UNIVERSITY OF DAR ES SALAAM

COLLEGE OF INFORMATION AND COMMUNICATION TECHNOLOGIES

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

END OF SEMESTER 01 REPORT

FINAL YEAR PROJECT

2021/2022

PROJECT TITLE: POST PAYMENT SYSTEM

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PROGRAM:	BSc In Computer Science
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DECLARATION

I hereby declare that the final year project report entitled “POST PAID SYSTEM” submitted to the University of Dar es Salaam, department of computer science and engineering (CSE) in partial fulfilment of the degree of Bachelor of Science in Computer Science, under the supervision of

Dr. Mathew Mndeme is genuine and of my own efforts. I solemnly declare that to the best of knowledge, no part of this report has been submitted here. All sources of knowledge used have been studied well before being filled in this report.

……..... ……

Student’s signature Supervisor’s signature

Ms. Mariam Ally Mniachi Dr. Mathew Mndeme

ABSTRACT

This project is focused on the day to day life of a common Tanzanian who is living under a salary. Being Paid on a certain date while needs tend to arise every now and then.
In a certain point an individual may run out of income and fail to get all their needs especially the necessities.

ACKNOWLEDGEMENT

All thanks goes to Almighty God for having given me, courage to undertake it as my project, the patience for completing it and for a guide, so supportive, without whom this gigantic task could never have been fulfilled. I take this opportunity to express my heartfelt gratitude and indebtedness to my respected supervisor DR. MATHEW MNDEME who constantly motivated, supported, encouraged and guided me. His invaluable guidance and continuous help in every aspect enabled me to complete my project and without his cooperation I would not have presented this dissertation successfully.

I am highly thankful to my colleagues, MS. HOSIANA BRYSON and MR. DANIEL MBALYO for their guidance, patience and hand to hand support. And without forgetting to thank my FYP coordinator, DR. JOSEPH MUSHI for his guidance and I take my deep sense of gratitude and reverence to him. Lastly I would like to thank my parents and all my friends for their unconditional love, support and care.

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CHAPTER ONE: INTRODUCTION

1.1. BACKGROUND

As of 2020, 23 million people were employed in Tanzania. According to the projections, the level of employment has slowly increased in the country since 2015, when 20.5 million Tanzanians aged 15 years and older were employed (Statista, 2021). Due to that, employed people do use their salaries in different activities like paying for school fees and so on. Also as far as I know is that among them there are some who their salaries are not enough for monthly expenditures since they will be needing for buying several products and services like buying food stuffs, paying a anniversary ceremonies hence it will make them move to a farther thoughts like either taking loans from microfinances or buying the staffs on credits from vendors.

And as for vendors who sell products on credits do note down the names for those who bought on credits, their products and total amount with absence of when the credit will be paid back. The customer leaves no assurance for future payment and might decide to go and buy on credit to another shop or vendor. Then, there comes a time when vendors wants to refill the products in his or her shop but facing a problem that products taken on credit is not yet paid back, hence it will hold him or her back.

The end result is that the customers who shop on credit will not be able to get products since there will be no more trust from their vendors due to the fact that other customers have not yet cleared their loans, hence it will be difficult for them to be supplied with the services and products in need at that time.

1.2. PROBLEM STATEMENT

1.2.1 MAIN PROBLEM

Customer freedom of spending at convenience and within their budget without affecting the cash flow and stock of Vendor since the possibility of that person getting his or her daily necessities is difficult due to the insufficient salary for the period until his next salary comes out. Also uncertainty for the seller to repay his debt so that he can use it in the purchase of other store goods due to recording credit sales in a poor record.

1.2.2 SUB-PROBLEM

- Lack of adequate individual needs in his daily life due to income adequacy for example food stuffs, electricity.
- Loss of vendor's confidence to sell goods on credit due to some customers not paying their debts on time or not paying at all.
- Vendors' business not growing well due to unpaid debts.

1.3. OBJECTIVES

1.3.1. MAIN OBJECTIVE

The main objective of this project is to facilitate purchase of services and products at the time of need by developing a Post Payment system. The system supports transactions that allow purchase of products and services on a credit limit to customers. The system will also allow Payment to be made directly from the system to the vendor's account and later on funds will be deducted from the Customers' Account.

1.3.2 SPECIFIC OBJECTIVES

1. To conduct a survey to identify the need for post-payment service for purchasing goods and services.
2. To design a post-paid business model that will allow individuals to purchase goods and services from vendors and service providers.
3. To establish requirements and design an information system to facilitate a post-paid business model proposed in objective (2) above.
4. To implement and pilot a proposed post payment information system.

1.4. SIGNIFICANCE OF THE PROJECT

As for this project will be significant in increasing the number of sales as well as cash flow in the business, hence help small businesses grow. Also it will boost living conditions and welfare of people with low income and help them attain their basic needs on the time of their need while waiting for their salary since this applies for both services and goods. As well generate a system that will be able to show the users' report of their expenditure and also be able to notify the user prior to reaching a limit of their expenditure

1.5. SCOPE AND LIMITATION

The scope of work during this project is based on Mangi Shops meanly vendors that sell goods in smaller quantities (retail) and most goods are consumer goods and are used on a day to day basis, as one of the retail Vendors that are representative of other vendors and individual people who own retail shops. As we were able to study and understand the requirements of this project which were obtained from the community (vendors and customers) to perform the construction of software requirements specification document of the project and construction of software design document from the requirements obtained which helps during the implementation of this project. And at the end customers and shop owners are able to obtain the services required for the whole process of shopping.

The scope of the project focuses solely on delivering the Post Payment System which is special for people who have a low cash flow at the time of purchasing goods or services but have a stable income. Also the platform will only the Vendors and customers who have registered in the system and it will involve in helping people purchasing products and services and not in getting cash.

