CMSC 131
Object-Oriented Programming I
Conditionals, Block Statements, Style
Dept of Computer Science
University of Maryland College Park

This material is based on material provided by Ben Bederson, Bonnie Dorr, Fawzi Emad, David Mount, Jan Plane
Overview

• Conditionals
• Block Statements
• Style
Control Flow and Conditionals

- **Control flow** → the order in which statements are executed
  - General rule → top to bottom
  - Several Control Structures that change that

- **Conditional statements** → permit control flow to be dependent on (true/false) conditions
  - if
  - if-else
The if and if-else statements have the following forms:

- `if (condition) {
  statements;
}
```
  • tests the condition
  • if true statements are done; otherwise they are skipped

- `if (condition) {
  statements1;
} else {
  statements2;
}
```
  • tests the condition
  • if true, statements1 is done; otherwise statements2 is done
  • We can remove the {} if only one statement is executed

Example: SimpleIf.java, SimpleIfElse.java
Logical Operators

Used for forming more complex conditions.

- "and"    
  ```java
  if (temp >= 97 && temp <= 99) {
    System.out.println("Patient is healthy");
  }
  ```

- "or"    
  ```java
  if (months >= 3 || miles >= 3000) {
    System.out.println("Change your oil");
  }
  ```

- "not"    
  ```java
  if (!phone.equals("301-555-1212")) {
    System.out.println("Sorry, wrong number");
  }
  ```

- Example: LogicalOps1.java, LogicalOps2.java

Let’s see a truth table for &&, ||
Blocks

• What happens?

```java
if (i > 10)
    i = 10;
    saturate = true;
else
    k = 100;
```

• Desired → both `i`, `saturate` are set only when `i > 10`

• Actual → syntax error
  ◦ Only one statement can be associated with `if`
  ◦ The `saturate` assignment statement is not part of the `if`
  ◦ The `else` can’t find the if it belongs to

• Blocks solve this problem
What Blocks Are

• Blocks are sequences of statements “glued together” into one
• Form:
  
  { 
    <statement 1>; 
    <statement 2>; 
    ... 
  }

• Example:

  if (i > 10) {
    i = 10; 
    saturate = true; 
  } else {
    i = i+1; 
  }

• if, if-else, {...} are *statement constructors*
  ◦ They take statement(s) and convert them into a new statement
  ◦ Implications: if statements, etc. can also appear inside (“be nested within”) one another
Issues with if-else

• Nested If/Elses can be ugly and confusing!
  • Indent and block carefully
  • **Example:** NestingExample.java
• The “Dangling Else” Problem
  • Java rule → else is associated with “innermost” possible if
  • **Example:** BadExample.java (example of bad indenting)
• Cascading Elses
  • **Example:**
    • Cascading1.java
    • Cascading2.java (Improved version of Cascading1.java)
    • Cascading3.java
• **WE WILL USE { ... } FOR ALL IF, IF-ELSE, IF-ELSE-IF, STATEMENTS**
Variables can be declared anywhere in a Java program.
When are the declarations active?
- After they are executed
- *Only inside the block in which they are declared*

Scope rules formalize which variable declaration are active
- **Global variables**: scope is entire program
- **Local variables**: scope is a block

**Example**: Initialization1.java (problem), Initialization2.java
**Example**: Initialization3.java
Named Constants

• If the same value should be used in several places, how to ensure consistency?
  • i.e. Check on temperature may be performed more than once
  • i.e. Same prompt might be printed in several places
• final int MAX_OK_TEMP = 99;
• Just like a regular variable declaration-initialization, except...
  • Special term final
  • Necessity of initial value
  • Any valid variable name will work, but convention is to use all capitals
• If you are not using constants then you have “magic numbers”
• Difference from non-final variables: assignment attempt leads to error!
• literals (= named values)
  e.g.
  if (temp >= 212 || temp <= 32) ...
  if (temp >= BOILING || temp <= FREEZING)
  e.g.
  System.out.print ("Enter integer: ");
  System.out.print (PROMPT);
Style for Projects

- You must use **meaningful variable names**
  - It must tell the purpose of that variable → what it is meant to hold
  - It can not have so much abbreviation that only you can read it
- You must use Java convention indenting and brace placement
  - Indentation → **4 spaces, do not use tabs**
- Java convention of capitalization of identifiers
  - Variables and methods start with lower case
  - Classes and interfaces start with upper case
  - Variables, methods, classes and interface use camel case
  - Constants are all uppercase with underscores between words
- You must have “Fully Blocked” if statements and looping structures
- You must have all lines less than or equal to 80 columns of text
- You must use "**named constants**" for any literal values that will not change during program execution
Checkling Eclipse Line Max is 80

- To draw a vertical line in the Eclipse editor to indicate 80\textsuperscript{th} column:
  - Window → Preferences → General → Editors → Text Editors
  - Check the box “Show print margin” and enter 80 in “Print margin column”
## Meaningful Variable Names

- Choose names for your variables to reflect their purpose not their type
- Make it readable to someone else
- Help prevent mistakes in order of the relational operators
- Avoid names that start with $ (usually reserved for “system level” variables)

<table>
<thead>
<tr>
<th>Bad</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>typedValue == 5</td>
<td>menuOption == 5</td>
</tr>
<tr>
<td>integer &gt; 13</td>
<td>age &gt; 13</td>
</tr>
<tr>
<td>input1 &gt; 45 &amp;&amp; input2 &gt; 100</td>
<td>height &gt; 45 &amp;&amp; weight &gt; 100</td>
</tr>
<tr>
<td>val1 &lt; 100</td>
<td></td>
</tr>
</tbody>
</table>
Suggestions for Writing Programs

• **Design** → Make sure you first come up with a plan/design for your code (e.g., using pseudocode)

• **Do not wait until the last minute** → Code implementation can be unpredictable

• **Incremental code development** → Fundamental principle in computer programming. Write a little bit of code, and make sure it works before moving forward

• **Don’t make assumptions** → If you are not clear about a language construct, write a little program to familiarize yourself with the construct

• **Good Indentation** → From the get-go use good indentation as it will allow you to understand your code better
Suggestions For Writing Programs

• **Good variable names →** Use good variable names from the beginning (do not use x and y and then change them to meaningful names before submitting the project)

• **Testing**
  • Test your code with simple cases first
  • Test as you develop your code

• **Keep backups →** As you make significant progress in your development, make the appropriate backups

• Trace your code

• Use a debugger or specialized tools

• **Take breaks →** If you cannot find a bug take a break and come back later