CS203 Java Programming and Application
Fall, 2016

Assignment 5
Assigned Date: Tuesday, November 29, 2016
Due Date: Midnight Sunday, December 11, 2016

QUESTION 1 (50 MARKS)

Define a class named Product that contains 3 data fields: name, id and description to represent product name, product id and product description. Provide accessor and mutator methods where necessary. Write a program called ProductDB that uses an ArrayList of Product type to simulate a database of products. Your ProductDB program should provide a menu with 4 options that lets users to add a product, display all products, search for a specific product and display it, and search for a specific product with the option to delete it. Given a search keyword, your search methods should return any product where its instance variables contain the search keyword. For example, if the product name, id and description are Mighty Leaf, 23988 and Black Tea respectively then any of the search keywords of "Bla", "988", "Lea", "hty" or "Mighty" should return and display the product. Your program output should look like the sample run of the program below.

A sample run of the program is as follow:

0) Quit
1) Add new product
2) List all products
3) Search product by keyword and display
4) Search product by keyword and remove

Please choose from the above menu by entering a number: 1

Enter product name: Mighty Leaf
Enter product ID: 23978
Enter product description: Black Tea

0) Quit
1) Add new product
2) List all products
3) Search product by keyword and display
4) Search product by keyword and remove

Please choose from the above menu by entering a number: 1

Enter product name: HP Pavillion
Enter product ID: 67238

Enter product description: Computer notebook

0) Quit
1) Add new product
2) List all products
3) Search product by keyword and display
4) Search product by keyword and remove

Please choose from the above menu by entering a number: 1

Enter product name: Nikon Coolpix
Enter product ID: 876239
Enter product description: Camera

0) Quit
1) Add new product
2) List all products
3) Search product by keyword and display
4) Search product by keyword and remove

Please choose from the above menu by entering a number: 1

Enter product name: Mainstays Coffee
Enter product ID: 778238
Enter product description: Small table

0) Quit
1) Add new product
2) List all products
3) Search product by keyword and display
4) Search product by keyword and remove

Please choose from the above menu by entering a number: 1

Enter product name: KitchenAid Aluminium Nonstick
Enter product ID: 662368
Enter product description: Cookwares

0) Quit
1) Add new product
2) List all products
3) Search product by keyword and display
4) Search product by keyword and remove

Please choose from the above menu by entering a number: 2
Mighty Leaf, 23978, Black Tea
HP Pavillion, 67238, Computer notebook
Nikon Coolpix, 876239, Camera
Mainstays Coffee, 778238, Small table
KitchenAid Aluminium Nonstick, 662368, Cookwares

0) Quit
1) Add new product
2) List all products
3) Search product by keyword and display
4) Search product by keyword and remove

Please choose from the above menu by entering a number: 3

Enter search keyword: 23
Matches:
Mighty Leaf, 23978, Black Tea
HP Pavillion, 67238, Computer notebook
Nikon Coolpix, 876239, Camera
Mainstays Coffee, 778238, Small table
KitchenAid Aluminium Nonstick, 662368, Cookwares

0) Quit
1) Add new product
2) List all products
3) Search product by keyword and display
4) Search product by keyword and remove

Please choose from the above menu by entering a number: 4

Enter search keyword: 23
Delete Mighty Leaf, 23978, Black Tea (Y/N)?
y
Delete HP Pavillion, 67238, Computer notebook (Y/N)?
n
Delete Nikon Coolpix, 876239, Camera (Y/N)?
y
Delete Mainstays Coffee, 778238, Small table (Y/N)?
n
Delete KitchenAid Aluminium Nonstick, 662368, Cookwares (Y/N)?
n

0) Quit
1) Add new product
2) List all products
3) Search product by keyword and display
4) Search product by keyword and remove

Please choose from the above menu by entering a number: 2
HP Pavillion, 67238, Computer notebook
Mainstays Coffee, 778238, Small table
KitchenAid Aluminium Nonstick, 662368, Cookwares

0) Quit
1) Add new product
2) List all products
3) Search product by keyword and display

QUESTION 2 (25 MARKS)

Program Listing 30.4 in the textbook, AccountWithoutSync.java, simulates the race condition in multithreaded program. Rewrite the simulation **without using** static inner class and Executors class. Listing 30.4 is given with this assignment. Your program output should look like the sample run of the program below.

A sample run of the program is as follow:

The Account Balance Before Deposit is 0
The Account Balance After Deposit is 3

QUESTION 3 (25 MARKS)

Write a **generic** insertionSort method based on the insertion sort program in chapter 23 of the textbook to sort Integer and Double objects. Write a test program that sorts and prints an Integer array and a Double array with your generic insertionSort method. You should also implement a generic printArray method to print the Integer and Double array. The insertion sort program is given with this assignment. Your program output should look like the sample run of the program below.

A sample run of the program is as follow:

Integer values in original order
9 23 6 3 83 11 1 7 5 2

Integer values in ascending order
1 2 3 5 6 7 9 11 23 83

Double values in original order
9.9 3.8 5.2 7.7 1.5 8.8 3.3 6.6 8.3

Double values in ascending order
1.5 3.3 3.8 5.2 6.6 7.7 8.3 8.8 9.9