



Web Based Garment Production Monitoring System For Sumithra Garments (Pvt.) Ltd

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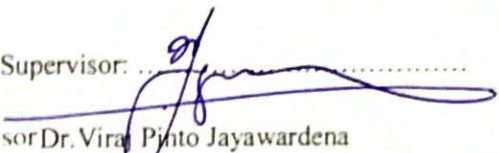
**This dissertation is submitted in partial fulfillment of the requirement of the Degree
of Bachelor of Information Technology (External) of the
University of Colombo School of Computing**

DECLARATION

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ABSTRACT

Garment manufacturing process is depends on various steps and techniques & this process is vertically integrated with the buyer's distribution centers as well as selling outlets. Hence this process receives a lot of attention from the buyer. Therefore garment production is done based on the guide lines & requirements given by buyer.

Once the consignment reached to customer's distribution centers, they conduct final inspections according to the quality standards and packing rules. In case if they found any quality deviation, mix packing or shipment delaying, buyers have the right to reject the total consignment & charge back the loss of sales. The current system is quite complex and difficult to manage due to use of hand written documents and spreadsheets. When management wants to know the current statues of production, it's hard to get an idea due to the details are not gathered at real time.

With regard to the above discussed process, management is required a tool which they can see the current status of each section / stages. Therefore proposed system will cover the following areas & it will help to efficiently monitor the production process & minimize the rejections.

The garment production monitoring system has been developed based on the Rational Unified Process (RUP) framework.

C# which is an object oriented language has been selected as the programming language to implement this system and Microsoft visual studio has been selected as IDE (integrated development environment). Further SQL server database has been selected the database to store the data of the system. Further this system has provided automation of the processes and become an aid to face the competition and future forecasting about the business.

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LIST OF ACRONYMS

IDE	-	Integrated Development Language
IIS	-	Internet Information Services
JAD	-	Joint Application Development
RAD	-	Rapid Application Development
RUP	-	Rational Unified Process
SDLC	-	Software Development Life Cycle
MIS	-	Management Information System
ASP	-	Active Server Pages
SQL	-	Structured Query Language
GB	-	Gigabyte
MB	-	Megabyte
HTML	-	Hypertext Mark- up Language
1NF	-	First Normal Form
2NF	-	Second Normal Form
3NF	-	Third Normal Form

1 INTRODUCTION

1.1 INTRODUCTION

Production is the most important part of garment exporting & this process has integrated with the buyer's distribution centers & selling outlets as well. Hence this process receives a lot of attention to the buyer.

Once the consignment reached to customer's distribution centers, they conduct final inspections according to the quality standards and packing rules. In case if they found any quality deviation, mix packing or shipment delaying, buyers have the right to reject the total consignment & it directly affect the company expenses and cash flow. Therefore production monitoring system becomes an important fact in a company.

Sumithra Garments (pvt) Ltd is a Sri Lankan Apparel Manufacturer an Exporter of Woven Apparel Products to the world, which is having manual paper based system currently in order to handle the day to day activities. This developing system will help to increase the competency and efficiency of their work, by reducing the heavy paper work. Further they can maintain and manage their day to day activities effectively and efficiently.

1.2 MOTIVATION OF THE PROJECT

Management of Sumithra Garment (Pvt) Ltd. has shown their interest of introducing a Web Based Garment Production Monitoring System. They also want a system which can process the information about the garment products as well as monitor the input and output of the production. The current system is spread over many different applications such as spreadsheets and word documents. However, the main way of capturing and

processing the data is done on manually. (paper-based system) The following problems have been occurred in the existing manual system.

- The current system is quite complex and difficult to manage due to use of hand written documents and spreadsheets. When management wants to know the current statues of production, it's hard to get an idea due to the details are not gathered at real time. Also it is an inefficient and time consuming method. But when they use the proposed System, they can efficiently manage production process& monitor the statues in real time.
- There is no proper mechanism to manage production details, buyer's details and their purchase order details separately
- There is no systematic way to generate daily, monthly reports. Because of that it will cost more time to achieve that task and the calculations won't be accurate too. The paper based system gives less accuracy of the information and takes more time to process
- Facing many difficulties when sending garments to other locations for washing & embroidering, There is no systematic way to track how many garments sent & received, and How long it take for washing & embroidering

To overcome the above mentioned problems, the garment production monitoring system is emerged. It will minimize the time and cost that will have to spend for the operations in the company. Further, it can improve the efficiency and the productivity of their services, so that, they can also provide a better and a reliable service for their customers. Also with the help of new system, management can analyze the details with previous details.

1.3 OBJECTIVES OF THE PROPOSED PROJECT

Management of the Sumithra Garment (pvt) LTD is required a tool which they can see the current status of each section / stages. Therefore proposed system will cover the order replacement & all areas in production & it will help to efficiently monitor the production process & minimize the rejections.

1.4 SCOPE OF THE PROJECT

Proposed system will cover the following areas & it will help to efficiently monitor the production process & minimize the rejections.

- **Record & Manage Order Details**

The overall aim of this section is to gather information regarding the order details.

- Insert order details such as style, buyer, purchase order details.
- Insert Daily Plan (Daily Production Target)

- **Record Daily Production Input & Output**

It's very vital that monitoring the daily production statues such as daily input & output for smooth delivery flow in apparel manufacturing industry. Therefore, management wants to check daily production status continuously and following questions are always raised.

- How many garments are made last production day by each line? Compare actual production with budgeted production given to the floor in-charge and line supervisors.
- What were the issues for low productions? Why too much quality issues?

Based on the proposed Garment Production Monitoring System, management can get the following reports & these reports will help to find the answers for their questions.

- Insert line wise production input & output
- View production output details
- Record sewing issues & reasons for that

- **Record Input & Output Garments in Finishing Section**

In apparel industry, finishing section involves with garment washing, checking, final inspection, pressing, etc. Proper finishing process can improve quality of garments and make on time order shipment. Garment shipments are very much dependable on Garments finishing section. Finishing section add value to the product which attracts customers by the presenting activities of the product according to buyer's requirements.

- Insert input & output garment count to the Finishing section
- record sewing defects
- Track the washing send garments, & received garments from washing plant
- Create Washing Dispatch Notes & Get the print out of a report.
- Create input, output, WIP garment count report
- Create Washing Plant In & Out Report

- **Record & Manage Product Information**

When garments arrive to the packing section, Quality checkers do the inspection and hang the swift tag (with barcode). After hanging the swift tag, then fold it and put in to the poly bag and stick the barcode sticker. The Barcode details are varying from customer wise & these details are provided by the customer (Buyer). It needs to ensure the placement of

sticker in correct placement for scanner to read. The barcode contains buyer details, style #, Color, Size & Box end barcodes are contained the destination details too.

The proposed system will track all the details about the barcode and this function will help to manage the information of the readymade garments (garment products) using barcode stickers, such as Product description, style number, color, size etc.

- Insert product details with the relevant barcode.
- View Product details by searching in various sections.
- Make changes to a product details and delete unwanted records

• **Manage Garment packing Input**

The garments ticketed with the barcode tag will reach to the final packing section through the Needle Detector Machine (Metal detector) & it's checking the metal type components in the garments or its accessories like button, zipper etc. The scanner will individually collect the information through the barcode tag from each garment received to the finishing section & the system will provide a report for each input and packed style. The system will handle this information and will be useful when counting the garments.

- Insert garments using barcode scanner with categorizing such as buyer, style, etc.
- Remove the incorrect inputs.
- View all input garments with buyer, style, color and size wise categorization.

• **Ratio Management**

All the garments must be placed in the predetermined pack by sorting according to the style, color and size. The system has the ability to insert predetermined packing ratios and also it can add how many times repeat it.

- Add new ratios such as Ratio A, Ratio B
- Add repeated times as Ratio A: 45, Ratio B: 5
- Delete the Ratios.
- View Ratios according to the style, color, size, etc.

- **Garment Packing**

Once the garments are assorted as per the ratios given, next step will be placing inside the cardboard boxes which called as cartooning & this process also carried out according to the predetermined ratios. The system provides facility for packers to check the number of garments to be packed in each box & also they are able to collect details of which color to be packed in which sizes.

The system will determine the style, color and size of the garment when scanning the barcode. To use this function, there are specified users & these users are only having the privilege to pack the goods.

- Can pack the garments according to the predetermined ratios.

- **Style Summary Report**

System will provide a report for each input & packed style. It will show buyer order quantity, Input quantity, packed quantity per style. These information will useful for management when getting decisions.

- **Packing List**

Packing list is the document that includes details about the packed goods. The packing list intended to let transport agencies, government authorities know the contents of the shipment and also foreign buyer can determine the total shipment content, weight, volume

and whether the correct cargo is being shipped. The proposed Web Based Garment Production Monitoring System has a facility to automatically generate this packing list.

- Insert packing details such as weight of package, cartoon measurements.
- Get the print out of a report.

- **Shipment Complete:**

The proposed system will track the shipment completed style after the completion and generate email to the relevant parties.

1.5 OUTLINE OF THE CHAPTERS OF THE DISSERTATION

This Dissertation provides the overall knowledge about the Garment Production Monitoring System. Dissertation structure as follows

Chapter 02-Analysis

This chapter explains the requirement gathering techniques, details of the manual system, functional nonfunctional requirements and details of the existing systems.

Chapter 03-Design

This chapter explains the use case diagram of the proposed system, database design of the system and main interfaces of the system.

Chapter 04-Implementation

This chapter explains the hardware software requirements, development tools which is used for system, code features and reused existing codes of the system.

Chapter 05-Evaluation

This chapters explains the techniques of testing, details of software testing, high level test plan of the system and client evaluation of the system

Chapter 06-Conclusion

This chapter explains the future enhancements of the system and lesson learnt of the overall project work.

Appendixes

These are provided further details about the content of the dissertation chapters which were not included in the chapters.

2 ANALYSIS

2.1 INTRODUCTION

System analysis is one of the main phases in the software development life cycle. System analysts will help to get an overall image of the system and will be able to produce a high level description of the system through this phase. Main objectives of this phase are what services system should provide, required performance of the system. Before analyzing the system, first the requirements should be gathered by using the fact finding techniques, such as interviews, observations, sample documentations etc [1].

2.2 SIMILAR SYSTEMS

There are lot of garment factories in Sri Lankan garment export industry. When considering the garment production monitoring systems for a garment factory And they are used various kinds of processes & systems.

Software modules are also available such as FAST REACT, PRIORITY, ROYAL 4 ENTERPRISE etc. But these modules are high cost and may not match with the client requirements. There were bulks of unnecessary functions which are not related to the proposed system, so that the best option is to make bespoke software to match with the client's requirements.

2.3 FACT GATHERING TECHNIQUES

Gathering client's requirements by using the fact finding techniques are the most critical part in the analysis phase. When gathering the requirements, there should be a proper way to handle these techniques. There are several fact finding techniques which can be used to collect the clear and accurate information. In this project facts were gathered by using following techniques.

1. Interviews

2. Observations
3. Sampling and documentation.

When we are gathering requirements using sampling and documentation, it would help to get a clear idea about the system. We selected some sampling documents such as daily production output report, packing ratio sheets, efficiency report, packing list in order to gather the client requirements.

Interviews are the most commonly used technique in requirements gathering. Information was collected from the management through face to face interactions. When we carried out interviews we used both structured way and unstructured way. It was a great aid to clarify and verify the facts. Feedbacks and questions were also gathered through these interviews. It becomes greater advantage to this project.

The existing system was observed to understand the complex areas of the system since the current system is a manual system. Further we gain more information about order placement, production process etc. through this observation.

2.4 ANALYZING THE CURRENT MANUAL SYSTEM

As the first step of placing the order with the vendor / manufacturer, buyer will issue purchase contract with the details of product, agreed prices, quantity & color details, agreed delivery dates & other terms.

Once the purchase contract receives from buyer, internal planning & operation team will start the planning process. Through the planning process, planning team will plan required number of workers, number of machines, number of working days as well as required number of production lines to execute the order.

While the planning team is working on planning process, MIS (Management Information System) team is starting on order creation.

Once the order creation & planning has completed, development merchandising team will start developing sample, fabrics, & other raw materials.

After completing the initial development works, bulk merchandising team will start ordering the raw materials. Upon receipt the ordered raw materials from suppliers; Factory warehouse team will store the goods according to the customer wise, style wise.

After completing all the pre production works, planning & operation team will give the go ahead to start the fabric cutting. Then cut components will issue to the production lines as per the plan. Through the sewing process, cut components will assemble and product will finish at line end. Once the sewing completed, finished product will send to the washing plant to add the washing treatments. Thereafter garments will back to the finishing section to add the final finishing touches.

The finished garments will dispatched to packing section to pack the garments for shipping purpose. The packing will be based on the buyer's requirement such as ratio pack, mixed pack or solid pack. The final product will shipped to customer in either way of boxes or GOH (garments on hanger).

Once the consignment reached to customer's distribution centers, they conduct final inspections according to the quality standards and packing rules. In case if they found any quality deviation or mix packing, buyers have the right to reject the total consignment & charge back the loss of sales.

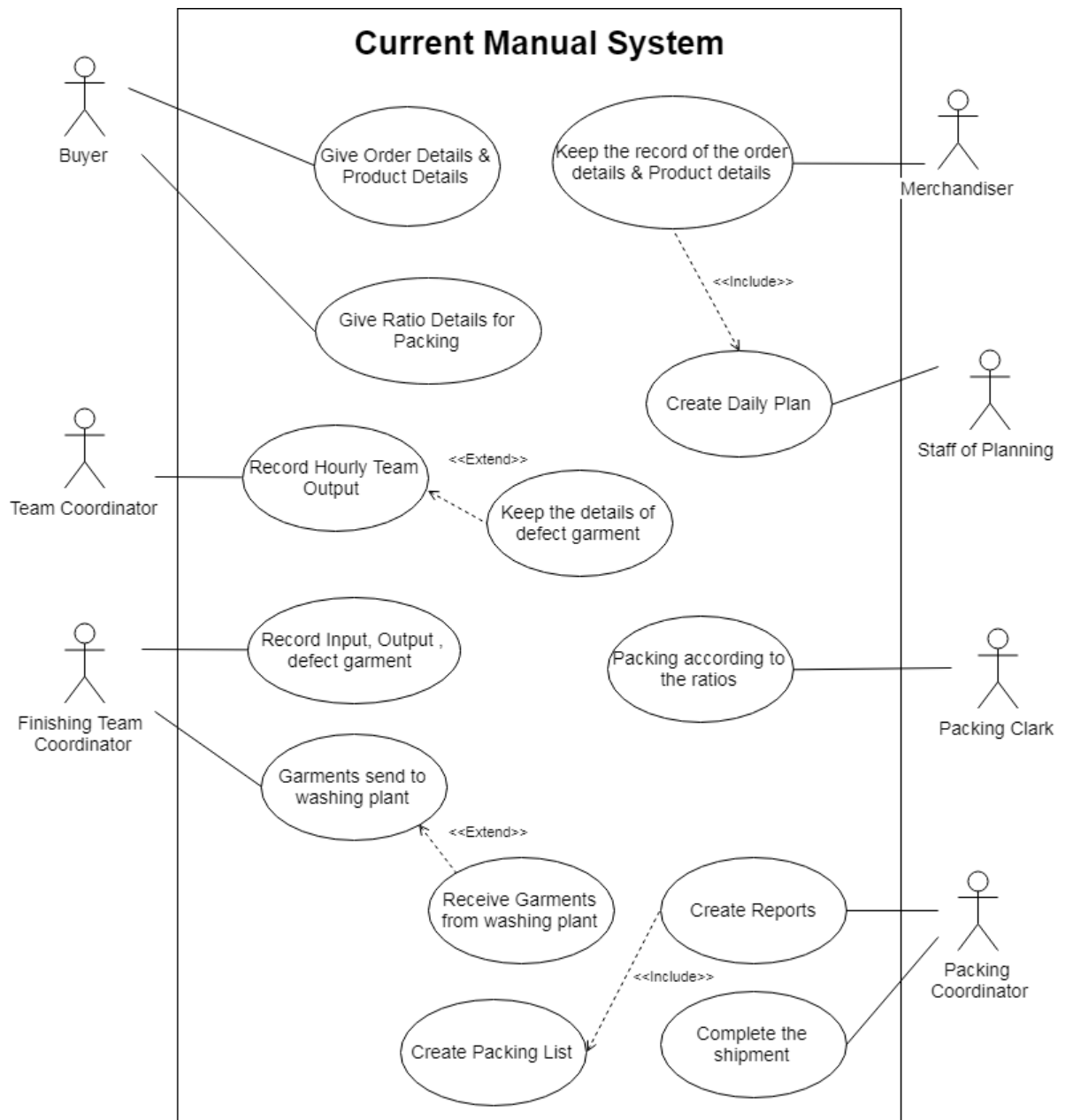


Figure 2:1 : Use Case Diagram of Manual System

2.5 FUNCTIONAL REQUIRMENTS

What the system is supposed to achieve, is known as functional requirements. Functional requirement can be a calculation, technical detail, etc. Following are the functional requirements that have been identified through the system analysis [2].

