

Adventist University of Central Africa

PLANT NURSERY MANAGEMENT SYSTEM

CASE STUDY: MODERNE

A research project

Presented in partial fulfillment of the

requirements for the degree

BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

Major in

SOFTWARE ENGINEERING

By

UMUTESI NADINE

June 2022

DECLARATION

I hereby declare that the project entitled “PLANT NURSERY MANAGEMENT SYSTEM” with the Case study: MODERNE, in the partial fulfilment of the requirement of the degree Bachelor of Information Technology, is a record of the research project work I carried out under the Supervision of Eng. NSENGIYUMVA Juvenal. I declare that the work reported in this research project has not been submitted, in the award of any other degree in this University or others.

Signed By:

Signature.....

UMUTESI

Nadine

Id: 22861

Date:/...../.....

APPROVAL

I, NSENGIYUMVA Juvenal, hereby certify that this project has been done under my supervision and submitted with my approval.

Signature:

Date:

DEDICATION

I hereby dedicate this research project to everyone who encouraged me to make this project successful.

To my families and friends for their constant support

To myself for pulling out this work

ACKNOWLEDGEMENT

First and foremost, I would like to acknowledge God's support throughout my life. I pay my deepest gratitude to God for being my strength and guidance and providing me wisdom and courage to write this thesis and throughout my studies

My supervisor Eng. NSENGIYUMVA Juvenal, who helped me complete this task, has my deepest gratitude, particularly for his insightful counsel, helpful support, direction, and priceless ideas.

I express my gratitude to the administration of Adventist University of Central Africa and the personnel of the information technology department.

Special thanks to my family, friends, and coworkers for their encouragement, friendship, and support as well as to everyone who helped with this effort in some manner.

God bless you all.

UMUTESI Nadine

ABSTRACT

A research project Presented in partial fulfillment of the requirements for the degree

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TITLE: PLANT NURSERY MANAGEMENT SYSTEM

Name of Researcher: UMUTESI Nadine

Name of Faculty Advisor: Eng. NSENGIYUMVA Juvenal

Date Completed: August 2022

The main objective of this project is to develop a system that can help reduce manual data collection and management of plant nurseries by introducing a computerized system. An online management system is an efficient solution to Plant nurseries of Rwanda today.

We used different data collection methods such as Observation, documentation and interview to analyze the currently used system. We also used Waterfall Model as an appropriate methodology in the development of our new system. The expected result of this system will be to enable different clients to get plants that they need and will also help track different plant nurseries across Rwanda. Furthermore, it will also introduce the service delivery to clients.

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CHAPTER 1

GENERAL INTRODUCTION

Introduction

As is well known, the 21st century belongs to the world of ICT. It's a century of knowledge. Throughout Africa, there is an important recognition that technology is the wave of the future. Faced with this new information revolution, Rwanda decided not to be left behind and embraced ICT with enthusiasm and courage. The Ministry of ICT Innovation is obliged to accelerate the use of information and communication technology in the field of socio-economic development in Rwanda.

The ministry does this through its mission to achieve national priorities for economic growth and poverty reduction through the development and coordination of national information technology, communications, innovation policies, programs, and the empowerment of its citizens. Following Rwanda's mission and the Smart Rwanda Master Plan, defining the goal of transforming the country from agriculture to a knowledge economy provided a clear path for the development of Rwanda's economy.

The ICT sector continues to catalyze rapid and sustainable economic growth, equitable social development and job creation, advising and inspiring the use of technology to develop innovative solutions. Therefore, we need to follow government initiative and develop sophisticated solutions to make a difference and influence the way people interact with technology.

The Plant Nursery Management System is a web application that simplifies the ordering and delivery of plants to customers and supports the management of nurseries throughout Rwanda.

Background of the study

The term "nursery" was used to refer to a business or commercial institution that sold live plant material or to the area of a garden where young stock was nurtured until it could be moved to a permanent position. The word "pépinière" is often used to describe a plant nursery.

In its original connotation, the word "nursery" was frequently interchanged with other words that have a more defined meaning, such "seminary" or "botanic garden." The section of a nursery from which plants started from seed were relocated to the main part of the nursery was referred to as the "seminary," despite the fact that the term literally refers to a plot where seeds were started. According to academics, the expansion of commercial nurseries in the 18th and 19th centuries was a reaction to both rising public demand and a broader variety of plants that were readily available.

The term "nursery" now also refers to for-profit businesses that sell plants, introduce new plants, and as a result build intricate networks of trade.

Statement of Problem

As, plant nurseries are regarded as cooperatives and The Rwanda Cooperative Agency has a core mandate to promote cooperatives. Rwanda's vision regarding technology is "A modern nation able to generate and disseminate technological knowledge and innovation as well as a center of excellence at a regional level in the area of technologies, particularly with ICT".

The existing system is outdated. The selling of plants in plant nurseries is recorded manually and processes are slower and time consuming. As a client wanting a plant to grow, one needs to go to the plant nursery to find it and if the plant is rare, the chances of getting it are slim which leads to spending a lot of time visiting different nurseries in search of the plant. In the current system, sales are difficult to trace and the security of data is not guaranteed as it is stored on papers and can get lost anytime.

Motivation

The main motivation of this application is to be able to create solution for my community using technology and a number of interests have motivated me to work on this project. Here's the key motivators for this work:

- ✓ To use technology to develop solutions and enhance societal services in order to put the knowledge I learned in my academic courses at Adventist University of Central Africa (AUCA) into practice.
- ✓ To make a simple, accessible application available, facilitating commerce for both customers and plant nurseries.
- ✓ To provide an online presence and consistent commerce for plant nurseries in case of reallocation.

Objectives of the study

General objective

The objective of the Plant nursery management system is to design a computerized system that will help users to get any type of plant they want and give easy access to different plant nurseries around them

Specific objectives

- To help customers view different plants in a plant nursery.
- To help customers order any plant and get it delivered on their doorstep
- Plant nurseries will be able to do marketing or advertisement of their plants easily
- To implement a computerized application used to manage information.
- To digitalize an e-commerce system of plant nurseries in Rwanda.
- To help both the customers and plant nurseries owners to minimize and use their time effectively

Scope of the study

In this project. The system is designed for all Rwandans wanting to buy plants. It will be the development of a web application that will focus on clients and plant nurseries for the purpose of creating an easy accessibility and ready-to use system for exchanging plants and monetary. The system will be accessed using computers, Smart mobile phones and internet.

Methodology and Techniques used in the study

Methodology is the process used to gather information and data for the motive of making decisions. The methodology can also encompass publication research, questionnaires, surveys and other different research methods and could include both current and past information. The following are techniques and methods used in conducting this research:

Observation

According to quizlet, Observation is regarded as an act of watching processes being performed. It is an effective tool to gain perception into the as-is system, and to check the validity of data gathered from other sources. This technique was used in getting more insight into the existing system, nevertheless, people gravitate towards cautiousness when noticing being watched. This technique was used by observing when the Consult is required to gather information from the entrepreneur. Therefore, building up a web application that will make it easier for them to gather information.

Interview

It is described as a structured dialogue between a researcher (interviewer) and an informant (interviewee), started to gather data for a particular study. (Dr. V.K. Maheshwari, 2011). This technique was used while conducting this study to come up with an effective, real, clear work and well working system. This technique was used for collecting information by interviewing one of the plant owners in a plant nursery about the way it works.

Expected results

This new system is expected to produce the following output:

- Reduce time wasted in reporting processing and finding the plant one wants.
- Reduce the current system's workload.
- Reduce the amount of time spent processing reports.
- Keep accurate record on different transactions made.
- Help different nurseries to be known.
- Get different information about the plant nurseries and the plants that they sell.
- Increase the sales and know all the profits made.

