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J&J Gifts Galore: Elevating Commerce with an Efficient Order and Payment Management Solutions

A Research Study Presented to the

College of Informatics and Computing Sciences

Batangas State University – Lipa

In Partial Fulfillment of the Requirements for the Course

IT 222 - Advanced Database Management System

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Leading Innovations, Transforming Lives, Building the Nation

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Table of Contents

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CHAPTER I
INTRODUCTION

1.1 Background of the Study

Business owners and individual sellers are finding it more necessary to implement systems as the business field becomes more competitive in the modern day. Many business owners are connecting with an audience globally and transcending national boundaries by using the internet and e-commerce platforms. Due to its ability to facilitate online platform exploration, choice comparison, and purchase, this approach has shown to be effective for a lot of consumers. In fact, according to Gelders (2024), worldwide retail e-commerce sales are anticipated to surpass 6.3 trillion U.S. which illustrates the widespread use of e-commerce. Furthermore, according to the International Trade Administration, the Philippines (2022), the e-commerce market is expected to increase at a rate of 17%. The surge in eCommerce demand during the COVID-19 pandemic was fueled by Filipinos working and studying from home. This trend continues today as many internet users in the Philippines prefer shopping over visiting malls

Merriam-Webster defines "e-commerce as commerce conducted via the Internet". To elaborate, it involves the selling and buying of products. This kind of approach changes a lot of things that alter the habits of consumers and the owners of businesses. As for the consumer, they can get a lot of benefits, including ease of use, a wider range of products, competitive pricing, and the flexibility to shop whenever and wherever. It has also enabled businesses to access a global audience while saving costs associated with traditional brick-and-mortar locations. We can now utilize it via phone because of technological improvements. In addition, it offers safe online payment methods and digital marketing tactics.

Based on an article written by Hines (2022), different features need to be considered to effectively run an e-commerce platform. It consists of concepts that focus on user interaction, order management, customer relationship management, product management, etc. A seller needs a management system in place to efficiently handle orders. Order management

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systems (OMSs) assist businesses in managing orders from start to finish as explained in the article written by Murphy (2024). This system records all activities and details related to an order, including order placement, workflows, inventory management order completion, and post-sale services, and follow-ups. Effective order management is closely connected to inventory control to prevent issues such as overselling or stock shortages. By ensuring real-time synchronization customers can only purchase items in stock reducing any potential disappointments. In addition, the payment needs to be considered. It involves processing and focuses on transactions and seamless integration with payment gateways for customer convenience.

J&J presents Galore, our selected beneficiary, as a well-known retail company that specializes in one-of-a-kind and customized gifts. With a strong consumer base and a diverse product offering. They utilize Facebook as a marketplace for their products. Orders and payments are also performed via messenger, which might endanger both the user and the vendor. The company recognizes the need to improve its ordering and payment systems to compete with rivals and meet growing customer expectations. The main objective of this research is to create and integrate a system for product ordering and payment administration into a web application.

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1.2 General Problem

The general problem of this study deals with the challenges in optimizing its business processes due to the absence of a centralized platform for ordering and payment processing.

1.2.1 Specific Problem Includes:

- **How can customer orders be effectively managed?**

  -For independent sellers who are handling all of their business operations, dealing with a massive customer base poses a lot of challenges. This can be compounded by delays in processing orders and trying to access past conversations that are very time-consuming.

- **In what ways can the payment process be enhanced?**

  -The only medium utilized to facilitate transactions in the present payment procedure is Messenger. Some improvements should therefore be made regarding issues such as manually transaction processing, insufficient security measures, and difficulty in handling payment-related data inside the Messenger.

1.3 General Objective

The objective of this research is to develop a highly effective web application system for J&J Gifts Galore, enabling the efficient management of its business operations.

1.3.1 Specific Objective

The specific objectives include:

- To develop and implement an order management system to handle and organize customers' orders effectively thereby streamlining the entire order fulfillment process.

