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Abstract

The Building Material Inventory System (BMIS) is a software application designed to automate and streamline the inventory management process for building materials. By providing accurate and real-time information about stock levels, orders, and suppliers, the BMIS helps businesses improve efficiency, reduce costs, and gain valuable insights into their inventory performance.

There are some few key points for this Building material Inventory system.

- Improves quality control: By providing real-time visibility into inventory levels, the system helps prevent stockouts of critical items and ensures timely reordering.
- Reduces human error: Automated counting eliminates the risk of mistakes associated with manual inventory management.
- Tracks large shipments efficiently: The system automates the tracking of large shipments, saving time and resources.
- Helps prevent theft: The system provides valuable information for tracking product theft and implementing appropriate countermeasures.
- Streamlines order processing: The system assists warehouse workers in locating items, packing orders, and updating inventory levels.
- Provides real-time inventory data: The system facilitates easy access to accurate and up-to-date inventory information.

Acknowledgement

Date : 15th December 2023
Project Name : Building Material Inventory System.

We would like to thank **Engr. Sudipta Vaskar Rakshit** sir, our instructor for this project also for his support and guidance in completing our project on the topic (Building Material Inventory System). It was a great learning experience. Also with the help of our instractor we learn new things with new opportunity which will help us in our future work.

Sincierly Your’s
Abed Afnan & Yakub Ali

Executive Summary

We've done a Building Material inventory system for any building project.We've use ASP.NET,#C for framework react.js for frontend & for database we use Microsoft SQL.For this project we chose iterative model which is easy to implement & development for any beginner.It is also an web.API project.

In the Building Material inventory System there are 3 user.They are admin,manager& customer.

All of the user's have to pass throuhg the login process to maintain secure system to use.

Customer can see avaulable product also they can purchased a product to their inventory.System have the customer information like customer name & phone number.

Manager is the one who will check the store availability of the product also if the product requires then he will buy the productto the inventory to maintain product stock.Also he can see the product sell price & buy price.

Problem Statement

There are many reason we build this type of system some of them are as follows :

- Manual Process/tracking : For a regular building project we have to trace the product availability & product procedure for this project but it can be sometimes time consuming & inefficient.
- Data Inaccuracy : For manual data counting we have seen many data accuracy problem.But this system we can overcome this type of problem.
- Limited Data visibility : For tarditional approach we have limited data visibility for any kind of project.
- Security : For traditional system we have to face many security issue but here we can know that who have access to which part of the system so it becomes easy to trace the product & manitain security for the product.

Introduction

The Building Material Inventory System SRS document serves as a comprehensive guide for the development of our software solution. This document outlines the requirements and expectations for the Building Material Inventory System, ensuring that software engineers and stakeholders have a clear understanding of the project.

Objective

The purpose of this SRS is to define and detail the requirements for the Building Material Inventory System. It serves as a crucial reference for software engineers and development teams responsible for designing, implementing, and maintaining the system. This document provides a solid foundation for the successful realization of the project.

Literature Review

The construction industry in Bangladesh plays a pivotal role in the nation's economic development, and efficient inventory management of building materials is critical for ensuring the success of construction projects.

Challenges in Building Material Management in Bangladesh:

Brief summary of challenges in building material management in Bangladesh, including issues related to manual tracking, procurement delays, and supply chain inefficiencies.

Technological Interventions in Building Material Inventory:
Examination of technological solutions and interventions adopted globally and in Bangladesh for optimizing building material inventory systems, including the use of digital tools, automation, and information systems.

Impact of Building Material Inventory Management on Project Performance:

Analysis of studies that have investigated the correlation between effective building material inventory management and project performance, with a focus on time and cost efficiency in the Bangladesh construction context.

Role of Information Technology in Building Material Inventory Systems: Exploration of how information technology, such as RFID, barcoding, and advanced software, has been leveraged to enhance building material inventory management in Bangladesh's construction industry.

Supplier Relationship Management in the Context of Bangladesh: Evaluation of the dynamics of supplier relationships in Bangladesh's construction industry and its impact on building material procurement and inventory management.

Methodology

For this Building material inventory system we choose iterative model ti implement our system.Cause in iterative model we can work with any iteration at any time to improve our system performance.

