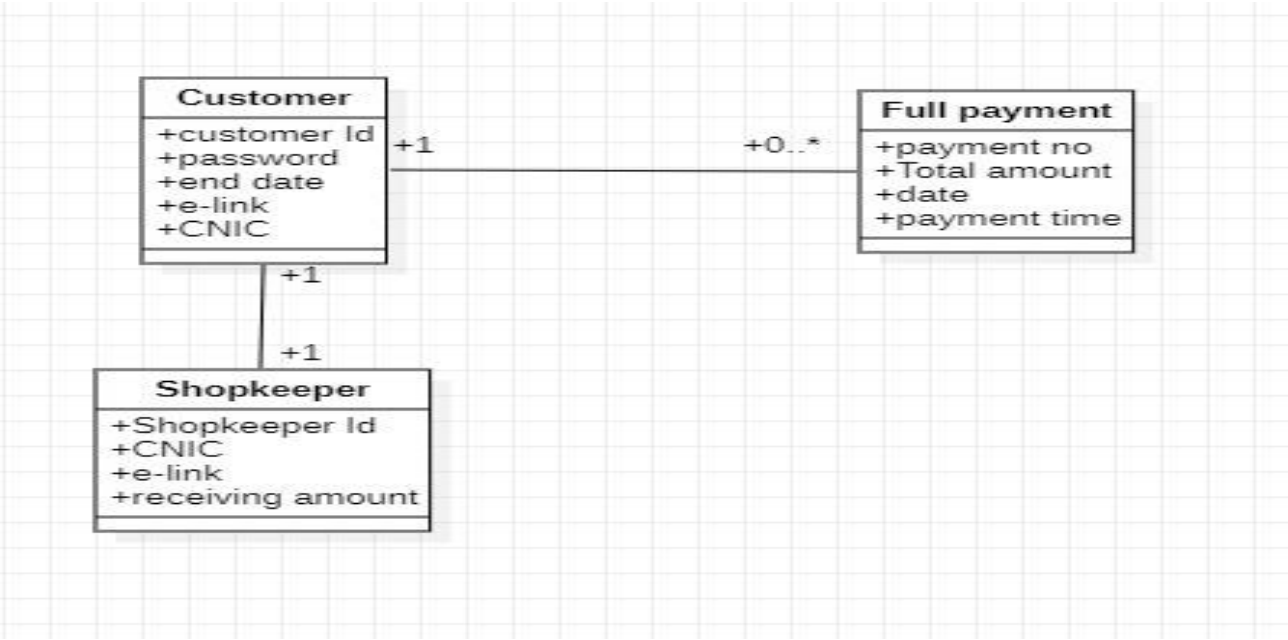


Figure 1.5 (n) Object Diagram

Use Case Name	Full payment	Business requiremen t:System analysis: System design:
Use Case ID	--	
Priority	High	
Primary Business Actor:	Customer	
Primary system Actor:	Customer	
Other Participating Actors:	Shopkeeper	
Descriptions	This use case describes the event of a full payment given by customer.	
Precondition:	Repairing of the refrigerator must be done successfully.	
Trigger:	This use case initiated when the fridge is delivered to customer.	
Typical Course of Events:	Actor Action	System Response
	Step 1: Customer pay full payment.	Step 3: When customer accept the price then system responds by displaying a window "w9-Payment" which contains name, bill no, phone no, fridge name, address and amount.
Alternate Course	--	
Conclusion:	The use case concludes when the shopkeeper accept the payment.	
Postcondition:	--	

