Software Development Master Class For Absolute Beginners

Basic Programming Concepts

On The Microsoft .Net Stack with C#

- with Mike Witt -

Software Development Master Class

for absolute beginners

COURSE INTRODUCTION

Software Development Master Class

for absolute beginners

COURSE OVERVIEW

Course Overview

Code Examples

Load Development Environment

Create Hello World Program

Visual Studio Overview

Course Overview

What is Software Development?

Can a Beginner Become a Pro?

Console Based Input/Output

How Does a Computer Work?

Course Overview

Introducing .Net Framework/Core

Program Variables

Branching

Looping

Course Overview

The Kiosk Project

Using the Visual Studio Debugger

Developer Best Practices

Summary/What's Next?

Software Development Master Class

for absolute beginners

ASSIGNMENTS & CODE EXAMPLES

Assignments & Code Examples

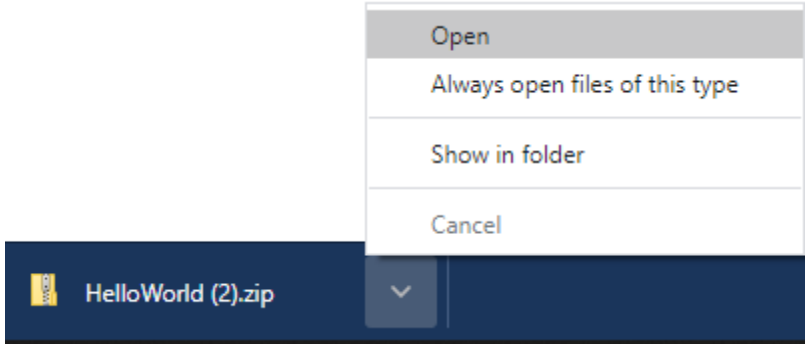
Assignment 1: Create Hello World

- Load the Visual Studio 2019 Software
- Create your own Helloworld program
- Experiment!

