.NET Standard

Reuse All the Code

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Hi, I'm J.

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github.com/jonathantower/dotnet-standard

If You Give $100, So Will I!

bit.ly/cnug-h2o

"charity:water is a non-profit organization that provides clean and safe drinking water to people in developing nations. The organization was founded in 2006 and has helped fund 22,936 projects in 24 countries, benefiting over 4.6 million people." - Wikipedia

"4/4 Stars"
- CharityNavigator.org

charity: water

Overview

What is the .NET Standard?

Why should I care?

- DEMO: How to read Nuget listing
- DEMO: Creating a .NET Standard library from scratch

Compare/Contrast with Portable Class Libraries (PCLs)

DEMO: Converting a PCL to .NET Standard

.NET Standard v2.0 & v2.1

What is .NET Standard?

The .NET Standard is a formal specification of .NET APIs

Intended to be available on all .NET runtimes/platforms

.NET Standard is a specification, not an implementation

Specification in code

.NET Standard?

NOT another name for non-Core version of .NET (.NET Framework)

Terminology:

- Platform/Flavor
- .NET Framework
- .NET Core
- .NET Standard
- .NET

Goals of .NET Standard

Create and maintain consistency between the .NET platforms

Uniform set of APIs on all .NET platforms

Portable libraries across platforms

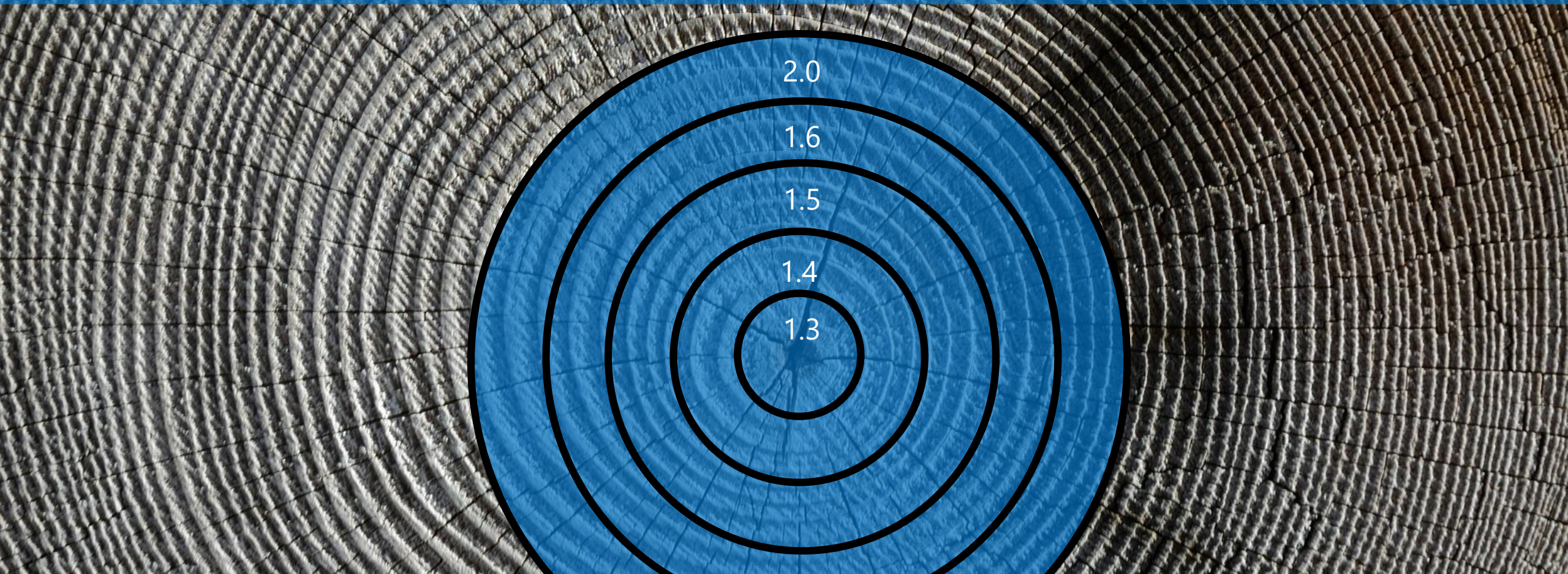
Reduce/eliminate conditional compilation

The Standards Gap

A standard exists for .NET runtime implementations (ECMA 335)

No standard existed for .NET Base Class Library (BCL) implementations

.NET Standard Versioning: Additive



.NET Standard Versioning: Immutable

.NET Standard	1.0	1.1	1.2	1.3	1.4	1.5	1.6	2.0	2.1
.NET Core	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**	**2.0**	
.NET Framework	4.5	**4.5**	**4.5.1**	**4.6**	4.6.1	4.6.1	4.6.1	**4.6.1**	
Mono	4.6	4.6	4.6	4.6	4.6	4.6	**4.6**	**5.4**	
Xamarin.iOS	10.0	10.0	10.0	10.0	10.0	10.0	**10.0**	**10.14**	
Xamarin.Mac	3.0	3.0	3.0	3.0	3.0	3.0	**3.0**	**3.8**	
Xamarin.Android	7.0	7.0	7.0	7.0	7.0	7.0	**7.0**	**8.0**	
Unity	2018.1	2018.1	2018.1	2018.1	2018.1	2018.1	2018.1	**2018.1**	
Universal Windows Platform	10.0	10.0	10.0	10.0	**10.0**	10.0.16299	10.0.16299	**10.0.16299**	
Windows	8.0	**8.0**	**8.1**						
Windows Phone	8.1	8.1	**8.1**						
Windows Phone Silverlight	**8.0**								

https://github.com/dotnet/standard/blob/master/docs/versions.md

What's Included?

