Database design

User-userID,userFname,userSname,username,password,email,phone_number

Products-productID,product_name,description,brandID,categoryID,imageURL,specifications

Brands-brandID,brand_name

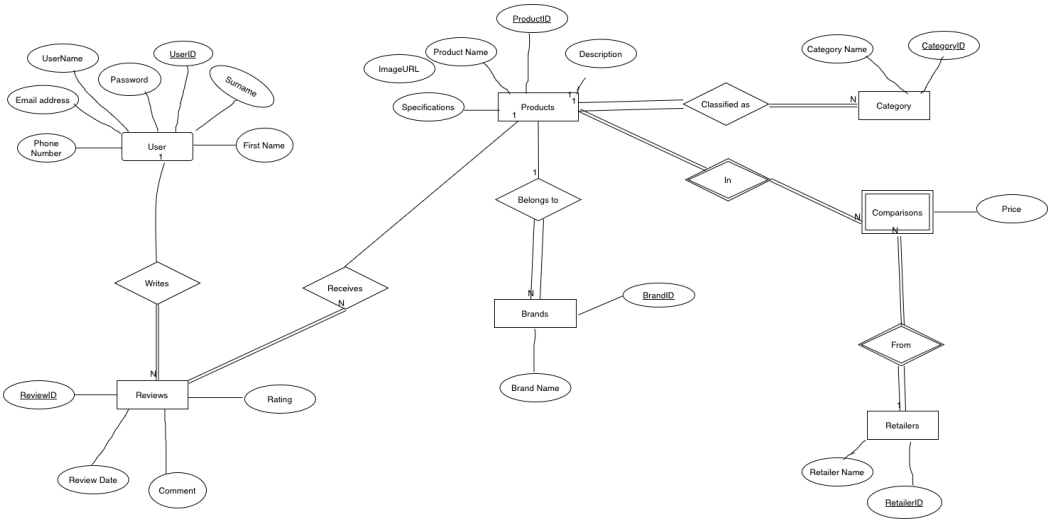
Category-categoryID,category_name

Retailers-retailorID,retailor_name

Comparisons-productsID,retailorID,price

Reviews-reviewID,productID,userID,rating,review_date,comment

Task 2



Task 3

Step 1

USER

UserID	UserFname	UserSname	Username	Password	Email	Phone_number

PRODUCTS

ProductID	Product_name	Description	BrandID	CategoryID	ImageURL	Specifications

RETAILER

RetailerID	Retailer_name

CATEGORY

CategoryID	Category_name

COMPARISON

RetailerID	ProductID	Price

BRANDS

BrandID	Brand_name

Step 2

USER

UserID	UserFname	UserSname	Username	Password	Email	Phone_number

PRODUCTS

ProductID	Product_name	Description	BrandID	CategoryID	ImageURL	Specifications

RETAILER

RetailerID	Retailer_name

CATEGORY

CategoryID	Category_name

COMPARISON

RetailerID	ProductID	Price

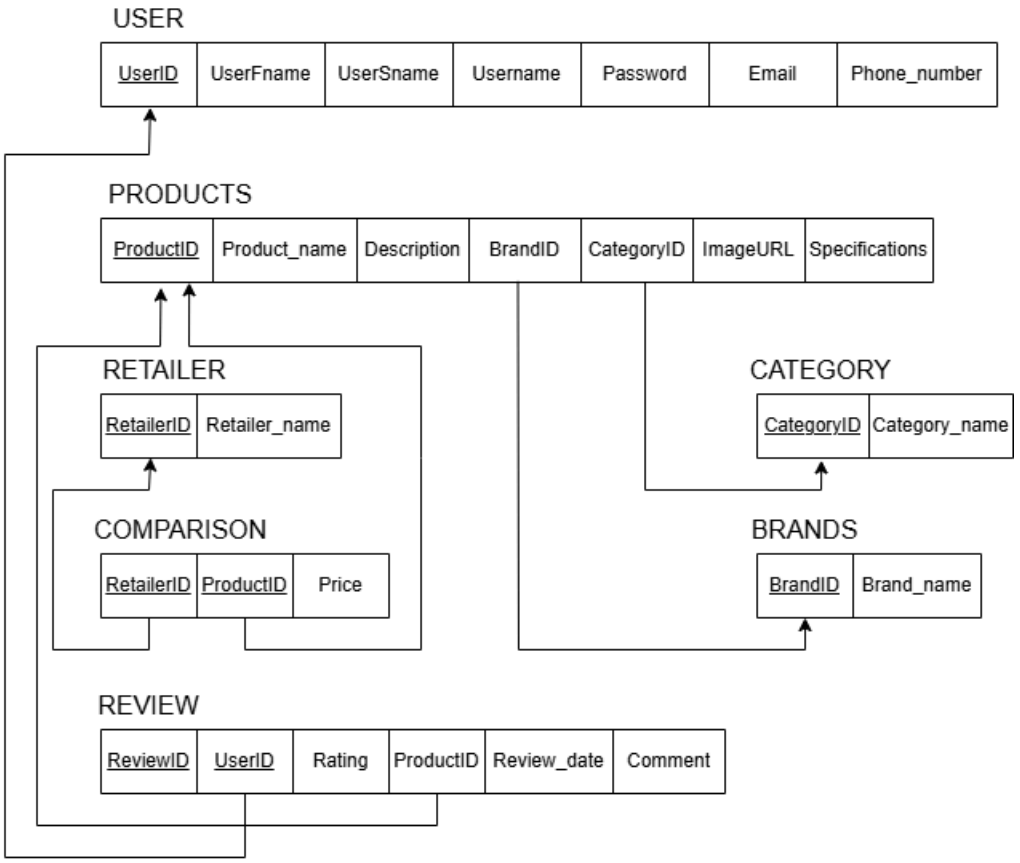
BRANDS

BrandID	Brand_name

REVIEW

ReviewID	UserID	Rating	ProductID	Review_date	Comment

Step 4(final relational model)



Task 4

DATABASE CREATION:

```
MariaDB [(none)]> show databases ;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| mysql              |
| performance_schema |
| sys                |
| [redacted]_northwind |
+--------------------+
5 rows in set (0.130 sec)

MariaDB [(none)]> create database CompareIT_BinaryBandits;
Query OK, 1 row affected (0.021 sec)

MariaDB [(none)]> show databases ;
+--------------------------+
| Database                 |
+--------------------------+
| compareit_binarybandits  |
| information_schema       |
| mysql                    |
| performance_schema       |
| sys                      |
| [redacted]_northwind     |
+--------------------------+
6 rows in set (0.007 sec)
```

```
MariaDB [compareit_binarybandits]> create table USER(userID INT AUTO_INCREMENT PRIMARY KEY, userFName VARCHAR(50), userSName VARCHAR(50), userName VARCHAR(45), password VARCHAR(75), email VARCHAR(50), phone_number VARCHAR(10));
Query OK, 0 rows affected (0.120 sec)

MariaDB [compareit_binarybandits]> create table CATEGORY(categoryID INT AUTO_INCREMENT PRIMARY KEY, category_name VARCHAR(30) NOT NULL UNIQUE);
