

Computerized Stock and Employee Management System for a Garment Factory

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ABSTRACT

The purpose of this research was point out the management complexity of internal affairs of garment factories. Garment factories are type of complex systems with several divisions that cannot be managed manually. Today in Sri Lanka, most of garment factories are conducted their processes separately in division wise. In this proposed system, stock, employee, supply and suppliers, and delivery management can be done together in a single system. Getting the appropriate material, in the right quantity, at the right time is a primary objective of supply and suppliers management. It confirms the supplier's stability and dependability. Purchasing is a critical and specialized role within a garment firm. This system provides a feature to store placed orders and their confirmed delivery date, and the procedure that is computerized. In essence, the receiving, storing, and distributing of supplies fall under the purview of the stock management. After stores the items while preventing deteriorations or harms that can be occurred, this division releases the stock also.[6] the proposed web application for a garment factory management system developed using mern stack (mongo db, express js, react js, node js). The system has four main functionalities for employee management, supplier management, inventory management, buyers, and delivery management. This system will give solutions to problems in currently using applications. For this application, microsoft azure boards, github, sonarqube, and selenium ide are used for project management, version control, checking code quality, and testing.

Keywords— Delivery Management, Employee Management, Inventory Management, Project Management, Supplier Management

I. INTRODUCTION

We developed a web-based application for garment factories to computerize daily work done manually.

There are four main functionalities: employee management, supplier management, stock management, buyers, and delivery management, which are assigned to the company's managers. There is a system administrator

who can add managers to the system by adding details of managers and creating login credentials for them. Then after managers can log in to the system by inserting the given credentials. Then they redirect to the relevant dashboard. From that managers can insert, update, delete, search, and generate reports.

The human resource manager can manage the employees of the company by adding them to the system, updating, deleting, and searching. Also, he can generate pdf report of all employees. The supplier manager can manage the suppliers of the factory who supplies raw materials. He can register them to the system, update, delete, and search. Also, he can generate report of all suppliers. There is a stock manager who is responsible for stock management. He can manage the stock-ins and stock-outs of ready-made garment items. He also can perform insert, update, delete, search, and report generate. The buyer and delivery manager can register the buyers to the system, update, delete, and search. Also has the responsibility to check and approve the stock outs and assign vehicles to deliver them.

This web application is developed using the MERN stack. Microsoft Azure boards, Git Hub, Selenium IDE, and SonarQube will be used for project management, version controlling, testing, and checking code quality.

II. LITERATURE REVIEW

There is an inventory management system called "Orderhive." It is an e-commerce automation platform to improve the customer experience. This application is good in all aspects, but it is not possible to search for an order using an order number in this application according to the user reviews. User can search for an order using order id in our implemented web application.[1]

There is a web application called "A2000." It is a fashion apparel management solution. According to the reviews given by the users, it took a lot of screens to get to the report you needed. But in our web application, users can simply click on the "Generate Report" button. After that, a pdf report will be downloaded, and the user can view it.[2]

There is a web application called "Lightspeed Retail." It is a point-of-sale application. According to the user reviews, users weren't able to change the "ship to" address on purchase orders if they needed a product shipped to different locations. But in our web application, users can enter the delivery location when the order is confirmed. It doesn't get the original location of the buyer in the database.[3]

III. METHODOLOGY

In the project that was mentioned above, to develop the web-based application we have used MERN stack as the main collection of technologies. In this term of MERN, there are four technologies that consists as MongoDB, Express, ReactJS, and NodeJS. These are intended to facilitate and simplify the development process. And it helps to deploy the web-based applications more quickly and easily. By using only JavaScript and JSON, the MERN architecture makes it simple to build a three-tier architecture (front end, back end, database).

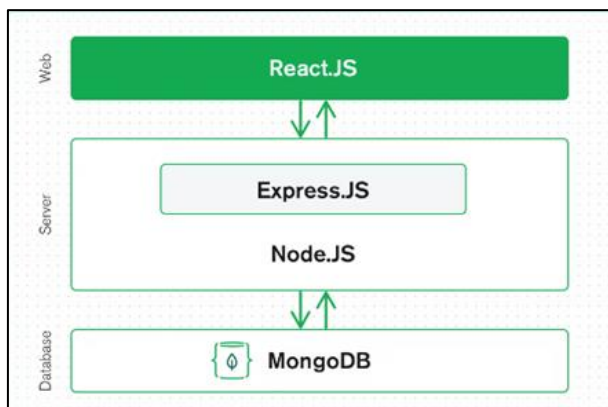


Figure 1: MERN Stack Structure [4]

A. Software Requirements

1) M – MongoDB

For this application, a database was required to store data that is simple and easy to use with React, Express, and Node. This was the reason for using MongoDB as the database. Without using local storage, we used MongoDB Atlas for deployment purposes of the application later. It made it simple to manage databases by providing the flexibility required to create scalable and high-performing applications on the cloud.