BCLs, but **NOT** FCLs

FCLs:
- WPF
- WCF
- ASP.NET
- WinForms
- …

David Fowler's "Developer Analogy"

```
// .NET Standard
interface INetStandard10
{
    void Primitives();
    void Reflection();
    void Tasks();
    void Collections();
    void Linq();
}
```

```
interface INetStandard11 :
    INetStandard10
{
    void ConcurrentCollections();
    void InteropServices();
}

interface INetStandard12 :
     INetStandard11
{
    void ThreadingTimer();
}

...
```

David Fowler's "Developer Analogy"

```
// .NET Framework
interface INetFramework45 : INetStandard11
{
    void FileSystem();
    void Console();
    void ThreadPool();
    void Crypto();
    void WebSockets();
    void Process();
    void Sockets();
    void AppDomain();
    void Xml();
    void Drawing();
    void SystemWeb();
    void WPF();
    void WindowsForms();
    void WCF();
}

// Mono
interface IMono43 : INetFramework46
{
    void MonoSpecificApi();
}
```

```
// Windows Universal Platform
interface IWindowsUniversalPlatform : INetStandard14
{
    void GPS();
    void Xaml();
}

// Xamarin
interface IXamarinIOS : INetStandard15
{
    void AppleAPIs();
}

interface IXamarinAndroid : INetStandard15
{
    void GoogleAPIs();
}

// .NET Core
interface INetCoreApp10 : INetStandard15 { }
```

David Fowler's "Developer Analogy"

```
class Example
{
    public void FuturePlatformApplication(ISomeFuturePlatform platform)
    {
        JsonNet(platform); //JSON.NET supports .NET Standard 1.0
    }

    public void JsonNet(INetStandard10 platform)
    {
        platform.Linq();
        platform.Reflection();
        platform.Collections();
    }
}
```

David Fowler's "Developer Analogy"

MORE: http://bit.ly/dev-analogy

Why Should I Care?

Two Reasons You Will Care

Consuming others' x-platform libraries from Nuget

DEMO

Creating your own x-platform libraries

DEMO

.NET Standard vs Other Ways to Share

Other Ways to Share Code

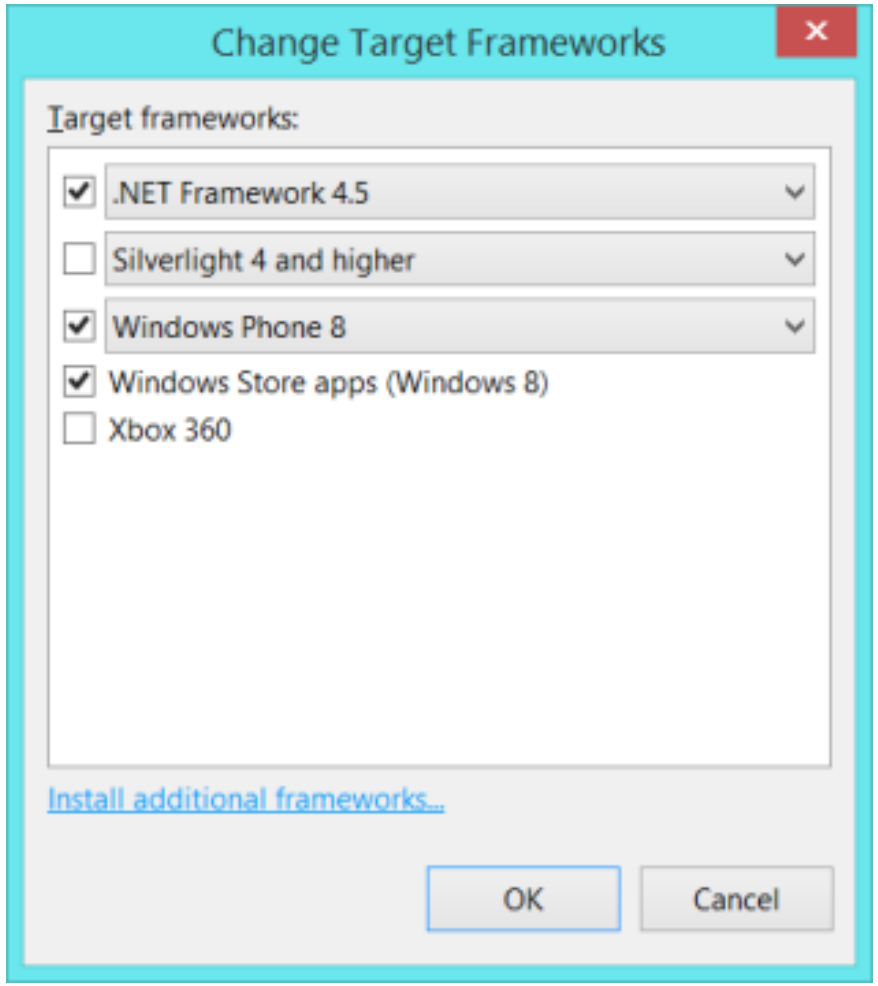
1. Completely different implementation per target
2. Linked files in source control
3. #if defs
4. Portable Class Libraries (PCLs)

Portable Class Libraries (PCLs)