Organization of report

The five chapters that make up this research study are as follows:

The general introduction, which is the first chapter of the study, will give the reader a general summary of the study's aims, methods of data collecting, and expected results. It will also explain why I chose this particular study and what drove me to conduct it.

The focus of the second chapter, Analysis of the existing system, will mostly be on a detailed description of the current system, including its architecture, issues, and suggested solutions.

The new system will be covered in full in the third chapter, Requirements analysis and design of the proposed system. An outline of its UML, along with use-case diagrams, sequence diagrams, activity diagrams, data dictionary diagrams, and architectural diagrams, will be provided.

The fourth chapter, Implementation of the new system, will primarily concentrate on the application of the research. By discussing and displaying images of my scripts as forms of data entry and reporting, as well as the technologies utilized to create and develop this software, we will demonstrate how the new system was constructed.

My research will be concluded in the fifth chapter, Conclusions and recommendations, which will also include suggestions for future improvement.

CHAPTER 2

ANALYSIS OF THE EXISTING SYSTEM

Introduction

This portion is expected to clarify the terms utilized amid the project advancement briefly. After a brief introduction of PNMS, we are going to examine an intensive examination of the existing frameworks, counting working standards, issues inside the framework, and all highlights related to future work. Prior to the conclusion of this chapter, the proposed arrangements to unravel the said issues are highlighted.

Historical background

Moderne, a plant nursery in Kigali, began as a backyard nursery in 2012 where a few houseplants were grown. Later, it grew into a sizable nursery with numerous employees that specializes in unusual and rare species. It focuses on plants that flourish both indoors and outside with the intention of offering excellent, specialized guidance and instruction to various plant types.

Mission

- ✓ To protect the environment and increase production in order to achieve long-term and holistic development.
- ✓ To advance maintainable advancement by mobilizing the community individuals to lift themselves out of poverty.

Vision

Aspire to business greatness through creating enduring connections with our clients. Create a work climate where the organization may profit fairly through innovation, efficiency, and dedication.

Description of the current system

Existing system analysis is the process of analyzing a business scenario in order to provide a system solution to a problem or design adjustments to such a condition. To successfully install a new system, it is essential to comprehend the existing one. In system analysis, more emphasis is given to understanding the complexity of an existing or proposed system, assessing if the new system is desirable or not, and identifying any necessary modifications to the current system. System analysis is therefore the process of investigating a system, identifying weaknesses, and using the information to recommend system modifications.

Current system requires clients to be present on scene to buy the plant. The client doesn't have enough information on the available plants in the plant nurseries which leads to cases where the client doesn't find the plant wanted.

The existing system is manual which doesn't give an alternative to the client to track and see other plant nurseries around her/him.

The recording to track sales in plant nurseries is done on papers or notebooks which can be lost anytime and less secure.

Analysis of the current system

A customer who wants to buy a certain plant must know where the plant nursery is located. As he/she arrives there, the client asks for the plant and if it is available, the seller shows the requested plant to the customer and the plant price is shared. If the plant satisfies the customer, he/she makes payment and get the desired product.

Design of activities of the current system

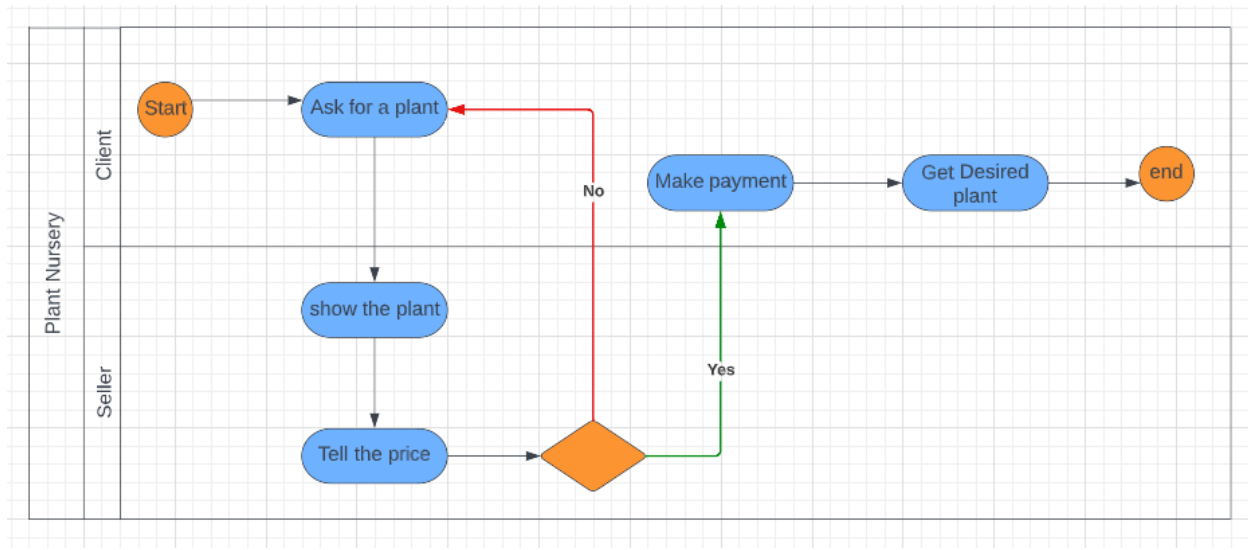


Figure 1: Sketch of the existing system

Problems with the current system

The current method of buying plants from plant nurseries is outdated and the processes are slower.

The problems with the current system involve:

- Insufficient information regarding available plants in plant nurseries.
- Difficulty in keeping track of sales
- Data is not well secured and stored. Security of the data is not guaranteed. The data most of the time are kept on papers and can be lost at any occasion.
- Manual handling of data is more expensive as compared to an automated system.
- It takes a lot of time to find a rare plant by searching in different plant nurseries
- Price may be high or inconvenient for customers where they don't have or possess enough money
- It may be difficult for different customers to reach the plant nursery due to their physical location or busy schedule.

Proposed solutions

A plant nursery management system needs to be developed in order for customers to be able to purchase plants, especially in light of how quickly computer technology is developing across practically all industries and its use in relation to information management. Therefore, according to the mentioned problems above, this new system will bring the following solutions:

- Reduce the current system's workload.
- Reduce the amount of time spent processing reports and looking for desired plants.
- Keep accurate record on different transactions made.
- Protection of data in a digital way
- Help different nurseries to be known.
- Get different information about the plant nurseries and the plants that they sell.
- Search a plant in different plant nurseries.
- Increase the sales and know all the profits made.
- The plants ordered will be delivered on their door step.

System requirements

Functional requirements are those requirements that are easier to be found at the starting moment and non-functional requirements, also called quality requirements define the system properties and constraints.

Functional requirements

The following are some functional requirements of the Plant Nursery Management System:

- The system should be able to allow clients to create their own account.
- Administrator should approve the registered entrepreneur through email.
- The system should record each transaction made either purchase or sale.
- Entrepreneurs/Plant nursery owners should be able to view all orders and sales on his/her assigned plant nursery.
- Entrepreneurs should be able to provide different plants in their plant nursery.
- Entrepreneurs should be able to process orders from the user.
- The client should be able to make orders.

Non-functional requirements

The following are some non-functional requirements of this application:

Security

- The application must encrypt the user password.
- The system must provide right privileges according to user type.
- The user has to login to perform a certain location

Performance

- Within 20 seconds, the system must fulfill the user's request.
- The system should not exceed 20 secs in case of downtime

Accessibility

- The system should be accessible on laptops/tablets/mobile phones.
- Access to the system must be made through local network infrastructures and web-bases.
- Whoever requires it should be able to access the system.