CHAPTER TWO: LITERATURE REVIEW

According to Michelle Kaffenberger (2018) Digital credit was first introduced in Tanzania in 2014, when M-Pawa was launched through a partnership between Vodacom and Commercial Bank of Africa (CBA). Since 2014 the number of offerings has expanded to at least nine. The three leading digital credit products are all offered in connection to a mobile wallet: Vodacom's M-Pawa, Airtel's Timiza, and Tigo's Nivushe. Further, each product is offered in partnership with a lender: M-Pawa with CBA, and Timiza and Nivushe with Jumo, a non-bank mobile lending platform. The lenders use customer data, such as data on airtime top ups and mobile money use, to determine an initial credit limit and extend loans. After the initial loan, they also include data on repayment to determine future loan sizes. Loan sizes from M-Pawa, for example, range from TSH1, 000($0.44) to TSH500, 000 ($220). Additional digital credit offerings include app-based lenders, such as Branch and Tala, which use data sources such as mobile-based social media use and GPS data, all gathered from the borrower's mobile phone, to determine loan sizes.

Also, Digital loans are most commonly used for ordinary household needs (37% of borrowers), and for airtime (36%). They are not often used for medical emergencies or expenses (9%), other emergencies (<1%), or school fee payments (8%). While the majority of digital borrowers are self-employed (72%), only a third have used digital loans for business purposes. Even among the self-employed less than 40% have used a digital loan for business. Women are more likely than men to use digital credit for business, while men are more likely to use it for ordinary household needs and for airtime. The only use case where digital credit is more commonly used than other loan sources is for purchasing airtime (Michelle Kaffenberger, 2018).

As far as I observed and understood is that most of the platforms that offers credit services they include cash that means they offer money which you can use for different purposes. But for us we will be focusing on credit services based on services and products instead of money since it will facilitate the purchasing of goods and services on a credit limit to customers in need whereby payments will be made directly from the guarantor to the vendor's account and later on funds will be deducted from the customers' Accounts.

CHAPTER THREE: METHODOLOGY

Since the problem is freedom of a customer to spend at convenience and within their budget without affecting the cash flow and stock of vendor due to insufficient income till then next salary. We conducted a survey to identify the need for post-payment service for purchasing goods and services that engaged vendors and customers. Also the survey based on what most people wants when they have no money in terms of products and services, and according to survey I did at Kinzudi area I got to know that most of the things they want during that time of having no money before the next salaries are food stuffs like rice, flour, sugar and so far, and for the services are Dawasco and Tanesco bills.

And for the development process we will be using agile development model which breaks tasks into smaller iterations, or parts do not directly involve long term planning. We chose this model due to unclear requirement to both us and clients since they are mostly involved with the system. During gathering of requirement, the following techniques have to be used;

- **Brainstorming:** Especially during the ideation phase, where the idea came up with different possible solutions to solve the existing challenge.
- **Interviews:** We prepared questions that we used to interview customers, shop owners and some local banks.
- **Questionnaire:** For remote stakeholders and for a large number we prepared questions that we distributed to people.

CHAPTER FOUR: SYSTEM ANALYSIS AND DESIGN

4.1.INTRODUCTION

This chapter analyses the requirements collected and from them the modelling of the system and the design of various parts can be addressed and developed to meet the requirements specified. This provides a complete description of all the functions and specifications of the Post Paid System.

4.2. REQUIREMENT GATHERING

This is a stage where we generate a list of requirements such as functional, system, technical requirements etc. from the various stakeholders such as customers, vendors etc. that will be used as the basis for the formal requirement definition.

The techniques used in gathering requirements are as follows;

- **Brainstorming:** Especially during the ideation phase, where the idea came up with different possible solutions to solve the existing challenge.
- **Interviews:** We prepared questions that we used to interview customers, shop owners and some local banks.
- **Questionnaire:** For remote stakeholders and for a large number we prepared questions that we distributed to people.

4.2.1. CORE FUNCTIONALITIES

To be more explicit, we came up with the core functionalities for Post Paid System which are as follows:

1. Management of Users.
2. Product Management.
3. Order Management.
4. Transaction Management.

Diagrammatically core functionalities are seen as follows:

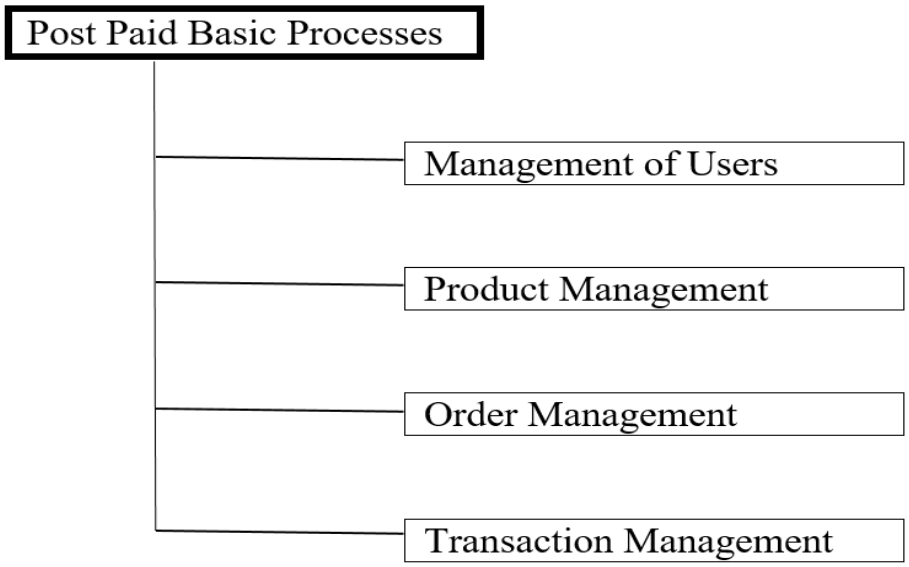

Figure 1: Core functionalities for the system

And the activities under each core functionality are as follows;

1. Management of Users.
    i. Register users
    ii. Make users submit needed information and documents.
    iii. Filter users.
    iv. Send notification.
    v. Authenticate users and redirect them to their specified profiles.

2. Product Management.
    i. Add products and services and also specify their categories.
    ii. Make vendors give descriptions of products they sell/supply.
    iii. Make customer search products in particular.
    iv. Filter the available vendors nearby a customer and display them on the map.
    v. Make customers add cart or to buy products immediately.

3. Order Management.
    i. Create orders when a user is purchasing a product(s)/services(s).
    ii. Check customer's credit limit.

iii. Notify customers.

iv. Make vendors produce receipts and records for all records.

4. Transaction Management.
    i. Create a transaction history.
    ii. Validate purchases made.
    iii. Calculate interest and deduct the amount credited.
    iv. Calculate and allocate purchase credit.