Query OK, 0 rows affected (0.070 sec)

MariaDB [compareit_binarybandits]> create table RETAILER(retailerID INT AUTO_INCREMENT PRIMARY KEY, retailer_name VARCHAR(50) NOT NULL UNIQUE);
Query OK, 0 rows affected (0.043 sec)

MariaDB [compareit_binarybandits]> create table BRANDS (brandID INT AUTO_INCREMENT PRIMARY KEY, brand_name VARCHAR(50) NOT NULL UNIQUE);
Query OK, 0 rows affected (0.052 sec)
```

```
MariaDB [compareit_binarybandits]> create table PRODUCTS (productID INT AUTO_INCREMENT PRIMARY KEY, product_name VARCHAR (50) NOT NULL, description TEXT NOT NULL, brandID INT NOT NULL, categoryID INT NOT NULL, imageURL VARCHAR(100), sp
ecifications TEXT NOT NULL, CONSTRAINT FK_products_brand FOREIGN KEY(brandID) REFERENCES BRANDS(brandID), CONSTRAINT FK_products_category FOREIGN KEY(categoryID) REFERENCES CATEGORY(categoryID));
Query OK, 0 rows affected (0.153 sec)

MariaDB [compareit_binarybandits]> create table COMPARISONS(retailerID INT NOT NULL, productID INT NOT NULL, price DECIMAL (10,2) NOT NULL, PRIMARY KEY (retailerID, productID), CONSTRAINT FK_comparison_retailer FOREIGN KEY (retailerID)
 REFERENCES RETAILER(retailerID), CONSTRAINT FK_comparison_product FOREIGN KEY (productID) FOREIGN KEY (productID) REFERENCES PRODUCTS(productID));
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MariaDB server version for the right syntax to use near 'FOREIGN KEY (productID) REFERENCES
MariaDB [compareit_binarybandits]> create table COMPARISONS(retailerID INT NOT NULL, productID INT NOT NULL, price DECIMAL (10,2) NOT NULL, PRIMARY KEY (retailerID, productID), CONSTRAINT FK_comparison_retailer FOREIGN KEY (retailerID)
 REFERENCES RETAILER(retailerID), CONSTRAINT FK_comparison_product FOREIGN KEY (productID) REFERENCES PRODUCTS(productID));
Query OK, 0 rows affected (0.150 sec)

MariaDB [compareit_binarybandits]> create table REVIEW (reviewID INT AUTO_INCREMENT PRIMARY KEY, userID INT NOT NULL, productID INT NOT NULL, rating INT DEFAULT NULL CHECK(rating BETWEEN 1 AND 5), review_date DATE DEFAULT NULL, comment
 TEXT DEFAULT NULL, CONSTRAINT FK_review_user FOREIGN KEY (userID) REFERENCES USER(userID), CONSTRAINT FK_review_product FOREIGN KEY (productID) REFERENCES PRODUCTS(productID));
Query OK, 0 rows affected (0.146 sec)
```

