

CHUKA UNIVERSITY



FACULTY OF SCIENCE, ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE & ICT

ACSC 484: SOFTWARE PROJECT 2

SMART LEASING AND RENTING OF FARM MACHINERY.

BY:

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UNDER SUPERVISION OF:

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DATE OF SUBMISSION: 12<sup>th</sup> October 2020

## DECLARATION

This dissertation is my original work and has not been presented for degree award in any University.

Signature\_\_\_\_\_ Date\_\_\_\_\_

Victorine Jeptoo Kipruto

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This dissertation has been submitted for examination with our approval as University supervisors.

Signature\_\_\_\_\_ Date\_\_\_\_\_

Mr. Osero

Department of Computer Science.

## **DEDICATION**

To my parents who taught me that success comes from fear of God and hard work and also, they have laid a good foundation in my education

To my siblings, Cornelius, Dairus, and Lawi, for their continuous support and encouragement, thank you so much

Finally, to Mr. Osero (project supervisor) and Madam Gakii (project coordinator) for their guidance all through.

## **ACKNOWLEDGMENT**

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Another gratitude goes to my course mates, Kyalo, Philip, and others thank you for always guiding me whenever we have a discussion on the same. Be favoured in your end offers.

I am much grateful to Chuka University fraternity inclusive of the department staff, for their personal attention and time to time help and care, without which it would not have been possible in completing my project. This opportunity, I perceive it as a great milestone for my career. I'll strive to use the skills gained alongside knowledge acquired in the best way possible. I will still continue to work on their improvement in order for me to attain desired career objectives. God bless you All.

Finally, my sincere gratitude goes to Almighty God for his grace and gift of good health.

## **ABSTRACT**

In Kenya, farming practices are essential and the highest contributor to GDB. This brings us to the process of land preparation whereby farmers really waste a lot of time looking for machinery to work on their farm. This is because there is no reliable platform where they can get machinery. Furthermore, there are those who own machinery and they would like to lease it at a cost.

This document gives the solution to these problems with the implementation of Smart Leasing and Renting of Farm Machinery. It describes the requirement and how the system looks like. This gives the full functioning of the project and testing process.

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## **LIST OF ABBREVIATIONS**

LAN	Local Area Network
UML	Unified Modelling Language
ERD	Entity Relationship Diagram
DFD	Data Flow Diagram
RAM	Random Access Memory
PHP	Hypertext Pre-processor
CSS	Cascading Style Sheet
HTTP	Hypertext Transfer protocol
GB	Gigabyte
HDD	Hard Disk
PC	Personal Computer
MySQL	My Structured Query Language
PK	Primary Key
FK	Foreign Key
SLRFM	Smart Leasing and Renting of Farm Machinery
GDP	Gross Domestic Product

# **CHAPTER ONE: INTRODUCTION**

## **1.0 Introduction**

Information Communication Technology is a rapidly growing field touching on all aspects of our lives. It has thus, through its strength, improved our approach to problem solutions and lead to high quality, cost-effective solutions and accurate data keeping to our computable day to day problems.

Farming being the core thing in our day to day running of activities, it requires attention and an effective system that is secure, reliable and easy to use. This ensures that every farmer need is satisfied with the continuous supply of farm product.

The project I propose, Smart Leasing and Hiring of Farm Machinery (SLHM), deals with one major part in agriculture of land preparation, planting, and harvesting. The system allows farmers to look for reliable farm machinery to hire. It reduces the time farmers take to look for the machinery.

Agriculture being the main source of income for most people in rural areas and among the source of revenue to the government of Kenya, it contributes highly to the achievement of vision 2030. This triggers a concern to make every aspect of agriculture digital to make work easier.

## **1.1 Background of the study**

In Kenya, the leasing and renting of farm machinery is done manually by farmers traveling in search of someone who owns a better machine. Being hard for small scale farmers to buy their own machinery, makes it mandatory for them to hire machinery to work on their farms. The farmers that are able to own machinery are responsible for leasing this to their potential farmer.

An increase in the number of farmers owning farm machinery triggers the need to have a system that hirers can visit and find an affordable, reliable and efficient machine to work for them. This makes work easier for them and reduce the time frame in search of a better machine. On the side of owners, they will be able to advertise themselves to find a potential customer.

## **1.2 Problem statement**

Farmers waste a lot of time looking for better farm machinery since they do it manually. At the same time, the machinery owners lack a platform to air their machinery in the look of someone to lease the machinery to. This has contributed to the low production of farm produce to the country as the process of land preparation, generally becomes slow.

## **1.3 Proposed solution**

The adoption of a web-based system is an ideal model in solving this setback. The web-based system allows the farmers who lease the machinery to describe their assets fully for the hirers to hire it at their own choice. On the other hand, the hirers can get full detail of the machinery and book a session for that machinery.

### **1.3.1 Aims of the project**

- i) Help farmers find a reliable, efficient and affordable farm machinery to work in their farm
- ii) Help the machinery owners to advertise their machinery for potential hirers.
- iii) To reduce the time in search of the machinery to work on the farm.

### **1.3.2 Objectives**

- i) To create a platform where farm machinery owners can advertise their machinery to get a potential client.
- ii) To provide a platform for small scale farmers to choose reliable machinery and book a session.
- iii) To allow farm machinery owners to login and update their status and machinery status.

### **1.4 Significance of the project**

Farming is a major milestone in achieving vision 2030 in our country. Farming activities are one of the main sources of revenue for this country and the livelihood of rural areas. Farmers waste a lot of time during land preparation looking for reliable machinery to work for them. This is because farmers lack a support system that helps them find a reliable platform to get machinery. The smart hiring and leasing of land machinery ensures that farmers can lease and rent farm machinery at their comfort.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

Leasing and renting play an important role in farming activities, especially in a developing country like Kenya. The upcoming businesses need to plan on continuing this process of inter-farming leasing and renting of agricultural activities such as land, machinery and buildings (Shin, etc 2006). The cost of farm machinery is really high, hindering many farmers to own them. In addition, most farmers operate on small acres of land which makes it hard for them to buy land.

Most of the leasing in the agricultural sector deals with land leasing where most of the concentration is on land. There is a need to develop a machinery leasing and renting system too.

### **2.2 Leasing of land machinery system**

There are systems that exist to suit this but it does not effectively suit our scenario. The system that effectively works in Kenya is the land leasing system which only provides the platform that does not describe fully the machinery that the farmer might be interested in. The system also does not allow those who own some machinery to advertise their own machinery. This means that it relies on one person to deliver all those services, limiting the booking choice.

This system does not show the status of the machine if its actively working or if it is already booked. It does not provide the geographical location of the machinery so that the farmer can effectively find the machine without having to contact anyone.

The Smart Renting and Leasing of machinery tries to solve this by providing a system that allows machinery owners to advertise their machines with their position for easy access.

### **2.3 Land machinery ownership**

The cost of buying land machinery is very high and furthermore, it is not suitable for small-scale farmers (Singh, 2018). Farm machinery is not only expensive to buy but also much expensive to maintain. This is the reason why most farmers cannot dare to buy them and hence prefer to hire. This triggers the need for a system that allows farmers to look for machinery and book a session at their own comfort.

## **CHAPTER THREE: METHODOLOGY**

### **3.1. Data collection**

A comprehensive research was conducted to understand various systems being used in booking and airing of machinery. The study helped me to understand the current systems being used. Also, study of secondary data from various external sources such as the internet, brochures, school reports and credible publications. The following shows methods used to collect the information: -

#### **3.1.1 interviews**

A well-structured interview was conducted in the county of UasinGishu in order to get information on what they use to air their machinery and how farmers are able to find the machinery to work for them.

#### **3.1.2 Observations**

Observation is a method which equips the researcher with first hand data on programs, processes and behaviour under investigation. By directly observing operations and activities, I have been in a position to develop an individual perspective and understand well the context in which the project operates. This method will give me an opportunity to learn about the challenges of the farmers undergo during land preparation

### **3.2 System Methodology**

The proposed system (Smart Leasing and Renting of Farm Machinery) is developed using the following stated development methodology:

#### **3.2.1 System type**

This system is a web-based system. This is efficient as it is platform independence and portable. Furthermore, there are no software installation services required for it to work on the client-side. The web browser is all that is needed in the client machine for the client to enjoy the services at their comfort zone.

#### **3.2.2 Programming languages and technologies used.**

The system is developed using PHP programming language for backend logical development and database query and manipulation. In addition, HTML, CSS and a bit of JavaScript is applied in frontend development.

#### **3.2.3 Frameworks used**

Laravel PHP framework is used to validate all this process. It's a reliable framework for developing both small large-scale websites and web-based systems.

#### **3.2.4 IDE used**

Visual studio code, community edition IDE is used to work on this project. This is because it can easily be integrated with the Laravel PHP framework.

### **3.5 Software development process model adopted**

In practice, most systems are developed by in-cooperating elements from several models, the primary development process used in this project is Waterfall Model.

This model is ideal for the project due to its approach to the software development process, which involves the following steps:

- i) Requirements analysis and definition
- ii) System and software design
- iii) Implementation and unit testing
- iv) Integration and system testing
- v) Operation and maintenance

## **CHAPTER FOUR: SYSTEM ANALYSIS AND REQUIREMENTS DEFINITION**

### **4.1 Introduction**

This part contains the overall overview and description of the smart leasing and renting of machinery that will ease the farm preparation processes. In addition to that, it includes the purpose of this document.

### **4.2 Purpose**

The purpose of this chapter is to describe the requirements in detail for the Smart Leasing and Renting of Farm Machinery software. It shows the purpose and complete declaration for the development of the system. It also explains system interface, constraints, and interaction with other external systems.

### **4.3 Scope**

Smart Leasing and Renting of Farm Machinery is a web-based system that is intended to be primarily used by UasinGishu county, Kenyan farmers on both large scale and small scale to facilitate machinery to work on their farms by hiring them. The activities that go on include looking for reliable machinery and booking that machinery. The platform will allow the machinery owners to air their machinery on their own. The system is to be delivered to the agricultural department for installation.

From the system, machinery owners can update the machine details and their own detail, that is if the machine is working well. On the other hand, the hirers and leasers can hire a get the overall details of machinery and its status and book for machinery, whereby, the machinery status can change to book.

## **4.4 Current System Description**

### **4.4.1 Tinga rentals**

The system that's is functioning and running online is the 'Tinga rentals' which is based on one company that has its own tractors without including any third party. It does not give a third-party opportunity to air their own machinery. This is not suitable for anyone in the society who would like to get hirers for the machinery they own. The system also lacks a platform where machinery hirers can register and book a machinery on their own.

### **4.5 Overview**

#### **4.5.1 Overall description**

This gives an overview of the whole system. The system is explained in its context, thus showing how it works and introduces the basic functionality of it. It also describes what type of users that uses the system and what functionalities that is available for each set of unique user/users. Lastly, the constraints and assumptions for the system is presented.



#### **4.5.2 General system description**

The Smart Leasing and Renting of Machinery is a web-based system with logins and property descriptions. It has the following view:

- a) Home page view
- b) Sign-up view
- c) Machinery listing
- d) Machinery posting view
- e) Booking view
- f) Login view
- g) Machinery owner's dashboard

Since this is a data-centric system it uses MySQL database to store data. All the views access the database but in slightly different ways. Only the developer has a privilege to access the database. However, the machinery owners can delete machinery and update the details at a web view. The hirers are only allowed to view and book the machinery without changing anything.

#### **4.6 System functions**

The system enables any machinery owner to air their machinery for the interest farmers to hire or lease them. The farmers, on the other hand, can be able to book machinery and state the size the machinery can work on their farm. The machinery posted will contain all the details including its status and availability

#### **4.7 User characteristics**

There are two distinct sets of users who access and interact with the system. These are:

- i) Machinery owners who would like to lease and hire out the machinery.
- ii) The customers who would like to hire the machinery at a cost.

The machinery owners can access the system in the following ways:

- i. Register into the system
- ii. Log in into the system if already registered, if not registered the system will not allow him or her to do anything.
- iii. Update the details and post a machinery

The customers who would like to hire the machinery at a cost have the privilege of:

- i. Log in into the system if already register, if not registered, he or she will have to register
- ii. View the available machinery
- iii. Book for machinery to work on their land or produce
- iv. Indicate the acers of land

#### **4.8 Constraints, Assumptions and dependencies**

##### **4.8.1 Constraints**

Since the application is web-based and different users access it through different devices such as phones and PCs, and also via several different browser families, the user interface might be

different for each user, dictated by the medium through which individual users access the system. This constraint may in the future be addressed in subsequent versions and releases by developing an application for both desktop and mobile users to customize the viewer experience and eliminate the possibility of unexpected, undesirable user experiences.

