

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

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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?

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ASSIGNMENTS & CODE EXAMPLES

Assignments & Code Examples

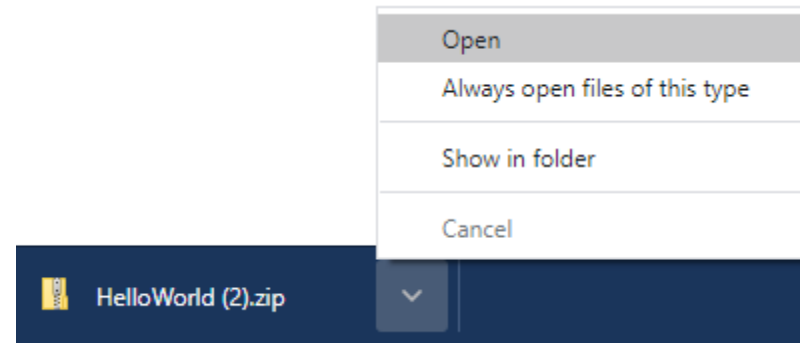
Assignment 1: Create Hello World

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

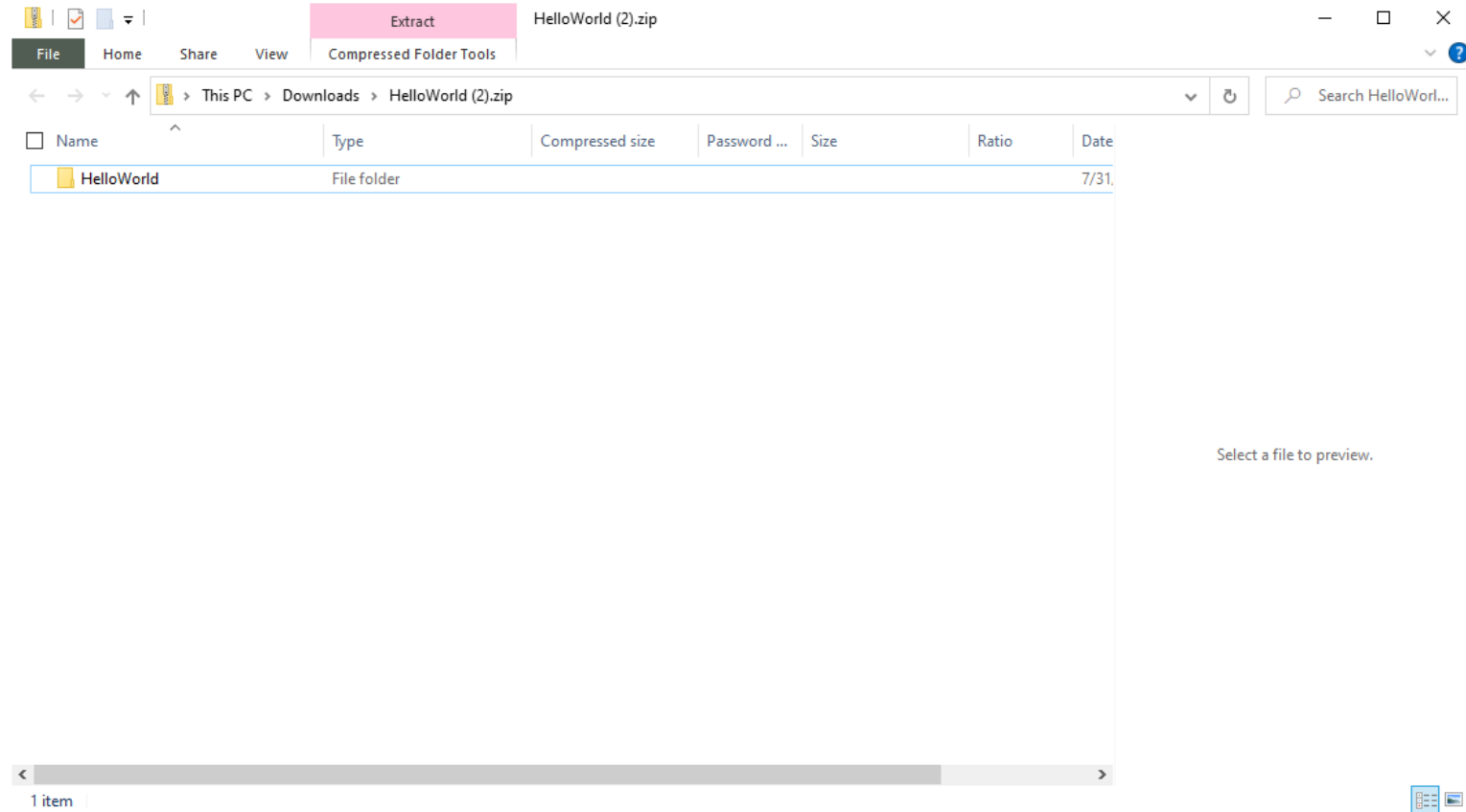
Resources for this lecture

 HelloWorld.zip

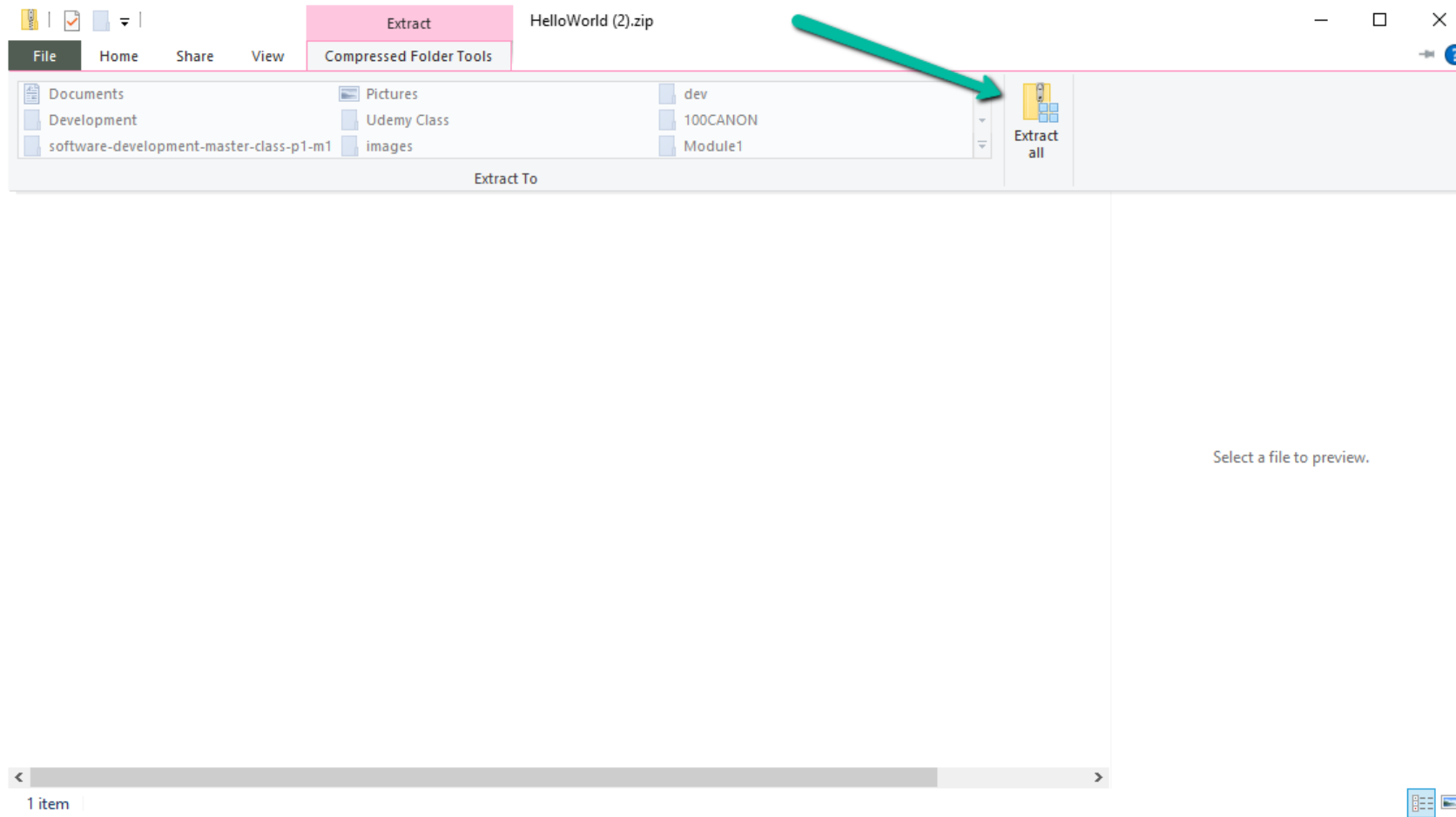
Assignments & Code Examples



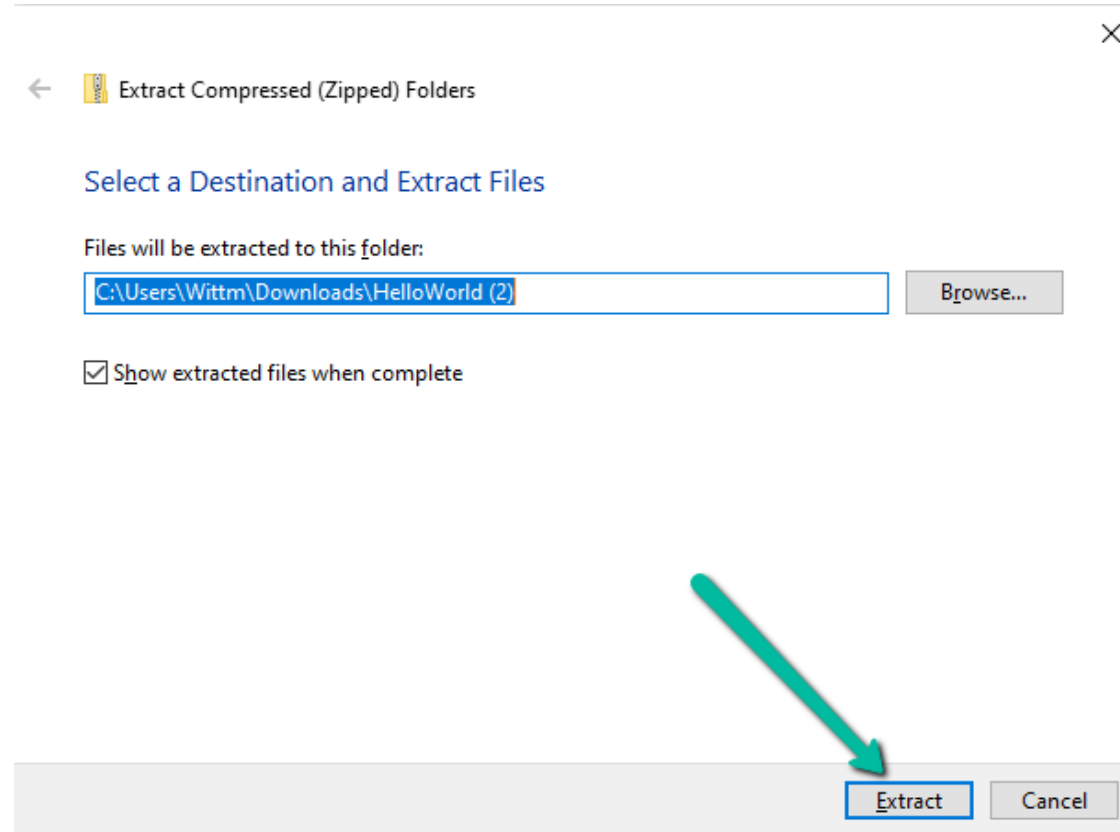
Assignments & Code Examples



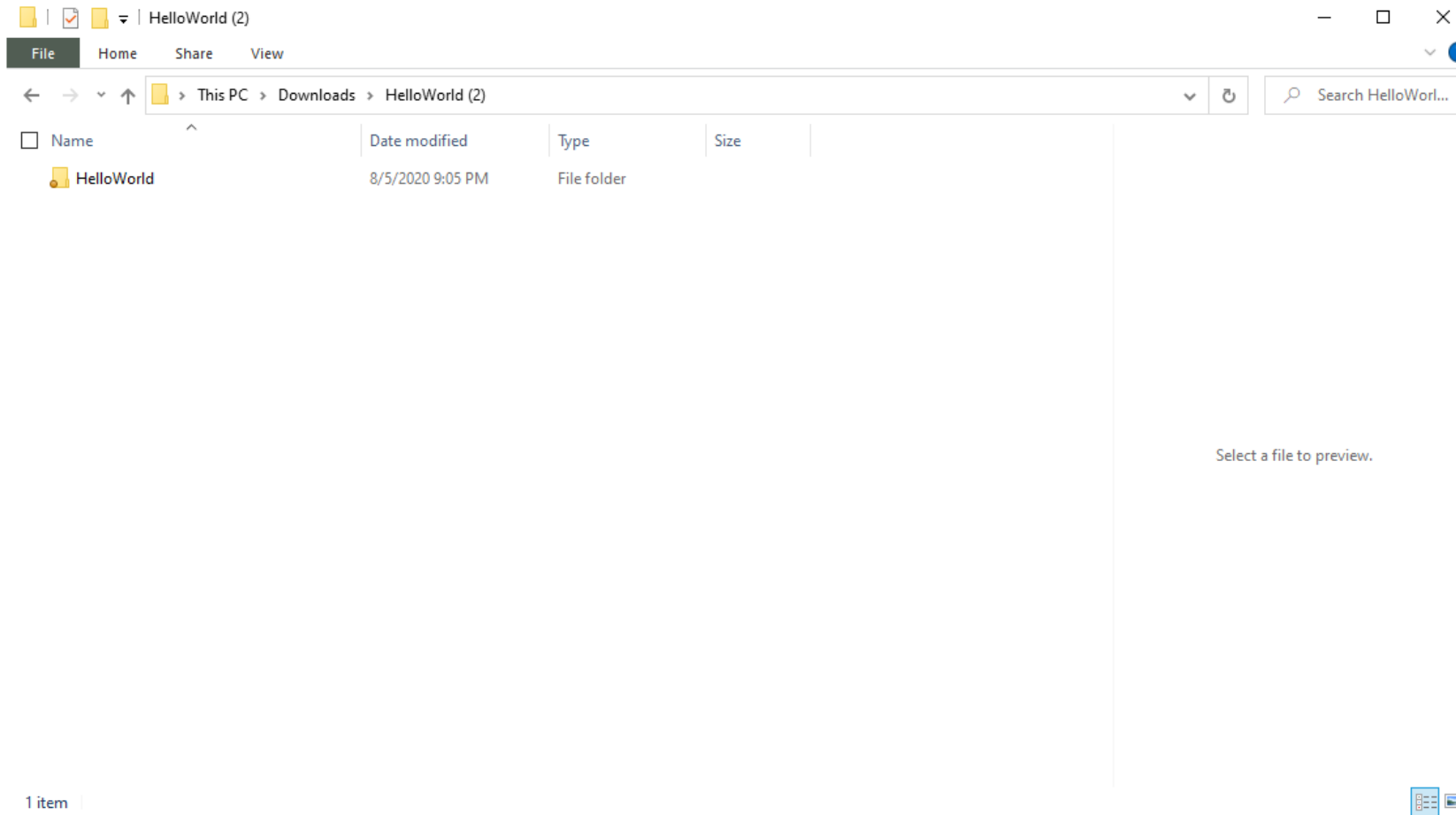
Assignments & Code Examples



Assignments & Code Examples



Assignments & Code Examples



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EVERY PROGRAMMER'S FIRST PROGRAM

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LOAD DEVELOPMENT ENVIRONMENT

Loading the Development Environment

Microsoft Visual Studio 2019

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

Loading the Development Environment

The screenshot shows the Microsoft Visual Studio website. The top navigation bar includes the Microsoft logo, 'Visual Studio', and links for Products, Downloads, Buy, Support, and More. A 'Free Visual Studio' button is on the right. The main content area has a large heading 'Thank you for downloading Visual Studio' followed by 'Your download will start shortly. If your download does not begin, [click here to retry](#).' Below this is another heading 'Start developing with Visual Studio'. At the bottom, there are links for 