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Java Foundations

5-3

switch Statement

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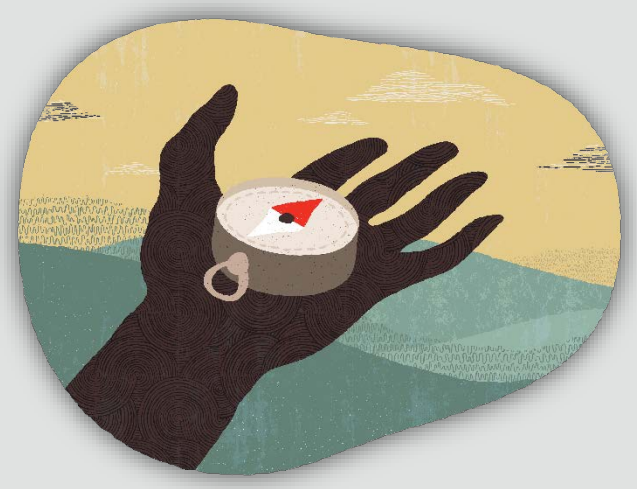
Objectives

- This lesson covers the following objectives:
  - Create a switch control structure
  - Compare if/else constructs with switch control structures
  - Understand the purpose of the break keyword



What About Using an if/else Statement?

- Consider the scenario where you need to write a Java program to implement the following:
  - User enters a school grade between 9 to 12 and the program prints the name of the grade
- First, let's start with a solution using an if/else statement

Solution: if/else Statement

```
Scanner in = new Scanner(System.in);
System.out.println("Enter your grade");
int grade = in.nextInt();
if (grade == 9){
   System.out.println("You are a freshman");
}
else if (grade == 10) {
   System.out.println("You are a sophomore");
}
else if (grade == 11) {
   System.out.println("You are a junior");
}
else if (grade == 12) {
   System.out.println("You are a senior");
}
else {
   System.out.println("Invalid grade");
}//endif
```

Complex conditions with a chained if construct tend to be confusing to read and hard to maintain

The switch Statement

- The switch statement provides more efficient syntax for choosing among several alternatives

```
switch (<variable or expression>) {
    case <literal value>: //code_block1
                          [break;]
    case <literal value>: // code_block2
                          [break;]
    default: //default_code
 }//end switch
```

Solution: switch Statement

```
Scanner in = new Scanner(System.in);
System.out.println("What grade are you in?");
int grade = in.nextInt();
switch (grade) {
   case 9:
       System.out.println("You are a freshman");
       break;
   case 10:
       System.out.println("You are a sophomore");
       break;
   case 11:
       System.out.println("You are a junior");
       break;
   case 12:
       System.out.println("You are a senior");
       break;
   default:
       System.out.println("Invalid grade");
}//end switch
```

The switch statement

- Compared with the if/else statement the switch statement:
  - Is more streamlined than chained if statements
  - Is easier to read and maintain
  - Simplifies the organization of the various branches of code that can be executed
  - Offers better performance
  - Can be used for complex conditions

When to Use switch Constructs

- Use when you are testing:
  - Equality (not a range)
  - A single value
  - For fixed known values at compile time
  - int, short, byte, char, or String

```
int month = 8;
month = in.nextInt();

switch (month) {
   case 1: case 3: case 5: case 7:
   case 8: case 10: case 12: System.out.print("31 days");
                                 break;
   case 2: if(isLeapYear)){
            ..
```

Only a single value can be tested

Known values

String in a switch Statement: Example

```
String typeOfDay;
String dayOfWeekArg = "Thursday";

switch (dayOfWeekArg) {
   case "Monday": typeOfDay = "Start of work week";
                  break;
   case "Tuesday":
   case "Wednesday":
   case "Thursday": typeOfDay = "Midweek";
                    break;
   case "Friday": typeOfDay = "End of work week";
                  break;
   case "Saturday":
   case "Sunday": typeOfDay = "Weekend";
                  break;
   default: System.out.print("Invalid");
}//end switch
```