1. Order Placement Module

- User can be able to insert, delete, update, view and search style details, buyer details, and purchase details.
- User can be able to generate reports of all information.

2. Daily Production Capturing Module

- User can be able to insert, delete, update, view and search Daily Production Plan details
- Insert, delete and view section wise hourly production output & sewing issues & reasons for that
- User can be able to generate report of all information

3. Dispatch for Washing Plant Module

- User can be able to insert, delete and update the details of washing send garments
- User can be able to generate dispatch notes and other reports such as WIP (Work In Progress) garment count report , washing in & out report

4. Product Information & Ratio Management Module

The proposed system will track all the details about the barcode and this function will help to manage the information of the readymade garments (garment products) using barcode stickers, such as Product description, style number, color, size etc.

- Insert, update and delete product details with the relevant barcode
- View Product details by searching in various sections.

- Insert, delete, update & view ratio details

5. Packing In Garments Capturing Module

- Insert, In garment count using barcode scanner with categorizing buyer, style, etc.
- Delete the incorrect inputs
- View all input garments to packing section with buyer, style, color and size wise categorization
- User can be able to pack the garments according to the predetermined ratios.
- User can be able to generate packing list

6. Shipment Complete Module

- User can be able to update the system as shipment complete
- User can be able to generate reports of all information.

2.6 NON FUNCTIONAL REQUIRMENTS

Non Functional requirements are also important facts which we need to consider when developing the system. Non functional requirements describe the system properties and constraints of the system. Those requirements are applied to the whole system, not only for the individual parts of the system. If we do not consider about nonfunctional requirements system can be useless [3].

1. Security

System should be achieving the security requirements. Because most of the important details- order details, style details, buyer details are stored in this system. If that information is misplaced, then it will be a huge problem when

dealing with the customer companies. Further system is also providing security through the user management.

2. Usability

Usability requirement has been achieved by using various techniques such as easy menu navigation, searching options, attractive interfaces and use of matching colors.

3. Accuracy

Accuracy is an also important nonfunctional requirement which we need to consider. If we do not consider about the accuracy, database problems can be occurred. By applying validation techniques to the user input data accuracy has been achieved in this system.

3 DESIGN

3.1 INTRODUCTION

In software designing, System should have good design before implementing. System design provides the detail and description of the system including components, interface, modules, architecture and data [4].

System designers may use various system design approaches. Such as modern structured design, information engineering, prototyping, JAD, RAD and object-oriented design.

Object-oriented designing is the widely used approach in modern software designing. The work has done in a project can be easily reuse than in the other approaches. Also when doing the coding will be easier to write, easier to understand and will contain fewer errors.

3.2 SYSTEM DEVELOPMENT LIFE CYCLE

The system development life cycle is a process that describes the activities performed at each stage of a software development project. It consists of a detailed plan describing how to plan, design, implement and test the system. The objective of the SDLC is producing the high quality software. There are various SDLC methodologies/models such as waterfall, Agile, incremental etc.

3.3 METHODOLOGY FOR PROPOSED SYSTEM

RUP (Rational Unified process) has been selected for the proposed system. Reasons of selecting RUP are it is an iterative software development process framework and it supports object oriented development. Initially client does not have a clear idea about system requirements, so requirements may likely to be changed. Further system has been

divided into modules such as Order Placement module, Daily Production Capturing module and Ratio Management module etc. Each module has developed incrementally and iteratively. Therefore RUP is the most appropriate SDLC (Software Development Life Cycle) methodology. Inception, Elaboration, Construction and Transition are the main phases of the RUP lifecycle. Brief description is given below [5].

❖ **Inception Phase**

In this phase business case is defined and the procedural approach that is to be taken to implement the project.

❖ **Elaboration Phase**

In this phase create the project plan and construct an architectural baseline that implements a working application with limited functionality.

❖ **Construction Phase**

In this phase finish development based on the baseline architecture

❖ **Transition Phase**

In this phase supply the system to its end users.

3.4 OBJECT ORIENTED DESIGN

Object-oriented design is concerned with developing an object oriented model of a software system to implement the identified requirements. The main goal of this design approach is defining objects, defining objects and establishing relationship between classes by sending and receiving messages [6].

Object oriented design is a method which is used to collaborate objects and attributes and methods of their objects. Unified Modeling Language is the widely used designing tool to perform objects oriented designing. Unified Modeling Language depicts the model of the objects. This design approach is very efficient way to implement designing phase.

3.4.1 USE CASE DIAGRAM FOR THE GARMENT PRODUCTION MONITORING SYSTEM

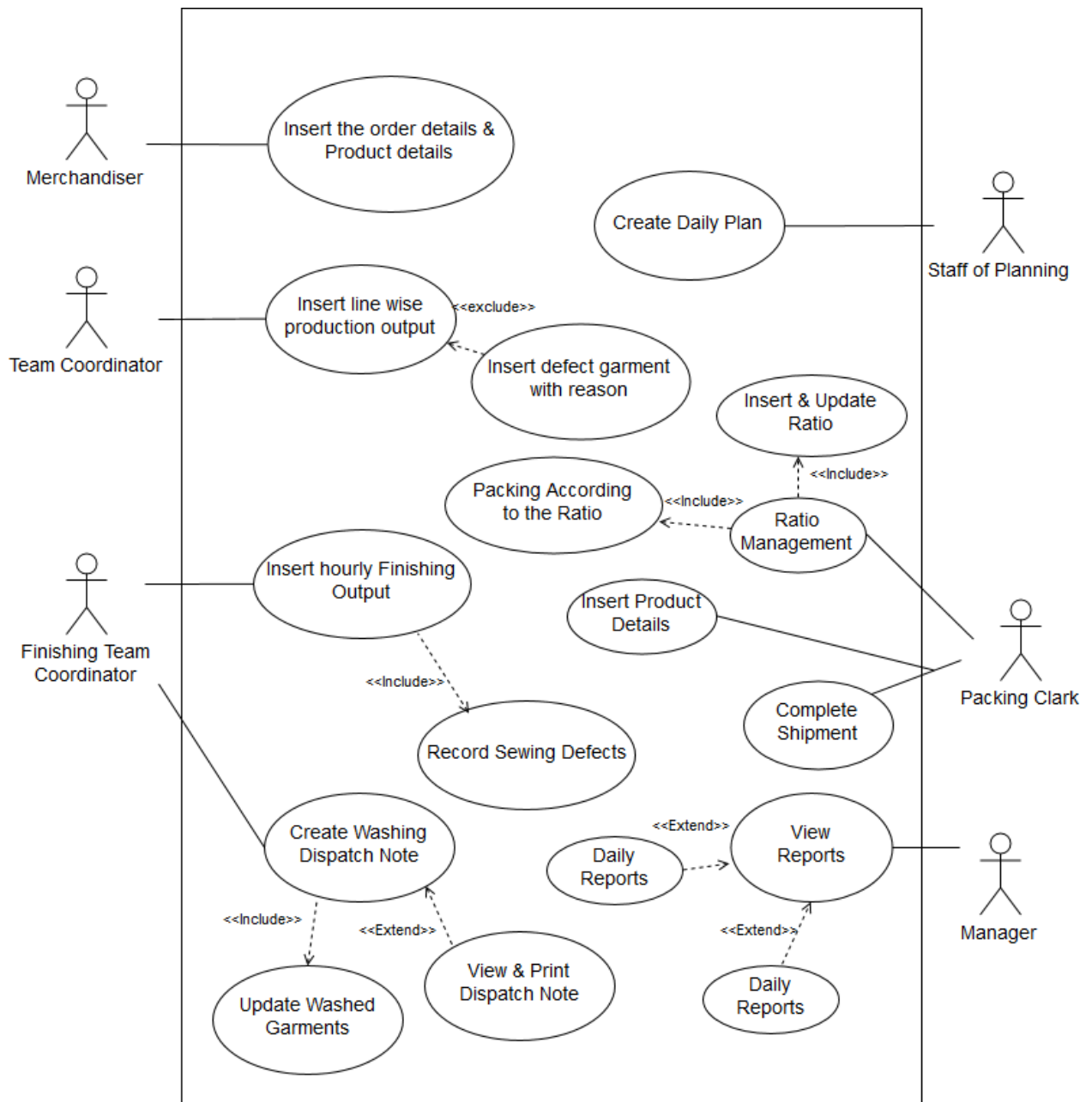


Figure 3:1 : Use Case Diagram for The Garment Production Monitoring System

3.4.2 ER DIAGRAM FOR THE GARMENT PRODUCTION MONITORING SYSTEM

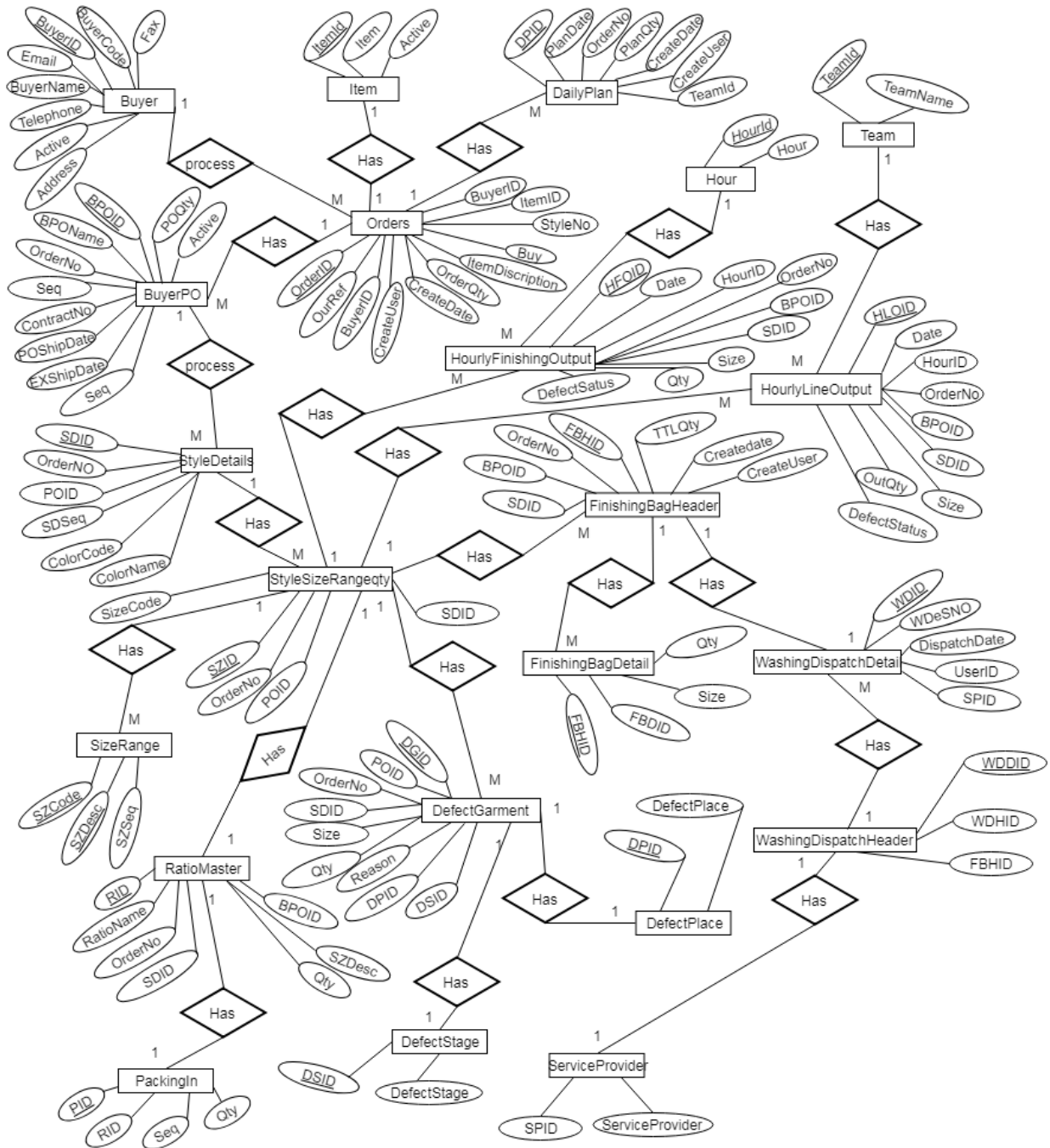


Figure 3:2 : ER Diagram For The Garment Production Monitoring System

3.5 DATABASE DESIGN

Database design is the process of producing a detailed data model of a database [7] . There are three main phase in the database design conceptual design, logical design and physical design. Figure 3.3 represent the table structure of the database for proposed system is given below.

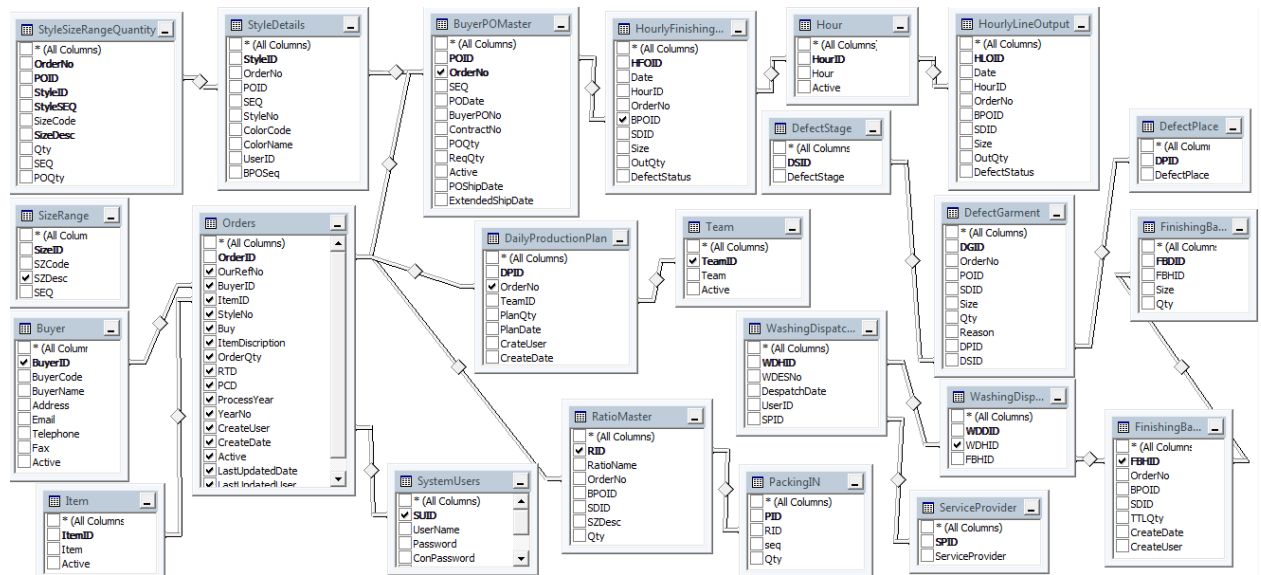


Figure 3.3 : Database Diagram

Valuable data can be kept in a proper order without losing them by a better database design. The above mentioned goal can be achieved by the database normalization method. Reduction of data redundancy and keeping consistency of the database is helped by it.

Normalization consists with several normal form stages with different goals. They are First Normal Form (1NF), Second Normal Form (2NF) and Third Normal Form (3NF). Database for the system has normalized up to the Third Normal Form.

3.6 INTERFACE DESIGN

Among all the major components of the system, a major role of the system is played by user interfaces. Interactivity in between system and the user is managed by the interface. User friendliness, integrated color combination and the well-organized components are dependent on it.

Without having a user friendly interface, interaction with the system becomes hard. Privileges must be set by the System Administrator to users in different ways. Management of those privileges and presenting them effectively to users is helped by the interfaces.