2) E – Express

For the application described in this paper, it was required to use a NodeJS framework that could be a support for creating exceptional web-based applications and Application Programming Interfaces (APIs). This was the reason for using Express as the server-side framework. It offered a wide range of middleware that simplifies creating the back-end code without typing load of codes for node modules and the process of handling robust APIs using HTTP (Hyper-Text Transfer Protocol) requests and responses.

3) R – ReactJS

For this application, it was better to use a declarative JavaScript framework which enables the development of dynamic client-side HTML applications. Therefore, we chose to use ReactJS as the front-end development technology that makes up the top layer of the MERN stack. React enabled to connect simple components to back-end server data, built up sophisticated interfaces, and all the features that can be expected from a contemporary web framework, including excellent support for forms, error handling, events, lists, and more.

4) N – NodeJS

For server-side JavaScript environment of the application, it was expected for an open-source runtime platform which was fast, powerful, and highly scalable. This is the reason to use NodeJS.

All the above-mentioned facts emphasize that the most suitable option for JavaScript related web-based applications is MERN stack.

5) Azure Boards

From the beginning of the implementation of this project Azure Boards was the tool that helps to plan and manage the whole amount of work. From there, an Agile approach was taken for tracking the steps of the project. To organize and track work, the Agile method offered some work items, including user stories, tasks, bugs, features, and epics for this project. The user stories were divided into 2 iterations and the tasks were assigned according to priority. We defined the work that needs to be done, assigned it to project participants, kept track of its progress, and engaged with others using the discussion area in each work item form for both iteration 1 and iteration 2.

6) GitHub

For version control management of the project, GitHub was the tool that used here. It offers a setting where many users can collaborate. This was the reason to select that platform. It was easy to branch and merge the entire codebase of the project using GitHub. When a part of the project was completed, we committed it to GitHub and updated the Azure Boards state to committed. Likewise, we continued and updated both simultaneously.

7) SonarQube

For verifying code quality of the project, SonarQube tool was used during the entire period. It is an open-source platform which was used to perform automatic reviews of code and static analysis of it and generate a report of bugs, code smells, and security flaws of the code. For the report, there are rules that are applied to the source code to create issues and each issue in the SonarQube report has a severity type.

8) Selenium

To perform testing for the system, Selenium was the tool we used. It is a web application testing tool that runs automatically. It enables both developers and testers to create functional browser tests and functions on every browser that accepts JavaScript. It enabled us to capture workflows to stop code regressions in the future. We applied it under four sections named as selenium IDE

with based URL, automation test script, IDE after running the test case and verify items on the page.

By using these tools and technologies, an understandable, easily changeable, and successful web-based application which meets the industry coding standards can be created. The “WoW – Wonder of Wear” web application acts as a same software development which consists of above industry coding standards. It was developed for a garment factory management system that has willingness to operate the functions within a computerized system. When considering the processing flow of the system, we can summarize it as follows.

B. Hardware Requirements

The proposed system was required to have hardware specifications.

- RAM: 4GB or more
- Hard Disk Space: 10GB
- CPU: Core i3 or more
- Operating System: Windows 10 Version 21H2 (November 2021 Update) or later

C. Functional Flowcharts

1) Employee Management – crud operations of backend process

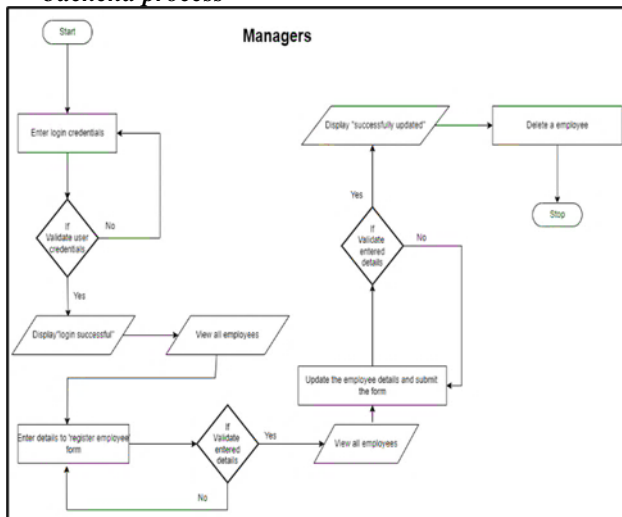


Figure 2: Flowchart for Backend Process of Employee Management

This flowchart illustrates the backend process for employee management of the system. After login to the system, the employee manager has the capability to add, view and edit employee details and delete employees from the system. And system admin handles the details of managers like adding, updating, and deleting. POST, GET, UPDATE, DELETE Rest APIs were used there.