- To enhance the automated payment process and security measures, and improving data accuracy can help minimize errors, ensuring that payments are processed correctly and on time within Messenger.

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1.4 Significance of the Study

The significance of the study lies in improving transactions, security, and data handling in Messenger to increase efficiency and accuracy on order and payment management solutions.

The results of this study hold substantial benefits for various stakeholders.

- **Owner:**

    The study is crucial for the owner as it tackles key issues in the business. It aims to improve product management, transaction records, and payment processing, leading to a more successful business.

- **Customer:**

    Customers benefit from the study through a better shopping experience. The web app ensures accurate product information and a secure payment gateway adds reliability to transactions.

- **Future Researchers:**

    This study would serve as a guide for future researchers who are researching similar or related topics that can provide insight the into development and implementation of Ordering Management, Payment Management Systems, and e-commerce websites for small businesses

- **Interested Readers:**

    Readers, like professionals and entrepreneurs, can learn from the study about the importance of a dedicated e-commerce system, inspiring improvements in their practices.

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1.5 Scope and Limitations

In this study, we will study the challenges J&J Galore is facing in administering orders and payments and providing workable alternatives for the company. We aim to design a Web Application thereof so that the owner can effectively manage his business

.

However, our system will be built by our developers using JavaScript, HTML, CSS, PHP, and MySQL, focusing on the key features at this stage of the project's timeline for adequate functionality assurance. Despite the visual simplicity in the system, it will communicate information excellently as well as maintain user friendliness. Furthermore, the UI/UX design needs further enhancement and the website will become more mobile responsive payment semi automatic

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CHAPTER II
REVIEW OF RELATED STUDIES

In this chapter, we will review existing literature related to order and payment management, focusing on their implementation and impact on business operations, particularly in the retail industry. This relevant study will assist us in creating a framework or main idea for our paper.

Electronic Payment Systems in E-Commerce

The research article "E-Commerce and Online Payment in the Modern Era" by Mukherjee and Roy (2017); examined the procedures, advantages, and security-related concerns of electronic payment systems. The article primarily focused on the current situations of e-commerce and online payment in the modern era. In the end, they conclude that even if e-commerce systems have many features, they are unable to provide 100% security to customers. It goes on to discuss the many forms of electronic payment systems, such as credit cards, ATM cards, mobile wallets, and so on. Furthermore, it is stated that Internet transactions are safer than using cash, and retailers favor them. In reality, merchants are less at risk if the store experiences any kind of incident, such as being burned down or robbed.

Impulse Buying and Electronic Payment Systems

A firm may benefit from the use of an electronic payment system. Erwin, Halim (2020) investigates the use of e-payment as a means of payment in e-commerce that makes consumers impulsive. He used the method of Structural Equation Modeling (SEM) with purposive sampling for data collecting. Data samples are taken from Indonesian e-commerce users who mostly used Payment Systems. Based on what he had concluded in his research, an electronic payment system has a major influence on impulsive buying, suggesting that consumers are more impulsive when using an electronic payment system. People's trust in a

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company, its goods, and its services rises as they do. Behavior control may have both good and negative effects on purchase decisions, so it's important to strike a balance.

Web-Based Billing and Payment Release Systems

Due to E-payments' widespread acceptance throughout the globe and its capabilities, the majority of transactions and commerce are now conducted online. Aswar A., Chipane D., et al. (2019) developed a Web-based Billing and payment release system that is used to overcome the entire problem, that the government faces during the accounting of the bills generated by training partners and releasing the payments. Currently, the manual billing process is both risky and time-intensive. The manual approach poses a threat of data loss and significantly extends the duration required for completion. In this crucial and time-consuming phase, consultants meticulously examine and authenticate all hardcopy documents provided by training partners. After this thorough review, a file becomes eligible for payment. Additionally, they offer a step-by-step method for the framework initiative. In summary, this approach allows clients to charge online using an Electronic Check Book (e-CheckBook). After requesting enrollment and obtaining their login credentials from the biller, clients can use electronic checks to pay their bills. The system makes sure that everything moves smoothly, from bank processing and clearing to payment confirmation. All things considered, this uncomplicated strategy offers customers a safe and effective way to handle and pay their payments online.

