

**Inventory Management and Order  
Processing System for  
Yodagama Timber Dealers**

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**2017**



# **Inventory Management and Order Processing System for Yodagama Timber Dealers**

**A dissertation submitted for the Degree of Master of  
Information Technology**

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**University of Colombo School of Computing**

**2016**



## Declaration

The thesis is my original work and has not been submitted previously for a degree at this or any other university/institute to the best of my knowledge it does not contain any material published or written by another person, except as acknowledged in the text.

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Signature:

Date:

This is to certify that this thesis is based on the work of Mr. W.A.N.P.Wijesinghe under my Supervision. The thesis has been prepared according to the format stipulated and is of acceptable standard.

Certified by:

Supervisor Name:

.....

Signature: Date:

## **Abstract**

This system is an integrated inventory management and an order processing system which is developed with the intension of enhancing the operational efficiency of the chosen client. Currently the client is maintaining a manual system subjected to traditional internal controls and allocated to set of authorized personnel to handle.

Requirement analysis was done using different techniques to identify the problems and limitations of the existing methods. The realization of the inefficiency of the usage of traditional methods leads to automate the system to improve efficiency and performance of the company. Web based order processing and stock management system was decided to develop, as a solution.

The new system was designed with a web based interface where the suppliers and customers can access online and with a normalized inventory database. It facilitates online orders, calculate re order levels, record online transactions and maintain stock levels etc. The system is also capable of generating some important reports such as sales of different items, availability of stocks, most valuable customers etc.

Different methodologies were analyzed and done feasibility study to identify the most appropriate method which suits the new system during design stage. The user interfaces and the database design was planned to ensure a well-designed system.

The system was developed during the implementation stage. Many tools and technologies were used for coding. CodeIgniter is an open source, free software which has great options and features, is used to develop the web framework of the system. Bootstrap which intended for an easy design of the interfaces of dynamic web sites, is used to design the frontend web framework of the system. MySQL is used to develop the database.

## **Acknowledgment**

First of all I would like to express my profound gratitude to MIT(General) Coordinator of the UCSC and to the Project Examination Board for giving me this valuable opportunity develop an individual project which enhance our knowledge, handle tension, time management and our practical skills.

I would like to take this opportunity to extend my special thanks to my project supervisor Mr. G.K.A. Dias for the guidance, supervision, and support extended throughout my project to succeed and to submit the relevant documents on time.

Mr. Vidura Kalinga is the Managing Director of Yodagama Timber Dealers (PVT) Ltd who was my Domain Supervisor. He utilized his valuable time from his busy life to provide guidance to help me to identify the overall business process clearly without any doubts. His valuable guidance is acknowledged by me with thanks.

Furthermore, I would also like to acknowledge with much appreciation the crucial role of the staff of Yodagama Timber dealers (PVT) Ltd, who gave all the necessary information and the support from the requirement analysis stage to the testing stage.

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## Chapter 1 -Introduction

### 1.1 Client of the project

Yodagama Timber Dealers (pvt) Ltd has more popular name in the timber industry in Sri Lanka among house builders, government and private building contractors and the general public. Having the largest stocks of imported timber and is one of the major timber suppliers to the construction industry in Sri Lanka.

Yodagama Timber Dealers (pvt) Ltd is a company, which established in 2000. The Managing Director is Mr. Vidura Kalinga. There are three branches which are situated at Piliyandala and Pannipitiya.

This system is an integrated inventory management and an order processing system which is developed with the intension of enhancing the operational efficiency of the chosen client, currently the client is maintaining a manual system subjected to traditional internal controls and allocated to set of authorized personnel to handle. This has had many issues in the last few accounting periods as many fraudulent acts have taken place due to the weaknesses in the internal control systems connected to the manual process, as a result in the new development the two modules had connected together to ensure that the inventory management and the related order processing is hybrid for the monitoring of the business.

In the processing of the above activity the system had to be equipped with an in feed system of the inventory items using a sequential basis, as a result the system can capture and identify each stock unit and item to ensure where each of such items currently stays in the business system.

Hence the system requires the use of a semi-skilled data entry operator to ensure that the functionality purposes are being achieved. This will enhance the ability of the business to generate interim profit and loss statements for the period concerned whenever the proprietor

requires in order to ensure that up to what extent the stocks that are purchased have been used for sales.

The system will be useful to calculate certain operational ratios such as stock turnover ratio, debtor turnover ratio, creditor turnover ratio, debtor days, inventory days and as well as creditor days for overall working capital management.

## **1.2 Problem Domain**

Presently, the company is using a manual database system, recording each and every transaction physically. They currently don't have a proper inventory control system and they used spreadsheets to store data. A paper based system is used in order processing and communication is done through emails, telephones, faxes etc.

In Credit transaction, if customer pays in an installments basis, the paid installment for each and every month needs to be recorded manually. Furthermore, in stock controlling, warehouses need to be examined thoroughly physically, which is a difficult task.

The company is currently facing the following problems;

1. All inventory details were updated manually in excel sheets.
2. The manual procedure is too complicated since the stock details, preparing good receive notes, preparation of costs done manually.
3. Data duplicity and waste of space.
4. Low efficiency and accuracy.
5. Difficulty in keeping track of the stocks and reorder levels.
6. Difficulty in identifying fraud.
7. Due to printed invoices, bills, shipment details etc. large volume of paper based materials are used.

An automated process was developed to update the inventory and process orders. Thereby it will minimize the complexity in manual procedure and improve efficiency and productivity of the company. A normalized database had been created to solve the problems of duplication of

data, waste of space, data redundancy etc. The system was improved by giving online access to customers that expand the customer base both locally and globally.

### **1.3 Motivation behind the project**

The final year individual project is a key component of MIT degree. The main motivation for the completion of the project is to successfully complete the requirement of the “individual project” to gain the qualification, Master of Information Technology (MIT).

This help to enhance the knowledge, coding skills, dissertation writing practice which need dedication throughout to complete an individual project successfully. The experience which was gained will be a definite advantage for career prospects.

### **1.4 Objectives of Project**

Major objectives of the system can be listed as follows

- (i) To minimize capital investment in inventory by eliminating excessive stocks
- (ii) To ensure availability of needed inventory for uninterrupted production and for meeting consumer demand
- (iii) To provide a scientific basis for planning of inventory needs
- (iv) To tide over the demand fluctuations by maintaining reasonable safety stock
- (v) To minimize risk of loss due to obsolescence, deterioration, etc.
- (vi) To maintain necessary records for protecting against thefts, wastes leakages of inventories and to decide timely replenishment of stocks.

## 1.5 Scope of the project

A web based system was developed to perform their internal and external activities accurately and efficiently to overcome their current drawbacks was the main objective. Apart from the above, other objectives and scopes are listed below

- The Inventory Control system and Order Processing system will be acting in a collaborative format where both developed with regards to the management of the inventory movement based on the orders that are placed.
- This is of high importance for mainly the valuation of the inventory and as well as the accounting and estimation of the overall accounting revenue for the period concerned.
- This is of high importance for mainly the valuation of the inventory and as well as the accounting and estimation of the overall accounting revenue for the period concerned

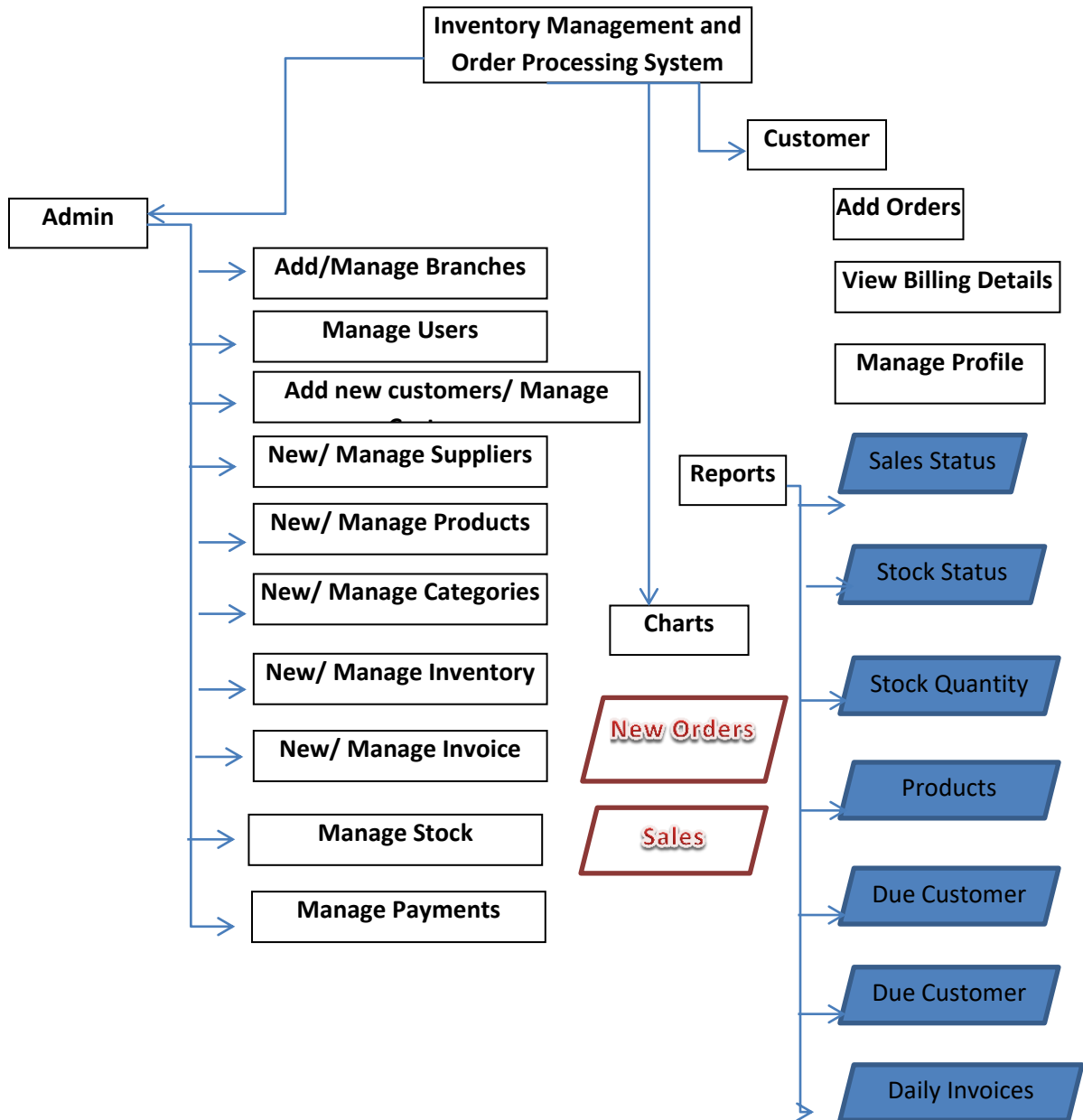


Figure 1-Block Diagram for the New System

When it comes to functional requirements, it states how the system reacts to a particular input and what kind of an output or process is carried out through the

system. Following are a list of functional requirements that are identified during the analysis stage:

1. Back Order Serving- Attempts to fill backorder quantities of open stock requisitions
2. Lead time calculations-Is based on a number of previously processed purchase requisitions, purchase orders and receipts of goods.
3. Reorder Point Calculations-Calculates the safety stock and reorder level for each item in inventory
4. Forecast Demand Calculations-Is based on historical issues and forecasted demand.
5. Annual Closing- Rolls back the historical information stored on Inventory Inquiry for each item.
6. Maintain Customer Order Record
7. Maintain a Product Master Record on each product
8. Maintain a Customer Master Record on each customer the company does business with and can be invoiced by the company.
9. Automatic order number assignments done when new sales transactions are added
10. Automatically print customer invoices for orders that have been processed
11. Customer Invoice Records are automatically created and added to the online database for use by the Accounts Receivable System to track customer payments.
12. Print accounting reports, such as Order Status Report, Sales Analysis Report and others, to provide an audit trail of sales data entered into the System.
13. Allow for the receipt of partial payments (deposits) when a sales order is taken.
14. Select the product from product categories

## **1.6 Outline of the Chapters**

### **Chapter 1 – Introduction**

This chapter will contain the details about the client, problems of the existing method, motivation for the project, Objectives and scope of the project.

### **Chapter 2 – Background/Literature Review**

This chapter will contain the Survey of existing similar systems. Issues related those systems and the solutions that would provide proposed system. Also contains the technologies that used for the design and development of the proposed system with the references related for this project.

### **Chapter 3 – Analysis and Design**

This chapter will include fact gathering techniques, current system explanation with a top level use case diagram, similar system analysis, functional and non-functional requirements and the methodologies.

Design section includes the methodology used for proposed system, alternative methods, model the system with various diagrams (Use case, sequence diagrams), use case descriptions, database design and main interface designs.

### **Chapter 4 – Implementation**

This chapter will include hardware & software requirements, tools and technologies used, as well as existing codes.

