Point of Sale System

ICT SBA
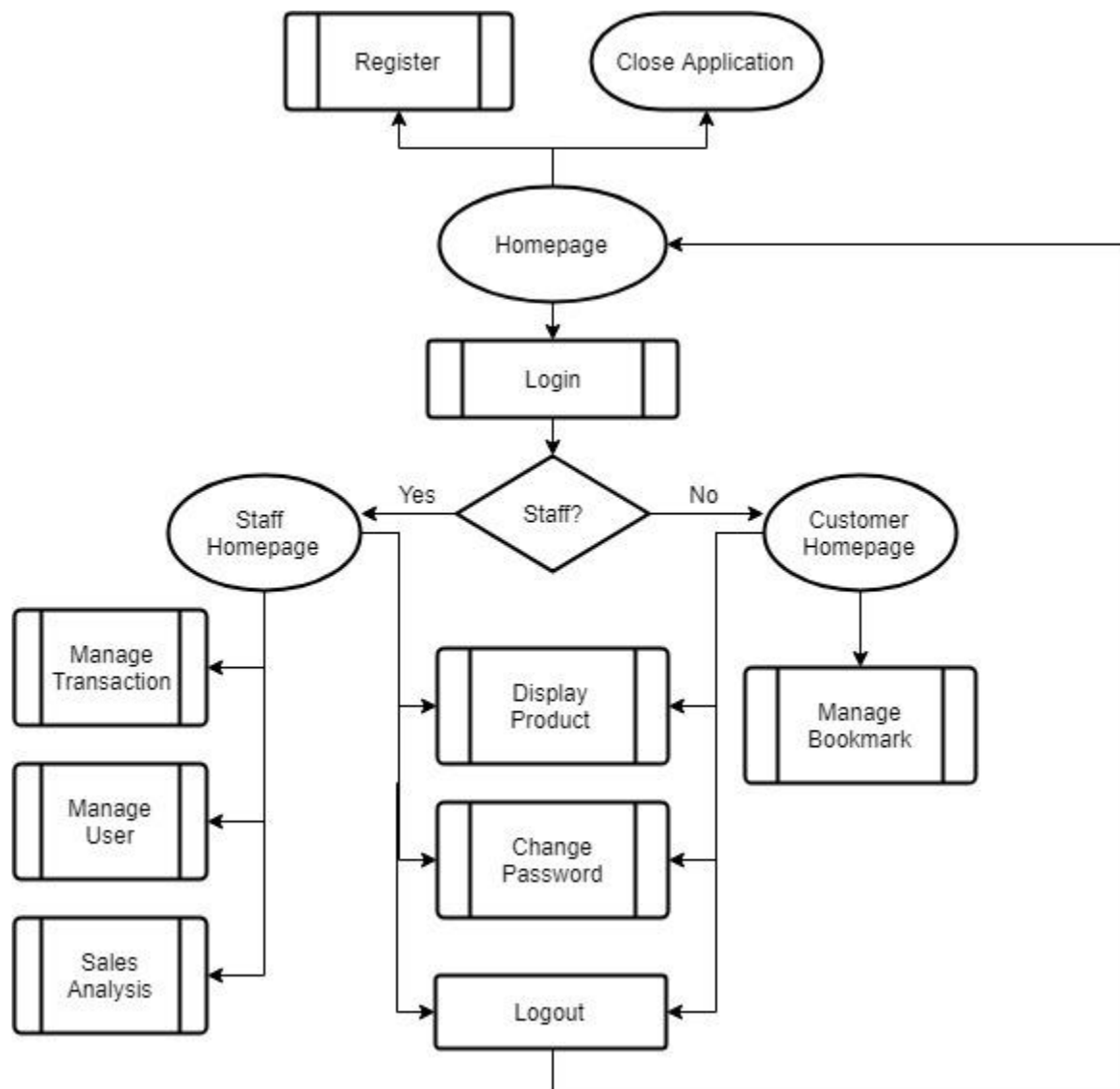
Table of Contents

Design and Implementation

Overall Design

The point-of-sale system provides an interface for both its staff and customer.

It contains functions including product, transaction and bookmark management and sales analysis. Register and login systems are also included.

Homepage

```
Welcome to ABC supermarket!

***********************************************

1 - Staff login
2 - Customer login
3 - New user register
4 - Close application

Your choice :
```

At first, users will be led to the homepage to input their choices for further actions.

When inputting their choice, a validation check is applied to ensure all inputs lies within 1-4.

```
Welcome to ABC supermarket!

***************************************

1 - Staff login
2 - Customer login
3 - New user register
4 - Close application

Your choice : 5
Invalid choice! Please enter again
Your choice :
```
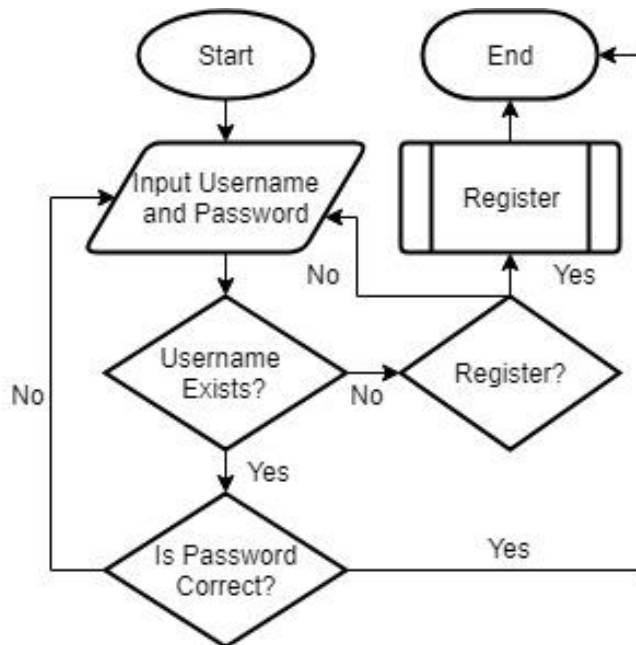
If choice 1 is inputted, users will be led to the login page for staff.

If choice 2 is inputted, users will be led to the login page for customer.

If choice 3 is inputted, users will be led to the register page to register a new customer account.

If choice 4 is inputted, the application will be closed after displaying a 'thank you' message.

Login

In the login page, user will be required to input their username and password.

Staff login


```
Please input your username : admin
Please input your password : adminpw
```

Customer login


```
Please input your username : customerA
Please input your password : cusa
```
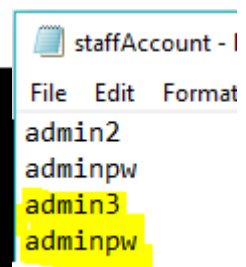
After inputting, the system will retrieve the database of either staff or customer account, depending on which type of login the user chose, to check if the pair of username and password exists.

If users entered a username that does not exist, user can choose to register a new customer account or re-enter the username.

```
Please input your username : cus
Please input your password : cus
Invalid username!
Register? (Y/N)
```

Afterwards, a verification check is carried out. If the user entered a password that does not match with the inputted username, the verification check is failed. The will be required to re-enter both the username and password to verify his/her identity.

```
Please input your username : admin3
Please input your password : adm
Wrong password! Please input again
Please input your username :
```

staffAccount - |

File Edit Format

admin2
adminpw
admin3
adminpw

If the user entered a pair of correct username and password, he or she will be led to either the customer homepage or staff homepage.

Register
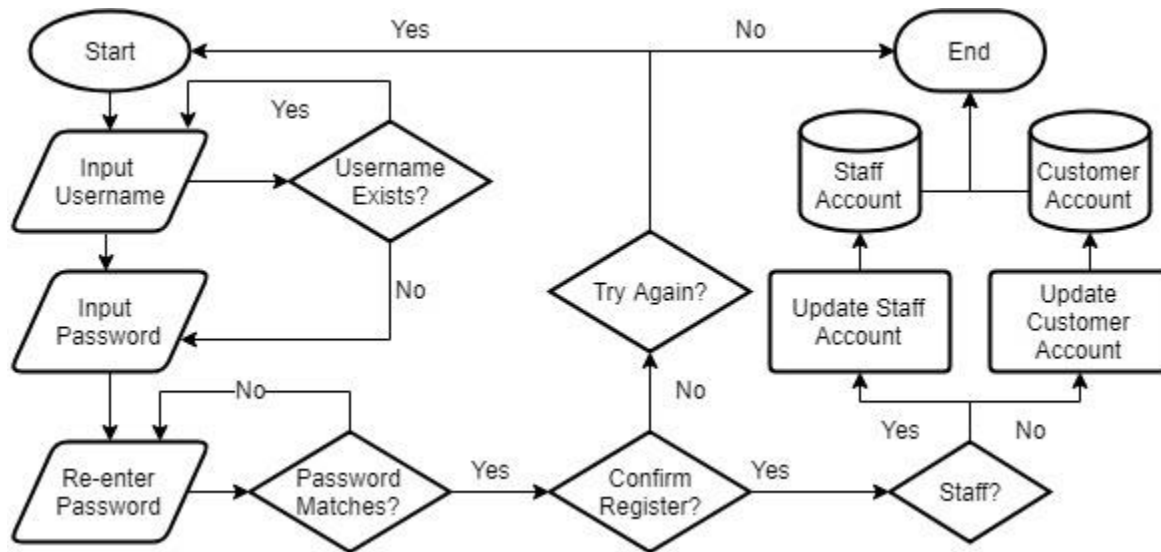
User will first be requested to input a username.

If the username is shorter than 6 characters, the user will be asked to enter another username.

```
Please input the following details
Username : cus
Username must be at least 6 characters! Please enter again
Username :
```

If the username already exists, he or she will be asked to enter another username.

```
Please input the following details
Username : customerA
Username already exists, please input another username
Username :
```

```
customerAccount -
File  Edit  Format  Vi
customerA
cusa
customerB
cusb
customerC
cusc
```

Then the user will be requested to enter a password.
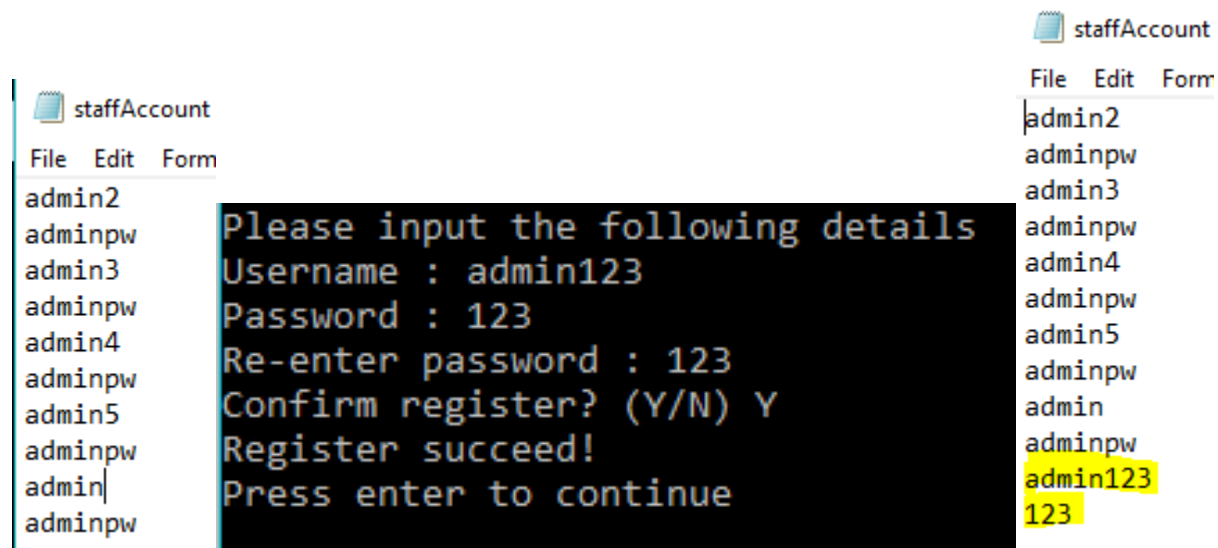
After entering the password, user will be requested to re-enter the password for verification purpose.

```
Please input the following details
Username : customerF
Password : cusF
Re-enter password :
```

A verification check is carried out, if the re-entered password is not same as the original one, the user is required to enter again.

```
Please input the following details
Username : customerF
Password : cusF
Re-enter password : cus
Password does not match, please enter again
Re-enter password :
```

After verifying the username and password, if the user confirms the register, the database storing staff/customer account would be updated.


```
Please input the following details
Username : admin123
Password : 123
Re-enter password : 123
Confirm register? (Y/N) Y
Register succeed!
Press enter to continue
```

The user will then be led back to the application homepage, he or she will be able to login to the new account.

Staff Homepage

```
Welcome admin!

********************************************

1 - Transaction
2 - Manage user
3 - Manage stock
4 - Sale analysis
5 - Logout
6 - Change password

Your choice?
```

The staff interface provides functions related to operation management for staff.

Upon inputting the choices, a validation check is carried out to ensure the input lies within 1-6.

```
1 - Transaction
2 - Manage user
3 - Manage stock
4 - Sale analysis
5 - Logout
6 - Change password

Your choice? a
Invalid choice! Please enter again
```

If choice 1 is inputted, the user is led to transaction management page.

If choice 2 is inputted, the user is led to user management page.

If choice 3 is inputted, the user is led to stock management page.

If choice 4 is inputted, the user is led to sales analysis page.

If choice 5 is inputted, the user is logged out and led to application homepage.

If choice 6 is inputted, the user is led to password-changing page for his/her own account.

Transaction
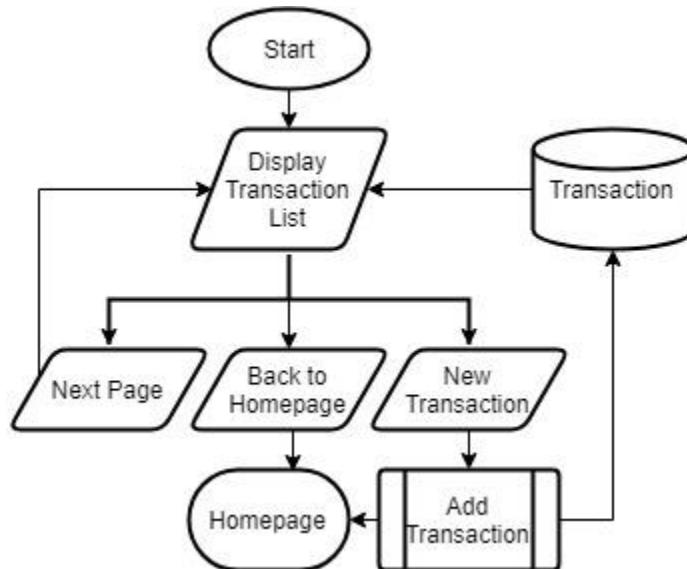
After entering the transaction homepage, a list of transaction record sorted in descending order of date is displayed. Details including transaction ID, date, product information and quantity are shown.

```
Transaction HomePage
Page 1

ID         Date               Product ID    Product Name     Quantity      Price
00000029   06/10/2018 17:07   00006         product6         12            540.00
00000028   06/10/2018 17:07   00001         Product name     25            375.00
00000027   06/10/2018 17:06   00003         Product 3        5             45.00
00000026   06/10/2018 17:06   00001         Product name     15            225.00

New transaction : Press 1
Back to homepage : Press 2
Your choice :
```

A validation check is carried out when inputting choice to ensure they lie within 1 and 2 or 1 and 3(when there are multiple pages).

```
1 - New transaction
2 - Back to homepage
Your choice : 0
Invalid choice! Please enter again
Your choice :
```

Next Page Function

If there are more than 20 transactions, they will be shown in different pages, each page displaying 20 transactions.

```
Transaction HomePage
Page 1

ID         Date                 Product ID    Product Name       Quantity       Price
00000031   24/02/2019 16:14     00006         product6           4              180.00
00000030   24/02/2019 16:13     00007         product 7          5              30.00
00000029   24/02/2019 16:13     00006         product6           2              90.00
00000028   24/02/2019 16:13     00007         product 7          1              7.50
00000027   24/02/2019 16:13     00006         product6           13             585.00
00000026   24/02/2019 16:12     00006         product6           1              45.00
00000025   24/02/2019 16:12     00005         product5           5              100.00
00000024   24/02/2019 16:12     00005         product5           3              75.00
00000023   24/02/2019 16:12     00002         Product name2      2              30.75
00000022   24/02/2019 16:12     00007         product 7          2              15.00
00000021   24/02/2019 16:09     00007         product 7          1              7.50
00000020   24/02/2019 16:03     00006         product6           1              45.00
00000019   24/02/2019 15:57     00007         product 7          2              15.00
00000018   24/02/2019 15:57     00006         product6           3              135.00
00000017   24/02/2019 15:57     00001         Product name       9              135.00
00000016   24/02/2019 15:56     00005         product5           2              50.00
00000015   24/02/2019 15:56     00008         product8           3              64.05
00000014   24/02/2019 15:55     00006         product6           6              270.00
00000013   24/02/2019 15:55     00008         product8           12             256.20
00000012   24/02/2019 15:49     00001         Product name       5              75.00

1 - New transaction
2 - Back to homepage
3 - Next page
Your choice :
```

```
Transaction HomePage
Page 2

ID         Date                 Product ID    Product Name       Quantity       Price
00000011   24/02/2019 15:42     00002         Product name2      4              61.50
00000010   24/02/2019 15:38     00005         product5           3              75.00
00000009   24/02/2019 15:36     00005         product5           3              75.00
00000008   24/02/2019 15:28     00007         product 7          7              37.50
00000007   24/02/2019 15:28     00007         product 7          5              30.00
00000006   24/02/2019 15:27     00007         product 7          2              15.00
00000005   24/02/2019 15:25     00007         product 7          2              15.00
00000004   24/02/2019 15:15     00002         Product name2      1              15.37
00000003   24/02/2019 15:15     00003         Product 3          10             90.00
00000002   24/02/2019 15:14     00001         Product name       1              15.00
00000001   24/02/2019 15:14     00001         Product name       5              75.00

1 - New transaction
2 - Back to homepage
Your choice :
```
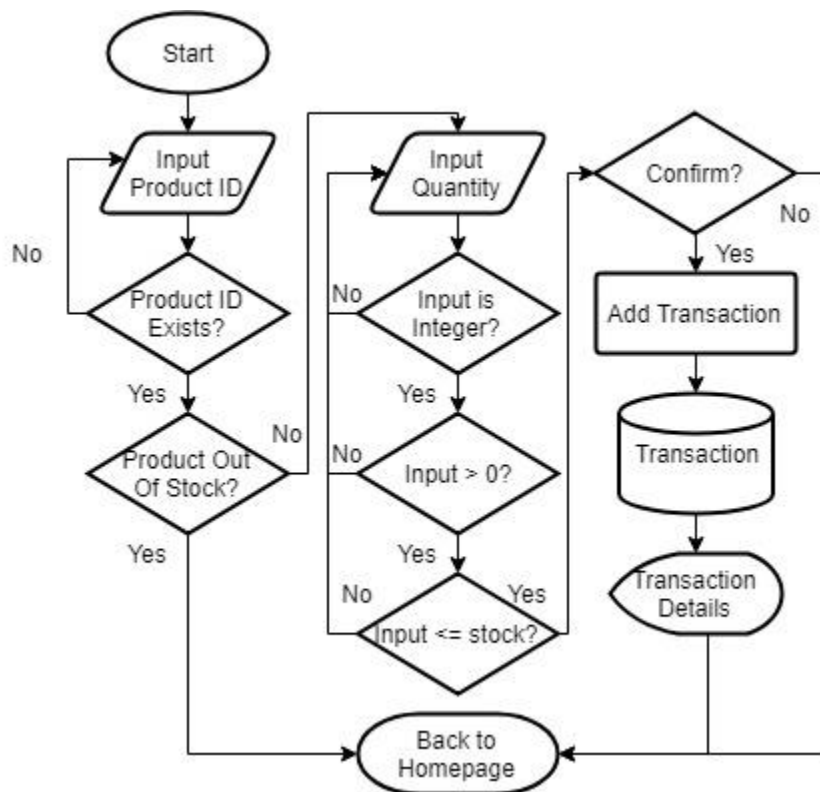
New Transaction

To add new transaction, user will need to input product ID and quantity.

If user entered an invalid product ID, he or she will be required to enter again.

```
New Transaction

Product ID : 0000001
Invalid product ID! Please enter again
Product ID :
```

If the product is out of stock, the transaction will be stopped, and the user will be led back to transaction homepage.

```
New Transaction

Product ID : 00005
Product out of stock!
Press enter to continue
```

If the quantity entered cannot pass the validation check, the user will be required to re-enter the quantity.

```
New Transaction

Product ID : 00001
Quantity : 10000
Current stock : 24
Please enter again
Quantity : 0.5
Invalid input! Please enter again
Quantity : -5
```

After confirming, the system will automatically generate other details including transaction ID, date and price of the transaction.

```
New Transaction

Product ID : 00001
Quantity : 15
Confirm? (Y/N)Y

Trasaction successful!
Transaction ID : 00000005
Date : 02/11/2018 22:08
Product ID : 00001
Product Name : Product name
Quantity : 15
Price : 225.00
Press enter to continue
```

After adding the new transaction, the user will be led back to transaction homepage, the transaction added just now will also be displayed at the top of the list.

```
Transaction HomePage
Page 1

ID         Date                Product ID    Product Name      Quantity      Price
00000005   02/11/2018 22:08    00001         Product name      15            225.00  <-
00000029   06/10/2018 17:07    00006         product6          12            540.00
00000028   06/10/2018 17:07    00001         Product name      25            375.00
00000027   06/10/2018 17:06    00003         Product 3         5             45.00
00000026   06/10/2018 17:06    00001         Product name      15            225.00

New transaction : Press 1
Back to homepage : Press 2
Your choice :
```

User Management
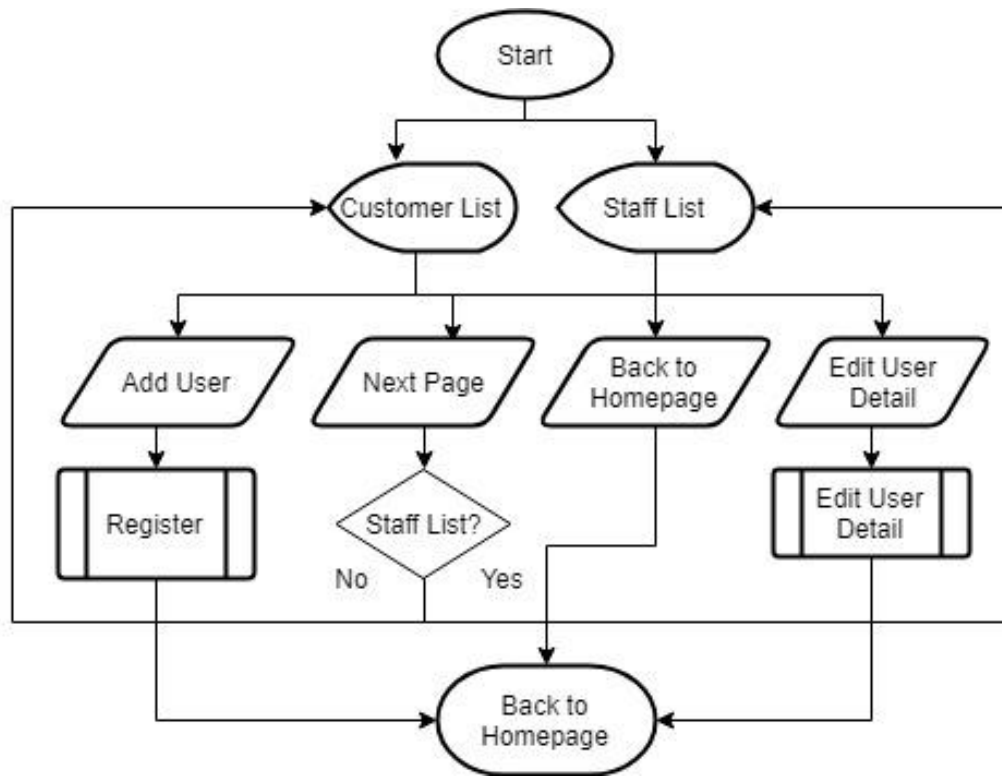
User can choose to manage staff or customer account.

```
1 - Manage staff account
2 - Manage customer account
Your choice :
```

A validation check is carried out to ensure the input choice lies within 1 and 2.

```
1 - Manage staff account
2 - Manage customer account
Your choice : 3
Invalid choice! Please input again
Your choice :
```

```
1 - Manage staff account
2 - Manage customer account
Your choice : lkj
Invalid choice! Please input again
Your choice :
```

If the user chooses '1', he or she will be led to the staff account management page. A list of staff account (username + password) is displayed.

```
Manage staff account
Page 1

Username                Password
admin2                  adminpw
admin3                  adminpw
admin4                  adminpw
admin5                  adminpw
admin                   adminpw

1 - Add user
2 - Manage user
3 - Back to homepage
Your choice :
```

If the user chooses '2', he or she will be led to the customer account management page. A list of customer account (username + password) is displayed.

```
Manage customer account
Page 1

Username                Password
customerA               cusa
customerB               cusb
customerC               cusc
customerD               cusd

1 - Add user
2 - Manage user
3 - Back to homepage
Your choice :
```

Next Page Function

If the number of accounts exceeds 20, they will be shown in different pages, each page displaying 20 accounts.

```
Manage staff account
Page 1

Username              Password
admin2                adminpw
admin3                adminpw
admin4                adminpw
admin5                adminpw
admin                 adminpw
admin123              123
admin1                pw1
admin6                pw6
admin7                pw7
adm8                  p8
staff9                stf9
admin10               pw10
admin11               pw11
admin12               pw12
admin13               pw13
adm14                 p14         Manage staff account
staff15               pw15        Page 2
user16                password16
admin17               adm17       Username              Password
staff18               p18         adm19                 pw19

1 - Add user                      1 - Add user
2 - Manage user                   2 - Manage user
3 - Back to homepage              3 - Back to homepage
4 - Next Page                     Your choice :
Your choice :
```

```
Manage customer account
Page 1

Username              Password
ctm001                pw1
ctm002                pw2
ctm003                pw3
ctm004                pw4
ctm005                pw5
ctm006                pw6
ctm007                pw7
ctm008                pw8
ctm009                pw9
ctm010                pw10
ctm011                pw11
ctm012                pw12
ctm013                pw13
ctm014                pw14
ctm015                pw15
ctm016                pw16
ctm017                pw17
ctm018                pw18
ctm019                pw19
ctm020                pw20

1 - Add user
2 - Manage user
3 - Back to homepage
4 - Next Page
Your choice : 4
```

```
Manage customer account
Page 2

Username              Password
ctm021                pw21

1 - Add user
2 - Manage user
3 - Back to homepage
Your choice :
```

A validation check is carried out to ensure that the input lies within 1-3 or 1-4(if there is next page).

```
1 - Add user
2 - Manage user
3 - Back to homepage
Your choice : 4
Invalid choice! Please enter again
Your choice :
```

```
1 - Add user
2 - Manage user
3 - Back to homepage
Your choice : 0
Invalid choice! Please enter again
```

If the user chooses '1', he or she will be led to the register page. He or she will then be able to create a new account, account type depending on whether the user is managing staff account or customer account.