'Installation instructions' and 'Quickstart'. A taskbar at the bottom shows a file explorer window titled 'What's New in Visual Studio 2019' with a context menu open over it, showing options: 'Open', 'Always open files of this type', 'Show in folder', and 'Cancel'. The taskbar also shows a task for 'vs_community_20...exe' and a 'Show all' button.

Microsoft | Visual Studio Products Downloads Buy Support More Free Visual Studio All Microsoft

Thank you for downloading Visual Studio

Your download will start shortly. If your download does not begin,
[click here to retry](#).

Start developing with Visual Studio

Installation instructions
Need help with your install? Check out our help documentation for installing Visual Studio
[Instructions](#)

Quickstart
Try out this to get started with your first C++ console application
[Quickstart](#)

Open
Always open files of this type
Show in folder
Cancel

vs_community_20...exe Show all

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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

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VISUAL STUDIO OVERVIEW

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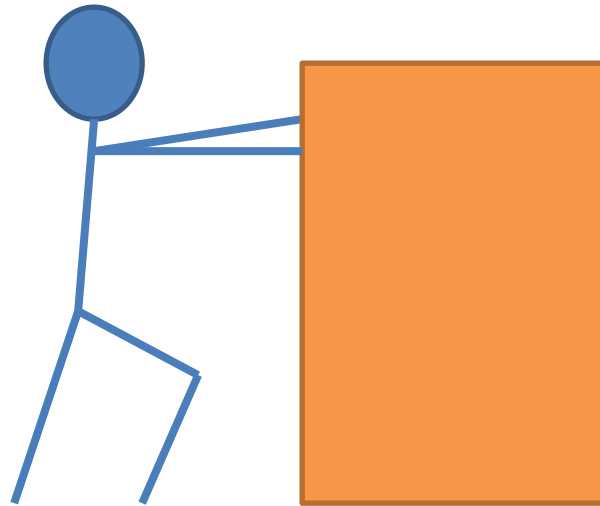
**EVERY PROFESSIONAL SOFTWARE DEVELOPER
STARTED SOMEWHERE**

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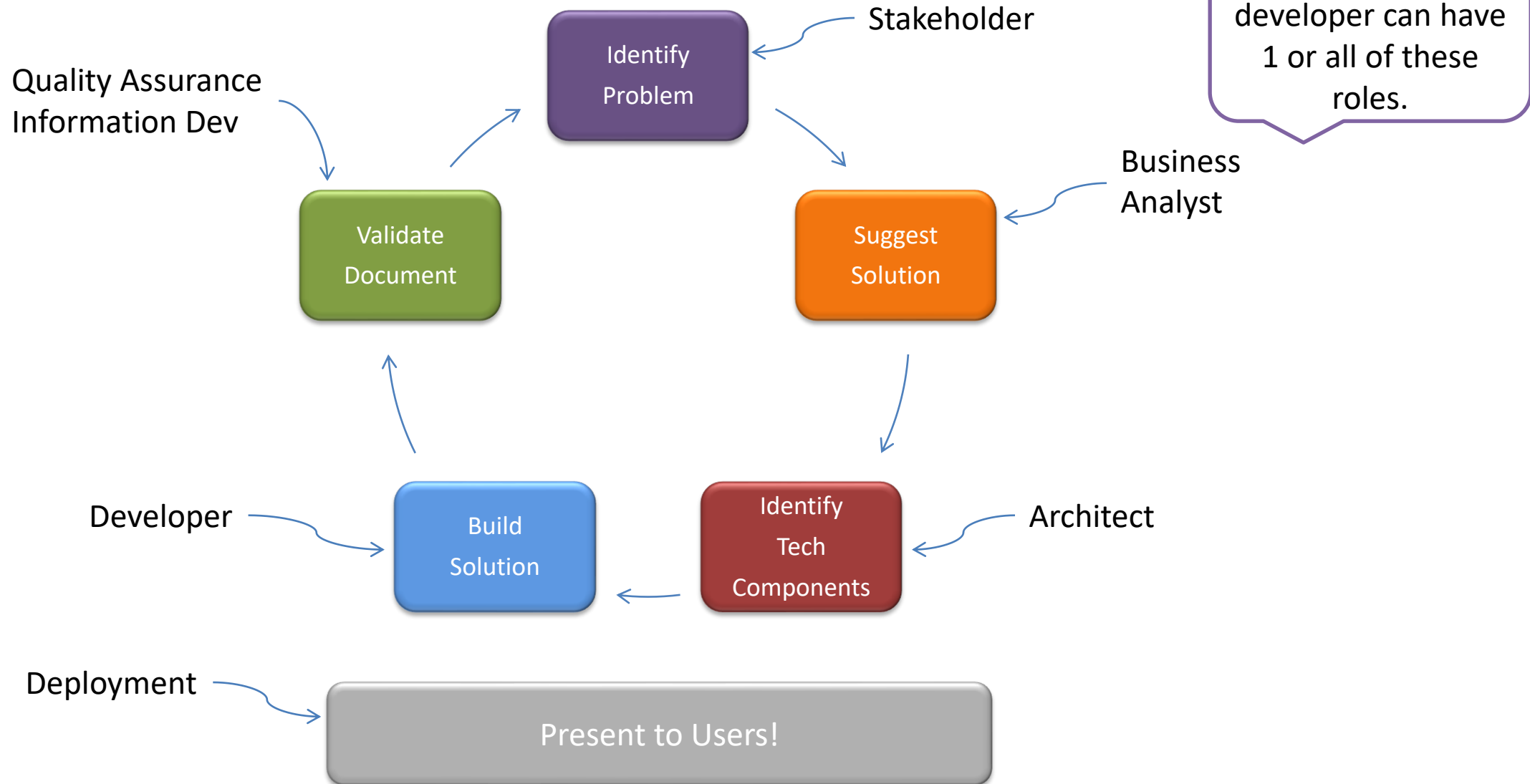
WHAT IS SOFTWARE DEVELOPMENT?

What is Software Development?

Take Some Manual Process And Automate It!



What is Software Development?



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CAN A BEGINNER BECOME A PRO?

Can a beginner become a pro?

