

Design and Implementation of a Relational Database System

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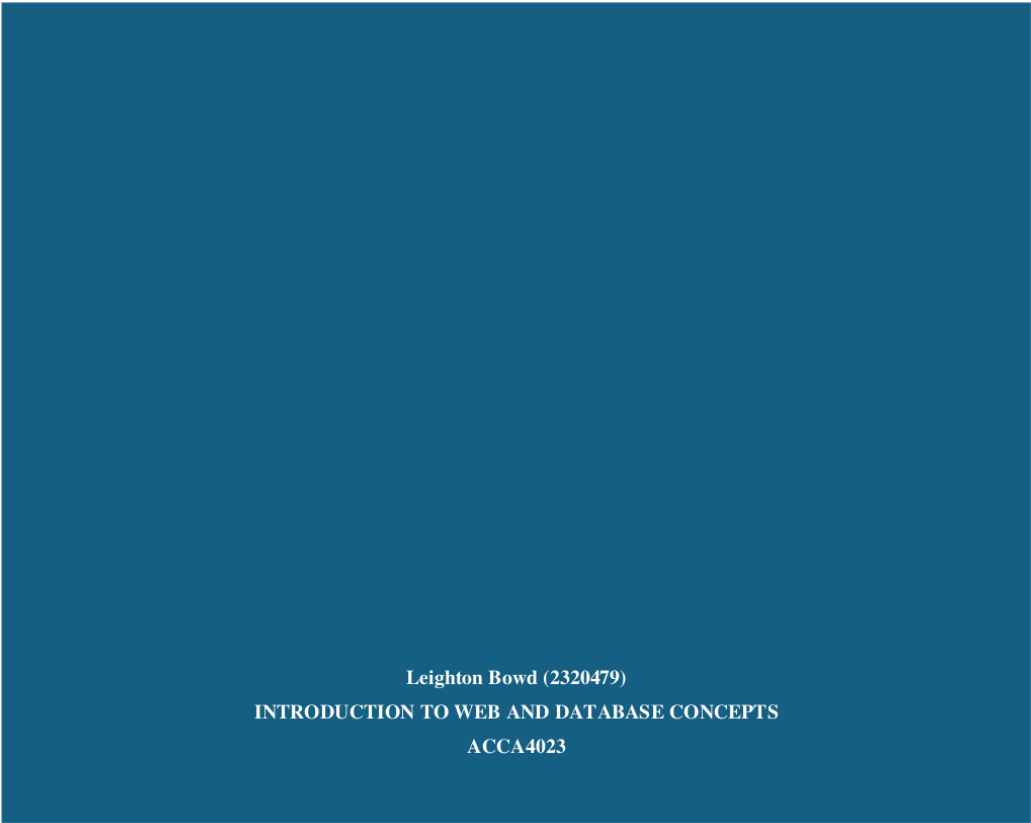
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DESIGN AND IMPLEMENTATION OF A RELATIONAL DATABASE SYSTEM



Leighton Bowd (2320479)

INTRODUCTION TO WEB AND DATABASE CONCEPTS

ACCA4023

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Introduction:

In this assignment scenario, I am tasked with developing a sophisticated database solution for CraftGem, a company looking to modernise its operational processes. Currently, CraftGem manages its day-to-day activities manually, which can lead to inefficiencies and errors. The company's director commissioned me to create an organised database system to streamline operations.

My primary goal is to design and implement a robust database that effectively manages key aspects of the business, including detailed inventory management, comprehensive customer information, and order processing. This database will improve the accuracy of their records and enhance productivity. Furthermore, it will include reporting features that facilitate data analysis, enabling CraftGem to make informed decisions based on reliable information.

Work completed when creating the content:

I have taken several steps to create my database using Microsoft Access. This section outlines those steps and includes screenshots to illustrate my actions.

Entity Relationship Diagram (ERD):

I created an Entity-Relationship Diagram (ERD) to identify all the entities and their relevant attributes. This diagram helps define the relationships between the entities, clearly specifying the degree of these relationships and their cardinality and modality. Additionally, I included annotated descriptions for each relationship to clarify how the entities interact within the database.



Figure 0-1: Screenshot of ERD.

Creation of database tables:

The next step in my project involves designing and creating the necessary tables for my database, consisting of four distinct tables.

The first table, "Customer," is essential for storing information about individuals who use our services. This table will include attributes such as CustomerID, which serves as the Primary Key to identifying each customer uniquely. Other vital fields will encompass FirstName, LastName, Email, ContactNumber, DateOfBirth, and Address, allowing me to maintain comprehensive records of our customers' details.

