# Methods

## Top-Down Development

- A problem-solving approach to software development
- Break a task down into smaller and smaller subtasks
- Eventually a complex task is broken into units that each describe a specific goal
- The first level of subtasks will occur in the main() method
- A method consists of
    - A declaration: access level, return type, name and parameters, if any
    - A body: statements that implement the method
- General form:

```
<access_level> <return_type> <name>(<parameters>) {
      <statements>
}
```

## Example Program: *TempConver ter*

- A program that allows the user to convert a temperature from Fahrenheit to Celsius or Celsius to Fahrenheit

**Algorithm for TempConverter**:

1. Determine the type of conversion to be done.
2. Convert the temperature using the appropriate formula

Step 2 can be further broken down

| 2a. | 2b. |
|---|---|
| Prompt the user for a Celsius temperature.<br>Convert to F using the formula: $F = \frac{9}{5}(C + 32)$<br>Display the temperature | Prompt the user for a Fahrenheit temperature.<br>Convert to C using the formula: $C = \frac{5}{9}(F - 32)$<br>Display the temperature |

**Pseudocode for TempConverter**:

```
main()
Prompt the user for the conversion type
Execute the appropriate method to convert the temperature
```

```
fahrenheitToCelsius()
Prompt the user for a temp in F
Convert the temp to C
Display the temp
```

```
celsiusToFahrenheit()
Prompt the user for a temp in C
Convert the temp to F
Display the temp
```

## Implementation of TempConverter

```
/*
 * TempConverter.java
 * An application for demonstrating methods.
 */

import java.util.Scanner;

/**
 * Performs a temperature conversion.
 */
public class TempConverter {

      public static void fahrenheitToCelsius() {
            double fTemp, cTemp;
            Scanner input = new Scanner(System.in);

            System.out.print("Enter a Fahrenheit temperature: ");
            fTemp = input.nextDouble();
            input.close();

            cTemp = (double)5/(double)9*(fTemp - 32);
            System.out.println("The Celsius temperature is " + cTemp);
      }

      public static void celsiusToFahrenheit() {
            double cTemp, fTemp;
            Scanner input = new Scanner(System.in);

            System.out.print("Enter a Celsius temperature: ");
            cTemp = input.nextDouble();
            input.close();

            fTemp = (double)9/(double)5*cTemp + 32;
            System.out.println("The Fahrenheit temperature is " + fTemp);
      }

      public static void main(String[] args) {
            int choice;
            Scanner input = new Scanner(System.in);

            /* Prompt user for type of conversion */
            System.out.println("1. Fahrenheit to Celsius conversion.");
            System.out.println("2. Celsius to Fahrenheit conversion.");
            System.out.print("Enter your choice: ");
            choice = input.nextInt();
            if (choice == 1) {
                  fahrenheitToCelsius();
            } else {
                  celsiusToFahrenheit();

            }
            input.close();
      }
}
```

methods must be part of a class!

the return type of void, means that the method will not return a value

access level: public
return type: void
name: fahrenheitToCelsius
parameters: none

any variables declared and used inside a method have a local scope - cannot be used or accessed outside of the method

main method is where execution begins

method call

method call

**Programming Exercise:**

Create a TimeChanger application that allows the user to choose among converting hours to minutes, days to hours, minutes to hours, or hours to days. ***Use methods as appropriate***.

Submit your source code to the Google Doc "ICS4U – Activity Submission Form"