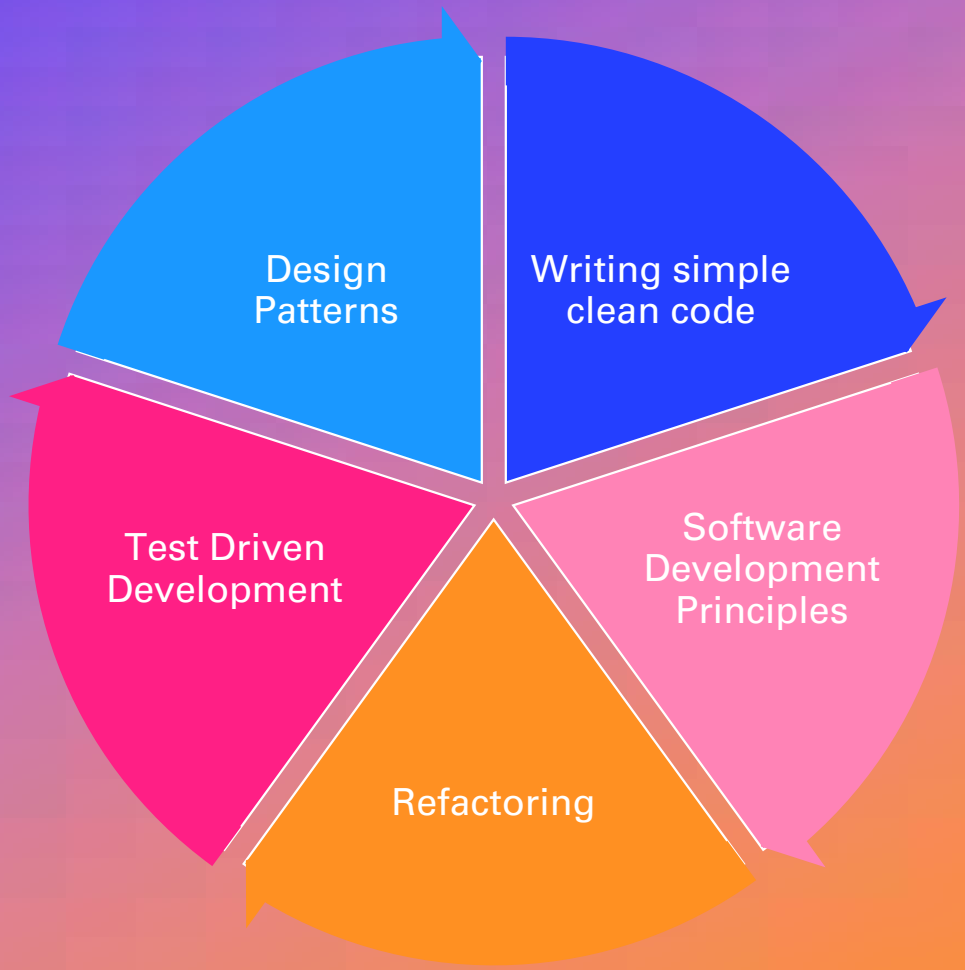
CO453 APPLICATION PROGRAMMING

ASP.NET Core C# Applications developed using Visual Studio 2019

Module Focus



Learning Outcomes

Analyse simple requirements in a structured manner

Design, document, implement and test reliable, maintainable programs as solutions to simple problems

Use structured techniques of design and implementation and good documentation practice

Use software development tools

Assessment – C# .NET Core Apps

CW1: 5 Applications

C# Console Apps

CW1: 2 Applications

C# Windows Forms

CW1: 1 Application

C# ASP.NET Core MVC

- Part in Class, Part Independent Study
- Code **reviewed** by tutor in class and feedback given
- Like a real job failure to complete the **features** on time lowers your Grade.
- Each application **feature** is marked after the App deadline for **Quality, Functionality, Testing and Documentation**.
- **Code Quality** is judged by 34 professional best practice standards

Clean Code Link

Clean Code Quality Issues

- Code Comments
- Code Names
- Code Layout
- Code Structure

Agilealliance.org

Agile's 12 Principles

1 Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.

1-3 Weeks

3 Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.

Feature Driven Development

7 Working software is the primary measure of progress.

9 Continuous attention to technical excellence and good design enhances agility.

10 Simplicity–the art of maximizing the amount of work not done–is essential.

Session Summary

- To create a simple console application using Visual Studio
- To introduce the basic Object-Oriented Concepts
- To Introduce input, output and arithmetic using C#
- To develop and document a program top-down.
- To share and document the program using Git & GitHub

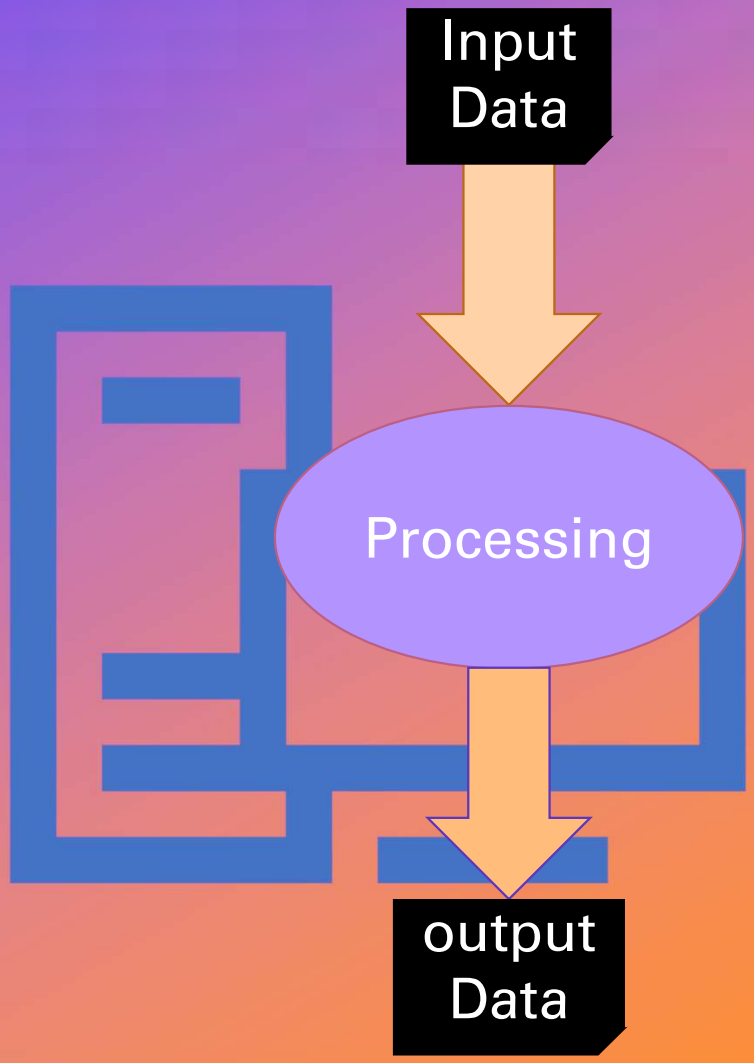
Computer Programming

What is a Computer?
(in 4 words)

What is a Program?

WHAT IS A COMPUTER

An electronic information processing machine



What is a Program?

A coded set of instructions to complete a specific data processing task.

e.g. Convert a given distance in miles to feet.

