

Mono + .NET Core =



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Mono BCL team

History of Mono

1.0 (2004) – first release

2.0 (2008) – C# 2.0, AOT, SIMD, Linker

3.0 (2012) – C# 5.0, SGen GC

4.0 (2015) – C# 6.0, reference-sources, MIT

5.0 (2017) – Roslyn, MSBuild, .NET Core-sources

X.Y (201..) – More of corefx, corert, WebAssembly

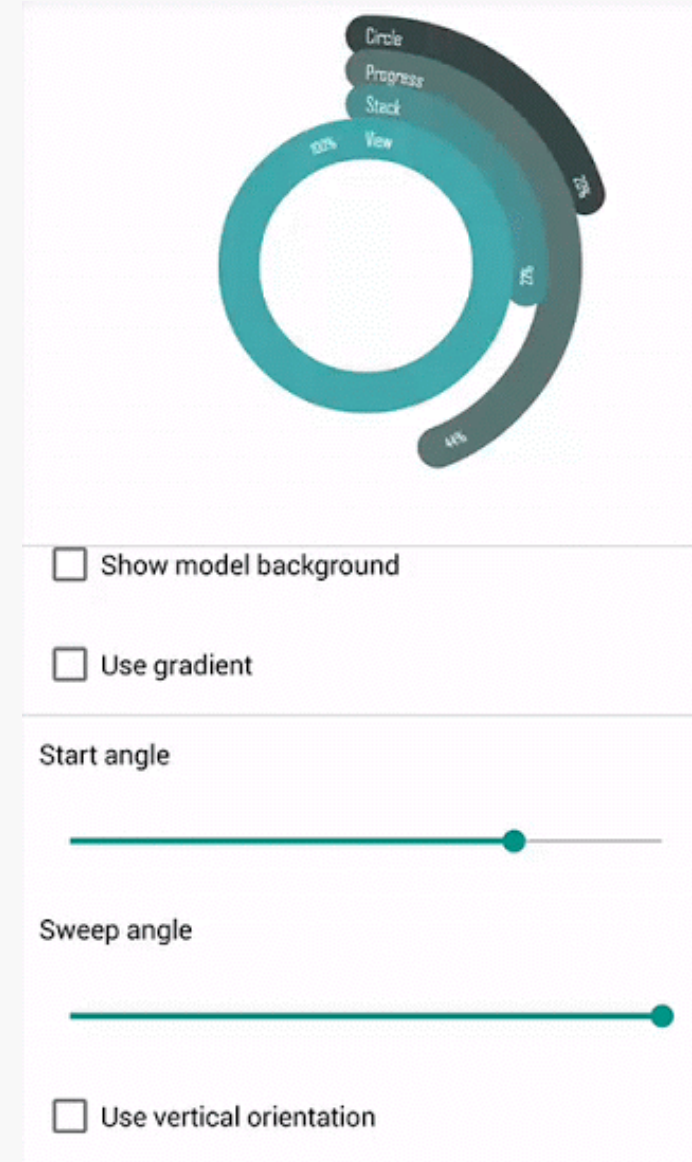
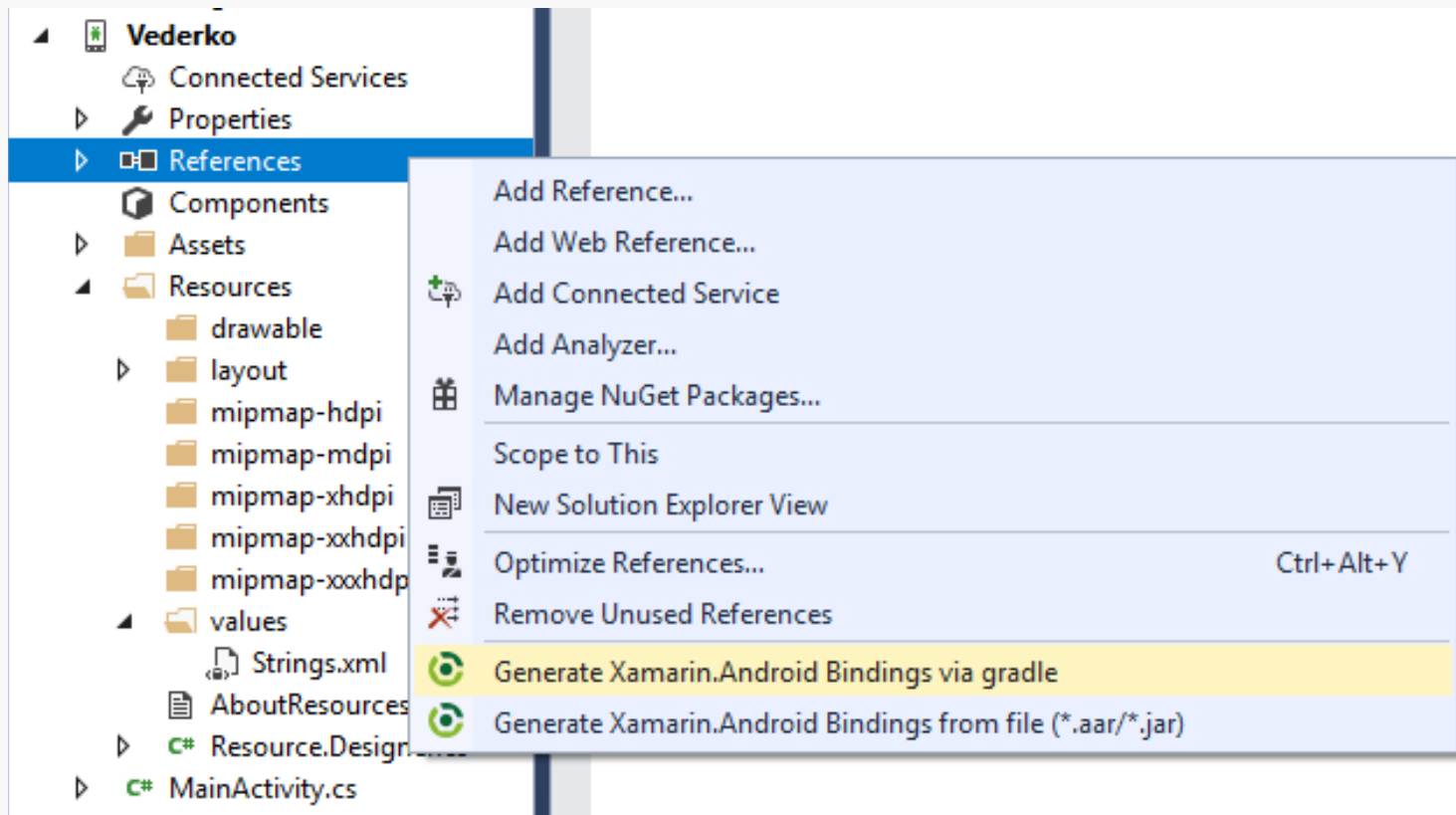


