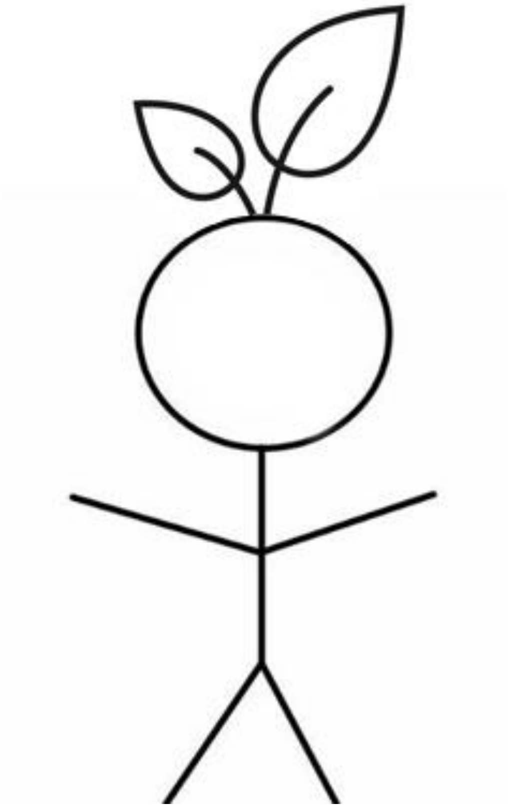
Growing Pains – An Online Plant Store System (OPSS)

Object Oriented Software Development - Project



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Course: Software Development (CW_KCSOF_B)

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Summary

A rapidly growing houseplant store wants to expand its business to build an Online Plant Store System (OPSS) to manage its expanding business and improve customer engagement. The system should aim to meet the following requirements:–

a) Facilitate the buying of a diverse range of plants and plant accessories

b) A comprehensive marketplace experience, making the interface accessible to the user

c) A responsive, dynamic application that responds to user inputs and updates the backend database as the user interacts with the application

d) The store catalogue must have a filter feature to enhance user experience, allowing users to sort items and accessories by price, type etc

e) The user must be able to edit their account information as well as view and cancel any orders made

f) Users must also be able to set personal reminders, notifying them of when to water their plants

The system should also feature a user-interface which keeps the design aesthetics of the houseplant store in mind.

The system should allow users to browse the store catalogue, which will include filtering options such as plant species, type, price and accessory. Each plant listing will include brief descriptions, care instructions and pricing information, which can be visible when a customer selects a plant.

Once the user selects a plant, they can add it to their cart to proceed with the checkout process. Users may update their cart or remove items. When the user initiates the checkout process, they must enter in payment details before finally placing the order.

Another integrated feature should allow users to set a reminder by selecting a date. The reminder will take input on the plant type and species (e.g., succulent, tropical, houseplant) and notify the user of when to next water their plant.

Requirements

The following document outlines the requirements for the Online Plant Store System (OPSS). To ensure that all corners of the requirements finding process were covered, the **FURPS+** model to assess functional and on-functional requirements was considered.

The functionality of the system is defined by the behaviours and features of the system, ensuring that the user's core needs and expectations of the system are met regarding what it does.

The non-functional requirements describe the systems usability, reliability, performance and supportability, ensuring that it operates as efficiently as possible and is scalable for future iterations.

Functional

Requirement ID :	FR001
Requirement Name :	Select Item
Definition:	The system shall display detailed information when a user selects an item from the catalogue.
Specification:	- On click of a product in the BrowsePanel the system should: - Form a SELECT query on the Product table - Display a new ProductPanel with the following using JLabels: 200x200 image of the product, product name, price and description

Requirement ID :	FR002
Requirement Name :	Cart Management
Definition:	Registered users may add products to their cart, from which they may alter the product quantity via a JSpinner
Specification:	- On click of the “Add to Cart” button the system must: - Validate the user is first logged in - Update the users cart object to display the product quantities and total price

Requirement ID :	FR003
Requirement Name :	Checkout Process
Definition:	Users complete the Order by initiating a checkout process, validated by inputting payment details
Specification:	- On click of the “Checkout” button the system must: - Build a form to input: Card Number, Card Holder, Address, CVV and Expiration Date (via JCombo boxes) - On submit, the system will generate an INSERT query into the Orders table