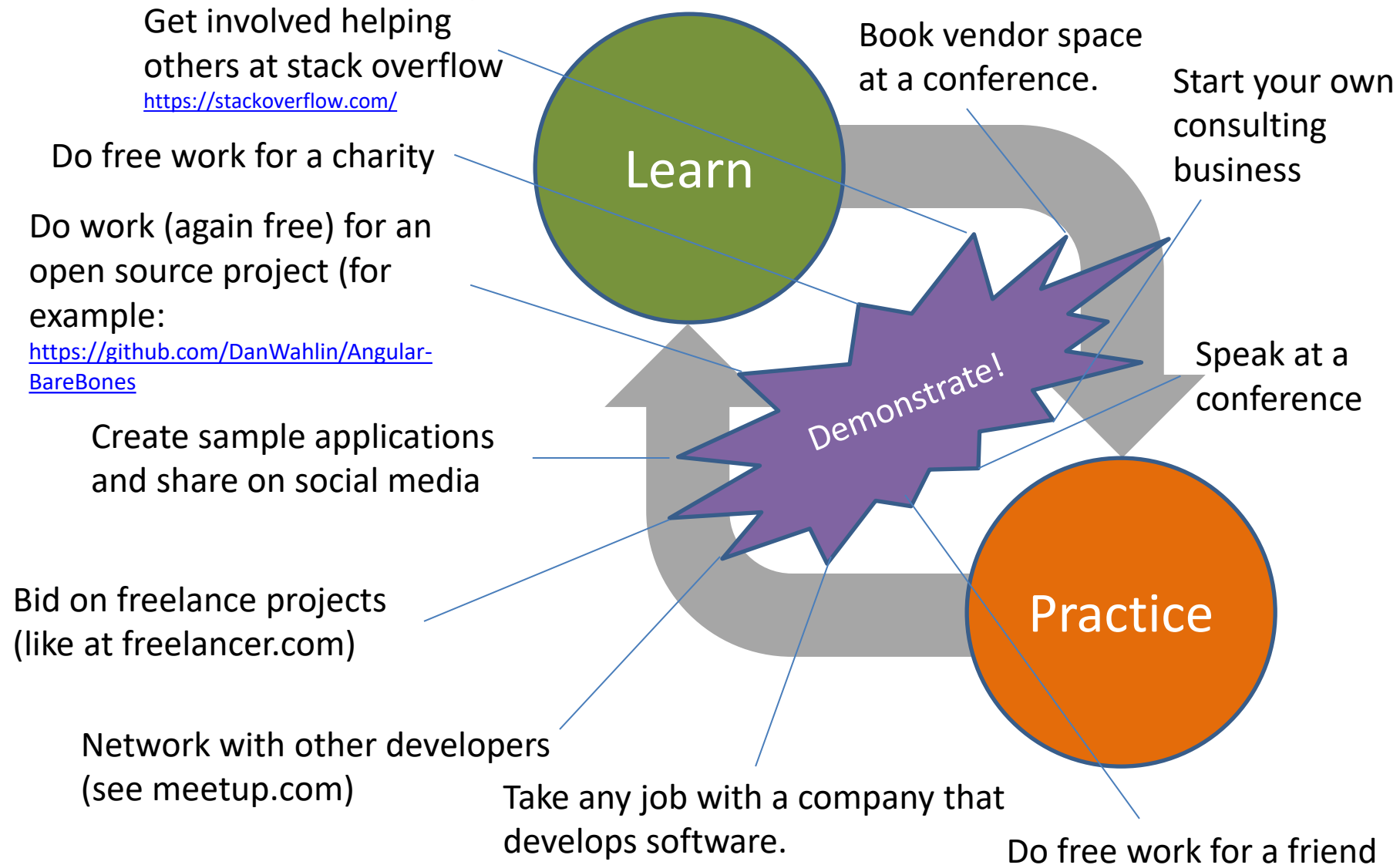
Short Answer: YES!

Can a beginner become a pro?

Short Answer: YES!

Longer Answer: It will take some work!

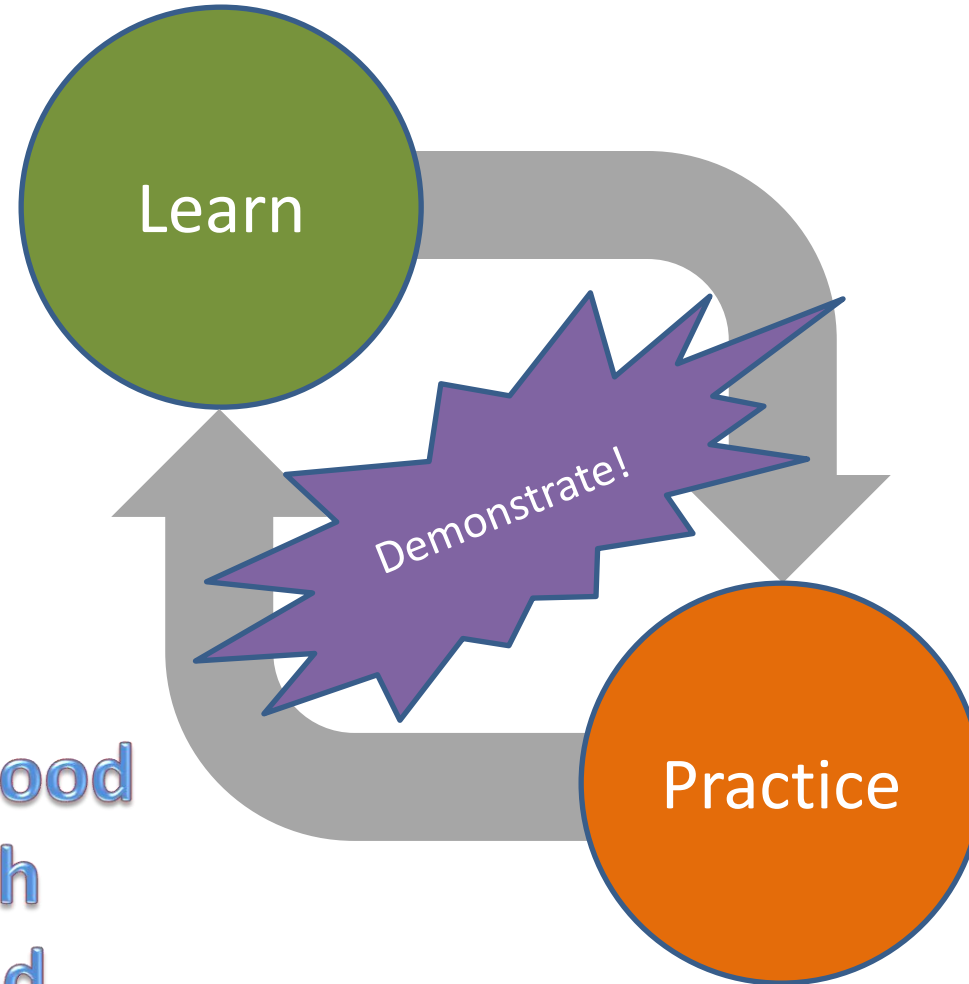
Can a beginner become a pro?



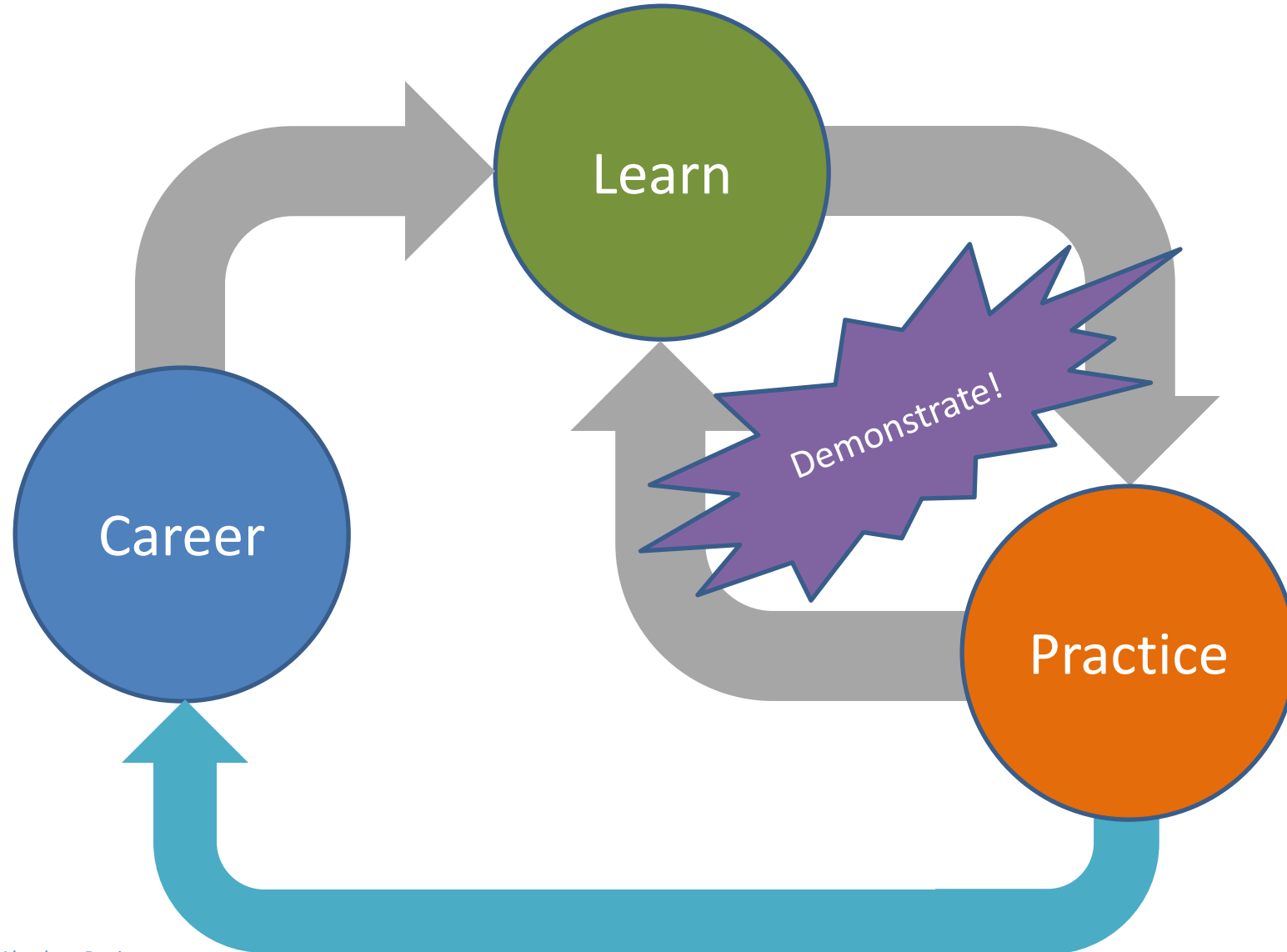
Can a beginner become a pro?

**Build a
Portfolio!**

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



Can a beginner become a pro?



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LET'S GET CODING!

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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

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

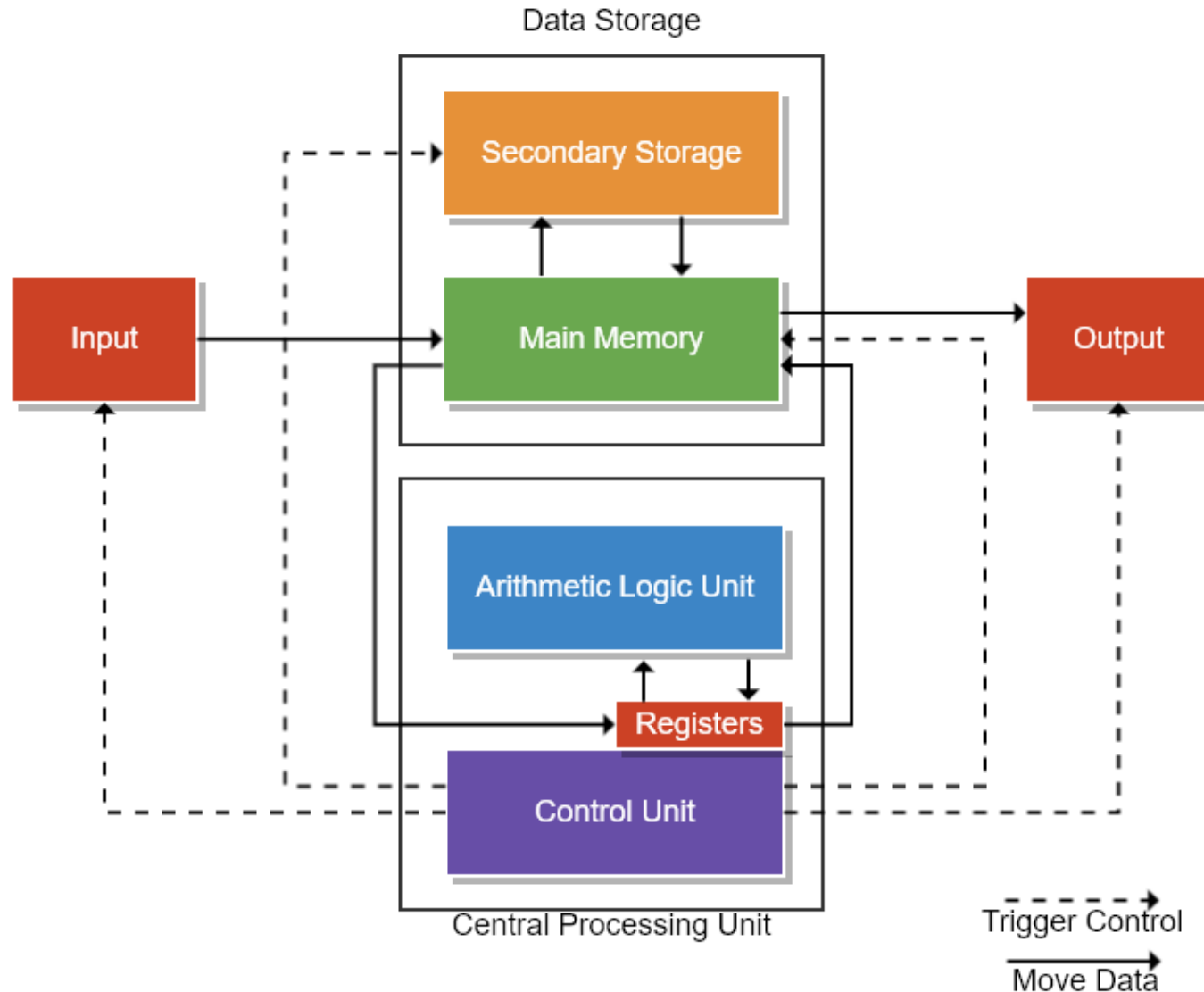
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HOW DOES A COMPUTER WORK?