(Registration page)

```
Please input the following details
Username :
```

Manage user

If the user chooses '2', he or she will be required to input the username of the account to be managed.

```
Manage staff account
Page 1

Username            Password
admin               adminpw
admin3              adminpw

1 - Add user
2 - Manage user
3 - Back to homepage
Your choice : 2

Enter username :
```

After inputting the username, the details of the account will be displayed again.

```
Enter username : admin3
Username : admin3
Password : adminpw

1 - Change password
2 - Delete user

Your choice :
```

If the user enters his or her own account (the account is currently logged in), he or she will not be able to delete the account.

```
Enter username : admin
Username : admin
Password : adminpw


1 - Change password

Your choice :
```

Change password

If the user chooses '1', he or she will be led to the 'change password' page. The user will need to input the old password first, then input the new password twice for verification.

```
Change password

Old password : adminpw
New password : admin
Re-enter password : admin

Password changed successfully!
Press enter to continue
```

The password is immediately updated in the database.

```
Manage staff account          Manage staff account
Page 1                        Page 1

Username        Password      Username        Password
admin           adminpw       admin           admin
admin3          adminpw       admin3          adminpw
```

Delete user

```
Enter username : ctm009
Username : ctm009
Password : pw9
                              ctm007          pw7
                              ctm008          pw8
1 - Change password           ctm010          pw10
2 - Delete user               ctm011          pw11
                              ctm012          pw12
Your choice : 2
```
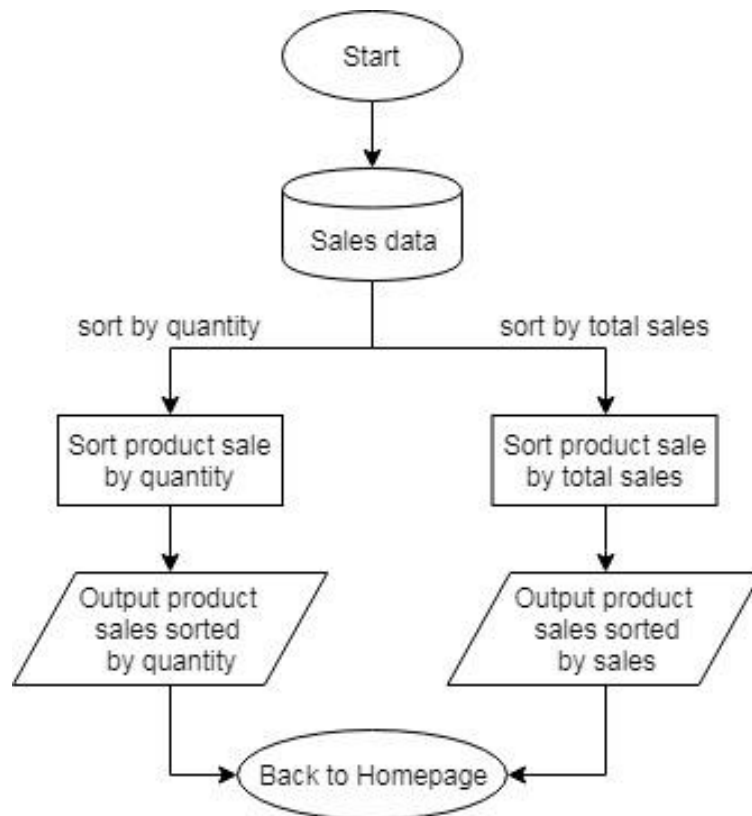
If the user chooses '2', the account will be immediately deleted from the database.

Sales Analysis

Users can choose to display product sales information either sorted in descending quantity or descending total sales.

A validation check is carried out to ensure input lies within 1 and 2.

```
1 - sort by quantity
2 - sort by price
Your choice : 3
Invalid input! Please enter again
Your choice :
```

The program will then retrieve all sales data from the database and sort them according to the user's choice.

If the user chooses '1', the sales information will be displayed in descending quantity sold.

```
Page 1
ID           Quantity        Price
00001        40              600.00
00006        12              540.00
00003        5               45.00
00002        0               0.00
00004        0               0.00
00005        0               0.00
00007        0               0.00
00008        0               0.00

1 - Back to HomePage
Your choice :
```

If the user chooses '2', the sales information will be displayed in descending revenue generated.

```
Page 1
ID           Quantity        Price
00001        40              600.00
00006        12              540.00
00003        5               45.00
00002        0               0.00
00004        0               0.00
00005        0               0.00
00007        0               0.00
00008        0               0.00

1 - Back to HomePage
Your choice :
```
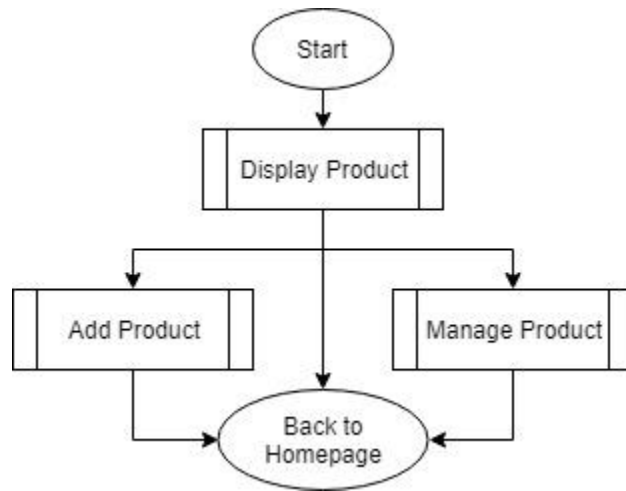
Next Page Function

If the number of products exceeds 20, they will be shown in different pages, each page displaying 20 products.

```
Page 1
ID           Quantity          Price
00007        94                517.50
00002        66                1287.63
00001        36                620.00
00006        33                1485.00
00005        16                375.00
00008        15                320.25
00003        10                90.00
00004        0                 0.00
00009        0                 0.00
00010        0                 0.00
00011        0                 0.00
00012        0                 0.00
00013        0                 0.00
00014        0                 0.00
00015        0                 0.00
00016        0                 0.00
00017        0                 0.00
00018        0                 0.00
00019        0                 0.00
00020        0                 0.00

1 - Back to HomePage
2 - Next Page
Your choice :
```
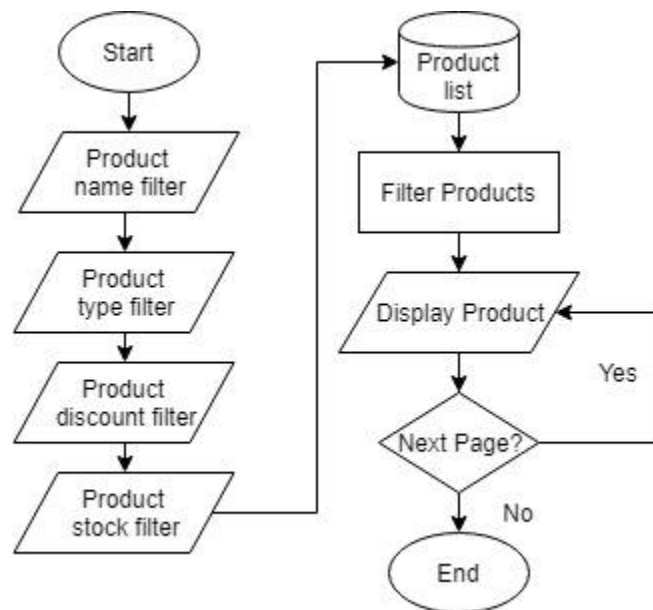
```
Page 2
ID           Quantity          Price
00021        0                 0.00
00022        0                 0.00
00023        0                 0.00

1 - Back to HomePage
Your choice :
```

Product Management

Display Product

Product filtering

User will first be required to input the filter for product display, or simply leave the input blank if no filtering is needed.

It can help user to quickly search for the information of specific products.

```
Leave the input blank if no filtering is needed

Product List

Name :
Type :
Discount?
0 - No discount
1 - X% off
2 - Buy X get X free

Product out of stock? (Y/N)
```

For example, the keyword 'drink' is inputted for product type.

```
Leave the input blank if no filtering is needed

Product List

Name :
Type : drink
Discount?
0 - No discount
1 - X% off
2 - Buy X get X free

Product out of stock? (Y/N)
```

All products displayed have their product type including the keywork 'drink' (case sensitive).

```
Product List
Page 1

Product ID     Product Name     Type          Price     Stock     Discount
00001          product1         drink         20.00     15        N/A
00002          Pd 2             drink         20.00     940       N/A
00009          coca cola        soft drink    7.00      100       N/A
00011          tea              drink         25.00     10        10% off
00015          sprite           soft drink    6.00      200       N/A

1 - Back to homepage
3 - Add product
4 - Manage product
```

If user inputs 'Y' in 'product out of stock?' option, all results displayed have stock equals to 0.

```
Product List
Page 1

Product ID        Product Name        Type                Price     Stock
00003             Product 3           dessert             12.00     0
00004             product4            typec               100.00    0
00005             product5            snack               25.00     0
00008             product8            beverage            30.50     0
```

If user inputs 'N' in 'product out of stock?' option, all results displayed have stock larger than 0.

```
Product ID        Product Name        Type                Price     Stock
00001             product1            drink               20.00     15
00002             Pd 2                drink               20.00     940
00006             product6            snack               45.00     1
00007             product 7           juice               7.50      7
00009             coca cola           soft drink          7.00      100
00010             ice cream           dessert             20.00     15
00011             tea                 drink               25.00     10
00012             cookies             snack               15.50     30
00013             chips               snack               10.50     300
00014             jelly beans         snack               5.00      10
00015             sprite              soft drink          6.00      200
00016             code                program             2000.00   1
00017             coins               cash                5.00      10
00018             fish                seafood             50.00     76
00019             rice                food                99.99     30
00020             apple               fruit               4.00      1000
00021             tea                 drink               7.00      80
```

Next Page Function

If the number of products exceeds 20, they will be shown in different pages, each page displaying 20 products.

```
Product List
Page 1

Product ID        Product Name         Type
00001             product1             drink
00002             Pd 2                 drink
00003             Product 3            dessert
00004             product4             typec
00005             product5             snack
00006             product6             snack
00007             product 7            juice
00008             product8             beverage
00009             coca cola            soft drink
00010             ice cream            dessert
00011             tea                  drink
00012             cookies              snack
00013             chips                snack        Product List
00014             jelly beans          snack        Page 2
00015             sprite               soft drink
00016             code                 program      Product ID        Product Name         Type
00017             coins                cash         00021             tea                  drink
00018             fish                 seafood
00019             rice                 food         1 - Back to homepage
00020             apple                fruit        3 - Add product
                                                    4 - Manage product
1 - Back to homepage
2 - Next page                                       Your choice :
3 - Add product
4 - Manage product
```

A validation check is applied to ensure the input choice lies within 1,3,4 (2 if there is next page).

```
Product List                              Product List
Page 1                                    Page 1

Product ID        Product Name            Product ID        Product Name
00003             Product 3               00003             Product 3
00004             product4                00004             product4
00005             product5                00005             product5
00008             product8                00008             product8


1 - Back to homepage                      1 - Back to homepage
3 - Add product                           3 - Add product
4 - Manage product                        4 - Manage product


Your choice : 2                           Your choice : 0
Invalid choice! Please enter again        Invalid choice! Please enter again
```
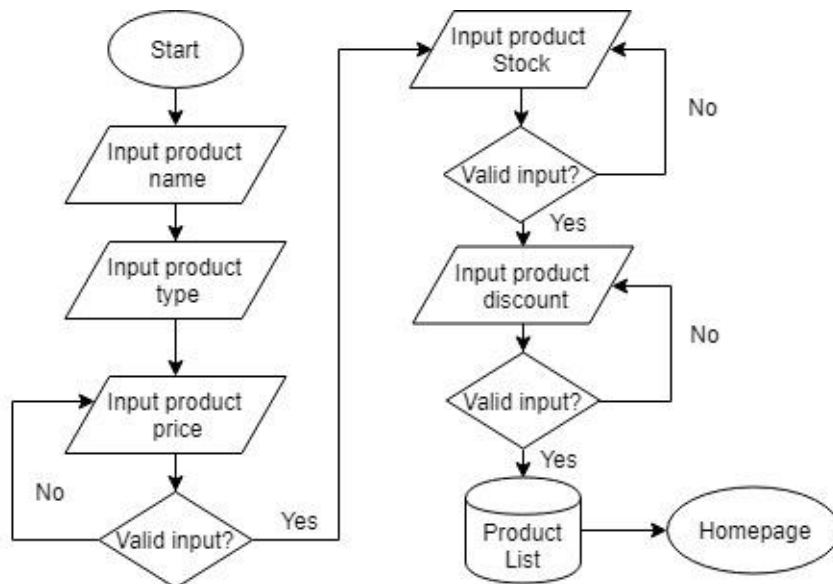
If the user inputs '1', he or she will be led back to staff homepage.

If the user inputs '2', the next page will be displayed (if there is next page).

If the user inputs '3', he or she will be led to the 'add product' page.

If the user inputs '4', he or she will be led to the 'manage product' page.

Add Product

In the new product page, user will be asked to input product details including name, type, price, stock and discounts.

```
Add new product

Product name : Milk Tea
Product type : drink
Price : 15
Stock : 30
Discount?
1 - X% off
2 - Buy X get X free
3 - No discount
3
Confirm add product?(Y/N) Y
```

A product ID is automatically generated, the product will then be added to the database.

```
Product List
Page 2

Product ID      Product Name        Type            Price       Stock           Discount
00021           tea                 drink           7.00        80              Buy 10 get 1 free
00022           Milk Tea            drink           15.00       30              N/A

1 - Back to homepage
3 - Add product
4 - Manage product

Your choice :
```

Validation checks

A validation check is carried out on product name and type to ensure the input is a non-null string.

```
Add new product

Product name :
Product name cannot be null! Please enter again
Product name :
```

```
Add new product

Product name : tissue paper
Product type :
Product type cannot be null! Please enter again
Product type :
```

A validation check is carried out on product price to ensure the value inputted is a non-negative real number.

```
Add new product

Product name : dumplings
Product type : food
Price : -5
Invalid input! Please enter again
Price :
```

```
Add new product

Product name : dumplings
Product type : food
Price : price!
Invalid input! Please enter again
Price :
```

A validation check is carried out on product stock to ensure the value inputted is a non-negative integer.

```
Add new product

Product name : dumplings
Product type : food
Price : 10
Stock : 1.5
Invalid input! Please enter again
Stock :
```

```
Add new product

Product name : dumplings
Product type : food
Price : 10
Stock : stock!
Invalid input! Please enter again
Stock :
```

A validation check is carried out on product discount choice to ensure the value lies within 1 - 3.

```
Discount?
1 - X% off
2 - Buy X get X free
3 - No discount
4
Invalid choice! Please enter again
```

```
Discount?
1 - X% off
2 - Buy X get X free
3 - No discount
0
Invalid choice! Please enter again
```

A validation check is carried out on confirmation message to ensure the value is 'Y' or 'N'.

```
Confirm add product?(Y/N)
Invalid choice! Please enter again
Confirm add product?(Y/N)
```

```
Confirm add product?(Y/N) y
Invalid choice! Please enter again
Confirm add product?(Y/N)
```

Manage Product

After inputting the product ID, the original details of the product are displayed.

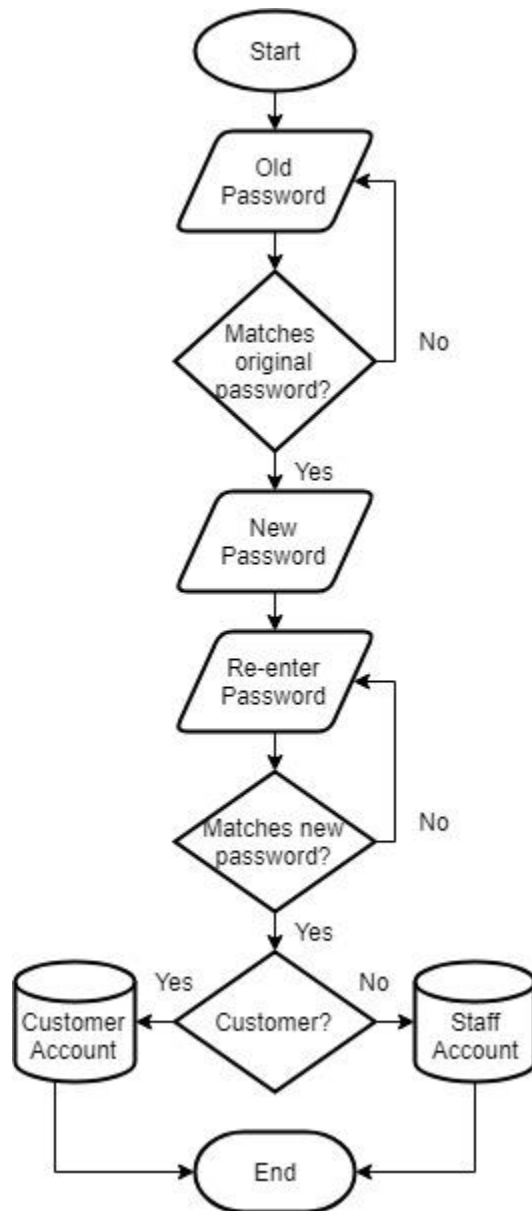The user will then have to input the new information of the product.

```
Enter product ID : 00021
Product name : tea
New name : oolong tea
Product type : drink
New type : drink
Price : 7.00
New price : 10
Stock : 80
New stock : 100
```

The product information is immediately updated in the database.

```
Product List
Page 2

Product ID      Product Name      Type              Price      Stock         Discount
00021           oolong tea        drink             10.00      100           Buy 7 get 1 free
00022           Milk Tea          drink             15.00      30            N/A

1 - Back to homepage
3 - Add product
4 - Manage product

Your choice :
```

Validation checks

A validation check is carried out on product name and type to ensure the input is a non-null string.

```
Enter product ID : 00023
Product name : tissue
New name :
Product name cannot be null! Please enter again
New name :
```

```
Enter product ID : 00023
Product name : tissue paper
New name : tissue
Product type : daily
New type :
Product type cannot be null! Please enter again
New type :
```

A validation check is carried out on product price to ensure the value inputted is a non-negative real number.

```
Enter product ID : 00023
Product name : tissue
New name : tissue paper
Product type : daily
New type : daily
Price : 13.00
New price : -10
Invalid input! Please enter again
New price :
```

A validation check is carried out on product stock to ensure the value inputted is a non-negative integer.

```
Enter product ID : 00023
Product name : tissue paper
New name : tissue
Product type : daily
New type : daily
Price : 15.00
New price : 15
Stock : 40
New stock : -089
Invalid input! Please enter again
New stock :
```

A validation check is carried out on product discount choice to ensure the value lies within 1 - 3.

```
Discount?
1 - X% off
2 - Buy X get X free
3 - No discount
4
Invalid choice! Please enter again
```

```
Discount?
1 - X% off
2 - Buy X get X free
3 - No discount
0
Invalid choice! Please enter again
```

Change Password

To verify the user, the program will first require the user to input his/her original password.

```
Change password

Old password :
```

If the password in incorrect, the user would be required to re-enter it.

```
Old password : adm
Wrong password! Please enter again
```

After inputting the correct original password, the program will ask the user to input new password.

```
Old password : adminpw
New password :
```

The program would require the user to re-enter the new password for verification.

```
New password : 1234testing
Re-enter password :
```

If the 2 inputted passwords do not match, user would be required to re-input it.

```
New password : password
Re-enter password : PASSWORD
Password does not match, please enter again
```

After successfully inputting the passwords, a confirmation message would be shown, and the password of the user will be updated immediately.

```
New password : password123
Re-enter password : password123

Password changed successfully!
Press enter to continue
```

Customer Homepage

```
Welcome customerA!

********************************************

1 - Display Product
2 - Manage Bookmark
3 - Change Password
4 - Logout

Your choice :
```

The customer interface provides functions for customers to check out product details and the bookmark function to facilitate shopping.

Upon inputting the choices, a validation check is carried out to ensure the input lies within 1-4.

If choice 1 is inputted, the user is led to product display page.

If choice 2 is inputted, the user is led to bookmark management page.

If choice 3 is inputted, the user is led to password-changing page for his/her own account.

If choice 4 is inputted, the user is logged out and led to application homepage.

Display Product

Display Product

Product filtering

User will first be required to input the filter for product display, or simply leave the input blank if no filtering is needed.

