Test-Driven C#

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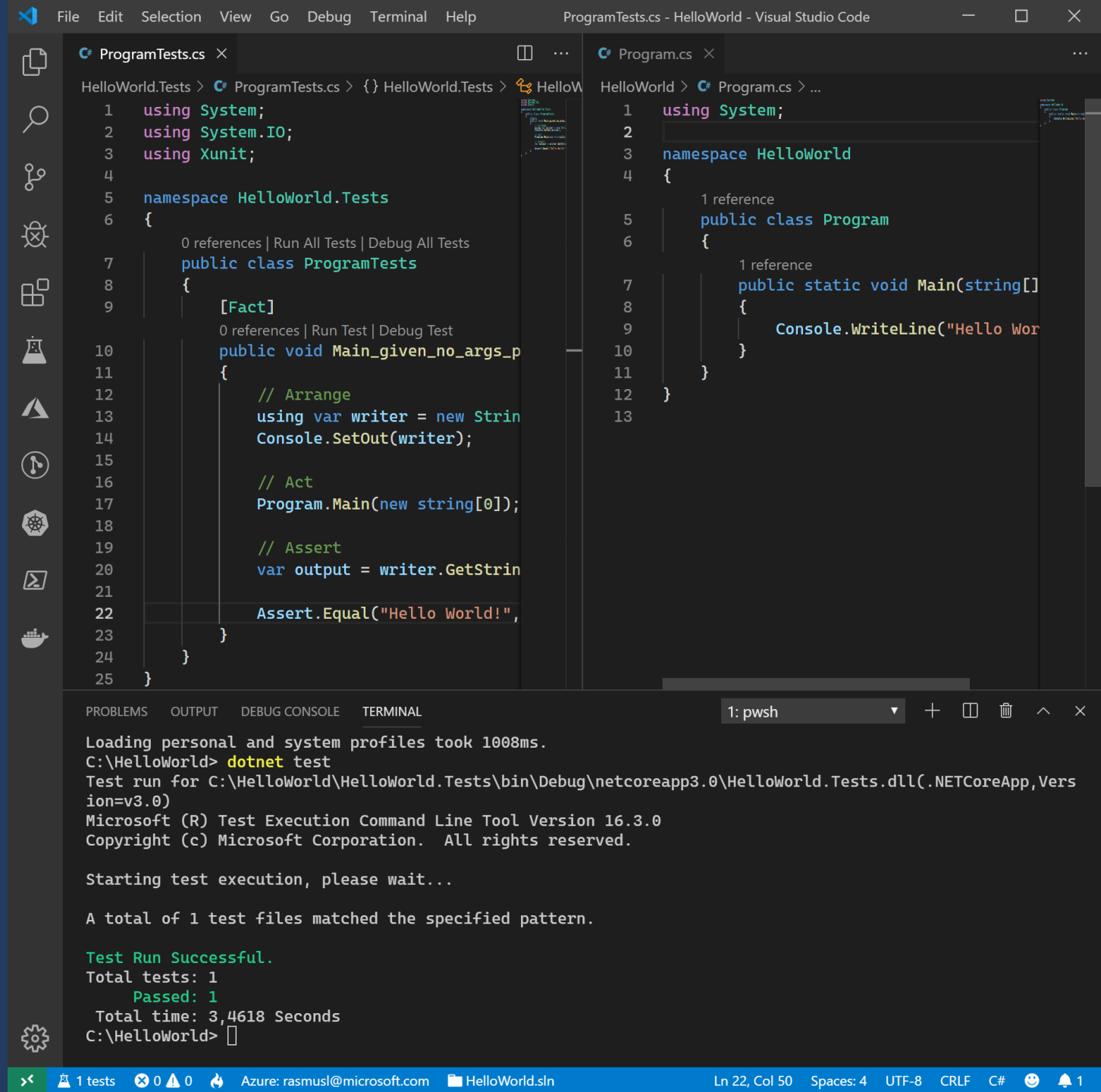
Associate Professor
ITU



2013-: Principal Consultant @ Microsoft
DevOps, Cloud, Security

2014-: Associate Professor @ ITU
Object-Oriented Programming, C♯, F♯, .NET Core

M.Sc. IT, ITU (2012)
Thesis: Forecalc – Developing a core spreadsheet implementation in F♯

1996-2008, 2013-: Captain @ Danish Army (Reserve)
Battalion Chief of Staff,

Wife: Katrine
Children: Lærke (3), Laura (6), and Alma (13)

Origin: Aarhus
Current whereabouts: Vanløse, Copenhagen

Hobbies

SLAYER

BRUTAL ASSAULT

COPENHELL

W:O:A

HELLFEST

Agenda

- How to reach me
- *Boring stuff*
- Test-Driven Development
- Trunk Based Development
- Continuous Integration
- Show and tell