PROGRAM DESIGN (UML: ACTIVITY DIAGRAM)

Possible alternative names?
Enter Miles, Display Feet

Classes & Objects

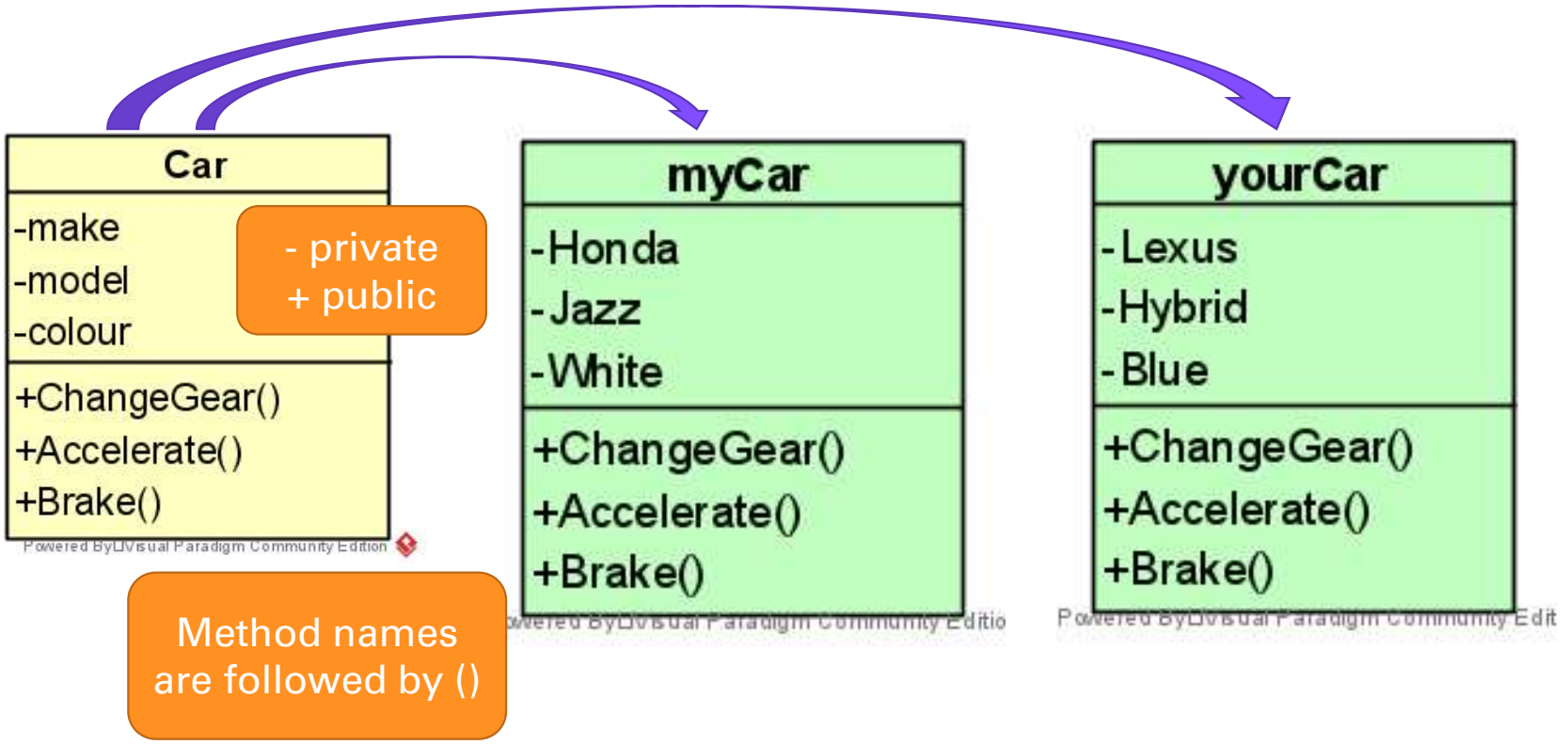
- C# programs are divided into classes
- Classes are the blueprints for creating the objects
- Classes contain Data (fields, variables or attributes)
- Classes contain Methods or Functions for processing

Alternative Names

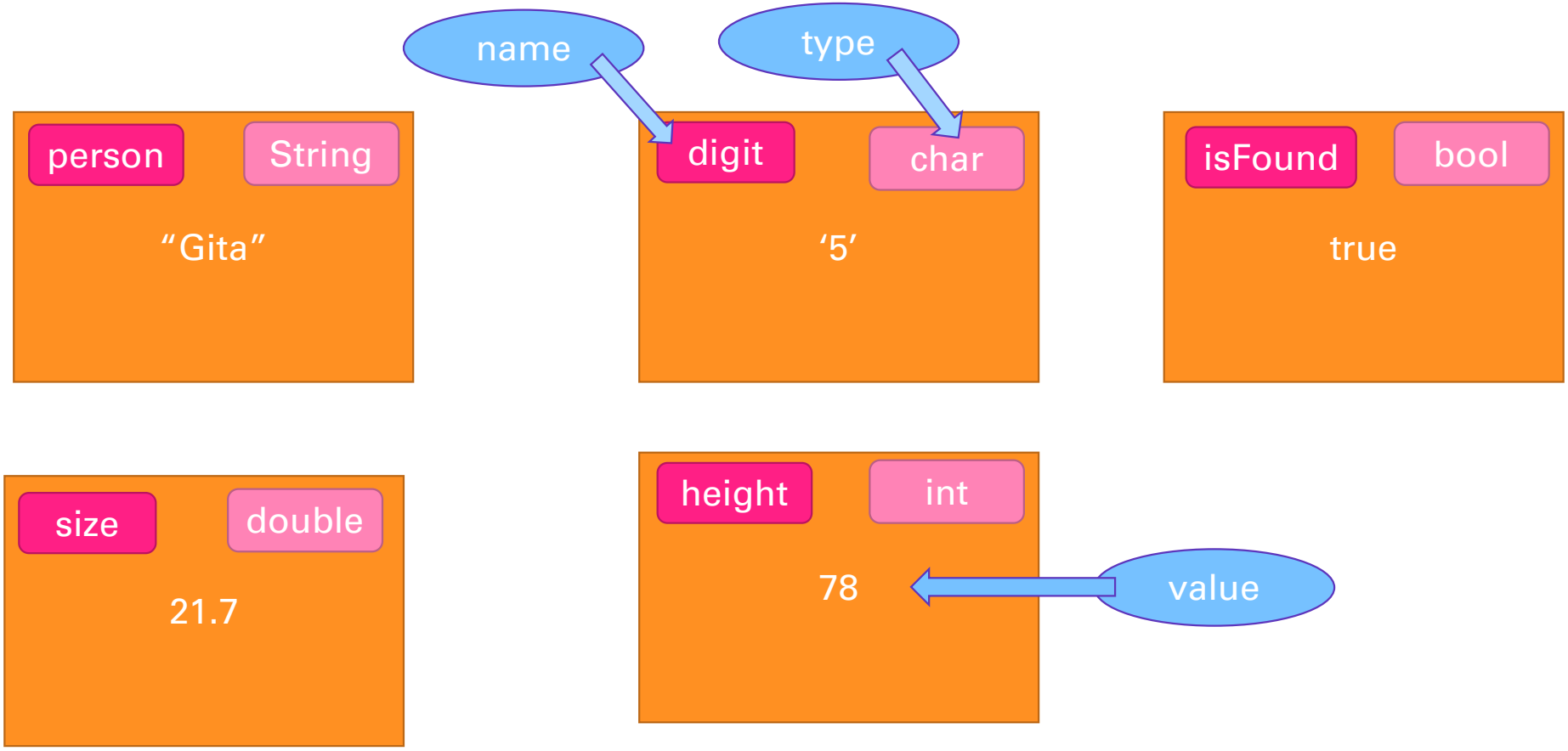
- Information
- Data
- Attributes
- Variables
- Properties
- Fields

- Processes
- Methods
- Operations
- Procedures
- Functions
- Actions

UML: Classes & Objects



Variables/Attributes: Data Types



C# Language

C# - Pascal Case
Java - Camel Case

```
/// <summary>
/// This is a comment describing the
/// main purpose of the class
/// </summary>
0 references
public class Car
{
    // Attributes

    private string make;

    private string model;

    private string colour;

    // Methods
```

Encapsulation:
private attributes
Public methods

```
    // Methods

    0 references
    public void ChangeGear()
    {
    }

    0 references
    public void Accelerate()
    {
    }

    0 references
    public void Brake()
    {
    } // end of method

} // end of class
```

Microsoft Naming Conventions 2008

General Naming Conventions

Names of Classes

Names of Properties & Methods

C# Naming Convention

- C# is case sensitive
- All names must start with a letter
- Method names start with a capital letter
- Class names start with a capital (Pascal)
- Names can contain letters, digits and underscores

Naming Continued

Object names start with lower case

Attribute (private variable) names start with lower case letter (camel)

Start with or contain **Nouns**

- Classes
- Objects
- Attributes

Methods start with **Verbs** (or imply verbs)