What is cross-platform?

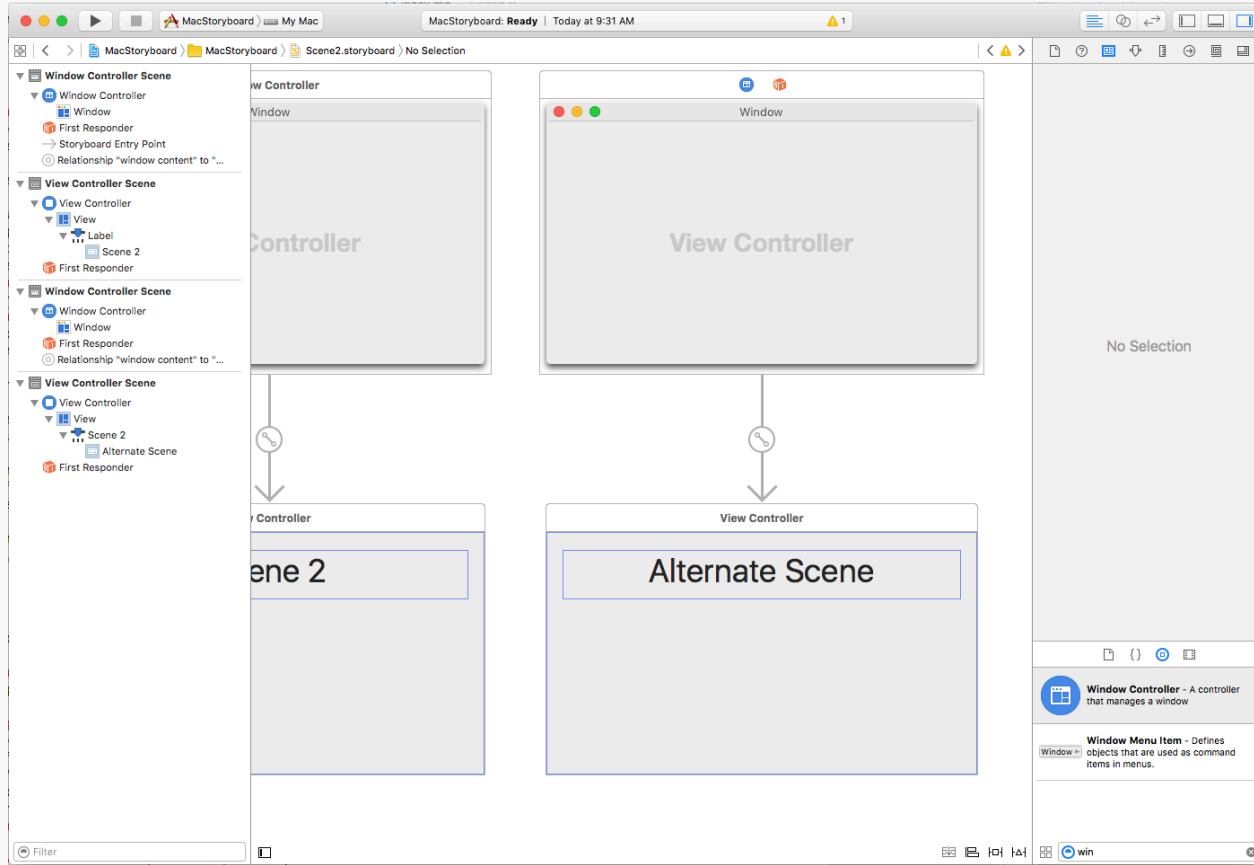
- “Hello world” written in Go/Swift for Android – is it cross-platform?
- NO! Cross-platform is about tools and interoperability

Lots of cool java 3rd parties out there

You can't just ignore them!