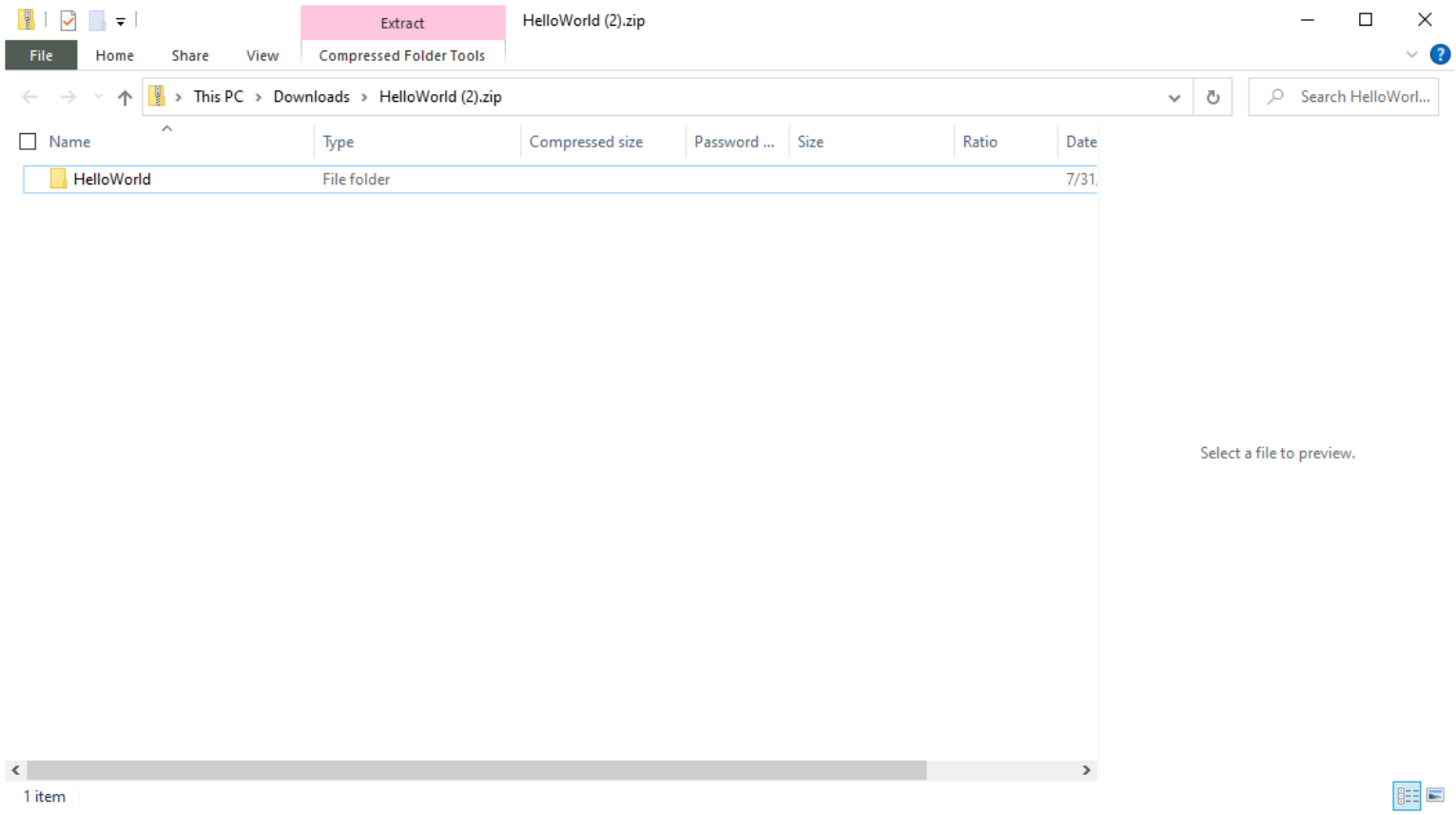
Resources for this lecture

HelloWorld.zip

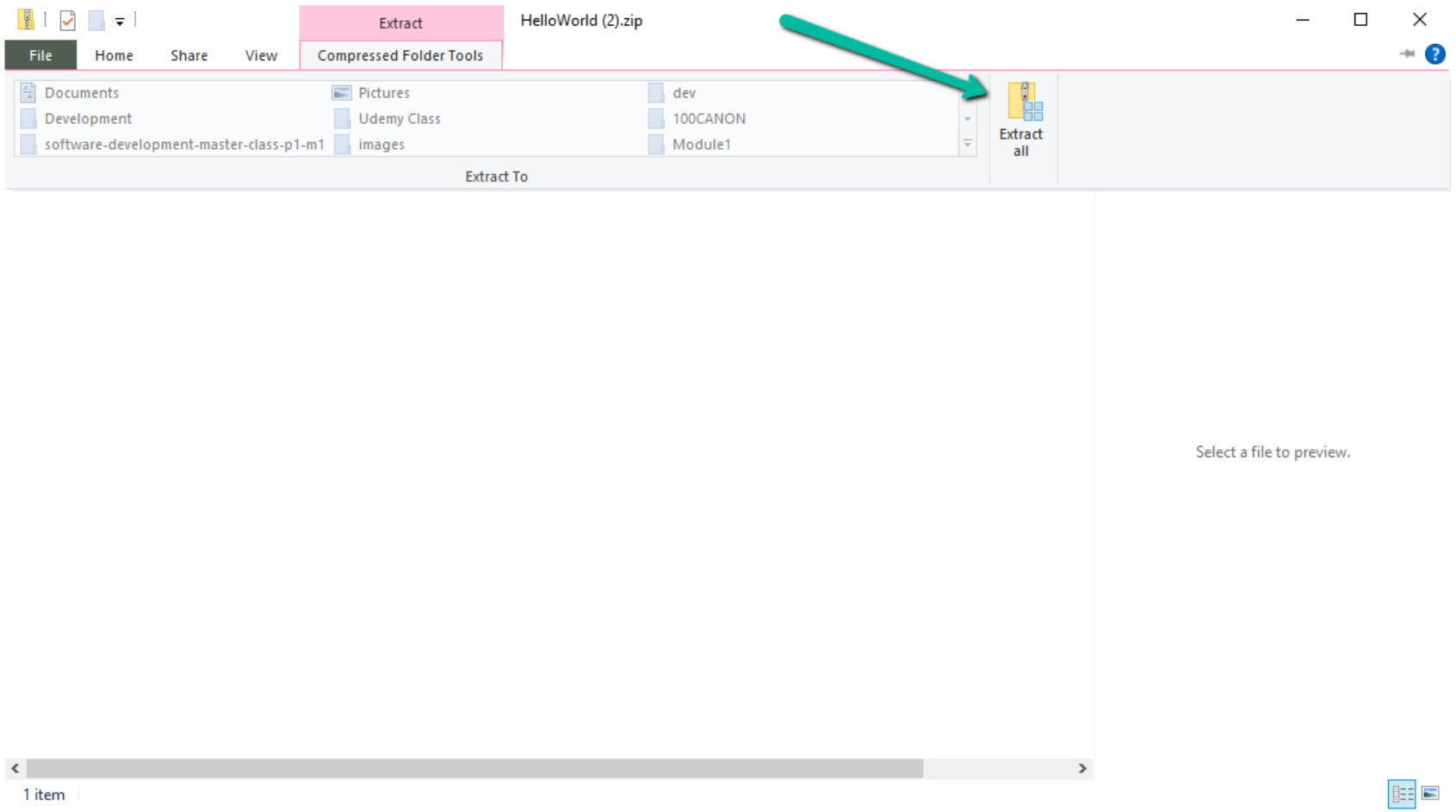
Assignments & Code Examples



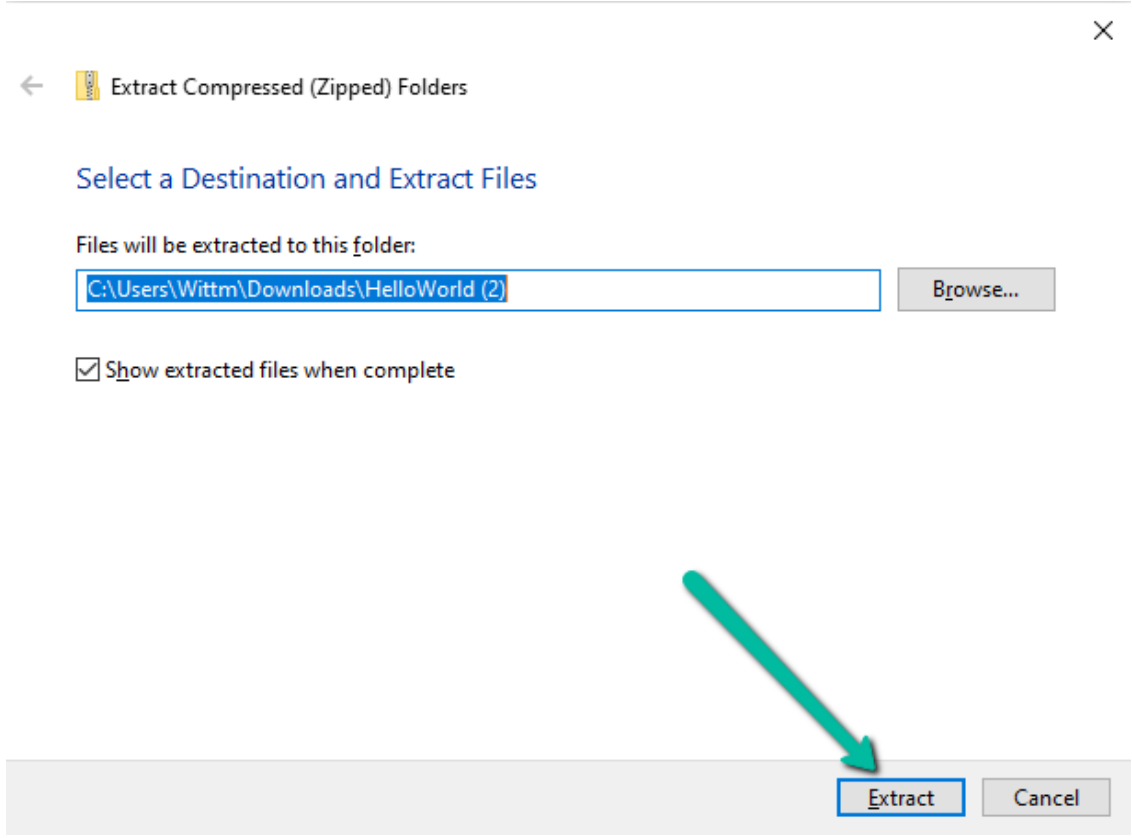
Assignments & Code Examples



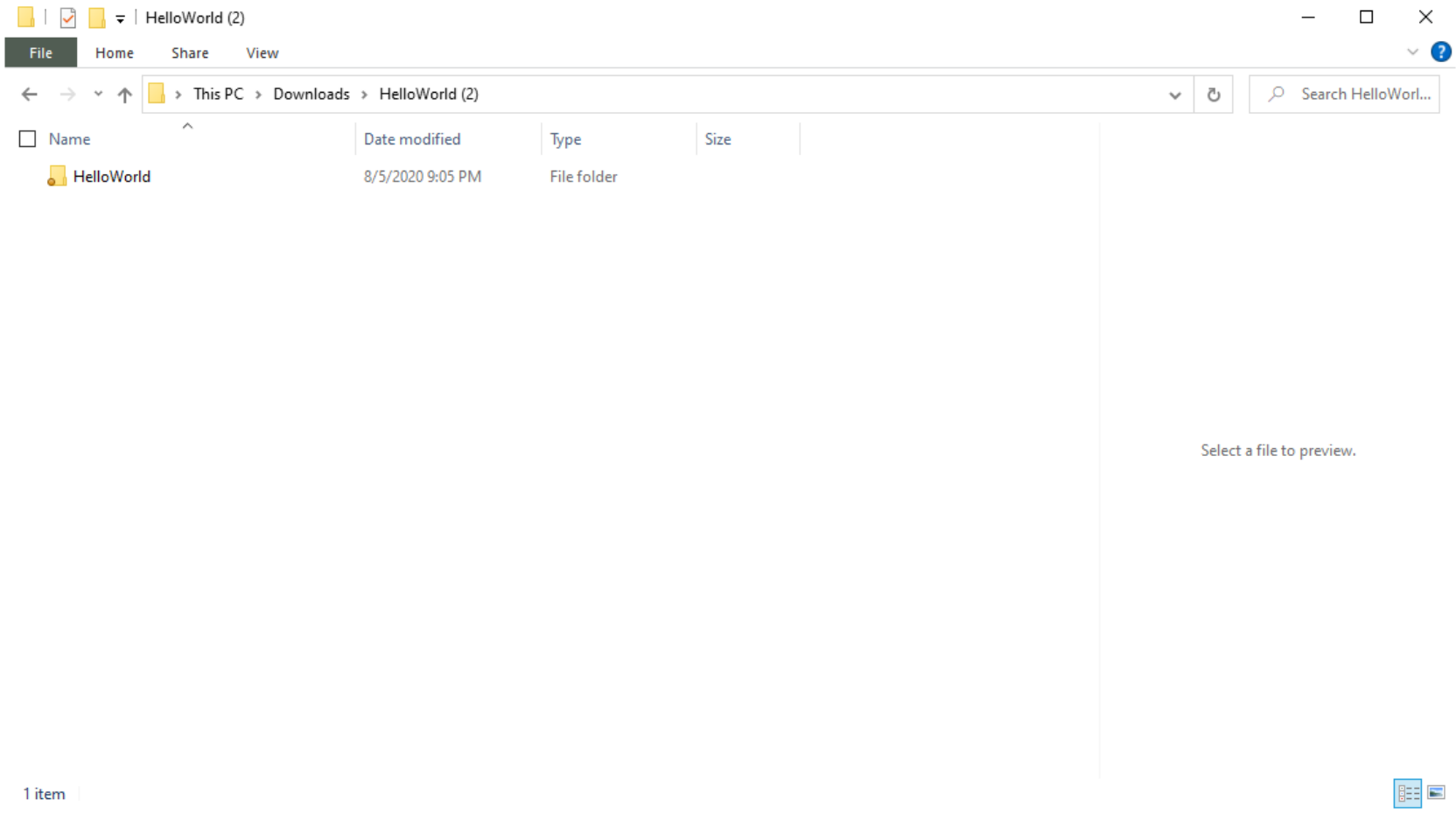
Assignments & Code Examples



Assignments & Code Examples



Assignments & Code Examples



Software Development Master Class

for absolute beginners

EVERY PROGRAMMER'S FIRST PROGRAM

Software Development Master Class

for absolute beginners

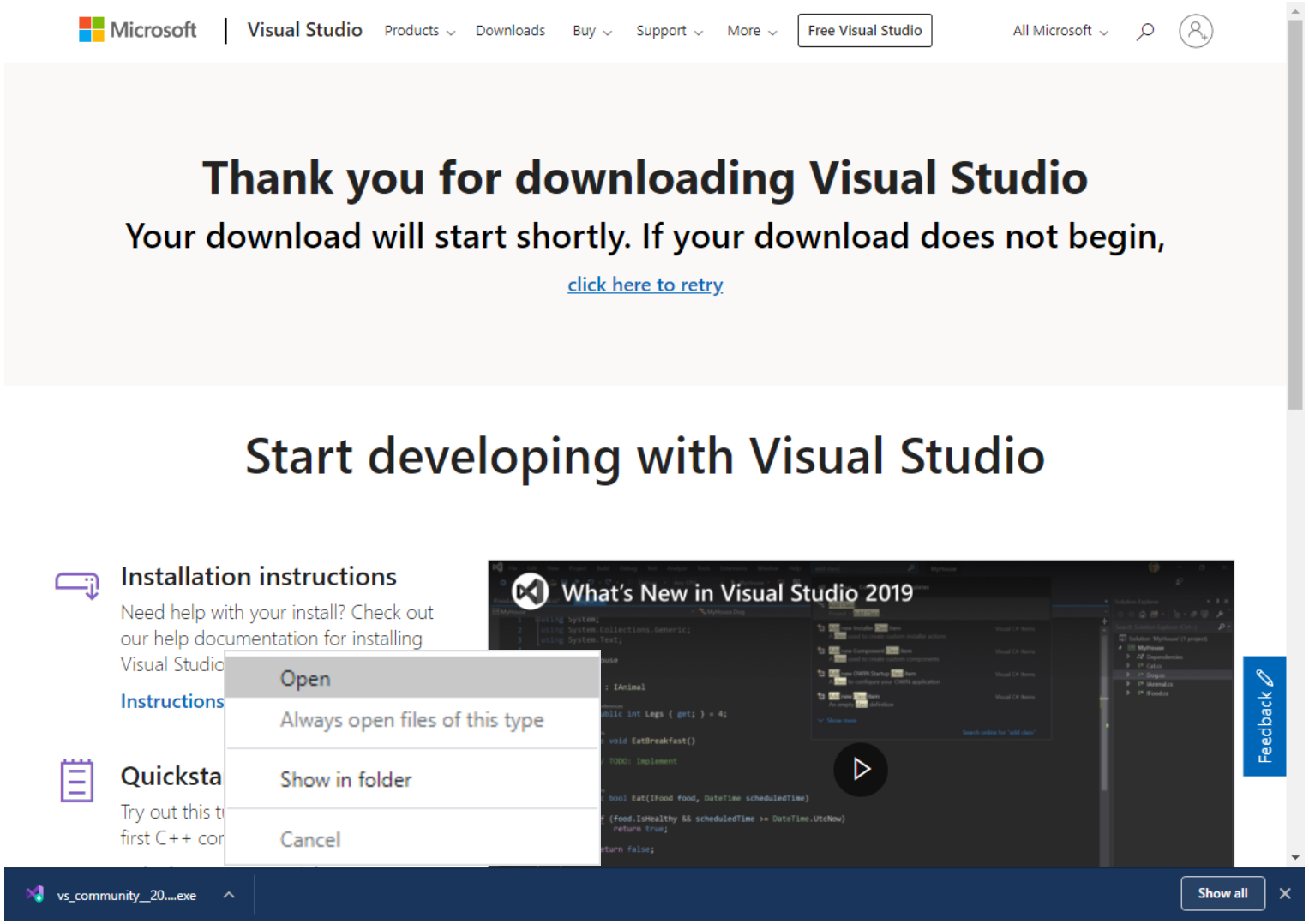
LOAD DEVELOPMENT ENVIRONMENT

Loading the Development Environment

Microsoft Visual Studio 2019

https://visualstudio.microsoft.com/vs/community/

Loading the Development Environment



Software Development Master Class

for absolute beginners

CREATE HELLO WORLD PROGRAM

Our First Program
Hello World

Traditional First Program

Our First Program
Hello World

Traditional First Program

Demonstration

Our First Program
Hello World

Traditional First Program

Demonstration

Visual Studio Overview

Our First Program
Hello World

Traditional First Program

Demonstration

Visual Studio Overview

Assignment 1

Software Development Master Class

for absolute beginners

VISUAL STUDIO OVERVIEW

Software Development Master Class

for absolute beginners

EVERY PROFESSIONAL SOFTWARE DEVELOPER STARTED SOMEWHERE

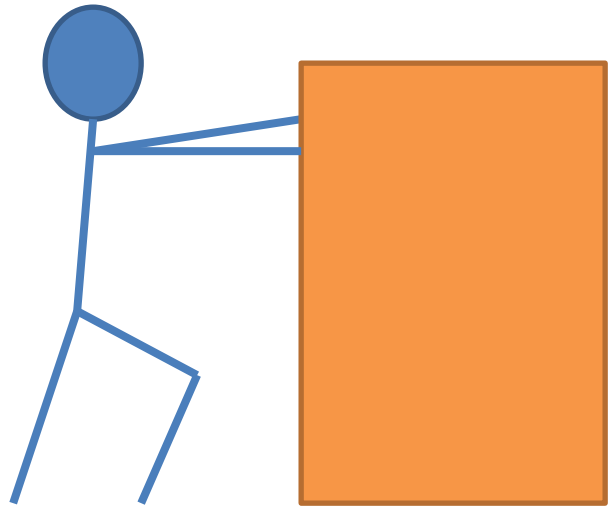
Software Development Master Class

for absolute beginners

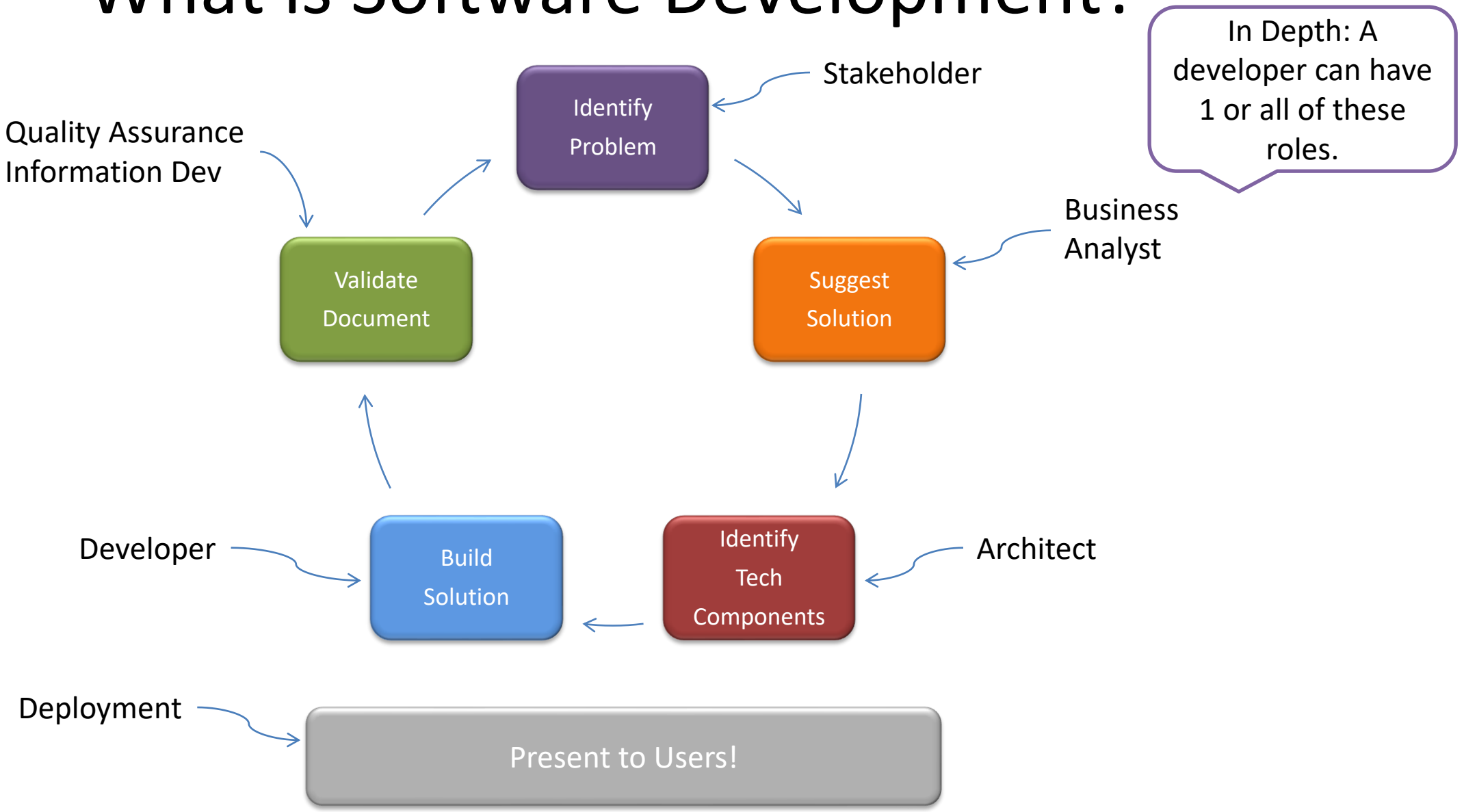
WHAT IS SOFTWARE DEVELOPMENT?

