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**1 INTRODUCTION**

This chapter is a part of our software requirement specification for the project “Grocery Management System”. In this chapter we will focus on the intended audience for this project.

1.1PURPOSE

This document briefly describes the Software Requirement Analysis of Grocery Management System. It contains the functional, non-functional and the supporting requirements and establishes a requirement’s baseline for the development of the system. The requirements contained in the SRS are independent, uniquely numbered and organized by topics. The SRS serves as an official means of communicating user requirements to the developer and provides a common reference point for both the developer team and the stakeholder community. The SRS will evolve over time as users and developers work together to validate, clarify and expand its contents.

1.2INTENDED AUDIENCE

This SRS report is intended for several audiences including the customers as well as the project managers, designers, developers, and testers.

The customer will use this SRS to verify that the developer team has created a product that is acceptable to the customer.

The project managers of the developer team will use this SRS to plan milestones and a delivery date, and ensure that the developing team is on track during development of the system.

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The designers will use this SRS as a basis for creating the system’s design. The designers will continually refer back to this SRS to ensure that the system they are designing will fulfill the customer’s needs.

The developers will use this SRS as a basis for developing the system’s functionality. The developers will link the requirements defined in this SRS to the software they create to ensure that they have created a software that will fulfill all of the customer’s documented requirements.

The testers will use this SRS to derive test plans and test cases for each documented requirement. When portions of the software are complete, the testers will run their tests on that software to ensure that the software fulfills the requirements documented in this SRS. The testers will again run their tests on the entire system when it is complete and ensure that all requirements documented in this SRS have been fulfilled.

1.3CONCLUSION

This analysis of the audience helped us to focus on the users who will be using our analysis. This overall document will help each and every person related to this project to have a better idea about the project.

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**2 INCEPTION OF GMS**

In this chapter, the Inception part of the SRS will be discussed briefly.

2.1 INTRODUCTION

A grocery store is a retail store that sells daily commodities. They are

normally small private business owner. This document will act as a demand list of what the stakeholders of their respective wanted for their anticipated software to be. Like the various features and interfaces of the software which will help them to ease the way of their business.

2.2 INCEPTION OF A GROCERY BUSINESS

At the beginning of our project, we entered the inception stage. This stage includes, how the project will be started and their scope and limitation. The main goal of this phase is to identify the requirements, demand and establish some sort of mutual understanding between the software team and the stakeholders of the groceries. In order to make this phase effective we took the following steps:

|  |  |
| --- | --- |
|  | Identifying the client of our project  Icebreaking  Identifying the stakeholders of the grocery shop Identifying the multiple viewpoints of stakeholder |

2.2.1 IDENTIFY THE CLIENT OF OUR PROJECT

At first, we identified the location from where we will start our expedition. Normally the shopkeepers do not always act as a stakeholder. So we have to go through a lengthy process in order to identify them. We have analyzed our requirements with the consent of both of them.

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2.2.2 ICEBREAKING

Icebreaking refers to the fact that to diminish the communication barrier between you and the other person. It is a crucial part since it denotes the acceptation of our proposal. We started this face by talking with them with context free languages. Their behavior, respond to our question or willing to take a change in their shops solely depends on this phase.

2.2.3 IDENTIFYING THE STAKE HOLDERS OF THE GROCERY SHOP

Stakeholder refers to any person or group who will be affected directly or indirectly by the system. Stakeholders include end-users who interact with the system and everyone else in an organization who may be affected by its installation. The shops that we visited have limited number of stakeholder. Identification of the stakeholders were done from the information provided by the shopkeepers. Their names are given below:

|  |  |
| --- | --- |
|  | Supplier |
|  | Owner |
|  | Employee |
|  | Customer |

2.2.4 IDENTIFYING THE MULTIPLE VIEWPOINTS OF THE STAKEHOLDER

Different stakeholders expect different benefits from the system as every person has his own point of view. So, we have to recognize the requirements from multiple viewpoints. Different viewpoints of the stakeholders about the expected software are given below:

Owner’s Viewpoint:

 First and foremost, a really friendly user interface  Desktop based software if affordable

 Provide signal when any product is short

 Store information about people who are working in the shop

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 Calculate total amount of sell and total amount of buying goods and end of

the month shows profit or loss  Keep information about late payment  Commission calculation

 Regular customer list  Online shopping facility

 Provides SMS to all the regular customers and nearby shops whenever

offer/s will be given

 Create a local network of the nearby groceries

 Some automated system providing in the digital weighted machine  Must have minimal cost

Employee‘s Viewpoint:

 Ease of calculation

 Minimum effort to use the software

Supplier‘s Viewpoint:

 Reduce the time for ordering  Must be cost effective as well

Customer‘s Viewpoint:

 Want to get the promised services like online shopping of the software

by going through an easy-to-understand procedure  Service must carry out without any unwanted error or failure.

2.3 CONCLUSION

The primary goal of this project is to model and design a software for those people who are related with small scale businesses like grocery shop or pharmacy. For these reasons, the software will be designed in such a way that it won’t be disaster for the client who will use it. The software will be as simple as a person who does not have any idea about software he/she can

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be able to maintain it without any annoyance. Otherwise it will not be appreciable by the clients even it may create disturbance with their businesses. The software will be designed in such a way as it takes very little time to manage. To make this software project successful, collaboration with the stakeholders was a main priority that what they want, how the software will work, how it can be more profitable than previous time, how it will save time to maintain the business policy etc.

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**3 ELICITATION OF GMS**

After discussing on the Inception phase, we need to focus on the Elicitation phase. So this chapter specifies the Elicitation phase.

3.1 INTRODUCTION

Requirements Elicitation is a part of requirements engineering that is the practice of gathering requirements from the shopkeeper, owner and other stakeholders. We have faced many difficulties, like understanding the prob- lems, making questions for the stakeholders, limited communication with the stakeholders due to a short amount of time and volatility. Though it is not easy to gather requirements within a very short time, we have surpassed these problems in an organized and systematic manner.

3.2 ELICITING REQUIREMENTS

We have seen Question and Answer (Q&A) approach in the previous chapter, where the inception phase of requirement engineering has been described. The main task of this phase is to combine the elements of problem solving, elaboration, negotiation and specification. The collaborative working approach of the stakeholders is required to elicit the requirements. We have finished the following tasks for eliciting requirements-

Collaborative Requirements Gathering Quality Function Deployment Usage Scenarios

Elicitation work products

3.2.1 COLLABORATIVE REQUIREMENTS GATHERING

We have met with many stakeholders in the Inception phase such as the shopkeeper, owner and supplier. These meetings created an indecisive state for us to elicit the requirements. To solve this problem, we have met with

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the stakeholders (who are acting a vital role in the whole process) few times to elicit the requirements.

3.2.2 QUALITY FUNCTION DEPLOYMENT

Quality Function Deployment (QFD) is a technique that translates the needs of the customer into technical requirements for software. Ultimately the goal of QFD is to translate subjective quality criteria into objective ones that can be quantified and measured and which can then be used to design and manufacture the product. It is a methodology that concentrates on maximizing customer satisfaction from the software engineering process. So, we have followed this methodology to identify the requirements for the project. The requirements, which are given below, are identified successfully by the QFD.

3.2.2.1 NORMAL REQUIREMENTS

Normal requirements are generally the objectives and goals that are stated for a product or system during meetings with the customer. The presence of these requirements fulfills customers' satisfaction. These are the normal requirements for our project.

|  |  |
| --- | --- |
|  | First and foremost, a really friendly user interface  Desktop based software if affordable  Store information about people who are working in the shop  Calculate total amount of sell and total amount of buying goods and end of the month shows profit or loss  Keep information about late payment  Must have minimal cost  Ease of calculation  Minimum effort to use the software  Reduce the time for ordering from the owner |
|  |
|  |

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3.2.2.2 EXPECTED REQUIREMENTS

These requirements are intrinsic to the product or system and may be so elementary that the customer does not explicitly state them. Their absence will be a cause for significant dissatisfaction. Below the expected requirements for our project are briefly described.

|  |  |
| --- | --- |
|  | Storing all shop related information  Interactive and attractive graphical user interface Authentication process |

3.2.2.3 EXCITING REQUIREMENTS

These requirements are for features that go beyond the customer's expectations and prove to be very satisfying when present. Following are some exciting requirements of our project.

 Provide automatic signal when any product is short.  Provide automatic signal when any product is expired.  Create auto-generated financial report.

3.2.3 USAGE SCENARIO

Grocery Management System (GMS) is an automated system for the following purposes:

1. Authentication

2. Shop management

3. Accounting

4. Notification

**Authentication**

System has two types of users:

 Administrator

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Shopkeeper

At the time of installation, a user should be created as an administrator. Thereafter, more user(s) can create account(s). For creating a shopkeeper account, the approval of an administrator account is needed. For any type of account creation, the following information needs to be given-

User name

Full name

Permanent address

Current address

Designation (Two options: Administrator, shopkeeper)

NID

Mobile number

Password (should be at least 8 characters at most 32 characters)

Then user information will be stored. Shopkeeper has salary and commission along with all the attributes mentioned above.

For user name, only alphanumeric characters and underscore (‘\_’) are allowed. If a user tries to create an account with empty field or contain invalid input, the system shows an error message and allows him/her to try

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again. For administrator account system will provide an administrator id and for shopkeeper system will provide a shopkeeper id. All information regarding accounts should be stored. For login, users will have to provide user name or a valid mobile number and password.

For invalid input or input mismatch, system shows an error message. A user can try to login to the system for three consecutive times with invalid or wrong input at a time. After third login failure, the system will pause for two minutes. While logging out of any account, the system will check for any unsaved file and wants confirmation of logging out. An administrator can modify his own information. But a shopkeeper will need administrator's approval for editing any information.

If a user forget password, he can recover his account. He will enter his mobile number. The system will send his forgotten password in his mobile through contact number.

