Welcome to CSE 142!

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University of Washington, Autumn 2017
What is computer science?

- computers?
- science?
- programming?
- late lonely nights in front of the computer?

ALGORITHMIC THINKING

algorithm:
a step-by-step procedure for solving a problem or accomplishing some end especially by a computer
Fields of computer science

- Graphics
- Computer Vision
- Artificial Intelligence
- Robotics
- Data Mining
- Natural Language Processing
- User Interfaces
- Mobile Applications
- ...

How does this all relate to programming?
- This course is “Introduction to Programming I” after all.
What is programming?

- **program**: A set of instructions to be carried out by a computer.

- **program execution**: The act of carrying out the instructions contained in a program.

- **programming language**: A systematic set of rules used to describe computations in a format that is editable by humans.
  - We will be studying a programming language called Java.
Programming is like Legos...
Should you take this course?

- No
  - “I hate computers.”
  - “I can’t be attentive to detail.”
    - Programming is pretty detail-oriented.
  - “I refuse to think logically.”
  - “I want to take an easy class.”
    - Hard for those who find difficulty in logical thinking and who don’t pay attention to details.
Should you take this course?

• Probably not
  • “I want free gourmet meals and to make lots of money by working for Google.”
  • “Candy Crush is awesome!”
  • “If I wrote WhatsApp, I would have made how many billion dollars???”

• Yes
  • “I have to take this class.”
    • Is this the only reason? Are you pursuing the right major?
  • “I like to solve problems.”
  • “Computers and robots are going to take over the world. I want to befriend them so that my life will be spared.”
Tips for Success

• Visit website often: http://cs.washington.edu/142

• Read syllabus carefully

• Do lots of problems on http://practiceit.cs.washington.edu/

• If you're stuck, review lecture and book examples

• Remember: assignments must be your own work!
Tips for Success (cont’d)

- Keep up with the assignments
  - The course material is cumulative
  - From a former student: “Procrastination will eventually come around to bite you in the ass!”

- If you don’t understand something, ask questions (especially “WHY?”).
  - “There’s no such thing as a dumb question.”

- Computers are neither magical nor mysterious. Everything can be explained!
Building Java Programs

Chapter 1
Lecture 1-1: Introduction; Basic Java Programs

reading: 1.1 - 1.3
Your first Java program!

```java
public class Hello {
    public static void main(String[] args) {
        System.out.println("Hello, world!");
    }
}
```

- File must be named `Hello.java`
- What does this code output (print to the user) when you run (execute) it?
Running a program

1. Write it.
   - **code** or **source code**: The set of instructions in a program.

2. Compile it.
   - **compile**: Translate a program from one language to another.
   - **byte code**: The Java compiler converts your code into a format named *byte code* that runs on many computer types.

3. Run (execute) it.
   - **output**: The messages printed to the user by a program.
Bigger Java program!

```java
public class Hello {
    public static void main(String[] args) {
        System.out.println("Hello, world!");
        System.out.println();
        System.out.println("This program produces");
        System.out.println("four lines of output");
    }
}
```

- **Its output:**
  Hello, world!

  This program produces
  four lines of output

- **console:** Text box into which the program's output is printed.
Structure of a Java program

Every executable Java program consists of a **class**, that contains a **method** named **main**, that contains the **statements** (commands) to be executed.
Names and identifiers

• You must give your program a name.

```java
public class HelloWorld {

• Naming convention: capitalize each word (e.g. MyClassname)
• Your program's file must match exactly (HelloWorld.java)
  • includes capitalization (Java is "case-sensitive")

• identifier: A name given to an item in your program.
  • must start with a letter or _ or $
  • subsequent characters can be any of those or a number
    • legal: _myName TheCure ANSWER_IS_42 $bling$
    • illegal: me+u 49ers side-swipe Ph.D's
```
Keywords

- **keyword**: An identifier that you cannot use because it already has a reserved meaning in Java.

