

CSE21 : Lab #3 - Generic Cheese Shop

Overview

We will review the following statements in this lab:

- Scanner
 - Variables (access types)
 - System.out.print/println
 - Conditional statements (if, else, else if)
 - Arrays
 - Loops
-

Getting started

After starting Eclipse, create a new project called Lab 21_3. Import Lab21_3_Error.java from the assignment page. Answer the questions in the exercises as you would assessment questions.

Look at the code given in Lab21_3_Error.java. It will run as is so go ahead and run it. You should see the following output.

```
We sell 10 kinds of Cheese
Dalaran Sharp: $1.25 per pound
Stormwind Brie: $10.0 per pound
Alterac Swiss: $40.0 per pound
Cheese Type D: $9.15 per pound
Cheese Type E: $2.5 per pound
Cheese Type F: $8.74 per pound
Cheese Type G: $9.88 per pound
Cheese Type H: $2.91 per pound
Cheese Type I: $6.66 per pound
Cheese Type J: $0.36 per pound
```

Analyze the code to figure out how it is working. Let's step through it to figure out what it is intended. We see a new kind of declaration for a variable :

```
final int MAXCHEESE = 10;
```

Final is an access modifier that makes the variable value not change after the initialization. The reason we would want something like that is to prevent ourselves from accidentally changing it in the rest of the program. This means we set it once and

use the variable as a *constant* throughout. We will be introducing more access modifiers starting next week.

Q1. What happens if you add another line to the program after the first line of MAXCHEESE where it sets it to 10 : `MAXCHEESE = 20; ?`

Next we declare 3 arrays:

```
String[] names = new String[MAXCHEESE];  
double[] prices = new double[MAXCHEESE];  
int[] amounts = new int[MAXCHEESE];
```

Q2. What are the data types of each array?

Q3. How many entries get created for each array?

Q4. State whether the following statements are valid or invalid :

```
names[3] = 1;  
prices[3] = 1;  
amounts[3] = 1;
```

Then we set the Dalaran Sharp cheese from Lab 2 to be the first cheese in the arrays:

```
names[0] = "Dalaran Sharp";  
prices[0] = 1.25; ...
```

That code repeats for the other two special cheeses. Note we choose the variable names so their function is obvious. We will print out how many cheese we are currently selling and start listing their names and prices:

```
System.out.println("We sell " + MAXCHEESE + " kinds of Cheese");  
  
System.out.println(names[0] + ": $" + prices[0] + " per pound");  
System.out.println(names[1] + ": $" + prices[1] + " per pound");  
System.out.println(names[2] + ": $" + prices[2] + " per pound");
```

Above code handles the first three cheeses but what about the generic cheeses that we will need to sell for this example of 10 cheeses? To do that we introduce an Object that will help us (like a Scanner) and generate prices for us. It will do a random sequence *except* if we gave it an initial value then the random sequence will always start at the same place. So we have to do that with the following line:

```
Random ranGen = new Random(100);
```

You can see the initial value is set to 100 and if you run this program multiple lines, the output is always the same. Then we output the rest of the cheeses with the for-loop.

```
for (int i = 3; i < MAXCHEESE; i++) {  
    names[i] = "Cheese Type " + (char)('A'+i);  
    prices[i] = ranGen.nextInt(1000)/100.0;  
    amounts[i] = 0;
```

```

        System.out.println(names[i] + ": $" + prices[i] + " per
        pound");
    }

```

First the name is created from a typecast of an integer to a character with (`char`). It is taking the expression (`'A'+i`) which is actually taking the value of character `A` (65) and adding `i` to it. So `A + 3` results in `68` which is actually character `D` (after casting) hence you see the Cheese Type `D` in the printout. Then we set the price by calling `nextInt` on the random number generator which gives us a number to turn into a price with 2 decimal points. Then we have a `println` which outputs the name and price of each of the cheeses. You can see the format is the same as specialty cheeses except indexing is using the loop variable `i`.

Q5. Give the output of the following statements:

```

System.out.println("Cheese " + 'A' + 10);
System.out.println("Cheese " + (char)'A' + 10);
System.out.println("Cheese " + (int)'A' + 10);
System.out.println("Cheese " + (char)('A' + 10));
System.out.println("Cheese " + (int)('A' + 10));

```

Q6. Why is the initial value of `i = 3`?

Now **CHANGE** the line `final int MAXCHEESE = 10;` to `final int MAXCHEESE = 0;`

You should see the following error:

```

Exception in thread "main" java.lang.ArrayIndexOutOfBoundsException: 0
    at Lab21_3_Error.main(Lab21_3_Error.java:14)

```

The error is in line 14 of the file. It is of the error type Out of bounds when indexing the Array. You can click on the line 14 link and it will highlight the error for you. If not this is the offending line:

```
names[0] = "Dalaran Sharp";
```

The reason is we have made `MAXCHEESE` to be 0 so now we are not selling any cheese at the shop. However line 14 is trying to access the first entry of the array at index 0. The array is of size 0 so there is no first entry hence results in an error. So think about the *CONDITION* that has to be true before we should access the array.