Table 1.4 (n) Design Use case Table

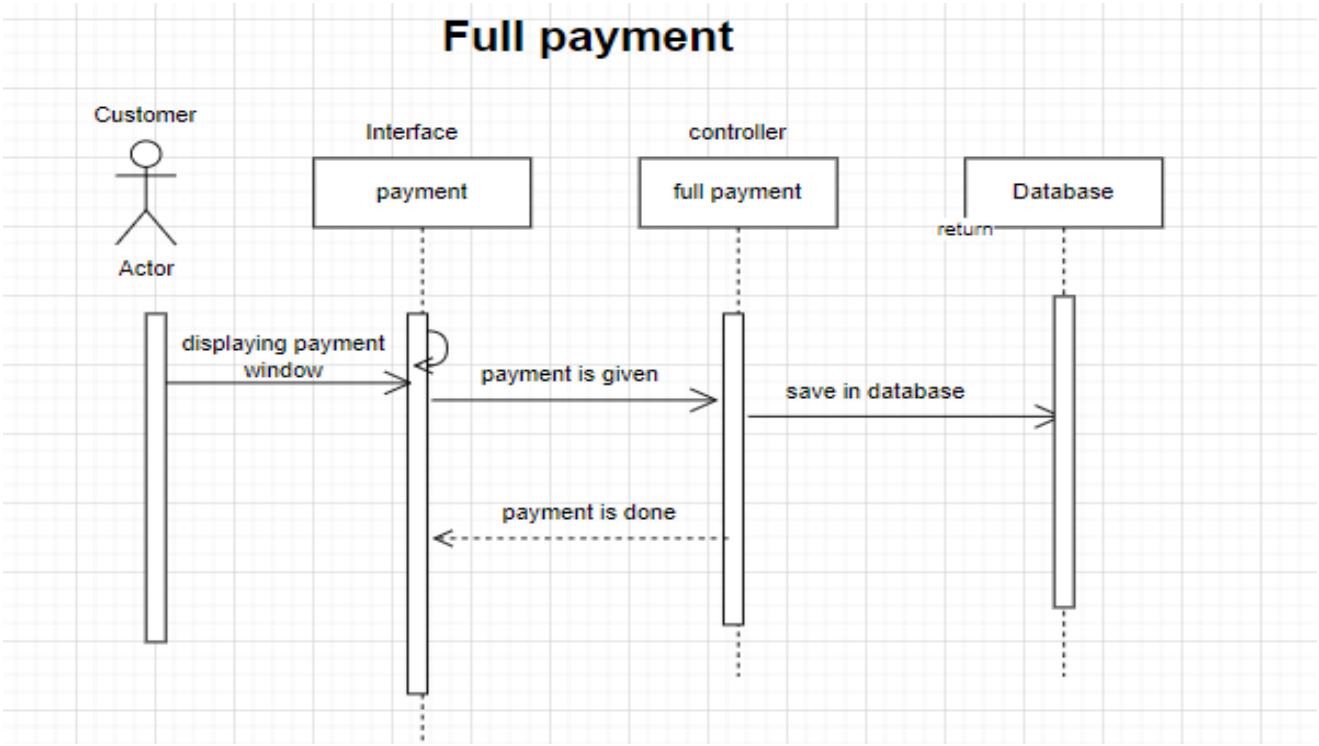
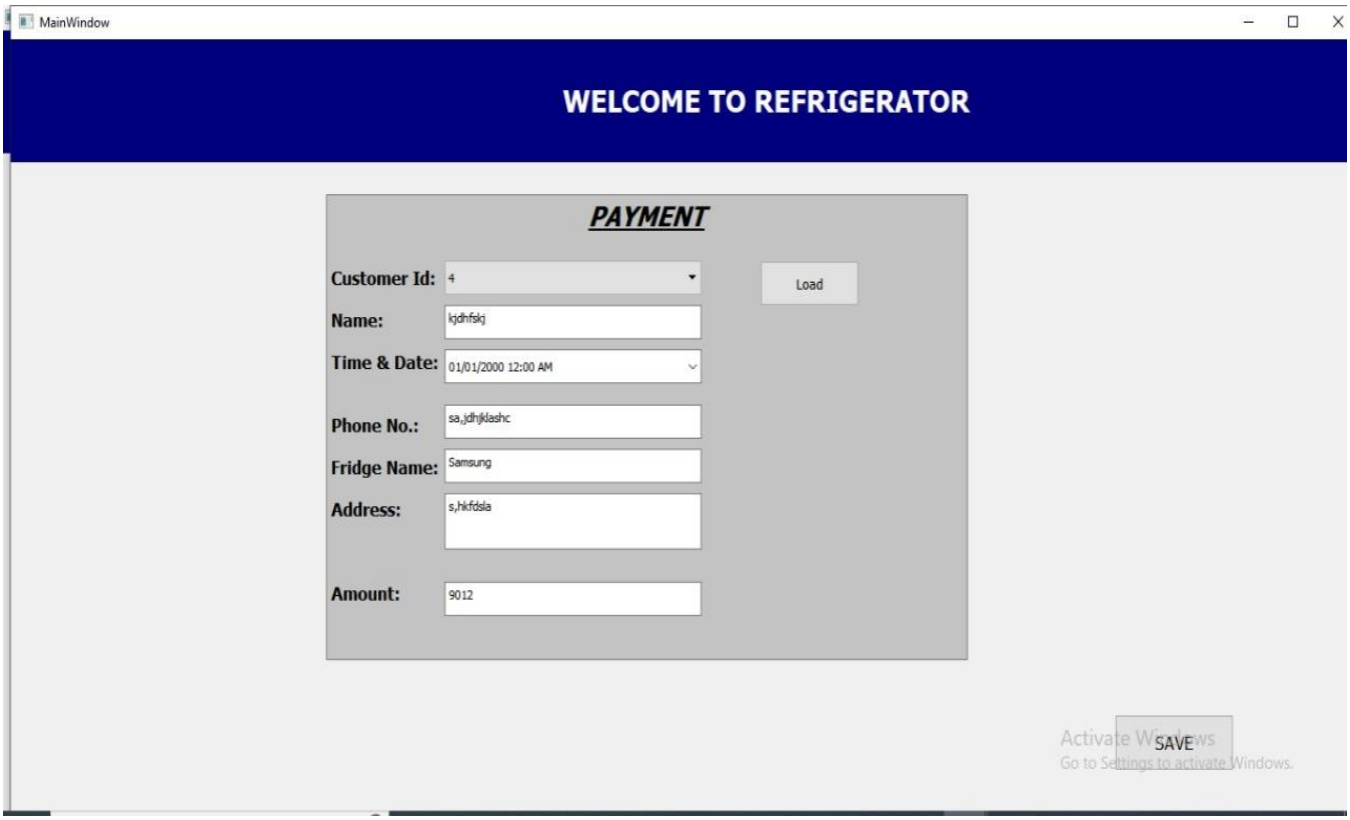