## **Chapter 5- User Evaluation and Testing**

This chapter will describe the testing techniques, test plans, system as well as client evaluation.

## **Chapter 6 – Conclusion and Future Work**

This chapter will describe the experiences gained through the project along with areas for future recommendations.



## Chapter 2 - **Background/ Literature Review**

### **2.1 Background of new System**

Proposed system had been designed with a web based interface where the suppliers and employees can access online and with a normalized inventory database. It facilitates online orders, calculate re-order levels, record online transactions and maintain stock levels etc. The system is also capable of generating some important reports such as sales of different items, availability of stocks, Most purchased clients etc.

Different methodologies were analyzed and did feasibility study to identify the most appropriate method which suits the proposed system during design stage. The user interfaces and the database design was planned to ensure a well-designed system.

The system will be developed during the implementation stage. Many tools and technologies are used for coding.

### **2.2 Existing similar Systems**

#### **ECO Stationary Inventory control and Order processing System**

- ECO Stationery Private Limited is an established company having been incorporated in Sri Lanka since 2002 under the Companies Act, as a private limited company.
- ECO Stationery Private Limited is situated in Wattala in a centrally convenient location for their customers and suppliers.
- They supply premium stationery brands such as Double A copier papers, 3M office stationery, Casio Calculators.

The image shows a registration form titled "Registration". At the top, there are two radio buttons: "Personal" (unselected) and "Company" (selected). Below this are three input fields: "Email" with an envelope icon, "Name" with a person icon, and "Password" with a shield icon. Under the input fields, there are two radio buttons for gender: "Male" (selected) and "Female" (unselected). At the bottom left, there is a disclaimer: "By clicking Register, you agree on our [terms and condition](#)." To the right of the disclaimer is a blue "Register" button.

Figure 2: Login Form

### **Lesova Holdings Inventory control and Order processing System**

Lesova is a T-shirts manufacturing company where they produced customized t-shirts and sell to company. This system is used to track their orders and monitor sales and update stock details accurately.

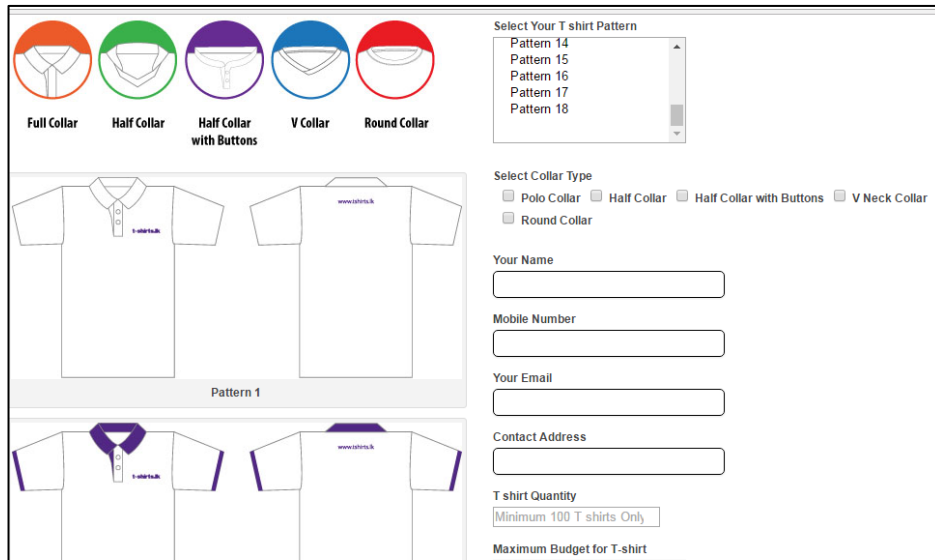


Figure 3: Custom Selection

## 2.3 System comparison matrix

Function/Feature	ECO Stationary	Lesova System	Proposed System
Stock module	√	√	√
Supplier Order Processing Module	√	×	√
Customer Order Processing Module	√	√	√
Master File module	√	√	√
Price calculations for stocks	×	×	√
User Login Module	√	√	√
Report Generation	√	√	√
Online access	×	×	√
Charts	×	×	√

Table 1: Similar System Comparison

## 2.4 Alternative solutions to the system

When discussing an alternative solution to this system it can categorize into few different sub topics.

- **Maintain system based with old file system**

The entire factory working process based on the existing file based system can be used by the client. So it can maintain all the work by using paper and generate factory related reports and valuable feedbacks by analyzing those paper works when necessary. By choosing this method the client has to waste time to get even a trace of previous data.

- **Purchase Commercial stand-alone Software**

Purchases of commercial products to maintain each and every different kind of work in the company such as accounting, user managing and stock handling can be made by the client. The main issues that can occur when using these kinds of software are as follows:

- **Platform dependence**

Different kinds of operating systems are required by different kinds of software. Therefore, different computer operating systems maintaining different relevant software packages must be maintained by the user.

- **Software update dependencies**

Some software packages depend on updates. The functionality as required cannot be performed by the software without updates. Additional software is required to run by some updates (Frame works). Sometimes more system performances to run are required by that additional software. Updating the computer system into modern system to meet that required performance has to be done ultimately by the user. It costs a lot.

- **Using free software Packages**

Software demos to manage their work can be used by the client. The issue is the trustworthiness of those kinds of software. These kinds of demos can consist of different kinds of errors. 18

## **2.5 System as a Web Solution**

As a web based solution, the system has been proposed for implementation without implementing it as a stand-alone system. The following reasons explain it:

- A web based system to automate day to day activities had been requested by the client.
- The cost of hardware as well as software can be reduced by the implementation of a web based solution.
- Web systems are platform independent and any different platform can be used.
- Access to the system can be obtained from anywhere without reaching to the office premises for that particular activity.
- When comparing with stand-alone systems, maintaining a web system is simple.

## **2.6 Technologies used for the proposed system**

CodeIgniter is an open source, free software which has great options and features, is used to develop the web framework of the system. Bootstrap, which intended for an easy design of the interfaces of dynamic web sites, is used to design the front end web framework of the system. MySQL is used to develop the database.

## Chapter 3 - Analysis and Design

A needs analysis is a systematic approach to studying the state of knowledge, ability, interest, or attitude of a defined audience or group involving a particular subject. It is critical to find the necessary facts to build a required the web based order processing and inventory control system. These facts were captured using fact finding techniques such as interviews, questionnaires, record gathering & observation.

### 3.1 Fact finding techniques

Fact finding techniques are very essential to gather information about the current system and further are used to identify the client's requirements. It should be done properly hence end up developing a wrong system.

#### Interviews

Most commonly used fact-finding technique enables collection of information from individuals face-to-face. There is only 6 staff in this company. Interview was done with the Managing Director and the officer who handles the stocks and orders.

- **Questionnaire for customers**

Permission was taken to give away a questionnaire to few of their current customers to evaluate the performance and the limitations of existing order processing method.

- **Record gathering**

Records of the current system were collected in order to get a better idea of the manual system and it might help me when designing the interfaces and database structure.

#### Collected records

- Purchase order sent to supplier
- Proforma invoice sent by a supplier
- Purchase order from a customer
- Invoice to a customer
- Good received note

- **Observation**

Current system process was observed to improve knowledge and to gather more information which helps to build the proposed system.

## 3.2 Design Overview

This section includes the level 0 use case diagram for the proposed system, modular wise use case diagrams with relevant descriptions, Use case narratives. Further, it includes the sequence diagrams.

## 3.3 Use case diagrams for proposed systems

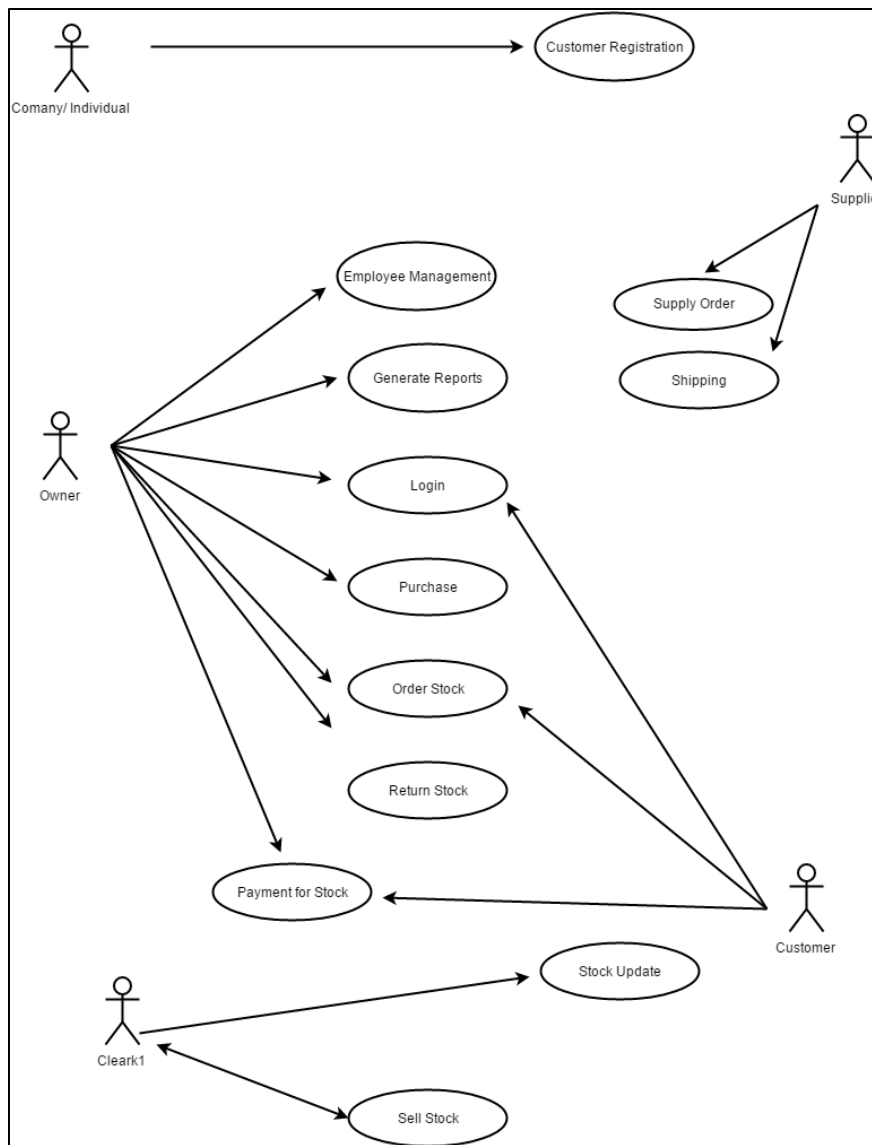
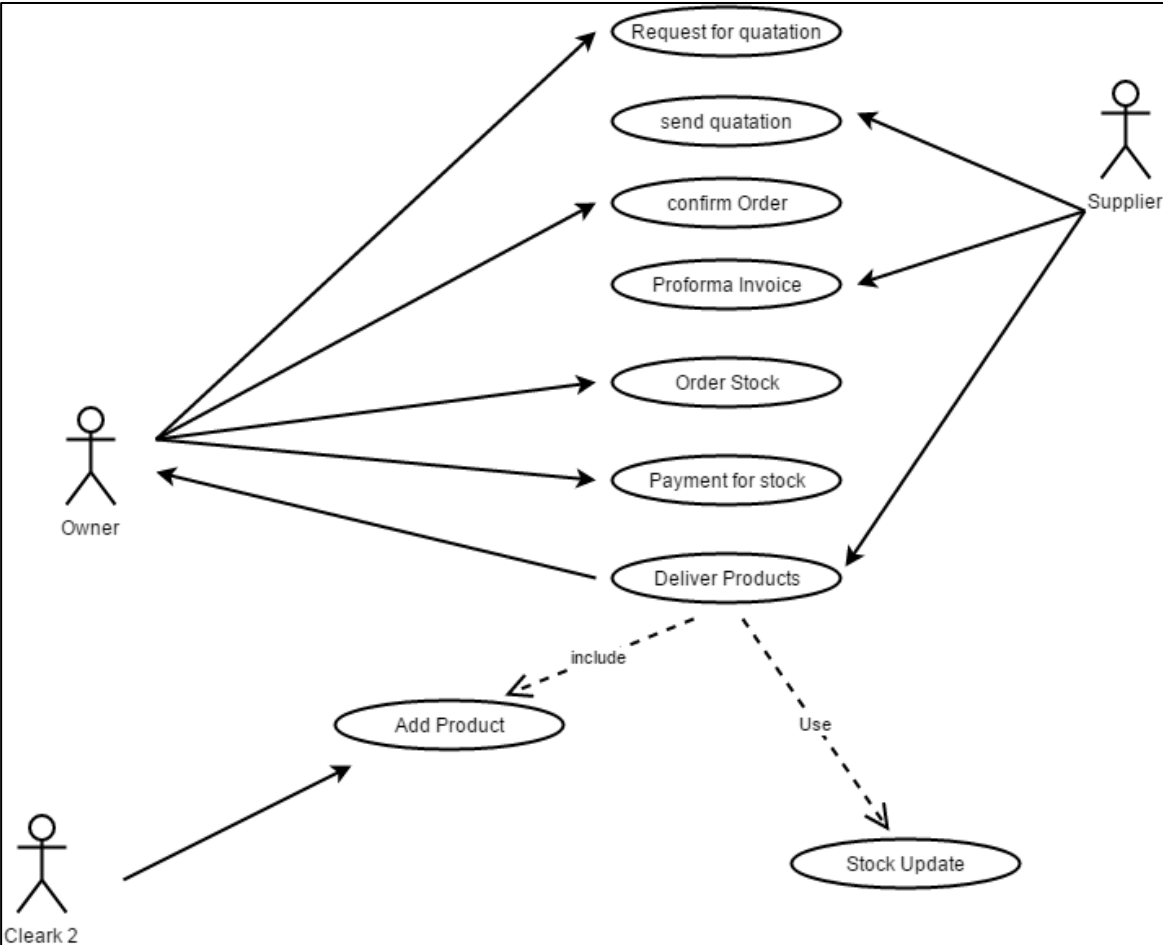