Maintainability

- The system should be easy to maintain, once needed.

Data integrity

- The system should be able to protect the user's privacy.

Reliability

- There shouldn't be any unplanned outages of the system.
- The system must have a quick performance; the response time must be short.

CHAPTER 3

REQUIREMENTS ANALYSIS AND DESIGN OF THE NEW SYSTEM

Introduction

According to the analysis of the present system in chapter 2, a thorough analysis and clear design are necessary to build a successful and durable system that meets user requests, just as a strong foundation is necessary for a strong framework. System Analysis and System Design are the two main parts of system development.

The process of gathering and evaluating data, finding problems, and breaking down a system into its constituent parts is known as system analysis. It is done to look at a system or its aspects to discover out what it is hoping to accomplish. It is a means of resolving difficulties to strengthens the system and guarantees that each of its aspects function effectively to accomplish its aims. (Dennis, 2012)

The process of defining a system's architecture, parts, components, connectors, and data in order to meet specific needs is known as system design. (Dennis, 2012). In order to establish what modifications will be required to include user needs that the present system was unable to satisfy, system design is based on an analysis of the existing system. The product of this phase will be the specifications, which must outline both the functions and operational details of the proposed system in order to define the solutions. How to accomplish the system's goals is a concern of system design.

Unified Modeling Language (UML)

A general-purpose modeling language used in software development, the Unified Modeling Language (UML) intends to offer a unified way to defining a system's architecture. It is a typical kind of documentation for Object-oriented systems. It is also thought of as a visual language for describing, building, and documenting the system artifacts. (Booch, 2006)

The Unified Modeling Language (UML) combines approaches from object modeling, component modeling, business modeling, and data modeling (entity relationship diagrams). Any procedure,

any step of the software development life cycle, and any implementation technology may be utilized with it. All object-oriented approaches can use UML as a standard notation, and it aims to pick out and incorporate the best components of predecessor notations.

The UML diagrams begin conceptually and abstractly before adding specifics that will eventually result in code production and development. Diagrams depict both the what and the how as they progress.

The Booch method, the Object-Modeling Technique (OMT), and Object-Oriented Software Engineering (OOSE) notations are all combined into one standard and widely used modeling language by UML. The goal of UML is to become a universal modeling language that can represent concurrent and distributed systems.

Design of the new system- Diagrams

The first step of the system development life cycle is system design, in which the programmer and the user build a solid knowledge of how the system will function.

Use Case Diagram

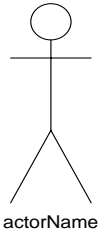
Use case diagrams are UML diagrams that show how the system interacts with its environment and business needs for the system. (Dennis, 2012)

It shows a company or software system, its external users (known as actors), and a collection of tasks (known as use cases) that system users ought to or are able to carry out when using the system. Use case diagrams are employed to describe a system's operation from the viewpoint of outside users.

The use case diagram uses the symbols below:

Actor

When engaging directly with a system, an external entity assumes a role that is specified by an actor. It could be a user role or a role performed by another system that interacts with the system.



Use case

The use case is a description of the series of actions that a system can perform while interacting with outside actors (Dennis, 2012). It is something a system should do at the actor's request and is illustrated as follows:



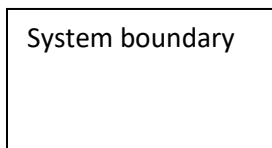
Relationship

Authentic connections between actors and use cases, represented by the UML association symbol.



System boundary

In order to illustrate the system's edge or boundary being modelled, a box is drawn around the use case.



The use case diagram in the following figure describes how the new system functions and the stakeholders.

Use case Diagram

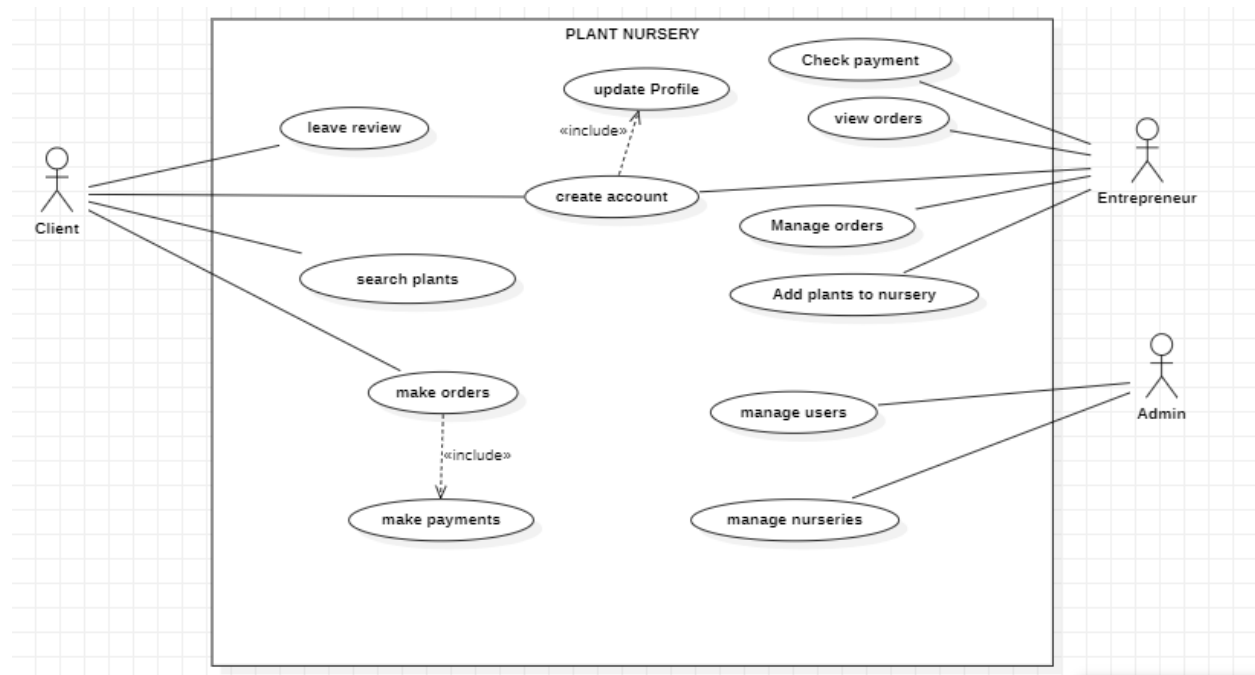


Figure 2: Use Case Diagram

Use-case description

Use Case description specifies what a use case accomplishes, and what it requires to be properly performed. Each use case looks like this:

- **Name:** A name of a use case
- **Description:** What a system aims to accomplish
- **Actor:** The participant in the use case
- **Pre-condition:** The system state is required before the use case may start.
- **Post-condition:** When the use case is finished, the system states it.
- **Normal flow:** The use case's real steps
- **Alternative flow:** Steps that could be taken if a regular flow were to fail.

Use case description for creating accounts

Use case Number	UC-01
Use Case Name	Create Account
Actor	Client, Entrepreneur
Description	Creating of account for entrepreneur and client to access the system
Pre-condition	Both parties must provide valid information while registering
Post-condition	The system should display a message that an account is created
Normal Flow	<ol style="list-style-type: none">1. Client runs the system2. User access the registration form3. System display the form to fill4. User fills the requested inputs and submits the form5. System validates the input of the fields.6. System saves data in the database7. System displays a confirmation message
Alternative flow	<ol style="list-style-type: none">a. If the data inserted in the inputs is not valid, the system will show an errorb. A user refill and submit the form again.c. If there is a failure in saving the data or the data already exists in the database, the system will display an error message.