There are several actions were taken in order to ensure the good and user friendly interfaces throughout whole system.

- Eye friendly colors were used for this system.(e.g. light blue were used)
- Tab indexes were used for easily navigation
- Enter button of keyboard has used for the enter details instead of mouse click in order to increase the effectiveness of the system
- Meaningful names and texts were used for button, forms and labels for increase the effectiveness of the system
- After saving, updating and deleting record, every form should show the successful message. Figure 3.4 and Figure 3.5 shows the message using to inform saving of record.

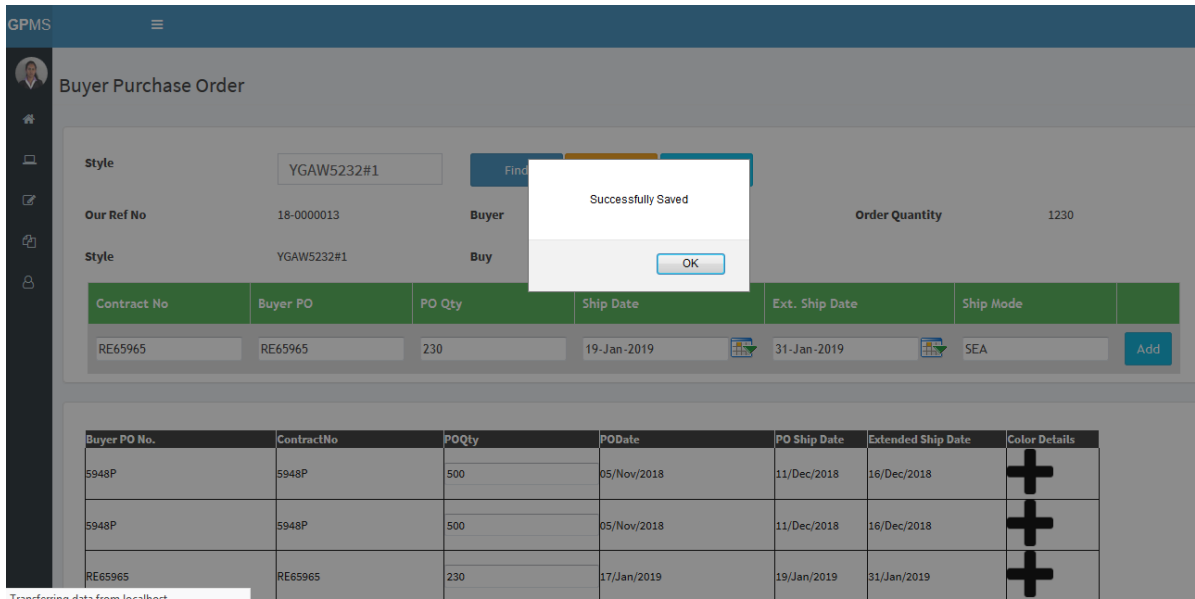


Figure 3:4 : Successful Insert Message

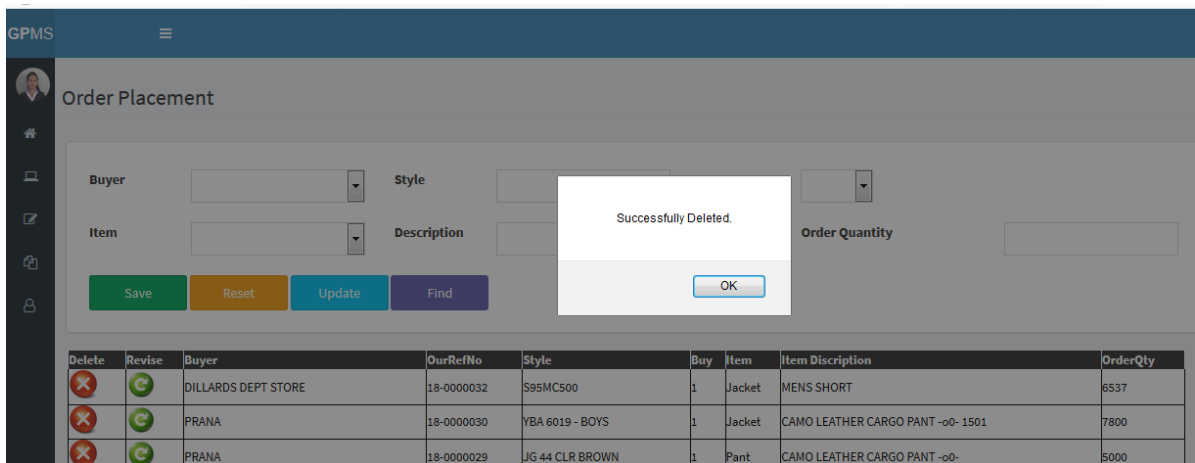


Figure 3:5 : Successful Delete Message

- System has provided meaningful error messages when fields are empty and when user enter invalid value. Figure 3.6 and figure 3.7 show empty value error message and invalid value (value is not in correct format) error message respectively.

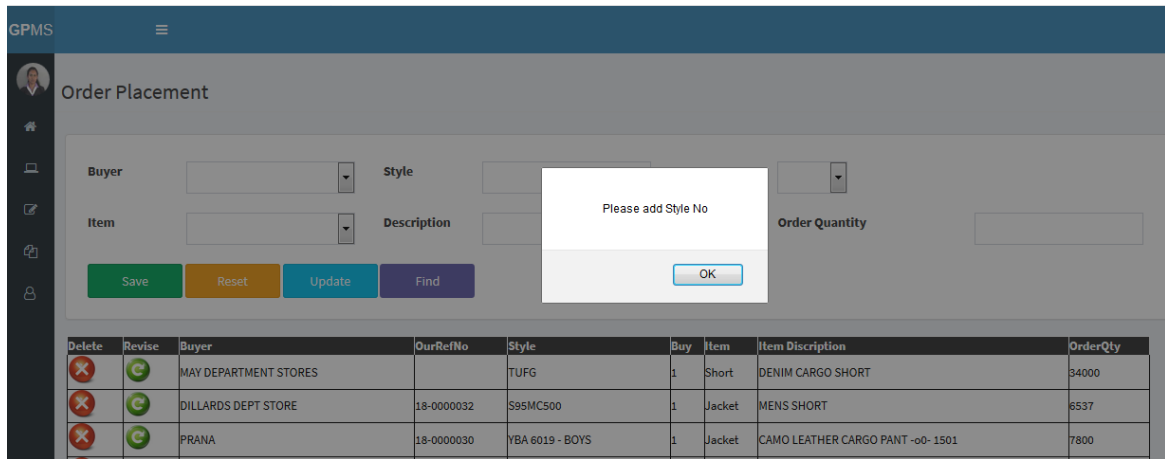


Figure 3:6:Empty Value Error Message

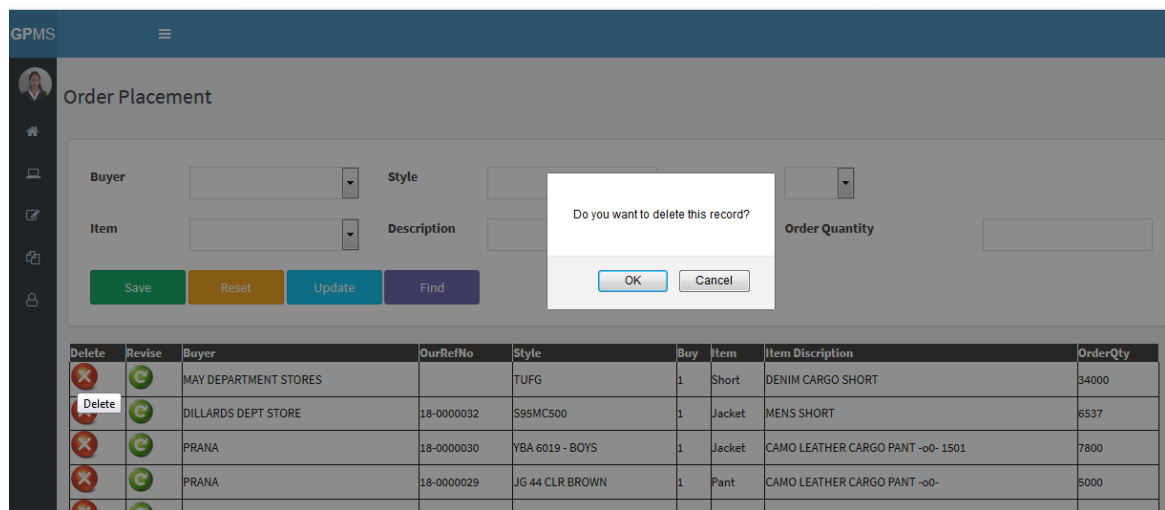


Figure 3:7 : Delete Confirmation Message

3.6.1 Login Interface

The system login page which belongs to the developed system is displayed by figure 3.8. In any computerized system the first interface encountered by the user is the login page. Therefore, by designing and handling errors properly a pleasant feeling about the rest of the system can be created within the user.

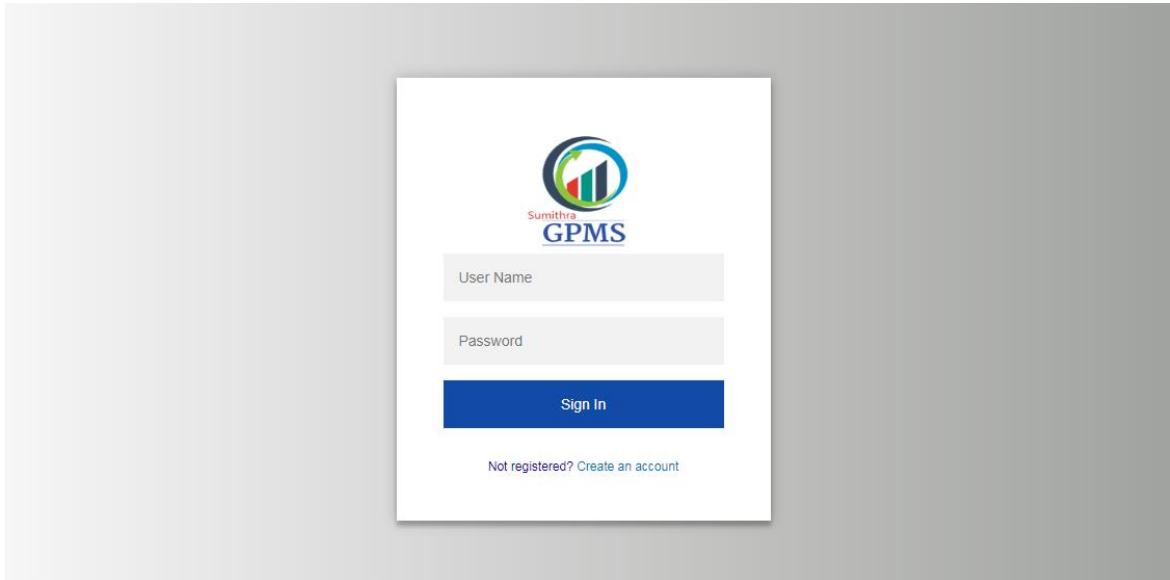


Figure 3:8 : Login Page

3.6.2 Order Placement Interface

Figure 3.9 represent the order placement page which can store the details of orders according to the buyer's requirements. This page facilitated to store order details such as style no, buyer details, item details. User can view last inserted order details easily. Further all insert, delete, update and clear function can be made in one page. So that user can easily manipulate and view data easily.

GPMS
Order Placement

Buyer

Style

Buy

Item

Description

Save

Update

Reset

		Buyer	OurRefNo	Style	Buy	Item	Item Discription	BuyerID	ItemID
		Next Manufacturing	18-0000016	Hanaa	1	Jacket	-	12	1
		Tex Corp Private Limited	18-0000015	kjinaikj	2	Short	Mens Short	3	3
		Next Manufacturing	18-0000014	HA464	1	Jacket	long sleeve jacket	12	1
		NOR Lanka	18-0000013	YGAW5232	1	Jacket	mens pant	9	1
		SUPER DRY	18-0000012	YGAW5232	1	Short	Mens Short	11	3
		LEADER DAY LANKA (PVT) LTD	18-0000011	W01PT26	1	Skirt	Short Skirt	5	4
		MARK & SPENCER	18-0000010	THG 0012	1	Jacket	long sleeve jacket	8	1

Figure 3:9 : Order Placement Page

3.6.3 Daily Production Plan

Figure 3.10 represent the page which can entering the daily production plan. Lot of functions has included to this page. Such as check availability, multiple style entering and style validating function. When selecting the date and click search button automatically displays previously entered plan for the requested date. Further all insert, delete, update and clear function can be made in one page. So that user can easily manipulate and view data easily.

GPMS

Daily Production Plan

Date

Search

Save

Reset

Select	Team	Style	Plan Qty
<input type="checkbox"/>	Team 1	<input type="text"/>	0
<input type="checkbox"/>	Team 2	<input type="text"/>	0
<input type="checkbox"/>	Team 3	<input type="text"/>	0
<input type="checkbox"/>	Team 4	<input type="text"/>	0
<input type="checkbox"/>	Team 5	<input type="text"/>	0
<input type="checkbox"/>	Team 6	<input type="text"/>	0
<input type="checkbox"/>	Team 7	<input type="text"/>	0
<input type="checkbox"/>	Team 8	<input type="text"/>	0
<input type="checkbox"/>	Team 9	<input type="text"/>	0
<input type="checkbox"/>	Team 10	<input type="text"/>	0

Figure 3:10 : Daily Production Plan Page

3.6.4 Production Line Output

GPMS

Production Line Output

Style

HA464 - 1

Buyer PO

2641664

Color

Pink

Team

Team 2

Save All

Reset

Defect Garments

Defect Correction

SEQ	Size	Line Out Qty
1	S	0
2	M	0
3	L	0
4	XL	0
5	XS	0
6	XXS	0

Figure 3:11 : Production Line Output Page

4 IMPLEMENTATION

4.1 INTRODUCTION

This is the phase that software becomes executable. In this phase software is developed according to the detail design based on the client requirements. Implementation phase is a very time consuming phase in the software development life cycle. The main objective of this phase is transforming the detail design into executable format effectively. When coding the system, using comments is a very important thing to consider, because if we want to rework and change the code it is easy to maintain it. Validation is also an important thing to consider while we programming. Further code should be readable.

C# which is an object oriented language has selected as a programming language to develop the web based garment production monitoring system. The selection of implementation platform has been made easier by further education on C# language and the willingness to work.

4.2 HARDWARE AND SOFTWARE REQUIREMENTS

4.2.1 Hardware Requirements

- ✓ 500 GB Hard Disk
- ✓ 4GB RAM
- ✓ Barcode Reader
- ✓ Printer
- ✓ Intel Core i5 Processor 2.50GHz

4.2.2 Software Requirements

- ✓ Microsoft Windows 7 Professional
- ✓ Microsoft .NET Framework 3.5
- ✓ Microsoft SQL Server 2008

Although Garment Production Monitoring System was developed with above configuration, the system is fully compatible with windows XP and windows Vista.

4.3 DEVELOPMENT TOOLS

4.3.1 Microsoft Visual Studio 2012

Microsoft Visual Studio 2012 was used as the IDE for this project. Considering about the time constraints of this project, Visual Studio 2012 offered faster development with features such as IntelliSense which is an auto complete system that enables to find a user parameters, classes etc. It also offers wide range of drag and drop controls that make development easy and fast.

IntelliSense is a powerful feature that can dramatically increase one's productivity. It is designed to make the development of your application much easier by helping you automatically generate code in the code editor [8].

4.3.2 C# Language

C# which is an object oriented language was used as a programming language for develop this project.

4.3.3 NET Framework

.NET Framework 3.5 was used for this project..NET framework is a software framework which include large library and provides language interoperability. .NET class library provides various services such as user interface, database connectivity etc [9].

4.3.4 SQL Server 2008

SQL server 2008 was used as a database server for this project. It offers various services such as database security, database administration etc.

