

Database Design and Implementation Report

SID: 2203834

MOD002589

Date: 30.11.2023

1. Introduction

The purpose of the following report is to demonstrate the knowledge and understanding of the concepts introduced within the Database Design and Implementation module. The report documents the research of selected e-commerce websites, extraction, and analysis of attributes stored by those websites, before moving on to the design of the proposed Database. The initial design has been thoroughly analysed and validated using normalization techniques and that process has been documented in the relevant sections. The Database has been created according to the design and filled in with test data. Finally, sample SQL queries have been produced to test the Database.

Resources used:

The following resources were required to successfully complete this task:

- Google Chrome web browser – to gather information
- draw.io – to create a basic design for the database
- XAMPP control panel and MySQL to develop the database and create queries
- phpMyAdmin database administration tool, version 4.5.1

2. Requirement Analysis

2.1 Description of the Three Websites Chosen

All three websites, amazon, eBay, and Argos, selected for this task are online shopping sites, from which customers can purchase a variety of products distributed by individuals and companies. To examine the websites' functions, I registered as a new customer, browsed the product categories, selected a product, looked at the review section, and added it to the basket.

2.1.1

Amazon is a multinational technology and e-commerce company. It started as an online bookstore and expanded into a diverse range of products and services, including retail, cloud computing, streaming, and artificial intelligence. Amazon is a major player in global online commerce and technology innovation.

2.1.2

eBay is a global online marketplace that facilitates consumer-to-consumer and business-to-consumer sales. It enables individuals and businesses to buy and sell a wide range of new or second-hand goods through auctions or fixed-price listings.

2.1.3

Argos is a British retailer known for its catalogue-based shopping and diverse product range, including electronics, furniture, and household items. Operating both online and through physical stores, Argos offers both a delivery and click-and-collect service, allowing customers to order online and pick up their purchases at a nearby store or receive them at home.

2.2 Table of Data Fields

Three lists of attributes have been presented in the subsections below. By analysing the steps required to successfully purchase a product on each of the three websites I have been able to gather the list of attributes. The attributes were obtained by looking into what details needed to be filled by the Customer, information displayed by the website's product search page, the customer basket, and the checkout pages.

The attributes in each of the three tables have been listed under relevant columns to improve readability. The attributes are grouped relating to the entities Customer, attributes related to the Product, attributes linked to Basket, and shows Order related data.

2.2.1

Table of data fields from www.amazon.co.uk website

Table 1, below, contains the data fields extracted during the analysis of www.amazon.co.uk website.

Customer	Product	Basket	Order
First and last name	Product Title	Product	Delivery address
Mobile number	Product price	Product quantity	Delivery instructions
Email	Amount Product was discounted by	Product stock	Payment method
password	Product information	Order subtotal	Billing address
	Products related to the item	Total-amount	Giftcard/vouture/promocode
	Product reviews		Offers
	Product rating		Items
			Delivery date
			Delivery type

Table 1: table of data fields extracted from the Amazon website.

During the registration process the user is required to provide either an email address or phone number to identify the customer and ensure they are not a robot and have entered their own contact details, verified by a verification code the customer must enter to create their account.

It is important to note that since the website deals with a large catalogue of items the attributes for each are very different. Due to this, only general attributes have been presented in the above list.

Each Product is related to a large range of other products of the same brand, similar names, or similar uses in order of the average customer rating, price, or brand.

The Payment-related attribute list contains some fields that are pre-filled with data referenced from elsewhere, such as the subtotal and total amount taken from basket. It is worth mentioning that although the user is required to enter details like Card number or Verification code, the details are most likely not stored in the database and so these attributes have not been included in Table 1.

Figure 1 shows “your account” found in the “All” section of the amazon website.

Your Account

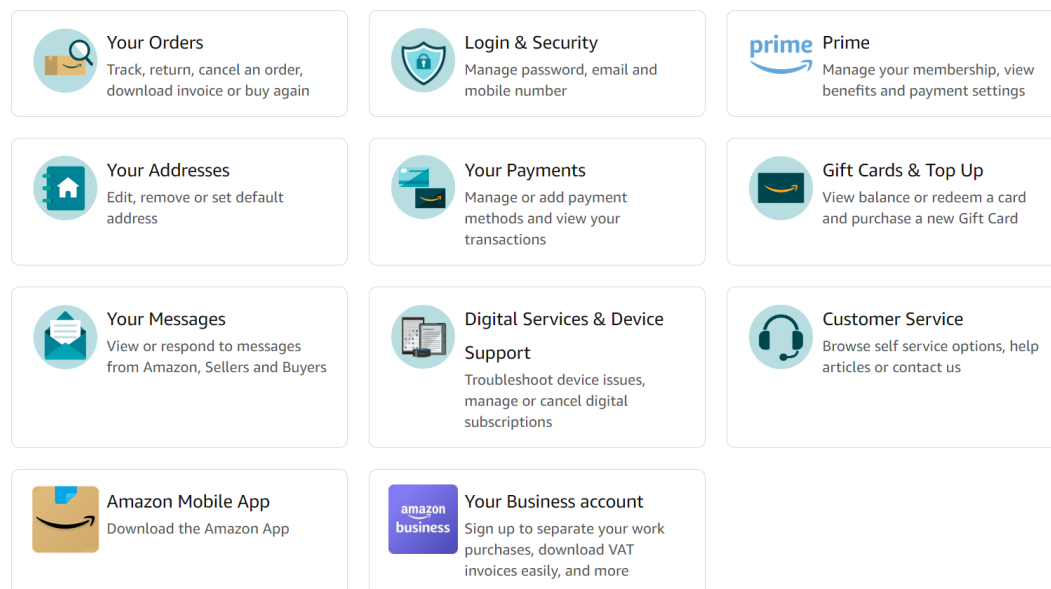


Figure 1: Screenshot of Your Account section on Amazon website

Figure 2 shows the Basket section of the Amazon website.