Order and Stock Management in Business Operations

Having an efficient order management feature can attract more customers and benefit business owners. It simplifies the ordering process, helps in comparing stock, and allows easy updates based on product availability. Applying an Order and Stock Management (OSM) system to a business has several advantages. John C., Eluvathingal T., Khan A., et al. (2024) addressed the issues of Agnel Cafeteria with manual order processes by introducing a web-based solution for cafeteria operations. Their system automates ordering, menu planning, and billing, reducing manual effort and improving performance. Test results show the system effectively enhances operational efficiency. According to feedback surveys, users

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find the portal user-friendly, with most rating it 4 out of 5. While opinions on ease of use differ, with some giving it 4 out of 5 and others 5 out of 5, all respondents agree that the website is an improvement over the current process.

This unanimous agreement indicates widespread satisfaction, establishing the website as a successful innovation in cafeteria operations for educational institutions.

Summary

To sum up, a comprehensive survey of the literature on order and payment management reveals their immense impact on the success of e-commerce sites. Previous works have indicated that electronic payment systems face security challenges (Mukherjee and Roy). Furthermore, Erwin highlights how impulse buyers behave when paying using digital money, this is because of trust and perceived safety. The shift towards e-transactions is further emphasized by the global acceptance of e-payments as evidenced by Aswar et al.'s web-based billing system. Lastly, an effective order management strategy like that portrayed in John C. et al.'s study is important in attracting clients as well as improving operational effectiveness. It can therefore be said that a solid order and payment management system is vital for long-term prosperity in J&J Gifts Galore among other e-commerce ventures.

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CHAPTER III

Methodology of the Study

This chapter presents the methodological framework that is used in the development of an advanced e-commerce web-based ordering and payment system for J&J Gift Galore.

3.1 Method:

Fig. 3. Stages of Waterfall Method
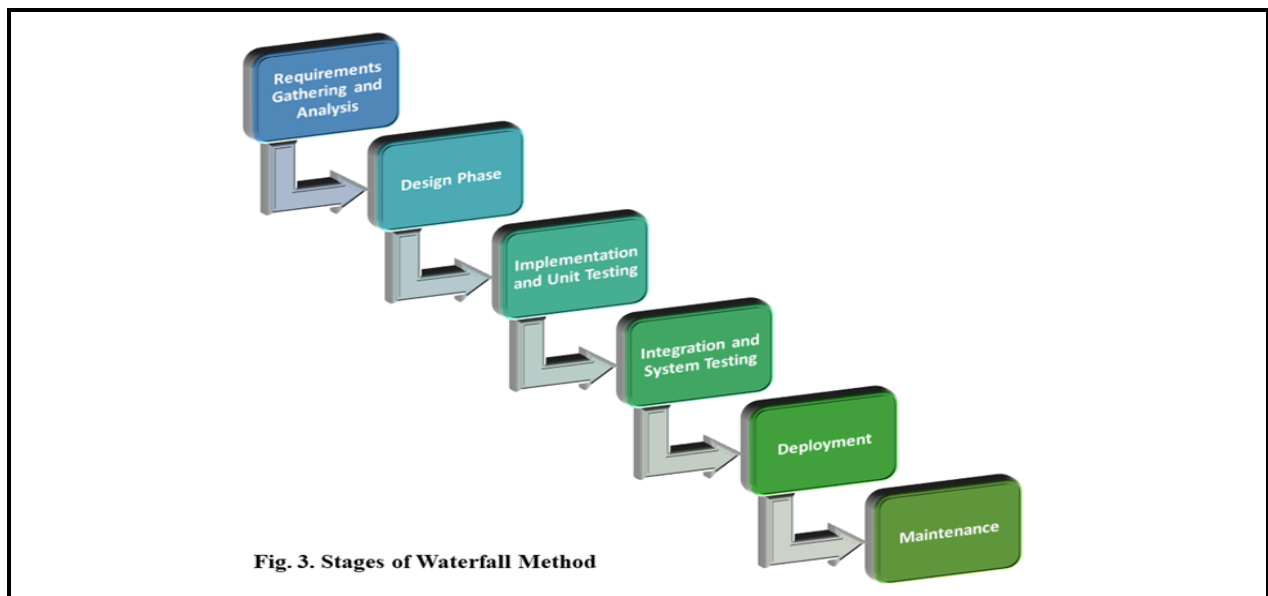
The waterfall model was used in this study since it is a reliable and well-established software development process. The software development technique follows a sequential or linear approach. The project is divided into a series of tasks, known as phases at the highest level of grouping (Sherman, 2015). The process is divided into several stages, such as gathering requirements, designing, implementing, testing units, deploying, and maintaining the system. This guideline is important because it will assist researchers and developers in successfully implementing the system for J&J Gift Galore. In particular, it will make it easier for us to manage our time so that it can be monitored using a comprehensive timetable and resource plan. Figure 1 illustrates the different stages of the waterfall model adopted throughout the implementation of this project:

3.1.1 Requirements Gathering and Analysis:

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This first phase provides an overview of the methodology used for data gathering and analysis, including semi-structured interviews and their concept classification. These methodologies allow a thorough examination of issues while ensuring systematic interpretation of the collected data.

3.1.2 Design Phase:

The second phase involved creating a database model to both visualize the system and predict any problems that may arise along the way. This will act as a guide for constructing the system.

3.1.3 Implementation and Unit Testing:

During this phase, the system was actively developed according to the specified requirements and design specifications. This brought into life the functionalities as outlined in earlier phases i.e. coding process whereby languages such as PHP, JavaScript, HTML, and CSS were used. Additionally, to guarantee that individual components within the system are executing adequately, unit testing was carried out.

3.1.4 Integration and System Testing:

The e-commerce system was moved to the production environment after the implementation and unit testing phases were done successfully. This process involved setting up the system, installing necessary software, and moving data from development into production.

3.1.5 Deployment:

The e-commerce system was moved to the production environment after the implementation and unit testing phases were done successfully. This process involved setting up the system, installing necessary software, and moving data from development into production.

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3.1.6 Maintenance:

After the system was deployed, constant maintenance and support were given to keep it running. This included supervising its performance, solving any problems or errors that emerge, and making updates or improvements whenever necessary.

By following the Waterfall model and completing each phase systematically, the efficient order and payment management system for J&J Gift Galore was successfully developed and deployed, addressing the operational deficiencies identified and improving business operations

3.2 Requirements Gathering:

This research adopted a qualitative design, specifically employing the action research approach. Action research is a qualitative methodology in which researchers collaboratively investigate and address practical issues by linking theory to practice, fostering social change (Bhandari 2023). Semi-structured interviews are valued for their flexibility, depth, and capacity to provide rich qualitative data, thus the researcher will use them as the instruments for data collection and analysis.

The participant of this research is the owner of J&J Gifts Galore, who is knowledgeable about the business processes, including order and payment transactions. The purpose of the research is to obtain an understanding of the issues or challenges that the business is currently facing. Using this data, the researchers aim to actively involve the individual in creating and implementing suitable remedies for the identified issues.

While conducting this research, we will use questionnaires that are meant to collect information about how the shop managed its customer orders and arranged them in an organized manner, along with other issues that might have been encountered and solutions used (Fig. 2.1). This is all done to comprehend the payment procedure being utilized currently during transactions, which is intended to reveal any problems involved or even client worries, as well as enable them to look at the overall efficiency of this system and

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check on its safety (Fig. 2.2). Thirdly, the questionnaire captures the general customers' experience concerning their orders and payment processes, as well as suggests areas that need improvement in terms of satisfaction (Fig. 2.3).