Table 1: Create Account Use Case Table

Use case description for managing the plants

Use case Number	UC-02
Use Case Name	Manage Plants
Actor	Entrepreneur
Description	Adding, Deleting, Updating plants in the plant nursery.
Pre-condition	Entrepreneur must login to access with valid credentials
Post-condition	The system should display a message if the different functionalities of adding, deleting and updated are successful.
Normal Flow	<ol style="list-style-type: none">1. Entrepreneur runs the system and request plant creation form2. System display a plant registration form3. Entrepreneur fills the form with the valid information and submit4. System saves data and display confirmation message.5. Entrepreneur views different plants and can update and delete a particular plant.
Alternative flow	<ol style="list-style-type: none">a. If the data inserted in the inputs is not valid, the system will show an errorb. The entrepreneur refills and submits the form.c. If there is a failure in saving the data or the data already exists in the database, the system will display an error message.

Table 2: Manage Plants Use Case Table

Use case description for searching plant

Use case Number	UC-03
Use Case Name	Search Plant
Actor	Client
Description	Client is able to search desired plant and view its information
Pre-condition	Client must have access to the system
Post-condition	The system should display the searched plant and its information
Normal Flow	<ol style="list-style-type: none">1. System displays home page with search box2. Client types the desired plant in the search box3. System checks the availability of the plant4. System display the plant and its information
Alternative flow	<ol style="list-style-type: none">a. If the plant being searched is unavailable, the system will display “0 result”b. Then the client searches other desired plants.

Table 3: Search plant Use Case Table

Use case description for managing users

Use case Number	UC-04
Use Case Name	Manage users
Actor	Admin
Description	Managing the users of the system
Pre-condition	Admin provide valid credentials for logging in
Post-condition	Admin should view all users of the system
Normal Flow	<ol style="list-style-type: none">1. Admin runs the system2. Admin access the login form3. System display the form to fill4. Admin provides the credentials and submit the form.5. System validates the input of the fields.6. System logs the admin and redirect to the dashboard7. Admin views the users of the system
Alternative flow	<ol style="list-style-type: none">a. If the data inserted in the login inputs is invalid, the system will show an error message.b. The admin refills and submits the form again.c. If there is a failure in logging in, the system will display an error message.

Table 4: Managing Users Use Case Table

Use case description for managing nursery

Use case Number	UC-05
Use Case Name	Manage Plant nursery
Actor	Admin
Description	Managing the plant nurseries of the system
Pre-condition	Admin provide valid credentials for logging in
Post-condition	Admin should view all plant nurseries of the system
Normal Flow	<ol style="list-style-type: none">1. Admin runs the system2. Admin access the login form3. System display the form to fill4. Admin provides the credentials and submit the form.5. System validates the input of the fields.6. System logs the admin and redirect to the dashboard7. Admin views all the plant nurseries of the system
Alternative flow	<ol style="list-style-type: none">a. If the data inserted in the login inputs is invalid, the system will show an error message.b. The admin refills and submits the form again.c. If there is a failure in logging in, the system will display an error message.

Table 5: Managing Nursery Use Case Table

Use case description for making orders

Use case Number	UC-06
Use Case Name	Make order
Actor	Client
Description	Client makes an order of the desired plant and it is delivered to them.
Pre-condition	<ol style="list-style-type: none">1. Client must have an account2. Client must be logged in
Post-condition	Success message will be displayed
Normal Flow	<ol style="list-style-type: none">1. Client will be able to view the plant and its details2. Client will be able to add desired plant to cart3. Client will be able to checkout
Alternative flow	<ol style="list-style-type: none">a. If there is a failure, the system will display an error message.

Table 6: Making Orders Use Case Table

Use case description for Payment

Use case Number	UC-08
Use Case Name	Payment
Actor	Client
Description	Clients make payment to ordered plants
Pre-condition	<ol style="list-style-type: none">1. Client must have an account and be logged in2. Client must have made an order3. Client must be aware of the total cost of the order
Post-condition	Success message will be displayed
Normal Flow	<ol style="list-style-type: none">1. Client makes an order2. System calculates the total cost to be paid3. Client makes the payment4. System checks the payment method5. System displays a success message
Alternative Flow	<ol style="list-style-type: none">1. If the information is invalid, an error message is displayed

Table 7: Make Payment Use Case Table

Class diagram

A class diagram is a structural diagram that depicts the classes, their properties, functions, and connections between classes to indicate how a system is organized.

A class describes the methods and variables in an object, which is a specific item in a program or the unit of code representing that thing. In the context of the Unified Modeling Language (UML), a class diagram is a depiction of the relationships and source code dependencies among classes. All types of object-oriented programming can benefit from class diagrams (OOP). The classes are grouped in groups based on shared traits in a class diagram.

Schema of Class Diagram

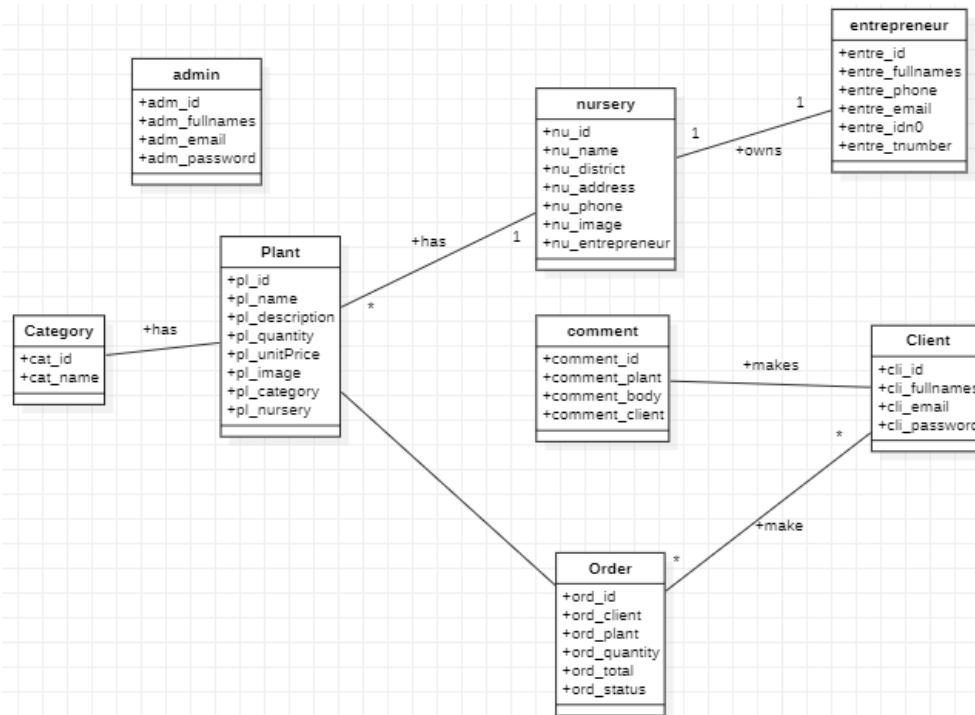


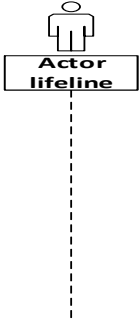
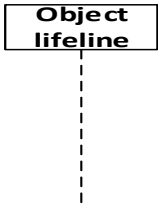

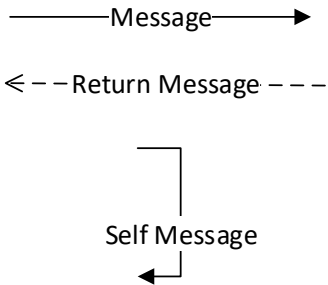
Figure 3: Class diagram

Sequence Diagram

A sequence diagram is a type of interaction chart that depicts objects as lifelines running down the page, with messages rendered as bolts from the source lifeline to the target lifeline, representing their interactions through time. Object interactions are arranged in temporal sequence in a sequence diagram.

