Java Foundations

Using break and continue Statements

Objectives

- This lesson covers the following objectives:
  - Use a break statement to exit a loop
  - Use a continue statement to skip part of a loop
  - Explain the need for loop comments

Mission to Saturn’s Rings

- Let’s consider another scenario for this mission
  - As the spaceship is rotating around Saturn and taking snapshots, the robotic arm or camera breaks
- How would you solve this problem?
  - If you were to write a Java program, which construct would you use?
  - Let’s see whether Java has a statement that enables you to end a loop immediately

How Do You Exit a Loop Early?

- Usually, the only way to exit a loop is for the loop condition to evaluate to false
- However, it’s often convenient to terminate a loop early when certain conditions are met
- In such cases, continuing to loop would be a waste of processor time

How Do You Exit a Loop Early?

- You can use two Java statements to terminate a loop early:
  - **`break`**
  - **`continue`**

Using break in a Loop

- When a break statement is executed inside a loop, the loop statement is terminated immediately
- The program continues to execute with the statement following the loop statement
- Syntax:

```
break;
```

Using break in a while Loop

```
while(condition){
    statement1;
    statement2;
    break;
    statement3;
    statement4
}
statement;              [statement outside the while loop]
```

Control passes to the statement outside the loop

Using break in a while Loop: Example

- Output: 0 1 2 3
  - Execution of the loop is terminated when the loop counter is equal to 4

```
public static void main(String[] args) {
    int i = 0;
    while (i < 10) {
        System.out.println(i + "\t");
        i++;
        if (i == 4) {
            break;
        }//endif
    }//end while
}//end method main
```

Using break in a for Loop

- Let's write a program to demonstrate a break statement in a for loop
- The program must …
  - Read 10 numbers from the console
  - Compute the sum of the numbers that the user enters
  - If the user enters 999, terminate the loop regardless of the value of the loop counter and without adding to the sum

Using break in a for Loop: Example

```java
public static void main(String[] args) {
   Scanner in = new Scanner(System.in);
   int numInputs = 10, input = 0, sum = 0, stopLoop = 999;
   System.out.println("Enter 10 numbers");
   for (int i = 0; i < numInputs; i++) {
      input = in.nextInt();
      if (input == stopLoop){
         break;
      }
      else {
         sum += input;
      }//endif
   }//end for
   System.out.println("The sum of the numbers:" + sum);
}//end method main
```

Mission to Saturn's Rings: Implementing the Conditions

- Let's use a while loop and a break statement to implement the conditions specified at the beginning of the lesson

```
public static void main(String[] args) {
   long distTravelled = 0;
   long minDistance = 50000000;
   while (distTravelled >= minDistance) {
      snap++; //click snap
      if (camera == broken) {
         break;
      }
      else {
         rotate();
      }//endif
   }//end while
} //end method main
```

Exercise 1

- Import and open the `BreakContinueEx` project
- Examine `ComputeSum.java`
- Implement the following:
  - Accept 10 numbers from the user
  - Compute the sum of the numbers entered
  - When 0 is entered, the program must exit and display the sum of the numbers

Mission to Saturn’s Rings: Another Scenario

- Let’s consider another scenario for this mission
  - As the spaceship is rotating around Saturn and taking snapshots of Saturn’s rings …
    - If the visibility is zero, do not take snapshots
    - Otherwise, continue to take the snapshots
- How would you solve this problem?
  - If you were to write a Java program, which construct would you use?
  - Let’s see whether Java has a statement that enables you to skip the current iteration of the loop

Using continue in a Loop

- Sometimes, you may want to skip the current iteration in a loop and not terminate the loop itself
- You can use a continue statement to skip the current iteration in a loop:
  - That is, the rest of the loop body is skipped to the end of the loop
  - However, it doesn’t end the loop
  - When the program reaches the end of the loop, the program jumps back to test the loop continuation condition
- Syntax:

```
continue;
```