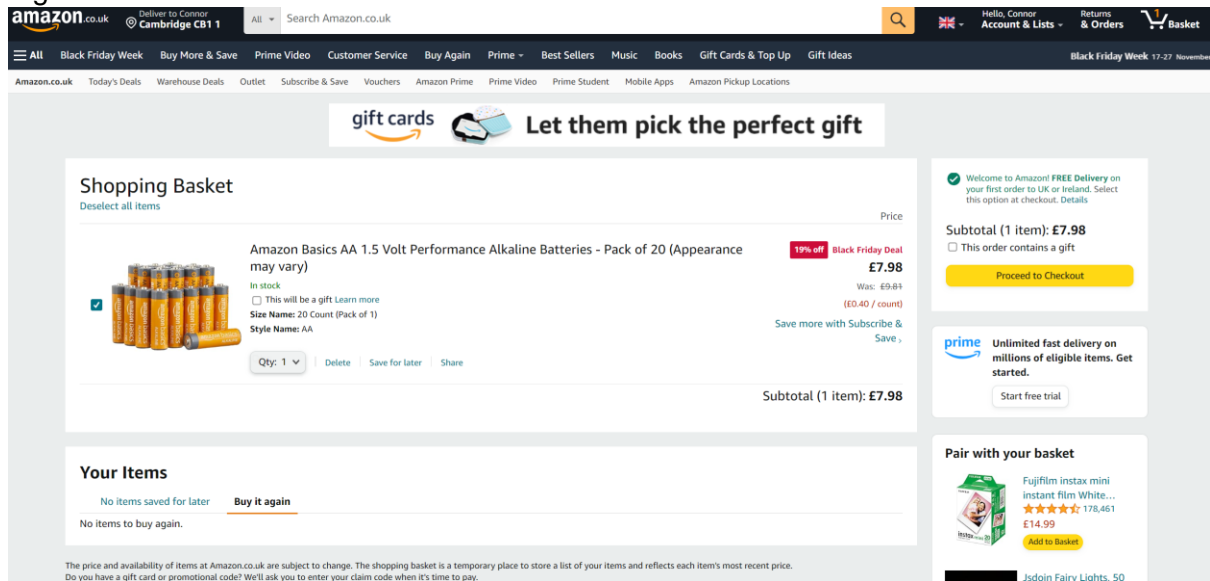


Figure 2: screenshot of the Shopping Basket section on the Amazon website

Figure 3 shows the “Checkout” section of the Amazon website.

amazon.co.uk

Checkout (1 item)

1 Delivery address

Connor Flynn
ANGLIA RUSKIN UNIVERSITY EAST ROAD
CAMBRIDGE, CB1 1PT
[Add delivery instructions](#)

Or pick up near this address - See nearby pick-up locations

Change

2 Payment method

Paying with Visa/Delta/Electron 0229
Billing address: Same as delivery address

Add a gift card or promotion code or voucher

Enter Code

Apply

Change

3 Offers

4 Review items and delivery

Want to save time on your next order and go directly to this step when checking out?

☐ Tick this box to default to these delivery and payment options in the future.

Delivery date: 27 Nov. 2023

If you order in the next 2 hours and 57 minutes ([Details](#))

Items dispatched from Amazon EU Sàrl

Amazon Basics AA 1.5 Volt Performance Alkaline Batteries - Pack of 20 (Appearance may vary)
£7.98 (£0.40 / count)

Qty: 1 ▾

Sold by: Amazon EU S.a.r.L.

Subscribe & Save:

☐ Save up to 5% on future scheduled deliveries ▾

Delivery every: 5 months (most common)

+ Add gift options

Item arrives in packaging that reveals what's inside. To hide it, choose Ship in Amazon packaging.

Ship in Amazon packaging

Choose a delivery option:

☒ FREE Delivery on your first order : get it Monday, 27 Nov.

Order Summary

Items: £7.98

Postage & Packing: £4.49

Total: £12.47

Promotion Applied: -£4.49

Order Total: £7.98

Order totals include VAT. See details

Qualifying offers:

- Free Delivery

How are delivery costs calculated?

Why didn't I qualify for FREE Delivery?

Buy now

By placing your order you agree to Amazon's Conditions of Use & Sale. Please see our Privacy Notice, our Cookies Notice and our Interest-Based Ads Notice.

Figure 3: screenshot of Checkout section on Amazon website

2.2.2

Table of data fields from www.ebay.co.uk website

Table 2, below, contains the data fields extracted during the analysis of www. ebay.co.uk website.

Customer	Product	Basket	Order
First name	Product Title	Product	Delivery address
Surname	Quantity	Quantity selected	Payment method
Business/personal	Stock	Number sold	Billing address
Email	Price	% of positive feedback	Voucher
Password	Postage date	Items price	Offers
	Return policy	Postage price	Delivery date
	Condition	Total price	Delivery type
	About this item		Product
	Business seller information		Quantity selected
	Product ratings and reviews		Postage date
			Postage price
			Total price

Table 2: table of data fields extracted from the Amazon website.

It is important to note that since the website deals with a large variety of products ranging from technology to toys, the attributes of each item are very different. Due to this, only general attributes have been presented in the above list.

As the website deals in the sale of items of varying conditions, the condition of the items is displayed to the viewer on the item page.

Figure 4 shows “Create an account” section of the eBay website

ebay

Already have an account? [Sign in](#)

Create an account

Personal Business

First name Surname

Email

Password

We'll regularly send you emails with offers regarding our services. You can [unsubscribe](#) at any time.

By selecting **Create personal account**, you agree to our [User Agreement](#) and acknowledge reading our [User Privacy Notice](#).

Create personal account

or continue with

Google Facebook Apple

Figure 4: Screenshot of Create an account section on eBay website


Figure 5 shows the section where the product is displayed website.










ebay Shop by category

[Back to home page](#) | Listed in category: [Home Garden](#) > [Lawn Mowers, Parts & Accessori...](#) > [Lawn Mowers](#) > [See more Flymo EasiStore 300R ...](#)

LAKELAND
BLACK FRIDAY
Save up to 50%

LAKELAND **Up to 50% Off Today**





✓ Refurbished on eBay

Flymo EasiStore 300R Rotary Lawn Mower Certified Refurbished - Silver Graded

Condition: **Certified - Refurbished** ⓘ
"Silver-graded products will show excellent value for money and condition."

Quantity: More than 10 available

Price: **£71.99**
RRP £109.99 ⓘ
Save £38.00 (35% OFF)

↶ **Breathe easy.** Free postage and returns.





⚡ **This one's trending.** 324 have already sold.