It can help user to quickly search for the information of specific products.

```
Leave the input blank if no filtering is needed

Product List

Name :
Type :
Discount?
0 - No discount
1 - X% off
2 - Buy X get X free

Product out of stock? (Y/N)
```

For example, the keyword 'drink' is inputted for product type.

```
Leave the input blank if no filtering is needed

Product List

Name :
Type : drink
Discount?
0 - No discount
1 - X% off
2 - Buy X get X free

Product out of stock? (Y/N)
```

All products displayed have their product type including the keywork 'drink' (case sensitive).

```
Product List
Page 1

Product ID      Product Name      Type              Price      Stock      Discount
00001           product1          drink             20.00      15         N/A
00002           Pd 2              drink             20.00      940        N/A
00009           coca cola         soft drink        7.00       100        N/A
00011           tea               drink             25.00      10         10% off
00015           sprite            soft drink        6.00       200        N/A
```

If user inputs 'Y' in 'product out of stock?' option, all results displayed have stock equals to 0.

```
Product List
Page 1

Product ID        Product Name        Type              Price      Stock
00003             Product 3           dessert           12.00      0
00004             product4            typec             100.00     0
00005             product5            snack             25.00      0
00008             product8            beverage          30.50      0
```

If user inputs 'N' in 'product out of stock?' option, all results displayed have stock larger than 0.

```
Product ID        Product Name        Type              Price      Stock
00001             product1            drink             20.00      15
00002             Pd 2                drink             20.00      940
00006             product6            snack             45.00      1
00007             product 7           juice             7.50       7
00009             coca cola           soft drink        7.00       100
00010             ice cream           dessert           20.00      15
00011             tea                 drink             25.00      10
00012             cookies             snack             15.50      30
00013             chips               snack             10.50      300
00014             jelly beans         snack             5.00       10
00015             sprite              soft drink        6.00       200
00016             code                program           2000.00    1
00017             coins               cash              5.00       10
00018             fish                seafood           50.00      76
00019             rice                food              99.99      30
00020             apple               fruit             4.00       1000
00021             tea                 drink             7.00       80
```

Next Page Function

If the number of products exceeds 20, they will be shown in different pages, each page displaying 20 products.

```
Product List
Page 1

Product ID        Product Name          Type
00001             orange                fruit
00002             Pd 2                  drink
00003             Product 3             dessert
00004             product4              typec
00005             product5              snack
00006             product6              snack
00007             product 7             juice
00008             product8              beverage
00009             coca cola             soft drink
00010             ice cream             dessert
00011             tea                   drink
00012             cookies               snack
00013             chips                 snack        Product List
00014             jelly beans           snack        Page 2
00015             sprite                soft drink
00016             code                  program      Product ID        Product Name          Type
00017             coins                 cash         00021             oolong tea            drink
00018             fish                  seafood      00022             Milk Tea              drink
00019             rice                  food         00023             tissue                daily
00020             apple                 fruit

1 - Back to homepage                                 1 - Back to homepage
2 - Next page                                        3 - Add Bookmark
3 - Add Bookmark
                                                     Your choice :
Your choice :
```

A validation check is applied to ensure the choice input lies within 1 and 3 (also 2 if there is next page)

```
1 - Back to homepage                    1 - Back to homepage
3 - Add Bookmark                        3 - Add Bookmark

Your choice : 2                         Your choice : 4
Invalid choice! Please enter again      Invalid choice! Please enter again
Your choice :                           Your choice :
```

If the user inputs '1', he or she will be led back to customer homepage.

If the user inputs '2', the next page will be displayed (if there is next page).

If the user inputs '3', he or she will be led to the 'add bookmark' function.

Add Bookmark
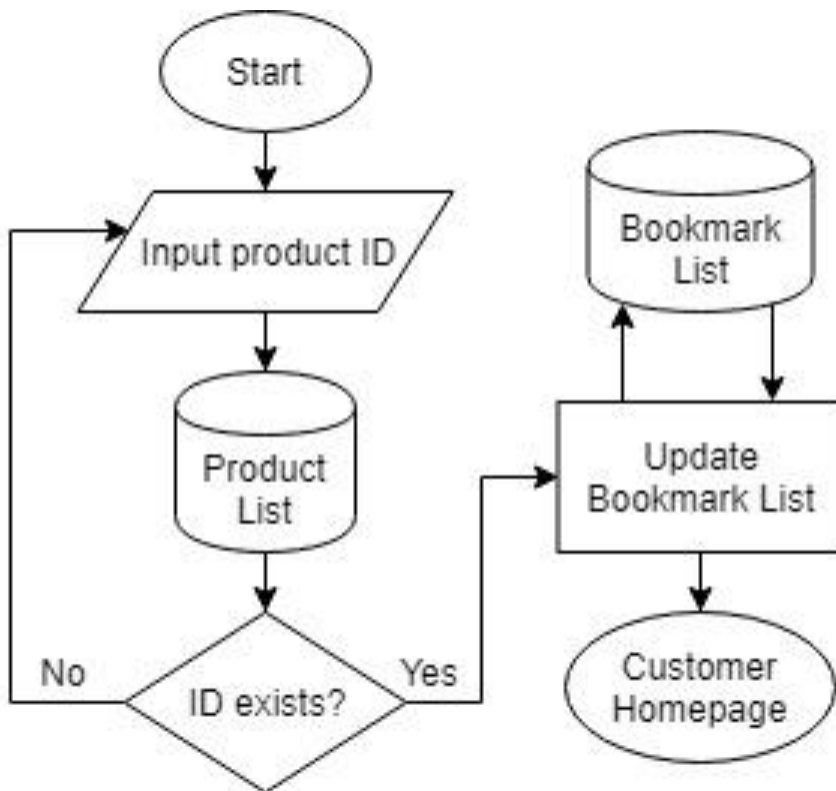
User can input the ID of the product he or she wants to bookmark.

```
Product List
Page 2

Product ID       Product Name            Type
00021            oolong tea              drink
00022            Milk Tea                drink
00023            tissue                  daily

1 - Back to homepage
3 - Add Bookmark

Your choice : 3
Enter Product ID : 00021
```

A validation check is carried out to ensure the input is an existing product ID.

```
Product List
Page 2

Product ID      Product Name          Type
00021           oolong tea            drink
00022           Milk Tea              drink
00023           tissue                daily

1 - Back to homepage
3 - Add Bookmark


Your choice : 3
Enter Product ID : 99999
Invalid input! Please enter again
Enter Product ID :
```

Afterwards, the product information will appear on the "manage bookmark" page of user's account.

```
Page 1
Product ID      Product Name          Type
00021           oolong tea            drink
00001           orange                fruit

1 - Delete Bookmark
2 - Back to HomePage
Your choice :
```

Manage Bookmark
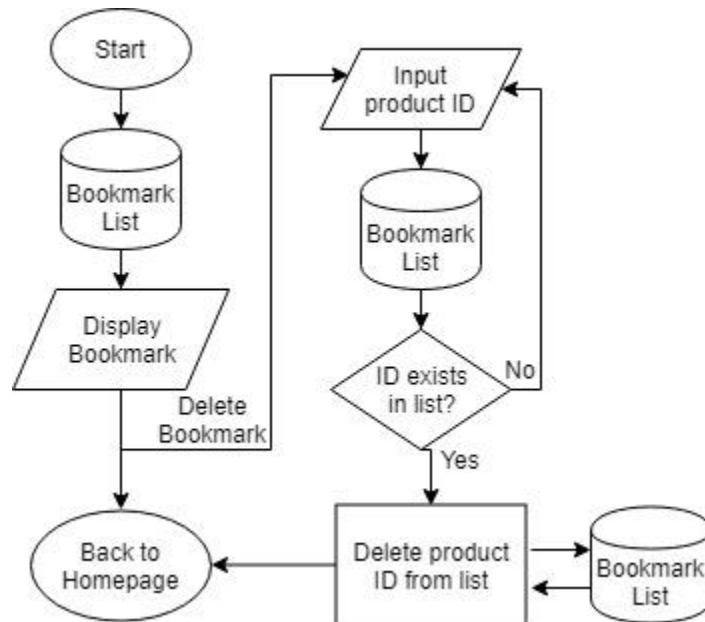
The application will retrieve bookmarks from the database and display the details of the bookmarked products.

```
Page 1
Product ID      Product Name        Type                Price       Stock           Discount
00005           product5            snack               25.00       0               Buy 3 get 1 free
00021           oolong tea          drink               10.00       100             Buy 7 get 1 free
00001           orange              fruit               15.00       400             N/A

1 - Delete Bookmark
2 - Back to HomePage
Your choice :
```

A validation check is carried out to ensure the input lies within 1, 2 (3 if there is next page).

```
Page 2                              Page 2
Product ID      Product Name        Product ID          Product Name
00019           rice                00019               rice
00022           Milk Tea            00022               Milk Tea

1 - Delete Bookmark                 1 - Delete Bookmark
2 - Back to HomePage                2 - Back to HomePage
Your choice : 3                     Your choice : 0
Invalid input! Please enter again   Invalid input! Please enter again
Your choice :                       Your choice :
```

Next Page Function

If the number of bookmarked products exceeds 20, they will be shown in different pages, each page displaying 20 products.

```
Page 1
Product ID      Product Name      Type
00020           apple             fruit
00005           product5          snack
00021           oolong tea        drink
00001           orange            fruit
00002           Pd 2              drink
00003           Product 3         dessert
00004           product4          typec
00006           product6          snack
00007           product 7         juice
00008           product8          beverag
00009           coca cola         soft d
00010           ice cream         dessert
00011           tea               drink
00012           cookies           snack
00013           chips             snack
00014           jelly beans       snack
00015           sprite            soft
00016           code              progr   Page 2
00017           coins             cash    Product ID      Product Name      Type
00018           fish              seafoo  00019           rice              food
                                          00022           Milk Tea          drink
1 - Delete Bookmark
2 - Back to HomePage                      1 - Delete Bookmark
3 - Next Page                             2 - Back to HomePage
Your choice :                             Your choice :
```

Delete Bookmark

The user will be required to input the product ID he or she wants to delete. It will be immediately removed from the database.

```
Page 2
Product ID      Product Name      Type
00019           rice              food
00022           Milk Tea          drink

1 - Delete Bookmark                 Page 2
2 - Back to HomePage                Product ID      Product Name
Your choice : 1                     00019           rice
Delete Bookmark

Enter product ID : 00022            1 - Delete Bookmark
                                    2 - Back to HomePage
                                    Your choice :
```

Change Password

To verify the user, the program will first require the user to input his/her original password.

```
Change password

Old password :
```

If the password in incorrect, the user would be required to re-enter it.

```
Old password : adm
Wrong password! Please enter again
```

After inputting the correct original password, the program will ask the user to input new password.

```
Old password : adminpw
New password :
```

The program would require the user to re-enter the new password for verification.

```
New password : 1234testing
Re-enter password :
```

If the 2 inputted passwords do not match, user would be required to re-input it.

```
New password : password
Re-enter password : PASSWORD
Password does not match, please enter again
```

After successfully inputting the passwords, a confirmation message would be shown, and the password of the user will be updated immediately.

```
New password : password123
Re-enter password : password123

Password changed successfully!
Press enter to continue
```

Procedure List

Name	Use
init	Read count of users, transactions and products from 'count.txt' into global variables. Initialize string formatting variables.
resetCount	Update count of users, transactions and products to 'count.txt' from global variables.
loginPage	Main homepage displayed, direct user to "staff login", "customer login", "new user register" and "close application".
login	Verify the login account. If the user is verified, it directs user to staff or customer homepage; else it directs user to register.
userRegister	Register a new user account.
staffHomepage *(staff only)*	Staff homepage, direct user to "transactionHome", "manageUser", "searchProduct", "saleAnalysis", "changePassword" or logout.
changePassword	Change password of current user account.
transactionHome *(staff only)*	Display transaction information and directs user to "newTransaction" or back to homepage.
newTransaction *(staff only)*	Add new transaction and update related databases ('transaction.txt', 'product.txt', 'sales.txt').
manageUser *(staff only)*	Display information of staff or customer user. Direct user to "userRegister", "staffUserDetail" or back to homepage.
staffUserDetail *(staff only)*	Display details of user and allow current user to change password or delete the account.
searchProduct	Carry product filtering, passes results to "displayStock".
displayStock	Display products information based on filtering from "searchProduct". Direct user to "newProduct", "editStockDetail", "addBookmark" or logout.
newProduct *(staff only)*	Add new product.
editStockDetail *(staff only)*	Change the details of an existing product.
saleAnalysis *(staff only)*	Display sales information of products and allow sorting by revenue or quantity.
addBookmark *(customer only)*	Add the product to bookmark list of the user.
customerHomepage *(customer only)*	Customer homepage, direct user to "searchProduct", "customerBookmark", "changePassword" or logout.
customerBookmark *(customer only)*	Display bookmark list of current user. Direct user to "deleteBookmark" or back to homepage.
deleteBookmark *(customer only)*	Delete the product from bookmark list of the customer.

Database List

Name	Use
bookmark.txt	Store bookmark list of customer user.
count.txt	Store count of staff user, customer user, transaction, product.
customerAccount.txt	Store customer username and password.
product.txt	Store product ID, name, type, price, stock and discount.
sales.txt	Store product ID, quantity and revenue.
staffAccount.txt	Store staff username and password.
transaction.txt	Store transaction ID, date and time, product ID, product name, quantity and revenue.

Variable List

Global Variable

Count

Name	Type	Use
staffNumber		Store number of staff user
customerNumber	Longint	Store number of customer user
transactionNumber		Store number of transactions
productNumber		Store number of products

Formatting

Name	Type	Use
fmtID		Format transaction ID
fmtDate		Format date
fmtName	String	Format name
fmtProductID		Format product ID
fmtQuantity		Format quantity
fmtPrice		Format price

Loop Counter

Name	Type	Use
i		Loop counter
j	Integer	Loop counter
k		Loop counter

Local Variable

init

Name	Type	Use
inp	Text	Input from 'count.txt'

resetCount

Name	Type	Use
op	Text	Output to 'count.txt'

Login

Name	Type	Use
tmpUsername	String	Store username read from database
tmpPassword		Store password read from database
pw	Boolean	Check if login username is found in database
us		Check if login password is correct
x	Longint	Parameter to specify whether the operation is for customer or staff user
inp	Text	Input from 'staffAccount.txt' or 'customerAccount.txt'

userReigster

Name	Type	Use
tmpUsername	String	Store username read from database
tmpPassword		Store password read from database
username		Registration username
password		Registration password
pw	Boolean	Check if login username is found in database
us		Check if login password is correct
x	Longint	Parameter to specify whether the operation is for customer or staff user
inp	Text	Input from 'staffAccount.txt' or 'customerAccount.txt'
op		Output to 'staffAccount.txt' or 'customerAccount.txt'

changePassword

Name	Type	Use
tmpUsername	String	Store username read from database
tmpPassword		Store password read from database
tusername		Username of user to be changed.
tpassword		Password of user to be changed.
fileName		The name of database to be edited.
x	Longint	Parameter to specify whether the operation is for customer or staff user
inp	Text	Input from 'staffAccount.txt' or 'customerAccount.txt'
op		Output to 'staffAccount.txt' or 'customerAccount.txt'

transactionHome

Name	Type	Use
transactionID	String	Transaction ID
date		Transaction date
productID		Transaction product ID
productName		Transaction product name
quantity		Transaction product quantity
price		Transaction total price
page	Longint	Current display page number
lc		Total number of pages of transaction
inp1	Text	Input from 'transaction.txt'

newTransaction

Name	Type	Use
transactionID		Transaction ID
date		Transaction date
tmp	String	Temporary variable
productID, productName, productType		Product information
price	Real	Transaction total price
tprice		Temporary transaction total price
quantity		Product quantity
stock	Longint	Product stock
discount, a, b, err		Product discount information
inp1, inp2	Text	Input from 'transaction.txt', 'sales.txt' or 'product.txt'
op1, op2		Output to 'producttmp.txt', 'transactiontmp.txt' or 'tmp.txt'

manageUser

Name	Type	Use
tmpPassword		Store username read from database
tmpUsername	String	Store password read from database
choice1, choice2		Store user action choice
lc, page, n	Longint	User display information
inp	Text	Input from 'staffAccount.txt' or 'customerAccount.txt'

staffUserDetail

Name	Type	Use
tmpUsername		Store username read from database
tmpPassword		Store password read from database
fileName	String	The name of database to be edited
nextUser		Username of account after current account
tusername		Username of account to be edited
inp	Text	Input from 'bookmark.txt', 'staffAccount.txt' or 'customerAccount.txt'
op		Output to 'tmp.txt'

searchProduct

Name	Type	Use
tdiscount	String	Store discount type of product to be searched
tname		Store name of product to be searched
ttype		Store type of product to be searched

displayStock

Name	Type	Use
tname, ttype, tdiscount, tstock	String	Product search information
tmpDIscount, discountType		Product discount information
price		Product price
productID, productName, productType		Product display information
stock		Product stock
discount, a, b, err		Product discount information
inp	Text	Input from 'product.txt' or 'tmp.txt'
op		Output to 'tmp.txt'

newProduct

Name	Type	Use
discount	String	Product discount
tmp, tprice, tquantity		Temporary variable
productID, productName, productType		Product information
price	Real	Transaction total price
quantity	Longint	Product quantity
a, b, err		Product discount information
inp1, inp2	Text	Input from 'transaction.txt', 'sales.txt' or 'product.txt'
op1, op2		Output to 'producttmp.txt', 'transactiontmp.txt' or 'tmp.txt'

editStockDetail

Name	Type	Use
tmp, tdiscount	String	Temporary variable
productID		Product information
price	Real	Transaction total price
quantity	Longint	Product stock
discount, a, b, err		Product discount information
inp	Text	Input from 'product.txt'
op		Output to 'tmp.txt'
v	Boolean	Indicate if the product ID is found

addBookmark

Name	Type	Use
productID	String	Store product ID
tmp		Temporary variable
inp	Text	Input from 'product.txt'
op		Output to 'tmp.txt'

saleAnalysis

Name	Type	Use
tmp1, tmp2	String	Temporary variable
treal	Real	
tmp	Longint	
page, lc		Sales display variable
inp	Text	Input from 'sales.txt'
quantity, id, price	Array	Store product information

customerBookmark

Name	Type	Use
discountType	String	Product discount
tmp, tProductID		Temporary variable
t	Array	
price	Real	Transaction total price
lc, page, count	Longint	Product display information
discount, a, b, err		Product discount information
inp, inp1	Text	Input from 'bookmark.txt'
op		Output to 'tmp.txt'

deleteBookmark

Name	Type	Use
productID	String	Store product ID
tmp		Temporary variable
inp	Text	Input from 'tmp.txt' or 'bookmark.txt'
op		Output to 't.txt'

Plan of Testing

Unit Test

Unit test is carried out on all modules of the program to ensure each individual modules perform its functions well. The list of modules tested are as follow:

Register

1. Username Input
2. Password Input
3. Register Confirmation
4. Retry Register
5. Impact on Database

Staff Interface

1. Staff Login
2. Homepage Choice Input
3. Transaction
4. Manage user
5. Sales Analysis
6. Display Product
7. Change Password

Customer Interface

1. Manage Bookmark
2. Change Password

System Test

Two system tests, one for staff and one for customer interface, were carried out to ensure that the program can runs smoothly when multiple functions and modules are being used consecutively.

User Acceptance Test

User acceptance is done by real users to ensure that the program meets the expectations and needs of users. I have invited four people to carry out user acceptance tests for my program by asking them to carry out operations normally done by users.

Unit Test

Register

Username Input

1. Validation check (User must not enter an existing username)

a. Input an existing username
Expected output: Username already exists, please input another username

Actual output:

Result: **Pass**

Result: **Pass**

Result: **Pass**

Result: **Pass**

b. Input a non-existing username

Expected output: Proceed to next step (ask user to input password)

Actual output:

Result: **Pass**

Result: **Pass**

Result: **Pass**

Result: **Pass**

2. Validation check (Username must be at least 6 characters) *Customer only*

a. Input username less than 6 characters

Expected output: Username already exists, please input another username

Actual output:

```
Please input the following details
Username : custo
Username must be at least 6 characters! Please enter again
Username :
```

Result: **Pass**

```
Please input the following details
Username : ctm
Username must be at least 6 characters! Please enter again
Username :
```

Result: **Pass**

b. Input username with length of 6 characters

Expected output: Proceed to next step (ask user to input password)

Actual output:

```
Please input the following details
Username : custom
Password :
```

Result: **Pass**

```
Please input the following details
Username : ctm123
Password :
```

Result: **Pass**

c. Input username longer than 6 characters

Expected output: Proceed to next step (ask user to input password)

Actual output:

```
Please input the following details
Username : customer123
Password :
```

Result: **Pass**

```
Username : customerH
Password :
```

Result: **Pass**

Password Input

1. Verification check (Re-input same password)

a. Input a different password

Expected output: Password does not match, please enter again

Actual output:

```
Please input the following details
Username : admin123
Password : 123
Re-enter password : 13
Password does not match, please enter again
Re-enter password :
```

Result: **Pass**

```
Please input the following details
Username : admin123
Password : adm
Re-enter password : adm123
Password does not match, please enter again
Re-enter password :
```

Result: **Pass**

```
Username : customerH
Password : cush
Re-enter password : cus
Password does not match, please enter again
Re-enter password :
```

Result: **Pass**

```
Username : customerH
Password : cush
Re-enter password : 123
Password does not match, please enter again
Re-enter password :
```

Result: **Pass**

b. Input same password

Expected output: Proceed to next step (ask user to confirm register)

Actual output:

```
Please input the following details
Username : admin123
Password : adm123
Re-enter password : adm123
Confirm register? (Y/N)
```

Result: **Pass**

```
Please input the following details
Username : admin123
Password : 123
Re-enter password : 123
Confirm register? (Y/N)
```

Result: **Pass**

```
Please input the following details
Username : customer123
Password : ctm123
Re-enter password : ctm123
Confirm register? (Y/N)
```

Result: **Pass**

```
Please input the following details
Username : customerH
Password : cush
Re-enter password : cush
Confirm register? (Y/N)
```

Result: **Pass**

Register Confirmation

1. Validation check (input must be 'Y' or 'N')

a. Case mismatch

Expected output: Invalid input! Please enter again

Actual output:

```
Confirm register? (Y/N) y
Invalid input! Please enter again
Confirm register? (Y/N)
```

Result: **Pass**

```
Confirm register? (Y/N) n
Invalid input! Please enter again
Confirm register? (Y/N)
```

Result: **Pass**

b. Length mismatch

Expected output: Invalid input! Please enter again

Actual output:

```
Confirm register? (Y/N) abc
Invalid input! Please enter again
Confirm register? (Y/N)
```

Result: **Pass**

```
Confirm register? (Y/N) /.,';l1q
Invalid input! Please enter again
Confirm register? (Y/N)
```

Result: **Pass**

```
Confirm register? (Y/N) YYY
Invalid input! Please enter again
Confirm register? (Y/N)
```

Result: **Pass**

```
Confirm register? (Y/N) NN
Invalid input! Please enter again
Confirm register? (Y/N)
```

Result: **Pass**

c. Character mismatch

Expected output: Invalid input! Please enter again

Actual output:

```
Confirm register? (Y/N) 1
Invalid input! Please enter again
Confirm register? (Y/N)
```

Result: **Pass**

```
Confirm register? (Y/N) %
Invalid input! Please enter again
Confirm register? (Y/N)
```

Result: **Pass**

```
Confirm register? (Y/N) a
Invalid input! Please enter again
Confirm register? (Y/N)
```

Result: **Pass**

Expected output: Proceed to next step (Register succeed)

Actual output:

```
Confirm register? (Y/N) Y
Register succeed!
Press enter to continue
```

Result: **Pass**

Expected output: Proceed to next step (Register failed)

Actual output:

```
Confirm register? (Y/N) N
Register failed, try again? (Y/N)
```

Result: **Pass**

Retry Register

1. Validation check (input must be 'Y' or 'N')

a. Case mismatch
Expected output: Invalid input! Please enter again

Actual output:

```
Register failed, try again? (Y/N) y
Invalid input! Please enter again
Register failed, try again? (Y/N)
```

Result: **Pass**

```
Register failed, try again? (Y/N) n
Invalid input! Please enter again
Register failed, try again? (Y/N)
```

Result: **Pass**

b. Length mismatch
Expected output: Invalid input! Please enter again

Actual output:

```
Register failed, try again? (Y/N) 123
Invalid input! Please enter again
Register failed, try again? (Y/N)
```

