PHASE-2
Technology stack for inventory management system for retailers

A technology stack or **tech stack** is a set of technologies, software, and tools used in the development and deployment of sites, apps, and other digital products.

A tech stack-which is the collection of tools that a company uses to build its products and monitor its performance metrics encloses coding languages as well.

For example, a classic technology stack is the LAMP stack (used for creating an environment for running PHP applications), made up of: Linux (the environment OS), Apache (the HTTP server), MySQL (the database), and PHP (the server-side programming language).

Tech stack meets the users' necessities in the same way as different devices and technologies to assemble the best software products around.

It incorporates two key elements: the frontend (client-side) and backend (server-side) to create a working tech stack, referred to as an application stack.

These stacks also shape the role of the developer who builds the product.

Let's check them briefly-

Front End Tech Stack

The frontend tech stack is the client's side of the application that a user can see or engage with on a screen.

The primary task of frontend development is to create an excellent user experience, a smooth user interface, and clear internal structures.

In other words, it is responsible for the design, format, and navigation of websites or web apps.

2 Principal Elements of a Frontend stack-

- **HTML (Hypertext Markup Language)** – The **HyperText Markup Language (HTML)** is the standard markup language for documents designed for web browser display. HTML can be assisted by technologies like cascading style sheets (CSS) and scripting languages like JavaScript. This markup language is used in making and displaying electronic documents (web pages) and is the backbone in the organization and placement of content on web pages.

- **JavaScript – JavaScript or JS (**programming language) is one of the core technologies of the www, alongside HTML and CSS. Over 97% of websites use JavaScript on the client-side for web page behavior, often incorporating third-party libraries. It is used to develop interactive web pages

and allows implementing dynamic features on web pages with libraries and frameworks like jQuery, React, Angular, and Vue.

Backend Tech Stack

The server-side of software development is the backend referring to the inner workings of applications that users cannot see.

The Backend Stack includes-

- **Programming languages** – This creates logic for apps and websites. The codes link the web to a database.
- **Frameworks** – it provides support of applications based on a single programming language. Laravel, Django, and Ruby on Rails are few of the popular frameworks. Most modern applications are built using an MVC style framework.
- **Databases –** Most applications require a SQL or NoSQL database. MongoDB, PostgreSQL, and MySQL are common databases. In our project IBM Db2 is used.

These web development programming languages, frameworks, technologies, servers, databases are built on top of each other. Hence stacks

SOLUTION REQUIREMENTS:

Overview

The daily processing of inventory transactions is carried out by the Inventory Management System (IMS). As an output, it generates the regular replenishment orders. The Inventory Control System (ICS) is the means for processing transactions which maintain part status files. The usual input transactions include demand, issues, and receipts which are posted as:

- Quantity on hand
- Quantity on order
- Quantity in process
- Backlog of unfilled demand
- Available stock
- Committed stock.

The ordering decisions for stock keeping units are governed by a pair of control numbers, order point and order quantity, which are periodically revised. The decision on when to order is determined in one of three ways. The first method is to compare the available stock to an order point. If the stock is less than or equal to the order point, an order is generated. In the second basic method of ordering, replenishment orders are generated at regular intervals. A third method is requirements generated by MRP.

Information flow within the ICS must be accurate and timely. Audit trails must be clearly established in order to trace and correct problems. Management reports must provide the associate inventories with costs and customer service level.

The inventory control function provides the information to drive most other manufacturing applications. It is the hub of the firm’s activities as well as the sponge that soaks up the

problems of all department. Interaction is required with purchasing, receiving, inspection, production, sales, accounting and shipping.

Location Control

- Maintain multiple locations for the same item, including:
  - Multi-plant
  - Multi-warehouse
  - Multi-warehouse areas (zones)
  - Row designator
  - Aisle designator
  - Shelf designator
  - Bin designator
  - User defined location scheme
- Identify a specific location within a stockroom/warehouse and work center for each item and require stocking in that location
- Create item inventory locations when/as required for random location control

Perpetual Inventory

- Provide the following inventory valuation methods:
  - LIFO (Last In First Out)
  - FIFO (First In First Out)
  - Standard
  - Current
  - Actual
  - Average
- Process all stock transactions online
- Ability for a transaction type/reason code and description to be included in all inventory adjustment transactions
- Accumulate shipment, issue, and receipt transaction history by item
- Maintain the date of last shipment, issue, and receipt
- Accumulate inventory transactions and provide a reconciliation between the quantity on hand at the beginning and the end of the designated time period
- Ability for online edit of part number, GL and work order accounts on all issues, receipts, adjustments and returns to stock
- Provide audit trails that will provide enough information to trace the flow of all transactions
- Recall all transaction activity on an item for a defined time interval
- Display online inventory information, both summary and detail, by produce line or product code
- Maintain inventory data for several warehouses, and several bay locations within a warehouse for the same item
- Accumulate the following year-to-date, period-to-date, and period-to-period information by part:
  - – Receipts
  - – Issues
  - – Scrap
  - – Shipments