**Shop Management**

Shop management subsystem includes:

|  |  |
| --- | --- |
|  | HR management Product management Maintenance |

If the administrator wants to fire any shopkeeper, he will first check all information about the shopkeeper and remove him. If any information about any shopkeeper needed to be modified, the administrator can update the list.

In product management section, product information of all the products are stored by the shopkeeper. The following information are stored:

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Product ID (PID) Product name Quantity

Price

delivery date expiry date company name status

User will check expiry date regularly. If the product is exchangeable, the user will contact with supplier(s) and exchange item(s). User will update expiry date of the product. Otherwise shopkeeper will inform administrator about the expired product and the administrator will take necessary steps to manage the product. User will check if inventory level is low or not. If inventory is low, he will inform the administrator. The administrator will either deal with the supplier or collect the products by his own. Then the cash and inventory level will be updated by him. If the administrator does not want to sell any product(s), he will remove it from the list.

If customer suggests any new product then it will be stored by the shopkeeper in a temporary suggested list. Then, the owner will check the list. If he approves the list then the product(s) will be stored. Otherwise, that suggested product will be removed by administrator.

Maintenance details will be stored separately by the user. Electricity bill, phone bill, repairing shop, adding furniture, repairing furniture, repairing fan, switching bulb are elements of maintenance. User will handle maintenance. User can also add new maintenance element. Elements with “done” status will be processed by the system and the expenditure information goes to the management part of the Accounting subsystem.

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**Accounting**

Along with user(s), clients are also involved in this system. Client has client id, name, address, type and contact. Here, types can be supplier, customer and shopkeeper of other shop. Anything related to spending and earning money will be handled by this subsystem. This subsystem is divided into three parts:

1. Transaction

2. Management cost

3. Financial report

Both the shopkeeper or administrator can request transaction with the supplier of certain product(s) and of specified quantity. The supplier(s) will confirm the item delivery. The system will store supplier id, supplier mobile number, company name. After, delivery, transaction between supplier(s) and the user will take place. After payment, that information of product(s) must be kept into inventory. For this purpose, the following information about the transaction will be stored:

|  |  |
| --- | --- |
|  | Transaction id Transaction date Transaction time Supplier id Product name Quantity  Unit cost Total cost Total amount |

Transaction id will be auto-generated. Total cost will be calculated by the system. All the information will be stored by user. Transaction are of several types such as buying, selling, loan and expenditures.

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At the time of buying product from supplier, a buying transaction will be created. If the user can not pay full amount, an agreement will be created as due type. The inventory level will be updated as either new product(s) will be added or quantity of some product(s) will be increased. On the other hand, selling transaction will take place between customer and the user(s). If any customer fails to pay full amount, another type of agreement called late payment will be created. The user can borrow product(s) from nearby shop with an agreement. Again, the inventory level will be updated as the quantity of product(s) will decrease. For an agreement following information must be kept:

|  |  |
| --- | --- |
|  | Transaction id Type |
|  | Payee Id |
|  | Receiver Id |
|  | Amount |
|  | Status Occurrence date  Return date Description |

.

If any due type agreement exists, user will check the cash. If he has enough amount to pay, he will complete payment with a transaction and update the cash. Otherwise, he can partially pay and issue a new date.

If any late payment occurs, the user will store information about the agreement. Before updating agreement information the user will check payable amount of the customer. This agreement can be updated in three situations:

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|  |  |
| --- | --- |
|  | If the customer pays full amount  If he pays partial amount  If customer wants to buy on account, the user will check whether his due amount is less than 500 tk. |

When agreement is updated transaction will also occur. When a customer asks for product(s), user will search for product(s). If the product(s) is found, user will add the product(s) quantity to receipt or if the customer does not want to buy the product(s) which was previously selected then user will remove the product(s) from the receipt. If desired product(s) are not available in the shop, the shopkeeper can bring those product(s) from nearby shop. If loan is not possible, shopkeeper will ask for next desired

product(s). If desired product(s) is found, the user will enter the unit of the products(s). System will calculate the price and add it to the receipt. If the number of product is zero on the receipt, no transaction will take place. Otherwise, system will calculate total amount. Then, the receipt will be printed.

“Management cost” list firstly stores the information about maintenance namely maintenance element and related cost. This list also includes shop rent, loan payment, shopkeeper salary, bonus on different occasions. User will record these expenditure information. He may add, delete and update any element.

There will be a financial report which will contain information about total cash, total inventory, total account payables, total account receivable and capital of a specific time. Administrator can see the financial report.

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**Notification**

There are three types of notification.

Two types of notification are generated by the system and sent to the owner and the shopkeeper. User will get notification(s):

i. If quantity of any product(s) is below a certain threshold.

ii. If expired date of any product exceeds.

When an owner or shopkeeper wants to include some product to the inventory, he may create a notification for the appropriate supplier. The system will send it to the desired supplier.

All the notification will have to store the notification id for each notification and also time, sender, receiver, type and description.

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**4 SCENARIO BASED MODELING OF** “GRO**CERY MANAGEMENT SYST**EM”

This chapter describes the Scenario Based Model for the “**Grocery Manage- ment Syste**m”

4.1 INTRODUCTION

Although the success of a computer-based system or product is measured in many ways, user satisfaction resides at the top of the list. If we understand how end users (and other actors) want to interact with a system, our software team will be better able to properly characterize requirements and build meaningful analysis and design models. Hence, requirements modeling begins with the creation of scenarios in the form of Use Cases, activity diagrams and swim lane diagrams.

4.2 DEFINITION OF USE CASE

A Use Case captures a contract that describes the system behavior under various conditions as the system responds to a request from one of its stakeholders. In essence, a Use Case tells a stylized story about how an end user interacts with the system under a specific set of circumstances. A Use Case diagram simply describes a story using corresponding actors who perform important roles in the story and makes the story understandable for the users. The first step in writing a Use Case is to define that set of “actors” that will be involved in the story. Actors are the different people that use the system or product within the context of the function and behavior that is to be described. Actors represent the roles that people play as the system operators. Every user has one or more goals when using system.

Primary Actor

Primary actors interact directly to achieve required system function and derive the intended benefit from the system. They work directly and frequently with the software.

Secondary Actor

Secondary actors support the system so that primary actors can do their work. They either produce or consume information.

4.3 USE CASE DIAGRAMS

Use Case diagrams give the non-technical view of overall system.

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4.3.1 LEVEL-0 USE CASE DIAGRAM - GMS

Level-0 GMS

Version 1.1 Created on 11/13/2017. Last modified 11/16/2017

Figure 1:

**Description of Use case diagram level-0**:

After analyzing the user’s story, we found 4 actors that directly or indirectly interacts with the system. Primary actors are those who will play action and get reply from the system whereas secondary actors only produce or consume information. The actors are -

|  |  |
| --- | --- |
|  | Shopkeeper |
|  | Owner |
|  | Customer suppliers |

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4.3.2 LEVEL-1 USE CASE DIAGRAM-SUB SYSTEM

Level-1 sub-system

Version 1.1 Created on 11/13/2017. Last modified 11/16/2017

Figure 2: Sub-system

**Description of level-1 use case diagram:**

There are four subsystems in Grocery Management System. They are as follows:

1. Authentication

2. Accounting

3. Shop Management

4. Notification

The first three subsystems are further decomposed, in level 1.1, 1.2, 1.3 respectively. The description of notification system is given below.

There are five types of notification.

Three types of notification are generated by the system and sent to the owner and the shopkeeper will get notification(s):

i. If quantity of any product(s) is below a certain threshold.

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ii. If expired date of any product exceeds.

iii. Immediate day before the loan period is over.

When an owner or shopkeeper wants to include some product to the inventory, he/she may create a notification for the appropriate supplier. The system will send it to the desired supplier.

Lastly, the owner or shop keeper may create notification for customer who have late payment issue(s). The system will send to the desired customer.

All the notification will have the store a notification id for each notification and also time, sender, receiver, type and description.

4.3.3 LEVEL-1.1 USE CASE DIAGRAM- AUTHENTICATION

1.1 Authentication

Version 1.1 Created on 11/13/2017. Last modified 11/13/2017

Figure 3: Level 1.1 Authentication

**Description of level-1.1 use case diagram:**

Authentication is a process in which credentials provided are compared to those on files in a database of authorized user’s information. The authentication subsystem can be divided into two parts. They are as follows:

1. Creating Account

2. Accessing Account

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4.3.4 LEVEL 1.1.1 CREATING ACCOUNT

*Use Case diagram in package 'Use Case Model'*

Level 1.1.1

Version 1.1 Created on 10/22/2017. Last modified 11/16/2017

Figure 4:

**Description of level-1.1.1 use case diagram:**

System has two types of users:

 Administrator

Shopkeeper

At the time of installation, an user should be created as an administrator. Thereafter, more user(s) can create account(s). For creating a shopkeeper account, the approval of an administrator account is needed. For any type of account creation, the following information needs to be given-

 User name

 Full name

 Permanent address

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Current address

Designation (Two options: Administrator, shopkeeper)

NID

Mobile number

Password (should be at least 8 characters at most 32 characters)

Shopkeeper has salary and commission along with all the attributes mentioned above.

If a user tries to create an account with empty field or contain invalid input, the system shows an error message and allows him/her to try again. For administrator account system will provide an administrator id and for shopkeeper system will provide a shopkeeper id. All information regarding accounts should be stored.

**Action-Reply of Use Case Diagram Level 1.1.1:**

**Administrator:**

 A1: Administrator creates an account filling with valid information.

R1: System creates an administrator account and the account information is stored.

|  |  |
| --- | --- |
|  | A2: Administrator creates an account filling with invalid information. R2: System allows the administrator to try again for account creation. |

|  |  |
| --- | --- |
|  | A3: Administrator accepts or delete request(s) for shopkeeper account creation. |

R3: System will work accordingly. If administrator accepts request then system will create and store that account(s).

**Shopkeeper:**

 A1: Shopkeeper creates an account filling with valid information.

