



# CS213:Programming II

## Project: Supermarket Simulation

### Objectives

- Applying all concepts that you have learned during the course to simulate a real program.

### Project Description

A supermarket contains a set of grocery items and has a set of customers that can buy these grocery items. In addition, a supermarket has a stock and an administrator who can enter the grocery items into the stock.

➔ So, the following classes should be defined: Stock, Person, Admin, Customer, Item, Time

Each grocery **item** should have the following properties:

- Name: represents the item name (e.g., LiptonTea)
- ID: int represents a unique ID for the item and it is generated by your program.
- Type: string represents the product type. Assume that the supermarket has these types (Washing, Drinking, Takeaway, Vegetables, and Meat).
- AvailAmount: int represents the available unites of this grocery item inside the stock.
- Price: int represents the price of each unit of a grocery item.

The supermarket's stock should have:

- A list of grocery items.
- LoadStock: loads stock items from a file. This method to be used to load the stock (items) from file when the program starts and not to be displayed in the menu.

Each **customer** should have the following properties:

- ID: int represents a unique ID for the customer and it is automatically generated by the program.
- ArrivalTime: represents the time that the customer enters to the supermarket. It is an object of the Time class. It will be automatically set when a customer enter to the supermarket.
- ShoppingList: is represented using 2 arrays; one for items, and the other for number of units per item that a customer bought. For example, a customer buys 2 units of an item X and 3 units of an item Y. All these will be stored in the ShoppingList arrays.

**Note:** To avoid using 2 arrays, you may write a class ShoppingItem where each



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ShoppingItem has an item and an amount, and use it in ShoppingList.

- ShoppingDuration: represents the duration that the customer stays inside the supermarket. It is a random number generated by your program. It is represented by hours ( $\geq 0$ ) and minutes (range 0 to 59).
- CheckOutTime: represent the time that the customer enters to the cashier in order to pay for the items bought. It is an object of the Time class. It is automatically calculated inside your program as (ArrivalTime+ShoppingDuration)

The system will ask the user about number of customers that will enter the supermarket. Then, your system will automatically generate a unique ID and a random shopping duration for each customer. For each customer, the system will display a menu which contains the items with available units and the user will select the items and number of units that he will buy.

A **customer** can do the following:

- BuyItems: select from the items menu, the items that he will buy.
- GetTotal: returns total price of the receipt.

The **Time** class should include the following properties and methods:

- hours: it represents a number from 0 to 4
- minutes: it represents a number from 0 to 59
- Operator + : this method will add a duration (e.g., shoppingDuration) to a time object and returns a time object.

This program has two categories of users (Administrator and Customer) who are persons. Each **Person** has a name and an address.

The administrator has a stock and a list of customers. He also has a **total revenue** property in order to store the current revenue. The **administrator** can do the following:

- ReportAvailableItems: to display **ALL** available items with their IDs, types, and available units of each item. Such that if the available units of an item less than 5, display the information of this item using Red color and bold.
- AddNewItem: add new grocery item to the stock with all required information of an item.
- UpdateExistingItem: it can update the available units of an item or update its price.



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- ReportTotalRevenue: to display the current revenue of the supermarket. This method will make checkout for all customers that are currently available in the system and sort these customers based on their checkout time. Then, this method will add the receipt of each customer to the total revenue. And finally, it will display the total revenue and the order of processing the customers with their checkout time.
- TotalCustomers: to display the total number of customers who visit the supermarket.
- MaxReceipt: display the total price of the maximum receipt.

This is the actual scenario for the supermarket:

**Welcome to Supermarket Simulator Program**  
Press 1 to Enter as admin, 2 to Enter as customer, and 0 to end the program: 1  
What you want to do:  
1- ReportAvailableItems  
2- AddNewItem  
3- UpdateExistingItem  
4- ReportTotalRevenue  
5- DisplayTotalCustomers  
6- DisplayMaxReceipt  
2  
Plz enter the item name, type, available units, price:  
ArialPowder, Washing, 10, 200  
  
Do you want to do another operation?  
N  
  
Press 1 to Enter as admin, 2 to Enter as customer, and 0 to end the program: 2  
  
Plz enter number of customers: 3  
➔ Your system will generate, for each customer, a unique ID(e.g., Cut1) and set his arrival time based on the current system time (e.g., 10:15) and generate random shopping duration(1:15) . So, the checkout for this customer will be (11:30)  
PLz select from the following menu the items that Cut1 bought:  
.... Display a list of items with available unites and the customer will select from it.  
.... Finally, Your system will display the total receipt for this customer (e.g., 400 LE)  
➔ Your system will generate, for each customer, a unique ID(e.g., Cut2) and set his arrival time based on the current system time (e.g., 10:15) and generate random shopping duration(0:50) . So, the checkout for this customer will be (11:05)  
PLz select from the following menu the items that Cut2 bought:  
.... Display a list of items with available amounts and the customer will select from it.  
.... Finally, Your system will display the total receipt for this customer (e.g., 300 LE)  
➔ Your system will generate, for each customer, a unique ID(e.g., Cut3) and set his arrival time based on the current system time (e.g., 10:15) and generate random shopping



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duration(0:15) . So, the checkout for this customer will be (10:30)

PLz select from the following menu the items that Cut3 bought:

.... Display a list of items with available amounts and the customer will select from it.

