GWC Week 6

Methods

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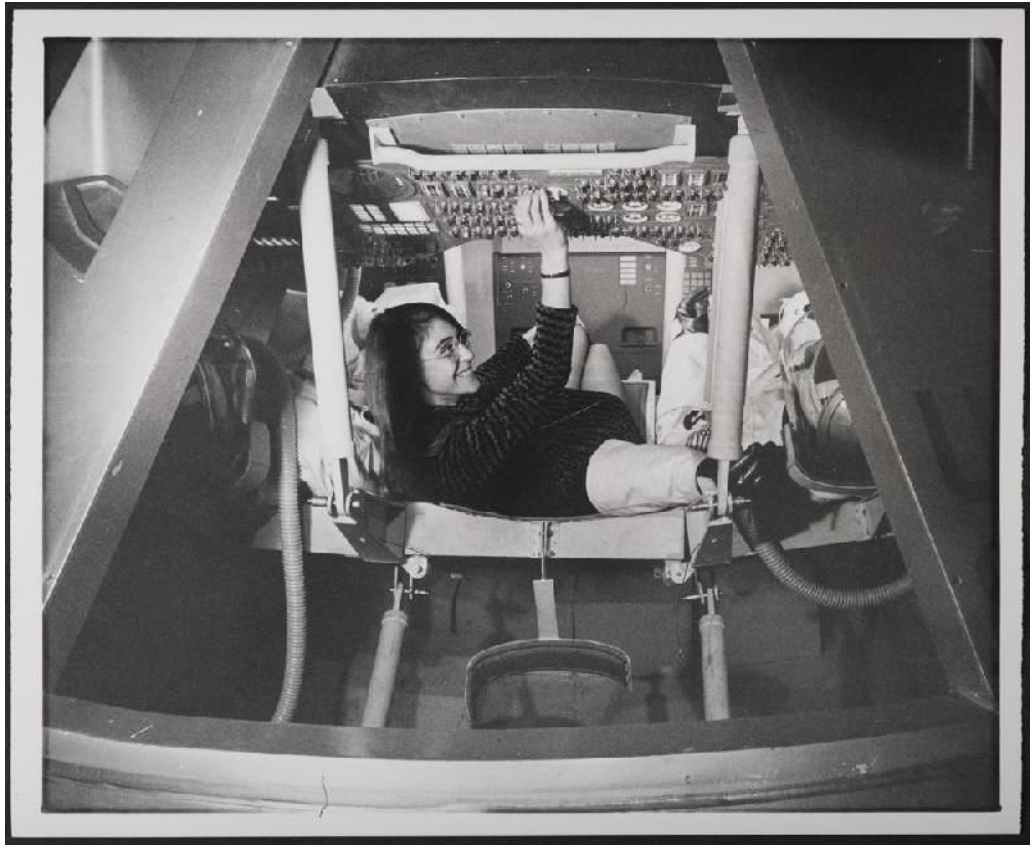
WIT Shout-Out of the Week
Margaret Heafield Hamilton

- An American Computer Scientist, Hamilton earned a bachelor's degree in mathematics from Earlham College in 1958
- Instead of attending graduate school she accepted a position developing software predicting weather in the meteorology department at MIT where her work helped made contributions to mathematics such as Chaos Theory
- Later she wrote software to help track unfriendly aircraft at MIT for the US Air Force
- She worked on the team developing software for the Apollo Space Mission with Nasa



Video

Data Types Refresher

- Must declare data type when CREATING variable, but not when CALLING variable
  - Int, double, boolean, char, string
- Typecasting for strings → use .Parse();
  - Ex: int x = int.Parse(s); // s is a string
- Typecasting for numbers → use casting
  - Ex: int x = (int)y; // y is a double

Class Warm Up

Warm-up

- Write a C# program that takes the radius of a circle as input and calculate the perimeter and area of the circle.
- Write a C# program that takes three letters as input and display them in reverse order.

Methods

See Week 5 Slides

Methods (aka Functions)

- Containers of code that allow you to perform a specific portion of code that is ***reusable***
- Methods for a program are contained inside of a **Class** but we will discuss those more later
- We've already seen several different methods
  - Console.Write()
  - Console.Read()
  - Main (string[] args)

Main Methods: Driver Programs

- In each C# program that you create the Main method is the one special container of code that is used to execute the overarching program.
- The main method is where you “Call” or execute the other methods (or functions) that you created to use to run the entire program
- ***For every program that you create you will need to create a main method***
- In Repl.it, the main method is the first one that you see:

```
1  using System;
2
3  class MainClass {
4
5    public static void Main (string[] args) {
6      //this is the main method aka the driver function
7      Console.WriteLine ("Hello World");
8    }
9
10 }
```

This is a main method, you can tell because it’s named “Main” and is makes use of the (string[] args) parameters

Parts of a Method

- Methods are pieces of code that are run by receiving both input and giving output
  1. **input** comes either from ***parameters*** or from user input or defined input
  2. **Output** for a method is data given back based on a ***return-type***
- Methods also make use of a ***Signature*** or method name that is “called” later to execute the portion of code you’ve defined in a method

