Computational Expression

Computer and Java Basics

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What is Computer Science?

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Computer science is the study of computation.

Computers are a medium for expression in computer science.
What is a computer?
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Each piece is represented as a number, a **binary number**.

**Binary Numbers:**
- Base 2 system.
- A single bit: either 0 or 1
  - can represent two items, e.g. state of the light bulb.
- $N$ bits can represent $2^N$ unique items.
Simple Structure
What is Computer Programming?

Programming is the act of writing usable and useful software. A program is a set of instructions.
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- Programming is the act of writing usable and useful software
- A program is a set of instructions
We will use **Java** programming language in this class.

Java is a programming language originally developed by Sun Microsystems and released in 1995 as a core component of Sun’s Java platform.
HISTORY OF JAVA

• Started development in 1991 at Sun
• Originally called Oak
• Intended for smart consumer-electronic devices
• Derives much syntax/concepts from C++
• BCPL → B → C → C++ → Java
• Development almost halted, but 1993 saw introduction of web; Java was revamped to be able to easily add dynamic content to web pages
• Formally announced and released in May 1995
• Released under GPL to the public in May 2007
Java is an **object-oriented** programming language.
Programming in Java

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- Objects are fundamental elements that make up a program
Programming in Java

- Java is an **object-oriented** programming language
- **Objects** are fundamental elements that make up a program
- Java has a library of software, called **Java API**, that is available for your use
Java program development process
/** This is the first program people write in a new language, the "Hello World!". In Java, this file must be named Welcome.java, with the first part of the name, Welcome, being the same as the name of the class. The filename itself (not the class name) must always end in .java to indicate to the operating system that it’s a java source file. */

class Welcome {
    public static void main ( String args[] ) {
        System.out.println ( "Hello World!" );
    }
}
Comments

Comments in Java can be one of three styles:

- **Single line**: starts at // anywhere on a line, ends at the end of that line
- **Multi-line**: starts with character sequence /* anywhere, ends with character sequence */ anywhere after that can span multiple lines
- **javadoc**: starts with character sequence /** anywhere, ends with character sequence */ anywhere, after that uses javadoc utility to create HTML documentation from code
public class Welcome:

- **public** means that something is available across packages (reserved word)
- Name of the class has to be the same as the name of the .java file
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**public static void main ( String identifier[]) :**

- The particular form of main is required by Java.
- JVM starts executing here!
- main is a static method, it is part of its class and not part of objects.
- Strings in Java are sequence of characters
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- Statements in Java end with semicolons.
Printing

- `println`: New line after printing
- `print`: No new line
- `printf`: Can specify format - may learn this later
Character Strings

string literal in class $\textit{String}$

“ABC”

“This is interesting”

“ ”

“91”
String literal in class **String**

“ABC”

“This is interesting”

“ ”

“91”

- Use `print` or `println` methods to print a character string to the terminal
- `System.out.println("CMPSC 111");`
- the string “**CMPSC 111**” is a **parameter**: data sent to a method
String Concatenation

appending one string to the end of another: use + operator
“This is ” + “interesting”
“Your grade is ” + “91”
String Concatenation

appending one string to the end of another: use + operator
“This is " + “interesting”
“Your grade is " + “91”

+ is also used for arithmetic addition

System.out.println(”Adding ” + 12 + 23); is not the same as
System.out.println(”Adding ” + (12 + 23));
Escape Sequences

- Escape sequences, or escape characters, begin with a slash and are immediately followed by another character.
- This two-character sequence, inside “ ” allows you to control your output (\n, \t, \b) or output characters you wouldn’t otherwise be able to (\\, \”) inside a string.
## Escape Sequences

<table>
<thead>
<tr>
<th>Seq</th>
<th>Meaning</th>
<th>Example Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>\n</td>
<td>New line</td>
<td>System.out.println(&quot;Hi\nThere&quot;);</td>
</tr>
<tr>
<td>\t</td>
<td>Horizontal tab</td>
<td>System.out.println(&quot;What’s\tup?&quot;);</td>
</tr>
<tr>
<td>\b</td>
<td>Backspace</td>
<td>System.out.println(&quot;Hi\b Hey&quot;);</td>
</tr>
<tr>
<td>\</td>
<td>Backslash</td>
<td>System.out.println(&quot;Back\Slash&quot;);</td>
</tr>
<tr>
<td>&quot;</td>
<td>Double quote</td>
<td>System.out.println(&quot;Dbl\&quot;Quote&quot;);</td>
</tr>
</tbody>
</table>