4.2.2. FUNCTIONAL REQUIREMENTS

These are those that relate directly to the functioning of the system and are the aspects of the system the client is most likely to recognize. Functional Requirements for each core functionality are described in the table below:

Table 1: System's functional requirements

Ref. No.		**FUNCTION DESCRIPTION**	**CATEGORY**
F1	**Users Management**		
	F1.1	System should allow users to register in the system.	Evident
	F1.2	System should allow users to submit needed information and documents into the system for account validation.	Evident
	F1.3	System should filter users who are qualified to be either vendor or customer based on the set of qualifications.	Hidden
	F1.4	System should be able to send notifications about successful registered or not successful registered to users.	Evident
	F1.5	System should authenticate users and redirect them to their specified profiles.	Evident
F2	**Products Management**		
	F2.1	System should allow admin to add products and services and also specify their categories.	Evident
	F2.2	System should allow vendors to give descriptions of products they sell/supply.	Evident

	F2.3	System should allow customers to search products in particular.	Evident
	F2.4	System should be able to filter the available vendors nearby a customer and display them on the map.	Evident
	F2.5	System should allow customer to add cart or to buy products immediately	Evident
F3	**Order Management**		
	F3.1	System should create orders when a user is purchasing a product(s)/services(s).	Evident
	F3.2	System should be able to check if the customer's credit limit allows purchase of service and products (Order Validation).	Hidden
	F3.3	System should be able to notify customers whether an order has been processed or not.	Evident
	F3.4	System should allow vendors to produce receipts and records for all records.	Evident
F4	**Transaction Management**		
	F4.1	System should create a transaction history for purchases and sales.	Evident
	F4.2	System should be able to validate purchases made.	Hidden
	F4.3	System should be able to calculate interest and deduct the amount credited to the customer directly from their account.	Hidden
	F4.4	System should be able to notify the customer on the amount deducted.	Evident
	F4.5	System should be able to calculate and allocate purchase credit to the customer based on details provided.	Hidden

4.2.3. NON-FUNCTIONAL REQUIREMENTS

Non-functional requirements are the requirements that specifies how a system performs its operations. These are the constraints by which the system is under, they are the quality or

standards that the system should adhere to. Non-functional requirements for Post Paid System are summarized in the table below as follows;

Table 2: Non-functionalities of the system

Attribute	**Constraints**
Reliability	Device malfunction or server not found should not interrupt other sensors or the attendance process. When a server is down, the devices should be able to work independently of the server and send data when the server is available. Also some functionalities need internet while others do not need connectivity
Usability	The interface should be user friendly and easily used and understood by the user.
Response time	The system shall be quick and fast in respond to data input in the system, for instance during enrolment it takes a less than a second to confirm all required details. This is due to the device chosen for this functionality.
Scalability	The system shall accommodate/take a large number of customers and vendors and large quantity of data.
Security requirement	The system can guarantee maximum data that is stored due to authentication of every user that logs in.
Adaptability	The system shall be able to allow or accept to any adaptations and modifications according to the environment and need of the user and new functionalities of the system. Through version control.
Maintainability	The system shall be easy to maintain, repair and undergo some improvement since we are localizing the system will be easy to maintain, upgrade and update its functionality so as to improve its efficiency and effectiveness of its functionalities.
Performance	The system has high performance ensured for the user implementing his/her work.

4.3. REQUIREMENT ANALYSIS

Requirements analysis is a set of operations that helps define users' expectations of the application you are building or modifying.

4.3.1. SYSTEM ACTORS

System will interact, either directly or indirectly, with the following significant roles:

- System admin: Main personnel that supervise maintain and manage the whole system.
- Vendors: They are registered retail sellers who provide either products or services.
- Customers: They are users that add their private information like account number and other salary details so as to be verified and registered. Also customers are the ones to make order and purchase products and services provided by the registered vendors.

4.3.2. SYSTEM CAPABILITIES

The system will provide the following capabilities to user:

- Filter users
- Send notifications
- Authenticate users
- Filter vendors according to location
- Check Credit Limit
- Notify customers
- Create receipts

4.3.3. USER CAPABILITIES

The system will provide the following capabilities to user:

i. System admin
    - Add products
    - Specify categories of products

ii. Vendor
    - Register
    - Submit documents
    - Describe products in terms of quantity and price
    - Create receipts

iii. Customer
    - Register
    - Submit documents
    - Search products

- Add cart or buy products

4.3.4. USE CASE DIAGRAMS

The use case diagram illustrated by figures below models the functionality of the proposed system using actors and use cases. It illustrates how the users of the proposed system can interact with the system through the system's user interface after the data is sent to the database.