Figure 1.6 (n) Sequence Diagram



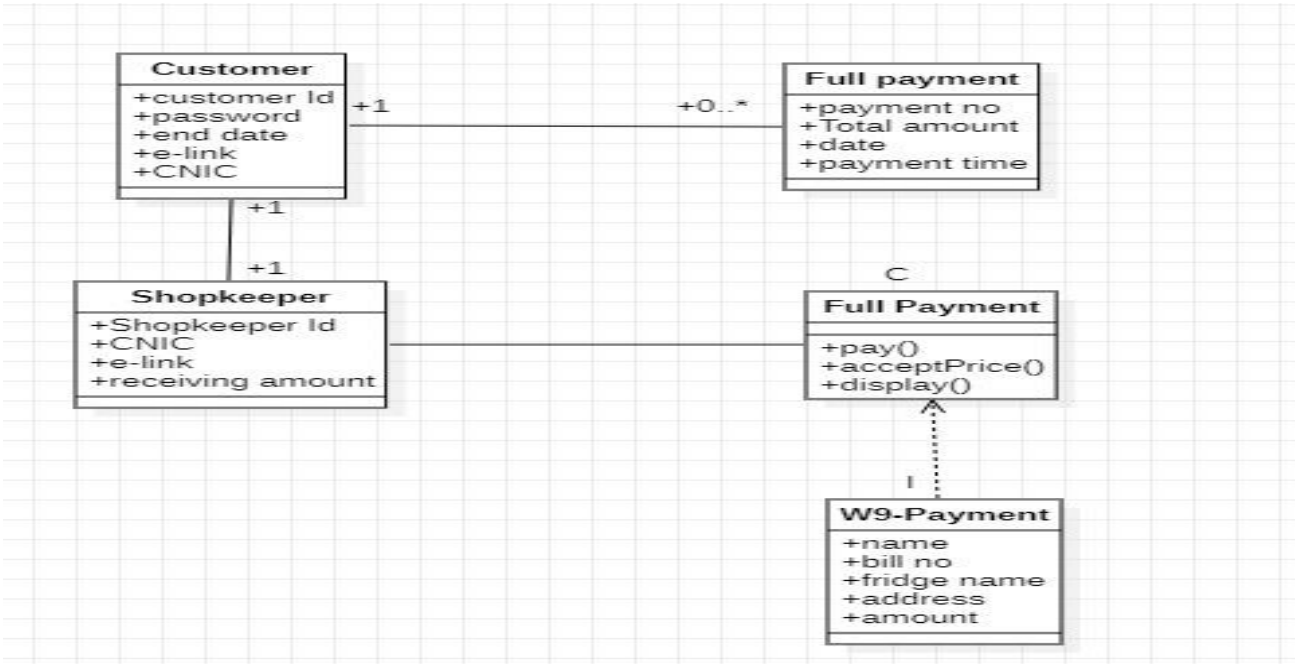


Figure 1.7 (n) Class Diagram

CLASS DIAGRAM

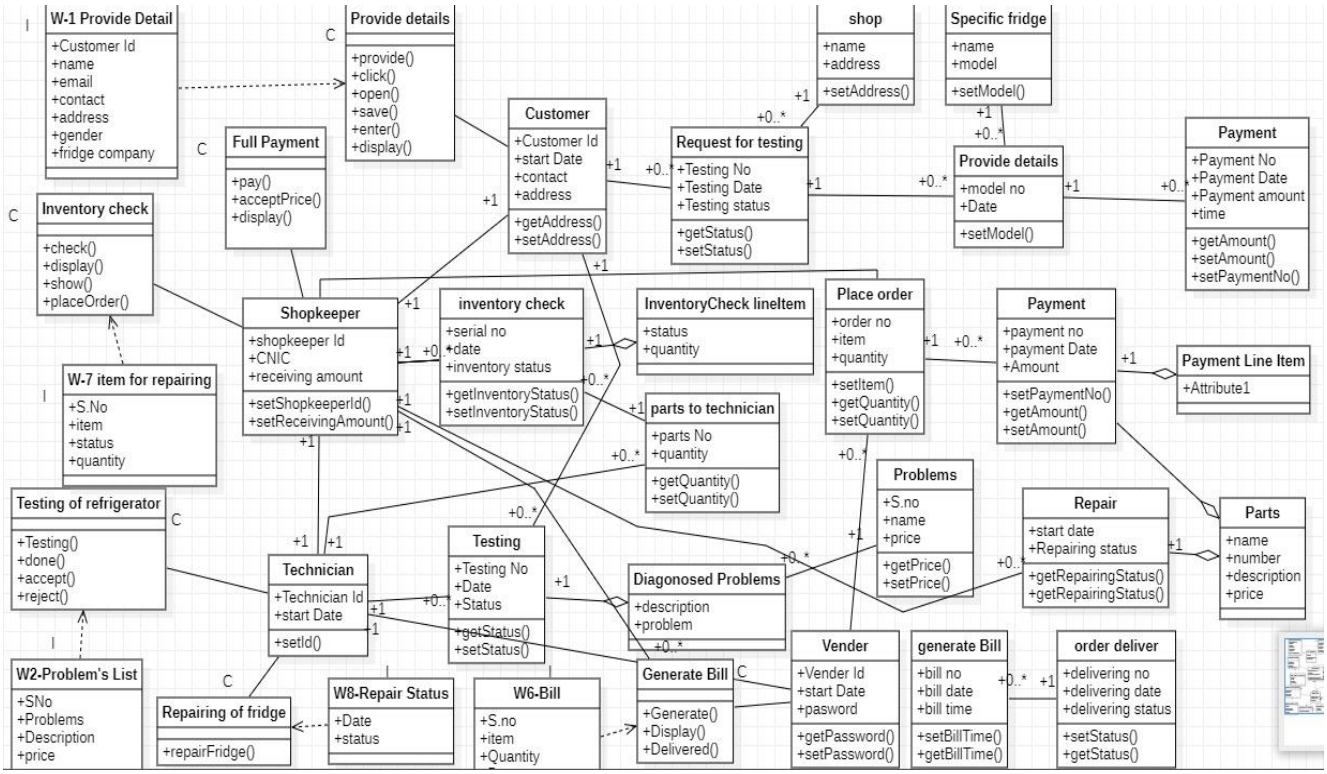


Figure 1.8 Class Diagram (Complete)

DATABASE DIAGRAM

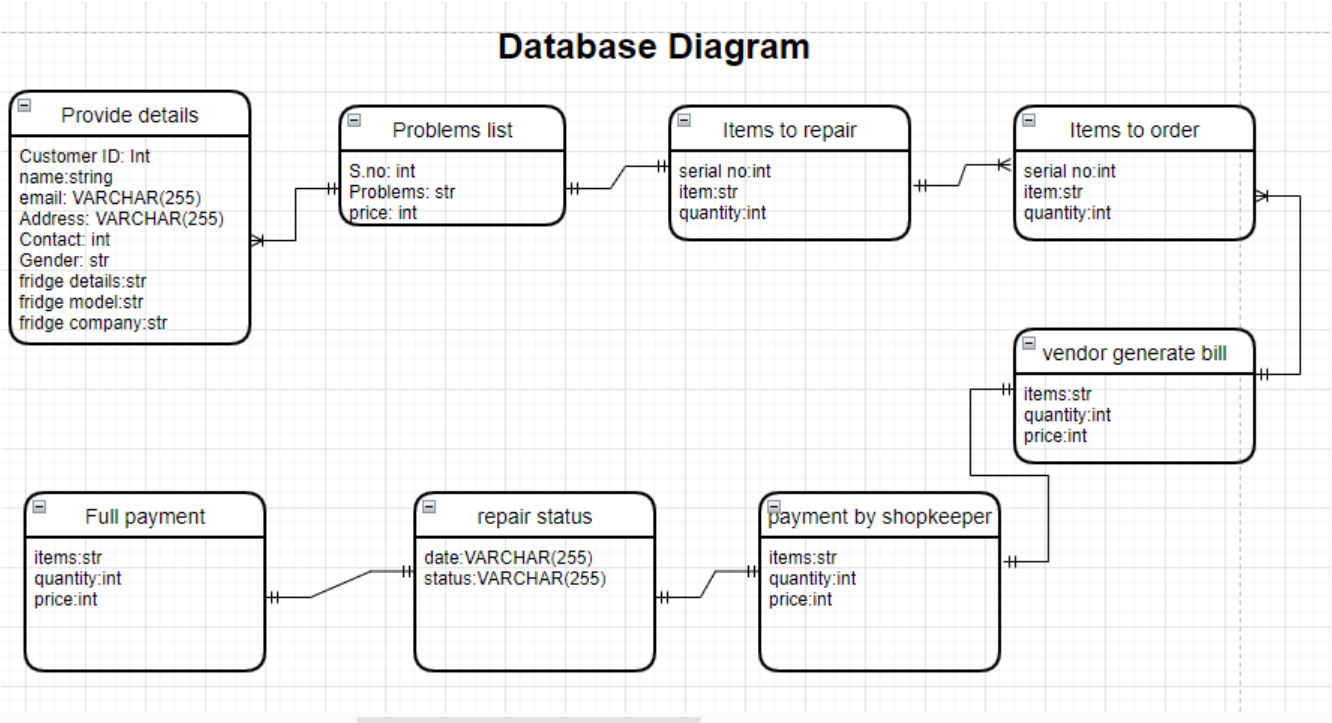


Figure 1.9 Database Diagram

IMPLEMENTATION

Actual Form:

The application is in the form of "Website". In the application, User first creates accounts for customers, shopkeeper and technician, then the user can create pages of provide details, problems in refrigerator, inventory check, place order, vendor payment, and generate bill.

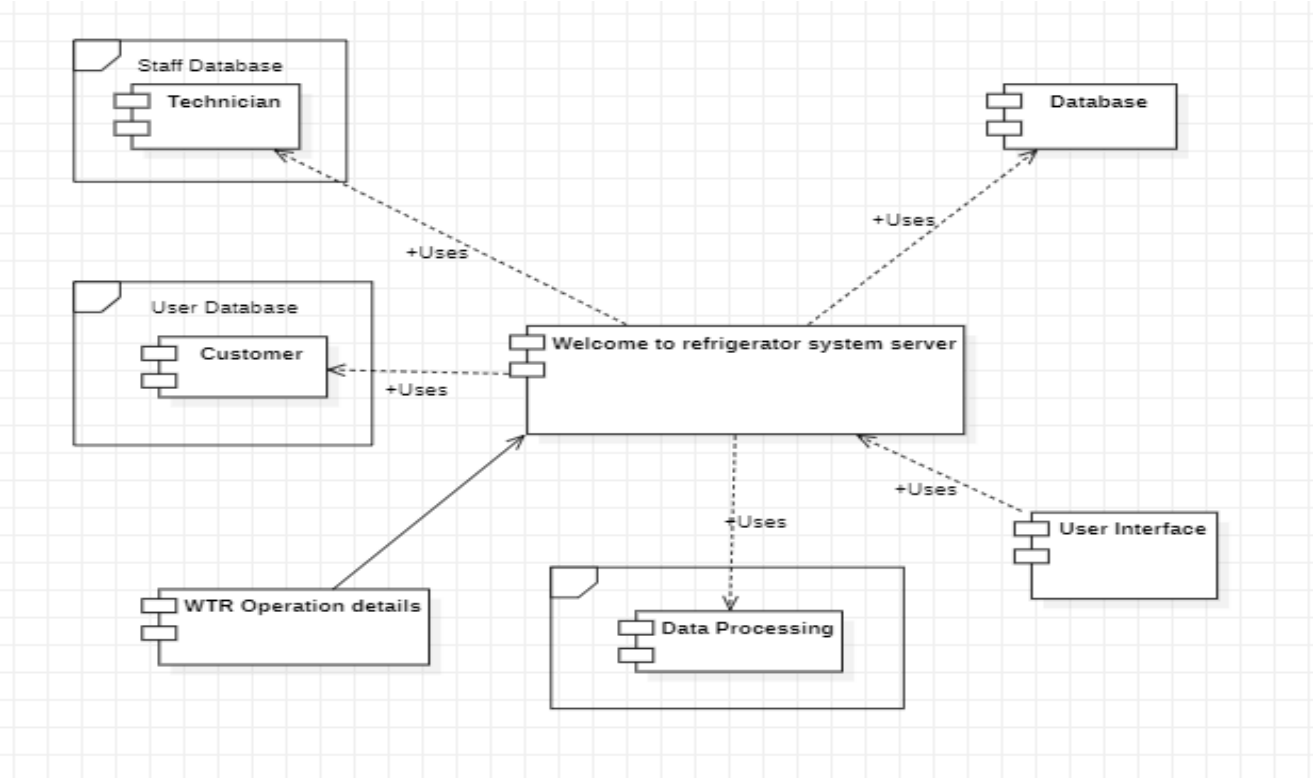


Figure 2.0 Component Diagram

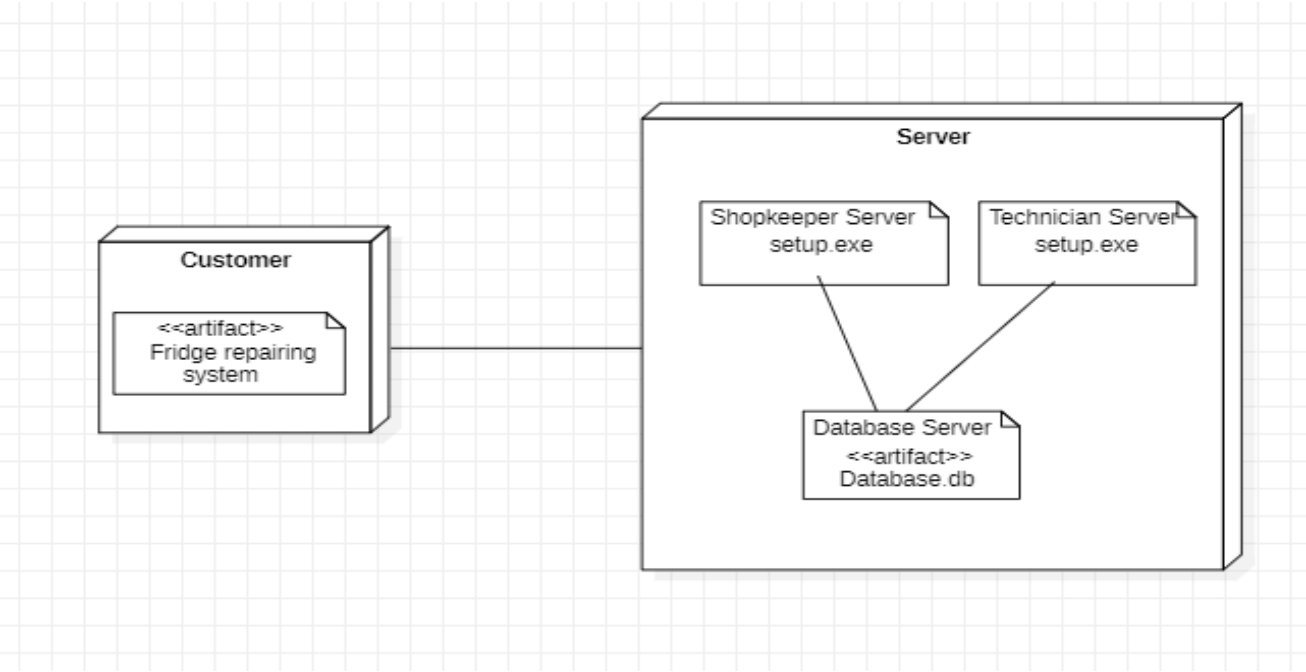
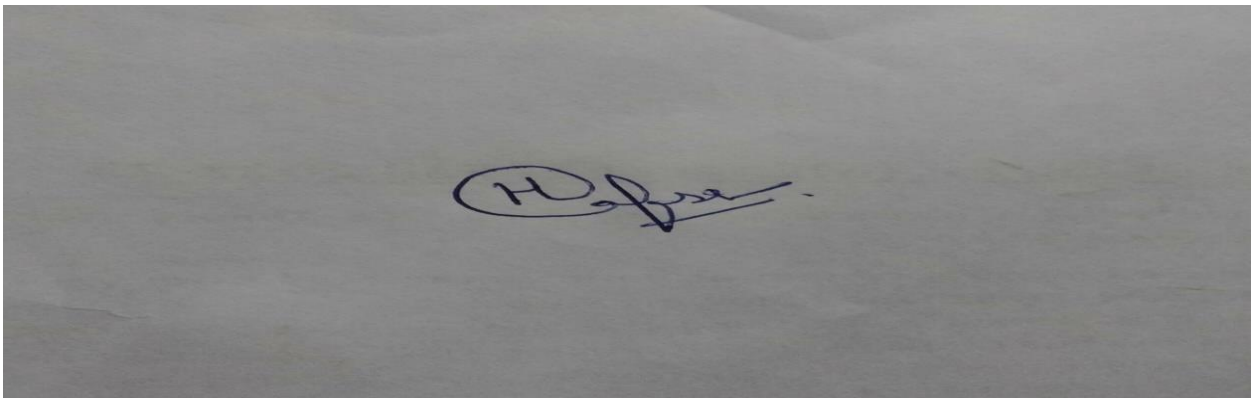


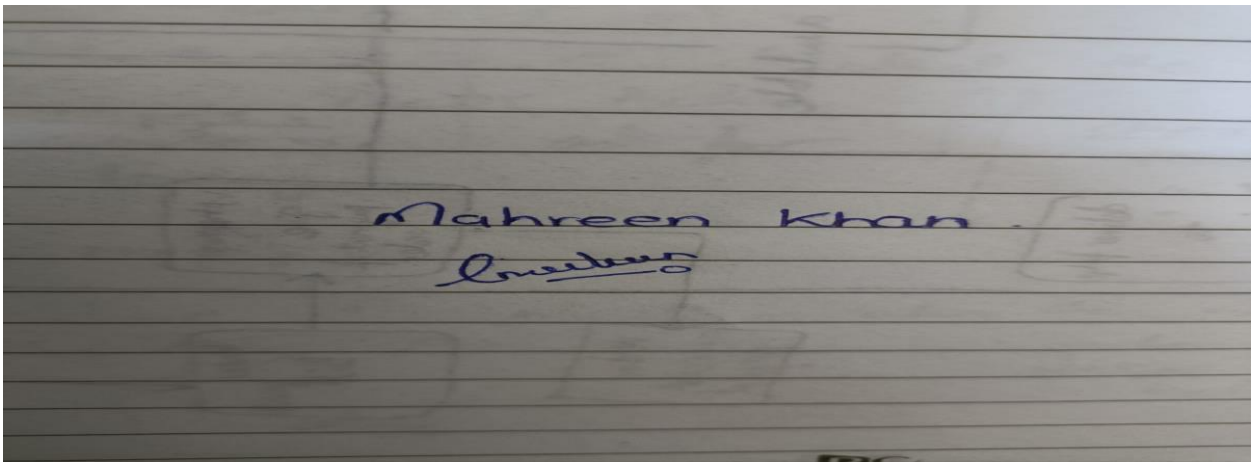