Figure 4: Proposed System Use Case Diagram

### 3.4 Use case diagram-Purchase Stock

Figure 5 Use case Diagram - Purchase Stock





3.5 Use case diagram-Sell Stocks

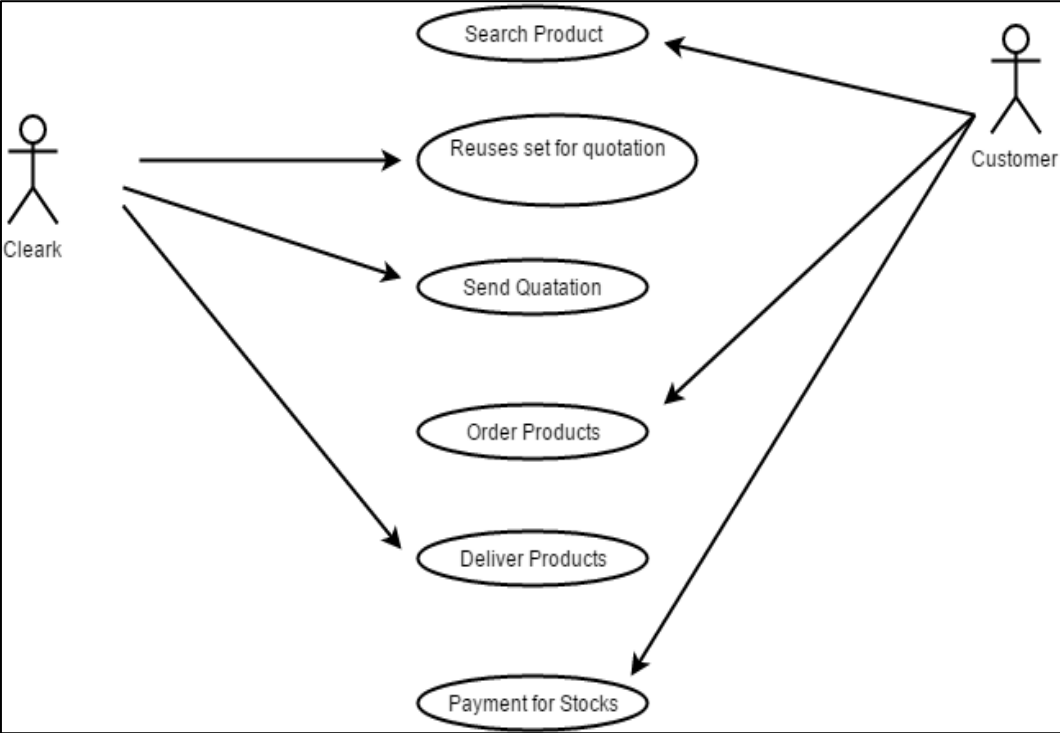


Figure6: Use case diagram: Sell Stocks

### 3.6 Use Case Narratives

#### Customer Registration

Use Case Name	Registration as Customer
Actor	Individual/Company
Normal	(01)Click Registration (02)Fill the form (03)Click Submit (04)Activate user by admin
Alternative	Create the user by admin
Pre-Conditions	User must register to view contents
Post-Conditions	Can online order products

Table 2: Customer Registration Use Case Narrative

## Online purchase stocks from supplier

Use Case Name	Online Purchase Stock
Actor	Owner
Overview	The owner to purchase stock from a supplier
Normal purchase events	Request quotation, Order products, Make payment, Add products, Update products
Alternative purchase events	Request alternative product details Search new products
Pre-Conditions	Supplier details must be entered
Post Condition	Purchase stock items

Table 3: Online Purchase Stock Use Case Narrative

Table 4: Sell Stocks

Sell Stocks Online

Use Case Name	Sell Stocks Online
Actor	Officer
Overview	Sell products to the customers
Normal sell events	Send quotation, Send purchase order, Deliver products, Collect payment
Alternative sell events	Request alternative product details Search new products
Pre-Conditions	Customers should register to the system
Post Condition	Sell stock items