4.3.4.1. MANAGEMENT OF USERS

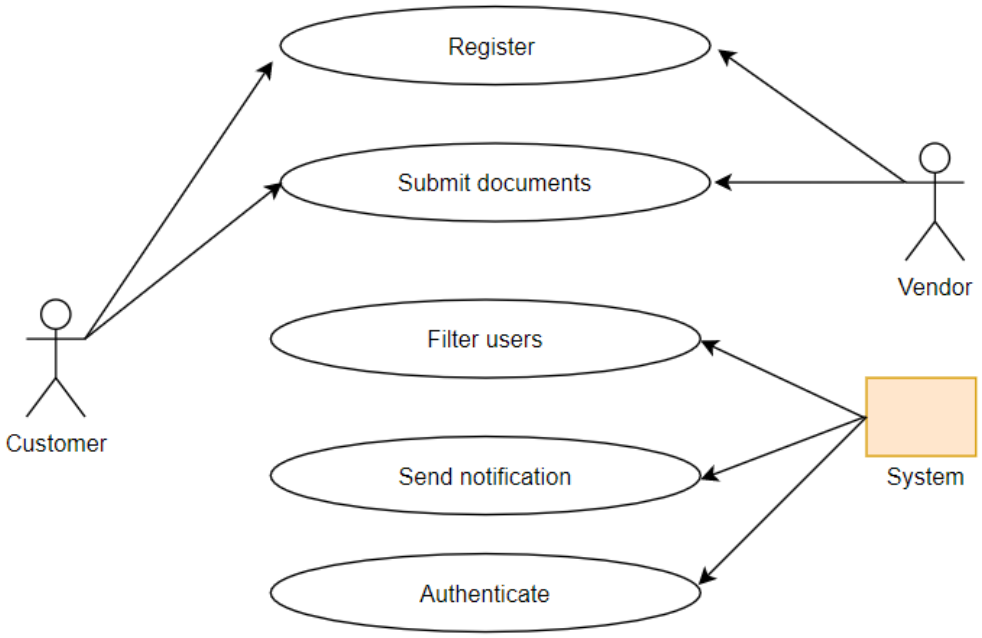

Figure 2: How users interact with the system

4.3.4.2. PRODUCT MANAGEMENT

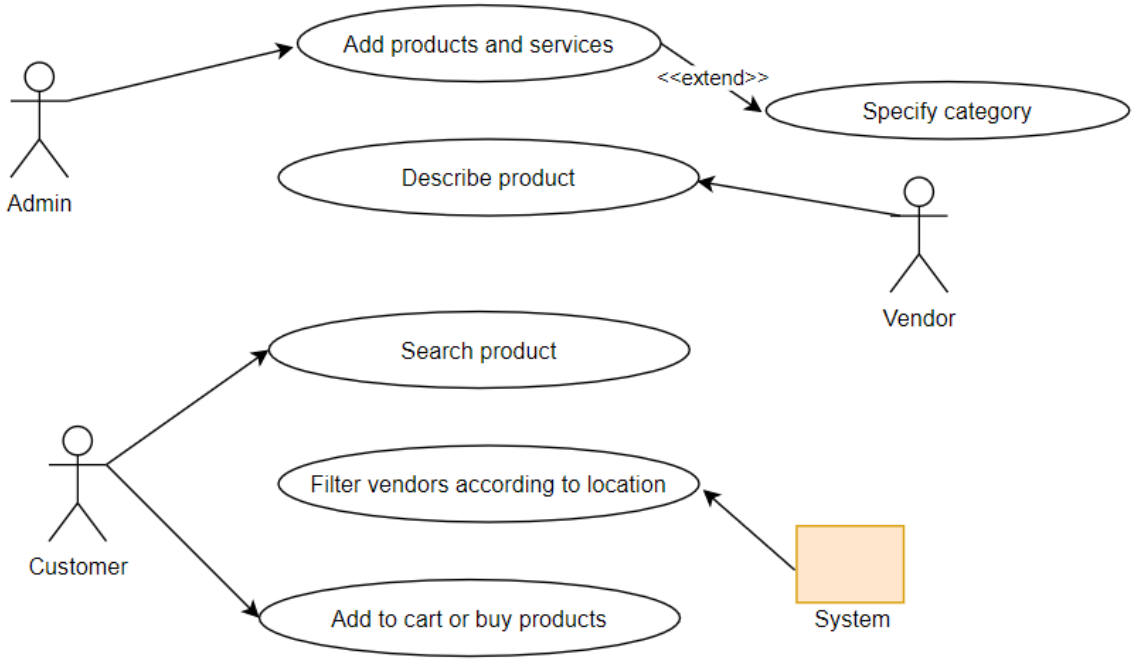

Figure 3: How different users interact with the system on the aspect of products

4.3.4.3. ORDER MANAGEMENT

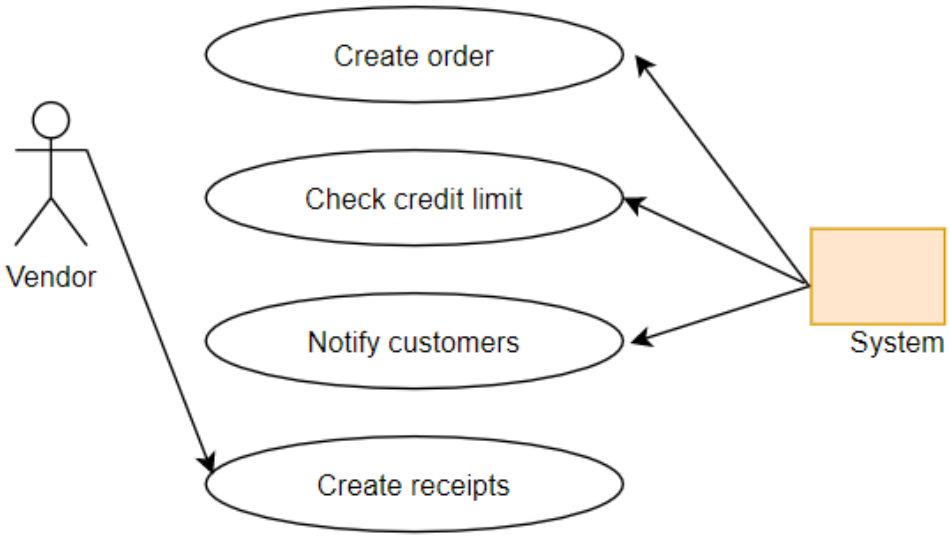

Figure 4: Shows how order is made

4.3.4.4. TRANSACTION MANAGEMENT

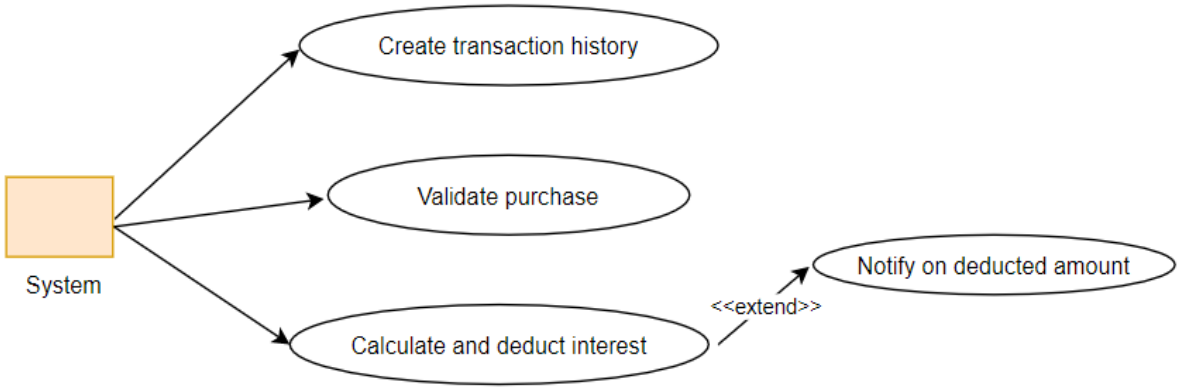

Figure 5: Shows how purchase transactions are handled

4.4. BUSINESS PROCESS

It is a series of steps performed by a group of the stakeholders to achieve a concrete goal. Each step in the business process represents a specific task to a particular user. Hence the business process it's an approach to improving those process and it helps achieve business goals.