Handling and Organizing Customer Orders:

1. What challenges do you face in handling and organizing customer orders at J&J Gifts Galore?

2. How do you track different orders to ensure smooth processing?

3. Is there a process that the customer follows in order to make the ordering and fulfillment of their order efficient?

Fig .2.1: Semi-structure interview questions about Handling and Organizing Customer Orders:

Payment Processes:

1. Can you describe the current payment methods used for transactions at J&J Gifts Galore?

2. What information do you typically collect from customers during payment?

Fig .2.2: Semi-structure interview questions about Payment Process

Customer Satisfaction:

1. How do you ensure customer satisfaction throughout the order and payment process?

2. Are there any common issues or concerns raised by customers regarding payments and orders?

Fig .2.3: Semi-structure interview questions about Customer Satisfaction

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3.3 Analysis

The insights from the analysis of semi-structured interviews conducted with J&J Gift Galore are discussed in this section, which focuses on handling and organizing customers' orders, payment processes, and customer satisfaction.

As a result of the conducted interview, we found out that J&J Gifts Galore is currently grappling with several challenges associated with their order and payment management processes, which affects overall productivity and customer satisfaction. One of the major shortcomings lies in the lack of a single platform for the ordering process. This aspect leads to manual handling of orders, hence increasing the chances for mistakes and delays when processing them. Consequently, the shop's inability to offer real-time updates as well as its lack of synchrony in inventory data worsen this situation, resulting in hindrances to providing seamless services to customers.

These problems are made worse by using Facebook as the main platform through which transactions take place. While Facebook acts as an avenue for communication, it does not have all-inclusive features for effective order and payment management. As a result, the company cannot expand its operations since it cannot satisfy the ever-changing demands of the market. Also, current payment methods may be insufficiently diversified to cater to different tastes among customers; thus, they may miss sales.

In addition, it is important to note that consumers are worried about data protection and confidentiality. Compromising customer privacy could weaken the payment process through which highly personal details are collected, therefore driving away buyers who value this aspect. Further, the unstructured ways of tackling these issues result in situations like late delivery processing times, the invisibility of the order tracking system, and discrepancies in payment confirmations.

In this aspect of delivery and fulfillment, there can be difficulties due to the current manual procedures. This can adversely affect customer satisfaction when there are delays or errors in fulfilling orders. Therefore, J & J Gifts Galore has to identify and deal with these challenges not only for efficient operations but also for improved customer satisfaction as well as competitive advantage.