What is Software Development?

Take Some Manual Process And Automate It!



What is Software Development?



Software Development Master Class

for absolute beginners

CAN A BEGINNER BECOME A PRO?

Can a beginner become a pro?

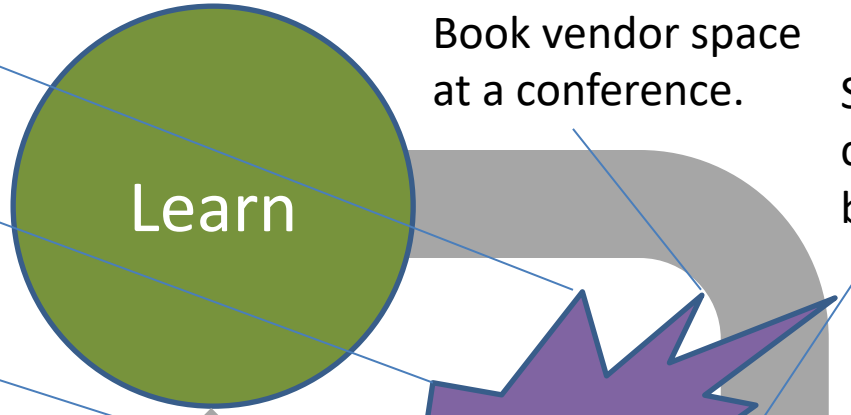
Short Answer: YES!

Can a beginner become a pro?

Short Answer: YES!

Longer Answer: It will take some work!

Can a beginner become a pro?



Get involved helping others at stack overflow
https://stackoverflow.com/

Do free work for a charity

Do work (again free) for an open source project (for example:
https://github.com/DanWahlin/Angular-BareBones

Create sample applications and share on social media

Bid on freelance projects (like at freelancer.com)

Network with other developers (see meetup.com)

Take any job with a company that develops software.

Do free work for a friend

Book vendor space at a conference.

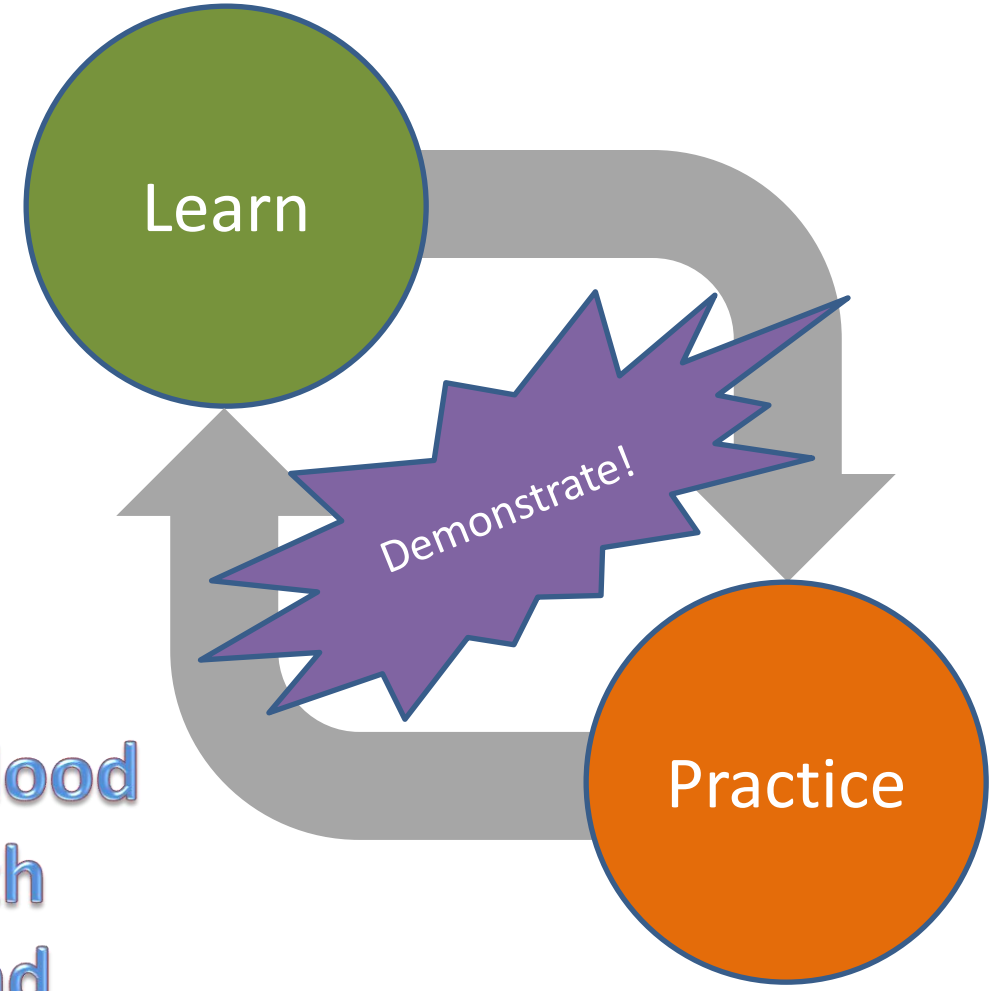
Start your own consulting business

Speak at a conference

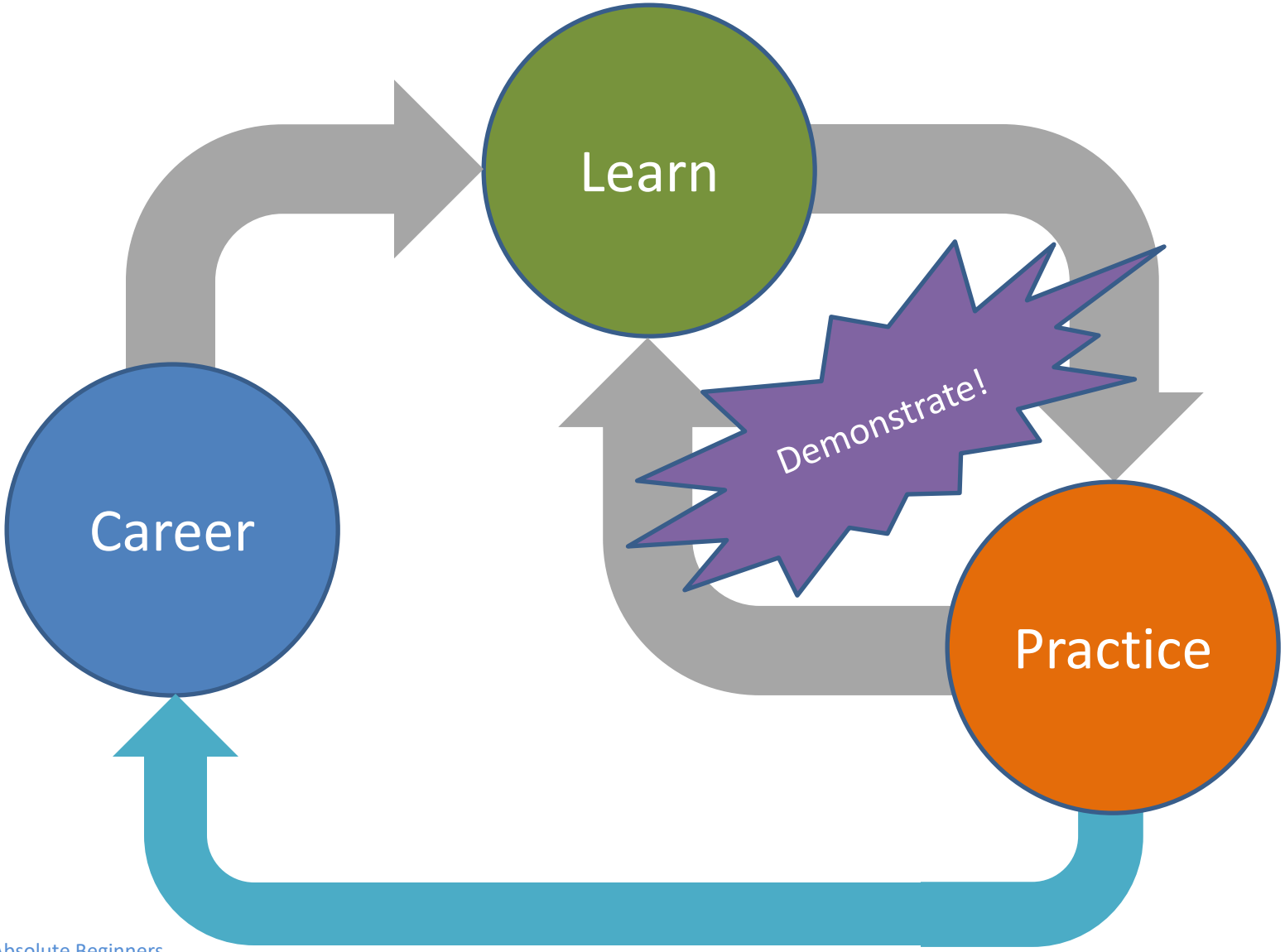
Can a beginner become a pro?

Build a Portfolio!

Don’t be afraid, flood the market with applications and resumes’!



Can a beginner become a pro?



Software Development Master Class

for absolute beginners

LET’S GET CODING!

Software Development Master Class

for absolute beginners

CONSOLE BASED INPUT/OUTPUT

Console Based Input/Output

In Depth: This I/O idea is used to read and write in other way (i.e. files)

Console Based Applications
Think: Typewriter

Console Write/WriteLine

Console Read/Readline

Software Development Master Class

for absolute beginners

WHAT ARE THE BASICS AND WHY DO YOU NEED TO KNOW ABOUT THEM?

Software Development Master Class

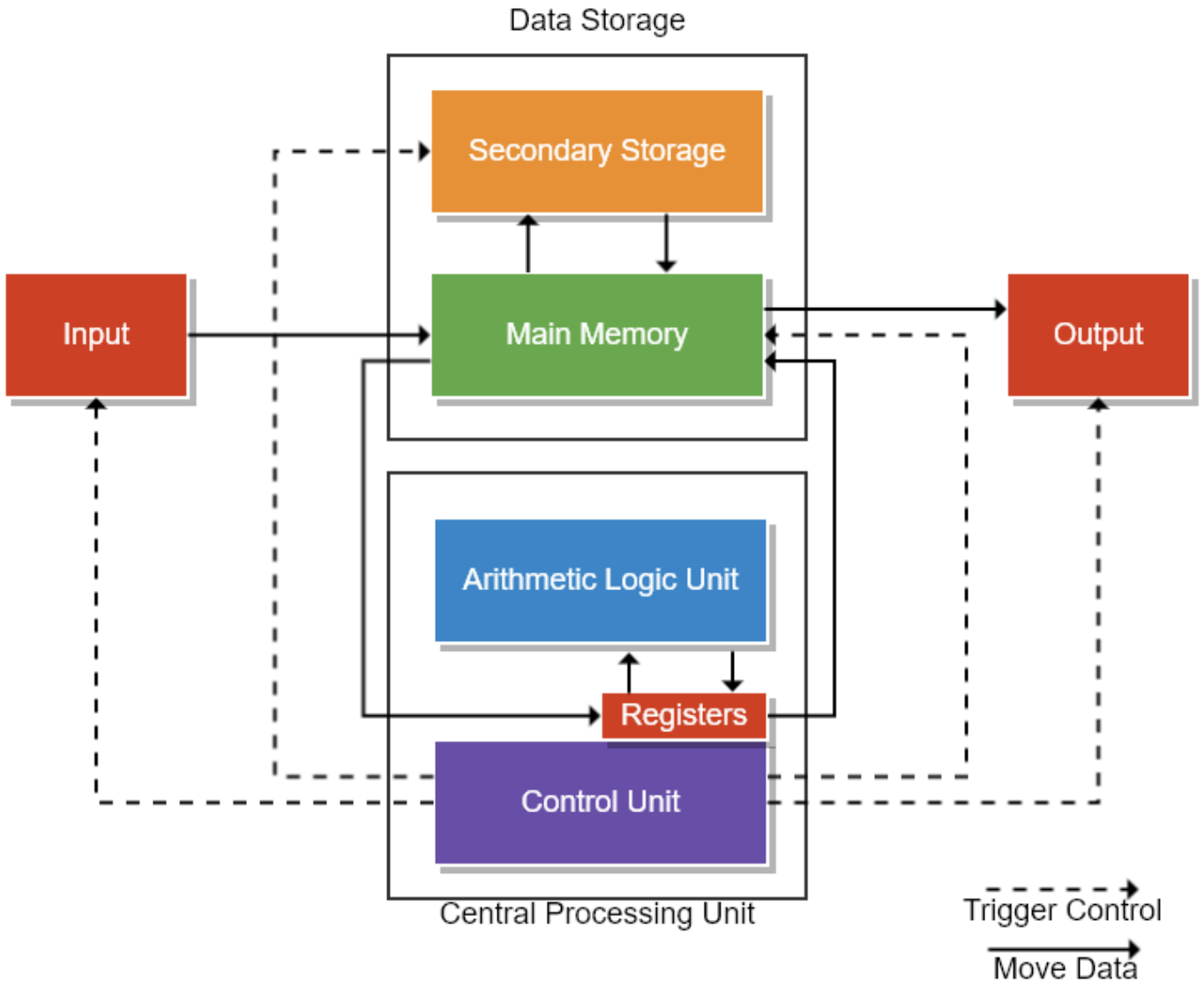
for absolute beginners

HOW DOES A COMPUTER WORK?