Result: **Pass**

```
Register failed, try again? (Y/N) %1/klk
Invalid input! Please enter again
Register failed, try again? (Y/N)
```

Result: **Pass**

```
Register failed, try again? (Y/N) YY
Invalid input! Please enter again
Register failed, try again? (Y/N)
```

Result: **Pass**

```
Register failed, try again? (Y/N) NNN
Invalid input! Please enter again
Register failed, try again? (Y/N)
```

Result: **Pass**

c. Character mismatch

Expected output: Invalid input! Please enter again

Actual output:

```
Register failed, try again? (Y/N) 3
Invalid input! Please enter again
Register failed, try again? (Y/N)
```

Result: **Pass**

```
Register failed, try again? (Y/N) %
Invalid input! Please enter again
Register failed, try again? (Y/N)
```

Result: **Pass**

d. Input 'Y'

Expected output: Proceed to next step (Re-enter register page)

Actual output:

```
Confirm register? (Y/N) N
Register failed, try again? (Y/N) Y
```

```
Please input the following details
Username :
```

Result: **Pass**

e. Input 'N'

Expected output: Proceed to next step (Back to homepage)

Actual output:

```
Confirm register? (Y/N) N
Register failed, try again? (Y/N) N
```
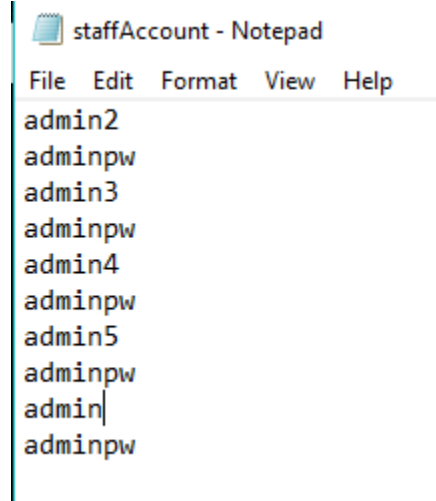
```
Welcome to ABC supermarket!

********************************************

1 - Staff login
2 - Customer login
3 - New user register
4 - Close application

Your choice :
```

Result: **Pass**

Impact on database
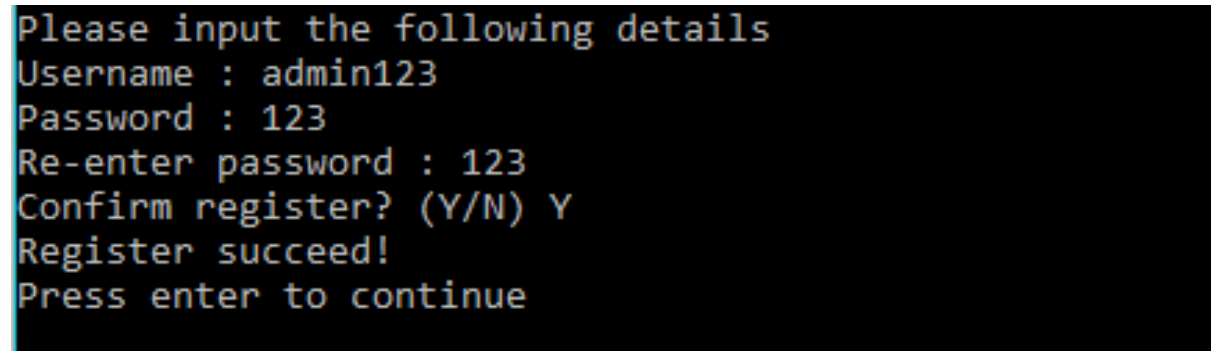
a. Staff register

Initial database


```
staffAccount - Notepad
File   Edit   Format   View   Help
admin2
adminpw
admin3
adminpw
admin4
adminpw
admin5
adminpw
admin
adminpw
```

Register process


```
Please input the following details
Username : admin123
Password : 123
Re-enter password : 123
Confirm register? (Y/N) Y
Register succeed!
Press enter to continue
```

Database after registration

staffAccount - Notepad

File   Edit   Format   View   Help

```
admin2
adminpw
admin3
adminpw
admin4
adminpw
admin5
adminpw
admin
adminpw
admin123
123
```

Result: **Pass**

b. Customer register

Initial database
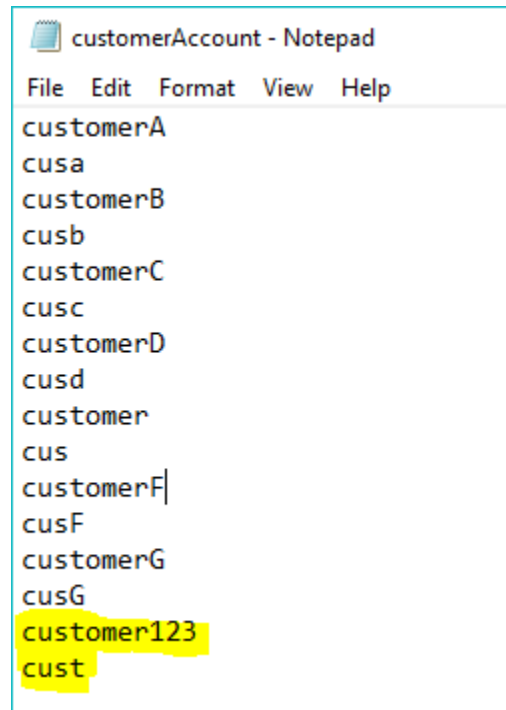
customerAccount - Notepad

File   Edit   Format   View   Help

```
customerA
cusa
customerB
cusb
customerC
cusc
customerD
cusd
customer
cus
customerF
cusF
customerG
cusG
```

Register process

```
Please input the following details
Username : customer123
Password : cust
Re-enter password : cust
Confirm register? (Y/N) Y
Register succeed!
Press enter to continue
```

Database after registration

A new user (username = customer123, password = cust) is added.

customerAccount - Notepad

File   Edit   Format   View   Help

```
customerA
cusa
customerB
cusb
customerC
cusc
customerD
cusd
customer
cus
customerF
cusF
customerG
cusG
customer123
cust
```

Result: **Pass**

Staff Interface

Staff Login

Username Input

a. Input an invalid username
Expected output: Invalid username!

Actual output:

```
Please input your username : adm
Please input your password : adm
Invalid username!
Register? (Y/N)
```

Result: **Pass**

```
Please input your username : invalidUserName
Please input your password : 123
Invalid username!
Register? (Y/N)
```

Result: **Pass**

b. Input an existing username
Expected output: Proceed to next step (enter staff homepage)

Actual output:

```
Please input your username : admin3
Please input your password : adminpw
```

```
staffAccount - |
File  Edit  Format
admin2
adminpw
admin3
adminpw
```
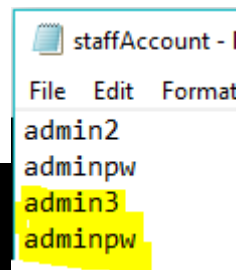
Result: **Pass**

Password Input

a. Input a wrong password

Expected output: Wrong password! Please input again

Actual output:
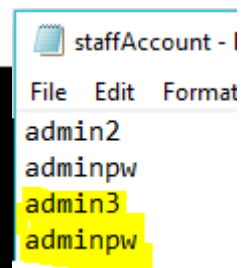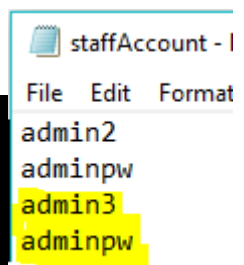
Result: **Pass**

Result: **Pass**

b. Input a correct password

Expected output: Proceed to next step (enter staff homepage)

Actual output:

```
Please input your username : admin5
Please input your password : adminpw
```
```
admin5
adminpw
admin
adminpw
```
```
Welcome admin5!


**************************************************


1 - Transaction
2 - Manage user
3 - Manage stock
4 - Sale analysis
5 - Logout
6 - Change password

Your choice?
```
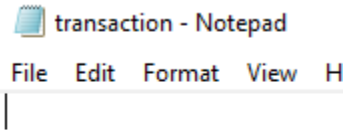
Result: **Pass**

```
staffAccount - |
File  Edit  Format
admin2
adminpw
admin3
adminpw
```
```
Please input your username : admin3
Please input your password : adminpw
```

Result: **Pass**

Homepage Choice Input

a. Length mismatch

Expected output: Invalid choice! Please enter again

Actual output:

```
Your choice? 123
Invalid choice! Please enter again

Your choice?
```

Result: **Pass**

```
Your choice? %lkjsd
Invalid choice! Please enter again

Your choice?
```

Result: **Pass**

b. Character mismatch

Expected output: Invalid choice! Please enter again

Actual output:

```
Your choice?
Invalid choice! Please enter again

Your choice?
```

Result: **Pass**

```
Your choice? a
Invalid choice! Please enter again

Your choice?
```

Result: **Pass**

c. Input out of range

Expected output: Invalid choice! Please enter again

Actual output:

```
Your choice? 0
Invalid choice! Please enter again

Your choice?
```

Result: **Pass**

```
Your choice? 7
Invalid choice! Please enter again

Your choice?
```

Result: **Pass**

d. Input '1'

Expected output: Proceed to next step (transaction homepage)

Actual output:

```
1 - Transaction
2 - Manage user
3 - Manage stock
4 - Sale analysis
5 - Logout
6 - Change password

Your choice? 1
```

```
Transaction HomePage
Page 1

ID          Date                    Product ID
00000005    02/11/2018 22:08        00001
00000029    06/10/2018 17:07        00006
00000028    06/10/2018 17:07        00001
00000027    06/10/2018 17:06        00003
00000026    06/10/2018 17:06        00001


1 - New transaction
2 - Back to homepage
Your choice :
```

Result: **Pass**

---

e. Input '2'

Expected output: Proceed to next step (manage user page)

Actual output:

```
1 - Transaction
2 - Manage user
3 - Manage stock
4 - Sale analysis
5 - Logout
6 - Change password

Your choice? 2
1 - Manage staff account
2 - Manage customer account
Your choice :
```

Result: **Pass**

f. Input '3'

Expected output: Proceed to next step (stock display page)

Actual output:

```
1 - Transaction
2 - Manage user
3 - Manage stock
4 - Sale analysis
5 - Logout
6 - Change password

Your choice? 3
```

```
Leave the input blank if no filtering is needed

Product List

Name :
```

Result: Pass

g. Input '4'

Expected output: Proceed to next step (sales analysis homepage)

Actual output:

```
1 - Transaction
2 - Manage user
3 - Manage stock
4 - Sale analysis
5 - Logout
6 - Change password

Your choice? 4
```

```
Sale Analysis

1 - sort by quantity
2 - sort by price
Your choice :
```

Result: **Pass**

h. Input '5'

Expected output: Proceed to next step (homepage)

Actual output:

```
1 - Transaction
2 - Manage user
3 - Manage stock
4 - Sale analysis
5 - Logout
6 - Change password

Your choice? 5
```

```
Welcome to ABC supermarket!

***************************************************

1 - Staff login
2 - Customer login
3 - New user register
4 - Close application

Your choice :
```

Result: **Pass**

i. Input '6'

Expected output: Proceed to next step (change password page)

Actual output:

```
1 - Transaction
2 - Manage user
3 - Manage stock
4 - Sale analysis
5 - Logout
6 - Change password

Your choice? 6
```

```
Change password

Old password :
```

Result: **Pass**

Transaction

Transaction Display

1. Transaction List is Empty

Expected output: No transaction displayed

Actual output:

Result: **Pass**

---

2. Number of Transaction less than 20
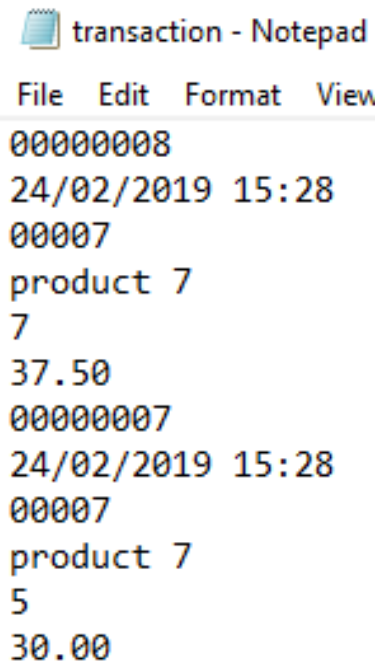
Expected output: All 8 transactions are displayed in descending transaction ID.
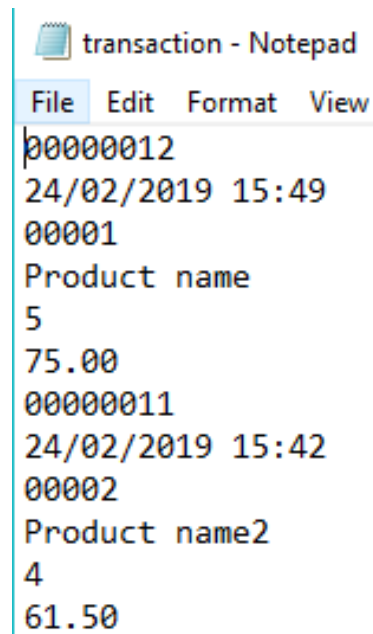
Actual output:

```
Transaction HomePage
Page 1

ID          Date                  Product ID    Product Name      Quantity      Price
00000008    24/02/2019 15:28      00007         product 7         7             37.50
00000007    24/02/2019 15:28      00007         product 7         5             30.00
00000006    24/02/2019 15:27      00007         product 7         2             15.00
00000005    24/02/2019 15:25      00007         product 7         2             15.00
00000004    24/02/2019 15:15      00002         Product name2     1             15.37
00000003    24/02/2019 15:15      00003         Product 3         10            90.00
00000002    24/02/2019 15:14      00001         Product name      1             15.00
00000001    24/02/2019 15:14      00001         Product name      5             75.00

1 - New transaction
2 - Back to homepage
Your choice :
```

Result: **Pass**

```
transaction - Notepad

File  Edit  Format  View
00000012
24/02/2019 15:49
00001
Product name
5
75.00
00000011
24/02/2019 15:42
00002
Product name2
4
61.50
```

Expected output: All 12 transactions are displayed in descending transaction ID.
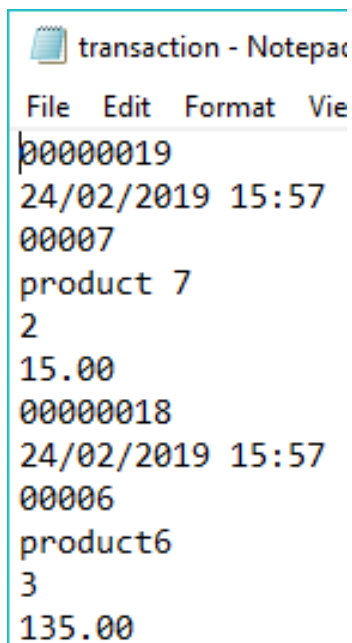
Actual output:

```
Transaction HomePage
Page 1

ID          Date                    Product ID      Product Name        Quantity        Price
00000012    24/02/2019 15:49        00001           Product name        5               75.00
00000011    24/02/2019 15:42        00002           Product name2       4               61.50
00000010    24/02/2019 15:38        00005           product5            3               75.00
00000009    24/02/2019 15:36        00005           product5            3               75.00
00000008    24/02/2019 15:28        00007           product 7           7               37.50
00000007    24/02/2019 15:28        00007           product 7           5               30.00
00000006    24/02/2019 15:27        00007           product 7           2               15.00
00000005    24/02/2019 15:25        00007           product 7           2               15.00
00000004    24/02/2019 15:15        00002           Product name2       1               15.37
00000003    24/02/2019 15:15        00003           Product 3           10              90.00
00000002    24/02/2019 15:14        00001           Product name        1               15.00
00000001    24/02/2019 15:14        00001           Product name        5               75.00

1 - New transaction
2 - Back to homepage
Your choice :
```

Result: **Pass**

```
transaction - Notepad

File  Edit  Format  Vie

00000019
24/02/2019 15:57
00007
product 7
2
15.00
00000018
24/02/2019 15:57
00006
product6
3
135.00
```

Expected output: All 19 transactions are displayed in one page in descending transaction ID.

Actual output:

```
Transaction HomePage
Page 1

ID          Date                   Product ID    Product Name        Quantity    Price
00000019   24/02/2019 15:57       00007         product 7           2           15.00
00000018   24/02/2019 15:57       00006         product6            3           135.00
00000017   24/02/2019 15:57       00001         Product name        9           135.00
00000016   24/02/2019 15:56       00005         product5            2           50.00
00000015   24/02/2019 15:56       00008         product8            3           64.05
00000014   24/02/2019 15:55       00006         product6            6           270.00
00000013   24/02/2019 15:55       00008         product8            12          256.20
00000012   24/02/2019 15:49       00001         Product name        5           75.00
00000011   24/02/2019 15:42       00002         Product name2       4           61.50
00000010   24/02/2019 15:38       00005         product5            3           75.00
00000009   24/02/2019 15:36       00005         product5            3           75.00
00000008   24/02/2019 15:28       00007         product 7           7           37.50
00000007   24/02/2019 15:28       00007         product 7           5           30.00
00000006   24/02/2019 15:27       00007         product 7           2           15.00
00000005   24/02/2019 15:25       00007         product 7           2           15.00
00000004   24/02/2019 15:15       00002         Product name2       1           15.37
00000003   24/02/2019 15:15       00003         Product 3           10          90.00
00000002   24/02/2019 15:14       00001         Product name        1           15.00
00000001   24/02/2019 15:14       00001         Product name        5           75.00

1 - New transaction
2 - Back to homepage
Your choice :
```

Result: **Pass**

3. Number of Transaction equals to 20

```
transaction - Notepad

File  Edit  Format  View
00000020
24/02/2019 16:03
00006
product6
1
45.00
00000019
24/02/2019 15:57
00007
product 7
2
15.00
```

Expected output: All 20 transactions are displayed in one page in descending transaction ID.

Actual output:

```
Transaction HomePage
Page 1

ID          Date                    Product ID    Product Name        Quantity      Price
00000020   24/02/2019 16:03       00006        product6            1            45.00
00000019   24/02/2019 15:57       00007        product 7           2            15.00
00000018   24/02/2019 15:57       00006        product6            3            135.00
00000017   24/02/2019 15:57       00001        Product name        9            135.00
00000016   24/02/2019 15:56       00005        product5            2            50.00
00000015   24/02/2019 15:56       00008        product8            3            64.05
00000014   24/02/2019 15:55       00006        product6            6            270.00
00000013   24/02/2019 15:55       00008        product8            12           256.20
00000012   24/02/2019 15:49       00001        Product name        5            75.00
00000011   24/02/2019 15:42       00002        Product name2       4            61.50
00000010   24/02/2019 15:38       00005        product5            3            75.00
00000009   24/02/2019 15:36       00005        product5            3            75.00
00000008   24/02/2019 15:28       00007        product 7           7            37.50
00000007   24/02/2019 15:28       00007        product 7           5            30.00
00000006   24/02/2019 15:27       00007        product 7           2            15.00
00000005   24/02/2019 15:25       00007        product 7           2            15.00
00000004   24/02/2019 15:15       00002        Product name2       1            15.37
00000003   24/02/2019 15:15       00003        Product 3           10           90.00
00000002   24/02/2019 15:14       00001        Product name        1            15.00
00000001   24/02/2019 15:14       00001        Product name        5            75.00

1 - New transaction
2 - Back to homepage
Your choice :
```

Result: **Pass**

4. Number of Transaction larger than 20

```
transaction - Notepad

File  Edit  Format  View
00000021
24/02/2019 16:09
00007
product 7
1
7.50
00000020
24/02/2019 16:03
00006
product6
1
45.00
```

Expected output: The latest 20 transactions are displayed in page 1 in descending transaction ID, the last transaction (ID 00000001) is displayed in page 2.

Actual output:

```
Transaction HomePage
Page 1

ID         Date                 Product ID    Product Name        Quantity        Price
00000021   24/02/2019 16:09     00007         product 7           1               7.50
00000020   24/02/2019 16:03     00006         product6            1               45.00
00000019   24/02/2019 15:57     00007         product 7           2               15.00
00000018   24/02/2019 15:57     00006         product6            3               135.00
00000017   24/02/2019 15:57     00001         Product name        9               135.00
00000016   24/02/2019 15:56     00005         product5            2               50.00
00000015   24/02/2019 15:56     00008         product8            3               64.05
00000014   24/02/2019 15:55     00006         product6            6               270.00
00000013   24/02/2019 15:55     00008         product8            12              256.20
00000012   24/02/2019 15:49     00001         Product name        5               75.00
00000011   24/02/2019 15:42     00002         Product name2       4               61.50
00000010   24/02/2019 15:38     00005         product5            3               75.00
00000009   24/02/2019 15:36     00005         product5            3               75.00
00000008   24/02/2019 15:28     00007         product 7           7               37.50
00000007   24/02/2019 15:28     00007         product 7           5               30.00
00000006   24/02/2019 15:27     00007         product 7           2               15.00
00000005   24/02/2019 15:25     00007         product 7           2               15.00
00000004   24/02/2019 15:15     00002         Product name2       1               15.37
00000003   24/02/2019 15:15     00003         Product 3           10              90.00
00000002   24/02/2019 15:14     00001         Product name        1               15.00

1 - New transaction
2 - Back to homepage
3 - Next page
Your choice :
```

```
Transaction HomePage
Page 2

ID         Date                 Product ID    Product Name        Quantity        Price
00000001   24/02/2019 15:14     00001         Product name        5               75.00

1 - New transaction
2 - Back to homepage
Your choice :
```

Result: **Pass**

Expected output: The latest 20 transactions are displayed in page 1 in descending transaction ID, the remaining transactions are displayed in page 2 in descending transaction ID.

Actual ouput:

```
Transaction HomePage
Page 2

ID          Date                    Product ID    Product Name        Quantity        Price
00000011    24/02/2019 15:42        00002         Product name2       4               61.50
00000010    24/02/2019 15:38        00005         product5            3               75.00
00000009    24/02/2019 15:36        00005         product5            3               75.00
00000008    24/02/2019 15:28        00007         product 7           7               37.50
00000007    24/02/2019 15:28        00007         product 7           5               30.00
00000006    24/02/2019 15:27        00007         product 7           2               15.00
00000005    24/02/2019 15:25        00007         product 7           2               15.00
00000004    24/02/2019 15:15        00002         Product name2       1               15.37
00000003    24/02/2019 15:15        00003         Product 3           10              90.00
00000002    24/02/2019 15:14        00001         Product name        1               15.00
00000001    24/02/2019 15:14        00001         Product name        5               75.00

1 - New transaction
2 - Back to homepage
Your choice :
```

Result: **Pass**

```
transaction - Notepad

File  Edit  Format  Vie
00000041
24/02/2019 17:04
00007
product 7
10
60.00
00000040
24/02/2019 17:04
00002
Pd 2
30
600.00
```

Expected output: 20 transactions are displayed each page, except the last. All transactions are displayed in descending order of transaction ID.

