



INFSCI 2710: DATABASE MANAGEMENT

PROJECT: DATABASE SYSTEM FOR E-COMMERCE

PROJECT MEMBERS:

(based on the alphabetical order of members' last names)

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Brief Intro

Our database system is designed as an online perfume and body-care shopping system, which displays six categories of products with eight types of scent aiming at providing customers with online perfume and body-care shopping experience. Specifically, in our system, customers can find and purchase products in views of Botanical Wax Candles, Reed Diffusers, Room & Linen Sprays, All Incense, Car Fragrance, and Hand & Body Wash. Also, customers are able to shop products by searching for scent, including Moss, Lavender, Rose, Tobacco, Vanilla, Grapefruit, Golden, Patchouli, Sweetgrass. The beautiful and convenient design of our website aims to provide customers with comfortable and satisfying shopping experience.

Content:

1. System overview: identification users and managers
2. Assumptions about the system
3. Schema of the database in E-R diagram
4. Relational schema with identification of primary and foreign keys
5. The DDL statements to create the database
6. Design of front-end to back-end connection
7. System implementation screen shots
8. Testing cases and fault detect
9. Limitations and possible improvements

1. System overview: identification users and managers.

1.1 Costumers

Customers are users who can click into our shopping site to browse products on the website and make purchases. In our system, customers are able to execute following actions:

- Register as a new customer
- Log in with existing information
- Change personal information (password etc.)
- Browsing items vaguely
- Browsing items in detail
- Search under a category
- Add interested items into shopping bag
- Check out
- Log out

1.2 Managers

Managers are defined as the users who can manage the daily operations of our shopping site and can monitor sales data on a data aggregation page. In our system, managers are able to execute following actions:

- Register as a new manager
- Log in with existing information
- View all information of selling items in detail (name, price, inventory, product ID, category ID, scent ID)
- Update part of information of existing items.
- Put items on/off shelves
- View data aggregation
- Log out

2. Assumptions about our system

2.1 Configuration assumptions:

Python 3.9.12

Flask 2.2.2

Werkzeug 2.2.2

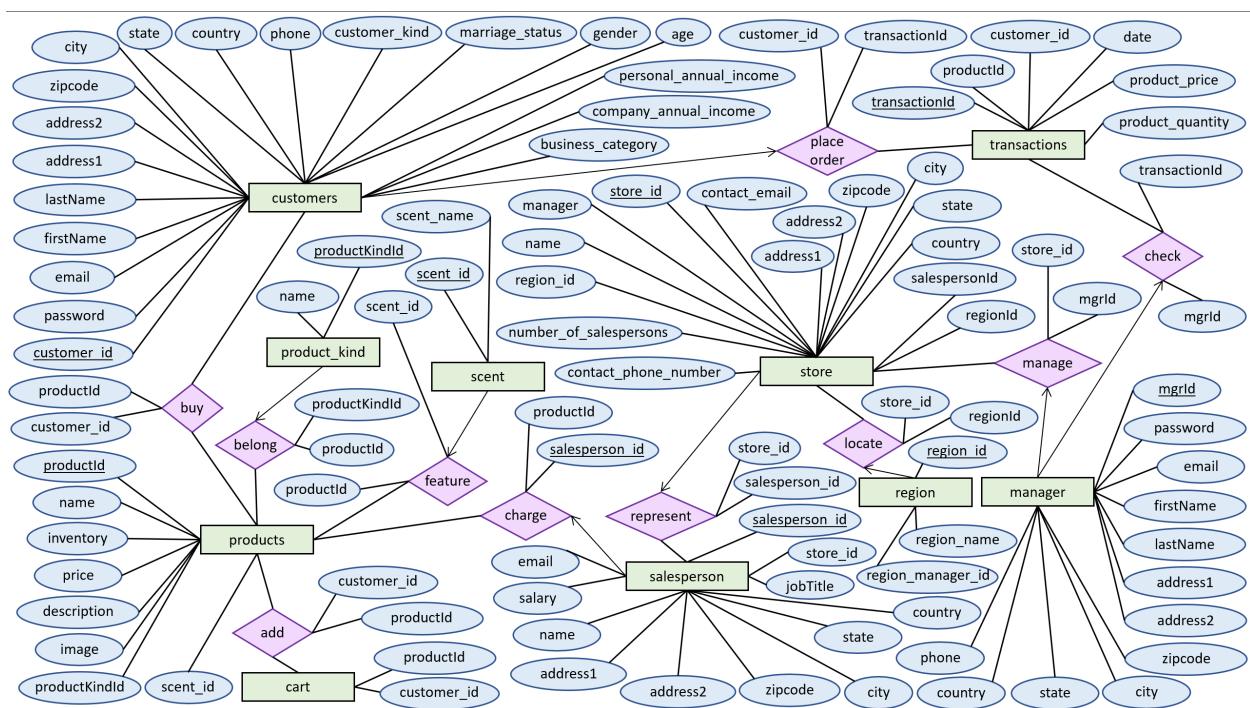
2.2 Function assumptions:

Our online system mainly sells perfumes and body-care products, and meanwhile assumes the following details:

- When logging into our online store, six categories of our products, including *Botanical Wax Candles*, Reed Diffusers, Room & Linen Sprays, All Incense, Car Fragrance, and Hand & Body Wash, which are in eight types of scent, including Moss, Lavender, Rose, Tobacco, Vanilla, Grapefruit, Golden, Patchouli, Sweetgrass, are available to browse from a website. Also, product information stored in our MySQL database has already been uploaded into our online store as available selling products. Other new products can only be updated by managers and cannot be seen by customers until managers successfully uploaded the new products into the database system.
- Managers are differentiated from customers, they should, and will only, take the responsibility of updating product information (For example, name, price, inventory etc.), adding items, deleting items and sales data aggregation.
- For customers' information part, customers are allowed to change any information in their profile as well as password depends on their own thought. However, there is no way to change either of them without logging in first.
- During shopping, a customer are able to add any desired items, if it has enough inventory, to her /his shopping cart, and the products added to cart can also be delete if no payment is made. Also, purchased products will be cleared from cart once the order is confirmed.

- Error checking includes checking the format of registration information and checking the correction of login information. For customers, it includes checking whether the selected amount of a product is more than the amount of product in stock. For managers, it includes checking whether the input information is correct to update, add or delete product, while other aspects of our system operations, such as transactions, internet connection, etc., are in their good status by default.

3. Schema of the database in E-R diagram



1) **customers**: An entity with 19 attributes, including *customer_id*, *password*, *email*, *firstName*, *lastName*, *address1*, *address2*, *zipcode*, *city*, *state*, *country*, *phone*, *customer_kind*, *marriage_status*, *gender*, *age*, *personal_annual_income*, *business_category*, and

company_annual_income. The attribute “*customer_id*” is the primary key, and all the 19 attributes are useful information to help us serve customers shopping in our online store.

2) products: An entity with 8 attributes, including *productId*, *name*, *inventory*, *price*, *description*, *image*, *productKindId*, and *scent_id*. The attribute “*productId*” is the primary key, and all the 8 attributes are necessary information for each product loaded in the database.

3) cart: An entity with 2 attributes, including *productId* and *customer_id*. This entity is designed to uniquely store the information of wanted products for each customer.

4) salesperson: An entity with 12 attributes, including *salespersonId*, *store_id*, *job_title*, *country*, *state*, *city*, *zipcode*, *address1*, *address2*, *name*, *email*, and *salary*. The attribute “*salespersonId*” is the primary key, and all the 12 attributes are necessary information for each salesperson.

5) store: An entity with 13 attributes, including *store_id*, *country*, *state*, *city*, *zipcode*, *address1*, *address2*, *manager*, *number_of_salespersons*, *region_id*, *name*, *contact_email*, and *contact_phone_number*. The attribute “*store_id*” is the primary key, and all the 13 attributes are necessary information for each store in our system.