4.5. SYSTEM FLOWCHART

This is a graphical description of how business process are performed, and documents flow in a system. The following is the flowchart for the system;

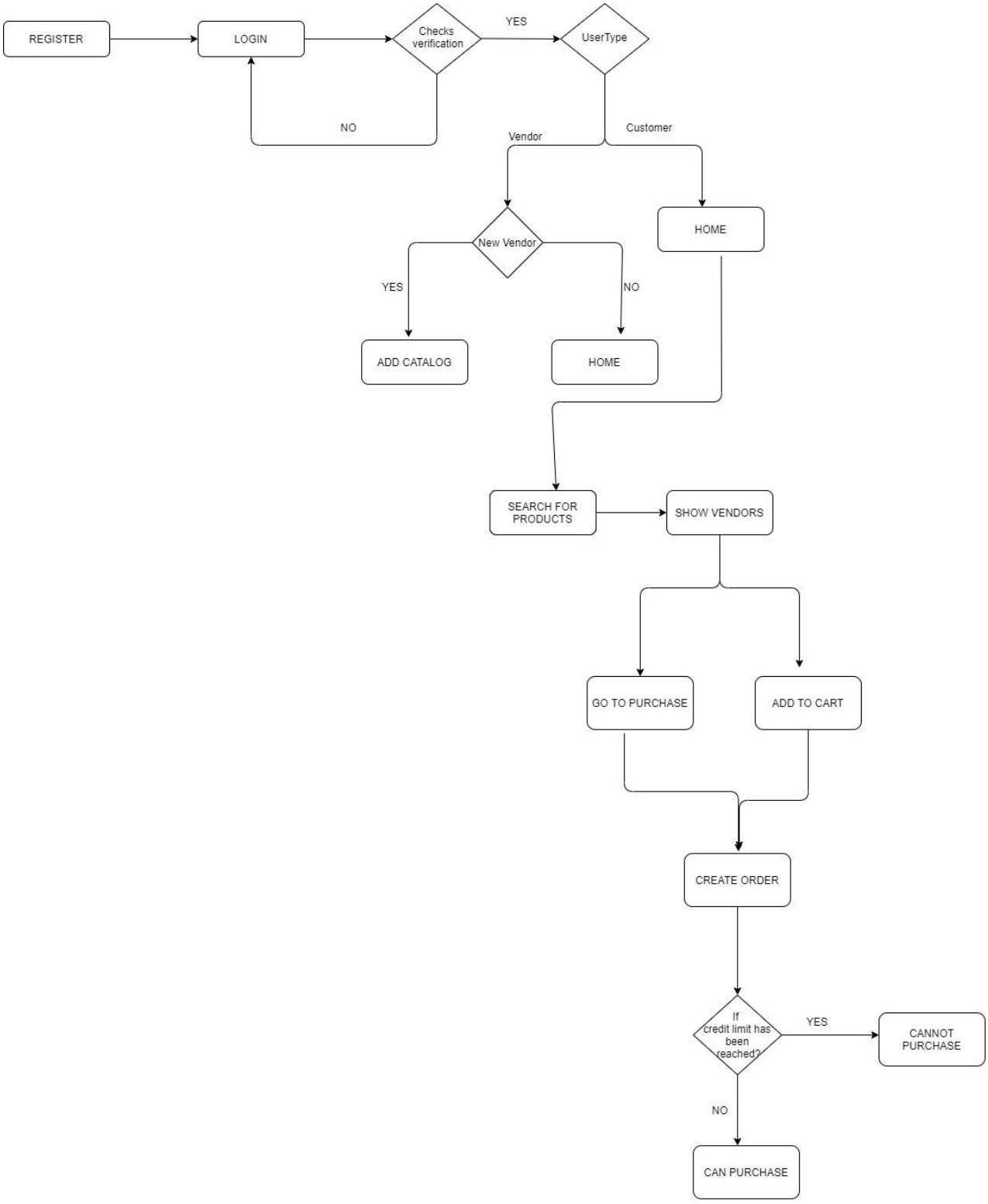

Figure 6: Shows flow of the system

4.6. CLASS DIAGRAM

This is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among objects.