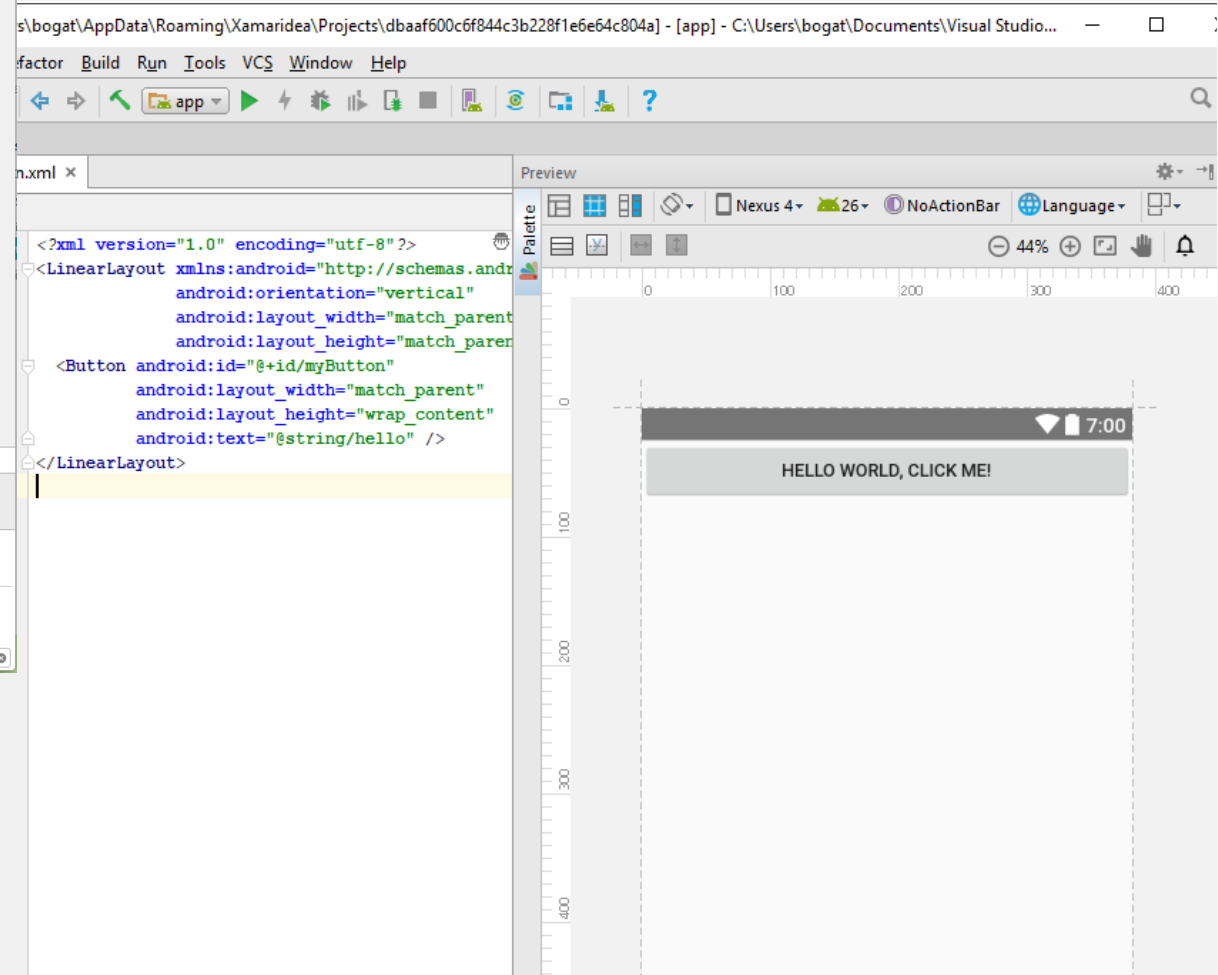


Native UI, native Tools

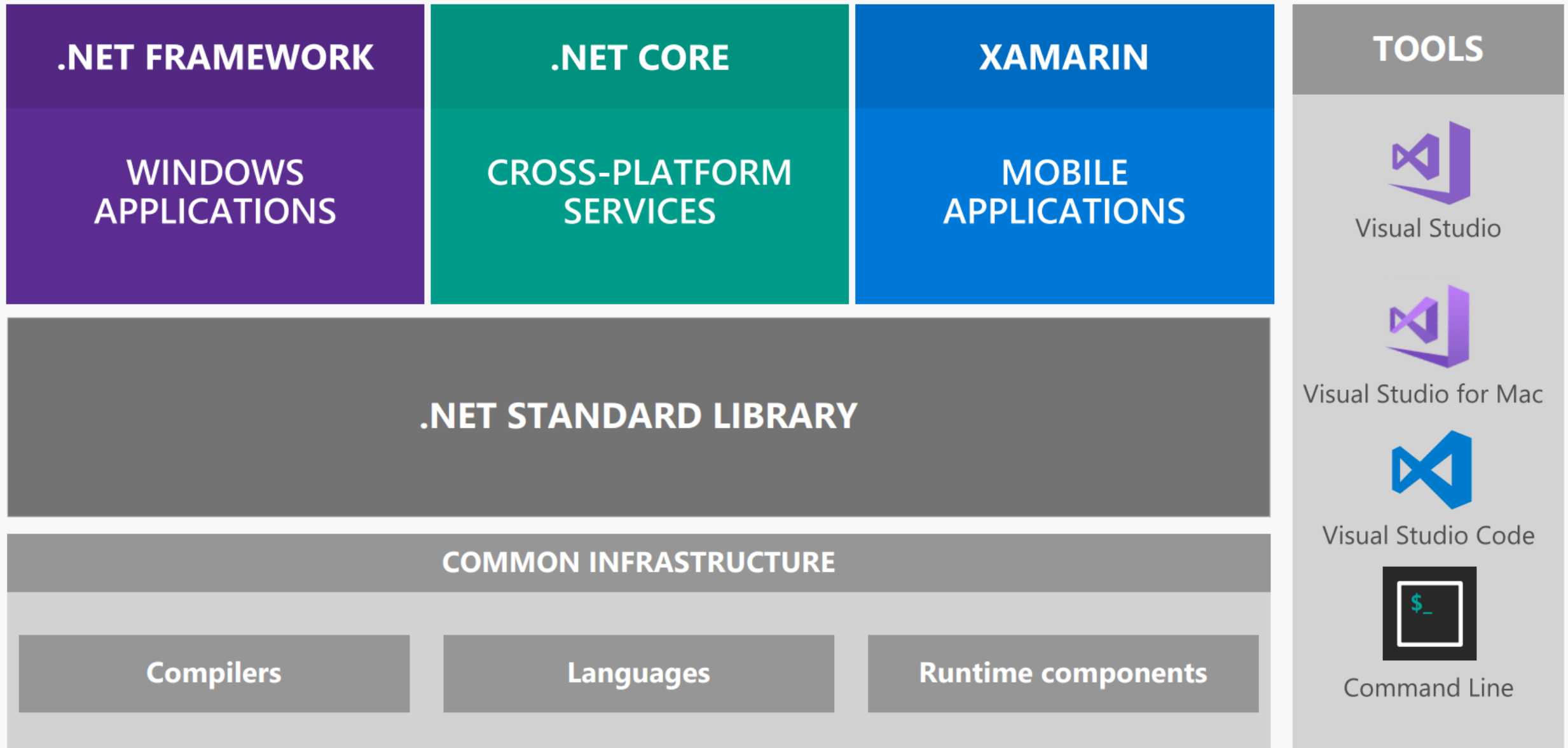


Xcode

Android Studio



.NET Standards to rule them all



Mono BCL sources

CLASS	
▸ SMDiagnostics	86 System.Security.Cryptography/ECParameters.cs
▸ System	87 System.Security.Cryptography/SHA256CryptoServiceProvider.cs
▸ System.ComponentModel.Compositi...	88 System.Security.Cryptography/SHA384CryptoServiceProvider.cs
▸ System.ComponentModel.DataAnnot...	89 System.Security.Cryptography/SHA512CryptoServiceProvider.cs
▸ System.Configuration	90
▸ System.Configuration.Install	91 ../referencesource/System.Core/System/Security/Cryptography/X509Certificates/TrustStatus.cs
▸ System.Core	92
▸ Assembly	93 ../../external/corefx/src/System.Collections/src/System/Collections/Generic/BitHelper.cs
▸ corefx	94 ../../external/corefx/src/System.Collections/src/System/Collections/Generic/HashSet.cs