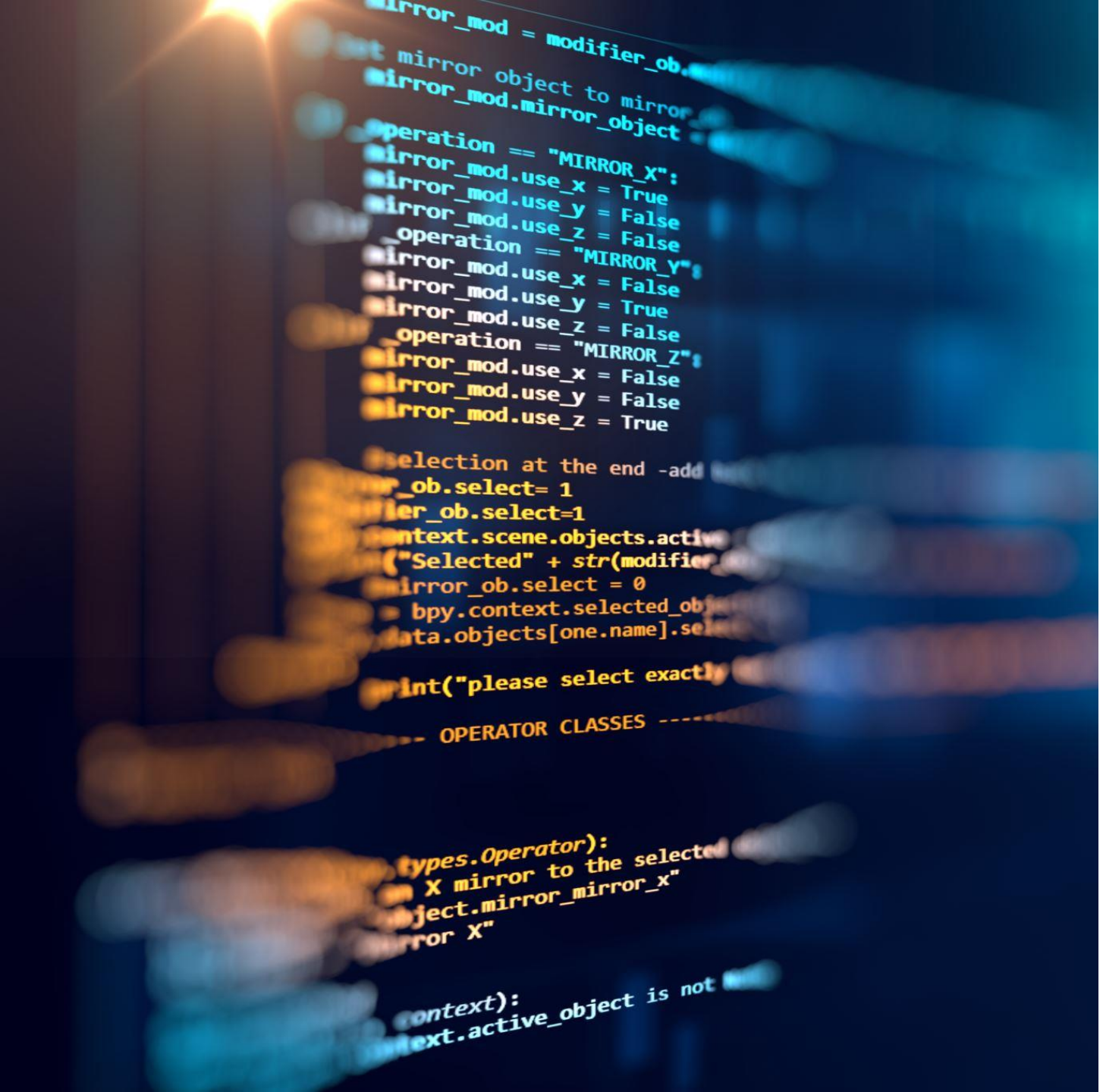
How to reach me

Do not write me an email!

Use Discord – the TA's or your fellow students might have the answer.

You may tag me.

You may DM me for personal questions.



Curriculum

Test-Driven C♯
Generics
Lambdas and Linq
Data access (ORM)
Asynchronous and parallel
Web APIs
Design Patterns
Mobile and desktop apps
Web apps
Security
Cloud

Updated on LearnIT

“C# is intended to be a simple, modern, general-purpose, object-oriented programming language.”

ECMA-334 ISO/IEC 23270:2018(E)
C# language specification, 5th edition, December 2017

Why C♯

- Popular - Stack Overflow Developer Survey 2021
- Ubiquitous
- Open Source
- Cross-platform
- Industry / Enterprise
- Tool for your toolbox
- IRON

Why not C♯?

It's just like Java:

Curly brackets and semicolons from C

Statically typed

Object-oriented

Single inheritance

Cross platform

Open source

Industry / enterprise

Enterprise

https://github.com/joaomilho/Enterprise

https://github.com/EnterpriseQualityCoding/FizzBuzzEnterpriseEdition

Build on what you know already

No basic stuff

Read the book

Do the exercises

Learn the advanced patterns and syntactic sugar

Idiomatic C♯

Focus on clean, testable code

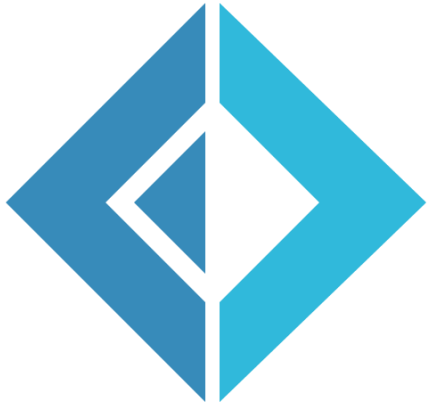
Stop the enterprise madness!

