CS5002NI Software Engineering

20% Group Coursework

Milestone number : 1

AY 2024-2025

Credit: 30

Group Name:			
SN	**Student Name**	**College ID**	**University ID**
1	**Rushav Sthapit(AI1)**	**np01ai4a230009**	**23048581**
2	**Sanskriti Agrahari(AI1)**	**np01ai4a230002**	**23048503**
3	**Sulav Paudel(AI1)**	**np01ai4a230091**	**23048610**
4	**Garima Ray(AI1)**	**np01ai4a230040**	**23048613**

Assignment Due Date: 26th November

Assignment Submission Date: 26th November

I confirm that I understand my coursework needs to be submitted online via Google Classroom under the relevant module page before the deadline in order for my assignment to be accepted and marked. I am fully aware that late submissions will be treated as non-submission and a mark of zero will be awarded.

6% Overall Similarity

The combined total of all matches, including overlapping sources, for each database.

Match Groups

- **13** Not Cited or Quoted 6%
  Matches with neither in-text citation nor quotation marks
- **0** Missing Quotations 0%
  Matches that are still very similar to source material
- **0** Missing Citation 0%
  Matches that have quotation marks, but no in-text citation
- **0** Cited and Quoted 0%
  Matches with in-text citation present, but no quotation marks

Top Sources

0% Internet sources
0% Publications
6% Submitted works (Student Papers)

Integrity Flags

0 Integrity Flags for Review

Our system's algorithms look deeply at a document for any inconsistencies that would set it apart from a normal submission. If we notice something strange, we flag it for you to review.

A Flag is not necessarily an indicator of a problem. However, we'd recommend you focus your attention there for further review.

Table of Contents

Table of Figures

BUSINESS CASE

CURRENT STATUSQUO

Global Tech is looking to implement an inventory management system to address the inefficiencies in its operations.

- **Delays in Order Processing:** The lack of automation is causing delays of up to 5 Days in order processing, leading to a 25% decline in customer dissatisfaction.

- **Mismanaged Resources:** Unclear inventory levels and frequent budget overruns are resulting in significant financial losses.
- **Budget Overruns**: Inefficient resource allocation has caused a 20% increase in operational costs.
- **Manual Errors:** Relying heavily on manual efficiencies has increased the error rate by 15% as the year ends.

A proper management system will streamline the operations as well as reduce processing time improving user satisfaction and saving costs supporting efficiency.

PROCESS

After careful consideration and weighing several options, the spiral model seems to be fit for this project as:

- It is a combination of design as well as prototyping.
- It provides a structured and also flexible approach, letting the involved individuals improve the system through iterative cycles.
- It stresses on continuous assessment of risks.
- It allows incorporation of new demands based on the stakeholder's evolving needs. It allows clear communication between the team and stakeholders from the early stages.

This model with its iterative design promotes constant evaluation and hence amplification of the project resulting in a smooth sailing project and quality product.

BENEFITS

With proper administration, this project can yield numerous advantages and enhancements:

- With automation of manual procedures, this project will increase productivity by upto 40% and reduce errors by 30%, leading to greater operational efficiency.
- It will also aid in lowering manual labour costs by approximately 20% as manual interventions are minimized.
- With timely deliveries and better customer service as a direct result of efficient operation, the customers can be expected to rise by 30%.
- This project also has the potential to enable scalability to accommodate 50% larger warehouses and expand in different locations.
- Real time data reports and analytics will allow for better and quicker data centric decisions by giving conception into sales patterns and warehouse stocks.

COSTS

Initial Costs

Development Costs - 2,50,000 Testing Costs - 1,00,000

Hardware and Infrastructure - 5,00,000 Licensing and Software Tools - 50,000

Training and Documentation - 1,00,000 Contingency Costs (10%) - 1,50,000

Initial Deployment and Launch - 1,50,000 Total Initial Costs For Development: Rs.13,00,000

Ongoing Costs

System Maintenance - 50,000 Technical Support - 50,000

Server Hosting and Storage - 50,000 Total Annual Ongoing Costs: Rs.1,50,000

ROI

Total Initial Costs: Rs. 13,00,000 Annual Savings/Benefits: Rs. 5,50,000

Break-even Timeline:

- Payback Period: 2.4 years Total Net Gains Over 5 Years: Rs. 14,50,000

RISKS

The project also poses some risk which if not mitigated could lead to failure. Such risks may include:

- The project scope and requirements should be studied carefully as lack of a clear scope could lead to increased cost due to project delays.
- The company seeks to complete a large project which requires a lot of work in which the stakeholders might not have enough experience in.
- Technological risks such as outdated systems could obstruct integration as well as risk data breaching.
- Lack of proper testing before deployment could cause the system to breakdown once deployed leading to more costs to fix it as well as customer dissatisfaction.
- Lack of proper maintenance and monitor post deployment could result in it being outdated after a few years.

SCHEDULE

Project Timeline:

- **Total Duration**: 6 months including 1 month for any delays.

Cycle 1 (1 Month): Initial Planning and Requirement Analysis
Objective: Development of Business Case and SRS.
Cycle 2 (1 Month): Initial Development Phase and System Design
Objective: Creating wireframes and designs as well as developing basic functional modules.
Cycle 3 (2 Months): Development and Testing of Prototypes
Objective: Gradually building all system modules.
Cycle 4 (1 Month): QA Testing
Objective: Validating the system's overall functionality and efficiency.
Cycle 5 (1 Month): Final Deployment
Objective: Launching the system and training end-users.

ASSESSMENT AND RECOMMENDATION

Failing to address warehouse management issues leads to operational risks, increased budget, and customer dissatisfaction. Poor inventory tracking causes stock misplacement, delays, and higher expenses, reducing profitability. Ineffective resource allocation and task distribution waste labor, equipment, and storage space, slowing productivity. Delays in key tasks like packing and shipping disrupt supply chains and erode customer trust. Lack of communication exacerbates errors such as incorrect dispatches and missed deliveries. Implementing efficient processes, improved communication, and better resource use ensures smoother workflows, reduced errors, and consistent operations. Investing in proper budgeting, staff, and technology upgrades secures efficiency, growth, and long-term success.

Software Requirements Specifications

Introduction

Purpose

This document is the SRS for the Inventory Management System being developed for Global Tech Corporation for the management of warehouse operations in Nepal. The main aim of this project is streamlining the warehouse tasks through automation of key business processes such as user access, order and inventory management, sales monitoring, and reporting. This documents outlines the structured design and functionality requirements of the system being developed, to ensure the efficiency of the project.

Intended Audience and Reading Suggestions

This documentation has been crafted for the audience of the following:

Developers: This document will help the developers to implement the software based on the requirements.
Project Managers: The Project Managers will be able to keep track on the softwares development time and budgets.
Testers: The testers will be able to verify that the system has met the requirements based on this document.
Users: Users, both admins and customers will be able to understand the functionality and features of the system via this document.