TABLE CREATION:

```
MariaDB [compareit_binarybandits]> show tables ;
+---------------------------------------+
| Tables_in_compareit_binarybandits     |
+---------------------------------------+
| brands                                |
| category                              |
| comparisons                           |
| products                              |
| retailer                              |
| review                                |
| user                                  |
+---------------------------------------+
7 rows in set (0.012 sec)
```

INSERTING DATA INTO THE TABLES

USER

```
MariaDB [compareit_binarybandits]> select * from user ;
+--------+-----------+-----------+----------+---------------+---------------------------+--------------+
| userID | userFName | userSName | userName | password      | email                     | phone_number |
+--------+-----------+-----------+----------+---------------+---------------------------+--------------+
|      1 | Alice     | Smith     | asmith   | P@ssw0rd123   | alice.smith@example.com   | 0723456789   |
|      2 | Bob       | Johnson   | bobbyJ   | SecurePass!45 | bob.johnson@example.com   | 0834567890   |
|      3 | Carol     | Williams  | carolw   | CwSecure#789  | carol.williams@example.com | 0745678901   |
|      4 | David     | Brown     | dave_b   | D@vidPass321  | david.brown@example.com   | 0656789012   |
|      5 | Emma      | Jones     | emma.j   | EmmaPW!2024   | emma.jones@example.com    | 0767890123   |
|      6 | Frank     | Miller    | frankm   | Fpass_54321   | frank.miller@example.com  | 0678901234   |
|      7 | Grace     | Davis     | graced   | Gr@ce456      | grace.davis@example.com   | 0789012345   |
|      8 | Hannah    | Wilson    | hannahw  | HannahPW_123  | hannah.wilson@example.com | 0790123456   |
|      9 | Ian       | Moore     | ianmo    | Ian1234!      | ian.moore@example.com     | 0601234567   |
|     10 | Julia     | Taylor    | juliaT   | JTay!2025     | julia.taylor@example.com  | 0612345678   |
+--------+-----------+-----------+----------+---------------+---------------------------+--------------+
10 rows in set (0.014 sec)
```