6) region: An entity with 3 attributes, including *region_id*, *region_name*, and *region_manager_id*. The attribute “*region_id*” is the primary key, and both the 3 attributes are necessary information for each region.

7) Transactions: An entity with 6 attributes, including *transactionId*, *customer_id*, *productId*, *date*, *product_price*, and *product_quantity*. The attribute “*transactionId*” is the primary key, and all the 6 attributes are necessary information for each transaction.

8) manager: An entity with 12 attributes, including *mgrId*, *password*, *email*, *firstName*, *lastName*, *address1*, *address2*, *zipcode*, *city*, *state*, *country*, and *phone*. The attribute “*mgrId*” is the primary key, and all the 12 attributes are necessary information for each manager.

9) product_kind: An entity with 2 attributes, including *productKindId*, and *name*. The attribute “*productKindId*” is the primary key, and both the two attributes are necessary information for each product category.

10) scent: An entity with 2 attributes, including *scent_id*, and *scent_name*. The attribute “*scent_id*” is the primary key, and both the two attributes are necessary information for each scent category.

11) buy: A relation with *customer_id* and *productId*. This relation builds a connection between customers and products.

- 12) add: A relation with *customer_id* and *productId*. This relation builds a connection between carts and products.
- 13) belong: A relation with *productKindId* and *productId*. This relation builds a connection between product_kind and products.
- 14) feature: A relation with *scent_id* and *productId*. This relation builds a connection between scent and products.
- 15) charge: A relation with *salespersonId* and *productId*. This relation builds a connection between salesperson and products.
- 16) represent: A relation with *salespersonId* and *storeId*. This relation builds a connection between salesperson and store.
- 17) place order: A relation with *customer_id* and *transactionId*. This relation builds a connection between customers and transactions.
- 18) locate: A relation with *regionId* and *storeId*. This relation builds a connection between resion and store.
- 19) check: A relation with *mgrId* and *transactionId*. This relation builds a connection between manager and transactions.
- 20) manage: A relation with *mgrId* and *store_id*. This relation builds a connection between manager and store.

4. Relational schema with identification of primary and foreign keys

- customer is N:N to product
- cart is N:N to product
- product_kind is 1:N to product
- scent is 1:N to product
- salesperson is 1:N to product
- store is 1:N to salesperson
- customer is 1:N to transaction
- region is 1:N to store
- manager is 1:N to transaction

- manager is 1:N to store

5. The DDL statements to create the database

(*SQLite is used in building the database.*)

5.1 Customer Table

```
CREATE TABLE "customers" (
    "customer_id" INTEGER NOT NULL PRIMARY KEY
    AUTOINCREMENT,
    "password" TEXT,
    "email" TEXT,
    "firstName" TEXT,
    "lastName" TEXT,
    "address1" TEXT,
    "address2" TEXT,
    "zipcode" TEXT,
    "city" TEXT,
    "state" TEXT,
    "country" TEXT,
    "phone" TEXT,
    "customer_kind" TEXT,
    "marriage_status" TEXT,
    "gender" TEXT,
    "age" TEXT,
    "personal_annual_income" TEXT,
    "business_category" TEXT,
    "company_annual_income" TEXT
);
```

5.2 Manager Table

```
CREATE TABLE "manager" (
    "mgrId" INTEGER PRIMARY KEY,
    "password" TEXT,
    "email" TEXT,
    "firstName" TEXT,
    "lastName" TEXT,
    "address1" TEXT,
    "address2" TEXT,
    "zipcode" TEXT,
    "city" TEXT,
    "state" TEXT,
    "country" TEXT,
    "phone" TEXT
);
```

5.3 Products Table

```
CREATE TABLE "products" (
    "productId" INTEGER,
    "name" TEXT,
    "inventory" INTEGER,
    "price" REAL,
    "description" TEXT,
    "image" TEXT,
    "productKindId" INTEGER,
    "scent_id" INTEGER,
    CONSTRAINT "PRODUCTS_PK" PRIMARY KEY ("productId"),
    CONSTRAINT "FK_products_product_kind" FOREIGN KEY
    ("productKindId") REFERENCES "product_kind" ("productKindId") ON
    DELETE NO ACTION ON UPDATE NO ACTION,
```

```
CONSTRAINT "products_FK" FOREIGN KEY ("scent_id")
REFERENCES "scent" ("scent_id") ON DELETE NO ACTION ON
UPDATE NO ACTION,
CONSTRAINT "inventory_constraint" CHECK (inventory>=0)
);
```

5.4 Product Kind Table

```
CREATE TABLE "product_kind" (
"productKindId" INTEGER PRIMARY KEY,
"name" TEXT
);
```

5.5 Scent Table

```
CREATE TABLE "scent" (
"scent_id" INTEGER,
"scent_name" TEXT,
CONSTRAINT "scent_PK" PRIMARY KEY ("scent_id")
);
```

5.6 Cart Table

```
CREATE TABLE "cart" (
"userId" INTEGER,
"productId" INTEGER,
FOREIGN KEY ("userId") REFERENCES "customers" ("customer_id")
ON DELETE CASCADE ON UPDATE CASCADE,
FOREIGN KEY ("productId") REFERENCES "products" ("productId")
ON DELETE CASCADE ON UPDATE CASCADE
);
```

5.7 Transactions Table

```
CREATE TABLE "Transactions" (
```

```
"transactionId" INTEGER NOT NULL PRIMARY KEY
AUTOINCREMENT,
"productId" INTEGER,
"date" TEXT,
"customer_id" TEXT,
"product_price" TEXT,
"product_quantity" INTEGER,
CONSTRAINT "productId" FOREIGN KEY ("productId")
REFERENCES "products" ("productId") ON DELETE NO ACTION ON
UPDATE NO ACTION,
CONSTRAINT "customer_id" FOREIGN KEY ("customer_id")
REFERENCES "customers" ("customer_id") ON DELETE NO ACTION
ON UPDATE NO ACTION
);
```

5.8 Region Table

```
CREATE TABLE "region" (
"region_id" INTEGER NOT NULL,
"region_name" TEXT,
"region_manager_id" INTEGER,
PRIMARY KEY ("region_id"),
CONSTRAINT "managerId" FOREIGN KEY ("region_manager_id")
REFERENCES "manager" ("mgrId") ON DELETE NO ACTION ON
UPDATE CASCADE
);
```

5.9 Store Table

```
CREATE TABLE "store" (
"store_id" INTEGER NOT NULL PRIMARY KEY
AUTOINCREMENT,
"address1" TEXT,
"address2" TEXT,
```

```
"zipcode" TEXT,  
"city" TEXT,  
"state" TEXT,  
"country" TEXT,  
"manager" TEXT,  
"number_of_salespersons" INTEGER,  
"region_id" INTEGER,  
"name" TEXT,  
"contact_email" TEXT,  
"contact_phone_number" TEXT,  
CONSTRAINT "region_id" FOREIGN KEY ("region_id")  
REFERENCES "region" ("region_id") ON DELETE CASCADE ON  
UPDATE CASCADE  
);
```

5.10 Salesperson Table

```
CREATE TABLE "salesperson" (  
    "name" TEXT,  
    "address1" TEXT,  
    "address2" TEXT,  
    "zipcode" TEXT,  
    "city" TEXT,  
    "state" TEXT,  
    "country" TEXT,  
    "email" TEXT,  
    "job_title" TEXT,  
    "store_id" INTEGER,  
    "salary" REAL,  
    "salesperson_id" INTEGER NOT NULL PRIMARY KEY  
    AUTOINCREMENT,  
    CONSTRAINT "store_id" FOREIGN KEY ("store_id") REFERENCES  
    "store" ("store_id") ON DELETE CASCADE ON UPDATE CASCADE  
);
```

6. Design of front-end to back-end connection

Our online shopping system is based on Python and Flask to program the connection between the front-end and back-end. Specifically, when click “Run” on the Python programming platform, it will show on the terminal as “Running on <http://127.0.0.1:5000>”.