How does a computer work?

The Simplified Version!

How does a computer work?



How does a computer work?

- Take a Byte, Made of Bits
  - Simplest Memory Unit
  - Each Bit Stores a 0 or a 1
  - Interpreted as a Base 2 Number
  - Complicating factors: Negative Numbers, Decimal Numbers
  - Powers of 2: 1+2+4+8+16+32+64+128 for each 1, right to left.

- Result: 76 in base 10 decimal notation
- Hex? 4C
  - Hexadecimal is Base 16. Adds A, B, C, D, E, F to digits
  - So, count 0, 1, 2, …, 9, A, B, C, D, E, F
  - Handy notation: For each 4 binary digits, 1 Hex digit can represent it.

How does a computer work?

Binary/Base 2

Hexadecimal/Base 16

Decimal/Base 10

How does a computer work?

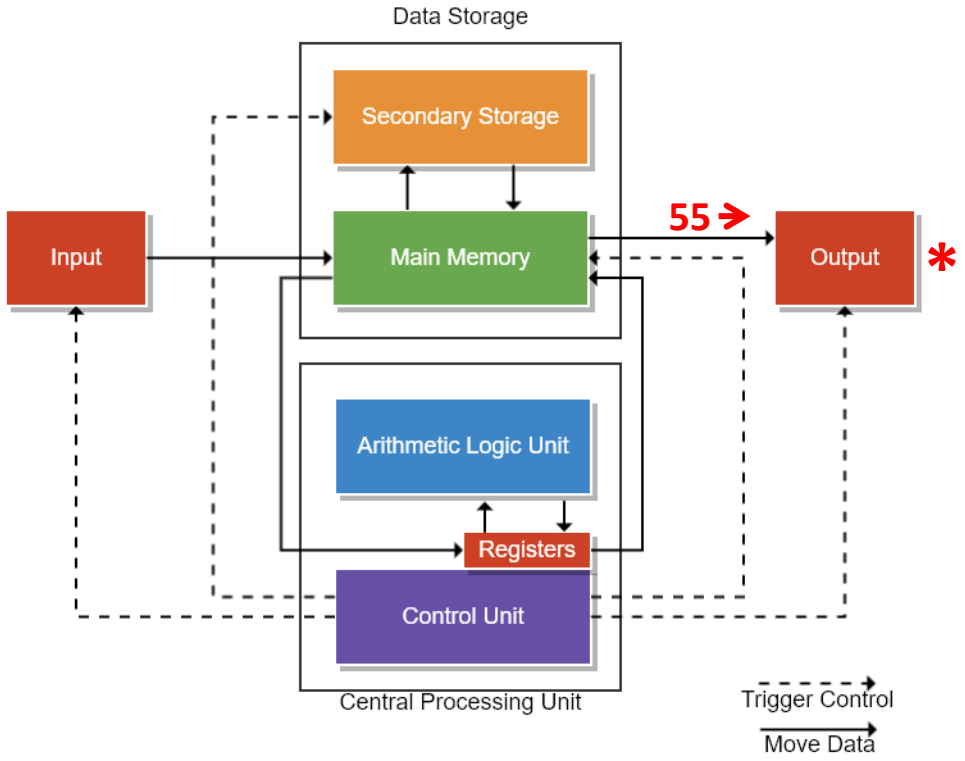
Machine Language

Hardware Specific

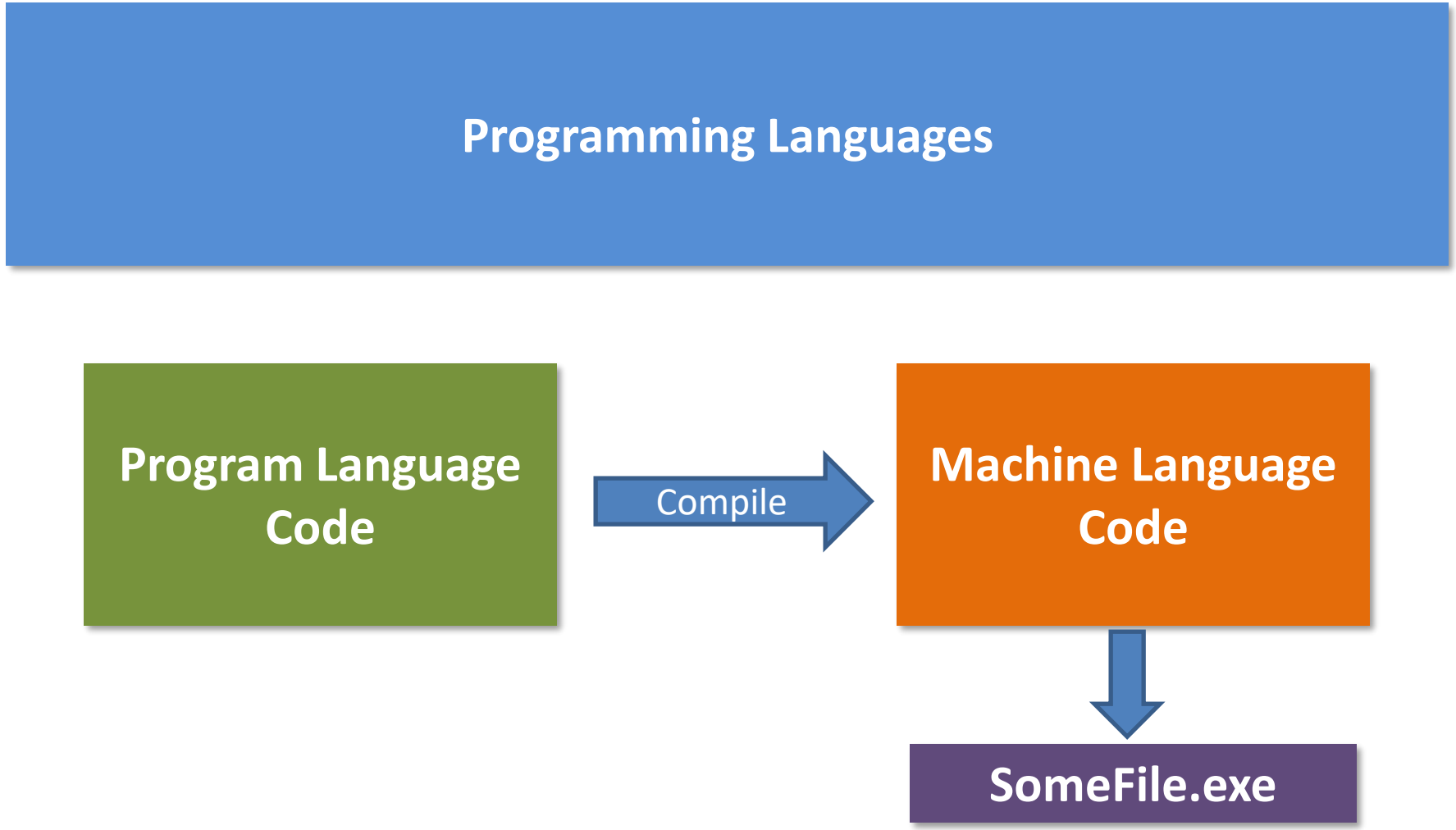
Controls Computer Components

Made-up Example: Input 2 numbers, add them together, and output the results.

- Inp M1
- Inp M2
- Mov M1, R1
- Mov M2, R2
- Add R1, R2, R3
- Mov R3, M3
- Out M3



How does a computer work?



Software Development Master Class

for absolute beginners

INTRODUCING THE MICROSOFT .NET FRAMEWORK

Introducing the Microsoft .Net Framework

In Depth: Focus on .Net Core. The .Net Framework focus is more legacy.

Version 1.0 Released in 2001

Common Language Framework, Support Multiple Languages – But Primarily C#

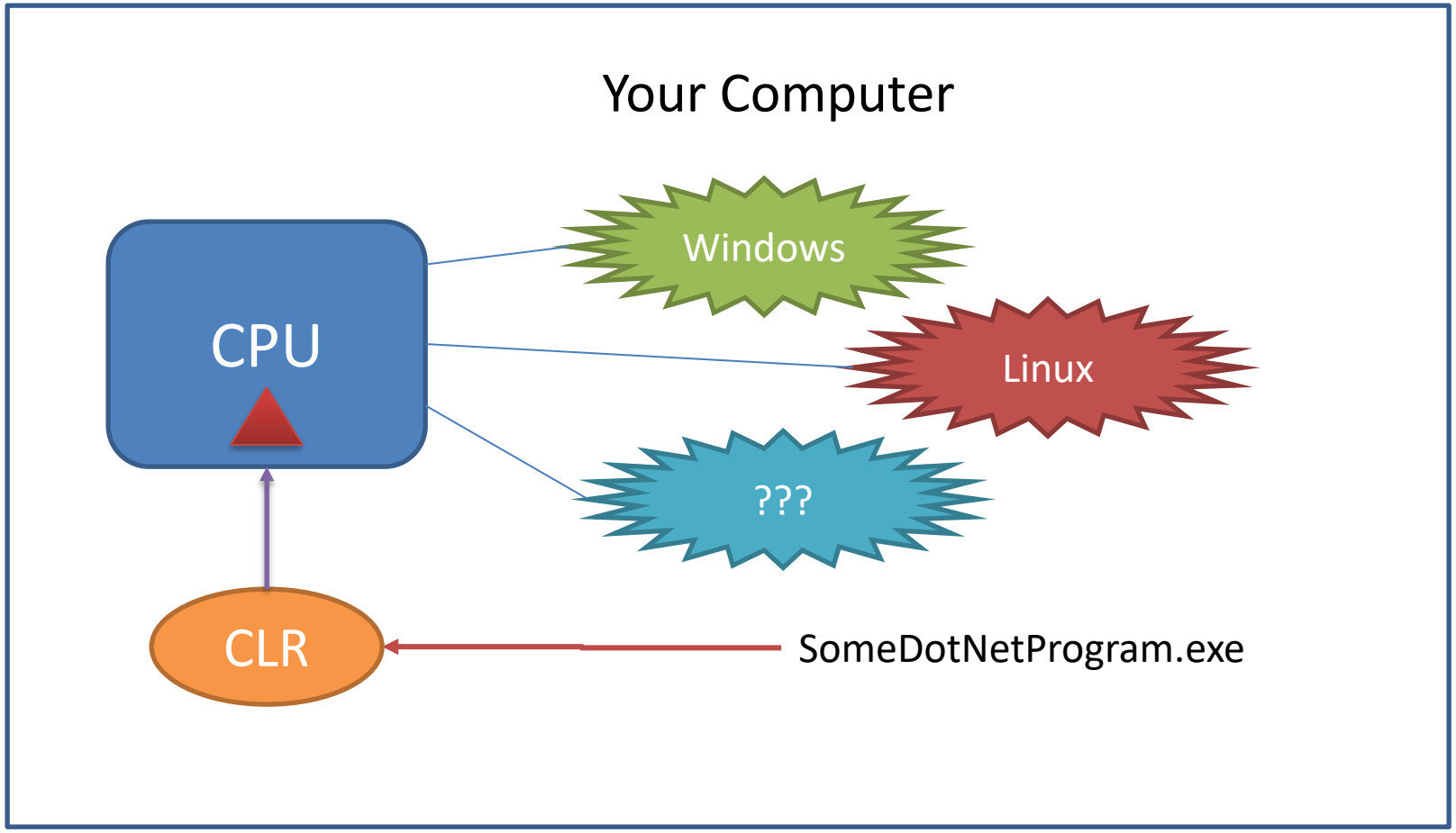
After Version 4.6.2 Release, .Net Core – Multiple Platforms