Actual ouput:

```
Transaction HomePage
Page 1

ID          Date                    Product ID      Product Name        Quantity        Price
00000041    24/02/2019 17:04        00007           product 7           10              60.00
00000040    24/02/2019 17:04        00002           Pd 2                30              600.00
00000039    24/02/2019 17:03        00001           product1            1               20.00
00000038    24/02/2019 17:03        00002           Pd 2                14              280.00
00000037    24/02/2019 17:03        00007           product 7           56              285.00
00000036    24/02/2019 17:03        00002           Pd 2                15              300.00
00000035    24/02/2019 17:02        00006           product6            3               135.00
00000034    24/02/2019 17:02        00001           product1            6               120.00
00000033    24/02/2019 17:02        00001           product1            3               60.00
00000032    24/02/2019 16:55        00001           product1            5               100.00
00000031    24/02/2019 16:14        00006           product6            4               180.00
00000030    24/02/2019 16:13        00007           product 7           5               30.00
00000029    24/02/2019 16:13        00006           product6            2               90.00
00000028    24/02/2019 16:13        00007           product 7           1               7.50
00000027    24/02/2019 16:13        00006           product6            13              585.00
00000026    24/02/2019 16:12        00006           product6            1               45.00
00000025    24/02/2019 16:12        00005           product5            5               100.00
00000024    24/02/2019 16:12        00005           product5            3               75.00
00000023    24/02/2019 16:12        00002           Product name2       2               30.75
00000022    24/02/2019 16:12        00007           product 7           2               15.00

1 - New transaction
2 - Back to homepage
3 - Next page
Your choice :
```

```
Transaction HomePage
Page 2

ID         Date                  Product ID     Product Name        Quantity        Price
00000021   24/02/2019 16:09      00007          product 7           1               7.50
00000020   24/02/2019 16:03      00006          product6            1               45.00
00000019   24/02/2019 15:57      00007          product 7           2               15.00
00000018   24/02/2019 15:57      00006          product6            3               135.00
00000017   24/02/2019 15:57      00001          Product name        9               135.00
00000016   24/02/2019 15:56      00005          product5            2               50.00
00000015   24/02/2019 15:56      00008          product8            3               64.05
00000014   24/02/2019 15:55      00006          product6            6               270.00
00000013   24/02/2019 15:55      00008          product8            12              256.20
00000012   24/02/2019 15:49      00001          Product name        5               75.00
00000011   24/02/2019 15:42      00002          Product name2       4               61.50
00000010   24/02/2019 15:38      00005          product5            3               75.00
00000009   24/02/2019 15:36      00005          product5            3               75.00
00000008   24/02/2019 15:28      00007          product 7           7               37.50
00000007   24/02/2019 15:28      00007          product 7           5               30.00
00000006   24/02/2019 15:27      00007          product 7           2               15.00
00000005   24/02/2019 15:25      00007          product 7           2               15.00
00000004   24/02/2019 15:15      00002          Product name2       1               15.37
00000003   24/02/2019 15:15      00003          Product 3           10              90.00
00000002   24/02/2019 15:14      00001          Product name        1               15.00

1 - New transaction
2 - Back to homepage
3 - Next page
Your choice :
```

```
Transaction HomePage
Page 3

ID         Date                  Product ID     Product Name        Quantity        Price
00000001   24/02/2019 15:14      00001          Product name        5               75.00

1 - New transaction
2 - Back to homepage
Your choice :
```

Result: **Pass**

5. Choice Input

a. Test for 'Next Page' Function

1. Number of transactions less than 20

Expected output: Only 2 choices are allowed, no 'Next Page' choice is shown.

Actual output:

```
Transaction HomePage
Page 1

ID          Date                        Product ID      Product

1 - New transaction
2 - Back to homepage
Your choice : 3
Invalid choice! Please enter again
Your choice :
```

Result: **Pass**

---

2. Number of transactions equals to 20

Expected output: Only 2 choices are allowed, no 'Next Page' choice is shown.

Actual output:

```
Transaction HomePage
Page 1

ID          Date                Product ID      Product Name         Quantity
00000020    24/02/2019 16:03    00006           product6             1
00000019    24/02/2019 15:57    00007           product 7            2
00000018    24/02/2019 15:57    00006           product6             3
00000017    24/02/2019 15:57    00001           Product name         9
00000016    24/02/2019 15:56    00005           product5             2
00000015    24/02/2019 15:56    00008           product8             3
00000014    24/02/2019 15:55    00006           product6             6
00000013    24/02/2019 15:55    00008           product8             12
00000012    24/02/2019 15:49    00001           Product name         5
00000011    24/02/2019 15:42    00002           Product name2        4
00000010    24/02/2019 15:38    00005           product5             3
00000009    24/02/2019 15:36    00005           product5             3
00000008    24/02/2019 15:28    00007           product 7            7
00000007    24/02/2019 15:28    00007           product 7            5
00000006    24/02/2019 15:27    00007           product 7            2
00000005    24/02/2019 15:25    00007           product 7            2
00000004    24/02/2019 15:15    00002           Product name2        1
00000003    24/02/2019 15:15    00003           Product 3            10
00000002    24/02/2019 15:14    00001           Product name         1
00000001    24/02/2019 15:14    00001           Product name         5

1 - New transaction
2 - Back to homepage
Your choice : 3
Invalid choice! Please enter again
Your choice :
```

Result: **Pass**

3. Number of transactions larger than 20

Expected output: 'Next page' choice is shown on first page; the second page will be displayed upon entering. However, the 'next page' is not available in second page.

Actual output:

```
Transaction HomePage
Page 1

ID          Date                    Product ID    Product Name        Quant
00000021    24/02/2019 19:21        00001         product1            1
00000020    24/02/2019 16:03        00006         product6            1
00000019    24/02/2019 15:57        00007         product 7           2
00000018    24/02/2019 15:57        00006         product6            3
00000017    24/02/2019 15:57        00001         Product name        9
00000016    24/02/2019 15:56        00005         product5            2
00000015    24/02/2019 15:56        00008         product8            3
00000014    24/02/2019 15:55        00006         product6            6
00000013    24/02/2019 15:55        00008         product8            12
00000012    24/02/2019 15:49        00001         Product name        5
00000011    24/02/2019 15:42        00002         Product name2       4
00000010    24/02/2019 15:38        00005         product5            3
00000009    24/02/2019 15:36        00005         product5            3
00000008    24/02/2019 15:28        00007         product 7           7
00000007    24/02/2019 15:28        00007         product 7           5
00000006    24/02/2019 15:27        00007         product 7           2
00000005    24/02/2019 15:25        00007         product 7           2
00000004    24/02/2019 15:15        00002         Product name2       1
00000003    24/02/2019 15:15        00003         Product 3           10
00000002    24/02/2019 15:14        00001         Product name        1

1 - New transaction
2 - Back to homepage
3 - Next page
Your choice :
```

```
1 - New transaction
2 - Back to homepage
3 - Next page
Your choice : 3
```

```
Transaction HomePage
Page 2

ID          Date                 Product ID        Product Name
00000001    24/02/2019 15:14     00001             Product name

1 - New transaction
2 - Back to homepage
Your choice :
```

Result: **Pass**

b. Other Invalid Input

Expected output: Invalid choice! Please enter again

Actual output:

```
1 - New transaction
2 - Back to homepage
Your choice : 0
Invalid choice! Please enter again
Your choice :
```

Result: **Pass**

```
Your choice :
Invalid choice! Please enter again
Your choice :
```

Result: **Pass**

```
Your choice : lkj
Invalid choice! Please enter again
Your choice :
```

Result: **Pass**

```
Your choice : %
Invalid choice! Please enter again
Your choice :
```

Result: **Pass**

Expected output: Proceed to next step (add new transaction page)

Actual output:

```
1 - New transaction
2 - Back to homepage
3 - Next page
Your choice : 1
```

```
New Transaction

Product ID :
```

Result: **Pass**

Expected output: Proceed to next step (back to staff homepage)

Actual output:

```
1 - New transaction
2 - Back to homepage
3 - Next page
Your choice : 2
```

```
Welcome admin!

*********************************************

1 - Transaction
2 - Manage user
3 - Manage stock
4 - Sale analysis
5 - Logout
6 - Change password

Your choice?
```

Result: **Pass**

New Transaction

Product ID input

a. Invalid ID

Expected output: Invalid product ID! Please enter again

Actual output:

```
New Transaction

Product ID : 00009
Invalid product ID! Please enter again
Product ID :
```

Result: **Pass**

```
Product ID : lkajsdfl
Invalid product ID! Please enter again
Product ID :
```

Result: **Pass**

```
Product ID :
Invalid product ID! Please enter again
Product ID :
```
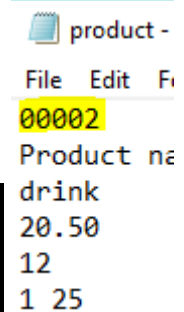
Result: **Pass**

b. Valid ID

Expected output: Proceed to next step (ask user to input quantity)

Actual output:

```
Product ID : 00002
Quantity :
```

```
product -
File  Edit  F
00002
Product na
drink
20.50
12
1 25
```

Result: **Pass**

Quantity Input
1. Data Type Validation (Integer)
a. Invalid data type

Expected output: Invalid input! Please enter again

Actual output:

```
Quantity : abc
Invalid input! Please enter again
Quantity :
```

Result: **Pass**

```
Quantity : %lkjd
Invalid input! Please enter again
Quantity :
```

Result: **Pass**

```
Quantity : 132abc
Invalid input! Please enter again
Quantity :
```

Result: **Pass**

```
Quantity : 123.45
Invalid input! Please enter again
Quantity :
```

Result: **Pass**

b. Valid data type

Expected output: Proceed to next step (ask user to confirm transaction)

Actual output:

```
Quantity : 10
Confirm? (Y/N)
```

Result: **Pass**

```
Quantity : 5
Confirm? (Y/N)
```

Result: **Pass**

2. Data Range Validation (positive integer not larger than stock amount)
a. Input 0
Expected output: Quantity cannot be 0!

Actual output:

```
Quantity : 0
Quantity cannot be 0!
Quantity :
```

Result: **Pass**

b. Input negative number
Expected output: Quantity cannot be negative!

Actual output:

```
Quantity : -1
Quantity cannot be negative!
Quantity :
```

Result: **Pass**

```
Quantity : -9999
Quantity cannot be negative!
Quantity :
```

Result: **Pass**

c. Input larger than stock
Expected output: Display current stock, ask user to enter again

Actual output:

```
Product ID : 00002              00002
Quantity : 13                   Product name2
Current stock : 12              drink
Please enter again              20.50
Quantity :                      12
                                1 25
```

Result: **Pass**

```
Product ID : 00003              00003
Quantity : 9999999              Product 3
Current stock : 10              dessert
Please enter again              12.00
Quantity :                      10
                                1 25
```

Result: **Pass**

d. Input equals to stock

Expected output: Proceed to next step (ask user to confirm transaction)

Actual output:

```
                                00002
/Product ID : 00002             Product name2
Quantity : 12                   drink
Confirm? (Y/N)                  20.50
                                12
                                1 25
```

Result: **Pass**

```
                                00003
Product ID : 00003              Product 3
Quantity : 10                   dessert
Confirm? (Y/N)                  12.00
                                10
                                1 25
```

Result: **Pass**

e. Input larger than zero and smaller than stock

Expected output: Proceed to next step (ask user to confirm transaction)

96

Actual output:

```
Product ID : 00001
Quantity : 20
Confirm? (Y/N)
```

```
00001
Product name
Soft drink
15.00
24
0
```

Result: **Pass**

```
Product ID : 00002
Quantity : 1
Confirm? (Y/N)
```

```
00002
Product name2
drink
20.50
12
1 25
```

Result: **Pass**

3. When product is out of stock

Expected output: Product out of stock!

Actual output:

```
New Transaction


Product ID : 00004
Product out of stock!
Press enter to continue
```

```
product -
File  Edit  F
product4
typec
100.00
0
1 30
```

Result: **Pass**

Confirm Transaction

1. Validation Check (input must be 'Y' or 'N')

a. Case mismatch

Expected output: Invalid input! Please enter again

Actual output:

```
Confirm? (Y/N)y
Invalid input! Please enter again
Confirm? (Y/N)
```

Result: **Pass**

```
Confirm? (Y/N)n
Invalid input! Please enter again
Confirm? (Y/N)
```

Result: **Pass**

b. Length mismatch

Expected output: Invalid input! Please enter again

Actual output:

```
Confirm? (Y/N)ljk
Invalid input! Please enter again
Confirm? (Y/N)
```

Result: **Pass**

```
Confirm? (Y/N)YYY
Invalid input! Please enter again
Confirm? (Y/N)
```

Result: **Pass**

```
Confirm? (Y/N)NN
Invalid input! Please enter again
Confirm? (Y/N)
```

Result: **Pass**

c. Character mismatch

Expected output: Invalid input! Please enter again

Actual output:

```
Confirm? (Y/N)1
Invalid input! Please enter again
Confirm? (Y/N)
```

Result: **Pass**

```
Confirm? (Y/N)%
Invalid input! Please enter again
Confirm? (Y/N)
```

Result: **Pass**

d. Input 'Y'

Expected output: Proceed to next step (Transaction completed)

Actual output:

```
New Transaction

Product ID : 00002
Quantity : 5
Confirm? (Y/N)Y
```

```
Trasaction successful!
Transaction ID : 00000006
Date : 24/02/2019 0:23
Product ID : 00002
Product Name : Product name2
Quantity : 5
Price : 76.88
Press enter to continue
```

Result: **Pass**

e. Input 'N'

Expected output: Proceed to next step (transaction homepage)

Actual output:

```
New Transaction

Product ID : 00002
Quantity : 1
Confirm? (Y/N)N
Transaction HomePage
Page 1

ID         Date                    Product ID
00000007   24/02/2019 0:37         00001
00000006   24/02/2019 0:23         00002
00000030   02/11/2018 22:08        00001
00000029   06/10/2018 17:07        00006
00000028   06/10/2018 17:07        00001

1 - New transaction
2 - Back to homepage
Your choice :
```

Result: **Pass**

Transaction Details

1. Product Price Calculation

a. No discount

Expected output: Price = 4 * 15.00 = 60.00

Actual output:

Result: **Pass**

---

b. X% off discount

Expected output: Price = 5 * 20.50 * 75% = 76.875 (76.88)

Actual output:

```
Trasaction successful!
Transaction ID : 00000006
Date : 24/02/2019 0:23
Product ID : 00002
Product Name : Product name2
Quantity : 5
Price : 76.88
Press enter to continue
```

Result: **Pass**

---

c. Buy X get X free discount

Product 00007 has a buy 4 get 2 free discount.

```
product - Not    New Transaction
File  Edit  Form
00007
product 7        Product ID : 00007
juice            Quantity : 2
7.50             Confirm? (Y/N)Y
100
2 4 2
```
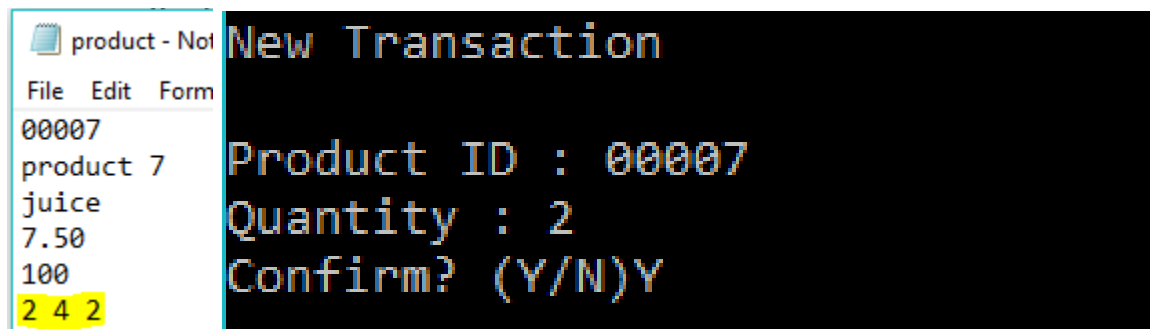
Expected output: Price = 2 * 7.50 = 15.00

Actual output:

```
Trasaction successful!
Transaction ID : 00000006
Date : 24/02/2019 15:27
Product ID : 00007
Product Name : product 7
Quantity : 2
Price : 15.00
Press enter to continue
```

Result: **Pass**

Product 00007 has a buy 4 get 2 free discount.
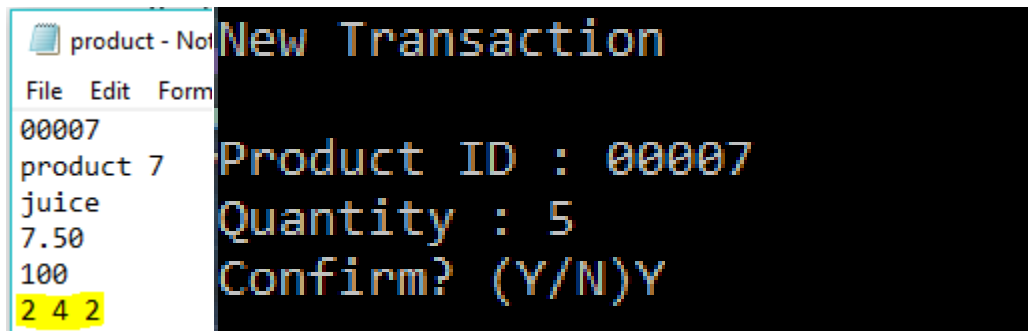
Expected output: Price = 4 * 7.50 = 30.00

Actual output:
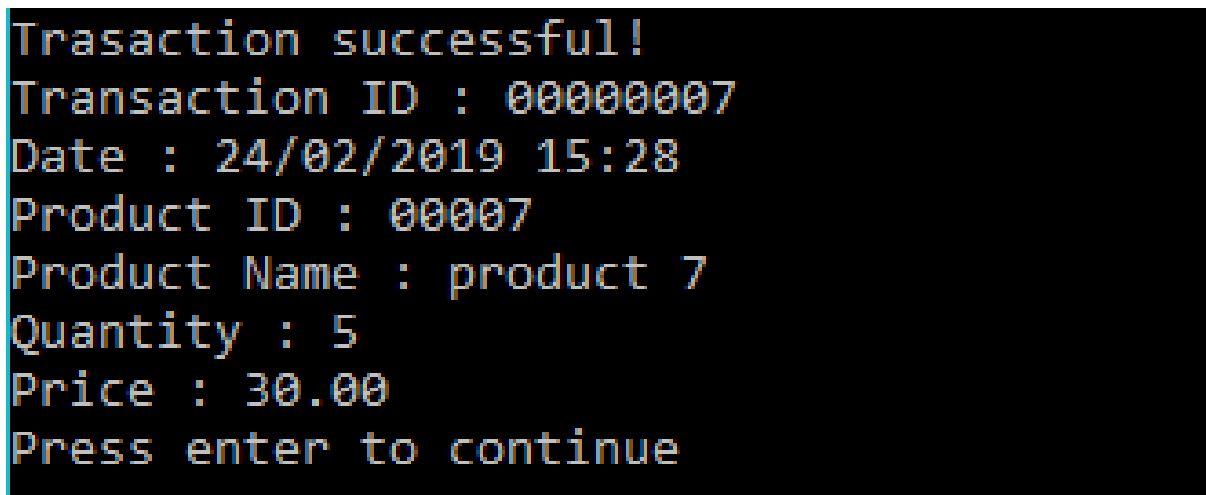
Result: **Pass**

Product 00007 has a buy 4 get 2 free discount.
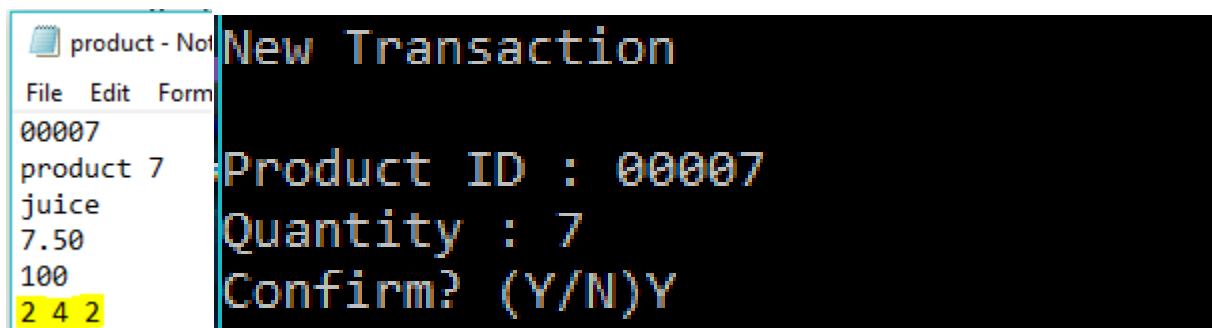
Expected output: Price = 5 * 7.50 = 37.50

Actual output:

Result: **Pass**

Product 00005 has a buy 3 get 1 free discount.
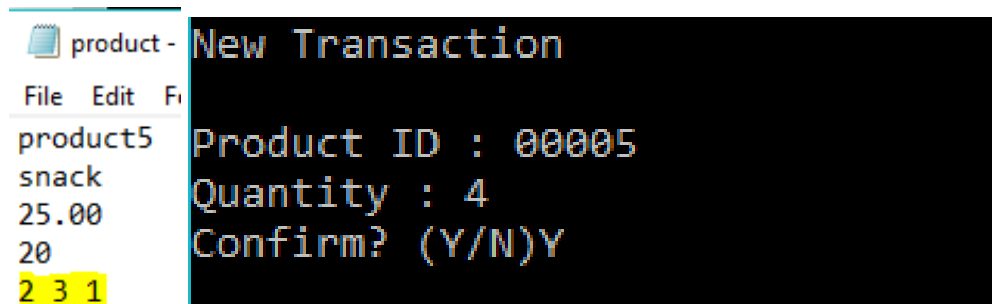
Expected output: Price = 3 * 25.00 = 75.00

Actual output:

Result: **Pass**

Impact on database

Initial Database

The stock of product 00002 is initially 6.

The sales of product 00002 is initially quantity 1 and price 15.38.

Transaction Process

```
New Transaction

Product ID : 00002
Quantity : 4
Confirm? (Y/N)Y

Trasaction successful!
Transaction ID : 00000011
Date : 24/02/2019 15:42
Product ID : 00002
Product Name : Product name2
Quantity : 4
Price : 61.50
Press enter to continue
```

Database after Transaction

A new transaction is added in the 'transaction' database.

The stock of product 00002 becomes 6 − 4 = 2.

The sales of product 00002 becomes quantity = 1+4 = 5 and price = 15.38+61.50 = 76.88.
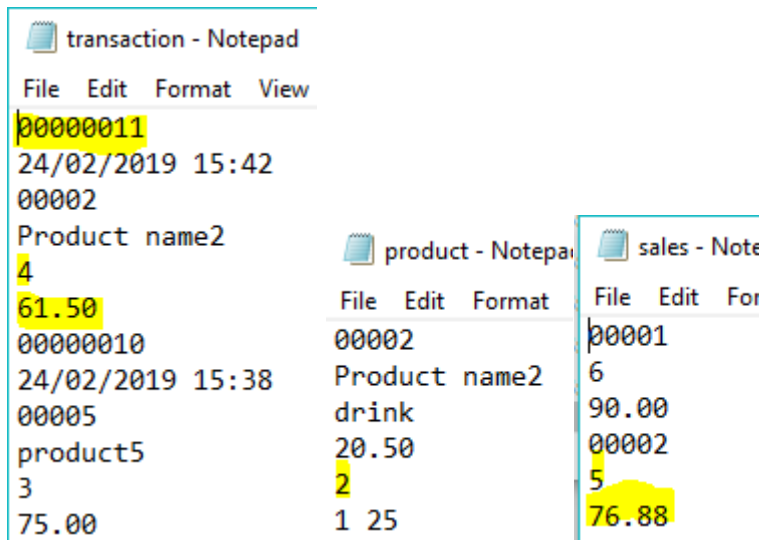
Result: **Pass**

Initial Database

The stock of product 00001 is 14.