The internet connection is also a constraint for the system. Since the system is web-based the user is expected to be connected to the internet in order to be able to access it via the browsers. The system is also constrained by the capacity of the database. Since the data is accessed by multiple users, it may be forced to queue incoming requests and thus increase the time it takes to fetch data.

#### **4.8.2 Assumptions and dependencies**

The system assumes that all the users have access to internet connection and also have browsers installed on the specific devices they use to connect to the system. In addition, the system assumes that the machinery owners will be changing their dashboard frequently

#### **4.9 Specific requirements**

This section contains all of the functional and non-functional/quality requirements of the system. It gives a detailed description of the system and all its features.

##### **4.9.1 External interface requirements**

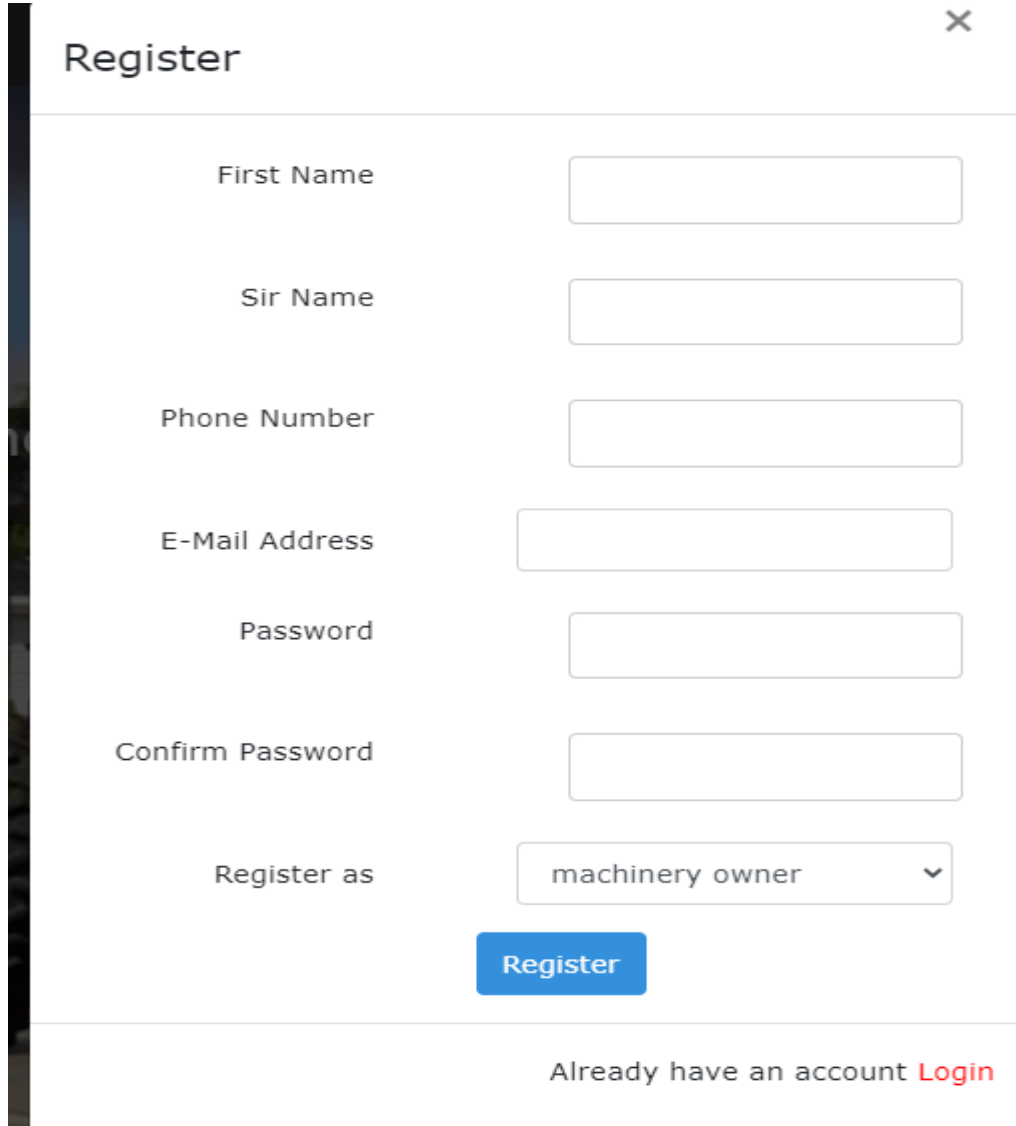
This section provides a detailed description of all inputs into and outputs from the system. It gives a detailed description of the hardware/software and communication interfaces and provides basic prototypes of the user interface. External interface includes the following -:

##### **i) User interfaces**

Both users log in to the system whenever they click on a hyperlink which directs them to the Smart Renting and Leasing of farm machinery which will redirect them directly to the homepage. From there they will click on login button which will log in as either machinery owner or as a hirer with the following credentials if already registered:

Email address=email as per database  
Password=password

If not registered the user will click on the register button to register as either machinery owner or as a hirer or leaser as follows:

The image shows a web registration form titled "Register" with a close button (X) in the top right corner. The form contains several input fields: "First Name", "Sir Name", "Phone Number", "E-Mail Address", "Password", and "Confirm Password". Below these is a dropdown menu labeled "Register as" with "machinery owner" selected. A blue "Register" button is positioned below the dropdown. At the bottom of the form, there is a link that says "Already have an account Login".

Register

First Name

Sir Name

Phone Number

E-Mail Address

Password

Confirm Password

Register as

machinery owner

Register

Already have an account [Login](#)

**Figure 1: Registration page**

The assumption is that the system accepts all the genuinely registered users with a genuine purpose to either hire or air machinery.

After a successful login by the users, each of them will have a privilege according to the type of user. If the user is a machinery owner, they will be able to add more machinery or update the machinery they own only.

## ii) **Hardware interfaces**

Since the system has no designated hardware requirements, it does not have any direct hardware interface. The hardware connection to the physical database is handled by the underlying operating system

### **iii) Software interface**

The system communicates with the database to verify that genuine users have log in to the system. This communication between the database and the web portal consists of operations concerning both reading and modifying the data.

### **iv) Communication interfaces**

The communication between the different parts of the system is important since they depend on each other. But how the communication is achieved is not important to the system because this is handled by the underlying operating system.

## **4.9.2 Functional requirements**

This describes the components of the system. That is the function of the system which includes outputs, behaviour, and inputs.

### ***User 1: machinery owners***

#### **Machinery owner's registration**

The machinery owners are required to register in order for their details to be captured fully. This ensures that the details are captured to facilitate genuine log in by users.

#### **Machinery owner login**

When the user logs in by entering the system link into a web browser, the user should be able to successfully login provided the credentials entered are genuine machinery owner as in the database.

This is useful in order to verify that genuine users who own machinery are logged into the system

#### **Retrieving forgotten password**

Given the user is a genuine user, they should be able to retrieve his or her password through the email. This enables users to retrieve their password whenever they lost them.

#### **Post of machinery and details**

After a successful login of a machinery owner, he or she can be able to post a machinery, update details or delete it. It enables machinery owners to be in control of the system.

#### **Logout**

A logout button to log the user out of the system. This enhances system security by ending a user session once he or she is done using the system. This is especially useful in case a user logs on to the system using a public/shared device.

## *User class 2 – Machinery hirers*

### **Hirer registration**

For the hirers to log in they need to register first so as the system can capture their personal details for genuine **Hirer login**

when a hirer logs in by entering the system link into a browser, the user should be able to successfully login provided the credentials entered are genuine. In order to ascertain that the user is a genuine hirer.

### **Retrieve password**

Given the user is a genuine user, they should be able to retrieve his/her password by e-mail. It gives users an opportunity to retrieve his/her password.

### **Machinery booking**

After a successful login, the user can be able to book the machinery and state the time period the machine will work for him or her and also the location. It allows the hirers to book for machinery on their own.

## **4.9.3 Non-functional Requirements**

The requirements in this section provide a detailed specification of the user interaction with the system and measurements placed on the system performance. It includes attributes of the system, which include security, performance, scalability, usability, performance, and reliability.

### **Response time**

The response time of the system on features such as loading a page during booking and response during registration functionalities. It improves response time to facilitate the user experience when interacting with the system.

### **Design Constraints**

This entails design constraints on the system caused by the hardware. Hardware used must be of high quality and reliable, that is with minimal breakages, to ensure continuous operation.

### **Hard drive space**

This is the hard drive space that the system will require in order to operate. This ensures that the system data are stored sufficiently and there is space for data movement

### **System memory usage.**

The memory space used by the system when running. The memory should always be enough to avoid a system crash.

**System software attributes**

The requirement in this section specifies the required reliability, availability, security and maintainability of the system.

**Reliability**

System reliability in airing the machinery and facilitating the booking process without any failer. This ensures that the system users are able to get the services easily and faster

**Availability**

Smart Leasing and Renting of Machinery should always be there whenever a machinery owner needs to air the machinery and updates its details. Furthermore, it should also be available for hires to look for reliable machinery and book it within the system.

**Internet connection**

The users should be connected to the internet in order to use the system effectively. In addition, the system also should be connected to the internet in order for the application to communicate with the database.

**User account security**

Security of user accounts including passwords disclosure and being stored as a different character in the database. It keeps the user accounts secure, allowing only valid/approved users. This also enables the users to entrust the system with their details

**Maintainability**

The application is to extend. The code is written in a way that favours the implementation of new functions. In order for future functions to be implemented easily.

## **CHAPTER FIVE: SYSTEM DESIGN**

### **5.1 Introduction**

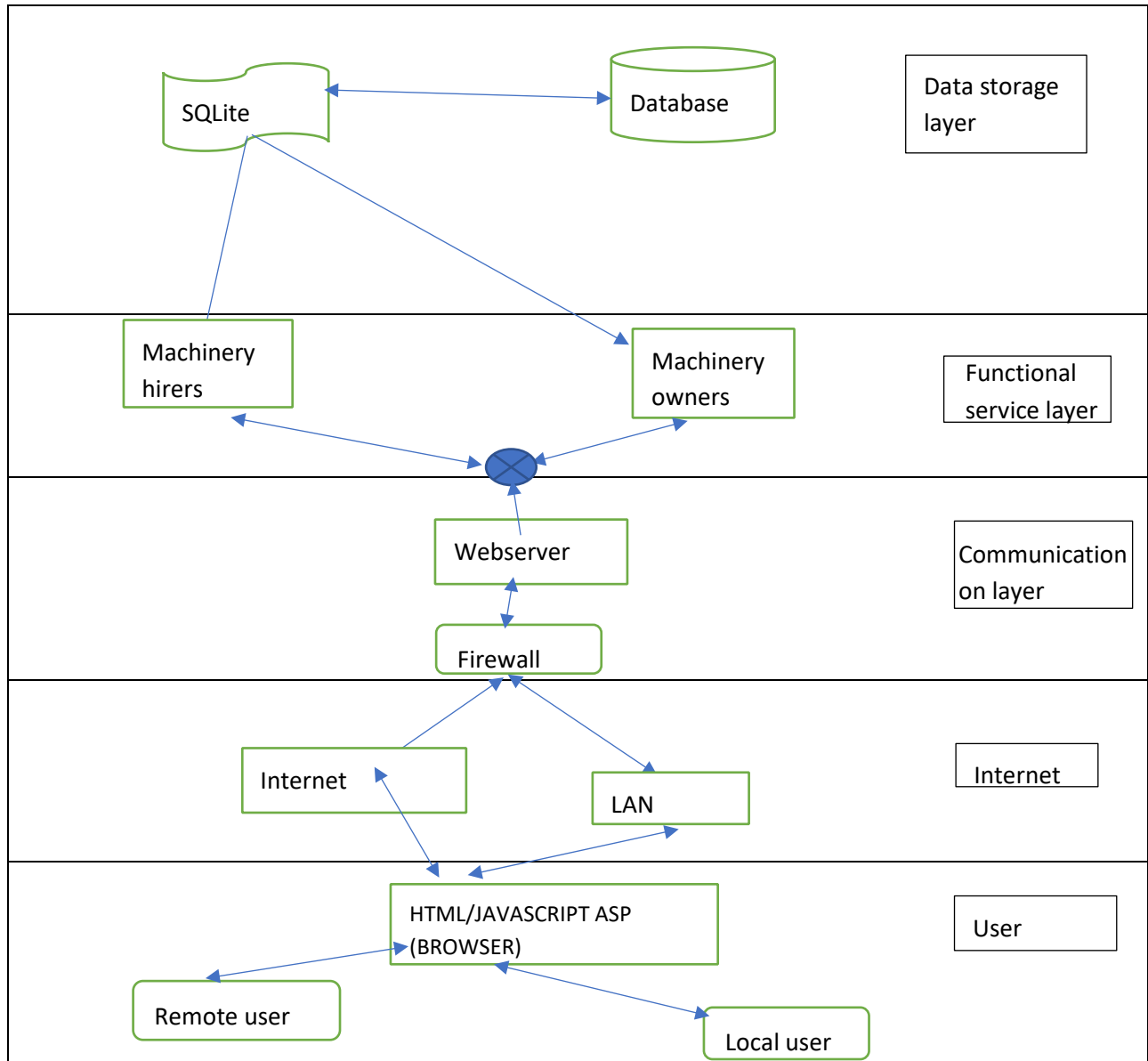
The purpose of this design specification is to present the system design at a level that can be directly traced to the specific system objective along with providing more detailed data, functional and behavioural requirements. This design verifies that the current design meets all of the explicit requirements contained in the system requirement specification document.