To implement our online shopping systems, we designed our front-end webpages by HTML with necessary elements and frames to help navigate customers to the webpage they need. Also, we try our best to beautify our front-end website by CSS, JS in order to improve the shopping experience of our customers. The front-end and back-end are connected using the Flask. Specifically, when running the Flask code, the back-end will send the request and render information to access to the front-end, which shows the programmed webpages on the website through the URL. Thus, users can browse our website. Especially, for managers are allowed to make changes to our tables from the front-end to the back-end.

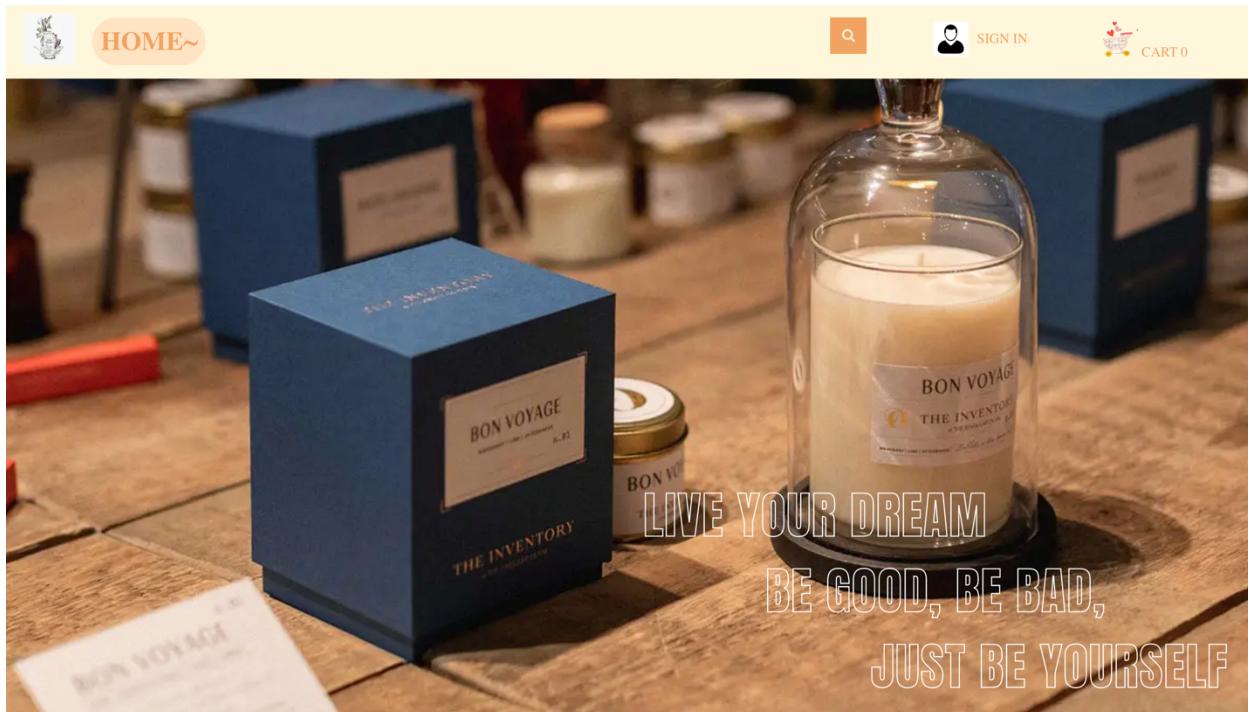
7. System implementation screen shots

Our shopping system is supportive for both customers and users. The following example screen shots will illustrate our system implementation in detail.

7.1 For Customers:

7.1.1 Home-cover page

When firstly enter our website, it will display a beautiful home-cover page to customer, including our recommended special products and our slogans.



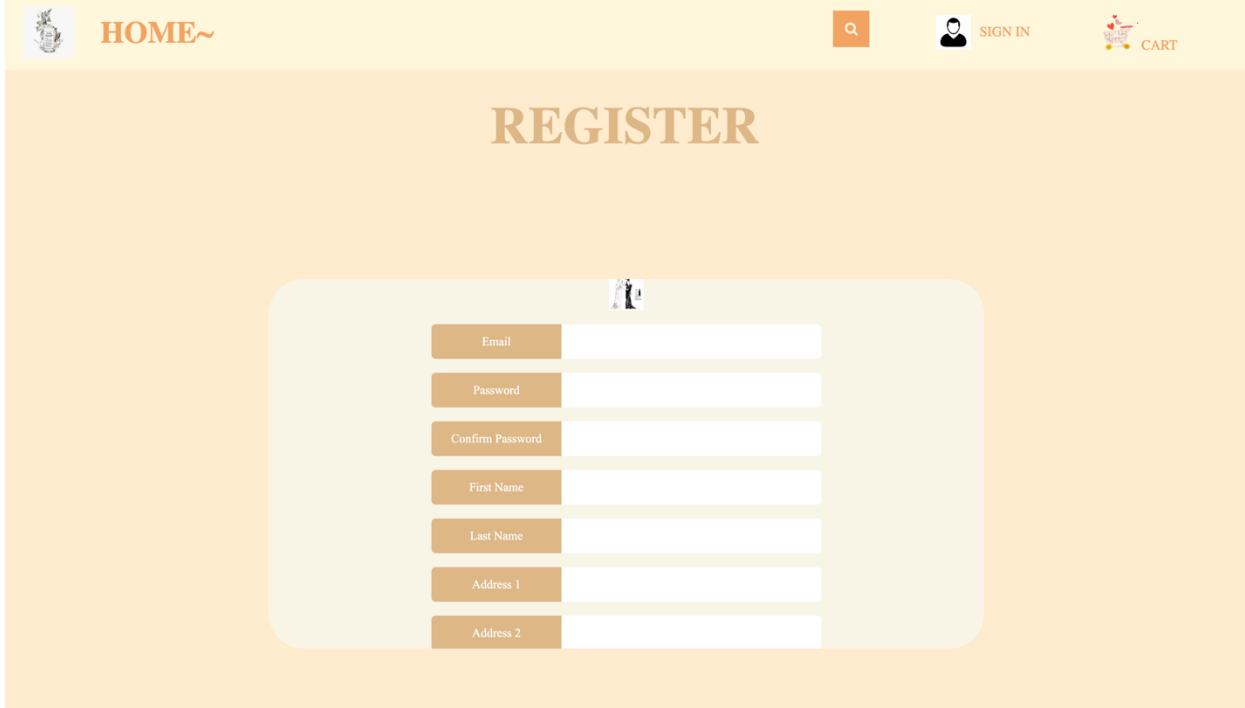
7.1.2 Login Page

By clicking “SIGN IN”, customers are shown with a login chart. They can log in by inputting their email and password.

The image shows the login page of The Inventory website. At the top, there is a navigation bar with icons for search, sign in, and a shopping cart containing 0 items. Below the navigation bar is a large, light-colored header with the word "LOGIN" in bold, gold-colored capital letters. Below the header is a light blue rectangular box containing a login form. The form has fields for "Email" and "Password", both with placeholder text. There is also a "login" button and links for "Register here" and "Forgot Password?".

7.1.3 Register Page

If customers are new to our website, they can create a new account by clicking “Register Here”.



For different kinds of customers (personal customers and business customers), different information is required.

