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OOP with Java
7. Conditionals

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Outline

website

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- In other words, we want to structure the flow of our program to perform different actions based on the values of our variables.

If-Then-Else

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- Inside the `code` and `otherwise` blocks, there can be arbitrarily many other commands, including more conditionals...

If-Then-Else Example

Listing: Examples for if-then and if-then-else.

```
import java.util.Scanner; // import the scanner class: ignore this for now

/** Examples for using if-then-else */
public class HelloIfThenElse {

  /** The main routine
   * @param args
   *          we ignore this parameter for now */
  public static final void main(String[] args) {
    Scanner scanner = new Scanner(System.in); // initiate reading from System.in, ignore for now

    System.err.println("Please␣enter␣your␣name:␣"); // <--- using System.err for status //$NON-NLS-1$
    String name = scanner.nextLine(); // read next line from input and store in variable "string"

    System.err.println("Please␣your␣gender␣[f=female,␣m=male]:␣"); // <--- using System.err for status
        //$NON-NLS-1$
    char gender = scanner.next().charAt(0); // read the next character from stdin

    System.out.print("Hello␣"); //$NON-NLS-1$
    if (gender == 'f') {
      System.out.print("Mrs.␣"); //$NON-NLS-1$
    } else {
      if (gender == 'm') {
        System.out.print("Mr.␣"); //$NON-NLS-1$
      }
    }
    System.out.println(name);
  }
}
```

Switch-Case

- Nesting many *if-then-else* can be complicated
- For cases where we make decisions based on the values of `char`, integer type, or `String`, we can use the *switch-case* statement:

Listing: The structure of *switch-case*

```
switch(expression) { // expression must be char, integer, or String-valued
  case value1: {
    // what to do if expression == value1
    break; // exit switch-case statement
  }
  case value2: {
    // what to do if expression == value2
    // here I leave "break" away, i.e., we fall-through
  }
  case value3: {
    // what to do if expression == value3 OR expression == value2
    break; // exit switch-case statement
  }
  // ...
  default: { // optional
    // what to do if expression is different from all of the above
  }
}
```

Switch-Case Example

Listing: Examples for switch-case.

```
import java.util.Scanner; // import the scanner class: ignore this for now

/** Examples for using if-then-else */
public class HelloSwitchCase {

  /** The main routine
   * @param args
   *          we ignore this parameter for now */
  public static final void main(String[] args) {
    Scanner scanner = new Scanner(System.in); // initiate reading from System.in, ignore for now

    System.err.println("Please␣enter␣your␣name:␣"); // <--- using System.err for status //$NON-NLS-1$
    String name = scanner.nextLine(); // read next line from input and store in variable "string"

    System.err.println("Please␣your␣gender␣[f=female,␣m=male]:␣"); // <--- using System.err for status //$NON-NLS-1$

    String gender = scanner.next(); // read the gender from stdin
    switch (gender) { // choose what to do based on gender
      case "f": //$NON-NLS-1$
      case "F": {// we will get here if gender is either "f" or "F" //$NON-NLS-1$
        System.out.print("Mrs.␣"); //$NON-NLS-1$
        break;
      }

      case "m": //$NON-NLS-1$
      case "M": {// we will get here if gender is either "m" or "M" //$NON-NLS-1$
        System.out.print("Mr.␣"); //$NON-NLS-1$
        break;
      }

      default: { // we will get here if the gender is neither "f", "F", "m", "M"
        System.out.print(gender);
        System.out.print('␣');
        break;
      }
    }
    System.out.println(name);
  }
}
```

Switch-Case: More Explanations

- We can write multiple `case` conditions and the `case` body is executed if any of them is met (like with logical `or`)

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- We can write multiple `case` conditions and the `case` body is executed if any of them is met (like with logical `or`)
- The `default` body is executed if no `case` condition is met

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- Why do you think it is there?

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- Why do you think it is there?
- If a `case` condition was met and the corresponding body does not contain any `break`, then the control flow will simply continue by executing the body of the next `case` statement, until it hits a `break` or the end of the `switch` body

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- Fall-throughs into the `default` case are allowed

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- Why do you think it is there?
- If a `case` condition was met and the corresponding body does not contain any `break`, then the control flow will simply continue by executing the body of the next `case` statement, until it hits a `break` or the end of the `switch` body
- This is called fall-though
- Fall-throughs into the `default` case are allowed
- This makes code very hard to read.

Switch-Case Fall-Through Example

Listing: Examples for switch-case fall-through.

```
import java.util.Scanner; // import the scanner class: ignore this for now

/** Examples for using if-then-else */
public class HelloSwitchCaseFallThrough {

  /** The main routine
   * @param args
   *          we ignore this parameter for now */
  public static final void main(String[] args) {
    Scanner scanner = new Scanner(System.in); // initiate reading from System.in, ignore for now

    System.err.println("Please␣enter␣your␣name:␣"); // <--- using System.err for status //$NON-NLS-1$
    String name = scanner.nextLine(); // read next line from input and store in variable "string"

    System.err.println("Please␣your␣gender␣[f=female,␣m=male]:␣"); // <--- using System.err for status //$NON-NLS-1$

    String gender = scanner.next(); // read the gender from stdin
    switch (gender) { // choose what to do based on gender
      case "f": //$NON-NLS-1$
      case "F": {// we will get here if gender is either "f" or "F" //$NON-NLS-1$
        System.out.print("Mrs.␣"); //$NON-NLS-1$
        // break; <- We comment out the break, so if the user types in "f", we will fall-through to the next
        // body after printing Mrs., i.e., we will print "Mrs. Mr. " as greeting
      }

      //$FALL-THROUGH$
      case "m":   // we will get here if gender is either "m" or "M"       //$NON-NLS-1$
      case "M": { // or if the user entered "f" or "F" and we fell-through //$NON-NLS-1$
        System.out.print("Mr.␣"); //$NON-NLS-1$
        break;
      }

      default: { // we will get here if the gender is neither "f", "F", "m", "M"
        System.out.print(gender);
        System.out.print('␣');
        break;
      }
    }
    System.out.println(name);
  }
}
```

Summary

- We have learned how to make decisions in a program.
- We can make binary decisions in the form of "if-this-then-do-that-otherwise-do-that-other-thing"
- We can make more complex choices by "switching" over the values of an expression

谢谢

Thank you

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Caspar David Friedrich, “Der Wanderer über dem Nebelmeer”, 1818
http://en.wikipedia.org/wiki/Wanderer_above_the_Sea_of_Fog