SE375 2021-2022 SUMMER
Laboratory Assignments #1 and #2.
1 August 2022
Goal: Non-threaded and Threaded Super Store Program

Super Store

Assume that you have a store of products to sell. This store has three kinds of products that are sold either in-store or online. An example sales data of the store for one month is given below:

January	**SALES**		
Products	**In-store (Kg)**	**Online (kg)**	**Unit Price (TL)**
A	20	35	15
B	15	42	20
C	18	38	25

You can find the dataset along with this document on Blackboard. The dataset consists of 12 .csv files, each corresponding to a month's worth of sales. Read each one and store the contents separately. The official of the store wants to know certain information about the sales of these products:

(1) The total in-store sales for a month,
(2) The total online sales for a month,
(3) The total in-store sales for a year,
(4) The total online sales for a year
(5) The total sale amount for the full year (3 + 4)
(6) The total yearly sale for a particular products.

Example Monthly calculations:

January	**SALES**	
Products	**In-store**	**Online**
A	20 * 15 = 300	35 * 15 = 525
B	15 * 20 = 300	42 * 20 = 840
C	18 * 25 = 450	38 * 25 = 950
Total	1050	2315

Yearly Calculations:

Jan Feb Mar Apr ..... Dec Total Year

$$\begin{bmatrix} s_1 \\ s_2 \end{bmatrix} + \begin{bmatrix} s_3 \\ s_4 \end{bmatrix} + \begin{bmatrix} s_5 \\ s_6 \end{bmatrix} + \begin{bmatrix} s_7 \\ s_8 \end{bmatrix} + \ldots + \begin{bmatrix} s_{23} \\ s_{24} \end{bmatrix} = \begin{bmatrix} s_{ins\_total} \\ s_{onl\_total} \end{bmatrix}$$

Where s1 and s2 are total in-store and online sales for the month of January.

Part 1 Read and Process Files.

You will have three primary data structures:

	Data Structure	Description
1	`HashMap<String, ArrayList<Integer>>`	This will contain monthly data read from the file which includes Product Name, Price, In-store and Online sales
2	`HashMap<String, ArrayList<Integer>>`	This will store monthly In-store and Online sale total for each product.
3	`HashMap<String, ArrayList<Integer>>`	This will store yearly In-store and Online sale total for each product

Implement these methods:

```
---- readFiles ------

HashMap<String, ArrayList<Integer>> readFiles(String month);
```

`readFiles` accepts a month name and returns a HashMap in the following format:
<Product Name, (Price, In-Store Sales Quantity, Online Sales Quantity)>

```
Example:
<A, (15,20,35)>, <B, (20, 15, 42)>, ...

----calculateMonthlySales ------

HashMap<String, ArrayList<Integer>>
        calculateMonthlySales(HashMap<String, ArrayList<Integer>> sales)
```

`calculateMonthlySales` accepts sales data read from the file and calculates the monthly In-store and Online sales amount (TL) for a product.
<Product Name, (In-Store Month, Online Month)>

```
Example:
<A, (300,525)>, <B, (300, 840)>, ...

---- calculateYearlySales ------

void calculateYearlySales(HashMap<String, ArrayList<Integer>> monthlySales)
```

`calculateYearlySales` accepts monthly sale totals for each product and stores the yearly results in the 3rd data structure given above.

<Product Name, (In-Store Year Total, Online Year Total)>

Part 2 Add User Interaction

Add user interaction to your program. Your program will ask a particular product name and display data for that product.

Sample Run

```
C:\java ThreadedSuperStore

Thread processing 02-February.csv...
Thread processing 03-March.csv...
Thread processing 01-January.csv...

Threads are complete.

Which product do you want to search?
B

For the product B,
In-store sales: 23435₺
Online sales: 32235₺
Total sales: 55670₺
```

If the use enters “X” it will display the sum of in-store and online sales for all products.

Part 3 Add Threads

In this task, you will make your program multi-threaded.

1) Create 12 threads to process each month.
2) Pass the file name as a parameter to the thread. Each thread reads the file and calculates monthly sales data.
3) Each thread then aggregates their results in the yearly sales data structure.
4) Compare your results with the version that does not use threads.