It is suggested to read the document in the following pattern as it is written in a structured and readable format:

Introduction: This section provides the overview of the inventory management system along with the purpose and the targeted audience for the SRS.
Overall Description: This section is about the functionality of the product, the overview of the system as well as the user characteristics.
External Interface Requirements: This section is concerned with the detailed interface related to the user, hardware, software and communication.
System Features: This provides the detailed account of the core features of the IMS.
Non Functional and Other Requirements: This section provides information of about miscellaenous requirements from performance, safety, security or any other requirements.

Product Scope

The IMS that will be developed for Global Tech Corporation will facilitate the operational order through automation for major business processes such as user access, order and inventory management, sales monitoring, and reporting. There will be personalized features available from both administrator and customer perspectives. This project is

expected to deliver a strong solution to overcome any issues related to system downtime or abject communication within the given timeframe. The system will integrate reporting tools and payment systems that will ensure smooth operations on the supplier's end and also contribute to making better decisions and controlling costs.

Overall Description

Product Perspective

The IMS for Global Tech Corporation aims to transform the warehouse management operations by focusing on delivering a well-designed and robust system. The IMS will serve as an automated platform, integrated with multiple functionalities curated for specific operational tasks like user authentication, different access for user and admin to ensure security and a personalized experience. It will also help with product management from product entry to its stock management. The reports generated from the system will allow for smooth decision making as it will give insights into sales trends and real time reports about statistics. It will also incorporate a secure payment gateway for the ease of customers. These features will be designed into the system cohesively to maintain operational efficiency while ensuring data security.

Product Functions

User Access Management: Admins and customers can register and log in to access the system based on their roles.

Purchase Order Management: Admins can add and view purchase orders, and customers can track their order history.

Sales Management: Admins can manage and track sales orders, including shipping and delivery details.

Product Management: Admins can add new products and view existing stock levels, while customers can check the availability of products.

Report Generation: Admins can generate sales and purchase reports to assist in decision-making.

Payment Integration: Customers can make payments for purchases, and payments are securely processed and linked to inventory updates.

User Classes and Characteristics

Admin User:

Admin users will use the system daily to manage inventory, process orders, and generate reports. They will have complete access to all the system features like managing products, order processing, report generation, etc.

Customer User:

Customers will use the system to browse products, place orders, and make payments. Customers will have access to the product catalog, order placement, payment processing, and their order history.

Design and Implementation Constraints

Database Requirements: A relational database management system like MySQL will be used to store user and product data.

Security: Important information like user details, authentication codes and payment details will be stored in an encrypted form.

Language Requirements: The primary language for the system is English although users will have the option to change the language according to their preferences.

Compliance: Important details such as dates, currency values and symbols as well as measurement units will be adapted according to the user's location and language.

User Documentation

User Manual: This will provide step-by-step instructions for both Admins and Customers on how to use the IMS.

Online Help: Context-sensitive help will be embedded within the application.

Training Materials: This will be available for admins to learn about system management.

API Documentation: For developers who may need to extend or integrate the system.

External Interface Requirements

User Interfaces

The IMS will provide a responsive and easily navigatable web-based interface for both Admins and Customers.

Login Page: For both Admin and Customer roles.

Dashboard: Displays system stats and recent activities.

Product Listings: Allows customers to browse available products.

Purchase Order Management: For Admin to add and view purchase orders.

Payment Interface: For secure payment processing.

Hardware Interfaces

Devices: The system will be compatible with different kinds of devices such as desktop, laptops, tablets and smartphones.
Barcode Scanners: Admins may use barcode scanners to manage product entries and updates.

Software Interfaces

Payment gateways: The system will use various payment gateways like VISA and PayPal to securely process customer payments.
Email Server: For sending order confirmation and shipping notifications to customers.

Communications Interfaces

Network Protocols: The system will use HTTP/HTTPS for secure communication over the web.
Email Communication: SMTP for sending email notifications.

System Features

Register Users to System

Description:
Customers will have to register and log in to gain access to their respective roles in the inventory system. Customers can only browse and make purchases according to their needs.
Functional Requirements:
The system will allow new customers to register with their own unique information.The user information will be verified during the login procedure. Customers will have access to view products, compare their prices and make accordingly.

Add to Cart

Description:

Customers can select products they have viewed and add them to their cart to make purchases.

Functional Requirements:

The system will have an add to cart feature that will allow customers to add products of interest to their cart to buy. Customers can view, add and delete items from their cart before checking out.

View Purchase History

Description:

Customers will have access to view their previous purchases in the purchase history section.

Functional Requirements:

The system upon request will provide the customer with past purchase details such as order date, name, quantity, price, etc. Customers will have the ability to sort the purchase history by date.

Purchase Report

Description:

The customers can also generate reports of their purchases.

Functional Requirements:

The system will generate a detailed purchase report for customers who have requested it with essential information like total expenditure over a selected time period. The reports can be downloaded as a pdf or can be stored in a csv.

Register to System

Description:

Admins will have to register and log in to gain access to their respective roles in the inventory system. Admins will have full control over the system including manipulation of data.

Functional Requirements:

The system will allow new Admins to register with their own unique information. The user information will be verified during the login procedure. Admins will have access to manipulation commands such as add, update and delete.

Sales Report

Description:

Admins will have access to sales performance to make decisions accordingly.

Functional Requirements:

Upon the request of the admin the system will generate sales reports including total sales, revenue, and profit/loss for the selected time period. Admins will have the option to filter the sales reports by product, category, or date.

Sales Management

Description:

Admins will have the ability to manage sales orders as well as customer information and details.

Functional Requirements:

The system will allow admins to view sales orders as well as track them. Admins will also be able to update sales tracking statuses like delivered, on the wayor acknowledged.

Purchase System

Description:

The admins will manage inventory by tracking and recording purchases made by the supplier.

Functional Requirements:

Upon the request of the admin the system will record details of product purchases, including supplier details, cost, and quantity. Admins will also be able to view and edit past purchase records.

Add Products

Description:

Admins can also add new products to the system.

Functional Requirements:

The system will give admins the option to add product details like name, category, price, and initial stock to the database. Admins will also be able to edit or remove product information as needed.

Other Nonfunctional Requirements

Performance Requirements

- The system will be able to handle up to 500 users simultaneously.
- The system must complete the login and register process as well as the validation of information within 3 seconds.
- Adding products to cart or recording customer purchases should not exceed 2 seconds of response time.
- Report generation both sales and purchase shall be completed within 5 seconds.

- The system must be available for use 24/7 with a downtime of 3 hours per month for routine checkups, bug fixes and feature updates and overall maintenance.

Safety Requirements

- The system will, on a daily basis, create a backup of all critical data in case of any data loss, system failure or cyber-attack.
- The data recovery must be completed within an hour.
- Data recovery methods must be implemented to prevent accidental data deletion by customers or admins such as confirmation prompts for critical actions like delete cart or add items by admin.
- Any unexpected system crashes should not result in the loss of incomplete transactions, ensuring data integrity for customers.

Security Requirements

- All user data for both customers as well as admins will be encrypted for an extra layer of protection.
- The system will prompt the user to enable two-factor authentication to enhance security.
- The system will also have a timeout mechanism to automatically log out inactive users after 10 mins of idleness.
- Admin access will be hierarchical, meaning certain functionalities will be restricted to certain levels of authority.