Table 5: Sell Stocks Online Use Case Narrative

### 3.7 Sequence Diagrams

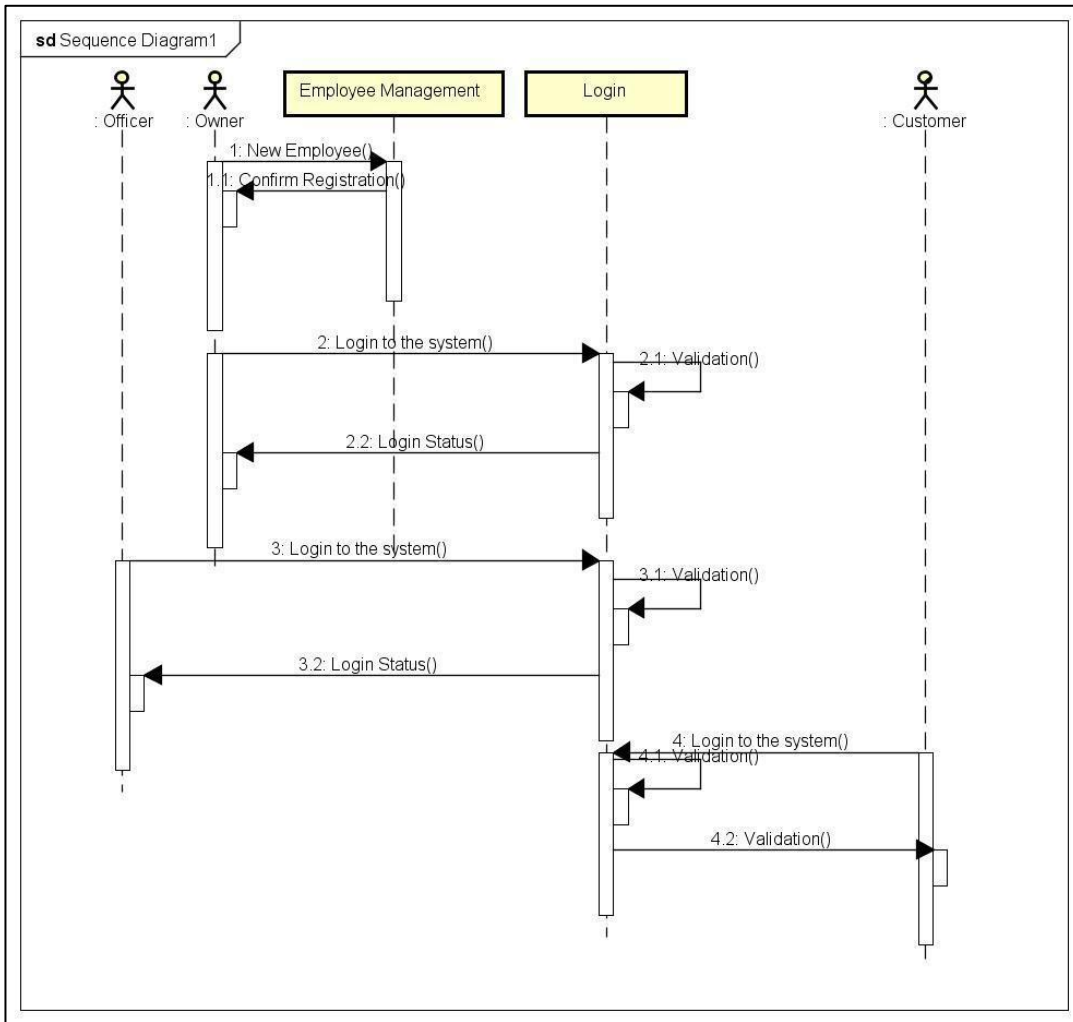


Figure7 :Sequence Diagram - Employee Management

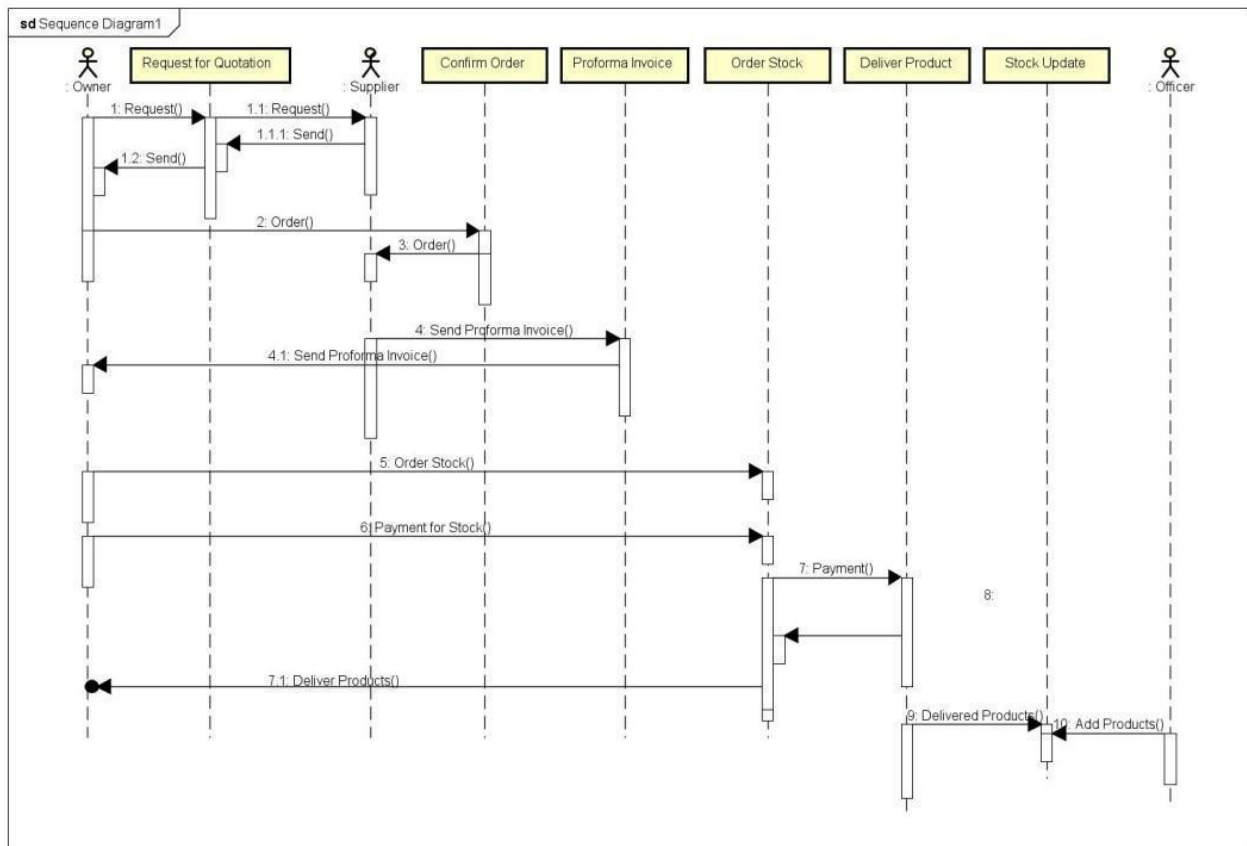


Figure 8 :Sequence Diagram Order Stock

### 3.5 Class Diagram

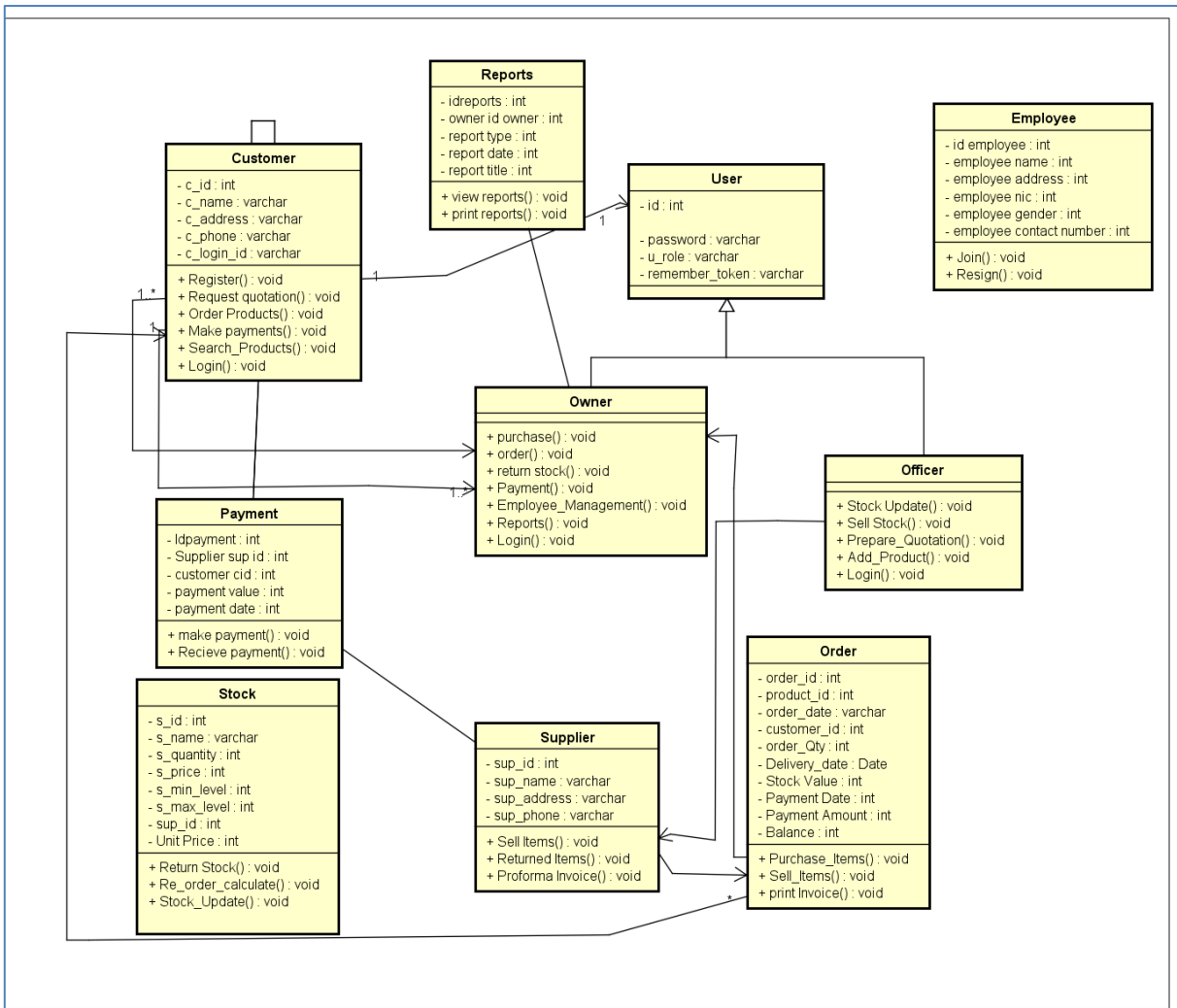


Figure 9 :Class Diagram

### 3.6 Database Design

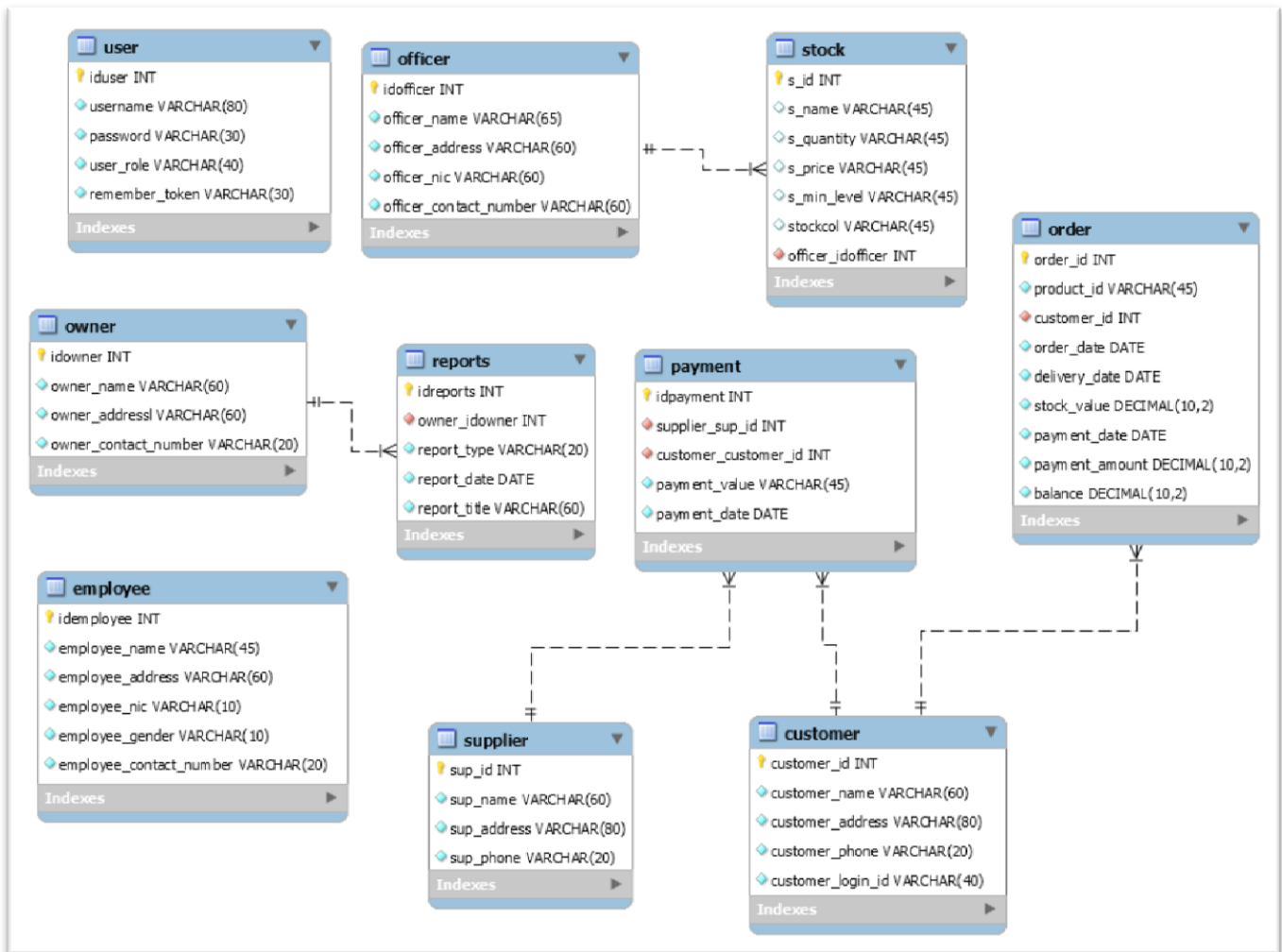
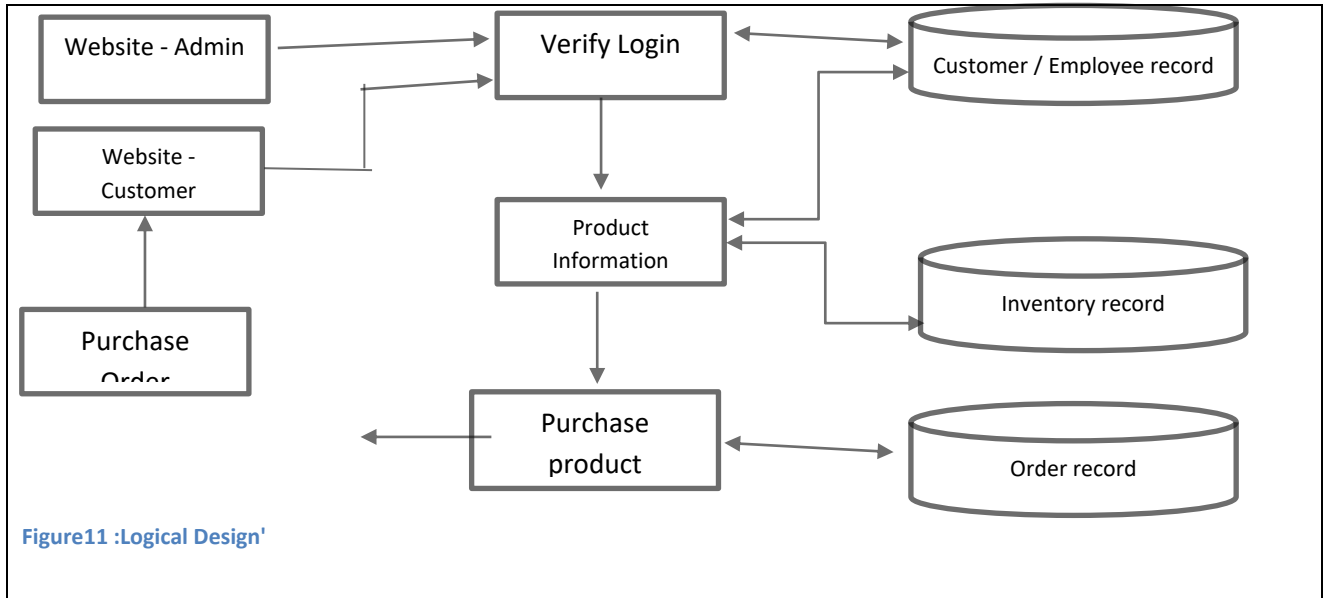


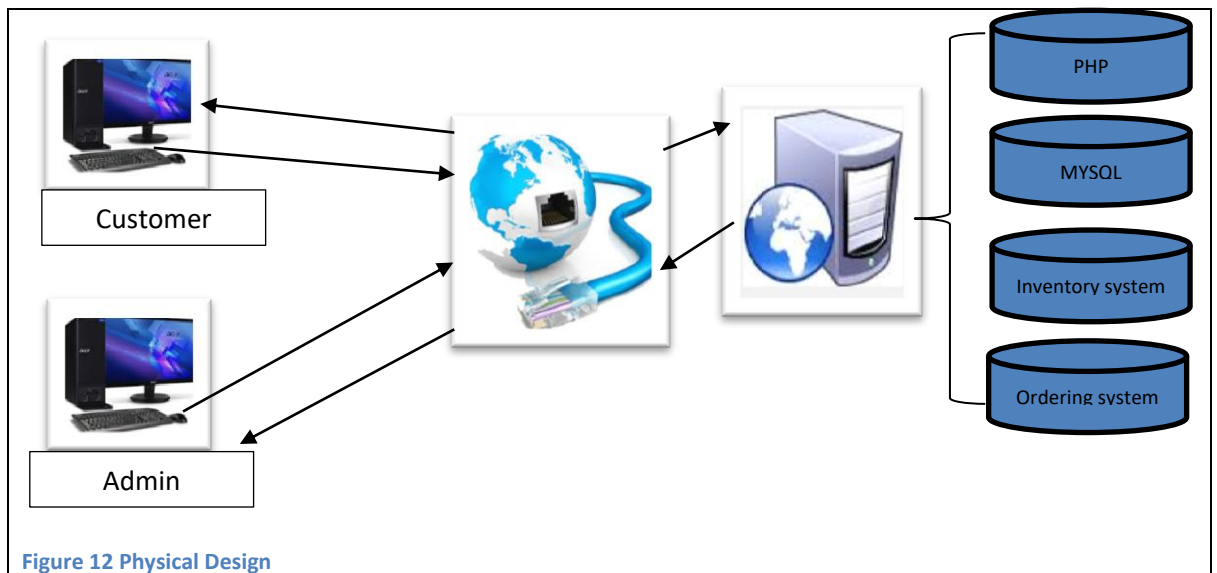
Figure10 :Database Design



### 3.7 Logical Design of the System



### 3.8 Physical Design of the System



## Chapter 4 - Implementation

A short description of software, tools and technologies used has been indicated below.