R1: System waits for administrator’s approval for creating shopkeeper account.

A2: Shopkeeper creates an account filling with invalid information. R2: System allows the shopkeeper to try again for account creation.

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4.3.5 LEVEL 1.1.2 USE CASE DIAGRAM-ACCESSING ACCOUNT

Level 1.1.2 Accessing-account

Version 1.1 Created on 10/22/2017. Last modified 11/16/2017

Figure 5:

**Description of level-1.1.2 use case diagram:**

Accessing account involves two tasks:

i. Log in ii. Log out

For logging into the account, the user must provide mobile number or user name and password. User name should be consisting of alpha numeric characters and underscore. A valid mobile number can also be used in the user name field for login. Correct password should be provided. If the user(s) tries to log into the account with empty field or invalid input or incorrect user name or invalid mobile number, the system will show error message and will allow to try again. After, third time failure, the system will get locked for two minutes. While logging out of any account the system will check for any unsaved file and will want confirmation of logging out.

**Action Reply**

User (Administrator & shopkeeper)

A1: User provides user name or valid mobile number and password.

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R1: System will check validity. For valid information system will allow user(s) to log into the account.

A2: User provides invalid information.

R2: System will show error message and allows to try again.

A3: User fails to log into the account for third time.

R3: System will be blocked for two minutes.

A4: Users will give command for log out.

R4: System will search for unsaved file(s). If unsaved file(s) is found, system will ask for confirmation whether the account should be logged out or not. Otherwise, account will be logged out automatically.

4.3.6 LEVEL-1.2 USE CASE DIAGRAM-ACCOUNTING

Level 1.2 Accounting

Version 1.1 Created on 11/13/2017. Last modified 11/13/2017

Figure 6:

**Description of level 1.2 use case diagram:**

Anything related to spending and earing money will be handled by this subsystem. This subsystem is divided into three parts:

i. Transaction

ii. Management cost

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iii. Financial report

Transaction consists of dealing, buying and selling things and exchanging. For more details on transaction see level 1.2.1.

“Management cost” list firstly stores the information about maintenance namely maintenance element and related cost. This list also includes shop rent, loan payment, employee salary, bonus for employees. These elements and the related cost are stored by the administrator. Only the administrator will have access into this table. He/she may add or delete any element from the list.

There is a file called “Financial report” that will contain total amount of money spent on buying products and management cost all together, total amount of money earned by selling products. Monthly record will be kept. Monthly and yearly profit will also be calculated and stored in this file. This is only accessed by the owner. He only can observe the records, but can’t edit it.

**Action Reply:**

Administrator:

 A1: Administrator enter transaction information into the system

R1: System saves the given information.

 A2: Administrator will provide maintenance cost of every maintenance elements.

R2: System saves the given information.

 A3: Administrator makes a request to see balance sheet

R3: System shows the balance sheet.

User (Shopkeeper and administrator):

A1: User give total amount of money spent on buying products and management cost all together, total amount of money earned by selling products into the system.

R1: System stores all information and calculate monthly and yearly profit and store it in a file

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4.3.7 LEVEL 1.2.1 USE CASE DIAGRAM-TRANSACTION

1.2.1 Transaction

Version 1.1 Created on 11/13/2017. Last modified 11/16/2017

Figure 7: 1.2.1 Transaction

**Description of level 1.2.1 use case diagram:**

Transaction subsystem holds records of agreement, buying, selling and excha- nging products.

Agreement can be established between the owner and suppliers, administrator and customers, shopkeeper and customers and sometimes between owner and shopkeeper for fixing his salary. For more details on dealing see level 1.2.1.1.

When the owner orders one or more products from suppliers he has to pay for those products and that information must be kept. For this purpose, the following information about the transaction will be stored:

|  |  |
| --- | --- |
|  | Transaction id Transaction date Transaction time Supplier id Product name Quantity  Unit cost  Total cost |

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Transaction id, date and time are auto-generated. Total cost is calculated by the system. All the information is stored by the shopkeeper in a temporary list. The list is then approved by the owner then all the information gets into a master list and the information in the temporary list get deleted.

Again, information about transaction with the customer is also stored by the shopkeeper at each transaction. The information that should be filled are:

|  |  |
| --- | --- |
|  | Transaction id Transaction date Transaction time Supplier id Number of products Product names |
|  | Quantities Unit costs Total cost |

If a customer wants to return any product, he will not be allowed to do it. Instead, he will be able to exchange purchased product with another product having the same price. This information is stored in a separate list by the shopkeeper containing name of the returned product and name of the exchanged product.

**Action Reply**

User (Administrator & shopkeeper)

|  |  |
| --- | --- |
|  | A1: User provides information about different expenditure. R1: System stores the information. |

|  |  |
| --- | --- |
|  | A2: User stores transaction information about sold items. R2: System stores the information. |

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4.3.8 LEVEL-1.2.1.1 USE CASE DIAGRAM-AGREEMENT

1.2.1.1 Agreement

Version 1.1 Created on 11/13/2017. Last modified 11/16/2017

Figure 8:

**Description of level 1.2.1.1 use case diagram:**

Agreement with suppliers means to buy products from different suppliers. The user deals with suppliers and stores all information about dealing items. Information are given below:

|  |  |
| --- | --- |
|  | Transaction id Transaction date Transaction time Supplier id Number of products Product names Quantities  Unit costs  Total cost |

If desired product(s) are not available in the shop, the shopkeeper brings those product(s)

SRS Report

from any nearby shop or may sometimes borrow money from them. There is a loan table in which name and cost of borrowed product(s) are stored. In case of borrowing money, only the cost column is updated.

Customers may not pay cash instantly. Shopkeeper will store name, address, mobile number, amount and status (paid/not paid) that is to be paid of the customer into a table named “late payment”. When a customer returns money then the shopkeeper updates the status to be ‘paid’.

Action Reply

**User**

|  |  |
| --- | --- |
|  | A1: User stores information about dealing items with suppliers. R1: System stores the information. |

|  |  |
| --- | --- |
|  | A2: User stores information about loan with other shop. R2: System stores the information. |

|  |  |
| --- | --- |
|  | A3: Shopkeeper will give information about late payment of customer. R3: System stores the information. |

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4.3.9 LEVEL-1.3 SHOP MANAGEMENT

1.3 Shop Management

Version 1.0 Created on 11/13/2017. Last modified 11/16/2017

Figure 9:

**Description of level 1.3 use case diagram:**

Shop management subsystem manages various tasks of grocery management system. These tasks can be categorized as follows:

1. HR management

2. Product management

3. Maintenance

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4.3.10

Figure 10: 1.3.2 Product Management

**Description of level 1.3.2 use case diagram:**

Product management subsystem plays a significant role in the grocery management system. This subsystem is related with managing all sorts of product item to be sale, tracking inventory level and stock of the product supply, overseeing expired items, ensuring product delivery in time and listing suggested products which are under consideration to be included.

This subsystem is divided into several subsystem which are as follows:  Product delivery

 Managing Expired items

SRS Report

 Inventory

 Listing suggested products

 Product shortage

Through the “Product Delivery” subsystem shortage of product is managed to recover in due time to cope with customer need. Supplier and shopkeeper are engaged with this subsystem. While “Managing Expired Item” is responsible for the management of products having expired. Shopkeeper gets notification and take steps to resolve the situation. Sometimes customer or other external person may suggest products that are on demand. “Listing suggested Product” provides with the scope of keeping a list of this kind of merchandises.

**Action Reply: User:**

 A1: User inputs product delivery information.

R1: System prompts with messages and saves information at the various stages of the execution of product delivery subsystem.

 A2: User manages expired item.

R2: System acts accordingly.

 A3: User updates a list of suggested products.

R3: System saves the list.

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Figure 11: Level-1.3.2.3 Inventory

**Description of level 1.3.2.3 use case diagram:**

Inventory subsystem is responsible for tracking inventory levels, sales and deliveries as well as controlling and supervising the ordering and flow of products. This subsystem consists of three basic part. They are:

1. Include/Exclude product

2. Update product quantity

3. Set price and quality

Owner can include new product item on the basis of current market demand and also exclude existing product item. When a particular product item falls short shopkeeper can update product quantity after product delivery and receiving new products increasing inventory level adequately. The task of setting the price of each product on the market value is performed by the owner that executed in this subsystem.

**Action Reply:**

**User**

|  |  |
| --- | --- |
|  | A1: User includes or excludes product from product list R1: System receives command and execute accordingly. |

 A2: User updates price and other information about a product.

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R2: System stores the information.

4.4 ACTIVITY DIAGRAM OF GMS

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency.

4.4.1 GROCERY MANAGEMENT SYSTEM

Grocery Management System

Version 1.0 Created on 11/16/2017. Last modified 11/16/2017

Figure 12: Main

SRS Report

4.4.2 SIGN UP

Sign Up

Version 1.2 Created on 10/13/2017. Last modified 11/16/2017

Start

**Sign Up**

**Enter Username**

No

If Username already exist

Yes

Yes

No

**Select Mode**

No

**Asking Admin's approv al**

Is Admin

Yes

Admin>0

Yes

Is Approved

No

No

**Successfull Sign Up**

END

Figure 13: Sign Up

SRS Report

4.4.3 LOGIN ACTIVITY DIAGRAM

Login Activity

Version 1.2 Created on 10/12/2017. Last modified 10/28/2017

**Login**

Yes

No

retry<=3

**Enter Mobile no./Username**

**retry++**

No

Are Mobile no. and Password matched?

Yes

**Successfull Login**

**Send password to mobile**

Figure 14: Login Activity

SRS Report

4.4.4 ACCOUNTING ACTIVITY DIAGRAM

Accounting activity

Version 1.0 Created on 10/12/2017. Last modified 10/28/2017

Figure 15: Login Activity

SRS Report

4.4.5 TRANSACTION ACTIVITY DIAGRAM

Transaction Activity

Version 1.0 Created on 10/13/2017. Last modified 11/16/2017

**Search product**

No

**Loan from neighbour**

Yes

Loan Possible?