▸ Documentation	95 ../../external/corefx/src/System.Collections/src/System/Collections/Generic/HashSetEquali
▸ Test	96 ../../external/corefx/src/System.Collections/src/System/Collections/Generic/ICollectionDe
▸ tools	97
▸ basic_System.Core.dll.sources	98 ../../external/corefx/src/System.Linq/src/System/Linq/*.cs
▸ build_System.Core.dll.sources	99
▸ common_System.Core.dll.sources	100 ../../external/corefx/src/System.Linq.Expressions/src/System/Dynamic/*.cs
▸ dynamic_System.Core.dll.sources	101 ../../external/corefx/src/System.Linq.Expressions/src/System/Dynamic/Utils/CachedReflecti
▸ ff.cs	102 ../../external/corefx/src/System.Linq.Expressions/src/System/Dynamic/Utils/CollectionExt
▸ interpreter_System.Core.dll.sources	103 ../../external/corefx/src/System.Linq.Expressions/src/System/Dynamic/Utils/EmptyReadOnlyC
▸ Makefile	104 ../../external/corefx/src/System.Linq.Expressions/src/System/Dynamic/Utils/ExpressionUtil
▸ monodroid_System.Core_test.dll.ex...	105 ../../external/corefx/src/System.Linq.Expressions/src/System/Dynamic/Utils/ExpressionVisi
	106 ../../external/corefx/src/System.Linq.Expressions/src/System/Dynamic/Utils/ListArgumentPr
	107 ../../external/corefx/src/System.Linq.Expressions/src/System/Dynamic/Utils/ListParameterP
	108 ../../external/corefx/src/System.Linq.Expressions/src/System/Dynamic/Utils/TypeUtils.cs
	109 ../../external/corefx/src/System.Linq.Expressions/src/System/Dynamic/Utils/TypeExtensions
	110 ../../external/corefx/src/System.Linq.Expressions/src/System/Linq/ITransformable.cs

Mono BCL evolution

I. Dark ages

`SqlClient/SqlConnection.cs`

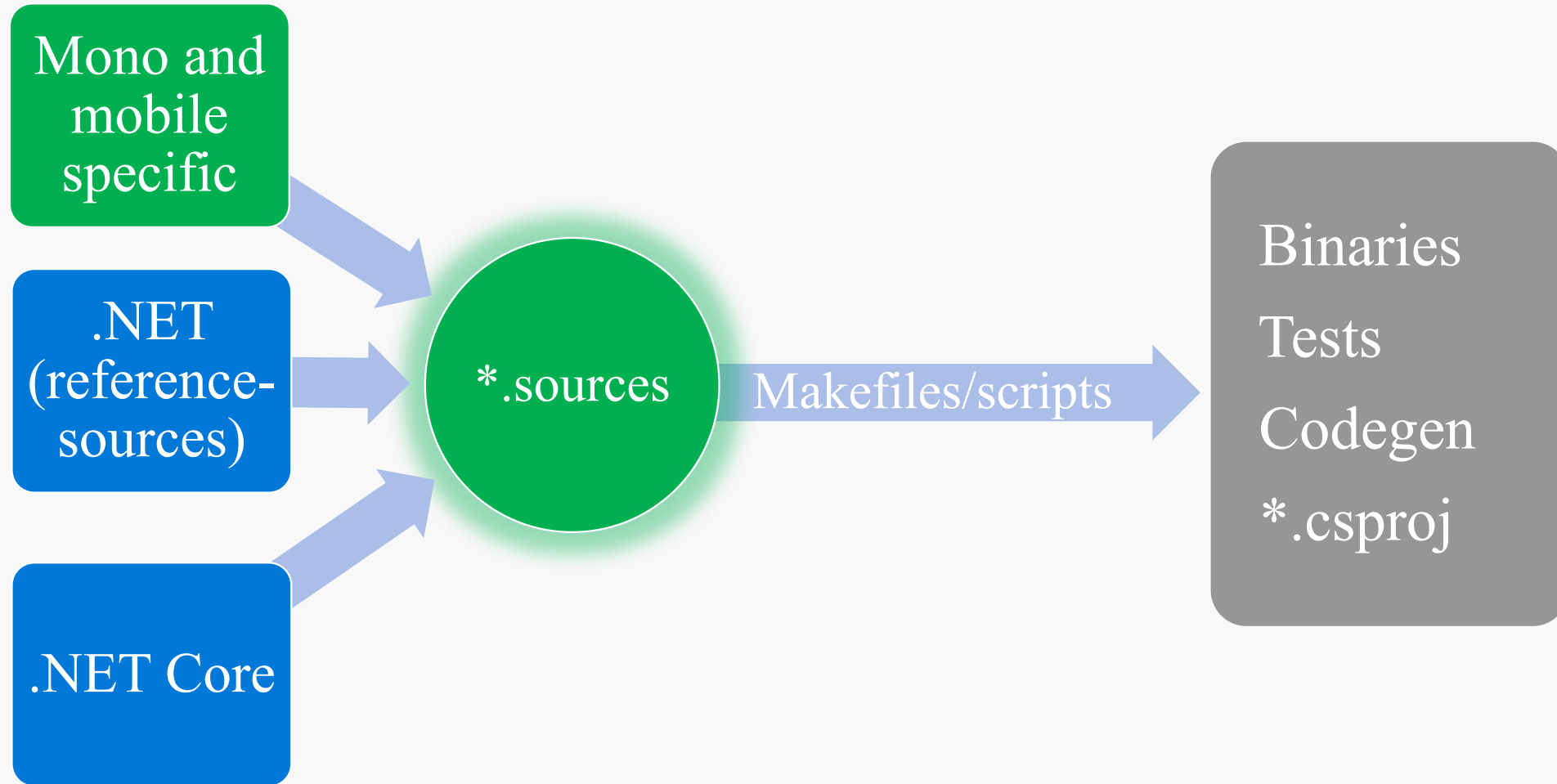
II. Reference-sources (dump)