Requirement ID :	FR004
Requirement Name :	Browse Catalogue
Definition:	The system shall display a populated catalogue of items with a scrollable UI
Specification:	- A JPanel displaying a series of product item containers which hold information about each product in the Product table. - Products are retrieved via a SELECT query in the Products table

Requirement ID :	FR005
Requirement Name :	Order History
Definition:	Users must be able to view past orders with the aim of cancelling orders should they wish
Specification:	- A JTable displaying a history of all orders made by the logged in user. - The table is populated via a SELECT query on the Customer table which INNER JOINS with the Orders table - When an order is selected, the user may cancel the order by clicking the “Cancel Order” button. - Onclick, a DELETE query in the Orders table is generated

Non-Functional

Requirement ID :	NFR001
Requirement Name :	Usability
Definition:	The system must be both learnable and accessible for new users
Specification:	- Learnability: Users must be able to comfortably adapt to the systems GUI, enabling them to purchase products quickly - Accessible: The system must be designed bearing in mind users who may have vision impairments, such as font sizes, colours etc.

Requirement ID :	NFR002
Requirement Name :	Reliability
Definition:	The system must reliably deal with invalid data input from the user
Specification:	- Data input must be handled appropriately according to what may constitute as “bad data” or malicious data. - Preventative measures against SQL Injection by using prepared statements

Requirement ID :	NFR003
Requirement Name :	Performance
Definition:	The system must respond quickly and appropriately to user input
Specification:	- Interaction between the system and database must be seamless, ensuring the customer is met with a responsive application

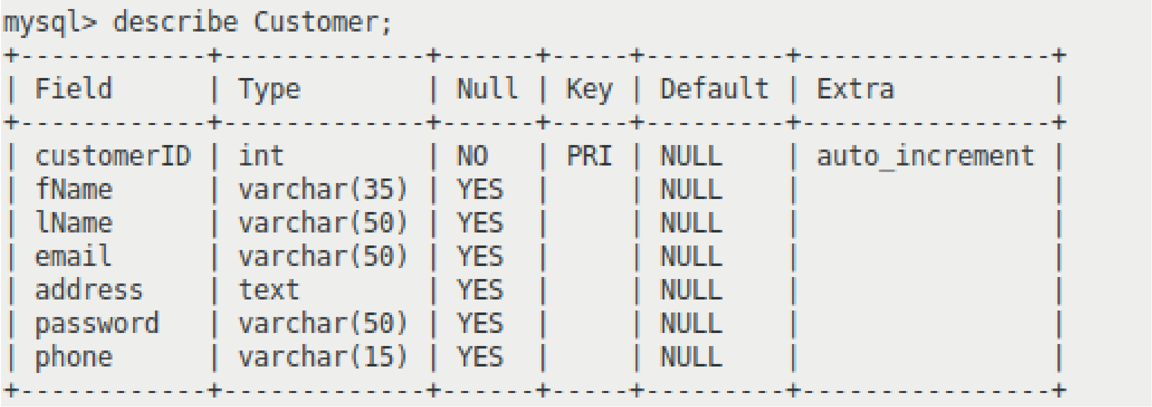
Requirement ID :	NFR004
Requirement Name :	Supportability
Definition:	The system must be maintainable for future iterations and expansion
Specification:	- Code must be well documented and conform to standard Object Oriented principles

Requirement ID :	NFR005
Requirement Name :	Security
Definition:	The system must be secure for the user to use
Specification:	Any sensitive or precious data must be handled with care