Next, we have the "Inventory" table, which is crucial for managing the products available for sale. This table will include attributes like ProductID, designated as the Primary Key, to ensure that each product can be accurately referenced. Additional fields in this table will include ProductName, Description, Price, and Quantity, providing a complete overview of our product offerings.

The third table, "OrderDetails," is designed to capture the specifics of each customer item. This table will contain attributes such as OrderDetailID and the Primary Key for each unique order detail entry. Additionally, it will include ProductID to link to the items being ordered, OrderID to associate with the respective order, QuantityOrdered to specify the amount of the product requested, and PriceAtOrderTime to record the cost at the moment of the order.

Finally, the "Orders" table is a comprehensive repository for all customer orders. It includes attributes such as OrderID, which functions as the Primary Key for each order. Other essential fields will be OrderDate to indicate when the order was placed, NumberOfOrdersPlaced to keep track of how many orders the customer has made, and CustomerID to link back to the customer who placed the order.

I achieve a well-organised database structure by maintaining separate tables for Orders and OrderDetails. This separation not only enhances the clarity of the data but also simplifies

reporting and analysis, allowing for more efficient management and insights into customer activities and product performance.

CustomerID	FirstName	LastName	Email	ContactNumber	DateOfBirth	Address
1	Emily	Carter	emily.carter@email.co.uk	020 1234 5678	15/01/2000	221B Baker Street, Imaginary Town, IN12 3NB
2	Liam	Taylor	liam.taylor@email.co.uk	020 9876 5432	22/06/1997	742 Evergreen Terrace, Fable City, FC32 7SW
3	Sophia	Wright	sophia.wright@email.co.uk	020 2345 6789	05/10/2004	100 Acre Wood, Fantasy Ville, FV24 4DE
4	Noah	Lewis	noah.lewis@email.co.uk	020 8765 4321	01/12/2002	12 Grimmauld Place, Enchanted Borough, EB1 1W
5	Ava	Wilson	ava.wilson@email.co.uk	020 3456 7890	10/03/1987	4 Privet Drive, Magical Suburb, MS9 8RT
6	Lee	Brown	lee.brown23@email.com	020 8724 5670	14/10/2003	123 Elm Street Springfield, SP 2AB
[New]						

Figure 0-2: Screenshot of Customer Table.

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Forms:

In addition to building tables, I enhanced my database by incorporating forms. These forms serve a similar purpose as the tables but offer added functionality through buttons that streamline the process of adding, removing, saving, or deleting records. This user-friendly feature makes data management more efficient and intuitive. The forms can be designed and tailored to meet the specific needs of your users in Microsoft Access's Design View, allowing for a personalised and optimised database experience.

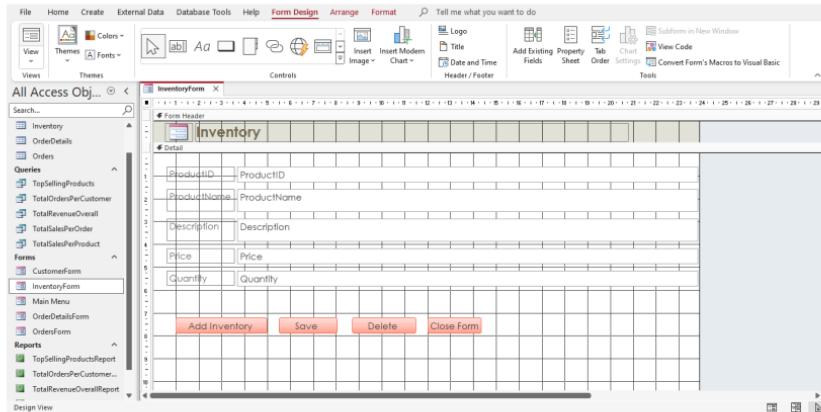


Figure 0-3: Screenshot showing design view option.

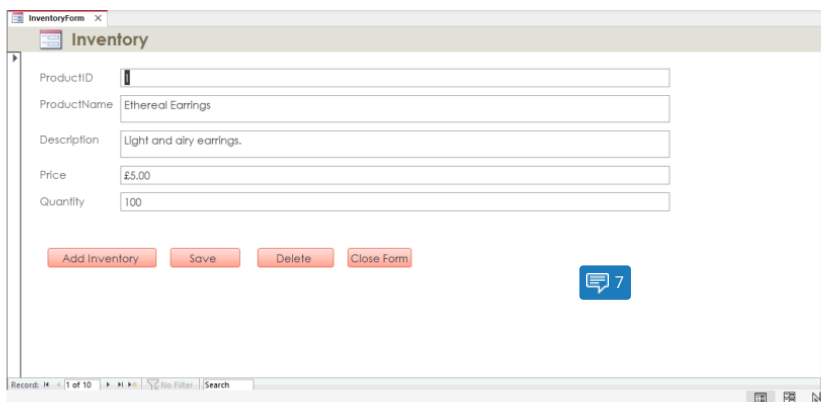


Figure 0-4: Showing image of Inventory form.