Software Quality Attributes

- **Availability**: The system shall maintain uptime 24/7 with a downtime for maintenance every month.

- **Reliability**: All system features like adding to cart, generating reports and viewing history shall function without failure and will be properly displayed with good UI/UX.
- **Usability**: The user interface must easy to navigate and must seamlessly navigate between portals, requiring no more than 5 clicks to perform any primary action.
- **Maintainability**: The system will get constant updates and feature additions with minimal disruptions.

Business Rules

- Admins are the only ones that can add, update, or delete products from the inventory.
- Customers must register to make purchases and access their purchase history.
- Only authenticated users with proper access will be able to gain control over the system’s core features.
- Sales and purchase reports must be generated and stored according to the regulations and made accessible to authorized personnel only.
- Admins must be present to review and approve of all major updates to the inventory or sales systems before deployment.

Data Flow Diagrams

Context-level

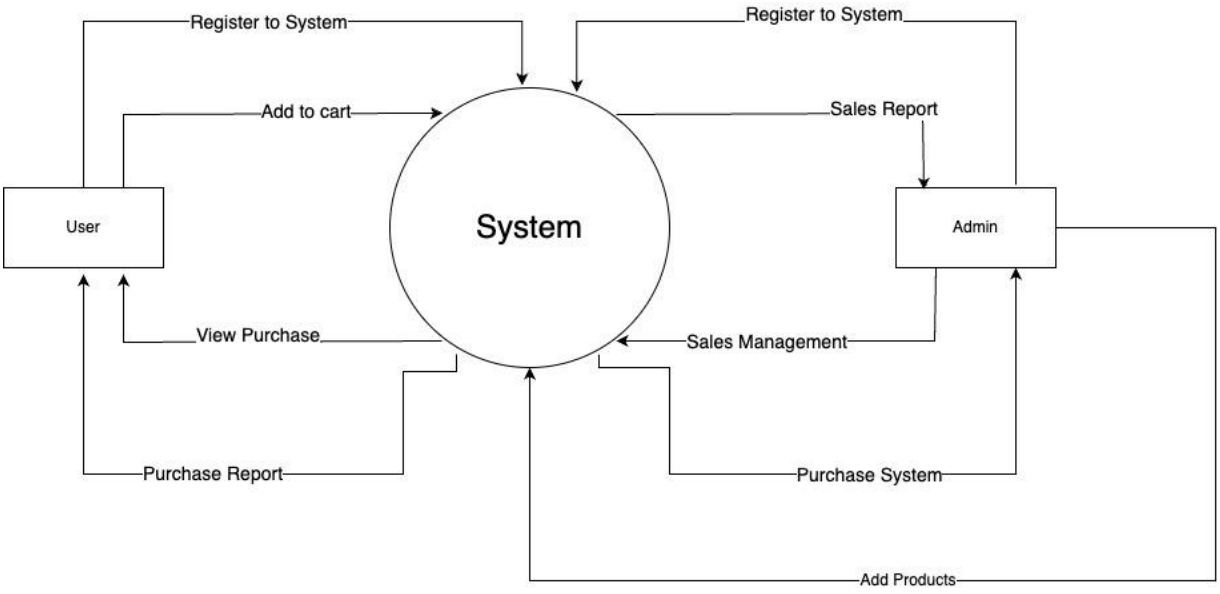

Figure 1 Context-Level DFD of the System

Level-1

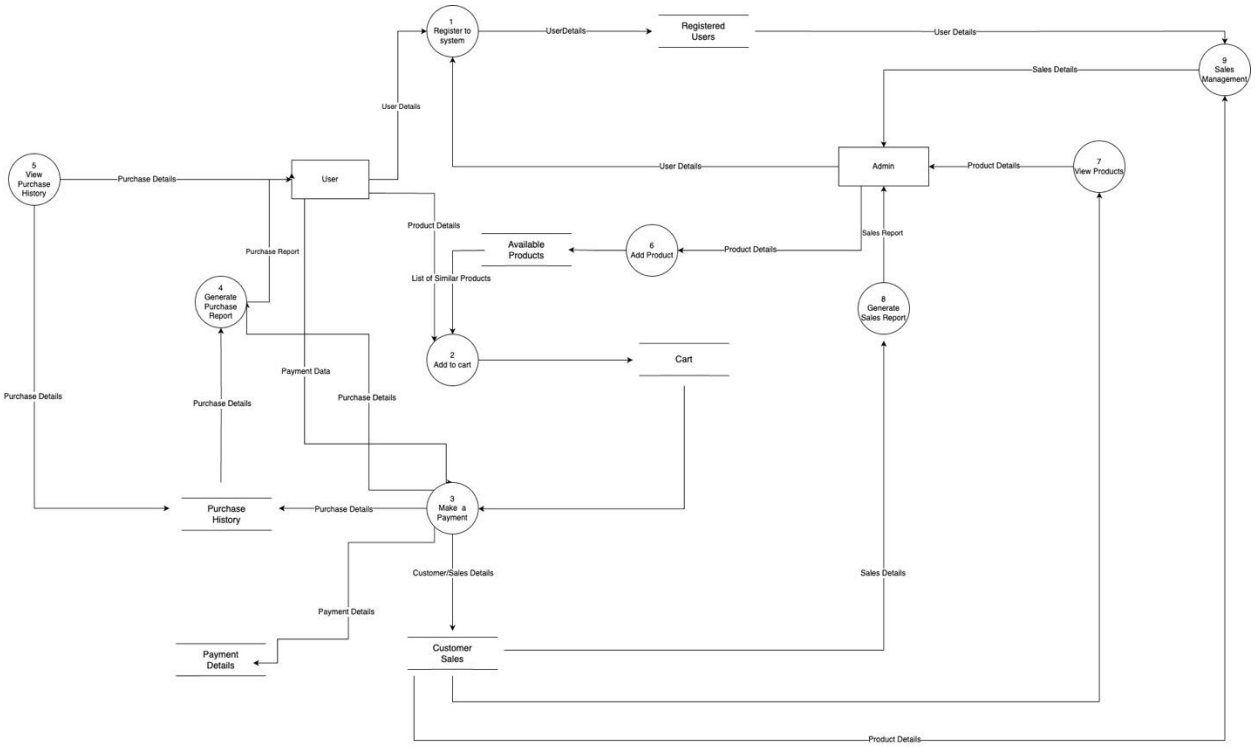

Figure 2 Level 1 DFD of the System

Level-2

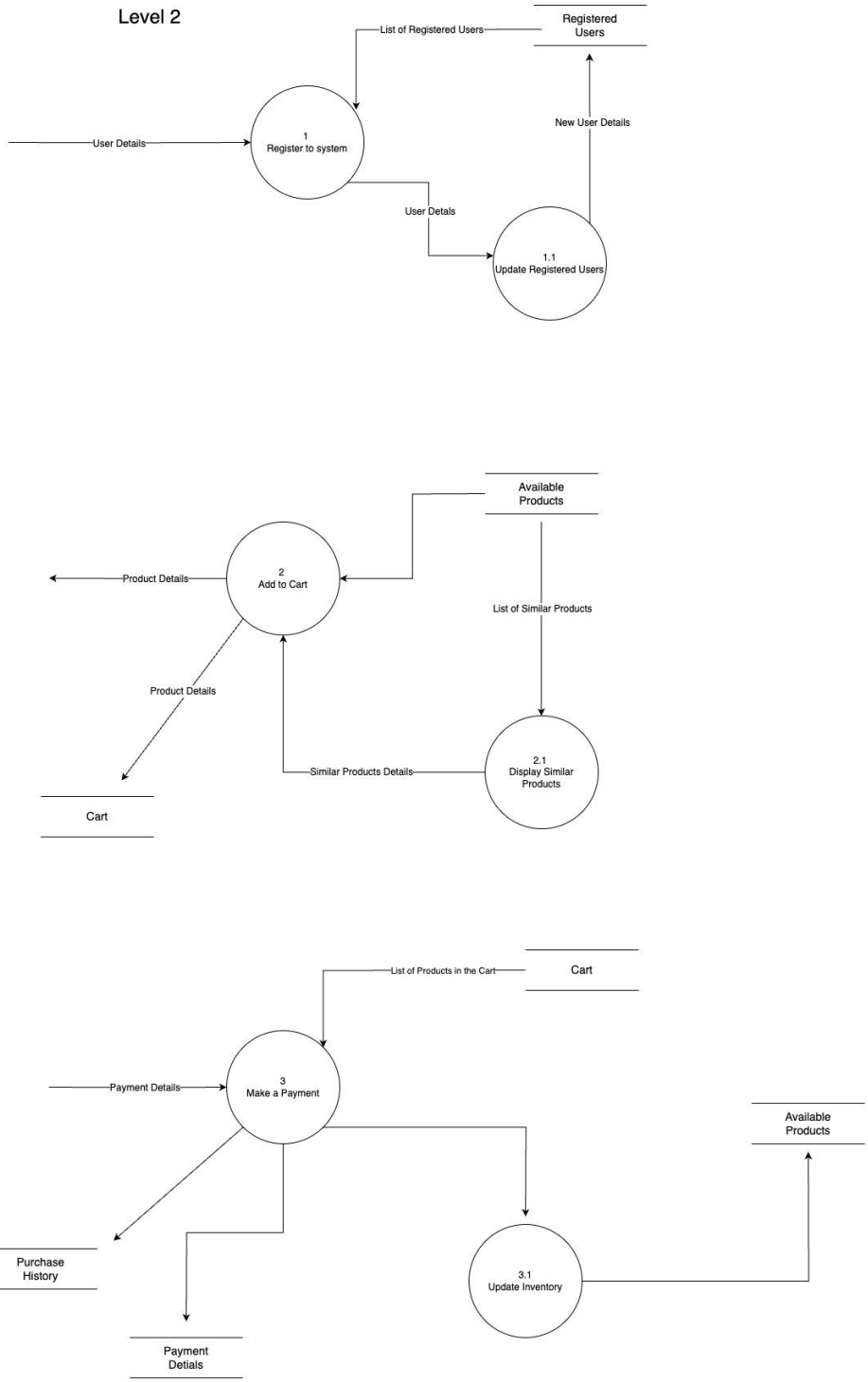