.NET – a brief introduction

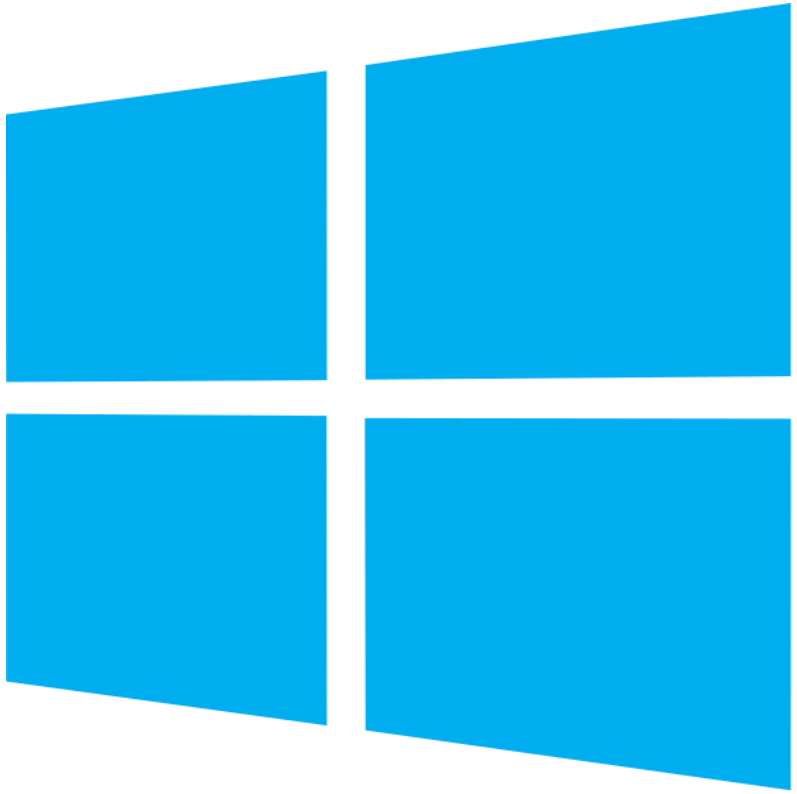
.NET

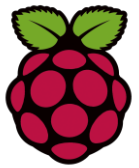
.NET is a free, cross-platform, open-source developer platform for building many different types of applications.

