Vending Machine Program Report

The keyboard has keys:

- Lower case letter a – z
- Space, Enter
- Numbers 1-10
- Buttons: 'continue', 'continue to buy', 'restart' and 'cancel'.

Object oriented programming:

I have applied object-oriented programming in this vending machine program design to organise different types of objects, functions they can perform with their respective attributes and the way they should interact each other.

Classes and functions defined in my program:

Classes	Functions
Products	- Show product availability - Reset availability (admin function) - Choose items (user) - Set quantity (user) - Add sugar to coffee
Coins	- Show coin storage (admin) - Dispense refund with available coins - Reset coin storage (admin)
Admin	- Set password - Show error message
Transaction	- Show selected items and quantity chosen - Calculate price based on items and respective quantity chosen - Make payment and calculate refund - Show transaction record
Account	Find user with entered user name (to access past credit)

Using loops

'For' loops were used in my program when iteration over a list, dictionary or other finite type of data collection. For example, I used 'for' loop when I needed to iterate over every product in user shopping cart to deduct the purchased amount from item availability.

'While' loops were used mainly when needing to repeat a process under a certain condition. For example, user is asked repeatedly to insert coin until total inserted coin value (plus any previous user credit) reaches total cost.

Exception handling:

I handled exceptions in my program:

1. By set certain error messages. For example, when user enters a product number outside product range, the user is reminded that they needed to enter a number between 1-6. The loop then continues and the user has chance to enter again.
2. By 'try and except' method. I used 'except ValueError' statement to display a message to remind the customer when they enter a value other than a number for resetting product quantity.

Functional Requirements

S-005	Display welcome and goodbye messages	
Executor	System	
Description	Welcome message at the beginning of transaction:	Goodbye message at the end of transaction:

```
Welcome:
System working.

Available products:
1. Coke   Cost: 2.5 dollars;   10 Available
2. Coffee   Cost: 3.4 dollars;   10 Available
3. Tea   Cost: 3.1 dollars;   10 Available
4. Juice   Cost: 3.4 dollars;   10 Available
5. Oat Bar   Cost: 4.85 dollars;   10 Available


Lolipop is currently unavailable


 a select products from product list
 b show transaction records
 c admin use: machine not working (show error message)
```

```
Enter 1 to add sugar automatically, any other key to mix sugar by hand: 1
Please wait 6 seconds for sugar preparation.
Please wait for 60 seconds for water to be boiled.
Thank you. Please wait 15 seconds while the machine prepares other items.
Please collect:      Item  Quantity
0  Coffee          2
1   Coke           1
Thank you for your purchase. Goodbye!
```

U-002	List of products displayed	
Executor	User	
Description	User selects a product from list of products. Information given about unavailable product.	
S-002	Only available products displayed as an item list, appropriate information provided about unavailable product(s)	
Executor	User	
Description	Only available items displayed under 'available products'. Any product(s) unavailable listed under 'Currently unavailable: ' section.	

```
Welcome:
System working.

Available products:
1. Oat Bar   Cost: 4.85 dollars;   10 Available
3. Coke   Cost: 2.5 dollars;   10 Available
4. Coffee   Cost: 3.4 dollars;   10 Available
5. Tea   Cost: 3.1 dollars;   10 Available
6. Juice   Cost: 3.4 dollars;   10 Available
Lolipop is currently unavailable

 a select products from product list
 b show transaction records
 c admin use: machine not working (show error message)

Please enter: [                    ]
```