Database Tables

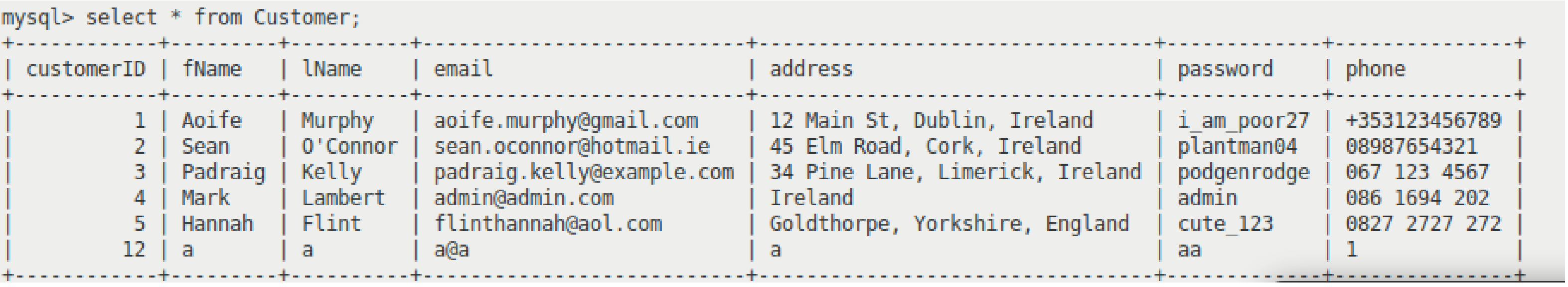
Customer Table

Structure of Customer Table



```
mysql> describe Customer;
+------------+-------------+------+-----+---------+----------------+
| Field      | Type        | Null | Key | Default | Extra          |
+------------+-------------+------+-----+---------+----------------+
| customerID | int         | NO   | PRI | NULL    | auto_increment |
| fName      | varchar(35) | YES  |     | NULL    |                |
| lName      | varchar(50) | YES  |     | NULL    |                |
| email      | varchar(50) | YES  |     | NULL    |                |
| address    | text        | YES  |     | NULL    |                |
| password   | varchar(50) | YES  |     | NULL    |                |
| phone      | varchar(15) | YES  |     | NULL    |                |
+------------+-------------+------+-----+---------+----------------+
```

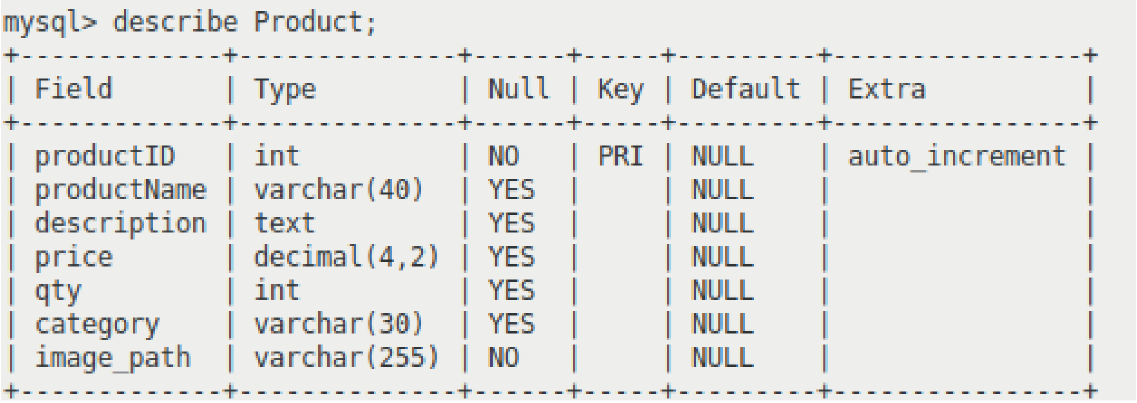
Sample Data for Customer Table



```
mysql> select * from Customer;
+------------+---------+----------+---------------------------+---------------------------------+-------------+---------------+
| customerID | fName   | lName    | email                     | address                         | password    | phone         |
+------------+---------+----------+---------------------------+---------------------------------+-------------+---------------+
|          1 | Aoife   | Murphy   | aoife.murphy@gmail.com    | 12 Main St, Dublin, Ireland     | i_am_poor27 | +353123456789 |
|          2 | Sean    | O'Connor | sean.oconnor@hotmail.ie   | 45 Elm Road, Cork, Ireland      | plantman04  | 08987654321   |
|          3 | Padraig | Kelly    | padraig.kelly@example.com | 34 Pine Lane, Limerick, Ireland | podgenrodge | 067 123 4567  |
|          4 | Mark    | Lambert  | admin@admin.com           | Ireland                         | admin       | 086 1694 202  |
|          5 | Hannah  | Flint    | flinthannah@aol.com       | Goldthorpe, Yorkshire, England  | cute_123    | 0827 2727 272 |
|         12 | a       | a        | a@a                       | a                               | aa          | 1             |
+------------+---------+----------+---------------------------+---------------------------------+-------------+---------------+
```