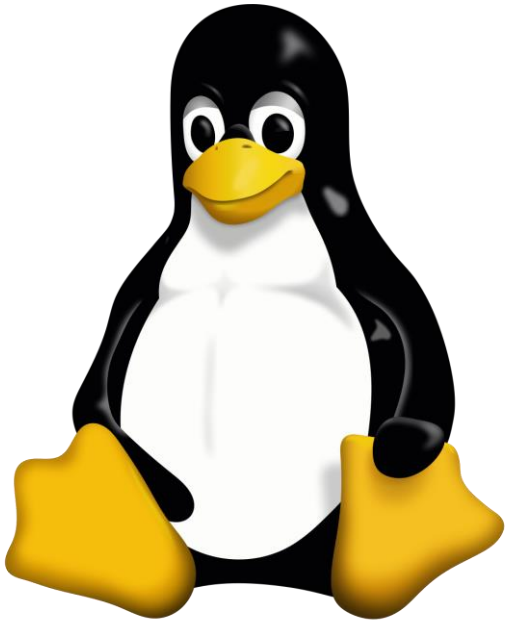
.NET Languages



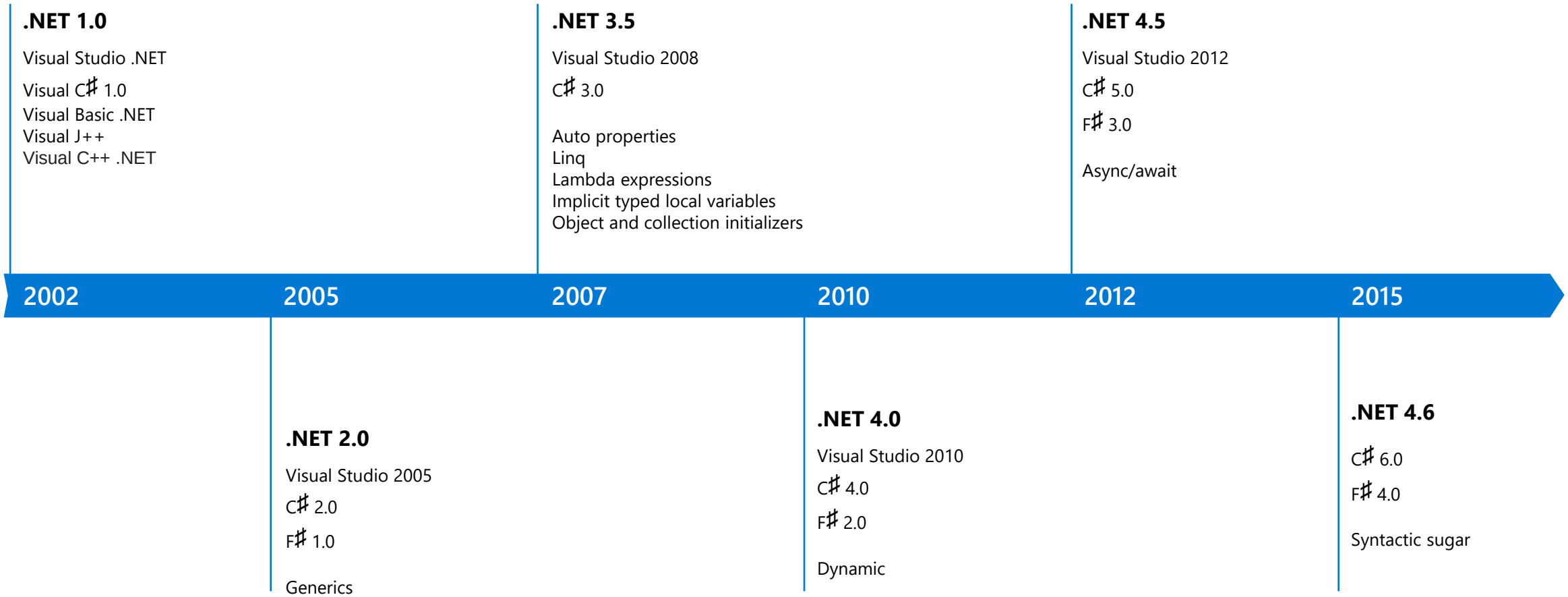
.NET Platforms





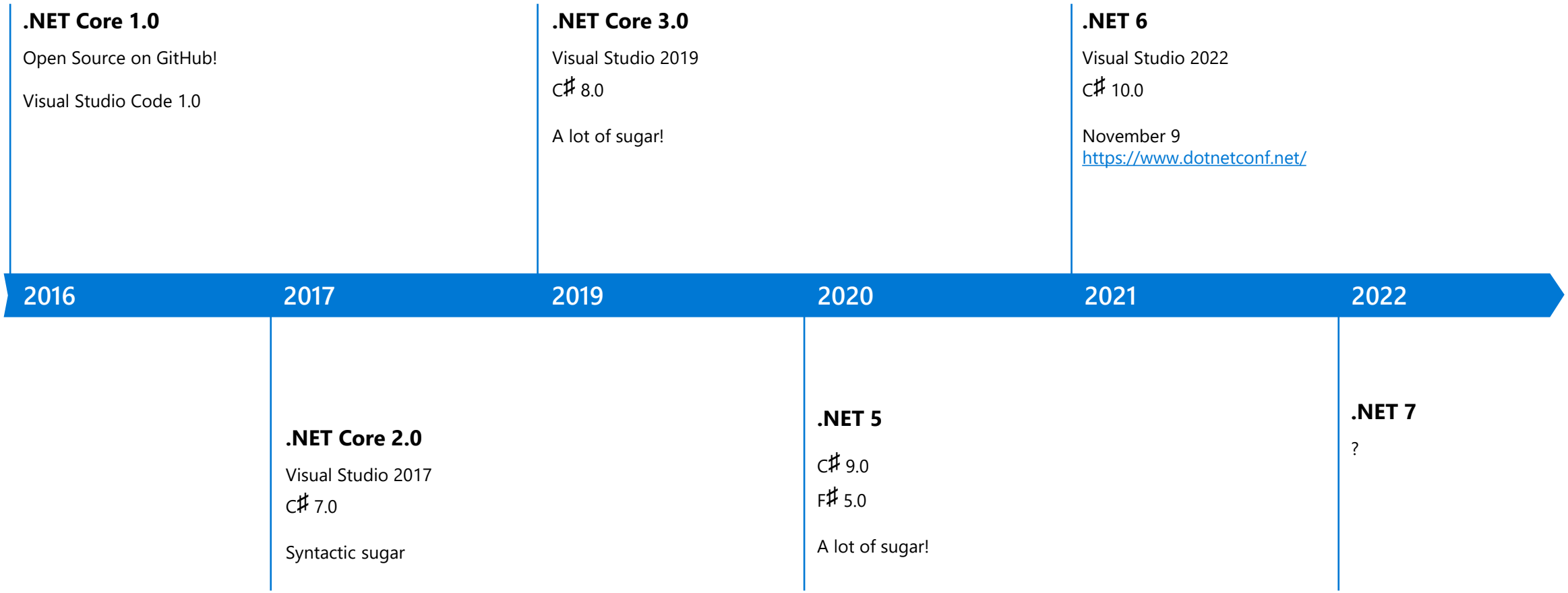


.NET Timeline



https://docs.microsoft.com/en-us/dotnet/csharp/whats-new/csharp-version-history

.NET Timeline II



https://docs.microsoft.com/en-us/dotnet/csharp/whats-new/csharp-version-history