No

Yes

Wants more?

No

Number of product on

receipt>0?

Yes

**Calculate total payment**

**Late payment\***

**Write 'Fully Paid' on receipt**

**Print Receipt**

Figure 16: Transaction Activity

SRS Report

4.4.6 LATE PAYMENTS DIAGRAM

Late Payments

Version 1.0 Created on 10/13/2017. Last modified 10/27/2017

Start

**Authentication**

**Wants to pay the due**

**Search the customer on list**

**Enter Customer name**

**Enter the paid amount**

|  |
| --- |
|  |
|  |

|  |
| --- |
|  |
|  |

**Print a receipt**

Yes

Any overdue?

|  |
| --- |
|  |
|  |

|  |
| --- |
|  |
|  |

Yes

**Successfully add to due list**

END

Figure 17: Late Payments

SRS Report

4.4.7 **DEALING WITH CLIENT ACTIVITY DIAGRAM**

Dealing with supplier

Version 1.0 ABDULLAH AL JUBAER created on 10/13/2017. Last modified 11/16/2017

**Authentication**

**Check inv entory lev els**

No

Inventory level low?

Yes

Yes

**Create purchase order**

**Check cash**

**Contact with supplier\***

No

**Issue a new date**

**Item deliv ery**

No

**Complete payment**

**Pay inv oice**

Yes

**Update inv entory**

Figure 18: Dealing with client

SRS Report

4.4.8 **MANAGEMENT COST DIAGRAM**

Management cost

Version 1.1 Created on 10/27/2017. Last modified 10/27/2017

**act management cost**

start

**authentication**

No

**check list**

no

yes

**check status**

new element?

yes

No

no

paid?

end

yes

**enter purpose name**

**update status**

no

**update cash**

**add**

end

Figure 19: Management Cost

SRS Report

4.4.9 HR MANAGEMENT DIAGRAM

HR Management

Version 1.0 Created on 10/15/2017. Last modified 11/16/2017

Start

**Authentication**

No

**Remov e from employees table**

Yes

Yes

No

Is everything ok?

**Check status**

New employee?

No

**Check attendence**

**Enter name**

Yes

Update requires?

No

**Update**

**Submit report v ia notification**

Figure 20: HR Management

SRS Report

4.4.10

**Authentication**

No

**Remov e from employees table**

Yes

Yes

No

Is everything ok?

**Check status**

New employee?

No

**Check attendence**

**Enter name**

Yes

Update requires?

No

**Update**

**Submit report v ia notification**

Figure 21: HR Management

SRS Report

4.4.11

**Authentication**

No

Is admin?

Yes

**Include product**

**Find the product**

**Remov e from the list**

**Enter product id**

**Successfully add to table**

Figure 22: Inventory

SRS Report

4.4.12

Figure 23: Notification

SRS Report

4.5 SWIMLANE DIAGRAMS OF GMS

4.5.1 SIGN UP SWIMLANE

signup swimlane

Version 1.1 Created on 25-10-17. Last modified 15-11-17

|  |  |  |
| --- | --- | --- |
| **User** | **System** | **Administrator** |
| **Enter User**  **Name**   |  | | --- | |  | |  |      |  | | --- | |  | |  |      |  | | --- | |  | |  |      |  | | --- | |  | |  |   **Select Mode**  No  is Admin?  Yes | Yes  Already exists?  No  yes  is Valid?  No  Yes  is Valid?  No  Yes  is Valid?  No  Yes  admin>0 ?  No  **Successful Sign Up** | approve ?  No  Yes |

Figure 24: signup

SRS Report

4.5.2 LOGIN SWIMLANE

login swimlane

Version 1.1 Created on 17-10-17. Last modified 15-11-17

|  |  |
| --- | --- |
| **User** | **System** |
| **Login**  **Enter**  **email/User name**  **Enter Mobile No** | Yes  NO  attempted<=3  and Password  Are Mobile no.  matched?  No  Forget Password?  yes  **Send Password to mobile**  **Successfull Login** |

Figure 25: login

SRS Report

4.5.3 TRANSACTION SWIMLANE DIAGRAM

Transaction Swimlane

Version 1.1 Created on 25-10-17. Last modified 16-11-17

|  |  |
| --- | --- |
| **User** | **System** |
| **Search product**  **Decrease amount**  **Loan from neighbour**  Yes  Wants more?  No  Loan possible?  Yes  **Loan\*** | Found?  No  yes  **Calculate price**  **Add to receipt**   |  | | --- | |  | |  |   Number Of Product>0  No  yes  **Calculate total price**  yes  Fully paid?   |  | | --- | | No | |  |   **Late payment table\***  **Print receipt** |

Figure 26: Transaction

SRS Report

4.5.4 LATE PAYMENT SWIMLANE

Late payment swimlane

Version 1.1 Created on 26-10-17. Last modified 16-11-17

|  |  |
| --- | --- |
| **User** | **System** |
| **Authentication**  **Wants to pay the due**   |  | | --- | |  | |  |   **Search the customer on list**   |  | | --- | |  | |  |   **Enter the paid amount**   |  | | --- | |  | |  |      |  | | --- | |  | |  |   **Print a receipt** | **Check due list**  Any unpaid due?  No  Yes  Previous due>threshold  No  yes  **Can't buy on account**  **Successfully added to due list** |

Figure 27: Late payment swimlane

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4.5.5 AGREEMENT WITH CLIENT SWIMLANE

Agreement with client swimlane

Version 1.1 Created on 26-10-17. Last modified 16-11-17

|  |  |  |
| --- | --- | --- |
| **User** |  | **System** |
| **Authentication**  **Check inv entory lev el**  **Check cash**  Yes  Inventory level low?  No  **Contact with supplier\***  Yes  No  **Item deliv ery**  **Pay inv oice**  **Update Inv entory**  **Issue a new date** |  | Any overdue?  No  Yes  **Complete payment**  Fully paid?  No  Yes  **Update cash** |
|  |
|  |
|  |
|  |
|  |

Figure 28: Agreement with client swimlane

SRS Report

4.5.6 MANAGEMENT COST SWIMLANE

Management cost swimlane

Version 1.1 Created on 09-11-17. Last modified 16-11-17

|  |  |
| --- | --- |
| **User** | **System** |
| **Authentication**  is Admin?  No  **Check list**  **Check expenditure list**  new expenditure?  new element?  yes  No  **update status**  **purpose**  **Enter**  **name**  **add** | Yes  paid?  No |

Figure 29: management

SRS Report

4.5.7 HR MANAGEMENT SWIMLANE

HR management

Version 1.1 Created on 27-10-17. Last modified 17-11-17

|  |  |
| --- | --- |
| **User** | **System** |
| **Authentication**  **Employee**  **Management**  **Enter name**  **Enter NID**   |  | | --- | |  | |  |   No   |  | | --- | |  | |  |      |  | | --- | |  | |  |   **Remov e from employee table**  update requires?  No  Yes | Admin?  No  yes  New Employee?  No  yes  **Add to employee table**  No  is everything ok?  yes  **Submit v ia notification**  **update** |

Figure 30: HR management

SRS Report

4.5.8 PRODUCT MANAGEMENT SWIMLANE

Product Management swimlane

Version 1.1 Created on 26-10-17. Last modified 16-11-17

|  |  |  |
| --- | --- | --- |
| **User** | **System** | **Administrator** |
| |  | | --- | |  | |  |   ~~yes~~  **inform owner**  **Exchange item**  **Update expiry date**  **Authentication**  **inform owner**  **Deal with supplier \***  **Update cash**  ~~No~~   |  | | --- | |  | |  |      |  | | --- | |  | |  |   ~~Yes~~  **Add to suggested list**   |  | | --- | |  | |  | | Any expired item?  ~~No~~  Exchangable?  ~~No~~  Yes  Inventory low?  ~~No~~  ~~Yes~~ | **Remov e from list**  ~~No~~  wants to include?  ~~Yes~~  **Check suggestion** |
| ~~No~~   |  | | --- | |  | |  | |
|  |

Figure 31: Product Management

SRS Report

4.5.9 INVENTORY SWIMLANE

Inventory Swimlane

Version 1.0 Created on 04-11-17. Last modified 17-11-17

|  |  |
| --- | --- |
| **Administrator** | **System** |
| **Authentication**  **Include product**  **Find the product**  **Remov e from the list**  **Enter product ID** | No  Is admin?  Yes  **Successfully added to table** |

Figure 32: Inventory swimlane

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4.5.10

|  |  |
| --- | --- |
| **User** | **System** |
| **Authentication**  **Enter username/mobile**  **no**  **Select category**  **Select message**  **Edit message**  **Send message** | **Expiry Date Checking**  Expired  No  Yes  **Generate Expiry information**  Yes  **Send to user**  No  **Verify mobile no/username**  yes  is Valid |

Figure 33: notification

SRS Report

**5 DATA MODELING OF GMS**

5.1 DATA MODELING CONCEPT

If software requirements include the necessity to create, extend or interact with a database or complex data structures need to be constructed and manipulated, then the software team chooses to create data models as part of overall requirements modeling. The entity-relationship diagram (ERD) defines all data objects that are processed within the system, the relationships between the data objects and the information about how the data objects are entered, stored, transformed and produced within the system.

5.1.1 DATA OBJECTS

A data object is a representation of composite information that must be understood by the software. Here, composite information means an information that has a number of different properties or attributes. A data object can be an external entity, a thing, an occurrence, a role, an organizational unit, a place or a structure.