### 4.1 Languages and frameworks used

Server side:

1. PHP
  - a. CodeIgniter Framework(<https://www.codeigniter.com/>)
2. MySQL database Management system
3. Localhost (WAMP Server)

Client side :

1. CSS ( CSS2/ CSS3)
2. CSS library - Twitter bootstrap (<http://twitterbootstrap.org/>)
3. javaScript
4. Bootstrap javascript library (<http://twitterbootstrap.org/>)
5. Datatable bootstrap addon(<https://datatables.net/>)
6. Color picker bootstrap addon ( <http://lauren.github.io/pick-a-color/>)
7. jQuery Library (<https://jquery.com/>)
8. Dropzone file uploading library (<http://www.dropzonejs.com/>)
9. HTML 5

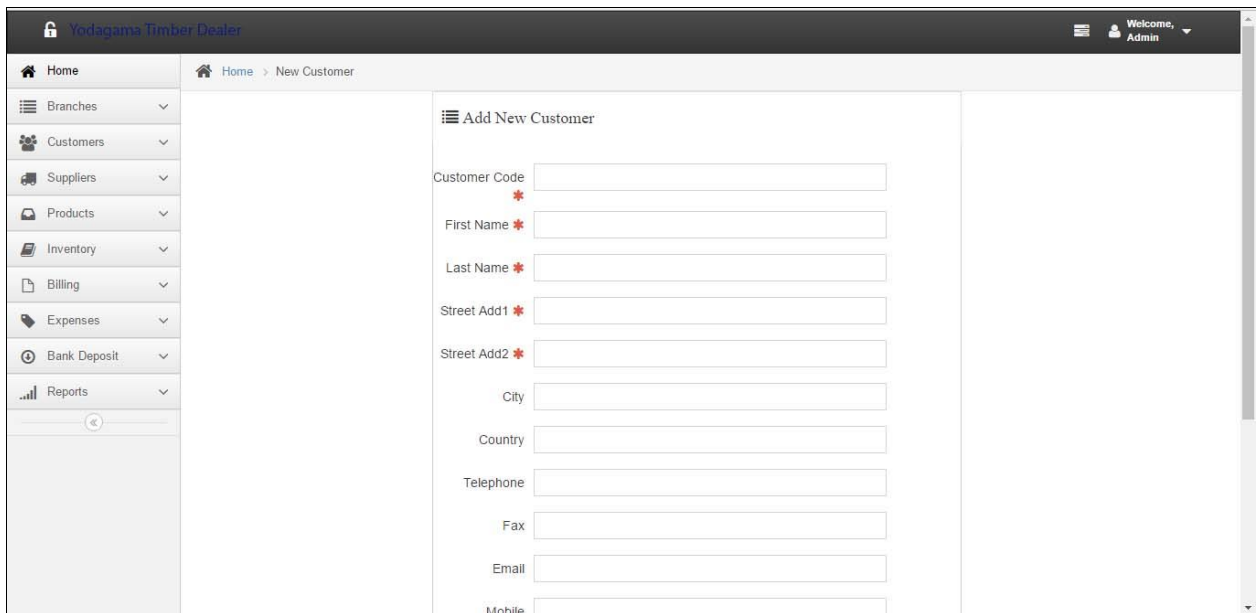
PHP has been used over other languages such as ASP, Perl and CGI as the server side language due to several reasons. Simplicity of ease of learning, Ability to obtain support through online means such as forums, social media and blogs easily for issues due to large user base of PHP as PHP being an open source product and level of freedom received to use multiple editors due to PHP being open source scripting language are some of them. Additionally, ease of use across different operating systems as PHP is not OS specific, PHP being free of charge with no requirement for licenses or royalty fees and ease of finding frameworks due to larger user base could also be listed. Not limiting to those PHP was preferred over other languages due to ease of fixing problems, easier scalability with addition of more servers as projects grow and PHP's ability to call Java and create custom classes as

well as the higher speed of PHP due to the fact that PHP is not dependent on a lot of system's resources.

On the other hand JavaScript has been used as the client side language due to several reasons. Javascript is executed on the client side and thus the web server is released from the strain of allocating bandwidth. Javascript is relatively faster to the end user as the code is executed on the client's computer. This would encourage the users to use the system frequently without a hassle. Additionally, due to Javascript's closeness to the English language it is relatively easier to learn.

## 4.2 User interfaces

Some important areas of the user interface are shown in the screenshots below.



The screenshot displays the 'Add New Customer' form within the Yodagama Timber Dealer application. The interface includes a top navigation bar with the application name and a user profile dropdown. A left sidebar contains a menu with options like Home, Branches, Customers, Suppliers, Products, Inventory, Billing, Expenses, Bank Deposit, and Reports. The main content area is titled 'Add New Customer' and contains several input fields: Customer Code, First Name, Last Name, Street Add1, Street Add2, City, Country, Telephone, Fax, Email, and Mobile. Red asterisks next to the first four fields indicate they are required.

Figure 13 : Add New Customer

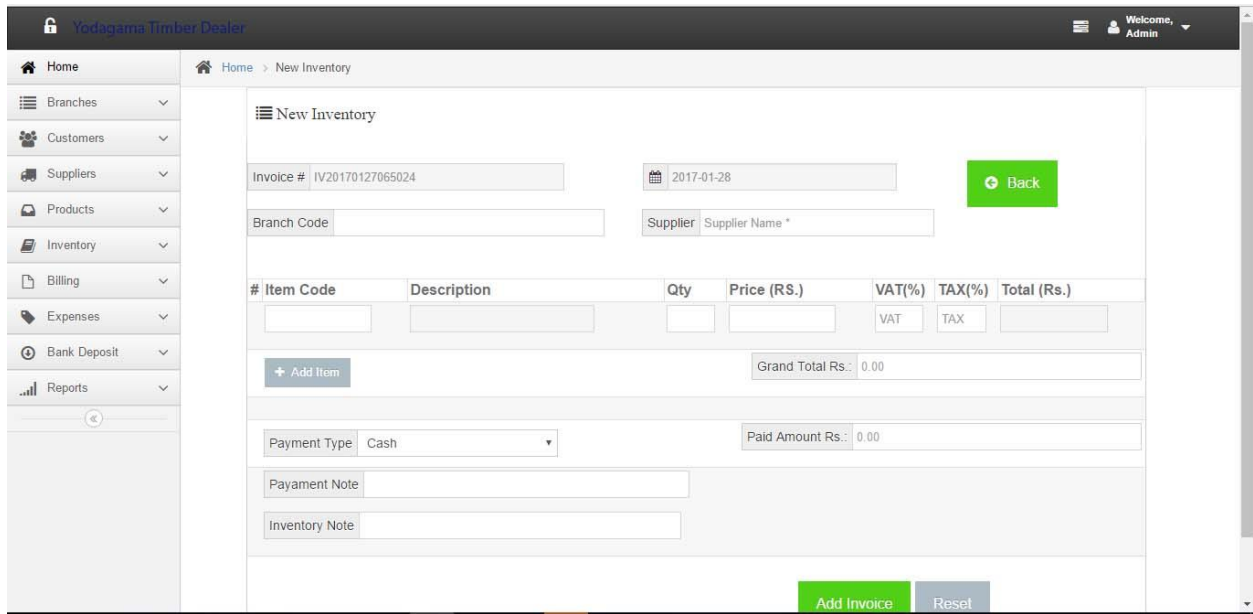


Figure14 :Make Inventory

### 4.3 Development Tools

- **PHP Storm**

PHP Storm is an IDE developed by JetBrains which supports the LARAVEL framework and an extended HTML, CSS, JavaScript editor. PHP Storm helps you to work with your code efficiently and thereby save time. It allows you to work with databases and MYSQL in our projects providing easy navigation to code and database.



- **PHP**

PHP is a server side scripting language which helps us to code dynamic and interactive websites. This is used to code the system as it provides essential features for web development.



- **CodeIgniter**

CodeIgniter (CI) is one of popular php framework. If you are already building PHP Application, CodeIgniter will help you to do it better and more easily. With CodeIgniter, you can save time, make your web more robust, your code will be easier to read and maintenance. It is free, lightweight, and simple to install. In this post, we will know more deep about CodeIgniter before write code.



- **MySQL 5.5**

MySQL 5.5 is used as the database server for this system. This has improved the speed, scalability and user friendliness with several InnoDB storage engine enhancements.



- **Bootstrap**

This is used to create the front – end framework for faster and easier development.



- **Javascript**

This was used to program the behaviors of the web pages.



- **Jquery**

Jquery is a java script library which simplifies JavaScript programming. It reduces the number of code lines enabling to perform complex tasks.



## Chapter 5 – User Evaluation and Testing

### 5.1 Introduction

The project will then be evaluated against the functional requirements defined by the user; this will verify whether the project meets the needs of the user by solving the problems as specified at the beginning. It involves monitoring, testing and maintaining the system.

### 5.2 Software Testing

It's a process of validating and verifying the system in order to identify any gaps, errors or missing requirements in line with actual requirements. Validation is the process of evaluating the final product to check whether the software meets the business needs. Verification is a process of evaluating the intermediary work products of a software development lifecycle to check if we are in the right track of creating the final product.

#### 5.2.1 Methodologies of Software Testing

- Black Box Testing

The software is tested without having knowledge of the interior structure/design/implementation of the system. The tester will interact with the user interfaces by providing inputs and examine outputs without having access to source code. This is also known as the functional testing.

- White Box Testing

The internal structure and logic is tested with the source code of the system, also known as open box testing or glass testing.

- Grey Box Testing

The technique is to test the application with a limited knowledge of the internal workings of the system. The test is done from the point of view of the user and not the designer.

## 5.2.2 Types of testing

- Unit Testing

The Unit testing part of a testing methodology is the testing of individual software modules or components that make up an application or system.

- Integration Testing

The Integration testing part of a testing methodology is the testing of the different modules/components that have been successfully unit tested when integrated together to perform specific tasks and activities.

- System Testing

The system testing part of a testing methodology involves testing the entire system for errors and bugs. This test is carried out by interfacing the hardware and software components of the entire system (that have been previously unit tested and integration tested), and then testing it as a whole.

- Acceptance Testing

The acceptance testing part of a testing methodology is the final phase of functional software testing and involves making sure that all the product/project requirements have been met and that the end-users and customers have tested the system to make sure it operates as expected and meets all their defined requirements.

- Security, Vulnerability Testing

Security testing tests the software for confidentiality, integrity, authentication, availability, and non-repudiation. Individual tests are conducted to prevent any unauthorized access to the software code.

- Usability Testing

The usability testing part of a testing methodology looks at the end-user usability aspect of the software. The ease with which a user can access the product forms the

main testing point. Usability testing looks at five aspects of testing, - learnability, efficiency, satisfaction, memorability, and errors.

- **Compatibility Testing**

The compatibility part of a testing methodology tests that the product or application is compatible with all the specified operating systems, hardware platforms, web browsers, mobile devices, and other designed third-party programs (e.g. browser plugins).

### **5.2.3 Test Plans and Test Cases**

Test plan is a document describing the scope, approach, resource and schedule of intended test activities. It is a record of the test planning process.

It is very important to draw test cases in order to find errors of the system and it shows the expected outcome if it work correctly. It consists of test cases, expected output, actual output and status.



<b>Test Case Name</b>	Test Validation Login Form 1
<b>Purpose of Test case</b>	
Check whether login form work correctly or not	
<b>Tasks</b>	
<ul style="list-style-type: none"> <li>1)submit form without user name</li> <li>2)submit form without giving password</li> <li>3)submit form with invalid user name</li> <li>4)submit form with wrong password</li> <li>5)submit form with correct user name &amp; password</li> </ul>	
<b>Expected Results</b>	
<ul style="list-style-type: none"> <li>1)take cursor again user name box</li> <li>2)display message” password cannot be empty</li> <li>3) display message ‘Invalid User Name’</li> <li>4) display message ‘password is incorrect’</li> <li>5)login successfully</li> </ul>	
<b>Actual Results</b>	
Received expected results Display error messages properly	
<b>Status</b>	passed

Table 6: Test Case for Login Form

<b>Test Case Name</b>	Test Validation of order Process
<b>Purpose of Test case</b>	
Check whether customer can makes order properly	
<b>Tasks</b>	
<ul style="list-style-type: none"> <li>1)Click submit button without filling the compulsory fields</li> <li>2) submit a complete form</li> </ul>	
<b>Expected Results</b>	
<ul style="list-style-type: none"> <li>1)display error message</li> <li>2)allow to make an order</li> </ul>	
<b>Actual Results</b>	

Received expected results	
<b>Status</b>	passed

Table 7: Test Case for Order Process

## 5.2.4 Evaluation

This will then follow by the evaluation of the system’s usability. This is because poor usability was one of the major drawbacks of the previous system and also helps conclude whether the development of this system was worthwhile. A questionnaire is provided to the owner, who has the administrative login access and to several customers to evaluate the success of the project.

The system was tested by the client to identify the functionality provided by the system, whether it can satisfy the operational needs of the company. By introducing the system briefly the client could understand how the system works. User Acceptance Testing was started by feeding the actual dataset to the developed system. There were some minor modifications required for the system.

The overall system was tested by the client; changing the user’s privileges. Because at the requirement gathering stage, it was stated there is a need for having all the company internal operational privileges to Administrator account. After testing the system, it had been requested to test the system using the staff members. Manager, Accountant and Sales Representative had tested the system by login to their user accounts under the direction. Some minor modifications needed were pointed out by the Accountant. When finishing their session there was a pleasant response about the system. According to the business knowledge of the client, raw material supplier’s account as well as the wholesale dealer’s account was tested. Those users who deal outside the company premises; had already informed the client about the criteria they should test in the system according to their requirements.