Test-Driven Development

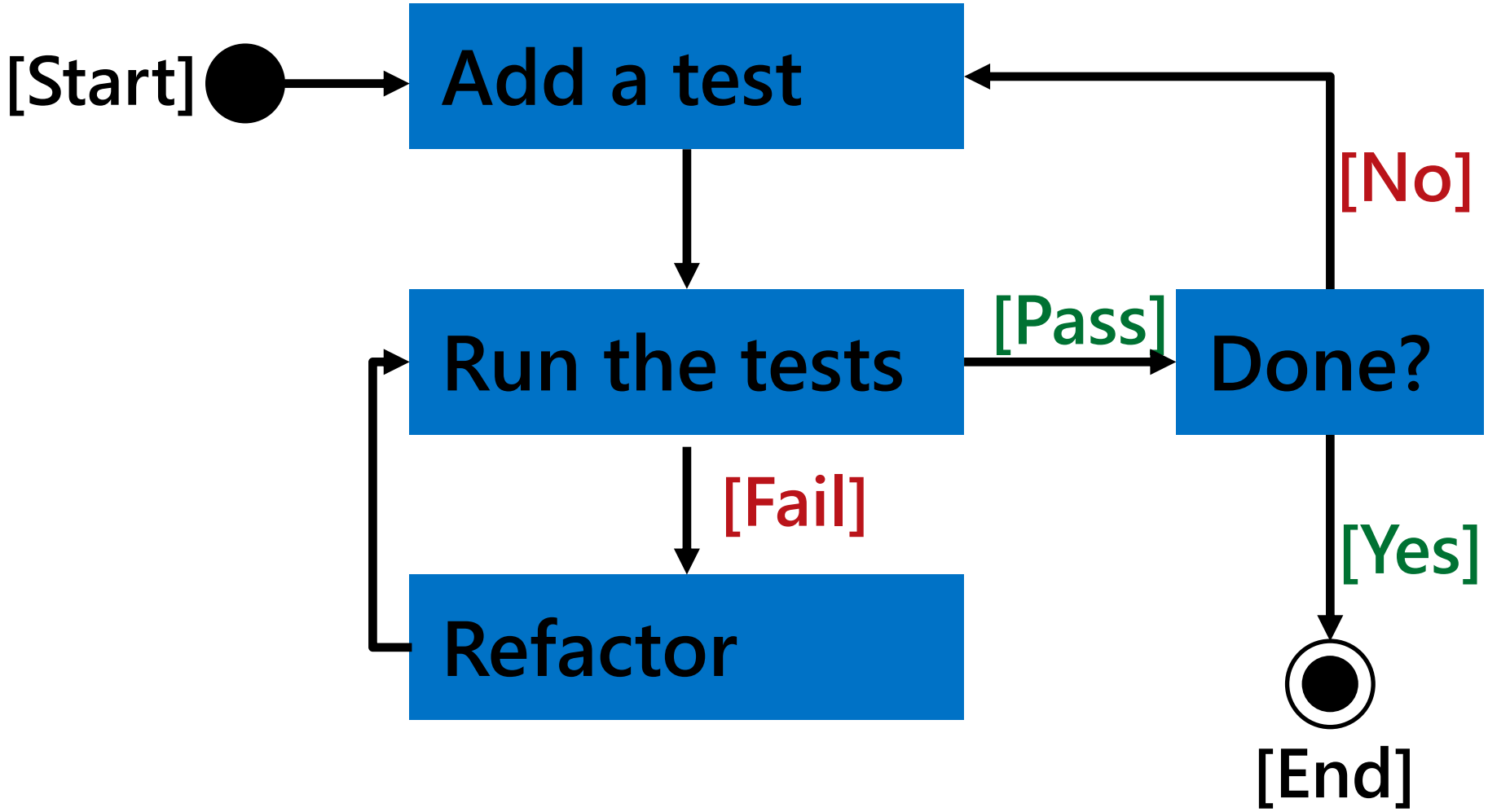
Test-Driven Development – What? – Why? – How?

WHAT?

WHY?

HOW?

Red – Green - Refactor



Trunk Based Development

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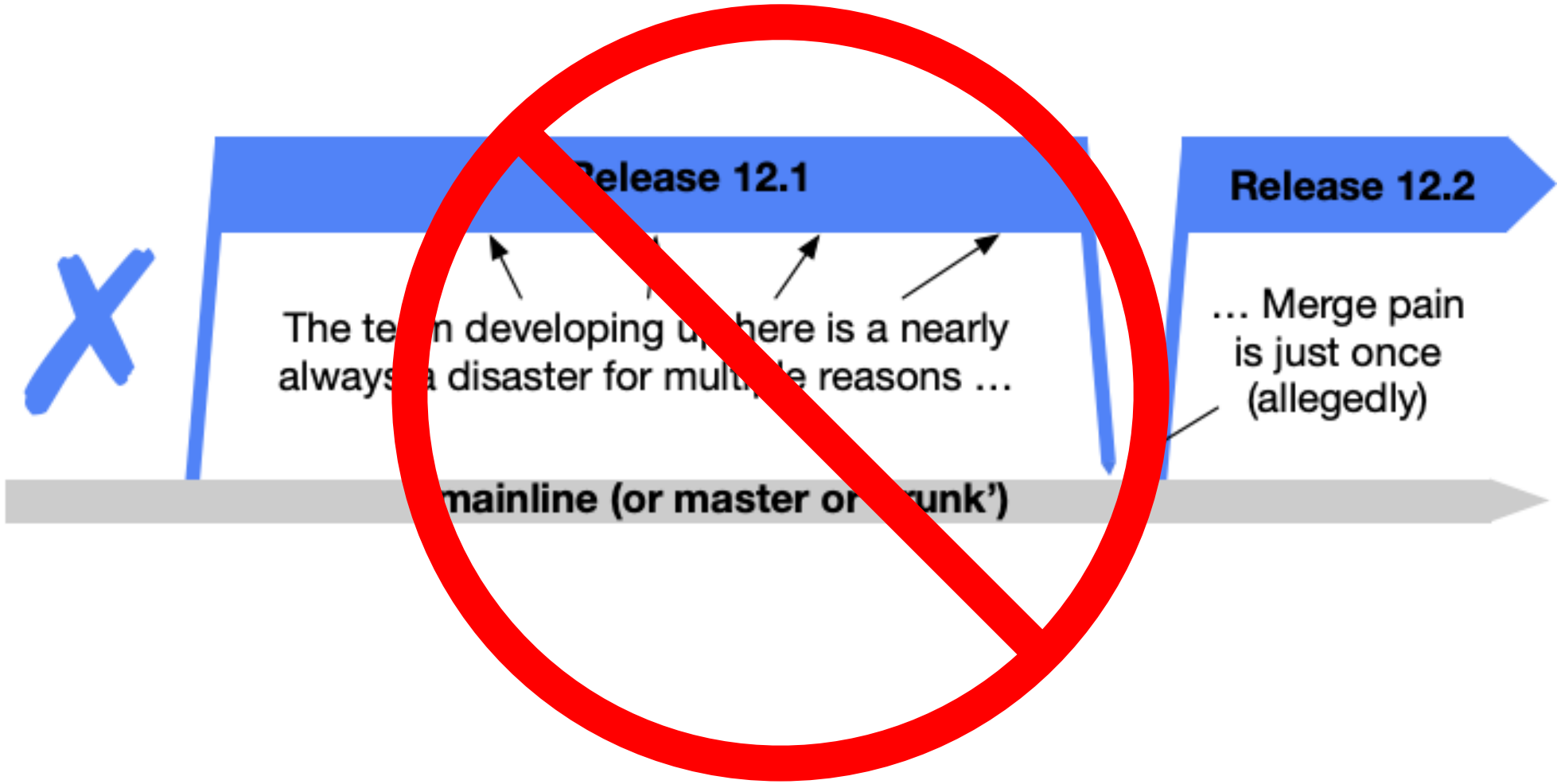
Trunk Based Development – What?