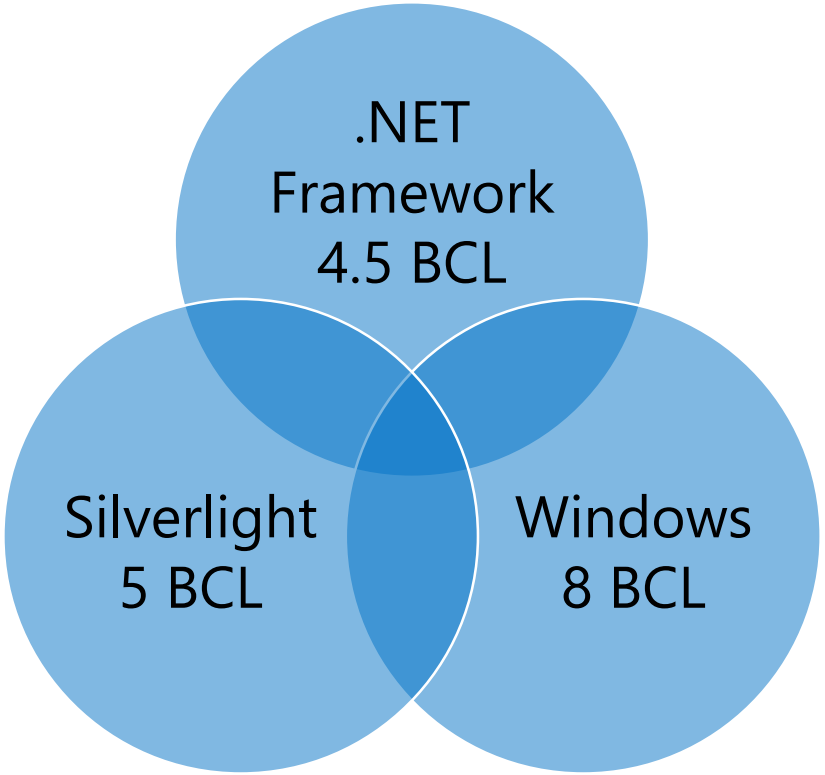
Problems with PCLs

Sheer number of permutations

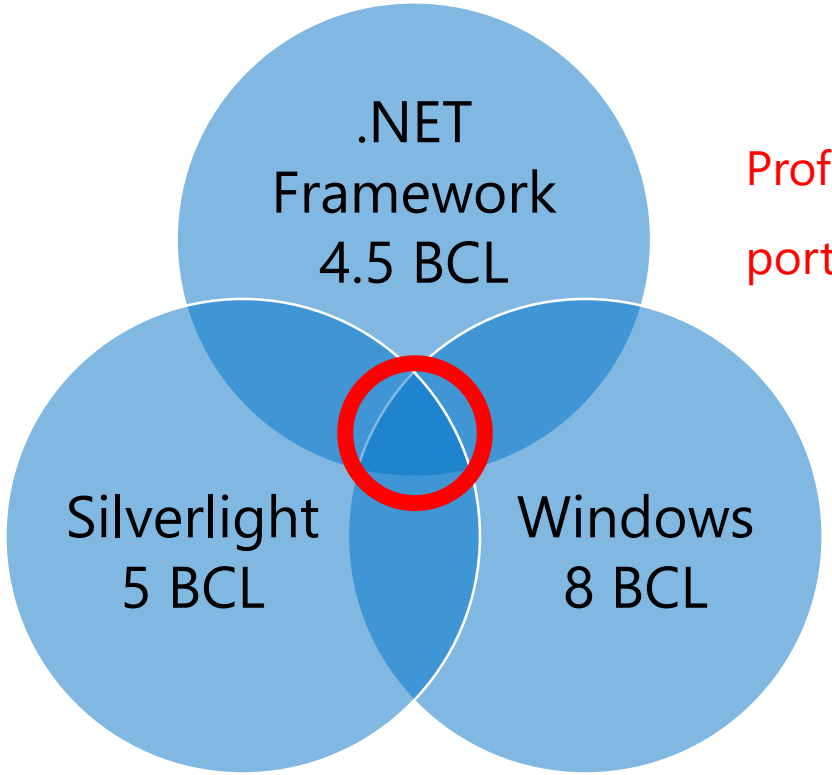
Intersection of APIs, not union



PCLs: Intersection of APIs

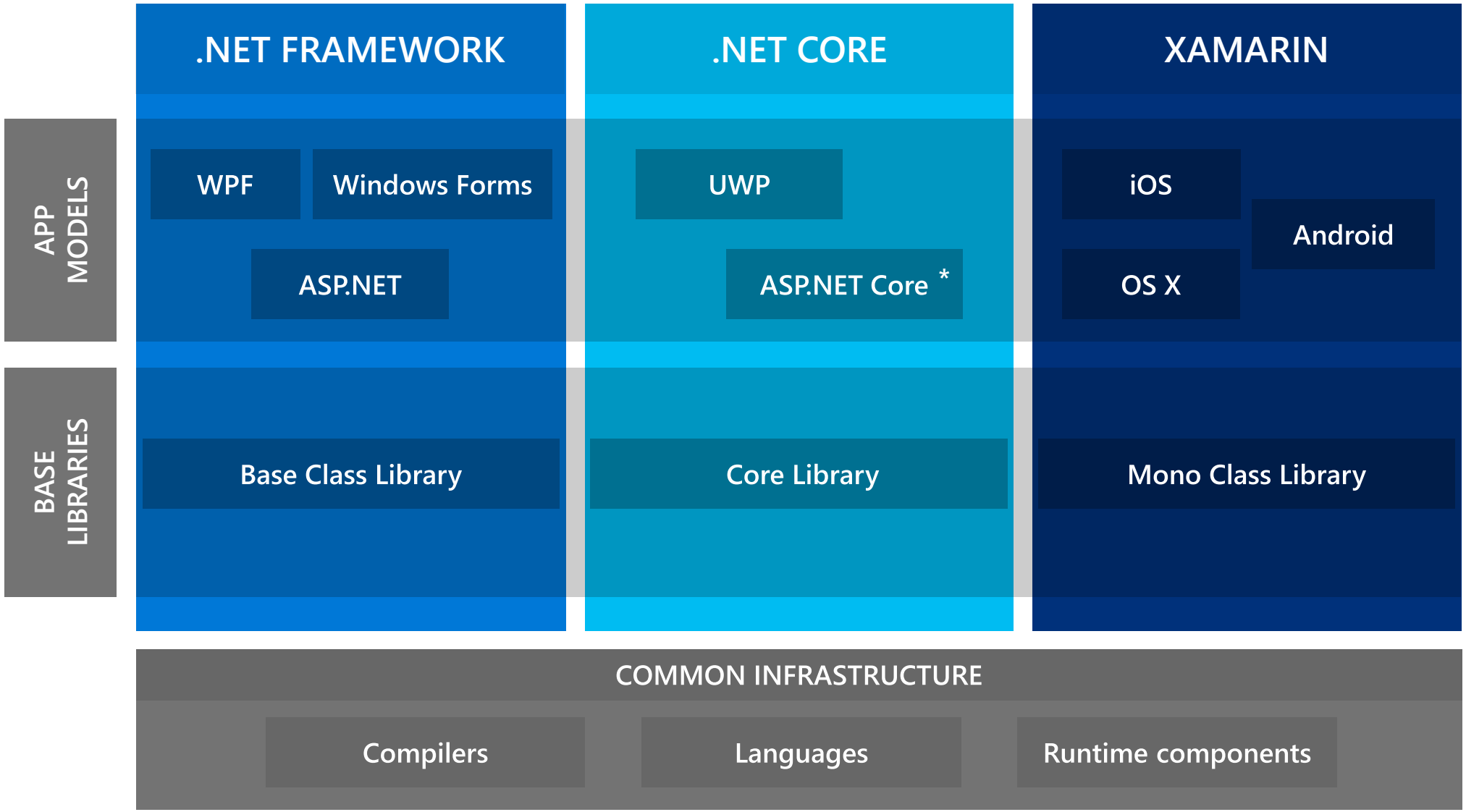


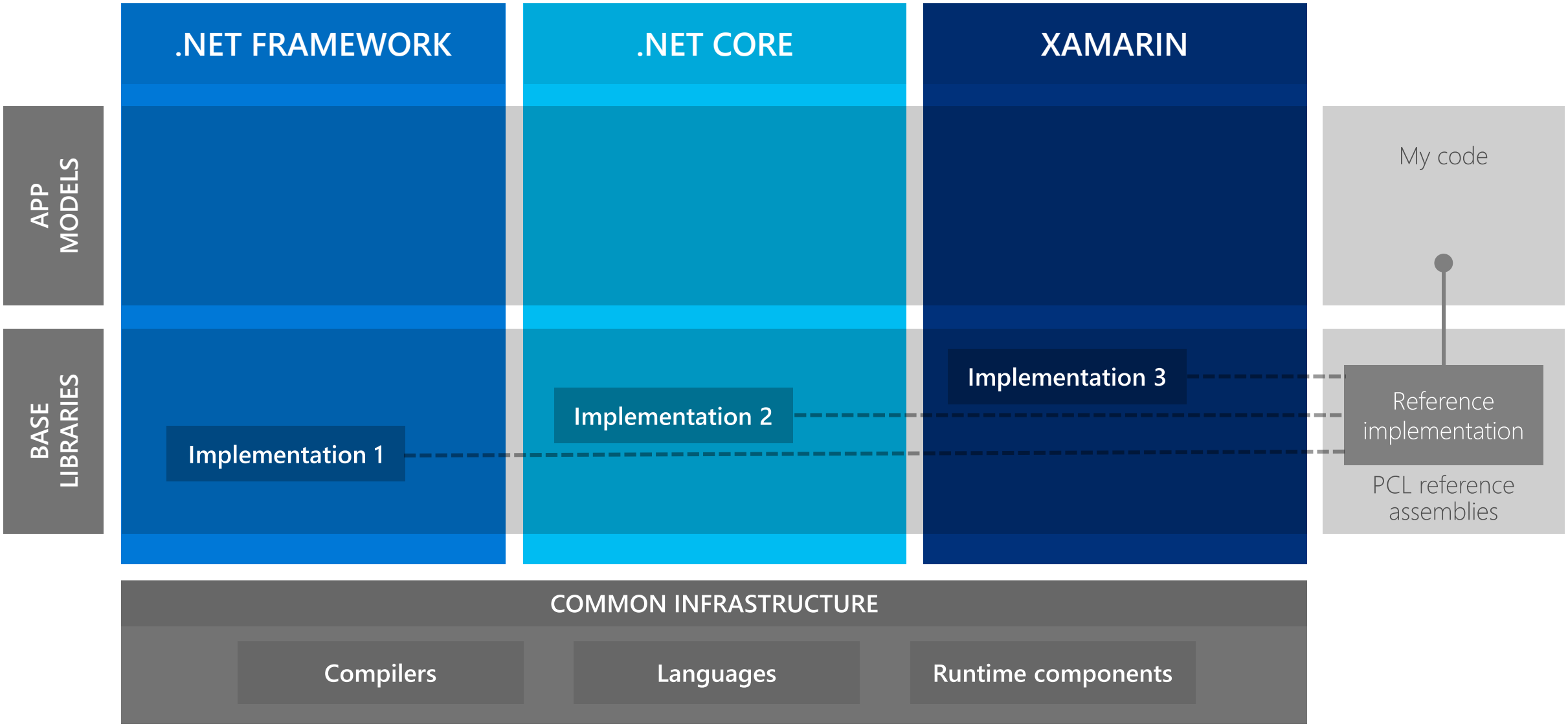
PCLs: Intersection of APIs



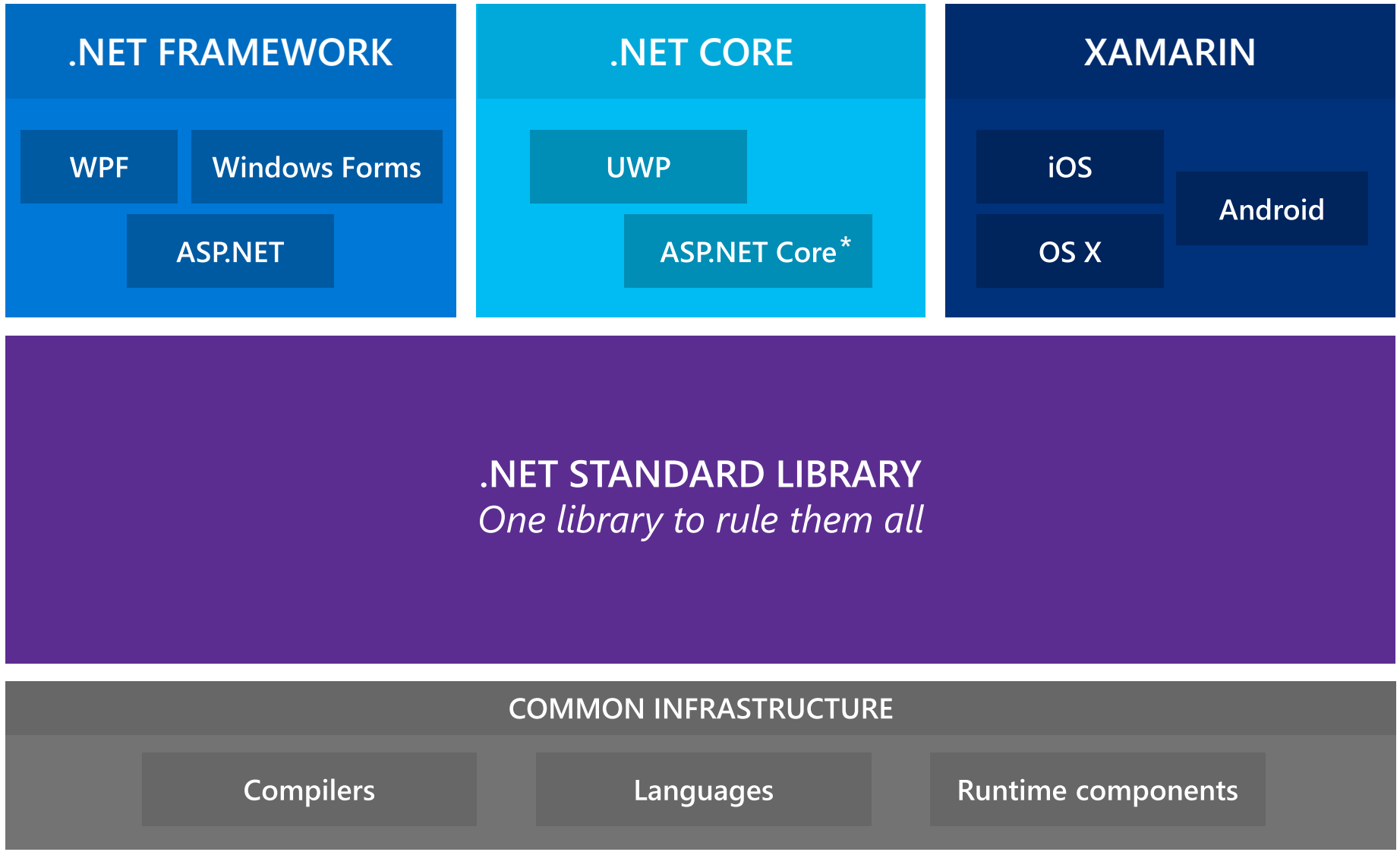
Profile47

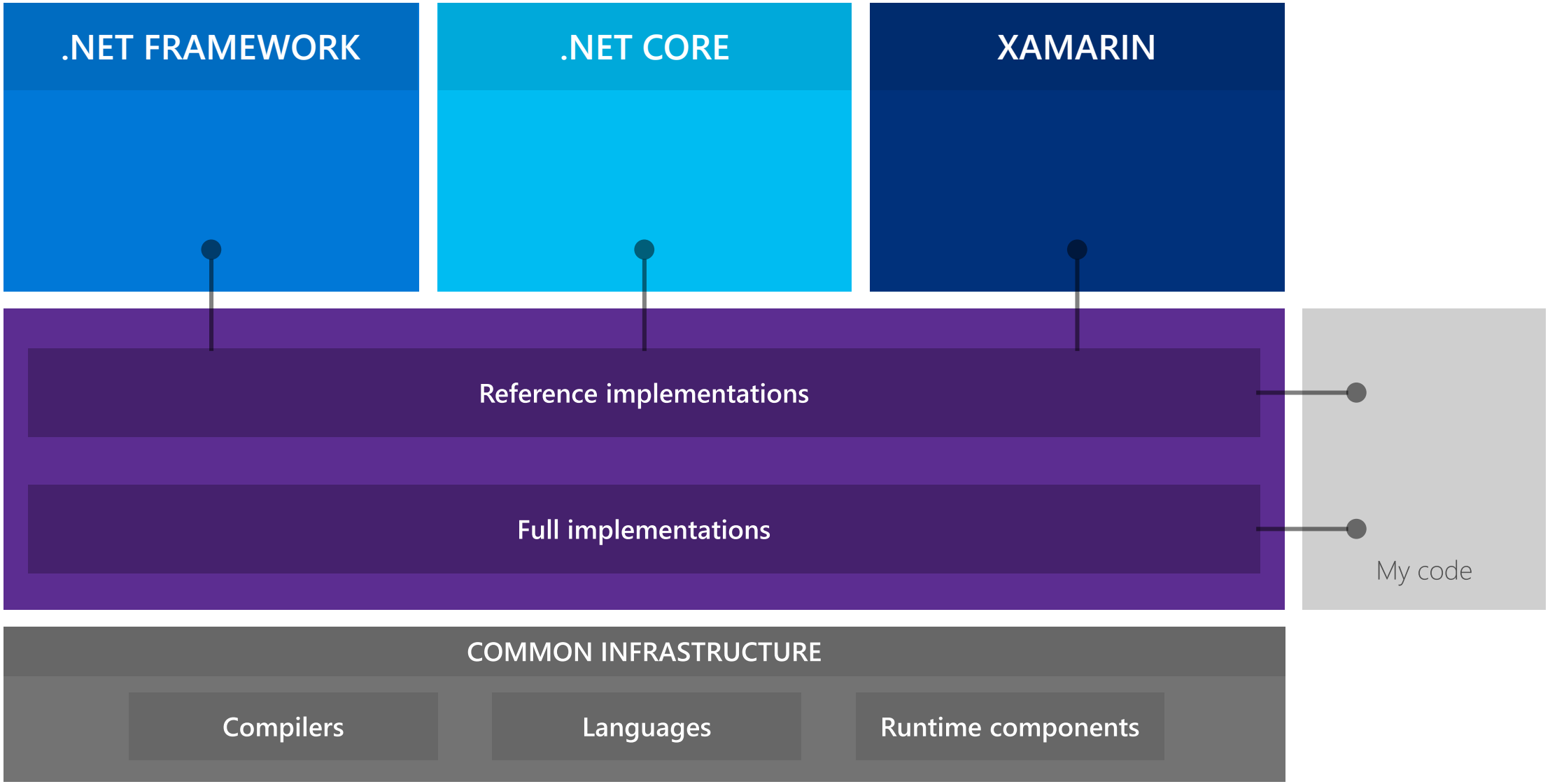
portable-net45+sl50+win8


.NET FRAMEWORK
.NET CORE
XAMARIN
APP MODELS
WPF
Windows Forms
ASP.NET
