King Saud University
College of Computer & Information Science
CSC111 – Lab05
Loops
All Sections

Objectives:

The students should learn how to:

1. Follow the loop design strategy to develop loops.
2. Control a loop with a sentinel value.
3. Write loops using for statements.
4. Write nested loops.
5. Combine loops and control statements to solve problems with complex logic.

Lab Exercise 1

Part1

Write a Java program that calculates and prints the cost of games that a customer buys at a gaming store as following:

- The cost of the game is input.
- A customer must buy at least 1 game (otherwise print “Error”).
- If a customer buys more than 2 games, then he will get a 20% discount.

Your program should read game id, the cost of the game as a double value and number of games. Then it should print the total cost after discount (if applicable). Name your class **GameStore1**.

Sample Runs

```
Welcome to Gaming Center :).
Please, enter game id: 1 ↵
Please, enter the price of a game: 100 ↵
Please, enter the number of games: 5 ↵
Total price for game 1 is: 400.0SR
```

```
Welcome to Gaming Center :).
Please, enter game id: 3 ↵
Please, enter the price of a game: 200 ↵
Please, enter the number of games: 2 ↵
Total price for game 3 is: 400.0SR
```

```
Welcome to Gaming Center :).
Please, enter game id: 6 ↵
Please, enter the price of a game: 200 ↵
Please, enter the number of games: 0 ↵
Error
```

Solution

```java
import java.util.Scanner;

public class GameStore1 {

	public static void main(String[] args) {
		Scanner in = new Scanner(System.in);
		System.out.println("Welcome to Gaming Center :).");

		// read the games id
		System.out.print("Please, enter game id: ");
		int id = in.nextInt();

		// read the price of the games
		System.out.print("Please, enter the price of a game: ");
		double price = in.nextDouble();

		// read the number of games
		System.out.print("Please, enter number of games: ");
```

```
            int numberOfGames = in.nextInt();

            // if there are less than 1 game, we print error
            if (numberOfGames < 1) {
                  System.out.println("Error");
            } else {

                  // calculating the total
                  double total = price * numberOfGames;

                  // a discount when buying more than 2 games
                  if (numberOfGames > 2) {
                        // 20% discount
                        total *=  1 - 20.0 / 100;
                  }
                  System.out.println("Total price for game " + id + " is: "
                                          + total + "SR");
            }
      }
}
```

Part 2

The previous program has a problem since it does not allow you to enter different prices for different games. Convert your program into an interactive point of sale program for a gaming store. The new program should work as follows:

- The program will read the id and price of games until the user enters -1 as a game id.
- If a customer buys more than 2 copies, then he will get a 20% discount otherwise he will pay the regular price.
- The program should print price before discount, discounted amount, and price after discount.

Name your class **GameStore2**.

Here are some sample runs to show different cases:

```
Welcome to Gaming Center :).
Please, enter game id: 1 ↵
```

```
Please, enter the price of next game: 100 ↵
Please, enter game id: 2 ↵
Please, enter the price of next game: 130 ↵
Please, enter game id: 4 ↵
Please, enter the price of next game: 200 ↵
Please, enter game id: -1 ↵
Total price before the discount: 430.0SR
Your discount is: 86.0SR
Total price after discount: 344.0SR
```

```
Welcome to Gaming Center :).
Please, enter game id: 1 ↵
Please, enter the price of next game: 100 ↵
Please, enter game id: 2 ↵
Please, enter the price of next game: 200 ↵
Please, enter game id: -1 ↵
Total price before the discount: 300.0SR
Your discount is: 0.0SR
Total price after discount: 300.0SR
```

Solution

```java
import java.util.Scanner;
public class GameStore2 {

	public static void main(String[] args) {
		Scanner in = new Scanner(System.in);
		System.out.println("Welcome to Gaming Center :).");
		int id, count = 0;
		double total = 0;

		// use loop to read multiple games
		do {
			System.out.print("Please, enter game id: ");
			id = in.nextInt();

			// only count the game if the id is not -1
			if (id != -1) {
				System.out.print("Please,enter the price of next game:");
				// add the new price to the total price
				total += in.nextDouble();
				// add 1 to the total number of games
				count++;
			}
			// exit if id == -1
		} while (id != -1);
```

```
		// discount is 0 if the number of games < 3
		double discount = 0;
		if (count > 2) {
			// calculate discount
			discount = total * (20.0 / 100.0);
		}
		System.out.println("Total price before discount: " + total + "SR");
		System.out.println("Your discount is: " + discount + "SR");
		System.out.println("Total price after discount: " + (total - discount)
				+ "SR");
	}
}
```

```
import java.util.Scanner;

public class GameStore2 {

	public static void main(String[] args) {
		Scanner in = new Scanner(System.in);
		System.out.println("Welcome to Gaming Center :).");
		int id, count = 0;
		double total = 0;

		System.out.print("Please, enter game id: ");
		id = in.nextInt();

		// use loop to read multiple games
		// exit if id == -1
		while (id != -1) {
			System.out.print("Please, enter the price of next game: ");
			// add the new price to the total price
			total += in.nextDouble();
			// add 1 to the total number of games
			count++;

			System.out.print("Please, enter game id: ");
			id = in.nextInt();
		}

		// discount is 0 if the number of games < 3
		double discount = 0;
		if (count > 2) {
			// calculate discount
			discount = total * (20.0 / 100.0);
		}
		System.out.println("Total price before discount: " + total + "SR");
		System.out.println("Your discount is: " + discount + "SR");
		System.out.println("Total price after discount: " + (total - discount)
				+ "SR");
	}
}
```