A source-control branching model, where developers collaborate on code in a single branch called ‘trunk’ *, resist any pressure to create other long-lived development branches by employing documented techniques. They therefore avoid merge hell, do not break the build, and live happily ever after.

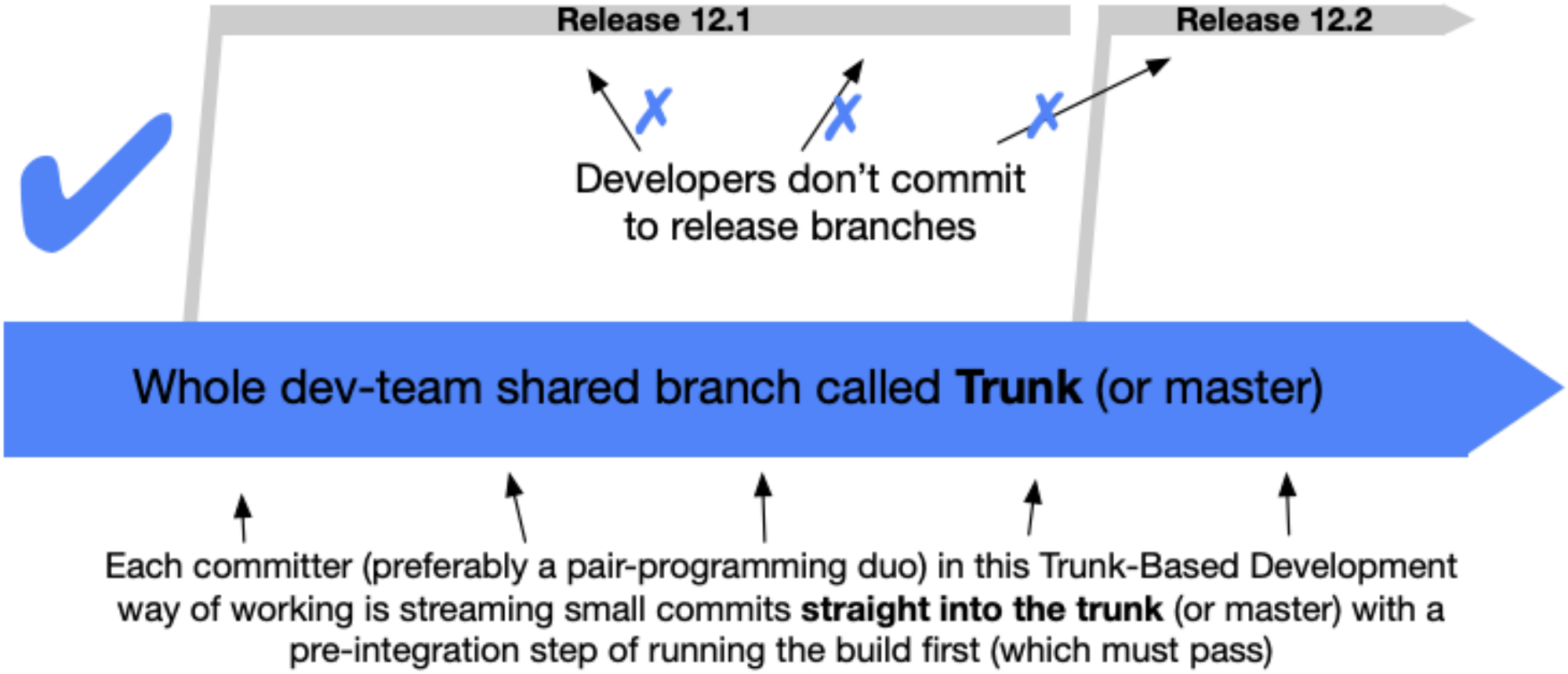
master/main, in Git nomenclature

Source: https://trunkbaseddevelopment.com/

Shared branches off mainline/master/trunk are bad at any release cadence

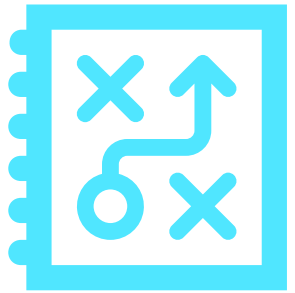


Trunk Based Development – How?