Queries:

If you have a comprehensive database filled with customer orders and wish to uncover which products stood out as the top sellers in the previous month, using a query will allow you to extract that detailed information effortlessly. Additionally, queries can assist in calculating essential metrics, such as the total sales generated during the month, or they can filter the data to highlight only those orders that surpass a specific monetary threshold.

Queries empower you to engage with your database meaningfully, offering valuable insights and precise answers to your unique enquiries. This capability transforms managing and comprehending your data, making it much more efficient and customised to meet your specific needs and objectives.

ProductID	ProductName	TotalSales	TotalQuantitySold
1	Glimmering Gemstone Bracelets	£10.00	1
3	Radiant Rings	£20.00	1
7	Dreamcatcher Dangles	£5.00	1
8	Mystic Moonstone Pendants	£10.00	1
9	Enchanting Ear Cuffs	£5.00	1
10	Serenity Sparkle Bracelet	£10.00	1

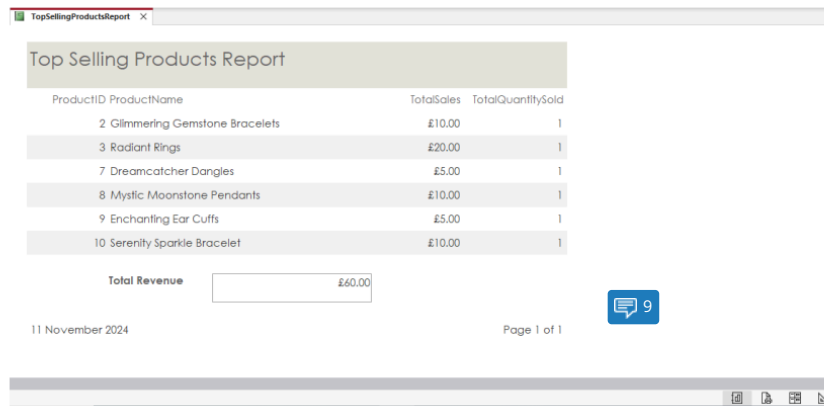
Figure 0-5: Screenshot of TopSellingProducts.

Reports:

Including a report in your database helps transform raw data into a structured and easily understandable format. Reports visually present information, summarising and organising data to highlight trends, patterns, and critical insights. This makes it easier to analyse and interpret the data, leading to more informed decision-making. For instance, a sales report can indicate which products are performing well, enabling you to adjust your inventory and marketing strategies accordingly.

The benefits of having reports in your database are numerous. First, they enhance data accessibility by presenting information clearly and concisely, which is especially helpful for stakeholders who may not be familiar with the underlying data structure. Second, reports save time and reduce errors by automating the process of data aggregation and calculation. Instead of manually compiling data, you can generate a report with just a few clicks, ensuring accuracy and consistency. Third, reports can be customised to meet specific needs, allowing you to focus on the most relevant information. This personalisation makes tracking key performance indicators and monitoring progress toward goals easier.

In summary, reports are powerful tools within a database that help make sense of your data, support decision-making, and effectively communicate findings to others.



ProductID	ProductName	TotalSales	TotalQuantitySold
2	Glimmering Gemstone Bracelets	£10.00	1
3	Radiant Rings	£20.00	1
7	Dreamcatcher Dangles	£5.00	1
8	Mystic Moonstone Pendants	£10.00	1
9	Enchanting Ear Cuffs	£5.00	1
10	Serenity Sparkle Bracelet	£10.00	1

Total Revenue £60.00

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Figure 0-6: Screenshot of the Top Selling Products Report.

Adding a Main Menu to my database:

I added a main menu to my Microsoft Access database to serve as a central dashboard that simplifies navigation and access to various parts of the database. It allows users to easily open forms, run reports, and execute queries with a single click, eliminating the need to navigate multiple tables or objects. This enhances the user experience by making the database more intuitive and user-friendly, especially for those needing to become more familiar with Microsoft Access. Additionally, a main menu can boost productivity by saving time and reducing the likelihood of errors when accessing different database functions. It also provides a professional and organised interface, giving your database a polished and well-structured appearance.