Sequence in UML, the stages required to perform an operation are described in diagrams, which are interaction diagrams. They show how things interact when operating within a cooperative system. Sequence Diagrams are time-focused and use the vertical axis of the diagram to indicate time, what messages are received when, and how the interaction is organized graphically.

The notations and their definitions that are used in sequence diagram:

Term and definition	Symbol
<p>An actor:</p> <ul style="list-style-type: none"> ➤ It could be a person or a system that is not a part of the system yet benefits from it. ➤ In a chain, it participates by sending and/or receiving messages. ➤ It is positioned at the top of the diagram. 	
<p>An object lifeline:</p> <ul style="list-style-type: none"> ➤ It partakes in a sequence by transferring and/or obtaining messages. ➤ It is placed at the upmost of the schema. 	
<p>An activation:</p> <ul style="list-style-type: none"> ➤ It is a lengthy narrow rectangle positioned at top of a lifeline. ➤ It shows the transfer and acquisition of messages 	
<p>message:</p> <ul style="list-style-type: none"> ➤ It bears information from one object to another. ➤ When an operation call is made, a message is marked with a solid arrow, but a return is marked with the value returned and shown as a dashed arrow. 	

Diagrams

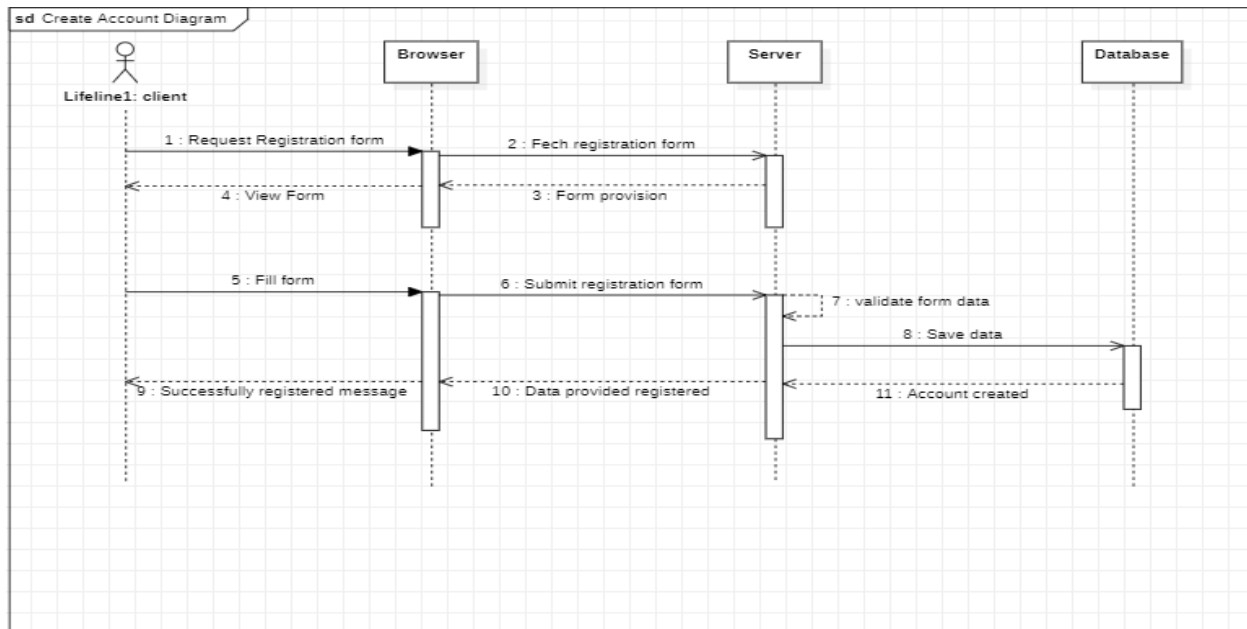


Figure 4: Create Account sequence diagram

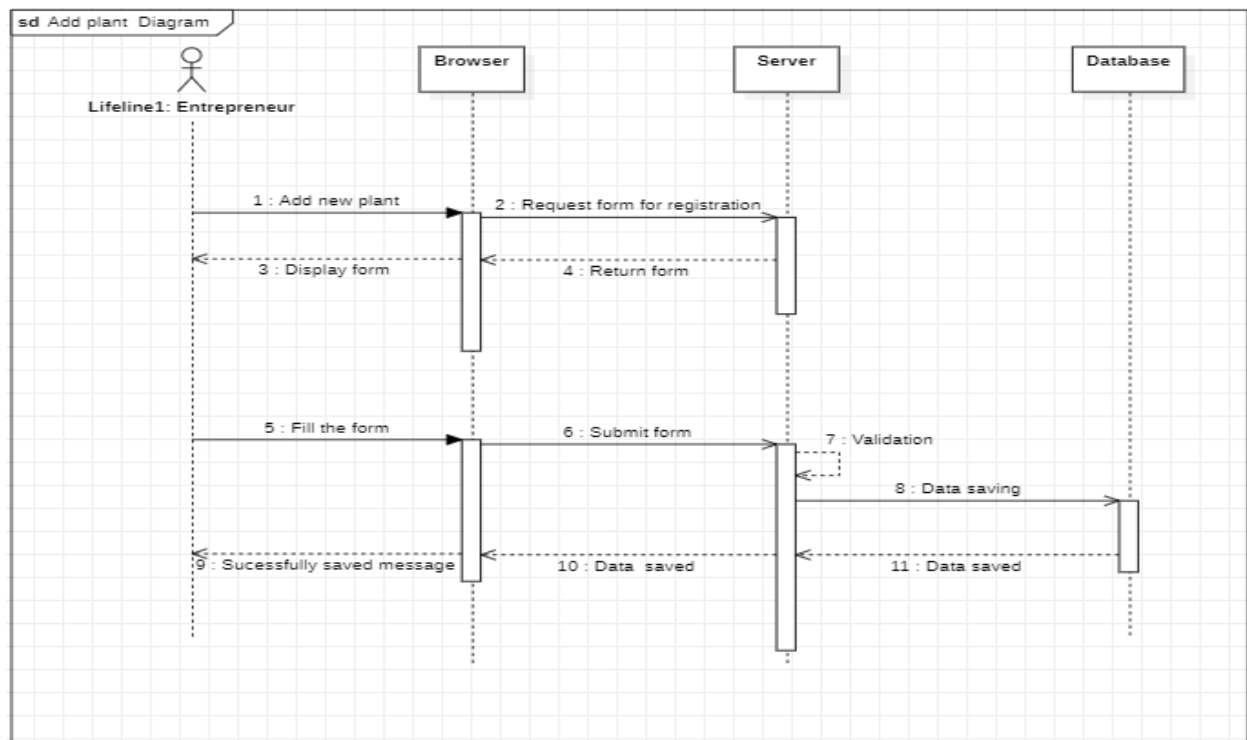


Figure 5: Add plant sequence diagram

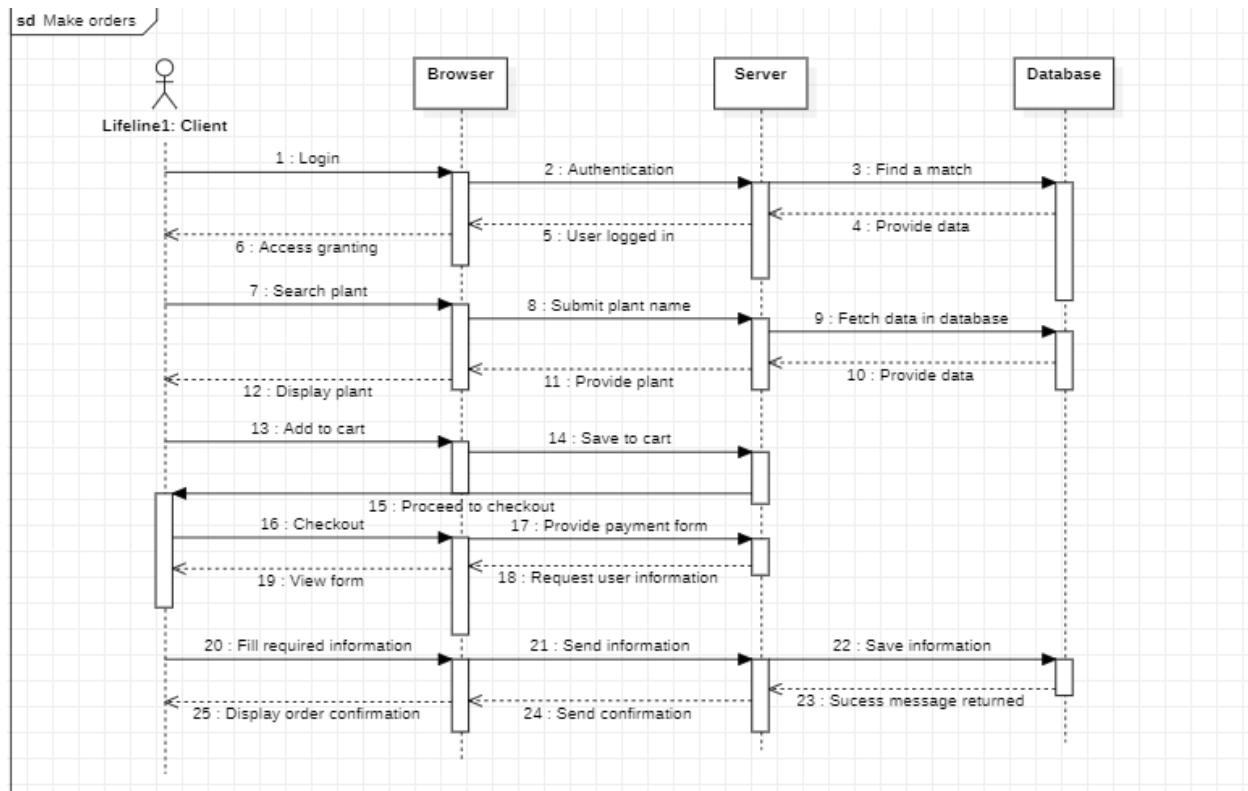


Figure 6: Make Orders Sequence Diagram

Database schema diagram

A database schema diagram describes how data is organized to create a blueprint for how a database will be constructed and is the database management system's supporting formal language used to define the structure of a database system (DBMS). Formally speaking, a database schema is a set of rules (sentences referred to as integrity constraints) applied to a database. The compatibility of the schema's components is ensured by these integrity requirements.

