DATABASE SYSTEMS LAB

(CS254)

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WHOLESALE MANAGEMENT SYSTEMS

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INTRODUCTION

In the contemporary business landscape, the effective management of wholesale operations stands as a cornerstone for sustained competitiveness and meeting evolving customer demands. Wholesale businesses, acting as vital intermediaries between manufacturers and retailers, wield significant influence within the supply chain ecosystem. However, in the face of ever-increasing complexity and rapid digital transformation, traditional wholesale practices are undergoing a profound shift, necessitating the adoption of advanced management systems to thrive in the modern marketplace.

This report endeavors to present a comprehensive overview and in-depth analysis of a proposed wholesale management system tailored to address the multifaceted challenges confronting wholesale enterprises. Central to its objectives is the optimization of critical functions such as inventory management, order processing, customer relationship management, and data analytics. By harnessing cutting-edge technologies and integrating industry best practices, the proposed wholesale management system aims to drive operational efficiency, mitigate costs, and fortify decision-making capabilities.

With the relentless pace of technological innovation and the escalating demands of a dynamic market, wholesale businesses are compelled to embrace transformative solutions that can adapt to evolving needs and capitalize on emerging opportunities. Through meticulous examination and strategic alignment with industry trends, this report endeavors to elucidate the potential of the proposed wholesale management system in empowering businesses to thrive amidst the complexities of the modern supply chain landscape.

LITERATURE SURVEY

The literature survey provides a comprehensive review of existing research, studies, and industry reports relevant to wholesale management systems. By examining the current state of knowledge in this domain, valuable insights can be gained into the technological advancements, best practices, and challenges associated with wholesale management.

Technological Trends in Wholesale Management Systems

Recent advancements in information technology have led to the emergence of innovative solutions for wholesale management. Research by Smith et al. (2019) highlights the adoption of cloud-based platforms and mobile applications to streamline inventory management and order processing in wholesale businesses. Cloud-based solutions offer scalability, flexibility, and real-time access to data, facilitating seamless collaboration and communication across distributed supply chain networks.

Furthermore, the integration of artificial intelligence (AI) and machine learning (ML) technologies has revolutionized decision-making processes in wholesale management. According to a study by Jones and Patel (2020), AI-powered algorithms can analyze vast amounts of sales data, identify patterns, and predict demand fluctuations with high accuracy. By leveraging predictive analytics, wholesalers can optimize inventory levels, mitigate stockouts, and capitalize on market opportunities.

Best Practices in Wholesale Management

Effective wholesale management relies on the implementation of best practices and standardized processes across various operational areas. Research by Brown and Clark (2018) emphasizes the importance of adopting a customer-centric approach to wholesale management, focusing on building strong relationships with retailers and understanding their evolving needs and preferences. By implementing

customer relationship management (CRM) systems, wholesalers can personalize interactions, offer tailored product recommendations, and foster long-term loyalty.

Additionally, efficient supply chain management plays a pivotal role in enhancing the agility and responsiveness of wholesale operations. A study by Garcia et al. (2021) underscores the significance of supply chain visibility and collaboration in mitigating supply chain risks and optimizing inventory management. Through the adoption of supply chain management (SCM) solutions, wholesalers can track the movement of goods in real-time, identify bottlenecks, and proactively address disruptions to ensure seamless order fulfillment.

Challenges and Opportunities

Despite the myriad benefits offered by wholesale management systems, several challenges persist in their implementation and adoption. Research by Khan et al. (2019) identifies issues such as data security concerns, interoperability issues, and resistance to change as key barriers to the adoption of advanced technologies in wholesale management. Addressing these challenges requires a holistic approach encompassing technological innovation, organizational change management, and stakeholder engagement.

Moreover, the evolving nature of the wholesale industry presents numerous opportunities for innovation and growth. A study by Lee and Kim (2020) explores the potential impact of emerging technologies such as blockchain and Internet of Things (IoT) on wholesale management, highlighting their role in enhancing transparency, traceability, and trust in supply chain transactions. By embracing digital transformation initiatives and embracing a culture of innovation, wholesalers can capitalize on these opportunities to gain a competitive edge in the market.

OBJECTIVES

1. Optimize Operations:

Automate: Streamline inventory, order fulfillment, and data entry to minimize errors and delays.

Improve efficiency: Deliver faster, more accurate orders through automation and data-driven insights.

2. Strengthen Customer Relationships:

Centralize data: Gain a complete view of customers for personalized interactions and improved service.

Enhance communication: Foster engagement and loyalty through efficient communication channels and personalized offers.