CATEGORY

```
MariaDB [compareit_binarybandits]> select * from category ;
+------------+-----------------------+
| categoryID | category_name         |
+------------+-----------------------+
|         10 | Baby Products         |
|          5 | Bakery                |
|          6 | Beverages             |
|          4 | Dairy                 |
|          2 | Fresh Produce         |
|          1 | Groceries             |
|          9 | Health & Beauty       |
|          8 | Household Essentials  |
|          3 | Meat & Poultry        |
|          7 | Snacks                |
+------------+-----------------------+
10 rows in set (0.005 sec)

MariaDB [compareit_binarybandits]> SELECT * FROM CATEGORY
    -> ORDER BY categoryID ASC;
+------------+-----------------------+
| categoryID | category_name         |
+------------+-----------------------+
|          1 | Groceries             |
|          2 | Fresh Produce         |
|          3 | Meat & Poultry        |
|          4 | Dairy                 |
|          5 | Bakery                |
|          6 | Beverages             |
|          7 | Snacks                |
|          8 | Household Essentials  |
|          9 | Health & Beauty       |
|         10 | Baby Products         |
+------------+-----------------------+
10 rows in set (0.005 sec)
```

BRANDS

```
MariaDB [compareit_binarybandits]> select * from brands ORDER BY brandID ASC ;
+---------+-----------------+
| brandID | brand_name      |
+---------+-----------------+
|       1 | Clover          |
|       2 | Albany          |
|       3 | Coca-Cola       |
|       4 | Simba           |
|       5 | Sunlight        |
|       6 | Koo             |
|       7 | Rainbow Chicken |
|       8 | Freshmark       |
+---------+-----------------+
8 rows in set (0.005 sec)
```

RETAILER

```
MariaDB [compareit_binarybandits]> select * from retailer ORDER BY retailerID ASC ;
+------------+----------------------+
| retailerID | retailer_name        |
+------------+----------------------+
|          1 | Pick n Pay           |
|          2 | Shoprite             |
|          3 | Woolworths           |
|          4 | Checkers             |
|          5 | Spar                 |
|          6 | Makro                |
|          7 | Game                 |
|          8 | Clicks               |
|          9 | Dis-Chem             |
|         10 | Food Lover's Market  |
+------------+----------------------+
10 rows in set (0.046 sec)
```

PRODUCTS

```
MariaDB [compareit_binarybandits]> select * from products order by productID asc ;
+-----------+-------------------------+-----------------------------------+---------+------------+-----------------------------------+-----------------------------------------+
| productID | product_name            | description                       | brandID | categoryID | imageURL                          | specifications                          |
+-----------+-------------------------+-----------------------------------+---------+------------+-----------------------------------+-----------------------------------------+
|        31 | Clover Milk 1L          | Fresh and nutritious full cream milk |       1 |          4 | https://example.com/clover-milk.jpg | 1L full cream milk, best before: 30/06/2025 |
|        32 | Albany White Bread      | Soft and fluffy white bread       |       2 |          5 | https://example.com/albany-bread.jpg | 500g loaf, fresh daily                  |
|        33 | Coca-Cola 500ml         | Refreshing soft drink             |       3 |          6 | https://example.com/coca-cola.jpg | 500ml bottle, carbonated                |
|        34 | Simba Potato Chips      | Delicious crispy potato chips     |       4 |          7 | https://example.com/simba-chips.jpg | 100g pack, various flavors              |
|        35 | Sunlight Dishwashing Liquid | Powerful dishwashing liquid   |       5 |          8 | https://example.com/sunlight-dish.jpg | 750ml, removes grease easily            |
|        36 | Nivea Soft Cream        | Moisturizing cream for soft skin  |       6 |          9 | https://example.com/nivea-soft.jpg | 200ml, for all skin types               |
|        37 | Huggies Ultra Dry Diapers | Soft and absorbent baby diapers |       7 |         10 | https://example.com/huggies.jpg   | Size 4, pack of 24                      |
|        38 | Koo Baked Beans         | Delicious baked beans in tomato sauce |       8 |          1 | https://example.com/koo-beans.jpg | 410g can, ready to eat                  |
+-----------+-------------------------+-----------------------------------+---------+------------+-----------------------------------+-----------------------------------------+
8 rows in set (0.071 sec)
```