🌱 Take **£14.40** off this item. [Show me how](#)

nectar Collect **72** Nectar points [Redeem your points](#)

Postage: **Free 4-5 day postage**
Get it between **Wed, 29 Nov** and **Fri, 1 Dec**
Located in: Stockton-On-Tees, United Kingdom

Returns: 30 days return. Seller pays for return postage

Payments:    



Get more time to pay. [See payment options](#)


Figure 5: screenshot of the item page on ebay website

Figure 6 shows the “Checkout” section of the eBay website.

ebay Checkout How do you like our checkout? [Give us feedback](#)

Review item and postage

Seller: flymo_official



Flymo EasiStore 300R Rotary Lawn Mower - Certified Refurbished
- Silver Grade
£71.99
~~£109.99~~

Quantity
1

Postage
Free 3 day postage
Get it by 28 - 29 Nov
DPD Two Day

☒ **Refurbished**
One-year guarantee included
[Learn more](#)

Subtotal (1 item) **£71.99**
Postage **Free**

Order total **£71.99**

[Confirm and pay](#)

Enter delivery address

Post to

Country or region
United Kingdom

First name Surname

Street address Street address 2 (optional)



City State / Province / ... Postcode


Email Confirm email


Country code **+44** Phone number (required)
We only use this number if there's an issue with delivery.

[Done](#)

Pay with

☐ Add new card
VISA  

☐  PayPal

☐ 

[Add vouchers](#)

Figure 6: screenshot of Checkout section on eBay website

2.2.3

Table of data fields from www. argos.co.uk website

Table 3, below, contains the data fields extracted during the analysis of www.ebay.co.uk website.

Customer	Product	Basket	Order
Email	Product Title	Product	Delivery address
Title	Product price	Product quantity	Store location
First name	Stock near postcode	Delivery address/Collection address	Delivery instructions
Second name	Product information	Order subtotal	Delivery date
Postcode	Products related items	Total-amount	Payment method
Phone number	Product reviews		Gift card
Password	Product rating		Items
Receive marketing info	Customer Questions		
	Special offers		

Table 3: table of data fields extracted from the Amazon website.

The Argos store differs from the previous two stores as it provides a “click and collect” service that works in a similar way to how deliveries work though the customer will enter their post code and have the product(s) delivered to a physical store.

Figure 7 & 8 show the registration section for the Argos website.

The screenshot shows the Argos website registration process. At the top, there is a navigation bar with the Argos logo, links for Shop, Trending, and Christmas, a search bar with the placeholder text "Search products, brands or FAQs", and links for Account, Wishlist, and Trolley. Below the navigation bar, the registration form is displayed. The form has three steps: 1. Your Email, 2. Your details, and 3. Your account info. Step 2, "Your details", is currently active and highlighted in blue. It contains the following fields: Title (a dropdown menu with "Select..." as the current selection), First name, Last name, Mobile number (optional, with a note "We'll text you order updates and only call if we have to"), and Postcode. A green "SAVE AND CONTINUE" button is located at the bottom of the form. The footer of the page includes a Feedback button and links for Customer Service, Payment methods, Product information, and About Argos.

Figure 7: Screenshot of registration page on Amazon website

The screenshot shows the Argos website registration process, step 3: Your account info. The navigation bar is the same as in Figure 7. The registration form has three steps: 1. Your Email, 2. Your details, and 3. Your account info. Step 3, "Your account info", is currently active and highlighted in blue. It contains the following information: "Your email address is cflynn110068@gmail.com", "Mr Connor Flynn", "CB1 1PT", and "07305175824". Below this, there is a "Create Password" section with a note "Password must contain at least" and three radio buttons for "8 characters", "2 letters", and "1 number". There are two input fields for "Your password" and "Re-type your new password". Below the password fields, there is a section for "Receive marketing information" with a "NO" button (selected) and a "YES" button. A note at the bottom states "For more information on how we use your personal details please refer to our [Privacy Policy](#) and [Cookie Policy](#)". A green "SAVE AND CONTINUE" button is located at the bottom of the form.

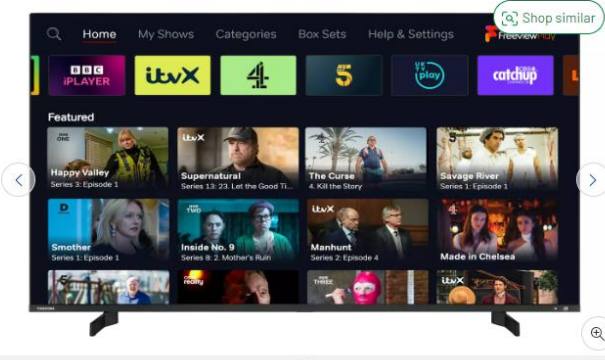
Figure 8: Screenshot of registration page on Amazon website

Figure 9 shows a product page on the Argos website.

Toshiba Fire 50 Inch 50QF5D53DB Smart 4K UHD HDR QLED TV 291/3133

★★★★★ [Read reviews \(11\)](#)

Black Friday **Price promise** **AGF** [Product information sheet](#)



1/12

[Video](#)

£299.00*
Save £80.00 | Was £379.00
[Flexible credit available](#) [See options](#)

PayPal Pay in 3 interest-free payments of £99.67. [Learn more](#)

Collect 1495 Nectar points [Find out more](#)

2 Money off bundles

Check stock
Check stock to see your delivery and collection options:

Postcode or town



1

[Add to Your Wishlist](#)

Insure your product with Argos Care

Argos Monthly Care	+£4.99 per month	>
2 years Accidental Damage and Extended Warranty - TV	+£69.99	>

Complete your purchase with...

	+	
Toshiba Fire 50 Inch 50QF5D53DB Smart 4K UHD HDR QLED TV		One For All WM442132 - 65 Inch Tilt TV Wall Bracket
£299.00 Save £80.00		£16.99 Save 1/3
Offer saving	£89.00	
Total price:	£315.99	<input type="button" value="Add all items to trolley"/>

About this product

Experience more colour, more sound and more connectivity with our QLED 4K Smart TV with Fire TV built in. Now with even more apps. Sit back, relax, and enjoy your favourites from Netflix, Prime Video, Disney+ and more. Alexa can also help you find new content and interact with your smart home devices to set the perfect mood for movie night.

