Project Report: Database Design for Canada Flowers Online Store

Understand the business functions.

The website https://www.canadaflowers.ca is an online flower delivery service that allows users to order and send fresh flowers and gifts to loved ones in Canada. The website offers a wide range of floral arrangements for various occasions such as birthdays, anniversaries, weddings, funerals, and more. Additionally, the website provides a same-day flower delivery service for select locations in Canada. Customers can browse and select floral arrangements and gift items on the website and complete their order online for delivery to the recipient's doorstep.

The website appears to provide options for customers to search for products based on occasions or categories, and displays relevant information such as product name, picture, version (e.g., standard, upgraded, premium), and prices for each version. Customers can add products to their shopping cart and proceed to checkout, where they will need to provide information such as login details (if applicable), recipient information (name, contact phone number, delivery address), delivery date, sender information (name, contact phone number), and payment method.

The external views collected from the website, as shown in the appendix, include a search request page, a search result page, forms for collecting sender and receiver information, and payment method. Each external view provides important information needed to facilitate the searching and ordering process for customers. For instance, the search result page displays the products available for a specific occasion or category, while the forms for collecting sender and receiver information ensure that the correct product is delivered to the correct recipient.

After visiting the website https://www.canadaflowers.ca, here are the basic functions of the business:

Objective:
To provide a convenient online platform for customers to purchase and send fresh flower arrangements and gifts to loved ones in Canada.

Services provided to the user:

- Browse floral arrangements and gift items by occasion or category.
- Select and add products to a shopping cart.
- Go through checkout process either as a guest or logged in user.
- Provide delivery and payment information.
- Same-day delivery service available for select locations in Canada.

Searching and Results:

- Customers can search for floral arrangements and gift items by occasion or category.
- Search results include images of the products, the product name, price, and a brief description.

Checkout Process:

- Customers can proceed to checkout as a guest or logged in user.
- Login requires an email address and password.
- During checkout, customers are required to provide the following information:
- Sender's name and contact information.
- Recipient's name and delivery address
- Delivery date and time
- Message for recipient
- Payment information (credit card details)

Figure 1 shows the front page of the website where there is a sign-in option, a number you could call for inquiries or complaints and the shopping cart value. There are various categories where the flowers are classified depending on the occasions and sentiments, including birthday, sympathy, rewards and corporate gifts sections. The front page also boldly presents savings offers which can facilitate purchases.

Figure 2 Customers can place their cursor on the categories shown in the front page to view the sub-categories. This view allows customers to further look for products that matches their specific need or want. Customers can select from options such as birthdays, anniversaries, sympathy, roses, lilies, etc. The view should display the available products that match the selected occasion/category.

Figure 3 Other than the flowers, the gift section allows the users to send their sentiments to someone with gifts such as fruit & gourmet, food & wine, and so on.

Figure 4 shows when the international category is clicked, customers can choose the delivery destination to specific countries first and then select the flowers available according to the country. Prices are in Canadian dollars. There are no extra service fees or taxes at checkout.

Figure 5 The ‘Corporate’ category when clicked, does not show list of products to purchase. Instead, it shows a corporate account sign up or login option as they provide distinguished service for business-to-business client base, such as an option for ‘Corporate Christmas gifts’ or ‘Employee discounts’.

Figure 6 The rewards page show how the reward system works in details and an option to join their reward system. This might promote sales as well.

Figure 7 If customers decide on the flower and click the thumbnail of the product after browsing categories, the detail page of the product selected will show up which includes product description, product name, picture, price, different versions (such as standard, upgraded, and premium), as well as the different types of flowers included in the product.

Figure 8 shows the shopping cart page where customers can review their choice of product, including the name of the product, quantity, version, add-ons, and total price. This view displays the list of products that a customer has added to their shopping cart, along with the quantities, prices, and a subtotal of the purchase. It allows customers to modify the quantity of items or remove items from the cart.

Figure 9 is the login page for customers to enter their email address and password to get access to their accounts during the check out process. They could also checkout as a guest but might not have access to the reward system.

Figure 10 This is an account creation page for customers who do not have an account, which collects the information including name/email address (used as account number)/phone number, specific address, password creation and whether they would like to receive special offers via email.