Address 1

Address 2

Zipcode

City

State

Country

Phone

Customer Kind

- Business
- Person

Business Only

Business Type

Company Annual Income

Marriage Status

Gender

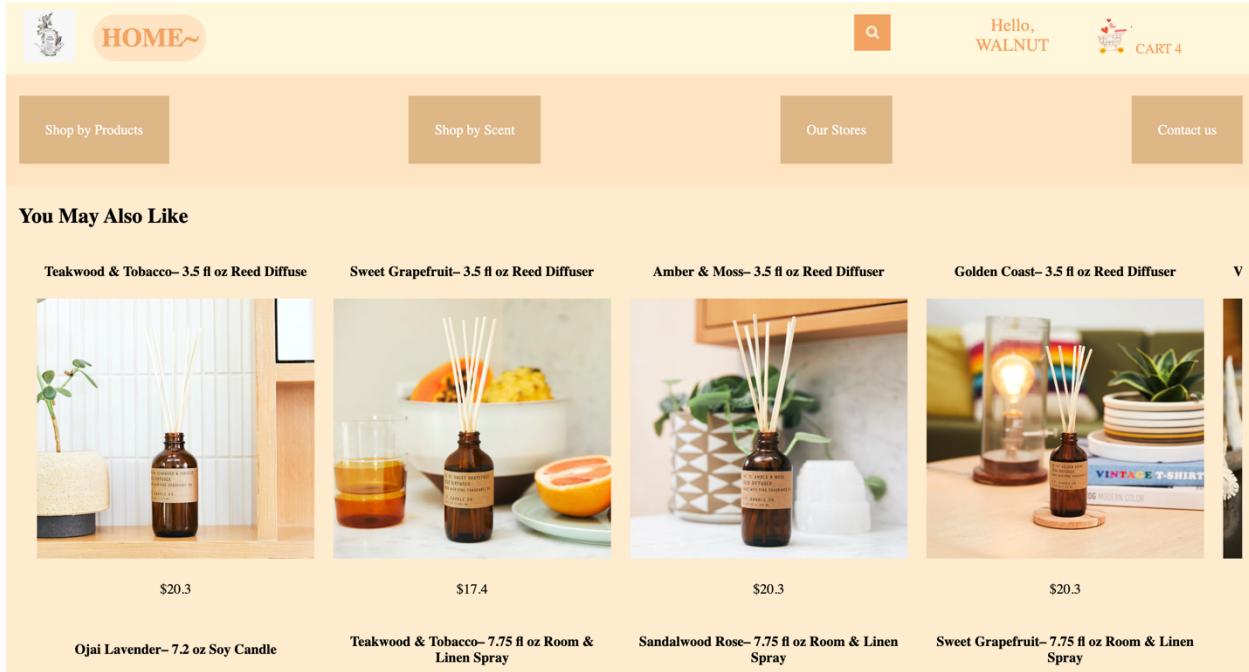
Age

Personal Annual Income

- NULL
- Sole Proprietorships
- Partnerships
- Corporations
- S Corporations
- Limited Liability Company (LLC)

7.1.4 Home Page after Sign in

We skip to the home page which is deserved as all products displayed page after signing in. Also with logged in status. ('SIGN IN' on the upper right corner of the page is replaced with "Hello, WALNUT")



The screenshot shows the homepage of a website after a user has signed in. At the top right, the text "Hello, WALNUT" is displayed next to a shopping cart icon with the number "CART 4". The top navigation bar includes a logo, a "HOME~" button, a search icon, and other links like "Our Stores" and "Contact us". Below the navigation, there's a section titled "You May Also Like" featuring four product cards:

| Product Image | Name | Price | Options |
|--|---|--------|---------|
|  | Teakwood & Tobacco- 3.5 fl oz Reed Diffuser | \$20.3 | V |
|  | Sweet Grapefruit- 3.5 fl oz Reed Diffuser | \$17.4 | |
|  | Amber & Moss- 3.5 fl oz Reed Diffuser | \$20.3 | |
|  | Golden Coast- 3.5 fl oz Reed Diffuser | \$20.3 | V |

Below these cards, there are two more product cards:

| Product Image | Name | Options |
|--|---|---------|
|  | Ojai Lavender- 7.2 oz Soy Candle | |
|  | Teakwood & Tobacco- 7.75 fl oz Room & Linen Spray | |

At the bottom of the page, there are sections for "Our Stores" and "Contact us".

7.1.6 Search by Product

Customers can search products by product kind, which is shown on the navigation button named "Shop by products" on the left top corner of the page.

 **HOME~**

Shop by Products

- BOTANICAL WAX CANDLES
- REED DIFFUSERS
- ROOM & LINEN SPRAYS
- ALL INCENSE
- CAR FRAGRANCE
- HAND & BODY WASH

Shop by Scent

Our Stores

Contact us

Search icon

Hello, WALNUT  CART 4

| Product | Description | Price |
|---------------------------------------|---|--------|
| Ojai Lavender– 7.2 oz Soy Candle | 3.5 fl oz Reed Diffuser | \$20.3 |
| Teakwood & Tobacco– 7.2 oz Soy Candle | Sweet Grapefruit– 3.5 fl oz Reed Diffuser | \$17.4 |
| Sandalwood Rose– 7.2 oz Soy Candle | Amber & Moss– 3.5 fl oz Reed Diffuser | \$20.3 |
| Ojai Lavender– 7.2 oz Soy Candle | Golden Coast– 3.5 fl oz Reed Diffuser | \$20.3 |

7.1.7 Display Product Search by Category

 **HOME~**

Showing all products of Category BOTANICAL WAX CANDLES:

| Product | Description | Price | |
|---|---|--|---|
| Vanilla & Ghost Pepper– 7.2 oz Soy Candle | Teakwood & Tobacco– 7.2 oz Soy Candle | Sandalwood Rose– 7.2 oz Soy Candle | Ojai Lavender– 7.2 oz Soy Candle |
|  |  |  |  |
| \$19.2 | \$19.2 | \$16.8 | \$19.2 |

7.1.8 Search by Scent

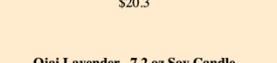
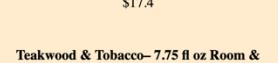
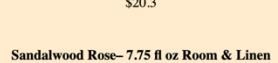
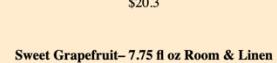
Customers can also search by scent.

 **HOME~**

[Shop by Products](#) [Shop by Scent](#) [Our Stores](#) [Contact us](#)

[Hello, WALNUT](#) [CART 4](#)

You May Also Like

| | | | |
|--|---|---|---|
| Teakwood & Tobacco– 3.5 fl oz Reed Diffuse  \$20.3 | Sweet Gr  \$17.4 | Amber & Moss– 3.5 fl oz Reed Diffuser  \$20.3 | Golden Coast– 3.5 fl oz Reed Diffuser  \$20.3 |
| Ojai Lavender– 7.2 oz Soy Candle  \$17.4 | Teakwood & Tobacco– 7.75 fl oz Room & Linen Spray  \$17.4 | Sandalwood Rose– 7.75 fl oz Room & Linen Spray  \$20.3 | Sweet Grapefruit– 7.75 fl oz Room & Linen Spray  \$20.3 |

7.1.9 Display Product Search by Scent

 **HOME~**

[Shop by Products](#) [Shop by Scent](#) [Our Stores](#) [Contact us](#)

[Hello, WALNUT](#) [CART 4](#)

Showing all products of Scent MOSS:

| | | | |
|---|---|---|---|
| Amber & Moss– 3.5 fl oz Reed Diffuser  \$20.3 | Amber & Moss– Incense Sticks  \$7.7 | Amber & Moss– Car Fragrance 2-Pack  \$15.2 | Amber & Moss– 8 oz Hand & Body Wash  \$12.6 |
|---|---|---|---|

7.1 10 Product Detail Display Page

By clicking the item, the detailed product description page is shown to the customers, with some information such as name, price, and description.