The objective is to provide an efficient, modular design that will reduce the complexity of the systems, facilitate change, and result in an easy implementation. This will be accomplished by designing a strongly cohesive system with minimal coupling. In addition, this document aims at providing an interface that is consistent and user-friendly, providing straightforward transitions through the various system functions.

It also gives the database tables with its content and how they relate with each other for easy data manipulation and retrieval. This includes the diagrams to fully illustrate the relation for effective understandability.

### **5.2 System Architecture Design**

Smart Leasing and Renting of Farm Machinery system is a client- server-based system, which contains the following layers: User interface, internet communication, functional service, and storage layers.



**Figure 2: Server architecture**

**Table 1**

Data transfers occur in both directions in the system. The user's input or data request is sent using the browser. This data then connects to the system either through the internet or the LAN. The data is passed through the firewall for purposes of security. In the functional layer user request/data input is channelled to the appropriate functional module in accordance with user login and account type. Through these modules, the user interacts with the database via the SQLite server.

### 5.3 Flow chats

This shows the flow charts of each user whenever they are logging into the system and after they are logged in.



### 5.3.1 Logins

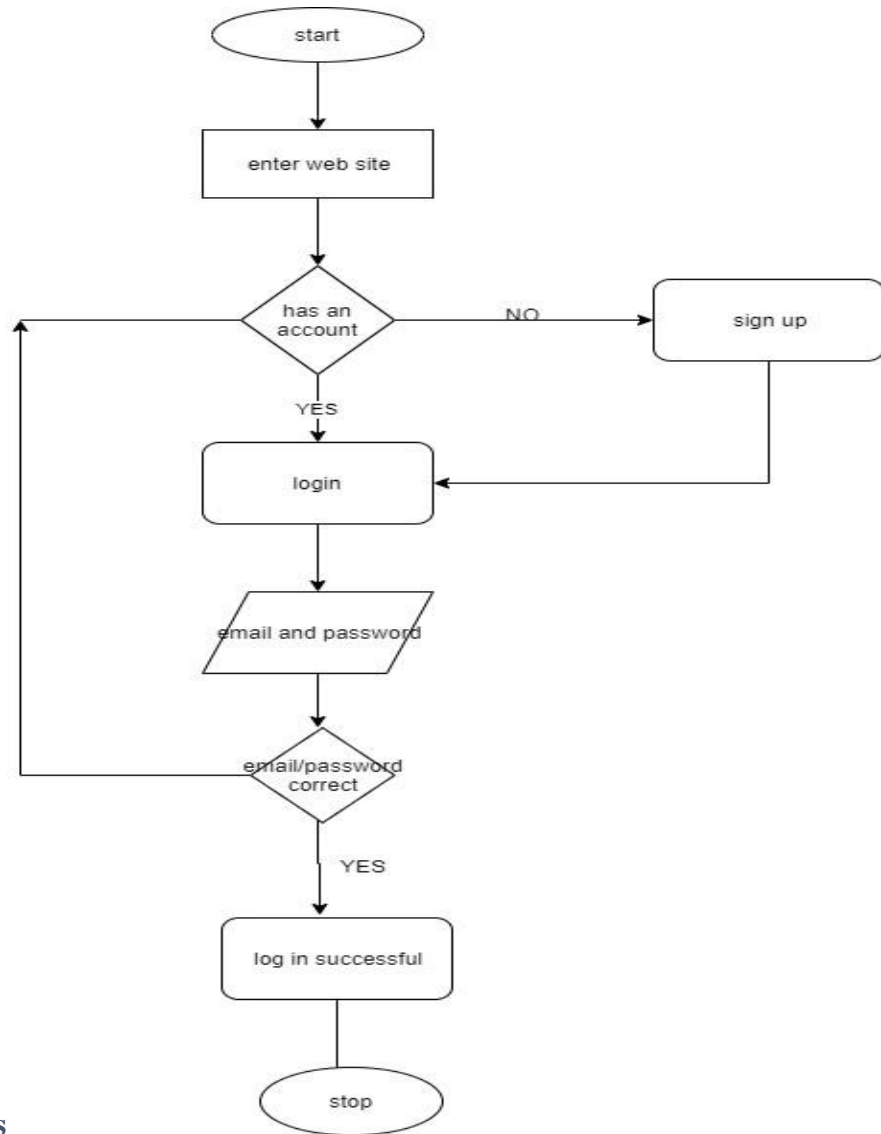


Figure 3: Login flow chats

### 5.3.2 Machinery posting

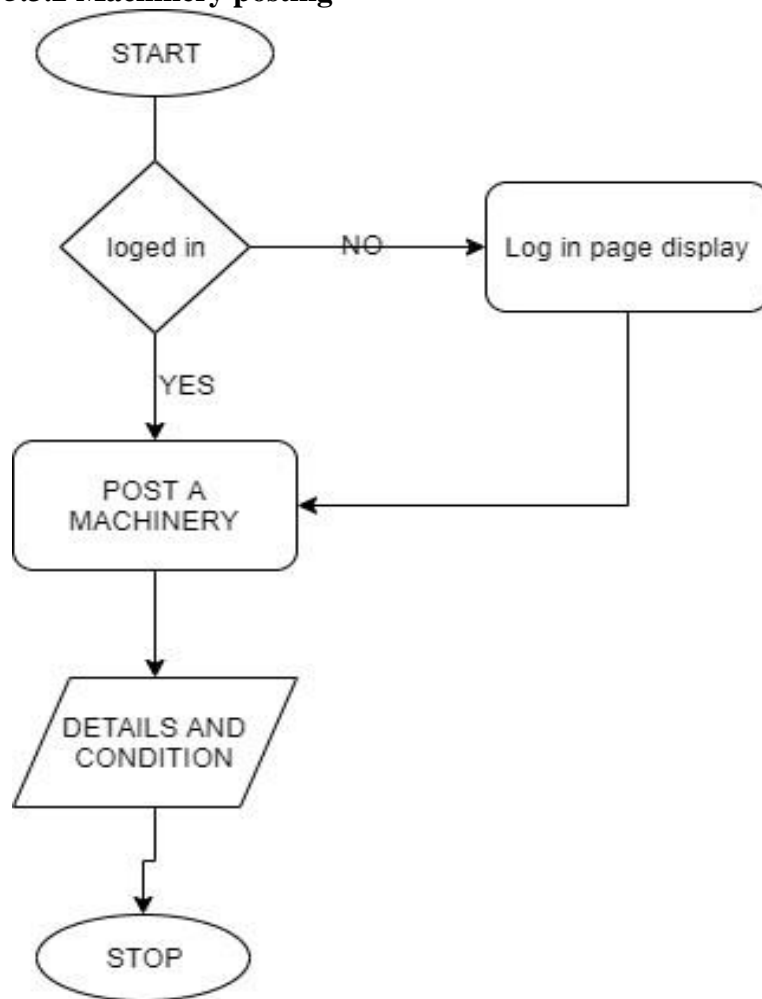
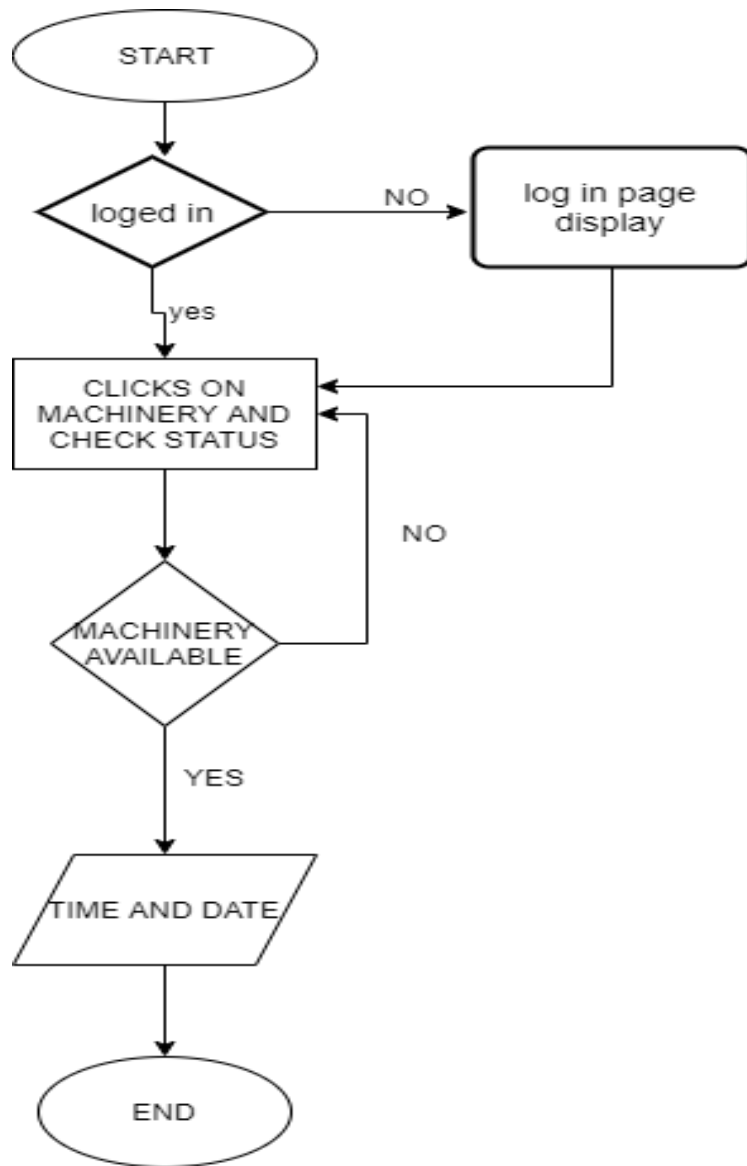


Figure 4: Machinery Post flow chats

### 5.3.3 Machinery booking

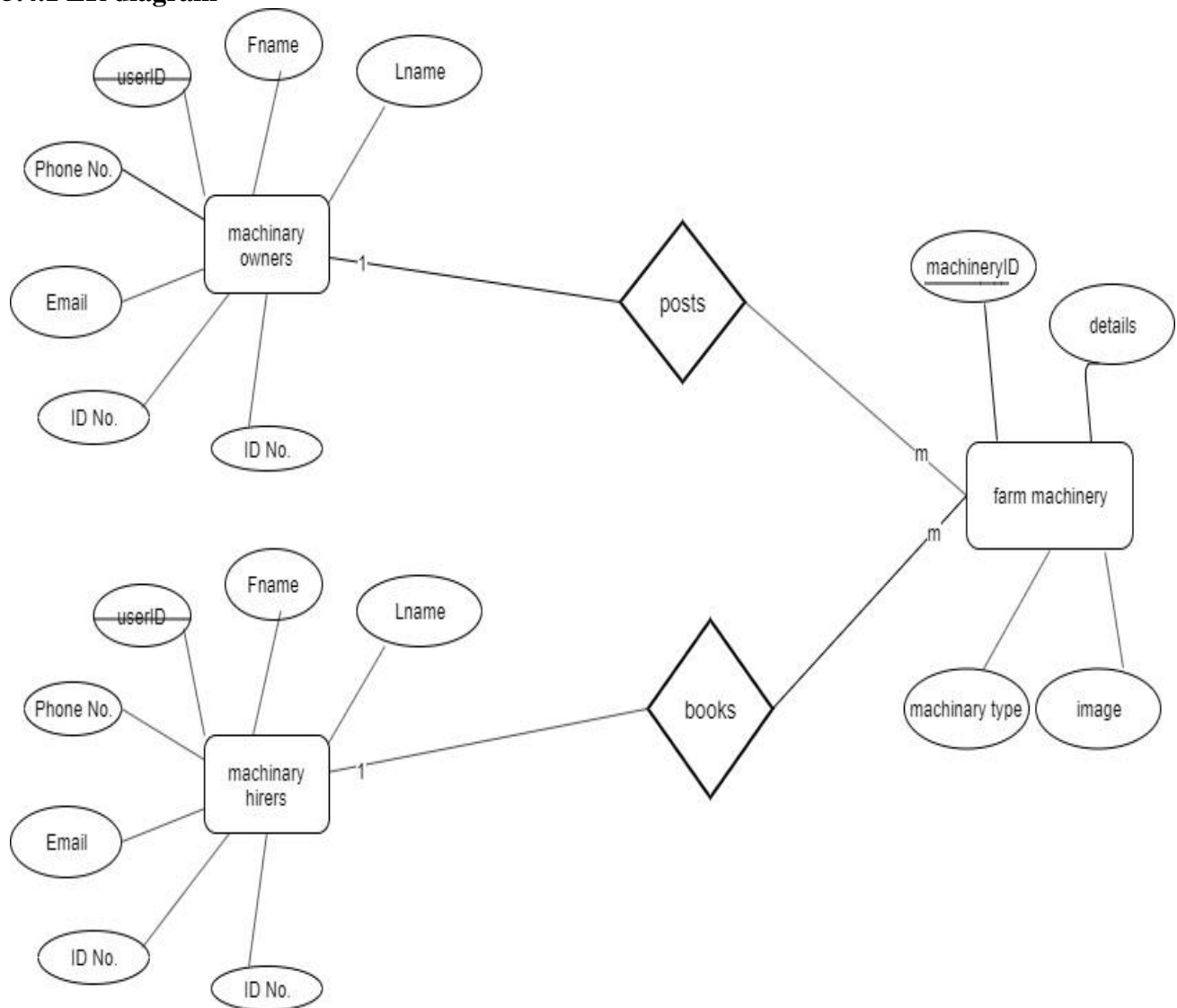


**Figure 5: machinery booking flowchart**

#### **5.4 Data design**

This shows the graphical representation of entities and their relationships that help in data organization in the database.