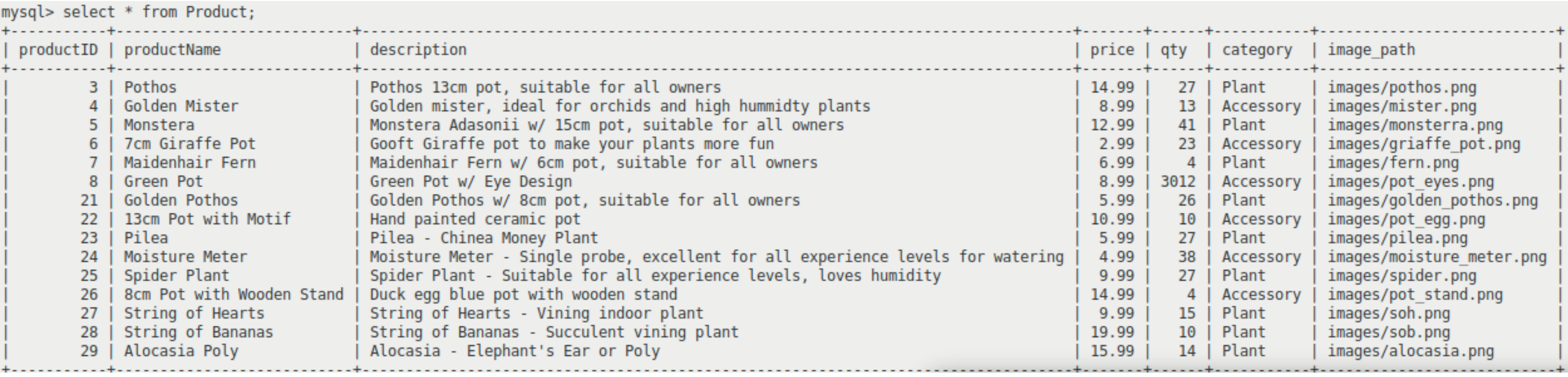
Product Table

Structure of Product Table



```
mysql> describe Product;
+-------------+--------------+------+-----+---------+----------------+
| Field       | Type         | Null | Key | Default | Extra          |
+-------------+--------------+------+-----+---------+----------------+
| productID   | int          | NO   | PRI | NULL    | auto_increment |
| productName | varchar(40)  | YES  |     | NULL    |                |
| description | text         | YES  |     | NULL    |                |
| price       | decimal(4,2) | YES  |     | NULL    |                |
| qty         | int          | YES  |     | NULL    |                |
| category    | varchar(30)  | YES  |     | NULL    |                |
| image_path  | varchar(255) | NO   |     | NULL    |                |
+-------------+--------------+------+-----+---------+----------------+
```