By clicking “Add to Cart”, the item is added into your shopping cart for later purchasing.

The screenshot shows a product detail page for an "Ojai Lavender- 7.2 oz Soy Candle". At the top, there's a navigation bar with icons for Home, Search, and Cart, along with a greeting "Hello, Sherley". On the left, there's a small image of the candle. The main content area has two sections: "Details" and "Description". The "Details" section lists the name as "Ojai Lavender- 7.2 oz Soy Candle" and the price as "\$19.2". The "Description" section contains a paragraph about the candle's scent profile, mentioning a calming vortex with orange groves, lavender farms, and citrus notes like pixie tangerine and blue lavender. There's also a link labeled "Add to Cart".

7.1.11 User Information

By clicking user's name on the navigation bar, customers can see the entrance of their profile page.

You May Also Like

| | | | |
|---|---|--|---|
|  \$20.3 |  \$17.4 |  \$20.3 |  \$20.3 |
| Ojai Lavender 7.2 oz Soy Candle | Teakwood & Tobacco 7.75 fl oz Room & Linen Spray | Sandalwood Rose 7.75 fl oz Room & Linen Spray | Sweet Grapefruit 7.75 fl oz Room & Linen Spray |

7.1.12 Display Personal Information

Email: leasing@walcap.com
First name: WALNUT
Last name: CAPITAL
Address 1: 5500
Address 2: Suite
Zip Code: 15217
City: Pittsburgh
State: PA
Country United
Phone number 1234567890
Customer Kind business
Business Type corporations
Company Annual Income 10000000

[Edit Profile](#)
[Change password](#)

7.1.13 Edit Profile

It is available for users to change their basic information in their profile.

The screenshot shows a user profile editing interface. At the top left is a small logo, followed by the word "HOME~". On the right side, there is a search icon, a "Hello, Sherley" greeting with a profile picture, and a shopping cart icon labeled "CART 1". The main title "Edit profile" is centered at the top of the form area. Below the title is a large, rounded rectangular input field containing several smaller input boxes for personal information:

| | |
|-------------|------------------------|
| Email: | sherleyjin@outlook.com |
| First Name: | Sherley |
| Last Name: | Qin |
| Address 1: | 5557 |
| Address 2: | Apt |
| Zip Code: | 15217 |
| City: | Pittsburgh |
| State: | PA |
| Country: | United |

7.1.14 Change Password

Users are required to enter their old password to set a new password.

The screenshot shows a password change form titled "Change Password". At the top left is a small logo, followed by the word "HOME~". On the right side, there is a search icon, a "SIGN IN" button with a user profile icon, and a shopping cart icon labeled "CART". The form itself has three input fields: "Old Password", "New Password", and "Confirm Password", each with a corresponding text input box. Below these fields are two buttons: "Save" and "Go to Profile".

7.1.15 Cart Page

All the added items are shown on this page, customers can out check and remove any of the items.

The screenshot shows a shopping cart page with a light orange background. At the top right, there's a user greeting "Hello, WALNUT" and a "CART 4" button. On the left, there's a "HOME~" link and a search icon. The main area is titled "CART" and contains four items:

- Sweet Grapefruit- 3.5 fl oz \$17.4**
Reed Diffuser
In stock
[Remove](#)
- Teakwood & Tobacco- 7.75 fl oz Room & Linen Spray \$15.4**
In stock
[Remove](#)
- Sweet Grapefruit- 3.5 fl oz \$17.4**
Reed Diffuser
In stock
[Remove](#)
- Vanilla & Ghost Pepper- 7.2 oz Soy Candle \$19.2**
In stock
[Remove](#)

At the bottom left, there's a "Proceed to checkout" button.

7.1.16 Check Out Page

By clicking “Proceed to checkout”, It will help you to confirm your order including checking products and delivery information.

 [HOME~](#)

[!\[\]\(17a0228b39008677ade5db645cf6f2ac_img.jpg\)](#) Hello,
WALNUT [!\[\]\(ff8dc53ffd46e79aef1093ba72da41e3_img.jpg\) CART 4](#)

Confirm Your Order


Sweet Grapefruit- 3.5 fl oz \$17.4
 Reed Diffuser
 In stock
[Remove](#)


Vanilla & Ghost Pepper- 7.2 oz \$19.2
 oz Soy Candle
 In stock
[Remove](#)

Subtotal : \$69.39999999999999

Delivery Information

First Name: WALNUT
 Last Name: CAPITAL
 Address 1: 5500
 Address 2: Suite
 Zipcode: 15217
 Phone: 1234567890

[Place Order](#)

7.1 17 Order Confirmed Page

 [HOME~](#)

[!\[\]\(70504f5c516bdc6a849cee9001a41321_img.jpg\)](#) Hello,
WALNUT [!\[\]\(228df832036bf4a24e5b42e2ec0b2d0a_img.jpg\) CART 4](#)

Thank you for shopping with us!

Your Order Details


Sweet Grapefruit- 3.5 fl oz \$17.4
 Reed Diffuser
 In stock
[Remove](#)


Vanilla & Ghost Pepper- 7.2 oz \$19.2
 oz Soy Candle
 In stock
[Remove](#)

Subtotal : \$69.39999999999999

Delivery Information

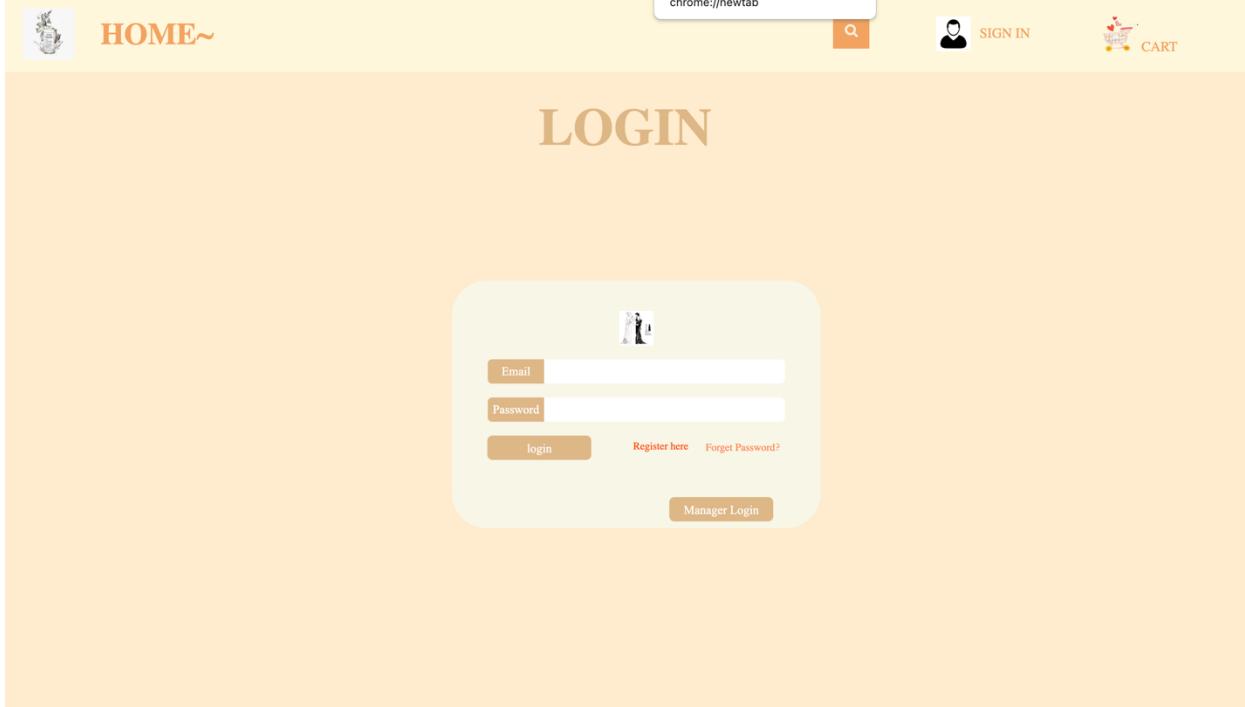
First Name: WALNUT
 Last Name: CAPITAL
 Address 1: 5500
 Address 2: Suite
 Zipcode: 15217
 Phone: 1234567890