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

0	0	0	1	0	0	0	0
---	---	---	---	---	---	---	---

Hexadecimal/Base 16

1	0
---	---

Decimal/Base 10

1	6
---	---

How does a computer work?

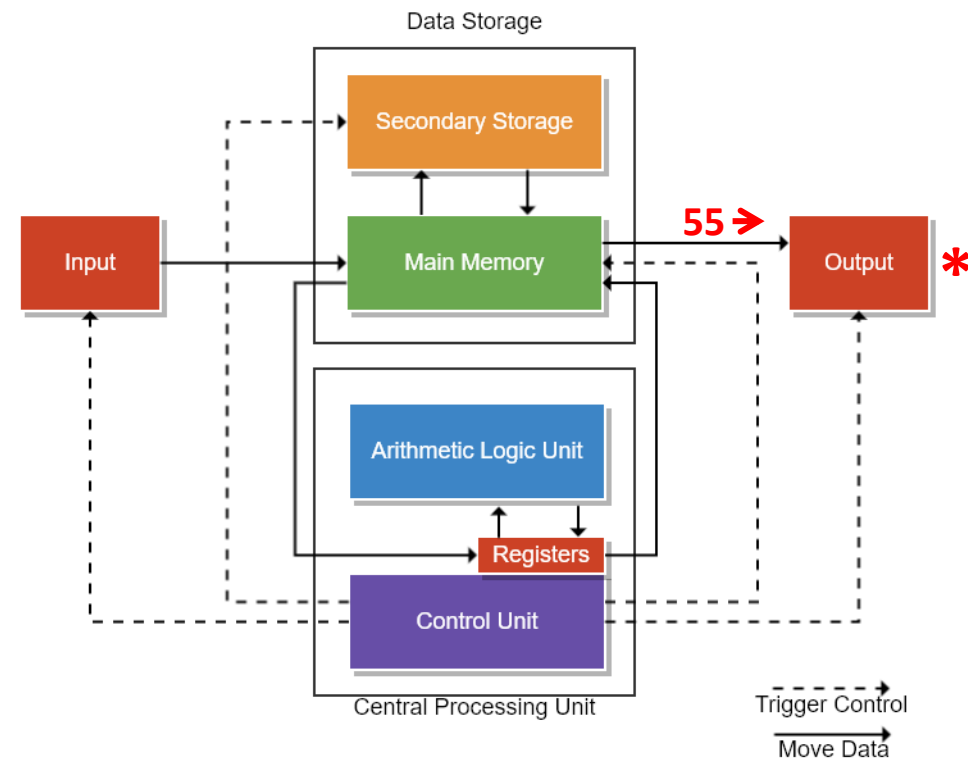
Machine Language

Hardware Specific

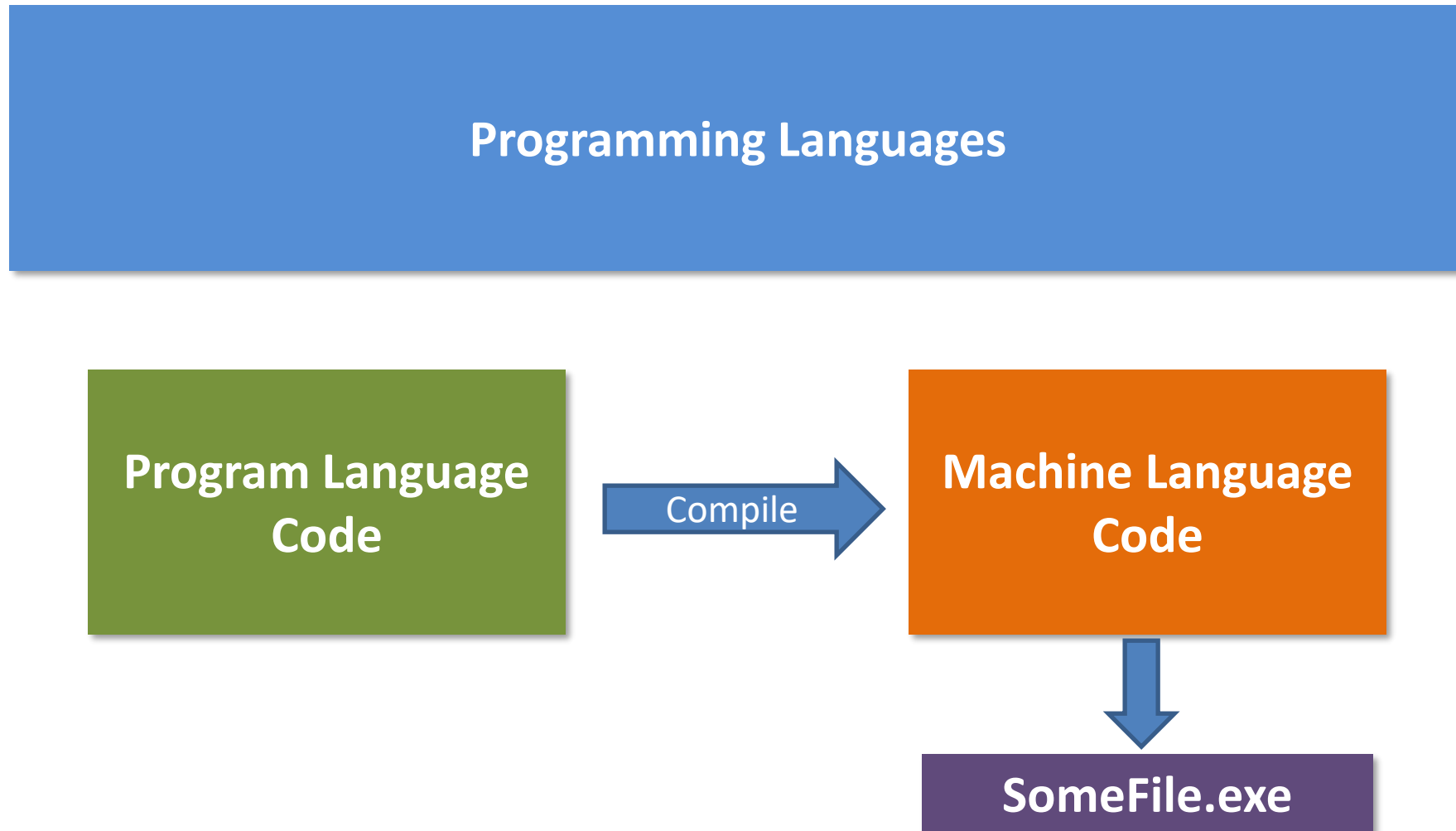
Controls Computer Components

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?



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INTRODUCING THE MICROSOFT .NET FRAMEWORK