5.1.1.1 NOUN IDENTIFICATION

We identified all the nouns whether they are in problem space or in solution space from our story

Table 1: Noun Indentification

|  |  |  |  |
| --- | --- | --- | --- |
| Serial no | Noun | Problem/solution space | Attributes |
| 1 | Authentication | p |  |
| 2 | System | p |  |
| 3 | User | s | 6-13,17 |
| 4 | Administrator | s | 6-13,17 |
| 5 | shopkeeper | s | 6-13,15-17 |
| 6 | Full name | s |  |
| 7 | Permanent address | s |  |
| 8 | Current address | s |  |
| 9 | Designation | s |  |

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|  |  |  |  |
| --- | --- | --- | --- |
| 10 | NID | s |  |
| 11 | User name | s |  |
| 12 | Mobile number | s |  |
| 13 | Password | s |  |
| 14 | Account | s | 11,13,17 |
| 15 | Salary | s |  |
| 16 | Commission | s |  |
| 17 | Id | s |  |
| 18 | characters | p |  |
| 19 | underscore | p |  |
| 20 | alphanumeric | p |  |
| 21 | field | p |  |
| 22 | input | p |  |
| 23 | validation | p |  |
| 24 | creation | p |  |
| 25 | message | s |  |
| 26 | information | p |  |
| 27 | Log in | p |  |
| 28 | Sign up | p |  |
| 29 | Log out | p |  |
| 30 | recovery | p |  |
| 31 | retry | p |  |
| 32 | Approval | p |  |
| 33 | shop | p |  |
| 34 | Management | p |  |
| 35 | HR Management | p |  |
| 36 | Product | s | 17, 37-43 |
| 37 | Name | s |  |
| 38 | quantity | s |  |
| 39 | price | s |  |
| 40 | Delivery date | s |  |
| 41 | Expiry date | s |  |
| 42 | Company name | s |  |
| 43 | Status | s |  |
| 44 | inventory | s | 45 |

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|  |  |  |  |
| --- | --- | --- | --- |
| 45 | Inventory level | s |  |
| 46 | Contact | s | 37,48-49 |
| 47 | item | p |  |
| 48 | Mobile number | s |  |
| 49 | status | s |  |
| 50 | Customer | s | 37,48-49 |
| 51 | Supplier | s | 42,48-49 |
| 52 | Client | s | 17,37,81-83 |
| 53 | Maintenance | s | 17,37,43 |
| 54 | Details | p |  |
| 55 | Cost | s |  |
| 56 | Expenditure | s | 17,37,55,49 |
| 57 | Electric bill | p |  |
| 58 | Repairing bill | p |  |
| 59 | Elements | p |  |
| 60 | Furniture | p |  |
| 61 | Bulb | p |  |
| 62 | Accounting | p |  |
| 63 | Agreement | s | 17,37,68-74 |
| 64 | Loan | s | 17,37,68-74 |
| 65 | Late payment | s | 17,37,68-74 |
| 66 | money | p |  |
| 67 | Transaction | s | 17,37,38,68,76-  79,56 |
| 68 | Type | s | 17,37,68-74 |
| 69 | Payee | s |  |
| 70 | Receiver | s |  |
| 71 | Amount | s |  |
| 72 | Occurrence date | s |  |
| 73 | Return date | s |  |
| 74 | Description | s |  |
| 75 | Due | s | 17,37,68-74 |
| 76 | Transaction time | s |  |
| 77 | Transaction date | s |  |
| 78 | amount | s |  |

SRS Report

|  |  |  |  |
| --- | --- | --- | --- |
| 79 | Unit cost | s |  |
| 80 | receipt | p |  |
| 81 | Mobile number | s |  |
| 82 | address | s |  |
| 83 | email | s |  |
| 84 | purpose | p |  |
| 85 | Inventory | s | 17,86 |
| 86 | Inventory level | s |  |
| 87 | Occasions | p |  |
| 88 | Purposes | p |  |
| 89 | Employee | p |  |
| 90 | Modification | p |  |
| 91 | Financial report | s | 92-96 |
| 92 | cash | s |  |
| 93 | Payable | s |  |
| 94 | Receivable | s |  |
| 95 | profit | s |  |
| 96 | Capital | s |  |
| 97 | assets | p |  |
| 98 | notification | s | 25,99-104 |
| 99 | Notification id | s |  |
| 100 | sender | s |  |
| 101 | receiver | s |  |
| 102 | time | s |  |
| 103 | type | s |  |
| 104 | description | s |  |
| 105 | week | p |  |
| 106 | month | p |  |
| 107 | calculation | p |  |
| 108 | list | p |  |

|  |  |
| --- | --- |
| 5.1.1.2 | Potential Data objects:  Administrator-6-13,17  Shopkeeper-6-13,15-17 |

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|  |  |
| --- | --- |
|  | User-6-13,17 Customer-37,48-49 Product-17, 37-43 Account-11,13,17 Loan- 17,37,68-74  Late payment-17,37,68-74 Supplier-42,48-49  Maintenance -17,37,43 Management cost -17,37,43 Transaction-17,37,38,68,76-79,56 Due-17,37,68-74 Notification-25,99-104 Report-92-96  Inventory -45  client-17,37,81-83 Agreement-17,37,68-74 contact-37,48-49 |

|  |  |  |
| --- | --- | --- |
| 5.1.1.3 | | Analysis for finalizing Data Objects |
|  | Both administrator and shopkeeper have some common attributes. So their common attributes can be stored as **User**.  Maintenance elements and management cost have some same attributes so an entity called “**Expenditure**” can store all information regarding these two entities.  Loan, due and late payment involve with transaction. Information about those can be stored as **Agreements**.  Details of shopkeeper is stored in **Shopkeeper** for updating information and tracking his activities.  **Administrator** information must be saved for finding and verifying account.  Transaction information are stored in **Transaction** and needs to be stored for profit calculation and generating a report.  Report is generated through **Transaction** and must be kept for the | |
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|  |

SRS Report

records of previous transaction.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Product** holds information on products. It will help to modify or update | | |
|  | any information about that particular product.  Client and user have **Contact** which needs to be stored. | | |
|  | User and client receives **Notification**. System generates notification. So | | |
|  | messages needs to be saved and all information must be stored. | |  |
|  | **Account** keeps information of user account.  Information about supplier and customer is stored in notifications will be send to them for many purposes. | **Client** | as |

5.1.1.4 Final Data Objects

Table 2: Final data object

|  |  |
| --- | --- |
| 1 | User: Full name, Permanent address, Current address Designation, NID, user Id |
| 2 | Administrator: Admin id, User id, Full name, Permanent address, Current address, Designation, NID |
| 3 | Shopkeeper: Shopkeeper id, User id, salary, commission, full name, permanent address, current address, designation, NID |
| 4 | Account: User name, User id, Password |
| 5 | Client: Client id, Name, Address, Type |
| 6 | Product: Product id, Admin id, Product name, Quantity, Price, Delivery date, Expiry date, Company Name, status |
| 7 | Expenditure: Type, Cost, Status, User id, EID |
| 8 | Transaction: Transaction id, User Id, Transaction date, Time, Unit cost, Total cost |
| 9 | Agreement: Transaction id, Type, Payee Id, Receiver Id, Amount, Status, Occurrence date, Return date, Description , AID |
| 10 | Report: Admin id, Report Id, type, Date, Cash, Account payable, Account  Receivable, profit |

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|  |  |
| --- | --- |
| 11 | Contact: Contact Name, Email, Mobile Number |
| 12 | Notification: Time, Notification id, Receiver User Id, Type, Description |

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5.2 DATA OBJECT RELATIONSHIPS

Data objects are connected to one another in different ways.

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5.3 ENTITY RELATIONSHIP DIAGRAM

Figure 34: Entity Relationship Diagram

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5.4 SCHEMA DIAGRAM

Table 3: Schema for user

|  |  |  |
| --- | --- | --- |
| **User**  Attributes | | |
| User Name  Current address  Designation  Full name  Permanent address  NID  Password  Mobile number | Varchar2  Varchar2  Varchar2  Varchar2  Varchar2  Varchar2  Varchar2  Varchar2 |  |

Table 4: Account Schema diagram

|  |  |  |
| --- | --- | --- |
| **Account**  Attribute | | |
| User name  User id  password | Varchar2  Varchar2  Varchar2 |  |

Table 5: Schema for Administrator

|  |  |  |  |
| --- | --- | --- | --- |
|  | | **Administrator** |  |
| Attribute | Type | | Size |
| UserId  Admin id  Permanent address  Full name | Varchar2  Varchar2  Varchar2  Varchar2 | |  |

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|  |  |  |
| --- | --- | --- |
| Designation  Current address  NID | Varchar2  Varchar2  Varchar2 |  |

Table 6: Schema for Product

|  |  |  |
| --- | --- | --- |
| **Product** | | |
| Attribute | Type | Size |
| Product name  Quantity  Product id  Admin id  Product key  Price  Company name  status  Delivery date  Expiry date | Varchar2  Varchar2  Number  Number  Varchar2  Varchar2  Varchar2  Varchar2  Varchar2  Varchar2 |  |

Table 7: Schema for Transaction

|  |  |  |
| --- | --- | --- |
| **Transaction**  Attribute | | |
| Transaction date  Time  Transaction id  User id  Unit cost  Total cost | Varchar2  Varchar2  Varchar2  Varchar2  Number  Number |  |

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Table 8: Schema for Client

|  |  |  |
| --- | --- | --- |
| **Client**  Attribute | | |
| Address  Type  Client id  Name | Varchar2  Varchar2  Varchar2  Varchar2 |  |

Table 9: Schema for Agreement

|  |  |  |
| --- | --- | --- |
| **Agreement**  Attribute | | |
| AID  Transaction id  Transaction type  Payee id  Amount  Receiver id  Return date  Description  Status  Occurrence date | Varchar2  Varchar2  Varchar2  Varchar2  Varchar2  Number  Varchar2  Varchar2  Varchar2  Varchar2 |  |

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Table 10: Schema for Expenditure

|  |  |  |
| --- | --- | --- |
| **Expenditure** | | |
| Attribute | Type | Size |
| Cost  status  User id  Type  EID | Varchar2  Varchar2  Varchar2  Number  Varchar2 |  |

Table 11: Schema User contact

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | | **Client**  **Notification** |  | |
| Attribute | Type | | | Size |
| Notification id  Time  Receiver User id  Receiver User id  Type  Description | Varchar2  Varchar2  Varchar2  Varchar2  Varchar2  Varchar2 | | |  |

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Table 12: Financial report

|  |  |  |
| --- | --- | --- |
| **Financial report**  Attribute | | |
| Type  Date  Report id  Admin id  Cash  Account receivable  Account payable  Profit | Varchar2  Varchar2  Varchar2  Varchar2  Varchar2  Number  Number  Profit |  |

Table 13: Schema for Contact

|  |  |  |
| --- | --- | --- |
| **Contact**  Attribute | | |
| User id  Name  Type  Mobile number | Varchar2  Varchar2  Varchar2  Varchar2 |  |

Table 14: Schema for Notification

|  |  |  |
| --- | --- | --- |
| **Notification**  Attribute | | |
| Notification id  User id  Time  Description  Type | Varchar2  Varchar2  Varchar2  Varchar2  Varchar2 |  |

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**6 CLASS-BASED MODELING FOR GMS**

This Chapter is intended to describe class based modeling of “**Grocery Management System**”.

