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## Diena Design Case Analysis

### Report 1 Entity Relationship Diagram (ERD)

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## Introduction

An Entity-Relationship Diagram (ERD) is a fundamental tool used in database architecture that visually shows the relationships, properties and entities in a database system. It provides a clear and straightforward method of illustrating the arrangement and structure of data, assisting stakeholders and designers in comprehending the rational relationships among various database components. By mapping out entities as well as their attributes and relationships, an ERD facilitates effective communication during the design phase, enabling stakeholders to identify key entities, define their attributes, and establish the connections necessary for data integrity and efficient query processing. In the end, an ERD acts as a guide for creating and managing reliable database systems that satisfy the requirements of both organisations and users.

This report explains in detail about:

- a. Conceptual database design
- b. Logical database design
- c. Physical database design

## Case Background

Diena Design, a thriving online shop on Shopee specialising in animal-themed button badges, uses a powerful database system to manage its large inventory and streamline billing operations. The shop's database is the foundation of its operations, storing critical information such as product listings, client orders, and supplier details. Each badge is properly catalogued in the database, replete with attributes such as design, size and availability, allowing for efficient inventory management and correct order fulfilment.

Additionally, the database is essential to Diena's Design billing processes. The database keeps track of every transaction that occurs as clients peruse the store's inventory and place orders, including item specifics, quantity and cost details. The system automatically gathers pertinent data and creates comprehensive invoices for every customer when it is time to generate bills. In addition to save time and lowering the possibility of mistakes, this automated invoicing procedure guarantees accountability and transparency in financial operations.

Furthermore, the database system makes it easier to communicate with suppliers, which helps Diena Design keep ideal stock levels and quickly restock inventory as needed. The database simplifies the procurement process by keeping track of suppliers and past purchases, which enables the store to locate premium badge materials quickly.

Diena Design's database system essentially acts as a central centre for overseeing all facets of the company's operations, including supplier relations, inventory management, and invoicing. The store can concentrate on pleasing its customers with an ever-expanding selection of funny animal button badges while guaranteeing efficiency and accuracy in its daily operations by using technology to automate and optimise these procedures.

**Diena Design**

Otaku Zone , Tingkat 1, N1-20, Kompleks UTC  
Kedah

**ORDER INVOICE**

**Customer Name:** Nur Athirah Nadhirah  
Binti Mohd Zaid (01159694384)

**Invoice Number:** 230510B92S2PG0

**Customer Address:** Kolej Matrikulasi  
Perak, Blok Seri Kerian

**Invoice Date:** 13/05/2023

**Order SN:** 230510B92S2PG0

**Order Paid Date:** 10/05/2023

**Payment Method:** Online Banking

**Order Details**

No.	Product	Variation	Net Product Price	Qty	Subtotal
1	Cat Meme Part 2 Animal Button Badge 58mm	13	1.00	1	1.00
2	Cat Meme Part 2 Animal Button Badge 58mm	15	1.00	1	1.00
3	Cat Meme Part 2 Animal Button Badge 58mm	3	1.00	1	1.00
4	Cat Meme Part 2 Animal Button Badge 58mm	4	1.00	1	1.00
5	Cat Meme Part 2 Animal Button Badge 58mm	8	1.00	1	1.00
6	Kermit Funny Meme Button Badge 58mm	1	1.00	4	4.00
					<b>9.00</b>

**Subtotal**  
Total Quantity (Active) **RM 9.00**  
9 items

**ENTITIES**

- 1) CUSTOMER
- 2) PRODUCT
- 3) INVOICE
- 4) ORDER
- 5) TRANSACTION

Merchandise Subtotal	9.00
Shipping Fee	4.90
<b>Total Paid</b>	<b>RM 13.90</b>

\*Entities and attributes are listed and highlighted with respect to colour.

Figure 1: Invoice from Diena Design Database System

Table 1 shows the list of identified entities and attributes for Diena Design referring to Figure 1.