REVIEW

```
MariaDB [compareit_binarybandits]> select * from review ;
+----------+--------+-----------+--------+-------------+-----------------------------------------------+
| reviewID | userID | productID | rating | review_date | comment                                       |
+----------+--------+-----------+--------+-------------+-----------------------------------------------+
|        1 |      1 |        31 |      5 | 2025-04-01  | Excellent quality milk. Very fresh.           |
|        2 |      2 |        32 |      4 | 2025-04-02  | Tastes good but packaging could be better.    |
|        3 |      3 |        33 |      5 | 2025-04-03  | Refreshing drink and always cold at the store. |
|        4 |      4 |        34 |      3 | 2025-04-04  | Chips were tasty but a bit salty for my liking. |
|        5 |      5 |        35 |      4 | 2025-04-05  | Great on greasy pans!                         |
|        6 |      6 |        36 |      5 | 2025-04-06  | Left my skin super soft, smells nice too.     |
|        7 |      7 |        37 |      2 | 2025-04-07  | Some leaks in the packaging - disappointed.   |
|        8 |      8 |        38 |      4 | 2025-04-08  | Goes well with toast, a bit sweet.            |
|        9 |      2 |        31 |      3 | 2025-04-09  | Milk was okay but a little warm.              |
|       10 |      1 |        33 |      5 | 2025-04-10  | My favorite soda hands down!                  |
+----------+--------+-----------+--------+-------------+-----------------------------------------------+
10 rows in set (0.012 sec)
```

COMPARISONS

```
MariaDB [compareit_binarybandits]> select * from comparisons ;
+------------+-----------+-------+
| retailerID | productID | price |
+------------+-----------+-------+
|          1 |        31 | 24.99 |
|          1 |        32 | 18.75 |
|          1 |        33 | 12.50 |
|          1 |        34 | 15.00 |
|          2 |        31 | 22.50 |
|          2 |        32 | 19.99 |
|          2 |        33 | 11.99 |
|          3 |        31 | 26.00 |
|          3 |        32 | 20.00 |
|          3 |        33 | 13.45 |
+------------+-----------+-------+
10 rows in set (0.003 sec)

MariaDB [compareit_binarybandits]>
```

DATA TYPES

DATA TYPE	ATTRIBUTE
INT (AUTO_INCREMENT) *Used mainly for primary keys*	userID, brandID, retailerID, productID, reviewID, categoryID
INT (NOT AUTO_INCREMENT) *Used mainly for foreign keys as they have to have a matching data type to their relationID data type)*	• (brandID, categoryID) -> PRODUCTS relation • (retailerID, productID) -> COMPARISONS relation • (userID, productID) -> REVIEW relation
VARCHAR	category_name (30), retailer_name (50), brand_name (50), product_name (50), imageURL (10), userFName (50), userSName (50), userName (45), password (75), email (50), phone_number (10)
TEXT *Used mainly for attributes that can hold large amount of text - but it is less than LONGTEXT*	description

CONSTRAINTS

1. Length - some attributes have length restrictions because of average/universal statistics (e.g the average length of a first name ranges from 5 to 7 characters; cell phone numbers include 10 digits in South Africa, etc.). Others have their specific length restrictions for memory management (e.g imageURL, descriptions, etc)
2. Keys - are of type INT (AUTO_INCREMENT or NOT). This makes it easier for comparison, can be generated fast, and indexing. AUTO_INCREMENT allows for uniqueness and sequential generation, and simplifies key management
    a. FOREIGN KEYS are important constraints - there are some relations that do not allow the insertion, or even complicate the deletion of some tuples in a relation

    i. Products cannot be inserted into the PRODUCTS table and be given a non-existent brandID (therefore, the brand has to exist for the product to be added to the table, and if the brand does not exist - it will have to be added to the BRANDS table, *then* inserted into the PRODUCTS tables; else the insertion will not occur). The same goes for categoryID in the PRODUCTS table

b. COMPOSITE KEYS (specifically those in the COMPARISONS table/entity) exist, and they emphasise the uniqueness of a tuple (row). A tuple cannot exist in the table unless both the retailer exists (retailerID is true) and the product also exists (also means that the category and the brand associated with the product exist)