6.1 CLASS BASED MODELING CONCEPT

Class-based modeling represents the objects that the system will manipulate, the operations that will applied to the objects, relationships between the objects and the collaborations that occur between the classes that are defined.

6.2 GENERAL CLASSIFICATION

To identify the potential classes, we have first selected the nouns from the solution space of the story. These were then characterized in seven general classification. The seven general characteristics are as follows

1. External entities

2. Things

3. Events

4. Roles

5. Organizational units

6. Places

7. Structures

Following are the specifications of the nouns according to the general classifications:

Table 15: General Classification

|  |  |  |
| --- | --- | --- |
| No | Noun | General Classification |
| 1 | Authentication | 3,5 |
| 2 | User | 4,5,7 |
| 3 | Administrator | 4,5,7 |

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|  |  |  |
| --- | --- | --- |
| 4 | Shopkeeper | 4,5,7 |
| 5 | Account | 2,4,7 |
| 6 | User Name |  |
| 7 | User Id |  |
| 8 | Password |  |
| 9 | Contact | 2,7 |
| 10 | Full name |  |
| 11 | Current address |  |
| 12 | Permanent address |  |
| 13 | NID |  |
| 14 | Designation |  |
| 15 | Product | 2,7,5 |
| 16 | Product Id |  |
| 17 | Product name |  |
| 18 | Inventory | 6,2 |
| 19 | Quantity |  |
| 20 | Expiry date |  |
| 21 | Delivery date |  |
| 22 | Company name |  |
| 23 | Price |  |
| 24 | Client | 1,5,7 |
| 25 | Client Id |  |
| 26 | Client type |  |
| 27 | Client name |  |
| 28 | Dealings | 3,6,7 |
| 29 | Customer | 1,5,7 |
| 30 | Client address |  |
| 31 | Late payment | 3 |
| 32 | Paid amount |  |
| 33 | Due | 3 |
| 34 | Occurrence date |  |

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|  |  |  |
| --- | --- | --- |
| 35 | Issue date |  |
| 36 | Payee |  |
| 37 | Receiver |  |
| 38 | Notification | 3,7 |
| 39 | Supplier | 1,5,7 |
| 40 | Message | 2 |
| 41 | Status |  |
| 42 | Mobile number | 2 |
| 43 | Receipt | 2,6,7 |
| 44 | Item | 2,7 |
| 45 | Amount |  |
| 46 | Total price |  |
| 47 | Transaction | 3,4,7 |
| 48 | Type |  |
| 49 | Loan | 3,7 |
| 50 | Shop name |  |
| 51 | Financial report | 2,7 |
| 52 | Cash |  |
| 53 | Payable |  |
| 54 | Receivable |  |
| 55 | Asset |  |
| 56 | profit |  |
| 57 | system | 2,4,7 |
| 58 | database | 2,4,7 |
| 59 | interface | 2,4,7 |
| 60 | expenditure | 2,7 |

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6.3 SELECTION CRITERIA

The potential classes were then selected as classes by six Selection Criteria. A potential class becomes a class when it fulfills all six characteristics.

 Retain information

 Needed services

 Multiple attributes

 Common attributes

 Common operations

 Essential requirements

|  |  |  |
| --- | --- | --- |
| no | noun | Selection criteria |
| 1 | Authentication | 3 |
| 2 | User | 1-5 |
| 3 | Administrator | 1-5 |
| 4 | Shopkeeper | 1-5 |
| 5 | Account | 1-5 |
| 6 | Contact | 3-5 |
| 7 | Product | 1,3,4,5 |
| 8 | Client | 3,4,5,6 |
| 9 | Deal | 3,4,5 |
| 10 | Late payment | 3,4,5 |
| 11 | Customer | 3,4 |
| 12 | Due | 3,4,5 |
| 13 | Supplier | 3,4 |
| 14 | Notification | 3,4,5 |

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|  |  |  |
| --- | --- | --- |
| 15 | Receipt | 3,4,5 |
| 16 | Item | 3,4,5 |
| 17 | Transaction | 1,3,4,5 |
| 18 | Loan | 3,4,5 |
| 19 | Financial report | 1,6 |
| 20 | Database | 1 |
| 21 | System | 1 |
| 22 | Interface | 1 |
| 23 | expenditure | 3,4,5 |

6.4ASSOCIATE NOUN AND VERB IDENTIFICATION

We now identify the nouns and verbs associated with the potential classes to better find out the attributes and methods of each class.

Table 16: Associate noun and identification

|  |  |  |  |
| --- | --- | --- | --- |
| No | Potential class | Noun | verb |
| 1 | User | Full name, permanent address, current address, NID, designation, contact, account | Updating user information(full name, permanent address, current address, NID, designation, contact), log out, creating notification, record transaction, recording late payment, recording due, updating price |
| 2 | Administrator | Full name, permanent address, current address, NID, designation, contact, account | |  |  |  | | --- | --- | --- | | Approving inventory, | | account, adding | | firing | employee, | | | employee, information, expenditure | | updating | |
| 3 | Account | |  |  | | --- | --- | | User password, Id, contact | name, user | | Updating contact, user Id, matching changing password, |
| 4 | Authentication | User, | Log |

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|  |  |  |  |
| --- | --- | --- | --- |
|  |  | interface | account, updating user, finding user |
| 5 | Product | |  |  | | --- | --- | | Product name, expiry delivery price, name | Id, quantity, date, date, company | | Updating products, generating product Id |
| 6 | Employee | Name, address, contact, NID, employee ID | Updating employee information, generating employee Id |
| 7 | Late Payment | Customer, return date, amount, time, status | Updating late payment information, increasing amount, decreasing amount, updating financial report, generating Id |
| 8 | Customer | Id, name, address, contact | Updating customer information |
| 9 | Due | Due date, pay date, supplier, amount | |  |  |  | | --- | --- | --- | | Updating | due | information, | | increasing amount, decreasing | | | | amount, report | updating | financial | |
| 10 | Supplier | Company name, id, contact | Updating supplier information, generating id |
| 11 | Notification | Id, time, account, message, contact | Generating id, sending message, receiving message, storing, removing |
| 12 | contact | Mobile number, status, name | Checking information |
| 13 | item | |  |  | | --- | --- | | Unit quantity, price, name | price, total product | | Calculating total price, setting item information |
| 14 | Receipt | Item, amount | Removing item, adding item, calculating total amount, printing, updating some information about item |
| 15 | Transaction | Id, paid amount, transaction type | Determine due, determine late payment, updating cash, updating financial report, generating Id, processing due, processing late payment |
| 16 | Loan | Id, shop name, quantity, item | Generating information |

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|  |  |  |  |
| --- | --- | --- | --- |
| 17 | Financial Report | Cash, payable, receivable, date | Showing report, updating information, calculating profit |
| 18 | System | Database, interface | Creating database, deleting database, accessing database, disconnecting database, creating temporary files, authentication, showing interface, showing files, locking system |
| 19 | Database | Connection, table name, status | Insert, update, delete, checking connection, search |
| 20 | Validation | Regex full name, regex NID, regex user name, regex mobile number, regex password | Verifying user name, password, full name, mobile number, NID |
| 21 | Management cost | name, amount | Updating information about expenditure, updating financial report |
| 22 | Maintenance element | Name, status | Updating information about   |  |  | | --- | --- | | expenditure,updating report | financial | |

6.5 ATTRIBUTE SELECTION

After identifying the classes, we have specified their attributes and methods.

Table 17: Attribute Selection

|  |  |  |
| --- | --- | --- |
| No | Name | Attributes |
| 1 | System | Database  Interface |
| 2 | Interface | User |
| 3 | Authentication | user  Database AuthenticationInterface |
| 4 | User | fullName permanentAddress currentAddress designation  NID  Contact |

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|  |  |  |
| --- | --- | --- |
|  |  | Account userId |
| 5 | Account | userName password userId cantact accountId |
| 6 | Shopkeeper | salary commission isPaid |
| 7 | AdministrativeUser | fullName permanentAddress currentAddress  designation NID Contact Account userId |
| 8 | Product | productId productName price  quantity expiryDate deliveryDate companyName totalPrice |
| 9 | Agreements | type  payee receiver amount occuranceDate returnDate id,quantity Product  Client description |
| 10 | Notification | notificationId time Account message Contact |
| 11 | Contact | name mobileNumber status |
| 12 | Receipt | amount |

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|  |  |  |
| --- | --- | --- |
|  |  | Product |
| 13 | Transaction | TID  amount paidAmount receipt transactionType userId |
| 14 | FinancialReport | cashId  amount payableAmount receivableAmount |
| 15 | Expenditure | EID type amount status |
| 16 | Client | CID name Contact address type payable receivable |
| 17 | Database | connection isConnected tableName |

6.6 METHOD IDENTIFICATION

After identifying the classes, we have specified their methods.