Introducing the Microsoft .Net Framework
.Net Core

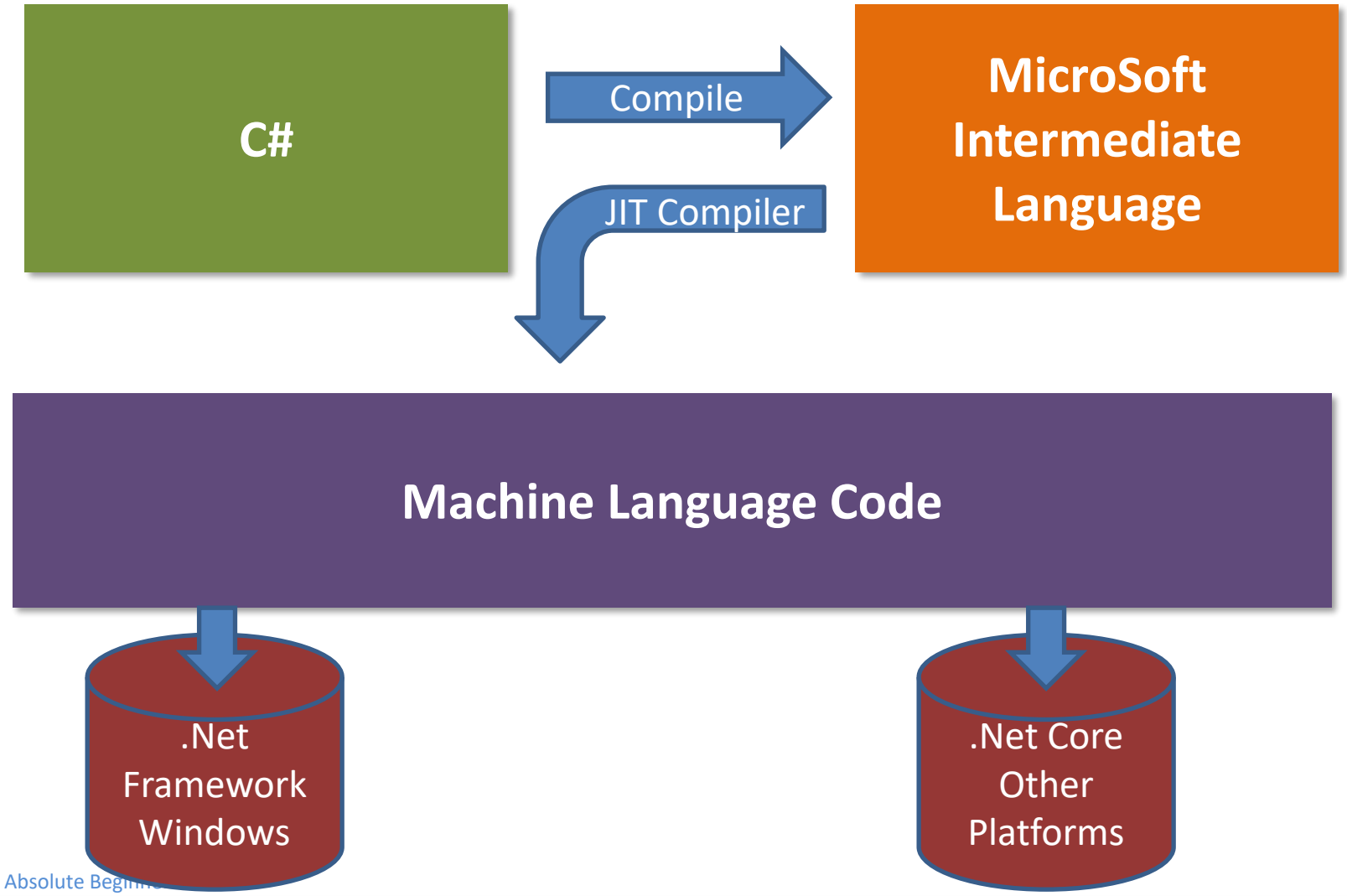
Common Language Runtime
CLR - CoreCLR

Virtual Machine that Runs Your Code

Introducing the Microsoft .Net Framework
.Net Core



Introducing the Microsoft .Net Framework



Software Development Master Class

for absolute beginners

STORING DATA FOR YOUR APPLICATION

Software Development Master Class

for absolute beginners

PROGRAM VARIABLES

Program Variables

In Depth: String data and numeric data are stored differently

Place To Keep Your Data

"Hello World"
"Enter your name"
"My name is Mike"

22
555
-10

Program Variables

Place To Keep Your Data

Strings: “Hello World”
Characters: ‘A’

Numbers: 22, 12.5, 0, -50
2.1E12

Boolean: True or False

Operations:
+, -, *, /
Concatenation
Logic: And, Or, Not

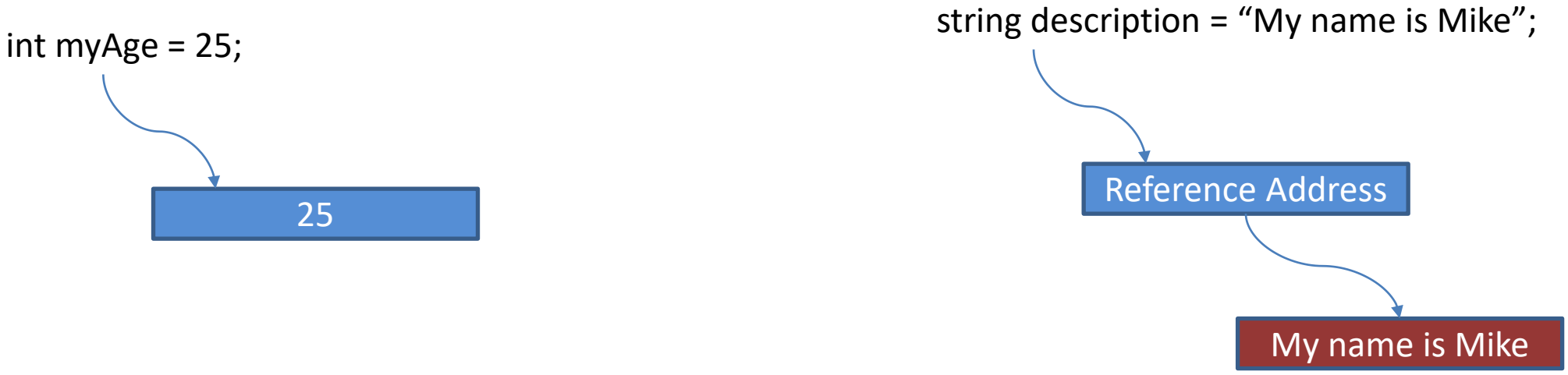
Comparison:
<, <=, >, >=, ==, !=

Program Variables

How Variables are Stored in Your Computer's Memory

By Value – int, bool, char, and other types

By Reference – string and many, many other types



Software Development Master Class

for absolute beginners

PROGRAM VARIABLES (NUMBERS)

Software Development Master Class

for absolute beginners

PROGRAM VARIABLES (STRINGS)

Software Development Master Class

for absolute beginners

PROGRAM VARIABLES (BOOLEANS AND COMPARISON)

Software Development Master Class

for absolute beginners

PROGRAM LOGIC FLOW

Software Development Master Class

for absolute beginners

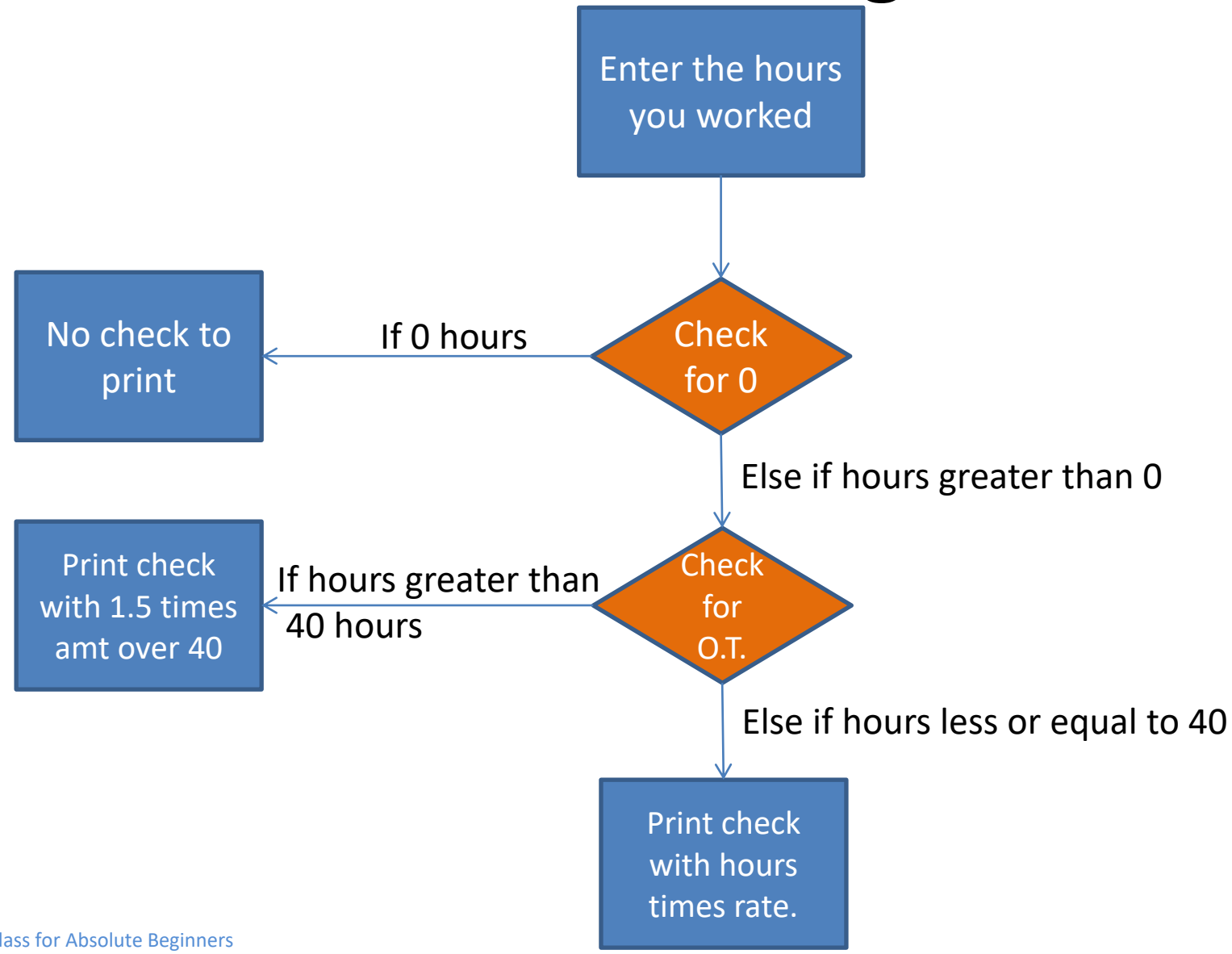
BRANCHING – IF/THEN/ELSE

Branching

Example: Calculate Employee Paycheck

Branching

In Depth: This is known as a flowchart.



Branching Tools

if **else**	Evaluates what to do if a statement is true and what to do if it is not true.

<	Less than	>	Greater than
<=	Less than or equal	>=	Greater than or equal
==	Equal	!=	Not Equal

&&	Logical And	||	Logic Or	!	Logical Not

Branching Tools

If - else

```
if (condition)
{

}
```

```
if (condition)
{

}
else
{

}
```

```
if (condition)
{
   if (condition)
   {
   }
   else
   {
   }
}
else
{

}
```

Software Development Master Class

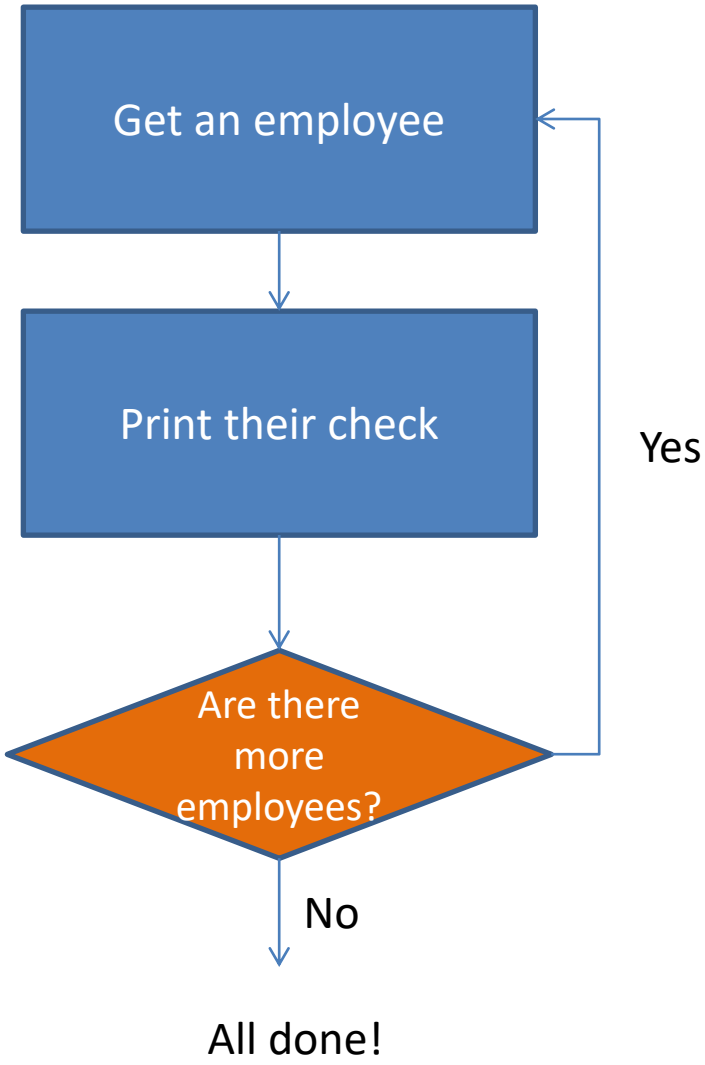
for absolute beginners

LOOPING FOR/WHILE/DO

Looping

Example: Calculate Paycheck for All Employees

Looping


Get an employee
Print their check
Are there more employees?
Yes
No
All done!