The iterative model are given as a sample of view :

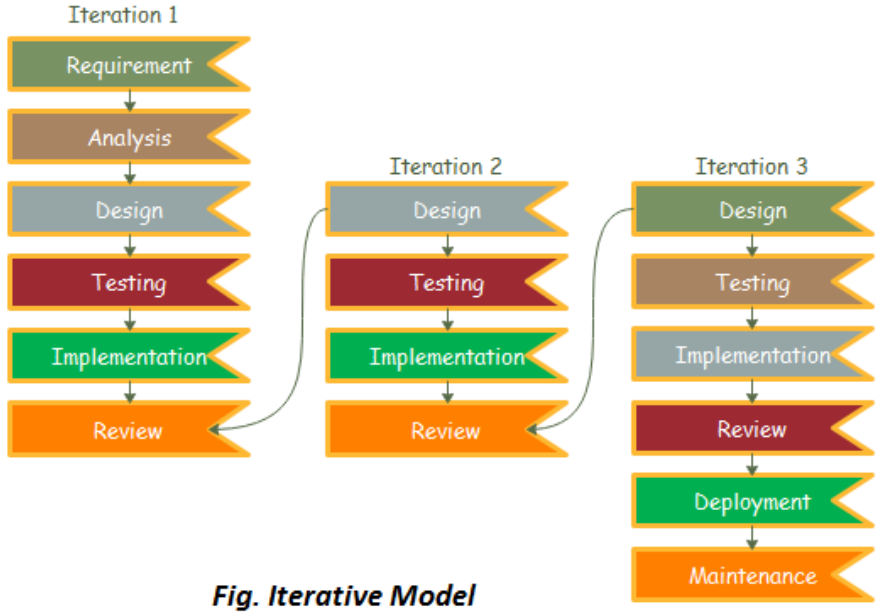

Fig. Iterative Model

Fig : 11.1

Requirements Phase: In the requirements phase of software development, the system related information is gathered and analyzed. The collected requirements are then planned accordingly for developing the system.

Design Phase: In the Design phase, the software solution is prepared to meet the necessities for the design. The system design may be a new one or the extension of a previous build one.

Implementation and Test: In the implementation as well as a test phase, the system is developed by coding and building the user interface and modules which is then incorporated and tested.

Review Phase: The review phase is where the software is estimated and checked as per the current requirement. Then, further requirements are reviewed discussed and reviewed to propose for an update in the next iteration.

Software Requirement Specification

This document serves as an outline of the specifications needed to create a iterative Building material inventory system with the ASP.NET framework. It has modules for Maneger,User & Admin like show product,update product, add products etc.

Functional Requirement :

- **User management -** Here our users could be whether customer or manager also they can see which product are available at the moment & if there are any need of the product then manager will add those product in our inventory.

- **Product management -** The system shows us the product id, products name,the brand of the products. Manager can add products to our inventory system.

- **Customers management -** Customer can get the desired products from this website also they get the product availability to get this products.

- **Sales management -** In this part we trace the products sales. Also we can trace the products quantity with it's selling price.Saller can see the selling price for this product.

- **Purchase management -** After customer purchased a item system will update the product quantity so that product quantity could be measured.

Non-Functional Requirement :

- **Performance -** System will react immediately if you have proper setup for this system & within few moment it perform the login platform for any interface.

- **Availability -** System is available for 24/7 for all users.It has a minimal downtime for maintenance.
- **Security -** System is secured enough for any user like customer/mamager/admin.Couse if thew system is not secured anough then any user can use this system to get data or data could be lost.
- **Usability -** System is free & easy to use.Any user can easily use this system also the functionality is easy so that anyone can use this system.

System Design

a) Choice of architecture :

The chosen architecture for the Building Material Inventory System is the three-tier architecture, a widely adopted model for developing scalable and modular web applications.

Presentation Layer:

Technology - React.js

Responsibilities - Handles user interface (UI) elements, interacts with the user, and displays relevant information.

Business Layer:

Technology - C# and ASP.NET Core

Responsibilities - Implements business logic, processes user requests, interacts with the database, and manages product information, orders, and payments.

Data Layer:

Technology - Microsoft SQL Server

Responsibilities - Stores and manages data related to users, products, orders, and other system information.

b) Choice of Programming Language :

The choice of programming language for the Building Material Inventory System project is crucial for achieving robust functionality and maintainability. Considering the requirements and compatibility with the chosen architecture (three-tier architecture), the following programming languages are recommended:

- Programming Language: C#
- Framework: ASP.NET
- Reasoning: C# with ASP.NET provides a powerful and versatile framework for backend development. It is well-suited for building scalable and secure web applications, aligning with the goals of the Grocery Ordering System.

c) Choice of Operating System :

For this project/system we use windows 11 to develope.Cause it is preferable for most of the development expertise.

d) Data Flow Diagram(DFD) :