Part 3

We are going to change the previous program to add even more interactivity and logic to it. The new program should present the user with an options menu that has two options, to add or sell games as shown below:

```
*********************************************************
*                 Welcome to Gaming Center :)           *
*                 --------------------------            *
* Please enter one of the following options:            *
* 1) add  ==> this allows you to add a game to inventory  *
* 2) sell ==> this allows you to sell games to a customer *
* 3) exit ==> to end this program                       *
*                                                       *
*********************************************************
```

- If the user chooses "**add**" then he will be able to add new games to inventory. When adding a game, the user needs to provide the game id only. Adding ends when id entered is -1.
- If the user chooses "**sell**" then the program works like the previous one except for one thing. You must make sure that the user cannot sell more games than he added. In other words, allow the user to sell games until there are no more games in inventory.
- All discount rules from the previous program apply here.

(Note: at this stage, you do not have to match ids when selling and adding since you need *arrays* for this.) Name your class **GameStore3**.

(**Note**: unlike other primitive data types like **int** and **double**, to compare two **String** variables **s1** and **s2** use **s1.equals(s2)**. Do NOT use **s1 == s2)**

Here is a sample run to show different cases:

```
*********************************************************
*                 Welcome to Gaming Center :)           *
*                 --------------------------            *
* Please enter one of the following options:            *
* 1) add  ==> this allows you to add a game to inventory  *
* 2) sell ==> this allows you to sell games to a customer *
* 3) exit ==> to end this program                       *
```

```
*                                                          *
************************************************************
Enter your option :> sell ↵
Sorry. There are no more games in store :(
************************************************************
*                 Welcome to Gaming Center :)              *
*                 --------------------------               *
* Please enter one of the following options:               *
* 1) add  ==> this allows you to add a game to inventory   *
* 2) sell ==> this allows you to sell games to a customer  *
* 3) exit ==> to end this program                          *
*                                                          *
************************************************************
Enter your option :> add ↵
Please, enter game id (-1 to end): 1 ↵
Please, enter game id (-1 to end): 2 ↵
Please, enter game id (-1 to end): 3 ↵
Please, enter game id (-1 to end): 4 ↵
Please, enter game id (-1 to end): -1 ↵
************************************************************
*                 Welcome to Gaming Center :)              *
*                 --------------------------               *
* Please enter one of the following options:               *
* 1) add  ==> this allows you to add a game to inventory   *
* 2) sell ==> this allows you to sell games to a customer  *
* 3) exit ==> to end this program                          *
*                                                          *
************************************************************
Enter your option :> sell ↵
Please, enter game id (-1 to end): 1 ↵
Please, enter the price of next game: 100 ↵
Please, enter game id (-1 to end): 10 ↵
Please, enter the price of next game: 200 ↵
Please, enter game id (-1 to end): 6 ↵
Please, enter the price of next game: 120 ↵
Please, enter game id (-1 to end): -1 ↵
Total price before discount: 420.0SR
Your discount is: 84.0SR
Total price after discount: 336.0SR
************************************************************
*                 Welcome to Gaming Center :)              *
*                 --------------------------               *
* Please enter one of the following options:               *
* 1) add  ==> this allows you to add a game to inventory   *
* 2) sell ==> this allows you to sell games to a customer  *
* 3) exit ==> to end this program                          *
*                                                          *
```

```
************************************************************
Enter your option :> sell ↵
Please, enter game id (-1 to end): 1 ↵
Please, enter the price of next game: 100 ↵
Cannot sell more games. Out of stock :(
Total price before the discount: 100.0SR
Your discount is: 0.0SR
Total price after discount: 100.0SR
************************************************************
*                 Welcome to Gaming Center :)              *
*                 --------------------------               *
* Please enter one of the following options:               *
* 1) add  ==> this allows you to add a game to inventory   *
* 2) sell ==> this allows you to sell games to a customer  *
* 3) exit ==> to end this program                          *
*                                                          *
************************************************************
Enter your option :> exit ↵
Thanks. Goodbye!
```