Looping Tools

for/foreach while/do	Repeat execution of a task until the job is done

for	Set a variable, check a condition, increment the variable	foreach	Beyond the scope of this course.
while	If a check is true, do it	do/while	Do it and then check if condition is true

```
for (i=0; i<10; i++)
{
  Console.Writeline(i);
}
```

```
int i=0;
while (i < 10)
{
  i++;
}
```

```
int i=0;
do
{
  i++;
} while (i < 10);
```

Software Development Master Class

for absolute beginners

WELCOME TO THE KIOSK PROJECT

Software Development Master Class

for absolute beginners

KIOSK PROJECT KICKOFF

Software Development Master Class

for absolute beginners

KIOSK PROJECT USER INTERFACE DESIGN SESSION

Software Development Master Class

for absolute beginners

KIOSK PROJECT DEVELOPMENT SESSION 1

Software Development Master Class

for absolute beginners

KIOSK PROJECT DEVELOPMENT SESSION 2

Software Development Master Class

for absolute beginners

KIOSK PROJECT DEVELOPMENT SESSION 3

Software Development Master Class

for absolute beginners

USING THE VISUAL STUDIO DEBUGGER

Software Development Master Class

for absolute beginners

YOU MADE IT!

Software Development Master Class

for absolute beginners

DEVELOPER BEST PRACTICES

Developer Best Practices

Indentation

No!

Program.cs*

Indentation

```
using System;

namespace Indentation
{
    0 references
class Program
{
    0 references
static void Main(string[] args)
{
Console.WriteLine("Enter your age: ");
int age = Convert.ToInt32(Console.ReadLine());
if (age >= 5 && age <= 18)
{
Console.WriteLine("You should be in school right now!");
}
else
{
if (age > 18 && age < 21)
{
Console.WriteLine("You're an adult but you cannot buy alcohol!");
}
else
{
if (age >= 21 && age < 65)
{
    Console.WriteLine("These are the best years!");
}
else
{
if (age >= 65)
{
Console.WriteLine("It's all downhill from here!");
}
}
}
}
}
}
}
```

Yes!

Program.cs

Indentation

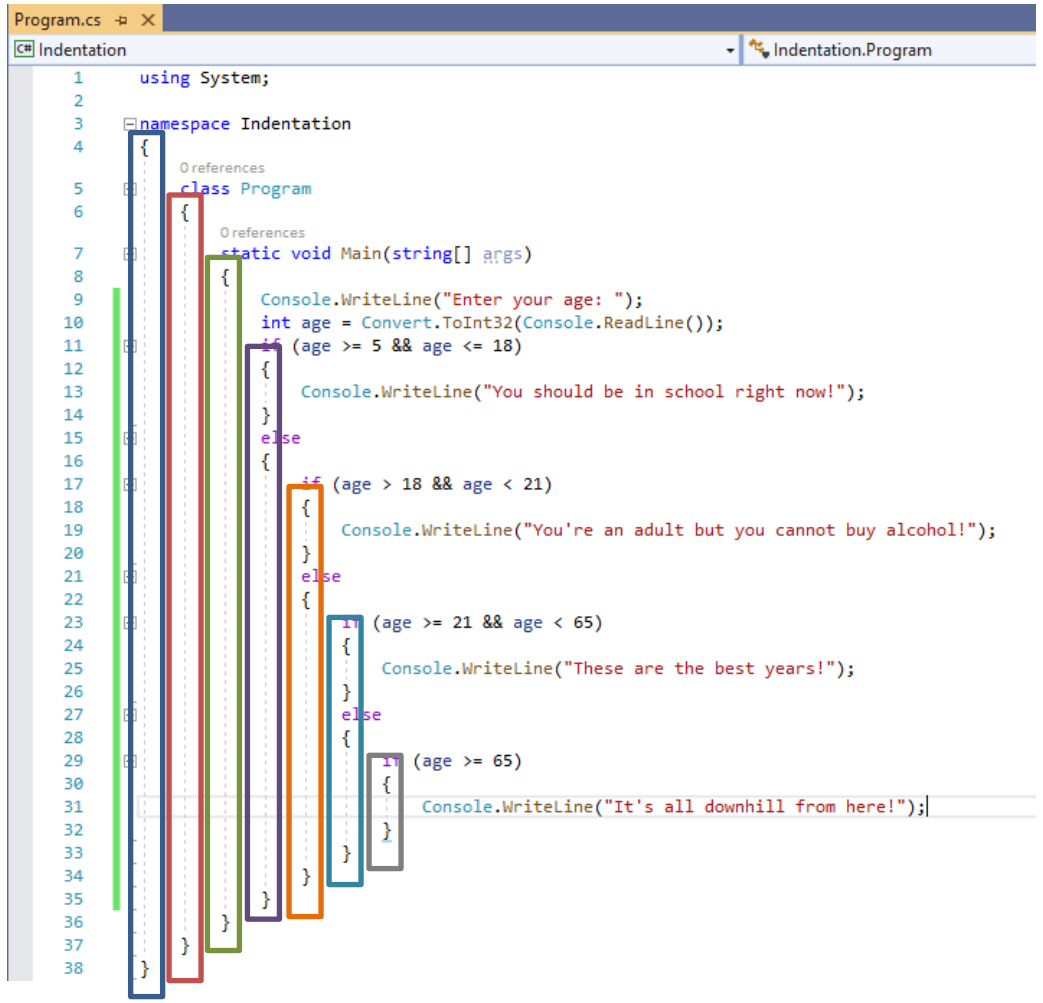
Indentation.Program

```
using System;

namespace Indentation
{
    0 references
    class Program
    {
        0 references
        static void Main(string[] args)
        {
            Console.WriteLine("Enter your age: ");
            int age = Convert.ToInt32(Console.ReadLine());
            if (age >= 5 && age <= 18)
            {
                Console.WriteLine("You should be in school right now!");
            }
            else
            {
                if (age > 18 && age < 21)
                {
                    Console.WriteLine("You're an adult but you cannot buy alcohol!");
                }
                else
                {
                    if (age >= 21 && age < 65)
                    {
                        Console.WriteLine("These are the best years!");
                    }
                    else
                    {
                        if (age >= 65)
                        {
                            Console.WriteLine("It's all downhill from here!");
                        }
                    }
                }
            }
        }
    }
}
```

Developer Best Practices

Curly Braces

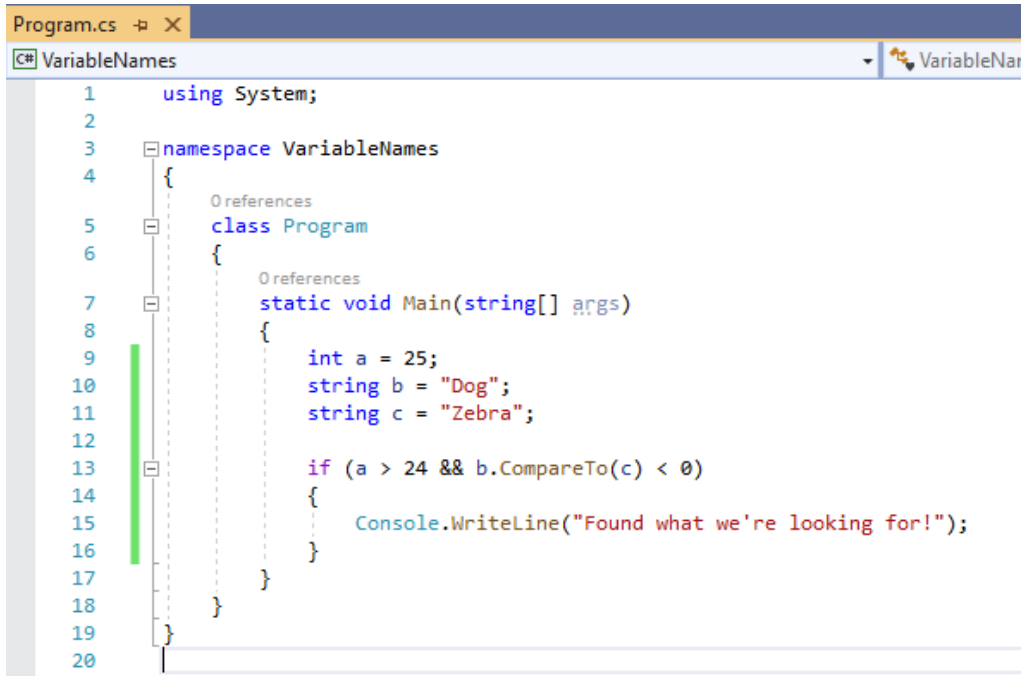


Developer Best Practices

Variable Naming

No!

a? b? c?



Use variable names that make sense in “camelCase”.

fourLeggedAnimal
customerOrderNumber
userAge
firstName
address

Developer Best Practices

Comments

No!

Program.cs

Indentation | Indentation.Program

```
using System;

namespace Indentation
{
    0 references
    class Program
    {
        0 references
        static void Main(string[] args)
        {
            Console.WriteLine("Enter your age: ");
            int age = Convert.ToInt32(Console.ReadLine());
            if (age >= 5 && age <= 18)
            {
                Console.WriteLine("You should be in school right now!");
            }
            else
            {
                if (age > 18 && age < 21)
                {
                    Console.WriteLine("You're an adult but you cannot buy alcohol!");
                }
                else
                {
                    if (age >= 21 && age < 65)
                    {
                        Console.WriteLine("These are the best years!");
                    }
                    else
                    {
                        if (age >= 65)
                        {
                            Console.WriteLine("It's all downhill from here!");
                        }
                    }
                }
            }
        }
    }
}
```

Yes!

Program.cs*

Indentation | Indentation.Program

```
using System;

namespace Indentation
{
    0 references
    class Program
    {
        0 references
        static void Main(string[] args)
        {
            /* This program will make some assumptions based on age.
             * Author: M. Witt
             * Date: 8/5/2020
             */

            Console.WriteLine("Enter your age: ");
            int age = Convert.ToInt32(Console.ReadLine());

            // Check for school age
            if (age >= 5 && age <= 18)
            {
                Console.WriteLine("You should be in school right now!");
            }
            else
            {
                // Check for adults who cannot drink
                if (age > 18 && age < 21)
                {
                    Console.WriteLine("You're an adult but you cannot buy alcohol!");
                }
                else
                {
                    // Check for the prime years
                    if (age >= 21 && age < 65)
                    {
                        Console.WriteLine("These are the best years!");
                    }
                    else
                    {
                        // Senior citizen check
                        if (age >= 65)
                        {
                            Console.WriteLine("It's all downhill from here!");
                        }
                    }
                }
            }
        }
    }
}
```

Developer Best Practices

Prevent Errors Before They Happen!

No!

```
Console.WriteLine("Enter your age: ");
int age = Convert.ToInt32(Console.ReadLine());
```

Yes!

