MODULE 1: INTRODUCTION TO PROGRAMMING

Loops and Arrays

Working with variables

C# Type	.NET Framework Type
bool	`System.Boolean`
byte	`System.Byte`
sbyte	`System.SByte`
char	`System.Char`
decimal	`System.Decimal`
double	`System.Double`
float	`System.Single`
int	`System.Int32`
uint	`System.UInt32`
long	`System.Int64`
ulong	`System.UInt64`

https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/keywords/built-in-types-table

Wild Animals

What is an array?

- An **array** is a data structure that is a collection of variables of the same type

Declarative syntax

```
string[ ] animals;
```

Initialization syntax

```
animals = new string[6];
```

Variable Name

Number of elements

syntax

```
string[ ] animals = new string[6];
```

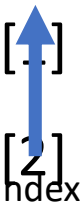
Element Type

Variable Name

Number of elements

Assigning values to elements

```
string[ ] animals = new string[6];
animals[0] = “Tiger”;
animals[1] = “Polar Bear”;
animals[2] = “Giraffe”;
animals[3] = “Koala”;
animals[4] = “Moose”;
animals[5] = “Panda”;
```



Accessing values in an array

- Write the 3rd value from the array to the console:
  - Console.WriteLine(animals[2]);

LET'S CODE!

What are arrays good for?

- Keeping related data together for processing
  - Names of students in a classroom
    - string[ ] students = new string[20];
  - Par values on a golf score card
    - int[ ] parValues = new int[18];

The gotchas

- Arrays are zero indexed
- Arrays are fixed length
- Arrays must be initialized before used
- Array are reference types

Scope

```
{
    int length;
    int width;
    int area;
    area = length * width;
}
```

A variable's **scope** defines where in the program that the variable exists (i.e. can be referenced). When code execution reaches a point where a variable is no longer referenceable, the variable is said to be *out of scope*.

Rules of Scope

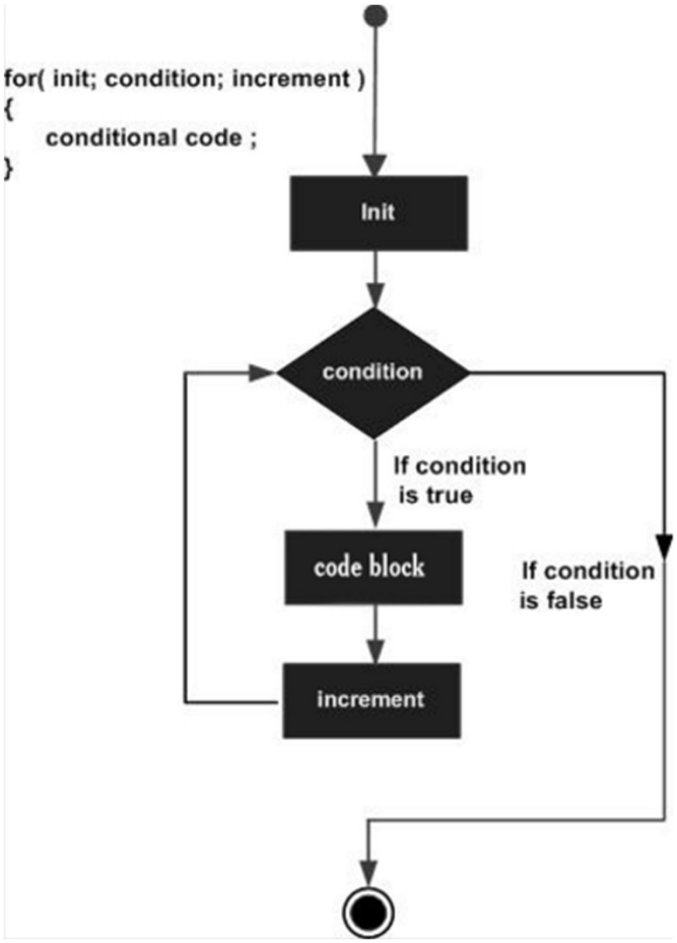
- Variables declared inside of a function or block {..} are local variables and only available within that block. This includes loops.
- Blocks can be nested within other blocks and therefore if a variable is declared outside of a block, it is accessible within the inner block.

Finding Animals

- How would we find the Moose?

Accessing Elements in an Array

- For loop allows you to check each element in an array.



Memorize this code segment!!

```
for(int i = 0; i < animals.Length; i++) {
        …
    }
```

Shorthand Notation

- Increment variable x by 1:
  - x++ is the same as x = x + 1
- Decrement variable x by 1:
  - x-- is the same as x = x -1
- Assignment shortcuts
  - x += n is the same as x = x + n
  - x -= n is the same as x = x – n

Danger of Shorthand notation

```
{
    Int x = 0;
    Int y = 0;
    Int z = 0;
    y = x++;
    z = ++x;
}
```

LET'S CODE!

WHAT QUESTIONS DO YOU HAVE?

Reading for tonight:

Building Command Line Programs aka Introduction to Object Objectives