An Application for Online Phone Sales

CS5200 Final Project Report

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1. README

Software
- MySQL Server >= 8.0.32
- MySQL Workbench >= 8.0.29
- Python >= 3.9
- (Optional) VScode == latest version

Dependency Packages
(make sure your version of python3 running this app has following library installed)
- Pymysql == latest version (python3 -m pip install pymysql)
- Numpy == latest version (python3 -m pip install numpy)
- Matplotlib == latest version (python3 -m pip install matplotlib)

Database Setup
1. Download and unzip the zip file "**YanYZhuZ_project.zip**"
2. Open MySQL Workbench > connect to **localhost**
3. Import dump file by using the tool bar: Server > Data Import > Select "Import from Self-Contained File" > Start Import (Make sure the name of the imported schema is "**online_phone_sales_db**")

Using Application
4. Use VScode or system terminal, direct to the folder "**YanYZhuZ_project/phone_store_app**"
5. Use the following cmd line to start this application: "**python3 main.py**" (make sure your version of python3 running this app has Pymysql, Numpy, Matplotlib installed)
6. You will be prompted to input your username and password to log into **MySQL server**
7. Once successfully logged in and connected to the database server, you will find the "**HOME PAGE**" with the following options:
   a. Create New Account (register new account for this app)
   b. Login (log into the app with username and password)
   c. Exit (terminate application)

2. Project Description

The aim of this project is to design a database for an online smartphone shop that enables users to browse and purchase smartphone models. The database will support various functions, including user registration, payment management, browsing or searching for a model by different features, adding a model to the cart, managing the cart, placing an order, making a payment, visiting order history, and so on.

We have seven primary entities which are users, phone models, orders, payment, features, company, and discount. Specifically, a user can own more than one payment method, and each payment method can belong to different users. A user can place more than one order, while an order can only be assigned to one user, and only one payment method can be chosen to pay for a specific order. One order can contain different phone models with a corresponding quantity. Each phone model can be added to a different order if the inventory is sufficient. A phone model also has features. One model can have no or many features. We use the company to represent the brand, and one company can produce more than one model, and each phone model can only belong to one company. Each phone model may be assigned one or more discount features. There can be several phones under the same discount code.

In terms of function, our application enables users to register and login. There are mainly three sections in our smartphone shop application. The first section is account management. Once logged in, in this section, a user can edit their account information and manage their payment methods, where a user can add new payment and view all added payments.

The second section is "View all models". In this section, a user is able to view all the available phone models in our shop. A user is also able to filter the model by different features such as brand, color, price range. Also, users are able to view detailed information on a specific model, which includes company information, discount information, full model specifications, special features with descriptions, and so on. Our application also provides functions that can show statistical results on our database in a graphic view. Specifically, a user can view the overall price distribution of all the phone models sold in our shop. A user can also view the release year of all the models as our shop's collection is up-to-date. A user can add an item to the cart by inputting the item id and quantity.