U-003	Cost of selected item displayed
Executor	User
Description	Unit price displayed for selected item and user confirm by selecting 'continue'. When user enters quantity, price for entered quantity of selected item is shown and user confirms by selecting 'continue'.

```
    a select products from product list
    b show transaction records
    c admin use: machine not working (show error message)
Please enter: a


Available products:
1. Coke   Cost: 2.5 dollars;   10 Available
2. Coffee   Cost: 3.4 dollars;   10 Available
3. Tea   Cost: 3.1 dollars;   10 Available
4. Juice   Cost: 3.4 dollars;   10 Available
5. Oat Bar   Cost: 4.85 dollars;   10 Available


Lolipop is currently unavailable

Enter number 1-6 to select product, select 'cancel' to return to homescreen: 2
Unit price for Coffee is 3.4 dollars.

   Select 'continue' to confirm, 'restart' to select another item, 'cancel' to cancel order:
   continue
```

```
   Select 'continue' to confirm, 'restart' to select another item, 'cancel' to cancel order: continue
Please enter quantity needed: 2
Price for 2 Coffee is 6.8 dollars


   Select 'continue' to confirm, 'restart' to reset quantity:   continue
```

```
   Select 'continue' to confirm, 'restart' to reset quantity: continue
continue


     Item  Quantity
0  Coffee          2
Total price: 6.8 dollars.

'continue to buy' to purchase another item, any other key to start payment:
```

U-006	Transaction continued as requried without restarting the whole process
Executor	Customer
Description	A user can add more items to cart by selecting 'continue to buy' option. Payments can be made when the user added all desired items to cart.

```
     Item  Quantity
0  Coffee          2
Total price: 6.8 dollars.
'continue to buy' to purchase another item, any other key to start payment: continue to buy

Available products:
1. Coke   Cost: 2.5 dollars;   10 Available
2. Coffee   Cost: 3.4 dollars;   10 Available
3. Tea   Cost: 3.1 dollars;   10 Available
4. Juice   Cost: 3.4 dollars;   10 Available
5. Oat Bar   Cost: 4.85 dollars;   10 Available


Lolipop is currently unavailable
```

```
Enter number 1-6 to select product, select 'cancel' to return to homescreen: 1
Unit price for Coke is 2.5 dollars.
Select 'continue' to confirm, 'restart' to select another item, 'cancel' to cancel order: continue
Please enter quantity needed: 1
Price for 1 Coke is 2.5 dollars

Select 'continue' to confirm, 'restart' to reset quantity: continue
continue


     Item  Quantity
0  Coffee        2
1    Coke        1
Total price: 9.3 dollars.

'continue to buy' to purchase another item, any other key to start payment:
```

U-004	Coin must be inserted to get the product
Executor	User
Description	The user insert coins into the machine until inserted coins plus previous credit (if any) reaches item price.
S-011	Compare item cost with entered coin
Executor	System
Description	Each time the user enters a coin, the total value of entered coin(s) (plus previous credit in user account if any) is compared with item(s) cost. When the total value reaches item(s) cost, the loop ends, and system gives refund if needed.
	Dispense selected items only if the amount of coin is inserted
Executor	User
Description	System compares total inserted value (plus previous credit if any) with total cost of items. Until sufficient payment is made, reminder given each time about how much more payment is required and asks whether to continue inserting or to reset order.
S-010	Accept coins of different amounts
Executor	Machine, user
Description	System accepts coins of 10-cent, 20-cent, 50-cent, 1-dollar and 2-dollar types.

```
     Item  Quantity
0  Coffee        2
1    Coke        1
Total price: 9.3 dollars.
'continue to buy' to purchase another item, any other key to start payment: a
 If you had an account, enter username:
 Or, enter username to set up new account: isabel
Current credit: 0.0 dollars
9.3 dollars required.
press any key to insert coins, or 'cancel' to cancel order and get refund: a
Please insert coin (enter value in cents): 200
Thank you.

7.3 dollars required.
press any key to insert coins, or 'cancel' to cancel order and get refund: a

Please insert coin (enter value in cents): 200
```

```
Please insert coin (enter value in cents): 200
Thank you.

5.3 dollars required.
press any key to insert coins, or 'cancel' to cancel order and get refund: a
Please insert coin (enter value in cents): 200
Thank you.

3.3 dollars required.
press any key to insert coins, or 'cancel' to cancel order and get refund: a
Please insert coin (enter value in cents): 100
Thank you.

2.3 dollars required.
press any key to insert coins, or 'cancel' to cancel order and get refund: a

Please insert coin (enter value in cents): | 100
```

```
Please insert coin (enter value in cents): 100
Thank you.

1.3 dollars required.
press any key to insert coins, or 'cancel' to cancel order and get refund: a
Please insert coin (enter value in cents): 50
Thank you.

0.8 dollars required.
press any key to insert coins, or 'cancel' to cancel order and get refund:
Please insert coin (enter value in cents): 50
Thank you.
```

```
0.3 dollars required.
press any key to insert coins, or 'cancel' to cancel order and get refund:
Please insert coin (enter value in cents): 50
Thank you.

Current refund: 0.2 dollars
Please collect refund 0.2 dollars. 0.0 dollars saved to account credit.

'Y' to add sugar to your coffee, any other key to skip sugar: |
```

```
'Y' to add sugar to your coffee, any other key to skip sugar: a
Please wait for 60 seconds for water to be boiled.
Thank you. Please wait 15 seconds while the machine prepares other items.
Please collect:      Item   Quantity
0  Coffee         2
1    Coke          1
Current refund: 0.2 dollars
Please collect refund 0.2 dollars. 0.0 dollars saved to account credit.
Thank you for your purchase. Goodbye!
```