Level 0 Diagram -

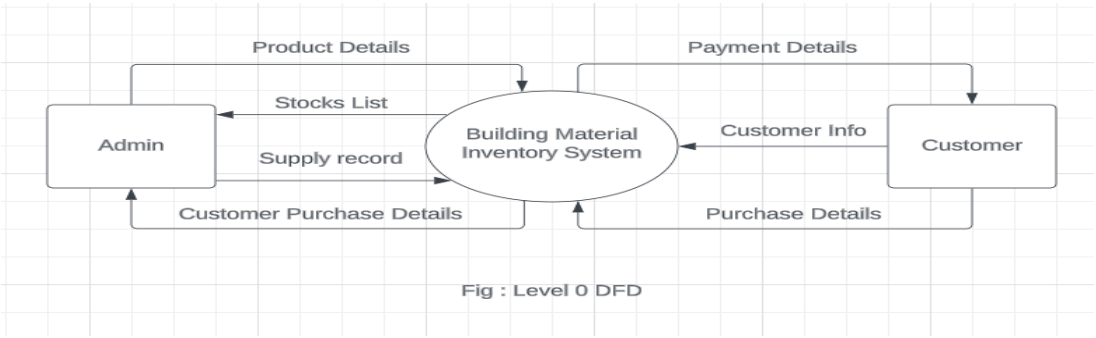

Fig : 13.1

Level 1 Diagram -

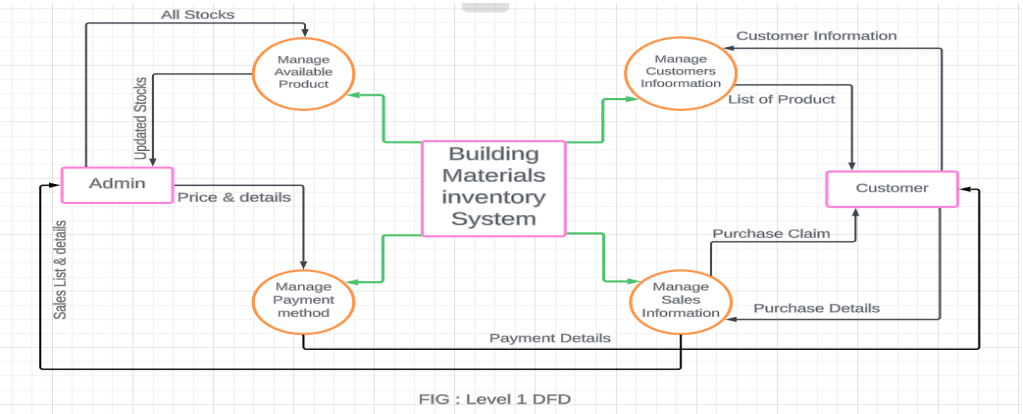

Fig : 13.2

e) Entity Relationship Diagram (ERD) :

Entity Relationships Diagram is a graphical representation of the entities, attributes, and relationships in a database. It is a tool used to design and document relational databases.