QLED technology delivers image vibrancy like never before. Offering a range of 1 billion colour shades, standard compressed broadcasting content is restored to its original brilliance for a natural and realistic picture, even in brightly lit rooms.

TRU Micro Dimming improves contrast across every part of the image. TRU Flow reduces image judder, even during rapid cuts and fast-moving scenes. And TRU Resolution upscales a range of non-4K content, to create a more high-resolution image that draws you into a truly vivid experience.

Enjoy a 4K HDR experience like no other. With Dolby Vision HDR, your viewing experience is augmented with ultra vivid picture quality.

Figure 9: screenshot of product section on Argos website

Figure 10 shows the trolley page of the Argos website

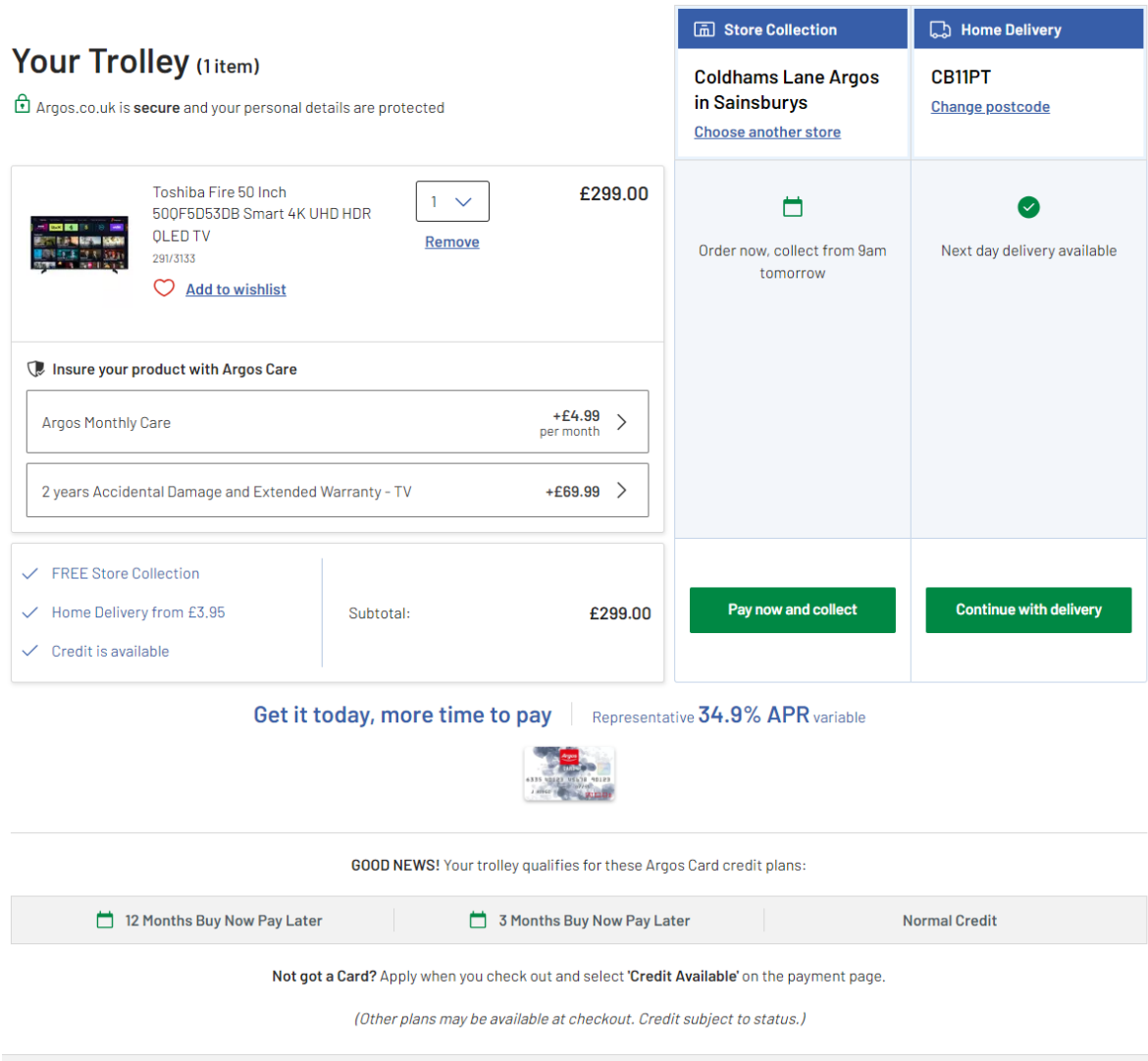


Figure 10: screenshot of the trolley section of the Argos website

2.3 Finalised List

2.3.1. The Generic List

Table 4 shows a table of all the relative attributes obtained from all three websites. Several other attributes have also been rejected and justification is presented in Section 2.3.2. Similarly, some attributes have been added to the list, with the details and justification shown in Section 2.3.3.

Customer	Product	Basket	Order
Customer ID	Product ID	Basket_ID	Order_ID
Title	Product name	Products	Delivery address
First name	Quantity in stock	Quantity selected	Payment method
Surname	Price	Items price	Billing address
Email	Return policy	Total price	gift cards/promo code
Phone number	Condition		Delivery date
	Product info		Product
	Business seller information		Quantity selected
	Product review		Postage price
	Customer Questions		Total price
	Sale details		
	Item ID		

Table 4: table of data fields obtained by merging relevant data from Tables 1,2 and 3

2.3.2 Justification for the Attributes Rejected

I have removed attributes related to “click and collect” options and left in attributes regarding delivery, as my proposed system is an online-only store where the customer will only be receiving products to their desired address.

The attribute relating to the account type in Table 2 has been removed as the proposed system will offer only one type of account for customers.

2.3.3 Justification for the Attributes Added

I have added “item ID”, this would be a hidden entity as it would not be viewable to the customer. The purpose of this is to allow the seller to keep track of stock as each individual item of the same type or product will be accounted for and removed from stock once that item has been sold

3. Database design

3.1 Entity Relationship Modelling

During the database design, several models have been created for each step; the first being an entity-relationship diagram presented in section 3.1.1. From this, I developed a more complex Extended Entity Relationship diagram(EERD) model presented in section 3.1.2 below.

