CMSC 131
Object-Oriented Programming I

Conditionals, Block Statements, Style

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

- Conditionals
- Block Statements
- Style
What happens?
```plaintext
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 also
What Blocks Are

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

- Example:
  ```plaintext
  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/Elises 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 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
- 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 camelCase
  - 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
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