`../referencesource/System.Data/SqlConnection.cs`

III. Corefx (git submodule)

`../../external/corefx/src/System.Data.SqlClient/SqlConnection.cs`

Mono BCL sources



Mono BCL: Corefx (.NET Core)

- System.Core (Linq, Collections, Net, IO, Buffers)
- System.CodeDom
- System.Cryptography*
- System.Numerics
- System.Data (SqlClient, Odbc, OleDb)
- mscorlib (here and there)

Mono BCL: Corefx (.NET Core)

- xUnit tests (corefx has ~300k tests)
- GSoC stuff
- New features and bugfixes such as Spans, etc..

Mono BCL: Corefx (.NET Core)



Miguel de Icaza @migueldeicaza · Oct 7

Context? Is there something we need to do in mono as well?



1



6



Immo Landwerth

@terrajobst

Replying to @migueldeicaza @ben_a_adams

Yes. "Steal" our code 🤪

7:25 PM - 7 Oct 2017

Challenges: will it compile?

```
Guid id;  
var str = id.ToString();
```

You can use “empty” (no fields) structs like this.

But is `Guid` empty struct?

Yes if you compile against reference-assemblies

Challenges: breaking changes

```
public class Program
{
    public static void Main(string[] args)
    {
        var obj = false ? Foo.Instance : null;
    }
}
```

.class public auto ansi beforefieldinit Foo

```
public class Foo
{
    public static Foo Instance = new Foo();
    static Foo() {}
    public Foo() => Console.WriteLine("constructor!");
}
```

How Mono helps .NET Core

- ILLink – Linker from mono ported to .NET Core
- System.Drawing – on non-windows (libgdiplus) and a few other non-windows pieces like HttpListener
- Tests, bug-reports, bug-fixes, discussions
- Implements NETStandards for mobile platforms ;-)
and proved .NET **can be** cross-platform