Introducing the Microsoft .Net Framework

Version 1.0 Released in 2001

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

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

After Version 4.6.2 Release, .Net Core – Multiple Platforms

Introducing the Microsoft .Net Framework

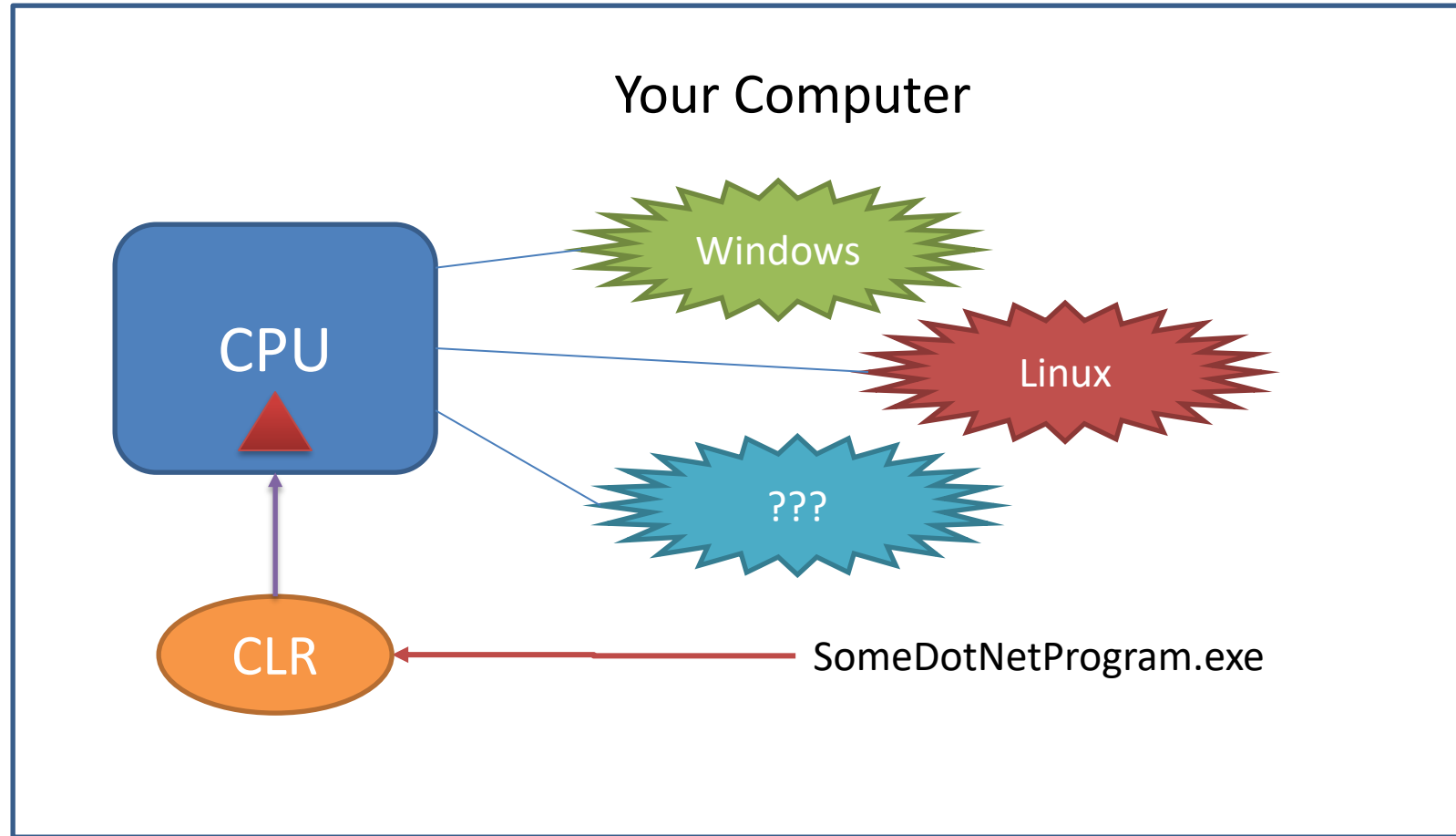
.Net Core

Common Language Runtime
CLR - CoreCLR

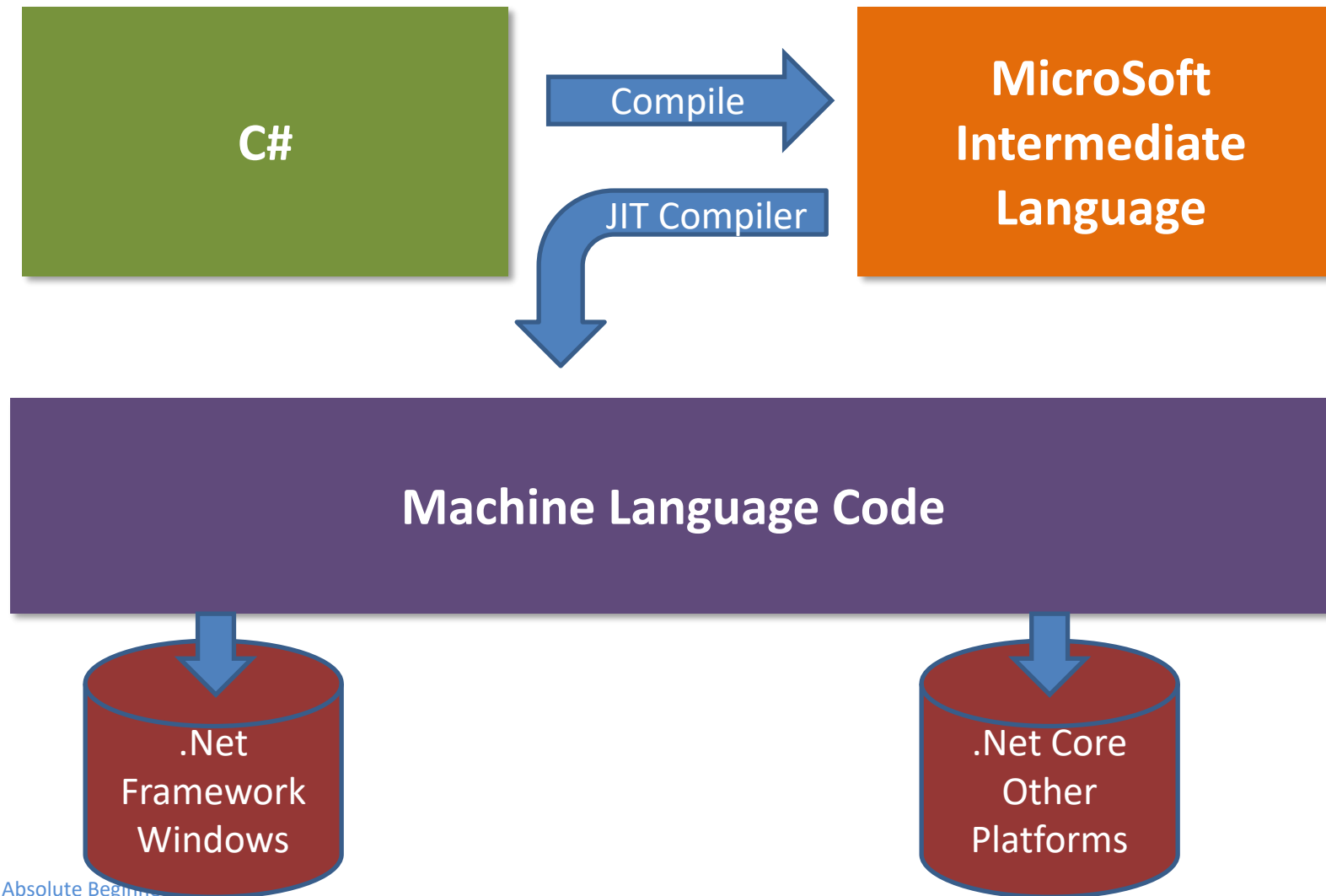
Virtual Machine that Runs Your Code

Introducing the Microsoft .Net Framework

.Net Core



Introducing the Microsoft .Net Framework



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STORING DATA FOR YOUR APPLICATION

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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

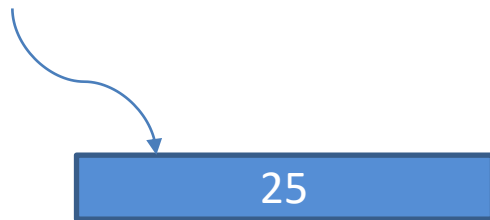
Comparison:
<, <=, >, >=, ==, !=

Program Variables

How Variables are Stored in Your Computer's Memory

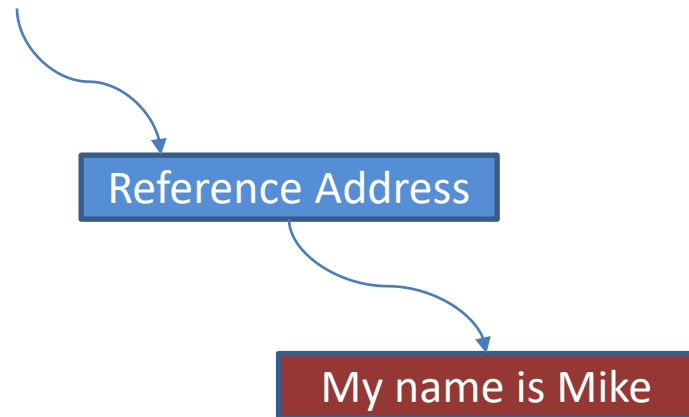
By Value – int, bool, char, and other types

```
int myAge = 25;
```



By Reference – string and many, many other types

```
string description = "My name is Mike";
```



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PROGRAM VARIABLES (NUMBERS)

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PROGRAM VARIABLES (STRINGS)

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PROGRAM VARIABLES (BOOLEANS AND COMPARISON)

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PROGRAM LOGIC FLOW

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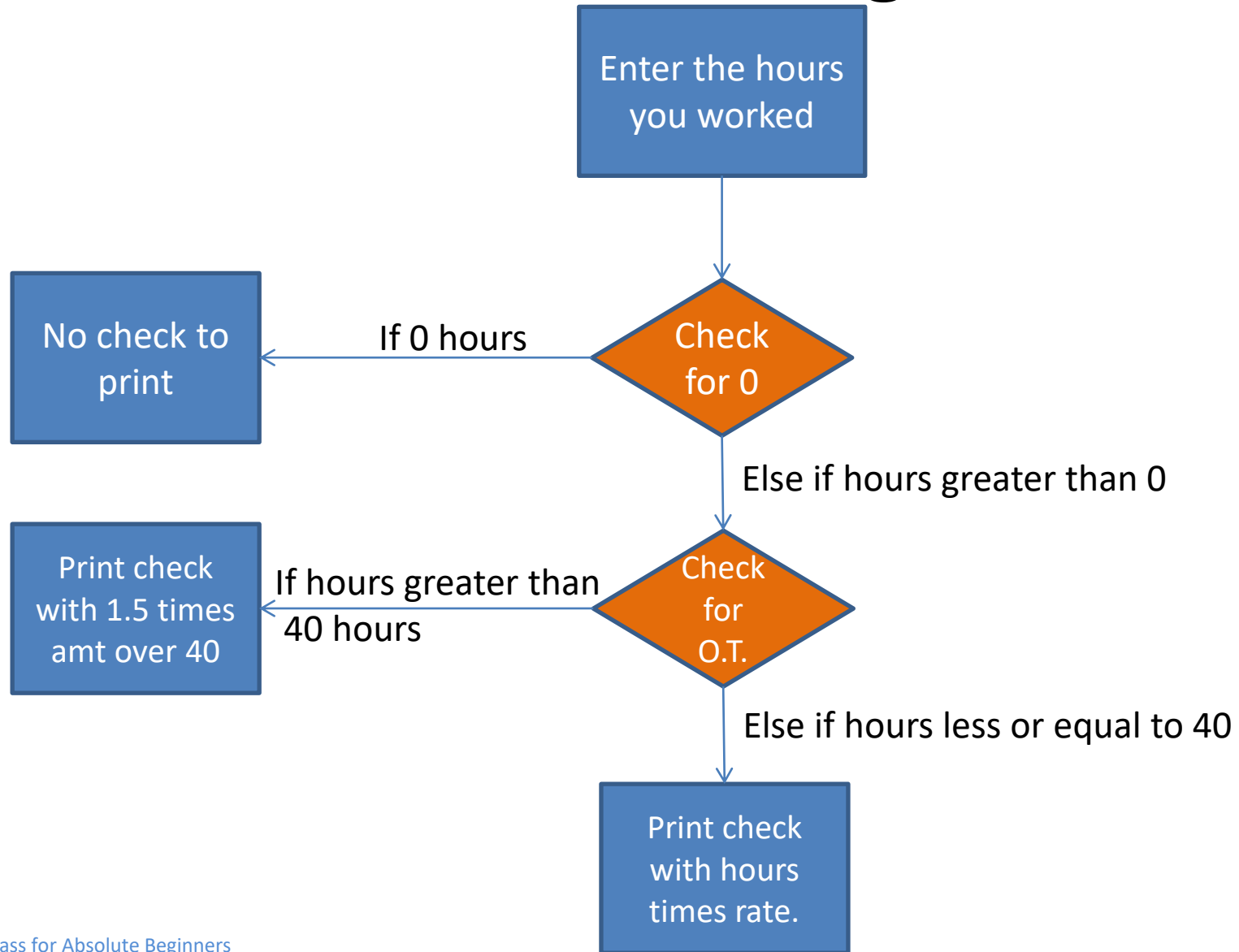
BRANCHING – IF/THEN/ELSE

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
{
}
}
```

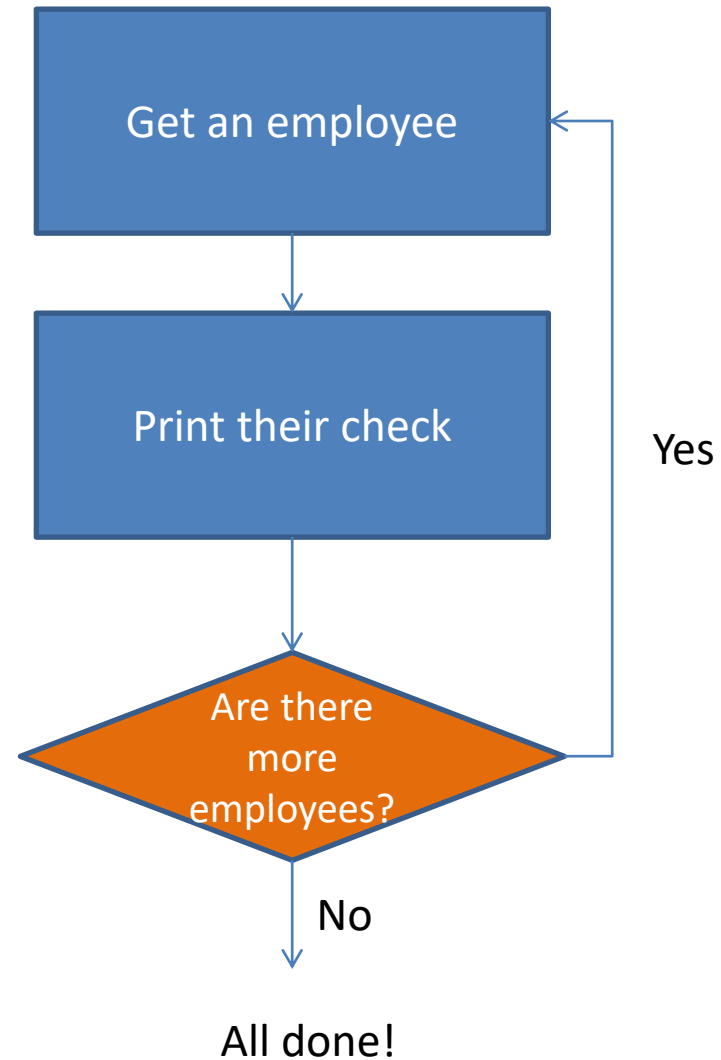

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LOOPING FOR/WHILE/DO

Looping

Example: Calculate Paycheck for All Employees

Looping



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);
```

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WELCOME TO THE KIOSK PROJECT

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KIOSK PROJECT KICKOFF

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KIOSK PROJECT USER INTERFACE DESIGN SESSION

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KIOSK PROJECT DEVELOPMENT SESSION 1

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KIOSK PROJECT DEVELOPMENT SESSION 2

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KIOSK PROJECT DEVELOPMENT SESSION 3

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USING THE VISUAL STUDIO DEBUGGER

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YOU MADE IT!