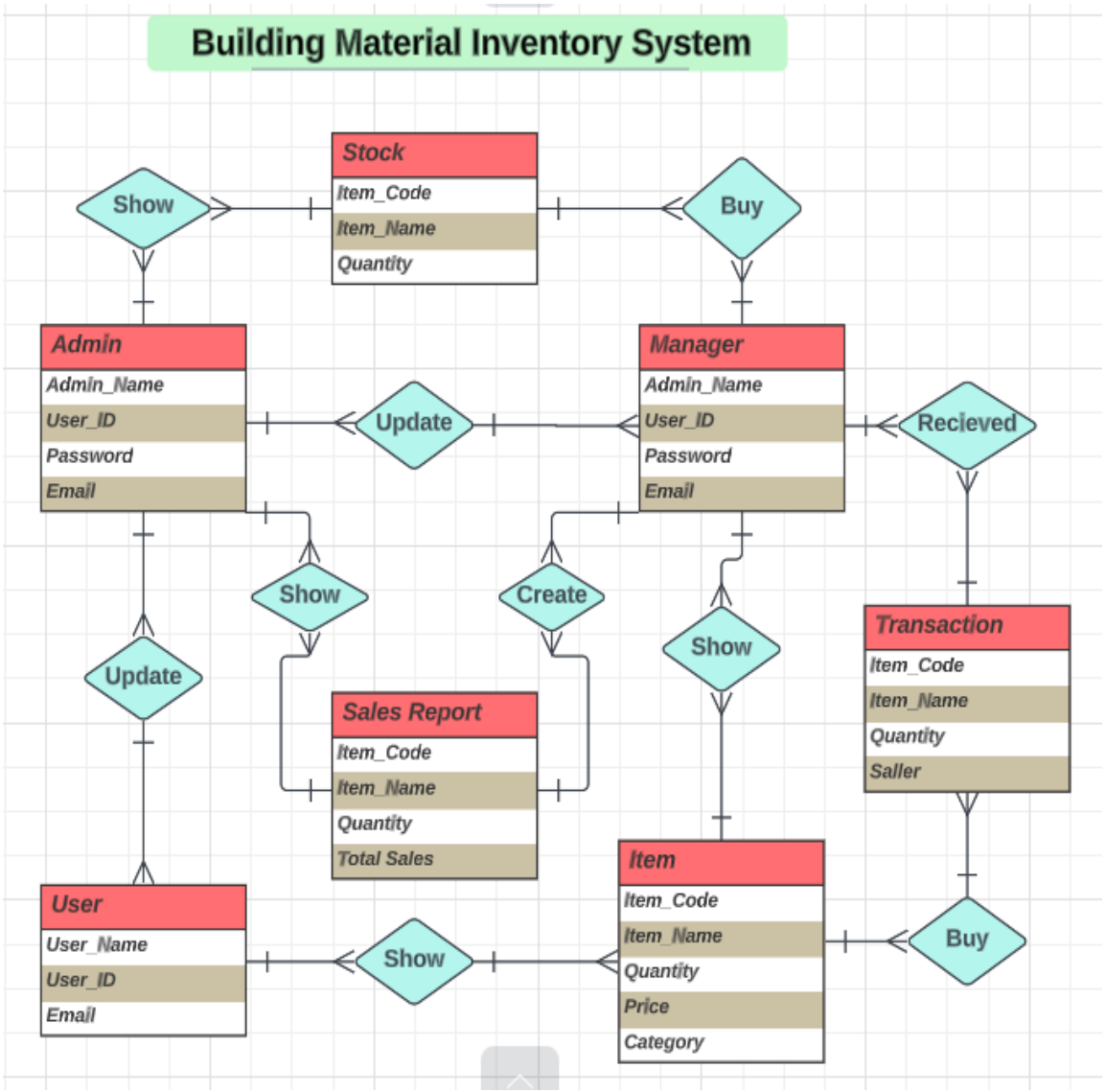

Fig : 13.3

f) Use case Diagram :

Use case diagram is a diagram that shows a set of use cases, actors and their relationships.