The last section is the cart section. In this section, a user can edit an item in the cart with a different quantity, or a user may delete an item from the cart. A user can submit their order here and choose a payment method to complete the order.
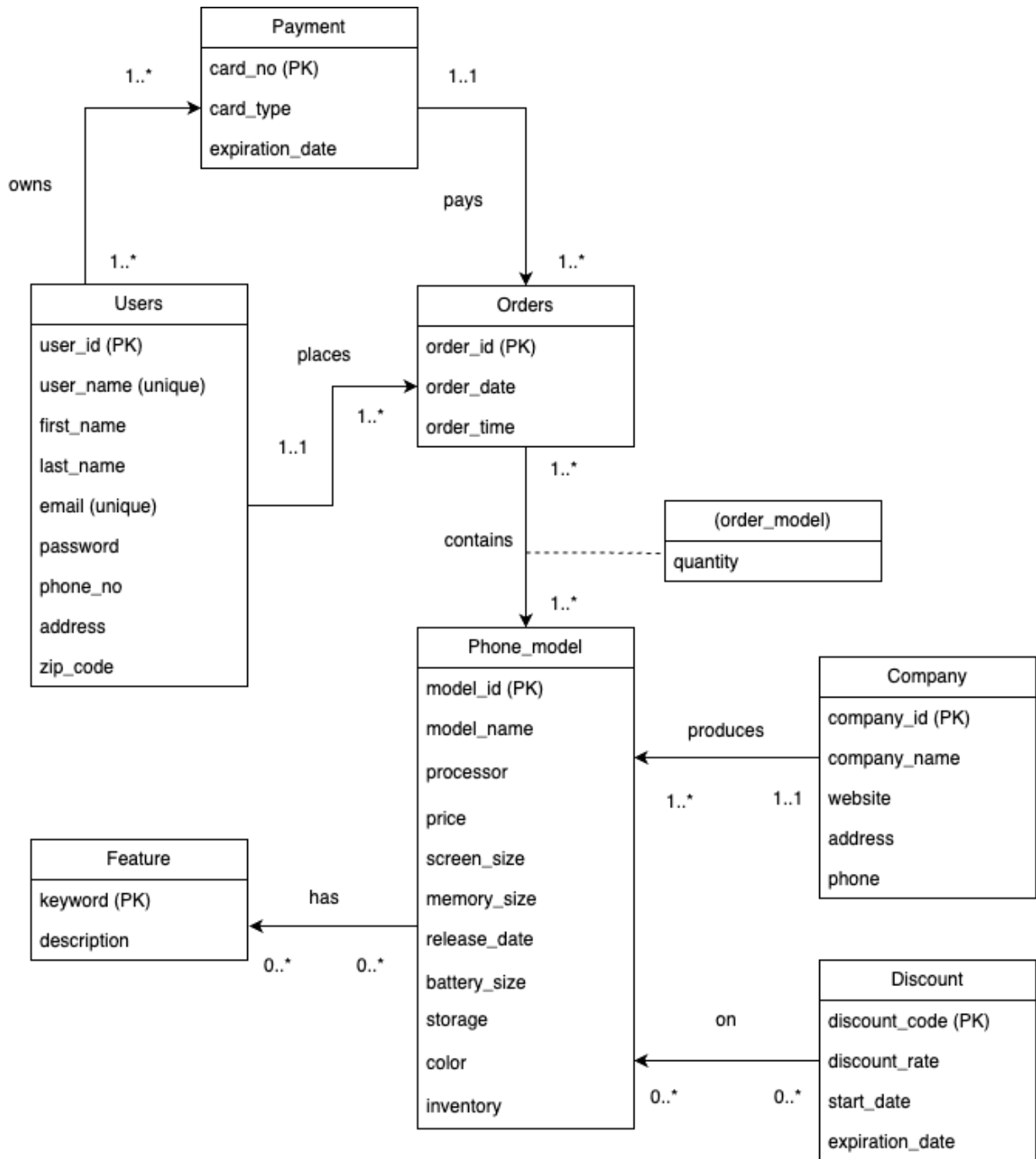
3. Domain Interest

In today's digital age, the data domain of an online smartphone store is highly relevant and critical. Smartphones have become an essential part of our lives, and the smartphone market is continuously growing and evolving.