Method Signature (Method Name)

- Each Method you write needs a signature or name that you can reference later to run the code inside of that method
- Names should be related to purpose of the method
- camelCase or use_underscores

```
public static int methodName(int a, int b) {
    // body
}
```

Parts of a Method: Return Type

- Each method you write will either return a value or not
- Since C# is strong typed like Java, we must define what type of value the method will return (ex: int, double,float, string)
- Methods that do not return anything but simply execute some operation will be a **void** return type

```
public static int methodName(int a, int b) {
    // body
}
```

Return Type

- Think back to data types from last week
  - int
  - double
  - bool
  - string
  - char
  - etc.

```
public static double methodName(int a, int b)
{
    // body
}
```

Parts of a Method: Access Modifiers (or property types)

- Each method that you write should be defined by a what is called an ***Access Modifier:*** the level to which this portion of code can be accessed by other parts of the program

public

The type or member can be accessed by any other code in the same assembly or another assembly that references it.

private

The type or member can be accessed only by code in the same class or struct.

protected

The type or member can be accessed only by code in the same class, or in a class that is derived from that class.

Method Examples

```
public static int methodName(int a, int b) {
   // body
}
```

```
public static double methodName(int a, int b) {
   // body
}
```

```
public static string methodName(int a, int b) {
   // body
}
```

Parameters

```
public static int methodName(int a, int b)
{
    // body
}
```

- This is the data that will be used in the method that are passed in to the method -- they are specified inside of the parenthesis next to the method name
- Must declare a data type for the values (above we use int)
- Can have multiple parameters
  - Just put a comma between them as shown above
- Can have 0 parameters
  - Ex: Console.ReadLine();

Parameters (continued)

```
public static int methodName(int a, int b)
{
    // body
}
```

- You only specify the data type when CREATING the method, when you call it in your main method you just include the variables
- Parameters are a way to PASS DATA BETWEEN METHODS

```
int x = 0;
int y = 3;
sum(x,y)
```

How to Call a Method

- To ***“Call”*** or execute/run a method we use the method name and any parameters that it requires
- Methods can be called in the main method, another method, or the same method (recursion)
- For example we call our add function from the previous example in the main method using:

add(4,5)

OR use variables: add(x,y)

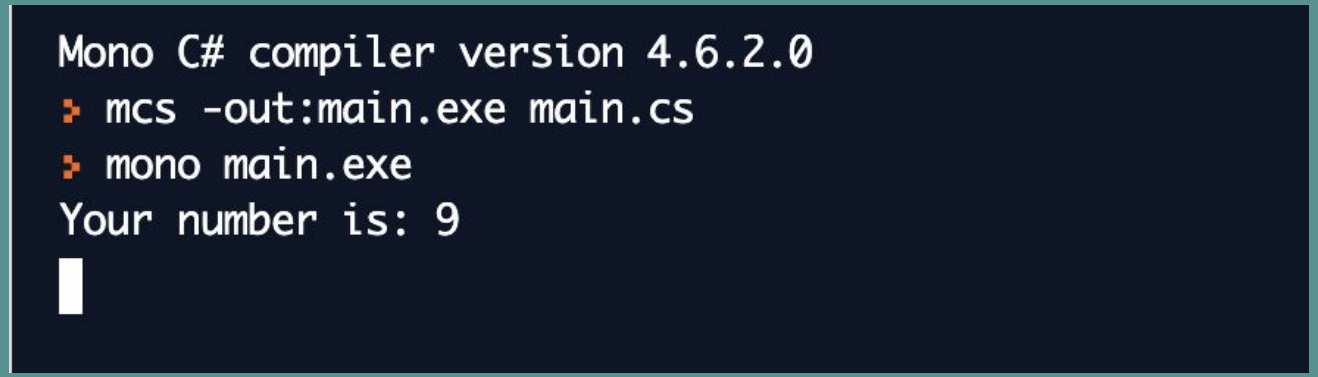
```
int x = 0;
int y = 3;
sum(x,y)
```

Method Example

```
class MainClass {

  public static int add(int a, int b){
    return a + b;
  }
  public static void Main (string[] args) {
    //this is the main method aka the driver function
    int val = add(4,5);
    Console.WriteLine ("Your number is: "+ val);
  }

}
```


Mono C# compiler version 4.6.2.0
mcs -out:main.exe main.cs
mono main.exe
Your number is: 9

Class Activity

We will be writing a calculator program

1. Write a method for each of the following math operations
    - Add
    - Subtract
    - Multiply
    - Divide
2. Write your main method so that someone can enter +, -, *, or /, and the correct mathematical operation will occur
    a. Each math operation should get a user input for the parameters

Your Turn

How to generate a Random Number

```
Random random = new Random();
int randomnum = random.Next(0,6);
```

Activities: Dice Rolling Simulation

- Write a program that asks a user for a “yes” or “no” answer to the question: Would you like to roll the dice? In a while loop until a person says “no”
- If a user says yes, then call a method named “roll” that will generate a random number between 0 and 6 and then return that integer ***this method should be public***
- If a user says no, then the program quits
- Use the random number generator code from the previous slide to help you with the roll method