### 5.4.1 ER diagram



**Figure 6: ER Diagram**

### 5.4.2 Data Objects

Provided below is a summary of the various data objects that make up the Smart leasing and renting of the farm machinery system.

Included in the diagram are the attributes of each object and data type.

<div> <div></div> <div></div> <div>machinery password_resets</div> </div> <div> <div></div> <div>email : varchar(255)</div> <div>token : varchar(255)</div> <div>created_at : timestamp</div> </div>	<div> <div></div> <div></div> <div>machinery users</div> </div> <div> <div></div> <div>id : bigint(20) unsigned</div> <div>first_name : varchar(255)</div> <div>sir_name : varchar(255)</div> <div>phone_number : varchar(255)</div> <div>email : varchar(255)</div> <div>email_verified_at : timestamp</div> <div>password : varchar(255)</div> <div>user_type : varchar(255)</div> <div>remember_token : varchar(100)</div> <div>created_at : timestamp</div> <div>updated_at : timestamp</div> </div>	<div> <div></div> <div></div> <div>machinery migrations</div> </div> <div> <div></div> <div>id : int(10) unsigned</div> <div>migration : varchar(255)</div> <div>batch : int(11)</div> </div>
	<div> <div></div> <div></div> <div>machinery posts</div> </div> <div> <div></div> <div>id : bigint(20) unsigned</div> <div>email : varchar(254)</div> <div>user_id : varchar(254)</div> <div>equipment_type : varchar(254)</div> <div>sub_county : varchar(254)</div> <div>manufacturer : varchar(254)</div> <div>list_title : varchar(254)</div> <div>hour_cost : varchar(254)</div> <div>image : mediumtext</div> <div>created_at : timestamp</div> <div>updated_at : timestamp</div> </div>	<div> <div></div> <div></div> <div>machinery bookings</div> </div> <div> <div></div> <div>id : int(254)</div> <div>equipment_id : int(254)</div> <div>owner_id : int(7)</div> <div>owner_mail : varchar(254)</div> <div>email : varchar(254)</div> <div>status : varchar(254)</div> <div>acres : varchar(10)</div> <div>image : mediumtext</div> <div>created_at : timestamp</div> <div>updated_at : timestamp</div> </div>

Figure 7: data objects

## 5.5 System interface design

This part shows the interactive interfaces that the user interacts with the system directly. It gives an overview of the functional requirements in the system.

### 5.5.1 Graphical user interface design

This section shows the major graphic user interface of the Smart Leasing and Renting of Farm Machinery. The interface design is based on different user requirements.

Below is the graphical user interface the users will interact with **Landing page**

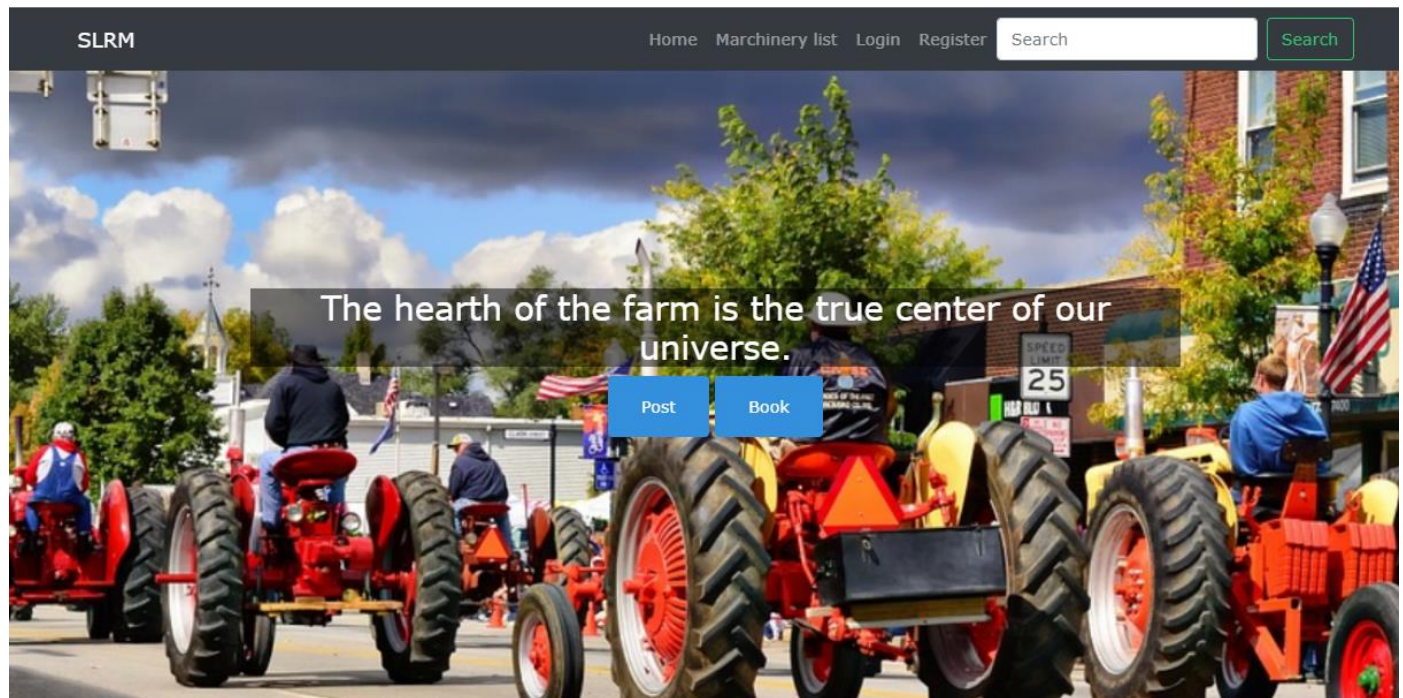


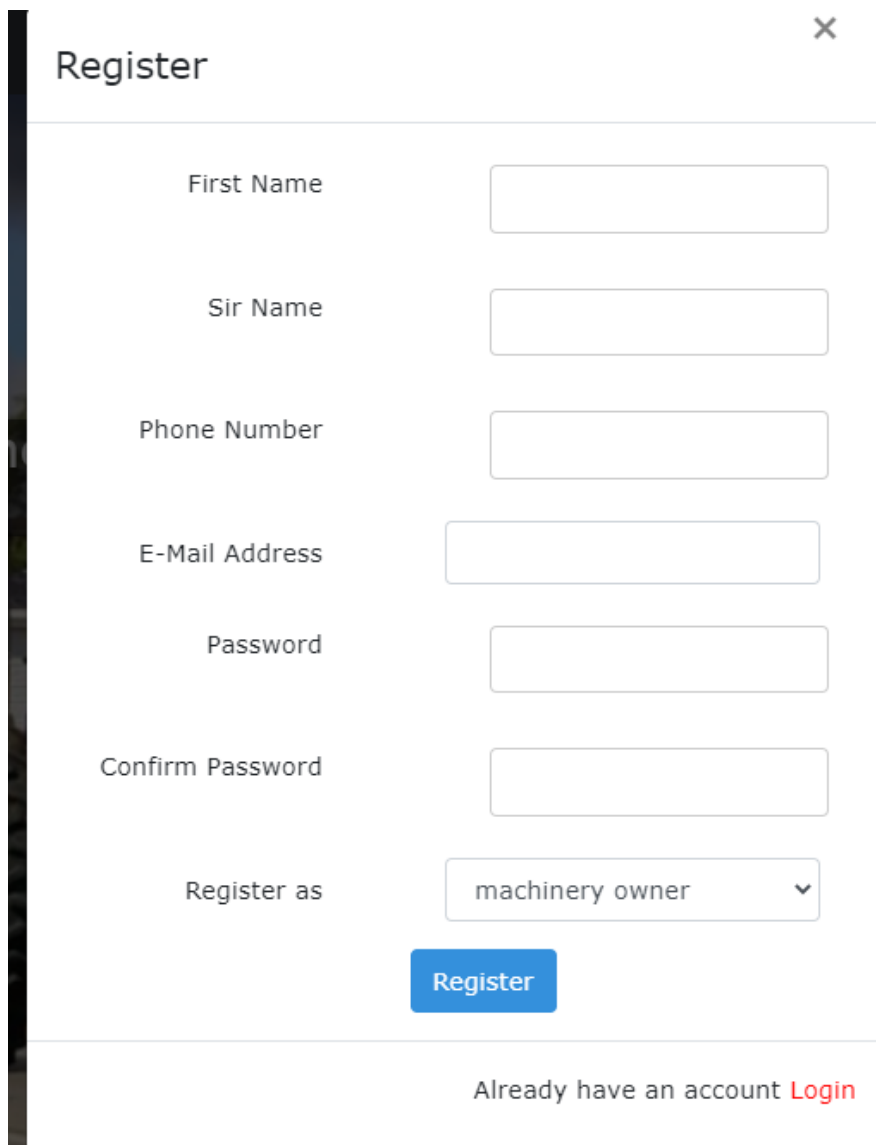
Figure 8:Landing Page

### Login screens

The image displays a login form within a window titled 'Login'. It features two input fields: 'E-Mail Address' with the value 'kiprutjeptoo@gmail.com' and a 'Password' field. Below these is a checkbox labeled 'Remember Me'. A blue 'Login' button is positioned below the checkbox. At the bottom of the form, there are two links: 'Forgot Your Password?' in blue and 'Register' in red. A close button (X) is located in the top right corner of the login window.

Figure 9: Login Screen

### Signing in (for the new users of the system)

A screenshot of a web application's registration screen. The form is titled "Register" with a close button (X) in the top right corner. It contains several input fields: "First Name", "Sir Name", "Phone Number", "E-Mail Address", "Password", and "Confirm Password". Below these is a dropdown menu labeled "Register as" with "machinery owner" selected. A blue "Register" button is positioned below the dropdown. At the bottom, there is a link that says "Already have an account Login".

Register

First Name

Sir Name

Phone Number

E-Mail Address

Password

Confirm Password

Register as

Register

Already have an account [Login](#)

**Figure 10: Register Screen**

### Figure 9: Signing in (for the new users of the system)

#### Post machinery details

This functionality works if only the user has logged into the system. If not, the system will direct them to a log in page before doing anything.

### Earn from your idle machinery today

Equipment type ▼

Equipment sub-county ▼

show case your equipment

Manufacturer

Equipment Manufacturer ▼

List title

Harrow

upload equipment image

Choose File

No file chosen

Price

cost per acres

ksh

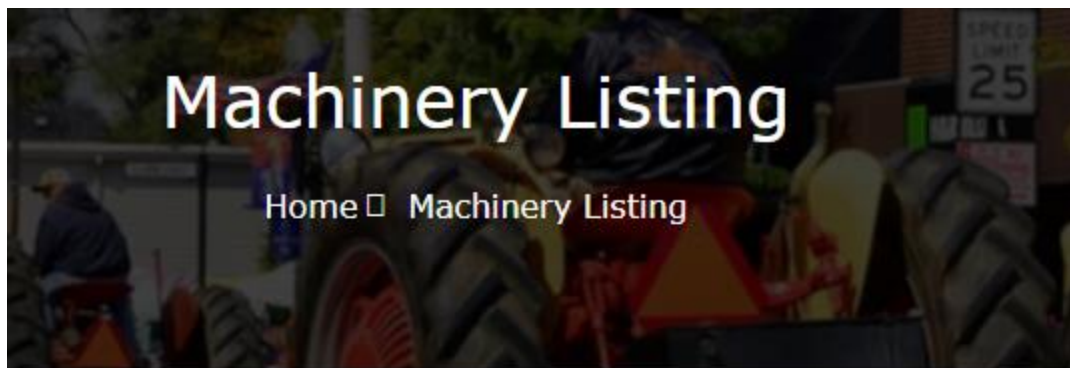
submit

**Figure 11: Posting machinery details**

### Booking machinery

A user must be logged in for them to book a machinery





Book Now

*Cost per acres*

600

*Acres of your land*

*Total Cost*

Book Now

**Figure 12: Booking a Machinery**

## Updating a machinery

If a machinery owner is log in, he or she is able to see the machinery he owns, update or delete it. They can also add machinery to the system.