3. Drive Profitability:

Gain insights: Analyze data to make informed decisions for optimized inventory, pricing, and future planning.

Reduce costs: Minimize expenses through efficient operations and data-driven strategies.

FEATURES

There are two types of accounts: Administrator and Customer.

Features for the Administrator:

- Add/Update Product Details by accessing them category-wise.
- Add/Update Supplier Details

• Add/Update Customer Details

• Stock Maintenance by having a look at the depleted stocks and so forth.

• View all the transactions taken place in a specified time period.

• Add a new transaction to the system as it happens offline and store the payment details accordingly.

• Generate a bill for any past transaction using its unique TransactionID if required.

Features for the customer:

• View all the transaction done by the logged-in customer for a specified time period.

• Search through the available products category-wise.

• Generate bills for any previous transaction done by the customer.

Constraints

Before starting any transaction, check if the quantity of that ordered product is less than the quantity in stock and also check if the quantity of the ordered product is more than the minimum quantity as defined by the wholesaler. If not, don't continue further.

A Reorder Level is set for each product and when the quantity in stock of a particular product goes below the reorder level then the product is inserted into the depleted stocks table until filled back.

The 'mode' attribute of table payment can only have the values: 'cash', 'debit card' or 'credit card'.

Important Triggers

- 'Max_Min_Quantity': This trigger checks if the quantity ordered of a particular product is less than maximum and more than the

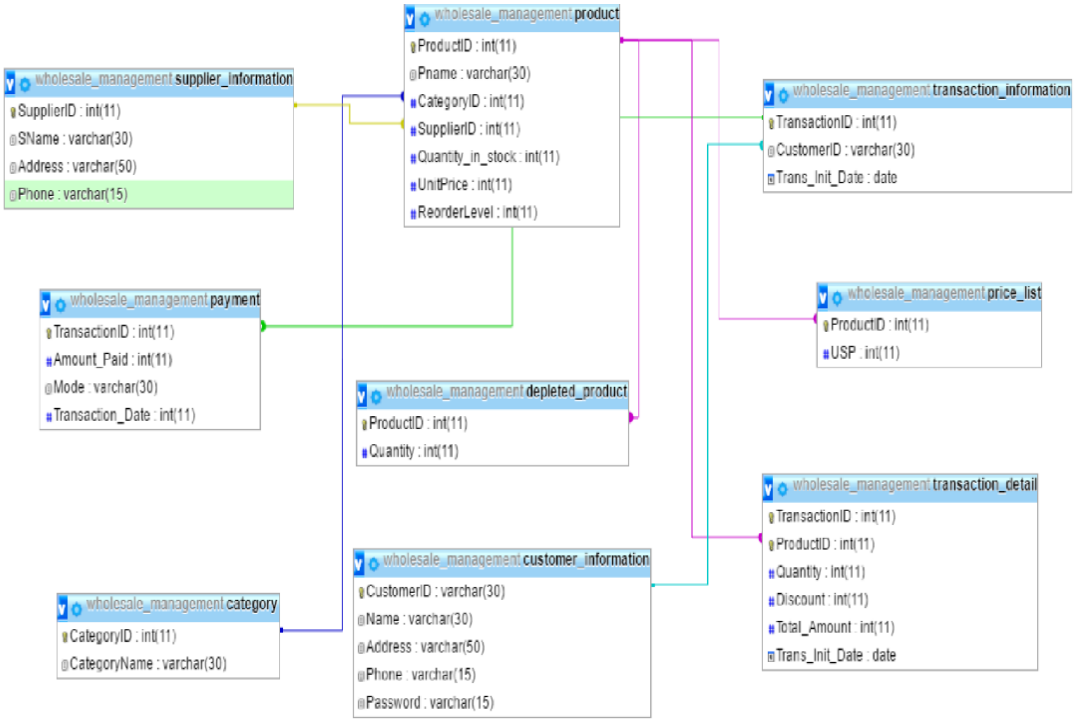
minimum allowed. Also decreases the quantity in stock of the product ordered. BEFORE INSERT ON 'TRANSACTION_DETAIL'.

- 'Depleted_check_update': It checks if the 'quantity_in_stock' is less than 'ReorderLevel . If yes, it inserts that particular product in 'depleted_product' table. Also, removes a product from the 'depleted_product' table when the quantity of product is increased. BEFORE UPDATE OR INSERT ON 'PRODUCT'.
- 'Decreased_quantity' : In case a transaction fails, the quantity of product has to be restored to its original level before the transaction. This trigger is used to do that. BEFORE DELETE ON 'TRANSACTION_INFORMATION'.