Figure 11 shows the recipient information that the website aims to collect from customers. It also requires selecting a delivery date, sentiment type and allows adding a card message. This allows business to ensure order is sent to the right recipient.

Figure 12 this page is to enter sender information in the system including name/email address (used as account number)/phone number, and specific address.

Figure 13 Customers can choose their preferred payment method and review the order before submitting it. This page is for entering payment details such as credit card information to make successful payment for purchase. After collecting order information from customers, on the right side, there is a brief order summary presented by the product/delivery service price and the total price after tax.

Order confirmation page: This view confirms the customer's order details, including the product name, quantity, price, recipient's information, delivery date, and payment method. It also provides a summary of the order, including the total cost and any applicable taxes or shipping fees.

State business rules and assumptions

Based on the functions and external views of the online flower store, the following business rules and assumptions can be identified:

1. Each customer has its unique customer ID.
2. Each order has its unique order number.
3. Each recipient has its unique recipient ID.
4. Each product has its unique product ID.
5. Each product may be suitable for multiple occasions, and multiple products may be suitable for one occasion.
6. Each order can be delivered to only one recipient at one location.
7. Recipient name, contact phone number, delivery date, and delivery address must be provided for delivery.
8. Payment is required before the order is processed and delivered.
9. The online store keeps a record of all customer orders for future reference and tracking purposes.
10. The online store maintains an inventory of products, and products that are out of stock cannot be ordered.
11. Prices and product information are subject to change without notice.
12. A customer (sender) has a customer ID, first name, last name, email address, up to 2 phone numbers, address, and payment information (credit card number, expiry date, and security digits
13. A recipient has a recipient ID, first name, last name, address, up to 2 phone numbers, and delivery date.
14. An order has an order date, delivery date, and order number.

15. An order line has a quantity, Order number, and Product ID.
16. A product has a product ID, picture, details, and 3 different prices with 3 different types of versions (standard, upgraded, and premium).
17. An occasion has an occasion name and occasion ID.
18. A customer (sender) can either place an order or not.
19. An order is placed by the sender (one person/ customer)
20. Customer can sign up for an account or place orders as a guest
21. Only one recipient for one order.
22. A recipient may receive multiple orders.
23. A recipient must receive the order once the order is placed and it can be a surprise

E-R model

1. Determine the attributes for each entity: For example, the Product entity may have attributes such as product ID, product name, product description, product image, price, and occasion. The Customer entity may have attributes such as customer ID, customer name, email address, and phone number.
2. Specify the relationships between entities: For example, an Order is placed by a Customer for a Product and is delivered to a Recipient. This relationship can be represented in the E-R diagram as a diamond shape connecting the entities.
3. Determine the cardinality of each relationship: For example, a Customer can place many Orders, but an Order can only be placed by one Customer. This can be represented in the E-R diagram as a "1-to-many" relationship.
4. Specify the type of entity for each entity: For example, the Product entity is a regular entity, but the Order entity may be considered a weak entity since it cannot exist without a Customer.
5. Add identifiers and derived attributes as necessary: For example, the Order entity may have an Order ID identifier, and the Recipient entity may have a derived attribute such as delivery status.

Based on the business functions and rules of Canada Flowers, the following entities, attributes, and relationships can be identified:

1. Customer Entity:

- Attributes: customer_id (primary key), first_name, last_name, email, phone_number, address
- Relationships: One customer can place many orders, but each order is placed by only one customer. This is a one-to-many relationship.

2. Order Entity:

- Attributes: order_id (primary key), order_date, delivery_date, payment_method, delivery_address, message
- Relationships: One order can have many products, and one product can belong to many orders. This is a many-to-many relationship.

3. Product Entity:

- Attributes: product_id (primary key), product_name, product_description, price
- Relationships: One product can belong to many orders, but each order can only have one instance of a particular product. This is a many-to-one relationship.

4. Cart Entity:

- Attributes: cart_id (primary key), date_created
- Relationships: One cart can have many items, and one item can belong to only one cart. This is a one-to-many relationship.