[Continue Shopping](#)

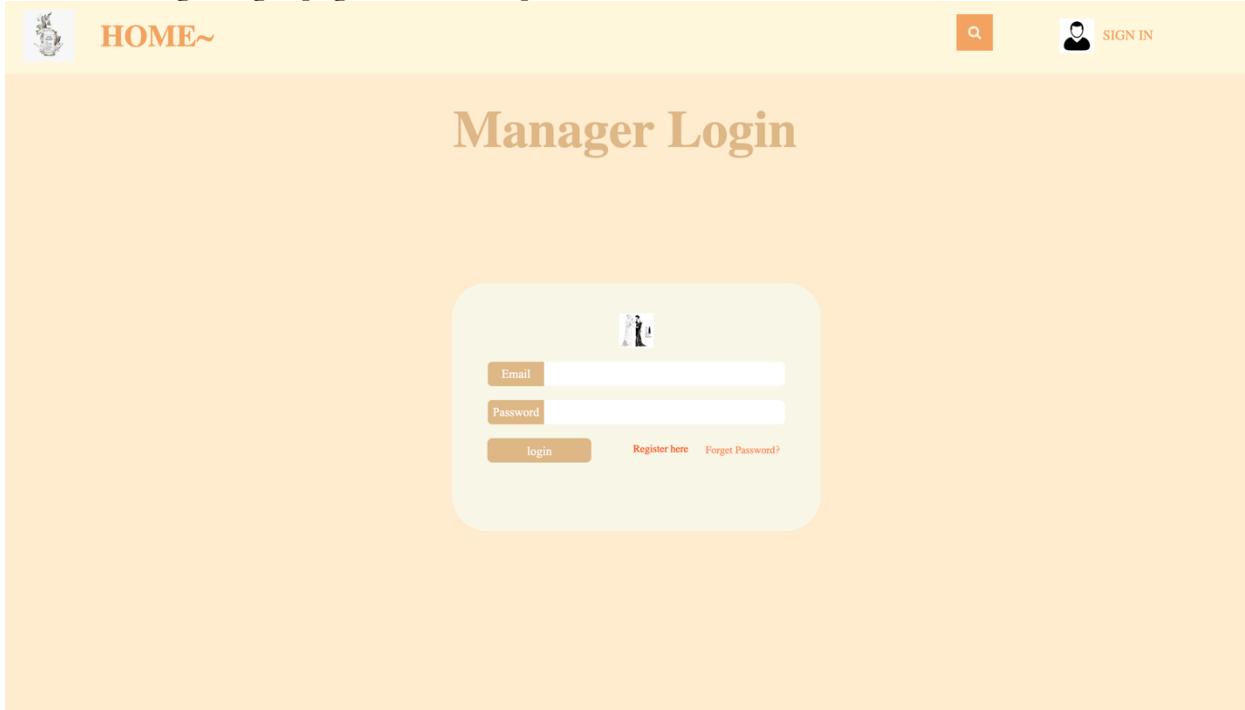
7.2 For Managers:

7.2.1 Manager Log In

Managers can log in by clicking the “Manager Login” on the login page.



Then a manager login page will show up.



7.2.2 Item Checking

Managers can browse all the products currently selling. By clicking into certain product, managers can view all details about the product. (Such as inventory, category ID, scent ID etc.)

The screenshot shows a web-based application for managing inventory. At the top, there's a navigation bar with a logo, a search icon, and a greeting "Hello, Eden". Below the navigation, there are four main categories: "Shop by Products", "Shop by Scent", "Our Stores", and "Contact us". A prominent section titled "All Items Here" displays four product cards:

- Sweet Grapefruit– 3.5 fl oz Reed Diffuser**: \$17.4
- Amber & Moss– 3.5 fl oz Reed Diffuser**: \$20.3
- Golden Coast– 3.5 fl oz Reed Diffuser**: \$20.3
- Teakwood & Tobacco– 7.2 oz Soy Candle**: \$19.2

Each card includes a small image of the product, its name, and its price. Below this section, a URL "127.0.0.1:5000/mgrproductDescription?productId=3" is visible, followed by another navigation bar identical to the first one.

Sweet Grapefruit– 3.5 fl oz Reed Diffuser

Details

| | |
|-------------|---|
| Name | Sweet Grapefruit– 3.5 fl oz Reed Diffuser |
| Price | \$17.4 |
| Inventory | 20 |
| Product ID | 2 |
| Category ID | 2 |
| Scent ID | 6 |

Description

Ice cold lemonade. Dinner on the patio with your favorite people. Grapefruit, yuzu, and lemon.

[Update Product](#)

[Delete Product](#)

7.2.3 Item Operation

Managers can update some of the selected item information by clicking “Update Product” or can delete the selected item by clicking “Delete Product”.

7.2.3.1 Update Product

Manager can browse all information details of the selected item on the left part of the website and choose to edit information on the right form of the website. (The grey part means cannot edit.)

The screenshot shows a web application interface for managing product information. At the top, there is a navigation bar with a logo, a search icon, and a greeting "Hello, Eden". Below the header, the main title "Update Information" is displayed, followed by a success message "Updated Successfully". On the left side, there is a table listing various product details:

| | |
|-------------------|--|
| Product ID: | 6 |
| Product Name: | Teakwood & Tobacco- 7.2 oz Soy Candle |
| Inventory: | 20 |
| Price: | 19.2 |
| Description: | The one that started it all. Some call it the boyfriend scent, we call it the O.G. Leather, teak, and orange |
| Image: | TTSC.jpg |
| ProductKind Name: | BOTANICAL WAX CANDLES |
| Scent Name | TOBACCO |

On the right side, there is a form where the same information is presented, allowing for edits. The "Description" field is shown with a placeholder text, indicating it is a non-editable field. The other fields (Product ID, Product Name, Inventory, Price, Image, ProductKind Name, Scent Name) are shown with their current values, suggesting they are editable.

7.2.3 Manager's Navigation Bar

Managers can conduct several operations, like “Add Product”, “Delete Product”, “Manage Inventory”, for the day-to-day running of the company business.

They are also provided with “Data Aggregation” page to analyze recent sales data.

The screenshot shows the Home page of a web application. At the top, there's a navigation bar with a logo, a search icon, and a greeting "Hello, Eden". Below the navigation bar, there are three main buttons: "Shop by Products", "Shop by Scent", and "Our Stores". On the right side, there's a vertical sidebar menu with options like "Add Product", "Delete Product", "Manage Inventory", "Data Aggregation", and "Sign Out".

All Items Here

| Product | Description | Price |
|---------|---|--------|
| | Sweet Grapefruit- 3.5 fl oz Reed Diffuser | \$17.4 |
| | Amber & Moss- 3.5 fl oz Reed Diffuser | \$20.3 |
| | Golden Coast- 3.5 fl oz Reed Diffuser | \$20.3 |
| | Teakwood & Tobacco- 7.2 oz Soy Candle | \$19.2 |

127.0.0.1:5000/managerpage/additemForm

7.2.4 Add Product

By clicking “Add Product”, managers can put new products on the shelves by inputting information about the latest development on this page.