Solution

```
package lab5;

import java.util.Scanner;

public class GameStore3 {

	public static void main(String[] args) {
		Scanner in = new Scanner(System.in);
		int inventory = 0;
		String op;
		do {

System.out.println("************************************************************");
System.out.println("*                 Welcome to Gaming Center :)              *");
System.out.println("*                 --------------------------               *");
System.out.println("* Please enter one of the following options:               *");
System.out.println("* 1) add  ==> this allows you to add a game to inventory   *");
System.out.println("* 2) sell ==> this allows you to sell games to a customer  *");
System.out.println("* 3) exit ==> to end this program                          *");
System.out.println("*                                                          *");
System.out.println("************************************************************");
```

```
// read the option ("add", "sell", "exit")
System.out.print("Enter your option :> ");
op = in.next();

switch (op) {
// if "add"
case "add":
	// read a game id, and stop if it's equal to 0
	System.out.print("Please, enter game id (-1 to end): ");
	int newId = in.nextInt();
	while (newId != -1) {
		inventory++;
		System.out.print("Please, enter game id (-1 to"
					+ "end): ");
		newId = in.nextInt();
	}
	break;
case "sell":
	if (inventory == 0)
	   System.out.println("Sorry. There are no more games"
					+ " in store :(");
	else {
		int id, count = 0;
		double total = 0;
		do {
			System.out.print("Please, enter game id ("
					+ "-1 to end): ");
			id = in.nextInt();
			if (id != -1) {
				count++;
				inventory--;
				System.out.print("Please, enter the"
					+ " price of next game: ");
				total += in.nextDouble();
			}
		} while (id != -1 && inventory != 0);
		double discount = 0;
		if (count > 2) {
			discount = total * (20.0 / 100.0);
		}
		System.out.println("Total price before discount: "
					+ total + "SR");
		System.out.println("Your discount is: " + discount
					+ "SR");
		System.out.println("Total price after discount: "
					+ (total - discount) + "SR");
	}
	break;
case "exit":
	System.out.println("Thanks. Goodbye!");
	break;
}
```

```
            } while (!op.equals("exit"));
            in.close();
      }
}
```

Part 4

Convert your program into an interactive game-store managing program. New program should let the user enter data for a new game sale, calculates the revenue and then asks the user if he wants to continue. If the user answers "yes" program should keep reading game sales and calculating the revenue. It only terminates when the user answers "no". Print total revenue for all sales before terminating the program.

(**Note**: unlike other primitive data types like **int** and **double**, to compare two **String** variables **s1** and **s2** use **s1.equals(s2)**. Do NOT use **s1 == s2**

The program asks for the game type ('g' or 'n').

- g : The price of a game should be increased by 40%. For example, if the price was 100, it'll be 140. 20% discount if more than 2 games were bought (first game is not included in the discount).
- n : 10% discount if more than 3 games were bought (first and second games are not included in the discount).
- Anything else will get an error message

Here is a sample run of the program

```
Welcome to Gaming Center :).
Please, enter the type of the game: g ↵
Please, enter the price of a game: 100 ↵
Please, enter the number of copies: 1 ↵
Total price is: 140.0
Do you want to continue? yes or no: yes ↵
Please, enter the type of the game: g ↵
Please, enter the price of a game: 100 ↵
Please, enter the number of copies: 2 ↵
```

```
Total price is: 280.0
Do you want to continue? yes or no: yes ↵
Please, enter the type of the game: g ↵
Please, enter the price of a game: 100 ↵
Please, enter the number of copies: 4 ↵
Total price is: 476.0
Do you want to continue? yes or no: yes ↵
Please, enter the type of the game: n ↵
Please, enter the price of a game: 100 ↵
Please, enter the number of copies: 3 ↵
Total price is: 300.0
Do you want to continue? yes or no: yes ↵
Please, enter the type of the game: n ↵
Please, enter the price of a game: 100 ↵
Please, enter the number of copies: 4 ↵
Total price is: 380.0
Do you want to continue? yes or no: no ↵
```

Solution

```
import java.util.Scanner;
public class GameStore4 {

	public static void main(String[] args) {
		Scanner in = new Scanner(System.in);
		String again = null;
		System.out.println("Welcome to Gaming Center :).");
		do {
		  System.out.print("Please, enter the type of the game (g or n):");
			char type = in.next().charAt(0);
			if (type != 'g' && type != 'n') {
				System.out.println("Incorrect type");
			} else {
				System.out.print("Please, enter the price of a game: ");
				double price = in.nextDouble();
				System.out.print("Please, enter number of copies: ");
				int num = in.nextInt();
				if (num < 1) {
					System.out.println("Error");
				} else {
					double total = 0;
					switch (type) {
					case 'g':
						total = price * 1.4 * num;
						if (num > 2) {
							total -= price * 1.4;
							total *= (1 - 20.0 / 100);
							total += price * 1.4;
```

```
                                        }
                                        break;
                                case 'n':
                                        total = price * num;
                                        if (num > 3) {
                                                total -= price * 2;
                                                total *= (1 - 10.0 / 100);
                                                total += price * 2;
                                        }
                                        break;
                                }
                                System.out.println("Total price is: " + total);
                        }
                }
                System.out.print("Do you want to continue? yes or no: ");
                again = in.next();
        } while (again.equals("yes"));
        System.out.println("Goodbye");
    }
}
```

Done…