UWP
ASP.NET Core *
iOS
Android
OS X
BASE LIBRARIES
Base Class Library
Core Library
Mono Class Library
COMMON INFRASTRUCTURE
Compilers
Languages
Runtime components

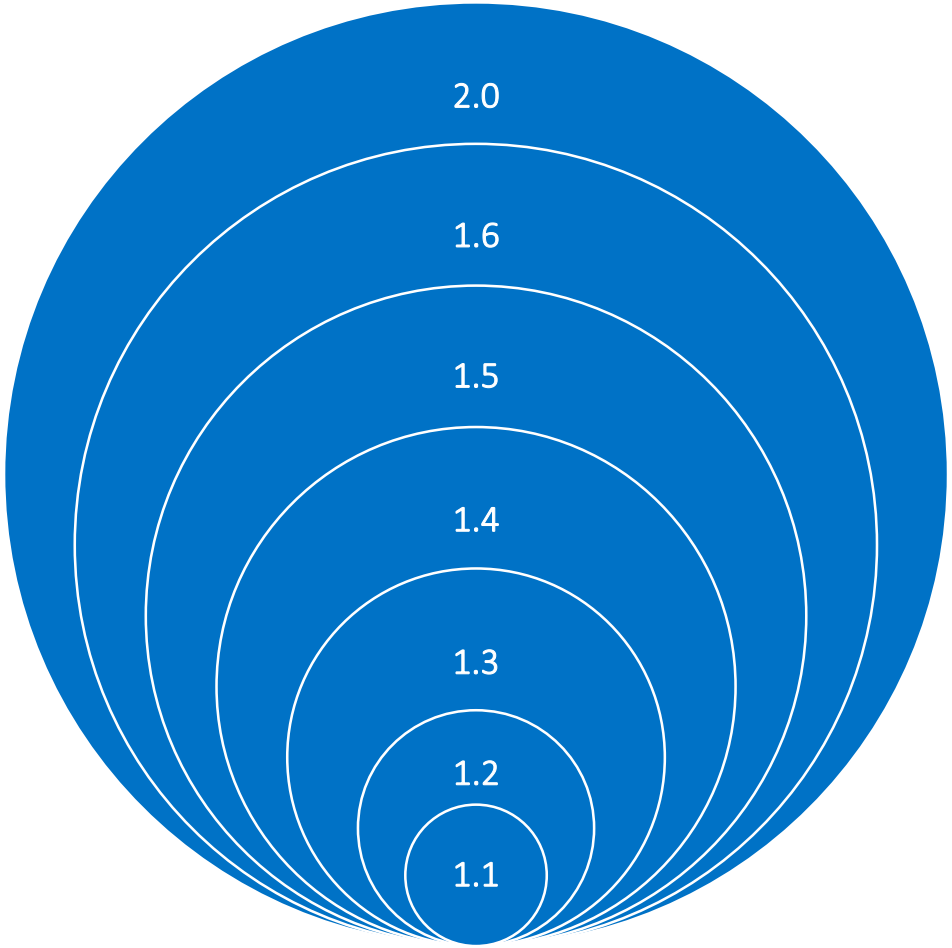

.NET FRAMEWORK
.NET CORE
XAMARIN
APP MODELS
BASE LIBRARIES
My code
Implementation 3
Implementation 2
Implementation 1
Reference implementation
PCL reference assemblies
COMMON INFRASTRUCTURE
Compilers
Languages
Runtime components

.NET Standard


.NET FRAMEWORK
WPF
Windows Forms
ASP.NET
.NET CORE
UWP
ASP.NET Core*
XAMARIN
iOS
Android
OS X
.NET STANDARD LIBRARY
One library to rule them all
COMMON INFRASTRUCTURE
Compilers
Languages
Runtime components


.NET FRAMEWORK
.NET CORE
XAMARIN
Reference implementations
Full implementations
My code
COMMON INFRASTRUCTURE
Compilers
Languages
Runtime components

.NET Standard: Curated Set of APIs



More APIs / Fewer Platforms

Comparison: .NET Standard to Portable Class Libraries

.NET Standard: sort of the next generation of PCLs

“Standard-based PCL” vs “profile-based PCL”

Soft reference through a go-between vs hard-coded reference

Comparison: .NET Standard to Portable Class Libraries

.NET Standard	PCLs
A curated set of APIs	Profiles are defined by intersections of existing platforms
Linearly versions	PCL profiles do not linearly version.
Agnostic to platform	PCL profiles represents Microsoft platforms

PCL Compatibility

Microsoft.NETCore.Portable.Compatibility

Enable .NET Standard-based PCLs to reference profile-based PCLs.