There were 10 attendees for usability testing. Each individual session lasted for about 10-20 minutes. 2 of the participants were from admin category and the remaining 8 participants were from staff member category.

However the test indicated several issues as well.

- 1) There are limited changes that the customers can do
- 2) Confusion with selecting timber categories
- 3) Non availability of frequently asked questions sections
- 4) Non availability of site navigation index

The following task scenarios were attempted by the participant

- 1) Amending invoice details
- 2) Amending stock details
- 3) Ordering timbers using the system
- 4) Preparing reports[APPENDIX C]

## Result of usability testing

9 of 10 participants completed task one. 8 response completed task 2. All 10 respondent completed task 3. 7 of 10 participants completed task 4. The results obtained are shown below.

### Task completion rates

Participant No	Task 01	Task 02	Task 03	Task 04
1	-	√	√	√
2	√	-	√	√
3	√	-	√	√
4	√	√	√	-
5	√	√	√	-
6	√	√	√	-
7	√	√	√	√
8	√	√	√	√
9	√	√	√	√
10	√	√	√	√
Success	9	8	10	7
Completion rate	90%	80%	100%	70%

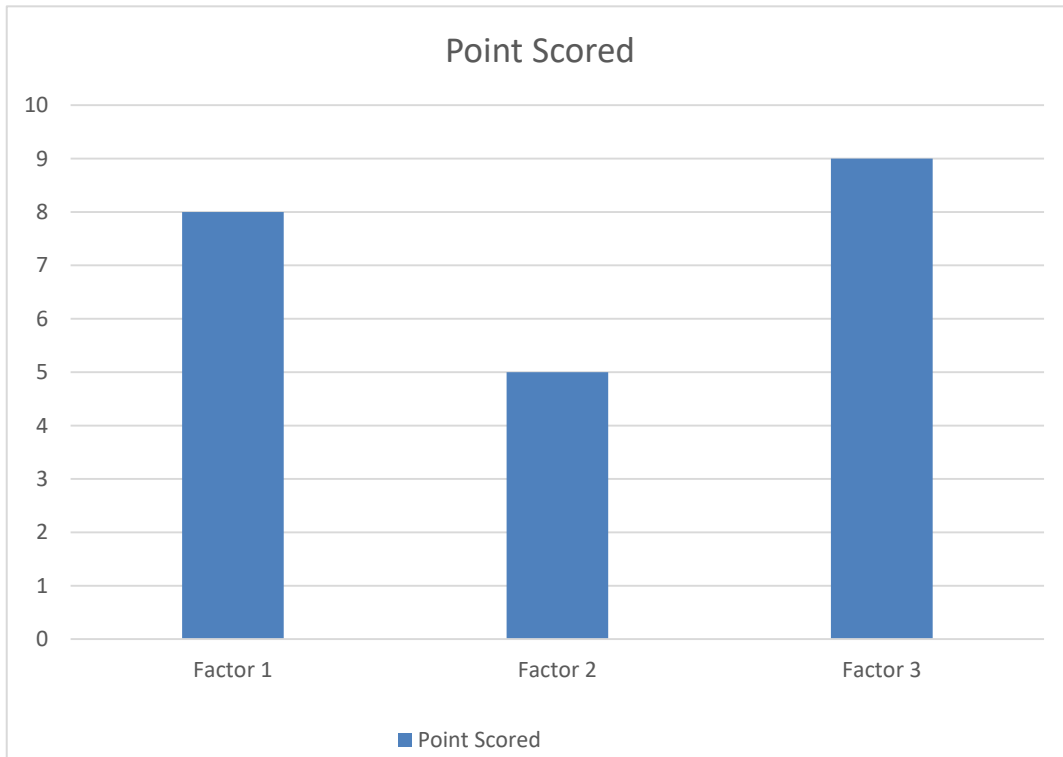
Upon completion of set of task, participants were asked to rate the ease or difficulty of completing the task for the following factors.

Factor 1: I found it easy to find my way to this specific information from the homepage

Factor 2: While searching for this specific information I was able to keep tract of where I was in the system

Factor 3: I managed to accurately predict the section of the system that contain this specific information

Figure 15: Point Scored



Answers from each participant were taken as either “yes or no” for each of the above factors the count received as yes was taken as a point scored for each factor and the results obtained are shown below.

### **Usability testing conclusion**

After completing the user acceptance testing, a positive response was received from all the users requesting for minor modifications. With the newly developed system the company could function efficiently and smoothly rather than continue using the old method, the client stated.

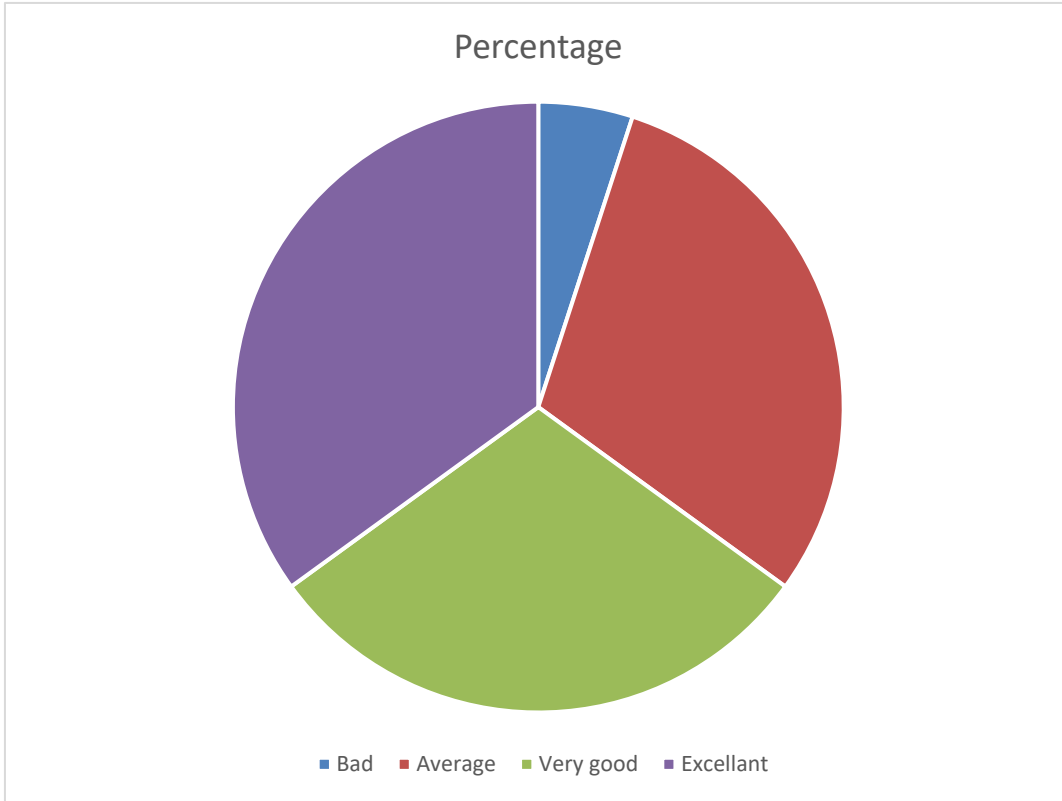


Figure 16 -Overall Feedback for User Acceptance

## **Chapter 6 - Conclusion and Future Work**

### **6.1 Introduction**

The development of the new system has helped minimize the short-falls of the existing system of Yodagama Timeber Dealers PVT Ltd. It help the management to access the employee details, Product Details, Order Details, Stock details all in one place with the help of the website. Also provide the customers with product details, to order products online. It is easy to make accurate decisions by analyzing the inventory and order details using a set of reports generated by the system. Therefore it would be concluded that the development of this system is a success and was worthwhile.

### **6.2 Future Enhancements**

This system was developed in line with the requirements requested by the client. These are some of the expansions that can be added to the system in future.

- Introducing online payments for suppliers
- Introducing online payments for customers
- Introduce serial number tracking
- Improve the system to handle shipment details

### **6.3 Lesson Learnt**

This final project helps to build a fully functional system which improves my programming skills. It gives me thorough knowledge and experience in developing a system within both theoretical and practical aspects. It also teaches to work according to a proper schedule, systematically. Thereby the importance of managing the time to submit the reports, dissertation on time is understood with the experience in working under pressure.

Theoretical knowledge and practical skills gained through this project can be listed as follows.

- Development of inter personal skills by communicating with different people when dealing with a client.
- Analyzing and drawing the use case diagrams, sequence diagrams, activity diagrams, class diagrams and ER diagrams for a real system with the help of the software draw.io
- Learning to pre design user interfaces with the help of Bootstrap Frontend framework.
- Creating databases and related functions with Navicat Premium.
- Development of programming skills by learning to code the system with the help of CodeIgniter 3.1.1.
- Learning that a template can be taken to design the webpage attractively by using JQuery
- Learning to minimize compatibility issues by using an IDE and PHPStorm.
- Learning to design test cases and test plans during the evaluation phase.



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# Appendices

## Appendix A – System Documentation

This documentation consists of a set of steps to show, how to install this web base inventory management and order processing System. These steps explain about the hardware and software environment which needs to be installed. When installing the system, this documentation can be followed by the interested parties.

### 1st Step

System requirements can be verified according to Table

Processor	3.0 GHz Intel Processor
Memory	4 GB RAM Memory Capacity
Hard Disk	40 GB Capacity
Display	1024 * 768 Resolution Monitor
Printer	Ink Jet or Laser Jet Printer
Internet	ADSL Connection

Table 8: Hardware Requirements

Software	Basic Requirements
Operating System	Windows 7/8.1/10
Web Browser	Google chrome, Firefox or any other browser
Code Editor	PHPStorm 2016.3.1
Localhost	WAMP 3.0.6
Database	Navicat Premium

Table 9: Software Requirements

### 2<sup>nd</sup> Step

- Installing WAMP
- Download and install WAMP
- Give installation path to C:\wamp of the computer.

### 3<sup>rd</sup> Step

- Files Extraction

- Open the CD and copy the Yodagama folder and paste it to the directory path “C:\wamp\www”

#### 4<sup>th</sup> Step

- Database Installation
- Open the web browser and type the URL <http://localhost/phpmyadmin/> and enter user name and password
- Create empty database by providing name as “yodagama” and navigate to the “Import” tab and click “choose file” button.
- Then browse the CD and select “yodagama.sql” file by opening the database folder
- Then press “Go” button located in the bottom of the page.

#### 5<sup>th</sup> Step

- Verify the WAMP is running properly, double click on wamp icon and verify whether all services running
- Open the web browser and type the URL localhost/yodagama and press “Enter” button
- Please refer Appendix-C User Documentation to get the idea about how to operate the system.

#### Final Step

Register your domain name and Host the website

## **Appendix B – Design Documentation**

### **Use case Diagram with Detailed information**

Following is the use case diagram in detail shown in Chapter 3. To understand it easily and clearly, it was categorized into six modules and each module explained with a small description. It is important to say that every module consists of a relevant module report.