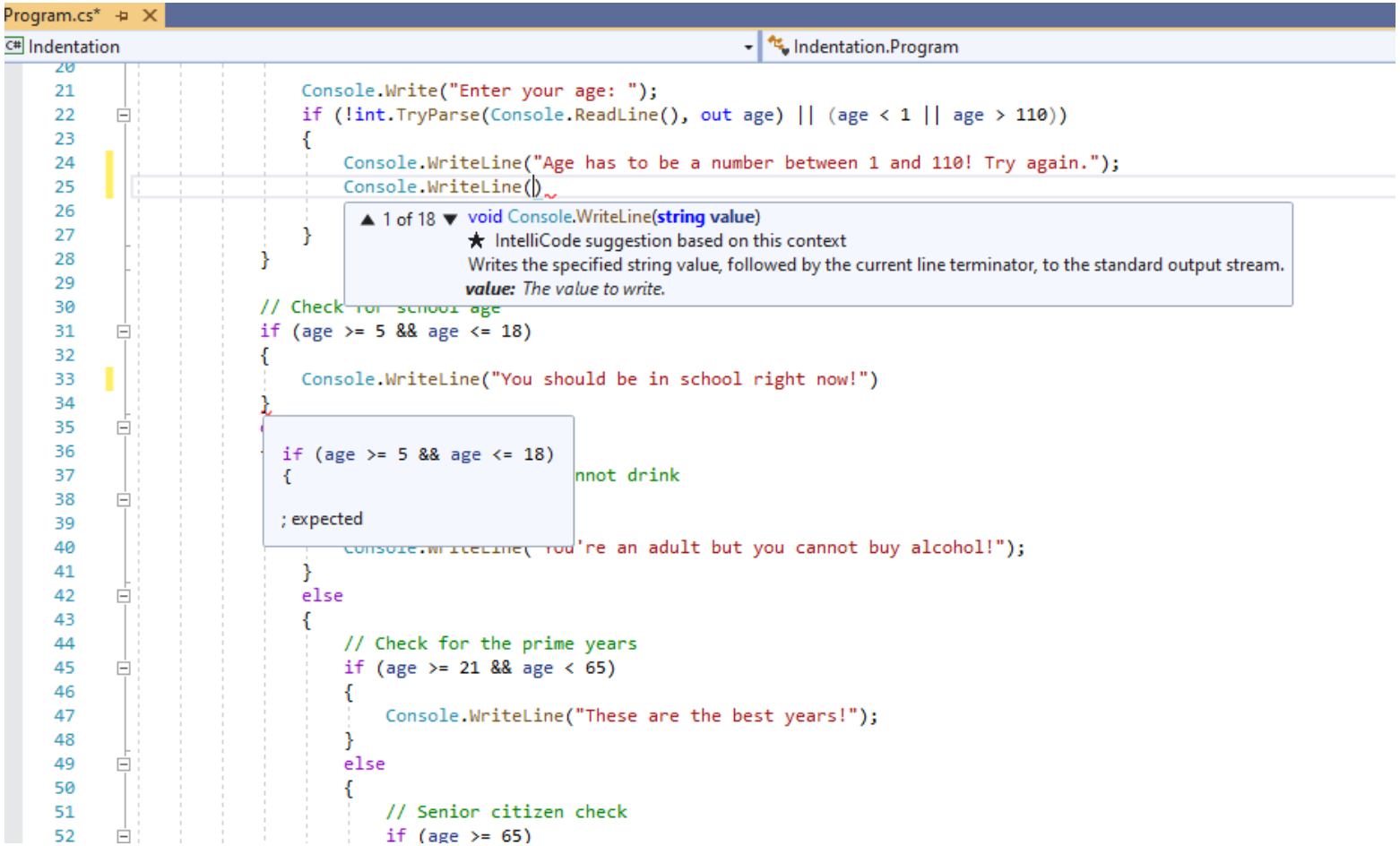
```
int age = 0;
bool invalidEntry = true;

while (invalidEntry)
{
    invalidEntry = false;

    Console.Write("Enter your age: ");
    if (!int.TryParse(Console.ReadLine(), out age) || (age < 1 || age > 110))
    {
        Console.WriteLine("Age has to be a number between 1 and 110! Try again.");
        invalidEntry = true;
    }
}
```

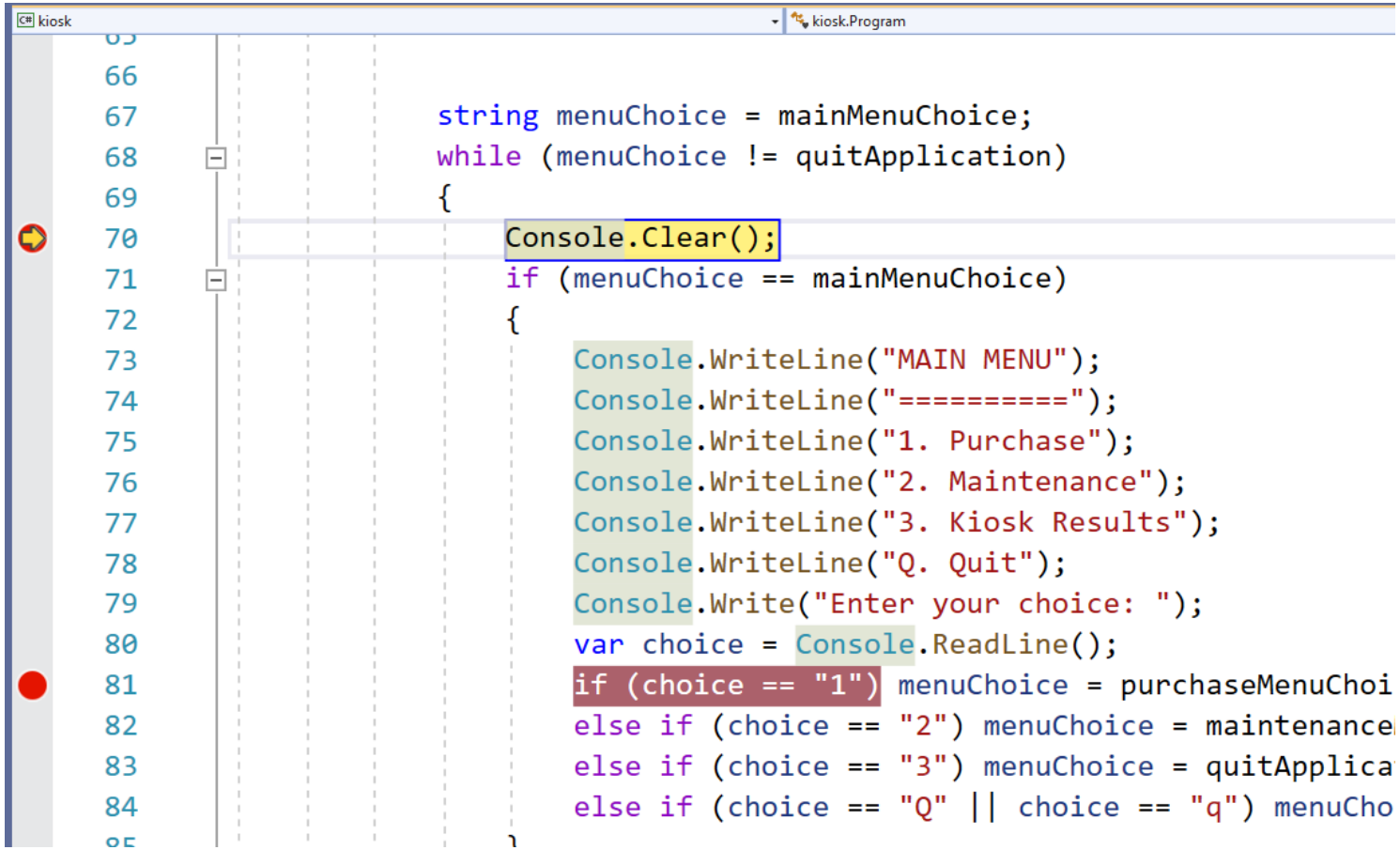
Developer Best Practices

Use Intellisense!



Developer Best Practices

Use the Visual Studio Debugger!



Software Development Master Class

for absolute beginners

WHAT HAVE WE LEARNED?

What Have We Learned?

Create a Program in Visual Studio

Developing a Career in Software Development

More Complicated Programs with Console I/O, Branching, and Looping

An Introduction to Computer Architecture

How to Work on a Project with the Kiosk Project

Software Development Master Class

for absolute beginners

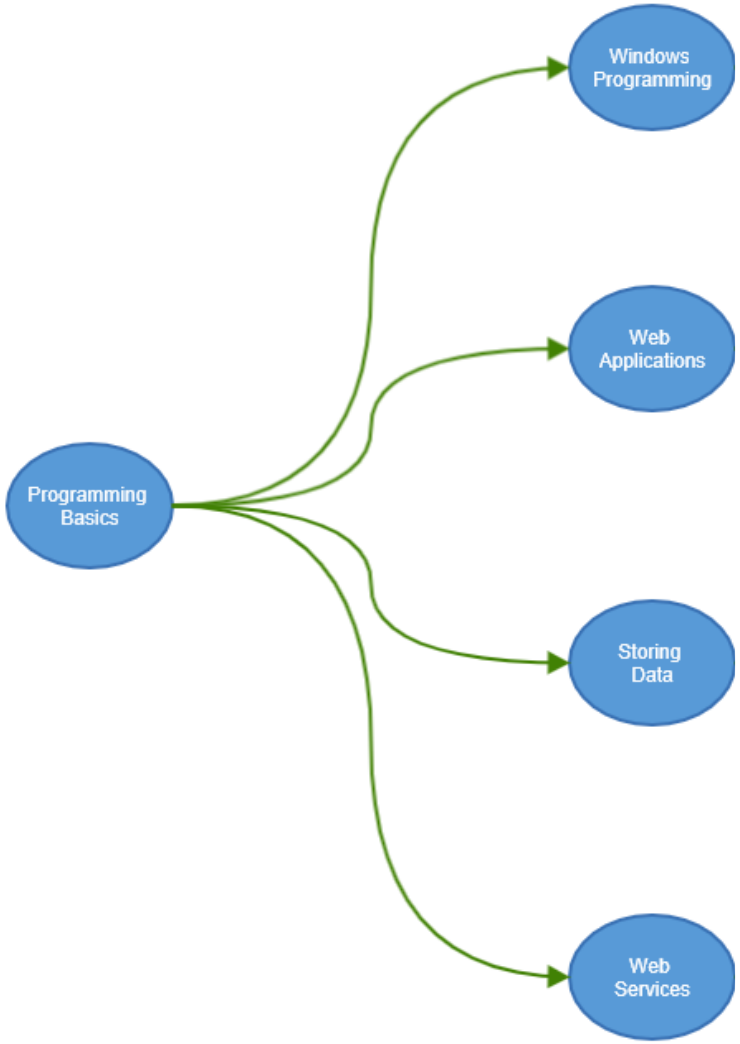
THANK YOU!