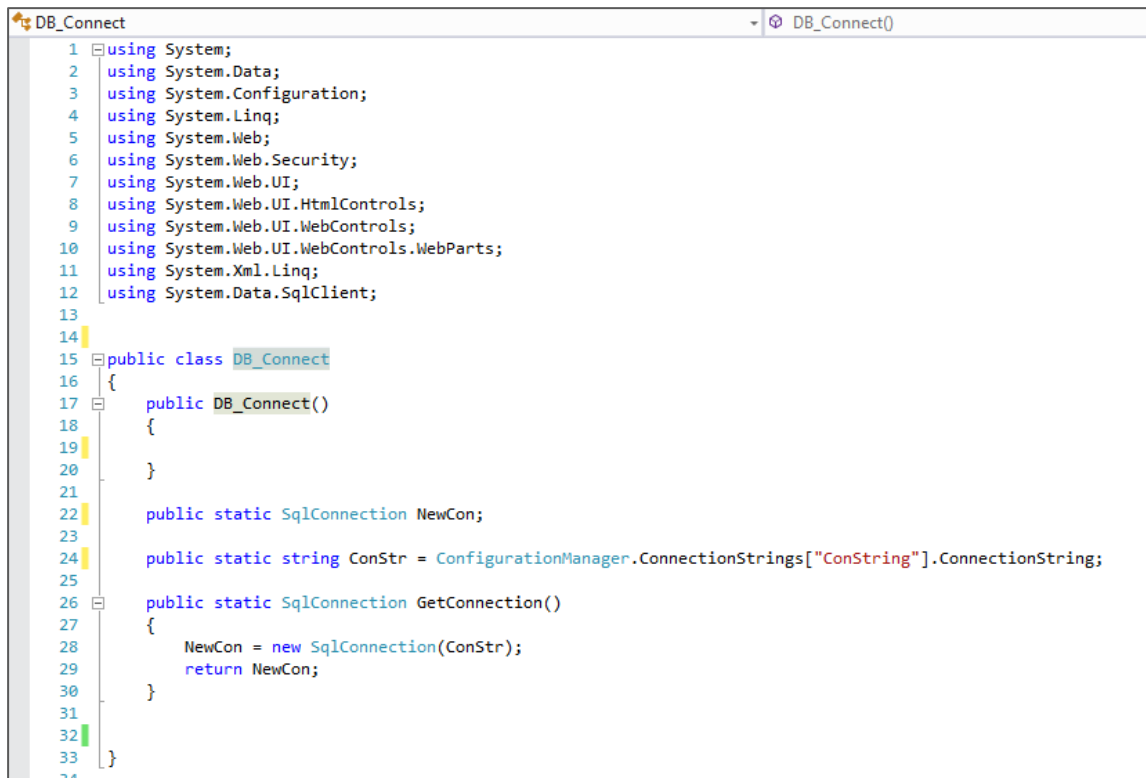
4.4 MAJOR CODE SEGMENTS

The main code modules developed in the system have been mentioned below by briefly describing their functionality. Code modules consist with comments to identify the specific reason of a particular code line.

- **Database Connection Page**

Every web system as well as stand-alone system always deals with a database. If something is added, deleted or updated in the system, the system always connects with the related database. Code segment given below links the system to its database.

Predefined C# object called “SqlConnection” helps to manage the connection by passing three parameters in its hostname, user account, and the password. Web.config file is used to connect the database by passing database name and the connection. Figure 4.1 shows the common class as DB_Connect for connecting with the database.



```

1  using System;
2  using System.Data;
3  using System.Configuration;
4  using System.Linq;
5  using System.Web;
6  using System.Web.Security;
7  using System.Web.UI;
8  using System.Web.UI.HtmlControls;
9  using System.Web.UI.WebControls;
10 using System.Web.UI.WebControls.WebParts;
11 using System.Xml.Linq;
12 using System.Data.SqlClient;
13
14
15 public class DB_Connect
16 {
17     public DB_Connect()
18     {
19     }
20
21     public static SqlConnection NewCon;
22
23     public static string ConStr = ConfigurationManager.ConnectionStrings["ConString"].ConnectionString;
24
25     public static SqlConnection GetConnection()
26     {
27         NewCon = new SqlConnection(ConStr);
28         return NewCon;
29     }
30
31 }
32
33
34

```

Figure 4:1 : Common Class for Connecting to Database

Following code snippets shows how to connect the database by web.config file.

```
<connectionStrings>
```

```
<add name="ConString" connectionString="Data Source=ABANS-PC;Initial
Catalog=GPMs;Persist Security Info=True;User ID=sa;Password=12345;Max
Pool Size=1000;" providerName="System.Data.SqlClient"/>
```

```
</connectionStrings>
```

- **Insert, Update, Delete Data**

Code segment given below shows the data insertion to the database using sql stored procedure according to the user input.

```

protected void BtnSave_Click(object sender, EventArgs e)
{
    SqlConnection conn = DB_Connect.GetConnection();
    using (SqlCommand cmd = new SqlCommand("exec [GPMS].[dbo].ADDOrders " + DDLBuyer.SelectedValue + ", "
        + " " + DDLItem.SelectedValue + ", " + txtStyleNo.Text + ", " + DDLBUY.SelectedValue + ", "
        + " " + txtItemDescription.Text + ", " + txtOrderQty.Text + ", " + DatePickerRTD.Text + ", "
        + " " + BasicDatePickerPCD.Text + ", " + userID + ", " + conn))
    {
        conn.Open();
        cmd.ExecuteNonQuery();
    }
    conn.Close();
    WebMsgBox.Show("Successfully Saved.");

    BindGridviewOrders();
}

```

Figure 4:2 : Insertion Code Segment Using Stored Procedure

The following stored procedure segment also belongs to the above insertion function and it is about the order placement process.

```

1 CREATE PROC [dbo].[ADDOrders]
2
3 @BuyerID int,
4 @ItemID int,
5 @StyleNo Varchar(100),
6 @Buy int,
7 @ItemDiscription varchar(255),
8 @OrderQty int,
9 @RTD date,
10 @PCD date,
11 @CreateUser int |
12
13 AS
14 BEGIN
15
16 DECLARE @OurRefNo Varchar(15);
17 DECLARE @ProcessYear int;
18 DECLARE @yearNo Varchar(10);
19
20 SELECT @ProcessYear = right(YEAR(getdate()),2)
21 SELECT @yearNo= RIGHT('00000' + CONVERT(VARCHAR(7), max(Cast(yearNo+1 as int))), 7)
22 FROM [GPMS].[dbo].[Orders] where ProcessYear=@ProcessYear
23 SELECT @OurRefNo = CONVERT(VARCHAR(2), @ProcessYear)+'-' + (SELECT RIGHT('00000' + CONVERT(VARCHAR(7),
24 max(Cast(yearNo+1 as int))), 7) FROM [GPMS].[dbo].[Orders] where ProcessYear=@ProcessYear)
25
26 INSERT INTO [GPMS].[dbo].[Orders]
27 ([OurRefNo],[BuyerID],[ItemID],[StyleNo],[Buy],[ItemDiscription],[OrderQty],[RTD],[PCD],[ProcessYear]
28 ,[yearNo],[CreateUser],[CreateDate],[Active]) VALUES
29 (@OurRefNo,@BuyerID,@ItemID,@StyleNo,@Buy,@ItemDiscription,@OrderQty,@RTD,@PCD,@ProcessYear,@yearNo
30 ,@CreateUser,GETDATE(),1)
31
32 END

```

Figure 4:3 : Stored Procedure

- **Data Validation**

Data validation is a most important and critical of the implementation process. Because users can enter unwanted values to the system, so that accuracy of the data can be loosed. The main objective of the data validation is ensuring the input value is in the correct format. Validation was done using “regular expression”. Following code snippets shows text field validation using regular expression.

```
<asp:TextBox ID="TxtStyleNo" Width="100px" Text="0" runat="server"></asp:TextBox>  
<asp:RegularExpressionValidator ID="regexName" runat="server"  
    ErrorMessage="Invalid Style No."  
    ControlToValidate="TxtStyleNo"  
    ValidationExpression="^[a-zA-Z'.\s]{1,40}$" />
```

Figure 4:4 : Regular Expression Validator

5 EVALUATION

5.1 INTRODUCTION

Testing is the process of evaluating a system or its component with the intent to find whether it satisfies the specified requirements or not. Further testing is executing a system in order to identify any gaps, errors or missing requirements in contrary to the actual desire or requirements [10].

Software testing is a process that should be done during the development process. In other words software testing is a verification and validation process.

5.2 SOFTWARE

Software testing is a verification and validation process. Software testing is done during the development.

Verification is the process to make sure the product satisfies the conditions imposed at the start of the development phase. In other words, to make sure the product behaves the way we want it to [10].

Validation is the process to make sure the product satisfies the specified requirements at the end of the development phase. In other words, to make sure the product is built as per customer requirements.

5.3 TECHNIQUES OF SOFTWARE TESTING

There are two techniques of software testing

1) Black box Testing

Black box testing is a testing technique that ignores the internal mechanism of the system and focuses on the output generated against any input and execution of the system. It is also called functional testing [11].

2) Black box Testing

White box testing is a testing technique that takes into account the internal mechanism of a system. It is also called structural testing and glass box testing.

Black box testing is often used for validation and white box testing is often used for verification [11].

5.4 TYPES OF TESTING

5.4.1 Unit Testing

Unit testing is the testing of an individual unit or group of related units. It falls under the class of white box testing. It is often done by the programmer to test that the unit he/she has implemented is producing expected output against given input [11].

5.4.2 Integration Testing

Integration testing is testing in which a group of components are combined to produce output. Also, the interaction between software and hardware is tested in integration testing if software and hardware components have any relation. It may fall under both white box testing and black box testing [11].

5.4.3 System Testing

System testing is the testing to ensure that by putting the software in different environments (e.g., Operating Systems) it still works. System testing is done with full system implementation and environment. It falls under the class of black box testing [11].

5.4.4 Acceptance Testing

Acceptance testing is often done by the customer to ensure that the delivered product meets the requirements and works as the customer expected. It falls under the class of black box testing [11].

5.4.5 Regression Testing

Regression testing is the testing after modification of a system, component, or a group of related units to ensure that the modification is working correctly and is not damaging or imposing other modules to produce unexpected results. It falls under the class of black box testing [11].

5.5 TEST PLAN AND TEST CASES

Test plan is detail information about the scope and schedule of the testing, test deliverables etc. It gives how the testing will proceed, who will do the testing, what will be tested, in how much time the test will take place, and to what quality level the test will be performed. Following table show high level test plan of the transport management system [12].

Creating test case is the most important part in the testing procedure. After creating the test plan test creation is done. Normally test case consist description of test case, expected output and status. In order to reduce the complexity of the system, system has divided into modules. Test cases were written for each module. Following Table 5.1 shows test plan. Please refer Appendix E for other test cases.

Module Name	Function name	Test Priority
Order Placement Module	Insert Order Details	High
	Update Order Details	High
	Delete Order Details	High
	View Order Details	Medium
	Search by Style No	Low
	Search by Buyer Name	Low
Buyer Purchase Order Module	Search by Style No	High

	View Order Details	Medium
	Insert Buyer Purchase Order Details	High
	Update Buyer Purchase Order Details	High
Daily Production Plan Insertion Module	Insert Production Plan Details	High
	Update Production Plan Details	High
	Delete Production Plan Details	High
	View Production Plan	Low
	Search Production Plan by date	Low
	Generate Daily Production Plan Report	
Production Line Output Module	Insert Line Output Details	High
	Insert Line Output Delete Request Details	High
	Insert Sewing Issues	High
	View Line Wise Output	Medium
	Search Line Output by Date Range	Low
	Search Line Output Against to Plan	Low
Finishing In & Output Module	Insert Input & Output Garment Details	High
	Insert Sewing Defects	High
	Delete Input & Output garment Count	Medium
	View In & Out Garment Details	Low
Washing Dispatch Note Module	Insert Details of Washing Dispatch Notes	High
	Update Details of Washing Dispatch Notes	High
	Delete Details of Washing Dispatch Notes	High
	Generate Washing Dispatch Note	High
Dispatch Garments Receiving Module	Insert Received Garment Details Against to the Dispatched Details	High
	View Received Garment Details	Medium

	Against to the Dispatched Details	
	Update Received Garment Details	High
Barcode Details Handling Module	Insert Barcode Details	High
	Delete Barcode Details	Medium
	Delete Barcode Details	Medium
	View Barcode Details	Medium
	Search Barcode Details by Style No	High
Packing Ratio Module	Insert Packing Ratio Details	High
	Update Packing Ratio Details	High
	Delete Packing Ratio Details	Medium
	View Packing Ratio Details	Low
Packing In & Out Module	Insert Input Garment Details	High
	Insert Packed Garments Details according to the Ratio	High
	Delete Input & Packed Garment Details	Medium
	View Input & Packed Garments Details	Medium
Reports	Generate Packing List	High
	Generate Section Wise Work In Progress Report	Medium
	Generate Style Wise Summary Reports	
Shipment Complete Module	Insert Shipment Complete Details	High
	Generate Email for Shipment Completion	High

Table 5.1 : High Level Test Plan

5.6 USER EVALUATION

Normally user evaluation is done by selecting different users of the system. In this transport management system Manager has been taken as an administrator of the system and other users has taken as normal users with different privileges. User evaluation questionnaire was given to target population and results has summarized. Following figure 5.1 and 5.8 shows user evaluation questionnaire.

USER EVALUATION QUESTIONIRE

Name Of User : Rohan			Role Of User : Administrator		
Evaluating Item	Very Good	Good	Average	Poor	Very Poor
Reliability			✓		
Security		✓			
Overall Reaction			✓		
Character Readability	✓				
Color Scheme				✓	
System Navigation		✓			
Ease of usage			✓		
Functionalities			✓		
Interfaces		✓			
Ease of learning			✓		
Response Time		✓			
Comments	This System ^{is} better than I expected.				

Figure 5:1: User Evaluation Form – Administrator

USER EVALUATION QUESTIONIRE					
Name Of User : <u>Sadun</u>			Role Of User : <u>Stores Coordinator</u>		
Evaluating Item	Very Good	Good	Average	Poor	Very Poor
Reliability	✓				
Security	✓				
Overall Reaction		✓			
Character Readability	✓				
Color Scheme	✓				
System Navigation	✓				
Ease of usage		✓			
Functionalities		✓			
Interfaces	✓				
Ease of learning		✓			
Response Time	✓				
Comments	—				

Figure 5:2: User Evaluation Form – Stores Coordinator

USER EVALUATION QUESTIONIRE					
Name Of User : <u>Nadun</u>			Role Of User : <u>Packing Clerk</u>		
Evaluating Item	Very Good	Good	Average	Poor	Very Poor
Reliability		✓			
Security		✓			
Overall Reaction	✓				
Character Readability			✓		
Color Scheme	✓				
System Navigation	✓				
Ease of usage			✓		
Functionalities			✓		
Interfaces			✓		
Ease of learning		✓			
Response Time		✓			
Comments	—				

Figure 5:3 : User Evaluation Form – Packing Clerk

USER EVALUATION QUESTIONIRE

Name Of User : <i>Dumindu</i>			Role Of User : <i>Manager</i>		
Evaluating Item	Very Good	Good	Average	Poor	Very Poor
Reliability	✓				
Security		✓			
Overall Reaction		✓			
Character Readability	✓				
Color Scheme	✓				
System Navigation	✓				
Ease of usage		✓			
Functionalities			✓		
Interfaces	✓				
Ease of learning		✓			
Response Time	✓				
Comments	—				

Figure 5:4 : User Evaluation Form – Manager

USER EVALUATION QUESTIONIRE

Name Of User : <i>Rameesha</i>			Role Of User : <i>Team Coordinator</i>		
Evaluating Item	Very Good	Good	Average	Poor	Very Poor
Reliability		✓			
Security		✓			
Overall Reaction		✓			
Character Readability	✓				
Color Scheme	✓				
System Navigation	✓				
Ease of usage		✓			
Functionalities		✓			
Interfaces		✓			
Ease of learning		✓			
Response Time		✓			
Comments	—				

Figure 5:5 :User Evaluation Form – Team Coordinator

USER EVALUATION QUESTIONIRE

Name Of User : <u>Ajeel</u>			Role Of User : <u>Merchandise</u>		
Evaluating Item	Very Good	Good	Average	Poor	Very Poor
Reliability	✓				
Security			✓		
Overall Reaction	✓				
Character Readability		✓			
Color Scheme		✓			
System Navigation			✓		
Ease of usage		✓			
Functionalities			✓		
Interfaces	✓				
Ease of learning		✓			
Response Time	✓				
Comments	The System is well built by fulfilling all the system requirements . Good job !				