5. Cart Item Entity:

- Attributes: cart_item_id (primary key), product_quantity, product_price
- Relationships: One cart item belongs to one product, and one product can have many cart items. This is a one-to-many relationship.

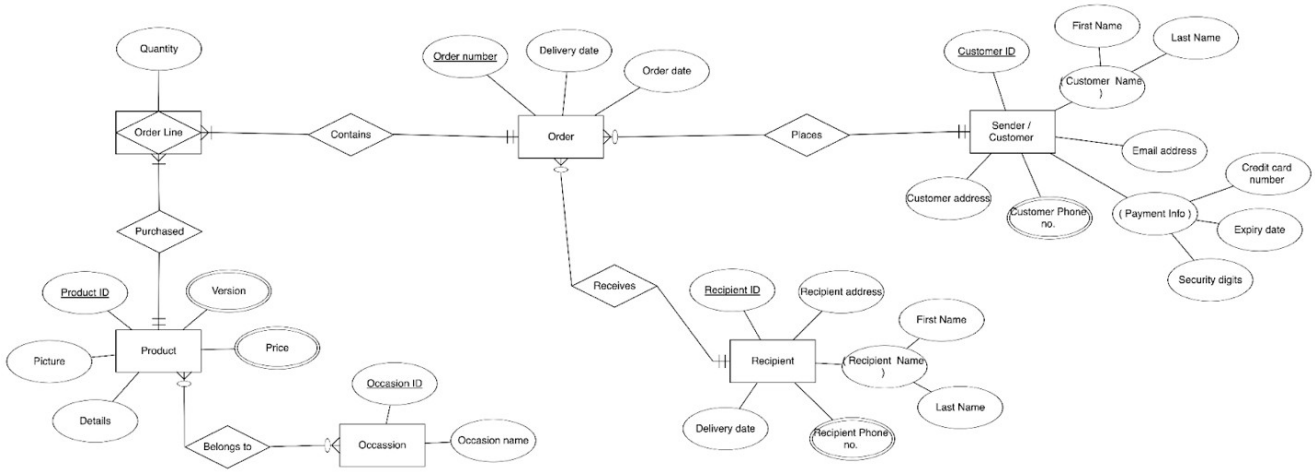
6. Occasion Entity:

- Attributes: occasion_id (primary key), occasion_name
- Relationships: One occasion can have many products, and one product can belong to many occasions. This is a many-to-many relationship.

7. Category Entity:

- Attributes: category_id (primary key), category_name
- Relationships: One category can have many products, and one product can belong to only one category. This is a many-to-one relationship.

The above entities and their relationships can be represented in an E-R diagram as follows:



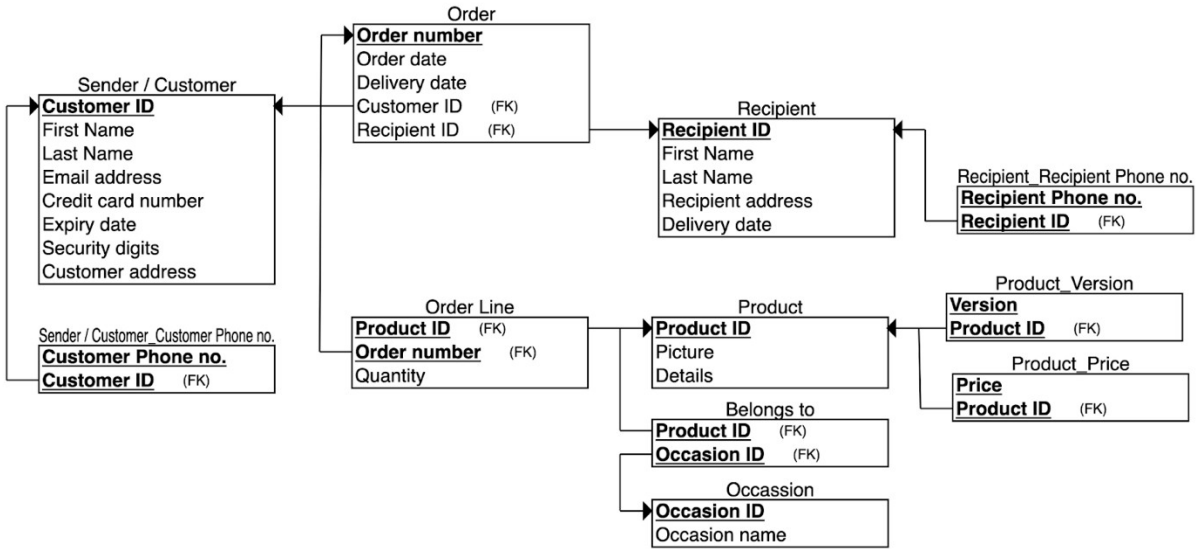
In this E-R model, there are 6 entities, including 1 associative entity called Order Line which indicates M:N relationships between product and order.