The screenshot shows the "Add New Item" page. At the top, it displays a success message: "Added Sucessfully". Below the message is a form with fields for "Product Name", "Inventory", "Price", "Description", "Image" (with a file upload button), "Product Kind Name", and "Scent Name". There is also a "Add" button at the bottom of the form.

7.2.5 Delete Product

Managers can move items off the shelves by either inputting product id or product name on this page.

The screenshot shows a user interface for deleting a product. At the top, there is a navigation bar with icons for Home, Search, and User Profile (Hello, Eden). The main title is "Delete Product". A success message states "Item Sweet Grapefruit– 7.2 oz Soy Candle has been deleted successfully!". Below the message is a form with two input fields: "Product ID" and "Product Name", each with a placeholder text area. There are two buttons at the bottom of the form: "Update" (in orange) and "Return" (in purple).

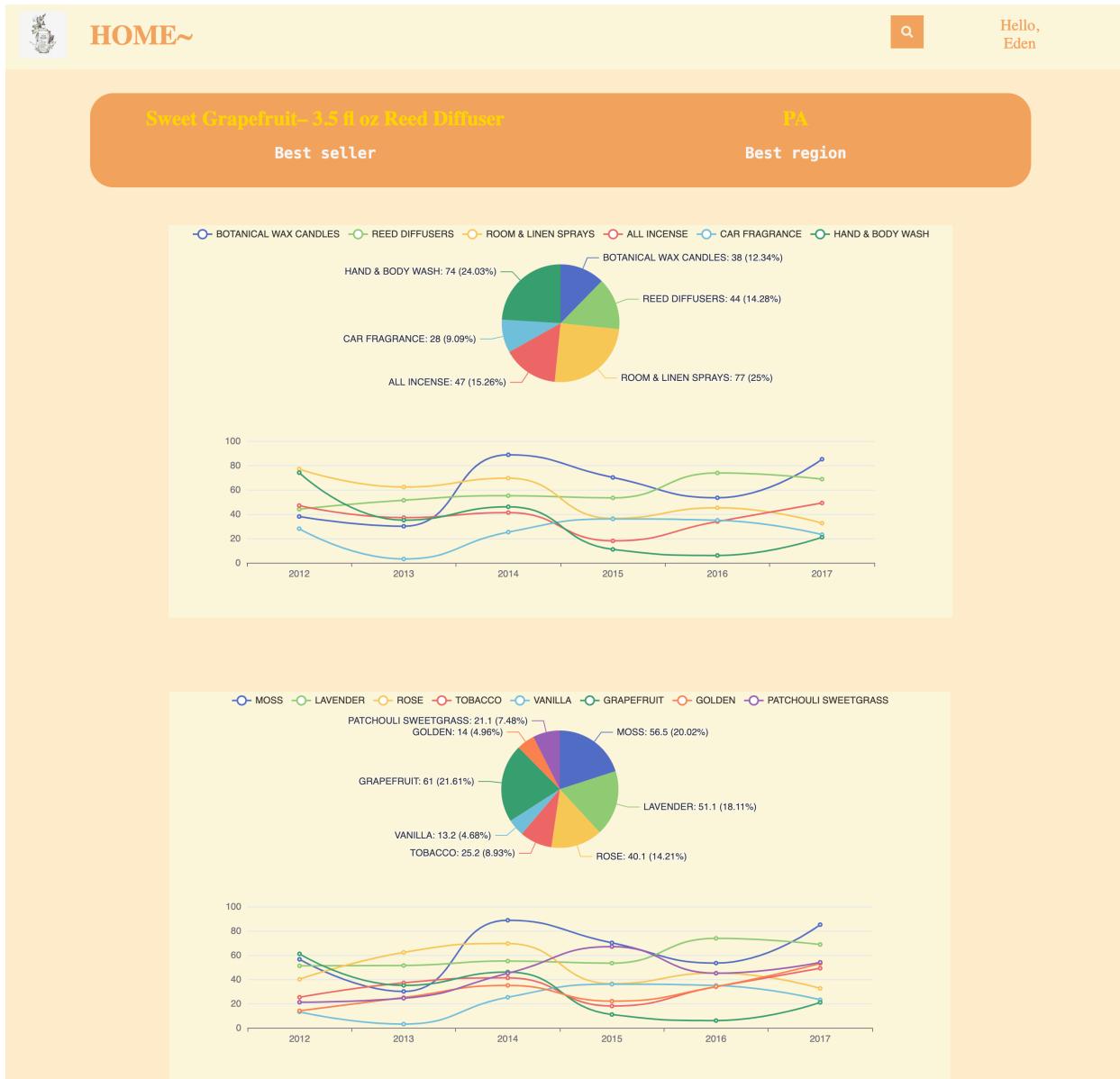
7.2.6 Manage Inventory

Managers are available to manage the quantity of products by inputting either product id or product name and updated inventory on this page.

The screenshot shows a web application interface. At the top left is a logo of a tree. Next to it is the word "HOME~". On the right side, there is a search icon and the text "Hello, Eden". The main title "Manage Inventory" is centered at the top. Below it, a success message "Updated successfully!" is displayed, followed by the text "Current inventory for Teakwood & Tobacco- 3.5 fl oz Reed Diffuse is 20.". A form is present, containing fields for Product ID, Product Name, and Inventory, along with "Update" and "Return" buttons.

7.2.7 Data Aggregation

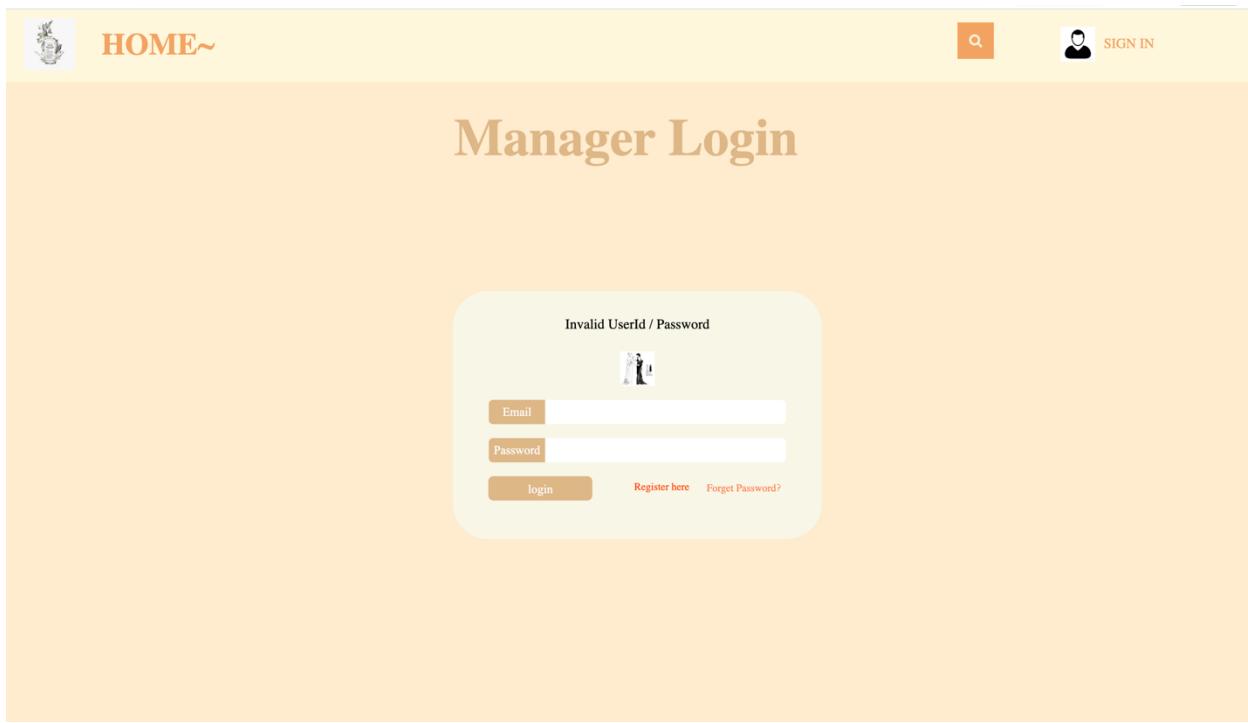
On this page, managers are available to see an overall sale in past years, including best sold product (that's 'Best Seller'), region with highest sales, and two annalistic charts. First chart talks about the variation of different product kinds among the last years, second chart tells about the variation of different scent among the last years.