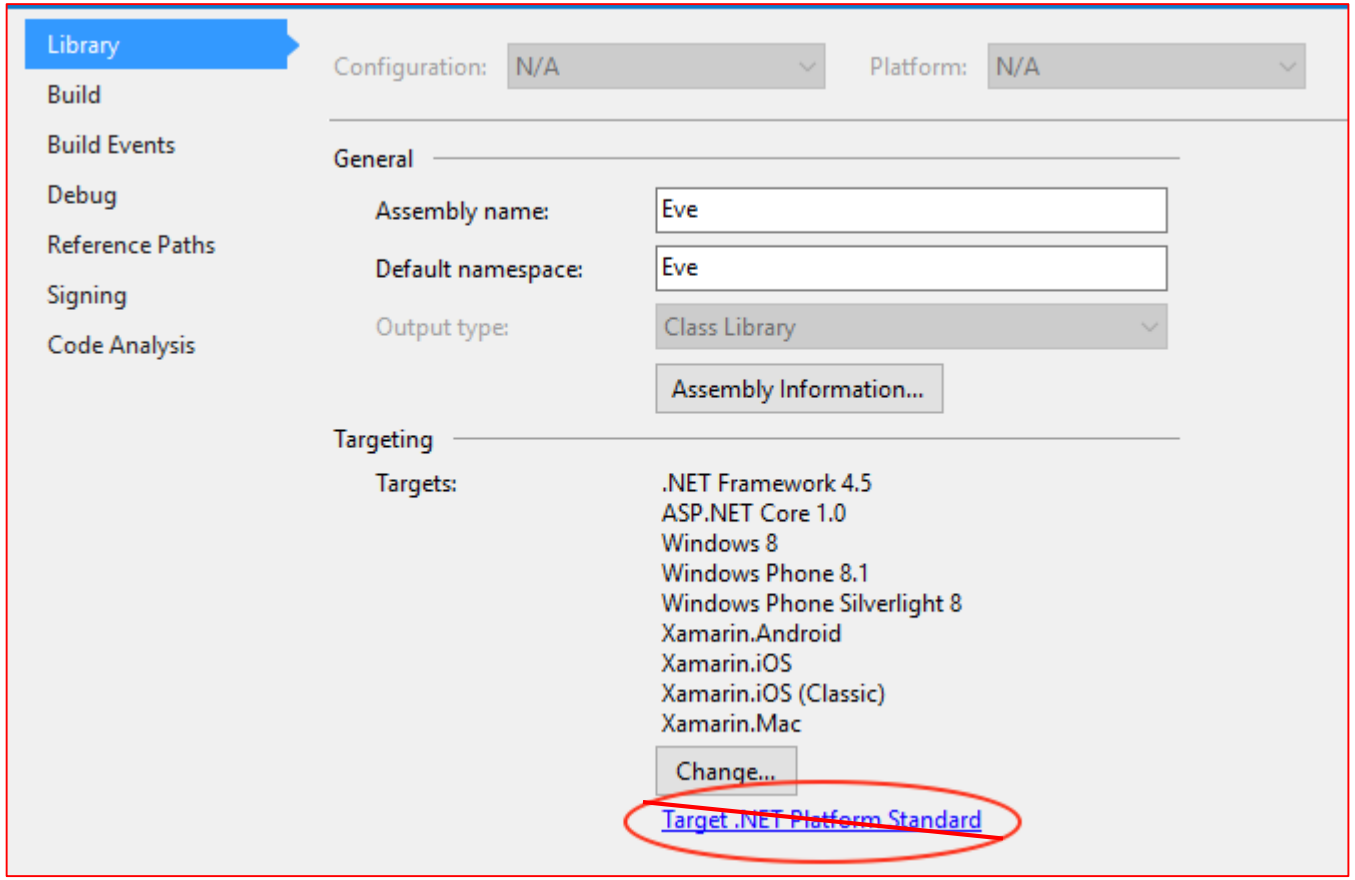
Enable profile-based PCLs to be packaged as .NET Standard-based PCLs.

PCL Profile	.NET Standard	PCL Platforms
Profile7	1.1	.NET Framework 4.5, Windows 8
Profile31	1.0	Windows 8.1, Windows Phone Silverlight 8.1
Profile32	1.2	Windows 8.1, Windows Phone 8.1
Profile44	1.2	.NET Framework 4.5.1, Windows 8.1
Profile49	1.0	.NET Framework 4.5, Windows Phone Silverlight 8
Profile78	1.0	.NET Framework 4.5, Windows 8, Windows Phone Silverlight 8
Profile84	1.0	Windows Phone 8.1, Windows Phone Silverlight 8.1
Profile111	1.1	.NET Framework 4.5, Windows 8, Windows Phone 8.1
Profile151	1.2	.NET Framework 4.5.1, Windows 8.1, Windows Phone 8.1
Profile157	1.0	Windows 8.1, Windows Phone 8.1, Windows Phone Silverlight 8.1
Profile259	1.0	.NET Framework 4.5, Windows 8, Windows Phone 8.1, Windows Phone Silverlight 8