Table 1 List of Entity and Attributes for Diena Design

<b>Entity</b>	<b>Attribute Name</b>	<b>Content</b>
<b>Customer</b>	MobileNo	Customer Mobile Number
	CustomerName	Customer Name
	Address	Customer Address
<b>Product</b>	ProductID	Product Identification
	ProductName	Product Name
	ProductPrice	Product Price
<b>Order</b>	OrderID	Order Identification
	MobileNo (FK)	Customer Mobile Number
	ProductID (FK)	Product Identification
	ShippingFee	Order Shipping Fee
	OrderPaidDate	Order Paid Date
<b>Invoice</b>	InvoiceNo	Invoice Number
	InvoiceDate	Invoice Date
	OrderID (FK)	Order Identification
<b>Transaction</b>	TransactionID	Transaction Identification
	InvoiceNo (FK)	Invoice Number
	PaymentMethod	Payment Method
	TotalPaid	Total Transaction

## Business Rules

Business rules are standards and guidelines that determine how activities and transactions should be carried out within the shop's specifications. These business rules are needed for the shop, Diena Design, to establish the conditions, regulations, and criteria that will guide different aspects of the shop's operations such as product designing, manufacturing processing, stock control, sales transactions, and customer communication. Adherence to these rules will help ensure that the shop will run its operations with consistency, accuracy, and comply with regulatory standards on a daily basis.

Diena Design needs a structure for it to operate smoothly and with utmost efficiency. Hence, business rules are key to an enhanced quality of services by the shop to their customers and for them to deliver high-quality products.

The business rules for the Diena Design Database System are:

1. A Customer makes One or Many Orders at a specific time.
2. An Order belongs to Only One Customer.
3. An Order has One Invoice.
4. An Invoice has Only One Order.
5. An Order consists of One or Many Products.
6. A Product has One or Many Orders.
7. An Invoice has only One Transaction.
8. A Transaction is related to Only One Invoice.

### ERD – Conceptual Level

An entity relationship diagram (ERD), an entity-relationship model, is a graphical representation that depicts relationships among people, objects, places, concepts or events within an information technology (IT) system. An ERD uses data modelling techniques that can help define business processes and serve as the foundation for a relational database.

At the conceptual level, the Entity-Relationship Diagram (ERD) for Diena Design depicts the foundational structure of its database system. It illustrates the key entities relevant to the store's operations, such as Customer, Order, and Invoice, along with their relationships and attributes. The ERD would showcase how the Customer is associated with the Invoice, Order and Transaction. The ERD conceptual level lays the groundwork for further refining and developing the database schema, ensuring alignment with the store's operational needs and objectives by providing a high-level overview of the store's data model.

Figure 2 shows the ERD of the Diena Design Database System at the conceptual level that is drawn referring to the business rules.