Figure 2.1 Deployment Diagram

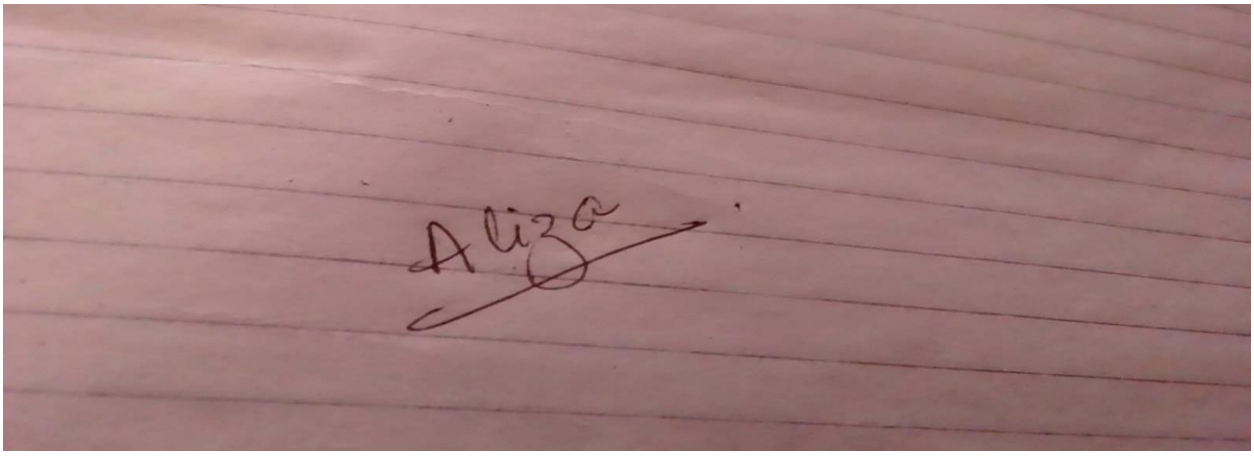
SUPPORT

Thank you for your support. We truly appreciate your business and look forward to serving you again. Thank you for being our valued customer. We are so grateful and hope we met your expectations. If you ever face any problem regarding anything whether it's related to bug, maintenance or even enhancement, so feel free to call us for help. We shall provide you our service till six months at free of cost.