(Exercise) Fix – Lab21_3_Error.java

Fix the code so the program will run correctly from `MAXCHEESE` size 0 to 20 (by changing the value in the code itself). If you are not sure of how it should work then look at the Expected Output of the next exercise. This part handles the beginning where it lists all the cheese types available and their prices. Note: it is a very *simple* fix that needs to be added to all the statements that have an array access.

(Exercise) Create – GenCheeseShop.java

The machine will dispense ANY types of cheese, in one-pound packages.

Your program will **STILL** do the following and use A-F in your answers:

- A. List all the cheese types available and the prices
- B. Asks the user how many pounds of each type of cheese to purchase
- C. Calculate Sub Total (price*amount of each cheese added together)
- D. Discount of Sub Total
 - a. for a \$10 discount if their purchase is \$50 or over
 - b. an additional \$15 discount (\$25 total) if \$100 or over
- E. Ask the user if they would like to see a list of what they purchased
 - a. If yes, a list comes up showing how much of each type of cheese they bought and the cost of each cheese
 - b. Display only the cheese they actually bought
 - c. If no then no itemized information is displayed
- F. Display Sub Total, Discount and Total Price

Sample Output:

```
We sell 0 kinds of Cheese
```

```
Sub Total: $0.0
-Discount: $0.0
Total      : $0.0
```

```
-----
We sell 1 kinds of Cheese
```

```
Dalaran Sharp: $1.25 per pound
Enter the amount of Dalaran Sharp : 1
Display the itemized list? (1 for yes) 1
1 lbs of Dalaran Sharp @ 1.25 = $1.25
```

```
Sub Total: $1.25
-Discount: $0.0
Total      : $1.25
```

```
-----
We sell 2 kinds of Cheese
```

```
Dalaran Sharp: $1.25 per pound
Stormwind Brie: $10.0 per pound
Enter the amount of Dalaran Sharp : 1
Enter the amount of Stormwind Brie : 1
Display the itemized list? (1 for yes) 1
1 lbs of Dalaran Sharp @ 1.25 = $1.25
1 lbs of Stormwind Brie @ 10.0 = $10.0
```

```
Sub Total: $11.25
-Discount: $0.0
Total      : $11.25
```

```
-----
We sell 3 kinds of Cheese
```

```
Dalaran Sharp: $1.25 per pound
Stormwind Brie: $10.0 per pound
Alterac Swiss: $40.0 per pound
```

Enter the amount of Dalaran Sharp : 1
Enter the amount of Stormwind Brie : 1
Enter the amount of Alterac Swiss : 1
Display the itemized list? (1 for yes) 1
1 lbs of Dalaran Sharp @ 1.25 = \$1.25
1 lbs of Stormwind Brie @ 10.0 = \$10.0
1 lbs of Alterac Swiss @ 40.0 = \$40.0

Sub Total: \$51.25
-Discount: \$10.0
Total : \$41.25

We sell 4 kinds of Cheese
Dalaran Sharp: \$1.25 per pound
Stormwind Brie: \$10.0 per pound
Alterac Swiss: \$40.0 per pound
Cheese Type D: \$9.15 per pound
Enter the amount of Dalaran Sharp : 1
Enter the amount of Stormwind Brie : 1
Enter the amount of Alterac Swiss : 1
Enter the amount of Cheese Type D : 1
Display the itemized list? (1 for yes) 1
1 lbs of Dalaran Sharp @ 1.25 = \$1.25
1 lbs of Stormwind Brie @ 10.0 = \$10.0
1 lbs of Alterac Swiss @ 40.0 = \$40.0
1 lbs of Cheese Type D @ 9.15 = \$9.15

Sub Total: \$60.4
-Discount: \$10.0
Total : \$50.4

We sell 4 kinds of Cheese
Dalaran Sharp: \$1.25 per pound
Stormwind Brie: \$10.0 per pound
Alterac Swiss: \$40.0 per pound
Cheese Type D: \$9.15 per pound
Enter the amount of Dalaran Sharp : 0
Enter the amount of Stormwind Brie : 0
Enter the amount of Alterac Swiss : 0
Enter the amount of Cheese Type D : 0
Display the itemized list? (1 for yes) 1

Sub Total: \$0.0
-Discount: \$0.0
Total : \$0.0

We sell 10 kinds of Cheese
Dalaran Sharp: \$1.25 per pound
Stormwind Brie: \$10.0 per pound
Alterac Swiss: \$40.0 per pound
Cheese Type D: \$9.15 per pound
Cheese Type E: \$2.5 per pound
Cheese Type F: \$8.74 per pound
Cheese Type G: \$9.88 per pound
Cheese Type H: \$2.91 per pound
Cheese Type I: \$6.66 per pound
Cheese Type J: \$0.36 per pound
Enter the amount of Dalaran Sharp : 1
Enter the amount of Stormwind Brie : 1