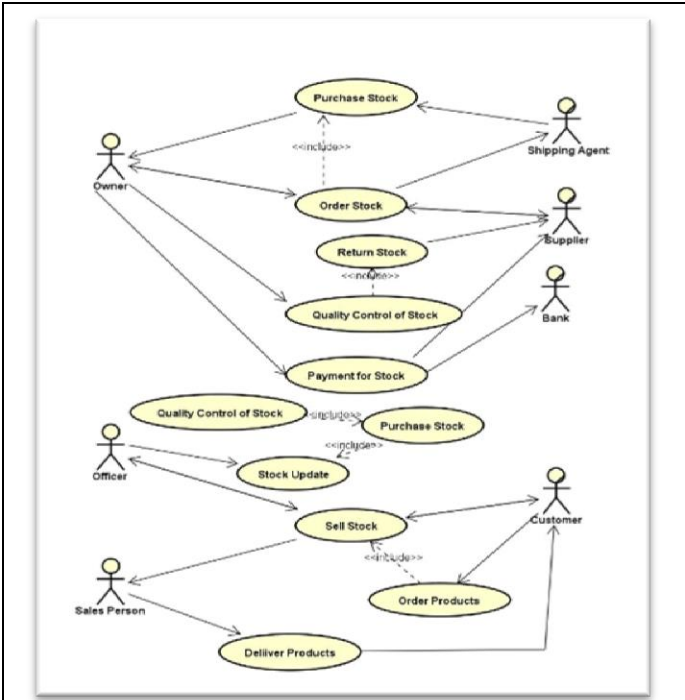


Figure17:Use Case Diagram - Current System

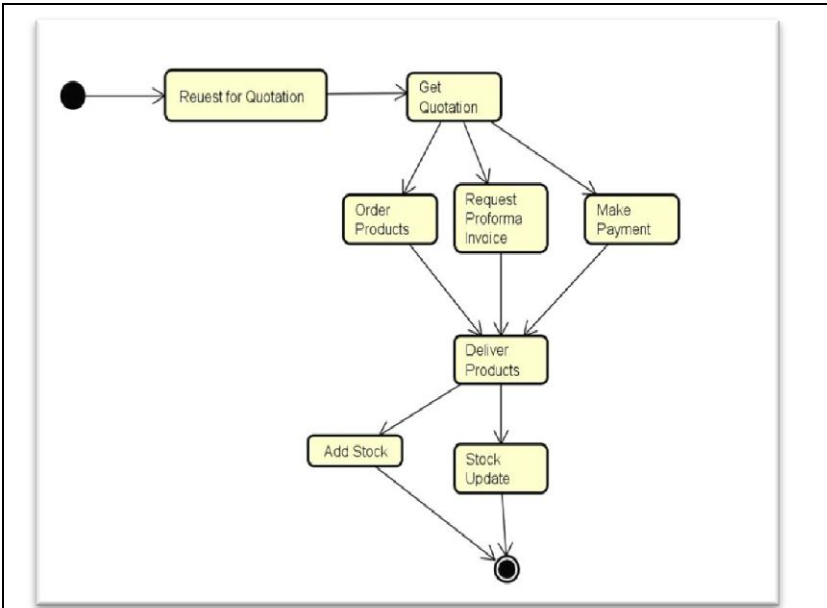


Figure18: Activity Diagram

## Appendix C - User feedback analysis

1. How did you interact with the system?

As an Admin	2
As a staff who wants place an order	5
As a Customer who wants win orders	3

2. What do you think about the system?

	Bad	Average	Very Good	Excellent
Concept	0	2	6	2
Design	0	7	3	0
Usefulness	0	3	6	1
Reliability	1	4	2	1

3. What do you think about the usability of the system?

	Bad	Average	Very Good	Excellent
How easy was it use the system	0	2	3	5
Is it productive	0	3	2	5

4. How often you actually used the system?

2	Few times a day
3	Once a day
3	Few times a week
1	Once a week
1	Once a month or less

# User Feedback Form

## User Feedback form- Yodagama Web Based System

(Mark X on correct section)

1) How did you interact with the system?

	Admin
	Customer
	Supplier

2) What do you think about the system?

	Bad	Average	Very Good	Excellent
Concept				
Design				
Usefulness				
Reliability				

3) What do you think about the usability of the system?

	Bad	Average	Very Good	Excellent
How easy to use the system				
Is it productive				

4) How often you actually used the system?

	Few times a day
	Once a day
	Few times a week
	Once a week
	Once a month or less

5) What do you think about overall experience?

--

## Appendix D - User Documentation

Users who have privileges to access the system about how to navigate within the system and how to use its functions are helped by this document. Eligibility to access the system is available to factory manager, accountant, administrator, wholesale dealer, raw material supplier and sales representative.

Different user levels are available to each and every member and different profile pages are provided for their management. The administrator's profile which has all the system privileges is described by this document.

### Login page and other functionalities

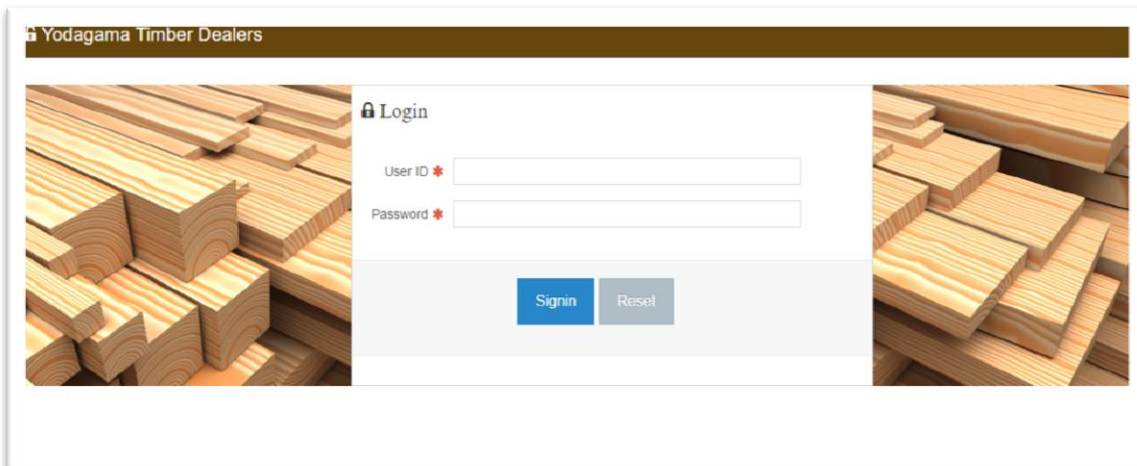


Figure 19: Login Page

After login you will get following interface



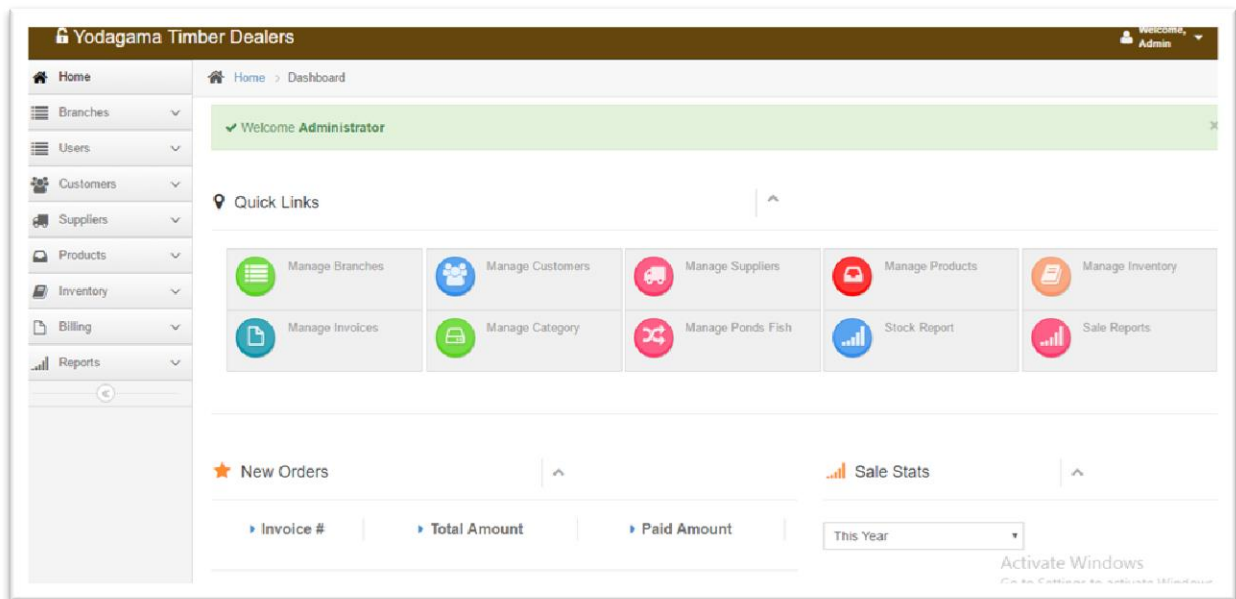


Figure 20 Switchboard

Add new branch

The image displays the 'Add New Branch' form. On the left, a partial navigation menu is visible with 'Users', 'Customers', 'Suppliers', 'Products', 'Inventory', 'Billing', and 'Reports'. The form itself contains several input fields: 'Branch Code' (with the value '1002'), 'Branch Name' (highlighted with a red border), 'Street Add1', 'Street Add2', 'City', 'Telephone', 'Mobile', 'Fax', and 'Type' (a dropdown menu). A tooltip message 'Please fill out this field.' is shown over the 'Street Add1' field. At the bottom of the form, there are two buttons: 'Add Branch' (green) and 'Reset' (grey).

Figure21:Add New Branch form

Enter compulsory fields and click submit button

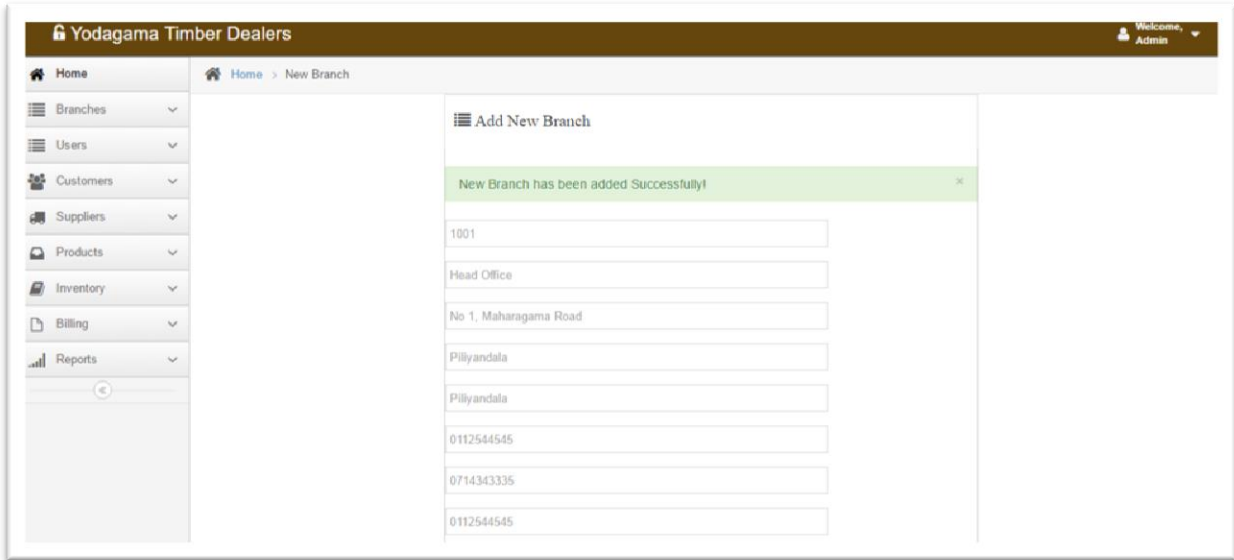


Figure22:Confirmation of Adding a new Branch

Add a new Customer

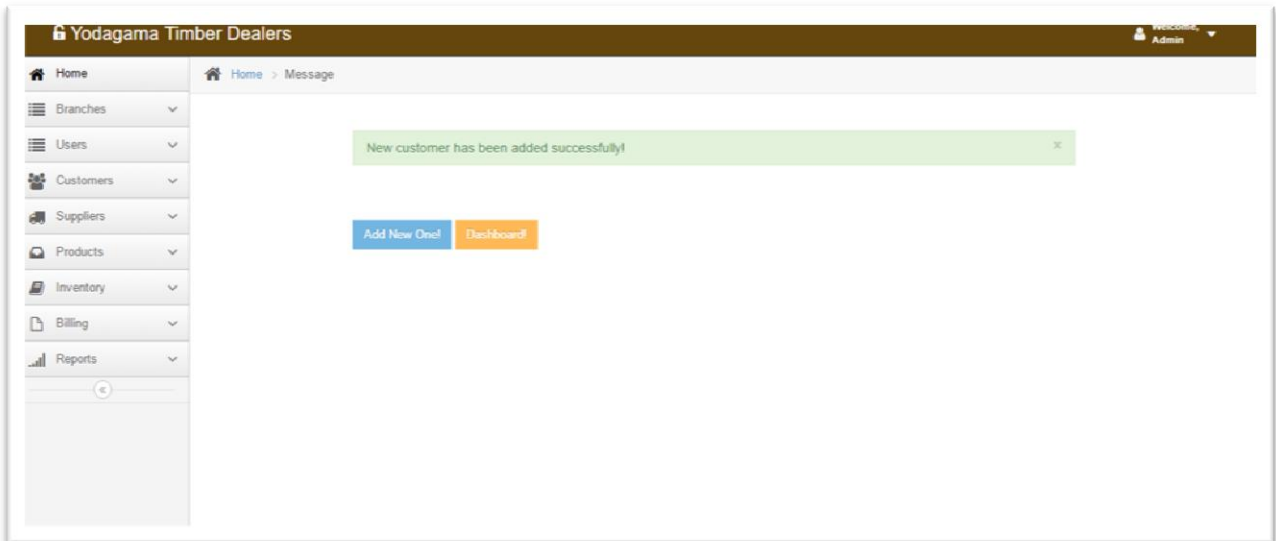


Figure23 : Add New Customer

## Add a new Supplier

The screenshot shows the 'Add New Supplier' form in the Yodagama Timber Dealers system. The form is titled 'Add New Supplier' and contains the following fields:

- Supplier Name: Malaysia Solid wood
- Supplier ID: (empty field with a red border)
- Street Add1: Lot 31, 3781 (Plot 4).
- Street Add2: Main Road, Saleng, Mukim Senai Kulai, Saleng
- City: Johor
- Country: Malaysia
- Telephone: +607-5909129
- Fax: +607-5909129
- Email: info@esewoodsdbbhd.com

The form is located in the 'New Supplier' section of the system. The left sidebar contains a navigation menu with the following items: Home, Branches, Users, Customers, Suppliers, Products, Inventory, Billing, and Reports. The top navigation bar shows 'Home > New Supplier'. The bottom right corner of the page has an 'Activate Windows' watermark.