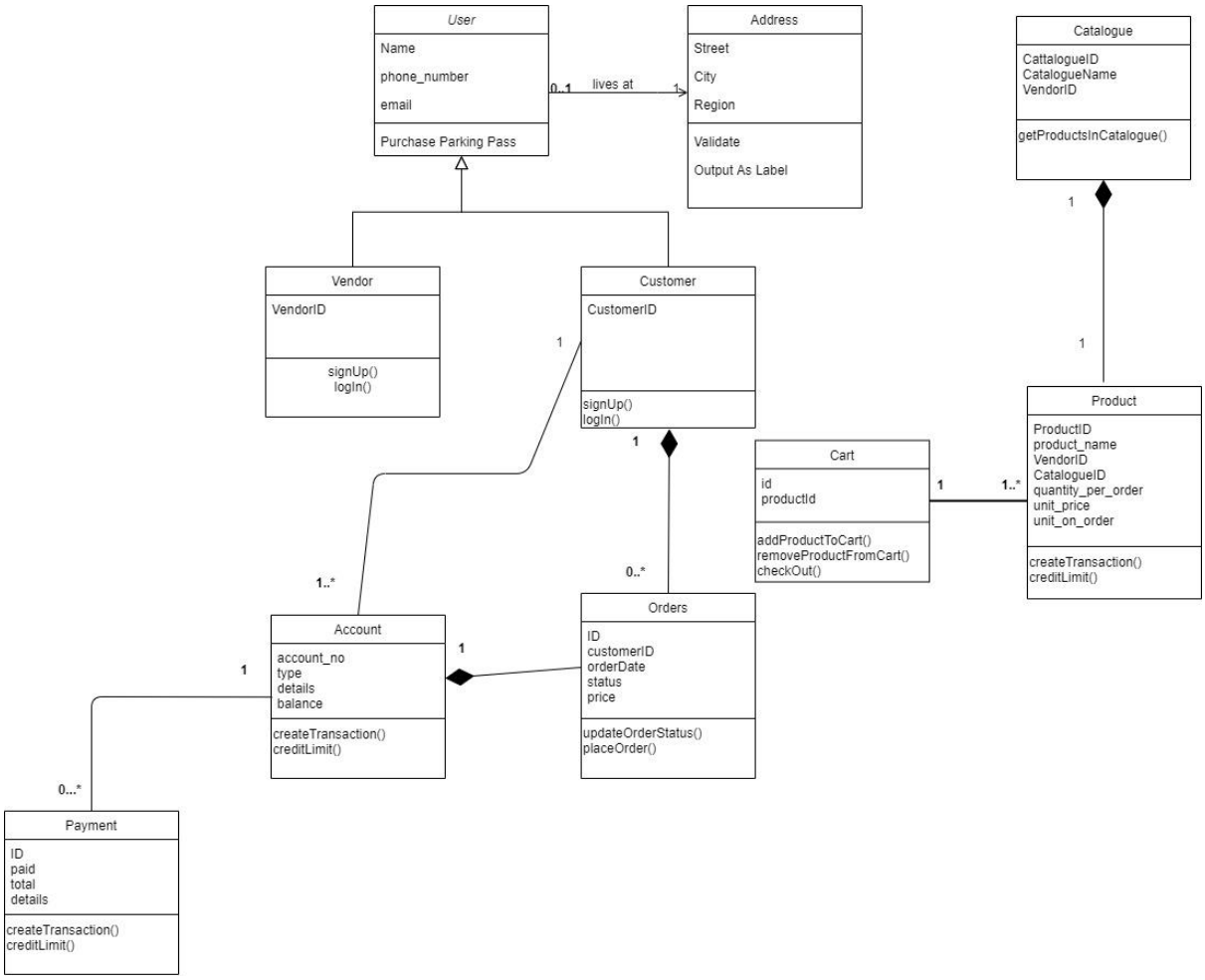

Figure 7: Class diagram for the system

4.7. SYSTEM DESIGN

This is a meaningful representation of the system that is to be built and it establishes an overall system architecture. It involves identifying and describing the fundamental software system abstractions and their relationships.

4.7.1. ARCHITECTURE DESIGN

This represents the structure of data and program components that are required to build a computer-based system.

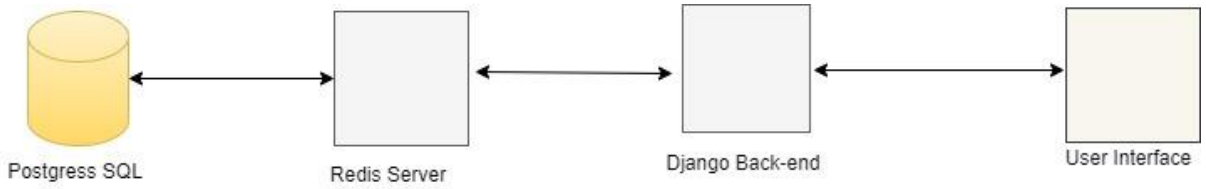

Figure 8: An architecture design using Postgress

4.7.2. ENTITY RELATIONSHIP DIAGRAM

An entity relational diagram is a high conceptual diagram that shows the relation of entities that are stored in the database. An entity might be an object with physical existence or conceptual existence and these entities have attributes that define their properties. The entity relational diagram is then shown by figure below;