3.1.1 Initial Entity Relationship Model

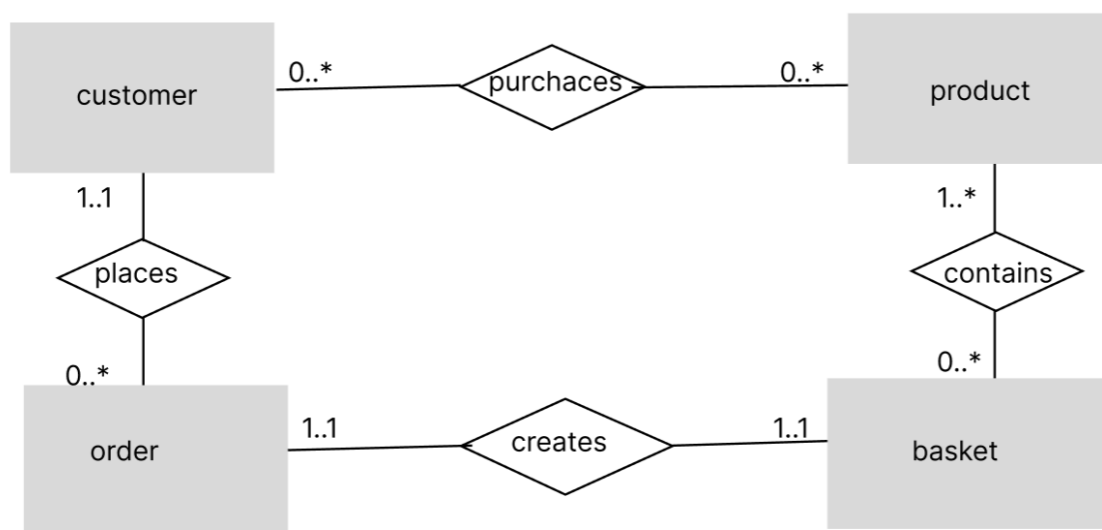


Figure 19: Entity Relationship Diagram

3.1.2 Extended Entity Relationship Model

From the ERD in Section 3.1.1 I developed a more detailed Extended Entity Relationship Diagram (EERD) that includes attributes, primary keys and foreign keys.

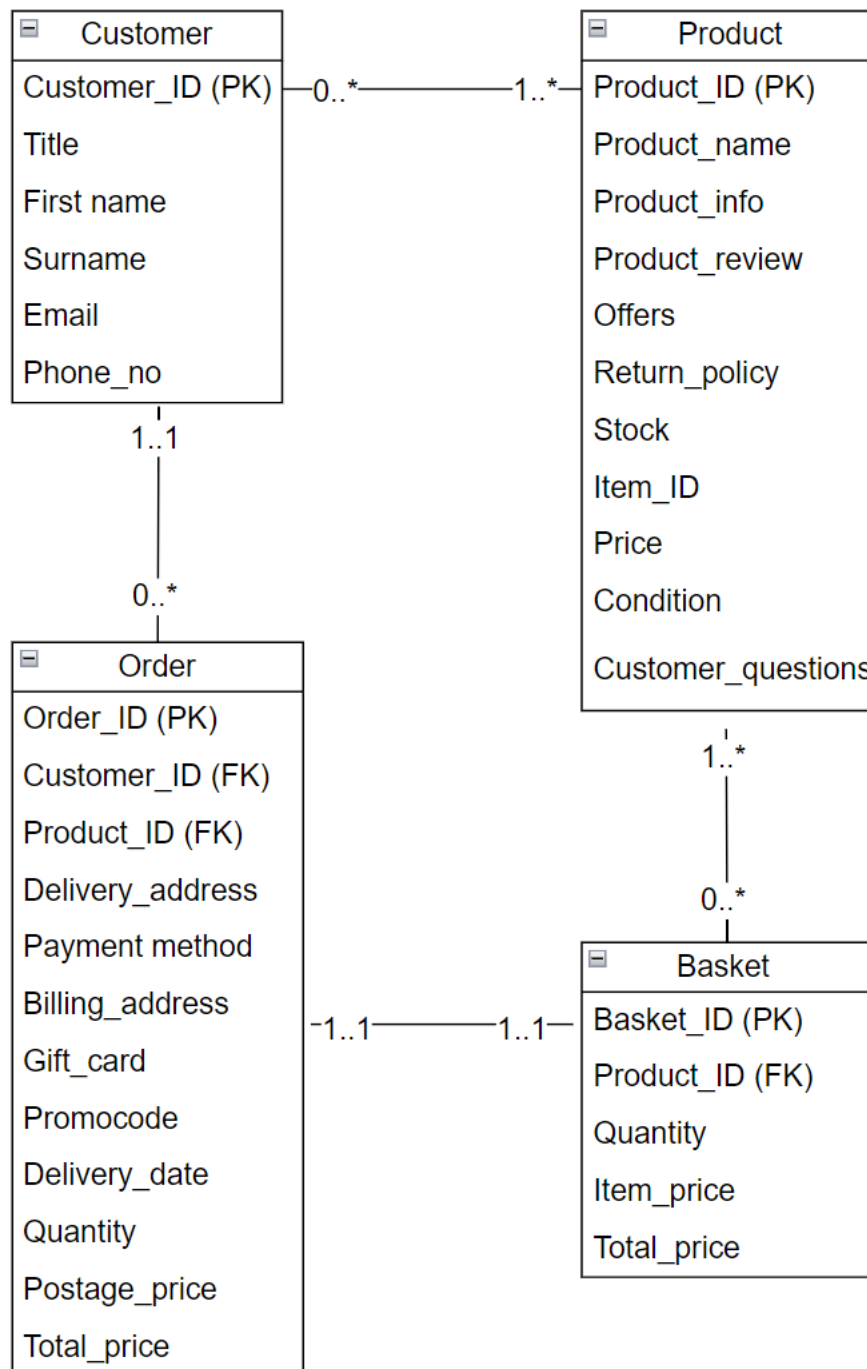


Figure 20: Extended Entity Relationship Diagram

3.2 Normalised Model

Through the use of normalization, I developed and validated my final EER model to ensure the relationship between entities would support the data requirements. This was an important step to helping me discover semantic errors allowing me to improve the model.