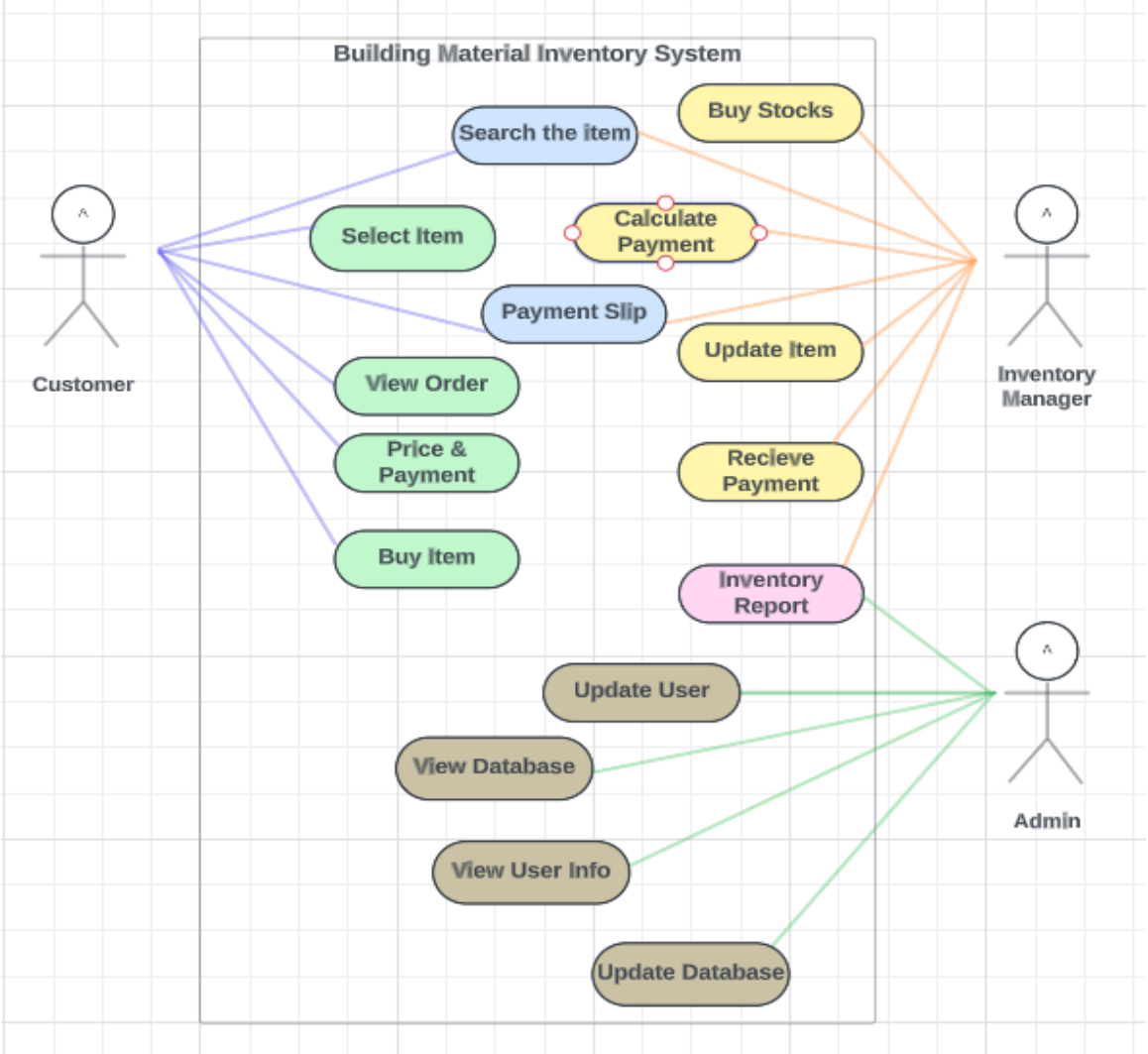

Fig : 13.4

g) Activity Diagram :

Activity diagrams are graphical representation of workflows of stepwise activities & actions with support for choice, iteration & concurrency.