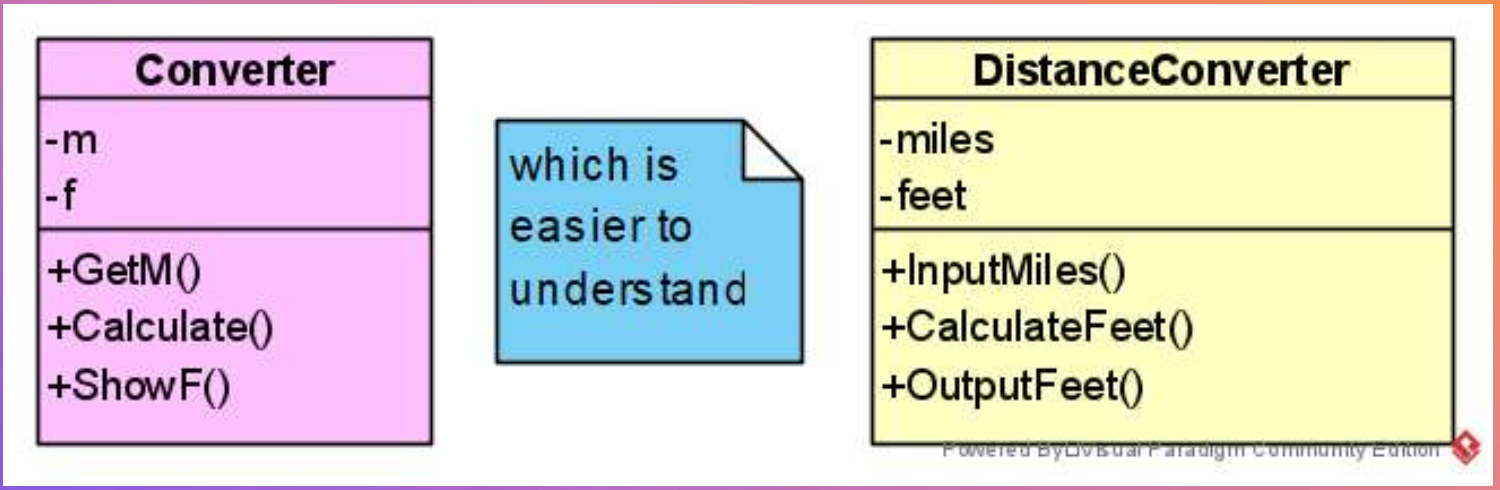
Valid Names? Good Names?

Class Names

1. Car
2. hondaCar
3. 007_Car
4. Honda Car
5. HondaCar
6. C1
7. Car1

Method Names

8. accelerate()
9. Accelerate()
10. Change Gear()
11. ChangeGear()
12. Change_Gear()
13. C2()
14. 2C()

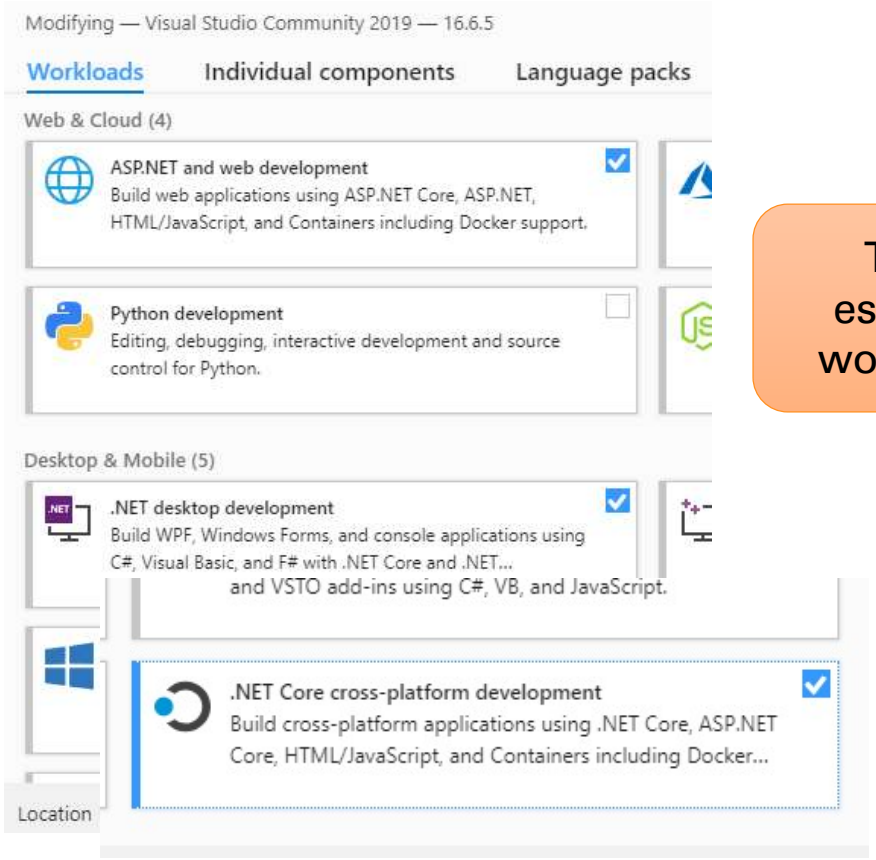


UML: CLASS DIAGRAM

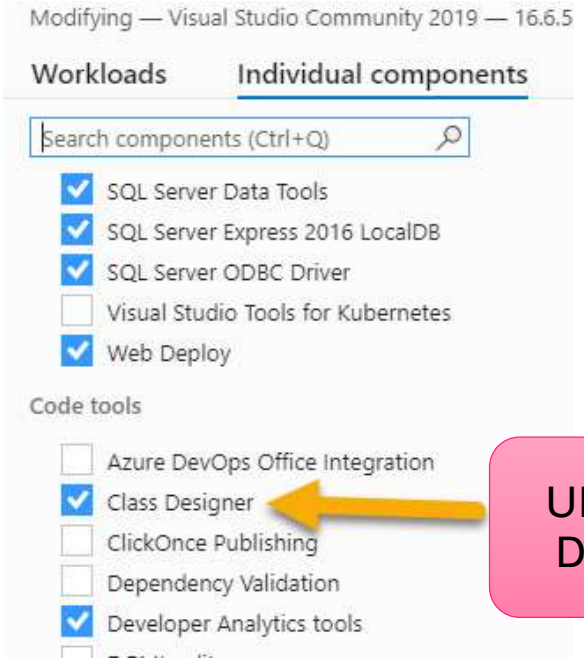
IDE: Visual Studio 2019

- Microsoft's Integrated Development Environment
- Develop, Analyse, Debug, Test, Collaborate, Deploy
- Community, Professional, Enterprise Editions
- 36 Different programming languages