In this diagram, the entities are represented as rectangles, and the relationships are represented as diamonds. The cardinality of each relationship is indicated by the lines connecting the entities to the diamonds. The crow's feet notation is used to indicate the cardinality.

For example, the one-to-many relationship between the Customer entity and the Order entity is represented by a line with a "1" on the Customer side and a crow's foot on the Order side. This indicates that one customer can place many orders, but each order is placed by only one customer. Similarly, the many-to-many relationship between the Order entity and the Product entity is represented by a line with crow's feet on both sides, indicating that one order can have many products, and one product can belong to many orders.

Overall, the ER diagram provides a clear and concise representation of the entities, attributes, and relationships involved in the Canada Flowers business.

E-R model to relational tables.



Order

Order number	Order date	Delivery date	Customer ID	Recipient ID
AB001849	Mar/01/2018	Mar/02/2018	JY0392	HU9041
AB002394	Jun/27/2022	Jun/28/2022	JU9382	KW2729
AB001936	Jun/29/2019	Jul/01/2019	EH9406	IY4839
AB001247	Jul/19/2015	Jul/20/2015	JM0813	KC9712
AB001528	Nov/25/2017	Nov/26/2017	YT7301	KD0924

Order Line

Quantity	Product ID	Order number
1	F0024	AB001849
1	F0283	AB002394

Quantity	Product ID	Order number
2	F1102	AB001936
1	F0130	AB001247
1	F0344	AB001528

Product

Product ID	Picture	Details	Version	Price
F0024	P0024	A stunning combination of pink and white gerbera in a leaf-lined wrapped vase and delicate greenery.	Standard	$54
F0283	P0283	This bright and vibrant bouquet is Sweeter Than Candy! Featuring sunny yellow lilies, fiery orange roses, hot hot pink carnations and brilliant purple stock!	Premium	$154
F1102	P1102	Blooming with sassy sweetness and popping with extreme color! Enjoy this stunning array of pink roses and carnations in a chic white ceramic vase.	Standard	$62
F0130	P0130	A lovely handled basket floral design of lavender roses, freesias, pink lilies, waxflower, lush greenery and purple organza ribbon.	Standard	$70
F0344	P0344	This stunning bouquet with tropical coloured roses in red, pink and orange! Designed in a black ceramic vase with whimsical greenery!	Upgraded	$136

Belongs to

Occasion ID	Product ID
OC01	F0024

OC02	F0283
OC03	F1102
OC04	F0130
OC05	F0344

Occasion

Occasion ID	**Occasion Name**
OC01	Birthday
OC02	Anniversary
OC03	Wedding
OC04	Valentine's Day
OC05	Christmas

Recipient

Recipient ID	**First Name**	**Last Name**	**Recipient Address**	**Delivery Date**	**Recipient Phone Number**
HU9041	Eve	Thompson	1200 Main St.	Mar/12/2023	905-555-1234
KW2729	Mike	Johnson	456 Queen St. W	Apr/22/2024	416-555-5678
IY4839	Samantha	Garcia	789 King St. E	Jul/04/2022	647-555-9012
KC9712	Benjamin	Davis	16 Yonge St.	Aug/19/2023	905-555-3456
KD0924	Sofie	Wilson	654 Barton St.	Nov/27/2023	647-555-7890