We hereby undertake that our team will be available for you for the next six months for any kind of problem.







CONCLUSIONS AND SUGGESTIONS FOR FUTURE WORK

The application is in the form of "Website". In the application, User first creates accounts for customers, shopkeeper and technician, then the user can create pages of provide details, problems in refrigerator, place order, vendor payment, and generate bill.

- Provide Detail :

  The customer will enter his/her information along with the information of his/her refrigerator and all the data will be saved in the database.

- Problems in refrigerator :

  The technician will detect the problem and tell the price according to it. The customer after reviewing the price will either accept the offer or reject it.

- Place order :

  If the parts required are not available in the inventory then shopkeeper will place an order to vendor.

- Vendor Payment:

  The vendor will generate the bill of the required part and the shopkeeper will pay the amount either through cash or card and this transaction also save in a database.

- Generate Bill:

  The shopkeeper will generate the bill after technician repaired the refrigerator and the customer will receive the fridge and will pay the bill and this transaction also save in database.

FUTURE WORK

• The rights could be given to customer so that he could track his order.

• The panel will be given to the customers so he could pay online.

• We could build an android application as well; through which everyone can monitor everything at anywhere anytime.

• An option can be added such that the purchase order be sent directly to company/vendor's mail instead of manually having to print the document and giving it to them. Email is more economical.

REFERENCES

Conference

[Bentley7] Jeffrey L. Whitten, Lonnie D. Bentley (1986) “system analysis and design methods” *process of examining a business situation with the intent of improving it through better procedures and methods*., McGraw-Hill, Inc., Professional Book Group 11 West 19th Street New York, NY, United States.

Book example:

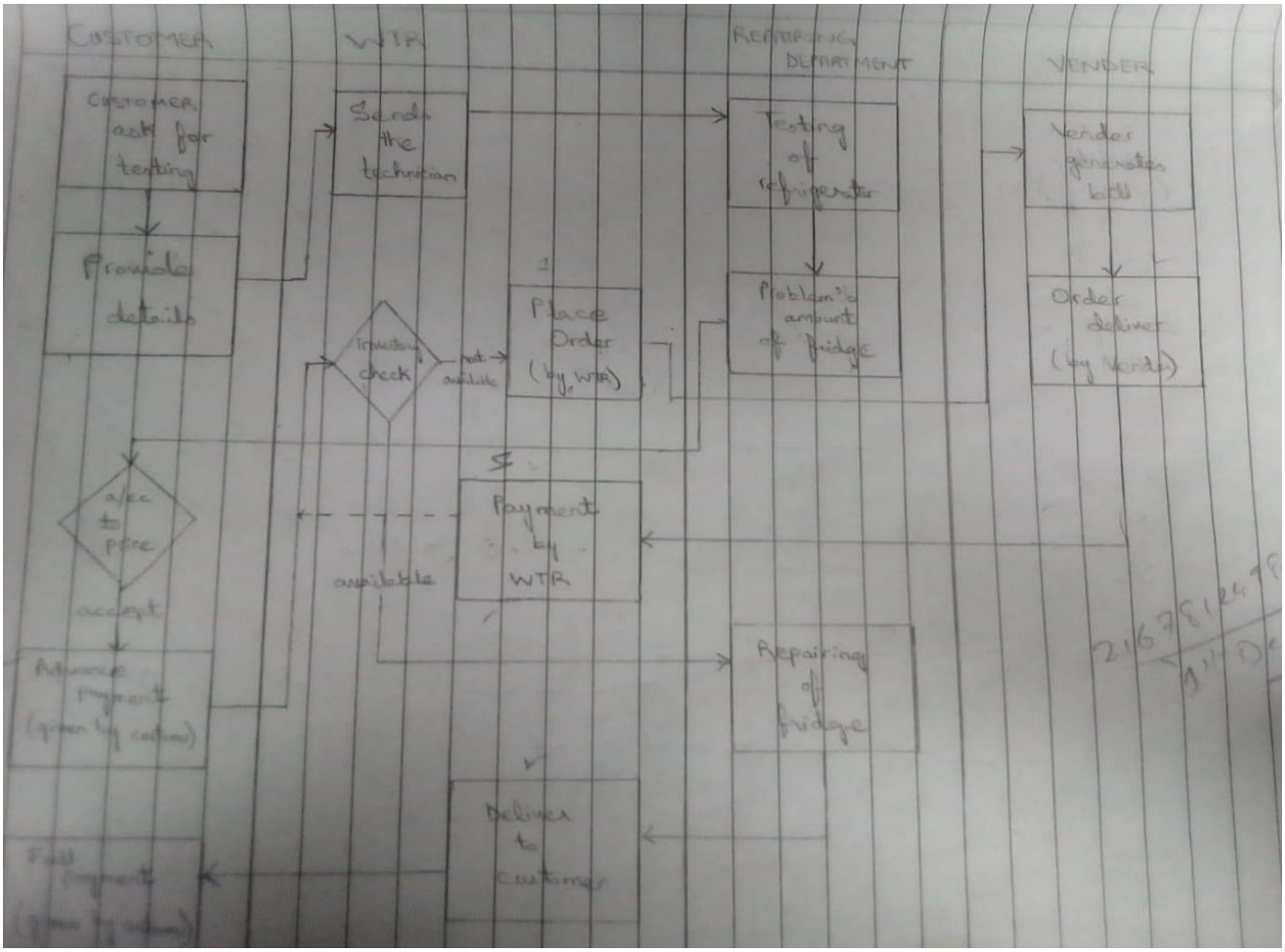
1. [Pressman7] Roger S. Pressman (2019) "Software engineering a practitioner’s approach,”