2) Supplier management – crud operations of backend process

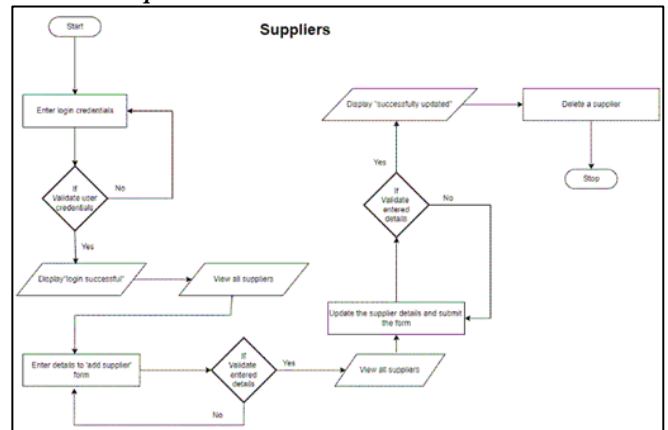


Figure 3: Flowchart for Backend Process of Supplier Management

This flowchart signifies the backend process for supplier management of the system. After login to the system, the supplier manager has the capability to add, view and edit supplier details and delete added suppliers from the system. Then, add the supplies to the system and view the details. POST, GET, UPDATE, DELETE Rest APIs were used there

3) Stock Management – crud operations of backend process

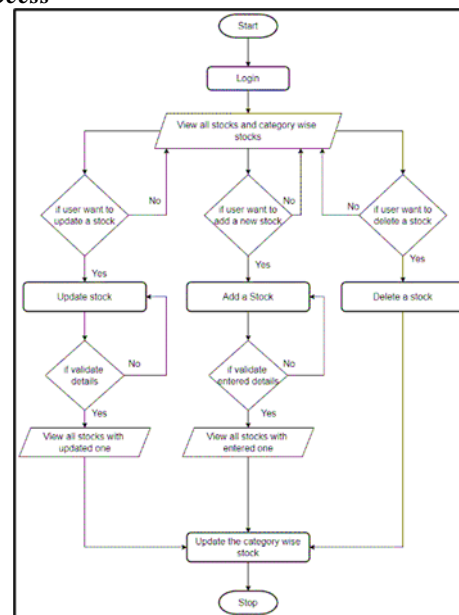


Figure 4: Flowchart for Backend Process of Stock Management

This flowchart represents the backend process for stock management of the system. After login to the system, the stock manager has the capability to add, view and edit ready-made garments stocks details and delete added stocks from the system. And there is a feature to view and update category wise stocks count of every

single garment type that exists in the tock. POST, GET, UPDATE, DELETE Rest APIs were used there.

4) Buyer and delivery Management – crud operations of backend process

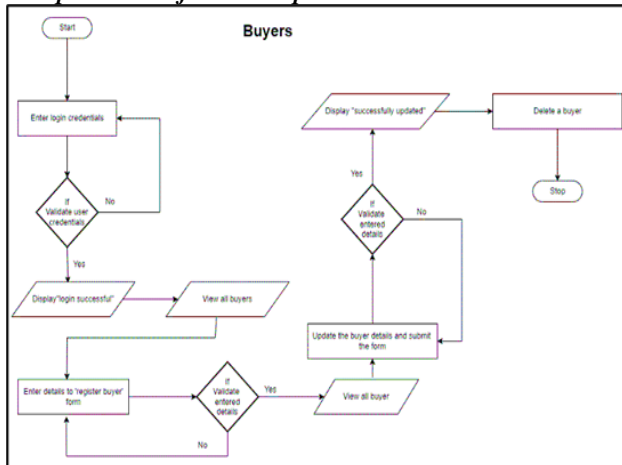


Figure 5: Flowchart for Backend Process of Delivery Management

This flowchart indicates the backend process for buyer and delivery management of the system. After login to the system, the delivery manager has the capability to add, view and edit buyers’ details and delete added buyers from the system. Then, delivery packages that are ready to be delivered are added to the system with vehicle assigning and the manager can view those details. POST, GET, UPDATE, DELETE Rest APIs were used there.