Take 2

Userbase- userID,password,email,phone_number

Users-userID,userFname,userSname,username

RetailUser-userID,retailerID,retailerCodeS

AdminUser-userID,adminID,adminName

Request-requestID,requestCode,RetailerID,ProductID,productName,desriptions,BrandID,categoryID,ImageURL,specifications,resolved

Products-productID,productName,description,brandID,categoryID,imageURL,specifications

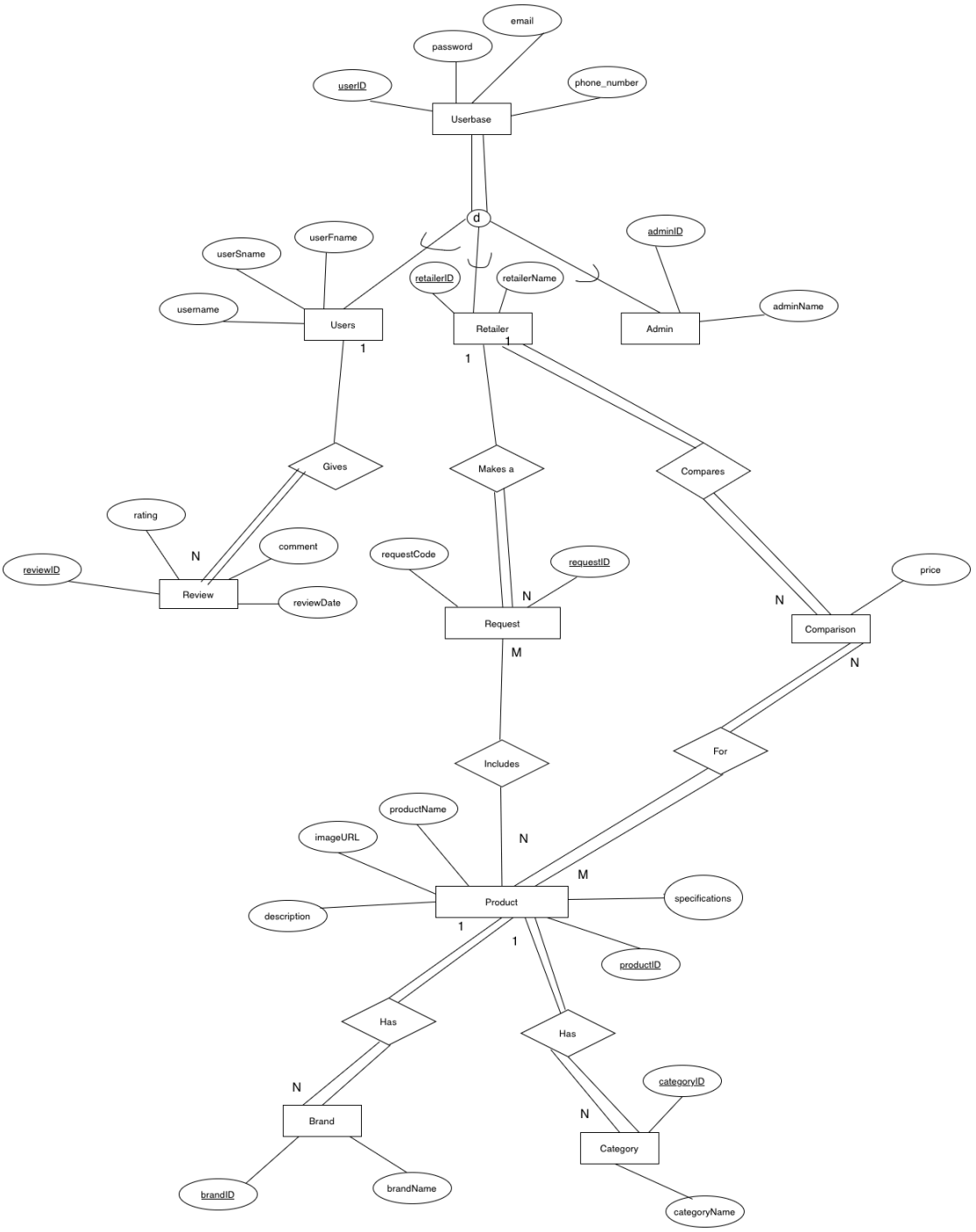
Brands-brandID,brand_name

Retailer-userID,retailerID,retailerName

Category-categoryID,categoryName

Comparisons-productsID,retailorID,price

Reviews-reviewID,productID,userID,rating,reviewDate,comment



Relational model

Step 1

USERBASE

UserID	Password	Emain	Phone_number

PRODUCTS

ProductID	Product_name	Description	BrandID	CategoryID	ImageURL	Specifications