Creating a database for an online smartphone store can streamline the process of browsing and purchasing smartphones for customers, while also providing valuable insights to store owners on customer behavior, sales trends, and product performance. These aspects are crucial for maintaining an efficient and effective e-commerce platform.
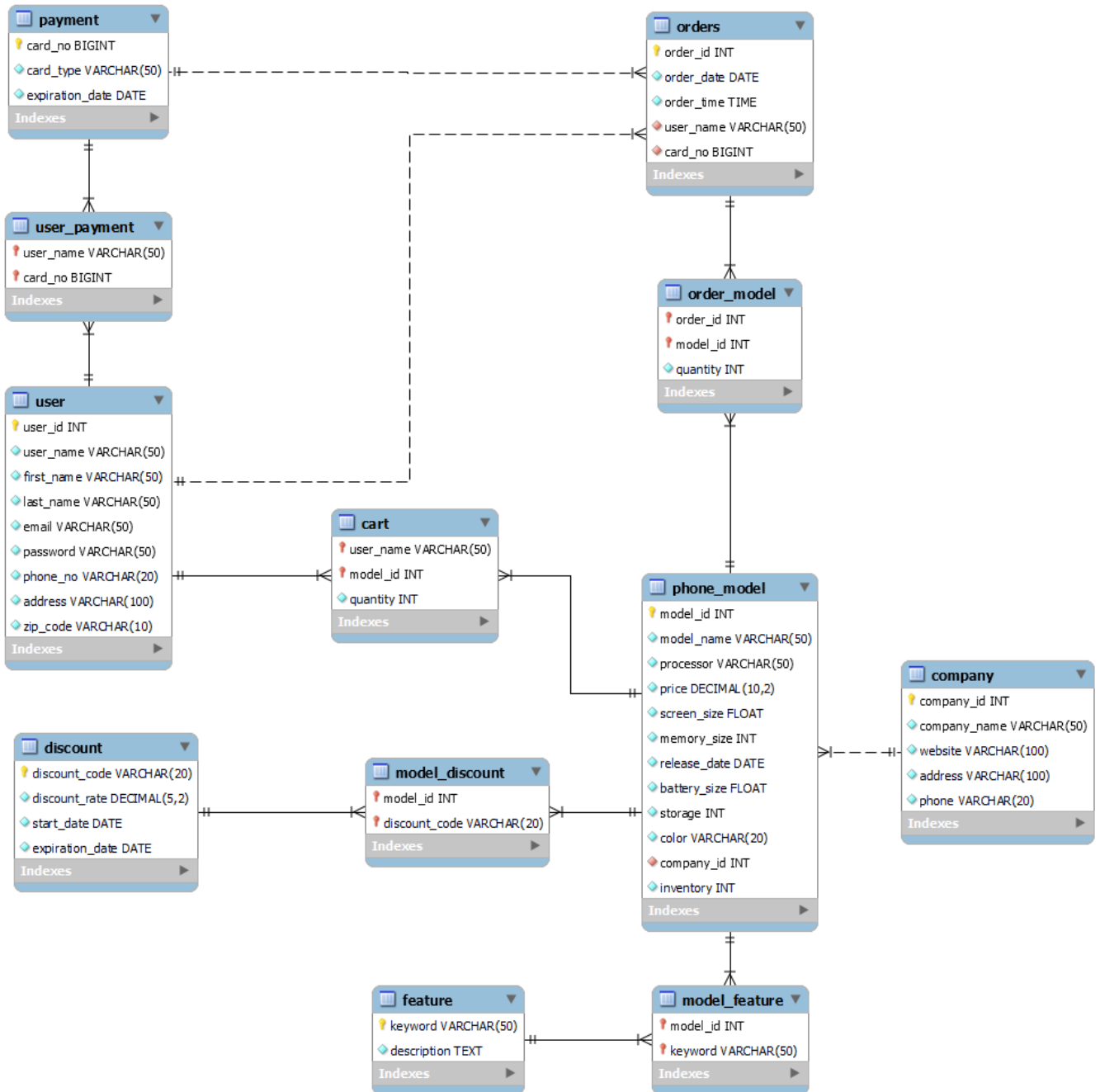
Our project focuses on exploring the vast amount of data available on different smartphone models. We plan to research and collect information about the specifications, features, and performance of various smartphones to create a reliable and comprehensive database. We believe that this database will be beneficial for smartphone users who want to make informed decisions about which smartphones to purchase.

Overall, this project can have a significant impact on the user experience of customers and the success of the online smartphone store. It is a valuable area of focus for data management and analysis, which can lead to better business decisions and customer satisfaction.

4. Conceptual Design

Payment
- card_no (PK)
- card_type
- expiration_date

Users
- user_id (PK)
- user_name (unique)
- first_name
- last_name
- email (unique)
- password
- phone_no
- address
- zip_code

Orders
- order_id (PK)
- order_date
- order_time

(order_model)
- quantity

Phone_model
- model_id (PK)
- model_name
- processor
- price
- screen_size
- memory_size
- release_date
- battery_size
- storage
- color
- inventory

Company
- company_id (PK)
- company_name
- website
- address
- phone

Feature
- keyword (PK)
- description

Discount
- discount_code (PK)
- discount_rate
- start_date
- expiration_date

owns   1..*   1..*
pays   1..1   1..*
places   1..1   1..*
contains   1..*   1..*
produces   1..*   1..1
has   0..*   0..*
on   0..*   0..*