Figure24:Add New Supplier

If you want you can continue

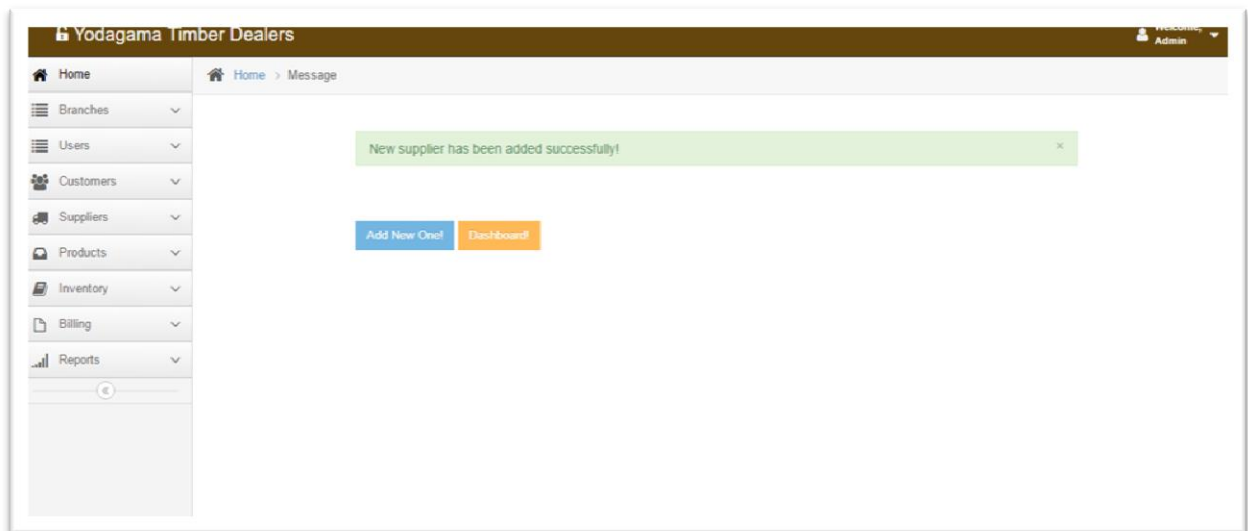


Figure25:Confirmation of Adding a new customer

Add new products after adding product groups

Yodagama Timber Dealers

Home > New Product

Add New Product

Category \* m

Medium Hardwood

Product Id \*

Name \*

Product Cost \*

Unit Price \*

Scale \* Select Scale \*

Reorder Level \* 10

Remarks \*

Status \* Enable Product

Activate Windows  
Go to Settings to activate Windows.

Figure26:Add New Products

Category should be available with database

Yodagama Timber Dealers

Home > New Product

Add New Product

Category \* plywood

No results found!

Product Id \*

Name \*

Product Cost \*

Unit Price \*

Scale \* Select Scale \*

Reorder Level \* 10

Remarks \*

Status \* Enable Product

Activate Windows  
Go to Settings to activate Windows.

Figure27:Validation of Product Category

## Enter new inventory

New Inventory

Invoice # IV20170308084018      2017-02-13      [Back](#)

Branch Code      Supplier Supplier Name \*

#	Item Code	Description	Qty	Price (RS.)	VAT(%)	TAX(%)	Total (Rs.)
	001	Tualang	10	160.00	VAT	TAX	1600.00

[+ Add Item](#)      Grand Total Rs.: 1600.00

Payment Type: Cash      Paid Amount Rs.: 0.00

Payment Note

Inventory Note

[Add Invoice](#)      [Reset](#)

Figure28:Enter New Inventory

Inventory data is added successfully

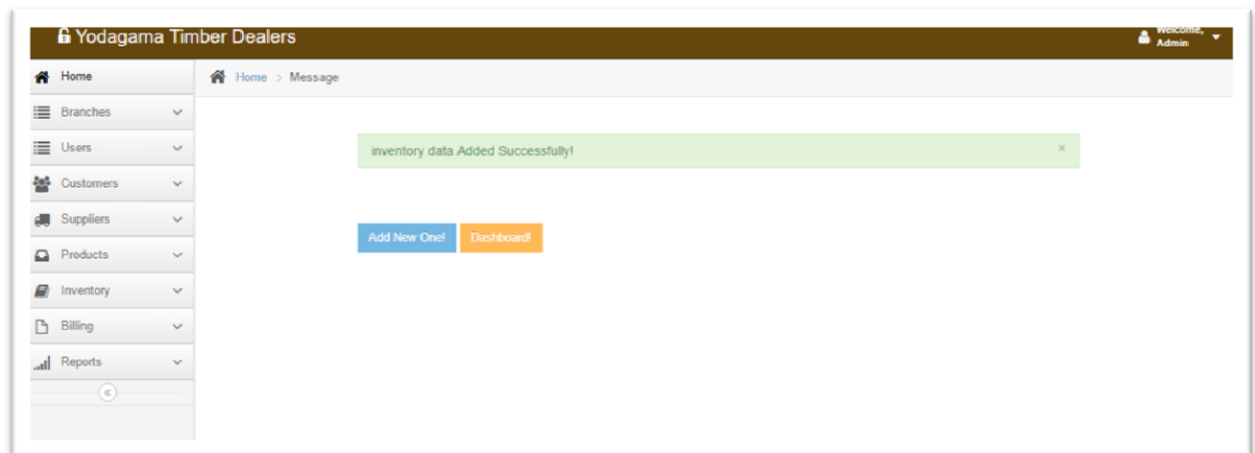


Figure29: Confirmation of inventory

## Appendix E - Code Listing

Major code fragments for anyone who is interested in referring the functionality of the system are contained in this document. Please refer the CD-ROM for the complete set of codes for the all code fragments.

## Profile Page Structure

Internal folder structure is hidden from the user or any other party with the help of this code fragment. More security is provided to the system by it. Using common page to multiple locations in other profiles is helped by it when needed.

```
<?php if ( ! defined('BASEPATH')) exit('No direct script access allowed');

class Customer extends CI_Controller {

    public function new_customer()
    {
        if($this->session->userdata('is_logged_in')){

            $this->load->view('customer/new_customer');

        }
        else {
            $this->load->view('login');
        }
    }
}
```

### Add new customer

```
public function new_customer_attempt()
{

    $this->load->library('form_validation');

    $this->form_validation->set_rules('f_name', 'First Name', 'required');
    $this->form_validation->set_rules('l_name', 'Last Name', 'required');
    $this->form_validation->set_rules('c_code', 'Customer Code',
'customer_code|is_unique[customer.customer_code]');

    $this->form_validation->set_message('is_unique', 'Customer Code already exists
!');

    //start user register
    if($this->form_validation->run()) {

        $this->load->model('customer_model');
        $this->customer_model->add_customer();

    }

    else{
        $this->load->view('customer/new_customer');
    }
}

public function new_customer_success() {

    $data['message'] = 'New customer has been added successfully!';
    $data['link'] = 'customer/new_customer';
    $this->load->view('messages/messages_success', $data);
}
```

## Manage Customers

```
public function manage_customers($sort_by = 'f_name', $sort_oder= 'ASC', $offset=0){  
  
    if($this->session->userdata('is_logged_in')){  
        $seach_key = $this->input->post('search_key');  
        $limit = 20;  
        $data['table_titles'] = array(  
            'f_name' => 'First Name',  
            'l_name' => 'Last Name',  
            'address1' => 'Address',  
            'phone' => 'Telephone',  
            'mobline' => 'Moblie',  
            'fax' => 'Fax',  
            'type' => 'Customer Type'  
        );  
  
        $this->load->model('customer_model');  
  
        $result = $this->customer_model->search_customers($limit, $offset, $sort_by,  
$sort_oder, $seach_key);  
  
        $data['customers'] = $result['rows'];  
        $data['num_result'] = $result['num_rows'];  
  
        //Pagination  
  
        $this->load->library('pagination');  
        $config = array();  
        $config['base_url'] = site_url('customer/manage_customers');  
        $config['total_rows'] = $data['num_result'];  
        $config['per_page'] = $limit;  
        $config['url_segment'] = 9;  
  
        $this->pagination->initialize($config);  
  
        $data['pagination'] = $this->pagination->create_links();  
  
        $data['sort_order'] = $sort_oder;  
        $data['sort_by'] = $sort_by;  
  
        $this->load->view('customer/manage_customers', $data);  
    }  
    else  
    {  
        $this->load->view('login');  
    }  
  
}
```

## Edit Customers

```
public function edit_customer_view()  
{
```

```

if($this->session->userdata('is_logged_in')){

    $customer_id = $this->input->post('customer_id');

    $this->load->model('customer_model');
    $this->customer_model->edit_customer_view($customer_id);

}

else {
    $this->load->view('login');
}
}

```

## Inventory model code

```

<?php

class Inventory_model extends CI_Model{

    public function getid_inventory(){

        $data['inventory_idd'] = 'IV'.date('Ymdhis');
        $this->load->view('inventory/new_inventory', $data);

    }

    public function add_inventory(){

        $inventory_idd = $this->input->post('inventory_id');
        $supplier_idd = $this->input->post('supplier_id');
        $biller_id = $this->session->userdata('user_id');
        $branch_code = $this->input->post('branch_code');
        $tax = $this->input->post('tax');
        $vat = $this->input->post('vat');
        $note = $this->input->post('note');
        $inventory_id = $inventory_idd.$biller_id;
        $itemCode = $this->input->post('itemCode');
        $itemQty = $this->input->post('itemQty');
        $itemPrice = $this->input->post('itemPrice');
        $a_date = $this->input->post('a_date');
        $payamount = $this->input->post('payamount');
        $pay_type = $this->input->post('pay_type');
        $pnote = $this->input->post('pnote');
        $limit = count($this->input->post('itemDesc'));
        $count = $limit-1;

        $this->db->where('branch_code', $branch_code);
        $q_branch = $this->db->get('branch');

        $row_branch = $q_branch->row();

        $this->db->where('s_id', $supplier_idd);
        $q_supplier = $this->db->get('supplier');
    }
}

```



```
$row_supplier = $q_supplier->row();
```

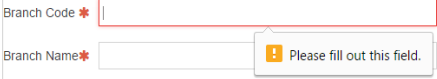
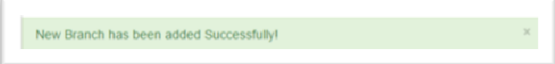

```
$supplier_id = $row_supplier->id;
```

```
for( $i = 0; $i <= $count; $i++ ){  
  
if( isset( $itemQty[$i] ) && isset( $itemPrice[$i] ) && intval($itemQty[$i] ) > 0 ){  
  
    $this->db->where('product_id', $itemCode[$i]);  
    $q_product= $this->db->get('products');  
    $row_product = $q_product->row();  
  
    //update stock  
    $this->db->where('product_id', $row_product->id);  
    $this->db->where('branch_id', $row_branch->id);  
    $query_stock =$this->db->get('stock');  
    $row_stock = $query_stock->row();  
  
    if($query_stock->num_rows()== 1){  
  
        $this->db->where('product_id',$row_product->id);  
        $this->db->where('branch_id',$row_branch->id);  
  
        $data = array(  
            'quantity' => ($row_stock->quantity + $itemQty[$i])  
        );  
  
        $query_stock =$this->db->update('stock', $data);  
    }  
  
    else if($query_stock->num_rows()== 0 ){  
  
        $data = array(  
            'product_id' => $row_product->id,  
            'quantity' => ($itemQty[$i]),  
            'branch_id' => $row_branch->id  
        );  
  
        $query_stock =$this->db->insert('stock', $data);  
  
    }  
  
}
```

Add inventory data into data base

## Appendix F – Test Results

Major test cases at the evaluation stage along with test results are contained in this chapter.

Test Id #	Description	Steps	Expected Result
1	Admin can add new branch	Click branches tab from left menu Click new branch button Select add branch button without filling compulsory fields	<p>Display following message</p>  <p><b>STATUS:</b> <b>Attempt 1: ✓ SUCCESS</b></p>
2	Admin can add new branch	Click branches tab from left menu Click new branch button Fill compulsory fields Select add branch Button	 <p><b>STATUS:</b> <b>Attempt 1: ✓ SUCCESS</b></p>
3	Admin can add new branch	Click branches tab from left menu Click new branch button Enter existing Branch Code	<p>Display following message</p>  <p><b>STATUS:</b> <b>Attempt 1: ✓ SUCCESS</b></p>