The sales of product 00001 is quantity 6 and price 90.
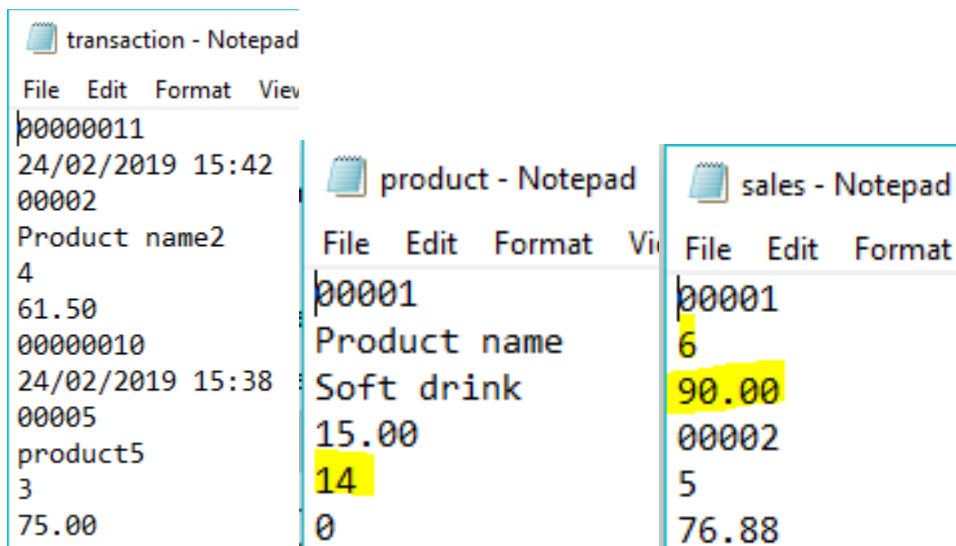
Transaction Process


```
New Transaction

Product ID : 00001
Quantity : 5
Confirm? (Y/N)Y

Trasaction successful!
Transaction ID : 00000012
Date : 24/02/2019 15:49
Product ID : 00001
Product Name : Product name
Quantity : 5
Price : 75.00
Press enter to continue
```

Database after Transaction

A new transaction is added in 'transaction' database.

The stock of product 00001 becomes 14 − 5 = 9.

The sales of product 00001 becomes quantity = 6+5 = 11, price = 90+75 = 165.


```
transaction - Notepad
File  Edit  Format  View
00000012
24/02/2019 15:49
00001
Product name
5
75.00
00000011
24/02/2019 15:42
00002
Product name2
4
61.50
```

```
product - Notep
File  Edit  Format
00001
Product name
Soft drink
15.00
9
0
```

```
sales - Notepad
File  Edit  Format
00001
11
165.00
00002
5
76.88
```

Result: **Pass**

Manage User

Homepage choice input

```
1 - Manage staff account
2 - Manage customer account
Your choice :
```

1. Length mismatch

Expected output: Invalid choice! Please input again

Actual output:

```
Your choice : lkjld
Invalid choice! Please input again
Your choice :
```

Result: **Pass**

```
Your choice :
Invalid choice! Please input again
Your choice :
```

Result: **Pass**

2. Type mismatch

Expected output: Invalid choice! Please input again

Actual output:

```
Your choice : %
Invalid choice! Please input again
Your choice :
```

Result: **Pass**

3. Value mismatch

Expected output: Invalid choice! Please input again

Actual output:

```
Your choice : 0
Invalid choice! Please input again
Your choice :
```

Result: **Pass**

```
Your choice : 3
Invalid choice! Please input again
Your choice :
```

Result: **Pass**

---

4. Input 1

```
1 - Manage staff account
2 - Manage customer account
Your choice : 1
```

Expected output: Proceed to next step (manage staff account page)

Actual output:

```
Manage staff account
Page 1

Username              Password
admin2                adminpw
admin3                adminpw
admin4                adminpw
admin5                adminpw
admin                 adminpw
admin123              123


1 - Add user
2 - Manage user
3 - Back to homepage
Your choice :
```

Result: **Pass**

5. Input 2

```
1 - Manage staff account
2 - Manage customer account
Your choice : 2
```

Expected output: Proceed to next step (manage customer account page)

Actual output:
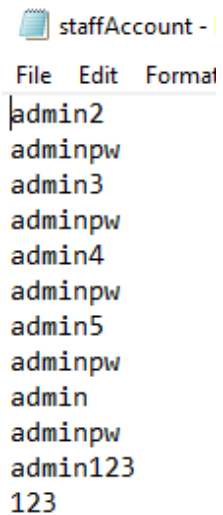
```
Manage customer account
Page 1

Username            Password
customerA           cusa
customerB           cusb
customerC           cusc
customerD           cusd
customer            cus
customerF           cusF
customerG           cusG
customer123         cust

1 - Add user
2 - Manage user
3 - Back to homepage
Your choice :
```

Result: **Pass**

Staff Account Display
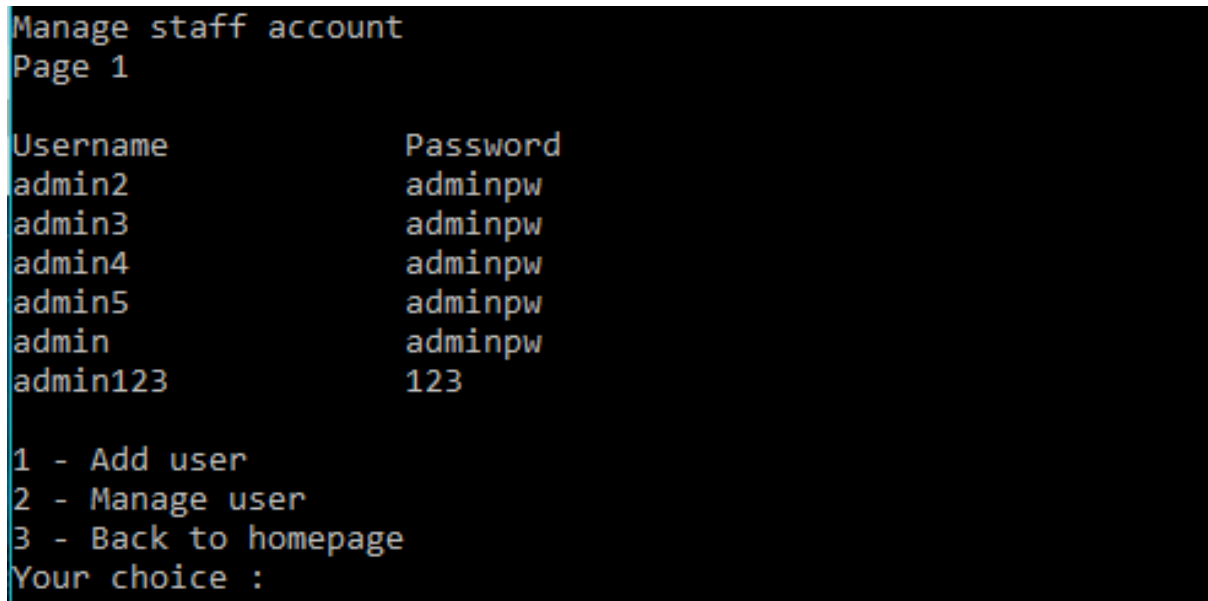
1. Number of staff user less than 20

staffAccount -

File   Edit   Format

admin2
adminpw
admin3
adminpw
admin4
adminpw
admin5
adminpw
admin
adminpw
admin123
123

Expected output: The username and password of all 6 accounts in the database are displayed.

Actual output:


```
Manage staff account
Page 1

Username            Password
admin2              adminpw
admin3              adminpw
admin4              adminpw
admin5              adminpw
admin               adminpw
admin123            123

1 - Add user
2 - Manage user
3 - Back to homepage
Your choice :
```

Result: **Pass**

staffAccount ·   staffAccount ·   staffAccount ·

File Edit Form	File Edit Form	File Edit Form	staffAccount ·
admin2	admin123	staff9	File Edit Form
adminpw	123	stf9	adm14
admin3	admin1	admin10	p14
adminpw	pw1	pw10	staff15
admin4	admin6	admin11	pw15
adminpw	pw6	pw11	user16
admin5	admin7	admin12	password16
adminpw	pw7	pw12	admin17
admin	adm8	admin13	adm17
adminpw	p8	pw13	

Expected output: The username and password of all 19 accounts in the database are displayed.

Actual output:

```
Manage staff account
Page 1

Username            Password
admin2              adminpw
admin3              adminpw
admin4              adminpw
admin5              adminpw
admin               adminpw
admin123            123
admin1              pw1
admin6              pw6
admin7              pw7
adm8                p8
staff9              stf9
admin10             pw10
admin11             pw11
admin12             pw12
admin13             pw13
adm14               p14
staff15             pw15
user16              password16
admin17             adm17


1 - Add user
2 - Manage user
3 - Back to homepage
```

Result: **Pass**

2. Number of staff user equals to 20

staffAccount | **staffAccount** | **staffAccount** | **staffAccount - N**

File Edit Form | File Edit Form | File Edit Form | File Edit Format

admin2	admin123	staff9
adminpw	123	stf9
admin3	admin1	admin10
adminpw	pw1	pw10
admin4	admin6	admin11
adminpw	pw6	pw11
admin5	admin7	admin12
adminpw	pw7	pw12
admin	adm8	admin13
adminpw	p8	pw13

adm14
p14
staff15
pw15
user16
password16
admin17
adm17
admin18
pw18

Expected output: The username and password of all 20 accounts in the database are displayed in one page.

Actual output:
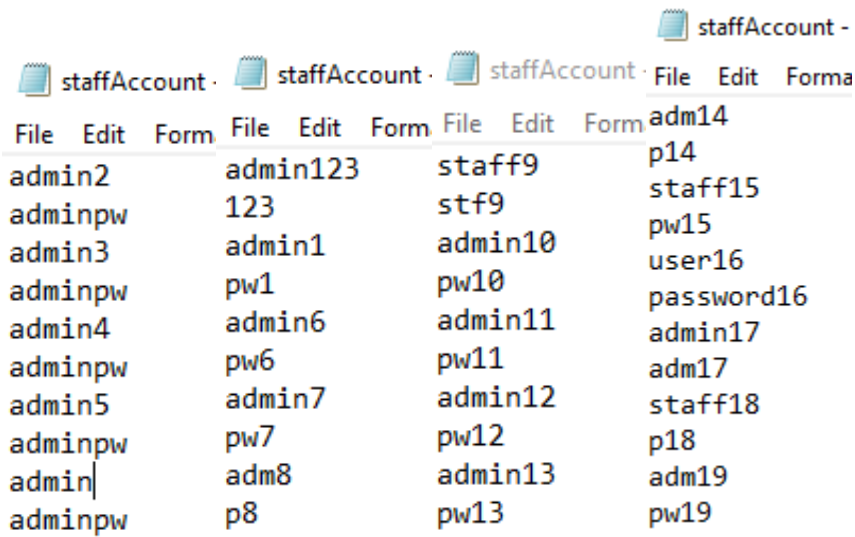
```
Manage staff account
Page 1

Username            Password
admin2              adminpw
admin3              adminpw
admin4              adminpw
admin5              adminpw
admin               adminpw
admin123            123
admin1              pw1
admin6              pw6
admin7              pw7
adm8                p8
staff9              stf9
admin10             pw10
admin11             pw11
admin12             pw12
admin13             pw13
adm14               p14
staff15             pw15
user16              password16
admin17             adm17
admin18             pw18

1 - Add user
2 - Manage user
3 - Back to homepage
```

Result: **Pass**

3. Number of staff user larger than 20

staffAccount ·
File Edit Form
admin2
adminpw
admin3
adminpw
admin4
adminpw
admin5
adminpw
admin|
adminpw

staffAccount ·
File Edit Form
admin123
123
admin1
pw1
admin6
pw6
admin7
pw7
adm8
p8

staffAccount ·
File Edit Form
staff9
stf9
admin10
pw10
admin11
pw11
admin12
pw12
admin13
pw13

staffAccount -
File Edit Forma
adm14
p14
staff15
pw15
user16
password16
admin17
adm17
staff18
p18
adm19
pw19

Expected output: Username and password of first 20 staff accounts in list are displayed in the first page while the remaining in the second page.

Actual output:

```
Manage staff account
Page 1

Username            Password
admin2              adminpw
admin3              adminpw
admin4              adminpw
admin5              adminpw
admin               adminpw
admin123            123
admin1              pw1
admin6              pw6
admin7              pw7
adm8                p8
staff9              stf9
admin10             pw10
admin11             pw11
admin12             pw12
admin13             pw13
adm14               p14
staff15             pw15
user16              password16
admin17             adm17
staff18             p18
```

Result: **Pass**

4. Choice Input

a. Test for 'Next Page' function

1. Number of staff user less than 20

Expected output: Only 2 choices are allowed, no 'Next Page' choice is shown.

Actual output:

Result: **Pass**

2. Number of staff user equals to 20

Expected output: Only 2 choices are allowed, no 'Next Page' choice is shown.

Actual output:

```
Manage staff account
Page 1

Username              Password
admin2                adminpw
admin3                adminpw
admin4                adminpw
admin5                adminpw
admin                 adminpw
admin123              123
admin1                pw1
admin6                pw6
admin7                pw7
adm8                  p8
staff9                stf9
admin10               pw10
admin11               pw11
admin12               pw12
admin13               pw13
adm14                 p14
staff15               pw15
user16                password16
admin17               adm17
staff18               p18

1 - Add user
2 - Manage user
3 - Back to homepage
Your choice :
```

Count - Notepad

File   Edit   Format   View

20   <- Number of Staff Account

8

21

8

Result: **Pass**

3. Number of staff user larger than 20

Expected output: 'Next page' choice is shown on first page; the second page will be displayed upon entering. However, the 'next page' is not available in the last page.

Actual output:

```
Manage staff account
Page 1

Username              Password
admin2                adminpw
admin3                adminpw
admin4                adminpw
admin5                adminpw
admin                 adminpw
admin123              123
admin1                pw1
admin6                pw6
admin7                pw7
adm8                  p8
staff9                stf9
admin10               pw10
admin11               pw11
admin12               pw12
admin13               pw13
adm14                 p14
staff15               pw15
user16                password16
admin17               adm17
staff18               p18

1 - Add user
2 - Manage user
3 - Back to homepage
4 - Next Page
Your choice : 4
Manage staff account
Page 2

Username              Password
adm19                 pw19

1 - Add user
2 - Manage user
3 - Back to homepage
Your choice :
```

Result: **Pass**

b. Other invalid input

Expected output: Invalid choice! Please enter again

Actual output:

```
Your choice : -1
Invalid choice! Please enter again
Your choice :
```

Result: **Pass**

```
Your choice :
Invalid choice! Please enter again
Your choice :
```

Result: **Pass**

```
Your choice : %dsf
Invalid choice! Please enter again
Your choice :
```

Result: **Pass**

```
Your choice : 4
Invalid choice! Please enter again
Your choice :
```

Result: **Pass**

c. Input 1

Expected output: Proceed to next step (Add user page)

Actual output:

```
1 - Add user
2 - Manage user
3 - Back to homepage
Your choice : 1
```

```
Please input the following details
Username :
```

Result: **Pass**

d. Input 2

Expected output: Proceed to next step (User management)

Actual output:

```
1 - Add user
2 - Manage user
3 - Back to homepage
Your choice : 2

Enter username :
```

Result: **Pass**

e. Input 3

Expected output: Proceed to next step (Back to staff homepage)

Actual output:

```
1 - Add user
2 - Manage user
3 - Back to homepage
Your choice : 3
```

```
Welcome admin!

********************************************

1 - Transaction
2 - Manage user
3 - Manage stock
4 - Sale analysis
5 - Logout
6 - Change password

Your choice?
```

Result: **Pass**

Customer Account Display

1. Customer List is Empty
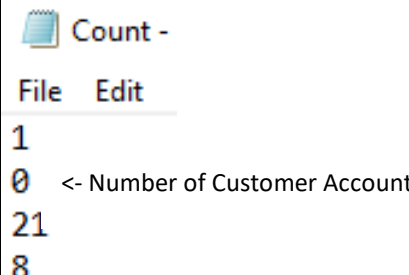
Expected output: A blank list is displayed.

Actual output:

```
Manage customer account
Page 1

Username              Password

1 - Add user
2 - Manage user
3 - Back to homepage
Your choice :
```

Count -

File   Edit

1
0   <- Number of Customer Account
21
8

Result: **Pass**

2. Number of customer user less than 20

Expected output: The username and password of all 4 accounts in the database are displayed.

Actual output:

```
Manage customer account
Page 1

Username              Password
customerA             cusa
customerB             cusb
customerC             cusc
customerD             cusd

1 - Add user
2 - Manage user
3 - Back to homepage
Your choice :
```

Count -

File   Edit

1
4   <- Number of Customer Account
21
8

Result: **Pass**

3. Number of customer user equals to 20

Expected output: The username and password of all 20 accounts in the database are displayed in a page.

Actual output:

```
Manage customer account
Page 1

Username            Password
ctm001              pw1
ctm002              pw2
ctm003              pw3
ctm004              pw4
ctm005              pw5
ctm006              pw6
ctm007              pw7
ctm008              pw8
ctm009              pw9
ctm010              pw10
ctm011              pw11
ctm012              pw12
ctm013              pw13
ctm014              pw14
ctm015              pw15
ctm016              pw16
ctm017              pw17
ctm018              pw18
ctm019              pw19
ctm020              pw20

1 - Add user
2 - Manage user
3 - Back to homepage
Your choice :
```

Count -

File   Edit

1

20   <- Number of Customer Account

21

8

Result: **Pass**

---

4. Number of customer user larger than 20

Count -

File   Edit

1

21   <- Number of Customer Account

21

8

Expected output: The username and password of first 20 accounts are displayed in first page, while the remaining in the second page.

Actual output:

```
Manage customer account
Page 1

Username              Password
ctm001                pw1
ctm002                pw2
ctm003                pw3
ctm004                pw4
ctm005                pw5
ctm006                pw6
ctm007                pw7
ctm008                pw8
ctm009                pw9
ctm010                pw10
ctm011                pw11
ctm012                pw12
ctm013                pw13
ctm014                pw14
ctm015                pw15
ctm016                pw16
ctm017                pw17
ctm018                pw18
ctm019                pw19
ctm020                pw20

1 - Add user
2 - Manage user
3 - Back to homepage
4 - Next Page
Your choice : 4
```

```
Manage customer account
Page 2

Username              Password
ctm021                pw21

1 - Add user
2 - Manage user
3 - Back to homepage
Your choice :
```

Result: **Pass**

5. Choice Input

<u>a. Test for 'Next Page' function</u>

1. Number of customer user less than 20

Expected output: Only 2 choices are allowed, no 'Next Page' choice is shown.

Actual output:

```
Manage customer account
Page 1

Username              Password
customerA             cusa
customerB             cusb
customerC             cusc
customerD             cusd


1 - Add user
2 - Manage user
3 - Back to homepage
Your choice :
```

Result: **Pass**

2. Number of customer user equals to 20

Expected output: Only 2 choices are allowed, no 'Next Page' choice is shown.

Actual output:

```
Manage customer account
Page 1

Username            Password
ctm001              pw1
ctm002              pw2
ctm003              pw3
ctm004              pw4
ctm005              pw5
ctm006              pw6
ctm007              pw7
ctm008              pw8
ctm009              pw9
ctm010              pw10
ctm011              pw11
ctm012              pw12
ctm013              pw13
ctm014              pw14
ctm015              pw15
ctm016              pw16
ctm017              pw17
ctm018              pw18
ctm019              pw19
ctm020              pw20

1 - Add user
2 - Manage user
3 - Back to homepage
Your choice :
```

Count -

File   Edit

```
1
20    <- Number of Customer
21
8
```

Result: **Pass**

3. Number of customer user larger than 20

Expected output: 'Next page' choice is shown on first page; the second page will be displayed upon entering. However, the 'next page' is not available in the last page.

Actual output:

```
Manage customer account
Page 1

Username            Password
ctm001              pw1
ctm002              pw2
ctm003              pw3
ctm004              pw4
ctm005              pw5
ctm006              pw6
ctm007              pw7
ctm008              pw8
ctm009              pw9
ctm010              pw10
ctm011              pw11
ctm012              pw12
ctm013              pw13
ctm014              pw14
ctm015              pw15
ctm016              pw16
ctm017              pw17
ctm018              pw18
ctm019              pw19
ctm020              pw20

1 - Add user
2 - Manage user
3 - Back to homepage
4 - Next Page
Your choice : 4
```

```
Manage customer account
Page 2

Username            Password
ctm021              pw21

1 - Add user
2 - Manage user
3 - Back to homepage
Your choice :
```

Result: **Pass**

b. Other invalid input

Expected output: Invalid choice! Please enter again

Actual output:

```
Your choice : -1
Invalid choice! Please enter again
Your choice :
```

Result: **Pass**

```
Your choice :
Invalid choice! Please enter again
Your choice :
```

Result: **Pass**

```
Your choice : %dsf
Invalid choice! Please enter again
Your choice :
```

Result: **Pass**

```
Your choice : 4
Invalid choice! Please enter again
Your choice :
```

Result: **Pass**

c. Input 1
Expected output: Proceed to next step (Add user page)

Actual output:

```
1 - Add user
2 - Manage user
3 - Back to homepage
Your choice : 1
```

```
Please input the following details
Username :
```

Result: **Pass**

d. Input 2
Expected output: Proceed to next step (User management)

Actual output:

```
1 - Add user
2 - Manage user
3 - Back to homepage
Your choice : 2

Enter username :
```

Result: **Pass**

Expected output: Proceed to next step (Back to staff homepage)

Actual output:

```
1 - Add user
2 - Manage user
3 - Back to homepage
Your choice : 3
```

```
Welcome admin!

*******************************************

1 - Transaction
2 - Manage user
3 - Manage stock
4 - Sale analysis
5 - Logout
6 - Change password

Your choice?
```

Result: **Pass**

Manage User Account

1. Username Input
a. Invalid Input
Expected output: Invalid username! Please input again

Actual output:

```
Enter username :
Invalid username! Please input again
Enter username :
```

Result: **Pass**

```
Enter username : ctm
Invalid username! Please input again
Enter username :
```

Result: **Pass**

```
Enter username : admin
Invalid username! Please input again
Enter username :
```

Result: **Pass**

b. Valid Input
Expected output: Proceed to next step (Display user details)

Actual output:

```
1 - Add user
2 - Manage user
3 - Back to homepage
4 - Next Page
Your choice : 2

Enter username : ctm021
```

```
Enter username : ctm021
Username : ctm021
Password : pw21

1 - Change password
2 - Delete user

Your choice :
```

Result: **Pass**

```
1 - Add user
2 - Manage user
3 - Back to homepage
Your choice : 2

Enter username : admin2
```

```
Enter username : admin2
Username : admin2
Password : adminpw

1 - Change password
2 - Delete user

Your choice :
```
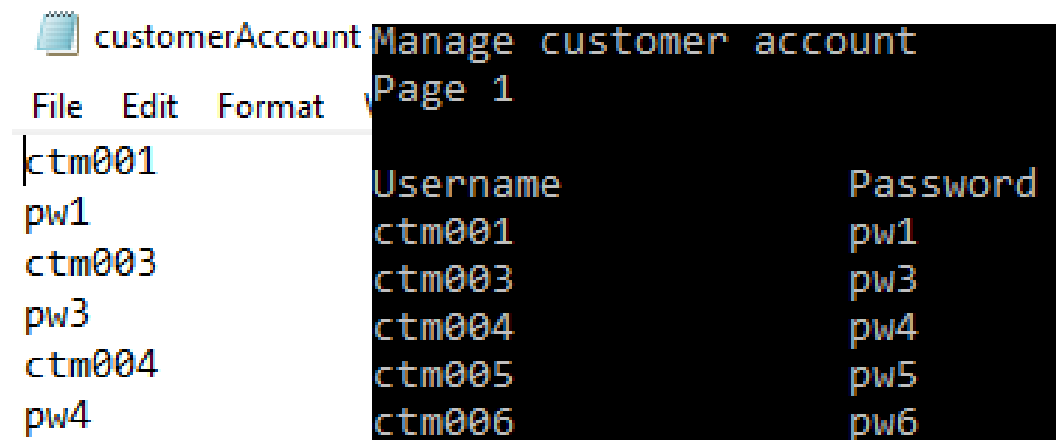
Result: **Pass**

2. Change Password

```
Enter username : ctm021
Username : ctm021
Password : pw21

1 - Change password
2 - Delete user

Your choice : 1
```

```
Change password

Old password :
```

a. Verification check 1 (Input original password)

1. Wrong Password

Expected output: Wrong password! Please enter again

Actual output:

```
Old password : pw
Wrong password! Please enter again

Old password :
```

Result: **Pass**

```
Old password :
Wrong password! Please enter again

Old password :
```

Result: **Pass**

2. Correct Password

Expected output: Proceed to next step (ask user to input new password)

Actual output:

```
Old password : pw21
New password :
```

Result: **Pass**

b. Verification check 2 (Re-enter new password)

1. Wrong Password

Expected output: Password does not match, please enter again

Actual output:

```
New password : password
Re-enter password : pw
Password does not match, please enter again
```

Result: **Pass**

Expected output: Proceed to next step (password successfully changed)

Actual output:

```
New password : pw21
Re-enter password : pw21

Password changed successfully!
Press enter to continue
```

Result: **Pass**

c. Impact on database

Initial Database

```
Manage customer account
Page 1

Username          Password
ctm001            pw1
ctm002            pw2
ctm003            pw3
ctm004            pw4
ctm005            pw5
```

```
customerAccount

File   Edit   Format

ctm001
pw1
ctm002
pw2
```

Change Password

```
Change password

Old password : pw1
New password : pw001
Re-enter password : pw001

Password changed successfully!
Press enter to continue
```

Resulting Database

Result: **Pass**

3. Delete User

a. Validation check (a user cannot delete his/her own account)

Expected output: Only the choice 'change password' is shown but not 'delete user'.