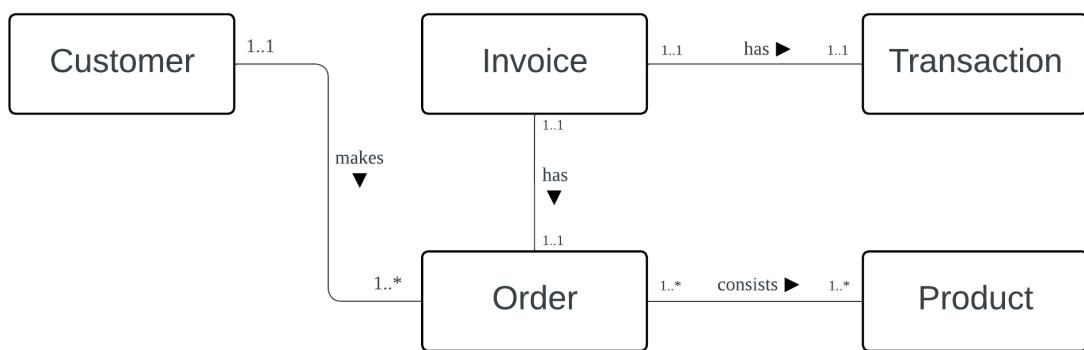


Figure 2

### ERD – Logical Level

At the logical level, the Entity-Relationship Diagram (ERD) for Diena Design goes beyond the basic structure to detail the specifics of the database design. The ERD defines attributes like MobileNo, OrderID, CustomerName, ProductName, TransactionID, and InvoiceID, along with their data types and constraints. Relationships between entities, such as Invoice and Transaction, are clarified with cardinality and participation constraints. This level of detail ensures the database accurately represents the store's operations, supporting effective management of Customer, Invoice, Product, and other vital aspects related to the Diena Design Database System. Figure 3 shows the ERD of the Diena Design Database System at the logical level.

For reference, PK refers to the Primary Key, whereas FK refers to the Foreign Key.

*Note: The Diena Design database uses mobile phone numbers (MobileNo) as Customer Identification.*

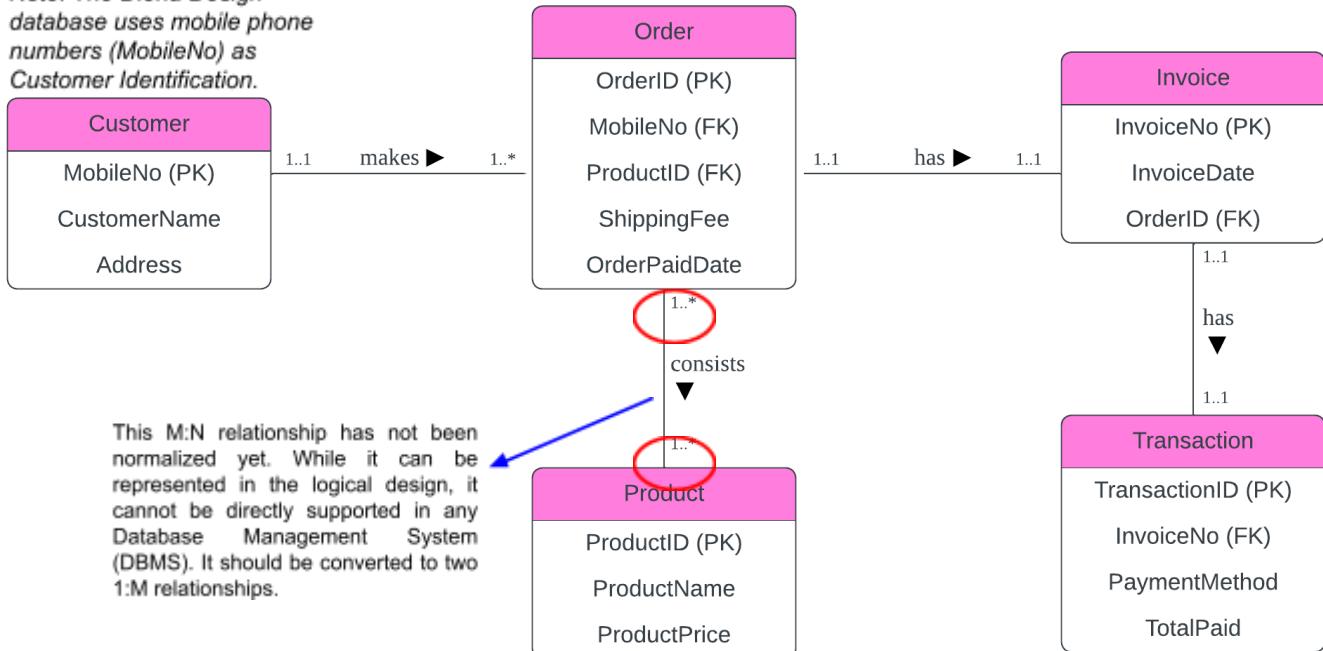


Figure 3 ERD of Diena Design Database System at the logical level

Figure 4 shows the ERD of Heaven Vet Clinic Database System at the logical level after converting M:N relationship into 1:M relationship.