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DEVELOPER BEST PRACTICES

Developer Best Practices

No!

Indentation

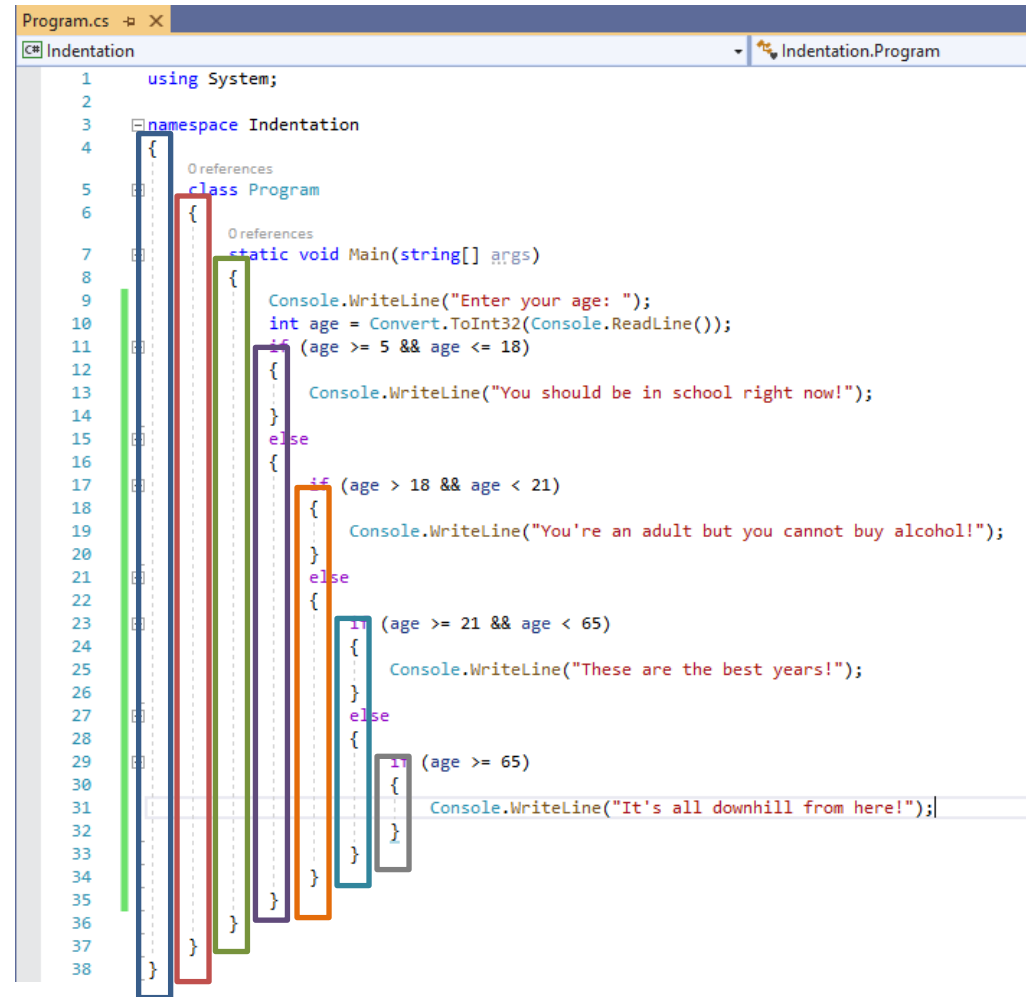
Yes!

```
Program.cs* -> X
C# Indentation -> Indental
1 using System;
2
3 namespace Indentation
4 {
5     References
6     class Program
7     {
8         References
9         static void Main(string[] args)
10        {
11            Console.WriteLine("Enter your age: ");
12            int age = Convert.ToInt32(Console.ReadLine());
13            if (age >= 5 && age <= 18)
14            {
15                Console.WriteLine("You should be in school right now!");
16            }
17            else
18            {
19                if (age > 18 && age < 21)
20                {
21                    Console.WriteLine("You're an adult but you cannot buy alcohol!");
22                }
23            }
24            else
25            {
26                if (age >= 21 && age < 65)
27                {
28                    Console.WriteLine("These are the best years!");
29                }
30            }
31            else
32            {
33                if (age >= 65)
34                {
35                    Console.WriteLine("It's all downhill from here!");
36                }
37            }
38        }
39    }
40 }
```

```
Program.cs* -> X
C# Indentation -> Indentation.Program
1 using System;
2
3 namespace Indentation
4 {
5     References
6     class Program
7     {
8         References
9         static void Main(string[] args)
10        {
11            Console.WriteLine("Enter your age: ");
12            int age = Convert.ToInt32(Console.ReadLine());
13            if (age >= 5 && age <= 18)
14            {
15                Console.WriteLine("You should be in school right now!");
16            }
17            else
18            {
19                if (age > 18 && age < 21)
20                {
21                    Console.WriteLine("You're an adult but you cannot buy alcohol!");
22                }
23            }
24            else
25            {
26                if (age >= 21 && age < 65)
27                {
28                    Console.WriteLine("These are the best years!");
29                }
30            }
31            else
32            {
33                if (age >= 65)
34                {
35                    Console.WriteLine("It's all downhill from here!");
36                }
37            }
38        }
39    }
40 }
```

Developer Best Practices

Curly Braces



```
1  using System;
2
3  namespace Indentation
4  {
5      class Program
6      {
7          static void Main(string[] args)
8          {
9              Console.WriteLine("Enter your age: ");
10             int age = Convert.ToInt32(Console.ReadLine());
11             if (age >= 5 && age <= 18)
12             {
13                 Console.WriteLine("You should be in school right now!");
14             }
15             else
16             {
17                 if (age > 18 && age < 21)
18                 {
19                     Console.WriteLine("You're an adult but you cannot buy alcohol!");
20                 }
21                 else
22                 {
23                     if (age >= 21 && age < 65)
24                     {
25                         Console.WriteLine("These are the best years!");
26                     }
27                     else
28                     {
29                         if (age >= 65)
30                         {
31                             Console.WriteLine("It's all downhill from here!");
32                         }
33                     }
34                 }
35             }
36         }
37     }
38 }
```

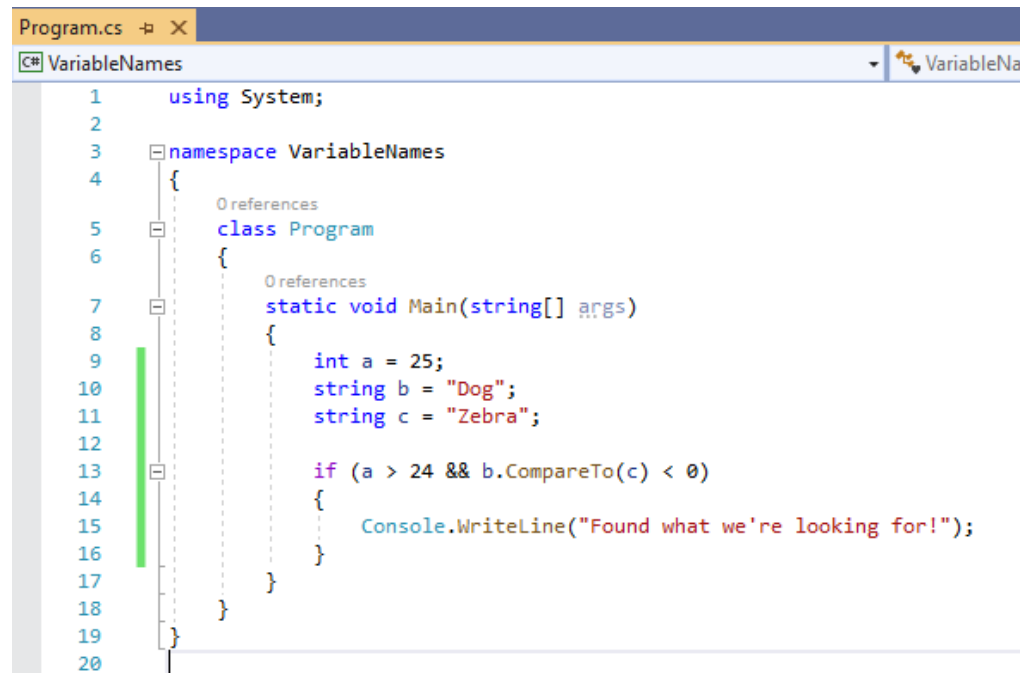
Developer Best Practices

Variable Naming

No!

a? b? c?

Use variable names that make sense in “camelCase”.



```
Program.cs
C# VariableNames
1  using System;
2
3  namespace VariableNames
4  {
5      class Program
6      {
7          static void Main(string[] args)
8          {
9              int a = 25;
10             string b = "Dog";
11             string c = "Zebra";
12
13             if (a > 24 && b.CompareTo(c) < 0)
14             {
15                 Console.WriteLine("Found what we're looking for!");
16             }
17         }
18     }
19 }
20
```

fourLeggedAnimal
customerOrderNumber
userAge
firstName
address

Developer Best Practices

Comments

Yes!

No!

```
Program.cs x
Indentation
1 using System;
2
3 namespace Indentation
4 {
5     class Program
6     {
7         static void Main(string[] args)
8         {
9             Console.WriteLine("Enter your age: ");
10            int age = Convert.ToInt32(Console.ReadLine());
11            if (age >= 5 && age <= 18)
12            {
13                Console.WriteLine("You should be in school right now!");
14            }
15            else
16            {
17                if (age > 18 && age < 21)
18                {
19                    Console.WriteLine("You're an adult but you cannot buy alcohol!");
20                }
21                else
22                {
23                    if (age >= 21 && age < 65)
24                    {
25                        Console.WriteLine("These are the best years!");
26                    }
27                    else
28                    {
29                        if (age >= 65)
30                        {
31                            Console.WriteLine("It's all downhill from here!");
32                        }
33                    }
34                }
35            }
36        }
37    }
38 }
```

```
Program.cs x
Indentation
1 using System;
2
3 namespace Indentation
4 {
5     class Program
6     {
7         static void Main(string[] args)
8         {
9             /* This program will make some assumptions based on age.
10              * Author: M. Witt
11              * Date: 8/5/2020
12              */
13
14             Console.WriteLine("Enter your age: ");
15             int age = Convert.ToInt32(Console.ReadLine());
16
17             // Check for school age
18             if (age >= 5 && age <= 18)
19             {
20                 Console.WriteLine("You should be in school right now!");
21             }
22             else
23             {
24                 // Check for adults who cannot drink
25                 if (age > 18 && age < 21)
26                 {
27                     Console.WriteLine("You're an adult but you cannot buy alcohol!");
28                 }
29                 else
30                 {
31                     // Check for the prime years
32                     if (age >= 21 && age < 65)
33                     {
34                         Console.WriteLine("These are the best years!");
35                     }
36                     else
37                     {
38                         // Senior citizen check
39                         if (age >= 65)
40                         {
41                             Console.WriteLine("It's all downhill from here!");
42                         }
43                     }
44                 }
45             }
46         }
47     }
48 }
```

Developer Best Practices

Prevent Errors Before They Happen!

No!