Actual output:

Result: **Pass**

Initial Database

Delete User

Resulting Database

Result: **Pass**

Initial Database

Delete User

Resulting Database

Result: **Pass**

Sales Analysis

Homepage choice input

```
Sale Analysis

1 - sort by quantity
2 - sort by price
Your choice :
```

1. Invalid Input

Expected output: Invalid input! Please enter again

Actual output:

```
Your choice : 221
Invalid input! Please enter again
Your choice :
```

Result: **Pass**

```
Your choice :
Invalid input! Please enter again
Your choice :
```

Result: **Pass**

```
Your choice : %
Invalid choice! Please input again
Your choice :
```

Result: **Pass**

```
Your choice : 0
Invalid choice! Please input again
Your choice :
```

Result: **Pass**

```
Your choice : 3
Invalid choice! Please input again
Your choice :
```

Result: **Pass**

```
Sale Analysis

1 - sort by quantity
2 - sort by price
Your choice : 1
```

Expected output: Sales of different products are displayed in descending order of quantity sold.
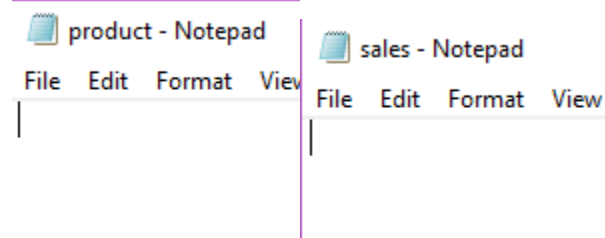
Actual output:

```
Page 1
ID          Quantity       Price
00007       94             517.50
00002       66             1287.63
00001       36             620.00
00006       33             1485.00
00005       16             375.00
00008       15             320.25
00003       10             90.00
00004       0              0.00

1 - Back to HomePage
Your choice :
```

Result: **Pass**

3. Input '2'

```
Sale Analysis

1 - sort by quantity
2 - sort by price
Your choice : 2
```

Expected output: Sales of different products are displayed in descending order of total price sold.

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Actual output:

```
Page 1
ID          Quantity         Price
00006       33               1485.00
00002       66               1287.63
00001       36               620.00
00007       94               517.50
00005       16               375.00
00008       15               320.25
00003       10               90.00
00004       0                0.00

1 - Back to HomePage
Your choice :
```

Result: **Pass**

Sales display

1. Product list is empty

Expected output: The display list is blank.

Actual output:

a. Sort by quantity

```
Page 1
ID          Quantity          Price


1 - Back to HomePage
Your choice :
```

Result: **Pass**

b. Sort by price

```
Page 1
ID          Quantity        Price

1 - Back to HomePage
Your choice :
```

Result: **Pass**

2. Number of products less than 20

```
00001          00003        00005        00007
product1       Product 3    product5     product 7
soft drink     dessert      snack        juice
20.00          12.00        25.00        7.50
14             0            0            7
0              1 25         2 3 1        2 4 2
00002          00004        00006        00008
Pd 2           product4     product6     product8
drink          typec        snack        beverage
20.00          100.00       45.00        30.50
940            0            1            0
0              1 30         0            1 30
               -----
```

Expected output: Products are listed in descending quantity sold.

Actual output:

a. Sort by quantity

```
Page 1
ID       Quantity       Price
00007    94             517.50
00002    66             1287.63
00001    36             620.00
00006    33             1485.00
00005    16             375.00
00008    15             320.25
00003    10             90.00
00004    0              0.00

1 - Back to HomePage
Your choice :
```

Result: **Pass**

b. Sort by price

Expected output: Products are listed in descending sales.

Actual output:

```
Page 1
ID          Quantity          Price
00006       33                1485.00
00002       66                1287.63
00001       36                620.00
00007       94                517.50
00005       16                375.00
00008       15                320.25
00003       10                90.00
00004       0                 0.00


1 - Back to HomePage
Your choice :
```
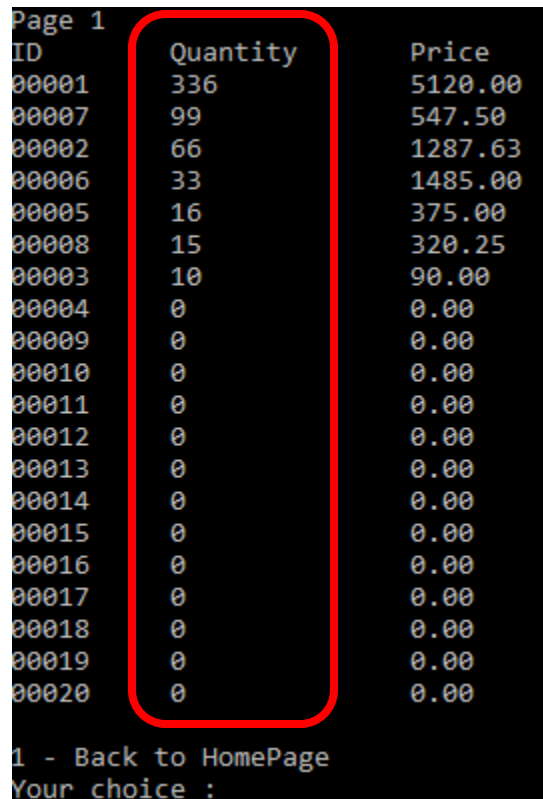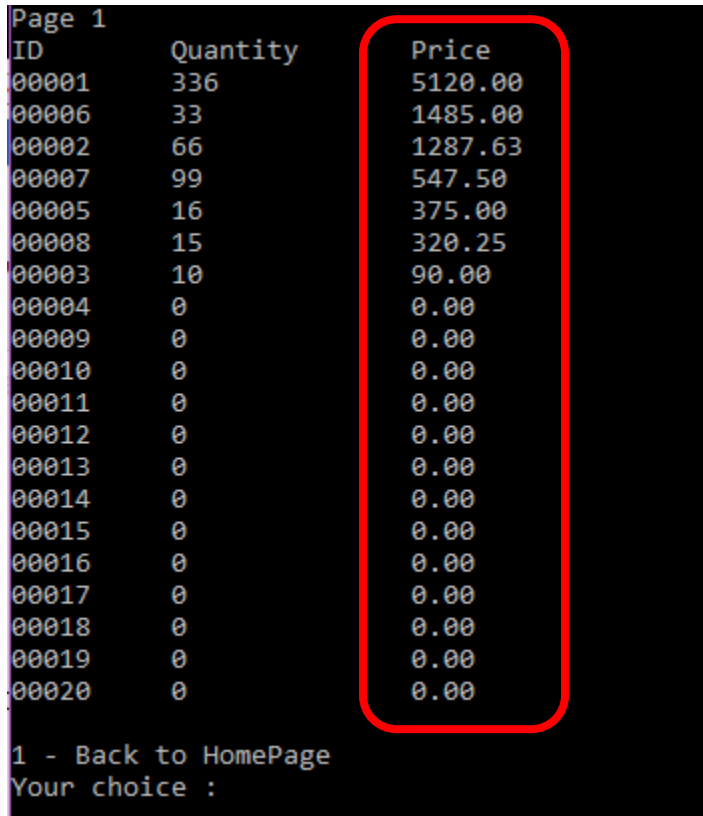
Result: **Pass**

---

3. Number of products equals to 20

00001	00006	00011	00016
336	33	0	0
5120.00	1485.00	0	0
00002	00007	00012	00017
66	99	0	0
1287.63	547.50	0	0
00003	00008	00013	00018
10	15	0	0
90.00	320.25	0	0
00004	00009	00014	00019
0	0	0	0
0	0	0	0
00005	00010	00015	00020
16	0	0	0
375.00	0	0	0

a. Sort by quantity

Expected output: Products are listed in descending quantity. No next page option is shown.

Actual output:

```
Page 1
ID          Quantity        Price
00001       336             5120.00
00007       99              547.50
00002       66              1287.63
00006       33              1485.00
00005       16              375.00
00008       15              320.25
00003       10              90.00
00004       0               0.00
00009       0               0.00
00010       0               0.00
00011       0               0.00
00012       0               0.00
00013       0               0.00
00014       0               0.00
00015       0               0.00
00016       0               0.00
00017       0               0.00
00018       0               0.00
00019       0               0.00
00020       0               0.00

1 - Back to HomePage
Your choice :
```

Result: **Pass**

Expected output: Products are listed in descending sales. No next page option is shown.

Actual output:

```
Page 1
ID          Quantity        Price
00001       336             5120.00
00006       33              1485.00
00002       66              1287.63
00007       99              547.50
00005       16              375.00
00008       15              320.25
00003       10              90.00
00004       0               0.00
00009       0               0.00
00010       0               0.00
00011       0               0.00
00012       0               0.00
00013       0               0.00
00014       0               0.00
00015       0               0.00
00016       0               0.00
00017       0               0.00
00018       0               0.00
00019       0               0.00
00020       0               0.00

1 - Back to HomePage
Your choice :
```

Result: **Pass**

4. Number of products larger than 20

00001	00006	00011	00016	
336	33	0	0	
5120.00	1485.00	0	0	00021
00002	00007	00012	00017	0
66	99	0	0	0
1287.63	547.50	0	0	00022
00003	00008	00013	00018	0
10	15	0	0	0
90.00	320.25	0	0	00023
00004	00009	00014	00019	0
0	0	0	0	0
0	0	0	0	00023
00005	00010	00015	00020	0
16	0	0	0	0
375.00	0	0	0	

a. Sort by quantity

Expected output: The product listed are sorted in descending order of quantity sold. The next page option is available in the first page.

Actual output:

```
Page 1
ID          Quantity            Price
00001       336                 5120.00
00007       99                  547.50
00002       66                  1287.63
00006       33                  1485.00
00005       16                  375.00
00008       15                  320.25
00003       10                  90.00
00004       0                   0.00
00009       0                   0.00
00010       0                   0.00
00011       0                   0.00
00012       0                   0.00
00013       0                   0.00
00014       0                   0.00
00015       0                   0.00
00016       0                   0.00
00017       0                   0.00
00018       0                   0.00
00019       0                   0.00
00020       0                   0.00

1 - Back to HomePage
2 - Next Page
Your choice :
```

```
Page 2
ID          Quantity            Price
00021       0                   0.00
00022       0                   0.00
00023       0                   0.00

1 - Back to HomePage
Your choice :
```

Result: **Pass**

Expected output: The product listed are sorted in descending order of sales. The next page option is available in the first page.

Actual output:

Result: **Pass**

Display Product

```
00001        00005        00009        00013        00017
orange       product5     coca cola    chips        coins
fruit        snack        soft drink   snack        cash
15.00        25.00        7.00         10.50        5.00
100          0            100          300          10
0            2 3 1        0            2 3 1        0
00002        00006        00010        00014        00018
Pd 2         product6     ice cream    jelly beans  fish
drink        snack        dessert      snack        seafood
20.00        45.00        20.00        5.00         50.00
940          1            15           10           76
0            0            2 5 1        0            2 4 1
00003        00007        00011        00015        00019
Product 3    product 7    tea          sprite       rice
dessert      juice        drink        soft drink   food
12.00        7.50         25.00        6.00         99.99
0            2            10           200          30
1 25         2 4 2        1 10         0            0
00004        00008        00012        00016        00020       00021
product4     product8     cookies      code         apple       coke
typec        beverage     snack        program      fruit       drink
100.00       30.50        15.50        2000.00      4.00        4.00
0            0            30           1            1000        50
1 30         1 30         0            0            1 5         0
```

This is a snapshot of the product list database.

\<product ID\>
\<name\>
\<type\>
\<price\>
\<stock\>
\<discount(0/1/2)\>

In this case, there are 21 products.

Search and Filter

1. No filter

```
Leave the input blank if no filtering is needed

Product List

Name :
Type :
Discount?
0 - No discount
1 - X% off
2 - Buy X get X free

Product out of stock? (Y/N)
```

No filtering is added for the product display.

Expected output: All products in database are listed in ascending order of product ID with "next page" option available in first page.

Actual output:

Result: **Pass**

2. Product name filter

```
Leave the input blank if no filtering is needed

Product List

Name : apple
Type :
Discount?
0 - No discount
1 - X% off
2 - Buy X get X free

Product out of stock? (Y/N)
```

Expected output: Products with name containing the string "apple" are listed in ascending order of product ID.

Actual output:

```
Product List
Page 1

Product ID      Product Name        Type            Price       Stock       Discount
00020           apple               fruit           4.00        1000        5% off

1 - Back to homepage
3 - Add product
4 - Manage product

Your choice :
```

Result: **Pass**

```
Leave the input blank if no filtering is needed

Product List

Name : pro
Type :
Discount?
0 - No discount
1 - X% off
2 - Buy X get X free

Product out of stock? (Y/N)
```

Expected output: Products with name containing the string "pro" are listed in ascending order of product ID.

Actual output:

```
Product List
Page 1

Product ID        Product Name        Type            Price       Stock       Discount
00004             product4            typec           100.00      0           30% off
00005             product5            snack           25.00       0           Buy 3 get 1 free
00006             product6            snack           45.00       1           N/A
00007             product 7           juice           7.50        2           Buy 4 get 2 free
00008             product8            beverage        30.50       0           30% off

1 - Back to homepage
3 - Add product
4 - Manage product

Your choice :
```

Result: **Pass**

3. Product type filter

```
Leave the input blank if no filtering is needed

Product List

Name :
Type : drink
Discount?
0 - No discount
1 - X% off
2 - Buy X get X free

Product out of stock? (Y/N)
```

Expected output: Products with type containing the string "drink" are listed in ascending order of product ID.

Actual output:

```
Product List
Page 1

Product ID        Product Name        Type            Price       Stock       Discount
00002             Pd 2                drink           20.00       940         N/A
00009             coca cola           soft drink      7.00        100         N/A
00011             tea                 drink           25.00       10          10% off
00015             sprite              soft drink      6.00        200         N/A
00021             coke                drink           4.00        50          N/A

1 - Back to homepage
3 - Add product
4 - Manage product

Your choice :
```

Result: **Pass**

4. Discount type filter
a. No discount

Expected output: Only products without discounts are listed in ascending order of product ID.

Actual output:

Result: **Pass**

```
Leave the input blank if no filtering is needed

Product List

Name :
Type :
Discount?
0 - No discount
1 - X% off
2 - Buy X get X free
1
Product out of stock? (Y/N)
```

Expected output: Only products with "X% off" discounts are listed in ascending order of product ID.

Actual output:


```
Product List
Page 1

Product ID      Product Name      Type          Price     Stock       Discount
00003           Product 3         dessert       12.00     0           25% off
00004           product4          typec         100.00    0           30% off
00008           product8          beverage      30.50     0           30% off
00011           tea               drink         25.00     10          10% off
00020           apple             fruit         4.00      1000        5% off

1 - Back to homepage
3 - Add product
4 - Manage product

Your choice :
```

Result: **Pass**

c. Buy X get X free


```
Leave the input blank if no filtering is needed

Product List

Name :
Type :
Discount?
0 - No discount
1 - X% off
2 - Buy X get X free
2
Product out of stock? (Y/N)
```

Expected output: Only products with "Buy X get X free" discounts are listed in ascending order of product ID.

Actual output:

Result: **Pass**

d. Invalid input

Expected output: The display list is blank.

Actual output:

Result: **Pass**

5. Stock filter

a. Out of stock


```
Leave the input blank if no filtering is needed

Product List

Name :
Type :
Discount?
0 - No discount
1 - X% off
2 - Buy X get X free

Product out of stock? (Y/N) Y
```

Expected output: Only products out of stock are listed in ascending order of product ID.

Actual output:


```
Product List
Page 1

Product ID     Product Name     Type          Price       Stock     Discount
00003          Product 3        dessert       12.00       0         25% off
00004          product4         typec         100.00      0         30% off
00005          product5         snack         25.00       0         Buy 3 get 1 free
00008          product8         beverage      30.50       0         30% off

1 - Back to homepage
3 - Add product
4 - Manage product

Your choice :
```

Result: **Pass**

b. Not out of stock


```
Leave the input blank if no filtering is needed

Product List

Name :
Type :
Discount?
0 - No discount
1 - X% off
2 - Buy X get X free

Product out of stock? (Y/N) N
```

Expected output: Only products with remaining stock are listed in ascending order of product ID.

Actual output:

```
Product List
Page 1

Product ID     Product Name    Type           Price      Stock    Discount
00001          orange          fruit          15.00      100      N/A
00002          Pd 2            drink          20.00      940      N/A
00006          product6        snack          45.00      1        N/A
00007          product 7       juice          7.50       2        Buy 4 get 2 free
00009          coca cola       soft drink     7.00       100      N/A
00010          ice cream       dessert        20.00      15       Buy 5 get 1 free
00011          tea             drink          25.00      10       10% off
00012          cookies         snack          15.50      30       N/A
00013          chips           snack          10.50      300      Buy 3 get 1 free
00014          jelly beans     snack          5.00       10       N/A
00015          sprite          soft drink     6.00       200      N/A
00016          code            program        2000.00    1        N/A
00017          coins           cash           5.00       10       N/A
00018          fish            seafood        50.00      76       Buy 4 get 1 free
00019          rice            food           99.99      30       N/A
00020          apple           fruit          4.00       1000     5% off
00021          coke            drink          4.00       50       N/A

1 - Back to homepage
3 - Add product
4 - Manage product

Your choice :
```

Result: **Pass**

<u>c. Invalid input</u>

```
Leave the input blank if no filtering is needed

Product List

Name :
Type :
Discount?
0 - No discount
1 - X% off
2 - Buy X get X free

Product out of stock? (Y/N) D
```

Expected output: The display list is blank.

Actual output:

```
Product List
Page 1

Product ID     Product Name    Type              Price     Stock      Discount

1 - Back to homepage
3 - Add product
4 - Manage product
```

Result: **Pass**

6. Multiple filter

Expected output: Only products with name containing the string "pro" with "buy X get X free" discounts are listed in ascending order of product ID.

Actual output:

Result: **Pass**

Expected output: Only products with type containing the string "drink" without discounts are listed in ascending order of product ID.

Actual output:

```
Product List
Page 1

Product ID      Product Name       Type          Price     Stock     Discount
00002           Pd 2               drink         20.00     940       N/A
00009           coca cola          soft drink    7.00      100       N/A
00015           sprite             soft drink    6.00      200       N/A
00021           coke               drink         4.00      50        N/A

1 - Back to homepage
3 - Add product
4 - Manage product

Your choice :
```

Result: **Pass**

Add Product

Original product list (filtering criteria "drink" applied).

```
Product List
Page 1

Product ID      Product Name       Type          Price     Stock     Discount
00002           Pd 2               drink         20.00     940       N/A
00009           coca cola          soft drink    7.00      100       N/A
00015           sprite             soft drink    6.00      200       N/A
00021           coke               drink         4.00      50        N/A

1 - Back to homepage
3 - Add product
4 - Manage product

Your choice :
```

A new product is added.

```
Add new product

Product name : pepsi
Product type : soft drink
Price : 7
Stock : 100
Discount?
1 - X% off
2 - Buy X get X free
3 - No discount
3
```

Expected output: The new product is added to the end of the product display list. All of its details displayed should match those inputted.

Actual output:

```
Product List
Page 1

Product ID       Product Name      Type                  Price      Stock      Discount
00002            Pd 2              drink                 20.00      940        N/A
00009            coca cola         soft drink            7.00       100        N/A
00011            tea               drink                 25.00      10         10% off
00015            sprite            soft drink            6.00       200        N/A
00021            coke              drink                 4.00       50         N/A
00022            pepsi             soft drink            7.00       100        N/A

1 - Back to homepage
3 - Add product
4 - Manage product

Your choice :
```

Result: **Pass**

Original product list (filtering criteria "drink" applied).

```
Product List
Page 1

Product ID       Product Name      Type                  Price      Stock      Discount
00002            Pd 2              drink                 20.00      940        N/A
00009            Coca cola         soft drink            5.00       150        N/A
00011            tea               drink                 25.00      10         10% off
00015            sprite            soft drink            6.00       200        N/A
00021            coke              drink                 4.00       50         N/A
00022            Pepsi Soft Drink  soft drink            8.00       105        20% off

1 - Back to homepage
3 - Add product
4 - Manage product
```

A new product is added.

```
Add new product

Product name : Bubble Milk Tea
Product type : drink
Price : 20
Stock : 10
Discount?
1 - X% off
2 - Buy X get X free
3 - No discount
3
Confirm add product?(Y/N) Y
```

Expected output: The new product is added to the end of the product display list. All of its details displayed should match those inputted.

Actual output:

```
Product List
Page 1

Product ID        Product Name        Type              Price     Stock     Discount
00002             Pd 2                drink             20.00     940       N/A
00009             Coca cola           soft drink        5.00      150       N/A
00011             tea                 drink             25.00     10        10% off
00015             sprite              soft drink        6.00      200       N/A
00021             coke                drink             4.00      50        N/A
00022             Pepsi Soft Drink    soft drink        8.00      105       20% off
00023             Bubble Milk Tea     drink             20.00     10        N/A

1 - Back to homepage
3 - Add product
4 - Manage product

Your choice :
```

Result: **Pass**

Manage Product

Original product list (filtering criteria "drink" applied).

```
Product List
Page 2

Product ID      Product Name      Type              Price      Stock      Discount
00021           coke              drink             4.00       50         N/A
00022           pepsi             soft drink        7.00       100        N/A

1 - Back to homepage
3 - Add product
4 - Manage product

Your choice :
```

```
4.00
50
0
00022
pepsi
soft drink
7.00
100
0
```

This is a snapshot of the "product.txt" database

The original information of the product matches those displayed.

The details of the product is changed.

```
Enter product ID : 00022
Product name : pepsi
New name : Pepsi Soft Drink
Product type : soft drink
New type : soft drink
Price : 7.00
New price : 8
Stock : 100
New stock : 105
Discount : N/A
New Discount :
1 - X% off
2 - Buy X get X free
3 - No discount
1
Input percentage off
20
```

Expected output: The new product is added to the end of the product display list. All of its details displayed should match those inputted.

Actual output:

```
4.00
50
0
00022
Pepsi Soft Drink
soft drink
8.00
105
1 20
```

```
Product List
Page 2

Product ID      Product Name      Type              Price      Stock      Discount
00021           coke              drink             4.00       50         N/A
00022           Pepsi Soft Drink  soft drink        8.00       105        20% off

1 - Back to homepage
3 - Add product
4 - Manage product
```

Result: **Pass**

Original product list (filtering criteria product name containing "pro" applied).

```
Product List
Page 1

Product ID      Product Name      Type              Price      Stock      Discount
00004           product4          typec             100.00     0          30% off
00005           product5          snack             25.00      0          Buy 3 get 1 free
00006           product6          snack             45.00      1          N/A
00007           product7          juice             7.50       2          Buy 4 get 2 free
00008           product8          beverage          30.50      0          30% off

1 - Back to homepage
3 - Add product
4 - Manage product

Your choice :
```

```
0
2 3 1
00006
product6
snack
45.00
1
0
00007
product 7
```

This is a snapshot of the "product.txt" database

The original information of the product matches those displayed.