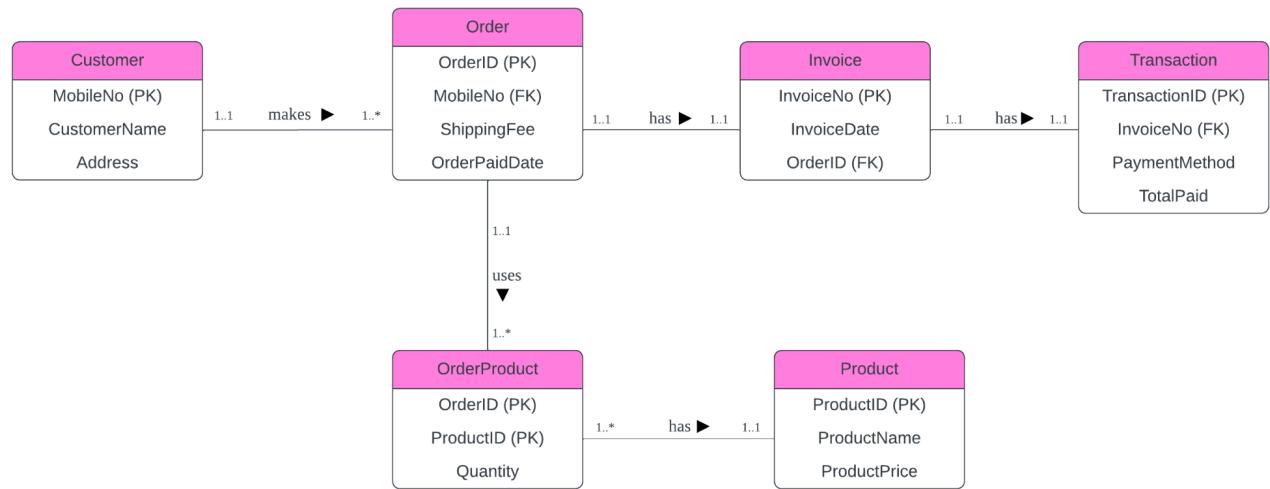


Figure 4 ERD of Diena Design Database System at the logical level after converting the M:N relationship

### Data Dictionary

A data dictionary for the Diena Design Database System is a centralised repository that defines and describes all data elements used within the store's database system. It includes comprehensive information about each data element, such as its name, data type, length, format, and usage. Table 2 shows the data dictionary of the Diena Design Database System.

Entity	Attribute Name	Content	Type	Format	Range	Required	PK or FK	FK Referred Table
<b>Customer</b>	CustomerName	Customer's Name	Vchar (30)	Xxxxx...				
	Address	Customer's Address	Vchar(200)	Xxxxx...				
	MobileNo	Customer's Mobile Number	Vchar(12)	019-9999999		Yes	PK	
<b>Order</b>	OrderID	Order Identification	Number(6)	999999	0-999999	Yes	PK	
	OrderPaidDate	Order Paid Date	Date	dd-MM-yyyy				
	ShippingFee	Order Shipping Fee	Decimal(6.2)	9999.99	0.00-999999.99			
<b>Invoice</b>	ProductID	Product Identification	Vchar(20)				FK	Product
	MobileNo	Customer's Mobile Number	Vchar(12)	019-9999999			FK	Customer
	InvoiceNo	Invoice Identification	Number(6)	999999	0 - 99999	Yes	PK	
<b>Product</b>	InvoiceDate	Invoice Date	Date	dd-MM-yyyy				
	OrderID	Payment's Method	Number(6)	999999	0 - 99999		FK	Customer
	ProductID	Product Identification	Vchar(20)	Xxxxx...		Yes	PK	
<b>Transaction</b>	ProductName	ProductName	Vchar(100)	Xxxxx...				
	ProductPrice	Price of product	Decimal(6.2)	9999.99	0.00-999999.99			
	TransactionID	Transaction Identification	Number(6)	999999	0 - 99999	Yes	PK	
<b>OrderProduct</b>	PaymentMethod	Transaction Method	Vchar(20)	Xxxxx...				
	TotalPaid	Total of transaction	Decimal(6.2)	9999.99	0.00-999999.99			
	InvoiceNo	Invoice Identification	Number(6)	999999	0 - 99999		FK	Invoice
<b>OrderProduct</b>	OrderID	Item Identification	Number(6)	999999	0 - 99999	Yes	PK	Order
	ProductID	Product Identification	Number(6)	999999	0 - 99999	Yes	PK	Product
	Quantity	Quantity of product	Number(4)	9999	0 - 99999			