RETAILER

RetailerID	Retailer_name

CATEGORY

CategoryID	Category_name

COMPARISON

RetailerID	ProductID	Price

BRANDS

BrandID	Brand_name

REQUEST

RequestID	RequestCode	RetailerID	Product_name	ProductID	Descriptions	BrandID	CategoryID	imageURL	Specifications	Resolved	AdminID

Step 2

USERBASE

UserID	Password	Emain	Phone_number

PRODUCTS

ProductID	Product_name	Description	BrandID	CategoryID	ImageURL	Specifications

RETAILER

RetailerID	Retailer_name

CATEGORY

CategoryID	Category_name

COMPARISON

RetailerID	ProductID	Price

BRANDS

BrandID	Brand_name

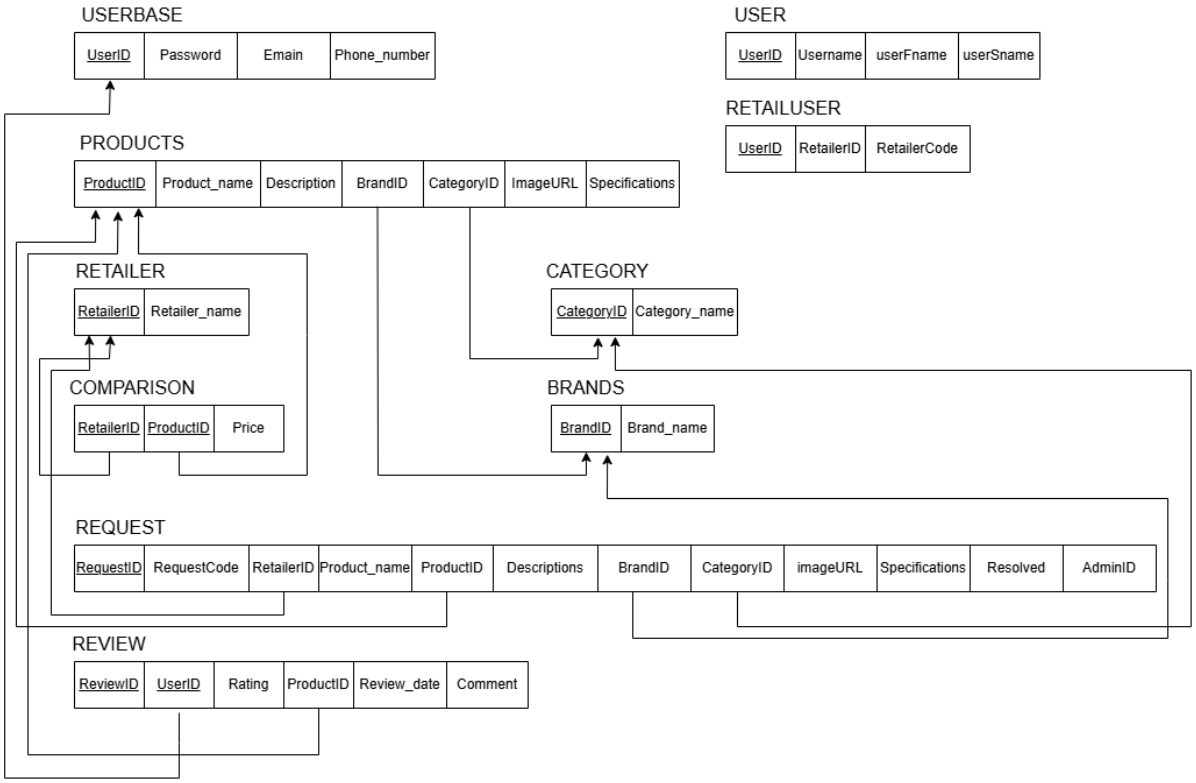
REQUEST

RequestID	RequestCode	RetailerID	Product_name	ProductID	Descriptions	BrandID	CategoryID	imageURL	Specifications	Resolved	AdminID