Figure 5:6 : User Evaluation Form – Merchandiser

USER EVALUATION QUESTIONIRE

Name Of User : <u>Nirmali Wickramasinghe</u>			Role Of User : <u>Planning Coordinator</u>		
Evaluating Item	Very Good	Good	Average	Poor	Very Poor
Reliability		✓			
Security	✓				
Overall Reaction		✓			
Character Readability	✓				
Color Scheme	✓				
System Navigation	✓				
Ease of usage	✓				
Functionalities		✓			
Interfaces	✓				
Ease of learning		✓			
Response Time		✓			
Comments					

Figure 5:7 : User Evaluation Form – Planning Coordinator

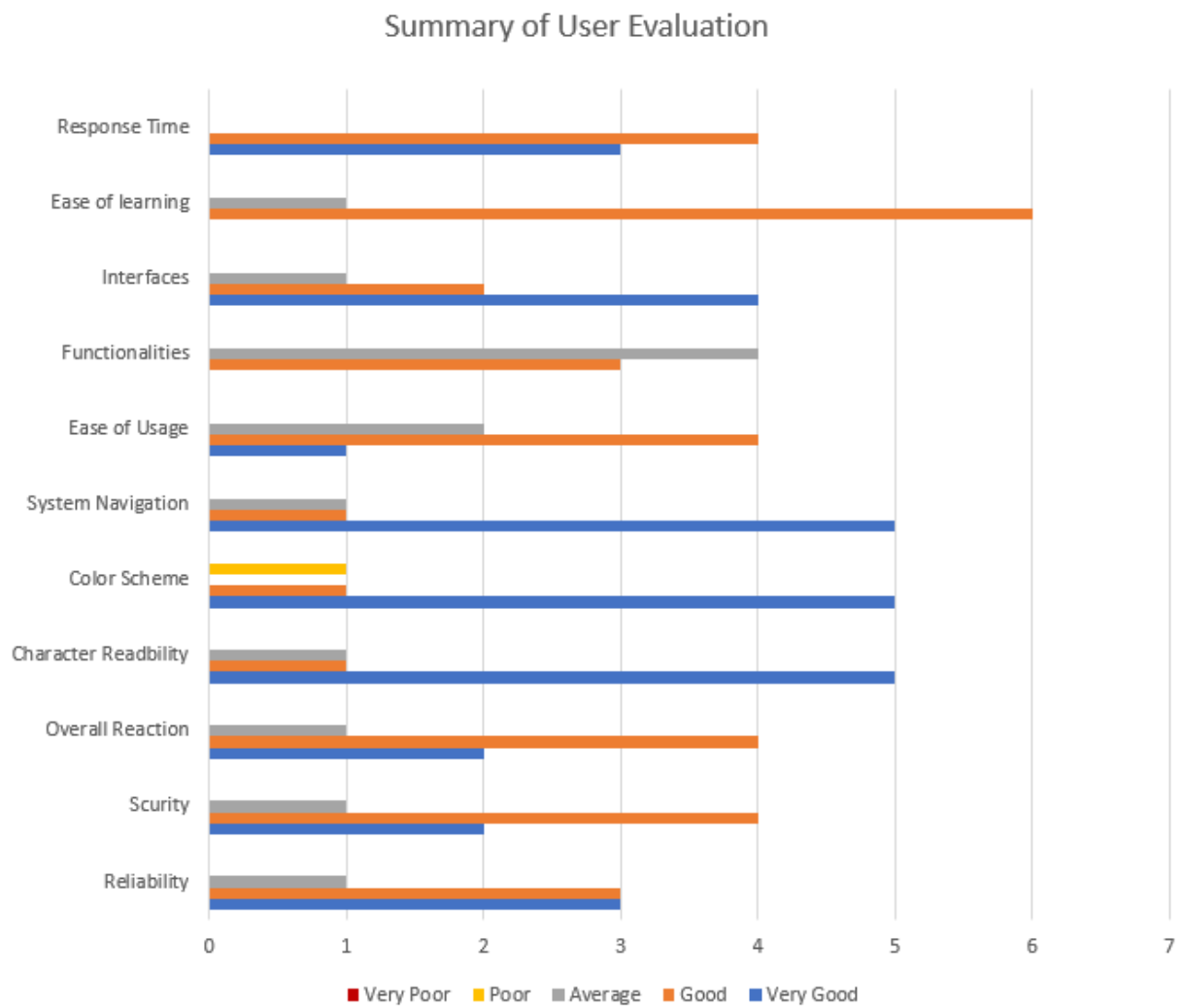


Figure 5:8 : User Evaluation Summary Chart

6 CONCLUSION

6.1 INTRODUCTION

Sumithra Garments (Pvt) Ltd was incorporated in 1984 as a Sri Lankan Manufacturer and an Exporter of Woven Apparel Products to the world, with special expertise in Woven Bottoms and Outwear. They need to enhance their business with new technology. Earlier they faced many problems with manual system and heavy paper works. But currently they are carrying out their day to day operational activities effectively. Earlier they faced many difficulties when garment shipping process. Currently because of this Garment Production Monitoring System, they can carry out their daily activities effectively and efficiently. Since all the day to day activities have automated through this system, now they can enhance their business easily. Since including the report generation process of this system, they can analyze their business status and forecasting about future business. Further decision making ability is increased.

During the analysis phase functional and non-functional requirements were identified in each module. After that all functional and non-functional requirements of each and every module were successfully completed in implement phase. End of the project additional functionalities and features were added which client requested. Further client was satisfied about my system finally.

6.2 CRITICAL EVALUATION OF THE PROJECT

From the start of the company, they have maintained the business process by using a traditional manual system. With the manual system they had faced lots of difficulties. This Web Based Garment Production Monitoring System was developed to address those drawbacks as well as to optimize their overall business process and through this to help them to keep their brand name at the top of the market.

From the requirement analysis stage, the client requirements were carefully analyzed and the system was developed by adding more functionality according to the user requirements to satisfy the user and to keep the user interacted with the system. By automating some processes, the workload of the user was reduced and it helped in saving the time of the client efficiently. Moreover, this automated system helps in reducing common mistakes that might occur by the user. Getting user feedback and properly testing the system helped to validate the overall system and to avoid conflicts that can occur. Although nobody can fulfill 100% all the expected requirements of a client, developing the system to a satisfactory level helped to satisfy the client expectations.

By comparing the user feedback, test results, system functionality with the existing system; it was identified as a system which can satisfy the client requirements up to a satisfactory level.

6.3 LESSON LEARNT

As a student taking a degree program, this was a great opportunity for me to apply the previously learned lessons into a working system. The domain area was considerably large, therefore it helped to gain experience in many business techniques and it broadened my horizons into understanding, how to map those related business processes into a computerized system.

Better experience was obtained on how to communicate with a real customer. Furthermore, the working environment consisted with web related languages; some of which I have learned before and I gained a lot of new knowledge in some new technologies such as Ajax, while developing the system. Apart from previously learned lessons, I could learn to write reports according to the recognized standard and to present reports to interested parties who wish to read.

6.4 FUTURE ENHANCEMENT

This proposed system was developed within a time constraint and functionalities which were agreed by the client. Following are the some of the future enhancement of the system

- Introducing the shipment dispatch process
- Improving report section as a mobile application by using technologies like Xamarin
- Improving reports and showing graphs by using analytical tool
- Introducing access granting process

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Appendix A - SYSTEM MANUAL

This documentation consists of a set of steps to show, how to implement this Garment Production Monitoring System. Below given 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.

Step 1 :- Install the Microsoft SQL server Management Studio 2008

Step 2 :- Create Database called “GPMS” in SQL server as shown in figure A.1

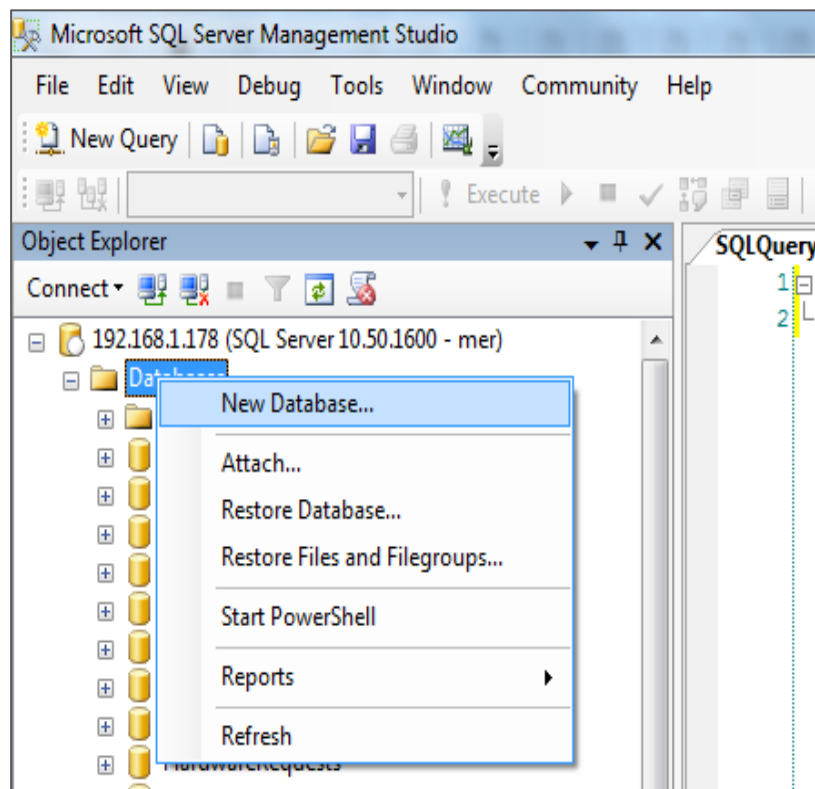


Figure A. 1 : Create New Database

Step 3 :- Restore the “GPMS” database.

- Figure A.2 & A.3 shows the how to restoring the given backup file. Right click on the database & restore the database.

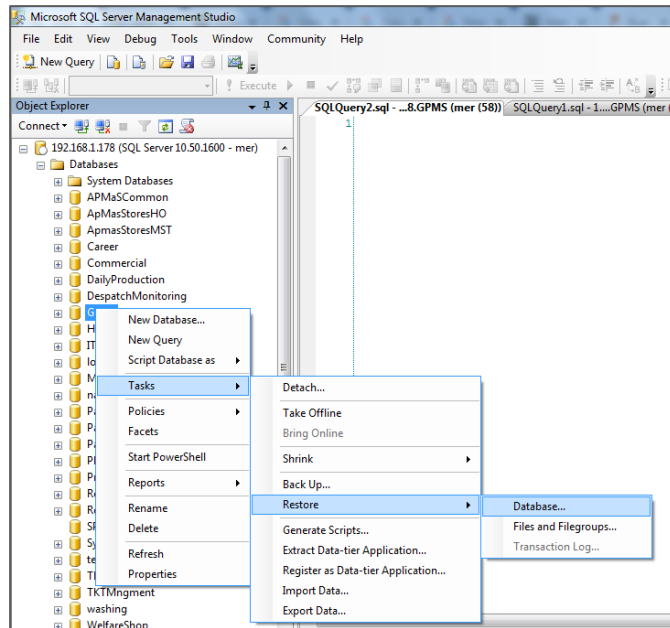


Figure A. 2: Restore Database

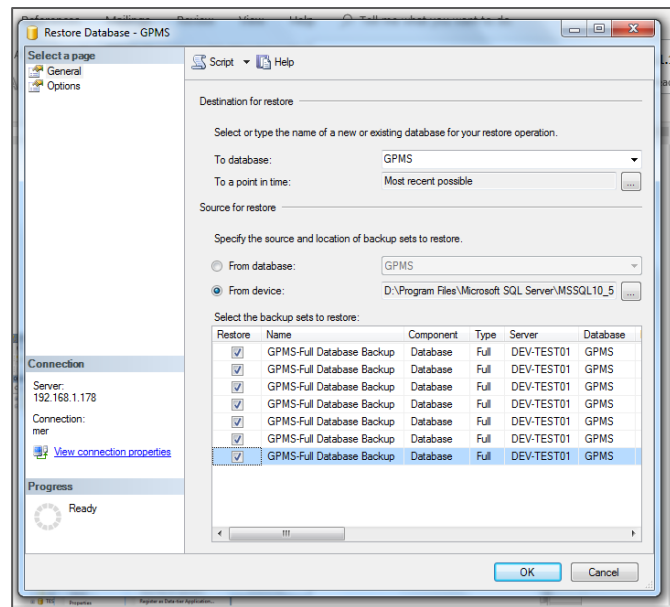


Figure A. 3: Selecting Database Backup file for Restore Database

- When restoring the given backup file, must be select as “overwrite the existing database (With Replace)”. Figure A.4 shows it.

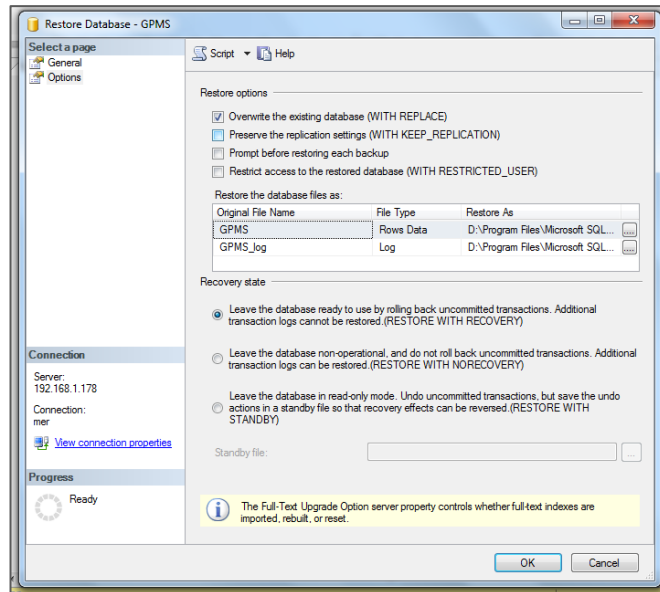


Figure A. 4: Overwrite the Existing Database

Step 4 :- Installing IIS and ASP.NET Modules

- IIS is a protocol server which is used to host a website on server. IIS stands for Internet Information services.
- To install IIS start with windows start icon -> Control panel, Programs and Features , then click Turn Windows features on or off. Figure A.5 shows the Programs and Features section for turn windows features on or off.



Figure A. 5: Turn Windows features on or off

- After that click windows features on or off, the Windows Features pop up window (shows in Figure A.5) opens.
- Then expand the Application Development Features in that & enable the ASP.NET application features such as .NET Extensibility, ASP, ASP.NET, CGI, ISAPI Extensions, ISAPI Filters, Server-Side Includes.

- Figure A.6 shows the how to enable the ASP.NET features on IIS hit Ok. The IIS server Manager is successfully enabled in start control list.

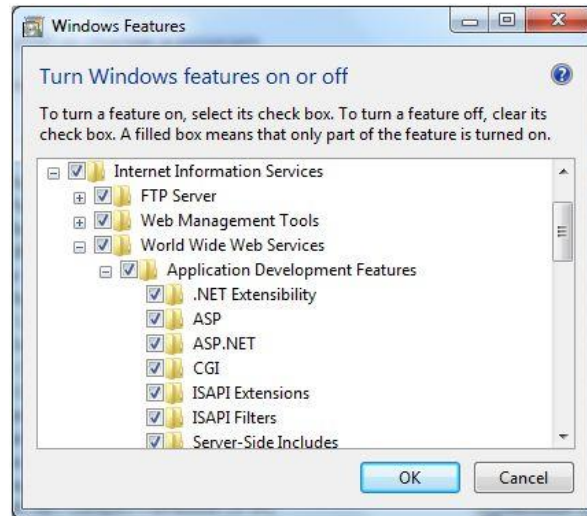


Figure A. 6 : Windows Features Enabling

Step 5 :- Install .NET Framework.

- Now we have to install .NET framework version in our system because the aspx web page needs to run the platform of .net framework. Here is the download link for .NET Framework 4.5 using below link.
<https://www.microsoft.com/en-in/download/details.aspx?id=30653>
- After the downloading, click the saved exe file and the extract field process window will appear. The file extraction process completed and the following authorization window will appear, check I agree box then hit Install. Then the download and installation progress will appear in the same window.