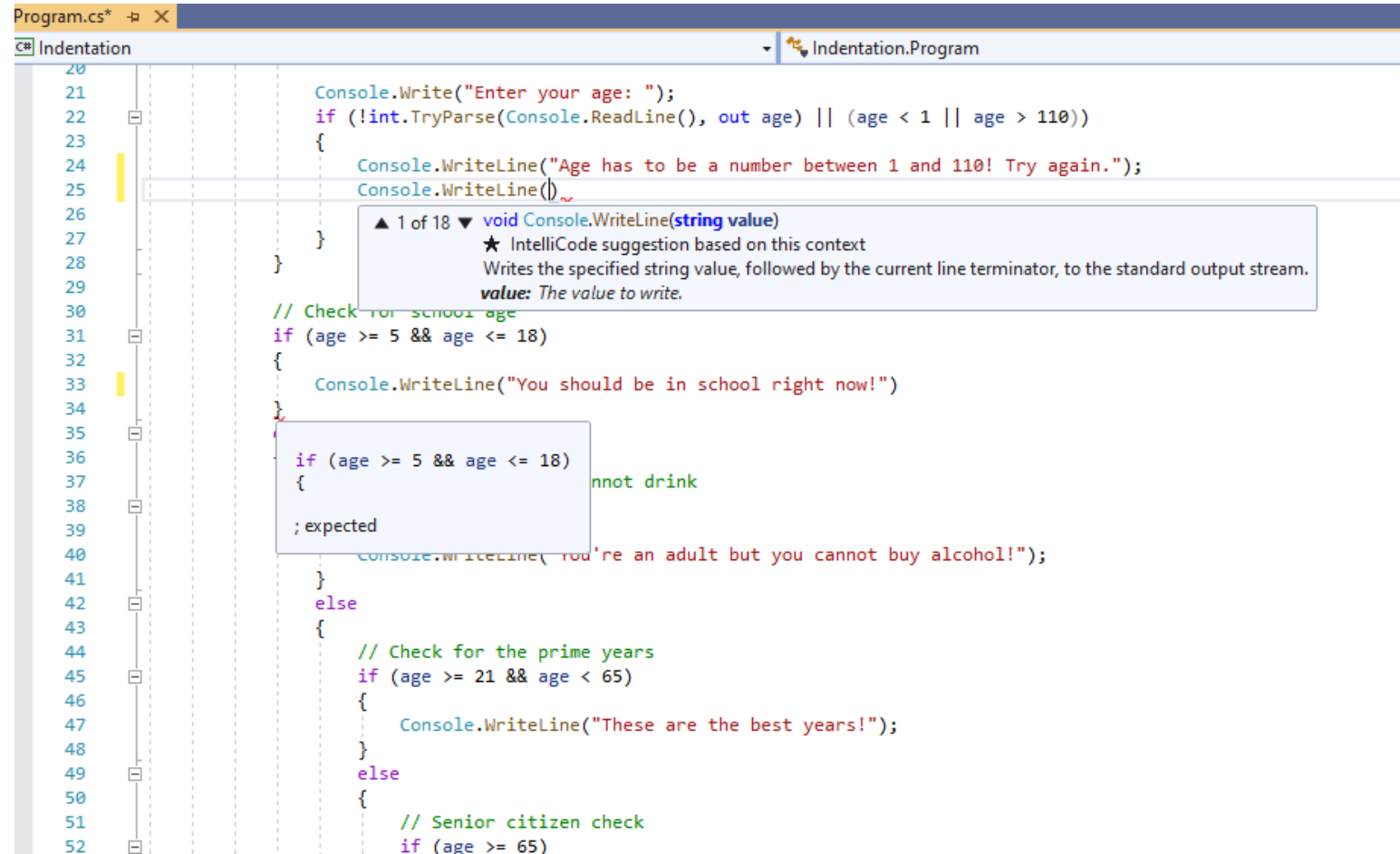
```
Console.WriteLine("Enter your age: ");  
int age = Convert.ToInt32(Console.ReadLine());
```

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!



The screenshot shows a Visual Studio editor window with a file named 'Program.cs'. The code is in C# and includes several conditional statements and console output calls. The editor is displaying line numbers from 20 to 52. Two Intellisense suggestion boxes are visible. The first box, located at line 25, suggests the 'Console.WriteLine(string value)' method, providing a description: 'IntelliCode suggestion based on this context. Writes the specified string value, followed by the current line terminator, to the standard output stream. value: The value to write.' The second box, located at line 37, suggests the 'if (age >= 5 && age <= 18)' condition, providing a description: 'if (age >= 5 && age <= 18) cannot drink; expected'.

```
20
21 Console.WriteLine("Enter your age: ");
22 if (!int.TryParse(Console.ReadLine(), out age) || (age < 1 || age > 110))
23 {
24     Console.WriteLine("Age has to be a number between 1 and 110! Try again.");
25     Console.WriteLine();
26 }
27 }
28 }
29
30 // Check for school age
31 if (age >= 5 && age <= 18)
32 {
33     Console.WriteLine("You should be in school right now!");
34 }
35
36 if (age >= 5 && age <= 18)
37 {
38     // cannot drink
39     ; expected
40     Console.WriteLine("You're an adult but you cannot buy alcohol!");
41 }
42 else
43 {
44     // Check for the prime years
45     if (age >= 21 && age < 65)
46     {
47         Console.WriteLine("These are the best years!");
48     }
49     else
50     {
51         // Senior citizen check
52         if (age >= 65)
```

Developer Best Practices

Use the Visual Studio Debugger!

```
66
67     string menuChoice = mainMenuChoice;
68     while (menuChoice != quitApplication)
69     {
70         Console.Clear();
71         if (menuChoice == mainMenuChoice)
72         {
73             Console.WriteLine("MAIN MENU");
74             Console.WriteLine("=====");
75             Console.WriteLine("1. Purchase");
76             Console.WriteLine("2. Maintenance");
77             Console.WriteLine("3. Kiosk Results");
78             Console.WriteLine("Q. Quit");
79             Console.Write("Enter your choice: ");
80             var choice = Console.ReadLine();
81             if (choice == "1") menuChoice = purchaseMenuChoi
82             else if (choice == "2") menuChoice = maintenance
83             else if (choice == "3") menuChoice = quitApplica
84             else if (choice == "Q" || choice == "q") menuCho
85         }
```

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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

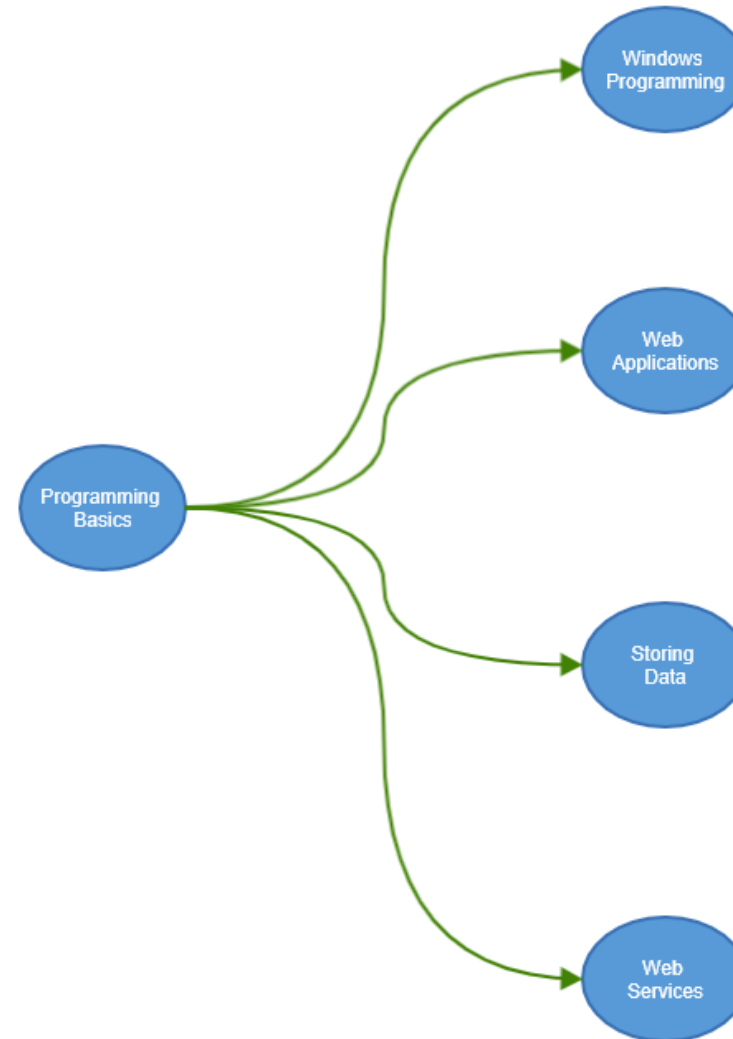
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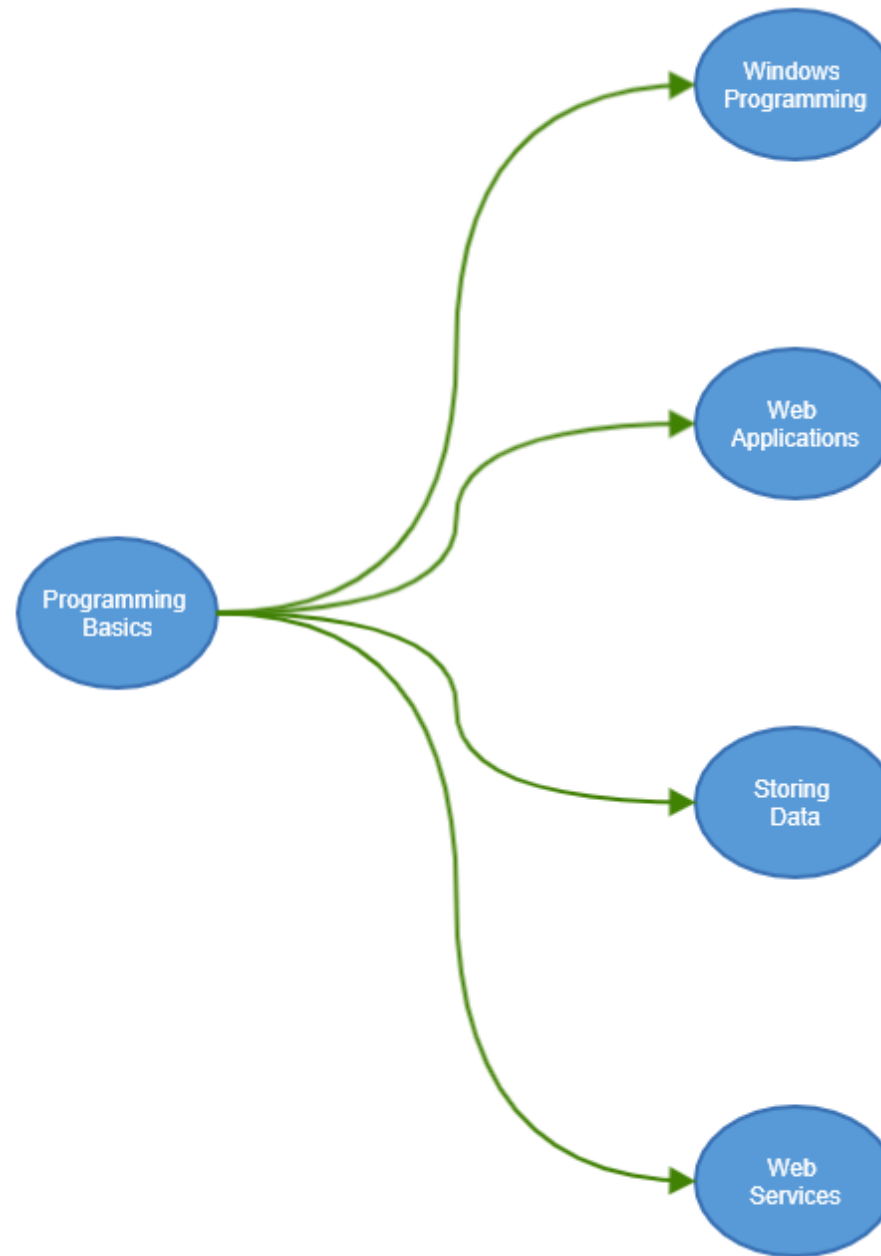
THANK YOU!