Figure 3 Level 2 DFD of the System

Entity Relationship Diagram

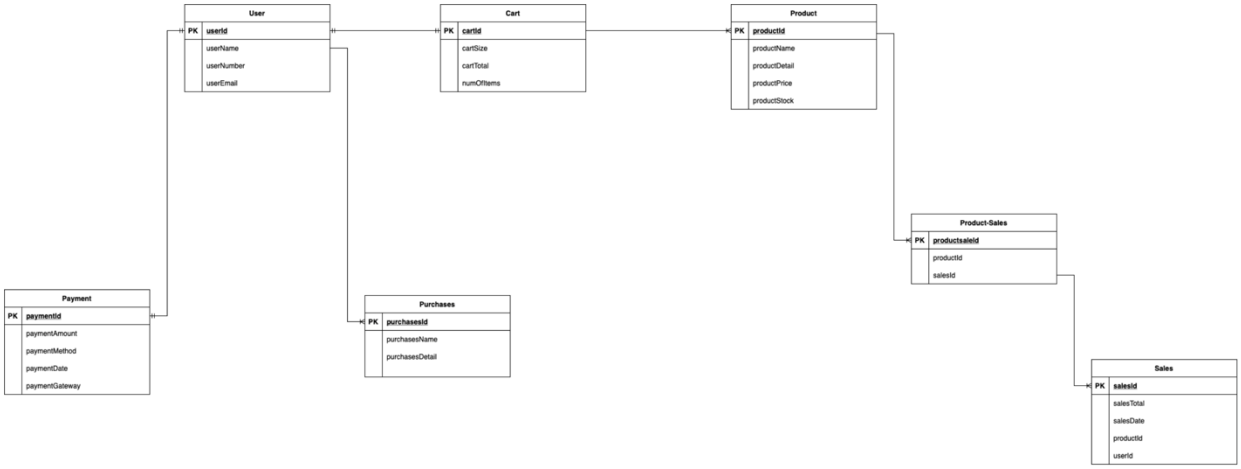

Figure 4 ERD of the System

Individual Data Flow Diagrams

Purchase Order

Context-level

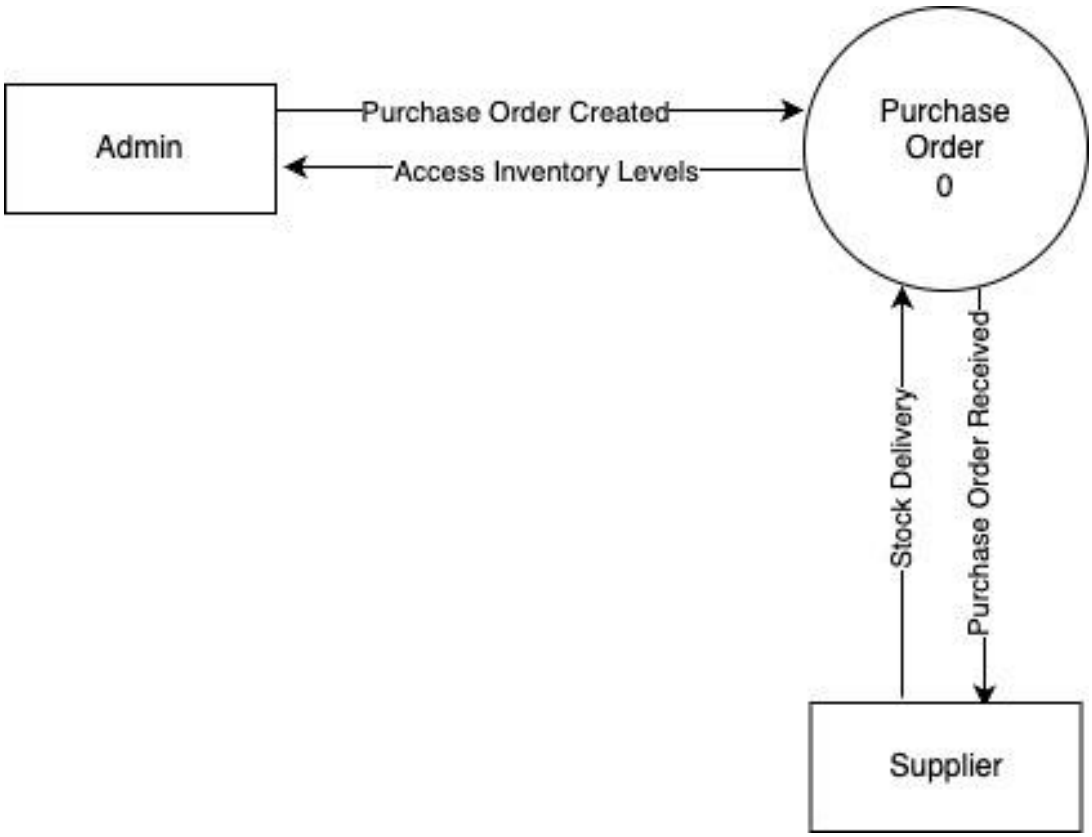

Figure 5 Context Level DFD of Purchase Order

Level-1

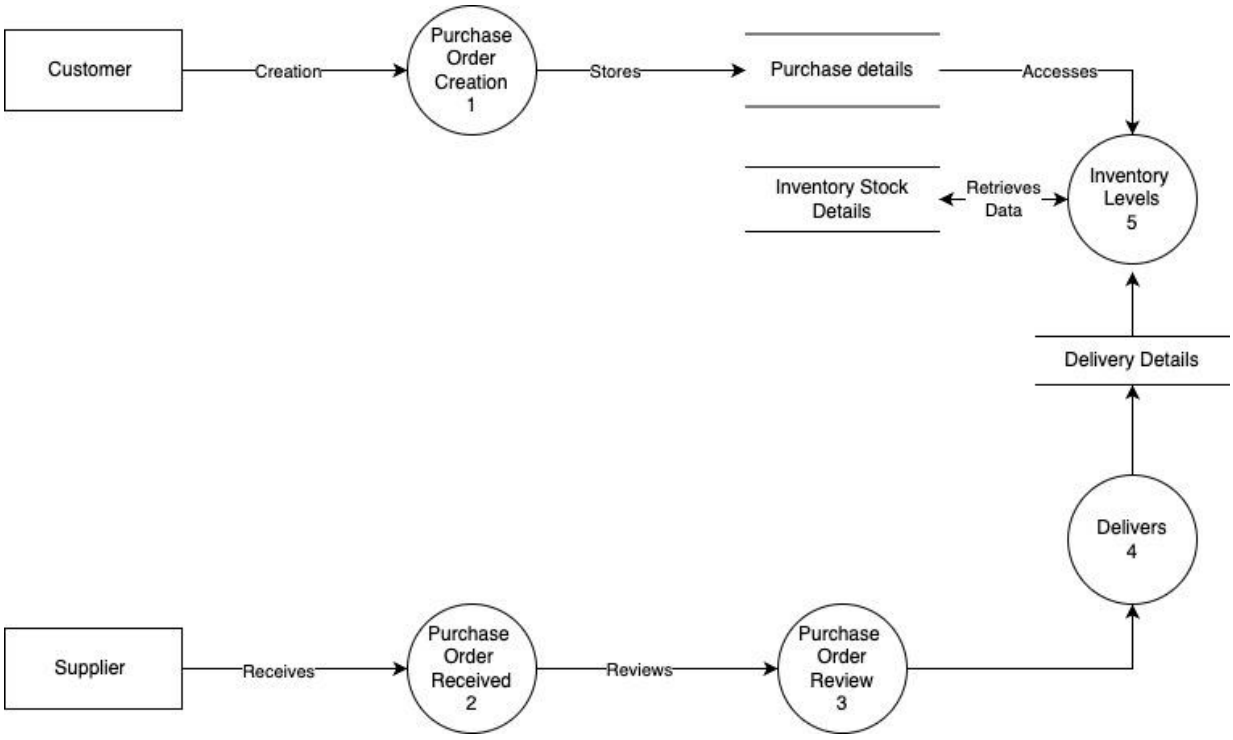

Figure 6 Level 1 DFD of Purchase Order

Level-2

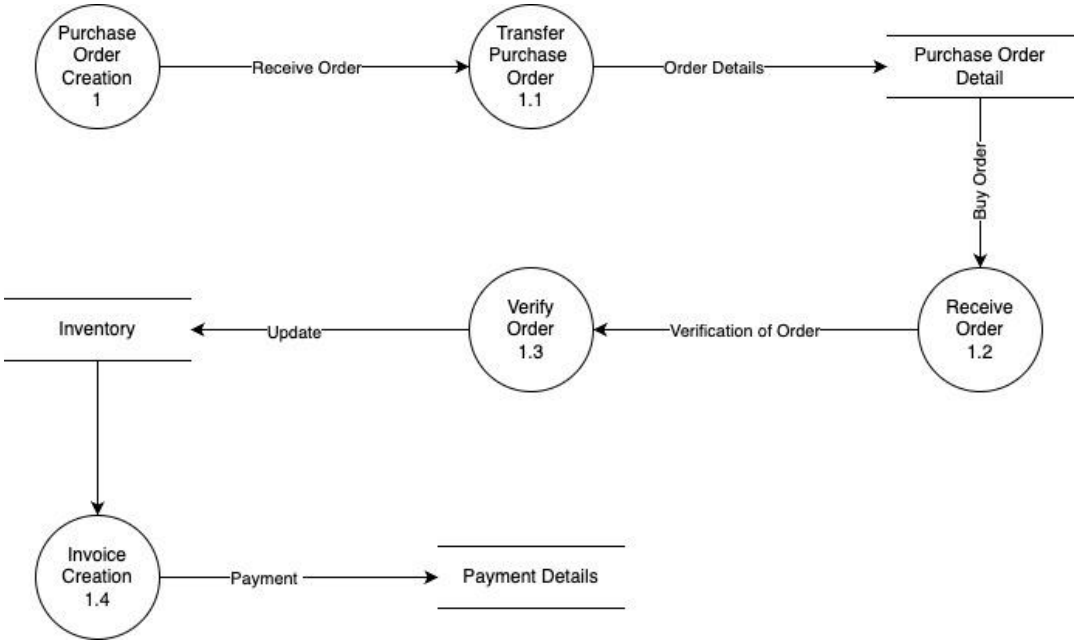

Figure 7 Level 2 DFD of Purchase Order