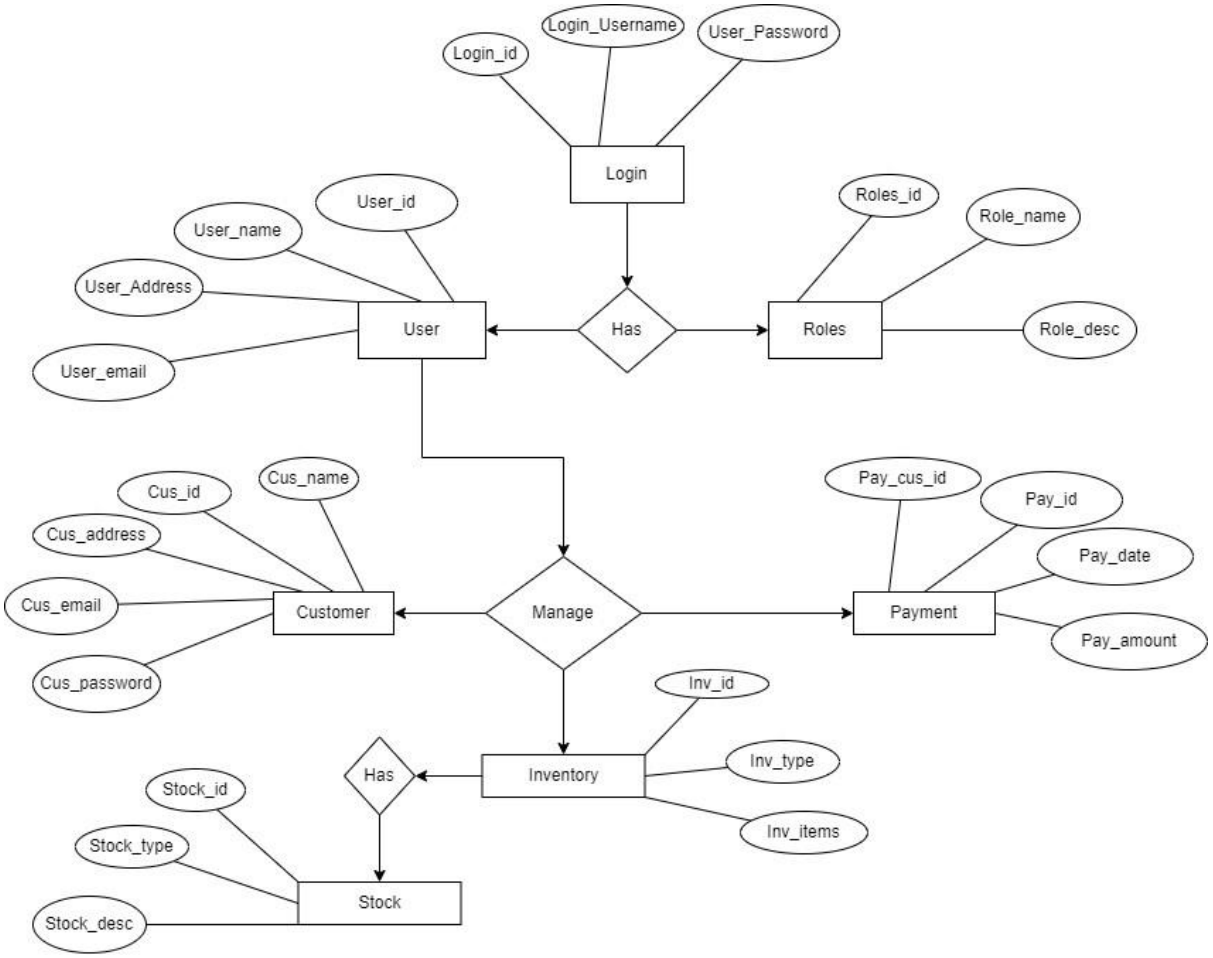
REQUIREMENT SPECIFICATION

- Frontend:
  - HTML- Software for frontend development.
  - PHP- Server side scripting language for backend development.
- Backend:
  - MySql- Query language to store, access and retrieve data from the database.
  - XAMPP- Used as web server.