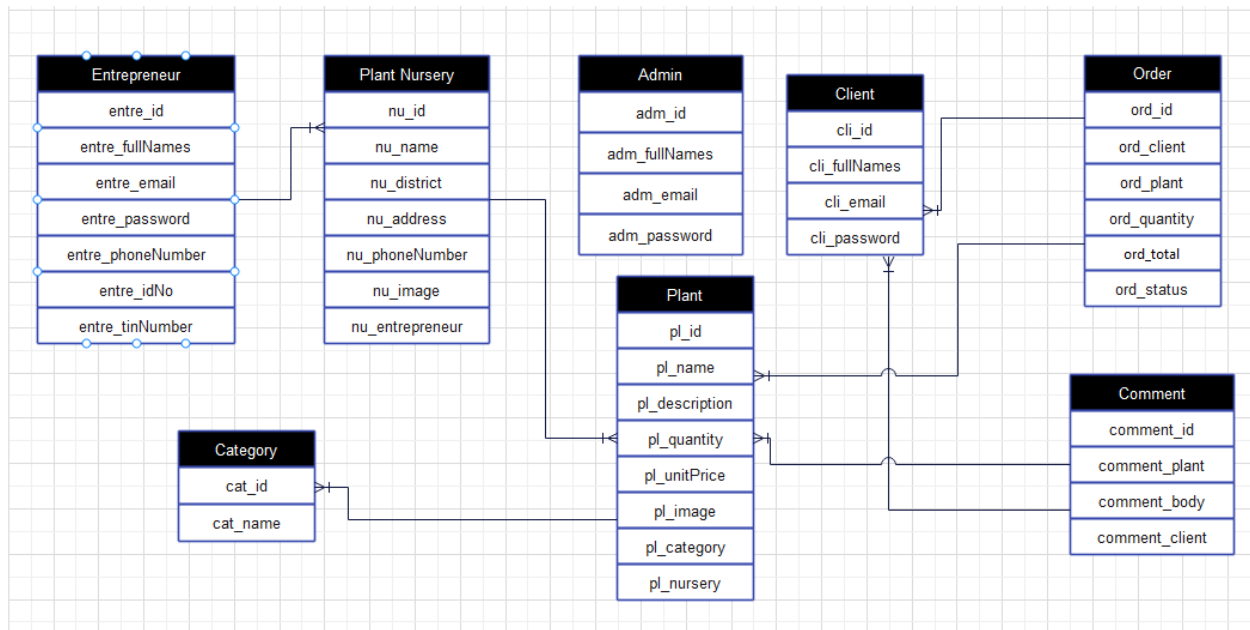


Figure 7: Database Schema Diagram

System Architecture Design

The design of a system's architecture shows how functionality are translated into hardware and software components, how the software architecture is overlaid on the hardware architecture, and how users interact with these components. It is a representation of a system represented by blocks connected by lines that indicate the connections between the blocks, where the main parts or functions are shown.

The sample system architecture of the new application is depicted in the image below.

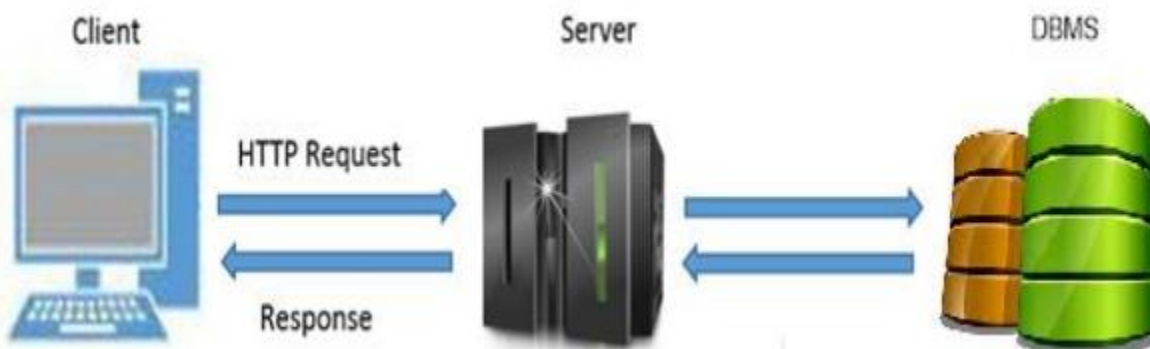


Figure 8: System Architecture Design

CHAPTER 4

IMPLEMENTATION OF THE NEW SYSTEM

Introduction

The creation of "PLANT NURSERY MANAGEMENT SYSTEM" is discussed in this chapter. It comprises a brief description of the technology used to make the program work, screenshots of the new system, and tests that have been run. Also, the compatibility criteria for software and hardware

Tools and Technologies used

In order to create this web application, I used a variety of tools and technologies, including:

- ✓ **Nestjs:** is a framework used to create effective, scalable Node.js server-side applications.
- ✓ **Reactjs:** is a library for creating user interfaces in JavaScript.
- ✓ **PostgreSQL:** is open source object-relational database system
- ✓ **Bootstrap:** is a CSS framework for developing responsive and mobile-first websites.
- ✓ **StarUML:** aims to promote agile and clear modeling with a smart software modeler.
- ✓ **Visual Code Studio:** is a code editor that has been redesigned and optimized for creating and fixing contemporary cloud and online apps.