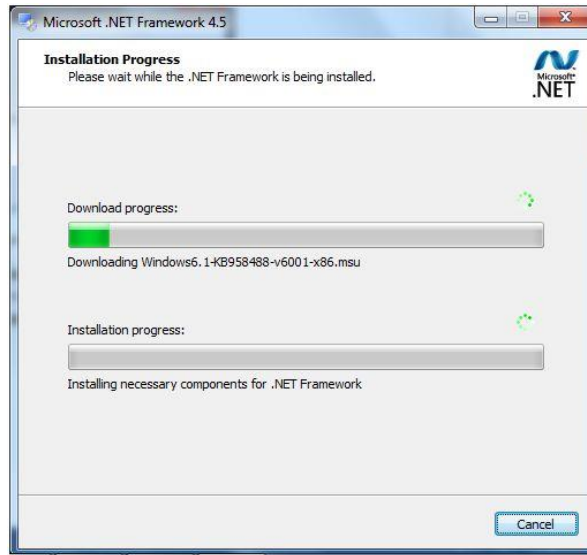


Figure A. 7: Install .NET Framework

- After the downloading and Installation progress are completed hit the finish button to complete the Installation. Now IIS is ready to host ASP.NET web sites.

Step 5 :- Hosting the site.

- Select the website folder which one you want to host it into your IIS. Then start IIS server, in that click site, right click on site and then choose add web site

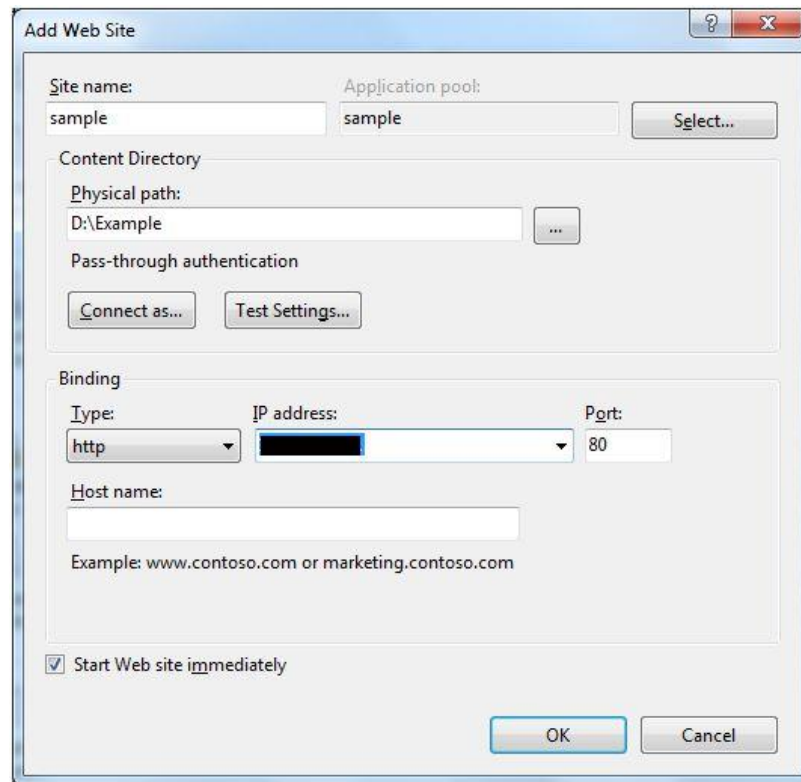


Figure A. 8 : Hosting the site

Step 5 :- Add web site window

- Add site name, path of that site folder, then assign the IP address or enter the host name of that particular site like www.GPTMS.com and then hit ok.
- After the process is completed site is placed under default web site under sites and at the same time there is one application pool is automatically created while adding the web site. Now the software site is ready to use.

Appendix B - DESIGN DOCUMENTATION

Use Case Diagrams and description

- Use case diagram of the order placement module

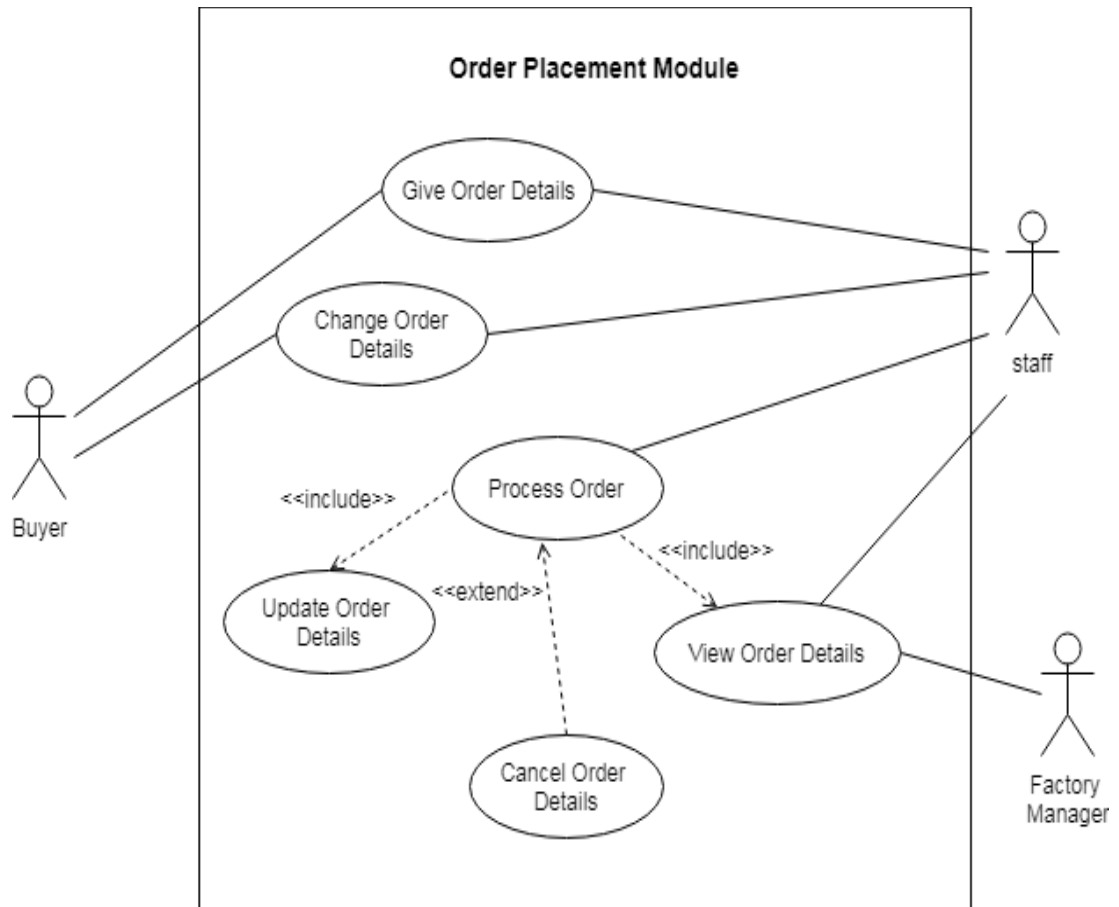


Figure B. 1 : Order Placement Module

Use Case Name	Process Order	
Actors	Staff	
Description	Staff makes order based on the buyer requirements and update & cancel order details as per the buyers request.	
Pre Conditions	System users should be logged into the system	
Typical Course of Events	Actor Action	System Response
	1. Select Buyer	
	2. Select Item	
	3. Add Style No & Buy No	
	4. Add Item Description	

	5.	
	6. Add Order Qty	
	7. Click save Button	
		8. Display successfully saved message
Alternative Courses	When click the save button, check requested style no & style no if it's system displays the "already in the system" message	
Conclusion	This use case emphasize when order process completed, all data successfully stored in the database	
Post Conditions	Display entered data	

Table B. 1: Use Case Description - Process Order

- **Use case diagram of the Production Planning Module**

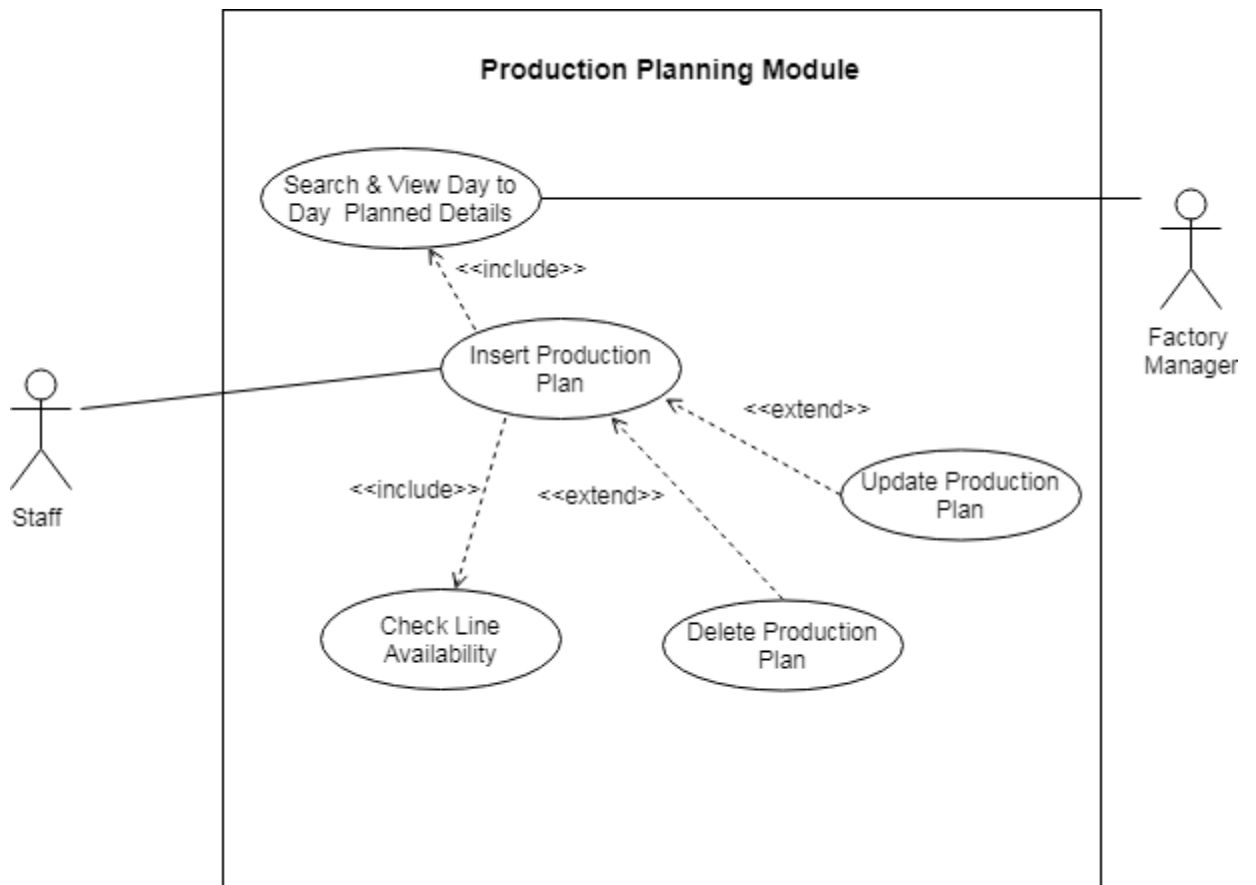


Figure B. 2 : Production Planning Module

Use Case Name	Insert Production Plan	
Actors	Staff	
Description	Staff insert the production plan	
Pre Conditions	System users should be logged into the system	
Typical Course of Events	Actor Action	System Response
	1. Select Date	
		2. System displays the previously entered plan if it's available disable the save button
	3. Select Styles one by one for all the teams	
	4. Add Plan Qty one by one for all the teams	
	5. Click the save button	
		6. Display successfully saved message
Alternative Courses	When select the date, check available dates and displays the previously entered plan	
Conclusion	This use case emphasize when saved the plan, all data successfully stored in the database	
Post Conditions	Display entered data	

Table B. 2: Use Case Description- Insert Production Plan

- **Use case diagram of the Production Line Output Module**

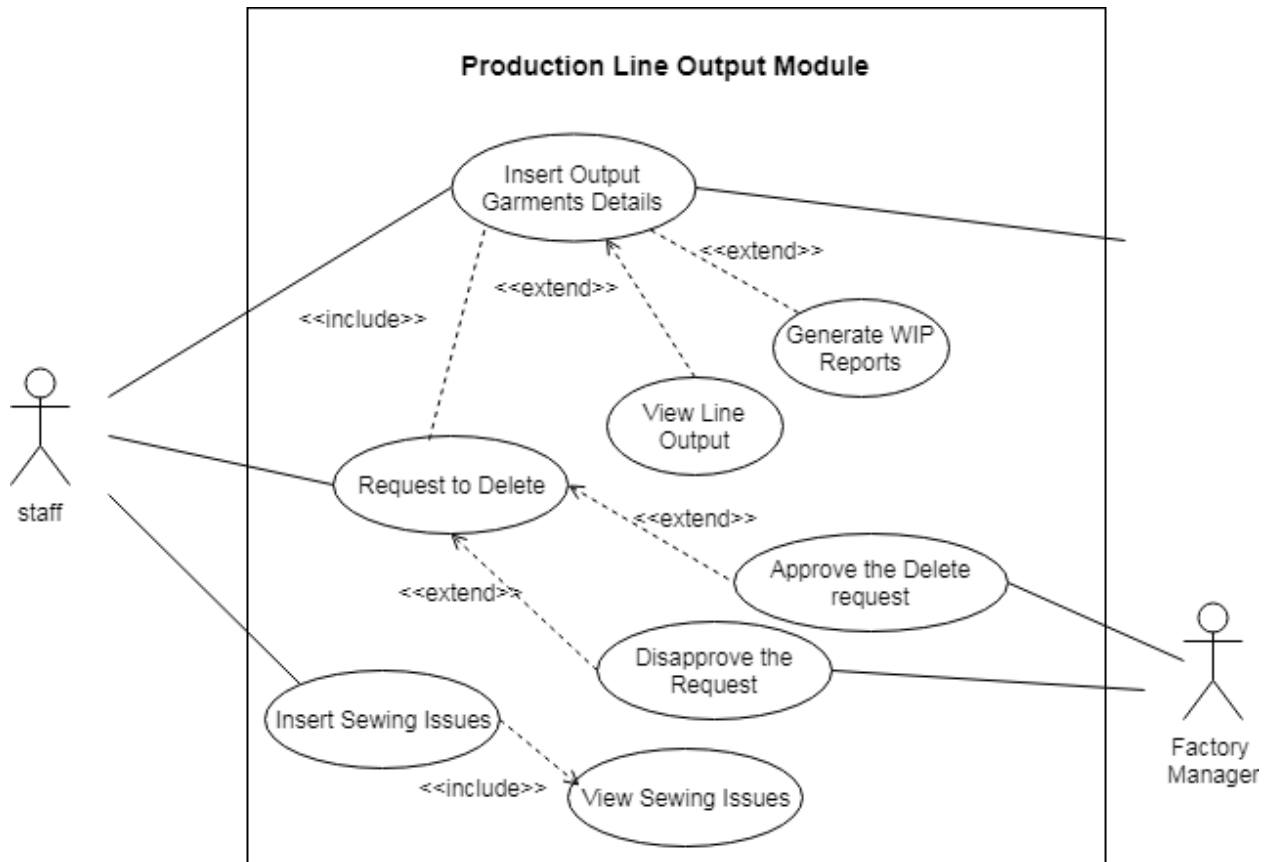


Figure B. 3 : Production Planning Module

Use Case Name	Insert Line Output Garment Details	
Actors	Staff	
Description	Staff Inserts Line Output Details of the sewed garments	
Pre Conditions	System users should be logged into the system	
Typical Course of Events	Actor Action	System Response
	1. Select Team	
	2. Select Style	
	3. Select Size	
	4. Add Qty	
	5. Click the save button	
		6. Display successfully saved message
Alternative Courses	When select the style, display the relevant size range	
Conclusion	This use case emphasize when saved the output details, all data successfully stored in the database	
Post Conditions	Display entered data	

Table B. 3: Use Case Description- Insert Line Output Garment Details

Use Case Name	Request to Delete Line Output	
Actors	Staff	
Description	Staff request delete details of Line Output Details	
Pre Conditions	System users should be logged into the system	
Typical Course of Events	Actor Action	System Response
	1. Select Team	
	2. Select Style	
	3. Select Size	
	4. Add Reject Qty	
	5. Add Reject Reason	
	6. Click the save button	
		7. Display successfully saved message
Alternative Courses		
Conclusion	This use case emphasize when Requested , all request data successfully stored in the database	
Post Conditions	Display Requested data in Pending Approval page	