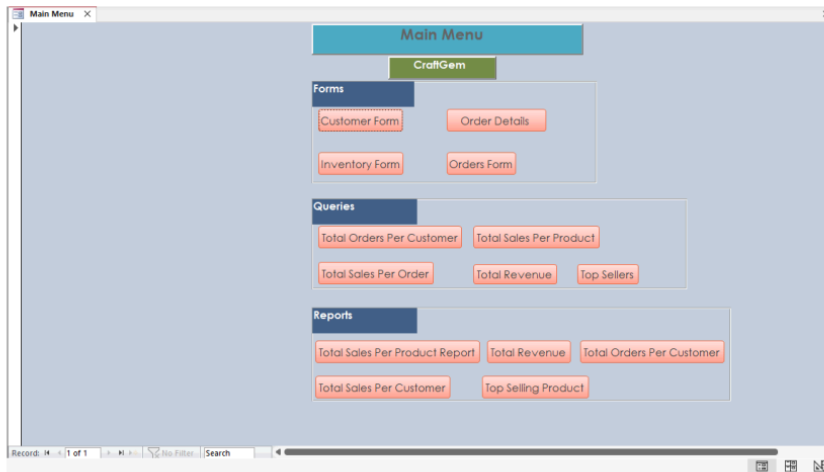


Figure 0-7: Screenshot of my main menu.

The reasoning behind the choice of queries and reports for the database created:

Queries:

In this section, I will explain the reasoning behind some of my choices for Queries and Reports.

Total Sales Per Product Query: This query is designed to identify which products are performing well. By calculating the total sales for each product, you can quickly determine which items are the most popular and generate the highest revenue. This information is crucial for making informed decisions regarding inventory and marketing strategies.

Total Orders Per Customer Query: This query helps you understand customer behaviour by displaying the total number of orders placed by each customer. It can highlight your most loyal customers and identify those requiring more attention or targeted marketing efforts.

Total Revenue Overall Query: This query provides a comprehensive overview of the total revenue generated from all orders. It is essential to assess the business's overall financial health and track sales performance over time.

Reports:

Customer Order Summary Report: This report aggregates data for each customer, showing the total number of orders generated. It is helpful for customer relationship management and helps identify critical customers who contribute to business growth.

Top Selling Products Report: This report ranks products based on their sales performance, making identifying which items drive revenue easy. It is essential for inventory management, developing marketing strategies, and planning future product lines.

Total Sales Per Order Report: This report details sales on a per-order basis, offering insights into the average order value and helping to identify patterns in customer purchasing behaviour.

Total Revenue Overall Report: This summary report provides an overview of total revenue, which is critical for high-level business analysis and financial reporting.

Together, these reports deliver a comprehensive approach to data management, enabling you to monitor performance at detailed and summary levels. They assist in identifying trends, making strategic decisions, and driving business growth.

References to relevant sources:

My primary sources of information for this assignment were my lectures and tutorial activities. I also used Microsoft Copilot AI, which offered valuable insights on creating queries and reports for my database. Additionally, Microsoft Copilot provided examples of SQL for my database queries, such as the one below.[1]

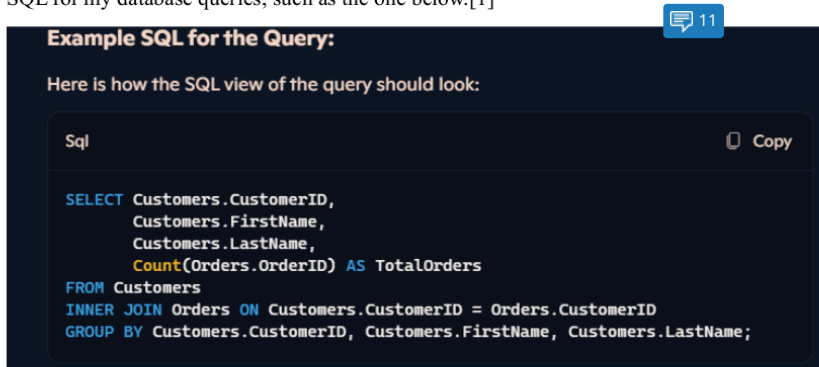


Figure 0-1: Screenshot of Microsoft Copilot response.



Figure 0-2: This screenshot shows the expression provided by Microsoft Copilot.