Table 18: Method Indentification

|  |  |  |
| --- | --- | --- |
| No | Name | Methods |
| 1 | System | connectDatabase() createInterface() checkEvents() deleteData() authenticate() showInterface() saveFiles() disconnectDatabase() lockSystem() createNotification() showFinancilaReport() |
| 2 | Interface | showAuthenticationAction() |

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|  |  |  |
| --- | --- | --- |
|  |  | showMenu() getInput() getAction() authenticate() |
| 3 | Authentication | setUser() validateInput() login()  signUp() findUser() logOut() getUser() pause() recoverAccount() |
| 4 | User | validateNid() validateFullName() verifyUser() setCurrentAddress() setContact() setAccount() getFullName() setFullName() getPermanentAddress() getCurrentAddress() getDesignation() getNID()  getContact() getAccount() createNotification() recordTransaction()  recordDealingInformation() updateInventory() recordExpenditure() |
| 5 | Shopkeeper | calculateSalary() getSalary() setSalary() getCommission() setCommission() |
| 6 | AdministrativeUser | approveAccount() addShopkeeper() removeShopkeeper() updateShopkeeperInformation() includeProduct() exludeProduct()  withdraw() viewReport() provideSalary() |
| 7 | Product | calculatePrice() |

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|  |  |  |
| --- | --- | --- |
|  |  | getProductID() getProductName() getPrice() getQuantity() getExpiryDate() getDeliveryDate() getCompanyName() getTotalPrice() setProductID() setProductName() setPrice() setQuantity() setExpiryDate() setDeliveryDate() setCompanyName() setTotalPrice() searchProduct() addProduct() removeProduct() |
| 8 | Agreements | generateID() increaseAmount() decreaseAmount() calculateAmount() getType() getPayee() getReceiver() |
| 9 | Client | calculatePayable() calculateReceivavle() generateId() |
| 10 | Notification | sendMessage() receiveMessage() storeMessage() removeMessage() |
| 12 | Contact | checkDuplicity() |
| 13 | Receipt | addProduct() removeProduct() calculateAmount() printReceipt() |
| 14 | Transaction | generateId() calculatePrice() createExpenditure() paidAmount() determineDealingAmount() updateCash() updateFinancialReport() processDealingInformation() createReceipt() |

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|  |  |  |
| --- | --- | --- |
|  |  | updateInventory() |
| 15 | FinancialReport | showReport() calculateProfit() calculateMonthlyProfit() |
| 16 | Expenditure | updateFinancialReport() generteId() |
| 17 | Database | insert() update() delete() search() |

6.7 FINALIZING CLASSES

To identify final classes we need to first check that if there can be any hierarchies or merges. These are given below

1. ‘User’ has common attributes and methods with ‘AdministrativeUser’ and ‘Shopkeeper’ so we merge them as ‘User’ and add the common and unique attributes and methods to ‘User’.

2.'MaintenanceElements' and 'ManagementCost' can be merged as 'Expendi- ture'. The attributes for this class are:

|  |  |
| --- | --- |
|  | EID expenditureName cost  Status |

3. 'LatePayment', 'Due' and 'Loan' can be merged as 'Deal' as these classes have same attributes. Attributes of this class are

 payee  receiver  amount  occurrenceDate

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 returnDate  id  quantity  Product  type

4.'Customer' and 'Supplier' can be merged as 'Client' as both of them are external entity and have some same attributes. Both entities can be distinguished by an attribute called 'type'. Attributes are given below

 id  name  contact  address  type  payable  Receivable

5. 'System' class will be used for showing user interface, creating database, managing temporary files.

6. 'Database' class is for saving, searching, updating and removing information into the system.

7. 'ProductCatagory' and 'Product' has same attributes. So we can merge these two classes as 'Product'.

 productid  ProductName  Price  Quantity  expiryDate  DeliveryDate  CompanyName

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 TotalPrice

8. 'User', 'Customer' and 'Supplier' all of them have contact. So a class 'Contact' is introduced for holding information regarding contact. Attribute are

 name  mobileNumber  Status

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6.8 CLASS CARDS

After identifying our final classes we have generated the following class cards.

Table 19: Class Card for System Class

|  |  |  |
| --- | --- | --- |
| System | | |
| Attribute |  | Method |
| Database  Interface |  | connectDatabase()  accessDatabase()  showInterface()  createInterface()  deleteData()  saveFiles()  pause()  createNotification()  disconnectDatabase() |
| Responsibilities |  | Collaboration |
| Handling database  Creating interface  Authentication |  | Authentication  Interface  Database  User |

Table 20: Class card for Interface class

|  |  |  |
| --- | --- | --- |
| Interface | | |
| Attribute |  | Method |
| User |  | showAuthenticationMenu()  authenticate()  showMenu()  getInput()  getAction()  authenticate() |
| Responsibilities |  | Collaboration |
| Creating interface  Authentication |  | Authentication  Database  User |

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Table 21: Class card for Authentication

|  |  |  |
| --- | --- | --- |
| Authentication | | |
| Attribute |  | Method |
| User  Database |  | signUp()  validateInput()  setUser()  login()  findUser()  getUser() |
| Responsibilities |  | Collaboration |
| getting input for signup/login  finding user from database |  | User  Database |

Table 22: Class card for User

|  |  |  |
| --- | --- | --- |
| User | | |
| Attribute |  | Method |
| fullName  permanentAddress  currentAddress  designation  NID  Contact  userID |  | validateInput()  verifyUser()  recoverAccount()  createNotification()  recordTransaction()  recordDealingInformation()  updateInventory()  recordExpenditure()  updateExpenditure()  logout()  getAccount()  setCurrentAddress()  setContact()  setAccount()  getFullName() |

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|  |  |  |  |
| --- | --- | --- | --- |
|  | |  | setFullName()  getPermanentAddress()  getCurrentAddress()  getDesignation()  getNID()  getContact() |
|  | Responsibilities |  | Collaboration |
| verifying user data  creating account  involving in transaction | |  | Authentication  System  Database  Transaction  Contact  Agreement  Notification  Product |

Table 23: Class card for AdministrativeUser

|  |  |  |  |
| --- | --- | --- | --- |
| AdministrativeUser | | |  |
| Attribute |  | Method |  |
| fullName  permanentAddress  currentAddress  designation  NID  Contact  Account  userID |  | approveAccount()  addShopkeeper()  removeShopkeeper()  updateShopkeeperInformation()  includeProduct()  exludeProduct()  withdraw()  viewReport()  provideSalary() |  |
| Responsibilities |  | Collaboration |  |
| |  |  | | --- | --- | |  | HR management | | Approving Account | | |  | Managing inventory Recovering expenditure | |  | Authentication  Product  Expenditure  FinancialReport |  |

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Table 24: Class card for Product

|  |  |  |
| --- | --- | --- |
| Product | | |
| Attribute |  | Method |
| productid  productName  price  quantity  expiryDate  deliveryDate  companyName  totalPrice |  | generateProductId()  searchProduct()  addProduct()  removeProduct()  calculatePrice()  getProductID()  getProductName()  getPrice()  getQuantity()  getExpiryDate()  getDeliveryDate()  getCompanyName()  getTotalPrice()  setProductID()  setProductName()  setPrice()  setQuantity()  setExpiryDate()  setDeliveryDate()  setCompanyName()  setTotalPrice() |
| Responsibilities |  | Collaboration |
| |  |  | | --- | --- | |  | Calculating total involve amount in a transaction | |  |  |

Table 25: Class card for Agreement

|  |  |  |
| --- | --- | --- |
| Agreement | | |
| Attribute |  | Method |
| type  payee  receiver  amount  occurrenceDate  returnDate  id |  | generateID()  createAgreement()  search()  increaseAmount()  decreaseAmount()  calculateAmount()  getType() |

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|  |  |  |
| --- | --- | --- |
| quantity  Product  Client  description |  | getPayee()  getReceiver()  takeInput()  getAmount()  getReturnDate()  getOccurrenceDate()  getId()  getQuantity()  setAmount()  setReturnDate() |
| Responsibilities |  | Collaboration |
| managing information regarding deal  calculating amount |  | Client  FinancialReport |

Table 26: Class card for Client

|  |  |  |
| --- | --- | --- |
| Client | | |
| Attribute |  | Method |
| clientID  name  contact  address  type  payable  receivable |  | generateId()  calculatePayable()  calculateReceivable()  getId()  getName()  setName()  getContact()  setContact()  getAddress()  setAddress()  createClient() |
| Responsibilities |  | Collaboration |
| |  |  | | --- | --- | |  | work as structure of customer and supplier | |  | Contact |

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Table 27: Class Card for Notification

|  |  |  |
| --- | --- | --- |
| Notification | | |
| Attribute |  | Method |
| notificationId  Time  Message  Contact |  | sendMessage()  receiveMessage()  storeMessage()  removeMessage() |
| Responsibilities |  | Collaboration |
| managing notification system  storing message |  | Client  User |

Table 28: Class Card for Contact

|  |  |  |
| --- | --- | --- |
| Contact | | |
| Attribute |  | Method |
| contactId  name  mobileNumber  status  email |  | checkDuplicacy()  generateContactId()  getStatus()  setStatus()  getMobileNumber()  setMobileNumber() |
| Responsibilities |  | Collaboration |
| sending message for password recovery  storing contact with unique name |  | |

Table 29: Class card for Receipt

|  |  |  |
| --- | --- | --- |
| Receipt | | |
| Attribute |  | Method |
| amount  Product |  | addProduct()  removeProduct()  calculateAmount()  printReceipt() |

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|  |  |  |
| --- | --- | --- |
|  |  | getProduct()  setAmount() |
| Responsibilities |  | Collaboration |
| calculating amount of each item  containing information of sold products |  | Product |