S-012	Check if coin type is acceptable
Executor	System
Description	System accepts 10-cent, 20-cent, 50-cent, 1-dollar and 2-dollar coins.
	If coin is outside these types, system reminds user of acceptable coins and prompt to enter again.

```
9.4 dollars required.
press any key to insert coins, or 'cancel' to cancel order and get refund:
Please insert coin (enter value in cents): 5
Acceptable coins: 10c, 20c, 50c, $1 (100) or $2 (200). Thank you!
'continue' to insert coin, other key to cancel order and get refund: continue
9.4 dollars required.
press any key to insert coins, or 'cancel' to cancel order and get refund:
Please insert coin (enter value in cents): 50
Thank you.

8.9 dollars required.
```

S-004	Refund coin by user request before items are dispensed
Executor	User, system
Description	System confirms if user wants to continue or cancel request when user inserts each coin. If user cancels request, inserted coins are refunded.

```
2.0 dollars required.
press any key to insert coins, or 'cancel' to cancel order and get refund: a
Please insert coin (enter value in cents): 50
Thank you.

1.5 dollars required.
press any key to insert coins, or 'cancel' to cancel order and get refund: a
Please insert coin (enter value in cents): 20
Thank you.

1.3 dollars required.
press any key to insert coins, or 'cancel' to cancel order and get refund: cancel
Current refund: 1.2 dollars
Please collect refund 1.2 dollars. 0.0 dollars saved to account credit.
Thank you for your purchase. Goodbye!
Press anywhere to go back to home screen: b
```

D-003	Store coffee and sugar can be mixed manually by the user or automatically by the machine
Executor	User, system
Description	Machines stores coffee. When a user buys coffee, they are asked whether sugar should be added, and whether they prefer sugar to be mixed automatically by the machine or manually by themselves.

```
0.3 dollars required.
press any key to insert coins, or 'cancel' to cancel order and get refund:
Please insert coin (enter value in cents): 50
Thank you.

Current refund: 0.2 dollars
Please collect refund 0.2 dollars. 0.0 dollars saved to account credit.
'Y' to add sugar to your coffee, any other key to skip sugar: y
Enter 1 to add sugar automatically, any other key to mix sugar by hand: 1
Please wait 6 seconds for sugar preparation.
Please wait for 60 seconds for water to be boiled.
Thank you. Please wait 15 seconds while the machine prepares other items.
```

S-006	Display waiting time
Executor	System
Description	Waiting time is displayed as a message when items are being prepared.

```
Enter 1 to add sugar automatically, any other key to mix sugar by hand: 1
Please wait 6 seconds for sugar preparation.
Please wait for 60 seconds for water to be boiled.
Thank you. Please wait 15 seconds while the machine prepares other items.
Please collect:     Item  Quantity
0  Coffee        2
1    Coke         1
Thank you for your purchase. Goodbye!
```