.... Finally, Your system will display the total receipt for this customer (e.g., 200 LE)

Press 1 to Enter as admin, 2 to Enter as customer, and 0 to end the program: 1

What you want to do:

- 1- ReportAvailableItems
- 2- AddNewItem
- 3- UpdateExistingItem
- 4- ReportTotalRevenue
- 5- DisplayTotalCustomers
- 6- DisplayMaxReceipt

➔ Till now, the system has the previously 3 customers who didn't make checkout and currently they are shopping.

5

The currently available customers are 3

Do you want to do another operation?

N

Press 1 to Enter as admin, 2 to Enter as customer, and 0 to end the program: 2

Plz enter number of customers: 2

➔ Your system will generate, for each customer, a unique ID (e.g., Cut4) and set his arrival time based on the current system time (e.g., 11:00) and generate random shopping duration(0:05). So, the checkout for this customer will be (11:05)

PLz select from the following menu the items that Cut4 bought:

.... Display a list of items with available unites and the customer will select from it.

.... Finally, Your system will display the total receipt for this customer (e.g., 80 LE)

➔ Your system will generate, for each customer, a unique ID (e.g., Cut5) and set his arrival time based on the current system time (e.g., 11:00) and generate random shopping duration(0:20) . So, the checkout for this customer will be (11:20)

PLz select from the following menu the items that Cut5 bought:

.... Display a list of items with available amounts and the customer will select from it.

.... Finally, Your system will display the total receipt for this customer (e.g., 250 LE)

Press 1 to Enter as admin, 2 to Enter as customer, and 0 to end the program: 1

What you want to do:

- 1- ReportAvailableItems
- 2- AddNewItem
- 3- UpdateExistingItem
- 4- ReportTotalRevenue
- 5- DisplayTotalCustomers
- 6- DisplayMaxReceipt

5

The currently available customers are 5

Do you want to do another operation?

Y



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What you want to do:

- 1- ReportAvailableItems
- 2- AddNewItem
- 3- UpdateExistingItem
- 4- ReportTotalRevenue
- 5- DisplayTotalCustomers
- 6- DisplayMaxReceipt

4

Total Revenue = 1230 LE

Order of the customers are:

Cut3, checkout at 10:30

Cut2, checkout at 11:05

Cut4, checkout at 11:05

Cut5, checkout at 11:20

Cut1, checkout at 11:30

Do you want to do another operation?

Y

What you want to do:

- 1- ReportAvailableItems
- 2- AddNewItem
- 3- UpdateExistingItem
- 4- ReportTotalRevenue
- 5- DisplayTotalCustomers
- 6- DisplayMaxReceipt

5

The currently available customers are 0

Do you want to do another operation?

Y

What you want to do:

- 1- ReportAvailableItems
- 2- AddNewItem
- 3- UpdateExistingItem
- 4- ReportTotalRevenue
- 5- DisplayTotalCustomers
- 6- DisplayMaxReceipt

6

Max Receipt Value =400 LE

Do you want to do another operation?

Y

What you want to do:

- 1- ReportAvailableItems
- 2- AddNewItem
- 3- UpdateExistingItem



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- 4- ReportTotalRevenue
- 5- DisplayTotalCustomers
- 6- DisplayMaxReceipt

1

The available Items are:

Item	Type	Units	Price
ArialPowder	Washing	10	200
<b>Lambada</b>	<b>Takeaway</b>	<b>4</b>	<b>3</b>
Borger	Meat	50	70
Lux	Takeaway	10	5
<b>LiptonTea</b>	<b>Drinking</b>	<b>3</b>	<b>20</b>

Do you want to do another operation?

N

Press 1 to Enter as admin, 2 to Enter as customer, and 0 to end the program: 0

**Bonus**(Note: First, you **must** complete the required functions of the project, then start doing the bonus)

- Add a method SaveStock that writes the updated stock to file at the end of the program.(1 mark)
- Create GUI for the supermarket (2 marks)

## Deliverables

- Software program ofyour project.(6 marks)
- Simple document with the following info
  - o Group members and IDs
  - o UML Model for all classes of the project with description about each class (with its member variables and member functions)(2 marks)

**Note that:**



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- The deadline of the UML Model is Dec.14<sup>th</sup>, and will be submitted on Acadox as a pdf.
- The deadline of the project is Dec.24<sup>th</sup> and will be submitted on Acadox.
- Maximum number of students per group is 5.
- A group of students can be from different lab groups, but no more than 2 lab groups. For example, a group can have 3 students from G9,10 and 2 students from G1,2.
- The grading of the project has an individual grade and a group grade, so each student has a part of the grade that is evaluated based on his contribution and effort in the project.