Sender/ Customer

Customer ID	First Name	Last Name	Email Address	Credit Card Number	Exp. Date	Security Digits	Customer Address	Customer Phone Number
JY0392	Ariana	Martinez	1234@gmail.com	4444-5555-6666-7777	05/25	678	100 Main St. W	905-221-3402
JU9382	Daniella	Robin	2345@gmail.com	3333-4444-5555-6666	08/27	918	24 Barton St.	905-521-4839
EH9406	Zoe	Parker	3456@gmail.com	2222-3333-4444-5555	02/24	234	100 King St. E	647-676-9424
JM0813	Sarah	Brochette	4567@gmail.com	1111-2222-3333-4444	06/23	996	90 Dundurn St.	416-029-9352
YT7301	Amy	Rodriguez	5678@gmail.com	6666-7777-8888-9999	05/24	015	53 James St. N	905-294-5563

5. Normalization check.

Normalization is a process of organizing data in a database to minimize redundancy and dependency. It involves dividing larger tables into smaller tables and defining relationships between them. Normalization helps to avoid data inconsistencies, reduce redundancy, and ensure data accuracy.

Table 1 - Order

1. Functional dependencies

Order Number --> Order Date
Order Number --> Delivery Date
Order Number --> Customer ID
Order Number --> Recipient ID
Customer ID -?-> Order Date
Recipient ID -?-> Order Date

2. The table is in 3NF because there are no partial dependencies as well as transitive dependencies. We do not need to denormalize the tables.

Table 2 - Order Line

1. Functional Dependencies

   Order Number --> Product ID
   Order Number --> Quantity
   Product ID -?-> Quantity

2. The table is in 3NF because there are no partial dependencies as well as transitive dependencies, as we can see both Product ID and Order Number determines the amount of quantity for the order. We do not need to denormalize the tables.

Table 3 – Product

1. Functional dependencies

   Product ID --> Picture
   Product ID --> Details
   Product ID --> Price
   Product ID --> Version
   Picture --> Details

2. The table is in 2NF because there are transitive dependencies but no partial dependencies.

Table 4 - Belongs to

1. Functional dependencies

   Product ID --> Occasion ID
   Occasion ID -?-> Product ID

2. The table is in 3NF because there are no partial dependencies as well as transitive dependencies.

Table 5 – Occasion

1. Functional dependencies

   Occasion ID --> Occasion Name

2. The table is in 3NF because there are no partial dependencies as well as transitive dependencies.

Table 6 – Recipient

1. Functional Dependencies:

   Recipient ID --> First Name
   Recipient ID --> Last Name
   Recipient ID --> Recipient address
   Recipient ID --> Delivery date
   Recipient ID --> Recipient phone number
   Address -?-> Phone Number

2. This table is in the third normal form (3NF) since all the attributes are dependent on the primary key and there are no transitive dependencies or partial dependencies.

Table 7 - Sender / Customer

1. Functional Dependencies:

   Customer ID --> Fist Name
   Customer ID --> Last Name
   Customer ID --> Email address
   Customer ID --> Credit card number
   Customer ID --> Exp. date
   Customer ID --> Security digits
   Customer ID --> Customer address
   Customer ID --> Customer phone number
   Address -?-> Credit Card
   Credit Card -?-> Phone Number
   Credit card number --> Exp. date
   Credit card number --> Security digits

2. The table is in 2NF because there are transitive dependencies but no partial dependencies.

Lessons Learned

Through this project, several key skills were developed:

- **Business Process Understanding:** Learned how business functions translate into data requirements.
- **Business Rules Creation:** Understood the importance of precise rules for accurate data modeling.
- **E-R Modeling:** Gained hands-on practice designing ER diagrams and mapping entities to relationships.
- **Relational Conversion:** Strengthened ability to convert E-R diagrams into normalized relational schemas.
- **Normalization:** Practiced identifying functional dependencies and applying 1NF, 2NF, and 3NF.

The most challenging part was the **normalization process**, while the most rewarding was designing the **E-R model**, which helped visualize business operations clearly.

Conclusion

The database design for *Canada Flowers* demonstrates how business operations can be translated into a structured, normalized data model. By applying business analysis, E-R modeling, and normalization, a scalable and efficient database was developed to support online flower ordering, delivery, and customer management. This project enhanced both technical and analytical skills essential for database design and management in real-world applications.