    - – Return to vendor
    - – Adjustments
- Provide inventory availability status codes:
    - – Available
    - – Allocated
    - – Not available (MRB)
- Compute average item usage
- Maintain inventory by condition code (e.g. serviceable, repairable, condemned, etc.)
- Classify inventory items as excess and obsolete
- Restrict one stockroom location from entering transactions that affect inventory records at another stockroom

Cycle/Physical Counting

- Assist in physical inventories and cycle counting through:
    - Generation of tags and tag control list
    - Extension of physical counts and production of variance reports in units and dollars
    - Updating the perpetual record with the actual count
    - Using the features of the physical inventory system for cycle counting
    - Using the system to identify which parts should be counted (by ABC code), and report summary and detail of the cycle count adjustment in dollars and units
    - Generate a cycle count variance report by stockroom
    - Designate counts distinct to a stockroom where multiple stockrooms may exist within one plant
    - Designate counts distinct to an inventory location where a part may exist within multiple stockroom locations
- Specify cycle count frequencies by ABC code
- Generate automatic cycle count request for part/locations with negative on-hand balances

Production Support

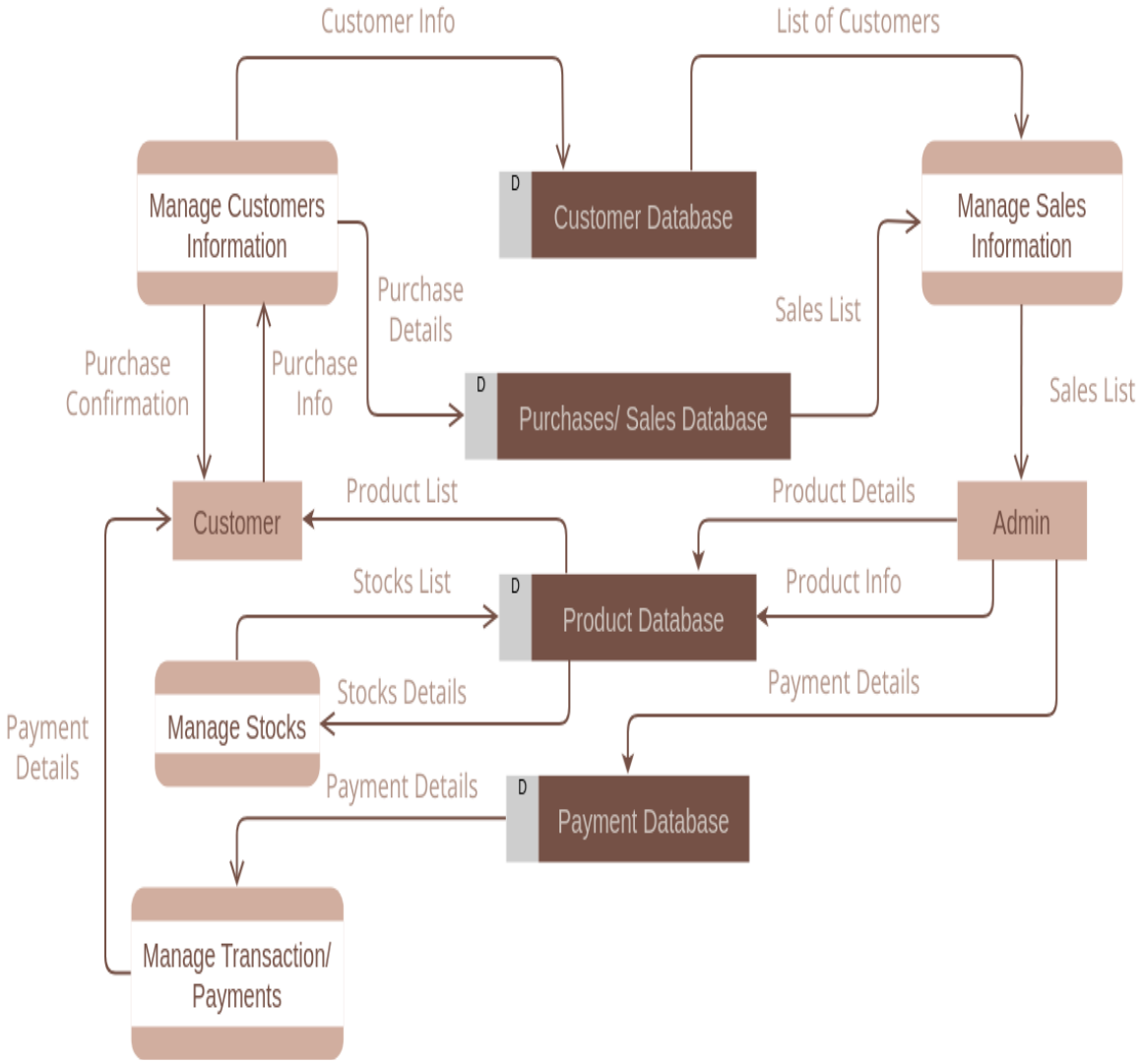
- Ability for online inquiry to determine availability of items. This should include the following information:
    - Quantity on-hand
    - Quantity allocated-pegged to work order number
    - Quantity available after commitments
    - Quantity on order by P.O. number and due dates – multiple deliveries
    - Quantity on open P.O. in return to vendor status
    - Quantity in Receiving Inspection by location
    - Quantity in MRB (Hold) location
    - Quantity on order by work order number
- Maintain a perpetual on order quantity by part number
- Maintain committed quantity information for
    - Sales orders
    - Work orders
    - Purchase orders