DEMO: PCL Conversion

Convert a PCL to .NET Standard

Removed in VS 2017 15.7.4



.NET Standard 2.0

.NET Standard 1.6 -> 2.0

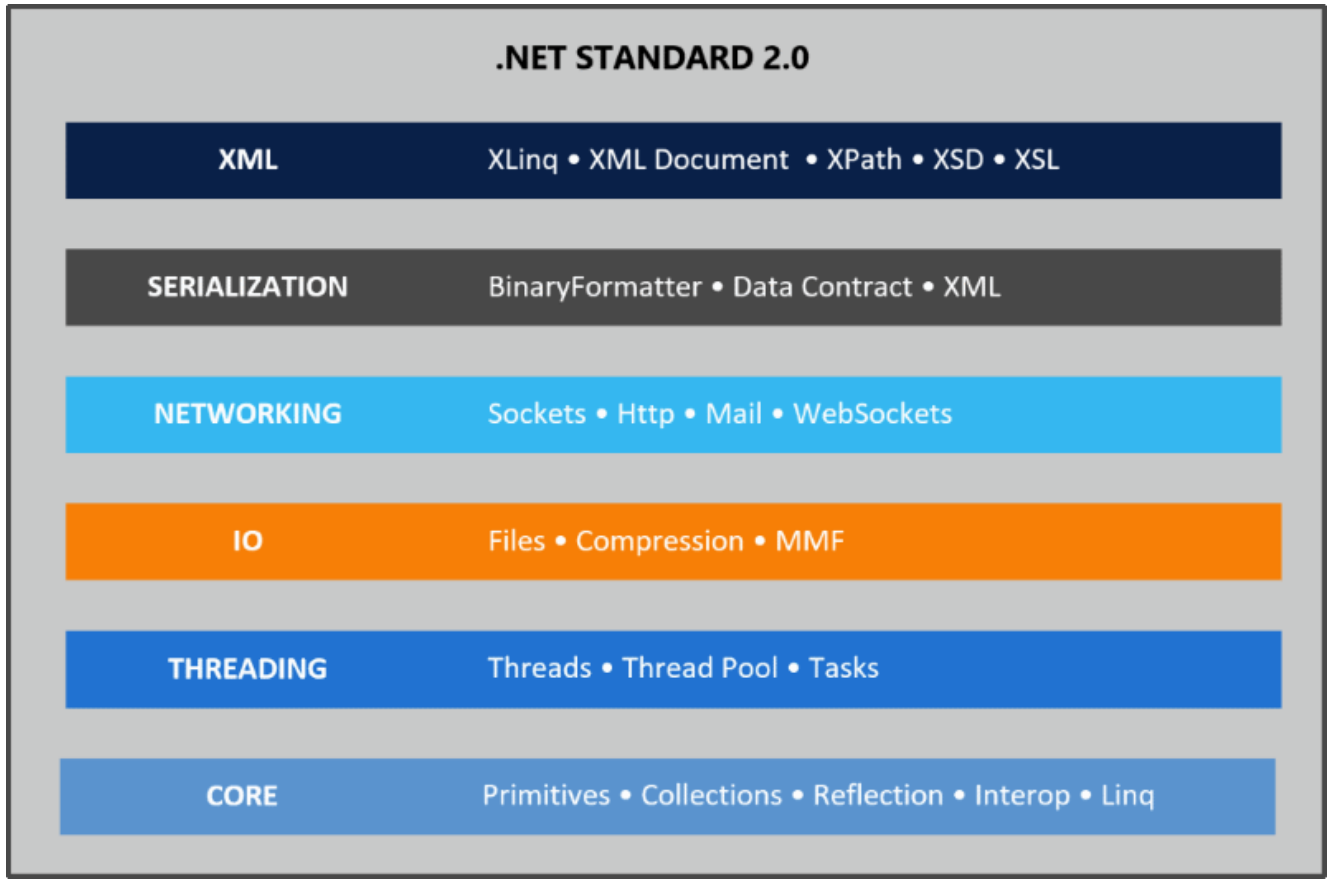
August 2017

With .NET Core 2.0

Huge!

20k new APIs

(or 149% increase)



.NET Standard 2.1

.NET Standard 2.1

3k new APIs

800 new members in .NET Core

Span<T> and foundational-APIs working with spans

Reflection emit

SIMD

ValueTask and ValueTask<T>

DbProviderFactories

System.HashCode

System.String overloads

.NET Standard 2.1

Currently ~ 63% complete

Released with .NET Core 3.0 in late 2019 (watch BUILD for details)

.NET Standard 2.1 Support

- .NET Core 3.0
- Future versions of Xamarin, Mono, and Unity
- Note: .NET Framework 4.8 remains on .NET Standard 2.0

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.NET Framework	4.5	**4.5**	**4.5.1**	**4.6**	4.6.1	4.6.1[1]	4.6.1[1]	**4.6.1**[1]	*N/A*[2]
Mono	4.6	4.6	4.6	4.6	4.6	4.6	**4.6**	**5.4**	**6.2**
Xamarin.iOS	10.0	10.0	10.0	10.0	10.0	10.0	**10.0**	**10.14**	**12.12**
Xamarin.Mac	3.0	3.0	3.0	3.0	3.0	3.0	**3.0**	**3.8**	**5.12**
Xamarin.Android	7.0	7.0	7.0	7.0	7.0	7.0	**7.0**	**8.0**	**9.3**
Unity	2018.1	2018.1	2018.1	2018.1	2018.1	2018.1	2018.1	**2018.1**	*TBD*
Universal Windows Platform	8.0	**8.0**	**8.1**	10.0	**10.0**	10.0.16299	10.0.16299	**10.0.16299**	*TBD*

1 The versions listed here represent the rules that NuGet uses to determine whether a given .NET Standard library is applicable. While NuGet considers .NET Framework 4.6.1 as supporting .NET Standard 1.5 through 2.0, there are several issues with consuming .NET Standard libraries that were built for those versions from .NET Framework 4.6.1 projects. For .NET Framework projects that need to use such libraries, we recommend that you upgrade the project to target .NET Framework 4.7.2 or higher.

2 .NET Framework will not support .NET Standard 2.1 or any other later version. For more details, see this blog post.

Source: https://github.com/dotnet/standard/blob/master/docs/versions.md

Recap

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Thank You! Questions?

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- CharityNavigator.org

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