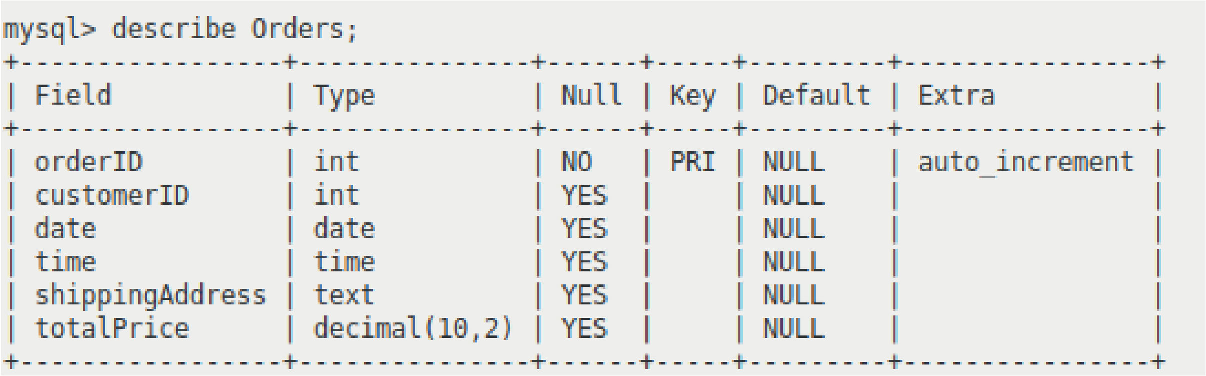
Sample Data for Product Table



```
mysql> select * from Product;
+-----------+---------------------------+---------------------------------------------------------------------------------+-------+------+-----------+---------------------------+
| productID | productName               | description                                                                     | price | qty  | category  | image_path                |
+-----------+---------------------------+---------------------------------------------------------------------------------+-------+------+-----------+---------------------------+
|         3 | Pothos                    | Pothos 13cm pot, suitable for all owners                                        | 14.99 |   27 | Plant     | images/pothos.png         |
|         4 | Golden Mister             | Golden mister, ideal for orchids and high hummidty plants                       |  8.99 |   13 | Accessory | images/mister.png         |
|         5 | Monstera                  | Monstera Adasonii w/ 15cm pot, suitable for all owners                          | 12.99 |   41 | Plant     | images/monsterra.png      |
|         6 | 7cm Giraffe Pot           | Gooft Giraffe pot to make your plants more fun                                  |  2.99 |   23 | Accessory | images/griaffe_pot.png    |
|         7 | Maidenhair Fern           | Maidenhair Fern w/ 6cm pot, suitable for all owners                             |  6.99 |    4 | Plant     | images/fern.png           |
|         8 | Green Pot                 | Green Pot w/ Eye Design                                                         |  8.99 | 3012 | Accessory | images/pot_eyes.png       |
|        21 | Golden Pothos             | Golden Pothos w/ 8cm pot, suitable for all owners                               |  5.99 |   26 | Plant     | images/golden_pothos.png  |
|        22 | 13cm Pot with Motif       | Hand painted ceramic pot                                                        | 10.99 |   10 | Accessory | images/pot_egg.png        |
|        23 | Pilea                     | Pilea - Chinea Money Plant                                                      |  5.99 |   27 | Plant     | images/pilea.png          |
|        24 | Moisture Meter            | Moisture Meter - Single probe, excellent for all experience levels for watering |  4.99 |   38 | Accessory | images/moisture_meter.png |
|        25 | Spider Plant              | Spider Plant - Suitable for all experience levels, loves humidity               |  9.99 |   27 | Plant     | images/spider.png         |
|        26 | 8cm Pot with Wooden Stand | Duck egg blue pot with wooden stand                                             | 14.99 |    4 | Accessory | images/pot_stand.png      |
|        27 | String of Hearts          | String of Hearts - Vining indoor plant                                          |  9.99 |   15 | Plant     | images/soh.png            |
|        28 | String of Bananas         | String of Bananas - Succulent vining plant                                      | 19.99 |   10 | Plant     | images/sob.png            |
|        29 | Alocasia Poly             | Alocasia - Elephant's Ear or Poly                                               | 15.99 |   14 | Plant     | images/alocasia.png       |
+-----------+---------------------------+---------------------------------------------------------------------------------+-------+------+-----------+---------------------------+
```