Another example below illustrates a response from Microsoft Copilot outlining steps to create a report in Microsoft Access.[2]

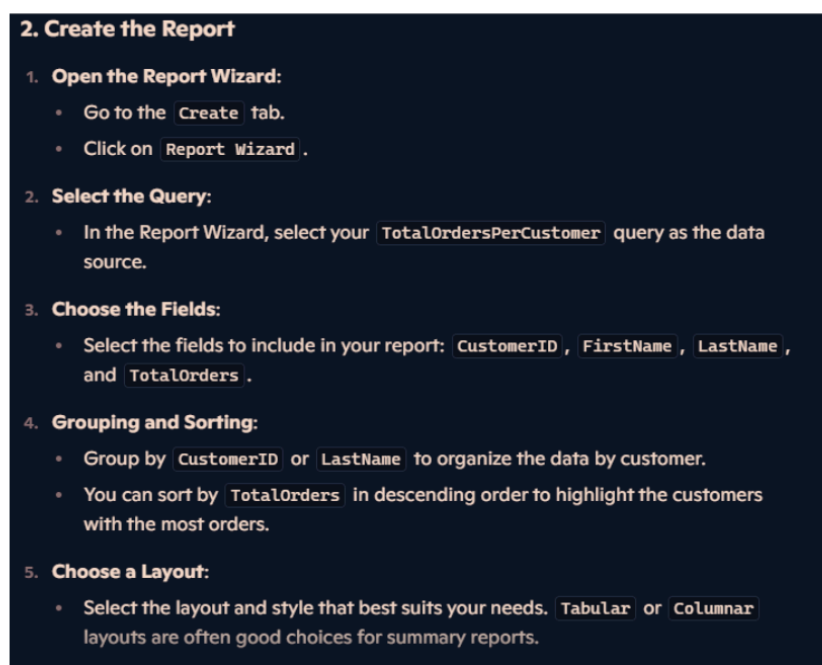


Figure 0-3: Microsoft Copilot provides a screenshot of how to create a report.

References



[1] Microsoft Copilot AI, *How to create a TotalOrdersPerCustomer report*, 2024.

[2] Microsoft Copilot AI, *How to create a TotalOrdersPerCustomer report*, 2024.

Design and Implementation of a Relational Database System

GRADEMARK REPORT

FINAL GRADE

GENERAL COMMENTS

67 /100

PAGE 1

PAGE 2

PAGE 3



Comment 1 | Transferrable skills

well done. clear description about the business case provided

PAGE 4



Comment 2 | Knowledge&understanding skills

Most of the entities and attributes are identified, but the alignment of these notations could be adjusted to make the diagram more aesthetically pleasing.

PAGE 5



Comment 3 | Transferrable skills

reasoning is clear

PAGE 6



Comment 4 | Knowledge&understanding skills

screenshots clearly numbered and labelled however screenshots of all the tables created should have been included



Comment 5 | Practical Application skills

data validation is very crucial to prevent incorrect entries

PAGE 7



Comment 6 | Knowledge&understanding skills

adding inputs through tables and forms clearly distinguished



Comment 7 | Practical Application skills

In addition to these buttons, a "Back to Main Menu" option would have made navigation easier.

PAGE 8



Comment 8 | Knowledge&understanding skills

Screenshots can be zoomed in or cropped to highlight only the essential sections

PAGE 9



Comment 9 | Practical Application skills

Implementing calculations in reports is a thoughtful approach. Well done

PAGE 10

PAGE 11



Comment 10 | Practical Application skills

Well justified however more advanced queries could have been implemented

PAGE 12



Comment 11 | Eng. with literature skills

Including generative AI prompts and responses is a good approach; however, also add references from more credible sources to make it more professional.

PAGE 13

PAGE 14



Comment 12 | Transferrable skills

The report currently lacks a conclusion, leaving the reader without a final summary or reflection on the overall project.

GRADING FORM: DC_IWD

LEIGHTON BOWD

67

ENG. WITH LITERATURE SKILLS

Materials to support the development of the database system



8

KNOWLEDGE&UNDERSTANDING SKILLS

ERD Description of tables with field names, datatypes, and constraints



23

PRACTICAL APPLICATION SKILLS

*populate database, Implementation with primary key, foreign key,
Validation rules Forms Queries Reports*



30

TRANSFERRABLE SKILLS

• Readability of the report. • Written quality, including spelling and grammar and the use of appropriate formal language. • Structure and presentation including screenshots of the report. • Critical evaluation of the selected database methods, tools and techniques and their deployment.



6