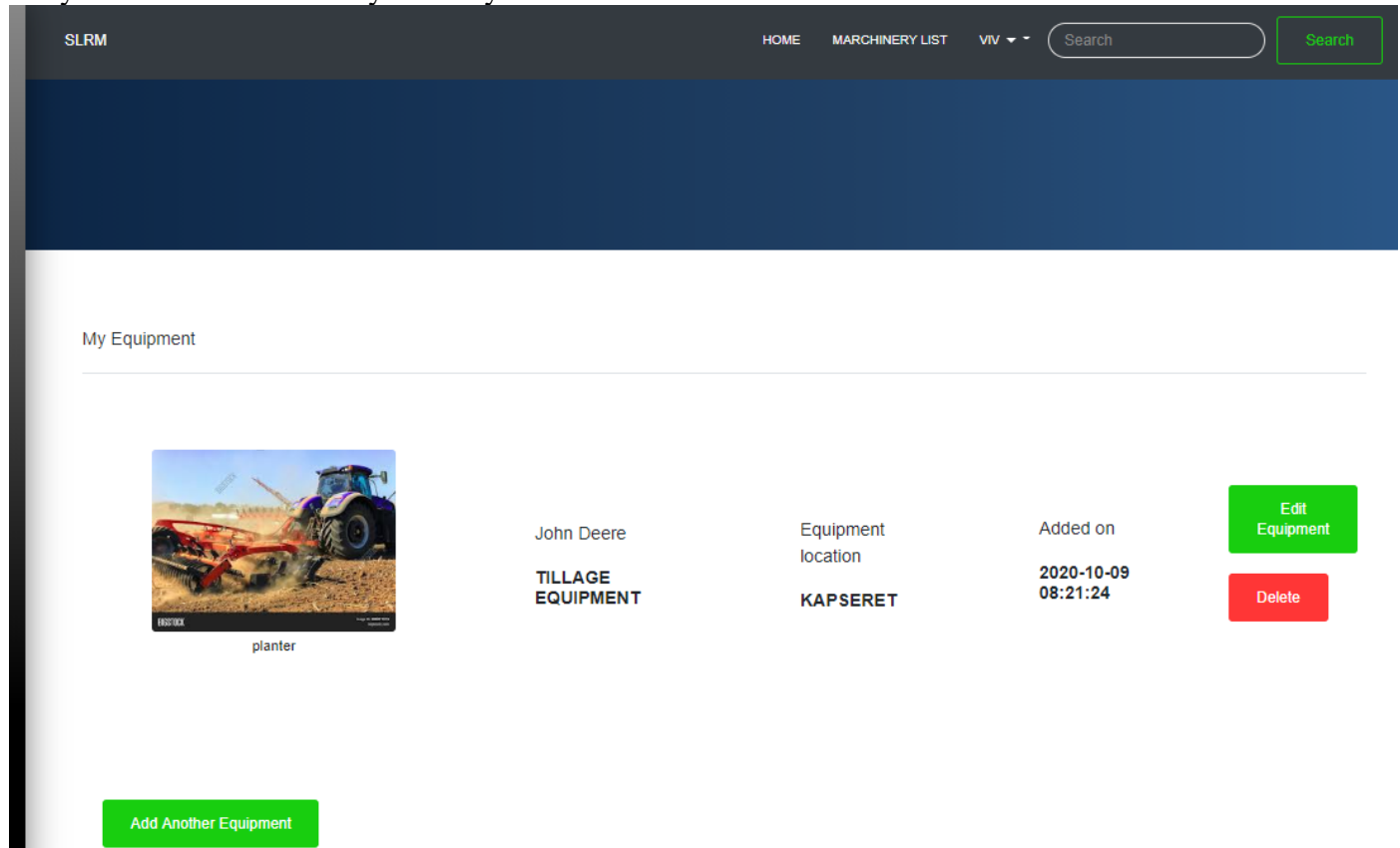
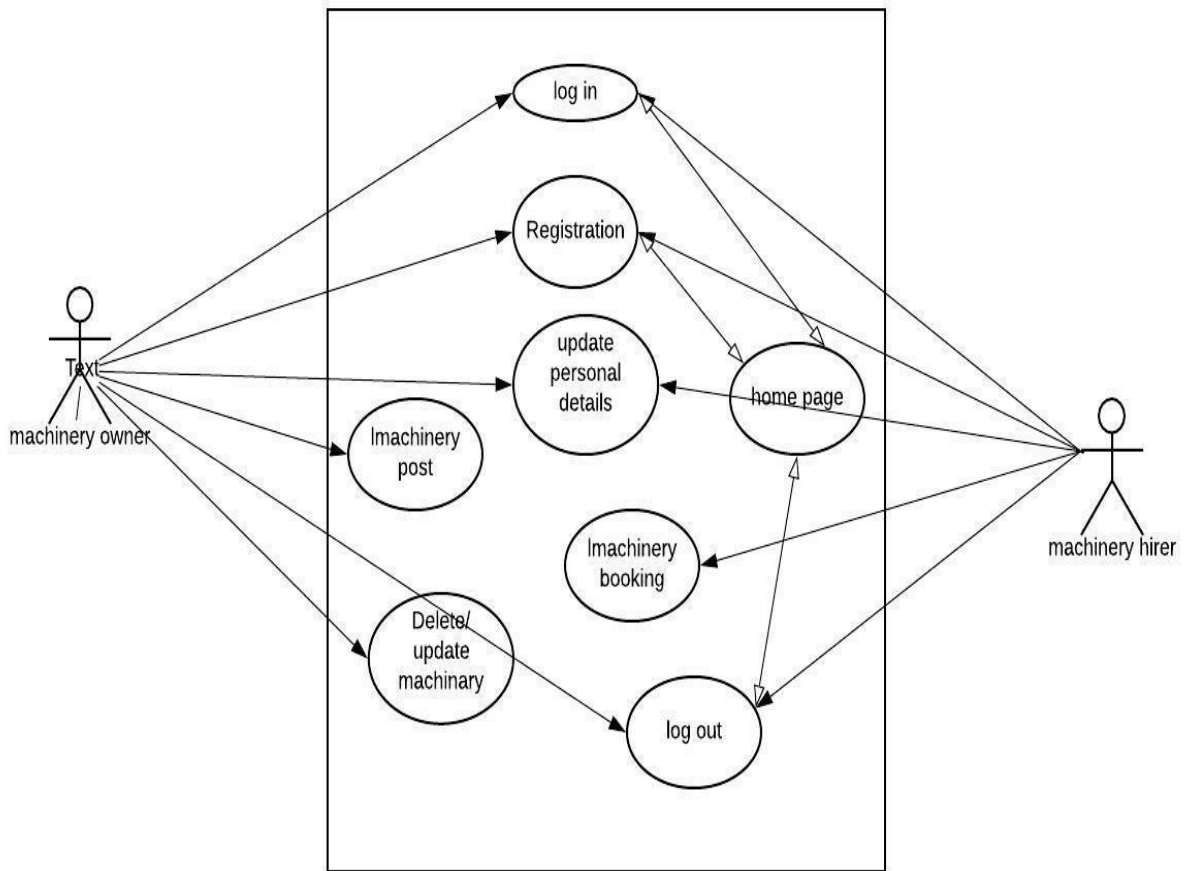


Figure 13: updating machinery

## 5.6 System use case

This shows how system users interact with the system in order to perform different activities.



**Figure 14: System Design**

### 5.7 Validation

Email validation. This is making sure that the email is in the correct format. That is, with @ after some characters.

Password validation. This is ensuring that the user knows the password they are using by allowing them to re-enter the password and it should match for them to continue.

Phone number validation to ensure that valid characters are entered by the user. It should start with 07 and should be exactly 10 characters long.

### 5.8 System security

System security is the core thing for the users to trust the usefulness of the system. Users must be able to entrust the system with their personal details. The security of the system will be ensured by: -

- Restricting users from entering less than 8 characters of passwords.
- Encrypting passwords in the database by making use of the hash function.

## CHAPTER 6: IMPLEMENTATION

Smart leasing and renting of farm machinery are a web based system that works systematically efficiently as per its objectives. This chapter deals with both the system interface and system code.

### 6.1 System Interface

At first, the system shows the machinery and different links that directs them to what they want to do in the system.



**Figure 15: Landing page**

However, the system shows only the common system links such as machinery listing. Users are first required to log into the system or register. The system has two users, machinery owners and machinery hires.

#### 6.1.2 Machinery owners.

Whenever users log into the system, they are redirected to their dashboard. The dashboard has three main functionalities, that is the profile editing, adding equipment, checking on bookings, editing the

equipment and deleting it

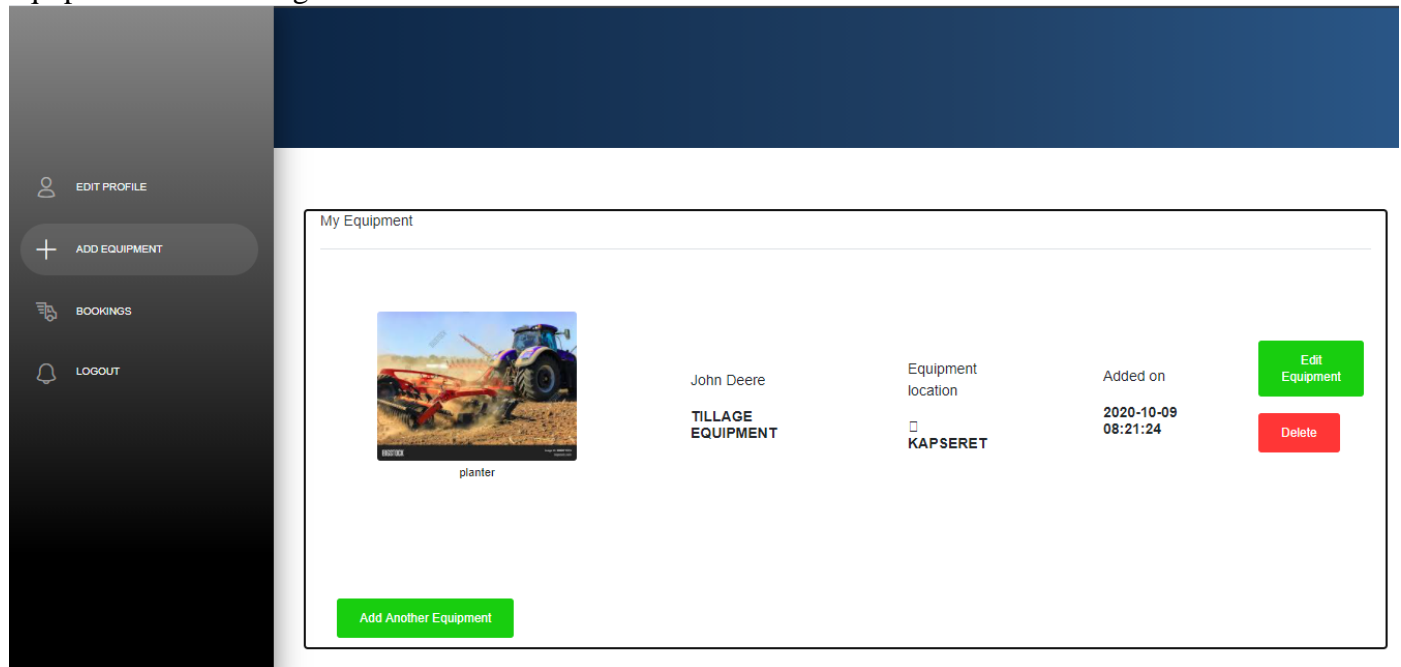


Figure 16: machinery owners' dashboard

### Editing of profile

Personal Details

First Name location <input type="text" value="viv"/>	Sir Name location <input type="text" value="iu"/>
Email location <input type="text" value="vv@gmail.com"/>	Phone No location <input type="text" value="1234578890"/>

[Save](#)