3.2.1 Normalization (1NF-3NF)

The initial model shown in Figure 20, Section 3.1.2 did not contain some repeating groups of attributes, however, each entity had an identifying key, this meant it needed some improving to pass the First Normal Form (1NF). I improved this by removing repeating attributes and removing the basket table as it contained only repeating attributes.

The final model did not contain any composite primary keys, and so passed the Second Normal Form (2NF) test.

The final model contained no non-key attribute, therefore passing the Third Normal Form (3NF) test.

The initial model did not comply with the three Normal Forms, and so the in-depth analysis uncovered errors I was able to improve on and showed me new features I could implement such as the item, and seller.

3.2.2 Extended Entity Relationship Model Derived from the 3NF Entities

Figure 21 shows the EER model of the proposed database and has been normalized by performing a series of normalization tests to ensure that the grouping of the attributes, and relationships between the entities support the data requirements.

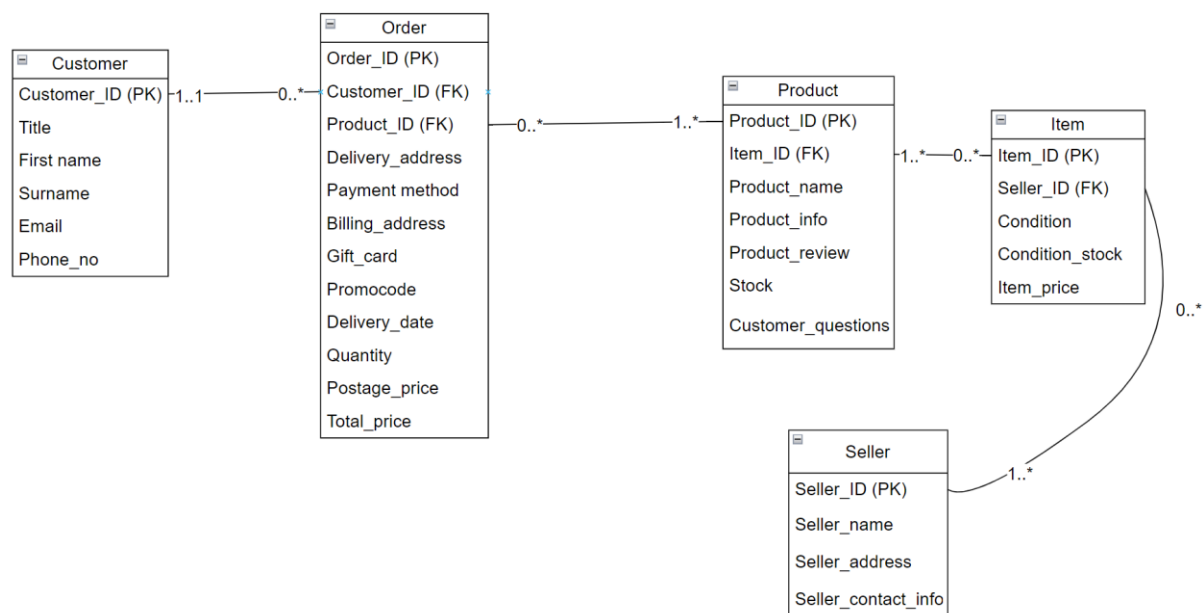


Figure 21: EER Diagram used to implement the proposed Database

3.3 Database Schema

The proposed database consists of 5 tables:

- Customer
- Order
- Product
- Item
- Seller

Customer		
Attribute name	Type	Description
Customer_ID	Int(25)	Primary key, indexed
Title	Varchar(15)	Stores customers honorific
First_name	Varchar(20)	Stores customers first name
Surname	Varchar(20)	Stores customers surname
Email	Varchar(50)	Stores customers email
Phone_no	Int(13)	Stores customers phone number

Table 6: The description of attributes stored in Customers table

Order		
Attribute name	Type	Description
Order_ID	Int(25)	Primary key, indexed
Customer_ID	Int(25)	Foreign key referenced from Customer table, indexed.
Product_ID	Int(25)	Foreign key referenced from Product table, indexed.
Delivery_address	Varchar(20)	Holds the delivery address
Payment_method	Enum(visa, mastercard, maestro)	Holds the payment method
Billing_address	Varchar(20)	Holds the billing address
Gift_card	Int(25)	Stores the gift card number
Promocode	Varchar(10)	Stores the promocode
Delivery_date	Datetime	Stores predicted delivery time
Quantity	Int(10), unsigned	Stores customers desired quantity of product, indexed
Postage_price	Decimal(8, 2), unsigned	Stores the postage price
Total_price	Decimal(8, 2), unsigned	Stores the total price

Table 7: The description of attributes stored in Order table

Product		
Attribute name	Type	Description
Product_ID	Int(25)	Primary key, indexed,
Item_ID	Int(25)	Foreign key referenced from Item table, indexed
Product_name	Varchar(10)	Holds product name
Product_info	Varchar(20)	Holds product info

Product _review	Varchar(25)	Holds product reviews
Stock	Int(20)	Stores total stock
Customer_questions	Varchar(20)	Holds customer questions

Table 8: The description of attributes stored in Product table

Item		
Attribute name	Type	Description
Item_ID	Int(25)	Primary key, indexed.
Seller_ID	Int(25)	Foreign key referenced from Seller table, indexed
Item_price	Decimal(8, 2)	Holds item price
Condition	Enum(second-hand, first-hand)	Holds the condition

Table 9: The description of attributes stored in Item table

Seller		
Attribute name	Type	Description
Seller_ID	Int(25)	Primary key, indexed.
Seller_name	Varchar(15)	Holds seller name
Seller_address	Varchar(20)	Holds seller address
Seller_contact_into	Varchar(20)	Holds seller's contact into

Table 10: The description of attributes stored in Seller table

4. Database Implementation

The Database for the proposed system has been build using phpMyAdmin. All of the test records have been inserted manually using insert SQLqueries.

Figure 22 the list of tables with their storage engine and number of rows.