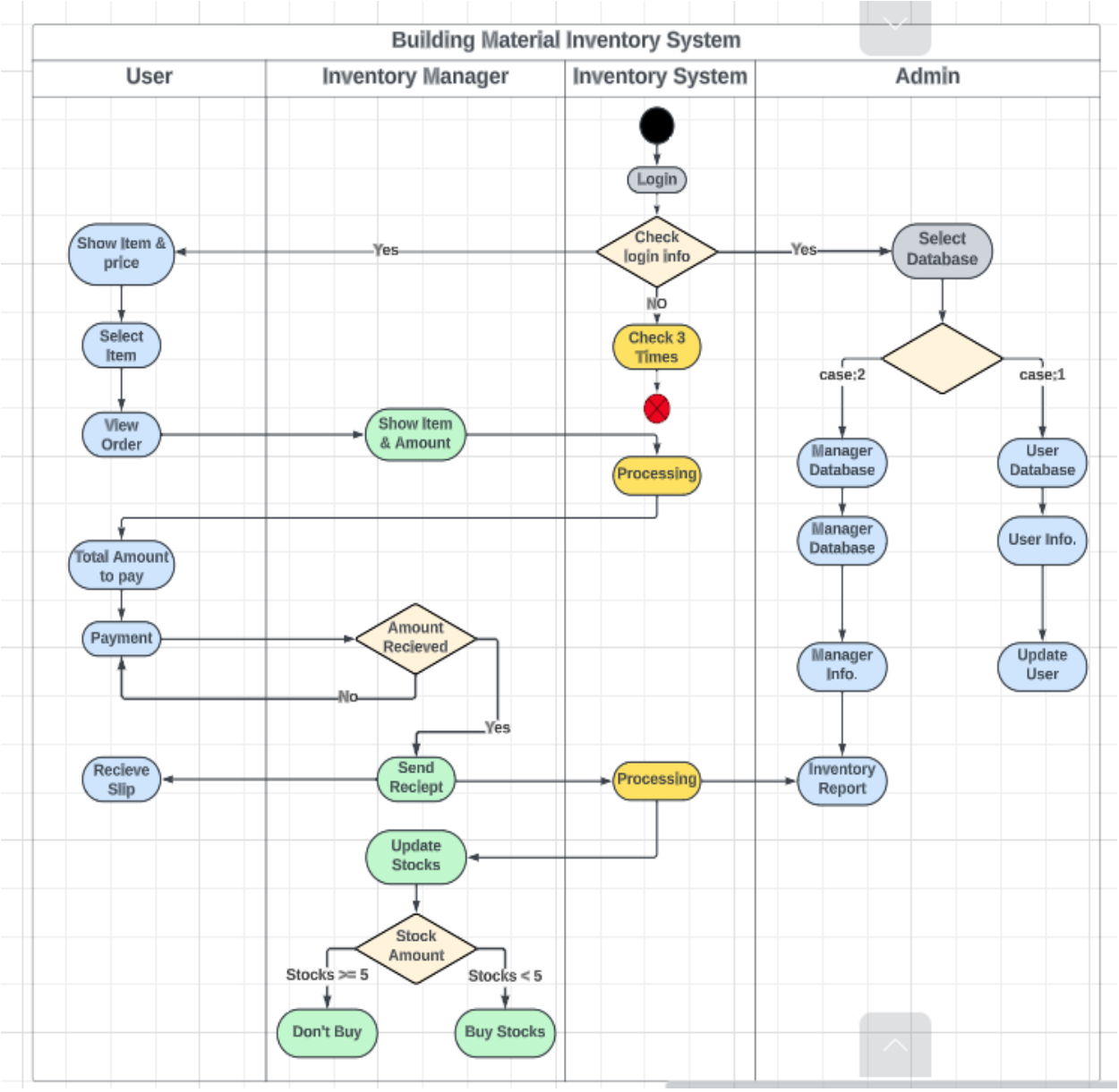

Fig : 13.5

h) Sequence Diagram :

For Admin :

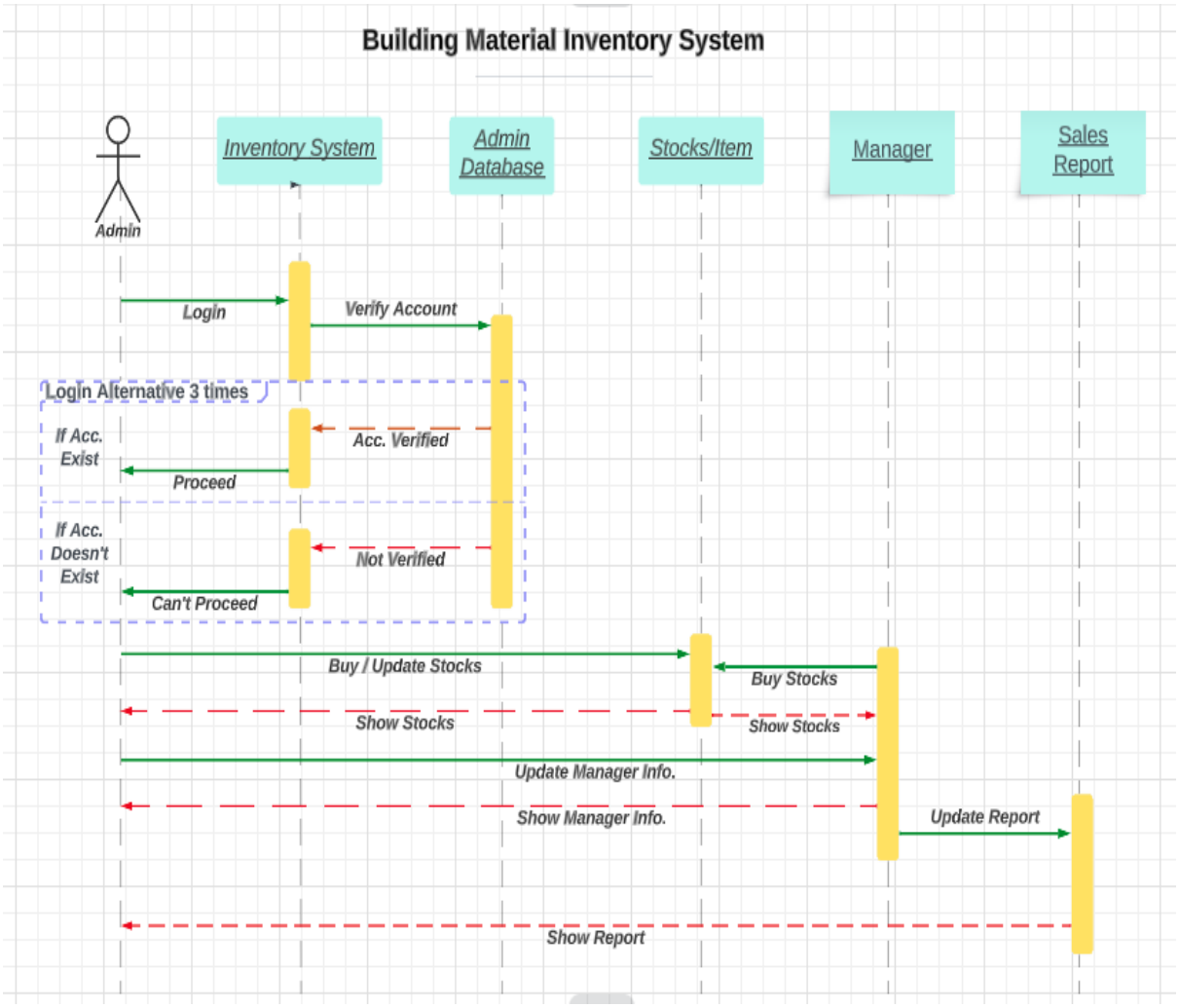

Fig : 13.6

For Manager :