Installing Visual Studio

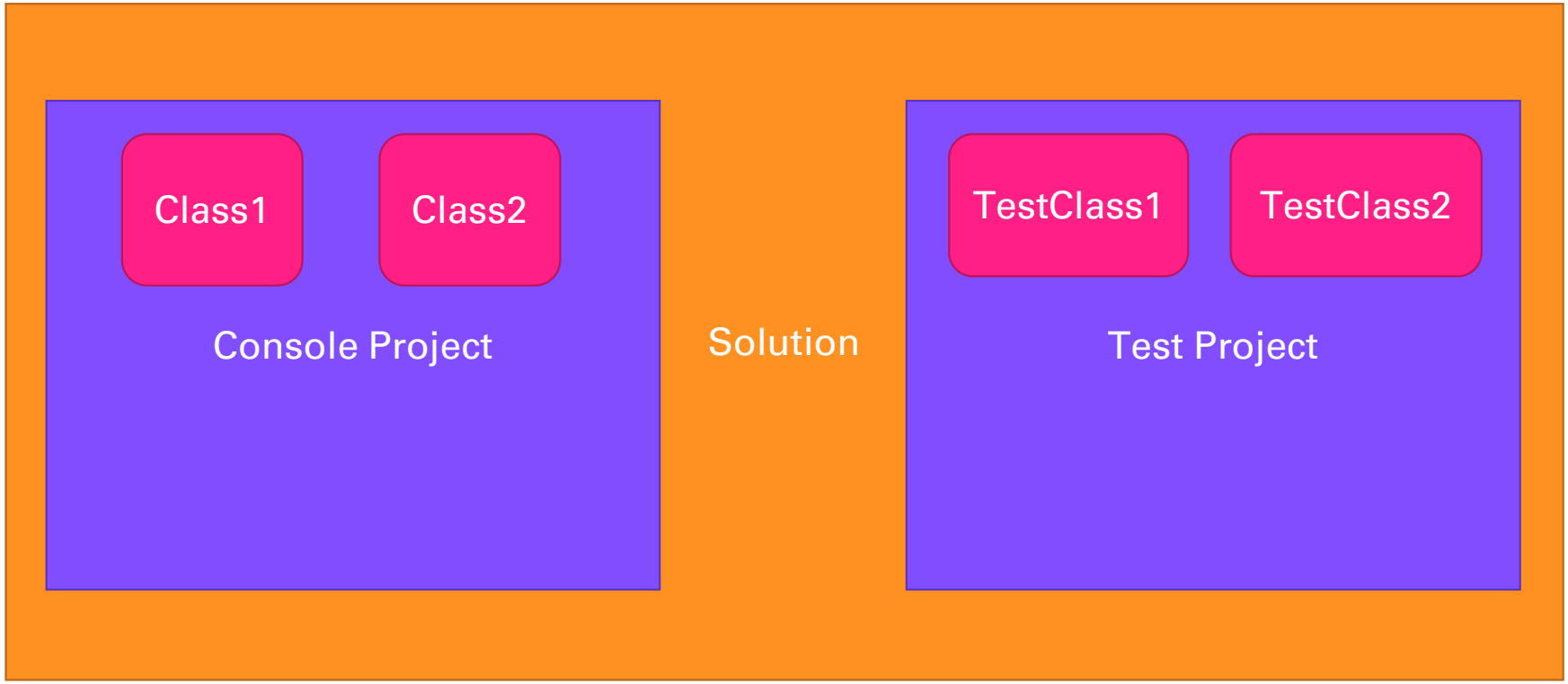


Three essential workloads

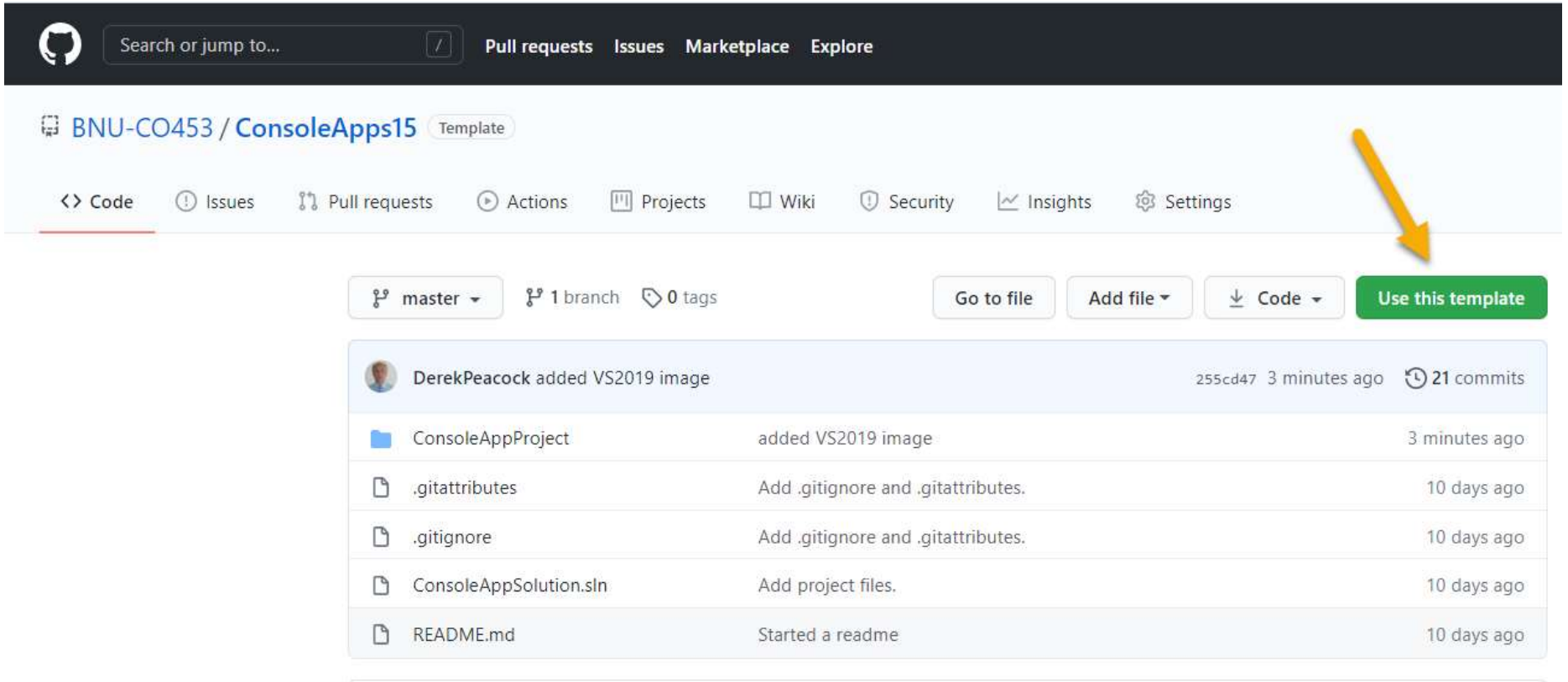


UML Class Diagrams

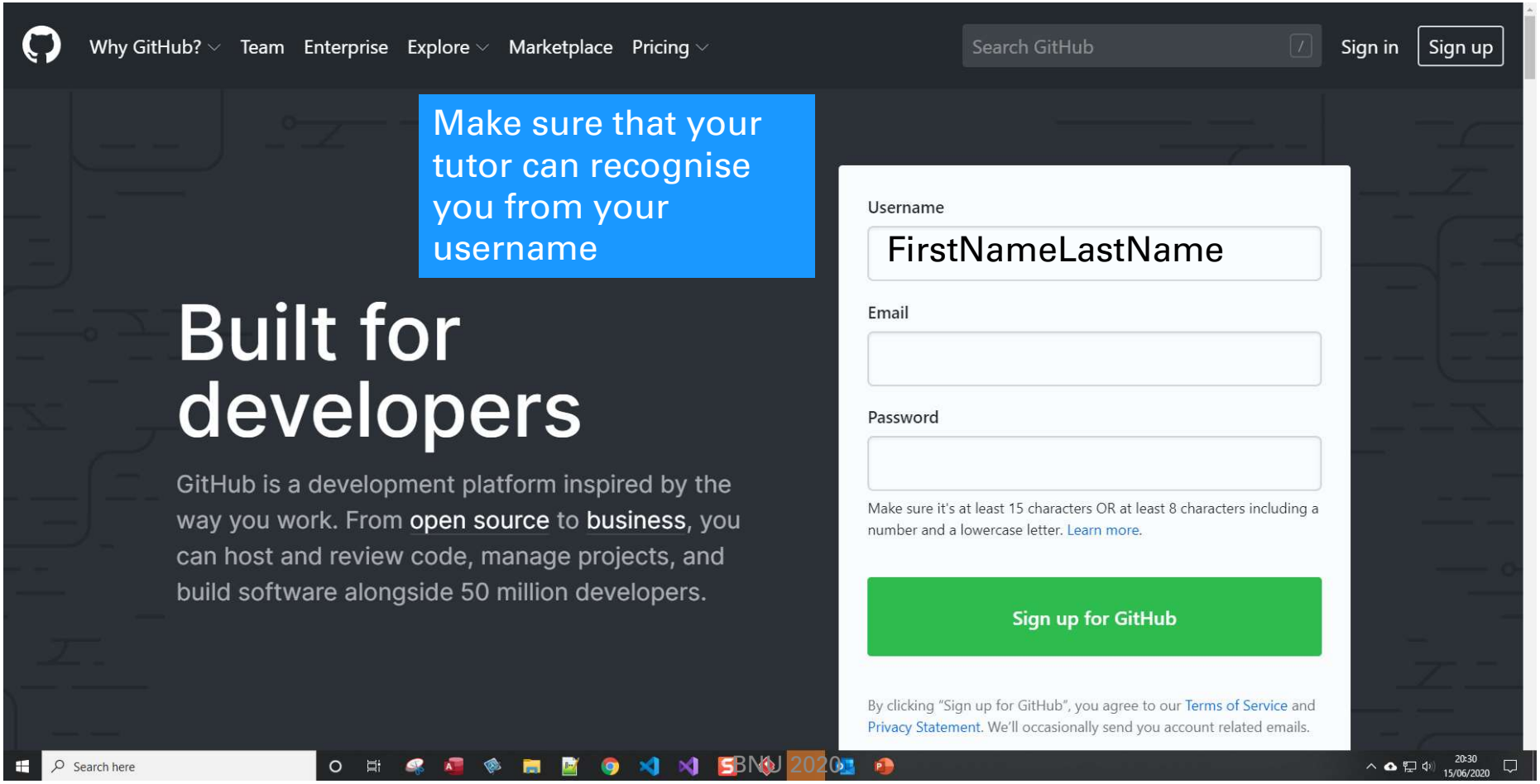
Create Visual Studio Project



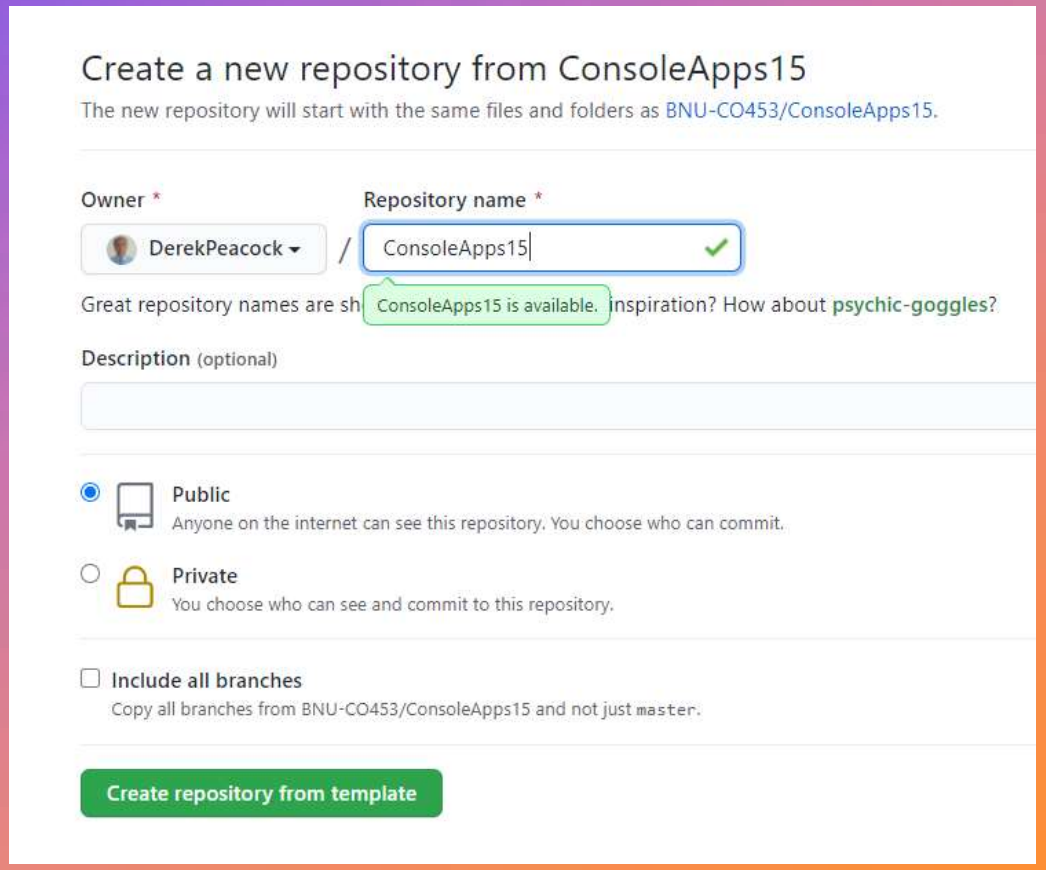
Find the Template
https://github.com/BNU-CO453/ConsoleApps15