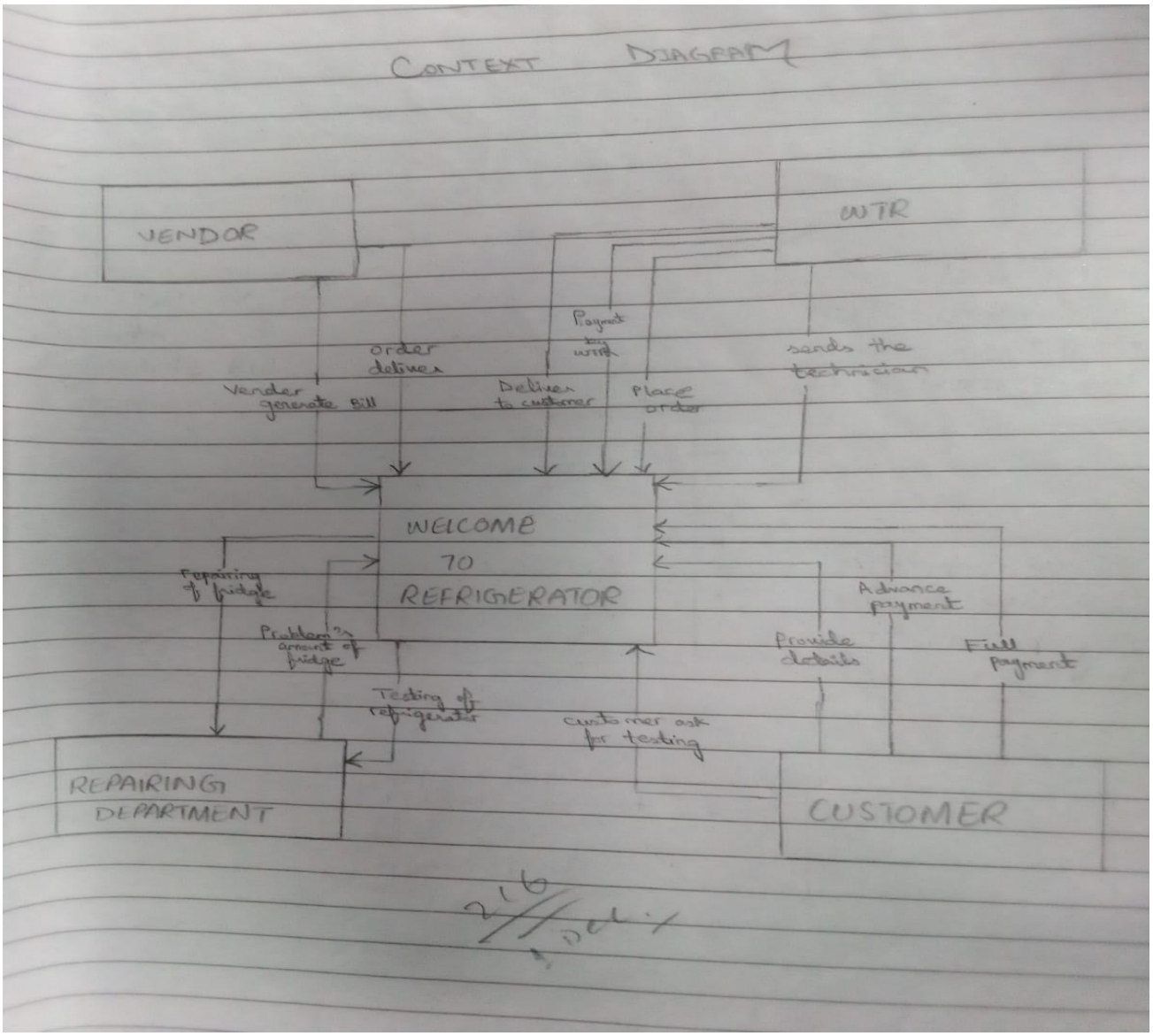
Website Reference

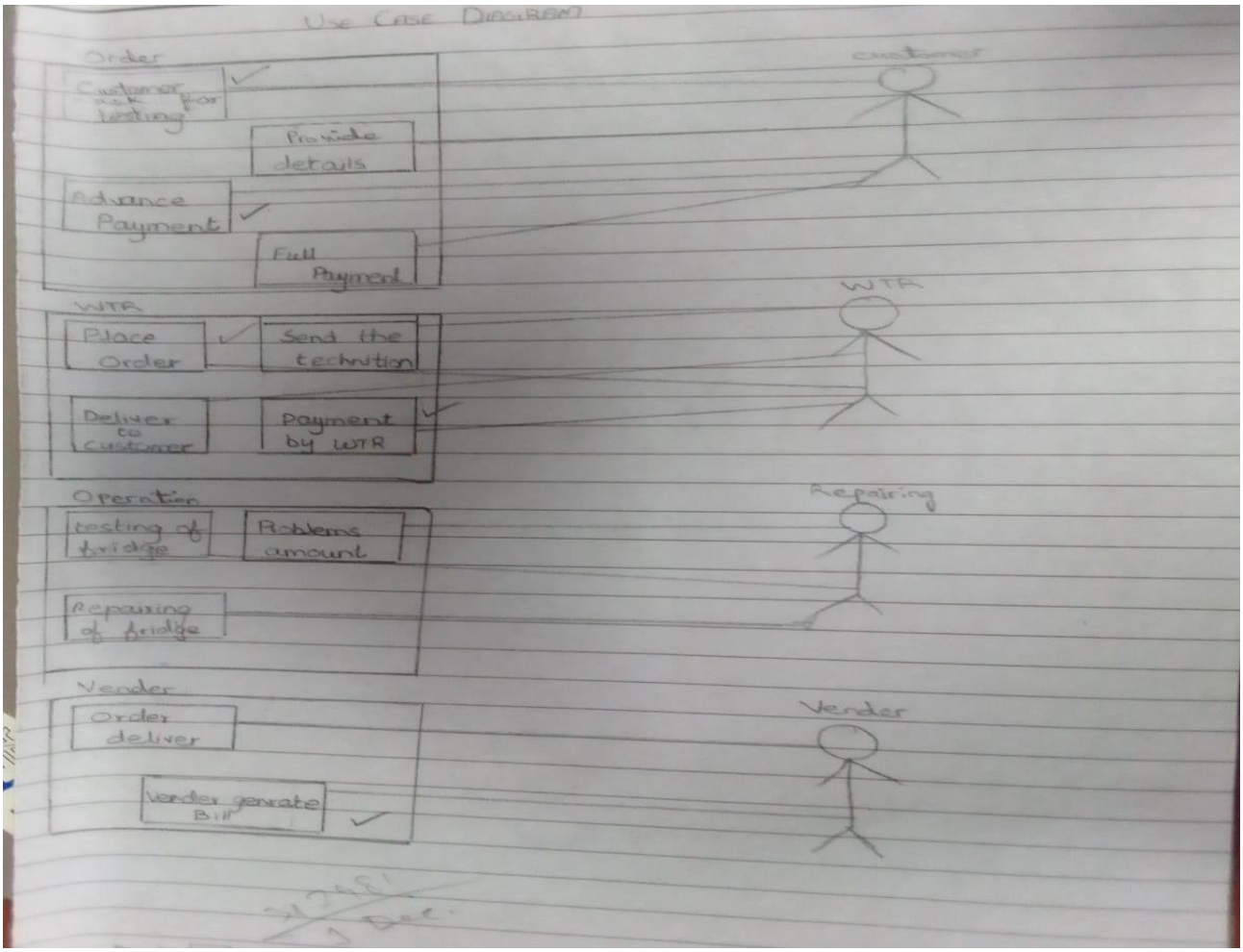
2. https://www.youtube.com/channel/UCyHta2dyCTkf29AB67AYn7A

General information for Object oriented diagrams.