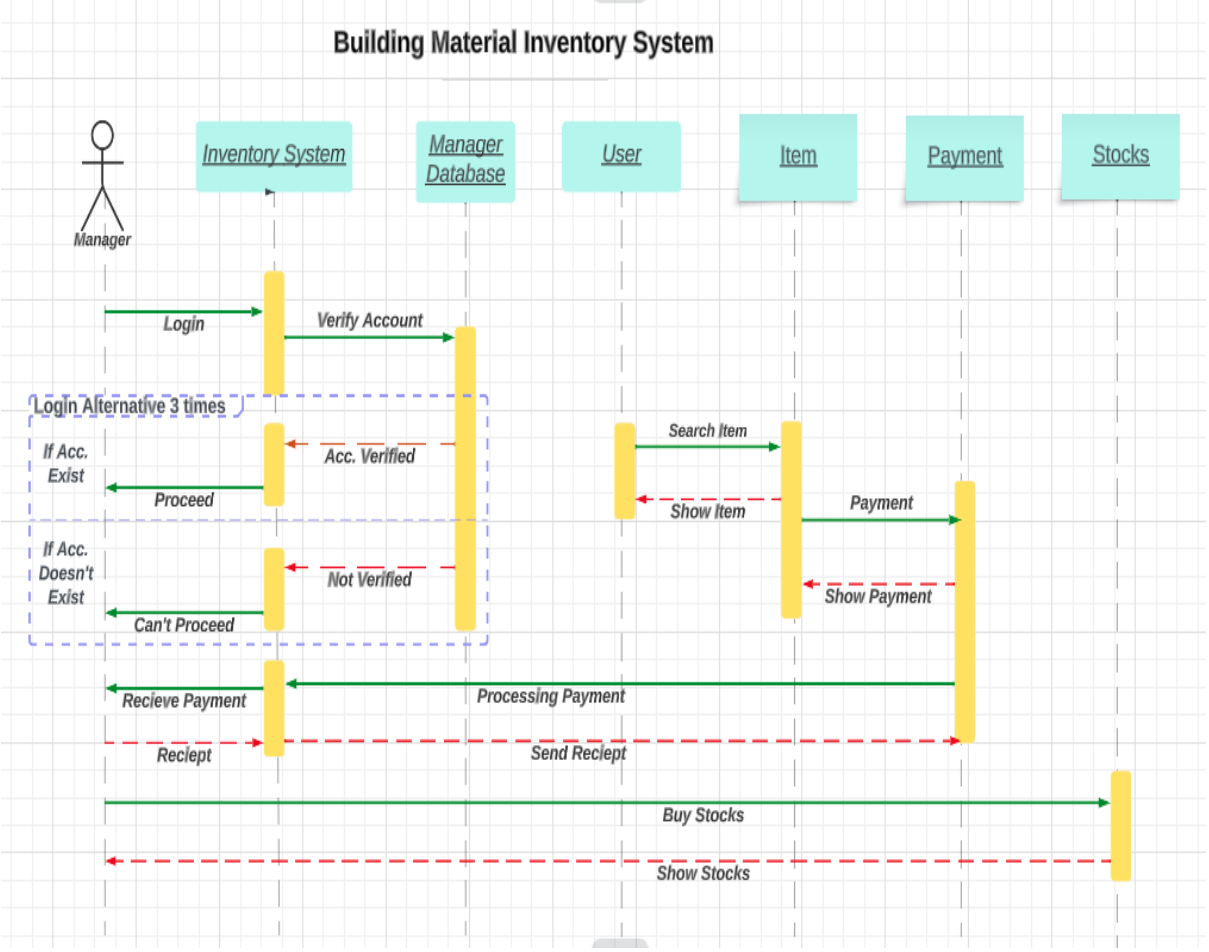

Fig : 13.7

Development & Implementation

Development : During the development phase of the Building Material Inventory System, the focus is on designing and coding the software. This involves creating a user-friendly interface, setting up the database for inventory records, and implementing features such as automated procurement, supplier management, and reporting tools.

Implementation : The implementation phase involves deploying the developed system within the organization. This includes configuring the software to meet specific organizational needs, integrating it with existing systems, and ensuring that all users are trained to use the new inventory management system effectively.