5. Logical Design

payment
- 🔑 card_no BIGINT
- ◇ card_type VARCHAR(50)
- ◇ expiration_date DATE
- Indexes ▶

orders
- 🔑 order_id INT
- ◇ order_date DATE
- ◇ order_time TIME
- 🔴 user_name VARCHAR(50)
- 🔴 card_no BIGINT
- Indexes ▶

user_payment
- 🔑 user_name VARCHAR(50)
- 🔑 card_no BIGINT
- Indexes ▶

order_model
- 🔑 order_id INT
- 🔑 model_id INT
- ◇ quantity INT
- Indexes ▶

user
- 🔑 user_id INT
- ◇ user_name VARCHAR(50)
- ◇ first_name VARCHAR(50)
- ◇ last_name VARCHAR(50)
- ◇ email VARCHAR(50)
- ◇ password VARCHAR(50)
- ◇ phone_no VARCHAR(20)
- ◇ address VARCHAR(100)
- ◇ zip_code VARCHAR(10)
- Indexes ▶

cart
- 🔑 user_name VARCHAR(50)
- 🔑 model_id INT
- ◇ quantity INT
- Indexes ▶

phone_model
- 🔑 model_id INT
- ◇ model_name VARCHAR(50)
- ◇ processor VARCHAR(50)
- ◇ price DECIMAL(10,2)
- ◇ screen_size FLOAT
- ◇ memory_size INT
- ◇ release_date DATE
- ◇ battery_size FLOAT
- ◇ storage INT
- ◇ color VARCHAR(20)
- 🔴 company_id INT
- ◇ inventory INT
- Indexes ▶

company
- 🔑 company_id INT
- ◇ company_name VARCHAR(50)
- ◇ website VARCHAR(100)
- ◇ address VARCHAR(100)
- ◇ phone VARCHAR(20)
- Indexes ▶

discount
- 🔑 discount_code VARCHAR(20)
- ◇ discount_rate DECIMAL(5,2)
- ◇ start_date DATE
- ◇ expiration_date DATE
- Indexes ▶