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3.4 Design

This section focuses on database design as the backbone of the e-commerce system to model a comprehensive database that will enable us to visualize what our system architecture would entail and also lay down a firm foundation for its construction process, anticipating any possible challenges. The elements of database design encompass several components for efficient data management and the seamless operation of an e-commerce platform. These parts include:
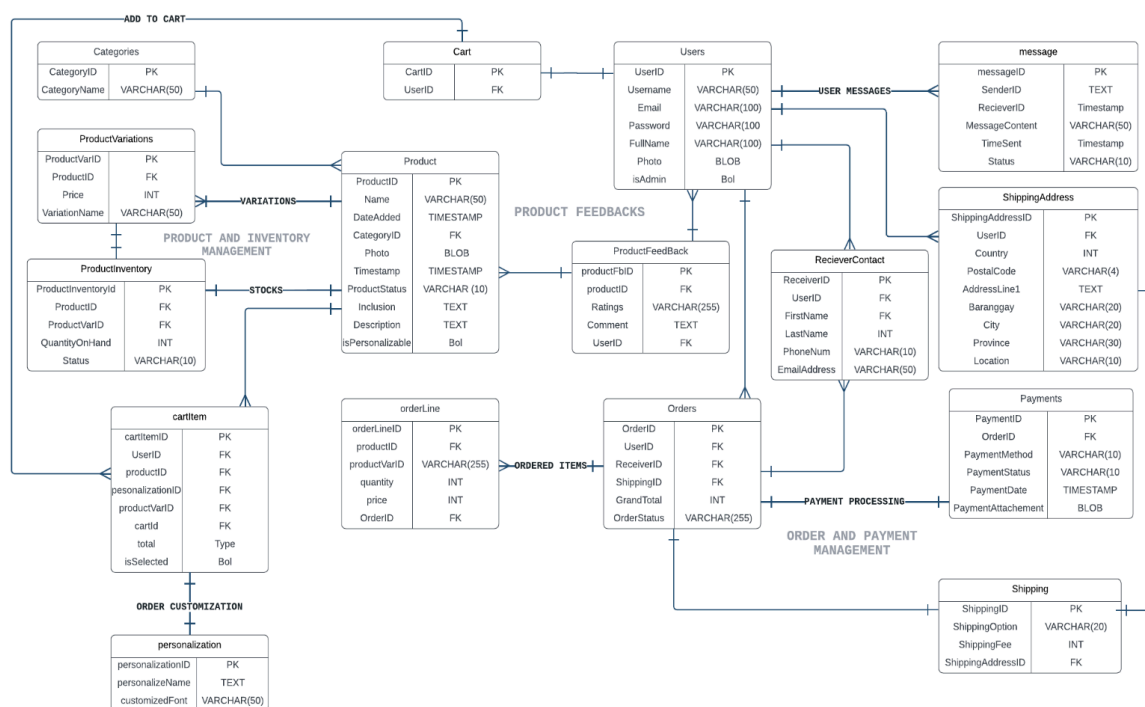
3.4.1 Entity Relationship Diagram (ERD)

Fig 3. Entity Relationship Diagram (ERD)

An Entity-Relationship Diagram (ERD) is crucial for setting up an efficient order and payment management system. The ERD outlines the entities, their attributes, and the relationships between them, ensuring a well-organized database. The key entities include:

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● **Users:** Each user has a unique UserID, along with attributes such as UserName, UserEmail, and UserPassword. A user can place multiple orders, establishing a one-to-many relationship between Users and Orders.

● **Products:** Each product is identified by a unique ProductID and includes attributes such as ProductName, CategoryID, and Price. A product can have multiple variations, creating a one-to-many relationship between Products and ProductVariations.

● **Categories:** Each category has a unique CategoryID and a CategoryName. A category can include multiple products, resulting in a one-to-many relationship between Categories and Products.

● **ProductVariations:** Each product variation is identified by a unique VariationID and includes attributes such as ProductID, Variation, Price, and QuantityOnHand. Multiple variations can be linked to one product, indicating a one-to-many relationship between Products and ProductVariations.

● **Orders:** Each order has a unique OrderID and includes attributes such as UserID, OrderDate, ShippingID, and PaymentID. An order can contain multiple order details, indicating a one-to-many relationship between Orders and OrderDetails. Each order is placed by one user, establishing a many-to-one relationship between Orders and Users. Each order also has one shipping address and one payment method, resulting in many-to-one relationships with Shipping and Payments, respectively.

● **OrderDetails:** Each order detail is identified by a unique OrderDetailID and includes attributes such as OrderID, ProductID, Quantity, and Price. Each order detail is linked to one order, and a product can appear in multiple order details, establishing many-to-one relationships with both Orders and Products.

● **Shipping:** Each shipping record has a unique ShippingID and includes attributes such as ShippingAddress and ShippingDate. Multiple orders can share the same shipping address, indicating a one-to-many relationship between Shipping and Orders.

● **Payments:** Each payment record has a unique PaymentID and includes attributes such as PaymentMethod and PaymentStatus. Multiple orders can be linked to one

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payment method, resulting in a one-to-many relationship between Payments and Orders.