Report Preparation

Context-level

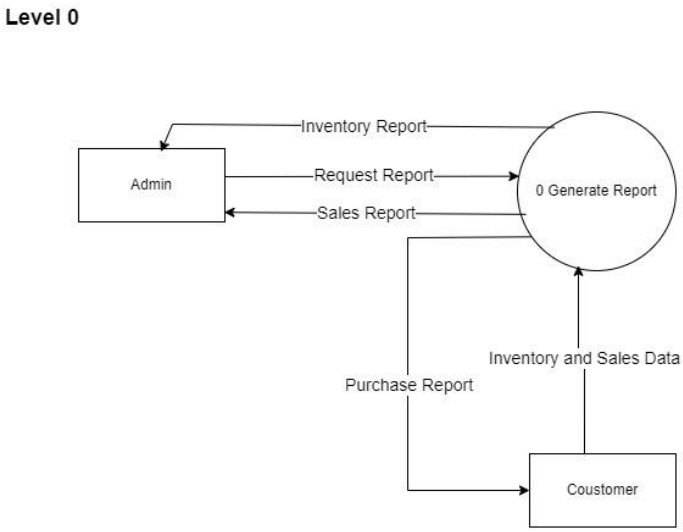

Figure 8 Context Level DFD of Report Preparation

Level-1

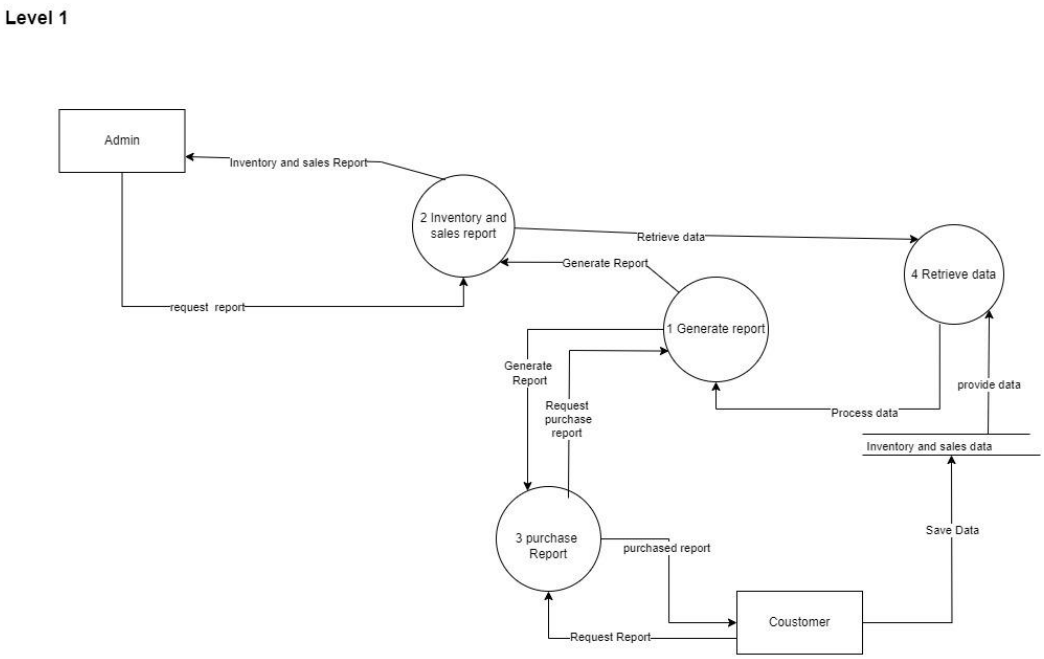

Figure 9 Level 1 DFD of Report Preparation

Level-2

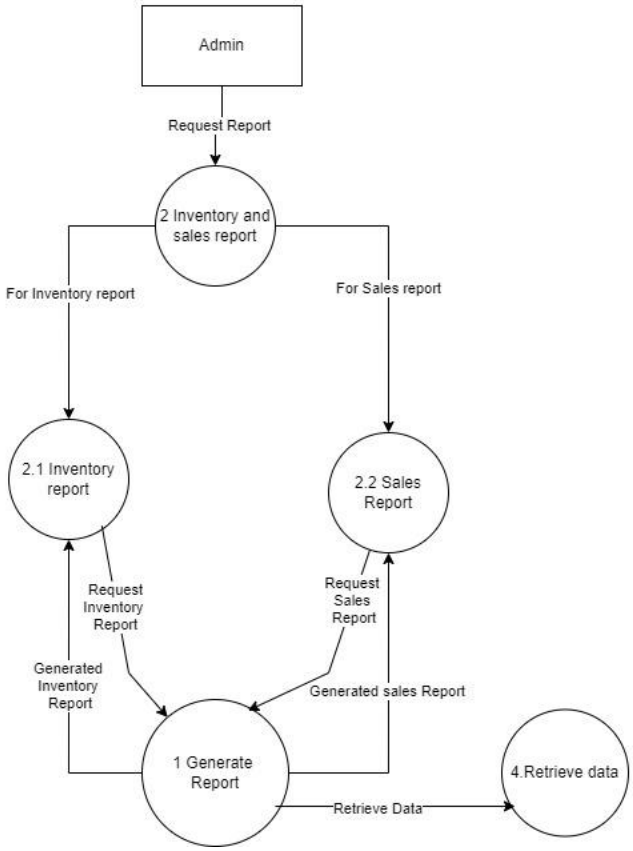

Figure 10 Level 2 DFD of Report Preparation

Dispatch Order

Context-level

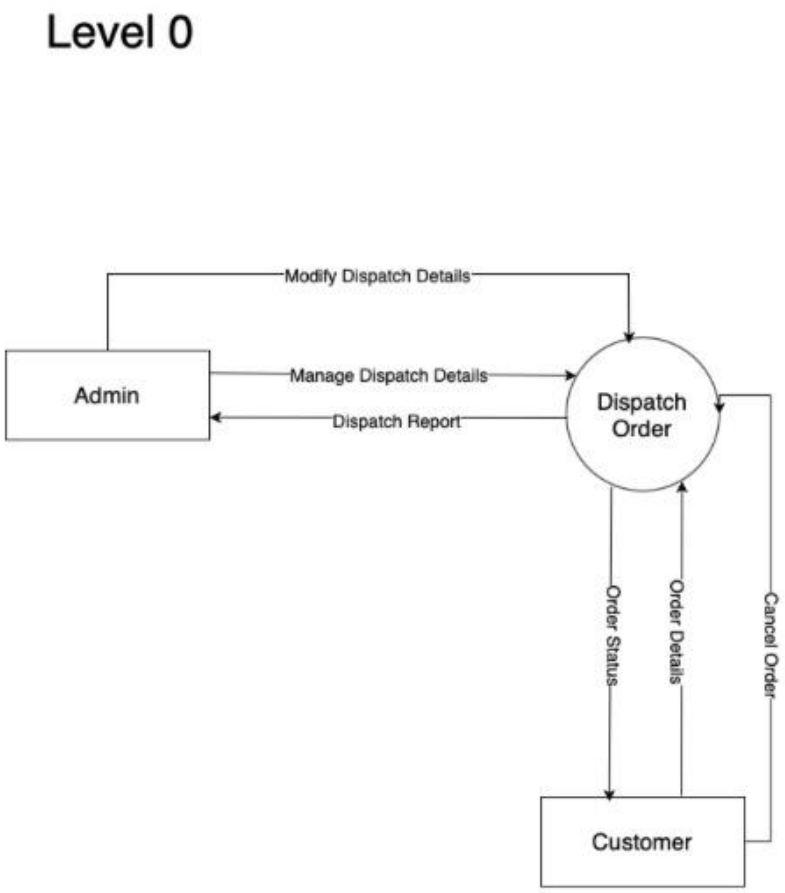

Figure 11 Context Level DFD of Dispatch Order

Level-1

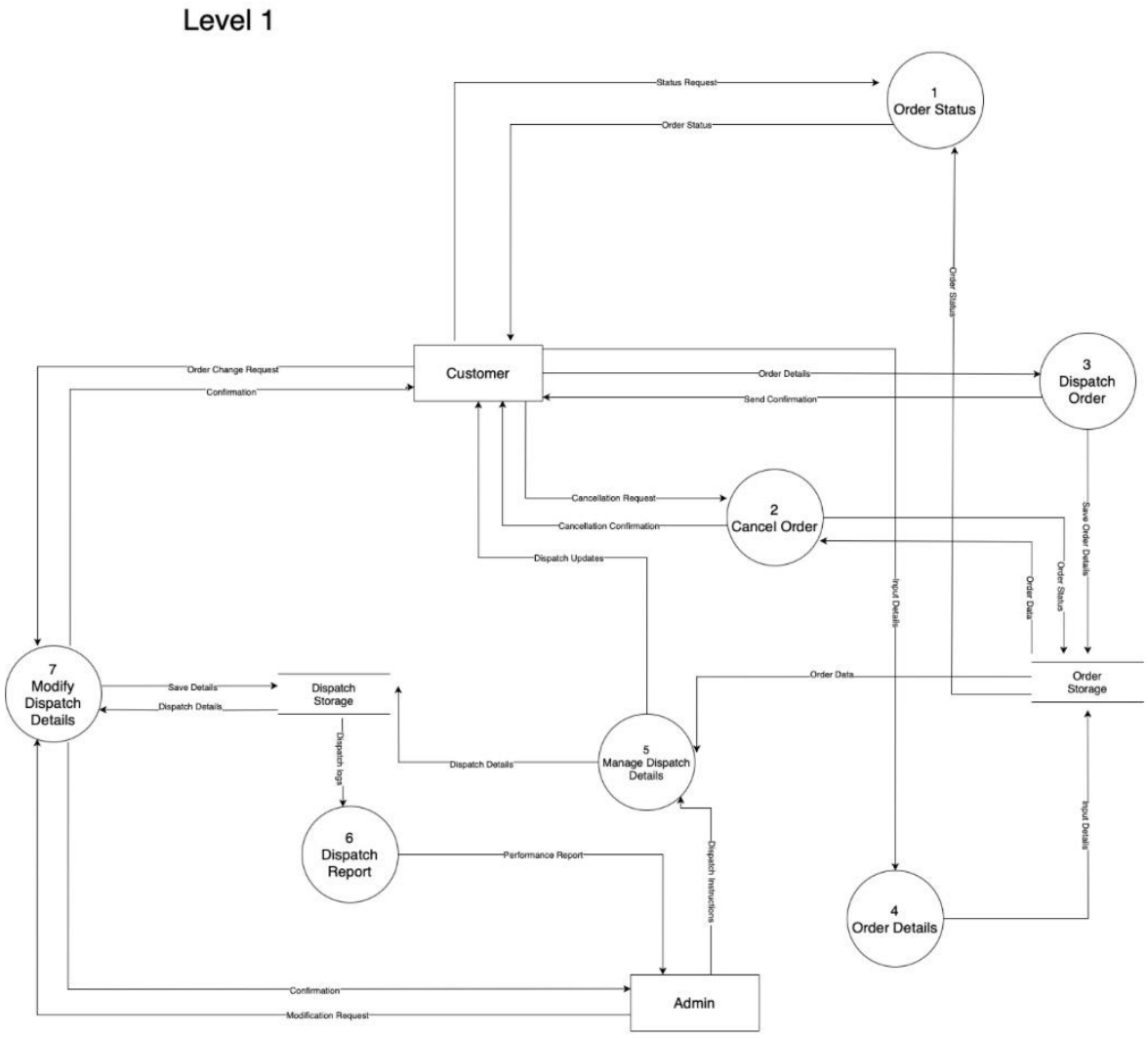