Exercise 1

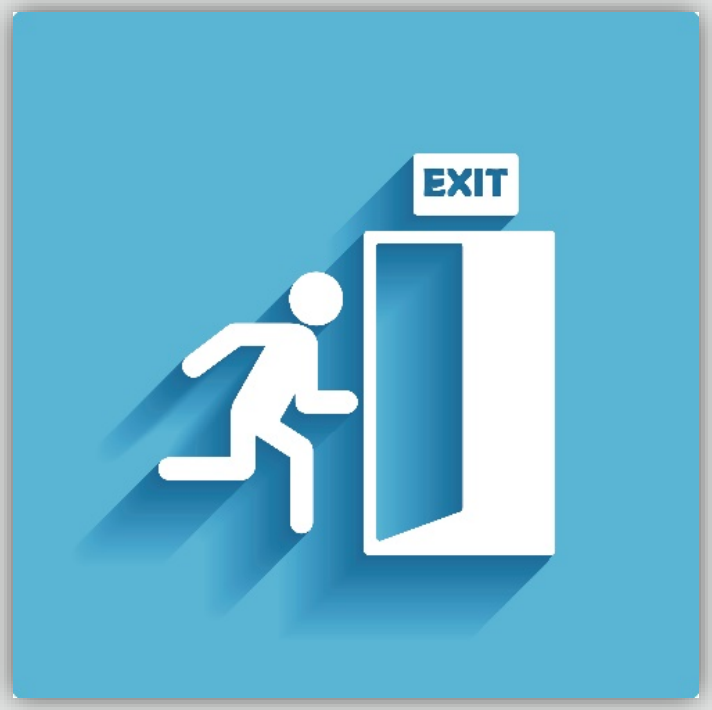
- Create a new project and add the `SwitchEx1.java` file to the project
- Modify `SwitchEx1.java` to implement the following with the switch statement
  - The user enters the month as a number
  - The corresponding month name must be displayed
  - For any invalid month, the output must be displayed as "Invalid month"

switch Statement: Keywords

- The following keywords are used in a switch statement:
  - switch: Specifies the variable to test for value
  - case: Compares the value of the switch variable
  - default: When the input doesn't match the cases, then the default statement is executed, however, the default statement is optional
  - break: Is used as the last statement in each case statement list, a break statement causes control to transfer to the end of the switch statement

What Is a break Keyword?

- Is used as the last statement in each case statement list and it causes control to transfer outside the switch



What Is a break Keyword?

```
char option = 'A';
int aCount = 0, bCount = 0, cCount = 0;

switch (option) {
   case 'A': aCount++;
             System.out.println("Count of A  " + aCount);
             break;
   case 'B': bCount++;
             System.out.println("Count of B  " + bCount);
             break;
   case 'C': cCount++;
             System.out.println("Count of C  " + cCount);
             break;
}//end switch

//additional code . . .
```

Exercise 2

- Add the file `SwitchEx2.java` to the project you created for exercise 1
- Observe `SwitchEx2.java` and execute the program
- Observe the output

Exercise 2

- Modify the switch statement as follows:
- Remove the break statements for case ‘A’
  - Execute the program
  - Observe the output
- Remove the break statements for case ‘A’ and case ‘B’
  - Execute the program
  - Observe the output

What Is switch Fall Through?

- switch fall through is a condition that occurs if there are no break statements at the end of each case statement
- All statements after the matching case label are executed in sequence, regardless of the expression of subsequent case labels, until a break statement is encountered.

Understanding switch Fall Through

- Expected Output:
  - The values of the count variables are incremented by 1

```
char option = 'A';
int aCount = 0, bCount = 0, cCount = 0;

switch (option) {
   case 'A': aCount++;
             System.out.println("Count of A  " + aCount);

   case 'B': bCount++;
             System.out.println("Count of B  " + bCount);
             break;
   case 'C': cCount++;
             System.out.println("Count of C  " + cCount);
             break;
}//end switch
```

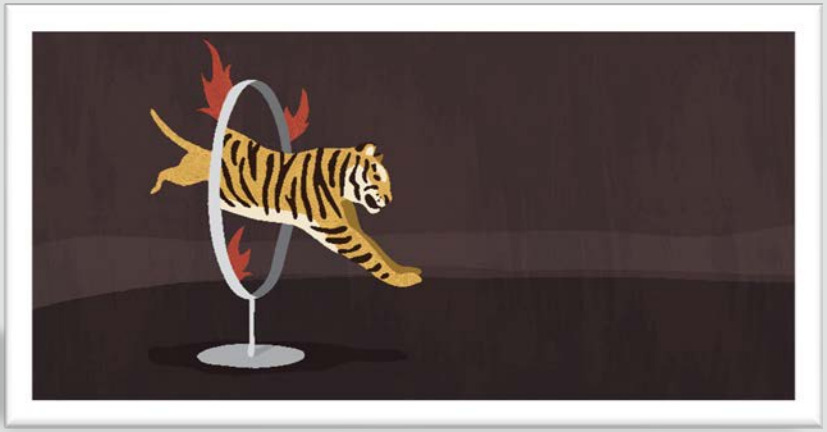
No break statement, so it continues execution with the next case statement

switch Fall Through: Example

```
int month = 12;
switch (month) {
   case 2: System.out.println("28 days (29 in leap years)");
           break;
   case 4:
   case 6:
   case 9:
   case 11: System.out.println("30 days");
            break;
   case 1:
   case 3:
   case 5:
   case 7:
   case 8:
   case 12: System.out.println("31 days");
            break;
   default: System.out.println("Illegal month number");
            break;
}//end switch
```

Summary

- In this lesson, you should have learned how to:
  - Create a switch control structure
  - Compare if/else constructs with switch control structures
  - Understand the purpose of the break keyword



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