IV. PROPOSED SYSTEM

This system is based on garment factory management. It has four main functions. There are Employee management, Supplier & Supply Management, Buyer & Delivery management, and Stock management. The Employee manager, Supplier manager, Buyer manager, and Stock manager are the responsible managers for the above divisions of management. Login function with authentication is a main feature of this system which secure the system and user data.

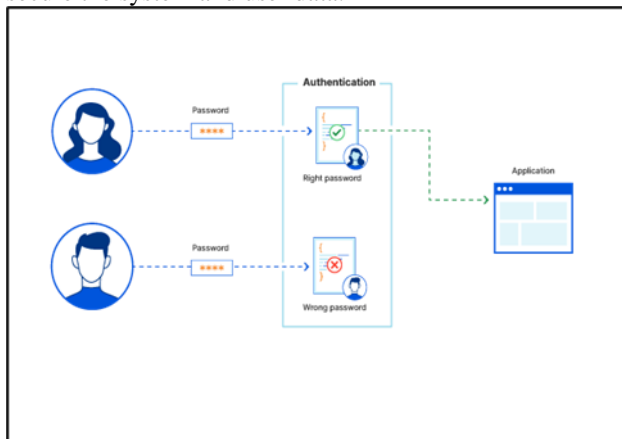


Figure 6: Authentication in Login Function

A. Employee management

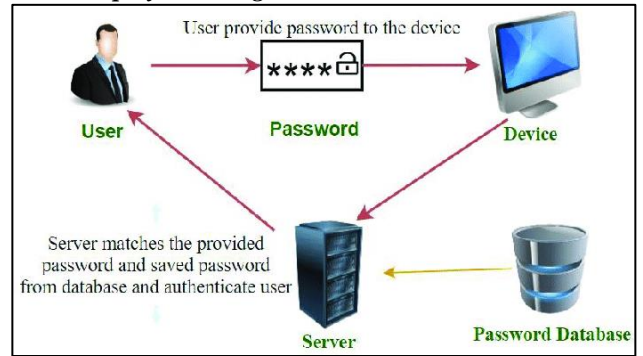


Figure 7: User Login Process [7]

Employee management is a main function in this system. Admin and Employee manager are the personas who are engaging with the function. Admin is responsible for registering managers. The Employee manager is responsible for registering employees. Form validations were used to validate the information that user will enter. Admin and managers have separate logins to the web application.

The admin can view all registered managers and former managers. If it is required to add a new manager to the system, only admin has the authority. Admin can update or delete managers using authority level. When deleting a manager, he is added to the former manager table on the Former Managers page automatically. When registering employees, the same fact applies there while moving authority level to the HR (Human Resource) manager.

B. Supplier & Supply management

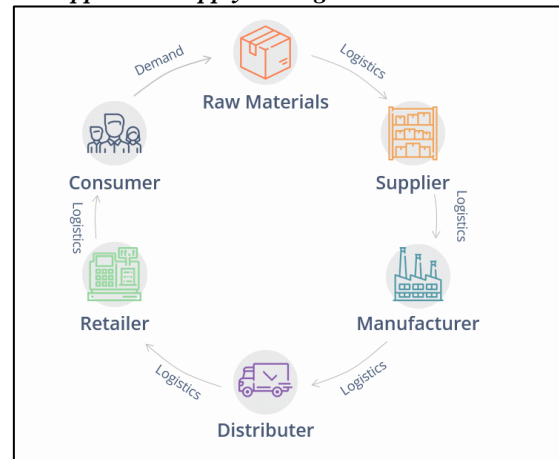


Figure 8: Supply Process [8]

The supplier manager is engaging with this function. He is the person who is responsible for managing Suppliers and Supplies. Supplier manager can view all registered suppliers. If a new supplier is required to add to the system, only supplier manager has the authority. Form validations were used to validate the information that user will enter.

The supplier manager can update and delete any supplier as it is needed. When deleting a supplier,

automatically that supplier is added to the former supplier table on the Former Suppliers page.

And also, supplier manager can register a new supply and add it to the system. He can view all registered supplies and sorting algorithms were used here then he can search any supply using any field. Also, there is a feature to get reports of these information.