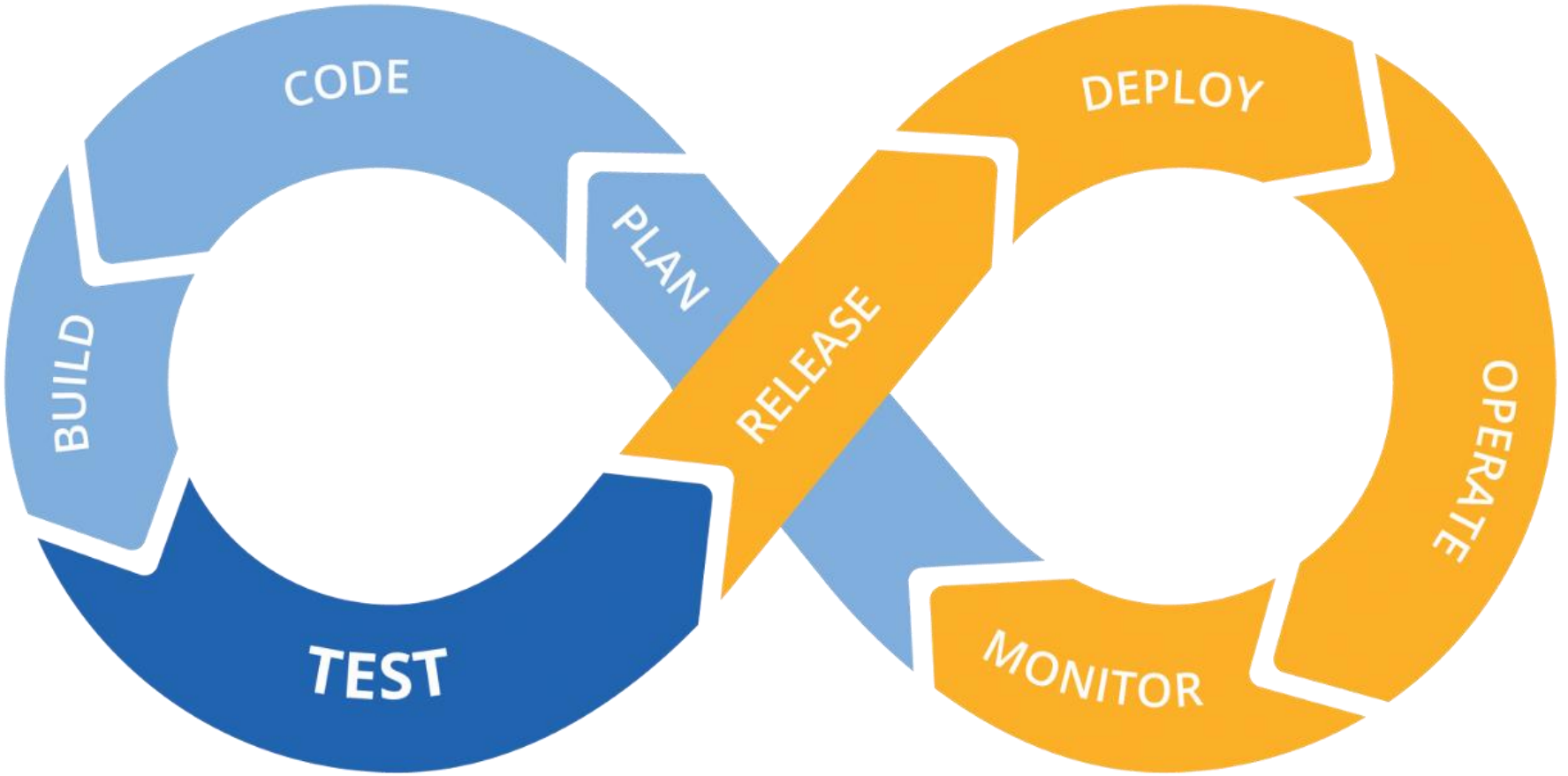
Branching strategy vs. tactics

Short-lived < 1 day



No *strategy*!

Continuous Integration



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Continuous Integration – What?

Continuous Integration (CI) is the process of automating the build and testing of code every time a team member commits changes to version control.