Change Password

Old Password* location <input type="text"/>	New Password* location <input type="text"/>
Confirm New Password* location <input type="text"/>	

[Update Password](#)

Figure 17: profile editing

## Add equipment

### Earn from your idle machinery today

Equipment type ▼

Equipment sub-county ▼

show case your equipment

Manufacturer  
Equipment Manufacturer ▼

List title  
Harrow

upload equipment image  
Choose File No file chosen

Price

cost per acres  
ksh

submit

Figure 18: Adding equipment

## Equipment up date

Tillage Equipment ▼

Kapseret ▼

show case your equipment

Manufacturer  
John Deere ▼

List title  
planter

Equipment image  
Choose image Browse



Price

cost per acres  
600

Update

Figure 19: equipment update

## Available bookings

My bookings			
	9 ACRES	Booked by □ VV@GMAIL.COM	Booked on 2020-10-09 11:52:17
	7 ACRES	Booked by □ JJ@GMAIL.COM	Booked on 2020-10-09 18:27:03

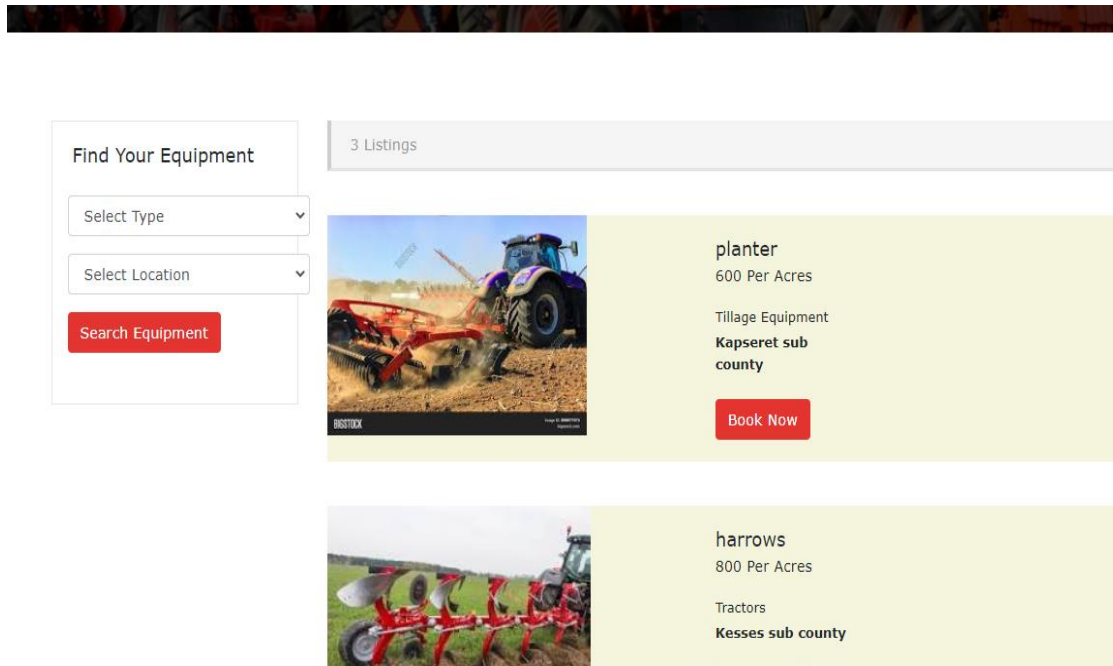
**Figure 20: owners booking**

### 6.1.2 machinery Hirers interfaces

Th users has a chance of booking the machinery available in the website. They are able to view and book the machinery giving the acres of their land. All users needs to log in before making any booking.

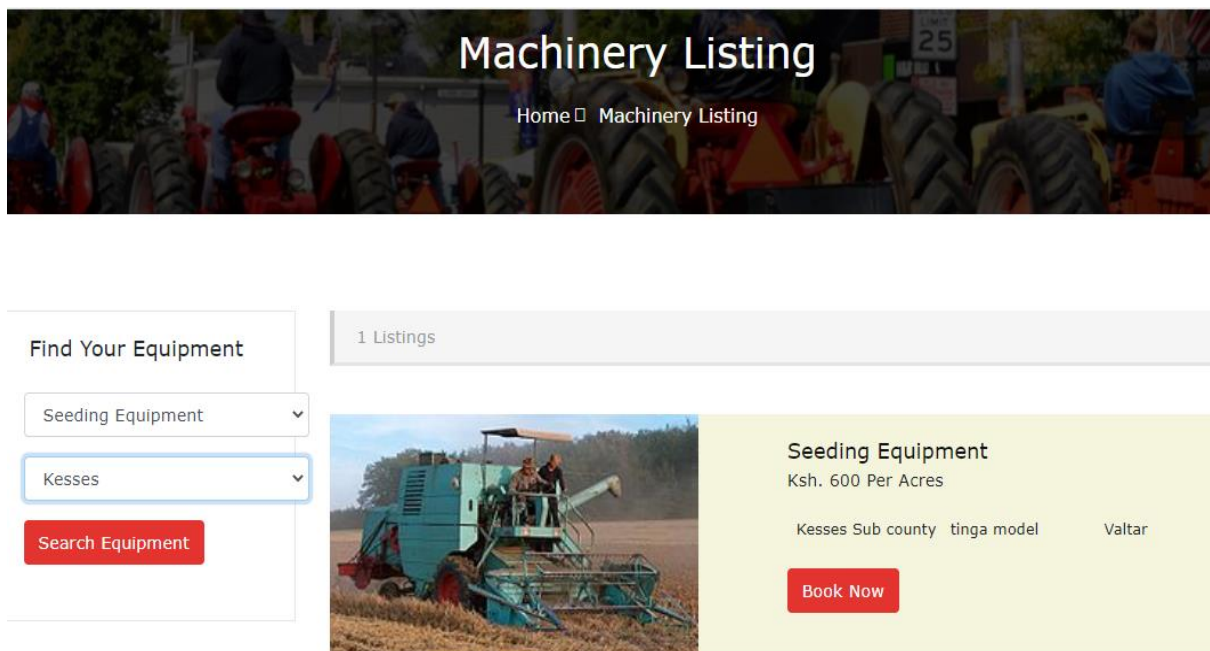
#### Machinery listing





**Figure 21: machinery listing**

**Machinery search**



**Figure 22: machinery search**

**Booking before logging in**





**Book Now**

*Cost per acres*

600

*Acres of your land*

*Total Cost*

•

**Log in for Book**

Figure 23: booking before logging in

After logging in



**Book Now**

*Cost per acres*

600

*Acres of your land*

9|

*Total Cost*

5400

**Book Now**

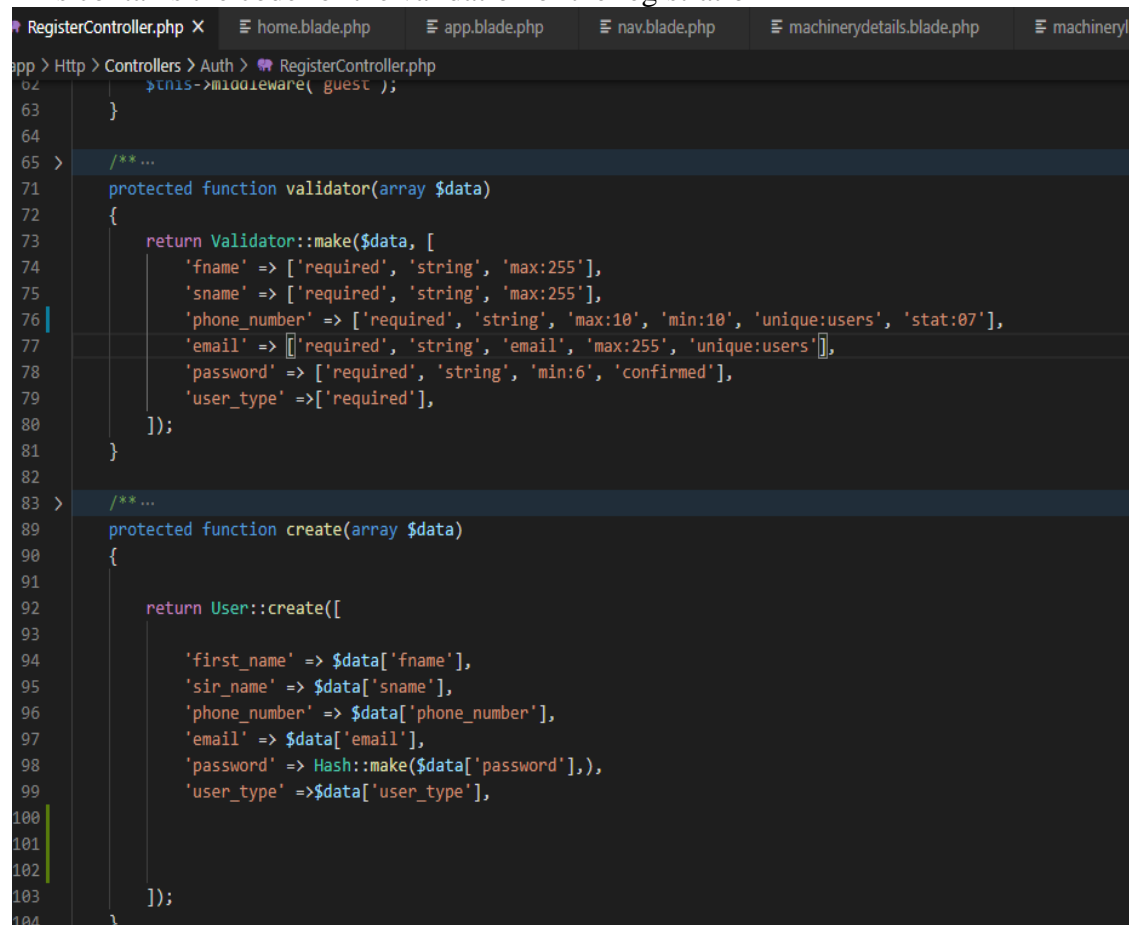
Figure 24: bookings after logging in

## 6.2 system code

This is the backend of the code that facilitate the transfer of data between the client side and server side

### Registration code

This contains the code for the validation of the registration

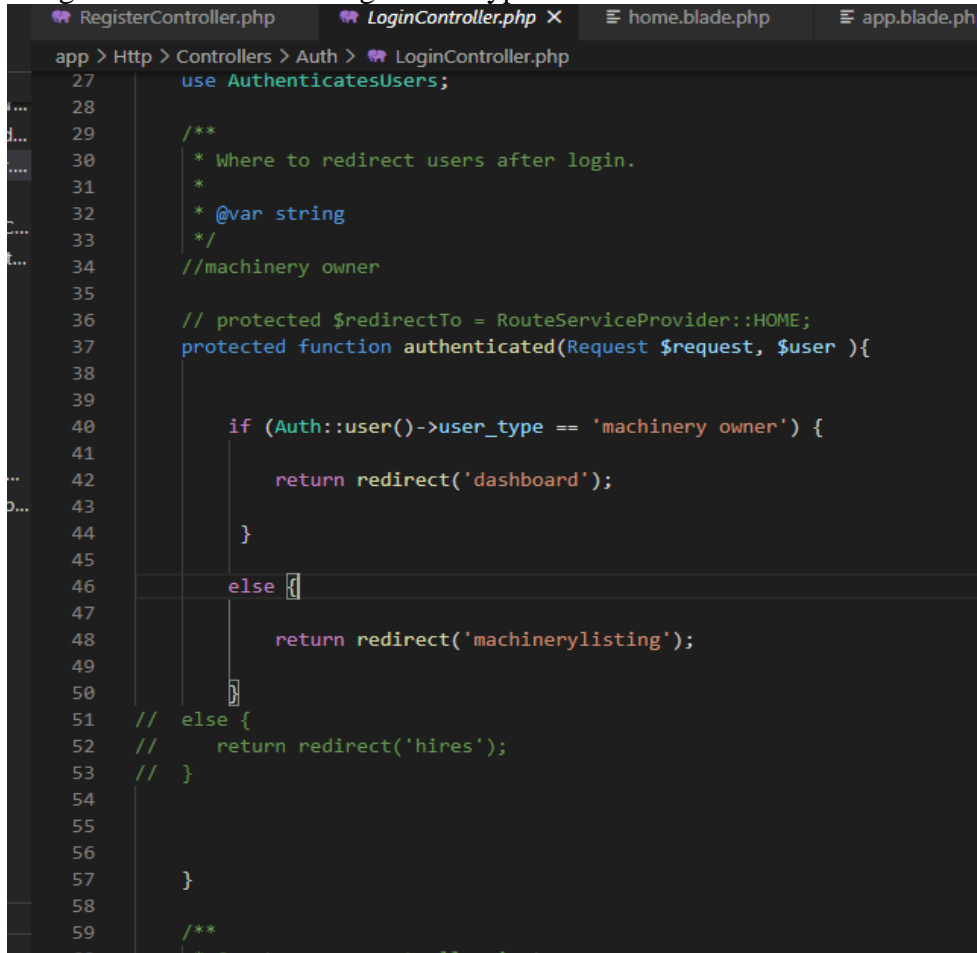


```
RegisterController.php X home.blade.php app.blade.php nav.blade.php machinerydetails.blade.php machineryfi
app > Http > Controllers > Auth > RegisterController.php
62     >this->middleware( 'guest' );
63     }
64
65 > /** ...
71     protected function validator(array $data)
72     {
73         return Validator::make($data, [
74             'fname' => ['required', 'string', 'max:255'],
75             'sname' => ['required', 'string', 'max:255'],
76             'phone_number' => ['required', 'string', 'max:10', 'min:10', 'unique:users', 'stat:07'],
77             'email' => ['required', 'string', 'email', 'max:255', 'unique:users'],
78             'password' => ['required', 'string', 'min:6', 'confirmed'],
79             'user_type' => ['required'],
80         ]);
81     }
82
83 > /** ...
89     protected function create(array $data)
90     {
91
92         return User::create([
93
94             'first_name' => $data['fname'],
95             'sir_name' => $data['sname'],
96             'phone_number' => $data['phone_number'],
97             'email' => $data['email'],
98             'password' => Hash::make($data['password'],),
99             'user_type' => $data['user_type'],
100
101
102         ]);
103     }
104 }
```