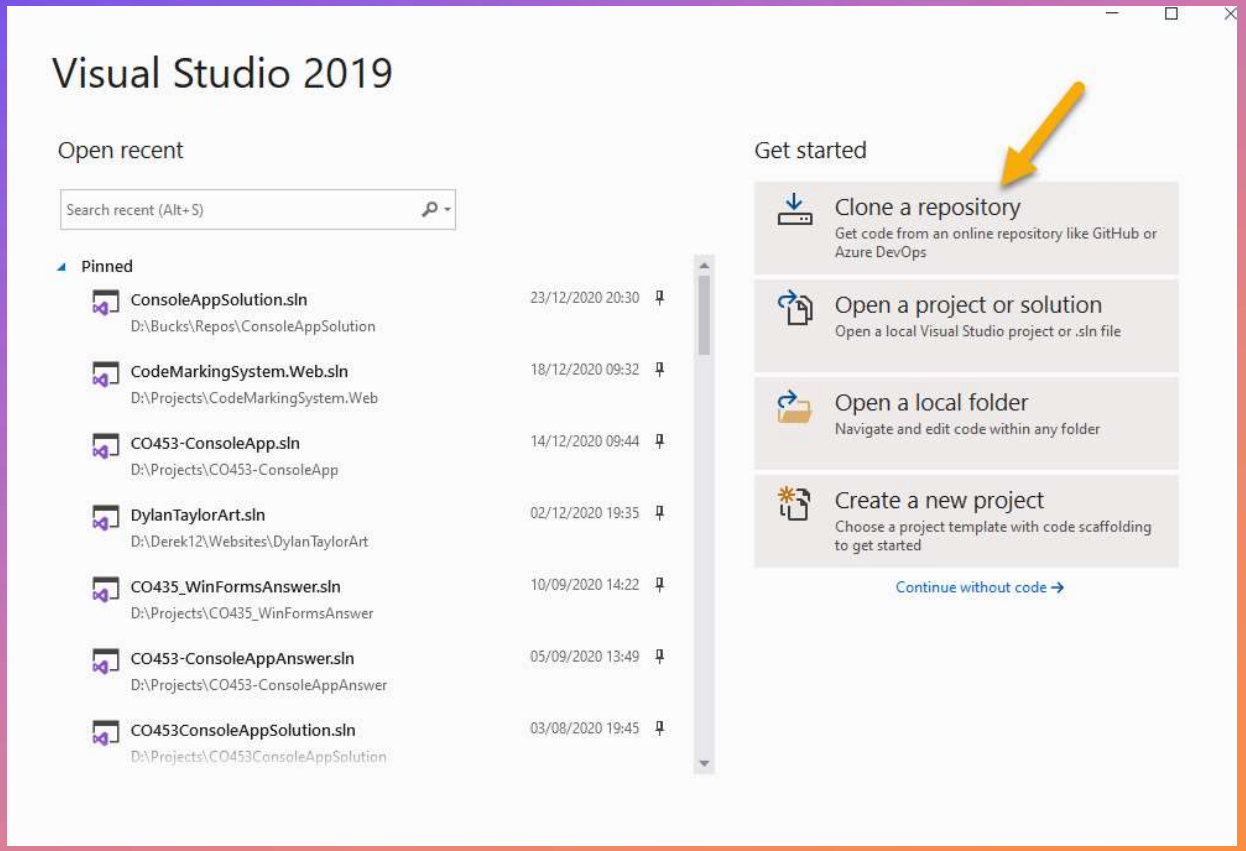
Code Sharing with GitHub



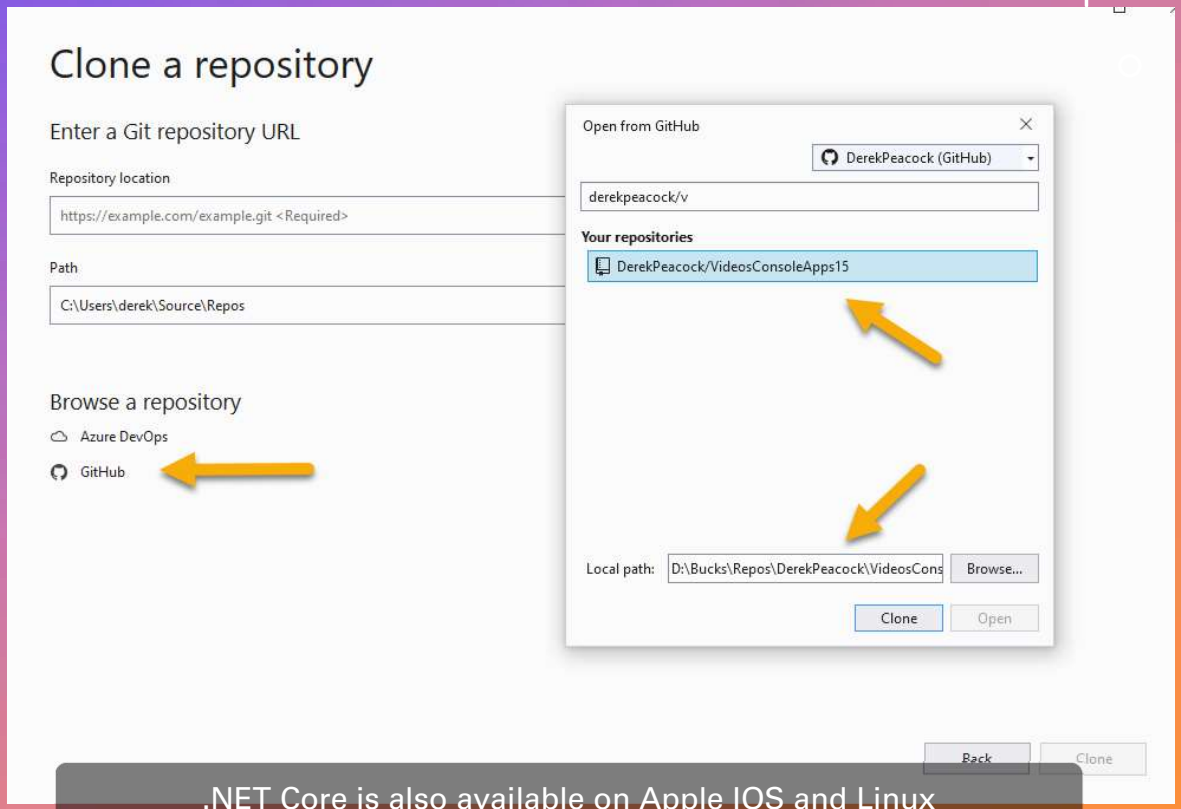
USING THE TEMPLATE



VS Startup Window

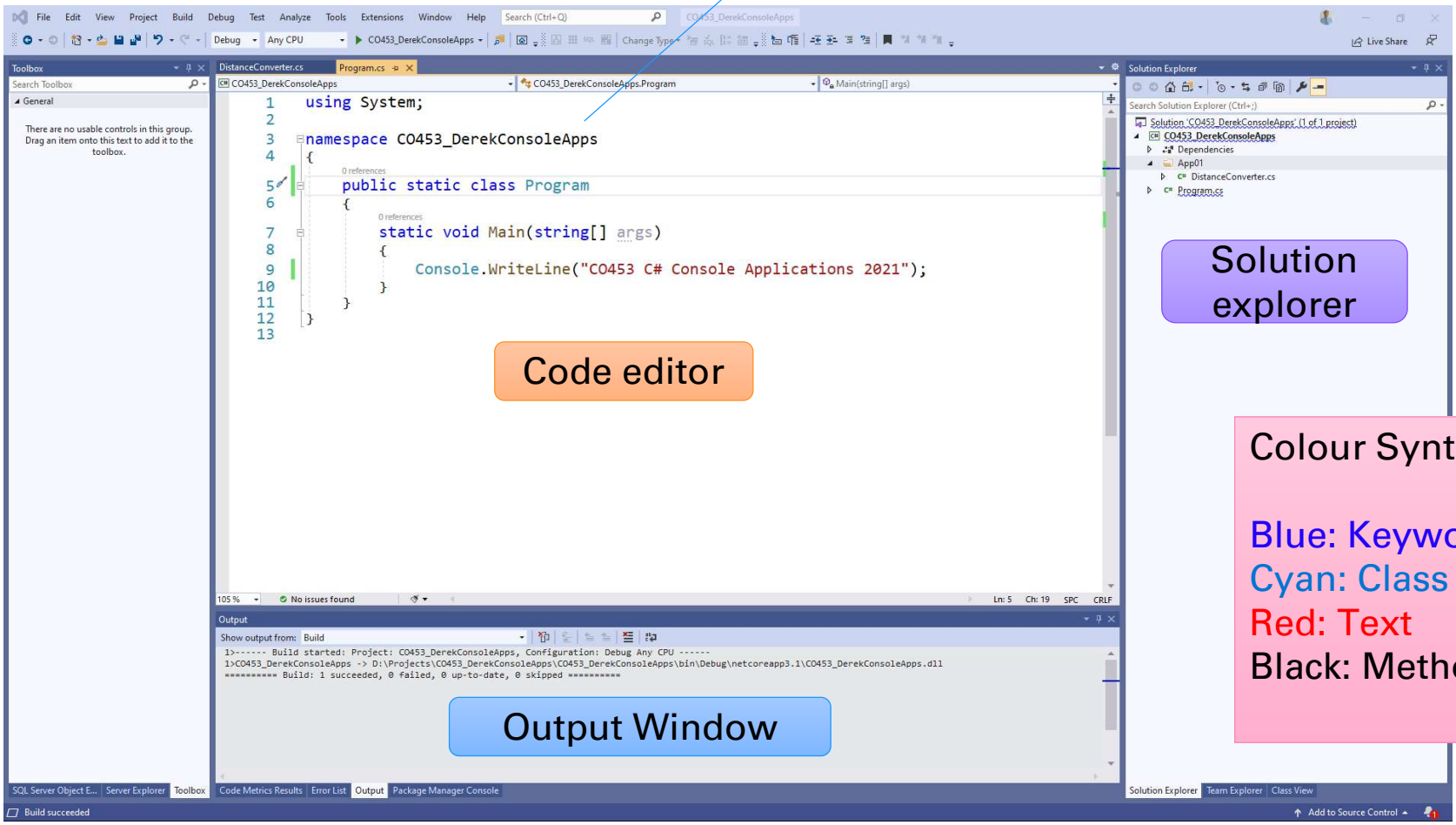


CLONING A REPOSITOTY



.NET Core is also available on Apple IOS and Linux