Enter the amount of Alterac Swiss : 1
Enter the amount of Cheese Type D : 1
Enter the amount of Cheese Type E : 1
Enter the amount of Cheese Type F : 1
Enter the amount of Cheese Type G : 1
Enter the amount of Cheese Type H : 1
Enter the amount of Cheese Type I : 1
Enter the amount of Cheese Type J : 1
Display the itemized list? (1 for yes) 1
1 lbs of Dalaran Sharp @ 1.25 = \$1.25
1 lbs of Stormwind Brie @ 10.0 = \$10.0
1 lbs of Alterac Swiss @ 40.0 = \$40.0
1 lbs of Cheese Type D @ 9.15 = \$9.15
1 lbs of Cheese Type E @ 2.5 = \$2.5
1 lbs of Cheese Type F @ 8.74 = \$8.74
1 lbs of Cheese Type G @ 9.88 = \$9.88
1 lbs of Cheese Type H @ 2.91 = \$2.91
1 lbs of Cheese Type I @ 6.66 = \$6.66
1 lbs of Cheese Type J @ 0.36 = \$0.36

Sub Total: \$91.44999999999999
-Discount: \$10.0
Total : \$81.44999999999999

We sell 10 kinds of Cheese

Dalaran Sharp: \$1.25 per pound
Stormwind Brie: \$10.0 per pound
Alterac Swiss: \$40.0 per pound
Cheese Type D: \$9.15 per pound
Cheese Type E: \$2.5 per pound
Cheese Type F: \$8.74 per pound
Cheese Type G: \$9.88 per pound
Cheese Type H: \$2.91 per pound
Cheese Type I: \$6.66 per pound
Cheese Type J: \$0.36 per pound

Enter the amount of Dalaran Sharp : 1
Enter the amount of Stormwind Brie : 1
Enter the amount of Alterac Swiss : 1
Enter the amount of Cheese Type D : 1
Enter the amount of Cheese Type E : 1
Enter the amount of Cheese Type F : 1
Enter the amount of Cheese Type G : 1
Enter the amount of Cheese Type H : 1
Enter the amount of Cheese Type I : 1
Enter the amount of Cheese Type J : 1
Display the itemized list? (1 for yes) 0

Sub Total: \$91.44999999999999
-Discount: \$10.0
Total : \$81.44999999999999

We sell 10 kinds of Cheese

Dalaran Sharp: \$1.25 per pound
Stormwind Brie: \$10.0 per pound
Alterac Swiss: \$40.0 per pound
Cheese Type D: \$9.15 per pound
Cheese Type E: \$2.5 per pound
Cheese Type F: \$8.74 per pound

```

Cheese Type G: $9.88 per pound
Cheese Type H: $2.91 per pound
Cheese Type I: $6.66 per pound
Cheese Type J: $0.36 per pound
Enter the amount of Dalaran Sharp : 1
Enter the amount of Stormwind Brie : 0
Enter the amount of Alterac Swiss : 2
Enter the amount of Cheese Type D : 0
Enter the amount of Cheese Type E : 3
Enter the amount of Cheese Type F : 0
Enter the amount of Cheese Type G : 4
Enter the amount of Cheese Type H : 0
Enter the amount of Cheese Type I : 5
Enter the amount of Cheese Type J : 0
Display the itemized list? (1 for yes) 1
1 lbs of Dalaran Sharp @ 1.25 = $1.25
2 lbs of Alterac Swiss @ 40.0 = $80.0
3 lbs of Cheese Type E @ 2.5 = $7.5
4 lbs of Cheese Type G @ 9.88 = $39.52
5 lbs of Cheese Type I @ 6.66 = $33.3

Sub Total: $161.57
-Discount: $25.0
Total      : $136.57

```

(Assessment) Logic Check for GenCheeseShop.java

- 1) What parts did you copy from lab 2 (A-F)?
- 2) What parts did you copy from fixed Lab21_3_Error.java (A-F)?
- 3) How many loops did you use in GenCheeseShop.java?
- 4) What types of loops did you use in GenCheeseShop.java?

What to hand in

When you are done with this lab assignment, you are ready to submit your work. Make sure you have done the following **before** you press Submit:

- ✦ Include answers to Q1, Q2, Q3, Q4, Q5 and Q6 (Lab21_3_Error.java)
 - ✦ Attach fixed Lab21_3_Error.java
 - ✦ Include answers to Assessment questions (1-4)
 - ✦ Attach created CheeseShop.java
 - ✦ List of Collaborators
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