Table	Action	Rows	Type
<input type="checkbox"/> customer	★ Browse Structure Search Insert Empty Drop	11	InnoDB
<input type="checkbox"/> item	★ Browse Structure Search Insert Empty Drop	21	InnoDB
<input type="checkbox"/> order	★ Browse Structure Search Insert Empty Drop	10	InnoDB
<input type="checkbox"/> product	★ Browse Structure Search Insert Empty Drop	10	InnoDB
<input type="checkbox"/> seller	★ Browse Structure Search Insert Empty Drop	4	InnoDB
5 tables	Sum	56	InnoDB

Figure 22: Screenshot of the details of the database


#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	customer_ID 	int(25)			No	None		AUTO_INCREMENT
2	title	varchar(15)	utf8mb4_general_ci		No	None		
3	first_Name	varchar(20)	utf8mb4_general_ci		No	None		
4	surname	varchar(20)	utf8mb4_general_ci		No	None		
5	email	varchar(50)	utf8mb4_general_ci		No	None		
6	phone_No	int(20)			No	None		

Figure 23: Screenshot of customer table structure

customer_ID	title	first_Name	surname	email	phone_No
1	mr	Johne	James	ja@gmail.com	211222333
2	Ms	Alice	Smith	alice@example.com	987654321
3	Dr	Michael	Johnson	michael@example.com	111222333
4	Mrs	Emily	Brown	emily@example.com	444555666
5	Mr	David	Wilson	david@example.com	777888999
6	Ms	Sophia	Martinez	sophia@example.com	101202030
7	Dr	Oliver	Anderson	oliver@example.com	404505060
8	Mrs	Emma	Thompson	emma@example.com	123789560
9	Mr	Daniel	Lee	daniel@example.com	999887777
10	Ms	Grace	Garcia	grace@example.com	666555444
11	Mr	John	Doe	john@example.com	123456789

Figure 24: Screenshot of customer table rows and columns



#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	Item_ID 	int(25)			No	None		
2	Seller_ID 	int(25)			No	None		
3	Item_price	decimal(8,2)			No	None		
4	Condition.	enum('Used', 'New')	utf8mb4_general_ci		No	None		

Figure 25: Screenshot of item table structure

Item_ID	Seller_ID	Item_price	Condition.
301	401	30.00	New
302	402	50.00	New
303	403	80.00	New
304	401	16.00	Used
305	402	41.00	Used
306	403	67.00	Used
307	404	25.00	Used
308	401	30.00	New
309	402	50.00	New
310	403	80.00	New
311	401	16.00	Used
312	402	41.00	Used
313	403	67.00	Used
314	404	25.00	Used
315	401	30.00	New
316	402	50.00	New
317	403	80.00	New
318	401	16.00	Used
319	402	41.00	Used
320	403	67.00	Used
321	404	25.00	Used

Figure 26: Screenshot of item table rows and columns





#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	Order_ID 	int(25)			No	None		
2	Customer_ID 	int(25)			No	None		
3	Product_ID 	int(25)			No	None		
4	Delivery_address	varchar(50)	utf8mb4_general_ci		No	None		
5	Payment_method	enum('visa', 'mastercard', 'maestro')	utf8mb4_general_ci		No	None		
6	Billing_address	varchar(50)	utf8mb4_general_ci		No	None		
7	Gift_card	varchar(10)	utf8mb4_general_ci		No	None		
8	Promocode	varchar(10)	utf8mb4_general_ci		Yes	NULL		
9	Delivery_date	datetime			No	None		
10	Quantity 	int(10)		UNSIGNED	No	None		
11	Postage_price	decimal(8,2)		UNSIGNED	No	None		
12	Total_price	decimal(8,2)		UNSIGNED	No	None		

Figure 27: Screenshot of order table structure

Order_ID	Customer_ID	Product_ID	Delivery_address	Payment_method	Billing_address	Gift_ca
101	1	201	123 Main St, City	visa	123 Billing St, City	No
102	2	202	456 Elm St, Town	mastercard	456 Billing St, Town	Yes
103	3	203	789 Oak St, Village	visa	789 Billing St, Vill	No
104	4	204	101 Pine St, Country	visa	101 Billing St, Coun	No
105	5	205	111 Cedar St, Suburb	mastercard	111 Billing St, Subu	Yes
106	6	206	222 Walnut St, Hills	maestro	222 Billing St, Hill	No
107	7	207	333 Maple St, Mounta	maestro	333 Billing St, Moun	No
108	8	208	444 Cherry St, Coast	visa	444 Billing St, Coas	Yes
109	9	209	555 Birch St, Beachs	maestro	555 Billing St, Beac	No
1010	10	210	666 Ash St, Riversid	mastercard	666 Billing St, Rive	Yes

Figure 28: Screenshot of order table rows and columns



#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	Product_ID 	int(25)			No	None		
2	Item_ID 	int(25)			No	None		
3	Product_name	varchar(50)	utf8mb4_general_ci		No	None		
4	Product_info	varchar(20)	utf8mb4_general_ci		No	None		
5	Product_review	varchar(50)	utf8mb4_general_ci		No	None		
6	Stock	int(10)			No	None		
7	Customer_questions	varchar(50)	utf8mb4_general_ci		No	None		

Figure 29: Screenshot of product table structure

Product_ID	Item_ID	Product_name	Product_info	Product_review	Stock	Customer_question
201	301	Example Pr	Info 1	review 1, review 2, revie	50	question 1, question
202	302	Example Pr	Info 2	review 4, review 5, revie	30	question 4, question
203	303	Example Pr	Info 3	review 7, review 8, revie	20	question 7, question
204	304	Example Pr	Info 4	review 10, review 11, rev	15	question 10, question
205	305	Example Pr	Info 5	review 13, review 14, rev	40	question 13, question
206	306	Example Pr	Info 6	review 16, review 17, rev	25	question 16, question
207	307	Example Pr	Info 7	review 19, review 20, rev	35	question 19, question
208	308	Example Pr	Info 8	review 22, review 23, rev	10	question 22, question
209	309	Example Pr	Info 9	review 25, review 26, rev	60	question 25, question
210	310	Example Pr	Info 10	review 28, review 29, rev	55	question 28, question

Figure 30: Screenshot of product table rows and columns


#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	Seller_ID 	int(25)			No	None		
2	Seller_name	varchar(15)	utf8mb4_general_ci		No	None		
3	Seller_address	varchar(50)	utf8mb4_general_ci		No	None		
4	Seller_contact_into	varchar(50)	utf8mb4_general_ci		No	None		

Figure 31: Screenshot of seller table structure

Seller_ID	Seller_name	Seller_address	Seller_contact_into
401	AC	123 Secondary St, Ci	Email: abjdc@example
402	XZ	456 Elmer St, Town	Email: xykgfhjz@exam
403	PR	789 Ocean St, Villag	Email: pqattr@exampl
404	LN	101 Peter St, Countr	Email: Impyuoyrn@exam

Figure 32: Screenshot of seller table rows and columns

5. SQL Queries

The select queries are designed to extract data customers and sellers would likely use from the proposed database. As such the queries imitate user stories from the perspective of the online store's customers and sellers.