C. Stock Management

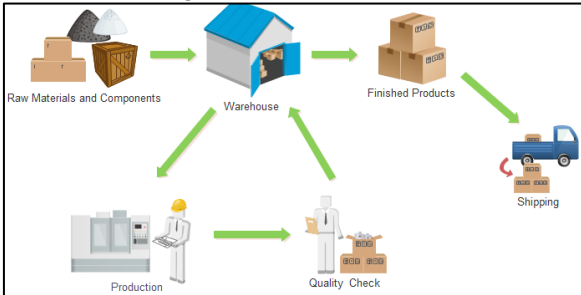


Figure 9: Stock Managing Process [9]

The stock manager is the person engaging with this function. He is the person who is responsible for managing stocks. If the stock manager wants to add a new stock to the system and register it, he has the authorization level to do that process. Form validations were used to validate the information that user will enter.

And he can view all registered stocks and category wise stocks while having the feature to search any field item since sorting algorithms were used here. Also, he can update, and delete a particular stock. When deleting a stock, automatically that stock is added to the former stock table in the database. Also, there is a feature to get reports of these information.

The stock manager can release the stock to the delivery management according to orders they received. After releasing those stocks, the stock manager can see all pending orders. Not only for the stock manager, it can be visible for the delivery manager also.

D. Buyer and Delivery Management



Figure 10: Delivery Process [10]

The delivery manager is the person engaging with this function. He is the person who is responsible for managing buyers and deliveries. If the delivery manager wants to add and register a new buyer to the system, only he has the authorization to do so. Form

validations were used to validate the information that user will enter.

The delivery manager can view all registered buyers while having the feature to search any field item since sorting algorithms were used here. Also, he can update or delete any buyer. When deleting a buyer, that buyer is added to the former buyer table automatically.

Delivery manager can view all pending orders/deliveries. Also, the manager can approve the order by assigning a vehicle. After that approval, that order will automatically insert into the approved deliveries. Also on this Approved Deliveries page, the manager can view all approved deliveries and there is a feature to get reports of these information.

V. DISCUSSION

Based on the released stocks of garment factories, Sri Lanka's foreign exchange is directly affected. Therefore, managing the affairs of a garment factory from purchasing raw materials to releasing ready-made garments within a same system will be more affective.

And the improvement of garment industry can be competitive. In such case, attention is drawn to best one which provides quality products. It depends on following factors such as increase production of high-quality garments, ensure their quality and keep stocks with safety manners and distributing stocks according to scheduled plan. This proposed system is useful for that process while centralizing all into a computerized system.

There are four main user roles in this proposed system. Such as employee manager, stock manager, supplier manager and delivery manager. We used MERN to develop, GitHub for version controlling purposes and Microsoft azure boards for project management. We used SonarQube to check the code quality, and Selenium to test the web application we developed.

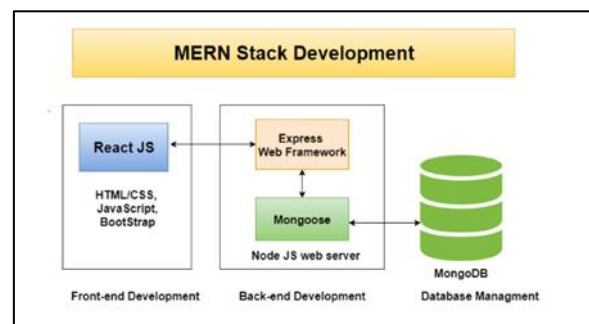


Figure 11: Working Process of MERN Stack [5]

VI. CONCLUSION

In conclusion, for managing garment factory within a same system should require knowledge to handle the processes of the system. Therefore, our web application, which we implemented for a garment factory to make the management of the factory easier will be more helpful. We implemented several functions to make it easy. such as employee management, supplier management, stock management, buyers, and delivery management. We used the MERN stack to implement this application. Also, we tested the functions and checked the code quality as well automatically.

Our web application makes a lot of employees' work easier. It saves time. It also helps to make the data management process easier. Our web application helps to improve the efficiency of the factory. It also helps executive-level officers of the factory when making decisions. because they can generate some reports through our web application. It helps to improve the quality of the garment factory. Managers can easily find the details of a particular employee, buyer, stock, or delivery through our web application.

If someone needs to improve the web application, they can add some new functions to the existing system. such as employees' attendance management, employees' salary management, and vehicle management, etc. They can also add new features to the existing functions, and they can improve the user experience, UI design, and overall design of the system.

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