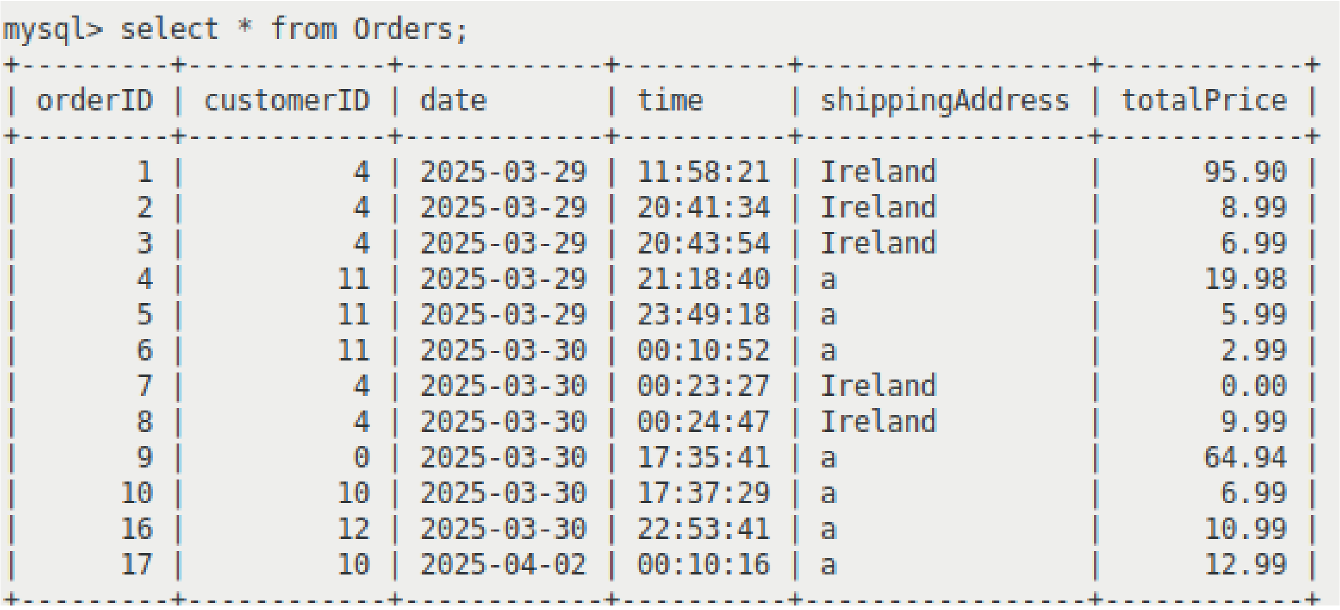
Orders

Structure of Orders Table



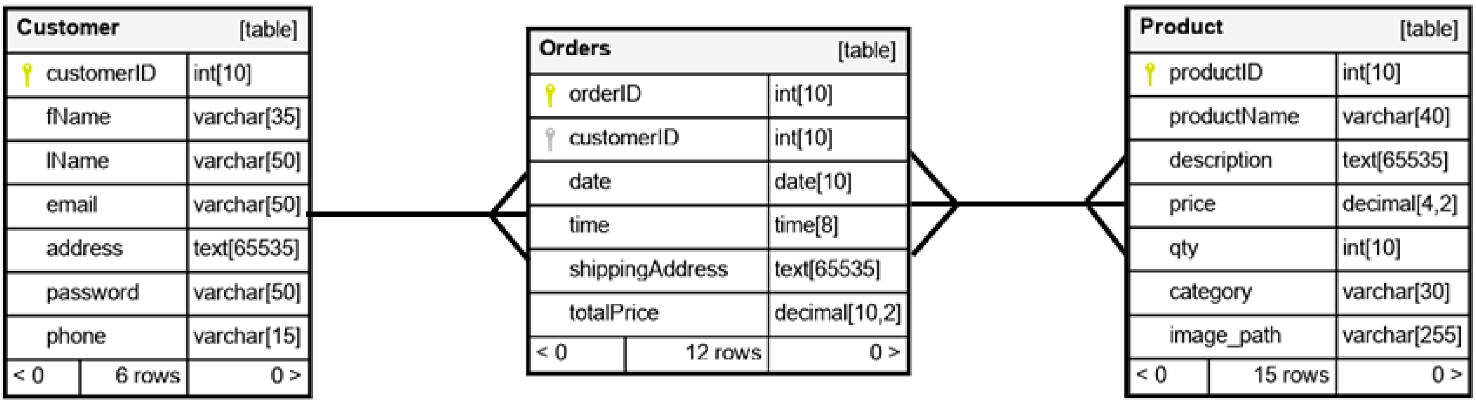
```
mysql> describe Orders;
+-----------------+---------------+------+-----+---------+----------------+
| Field           | Type          | Null | Key | Default | Extra          |
+-----------------+---------------+------+-----+---------+----------------+
| orderID         | int           | NO   | PRI | NULL    | auto_increment |
| customerID      | int           | YES  |     | NULL    |                |
| date            | date          | YES  |     | NULL    |                |
| time            | time          | YES  |     | NULL    |                |
| shippingAddress | text          | YES  |     | NULL    |                |
| totalPrice      | decimal(10,2) | YES  |     | NULL    |                |
+-----------------+---------------+------+-----+---------+----------------+
```

Sample Data for Orders Table



```
mysql> select * from Orders;
+---------+------------+------------+----------+-----------------+------------+
| orderID | customerID | date       | time     | shippingAddress | totalPrice |
+---------+------------+------------+----------+-----------------+------------+
|       1 |          4 | 2025-03-29 | 11:58:21 | Ireland         |      95.90 |
|       2 |          4 | 2025-03-29 | 20:41:34 | Ireland         |       8.99 |
|       3 |          4 | 2025-03-29 | 20:43:54 | Ireland         |       6.99 |
|       4 |         11 | 2025-03-29 | 21:18:40 | a               |      19.98 |
|       5 |         11 | 2025-03-29 | 23:49:18 | a               |       5.99 |
|       6 |         11 | 2025-03-30 | 00:10:52 | a               |       2.99 |
|       7 |          4 | 2025-03-30 | 00:23:27 | Ireland         |       0.00 |
|       8 |          4 | 2025-03-30 | 00:24:47 | Ireland         |       9.99 |
|       9 |          0 | 2025-03-30 | 17:35:41 | a               |      64.94 |
|      10 |         10 | 2025-03-30 | 17:37:29 | a               |       6.99 |
|      16 |         12 | 2025-03-30 | 22:53:41 | a               |      10.99 |
|      17 |         10 | 2025-04-02 | 00:10:16 | a               |      12.99 |
+---------+------------+------------+----------+-----------------+------------+
```