model_discount
- 🔑 model_id INT
- 🔑 discount_code VARCHAR(20)
- Indexes ▶

feature
- 🔑 keyword VARCHAR(50)
- ◇ description TEXT
- Indexes ▶

model_feature
- 🔑 model_id INT
- 🔑 keyword VARCHAR(50)
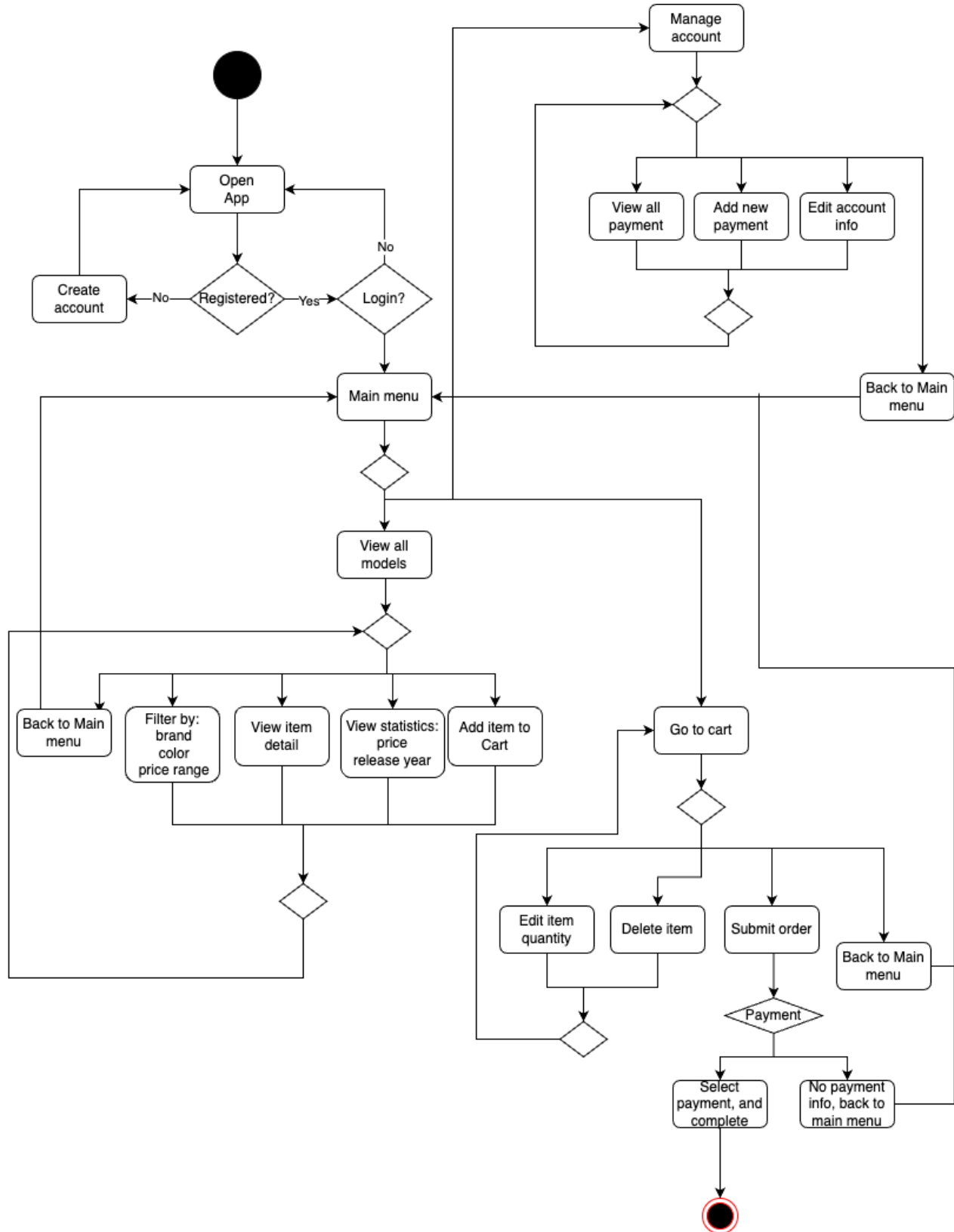- Indexes ▶

6. User Flow

7. User Manual (Detailed User Commands)

1. HOME PAGE

```
===== HOME PAGE =====
1. Create New Account
2. Login
0. Exit
Enter your choice:
```

1.1 Create New Account
Input user info to create a new account.

```
===== CREATE ACCOUNT =====
First name: test
Last name: test
Email: test@g.com
Username: test
Password: 1234
Phone number: 7778889999
Address: test addr
Zip code: 00000
Account created successfully!
```

1.2 Login and MAIN MENU
Input username and password to login. Once logged in, you will be directed to MAIN MENU automatically.

```
===== LOGIN =====
Enter username: test
Enter password: 1234

Login successfully!!
Hello test, welcome to shop!!

===== MAIN MENU =====
1. Manage account
2. View all models
3. Go to cart
0. Exit
Enter your choice:
```

2. Manage account

```
===== Manage Account =====
1. Edit account info
2. View all payment
3. Add new payment
0. Back to main menu
Enter your choice:
```

2.1 Edit account info

```
===== Edit account info =====
First name: newfi
```

```
Last name: newla
Email: new@g.com
Password: 1111
Phone number: 6667778888
Address: addr2
Zip code: 000011
DONE: Account info updated!

(Input any key, back to Manage Account.)
```

2.2 View all payment

If you didn't add any payment method:

```
===== Your added payment methods =====
You have not added any payment methods yet.
```

If you have added payment methods:

```
===== Your added payment methods =====
Card No: 34567890123, Card Type: Debit Card, Expiration Date: 2026-09-01
Card No: 45678901234, Card Type: Debit Card, Expiration Date: 2023-11-01
```

2.3 Add new payment

```
===== Add new payment =====
Card number: 12345

Support card type:
  1. Credit Card
  2. Debit Card
  3. Gift Card
Choose card type: 1
Expiration date (YYYY-MM-DD): 2033-3-3
New payment added.
```