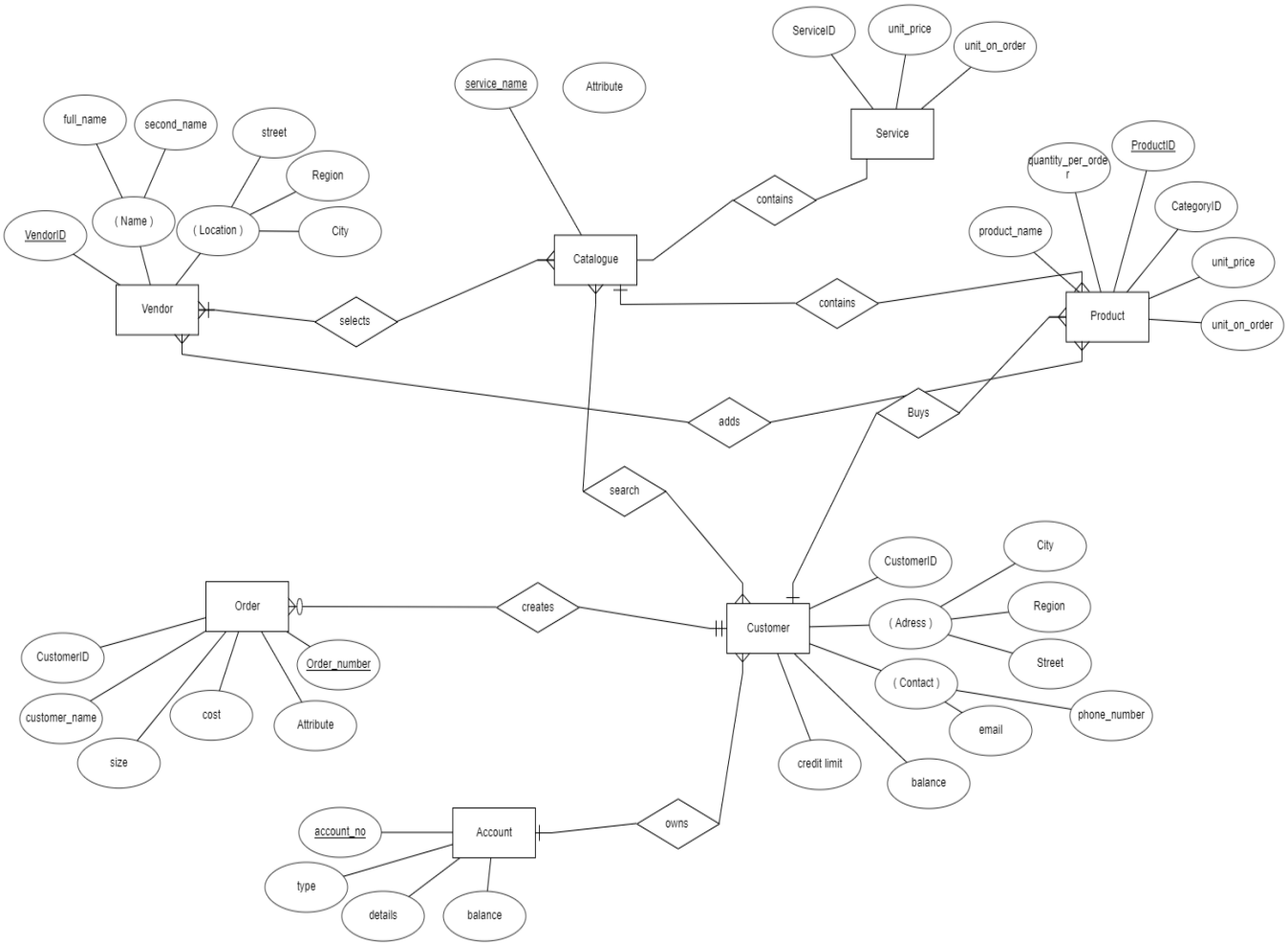

Figure 9: Entity relationship diagram for the system

4.7.3. DATABASE SCHEMA

This is organized within a relational database which is include of logical constraints such as, table names, fields, data types, and the relationships between these entities. Schemas commonly use visual representations to communicate the architecture of the database, becoming the foundation for an organization's data management discipline.