Table 2 Data dictionary of Diena Design Database System

## References

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Sandoval, J. (2023, June 20). Understanding Entity-Relationship Diagrams (ERDs) and their applications in database design. Vertabelo Data Modeler.  
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LucidApp. <https://lucid.app/> Accessed date: 14th April 2024.

## Appendix

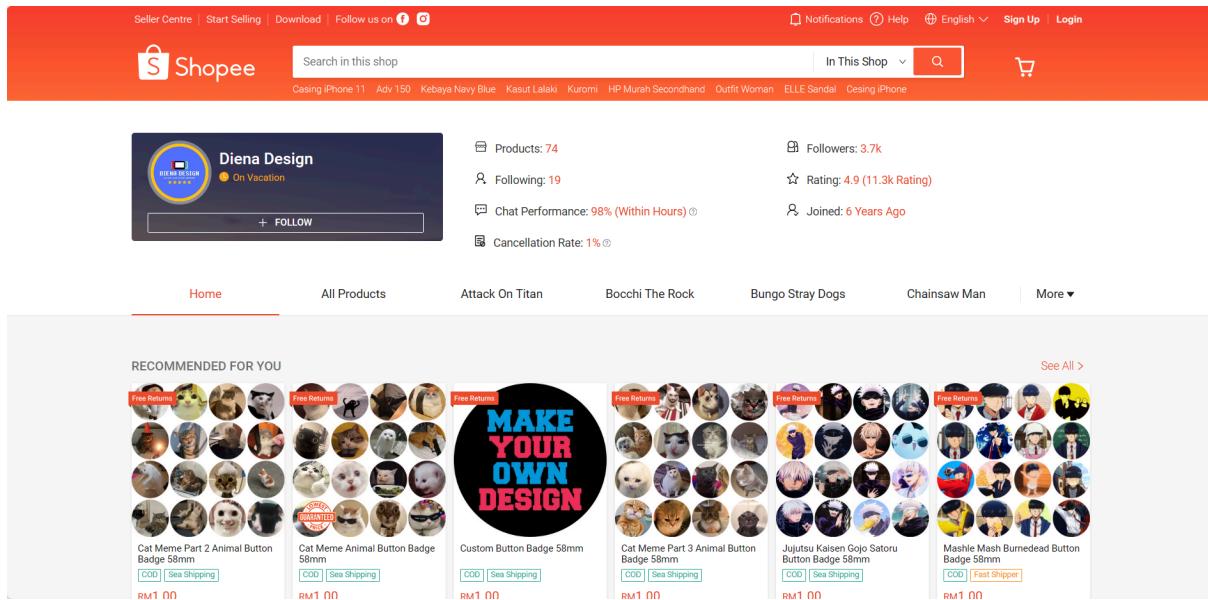


Figure 5 shows the profile page of Diena Design on the Shopee Application.



Figure 6 shows the members of the Group Presentation of this assignment on 24 April 2024.

(Names of group members from left to right: Teng Hui Ying, Evelyn Foo Yifei, Nur Athirah Nadhirah binti Mohd Zaid, Nur Aina Sabihah binti Alias)