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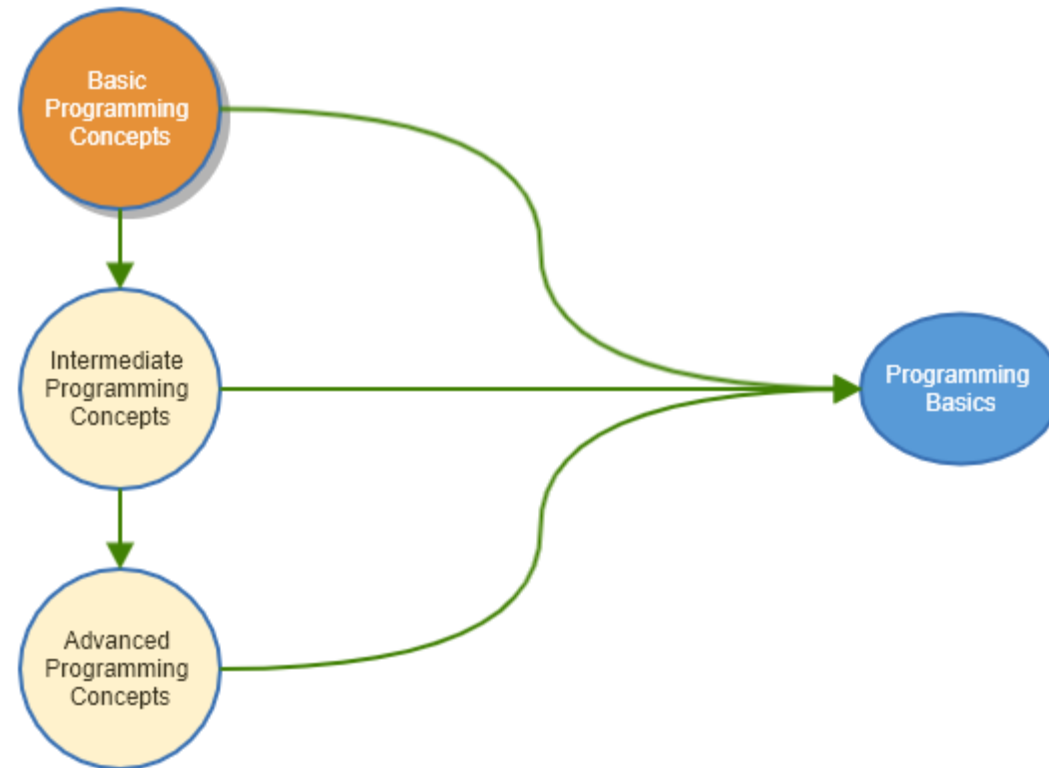
WHAT'S NEXT?

What's Next?

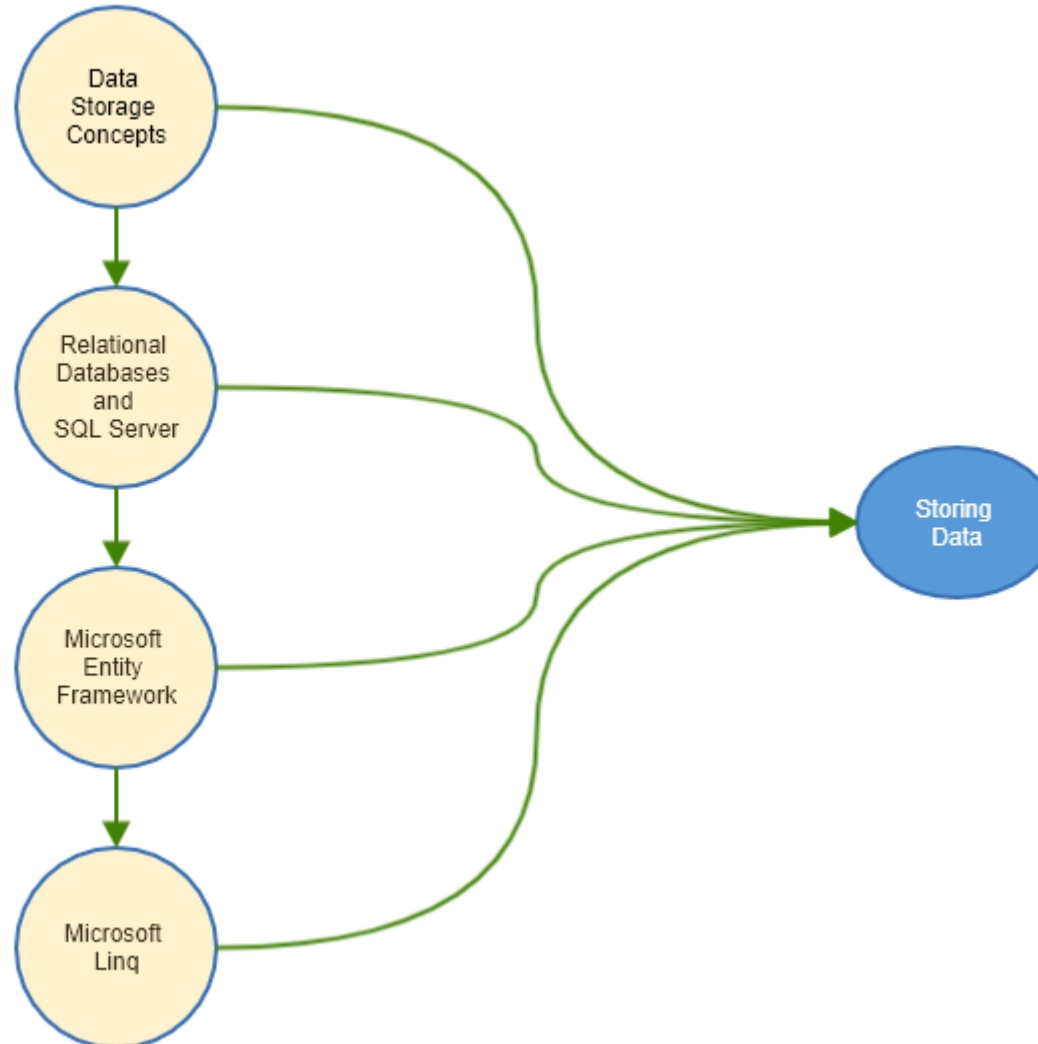




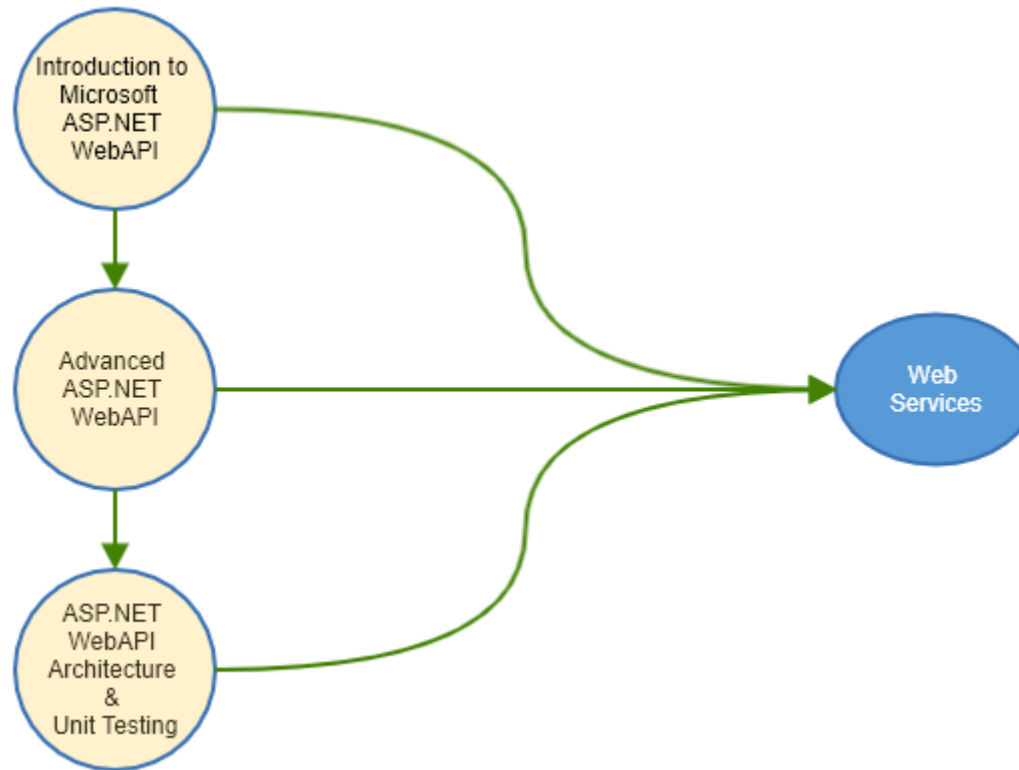
What's Next?



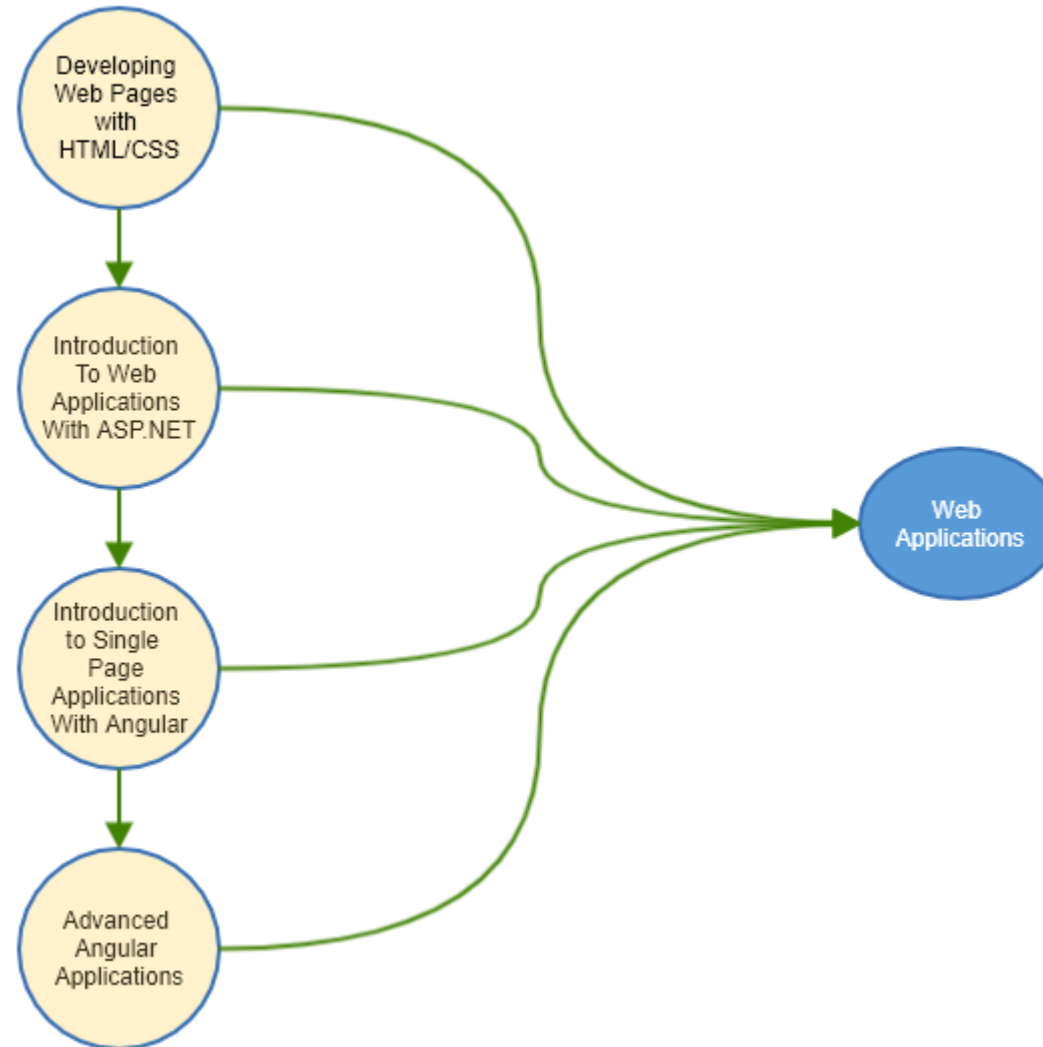
The Learning Roadmap



The Learning Roadmap



The Learning Roadmap



Coming Soon!

INTERMEDIATE PROGRAMMING CONCEPTS

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