Figure 25: Register controller

## Login controller

It logs in the users according to user type.



```
27 use AuthenticatesUsers;
28
29 /**
30  * Where to redirect users after login.
31  *
32  * @var string
33  */
34 //machinery owner
35
36 // protected $redirectTo = RouteServiceProvider::HOME;
37 protected function authenticated(Request $request, $user ){
38
39
40     if (Auth::user()->user_type == 'machinery owner') {
41
42         return redirect('dashboard');
43     }
44
45     else {
46
47         return redirect('machinerylisting');
48     }
49
50 // else {
51 //     return redirect('hires');
52 // }
53
54
55
56
57 }
58
59 /**
```

Figure 26: login controller

## Dashboard control panel

It ensures that the information being displayed belong to the login user only

```

class DashboardController extends Controller
{
    public function equipment(){
        // $email = auth()->user()->email;

        // $posts = User::find($email);

        $user_id = auth()->user()->id;
        $posts = Post::where('user_id', $user_id)->get() ;

        return view ('owners.equipment', compact('posts'))->with(array('posts', $posts));
    }

    public function mybookings(){

        $user_id = auth()->user()->id;
        $bookings = Booking::where(['owner_id', $user_id])->get() ;

        return view ('owners.mybookings', compact('bookings'))->with(array('bookings', $bookings));
    }

    public function profile(){
        // $user = User::find(Auth::user()->id);
        $user = auth()->user()->id;
        $user = User::find($user);
        return view('owners.profile')->withUser($user);
    }

    public function dashboard(){

```

```

        return view ('owners.equipment', compact('posts'))->with(array('posts', $posts));
    }

    public function profiledata(Request $request ){
        $user_id = auth()->user()->id;
        $user = User::find($user_id);
        $user->first_name = $request->input('first_name');
        $user->sir_name = $request->input('sir_name');
        $user->phone_number = $request->input('phone_number');
        $user->email = $request->input('email');

        $user->update();

        return redirect()->back()->with('status', 'profile updated');
    }
    public function changepassword(Request $request){
        $user_id = auth()->user()->id;
        $user = User::find($user_id);

        if(!Hash::check($request->get('current-password'), $user->password)){
            return redirect()->back()->with("error", "your current password doesnot match with password you provided. Pl
        }
        if(strcmp($request->get('current-password'), $request->get('new-password'))== 0){
            return redirect()->back()->with("error", "New password cannot be same . Please choose a different
        }
        $validateData = $request->validate(['current-password' => 'required', 'new-password' => 'required|string

        $user->password = bcrypt($request->get('new-password'));
        $user->save();
        return redirect()->back()->with('status', 'password changed successful');
    }
}

```

Figure 27: dashboard controller

## Hirers control code

```
http://controllers/hires/hirescontroller.php

    $posts=Post::all();

    return view('hires.machinerylisting')->with('posts',$posts );
}

public function machinerysearch(){

    $posts=Post::all();

    return view('hires.machinerysearch')->with('posts',$posts );

}

> public function details($id){...
}

public function machinerydetails($id){

    $post = Post::find($id);
    return view('hires.machinerydetails')->with('post',$post );

}

public function bookings(Request $request)
{
    $booking = new Booking();
    $booking->status=("booked");
    $booking->acres =$request->input('acres');
    $booking->equipment_id = $request['post_id'];
    $booking->owner_mail = $request['owner_mail'];
    $booking->owner_id = $request['owner_id'];
    $booking->email = auth()->user()->email;
    $booking->image = $request['image'];
    $booking->save($request->all());

    return redirect('machinerylisting');
}
```

*Figure 28: hires controller*

## Pages urls

This dictates the links of the pages in whole project. It also ensures that some pages cannot be accessed unless the user has logged in

```

Route::get('/', 'PagesController@index');
Route::get('/hire', 'PagesController@hire');
Route::get('/rent', 'PagesController@rent');
Route::get('/reg', 'PagesController@reg');
Route::post('reg_data', 'PagesController@reg_data');
Route::get('/register', 'PagesController@register');
Route::get('/login', 'PagesController@login');
Route::Post('/posts', 'PostController@posts')->name('posts');
Route::get('/hires', 'PagesController@hires');

Route::Post('/post', 'PostController@post')->name('post');
Route::Post('/postimage', 'PostController@postimage')->name('postimage');
//pages accessible only aftr logging in as machonery owner
Route::group(['middleware'=>['auth','owners']], function(){
    Route::get('/equipment', 'owners\DashboardController@equipment');
    Route::get('/owners', 'PagesController@owners');
    Route::get('/owners', 'PagesController@owners');
    Route::get('/mybookings', 'owners\DashboardController@mybookings');
    Route::Post('/postimage', 'PostController@postimage')->name('postimage');
    Route::get('/profile', 'owners\DashboardController@profile');
    Route::get('/dashboard', 'owners\DashboardController@dashboard');
    Route::Post('/profiledata', 'owners\DashboardController@profiledata')->name('profiledata');
    Route::Post('/changepassword', 'owners\DashboardController@changepassword')->name('changepassword');

    Route::get('/edit/{id}', 'owners\DashboardController@edit');
    Route::Post('/equipmentupdate/{id}', 'owners\DashboardController@equipmentupdate')->name('equipmentupdate');
});
Route::get('/machinerylisting', 'hires\hiresController@machinerylisting');
Route::get('/machinerysearch', 'hires\hiresController@machinerysearch');
Route::get('/details/{id}', 'hires\hiresController@details');
Route::get('/machinerydetails/{id}', 'hires\hiresController@machinerydetails');
Route::get('/bookings', 'hires\hiresController@bookings')->name('bookings');

```

Figure 29: web

## Creation of database relationship

```

4
5 use Illuminate\Contracts\Auth\MustVerifyEmail;
6 use Illuminate\Foundation\Auth\User as Authenticatable;
7 use Illuminate\Notifications\Notifiable;
8
9 class User extends Authenticatable
10 {
11     use Notifiable;
12
13     /** ...
14
15     protected $fillable = [
16         'first_name', 'sir_name', 'phone_number', 'email', 'password', 'user_type', 'name',
17     ];
18
19     /** ...
20
21     return $this->user_type;
22     }
23
24     protected $hidden = [
25         'password', 'remember_token',
26     ];
27
28     /** ...
29
30     protected $casts = [
31         'email_verified_at' => 'datetime',
32     ];
33
34     public function post(){
35         return $this->hasMany('App\Post');
36     }
37 }

```

```

Post.php
<?php

namespace App;

use Illuminate\Database\Eloquent\Model;
use App\Model\Booking;
class Post extends Model
{
    //
    protected $table='posts';
    protected $fillable = [

        'equipment_type', 'sub_county', 'manufacturer', 'cost', 'day_cost','image',
    ];// public $primaryKey='machine_id';

    public function user(){
        return $this->belongsTo('App\User');
    }

    public function bookings(){
        return $this->hasMany('App\Booking');
    }

    public function post_id(){
        return $this->post_id;
    }
}

```

```

> Booking.php
1  <?php
2
3  namespace App;
4
5  use Illuminate\Database\Eloquent\Model;
6  use App\Model\Post;
7  class Booking extends Model
8  {
9      //
10     protected $table='bookings';
11     protected $fillable = [
12
13         'from_date', 'todate',
14     ];// public $primaryKey='machine_id';
15
16     public function posts(){
17         return $this->belongsTo('App\Post');
18     }
19 }
20

```

Figure 30: models

## CHAPTER 7: TESTING

Testing is done to determine all defect in this project. This system was subjected to number of test inputs and various conclusion was made.

### 7.1 sample testing

This sapling of all tests that is conducted in the whole project

#### 1. General sample testing

##### a) Login testing-

Users logs in into the system using correct email and password as per the database.

##### b) Password testing

Users need to provide the password and confirm. If the first password and the second password does not match, the system tells the user that the passwords do not match

#### 2. Machinery owner testing

##### a) Equipment displays

The machinery that is displayed by the system should only belong to the logged in owner

##### b) Posting and of a machinery

Posting of machinery is only done by the users who registered as a machinery owner

##### c) Editing of a machinery

Whenever users want to edit the machinery, only the selected machinery information is being displayed.

##### d) Available bookings

Ensuring that the users only see the machinery that have been booked and belongs to the logged in user only.

#### 3. Machinery hirer testing samples

##### a) Logging in before booking

This makes user that the user first logs in to the system before booking a machinery.

##### b) Display of total cost of service.

The system should be able to display the total cost so as to ensure the cost is predicted in advance.

### 7.2 Test results

Logging in



## Login



E-Mail Address

jj@gmail.com



**These credentials do not match  
our records.**

Password

☐ Remember Me

Login

[Forgot Your Password?](#) [Register](#)