Table B. 4:Use Case Description- Request to Delete Line Output

Use Case Name	Approve Line Output Garment Details	
Actors	Factory Manager	
Description	Factory Manager approves the delete request	
Pre Conditions	System users should be logged into the system	
Typical Course of Events	Actor Action	System Response
		1. Display all the requests
	2. Approve the request	
		3. Display successfully approved message
		4. Display other pending request
Alternative Courses	When approve the request, removed approved record & display other pending requests	
Conclusion	This use case emphasize when approved the requested deletion output details, all data successfully removed in the database	
Post Conditions	Automatically delete requested output details & display other approval pending requests	

Table B. 5: Use Case Description- Approve Line Output Garment Details

- Use case diagram of the Finishing In & Out Module

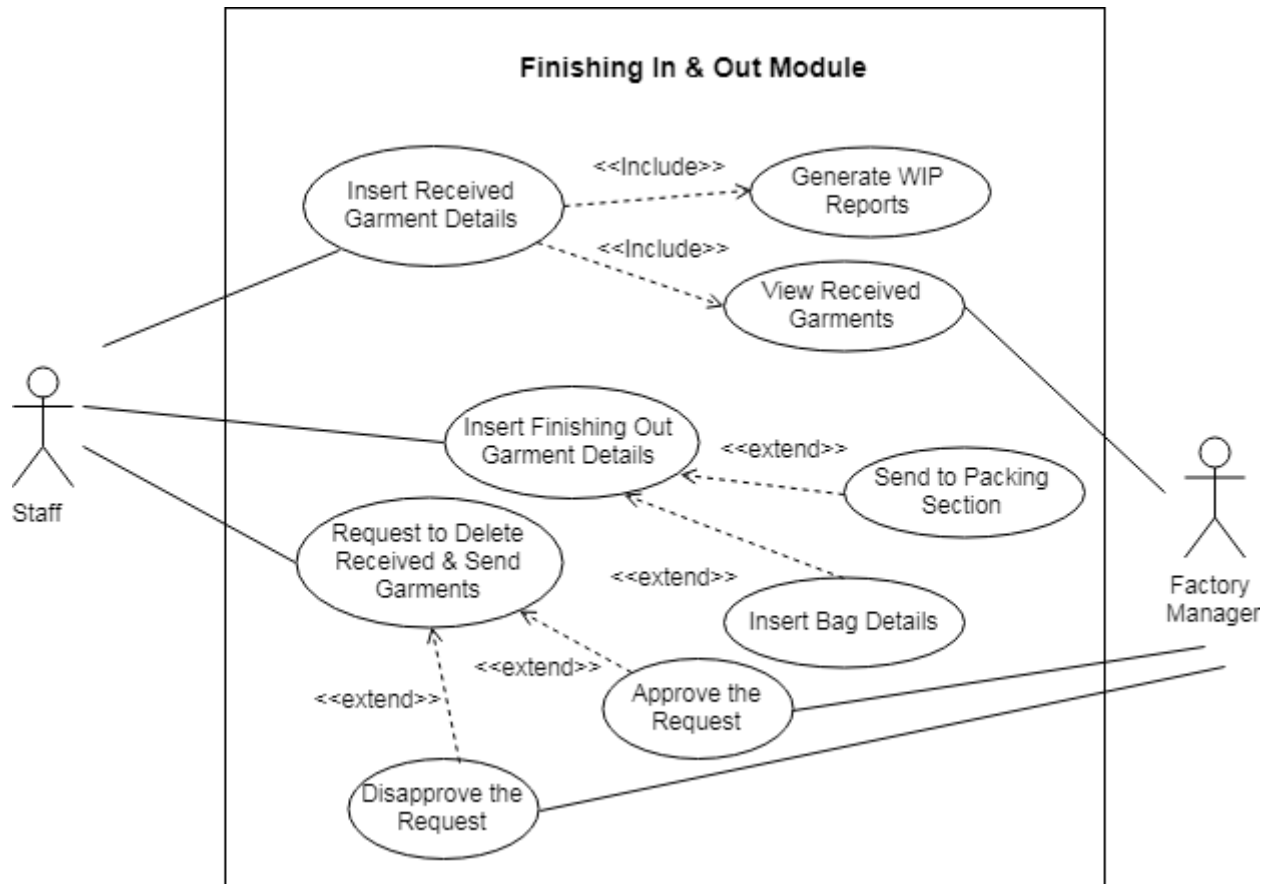


Figure B. 4: Finishing In & Out Module

Use Case Name	Insert Finishing Out Garment Details	
Actors	Staff	
Description	Staff Inserts Finishing Output Details	
Pre Conditions	System users should be logged into the system	
Typical Course of Events	Actor Action	System Response
	1. Select Style	
	2. Select Color	
	3. Select Size	
	4. Add Qty	
	5. Click the save button	
Alternative Courses	When select the style, display the relevant size range	
Conclusion	This use case emphasize when saved the output details, all data successfully stored in the database	
Post Conditions	Display entered data	

Table B. 6: Use Case Description - Insert Finishing Out Garment Details

- **Use case diagram of the Washing Dispatch Note Module**

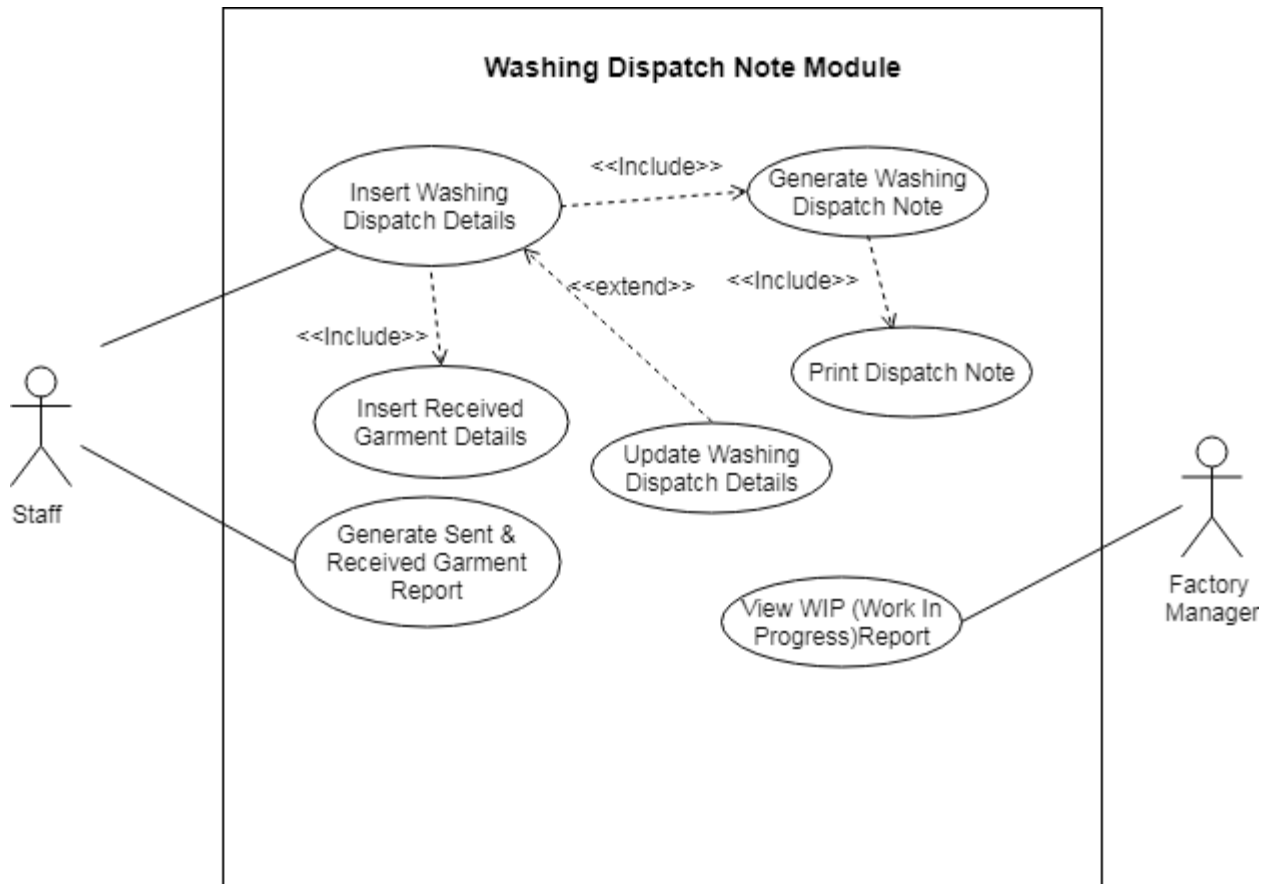


Figure B. 5: Washing Dispatch Note Module

Use Case Name		Insert Washing Dispatch Garment Details	
Actors		Staff	
Description		Staff Inserts Washing Dispatch Details	
Pre Conditions		System users should be logged into the system	
Typical Course of Events	Actor Action	System Response	
		1. Select Washing Plant	
		2. Insert Attention	
		3. Insert Dispatch Vehicle No	
		4. Insert Wash Type	
		5. Select Style	
		6. Select Color	
		7. Select Size	
		8. Add Qty	

	9. Click the save button	
		10. Display successfully saved message
Alternative Courses	When click the save button, automatically generate Washing Dispatch Note with the unique dispatch number	
Conclusion	This use case emphasize when saved the washing dispatch details, all data successfully stored in the database	
Post Conditions	Display Washing Dispatch Note	

Table B. 7: Use Case Description - Insert Washing Dispatch Garment Details

- **Use case diagram of the Barcode Details Handling Module**

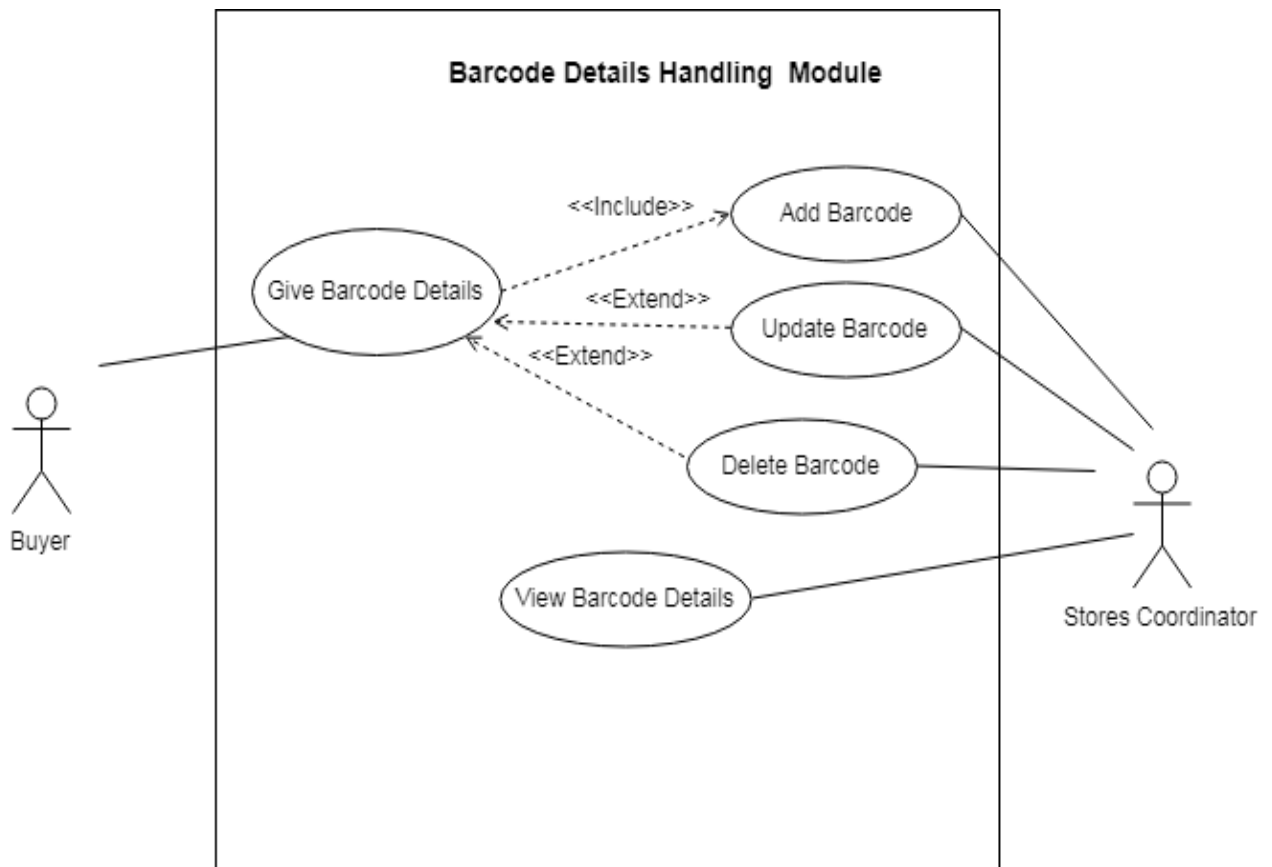


Figure B. 6: Barcode Details Handling Module

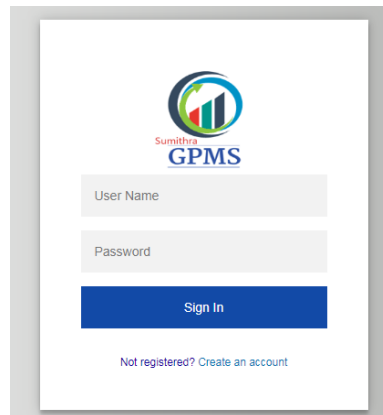
Use Case Name	Add Barcode	
Actors	Stores Coordinator	
Description	Staff Inserts Barcode Details	
Pre Conditions	System users should be logged into the system	
Typical Course of Events	Actor Action	System Response
	1. Select Style	
	2. Select Color	
	3. Select Size	
	4. Add Barcode No	
	11. Click the save button	
		12. Display successfully saved message
Alternative Courses	When click the save button, check the barcode if it's already saved or not	
Conclusion	This use case emphasize when saved the output details, all data successfully stored in the database.	
Post Conditions	Display entered data	

Table B. 8: Use Case Description - Add Barcode

Appendix C - USER MANUAL

- **Login Form**

Following Figure C.1 shows user login page which allows users to log into the system. All levels of users can log into the system in one page. When user try to log into the system check whether this user is valid user or not otherwise system display error message.

A screenshot of the login page for the Sumithra GPMS system. The page features a logo at the top center with the text "Sumithra GPMS" below it. Below the logo are two input fields: "User Name" and "Password". A blue "Sign In" button is positioned below the password field. At the bottom of the form, there is a link that says "Not registered? Create an account".

Field	Label
<input type="text"/>	User Name
<input type="password"/>	Password
<input type="button" value="Sign In"/>	Sign In
Not registered? Create an account	Not registered? Create an account

Figure C. 1: Login Page

- **Home Page**

All the functions of each and every module can be accessible by users through this main page. Following figure C.2 shows how main menu looks like.

