CSE 222 HOMEWORK 3

Gebze Technical University Computer Engineering Department

Submission Deadline: 25th March 2024

1 Introduction

The primary objective of this assignment is to apply the principles of Object-Oriented Programming (OOP) and data structures, specifically ArrayLists and LinkedLists, to develop an inventory management system for an electronics shop. This assignment aims to provide hands-on experience in managing and manipulating collections of objects and to reinforce understanding of basic data structures and OOP standards.

2 Assignment Requirements

2.1 Devices in Inventory

Begin by defining at least five different electronic devices for the inventory, each with a unique set of attributes: **category**,**name**, **price**, and **quantity**. In order to do so, you need to define an interface named **Device**. All electronic devices should derive from this interface. Then, you should define a class named **Inventory**. In this class there should be a **Linked List**. Nodes of this **Linked List** consists of **Array Lists**. Each **Array List** contains a unique device, for instance: TV, Smartphone, Laptop, ... etc.

2.2 Features

2.2.1 Core Features

The system must support the following core functionalities:

- Adding new devices to the inventory
- Removing devices from the inventory
- Updating device details (name, price, quantity)
- Displaying a list of all devices
- Identifying the device with the minimum price

2.2.2 Advanced Features

Additionally, implement the following advanced functionalities to enhance the system:

- Sorting devices based on price
- Calculating the total value of the inventory
- Restocking devices (updating quantity)
- Exporting the inventory list to a file

3 User Interface

Develop a simple, intuitive text-based menu to navigate through the system's functionalities. The menu should prompt the user to select an option and perform the corresponding action.

4 Example Outputs

4.1 Menu System

```
Welcome to the Electronics Inventory Management System!

Please select an option:
1. Add a new device
2. Remove a device
3. Update device details
4. List all devices
5. Find the cheapest device
6. Sort devices by price
7. Calculate total inventory value
8. Restock a device
9. Export inventory report
0. Exit
```

4.2 Adding a Device

```
Enter category name: Smart Phone
Enter device name: Samsung S21 Black
Enter price: 525.65$
Enter quantity:180
Smart Phone, Samsung S21, 525.65$, 180 amount added...
```

4.3 Updating Device Details

```
Enter the name of the device to update: Samsung S21 Black
Enter new price (leave blank to keep current price): 500.00$
Enter new quantity (leave blank to keep current quantity): 200
Samsung S21 Black details updated: Price - 500.00$, Quantity - 200
```

4.4 Displaying All Devices

```
Device List:
1. Category: Smart Phone, Name: Samsung S21 Black, Price: 500.00$, Quantity:
    200
2. Category: Laptop, Name: Dell XPS 13, Price: 1200.00$, Quantity: 50
3. Category: TV, Name: LG OLED55, Price: 800.00$, Quantity: 30
...
```

4.5 Finding the Cheapest Device

```
The cheapest device is:
Category: Headphones, Name: Sony WH-1000XM4, Price: 250.00$, Quantity: 100
```

4.6 Sorting Devices by Price

```
Devices sorted by price:
1. Category: Headphones, Name: Sony WH-1000XM4, Price: 250.00$, Quantity: 100
2. Category: Smart Phone, Name: Samsung S21 Black, Price: 500.00$, Quantity:
    200
3. Category: TV, Name: LG OLED55, Price: 800.00$, Quantity: 30
...
```

4.7 Calculating Total Inventory Value

```
Total inventory value: $56,000.00
```

4.8 Restocking a Device

```
Enter the name of the device to restock: Samsung S21 Black
Do you want to add or remove stock? (Add/Remove): Add
Enter the quantity to add: 50
Samsung S21 Black restocked. New quantity: 250

Enter the name of the device to restock: Samsung S21 Black
Do you want to add or remove stock? (Add/Remove): Remove
Enter the quantity to remove: 20
Samsung S21 Black stock reduced. New quantity: 230
```

4.9 Exporting Inventory Report

```
Electronics Shop Inventory Report
Generated on: 26th March 2024

---------------------------------------
| No. | Category   | Name               | Price   | Quantity |
---------------------------------------
| 1   | Smart Phone | Samsung S21 Black | $500.00 | 250   |
| 2   | Laptop      | Dell XPS 13       | $1200.00| 50      |
| 3   | TV          | LG OLED55         | $800.00 | 30      |
| 4   | Headphones  | Sony WH-1000XM4   | $250.00 | 100     |
| 5   | Smart Watch | Apple Watch Series 6| $399.00 | 75  |
---------------------------------------

Summary:
- Total Number of Devices: 5
- Total Inventory Value: $56,250.00

End of Report
```

5 Submission Guidelines

5.1 Documentation and Makefile

- A Makefile to compile and run the program is mandatory.
- JavaDoc documentation for all classes and methods is required. You should define your function and its time complexity of in this part.

5.2 Academic Integrity

- Submissions must be the original work of the student.
- Any form of cheating or plagiarism will result in a score of 0.

5.3 OOP Standards

The assignment must adhere strictly to OOP principles, demonstrating effective use of classes, objects, inheritance, and polymorphism where appropriate.

6 Evaluation Criteria

The assignment will be evaluated on the following criteria:

- Functionality and correctness of the implemented features
- Adherence to OOP principles and JavaDoc documentation standards
- Code quality, including readability and structure
- Completeness and usability of the user interface

If you have any questions about the homework, you can email barisozcan@gtu.edu.tr.