Chapter 3
Flow of Control

Prof. Yongsu Park

Division of Computer Science and Engineering
Hanyang University

Flow of Control

- As in most programming languages, *flow of control* in Java refers to its *branching* and *looping* mechanisms
- Java has several branching mechanisms:
  - `if, else if, else`
  - `switch`
- Java has three types of loop statements:
  - `while`,
  - `do-while`
  - `for`
- Most branching and looping statements are controlled by Boolean expressions
  - A Boolean expression evaluates to either `true` or `false`
  - The primitive type `boolean` may only take the values `true` or `false`

Display 3.1 Tax Program

– an example of if, else if, else

등호에 따른 조건문포함소심

```
import java.util.Scanner;

public class IncomeTax
{
    public static void main(String[] args)
    {
        Scanner keyboard = new Scanner(System.in);
        double netIncome, tax, fivePercentTax,
tenPercentTax;

        System.out.println("Enter net income.\n"
                + "Do not include a dollar sign or any
commas.");
        netIncome = keyboard.nextDouble( );

        if (netIncome <= 15000)
            tax = 0;
        else if ((netIncome > 15000) && (netIncome <=
30000))
            //tax = 5% of amount over $15,000
            tax = (0.05*(netIncome - 15000));
        else //netIncome > $30,000
        {
            //fivePercentTax = 5% of income from $15,000
to $30,000.
            fivePercentTax = 0.05*15000;
            //tenPercentTax = 10% of income over
$30,000.
            tenPercentTax = 0.10*(netIncome - 30000);
            tax = (fivePercentTax + tenPercentTax);
        }

        System.out.printf("Tax due = $%.2f", tax);
    }
}
```

Display 3.1 Tax Program

```
Enter net income.
Do not include a dollar sign or any commas.
40000
Tax due = $1750.00
```

Display 3.2 A switch Statement

```
import java.util.Scanner;

public class SwitchDemo
{
    public static void main(String[] args)
    {
        Scanner keyboard =
                new Scanner(System.in);

        System.out.println("Enter number of
                                    ice cream flavors:");
        int numberOfFlavors = keyboard.nextInt( );

        switch (numberOfFlavors)
        {
            case 32:
                System.out.println("Nice selection.");
                break;
            case 1:
                System.out.println("I bet it's vanilla.");
                break;
            case 2:
            case 3:
            case 4:
                System.out.println(numberOfFlavors + " flavors");

                System.out.println("is acceptable.");
                break;
            default:
                System.out.println("I didn't plan for");
                System.out.println(numberOfFlavors + " flavors.");
                break;
        }
    }
}
```

Display 3.2 A switch Statement

```
Enter number of ice cream flavors:
1
I bet it's vanilla.

Enter number of ice cream flavors:
32
Nice selection.

Enter number of ice cream flavors:
3
3 flavors
is acceptable.

Enter number of ice cream flavors:
9
I didn't plan for 9 flavors.
```

Pitfall: Using == with Strings

- The equality comparison operator (**==**) can correctly test two values of a *primitive* type
- However, when applied to two *objects* such as objects of the **String** class, **==** tests to see if they are stored in the same memory location, not whether or not they have the same value
- In order to test two strings to see if they have equal values, use the method **equals**, or **equalsIgnoreCase**

```
string1.equals(string2)
string1.equalsIgnoreCase(string2)
```

Display 3.4 Comparing Strings

```
public class StringComparisonDemo
{
    public static void main(String[] args)
    {
        String s1 = "Java isn't just for breakfast.";
        String s2 = "JAVA isn't just for breakfast.";

        if (s1.equals(s2))
            System.out.println("The two lines are equal.");
        else
            System.out.println("The two lines are not equal.");

        if (s2.equals(s1))
            System.out.println("The two lines are equal.");
        else
            System.out.println("The two lines are not equal.");

        if (s1.equalsIgnoreCase(s2))
            System.out.println("But the lines are equal, ignoring case.");
        else
            System.out.println("Lines are not equal, even ignoring case.");

        String s3 = "A cup of java is a joy forever.";
        if (s3.compareToIgnoreCase(s1) < 0)
        {
            System.out.println("\"" + s3 + "\"");
            System.out.println("precedes");
            System.out.println("\"" + s1 + "\"");
            System.out.println("in alphabetic
ordering");
        }
        else
            System.out.println("s3 does not
precede s1.");
    }
}
```

순서
1. 대문자먼저
2. 알파벳순서
순서이전: -
" 이후: +

4행

Display 3.4 Comparing Strings

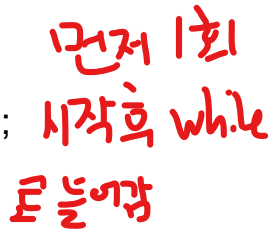
```
The two lines are not equal.
The two lines are not equal.
But the lines are equal, ignoring case.
“A cup of java is a joy forever.”
precedes
“Java isn’t just for breakfast.”
in alphabetical ordering
```

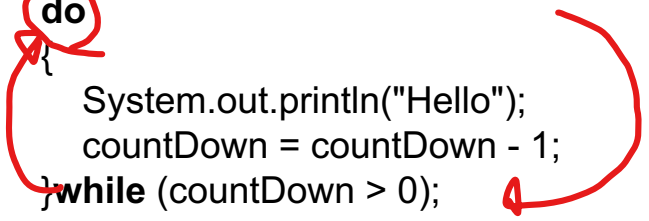
Loops

- *Loops* in Java are similar to those in other high-level languages
- Java has three types of loop statements: the **`while`**, the **`do-while`**, and the **`for`** statements
  - The code that is repeated in a loop is called the *body* of the loop
  - Each repetition of the loop body is called an *iteration* of the loop

Display 3.7 Demonstration of while Loops and do-while Loops

```
public class WhileDemo
{
    public static void main(String[] args)
    {
        int countDown;

        System.out.println("First while loop:");
        countDown = 3;
        while (countDown > 0)
        {
            System.out.println("Hello");
            countDown = countDown - 1;
        }

        System.out.println("Second while loop:");
        countDown = 0;
        while (countDown > 0)
        {
            System.out.println("Hello");
            countDown = countDown - 1;
        }

        System.out.println("First do-while loop:");
        countDown = 3;
        do
        {
            System.out.println("Hello");
            countDown = countDown - 1;
        }while (countDown > 0);

        System.out.println("Second do-while loop:");
        countDown = 0;
        do
        {
            System.out.println("Hello");
            countDown = countDown - 1;
        }while (countDown > 0);
    }
}
```





Display 3.7 Demonstration of while Loops and do-while Loops

```
First while loop:
Hello
Hello
Hello
Second while loop:
First do-while loop:
Hello
Hello
Hello
Second do-while loop:
Hello
```