<table>
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<tr>
<th>abstract</th>
<th>default</th>
<th>if</th>
<th>implements</th>
<th>private</th>
<th>this</th>
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<tbody>
<tr>
<td>boolean</td>
<td>do</td>
<td>implements</td>
<td>import</td>
<td>protected</td>
<td>throw</td>
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<td>break</td>
<td>double</td>
<td>import</td>
<td>instanceof</td>
<td>return</td>
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<td>byte</td>
<td>else</td>
<td>int</td>
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<td>final</td>
<td>interface</td>
<td>int</td>
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<td>char</td>
<td>finally</td>
<td>long</td>
<td>native</td>
<td>switch</td>
<td>while</td>
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<td><strong>class</strong></td>
<td>float</td>
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<td>const</td>
<td>for</td>
<td>new</td>
<td>package</td>
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<td>continue</td>
<td>goto</td>
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- **Note**: Because Java is case-sensitive, you could technically use `Class` or `cLaSs` as identifiers, but this is very confusing and thus **strongly discouraged**.
System.out.println

- A statement that prints a line of output on the console.
  - pronounced "print-linn"

- Two ways to use System.out.println:
  - System.out.println("text");
    Prints the given message as output.
  - System.out.println();
    Prints a blank line of output.
Syntax

- **syntax**: The set of legal structures and commands that can be used in a particular language.
  - The “spelling” and “grammar” of a programming language.
  - Every basic Java statement ends with a semicolon `;`
  - The contents of a class or method occur between `{` and `}`

- **syntax error (compiler error)**: A problem in the structure of a program that causes the compiler to fail.
  - Missing semicolon
  - Too many or too few `{` `}` braces
  - Class and file names do not match
  - ...
Syntax error example

```java
public class Hello {
    pooblic static void main(String[] args) {
        System.owt.println("Hello, world!")
    }
}
```

- **Compiler output:**

```
Hello.java:2: <identifier> expected
    pooblic static void main(String[] args) {
        ^
Hello.java:3: ';' expected
    }
        ^
2 errors
```

- The compiler shows the line number where it found the error.
- The error messages can be tough to understand!
  - Why can’t the computer just say “You misspelled 'public’”?
First lesson in this class

- Computers are stupid.
- Computers can’t read minds.
- Computers don’t make mistakes.
- If the computer is not doing what you want, it’s because **YOU** made a mistake.
More on syntax errors

- Java is case-sensitive
  - Hello and hello are not the same

1 Public class Hello {
2   public static void main(String[] args) {
3     System.out.println("Hello, world!");
4   }
5 }

compiler output:

Hello.java:1: class, interface, or enum expected
Public class Hello {
  ^
1 error
Strings and escape sequences
Strings

- **string**: A sequence of text characters.
  - Starts and ends with a " (quotation mark character).
    - The quotes do not appear in the output.
  - Examples:
    "hello"
    "This is a string. It's very long!"

- Restrictions:
  - May not span multiple lines.
    "This is not a legal String."
  - May not contain a " character.
    "This is not a "legal" String either."

- This begs the question...
Escape sequences

- **escape sequence**: A special sequence of characters used to represent certain special characters in a string.
  
  \t  tab character
  \n  new line character
  "  quotation mark character
  \\  backslash character

- **Example**:  
  System.out.println("\\hello\\nhow\\tare "\\"you"\\)?\\\\");

- **Output**:  
  \hello  
  how are "you"?\\
Questions

What is the output of the following `println` statements?

```java
System.out.println("\ta\tb\tc");
System.out.println("\\\\\\\\");
System.out.println("\\\\\\");
System.out.println("\\\\\\\\\\\\\\");
System.out.println("C:\nin\the downward spiral");
```

Write a `println` statement to produce this output:

```plaintext
/ \ // \ \ /// \ \ \ \ \ \ \ 
```
Answers

• **Output of each `println` statement:**

```
a    b    c
//
''
"""
C:
in    he downward spiral
```

• **`println` statement to produce the line of output:**

```java
System.out.println("/ \  //  ///  ///  /// /\")
```
Questions

• What `println` statements will generate this output?

This quote is from
Irish poet Oscar Wilde:

"Music makes one feel so romantic
- at least it always gets on one's nerves -
which is the same thing nowadays."

• What `println` statements will generate this output?

A "quoted" String is
'much' better if you learn
the rules of "escape sequences."

Also, "" represents an empty String.
Don't forget: use \" instead of " !
'" is not the same as ""
Answers

• `println` statements to generate the output:
  ```java
  System.out.println("This quote is from");
  System.out.println("Irish poet Oscar Wilde:");
  System.out.println();
  System.out.println("\"Music makes one feel so romantic\"");
  System.out.println("- at least it always gets on one's nerves -");
  System.out.println("which is the same thing nowadays.\"\")
  ```

• `println` statements to generate the output:
  ```java
  System.out.println("A \"quoted\" String is");
  System.out.println("'much' better if you learn");
  System.out.println("the rules of \"escape sequences.\"\")
  System.out.println();
  System.out.println("Also, \"\" represents an empty String.\")
  System.out.println("Don't forget: use \\
  instead of " !")
  System.out.println("'\' is not the same as \\
  ")
  ```