By clearly defining these entities and their relationships, the ERD ensures a structured and efficient database design for order and payment management, minimizing redundancy and optimizing data retrieval.

3.4.2 Unnormalization

Unnormalization is the process of combining tables to improve database performance at the cost of some redundancy. In some cases, it might be beneficial to combine certain tables or attributes to reduce the number of joins required during query operations.

Table 1: Combined Orders Table:

OrderID	UserID	UserName	UserEmail	OrderDate

ShippingID	ShippingAddress	SippingDate	PaymentMethod	PaymentStatus

The Combined Orders Table is about users' information, shipping, and payments that have been combined into the Orders table. This reduces the need to perform joins across multiple tables when retrieving order-related data. However, this approach introduces redundancy, as user information and shipping details are repeated for each order made by the same user.

3.4.3 Normalization

Normalization is essential for J&J Gifts Galore as it ensures data integrity, reduces redundancy, and improves data retrieval efficiency. It defines clear relationships between tables, facilitates scalability, and enhances data security. Overall, normalization supports operational efficiency, reliability, and growth, crucial for the company's success.

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First Normal Form (1NF)

First Normal Form (1NF) is critical for ensuring the efficiency and reliability of J&J Gifts Galore's database. By structuring the database only to contain atomic values and ensuring each record is unique, 1NF eliminates redundancy, improves data integrity, and enhances query performance. This facilitates easier data maintenance and supports the system's scalability, crucial for handling growth and changes in an e-commerce environment.

Users Table:

UserID	UserName	UserEmail	UserPassword

Orders Table:

OrderID	UserID	OrderDate	ShipingID	PaymentID

Shipping Table:

ShippingID	ShippingAddress	ShippingDate

Payments Table

PaymentID	PaymentMethod	PaymentStatus

Second Normal Form (2NF)

2NF requires that the table be in 1NF and that all non-key attributes are fully dependent on the primary key. Here, we remove partial dependencies.

- **Users Table:** Already in 2NF, as UserName and UserEmail depend on UserID.
- **Orders Table:** Already in 2NF, as UserID, OrderDate, ShippingID, and PaymentID depend on OrderID.

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- **Shipping Table:** Already in 2NF, as ShippingAddress and ShippingDate depend on ShippingID.
- **Payments Table:** Already in 2NF, as PaymentMethod and PaymentStatus depend on PaymentID.

Ensuring Second Normal Form (2NF) in J&J Gifts Galore's database is important because it maintains data integrity, reduces redundancy, streamlines data management processes, simplifies updates, improves performance, and enhances scalability for future growth.

Third Normal Form (3NF)

3NF requires that the table be in 2NF and all non-key attributes are not transitively dependent on the primary key.

We already have:

- **Users Table**: All attributes (UserName, UserEmail) depend on UserID.
- **Orders Table:** All attributes (UserID, OrderDate, ShippingID, PaymentID) depend on OrderID.

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- **Shipping Table:** All attributes (ShippingAddress, ShippingDate) depend on ShippingID.

- **Payments Table:** All attributes (PaymentMethod, PaymentStatus) depend on PaymentID.

In summary, the database tables of J&J Gifts Galore adhere to Third Normal Form (3NF), ensuring data integrity and efficiency. This normalization level eliminates transitive dependencies, where non-key attributes depend on other non-key attributes, ensuring a well-structured and optimized database design. By organizing data in this manner, the database maintains accuracy, reduces redundancy, and simplifies data management processes, supporting the company's operations and facilitating future growth. Overall, 3NF ensures that the database remains robust, scalable, and adaptable to changing business needs.

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Final Project
Member Percentage of Contribution

Specify your group members' contribution from 0% to 100% as highest.
Only write divisible by 5 (e.g. 75% or 95%)

Chapter 1: Accumulated Score/ 30 points	Chapter 2: Accumulated Score/ 30 points

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