Possible error: Invalid card type

```
===== Add new payment =====
Card number: 1234

Support card type:
  1. Credit Card
  2. Debit Card
  3. Gift Card
Choose card type: 4

Invalid card type: 4. Support card type:
  1. Credit Card
  2. Debit Card
  3. Gift Card
Choose card type:
```

3. View all models

This option will first print out all available models, and prompt the option for filtering, viewing detail, and adding items to cart.
(NB: This is a demo data set, the ultimate version contains more data entries.)

```
===== Available models =====
```

```
ID: 1, Model: iPhone 13 Pro, Color: Sierra Blue, Price: 999.00, Release: 2021-09-24
ID: 2, Model: Galaxy S21, Color: Phantom Gray, Price: 799.99, Release: 2021-01-29
ID: 3, Model: Pixel 6, Color: Stormy Black, Price: 699.00, Release: 2021-10-28
ID: 4, Model: V60 ThinQ, Color: Classy Blue, Price: 899.99, Release: 2020-03-20
ID: 5, Model: Xperia 5 III, Color: Black, Price: 949.99, Release: 2021-08-30


===== View options =====
1. Filter by brand
2. Filter by color
3. Filter by price
4. View item detail
5. Add item to cart
6. View price statics
7. View release year statics
0. Back to Main menu
Enter option number:
```

3.1 Filter by brand
```
Enter brand keyword: apple
===== Search result for brand 'apple' =====
ID: 1, Model: iPhone 13 Pro, Color: Sierra Blue, Price: 999.00, Release: 2021-09-24
```
No result found:
```
Enter brand keyword: dog
===== Search result for brand 'dog' =====
No result for brand 'dog'.
```

3.2 Filter by color
```
Enter color: blue
===== Search result for color 'blue' =====
ID: 1, Model: iPhone 13 Pro, Color: Sierra Blue, Price: 999.00, Release: 2021-09-24
ID: 4, Model: V60 ThinQ, Color: Classy Blue, Price: 899.99, Release: 2020-03-20
```
No result found:
```
Enter color: pink
===== Search result for color 'pink' =====
No result for color 'pink'.
```

3.3 Filter by price
```
Enter lowest price: 700
Enter highest price: 900
===== Search result for price range: 700 - 900 =====
ID: 2, Model: Galaxy S21, Color: Phantom Gray, Price: 799.99, Release: 2021-01-29
ID: 4, Model: V60 ThinQ, Color: Classy Blue, Price: 899.99, Release: 2020-03-20
```
No result found:
```
Enter lowest price: 2000
Enter highest price: 9999


===== Search result for price range: 2000 - 9999 =====
No result for price range 2000 - 9999.
```

3.4 View item detail
Display detailed information of a specific item, including company info, discount info, feature etc.

```
Enter item ID: 1
===== Detail Info of Item: 1 =====

Company Info:
 Name: Apple
 Website: www.apple.com
 Address: 1 Apple Park Way, Cupertino, CA
 Phone: 1-800-MY-APPLE

Discount Info:
 Discount Code: DISCOUNT10
 Discount Rate: 0.10
 Start Date: 2023-01-01
 Expiration Date: 2023-12-31

Model Specifications:
 Model ID: 1
 Model Name: iPhone 13 Pro
 Processor: A15 Bionic chip
 Price: 999.00
 Screen Size: 6.1
 Memory Size: 128
 Release Date: 2021-09-24
 Battery Size: 3085.0
 Storage: 128
 Color: Sierra Blue

Model Feature:
 Keyword: 5G
 Description: Supports 5G network connectivity
```

Invalid Item ID:

```
Enter item ID: 8888
===== Detail Info of Item: 8888 =====
Can not find Item ID: 8888.
```

3.5 Add item to cart

```
Enter item ID: 1

===== Current storage: 100 =====
Enter item quantity: 2
DONE: 2 Item 1 added to cart!!
```