ER Diagram



Customer	[table]
customerID	int[10]
fName	varchar[35]
lName	varchar[50]
email	varchar[50]
address	text[65535]
password	varchar[50]
phone	varchar[15]
< 0 6 rows	0 >

Orders	[table]
orderID	int[10]
customerID	int[10]
date	date[10]
time	time[8]
shippingAddress	text[65535]
totalPrice	decimal[10,2]
< 0 12 rows	0 >

Product	[table]
productID	int[10]
productName	varchar[40]
description	text[65535]
price	decimal[4,2]
qty	int[10]
category	varchar[30]
image_path	varchar[255]
< 0 15 rows	0 >

[1]

[1] The Many to Many relationship between the Orders and Product tables in the current iteration of the OPSS has not been simplified to include an Order/Product table.

Future expansion during the Summer of '25 will ensure this implementation is appropriately handled.

Interesting Source Code Snippets

Test Cases

Name	**TC-001:** Select Item
Requirement	Verify that the system successfully updates to display details of a selected item from a database of items.
Preconditions	The system is displaying the full catalogue
Steps	1. Click on the **image** of the third item. 2. Return to previous page 3. Click on the **name** of the first item. 4. Return to previous page
Expected Results	1. The item details window appears, with a larger image and more detailed information 2. Verify that items can be selected by clicking icon **or** thumbnail 3. Return to browsing catalogue

Name	**TC-002:** Add to Cart
Requirement	Verify that the system successfully allows a user to enter item(s) to cart.
Preconditions	The user is viewing the catalogue
Steps	1. Click on the **second** product 2. Click the “Add to Cart” button 3. Return to catalogue 4. Click on the **fourth** product 5. Change **quantity** to 2, add to cart
Expected Results	1. The item details window appears, with a larger image and more detailed information 2. The system alerts the user to the fact that the item has been added successfully 3. Return to browsing catalogue

Name	**TC-003:** Checkout
Requirement	Verify that the store system successfully allows the user to checkout their items
Preconditions	The customer has items in their cart
Steps	1. Click on the **View Cart** button 2. Click on the **Proceed to Checkout** button 3. Enter your **login details** 4. Input **personal information** 5. Click on the **Confirm Order** button
Expected Results	1. The system displays the users Cart 2. The system begins the Checkout process 3. System prompts user for login details 4. System prompts user for shipping & billing information 5. System updates to confirm to the user that their order has been successfully placed

Name	**TC-004:** Filter Catalogue
Requirement	Verify that the system allows the user to apply filter(s) to the Catalogue of Items
Preconditions	The system is displaying the full catalogue
Steps	1. Click on the **Filter** button 2. Select **one** filter 3. Click the **Apply Filter** button 4. Click on the **Filter** button 5. Select **another** filter 6. Click on the **Apply Filter** button
Expected Results	1. The system updates to show a list of filters to choose from 2. When applied, the system displays just items matching the filter tag 3. Applying another filter will result in a more specific list of items

Name	**TC-005:** Schedule Reminder
Requirement	Verify that the system successfully sets and alerts the user when a Reminder is Scheduled
Preconditions	The user is logged in
Steps	1. Click on the **Schedule Reminder** button 2. Input **todays date** 3. Click on the **Set Reminder** button to confirm
Expected Results	1. The system will display the Schedule Reminder page 2. The system will update to display the reminder the user has just input

Name	**TC-006:** Browse Catalogue
Requirement	Verify that the system allows the user to browse the catalogue of items
Preconditions	The user is on the page displaying the catalogue
Steps	1. Click on the **Home** page 2. Scroll to browse the catalogue
Expected Results	1. The system will update in real time to display the catalogue – containing items - for the user