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The details of the product is changed.

```
Enter product ID : 00006
Product name : product6
New name : Fan
Product type : snack
New type : home appliances
Price : 45.00
New price : 150
Stock : 1
New stock : 50
Discount : N/A
New Discount :
1 - X% off
2 - Buy X get X free
3 - No discount
1
Input percentage off
10
```

Expected output: The new product is added to the end of the product display list. All of its details displayed should match those inputted.

Actual output:

```
Product List
Page 1

Product ID      Product Name        Type            Price       Stock       Discount
00006           Fan                 home appliances 150.00      50          10% off
00011           tea                 drink           25.00       10          10% off
00020           apple               fruit           4.00        1000        5% off
00022           Pepsi Soft Drink    soft drink      8.00        105         20% off

1 - Back to homepage
3 - Add product
4 - Manage product

Your choice :
25.00
0
2 3 1
00006
Fan
home appliances
150.00
50
1 10
00007
product 7
```

Result: **Pass**

Change Password

Original Password Input

1. Input wrong password

Expected output: Wrong password! Please enter again

Actual output:

Result: **Pass**

Result: **Pass**

Result: **Pass**

Result: **Pass**

Result: **Pass**

Result: **Pass**

Result: **Pass**

2. Input correct password

Expected output: Proceed to entering new password

Actual output:

Result: **Pass**

Result: **Pass**

New Password Input

1. Input mismatched password

Expected output: Password does not match, please enter again

Actual output:

Result: **Pass**

Result: **Pass**

Result: **Pass**

Result: **Pass**

2. Input matched password

Expected output: Successfully changed password

Actual output:

Result: **Pass**

Result: **Pass**

Customer Interface

For display product, please refer to the "search and filter" part of the "Display Product" module in staff interface part.

Manage Bookmark

Display Bookmark

1. Number of bookmarks > 20

ctm001		
00020	00006	
00005	00007	00014
00021	00008	00015
00001	00009	00016
00002	00010	00017
00003	00011	00018
00004	00012	00019
	00013	

This a snapshot of the bookmark list of user ctm001 from the bookmark database 'bookmark.txt'.

Those numbers indicate the product ID, listed in the order of time added into the list.

Expected output: The products are listed in the same order as the database. As the number of bookmarks > 20, a 'next page' function should be shown in first page with page 2 available.

Actual output:

Page 1
Product ID	Product Name	Type	Price	Stock	Discount
00020	apple	fruit	4.00	1000	5% off
00005	product5	snack	25.00	0	Buy 3 get 1 free
00021	coke	drink	4.00	50	N/A
00001	orange	fruit	15.00	100	N/A
00002	Pd 2	drink	20.00	940	N/A
00003	Product 3	dessert	12.00	0	25% off
00004	product4	typec	100.00	0	30% off
00006	product6	snack	45.00	1	N/A
00007	product 7	juice	7.50	2	Buy 4 get 2 free
00008	product8	beverage	30.50	0	30% off
00009	coca cola	soft drink	7.00	100	N/A
00010	ice cream	dessert	20.00	15	Buy 5 get 1 free
00011	tea	drink	25.00	10	10% off
00012	cookies	snack	15.50	30	N/A
00013	chips	snack	10.50	300	Buy 3 get 1 free
00014	jelly beans	snack	5.00	10	N/A
00015	sprite	soft drink	6.00	200	N/A
00016	code	program	2000.00	1	N/A
00017	coins	cash	5.00	10	N/A
00018	fish	seafood	50.00	76	Buy 4 get 1 free

1 - Delete Bookmark
2 - Back to HomePage
3 - Next Page
Your choice :

```
Page 2
Product ID      Product Name        Type            Price       Stock           Discount
00019           rice                food            99.99       30              N/A

1 - Delete Bookmark
2 - Back to HomePage
Your choice :
```

Result: **Pass**

ctm016	00017	00014	
00020	00018	00003	00015
00005	00002	00004	00010
00021	00019	00006	00021
00001	00005	00020	00016
00010	00012	00008	00011
00011	00013	00009	

This a snapshot of the bookmark list of user ctm016 from the bookmark database 'bookmark.txt'.

Those numbers indicate the product ID, listed in the order of time added into the list.

Expected output: The products are listed in the same order as the database. As the number of bookmarks > 20, a 'next page' function should be shown in first page with page 2 available.

Actual output:


```
Page 1
Product ID      Product Name        Type            Price       Stock           Discount
00020           apple               fruit           4.00        1000            5% off
00005           product5            snack           25.00       0               Buy 3 get 1 free
00021           coke                drink           4.00        50              N/A
00001           orange              fruit           15.00       100             N/A
00010           ice cream           dessert         20.00       15              Buy 5 get 1 free
00011           tea                 drink           25.00       10              10% off
00017           coins               cash            5.00        10              N/A
00018           fish                seafood         50.00       76              Buy 4 get 1 free
00002           Pd 2                drink           20.00       940             N/A
00019           rice                food            99.99       30              N/A
00005           product5            snack           25.00       0               Buy 3 get 1 free
00012           cookies             snack           15.50       30              N/A
00013           chips               snack           10.50       300             Buy 3 get 1 free
00014           jelly beans         snack           5.00        10              N/A
00003           Product 3           dessert         12.00       0               25% off
00004           product4            typec           100.00      0               30% off
00006           product6            snack           45.00       1               N/A
00020           apple               fruit           4.00        1000            5% off
00008           product8            beverage        30.50       0               30% off
00009           coca cola           soft drink      7.00        100             N/A

1 - Delete Bookmark
2 - Back to HomePage
3 - Next Page
Your choice :
```

```
Page 2
Product ID      Product Name        Type            Price       Stock           Discount
00015           sprite              soft drink      6.00        200             N/A
00010           ice cream           dessert         20.00       15              Buy 5 get 1 free
00021           coke                drink           4.00        50              N/A
00016           code                program         2000.00     1               N/A
00011           tea                 drink           25.00       10              10% off

1 - Delete Bookmark
2 - Back to HomePage
Your choice :
```

Result: **Pass**

2. Number of bookmarks = 20

```
ctm007  00021  00019
00009   00001  00003
00010   00002  00006
00011   00005  00008
00012   00004  00015
00013   00007  00016
00014   00020  00017
```

This a snapshot of the bookmark list of user ctm007 from the bookmark database 'bookmark.txt'.

Those numbers indicate the product ID, listed in the order of time added into the list.

Expected output: The products are listed in the same order as the database. As the number of bookmarks <= 20, there should be one page only without 'next page' function.

Actual output:

```
Page 1
Product ID    Product Name    Type          Price     Stock    Discount
00009         coca cola       soft drink    7.00      100      N/A
00010         ice cream       dessert       20.00     15       Buy 5 get 1 free
00011         tea             drink         25.00     10       10% off
00012         cookies         snack         15.50     30       N/A
00013         chips           snack         10.50     300      Buy 3 get 1 free
00014         jelly beans     snack         5.00      10       N/A
00021         coke            drink         4.00      50       N/A
00001         orange          fruit         15.00     100      N/A
00002         Pd 2            drink         20.00     940      N/A
00005         product5        snack         25.00     0        Buy 3 get 1 free
00004         product4        typec         100.00    0        30% off
00007         product 7       juice         7.50      2        Buy 4 get 2 free
00020         apple           fruit         4.00      1000     5% off
00019         rice            food          99.99     30       N/A
00003         Product 3       dessert       12.00     0        25% off
00006         product6        snack         45.00     1        N/A
00008         product8        beverage      30.50     0        30% off
00015         sprite          soft drink    6.00      200      N/A
00016         code            program       2000.00   1        N/A
00017         coins           cash          5.00      10       N/A

1 - Delete Bookmark
2 - Back to HomePage
Your choice :
```

Result: **Pass**

```
ctm014     00001     00013
00009      00002     00014
00010      00005     00020
00006      00004     00019
00008      00007     00003
00015      00011     00016
00021      00012     00017
```

This a snapshot of the bookmark list of user ctm014 from the bookmark database 'bookmark.txt'.

Those numbers indicate the product ID, listed in the order of time added into the list.

Expected output: The products are listed in the same order as the database. As the number of bookmarks <= 20, there should be one page only without 'next page' function.

Actual output:

```
Page 1
Product ID      Product Name      Type            Price       Stock     Discount
00009           coca cola         soft drink      7.00        100       N/A
00010           ice cream         dessert         20.00       15        Buy 5 get 1 free
00006           product6          snack           45.00       1         N/A
00008           product8          beverage        30.50       0         30% off
00015           sprite            soft drink      6.00        200       N/A
00021           coke              drink           4.00        50        N/A
00001           orange            fruit           15.00       100       N/A
00002           Pd 2              drink           20.00       940       N/A
00005           product5          snack           25.00       0         Buy 3 get 1 free
00004           product4          typec           100.00      0         30% off
00007           product 7         juice           7.50        2         Buy 4 get 2 free
00011           tea               drink           25.00       10        10% off
00012           cookies           snack           15.50       30        N/A
00013           chips             snack           10.50       300       Buy 3 get 1 free
00014           jelly beans       snack           5.00        10        N/A
00020           apple             fruit           4.00        1000      5% off
00019           rice              food            99.99       30        N/A
00003           Product 3         dessert         12.00       0         25% off
00016           code              program         2000.00     1         N/A
00017           coins             cash            5.00        10        N/A

1 - Delete Bookmark
2 - Back to HomePage
Your choice :
```

Result: **Pass**

3. Number of bookmarks < 20

```
ctm004
00005        00002
00006        00007
00001        00020
00010        00019
```

Expected output: The products are listed in the same order as the database. As the number of bookmarks <= 20, there should be one page only without 'next page' function.

Actual output:

```
Page 1
Product ID      Product Name      Type          Price     Stock      Discount
00005           product5          snack         25.00     0          Buy 3 get 1 free
00006           product6          snack         45.00     1          N/A
00001           orange            fruit         15.00     100        N/A
00010           ice cream         dessert       20.00     15         Buy 5 get 1 free
00002           Pd 2              drink         20.00     940        N/A
00007           product 7         juice         7.50      2          Buy 4 get 2 free
00020           apple             fruit         4.00      1000       5% off
00019           rice              food          99.99     30         N/A

1 - Delete Bookmark
2 - Back to HomePage
Your choice :
```

Result: **Pass**

```
ctm019
00002
00005
00010
00004
00003
```

Expected output: The products are listed in the same order as the database. As the number of bookmarks <= 20, there should be one page only without 'next page' function.

Actual output:

```
Page 1
Product ID      Product Name      Type          Price     Stock      Discount
00002           Pd 2              drink         20.00     940        N/A
00005           product5          snack         25.00     0          Buy 3 get 1 free
00010           ice cream         dessert       20.00     15         Buy 5 get 1 free
00004           product4          typec         100.00    0          30% off
00003           Product 3         dessert       12.00     0          25% off

1 - Delete Bookmark
2 - Back to HomePage
Your choice :
```

Result: **Pass**

Delete Bookmark

Initially, product 00007 is in both the bookmark database and bookmark displayed of ctm001.

```
00004          product4      ctm001
00006          product6      00020
00007          product 7     00005
00008          product8      00021
00009          coca cola     00001
00010          ice cream     00002
00011          tea           00003
00012          cookies       00004
00013          chips         00006
                             00007
                             00008
```

Product 00007 is deleted.

```
1 - Delete Bookmark
2 - Back to HomePage
3 - Next Page
Your choice : 1
Delete Bookmark

Enter product ID : 00007
```

Expected output: Product 00007, originally between product 00006 and 00008, is removed from both the database and the display list.

Actual output:

```
00004          product4      ctm001
00006          product6      00020
00008          product8      00005
00009          coca cola     00021
00010          ice cream     00001
00011          tea           00002
00012          cookies       00003
00013          chips         00004
00014          jelly beans   00006
                             00008
```

Result: **Pass**

Initially, product 00001 is in both the bookmark database and bookmark displayed of ctm004.

Product 00001 is deleted.

Expected output: Product 00001, originally between product 00006 and 00010, is removed from both the database and the display list.

Actual output:

Result: **Pass**

Add Bookmark

Initially, both the bookmark database and bookmark displayed of ctm018 is empty.

Product 00003 is added into bookmark in the product display page.

Expected output: Product 00003 becomes the only entry in both the bookmark database and display list.

Actual output:

Result: **Pass**

Initially, both the bookmark database and bookmark displayed of ctm006 is has product 00004 and 00020 only.

```
Page 1
Product ID      Product Name       ctm005
00004              product4         ctm006
00020              apple            00004
                                    00020
1 - Delete Bookmark                 ctm007
2 - Back to HomePage                00009
Your choice :                       00010
```

Product 00016 is added into bookmark in the product display page.

```
1 - Back to homepage
2 - Next page
3 - Add Bookmark

Your choice : 3
Enter Product ID : 00016
```

Expected output: Product 00016 becomes the top entry in both the bookmark database and display list.

Actual output:

```
Page 1
Product ID      Product Name       ctm005
00016              code             ctm006
00004              product4         00016
00020              apple            00004
                                    00020
1 - Delete Bookmark                 00009
2 - Back to HomePage                ctm007
Your choice :                       00009
```

Result: **Pass**

Change Password

Original Password Input

1. Input wrong password
Expected output: Display "Wrong password! Please enter again" and prompt user to re-input password

Actual output:

```
Change password

Old password : pw
Wrong password! Please enter again

Old password :
```
```
ctm001
pw1
ctm003
pw3
```

Result: **Pass**

```
Change password

Old password : pw2
Wrong password! Please enter again

Old password :
```
```
ctm001
pw1
ctm003
pw3
```

Result: **Pass**

2. Input correct password
Expected output: Prompt user to enter new password

Actual output:

```
Old password : pw1
New password :
```
```
ctm001
pw1
ctm003
pw3
```

Result: **Pass**

Result: **Pass**

New Password Input

1. Input mismatched password

Expected output: Display "Password does not match, please enter again" and prompt user to re-input password

Actual output:

Result: **Pass**

Result: **Pass**

2. Input matched password

Expected output: Successfully changed password

Actual output:

```
Change password

Old password : pw1
New password : Password1
Re-enter password : Password1

Password changed successfully!
Press enter to continue
```

Result: **Pass**

```
Change password

Old password : password
New password : pw1
Re-enter password : pw1

Password changed successfully!
Press enter to continue
```

Result: **Pass**

```
Change password

Old password : dkjAb@
New password : password
Re-enter password : password

Password changed successfully!
Press enter to continue
```

Result: **Pass**

System Test

Staff

Firstly, the user login with a staff account with username "admin".

```
Please input your username : admin
Please input your password : admin
```

The homepage is then displayed.

```
Welcome admin!

*********************************************

1 - Transaction
2 - Manage user
3 - Manage stock
4 - Sale analysis
5 - Logout
6 - Change password

Your choice?
```

The user went to the stock management page, looking for products with type containing the string "drink".

```
Leave the input blank if no filtering is needed

Product List

Name :
Type : drink
Discount?
0 - No discount
1 - X% off
2 - Buy X get X free

Product out of stock? (Y/N)
```

A list of drinks is shown.

```
Product List
Page 1

Product ID       Product Name       Type               Price      Stock       Discount
00002            Pd 2               drink              20.00      940         N/A
00009            coca cola          soft drink         7.00       100         N/A
00011            tea                drink              25.00      10          10% off
00015            sprite             soft drink         6.00       200         N/A
00021            coke               drink              4.00       50          N/A

1 - Back to homepage
3 - Add product
4 - Manage product

Your choice : 3
```

The user added a new soft drink product.

```
Add new product

Product name : pepsi
Product type : soft drink
Price : 7
Stock : 100
Discount?
1 - X% off
2 - Buy X get X free
3 - No discount
3
```

The new product is added to the product display list.

```
Product List
Page 1

Product ID       Product Name       Type               Price      Stock       Discount
00002            Pd 2               drink              20.00      940         N/A
00009            coca cola          soft drink         7.00       100         N/A
00011            tea                drink              25.00      10          10% off
00015            sprite             soft drink         6.00       200         N/A
00021            coke               drink              4.00       50          N/A
00022            pepsi              soft drink         7.00       100         N/A

1 - Back to homepage
3 - Add product
4 - Manage product

Your choice :
```

Then, the user checked the sales analysis with descending quantity shown.

```
Page 1
ID          Quantity        Price
00001       336             5120.00
00007       99              547.50
00002       66              1287.63
00006       33              1485.00
00005       16              375.00
00008       15              320.25
00003       10              90.00
00004       0               0.00
00009       0               0.00
00010       0               0.00
00011       0               0.00
00012       0               0.00
00013       0               0.00
00014       0               0.00
00015       0               0.00
00016       0               0.00
00017       0               0.00
00018       0               0.00
00019       0               0.00
00020       0               0.00

1 - Back to HomePage
2 - Next Page
Your choice :
```

After carrying out these operations, the user logged out from the system in staff homepage.

```
Welcome admin!

********************************************

1 - Transaction
2 - Manage user
3 - Manage stock
4 - Sale analysis
5 - Logout
6 - Change password

Your choice? 5
```

Comment: The overall operation is smooth, using multiple functions continuously does not cause any runtime errors leading to program crash. Therefore, the performance is satisfactory.

Result: **Pass**

Customer

A customer login into the customer interface of the system with account ctm001.

```
Please input your username : ctm001
Please input your password : pw1
```

The customer homepage is shown.

```
Welcome ctm001!

************************************************

1 - Display Product
2 - Manage Bookmark
3 - Change Password
4 - Logout

Your choice :
```

The customer opened the "manage bookmark" function

```
Page 1
Product ID      Product Name      Type          Price      Stock      Discount
00020           apple             fruit         4.00       1000       5% off
00005           product5          snack         25.00      0          Buy 3 get 1 free
00021           coke              drink         4.00       50         N/A
00001           orange            fruit         15.00      100        N/A
00002           Pd 2              drink         20.00      940        N/A
00003           Product 3         dessert       12.00      0          25% off
00004           product4          typec         100.00     0          30% off
00006           product6          snack         45.00      1          N/A
00008           product8          beverage      30.50      0          30% off
00009           Coca cola         soft drink    5.00       150        N/A
00010           ice cream         dessert       20.00      15         Buy 5 get 1 free
00011           tea               drink         25.00      10         10% off
00012           cookies           snack         15.50      30         N/A
00013           chips             snack         10.50      300        Buy 3 get 1 free
00014           jelly beans       snack         5.00       10         N/A
00015           sprite            soft drink    6.00       200        N/A
00016           code              program       2000.00    1          N/A
00017           coins             cash          5.00       10         N/A
00018           fish              seafood       50.00      76         Buy 4 get 1 free
00019           rice              food          99.99      30         N/A

1 - Delete Bookmark
2 - Back to HomePage
Your choice :
```

Bookmarks of product 00014 and 00008 are deleted.

```
1 - Delete Bookmark          1 - Delete Bookmark
2 - Back to HomePage         2 - Back to HomePage
Your choice : 1              Your choice : 1
Delete Bookmark              Delete Bookmark

Enter product ID : 00014     Enter product ID : 00008
```

The user went to product display page to search for snacks under "Buy X get X free" discount.

```
Leave the input blank if no filtering is needed

Product List

Name :
Type : snack
Discount?
0 - No discount
1 - X% off
2 - Buy X get X free
2
Product out of stock? (Y/N) N
```

A single product is displayed, the user added it into the account's bookmark list.

```
Product List
Page 1

Product ID     Product Name      Type          Price    Stock     Discount
00013          chips             snack         10.50    300       Buy 3 get 1 free

1 - Back to homepage
3 - Add Bookmark

Your choice :
```

```
1 - Back to homepage
3 - Add Bookmark

Your choice : 3
Enter Product ID : 00013
```

Then the user changed the account's password.

```
Old password : pw1
New password : PassWord00001
Re-enter password : PassWord00001

Password changed successfully!
Press enter to continue
```

Comment: The overall operation is smooth, using multiple functions continuously does not cause any runtime errors leading to program crash. Therefore, the performance is satisfactory.

Result: **Pass**

User Acceptance Test

User acceptance test is a test carried out by real users to determine whether the system is user-friendly and meets the expectations and needs of user. Therefore, I have invited four friends to carry out the user acceptance test for my program. After trying to use the program for a several times, they gave some feedbacks and opinions about the system.

Firstly, all of them commented that the system is comprehensive with sufficient functions for the daily operations of a real-life point of sale system. Some also expressed their appreciation towards the different functions provided for the staff and user interface.

Secondly, most thought that the overall operation of the program was smooth. Moreover, it can effectively check invalid inputs and prevent the program from crashing due to weird inputs caused by reasons like typing errors.

Thirdly, it is suggested that a graphical user interface can be used instead of command line interface. Since the majority of applications today support graphical user interface, a command line interface drastically reduces the user-friendliness of the program for users unfamiliar with command prompt.

Lastly, a few mentioned that some instructions for certain functions are unclear, such as the filtering function in product display. They hoped that more instructions can be added to state what the function is about and how it can be used.

Evaluation and Improvements

After carrying out the three tests, I found out that my program is overall satisfactory with comprehensive functions and generally smooth usage which satisfies the needs of daily operation of a point of sale system. However, after careful considerations and evaluations, I have concluded some areas that I can make further improvements on.

Data handling

The system performs poorly with large amount of data. As only txt files are used as database with data stored in chronological order, the speed in searching and accessing specific data is slow since efficient data searching algorithms like binary search can hardly be applied. Therefore, the following improvements can be made based on this issue:

1. Sort the data in database

By sorting the data with certain keys, such as lexicographical order, more efficient algorithms like binary search can be applied when searching for specific data to raise searching efficiency and reduce search time.

2. Use a database management system

Due to limitations in aspects such as code complexity and database functionality, the amount and comprehensiveness of functions based on data processing, such as sorting, searching and filtering of data, are restrained. As database management systems provide many data processing functions with high efficiency and effectiveness along with flexible data extraction, the functionality of my program in terms of data handling can be significantly enhanced.

3. Apply more efficient algorithms

In my program, sequential search is applied even when only one specific data is to be searched from the database. When the amount of data is large with many searching operations need to be carried out, the system performs poorly with a slow runtime. Therefore, faster searching algorithms like binary search or even ternary search should be considered.

In addition, when sorting display data, bubble sort is used. As bubble sort is slow with time complexity $O(N^2)$, the runtime significantly worsens with an increasing amount of data. To tackle this problem, more efficient sorting algorithms such as merge sort and quick sort can be used.

Enhance functionality

Apart from the existing functions, it is suggested by some users that the system can add some extra functions or improve its interface to make it an even more appealing and useful one. Therefore, the following are a few ideas that I come up with which can be added to make my system even better:

1. Graphical user interface

In my program, only command line interface is supported due to the limited development time. Although I have attempted to present the information in a clearer way with the use of formatting functions and clear screen, the interface is still far from appealing and attractive. Therefore, with sufficient time and resources, the system can be presented in a graphical user interface with the use of programming languages like visual basics, Java or even HTML with CSS. With a graphical user interface, the program can be more attractive and user-friendly.

2. Extra customer functions

Currently, only two major functions, display products and manage bookmark, are included in the customer interface. The amount of functions is small compared to the staff interface. Therefore, some extra functions may be added. For example, an online goods purchasing system may be added, which allow customers to carry out online transactions through the system. Moreover, a customer rating or comment system on products may be implemented. In addition, to enhance the customers' experience in using the service of the point of sale, a customer service system can be established to collect feedback and tackle problems encountered by individuals. Finally, a discussion forum for customers to discuss and comment on the shops can be included.

3. Strengthen validation and verification

In the program, many validation and verification checks are carried out to lower the risk of bugs caused by invalid inputs. Yet, it can be further strengthened. For example, for the password of user accounts, the program can include an extra layer of security enforcing by requiring users to use a combination of alphabets, number and symbols with a length larger than or equal to 6.

4. Increase user-friendliness

Firstly, some people reflected that the instructions are not clear enough. For example, in display products module, the instructions on product searching and filtering is unclear. Therefore, more instructions can be added to indicate the purpose and usage of functions to allow a smoother user experience.

Secondly, some extra functions can be added to increase the convenience of the program. For example, due to the limitations in code complexity, in display pages, "previous page" function is not provided despite it supports multiple page display with "next page" function.