Nestjs: is a toolkit for creating scalable, effective Node.js server-side applications. It mixes features of OOP (Object Oriented Programming), FP (Functional Programming), and FRP. It also employs progressive JavaScript, is built with and fully supports TypeScript (yet still allows developers to create in plain JavaScript) (Functional Reactive Programming). In addition to providing an abstraction layer over Express and Fastify, Nest also makes their APIs available to developers directly.

Reactjs: is a front-end JavaScript toolkit for creating user interfaces based on UI components that is open-source and free. It is updated by Meta (formerly Facebook), as well as a number of unaffiliated programmers and companies. React is only concerned with state management and delivering that information to the DOM, so creating React apps often requires the usage of additional frameworks for routing and particular client-side functionality.

PostgreSQL: it is a relational database management system (RDBMS) that emphasizes extensibility and SQL conformance and is also referred to as Postgres. From single workstations to data warehouses or Web services with many concurrent users, it is made to manage a variety of workloads.

Bootstrap: It is a free and open-source CSS framework made with mobile responsiveness in mind for front-end web development. It features HTML, CSS, and (optionally) JavaScript design templates for typography, forms, buttons, navigation, and other interface elements.

StarUML: is a software engineering tool for modeling systems that uses traditional modeling notations, the Unified Modeling Language, and Systems Modeling Language.

Visual Code Studio: is a source-code editor created by Microsoft for Windows, Linux, and macOS, and is also frequently referred to as VS Code. Among the features are debugging assistance, syntax highlighting, intelligent code completion, snippets, code refactoring, and embedded Git. Users can alter the theme, keyboard shortcuts, preferences, and extensions that provide additional functionality.

Presentation of the New System

The outcomes of the application of this system are shown in this section. These are the web pages or user interfaces that are produced as a result of running the programs. The screenshots in this section show the user interface:

Create Client Account

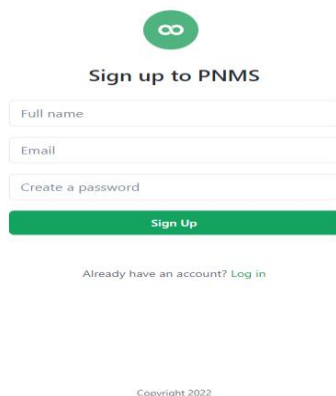
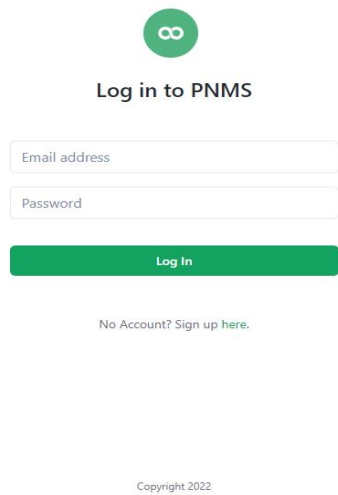


Figure 9: Create Account User Interface

Login



The login interface features a green circular logo with a white infinity symbol at the top. Below it is the text "Log in to PNMS". There are two input fields: "Email address" and "Password". A green "Log In" button is positioned below the password field. At the bottom, there is a link that says "No Account? Sign up here." and a copyright notice "Copyright 2022".

Log in to PNMS

Email address

Password

Log In

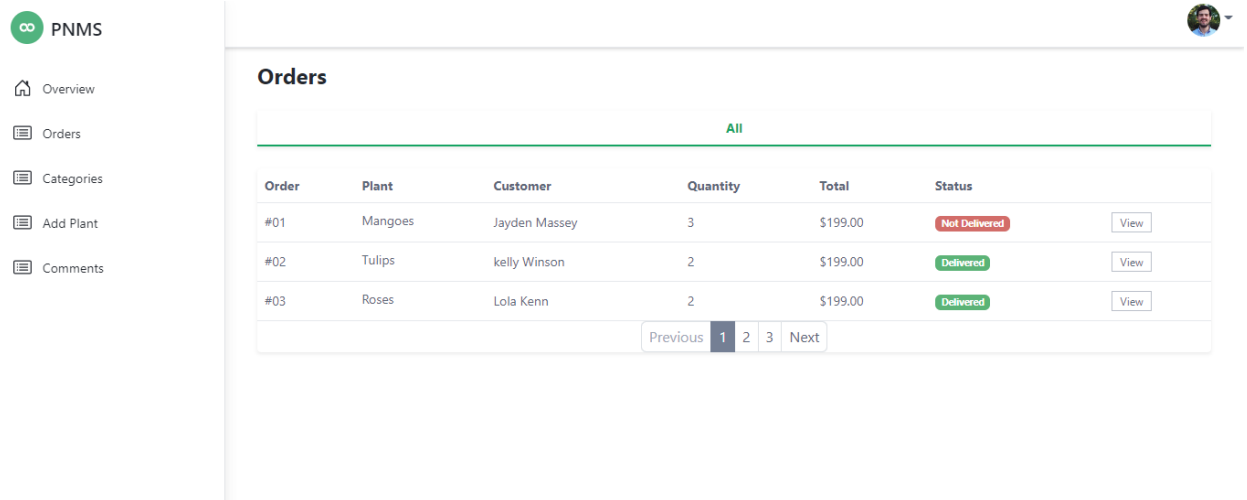
No Account? Sign up [here](#).

Copyright 2022



Figure 10: Login User Interface

Orders



The Orders user interface shows a sidebar with navigation links: Overview, Orders, Categories, Add Plant, and Comments. The main content area displays a table of orders. The table has columns for Order, Plant, Customer, Quantity, Total, and Status. There are three orders listed: #01 (Mangoes, Jayden Massey, 3, \$199.00, Not Delivered), #02 (Tulips, Kelly Winson, 2, \$199.00, Delivered), and #03 (Roses, Lola Kenn, 2, \$199.00, Delivered). Each order has a "View" button. At the bottom of the table, there are pagination controls: Previous, 1, 2, 3, Next.