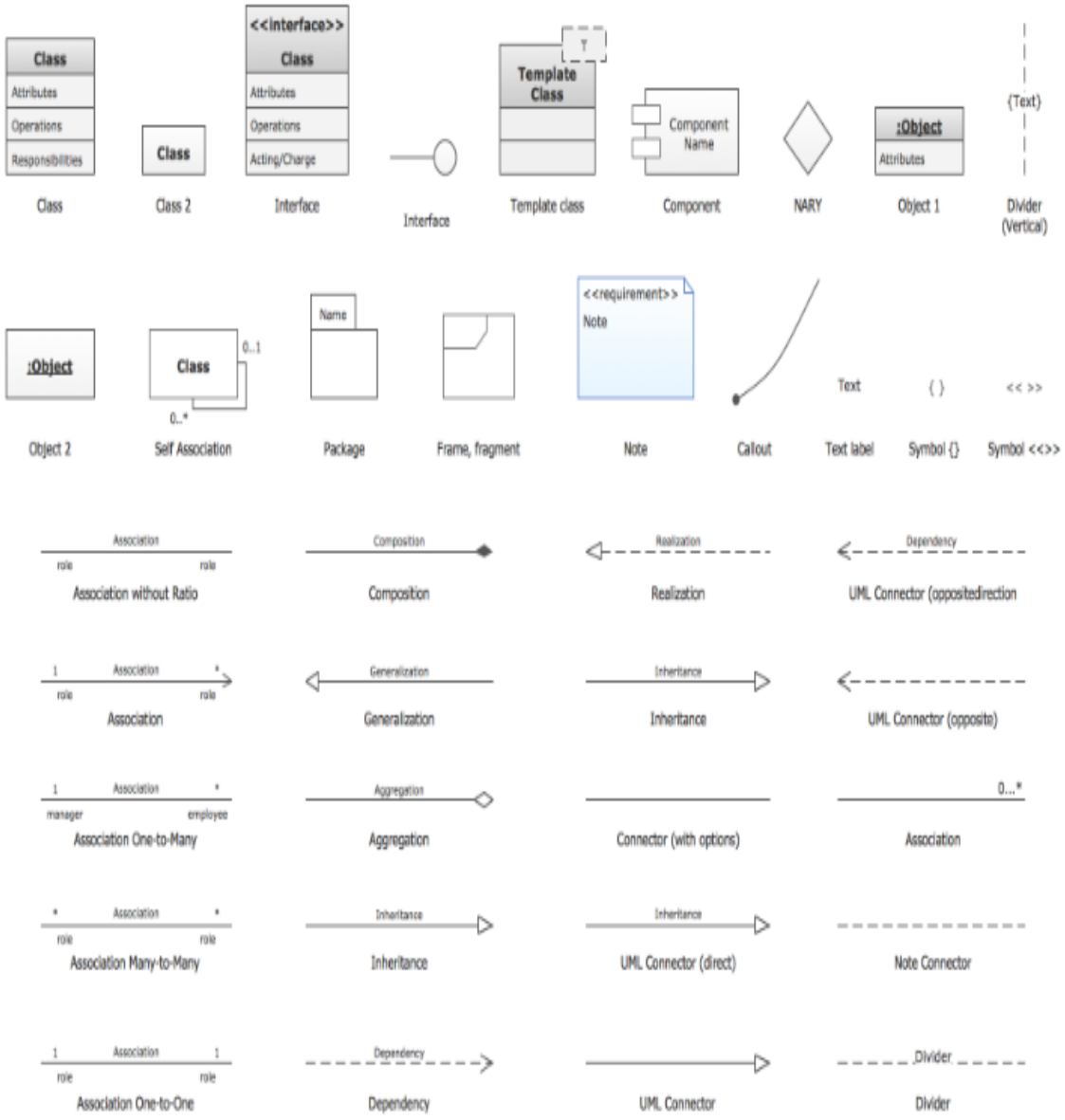
APPENDICES SHOULD APPEAR AFTER THE LIST OF REFERENCES




CONTEXT DIAGRAM
VENDOR
WTR
Payment to WTR
order deliver
sends the technician
Vender generate Bill
Deliver to customer
Place order
WELCOME
TO
REFRIGERATOR
Repairing of fridge
Problem? amount of fridge
Testing of refrigerator
customer ask for testing
Advance payment
Provide details
Full payment
REPAIRING DEPARTMENT
CUSTOMER


Use Case Diagram
Order
Customer ask for testing
Provide details
Advance Payment
Full Payment
WTR
Place Order
Send the technition
Deliver to Customer
Payment by WTR
Operation
testing of bridge
Problems amount
Repairing of bridge
Vender
Order deliver
Vender generate Bill
customer
WTR
Repairing
Vender

LIST OF SYMBOLS



GLOSSARY

Context Diagram: the interactions between a system and other actors (external factors) with which the system is designed to interface.

Use case Diagram: model the behavior of a system and help to capture the requirements of the system.

Narrations: describe the desired response of a system when it receives external requests.

UML: unified modeling language.

Object Diagram: it is a graph of instances, including objects and data values.

SSD: system sequence diagram.

Sequence Diagram: shows object interactions arranged in time sequence in the field of software engineering.

Component Diagram: describes the organization and wiring of the physical components in a system.

Deployment Diagram: to visualize the topology of the physical components of a system, where the software components are deployed.

PIECES: Performance, Information (and data), Economics, Control, Efficiency, Services.

PIECES Framework: framework containing the categories of classification and problem-solving problems.