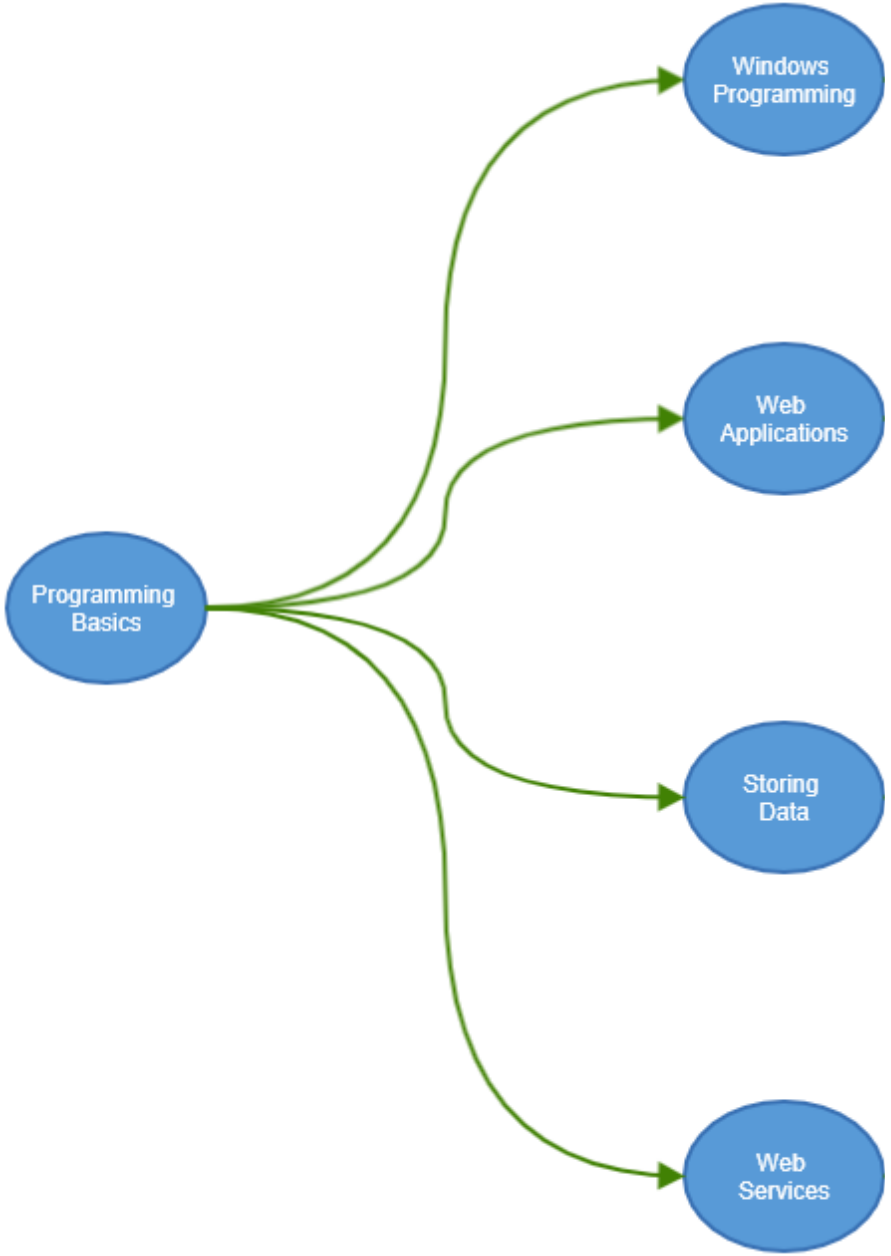
Software Development Master Class

for absolute beginners

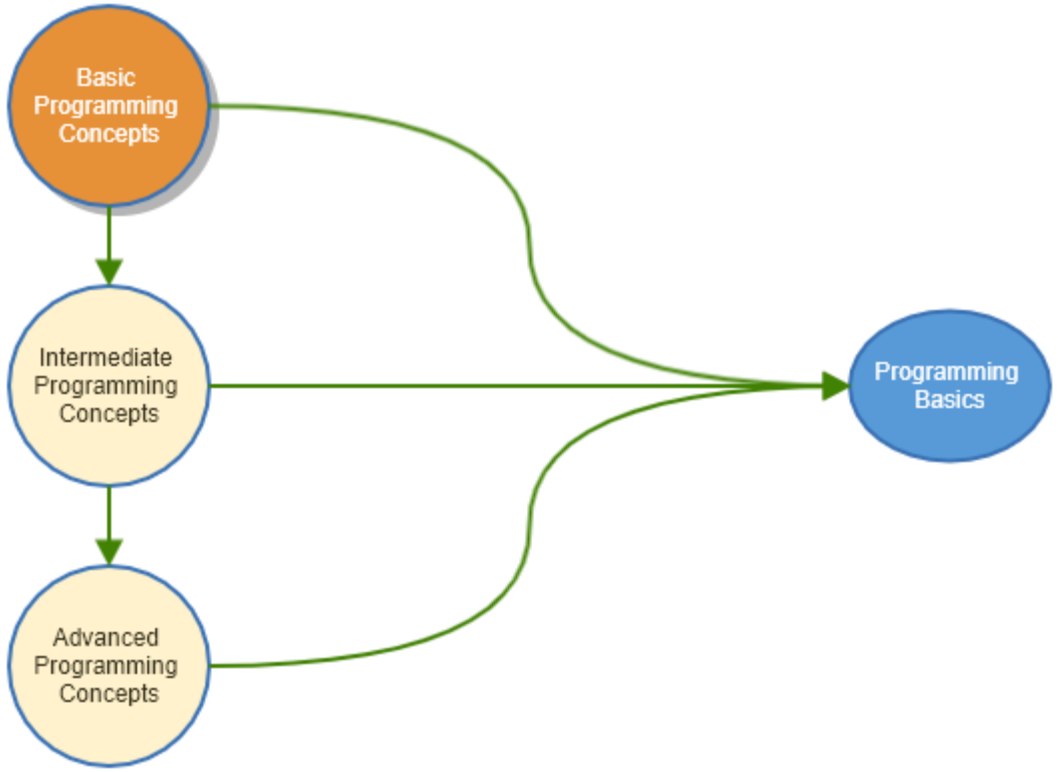
WHAT'S NEXT?

What's Next?

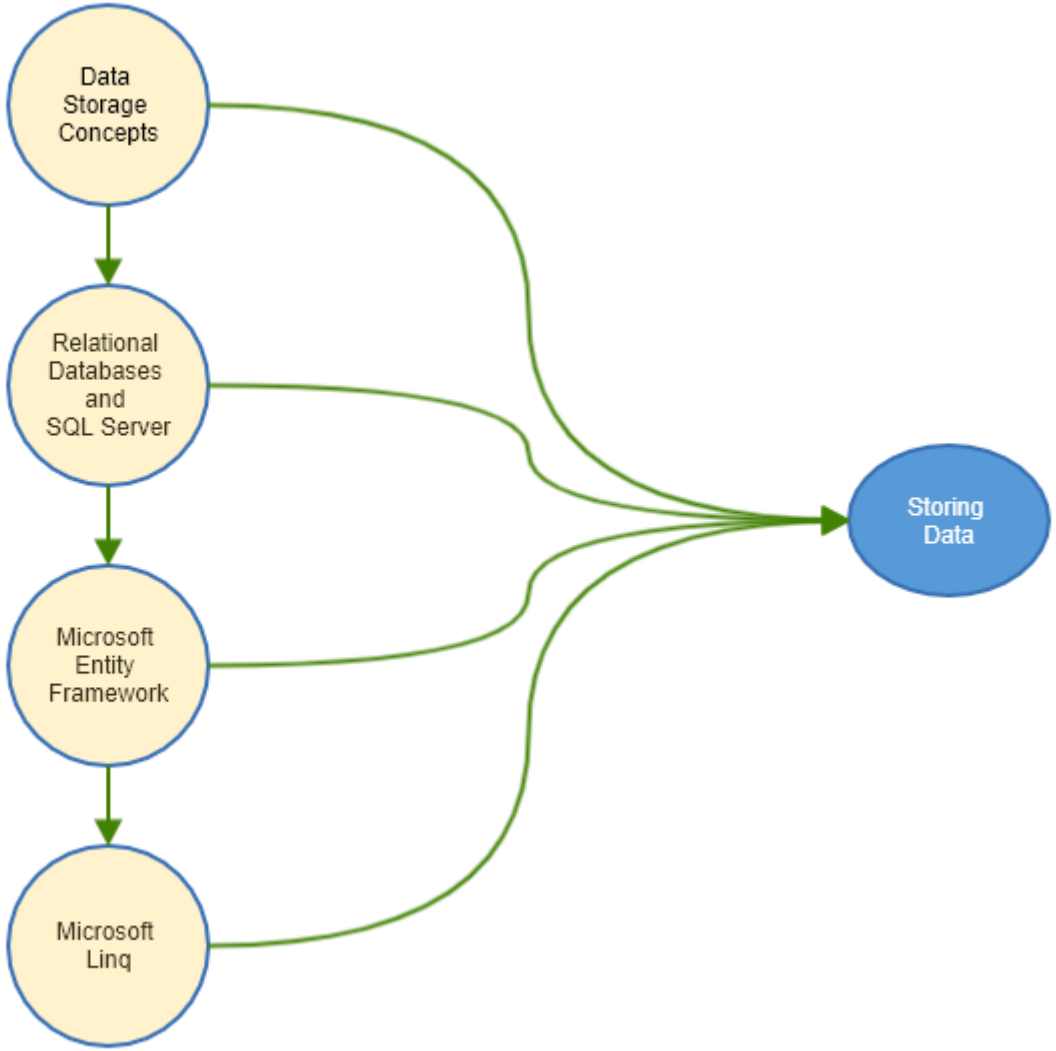

Programming Basics
Windows Programming
Web Applications
Storing Data
Web Services


Windows Programming
Web Applications
Programming Basics
Storing Data
Web Services

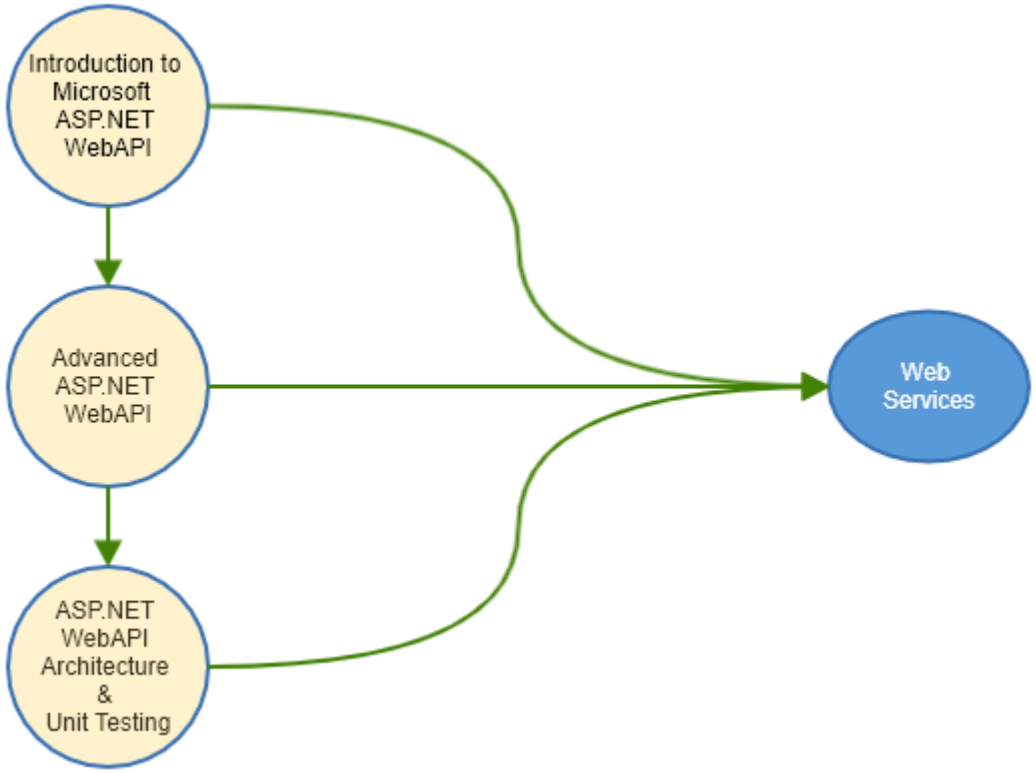
What's Next?


Basic Programming Concepts
Intermediate Programming Concepts
Advanced Programming Concepts
Programming Basics

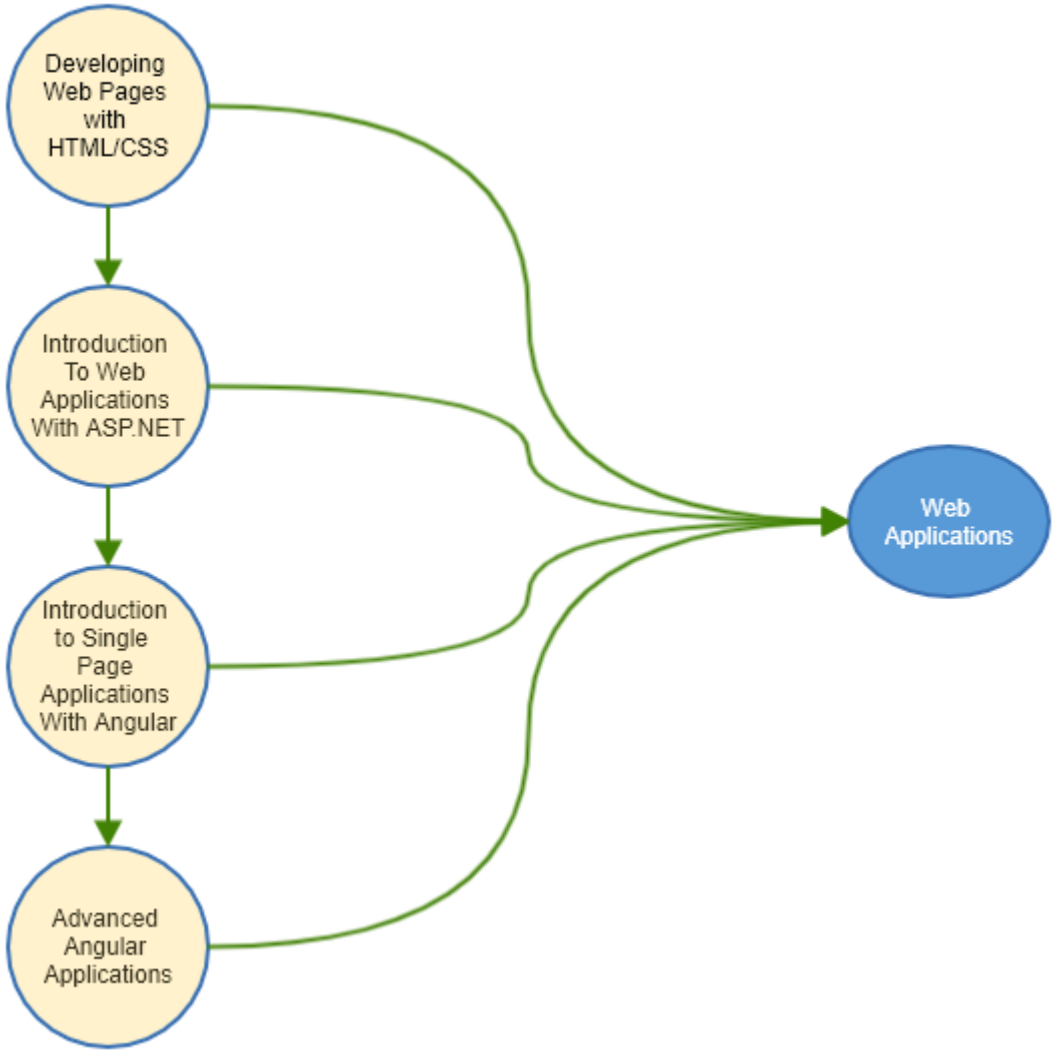
The Learning Roadmap



The Learning Roadmap



The Learning Roadmap



Coming Soon!

INTERMEDIATE PROGRAMMING CONCEPTS

Part 2 of the Series:
Software Development Master Class For Absolute Beginners