REVIEW

ReviewID	UserID	Rating	ProductID	Review_date	Comment

Step 4



Step 8

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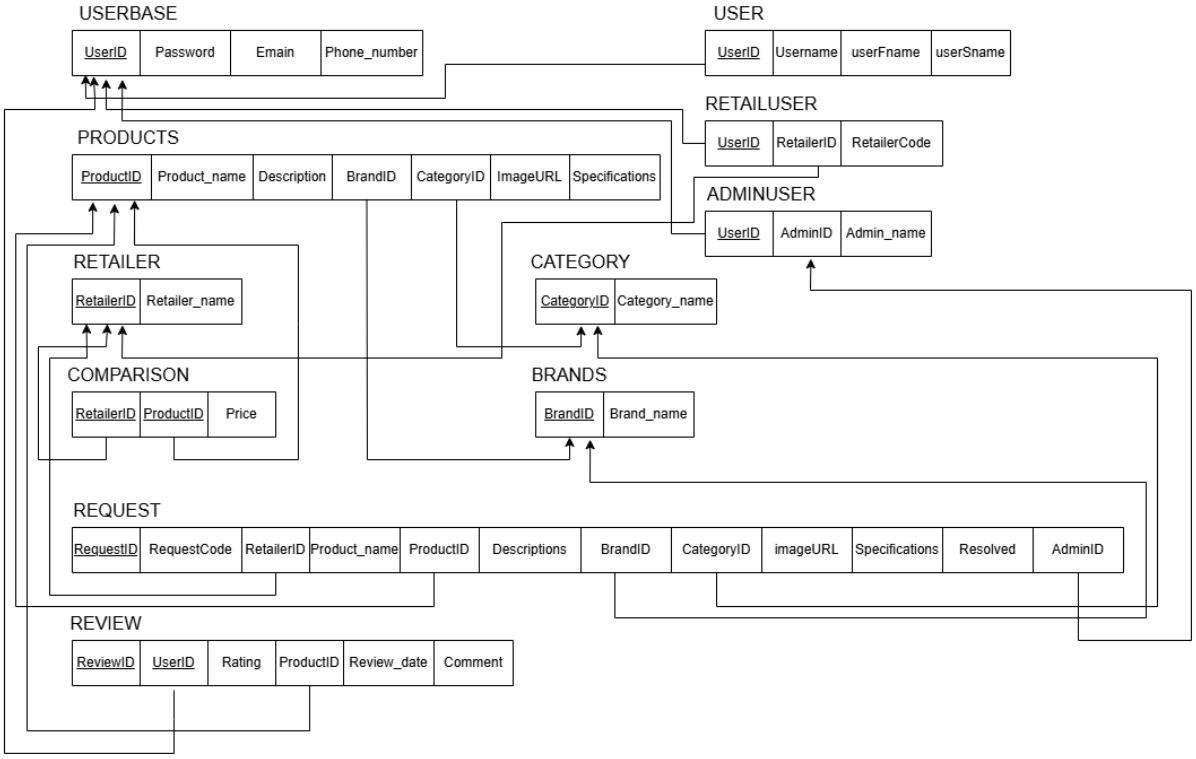

Assumptions and reasons

- We assume that a customer will want to make more than one comment on one product, making its dependent Userbase opposed to Product.

- We assume that all customers either have an email address or a phone number
- We chose to move pricing into its own table to keep the foreign keys and dependants more manageable if we want to remove or delete
- We chose to make category a single values attribute opposed to a multivalued attribute as making it multivalued would require either including all combinations of categories to be listed in category table or product table
- We chose to make ratings a numerical system based of the 5 star rating system as its most familiar to users
- We chose to use a system that separates users from retailers from admin
- We chose to create a request table to manage all the deletes/updates that a retailer might want to make

Many to many mapping and foreign key table