Using continue in a while Loop

```
while(condition){

    statement1;
    statement2;           Control passes to the loop condition
    continue;
    statement3;  }  These statements are skipped in the current iteration
    statement4
}
statement;    [statement outside the while loop ]
```

Using continue in a for Loop

```
for (i = 0; i < 10; i++) {

     statement1;              Control passes to the loop condition
     statement2;
     continue;
     statement3;  }  These statements are skipped in the current iteration
     statement4;
}//end for
```

Using continue in a for Loop

- Output: `0 1 2 3 5 6 7 8 9`
  - The output doesn't include 4
  - Because of the continue statement, the loop execution is skipped when the loop counter is 4

```
public static void main(String[] args) {
   for (int i = 0; i < 10; i++) {
      if (i == 4) {
         continue; //control jumps to update i++
      }//endif
      System.out.print(i + "\t");
   }//end for
}//end method main
```

Putting It All Together

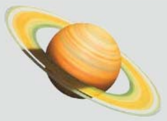
- Let's write a program using the while loop and the continue statement
- The program must …
  - Compute the sum of numbers between 1 and 99 using the while loop
  - If the number is a multiple of 10, the current iteration must be skipped and the number must not be added to the sum
  - Display the sum to the console

Computing the Sum of Numbers

```
public static void main(String[] args) {
   int counter = 0;
   int sum = 0;
   while (counter < 100) {
      counter++;
      if (counter % 10 == 0) {
         continue;
      }
      else {
         sum += counter;
      }//endif
   }//end while
   System.out.println("Sum of 1 - 99: " + sum);
}//end method main
```

Is this a multiple of 10? If yes, then skip the current iteration

Mission to Saturn's Rings: Implementing the Conditions



- Let's use a `while` loop and a `continue` statement to implement the conditions specified at the beginning of this topic

```
public static void main(String[] args) {
   long distTravelled = 0;
   long minDistance=50000000;
   while (distTravelled >= minDistance) {
      if (visibility == 0) {
         continue;
      }
      else {
         snap++;
      }//endif
   }//end while
}//end method main
```

Exercise 2

- Import and open the `BreakContinueEx` project
- Examine `CountChar.java`
  - The program is used to count the number of occurrences of the char ‘w’ in the string
  - Modify the program to …
    - Resolve the syntax error
    - Print the count of char ‘w’
  - Expected Output:
    - Number of w : 3

Exercise 3

- Import and open the `BreakContinueEx` project
- Examine `BreakContinue.java`
- Modify the program by using break and continue statements …
  - If the number is even, the number should not be printed
  - Execution of the loop should stop when the value of the loop counter is 7

Writing Loop Comments

- It’s a good practice to add appropriate comments to loops
- Otherwise …
  - Code tends to be confusing to look at
  - You won’t be able to understand the logic very easily
- It helps to understand …
  - Loop variables used and their purpose
  - Logic of the loop
  - Number of iterations
  - Execution of the statements in the loop depending on the condition or criteria or both

Writing Loop Comments: Example

```java
public static void main(String[] args) {

   Scanner in = new Scanner(System.in);
   int numInputs = 10, input = 0;

   //This loop is executed 10 times
   for (int i = 0; i < numInputs; i++) {
      input = in.nextInt(); //user inputs a number

      if (input % 2 == 0) { //if the number is even skip the
        continue;           //remaining code and restart the loop
      }//endif

      System.out.println("That number was odd");
   }//end for
}//end method main
```

Exercise 4

- Import and open the `BreakContinueEx` project
- Examine `Divisors.java`
- The program finds all divisors of a number

Exercise 4

- Modify the program to include comments for the loop about …
  - Loop variables used
  - Logic of the loop
  - Number of iterations
  - Condition used
  - Control flow in the loop

Summary

- In this lesson, you should have learned how to:
  - Use a break statement to exit a loop
  - Use a continue statement to skip part of a loop
  - Explain the need for loop comments