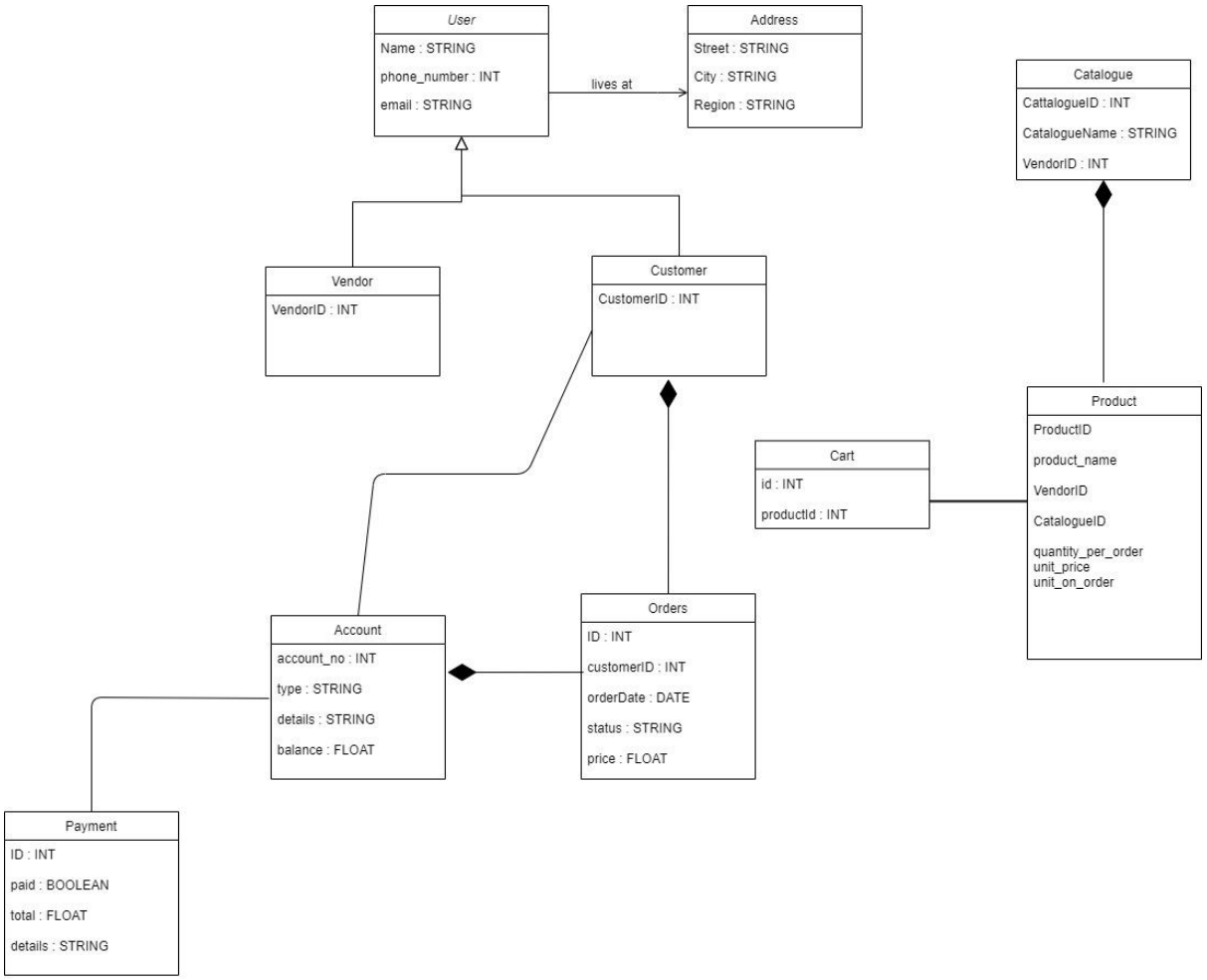

Figure 10: shows database schema for the system

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APPENDICES

PROJECT SCHEDULE

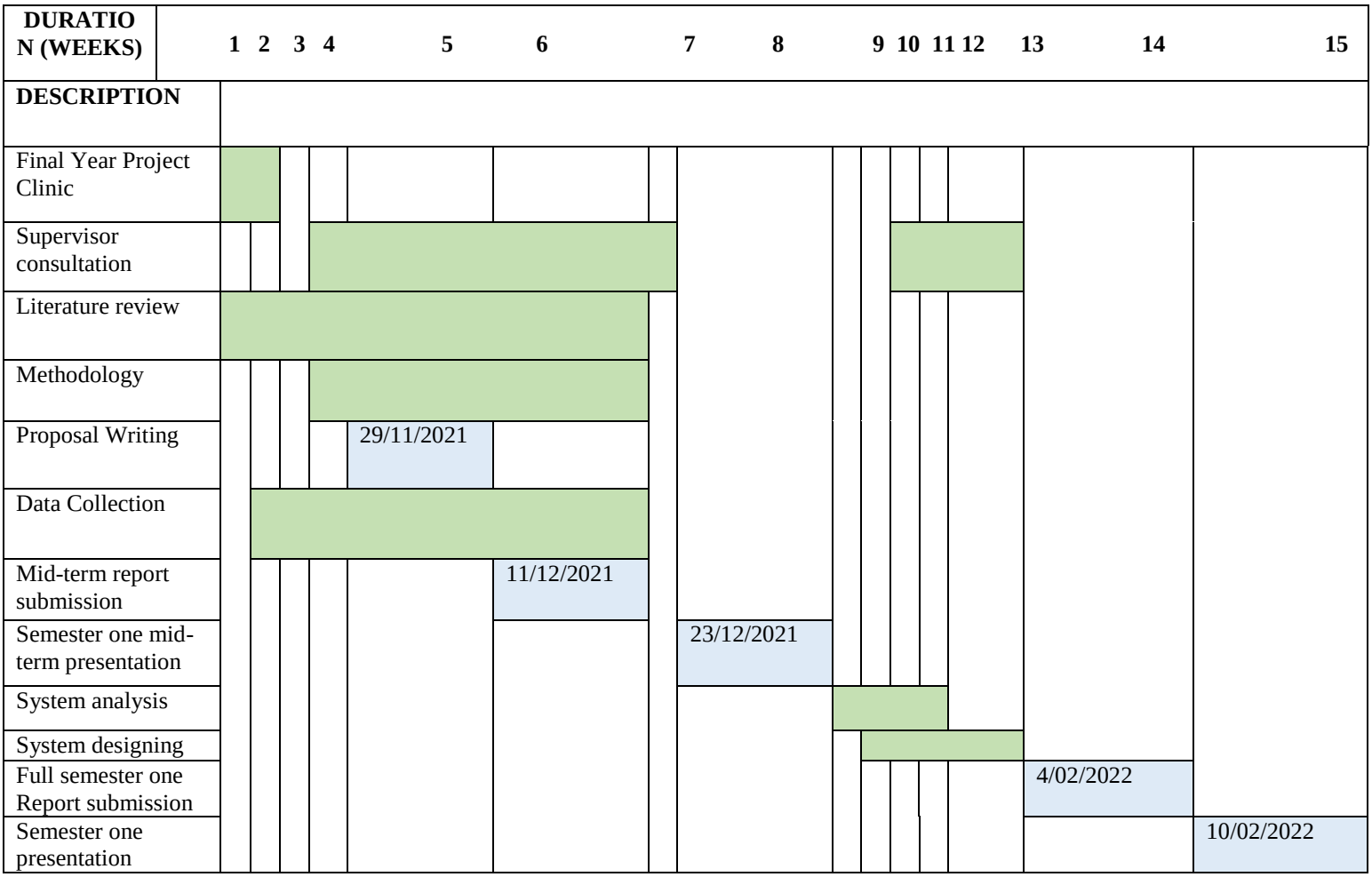

Table 3: Shows how tasks distributed in semester 1

PROJECT BUDGET

Table 4: How budget of the project is in a whole semester 1

No	Task	Weekly	Semester
1.	Travel expenses	30,000/=	420,000/=
2.	Internet bundles	50,000/=	700,000/=
3.	Stationaries	10,000/=	50,000/=
4.	Hosting & server	25,000/=	250,000/=
	TOTAL	**115,000/=**	**1,420,000/=**

One-time costs;

Table 5: Show the budget of MiFi bundle that is made once in a semester

1.	MiFi (Mini router)	100,000/=

PROJECT PLAN

Table 6: Project plan

NO	TASK	LEAD	DAYS
1.	**REQUIREMENT SPECIFICATION**		
1.1.	Conducting interviews and questionnaires	Hosiana	7
1.2.	Requirement Analysis	Mariam and Daniel	5
1.3.	Preparation of software requirements specification document	Daniel	3
2.	**DESIGN SPECIFICATION**		
2.1.	Preparing ERD, UML diagrams	Daniel	4
2.2.	Documenting system design	Mariam	6
3.	**IMPLEMENTATION**		
3.1.	Setting up environments (installation of software)	Mariam	2
3.2.	Coding	Hosiana and Daniel	30
4.	**TESTING**		
4.1.	Independent parts testing	Mariam, Hosiana , and Daniel	6
4.2.	Testing the whole system	Mariam, Hosiana and Daniel	3
4.3.	Preparing testing documentation	Mariam, Hosiana and Daniel	2

QUESTIONS USED DURING QUESTIONNAIRE

Customer/ Debtors

1. What is the current means that you are using to buy goods on credit?
2. How much can you buy on credit? What is the limit amount that you can buy credit?
3. How long does it take to pay back?
4. Any assurance that you leave behind so as to pay up?
5. Do you go through any problem while you haven't paid credit?
6. Can you buy more once you have already bought on credit a large sum of goods?
7. Would you like it if there was a system that allows you to buy goods and pay as you earn? A cut from salary?
8. If there was a technology to be invented right now how would you prefer it to be?

Vendors/ Creditors

9. What is the current means that you are using to sell goods on credit?
10. How many bad debtors can you get?
11. How do you deal with bad debtors?
12. How much can you sell on credit to one customer? What's the limit amount that you can sell credit?
13. How long does it take your customers to pay back?
14. Any assurance your customer leaves behind so as to pay up?
15. What do you prefer to be used as an assurance of payment?
16. How many credit customers can you accommodate?
17. What is the most preferred good to be bought on credit?
18. Are there any goods that you cannot sell on credit?
19. How much is the limit value of goods?
20. Do you go through any problem while you haven't paid credit?
21. Can you buy more once you have already bought on credit a large sum of goods?
22. If there was a technology to be invented right now how would you prefer it?
23. Would you like it if there was a system that allows you to sell goods on credit and have an assurance of payment? Customers to pay as they earn through a cut from their salary?