Add again, inventory will change dynamically:

```
Enter item ID: 1

===== Current storage: 98 =====
Enter item quantity: 3
DONE: 3 Item 1 added to cart!!
```
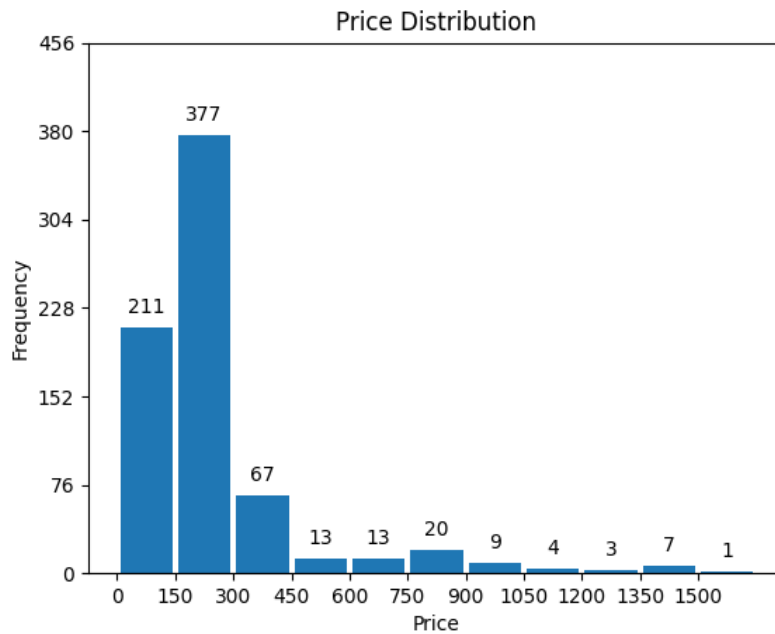
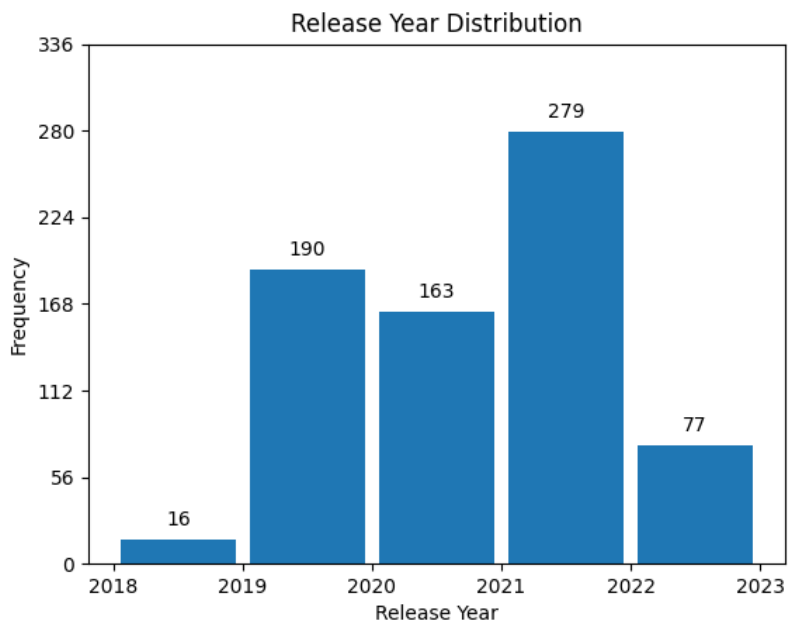Error: Invalid quantity:

```
Enter item ID: 1

===== Current storage: 95 =====
Enter item quantity: 96
```

```
===== Invalid quantity!! (Current storage: 95) =====
Enter item quantity:
```

3.6 View price statics (graphically)

Price Distribution

3.7 View release year statics (graphically)

Release Year Distribution

4. Go to cart

Will display items in cart, and prompt cart options:

```
===== Your cart =====
ID: 1, Model: iPhone 13 Pro, Price: 999.00, Quantity: 5
ID: 2, Model: Galaxy S21, Price: 799.99, Quantity: 1

===== Cart Options =====
1. Edit item quantity
2. Delete item
3. Submit order
4. View order history
0. Back to Main menu
Enter option number:
```