Testing & Validation

Rigorous testing is conducted to validate the functionality and reliability of the Building Material Inventory System. This includes unit testing for individual components, integration testing to ensure seamless interaction with other systems, and user acceptance testing to verify that the system meets the specified requirements.

Result & Analysis

Once the system is operational, results and data are systematically collected and analyzed. This involves assessing key performance indicators, such as inventory accuracy, procurement efficiency, and real-time tracking capabilities. The analysis phase provides insights into the system's impact on workflow and identifies areas for improvement.

Maintenance

Maintenance Plan:

- A comprehensive maintenance plan will be developed to ensure the system remains operational and secure.
- Regular updates will be made to address bugs and introduce new features.
- System performance will be monitored and optimized as needed.

Conclusion

This project has demonstrated the successful development and implementation of an ASP.NET application. The application has been designed to meet the specific needs and requirements of the identified stakeholders. Throughout the development process, we have used a variety of tools and technologies to ensure the quality and performance of the application.

We are pleased with the successful completion of this ASP.NET project. The project has provided us with the opportunity to learn and grow as developers.

Recommendation

- Use cloud-based inventory systems, barcode scanners, and mobile apps.
- Design a user-friendly system with multilingual support and provide training.
- Use analytics to forecast demand and optimize stock levels.
- Government and industry should collaborate on standards, funding, and promotion.
- Focus on data security and compliance.

Future Work

The future work can be done done for project is to improve the system's functionality, usability, and adaptability to changing market demands. Here are a few possible directions for further research:

Development of Mobile Applications:
Create a mobile application for iOS and Android to increase the system's reach. Through their mobile devices, guests would be able to check in, make reservations, access services, and receive notifications.

Mixing Emerging Technologies with Integration:
Investigate and incorporate cutting-edge technologies like artificial intelligence (AI) and machine learning (ML) to improve individualised visitor experiences, optimise room rates depending on demand, and offer astute suggestions for extras and services.

Blockchain Technology for Openness and Security:
We can use blockchain technology to improve financial transaction security, transparency, and traceability, providing a reliable and safe environment for online payments and private guest information.

Multilingual Assistance:
Provide multilingual support for the customer communication system and user interface to accommodate a wide variety of visitors and increase the system's appeal to a worldwide audience.

Localization and Globalisation:
By incorporating globalisation and localization features, you can expand the system's capacity to accommodate hotels across different regions. This will enable effortless adaptation to diverse languages, currencies, and regional preferences.

Reference

- Comprehensive Procurement Guidelines for Construction Products (USA):
  - •Description: Internal procurement guidelines have been referred to in order to align the procurement of the Construction product with organizational procedures.
  - •Source:https://www.epa.gov/smm/comprehensive-procurement-guidelines-construction-products
- User Interface Design Guidelines for Web Applications:
  - •Description: User interface design best practices and guidelines have been followed to ensure the system's usability and user experience.
  - •Source: https://www.shopify.com/blog/ui-design-principles

- DFD (level 0 diagram) - https://lucid.app/lucidchart/124c9a59-df90-4175-b0a0-adce10d4ddf3/edit?invitationId=inv_6f058a6c-e74c-4632-93e5-4f9d1aa7f513

- DFD (level 1 diagram) - https://lucid.app/lucidchart/123c5f4c-ee04-4a39-b0b9-4039a925e38c/edit?invitationId=inv_bafd08a9-83d3-43f6-bc1f-1ef68e18b036

- ERD - https://lucid.app/lucidchart/25b43046-3a65-465f-b249-28b2ec611b1d/edit?invitationId=inv_248d1858-2f27-4fc1-9da4-e1fa1547dac5

- Use case Diagram - https://lucid.app/lucidchart/606ee4df-5ea2-49ad-a87b-d29eda14f486/edit?invitationId=inv_dc83b91b-4ce8-412e-a805-91f38f8d7dc3

- Activity Diagram - https://lucid.app/lucidchart/bc229cd5-0353-4c3a-a1a6-e969da08d36a/edit?invitationId=inv_41b91838-1dec-4584-a9ff-2fb525d1e652

- Sequence Diagram (For admin) - https://lucid.app/lucidchart/de5d2a1b-9ee2-4a8b-a69c-bddecd22167d/edit?invitationId=inv_d6cde117-2c8f-471c-a084-68daf27dcd31

- Sequence Diagram - (For manager) - https://lucid.app/lucidchart/ce83da77-8d9b-40f6-b2cd-ccd72f85615e/edit?invitationId=inv_d3e532f1-c235-43e5-a500-884f59efa8b2

Appendices

Appendix A :