- Maintain a reorder point and recommended order quantity in the inventory master file(s)
- Maintain trace source (identifying both vendor and lot serial number), especially when several vendors can supply the same item, by:
    - Lot Control
    - Serial Number Control
- Track back ordered or shortage items by:
    - Work order
    - Purchase order
- Calculate reorder point and economic order quantity on basis of:
    - Item usage
    - Firm demand
- Accommodate and control:
    - Parts on consignment at vendor
    - Substitute parts
    - Parts sent outside for processing
    - Parts returned to vendor
- Provide visibility of work-on-process inventory at vendor locations
- Produce ABC analysis based on:
    - Item usage
    - Firm demand
- Translate shop order material requirements into an accurate material picklist
- Provide for specific customer allocation on finished goods material
- Track rework, scrap, MRB and return to vendor (RTV) material in inventory
- Print pick list, and/or B.O.M. structure, and:
    - Generate a shortage report from original pull sorted by order number
    - Automatically fill pick list shortages, exception report to be issued when material is available
    - Measure performance based on number of shortages as percent of items picked
    - Make unplanned issues and receipts to/from valid work orders or GL account
- Issue and track material to outside contractors on an inhouse work order without double counting by purchase order
- Track and control interplant transfer via transfer order and identify intransit material status
- Do soft (phantom) pulls to evaluate “what if” production situations and identify potential component shortages
- Interface with automated data collection (bar code) devices to process inventory transactions in a real-time environment
- Create an automatic backorder if required material is not in stock
- Override or delete a backorder by individual item
- Provide work order status visibility:
    - Allocated: complete
    - Allocated: shortage
    - Picked: complete
    - Picked: shortage
- Report part shortages by work order and assembly part number
- Define non-nettable (unavailable for MRP use or allocation) locations for a part

Cost Requirements

- Maintain inventory value on:
    - LIFO
    - FIFO
    - Average cost
    - Standard cost
- Maintain latest cost field
- Identify excess and obsolete
- Tie outside contractor invoices to a specific work order for cost analysis
- Compute average item cost
- Interface with the GL accounts for all inventory transactions – issues, receipts, scrap, MRP and return to vendor, etc.

DATAFLOW DIAGRAM:



CUSTOMER JOURNEY MAP:

	Awareness	Exterior	In-Store			Post-Sale	
Touchpoint	**Marketing**	**Arrival**	**Entrance**	**Sales Floor**	**POS**	**State**	**Repeat Visit**
Description	Billboard, word of mouth, online ad, tv, radio, print ads, online content, social media, press releases.	Ease of finding store, cleanliness, ease of parking, storefront appearance, associate appearance, first impressions.	First impressions, associate appearance, navigation, first associate interaction.	Navigation, layout, routing, product positioning, assistance, associate experience.	Wait times, impulse purchases, self checkout, associate check out, upsells, final impressions.	Need state, brand impression, likelihood of repeat visit, trip spend.	Customer retention, customer loyalty.
Key Questions	What are our 20/80 channels? Which are driving engagement? What's our online reputation? Cost of acquisition? Where do we have the most leverage?	How easy is it to find our stores? How clean is the parking lot? How easy is to find parking? How's the storefront curb appeal? How do our associates outside the store appear? What's the customer's overall first impression?	What's the customer's first impression upon entering the store? Do our associates appear clean, professional and approachable? How easy is it for customers to find their first item? Do our associates seem helpful and knowledgeable?	How easy is it for the customer to find subsequent items? How intuitive is our store's layout? How are customers routing through the store? How easy is it for customers to find assistance? Are our associates approachable, knowledgeable, and upselling?	How long are customers waiting? How relevant and effective are our impulse buys? How is self-checkout impacting wait times? What about customer spend? Are associates adding to the customer's experience during checkout? How can we increase customer spend, upsells, and cross-sells of services at the POS? What are the customer's final impressions?	Have the customer's initial needs been met? Is the customer's impression of our brand better or worse? Was the customer's experience strong enough to persuade or dissuade another visit? Has the customer's trip spend been maximized?	How can we retain more customers? How can we improve customer loyalty?