Figure 12 Level 1 DFD of Dispatch Order

Level-2

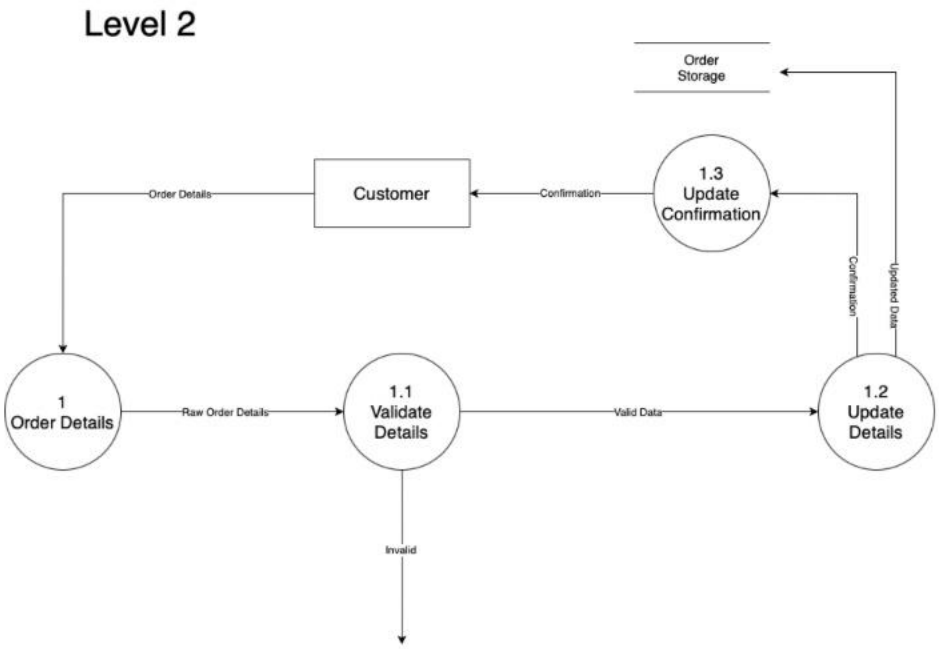

Figure 13 Level 2 DFD of Dispatch Order

Real-Time Stock Updates

Context-level

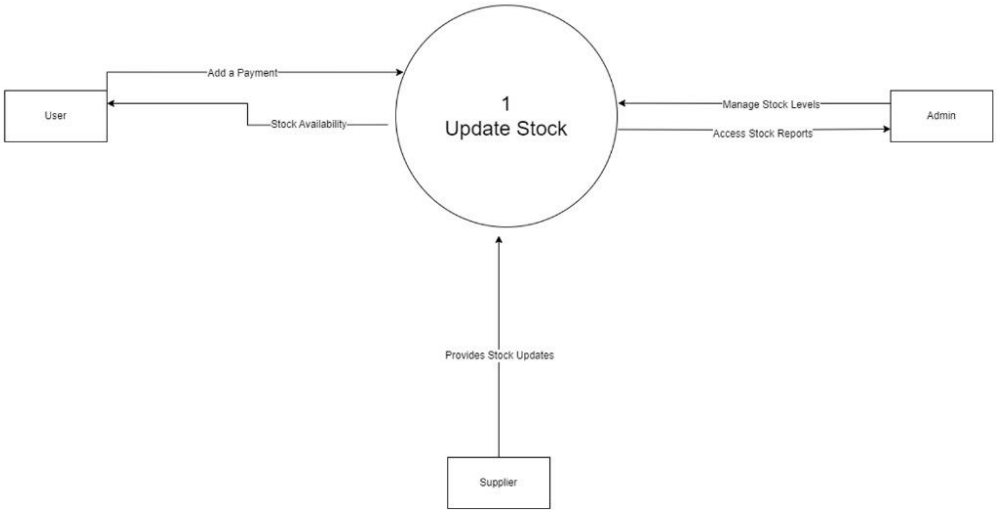

Figure 14 Level 0 of Real Time Stock Update

Level-1

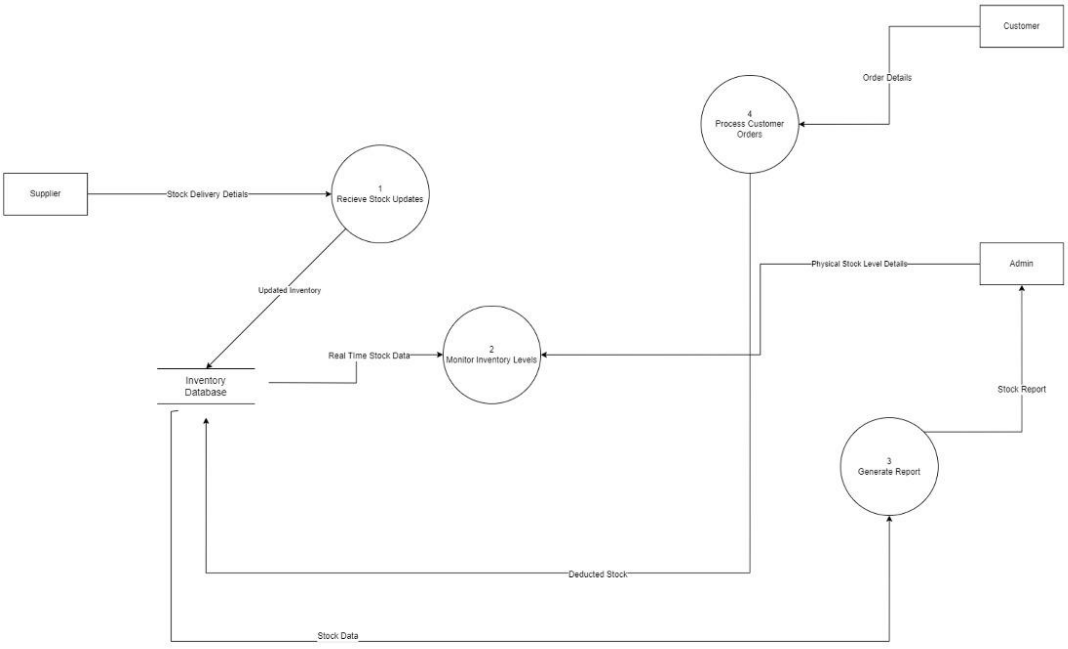

Figure 15 Level 1 of Real Time Stock Update

Level-2

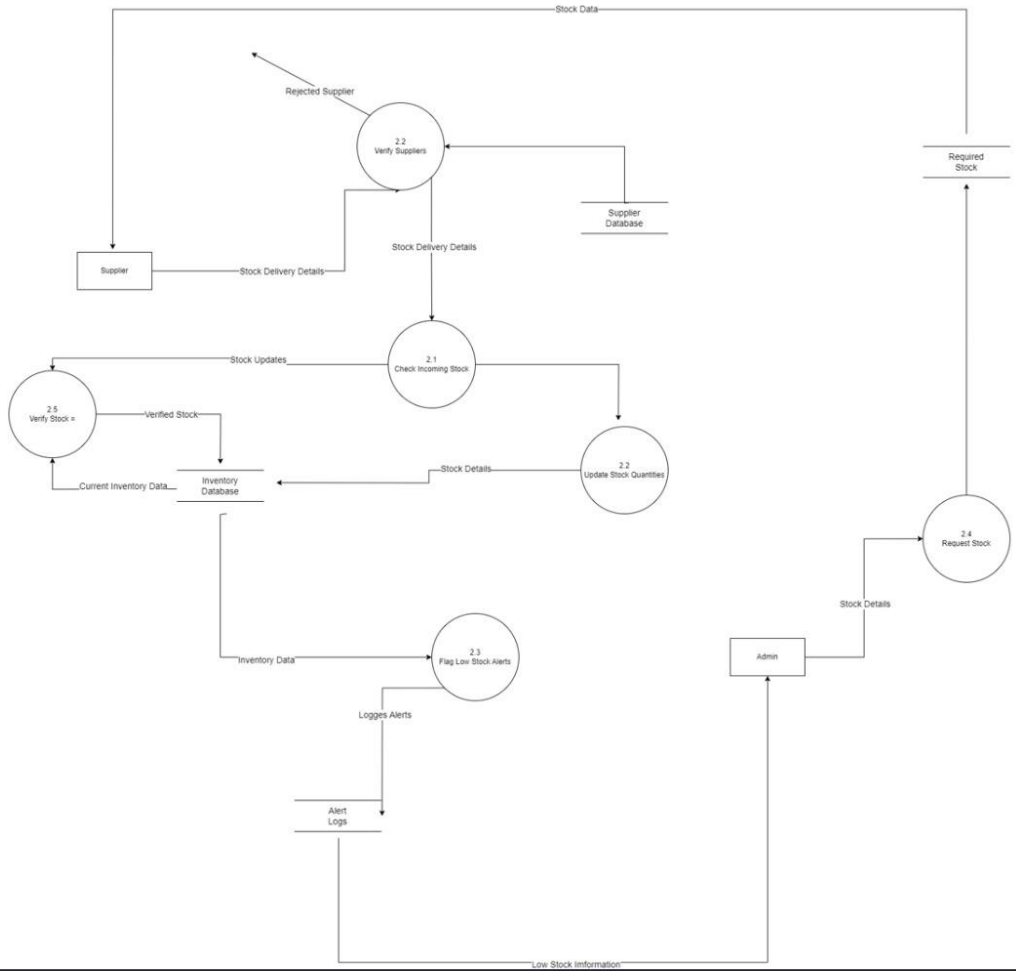

Figure 16 Level 2 of Real Time Stock Update