Table 30: Class card for Transaction

|  |  |  |
| --- | --- | --- |
| Transaction | | |
| Attribute |  | Method |
| TId  Amount  paidAmount  receipt  transactionType  userId |  | generateId()  createReceipt()  calculatePrice()  createTransaction()  paidAmount()  determineDealingAmount()  updateCash()  updateFinancialReport()  processDealingInformation()  updateInventory() |
| Responsibilities |  | Collaboration |
| |  |  | | --- | --- | |  | updating cash recording transaction information | |  | Financial report Agreement Product |

Table 31: Class card for FinancialReport

|  |  |  |
| --- | --- | --- |
| FinancialReport | | |
| Attribute |  | Method |
| cashID  amount  payableAmount  receivableAmount  date  profit |  | showReport()  getCash()  getReceivableAmount()  getPayableAmount()  calculateProfit()  calculateMonthlyProfit()  getDate() |
| Responsibilities |  | Collaboration |
| calculating profit  providing report on daily transaction |  | AdministrativeUser  Client |

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Table 32: Class card for Expenditure

|  |  |  |
| --- | --- | --- |
| Expenditure | | |
| Attribute |  | Method |
| EID  type  amount  status |  | generateEID()  getType()  getAmount()  getStatus()  setType()  setAmount()  setStatus() |
| Responsibilities |  | Collaboration |
| generate EID  Update cash |  | Financial report Database |

Table 33: Class card for Database

|  |  |  |
| --- | --- | --- |
| Database | | |
| Attribute |  | Method |
| isConnected  tableName |  | insert()  update()  delete()  search() |
| Responsibilities |  | Collaboration |
| Insert element  Update element  Delete element  Search element |  | |

Diagram Report

**7 BEHAVIORAL MODELING OF GMS**

7.1 STATE TRANSITION DIAGRAM

State diagram represents active states for each class the events (triggers). For this we identified all the events, their initiators and collaborators.

Table 34: Event Indentification

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Serial no | Events | Primary object | Collaborator | Invoked method |
| 1. | Provide input account creation | Administrativ e User | Authentication | signUp() |
| 2. | Provide input for account creation | shopkeeper | Authentication | signUp() |
| 3. | administrative account will be confirmed | Administrativ e User |  | addAccount() |
| 4. | Shopkeeper account will be confirmed | Administrativ eUser |  | addAccount() |
| 5. | Provide input for login | User | Authentication | login() |
| 6. | Checks valid input | System | User | Login(), signUp(), verifyName(), verifyPassword (),findUser() |
| 7. | Verify password | Authenticatio n | User | verifyPassword () |
| 8. | Verify user name | Authenticatio n | User | verifyName() |
| 9. | For invalid input error message is shown | System | Interface | showErrorMess age() |
| 10. | Account will be locked for a certain period for consecutively three wrong input | System |  | lockAccount() |
| 11. | Want to recover account | User | Authentication , Notification | recoverAccount (),recover() |
| 12. | Send forgotten password through his contact | System | Notification,Us er | sendMessage() |

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|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 13. | Want to log out | User | Authentication | logout() |
| 14. | Remove shopkeeper | Administrativ eUser | Shopkeeper, Database | removeEmploy ee(), remove() |
| 15. | Update shopkeeper information | Administrativ eUser | Shopkeeper, Database | update() |
| 16. | Pays shopkeeper salary | Administrativ eUser | User | provideSalary() |
| 17. | include product | Administrativ eUser | Product, Database | update- Inventory(), insert() |
| 18. | ID will be auto- generated | Product, User, Client, Deal, Expenditure, Transaction |  | generateId() |
| 19. | Exclude product | Administrativ eUser | Product, Database | update- Inventory(), remove() |
| 20. | Update inventory | Administrativ eUser | Database | update() |
| 21. | Update price for any products | Adminstrative  User | Product, Database | update- Inventory() |
| 22. | Record expenditure information | User | Expenditure, Database | record- Expenditure(), insert() |
| 23. | Calculates profit | Financial report | Database | calculate- Profit() |
| 24. | Withdraw money | Administrativ eUser | Database | withdraw() |
| 25. | See the financial report | Administrativ eUser | Interface,Data base | veiwReport() |
| 26. | User information will be stored | System | Database | insert() |
| 27. | Add products to receipt | User | Transaction,R eceipt | createReceipt() , addProductToR eceipt() |
| 28. | Remove product from receipt | User | Transaction,R eceipt | createReceipt, removeProduct FromReceipt() |

Diagram Report

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 29. | Calculates total price | System | Receipt | calculateAmou nt() |
| 30. | Create late payments | User | Agreement, Client | createAgreeme nt() |
| 31. | Record transaction information | User | Transaction, Database | createTransacti on() |
| 32. | Create due | User | Agreement, Client | createAgreeme nt() |
| 33. | Create Loan | User | Agreement, Client | createAgreeme nt() |
| 34. | Print receipt | Transaction | Receipt | createReceipt, print |
| 35. | Record dealing information | User | Agreement | createAgreeme nt() |
| 36. | Show interface | System | Interface | showInterface( ) |
| 37. | Update late payments | User | Agreement | Update() |
| 38. | Update loan | User | Agreement | Update() |
| 39. | Update Due | User | Agreement | Update() |
| 40. | Updates cash | Transaction | Database | updateCash() |
| 41. | Create notification | System, User | Notification, Client | createNotificati on() |
| 42. | Sends notification | User | Notification | sendMessage() |
| 43. | Receive notification | System | User | receiveMessag e() |
| 44. | Removes notification | System | Database | Remove() |
| 45. | Checks for unsaved files | System |  | saveFiles() |
| 46. | Ask confirmation before taking action on unsaved file(s) | System |  | saveFiles() |
| 47. | Power off the system | System |  | saveFiles(), diconnectDatab ase() |

Diagram Report

7.1.1 EVENTS AFTER ANALYSIS

Table 35: Merged Events

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Serial  No | Events | Primary Object | Collaborator | Invoked Methods |
| 1. | account by  Logs into  authentication | User | Authentication | logIn() validateInput() |
| 2. | Manages products | User | Product  Transaction | updateInventory() updateCash() |
| 3. | Creates transaction | User | Transaction | recordTransaction() |
| 4. | receives  Sends and  notification | User | Notification | receiveMessage()  sendMessage()  createNotification() |
| 5. | Records expenditure | User | - | recordExpenditure() updateExpenditure() |
| 6. | Manages agreements | User | Transaction  Agreement | recordDealingInforma  tion()  createAgreement()  search() |
| 7. | Logs out | User | Authentication | logOut() |
| 8. | Recovers accounts | User | Authentication | accountRecovery() |
| 9. | Chooses type of operation | administrative User | - | getType() |
| 10. | account  shopkeeper | administrative User | - | approvesAccount() |
| 11. | the shop  money from | administrative User | - | withdraw() |
| 12. | report | administrative User | - | viewReport() |
| 13. | shopkeeper | adminstrativeU ser | - | addShopkeeper() removeShopkeeper() updateShopkeeper() |
| 14. | products | administrative User | - | includeProduct() |
| 15. |  | administrative | - | excludeProduct() |

Diagram Report

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | products | User |  |  |
| 16. | sign up | Authentication | - | findUser()  signUp()  validateInput() |
| 17. | database | Authentication | Database | setUser() |
| 18. |  | Authentication | - | logIn() findUser() |
| 19. |  | Authentication | - | getUser() |
| 20. | recover account | Authentication | - | recoverAccount() |
| 21. | database | System | Database | connectDatabase() |
| 22. | database | System | Database | accessDatabase() |
| 23. | files  temporary | System | - | createTemp- oraryFiles() |
| 24. | 2Shows interface | System | - | showInterface() |
| 25. |  | System | Database | deleteData() |
| 26. | Is shut down by itself | System |  | saveFiles()  shutDown()  disconnectDatabase() |
| 27. | receipt | Transaction | - | createReceipt() |
| 28. | total price | Transaction | - | calculateTotalPrice() getPaidAmount |
| 29. |  | Transaction | - | search()  updateCash()  printReceipt() |
| 30. | agreements | Transaction | - | createAgreements() updateCash() printReceipt() |
| 31. | 3Stores information | Agreement | - | getter() setter() |
| 32. | amount | Agreement | - | increaseAmount() decreaseAmount() |
| 33. |  | Client | - | getter() |

Diagram Report

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | information |  |  | setter() |
| 34. | 3Stores  product information | Product | - | getter() setter() |
| 35. | information | Receipt | - | getter() setter() |
| 36. | 3Stores expenditure information | Expenditure | - | getter() setter() |
| 37. | information | FinancialReport | - | getInformation() setInformation() |
| 38. | profit | FinancialReport | - | calculateProfit() |
| 39. | information | Database | - | update () |
| 40.  41.  42.  43.  44.  45. | Inserts information  search information  deletes information  Shows menu  Shows authentication menu  Authenticate user | Database  Database  Database  Interface  Interface  Interface | -  -  -  -  -  Authentication | insert ()  search()  delete()  showMenu()  showAuthenticationM enu()  authenticate() |

Diagram Report

7.1.2 STATE TRANSITION DIAGRAMS

**Authentication**

Figure 35: Authentication State Diagram

Diagram Report

**User**

Figure 36: User State Diagram

Diagram Report

**Administrative User**

Figure 37: Administrator State Diagram

Diagram Report

**Transaction**

Figure 38: Transaction State Diagram

**Agreement**

Figure 39: Agreement State Diagram

Diagram Report

**System**

Figure 40: System State Diagram

**Interface**

Figure 41: Interface State Diagram

Diagram Report

**Product**

Figure 42: Level-0 GMS

**Receipt**

Figure 43: Receipt State Diagram

**Notification**

Figure 44: Notification State Diagram

Diagram Report

**Database**

Figure 45: Database State Diagram

**Financial Report**

Figure 46: Financial Report State Diagram

7.2 SEQUENCE DIAGRAM

Diagram Report