PNMS

Overview

Orders

Categories

Add Plant

Comments

Orders


All

Order	Plant	Customer	Quantity	Total	Status
#01	Mangoes	Jayden Massey	3	\$199.00	Not Delivered
#02	Tulips	Kelly Winson	2	\$199.00	Delivered
#03	Roses	Lola Kenn	2	\$199.00	Delivered

Previous 1 2 3 Next

Figure 11: Orders User Interface

List of Plants

 PNMS

Overview

Orders

Categories

Add Plant

Comments

Plant


Add Plant

All plants

Plant	Name	Description	Quantity	Unit price	Category	
#01	Mangoes	A mango is an edible stone fruit produ...	50	RWF 1500	Fruits	View
#02	Apples	Apple trees are cultivated worldwide a...	50	RWF 1100	Fruits	View
#03	Roses	A rose is either a woody perennial flow...	50	RWF 1200	Flowers	View
#04	Tulips	Tulips are a genus of spring-blooming ...	50	RWF 1250	Flowers	View

Figure 12: List of Plants

Comments

 PNMS

Overview


Orders

Categories

Add Plant

Comments

Comments

 **John Doe**
30/03/2022

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[Load more notifications](#)

Figure 13: Comments

User Add to Cart Plants

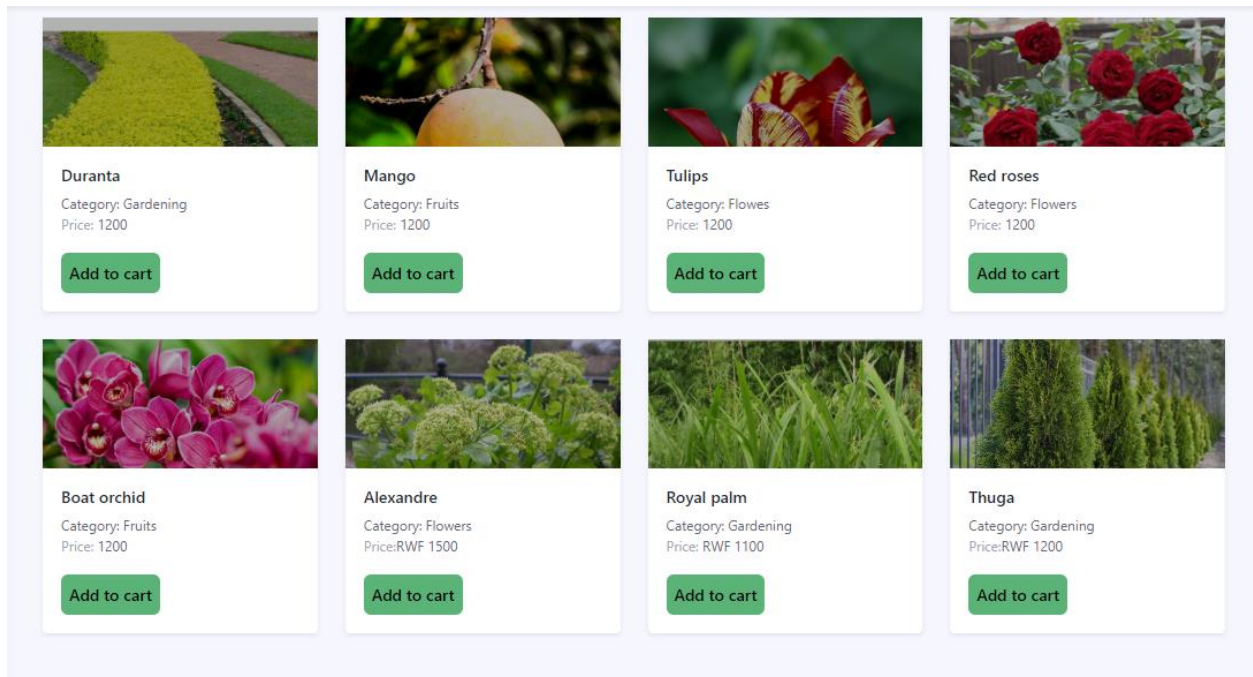


Figure 14: Add to Cart User Interface

Software Testing

The design of software benefits from the use of software tests. They aid in determining whether the software genuinely accomplishes the task it was designed to tackle.

When undertaking software testing, it's vital to keep the following things in mind:

- ✓ Is the application compliant with the standards that guided its design and development?
- ✓ Is the application functioning as it should?
- ✓ Is it possible to implement the application in the same way and satisfy the needs of the stakeholders?

The following are some software testing:

The Unit Test: Unit testing is a technique for ensuring the correct operation of a particular piece of software or a program. It is a method of evaluating the acceptability for use of individual pieces of source code, sets of one or more computer program modules, related control data, usage processes, and operating procedures. In other words, every little component that can be assembled with the aim of verifying that each part is in accordance with its specifications and checking for logical errors. Unit testing is a powerful tool that allows for the most thorough error detection. At every point where code has been created, a unit test has been run on the application.

The Integration test: is the stage of software testing where many software components are combined and tested together. This test is crucial for confirming the correct assembly of the software's numerous components. As more tests are run, the hardware and software components are gathered and tested, and eventually the full system is tested. The application modules were thoroughly tested one after another until they were finished to guarantee that the assembled software components met all of the necessary functional and technical requirements.

The Validation test: The software is validated in its external context during the final test step. To guarantee that it fully satisfies the requirements established in the beginning phase, the product has been tested in its final configuration. The validation test is essential to make sure that the setup of the application corresponds to the needs stated. For instance, the national ID must contain 16 digits, and the email address must begin with @ and conclude with yahoo.com or gmail.com. The application was thoroughly tested, and it was during this process that we discovered that the operations' progress matched the functional requirements.

Software and Hardware compatibility requirements

- ✓ A web browser (Mozilla Firefox, Google Chrome, Safari, etc.)
- ✓ Operating system (Windows XP, 7, 8, Linux, macOS)
- ✓ Microprocessor intel 2 (minimum)
- ✓ Ram of 512 Megabytes (minimum)
- ✓ Hard disk of at least 1 Gigabyte of free space
- ✓ Intel Core i3 processor (minimum)

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

Conclusion

The primarily goal of this project is to create and implement a Web application that will allow users to search for and purchase any plant they want from any plant nursery in Rwanda.

To successfully achieve the goal, as indicated in the graphic from the previous chapter, a realistic solution was applied. A variety of techniques, including observation, interviewing, and documenting, were utilized to identify the issues with the current system.

Following the identification of the issues within our purview, UML analysis was conducted in order to determine the best course of action for creating a new system employing programming language. Various tests were conducted to see whether the developed system resolves the issues of the previous system, and we discovered that the findings were favorable.

Once completely established, this project should enable users to readily acquire plants for growing. This system will offer a user interface that is well built for simple interaction and the sales-related data will be kept secure and readily available.

It will also provide a remedy for plant nurseries as It will enable the nurseries to have an online presence and continue to serve their customers. This program increases efficiency and decreases the quantity of human data entry.

In conclusion, I can state with confidence that the Plant Nursery Management System has been fully established and implemented in accordance with the prospects described in the earlier chapters.

Recommendations

I'd like to advise people and plant nurseries to start using this system in place of the current method if they need to conduct the buying and selling of plants. They should research the benefits of this new system and learn how it works and what it does so that it can assist them in carrying out their tasks effectively and efficiently.

Future updates to the program will feature additional payment options and integration of different languages.

To conclude this effort, I would want to encourage anyone who is interested to add other features to enhance my work.

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APPENDICES

CURRICULUM VITAE

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E-mail: umutesinad3@gmail.com
Date of birth: 29th June 2000
Nationality: Rwandese
Sex: Female
Marital status: Single

PERSONALITY

A committed, hardworking, and motivated full-stack developer and software engineer. I have developed creative thinking, critical thinking, and problem-solving skills after being exposed to different problems that required different programming languages. I'm always looking for a challenge to tackle.

ACADEMIC QUALIFICATION

2019 - Present: Adventist University of Central Africa
2013-2018: Highschool Diploma

PROGRAMMING SKILLS

- NodeJs
- ReactJs
- Java
- C programming
- Django Python
- HTML&CSS
- Flask

LANGUAGES

- Fluent in Kinyarwanda
- Fluent in English
- Fluent in French

OTHER SKILLS

- Computer literate: Windows applications and Microsoft skills.
- Communication skills

INTERESTS

- Meeting friends, listening music and watching movies
- Learning More in Programming

CERTIFICATION

- Microsoft Office Specialist Badge: Microsoft Office Specialist word 2013
- TestDome Gold Certificate: SQL
- TestDome Silver Certificate: MYSQL and SQL

I certify that the information provided above in the curriculum vitae is accurate to the best of my knowledge and belief.

UMUTESI Nadine