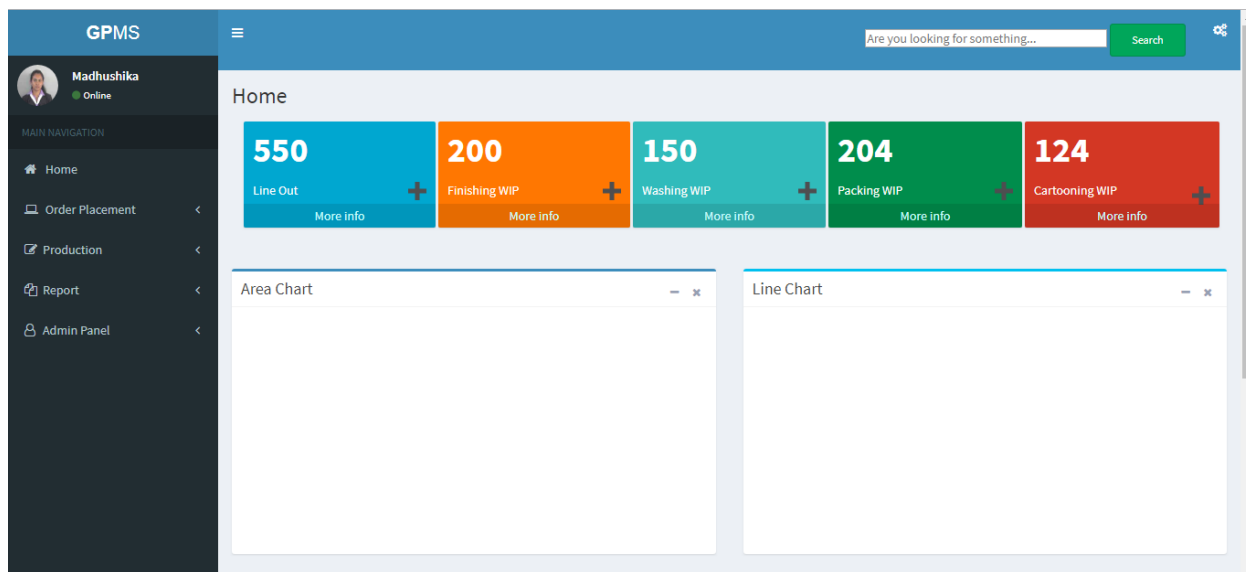


Figure C. 2: Home Page

- **Main Navigation Menu**

Figure C.3 shows the main menu item of the main form.

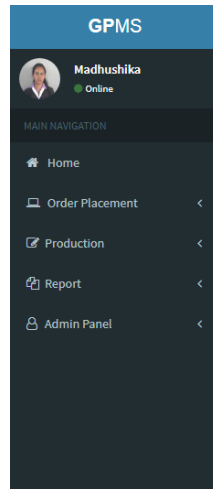


Figure C. 3: Main Navigation Menu

- **Order Placement Page**

All the order details can be stored via this page. User can do insert, delete, update and clear functions. Further all the inserted data are displayed the table. When click on the revise button in a row of table all the relevant data filled in textboxes and drop downs, then user can update data. If user needs to delete an order user can do it using the delete button of the gridview. If user enters invalid data system displays the error message. If user trying to save with empty field system checks and display error message. Figure C.4 shows how order place page looks like it.

GPMS

Order Placement

Buyer: RTD: PCD:

Item: Description: Order Quantity:

Style: Buy:

Delete	Revise	Buyer	OurRefNo	Style	Buy	Item	Item Description	OrderQty	RTD	PCD
<input type="button" value="X"/>	<input type="button" value="G"/>	SUPER DRY	18-0000021	MP569	1	Short	DENIM CARGO SHORT	1000	25/Oct/2018	27/Oct/2018
<input type="button" value="X"/>	<input type="button" value="G"/>	MAY DEPARTMENT STORES	18-0000017	JG BOBBY TROUSER	1	Jacket	test	0	01/Jan/1900	01/Jan/1900
<input type="button" value="X"/>	<input type="button" value="G"/>	DILLARDS DEPT STORE	18-0000016	JG BOBBY TROUSER	2	Jacket	CAMEL HERRING BONE TROUSER	0	01/Jan/1900	01/Jan/1900
<input type="button" value="X"/>	<input type="button" value="G"/>	LEADER DAY LANKA (PVT) LTD	18-0000015	KJUNAIXKJP-48	2	Short	Mens Short	0	01/Jan/1900	01/Jan/1900
<input type="button" value="X"/>	<input type="button" value="G"/>	Next Manufacturing	18-0000014	HA464	1	Jacket	long sleeve jacket	0	01/Jan/1900	01/Jan/1900

Figure C. 4: Order Placement Page

- **Buyer PO Details Entering Page**

Figure C.5 shows how buyer's purchase order adding page looks like it. After placing the order user can add buyer contract details, color details & size details by searching style number.

GPMS

Buyer Purchase Order

Style: YGAW5232 [Find] [Reset]

Our Ref No: 18-0000012 Buyer: SUPER DRY Order Quantity: 4560

Style: YGAW5232 # 1 Buy

Contract No	Buyer PO	Ship Date	Ext. Ship Date	Ship Mode

[Save All]

Buyer PO No.	ContractNo	POQty	PODate	PO Ship Date	Extended Ship Date	Color Details
TR000546	TR000546	0	21/Jun/2018	10/Aug/2018	29/Jun/2018	+
SBTW-1100	SBTW-1100	0	15/Oct/2018	26/Oct/2018	31/Oct/2018	+

Figure C. 5 : Buyer PO Details Entering Page

- **Daily Production Plan**

Figure C.6 shows how daily production plan page looks like it.

GPMS
Daily Production Plan

Date

Select	Team	Style	Plan Qty
<input type="checkbox"/>	Team 1	<input type="text"/>	0
<input type="checkbox"/>	Team 2	<input type="text"/>	0
<input type="checkbox"/>	Team 3	<input type="text"/>	0
<input type="checkbox"/>	Team 4	<input type="text"/>	0
<input type="checkbox"/>	Team 5	<input type="text"/>	0
<input type="checkbox"/>	Team 6	<input type="text"/>	0
<input type="checkbox"/>	Team 7	<input type="text"/>	0
<input type="checkbox"/>	Team 8	<input type="text"/>	0
<input type="checkbox"/>	Team 9	<input type="text"/>	0
<input type="checkbox"/>	Team 10	<input type="text"/>	0

Figure C. 6: Daily Production Plan

In this page user can allocate style & qty vehicle for teams. When user selecting a date user can view is it available or not. If it is not available system will display the previously entered plan. All previously entered plans are displayed in the table. User can view it by clicking the search button with the filled date picker.

Appendix D - MANAGEMENT REPORTS

- Production Line Output Report**

Figure D.1 shows production line output report which calculates daily output garments count against to the plan qty. This report shows variance between plan & actual out quantity.

Team 01					Team 02					Team 03					Team 04					Team 05					Team 06				
Date	Style	PlanQty	ActualQty	Variance	Date	Style	PlanQty	ActualQty	Variance	Date	Style	PlanQty	ActualQty	Variance	Date	Style	PlanQty	ActualQty	Variance	Date	Style	PlanQty	ActualQty	Variance	Date	Style	PlanQty	ActualQty	Variance
2018-10-01	G70101NT - 2	310	200	-110	2018-10-01	WESTGATE TROUSER - 928903 - 1	450	325	-122	2018-10-01	M71011NT - 2 / OB888962 - 1	325	255	-69	2018-10-01	M71011NT - 2	358	320	-38	2018-10-01	M71011NT - 2	334	358	24	2018-10-01	M510198634 - 6	59	0	-59
2018-10-02	G70101NT - 2	317	300	-17	2018-10-02	WESTGATE TROUSER - 928903 - 1	300	272	-28	2018-10-02	M71011NT - 2	325	300	-25	2018-10-02	M71011NT - 2	358	350	-8	2018-10-02	M71011NT - 2	358	350	-8	2018-10-02	M510198634 - 5	178	180	2
2018-10-03	G70101NT - 2	312	320	8	2018-10-03	WESTGATE TROUSER - 928903 - 1 / F85HX661 - 1	175	397	222	2018-10-03	M71011NT - 2	325	300	-25	2018-10-03	M71011NT - 2	358	350	-8	2018-10-03	M71011NT - 2	334	205	-129	2018-10-03	M510198634 - 5	298	335	37

Figure D. 1: Production Line Output Report

- Packing List**

Figure D.2 shows packing list which shows how garments are pack of the cartoons style wise according to the buyer given ratios.

SUMITHRA GARMENTS (PVT) LTD

NO.33,THELANGAPATHA ROAD,WATTALA

SRI LANKA

PACKING LIST

CONSIGNEE : DILLARD'S STORE SERVICE INC,

1600 CANTRELL ROAD,

LITTLE ROCK,AR 72201,US.

NOTIFY PARTY: EXPEDITORS INTERNATIONAL INC, 500E, DALLAS ROAD

SUITE 400, GRAPEVINE, TX 76051 ATTN: CHRIS MASON

PHONE:817-305-4120

DILLARD'S DEPT STORES INC, 11701 OTTER CREEK SOUTH, MABELVALE

AR 72103,ATTENTION: ALAN DORMAN TEL: 501-455-7733

STYLE # : S75PR280B

ORDER # : 65447400

CTN No		PRE PACK	Color	Size	NO.OF PCS/CTN	TTL NO OF PCS/CTN	TTL NO OF PCS	CTN MES(CM)	GROSS WEIGHT	NET WEIGHT	NET NET WEIGHT	TOTAL G-WEIGHT	TOTAL WEIGHT	TOTAL N-WEIGHT
1	5	Ratio B	BR CHINO 65B	44X344713241	28223	-122185433	58	12.00	75.00	45.00	338676.00	2116725.00	1270035.00	
5	8	Ratio C	DARK NAVY	44X30599664	9672	1504982912	58	23.00	87.00	35.00	222456.00	841464.00	338520.00	
8	10	Ratio D	DARK NAVY	48X301719900	16380	-1892809072	53	24.00	54.00	54.00	393120.00	884520.00	884520.00	
11	15	Ratio C	GREY 55B	48X30599664	9672	1504982912	54	32.00	65.00	65.00	309504.00	628680.00	628680.00	
13	14	Ratio D	GREY 55B	46X301719900	16380	-1892809072	53	28.00	85.00	53.00	458640.00	1392300.00	868140.00	
14	19	Ratio C	OLIVE	50X32599664	9672	1504982912	65	42.00	82.00	42.00	406224.00	793104.00	406224.00	
												2128620.00	6656793.00	4396119.00

Figure D. 2: Packing List

Appendix E - TEST RESULTS

- **Test Case for Login Module**

No	Test Case	Expected Output	Actual Output	Status
1	Verify that the login screen contains elements such as Username, Password & Sign in button	Show user name & password text boxes with the sign in button	Successfully load user name & password text boxes with the sign in button	pass
2	Verify that cursor is focused on "Username" text box on the page load	When load page, cursor focused on user name text box	cursor focused on user name text box	pass
3	Verify that tab functionality is working properly or not	User can move cursor among user name , password & sign in button	moving cursor among user name , password & sign in button	pass
4	Verify that Enter/Tab key works as a substitute for the Sign in button	User can use Enter key instead of Sign In button for Sign In to the system	Successfully signing to the system using Enter Key	pass
5	Verify that User is able to Login with Valid Credentials	User can logging to the system with the valid user name, password	Successfully logging to the system	pass
6	Verify that User is not able to Login with invalid Username and invalid Password	User can logging to the system with the valid user name, password	Successfully logging to the system	pass
7	Verify that User is not able to Login with Valid Username and invalid Password	Display error message as "Invalid User Name or Password. Please try again"	show error message as "Invalid User Name or Password. Please try again"	pass
8	Verify that User is not able to Login with invalid Username and Valid Password	Display error message as "Invalid User Name or Password. Please try again"	show error message as "Invalid User Name or Password. Please try again"	pass
9	Verify that User is not able to Login with blank Username or Password	Display error message as "Invalid User Name or Password. Please try again"	show error message as "Invalid User Name or Password. Please try again"	pass
10	Verify that User is not able to Login with	Display error message as "Invalid	show error message as "Invalid User Name or	

	inactive credentials	User Name or Password. Please try again”	Password. Please try again”	
--	----------------------	--	-----------------------------	--

Table E. 1 : Login Module Test Cases

- **Test Case for Order Placement Module**

No	Test Case	Expected Output	Actual Output	Status
1	Verify that the Order Placement page contains Style No, Buy No, Buyer Name, Item Name, Item Description, Quantity, Login (If you already have an account)	Show order details entering panel & show Last inserted orders table	Successfully load the entering panel & table	pass
2	Verify that system generates a validation message when clicking on submit button without filling style no.	Display error message as “Please enter Style No”	Show error message as “Please enter Style No”	pass
3	Verify that system generates a validation message when clicking on submit button without filling style no.	Display error message as “Please enter Buy No”	Show error message as “Please enter Buy No”	pass
4	Verify that system generates a validation message when clicking on submit button without filling Buyer Name.	Display error message as “Please select Buyer”	Show error message as “Please select Buyer”	pass
5	Verify that system generates a validation message when clicking on submit button without filling Item Name.	Display error message as “Please select Item”	Show error message as “Please select Item”	pass
6	Verify that system generates a validation message when clicking on submit button without filling Order Quantity.	Display error message as “Please add order quantity”	Show error message as “Please add order quantity”	pass
7	Verify that clicking on submit button by leaving optional fields,	Save successfully without any error	Successfully saved without any error	pass

	submits the data to the server without any validation error			
8	Verify that clicking on submit button, submits the data to the database server without any validation error	Save successfully without any error	Successfully saved without any error	pass
9	Verify that the successfully saved message is displayed when clicking on submit button	Display message as “Successfully saved”	Display message as “Successfully saved”	pass

Table E. 2: Test Case for Order Placement Module

- **Test Case for Buyer Purchase Order Module**

No	Test Case	Expected Output	Actual Output	Status
1	Verify that the style search panel is displaying properly	Display style search panel	Show style search panel	pass
2	Verify that system generates a validation message when clicking on search button without filling style no.	Display message as “Please fill style no”	Show message as “Please fill style no”	pass
3	Verify that clicking on submit button, show all the style list similar to search text without any validation error	Display Style no list similar to search text	Display Style no list similar to search text	pass
4	Verify that the style list panel is displaying properly	Display Style List with Select button, Buyer Name , Order Qty details	Display Style List with Select button, Buyer Name , Order Qty details	pass
4	Verify that the select button is working properly	Display order details of the relevant style	Display order details of the relevant style	pass
5	Verify that clicking on add button by leaving optional fields, submits the data to the server without any validation error	Save successfully without any error	Save successfully without any error	pass

Table E. 3:Test Case for Buyer Purchase Order Module

Appendix F - CLIENT CERTIFICATE



12th October 2018

Project Examination Board,
University of Colombo School of Computing,
UCSC Building Complex,
35 ,Reid Avenue,
Colombo 7

Dear Sir / Madam,

LETTER OF CERTIFICATION

This is to certify that Miss. M.D. Samankula who is an undergraduate of the Bachelor of Information Technology program conduct by University of Colombo School of Computing (UCSC) has successfully developed & implemented the Garment Production Monitoring System for Sumithra Garments (Pvt) Ltd.

I glad to say that the system has facilitated to increase productivity on our operational activities and daily transactions. She has successfully delivered the Application for the requirements given. I would like to thank Miss. Samankula for her effort that she has extended towards the completion of this valuable system.

This certification is issued upon the request of Miss. M.D. Samankula.

Thank You,

Yours faithfully,

A handwritten signature in blue ink, appearing to read "Eshaka Weerasinghe".

.....
Eshaka Weerasinghe

Group IT Manager

SUMITHRA GARMENTS (PVT) LTD.

33, THELANGAPATHA ROAD, WATTALA, SRI LANKA.

Tel : +94 4824900 Fax: +94 11 2939204 E-mail: ho@sumithra.lk

Web: <http://www.sumithra.lk>

GLOSSARY

IDE - An integrated development environment (IDE) is a software application that provides comprehensive facilities to computer programmers for software development

IIS - Internet Information Services (IIS, formerly Internet Information Server) is an extensible web server created by Microsoft for use with the Windows NT family.

JAD - JAD (Joint Application Development) is a methodology that involves the client or end user in the design and development of an application, through a succession of collaborative workshops called JAD sessions.

RAD - Rapid-application development (RAD) is both a general term, used to refer to adaptive software development approaches, as well as the name for James Martin's approach to rapid development.

RUP - The Rational Unified Process (RUP) is an iterative software development process framework created by the Rational Software Corporation, a division of IBM since 2003.

SDLC - The software development life cycle (SDLC) is a framework defining tasks performed at each step in the software development process.

MIS - Management Information Systems (MIS) is the study of people, technology, and organizations.

ASP - ASP stands for Active Server Pages. ASP is a development framework for building web pages.

SQL - Structured Query Language, SQL is a standard language for accessing and manipulating databases.

GB - The gigabyte is a multiple of the unit byte for digital information.

MB - The megabyte is a multiple of the unit byte for digital information.

HTML - Hypertext Markup Language, a standardized system for tagging text files to achieve font, colour, graphic, and hyperlink effects on World Wide Web pages.

1NF - First Normal Form, property of a relation in a relational database.

2NF - Second Normal Form , property of a relation in a relational database.

3NF - Third Normal Form , property of a relation in a relational database.

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