Figure 31: login Testing

### Password testing

#### Register



First Name

JEPTOO

Sir Name

KIPRUTO

Phone Number

0234123467

E-Mail Address

kiprutjeptoo@gmail.cor



**The email has already been  
taken.**

Password



**The password must be at least 6  
characters.**

Confirm Password

Register as

machinery owner



Register

Figure 32: password testing

## Equipment displays

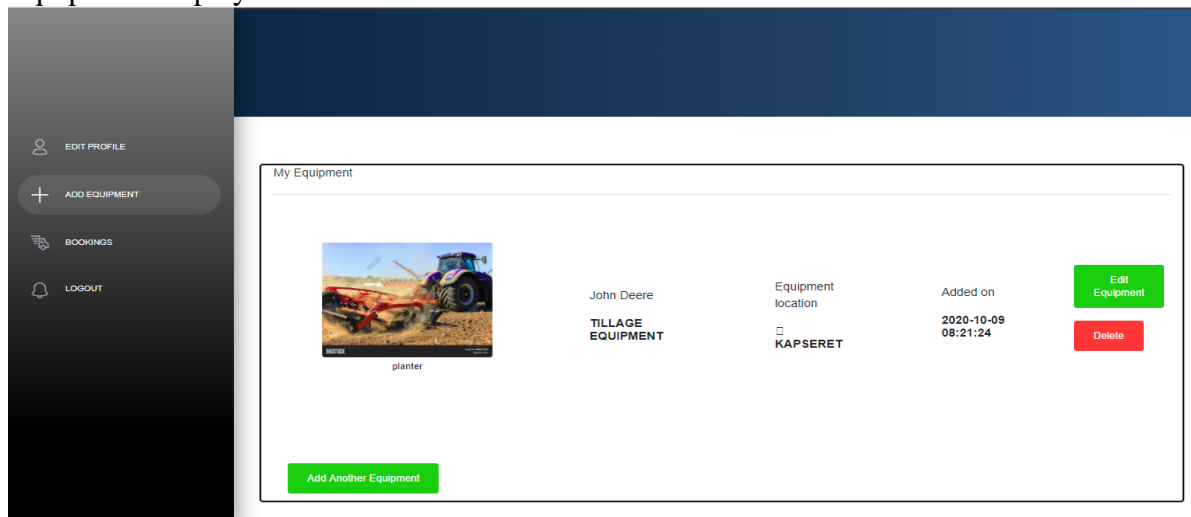


Figure 33: equipment display testing

## Individual booking

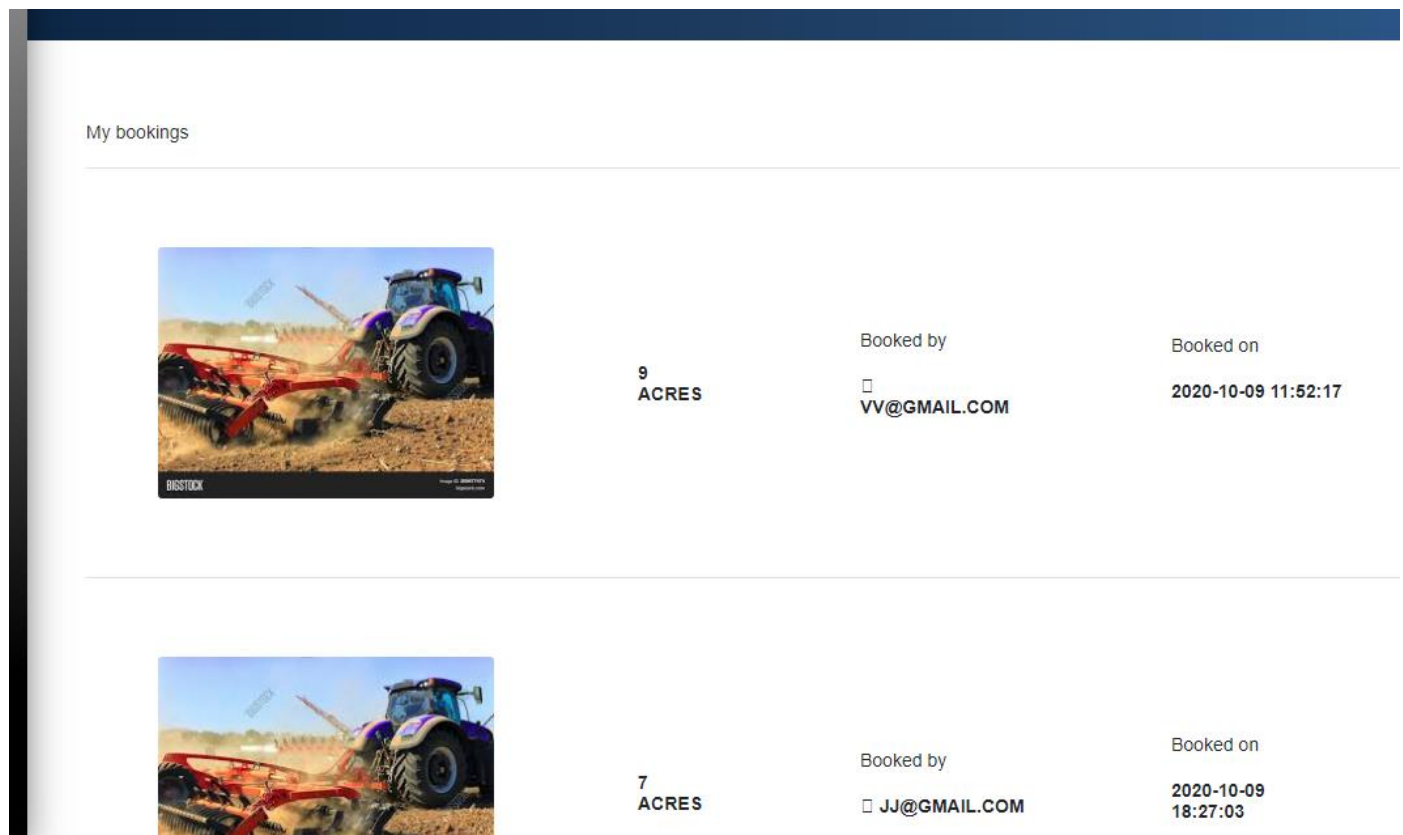
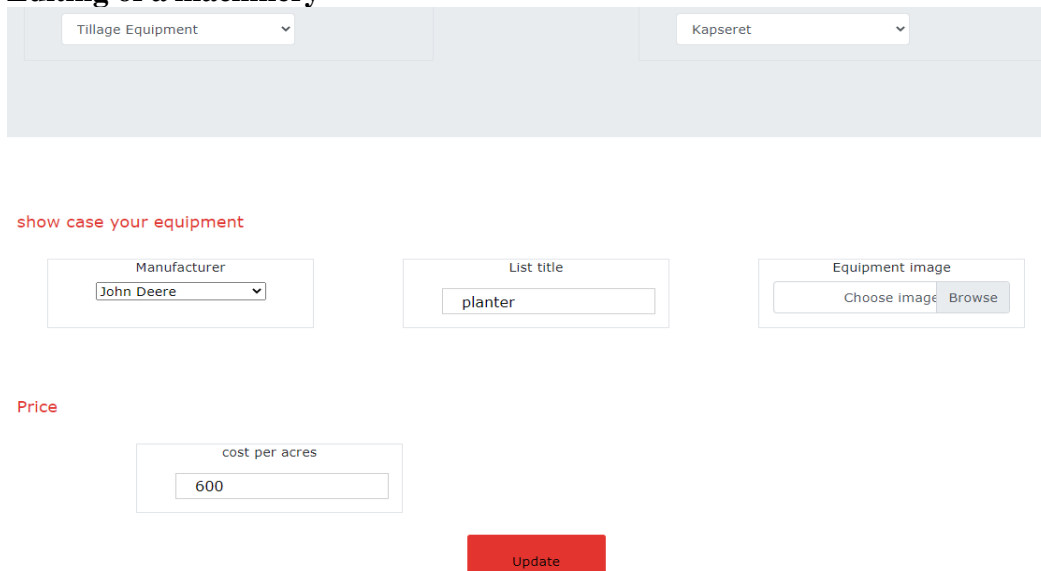


Figure 34: individual bookings

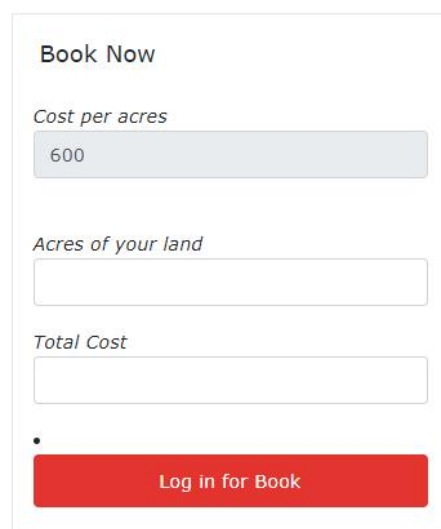
## Editing of a machinery



The screenshot shows a web form for editing machinery. At the top, there are two dropdown menus: 'Tillage Equipment' and 'Kapseret'. Below these, the text 'show case your equipment' is displayed in red. The form consists of three main sections: 1. Manufacturer: A dropdown menu with 'John Deere' selected. 2. List title: A text input field containing 'planter'. 3. Equipment image: A section with 'Choose image' and 'Browse' buttons. Below these sections, the text 'Price' is displayed in red. There is a 'cost per acres' label above a text input field containing '600'. At the bottom right, there is a red 'Update' button.

Figure 35: machinery update

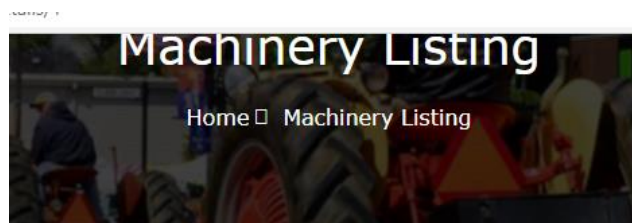
## Logging in before booking



The screenshot shows a 'Book Now' form. It has a title 'Book Now' at the top. Below it are three input fields: 'Cost per acres' with the value '600', 'Acres of your land' (empty), and 'Total Cost' (empty). At the bottom, there is a red button labeled 'Log in for Book'.

Figure 36: booking testing

## Display of total cost of service.



**Book Now**

*Cost per acres*

*Acres of your land*

*Total Cost*

**Book Now**

**Figure 37: cost display**

## **CHAPTER 8: CONCLUSION, DISCUSSION AND RECOMMENDATIONS**

This is the final chapter that discuss on the achievement of objective, system limitation, lessons learnt, challenges faced and recommendation for future research.

### **8.1 Achievement of aims and objectives**

Smart leasing and hiring of machinery confirm to its aims and objects.

The achievement of its aims includes:

- a. The system enables farm machinery hirers to get a reliable, efficient and affordable machinery to work on their farm.
- b. It enables those who own a machinery to post the machinery in the platform to get a farmer who would like to hire it.
- c. The system reduces the time frame used by the farmers to find someone who owns a machinery.

The system has achieved its objective which include:

- a. Smart leasing and renting of farm machinery is enables farmers who own a machinery to post there machinery in the platform where interested clients can book for it to work on the farm.
- b. The system also provides an enabling platform where machinery hires can find a machinery at an affordable price.
- c. The system allows machinery owners to login into the system and update their profile and machinery detail
- d. Finally, the system is able to search for a machinery according to the location and type of equipment.

### **8.2 System limitation**

Smart leasing and renting of farm machinery have a number of limitations. These limitations include:

- a. They system only covers Uasin Gishu county farmers.
- b. The system lacks a proper communication procedure between the machinery hirer and machinery owner. This can be addressed in future updates.
- c. The system relies on internet for it to work probably. This limits the users to those have smart phones and computers to access the services.

### **8.3 Lessons Learnt**

The whole of this process of coming up with smart leasing and renting of farm machinery have thought me a lot of things both academically and socially. Some of the lessons include:

- a. Implementations of Laravel framework. This involves creation of controllers, models, views and routs. Creation of migrations to work on databases is another major lesson learned. Finally, creation of relations using Laravel is another thing that was able to learn.
- b. Another lesson is sharing of information. Through consultation among friends, I have been able to archive this project objects and made the system work effectively only by the help of consultation among friends.
- c. Application of knowledge form class is another important lesson learnt. Most of this project part is basically application of class knowledge.

#### **8.4 Challenges Faced**

The accomplishment of this project was accompanied by a number of challenges. One of the major challenges is the emergence of corona virus in the whole country which made many students to go home and forget everything. The fact that there is no maximum time to work on the project at home due to other responsibilities made it difficult to accomplish whole the system functionality on time.

#### **8.5 Recommendations for future research**

After a tremendous effort done in the implementation, I recommend a few future works to be further implemented, this include:

- a. A better way of communication between the hirers and owners to be establish to make work easier for it to be effective.
- b. Extension of the services of this system to be used by all personnel national wide.
- c. Development of a mobile application that facilitate this service.

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## APPENDICES

### APPENDIX A: RESOURCES REQUIRED / BUDGET.

The table below shows the required resources and the estimated cost for the whole project:

ITEMS	QUANTITY	UNIT PER COST	TOTAL COST
<b>HARDWARE</b>			
□ LAPTOP: ➤ 4GB Ram,500 GB HDD, CORE i5,	1	32,000	32,000
<b>SOFTWARE</b> ❖ Visual Studio code community	1	FREE (Open source)	—
❖ Laravel PHP framework	1	FREE (Open source)	—
❖ XAMPP	1	FREE (server)	
<b>OTHER COSTS</b> ❖ Internet connectivity	20 GB	300	6,000
❖ Stationaries: 1) Notebook 2) Pen/pencil	3	50	150
❖	2	20	40
<b>TOTAL COST</b>			38, 190

**Table 1.1: Budget estimate**



## APPENDIX B: TIME PLAN

The Plan for the proposed project.

Activity	Brief Description	Estimated Time	Deliverable
1. Project Topic Selection.	Involves the selection of topic for the project to be done	Three weeks.	A copy of the project selection form with the selected topic, statement of problem and aim of the project to be submitted to the project coordinator.
2. Project Proposal.	Writing a proposal for the approved topic/project	Three weeks	Full project proposal printed and spiral bound to be submitted to the project supervisor
3. System Analysis and Requirement Definition.	Writing a detailed system analysis and requirement for the project	Two weeks	Printed copy of the project system analysis and requirement to be submitted to the project supervisor.
4. System design analysis	Writing a detailed system design analysis	Three weeks	Printed copy of the system analysis design.
5. Implementations	Working on an executable system, that is coding the front end, back end	8 weeks	Real working system
6. Testing	Verification and validating the system	Three weeks	Better working system
7. Documentation	Writing the system documentation	2 weeks	Leasing and renting of farm machinery documentation

**Table 1.2 Project time plan.**

## APPENDIX C: INTERVIEW QUESTIONS Farmers questions

(A) How do you get to know a reliable machinery to work on your farm?

- (B) Which problems do you face during land preparation and harvesting in terms of getting a machinery?
- (C) Do you feel like you waste a lot of time in looking for a machinery manually? (D) Is there any effective platform that you can use to get a machinery?

**Machinery owners' questions**

- (A) How do you get farmers who need a machinery?
- (B) Which problem do you face as you look for hirers?
- (C) Is there any effective platform that you use to air your machinery?