If cart is empty:

```
===== Your cart =====
Your cart is empty.
```

4.1 Edit item quantity

```
Enter ID of item to edit: 1

===== Current storage: 94 =====
Enter new quantity: 7
DONE: Item updated.

(Input any key, back to cart.)

===== Your cart =====
ID: 1, Model: iPhone 13 Pro, Price: 999.00, Quantity: 7
ID: 2, Model: Galaxy S21, Price: 799.99, Quantity: 1
```

4.2 Delete item

```
Enter ID of item to delete: 2
DONE: Item deleted.

(Input any key, back to cart.)

===== Your cart =====
ID: 1, Model: iPhone 13 Pro, Price: 999.00, Quantity: 7
```

4.3 Submit order

Will display available payment to choose from:

If no payment methods have been added:

```
===== Select a payment method =====
You have not added any payment methods yet.
Go to MAIN MENU >> Manage Account >> Add new payment to add.
```

If payment methods have been added:

```
===== Select a payment method =====
Card No: 7890, Card Type: Debit Card, Expiration Date: 2055-05-05
Card No: 55555, Card Type: Credit Card, Expiration Date: 2033-03-03
Enter payment ID: 55555
Order submitted.
```

At this point you will find your cart is empty. Because your order has been submitted.

4.4 View order history

Now you can find your history orders here. You will get a well organized information on your each order/purchase:

```
===== Your order history =====
Order Id: 7 | Date: 2023-04-19 11:21:18 | Payment: 7890
  Model ID: 3, Model Name: Pixel 6, Price: 699.00, Quantity: 1
  Model ID: 5, Model Name: Xperia 5 III, Price: 949.99, Quantity: 2
Order total price: 2597.

Order Id: 6 | Date: 2023-04-19 11:11:31 | Payment: 55555
  Model ID: 1, Model Name: iPhone 13 Pro, Price: 999.00, Quantity: 7
Order total price: 6993.
```

If you don't have any purchase:

```
===== Your order history =====
No order history found.
(Input any key, back to cart.)
```

8. Lessons Learned

Technical Expertise:

Through the development of this project, I have gained a solid understanding of database design and management. Specifically, I learned how to create and manage a database that supports various functions such as user registration, payment management, and order tracking. I also gained experience in implementing complex relationships between entities, such as the relationships between orders, users, phone models and payment methods.

Time Management and Data Domain Insights:

This project taught me the importance of time management when working on complex projects. I gained insights into breaking down a large project into smaller tasks and setting achievable deadlines for each task. This approach helped me stay on track and ensured that the project was completed within the given timeframe.

Realized or contemplated alternative design / approaches to the project:

Looking back at the initial version of our project design, it appears chaotic compared to the current version. However, we have consistently updated our design as we progress with the development of the project. As we gained a better understanding of our application, we realized the need to separate functions into different sections and manage them in a more intuitive way. For instance, in the early versions, we had a nested structure between the view and cart

management, which was complicated and not user-friendly. However, in our latest design, we streamlined the functions and separated them into mainly three sections. This approach has made the functions more straightforward and user-friendly, and it is now easy for us to organize different functional groups.

Code not working:

We encountered an issue while developing the keyword filtering function in our application. Initially, we used the SQL code "WHERE pm.color "%$in_coolor%" which did not work. Later, we realized that we should have used "WHERE pm.color LIKE CONCAT("%", in_coolor, "%)" instead.

9. Future Work

Planned Uses of the Database:

The database we designed for the online smartphone shop has several potential uses in the future. Apart from supporting the existing functions, the database can be utilized to develop additional features such as order analysis, which provides statistical results on orders placed within a given period that enables the owner to have a better understanding of user activity.

The database can also be used for inventory management, where the admin can manage inventory and track its history to gain more knowledge on the popularity of items and provide useful insight for future storage. The database can provide valuable insights into customer preferences and buying behavior that can help the business make better decisions.

Potential Areas for Added Functionality:

There are several areas where we could add functionality to enhance the user experience. For example, we could incorporate a comparison feature that allows users to compare different models side-by-side, providing a more comprehensive view of the product.

We could also implement a recommendation engine that suggests models based on the user's browsing and purchasing history. Additionally, we could add a review and rating system where users can rate and provide feedback on the products they purchase, helping other users make informed decisions.