U-005	Cancel transaction as required
Executor	User
Description	User can cancel order at any time during the transaction by selecting 'cancel'

```
Enter number 1-6 to select product, select 'cancel' to return to homescreen: 5
Unit price for Oat Bar is 4.85 dollars.
Select 'continue' to confirm, 'restart' to select another item, 'cancel' to cancel order: cancel
Welcome:
System working.

Available products:
1. Coke   Cost: 2.5 dollars;   10 Available
2. Coffee   Cost: 3.4 dollars;   10 Available
```

User can select cancel to go back to home screen

```
4. Juice   Cost: 3.4 dollars;   10 Available
5. Oat Bar   Cost: 4.85 dollars;   10 Available


Lolipop is currently unavailable

Enter number 1-6 to select product, select 'cancel' to return to homescreen: 4
Unit price for Juice is 3.4 dollars.
Select 'continue' to confirm, 'restart' to select another item, 'cancel' to cancel order: cancel
Welcome:
System working.

Available products:
1. Coke   Cost: 2.5 dollars;   10 Available
2. Coffee   Cost: 3.4 dollars;   10 Available
```

User can cancel transaction after product price is shown

```
3.0 dollars required.

press any key to insert coins, or 'cancel' to cancel order and get refund:
Please insert coin (enter value in cents): 200
Thank you.

1.0 dollars required.
press any key to insert coins, or 'cancel' to cancel order and get refund: cancel
Current refund: 4.0 dollars
Please collect refund 4.0 dollars. 0.0 dollars saved to account credit.
Thank you for your purchase. Goodbye!

Press anywhere to go back to home screen: [                                    ]
```

User can cancel order during payment

U-007	Order can be changed when required
Executor	User
Description	User can change order during transaction

```
Lolipop is currently unavailable

Enter number 1-6 to select product, select 'cancel' to return to homescreen: 4
Unit price for Juice is 3.4 dollars.
Select 'continue' to confirm, 'restart' to select another item, 'cancel' to cancel order: restart

Available products:
1. Coke    Cost: 2.5 dollars;    10 Available
2. Coffee    Cost: 3.4 dollars;    10 Available
3. Tea    Cost: 3.1 dollars;    10 Available
4. Juice    Cost: 3.4 dollars;    10 Available
5. Oat Bar    Cost: 4.85 dollars;    10 Available


Lolipop is currently unavailable

Enter number 1-6 to select product, select 'cancel' to return to homescreen:
[                                    ]



Enter number 1-6 to select product, select 'cancel' to return to homescreen: 5
Unit price for Oat Bar is 4.85 dollars.
Select 'continue' to confirm, 'restart' to select another item, 'cancel' to cancel order: continue
Please enter quantity needed: 2
Price for 2 Oat Bar is 9.7 dollars

Select 'continue' to confirm, 'restart' to reset quantity: restart
Please enter quantity needed: 4
Price for 4 Oat Bar is 19.4 dollars

Select 'continue' to confirm, 'restart' to reset quantity: continue
continue


        Item  Quantity
0  Oat Bar          4
Total price: 19.4 dollars.
```

S-003	Alert message automatically displayed when sugar is not available
Executor	System
Description	Machine stores sugar patches and can be added to coffee as needed. Number of sugar patches remaining recorded by machine and when reaching zero, machine automatically prints message 'Please note: sugar is not available.'

```
'Y' to add sugar to your coffee, any other key to skip sugar: y
Enter 1 to add sugar automatically, any other key to mix sugar by hand: 1
Please wait 15 seconds for sugar preparation.
Please wait for 150 seconds for water to be boiled.
Thank you. Please wait 15 seconds while the machine prepares other items.
Please collect:      Item  Quantity
0    Coke          1
1  Coffee          5
Current refund: 0.5 dollars
Please collect refund 0.5 dollars. 0.0 dollars saved to account credit.
Thank you for your purchase. Goodbye!

Press anywhere to go back to home screen: [                              ]
```