VS User Interface



Colour Syntax Highlighting

Blue: Keywords
Cyan: Class names
Red: Text
Black: Method names

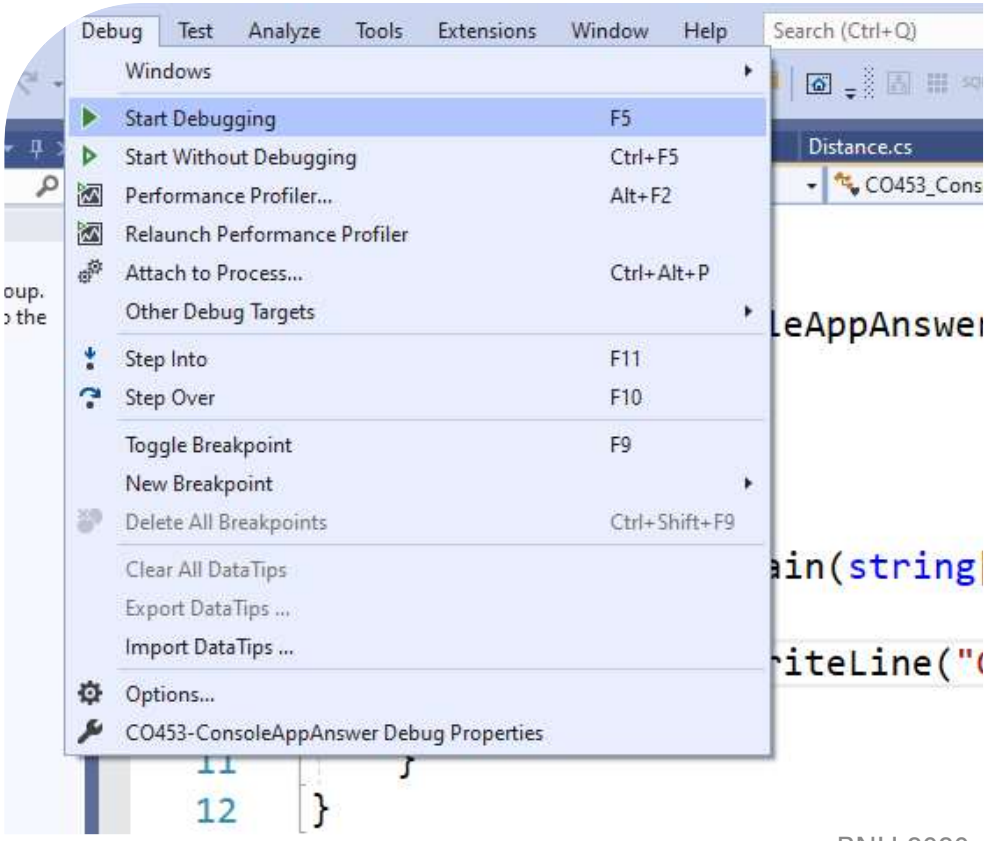
Program Class

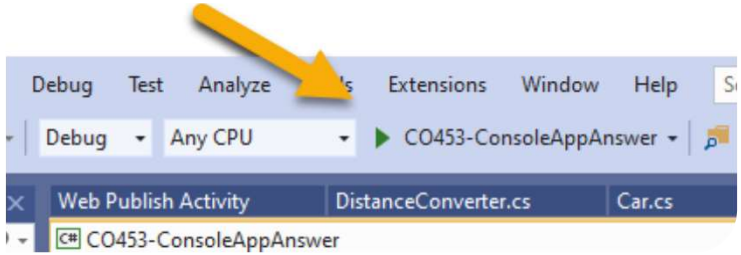
Class contains a **Main**() method which is where the program will start