8. Testing cases and fault detect

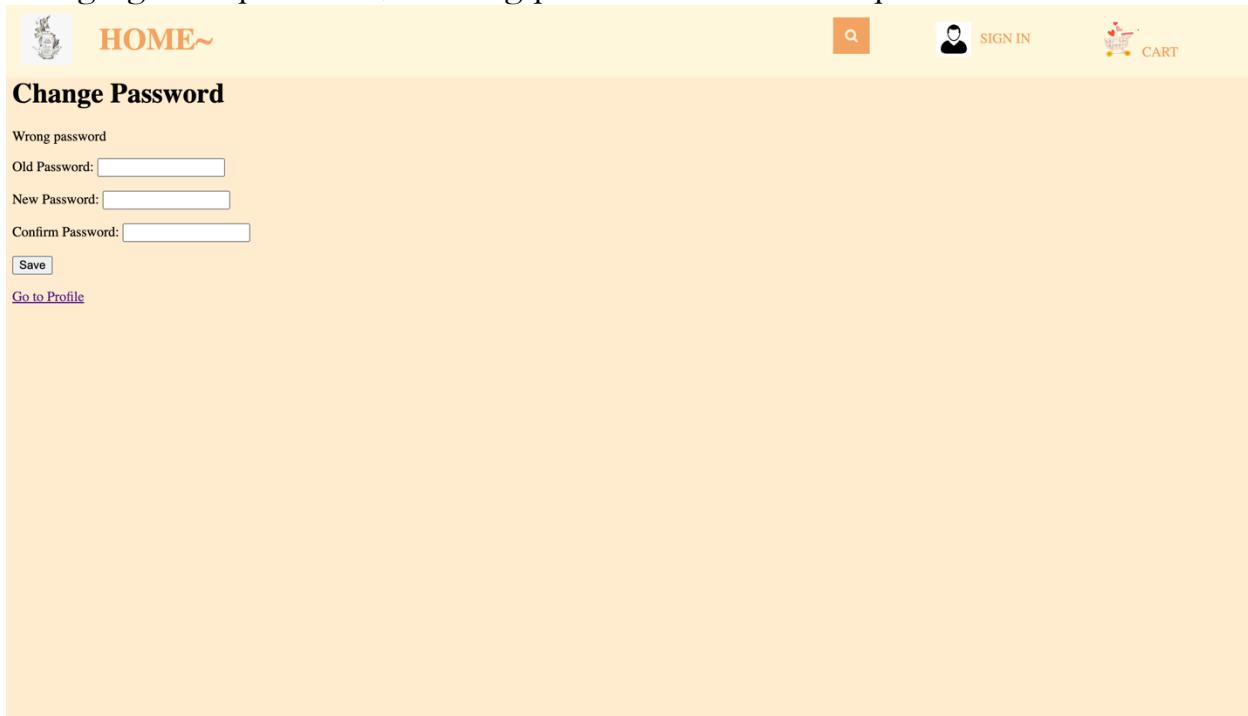
8.1 Logging error

If the email-password pair users input does not exist in our database, an “Invalid UserId/Password” will show up to warn users.



8.2 Wrong password error (Changing password)

If the old password does not match with the password in the database while users changing their password, “Wrong password” will show up above the chart.



8.3 Out of Stock

If the item is out of stock, the system will warn customers about it. (Two different situations)

- (1) When a customer would like to add it to her/his shopping cart, but the item is out of stock.

The screenshot shows a shopping cart interface. At the top, there are navigation links: a logo, 'HOME~', a search icon, 'SIGN IN', and a 'CART' icon with a count of '1'. Below the header, a message reads: 'Sorry! Teakwood & Tobacco—3.5 fl oz Reed Diffuse is in No Stock!' A large yellow rectangular area covers most of the page content. At the bottom left, a button says 'Proceed to checkout'.

- (2) When a customer have added it to her/his shopping cart for some time, but the selected item is out of stock now!

The screenshot shows a shopping cart interface. At the top, there are navigation links: a logo, 'HOME~', a search icon, 'Hello, Sherley', and a 'CART 1' icon. Below the header, a message reads: 'Sorry, there is no Teakwood & Tobacco—3.5 fl oz Reed Diffuse in stock'. A section titled 'Your Order Details' shows a product row for 'Teakwood & Tobacco—3.5 fl oz Reed Diffuse' with a price of '\$20.3'. The product status is 'In stock' with a 'Remove' link. A 'Subtotal : \$20.3' line is shown below. A 'Delivery Information' section lists shipping details: First Name: Sherley, Last Name: Qin, Address 1: 5557 Hobart St, Address 2: Apt 8, Zipcode: 15217, Phone: 1234567890. At the bottom, a 'Continue Shopping' button is visible.

8.4 Manager Input Wrong Information

(1) When a manager tries to update the inventory of a product, but she/he inputs a wrong product id or product name that is not existed in the database.

The screenshot shows a web application interface. At the top left is a logo, followed by a "HOME~" button. On the right side are a search icon and a "Hello, Eden" greeting. The main title "Manage Inventory" is centered at the top. Below it, a red error message "Error Occured" is displayed. A form box contains three input fields: "Product ID", "Product Name", and "Inventory". To the right of the "Inventory" field is a "Return" link. Below the form is a large, empty white area.

(2) When a manager tries to delete a product, but she/he inputs a wrong product id or product name that is not existed in the database.

The screenshot shows a web application interface. At the top left is a logo, followed by a "HOME~" button. On the right side are a search icon and a "Hello, Eden" greeting. The main title "Delete Product" is centered at the top. Below it, a red error message "Error Occured" is displayed. A form box contains three input fields: "Product ID", "Product Name", and "Inventory". To the right of the "Inventory" field is a "Return" link. Below the form is a large, empty white area.

9. Limitations and possible improvements

Many functions and webpages have been designed to make our system more practical and powerful to use. However, our shopping system also has some limitations and potential aspects for improvements.

Therefore, we have these following plans for future improvements.

- 1) We are planning to make more use of our *Customers* table, especially the customer information that could help us understand more about what our customers would like and prefer given their different backgrounds. For example, we can design an additional function based on big-data technologies to learn customers' preferences for different categories or scents of products, so that we could serve our customers better.
- 2) There are still potentials for our webpage design. We plan to make our website more beautiful and attractive to customers, offering more satisfying shopping experiences. In addition, we also plan to design more functions for customers, such as adding reviews to the products they purchased, or giving scores to their purchased products based on their shopping and product using experience.
- 3) We also try to design more functions for managers to improve the management and administration of our system. For example, we plan to design the administration function for stores and salespersons to offer more complete system management, especially when more stores and products are joining our system. Also, we are planning to design a manager administration function to more detailed assign various responsibilities to different managers, such as adding several types of departments and dividing duties to corresponding departments.
- 4) Our website does not have the ability to send emails at this time, but once we do, we can send confirmation emails to the email

addresses of users who have forgotten their passwords to help them reset them.

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