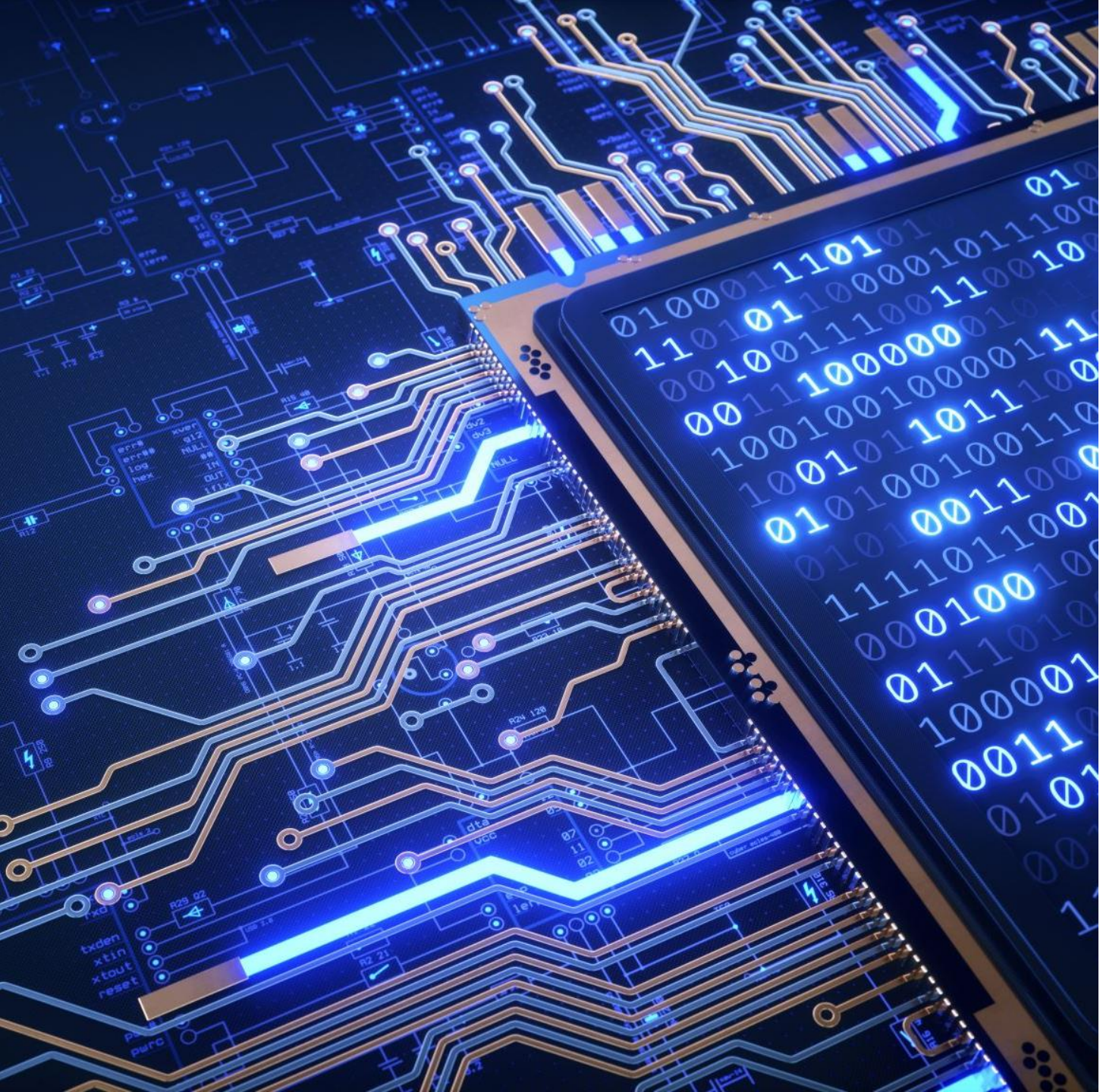
Source: https://docs.microsoft.com/en-us/devops/develop/what-is-continuous-integration

Demo

Test-Driven C♯ using Continuous Integration and Trunk Based Development


Thank you

Appendix



Create a C# console app with a test library

```
mkdir MyApp
cd MyApp

dotnet new console -o MyApp
dotnet new xunit -o MyApp.Tests

dotnet new sln
dotnet sln add MyApp
dotnet sln add MyApp.Tests
dotnet add MyApp.Tests
reference MyApp
```

Build, test, and run your app

```
dotnet build
dotnet test
dotnet run --project MyApp
```

Naming conventions

Composed names

`currentLayout`, `CurrentLayout`

Variables and fields

`vehicle`, `leftElement`

Private fields

`_vehicle`, `_leftElement`

Methods

`CurrentVehicle()`, `Size()`

Properties

`Pi`, `Name`, `Size`

Classes

`MyClass`, `List<T>`

Interfaces

`IException`, `IObserver`

https://docs.microsoft.com/en-us/dotnet/standard/design-guidelines/naming-guidelines

The C# class

```
using System;

namespace Namespace
{
    public class Class
    {
        private string _field;

        protected DateTime _inheritableField;

        public string Property { get => _field; } // Getter

        public int AutoProperty { get; set; }

        public Class() // Constructor
        {
        }
```

The C# class (methods)

```
public object InstanceMethod(int parameter)
{
    return null;
}

public virtual object OverridableInstanceMethod(bool parameter)
{
    return null;
}

public static void StaticMethod()
{
}

private void PrivateInstanceMethod()
{
}
```

The C# class (events and delegates)

```
        public event EventHandler Event;

        protected virtual void OnEvent(EventArgs e)
        {
            EventHandler handler = Event;
            handler?.Invoke(this, e);
        }

    }

    public delegate void MyEventHandler(object sender, EventArgs e);
}
```

Built-in types

```
bool boolean; // true || false
char character;  // 'a', 'b', 'c', '1', '2', '3'

// Floating point numeric types
decimal precisionFloatingPoint;
double floatingPoint64bit;
float floatingPoint32Bit;

// Integral numeric types
byte integer8bit;
int integer32bit;
long integer64bit;
short integer16bit;

sbyte signedByte;
uint unsignedInteger32bit;
ulong unsignedInteger64bit;
ushort unsignedInteger16bit;

// Reference types
object _object;
string _string;
dynamic dynamic;
```

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

Basic Unit Test

```
public class Ticker
{
    public int Counter { get; private set; }
    public void Increment() => Counter++;
}

public class TickerTests
{
    [Fact]
    public void Increment_when_called_increases_Counter_by_1()
    {
        // Arrange
        var sut = new Ticker();

        // Act
        sut.Increment();

        // Assert
        Assert.Equal(1, sut.Counter);
    }
}
```