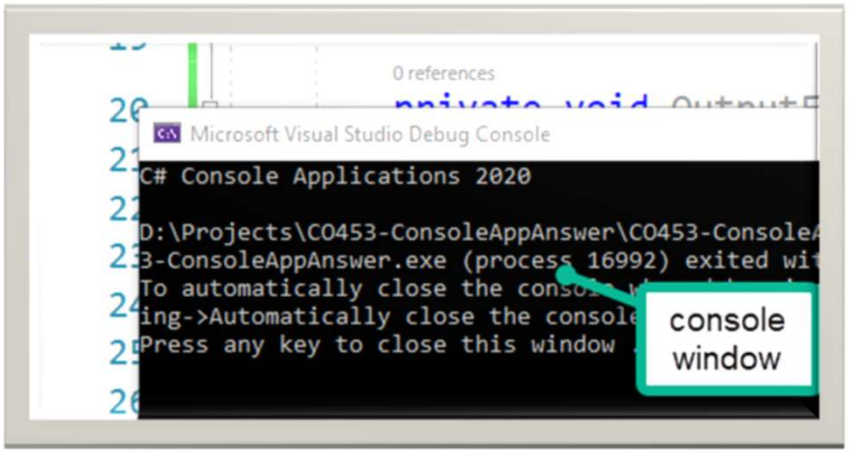
Console is a library class (using System) which contains methods

WriteLine() is a method that writes text to the console window

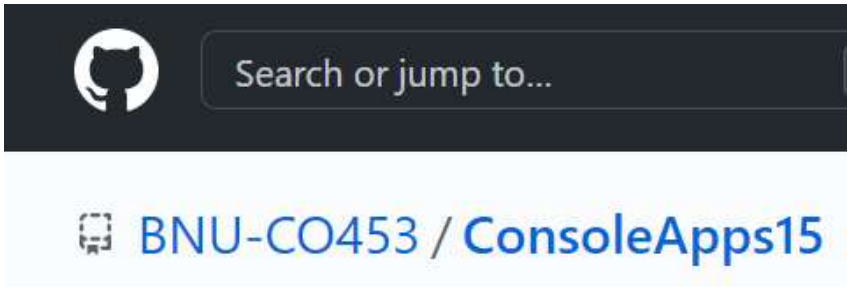
Start Debugging (run the program)







Using the Wiki



1. Edit Your Readme.md
2. Add your Home wiki page
3. Add the App01 wiki page
4. Use the Wiki information

Home Page

Wiki Home Page: Andrei [redacted]7459

BSc Data Science

I am studying Data Science at Buckinghamshire new University! I 'fell in love' with programming in college while learning the basic language 'Pascal' and later on doing a course in Oracle SQL. Ever since I am using some of my free time to learn the basics of other programming languages like Python and Java, but not having a mentor and not knowing other people with similar interests had a big impact on my progression. Being enrolled at university has changed that!

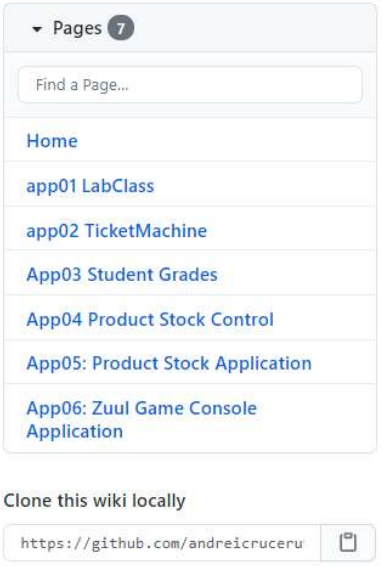
CO452 Lesson: Wed 10:30 Nick (online lesson Friday 10:30)

Course Work Assessment Part A

1. App01: LabClass
2. App02: Ticket Machine
3. App03: Student Grades
4. App04: Stock Management

Course Work Assessment Part B

5. App05: Product Stock Application
6. App06: Zuul Game Console Application



App01: User Requirements

App01: Distance Converter

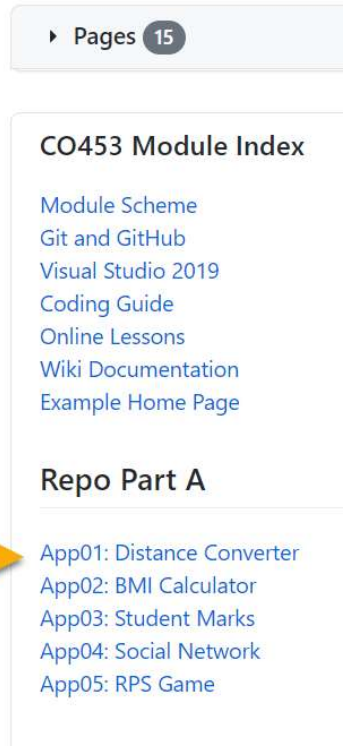
Description

This App allows the user to convert distances measured in one unit of distance into another unit of distance, for example it will convert a distance measured in miles into the same distance measured in feet.

Features Stage 1

The application should:-

1. Output a heading with the name of the application and the name of the programmer.
2. Input any valid distance measured in miles
3. Convert that distance into feet
4. Output the equivalent distance in feet The input and output should accept numbers that include the decimal point, and this app can use the fact that 1.0 miles is exactly 5280 feet.



```
public class DistanceConverter
{
    private double miles;
    private double feet;

    0 references
    public void Run()
    {

    }

    0 references
    private void InputMiles()
    {
    }

    0 references
    private void CalculateFeet()
    {
    }

    0 references
    private void OutputFeet()
    {
    }
}
```

App01: DistanceConverter

- Add the attributes and methods
- **Notice**
- Semicolons;
- the indentation
- the line spacing
- the names and use of case
- public method is black
- private methods are grey

Use Block Comments

```
namespace CO453_DerekConsoleApps.App01
{
    /// <summary>
    /// This class offers methods for converting a given
    /// distance measured in miles to the equivalent
    /// distance measured in feet
    /// </summary>
    /// <author>
    /// Derek Peacock version 0.1
    /// </author>
    0 references
    public class DistanceConverter
    {
    }
}
```

- Block comments are multiline
- Generates XML API documentation
- Every class
- Every method

API documentation is for other programmers to read

Block and Single Line Comments

```
public class DistanceConverter
{
    // Distance measured in miles
    private double miles;
    // Distance measured in feet
    private double feet;

    /// <summary>
    /// This method will input the distance measured in miles
    /// calculate the same distance in feet, and output the
    /// distance in feet.
    /// </summary>
    0 references
    public void Run()
    {
        InputMiles();
        CalculateFeet();
        OutputFeet();
    }
```

- Only add single line comments if it would help understanding
- Always add block comments to summarise what the method does

Top Down Development

```
0 references
public void Run()
{
    InputMiles();
    CalculateFeet();
    OutputFeet();
}
```

Executing this program will not produce any output yet!