When sugar patches exhausted, system reminds next user 'sugar is not available:

```
 a select products from product list
 b show transaction records
 c admin use: machine not working (show error message)
Please enter: a


Please note: sugar is not available.

 Available products:
 1. Coke   Cost: 2.5 dollars;   10 Available
 2. Coffee   Cost: 3.4 dollars;   10 Available
 3. Tea   Cost: 3.1 dollars;   10 Available
 4. Juice   Cost: 3.4 dollars;   10 Available
 5. Oat Bar   Cost: 4.85 dollars;   10 Available


 Lolipop is currently unavailable
```

D-006	Provide statistical data based on transaction
Executor	System
Description	Data include the date, user, payment and items purchased

```
 a select products from product list
 b show transaction records
 c admin use: machine not working (show error message)
Please enter: b
Transaction no.    User      Date        Payment        Items purchased

1              isabel    2.5 dollars    2022-10-03      ['Coke']

2              tom      9.3 dollars    2022-10-03     ['Juice', 'Coke']

3              sam      6.5 dollars    2022-10-03     ['Tea', 'Coffee']
```

S-001	Status of machine displayed
Executor	Customer
Description	'System working' message is displayed when machine is working. Admin staff can use admin password to set 'out of order' message on screen when machine out of order.

When machine is in working status, show 'system working'.

```
Welcome:
System working.
 a show and select products
 b show transaction records
 c admin use: machine not working (show error message)
Please enter: a
```

When machine out of order, staff can set 'out of order' message with admin password.

```
 a select products from product list
 b show transaction records
 c admin use: machine not working (show error message)
Please enter: c

Please enter admin password (case sensitive): pswd1



 Machine out of order.
```

When issue solved, staff can cancel error message with admin password.

```
(If problem solved, enter admin password to cancel this message: )pswd1
Welcome:
System working.
```

S008	supplier can reset operation during first installation
Executor	Customer
Description	Vending machine supplier can reset available product quantity or number of coins stored.

```
Welcome:


First installation. Please set admin password: pswd1

Available products:
1. Coke    Cost: 2.5 dollars;    10 Available
2. Coffee    Cost: 3.4 dollars;    10 Available
3. Tea    Cost: 3.1 dollars;    10 Available
4. Juice    Cost: 3.4 dollars;    10 Available
5. Oat Bar    Cost: 4.85 dollars;    10 Available
6. Lolipop    Cost: 1.6 dollars;    10 Available


Please enter product number to reset: 6
Change availability to: 0

Available products:
1. Coke    Cost: 2.5 dollars;    10 Available
2. Coffee    Cost: 3.4 dollars;    10 Available
3. Tea    Cost: 3.1 dollars;    10 Available
4. Juice    Cost: 3.4 dollars;    10 Available
5. Oat Bar    Cost: 4.85 dollars;    10 Available


Lolipop is currently unavailable
```

Reset available quantity of products stored

```
 a reset product quantity
 b reset quantity of coins stored
 c enter user screen (vending system starts)
Please enter: b


10c      quantity stored: 50
20c      quantity stored: 50
50c      quantity stored: 50
$1       quantity stored: 50
$2       quantity stored: 50
Reset for coin (enter value in cents, e.g 50, 100($1), 200
Number of coin stored changes to: 45

 Stored coins:
10c      quantity stored: 50
20c      quantity stored: 50
50c      quantity stored: 45
$1       quantity stored: 50
$2       quantity stored: 50
```

Reset number of coins stored in machine:

S-009	Allow user to select products coffee, tea, Coke and juice
Executor	User
Description	User can select these products from product list

```
Available products:
1. Coke    Cost: 2.5 dollars;   10 Available
2. Coffee   Cost: 3.4 dollars;   10 Available
3. Tea    Cost: 3.1 dollars;   10 Available
4. Juice   Cost: 3.4 dollars;   10 Available
5. Oat Bar   Cost: 4.85 dollars;   10 Available


Lolipop is currently unavailable

Enter number 1-6 to select product, select 'cancel' to return to homescreen: 2
Unit price for Coffee is 3.4 dollars.
Select 'continue' to confirm, 'restart' to select another item, 'cancel' to cancel order: continue
Please enter quantity needed: 5
Price for 5 Coffee is 17.0 dollars

Select 'continue' to confirm, 'restart' to reset quantity: continue
```

```
     Item  Quantity
0  Coffee       5
Total price: 17.0 dollars.
'continue to buy' to purchase another item, any other key to start payment: continue to buy

Available products:
1. Coke    Cost: 2.5 dollars;   10 Available
2. Coffee   Cost: 3.4 dollars;   10 Available
3. Tea    Cost: 3.1 dollars;   10 Available
4. Juice   Cost: 3.4 dollars;   10 Available
5. Oat Bar   Cost: 4.85 dollars;   10 Available


Lolipop is currently unavailable

Enter number 1-6 to select product, select 'cancel' to return to homescreen: 3
Unit price for Tea is 3.1 dollars.
Select 'continue' to confirm, 'restart' to select another item, 'cancel' to cancel order: continue
Please enter quantity needed: 1
```

```
Enter number 1-6 to select product, select 'cancel' to return to homescreen: 3
Unit price for Tea is 3.1 dollars.
Select 'continue' to confirm, 'restart' to select another item, 'cancel' to cancel order: continue
Please enter quantity needed: 1
Price for 1 Tea is 3.1 dollars

Select 'continue' to confirm, 'restart' to reset quantity: continue


     Item  Quantity
0  Coffee      5
1     Tea      1
Total price: 20.1 dollars.
'continue to buy' to purchase another item, any other key to start payment: continue to buy
```

```
Please enter quantity needed: 1
Price for 1 Tea is 3.1 dollars

Select 'continue' to confirm, 'restart' to reset quantity: continue


     Item  Quantity
0  Coffee       5
1     Tea       1
Total price: 20.1 dollars.
'continue to buy' to purchase another item, any other key to start payment: continue to buy

Available products:
1. Coke    Cost: 2.5 dollars;   10 Available
2. Coffee   Cost: 3.4 dollars;   10 Available
3. Tea    Cost: 3.1 dollars;   10 Available
4. Juice   Cost: 3.4 dollars;   10 Available
5. Oat Bar   Cost: 4.85 dollars;   10 Available
```

```
Lolipop is currently unavailable

Enter number 1-6 to select product, select 'cancel' to return to homescreen: 4
Unit price for Juice is 3.4 dollars.
Select 'continue' to confirm, 'restart' to select another item, 'cancel' to cancel order: continue
Please enter quantity needed: 2
Price for 2 Juice is 6.8 dollars

Select 'continue' to confirm, 'restart' to reset quantity: continue


     Item  Quantity
0  Coffee        5
1     Tea        1
2   Juice        2
Total price: 26.9 dollars.
'continue to buy' to purchase another item, any other key to start payment: continue to buy

Available products:
 Available products:
 1. Coke   Cost: 2.5 dollars;   10 Available
 2. Coffee   Cost: 3.4 dollars;   10 Available
 3. Tea   Cost: 3.1 dollars;   10 Available
 4. Juice   Cost: 3.4 dollars;   10 Available
 5. Oat Bar   Cost: 4.85 dollars;   10 Available


 Lolipop is currently unavailable

 Enter number 1-6 to select product, select 'cancel' to return to homescreen: 1
 Unit price for Coke is 2.5 dollars.
 Select 'continue' to confirm, 'restart' to select another item, 'cancel' to cancel order: continue
 Please enter quantity needed: 1
 Price for 1 Coke is 2.5 dollars

 Select 'continue' to confirm, 'restart' to reset quantity: continue


 Enter number 1-6 to select product, select 'cancel' to return to homescreen: 1
 Unit price for Coke is 2.5 dollars.
 Select 'continue' to confirm, 'restart' to select another item, 'cancel' to cancel order: continue
 Please enter quantity needed: 1
 Price for 1 Coke is 2.5 dollars

 Select 'continue' to confirm, 'restart' to reset quantity: continue


     Item  Quantity
0  Coffee        5
1     Tea        1
2   Juice        2
3    Coke        1
Total price: 29.4 dollars.

'continue to buy' to purchase another item, any other key to start payment:
```