5.1.1 User Story.

As a seller, I want to know the name and address of my customers.

5.1.2 SQL Code and Output

```
SELECT c.first_Name, c.surname, o.Delivery_address
FROM customer c
JOIN `order` o ON c.customer_ID = o.Customer_ID
JOIN seller s ON c.Seller_ID = s.Seller_ID
WHERE s.Seller_ID = 402;
```

Figure 33: Screenshot showing SQL query.

first_Name	surname	Delivery_address
Johne	James	123 Main St, City
Alice	Smith	456 Elm St, Town
Michael	Johnson	789 Oak St, Village
Emily	Brown	101 Pine St, Country
David	Wilson	111 Cedar St, Suburb
Sophia	Martinez	222 Walnut St, Hills
Oliver	Anderson	333 Maple St, Mounta
Emma	Thompson	444 Cherry St, Coast
Daniel	Lee	555 Birch St, Beachs
Grace	Garcia	666 Ash St, Riversid

Figure 34: screenshot of output generated by query

5.1.3 Explanation of the Query's Output

The output of this query produces a list of customers full names and addresses, allowing the seller to ship items to the correct location.

5.2.1 User Story

As a customer, I want to read a product's information and see its price.

5.2.2 SQL Code and Output

```
SELECT p.Product_name, p.Product_info, i.Item_price
FROM `product` p
JOIN `item` i ON p.Item_ID = i.Item_ID
WHERE p.Product_ID = 202;
```

Figure 33: Screenshot showing SQL query.

Product_name	Product_info	Item_price
Example Pr	Info 2	50.00

Figure 34: Screenshot of output generated by the query

5.2.3 Explanation of the Query's Output

The output of this query produces a list of a specified product's name and info from the product table, and the item price from the item table.

5.3.1 User story

As a customer, I want to be able to update my email and phone number.

5.3.2 SQL Code and Output

```
UPDATE `customer`
SET `email` = 'newemail@example.com', `phone_No` =
'1111111111'
WHERE `customer_ID` = 1;
```

Figure 33: Screenshot showing SQL query.

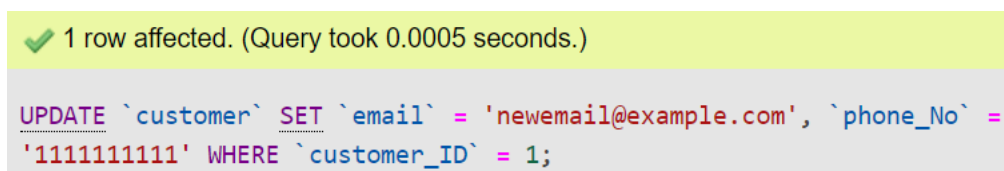


Figure 34: screenshot of output generated by query

5.3.3 Explanation of the Query's Output

The SQL query changes the contact details of the chosen customer by directly accessing their email and phone number in the customer table where the chosen customer's id is equal to the customer id.

5.4.1 User Story

As a seller, I would like to see the reviews of my products from my customers.

5.4.2 SQL Code and Output

```
SELECT p.Product_name, p.Product_review, c.first_Name,
       c.surname
FROM `product` p
JOIN `order` o ON p.Product_ID = o.Product_ID
JOIN `customer` c ON o.Customer_ID = c.customer_ID
JOIN `item` i ON p.Item_ID = i.Item_ID
JOIN `seller` s ON i.Seller_ID = s.Seller_ID
WHERE s.Seller_ID = 403
```

Figure 37: Screenshot showing SQL query.

Product_name	Product_review	first_Name	surname
Example Pr	review 7, review 8, revie	Michael	Johnson
Example Pr	review 16, review 17, rev	Sophia	Martinez
Example Pr	review 28, review 29, rev	Grace	Garcia

Figure 38: screenshot of output generated by query

5.4.3 Explanation of the Query's Output

The output of this query produces a list of product reviews given by customers who bought the same product, it also gives the full name of the customer to show what different people thought about the product. The product name and reviews are taken from the product table and the first name and surname are taken from the customer table.

5.5.1 User Story

As a customer, I would like to find the contact details of the person who sold me my product.

5.5.2 SQL Code and Output

```
SELECT s.Seller_name, s.Seller_address, s.Seller_contact_into
FROM `seller` s
JOIN `item` i ON s.Seller_ID = i.Seller_ID
JOIN `product` p ON i.Item_ID = p.Item_ID
JOIN `order` o ON p.Product_ID = o.Product_ID
JOIN `customer` c ON o.Customer_ID = c.Customer_ID
WHERE c.Customer_ID = 1
```

Figure 39: Screenshot showing SQL query.

Seller_name	Seller_address	Seller_contact_info
AC	123 Secondary St, Ci	Email: abjdc@example

Figure 40: screenshot of output generated by query

5.5.3 Explanation of the Query's Output

The output of this query produces a list of the sellers details for a customer who bought the seller's product to allow them to return a parcel or get in contact with the seller, it does this by presenting the seller's name, address, and email from the seller table.

6. Conclusion

From this module, I have learned how to identify and examine a website to outline the entities and attributes they may contain, these being both hidden and not hidden, and form them into a list. I have also learned how to model the list of entities and attributes I have gathered into an EERD using the three forms of normalisation, and schemas such as keys(primary and foreign), data types, and data ranges, and the importance of these schemas. I have also learned how to use software to build tables that represent the entities and populate these tables using SQL queries that insert data to the relevant columns. Finally, this module has taught me how to develop SQL queries to show specific data throughout the database I have designed and implemented.