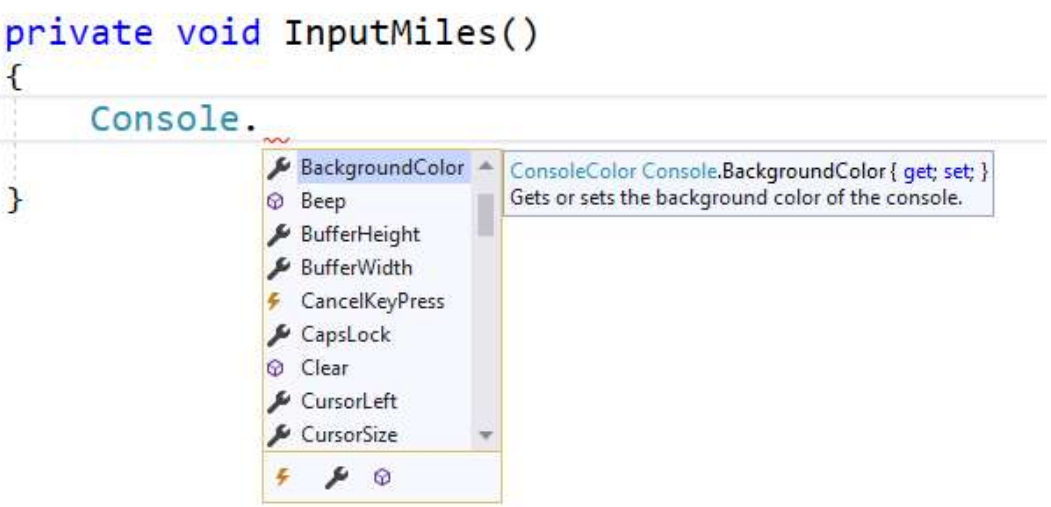
Using Methods

Only **public** methods can be access by other classes

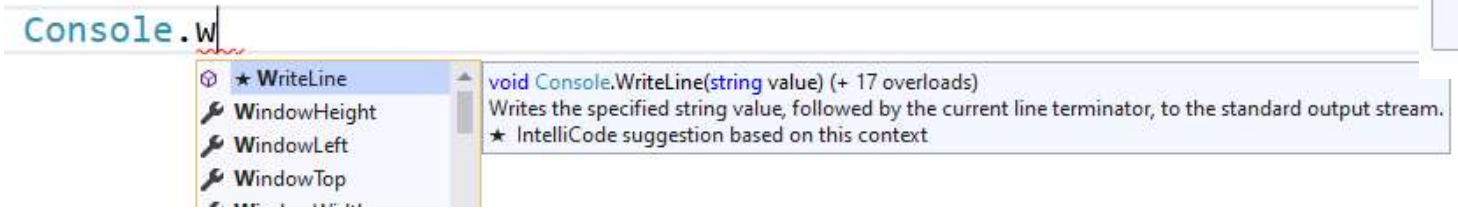
So ConvertMilesToFeet() calls the other **private** methods

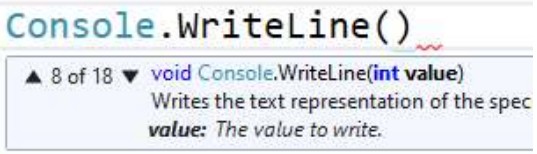
Intellisense

Your own block comments generate intellisense



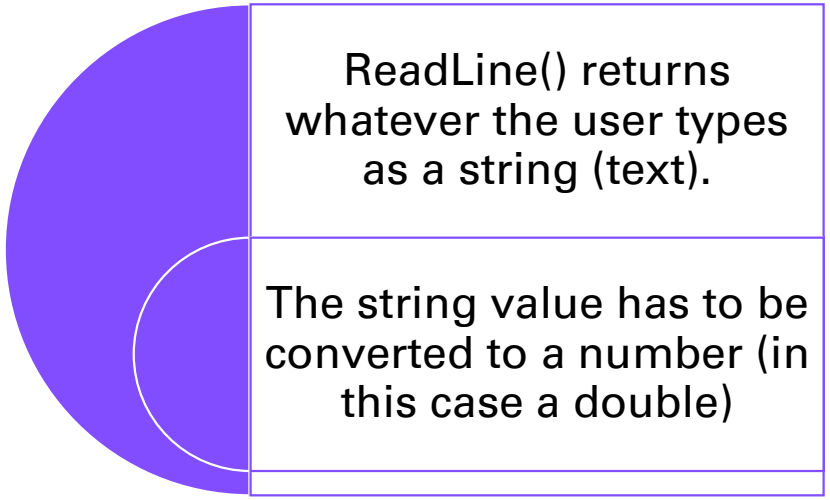
- Console is a class
- BackgroundColour is a Property.
- Beep is a Method
- 18 versions of WriteLine()





The InputMiles() Method

```
1 reference
private void InputMiles()
{
    Console.Write("Enter the number of miles >");
    string value = Console.ReadLine();
    miles = Convert.ToDouble(value);
}
```



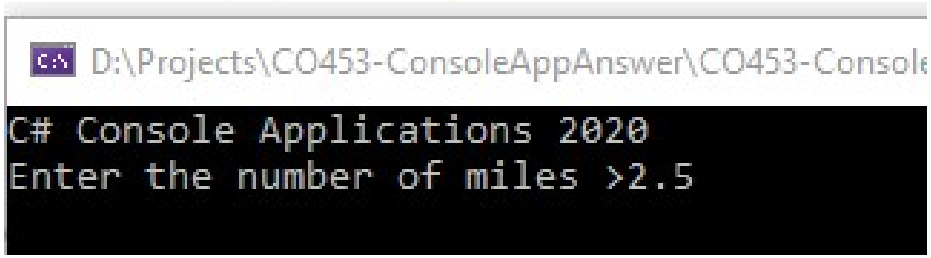
Testing the DistanceConverter

```
class Program
{
    0 references
    static void Main()
    {
        Console.WriteLine(" C# Console Applications 2020");
        Console.WriteLine("");

        DistanceConverter converter = new DistanceConverter();
        converter.
```

ConvertMilesToFeet
Equals
GetHashCode
GetType
ToString

void DistanceConverter.ConvertMilesToFeet()
Calculate how many feet there are in the given miles



Notice the only method that can be accessed is ConvertMilesToFeet()

The other private methods are available inside the object

```
converter.ConvertMilesToFeet();
```

SOME C# DATA TYPES

Data Type	Description	Range
int	Whole numbers	-2.1 Billion to +2.1 Billion
Float (single)	Floating decimal point	6-7 Digits
double	Floating decimal point	15 Digits
bool	Logical value	true | false
char	Single character	Use single quotes marks ‘A’
string	Sequence of chars	Use double quotes “Hello”

Completing the Program

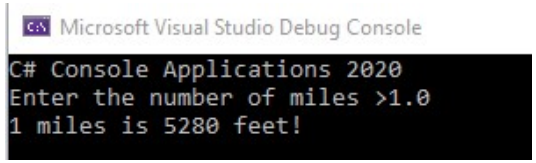
```
0 references
public void ConvertMilesToFeet()
{
    InputMiles();
    feet = miles * 5280;
    OutputFeet();
}
```

Evaluation

- demonstrates input, output and arithmetic
- Limited guidance to the user
- The number of feet in a mile never changes
- The program has to be run for each distance converted

```
1 reference
private void OutputFeet()
{
    Console.WriteLine(miles + " miles is " + feet + " feet!");
}
```

String concatenation



Constants & Arithmetic

Pascal case with no underbars is an alternative for constants

All constants should be declared by name

Constant names in uppercase with underbars (not MS) or Pascal case

Exceptions = 0, 1

```
public const int FEET_IN_MILES = 5280;
```

```
feet = miles * FEET_IN_MILES;
```

Operator	Description
++, --	Increment or decrement by 1
*, /	Multiplication, Division
%	Remainder after division
+, -	Addition, subtraction

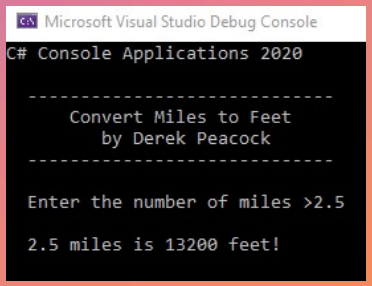
Examples	Result
2 + 2 * 2	6
(2 + 2) * 2	8
C = 3; C++;	C = 4
9 / (5 / 2)	4
5.0/2.0	2.5
5 % 2	1

ENHANCE PROGRAM

```
0 references
public void ConvertMilesToFeet()
{
    OutputHeading();
    InputMiles();

    feet = miles * FEET_IN_MILES;

    OutputFeet();
}
```




```
1 reference
private void OutputHeading()
{
    Console.WriteLine();
    Console.WriteLine("  ----------------------------");
    Console.WriteLine("      Convert Miles to Feet    ");
    Console.WriteLine("         by Derek Peacock      ");
    Console.WriteLine("  ----------------------------");
    Console.WriteLine();
}
```

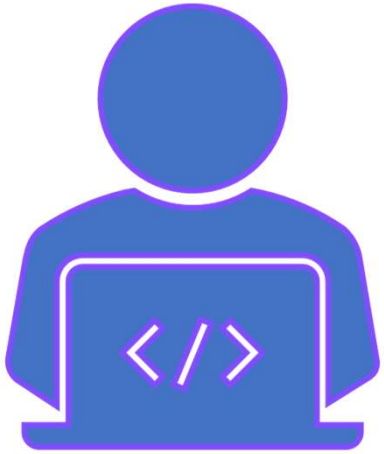
Independent Study

ADD METHODS SO THAT THE USER CAN

APP 01 FEATURE 02 CONVERT FEET TO MILES

APP 01 FEATURE 3 CONVERT MILES TO METRES

References



- C# 6 For Programmers, Deitel & Deitel (2017)
- Clean Code, Robert Martin (2009)
- Tutorialspoint C# Classes
- Tutorialspoint C# Variables
- Visual Studio 2019
- Microsoft Tutorial Console App
- GitHub
- Markdown Cheatsheet