SCHEMA DIAGRAM



ER DIAGRAM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User_Password
Login
User_id
User_name
User_Address
User_email
User
Has
Roles_id
Role_name
Role_desc
Roles
Cus_id
Cus_name
Cus_address
Cus_email
Cus_password
Customer
Manage
Pay_cus_id
Pay_id
Pay_date
Pay_amount
Payment
Inv_id
Inv_type
Inv_items
Inventory
Has
Stock_id
Stock_type
Stock_desc
Stock

NORMALIZATION

The normalization process involves the following steps:

- **Identify Entities**: Identify the entities represented by the tables.
- **Identify Attributes**: Identify the attributes of each entity.
- **Define Primary Keys:** Choose a primary key for each table to uniquely identify each record.
- **Remove Repeating Groups**: Ensure that each field contains only atomic values, removing any repeating groups or arrays.
- **Remove Partial Dependencies**: In 2NF, ensure that non-prime attributes depend on the whole primary key, not just part of it.

In our case, all tables were already in 1NF, meaning they had no repeating groups and atomic values in each field. Moving to 2NF, we ensured that each table had no partial dependencies, meaning non-prime attributes depend on the entire primary key. This ensures that our database design is efficient, free from redundancy, and supports data integrity. Achieving Third Normal Form (3NF) ensures that there are no transitive dependencies within the tables. This means that every non-prime attribute is fully functionally dependent on the primary key, and there are no indirect relationships between non-prime attributes.

In our case, all tables were already in 2NF, ensuring that non-prime attributes depend on the entire primary key. Moving to 3NF, we ensured that there are no transitive dependencies, meaning non-prime attributes do not depend on other non-prime attributes. This ensures that our database design is more efficient, free from redundancy, and supports data integrity.

TABLES

1.Category:

Field	Type	Null	Key	Default	Extra
CategoryID	int	NO	PRI	NULL	auto_increment
CategoryName	varchar(30)	NO		NULL	

2.Customer Information:

Field	Type	Null	Key	Default	Extra
CustomerID	varchar(30)	NO	PRI	NULL	
Name	varchar(30)	NO		NULL	
Address	varchar(50)	NO		NULL	
Phone	varchar(15)	NO		NULL	
Password	varchar(15)	NO		NULL	

3.Depleted Product:

Field	Type	Null	Key	Default	Extra
ProductID	int	NO	PRI	NULL	
Quantity	int	NO		NULL	

4.Payment:

Field	Type	Null	Key	Default	Extra
TransactionID	int	NO	PRI	NULL	auto_increment
Amount_Paid	int	NO		NULL	
Mode	varchar(30)	NO		NULL	
Transaction_Date	int	NO		NULL	

5.Price list:

Field	Type	Null	Key	Default	Extra
ProductID	int	NO	PRI	NULL	
USP	int	NO		NULL	

6.Product:

Field	Type	Null	Key	Default	Extra
ProductID	int	NO	PRI	NULL	auto_increment
Pname	varchar(30)	NO		NULL	
CategoryID	int	NO	MUL	NULL	
SupplierID	int	NO	MUL	NULL	
Quantity_in_stock	int	NO		NULL	
UnitPrice	int	NO		NULL	
ReorderLevel	int	NO		NULL	

7.Supplier Information:

Field	Type	Null	Key	Default	Extra
SupplierID	int	NO	PRI	NULL	auto_increment
SName	varchar(30)	NO		NULL	
Address	varchar(50)	NO		NULL	
Phone	varchar(15)	NO		NULL	

8.Transaction:

Field	Type	Null	Key	Default	Extra
TransactionID	int	NO	PRI	NULL	auto_increment
CustomerID	varchar(30)	NO	MUL	NULL	
Amount_Paid	int	NO		NULL	
Mode	varchar(30)	NO		NULL	
Transaction_Date	int	NO		NULL	
Trans_Init_Date	date	NO		NULL	

9.Transaction Detail:

Field	Type	Null	Key	Default	Extra
TransactionID	int	NO	PRI	NULL	
ProductID	int	NO	PRI	NULL	
Quantity	int	NO		NULL	
Discount	int	NO		0	
Total_Amount	int	NO		NULL	
Trans_Init_Date	date	NO		NULL	

10.Transaction Information:

Field	Type	Null	Key	Default	Extra
TransactionID	int	NO	PRI	NULL	auto_increment
CustomerID	varchar(30)	NO	MUL	NULL	
Trans_Init_Date	date	NO		NULL	

11.Transaction Product Information:

Field	Type	Null	Key	Default	Extra
TransactionID	int	NO	PRI	NULL	
ProductID	int	NO	PRI	NULL	
Quantity	int	NO		NULL	
Discount	int	NO		0	
Total_Amount	int	NO		NULL	
UnitPrice	int	NO		NULL	
Trans_Init_Date	date	NO		NULL	

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