How Mono helps .NET Core

mono / mono

Watch

571

Unstar

Code

Pull requests 188

Insights

[System.Core] Use corefx System.Linq tests (~25k tests)
#5515

Open EgorBo wants to merge 6 commits into mono:master from EgorBo:system-core-corefx-tests



dotnet / corefx

Watch

1,511

Unstar

Code

Issues 1,902

Pull requests 54

Projects 0

Wiki

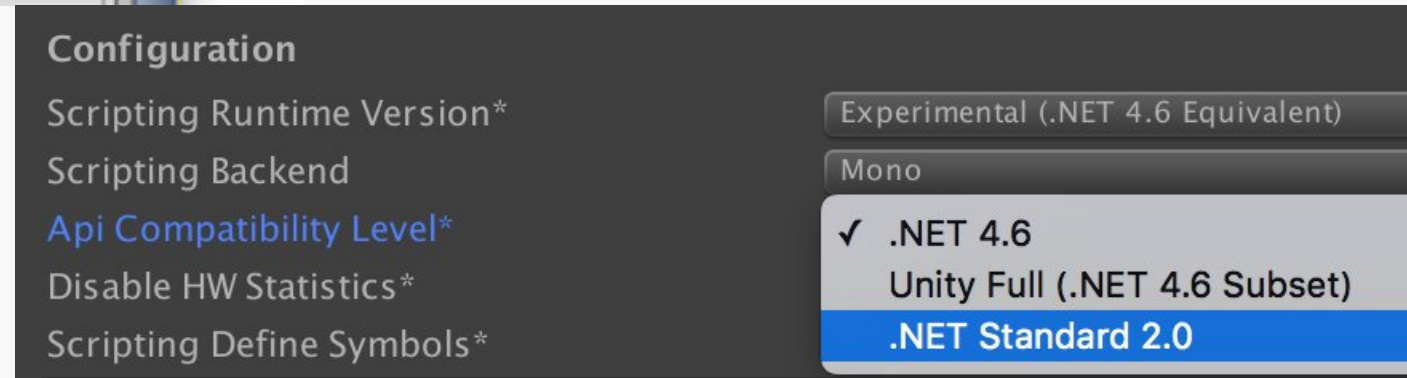
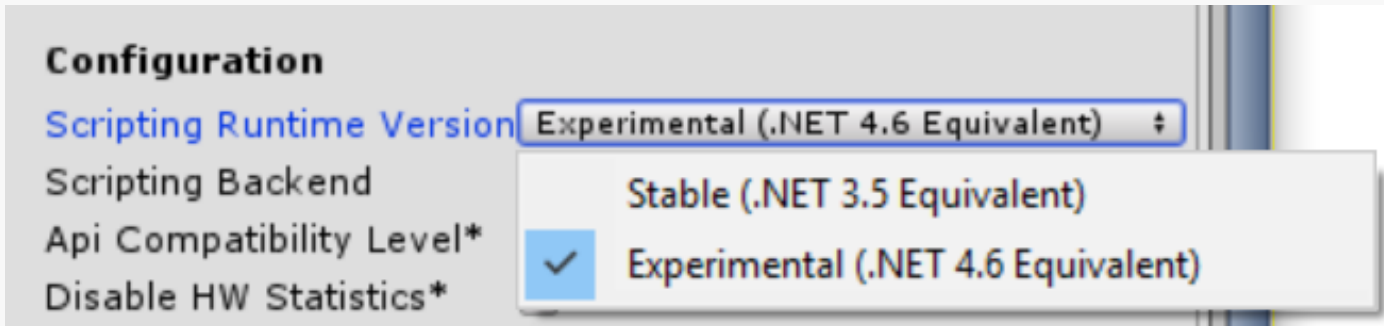
Insights

[RFC] [System.Drawing] Add unit tests based on Mono's
test suite #23797

Open qmfrederik wants to merge 55 commits into dotnet:master from qmfrederik:drawing/mono-tests

Unity's story

- Mono 2.x for too long
- Unity 2017.1 has mono 4.8 support (experimental)
- Roslyn or mcs?



Rolsyn vs mcs

- Roslyn

- 1.2M lines of code
- Code completion, “intellisense”, analysis, etc..
- C# 7.0, 7.2, 8.0, vNext
- VBCSCompiler.exe

- mcs

- 100k lines of code
- Just a batch compiler.
- C# 6.0 (7.2)
- Faster, less memory needed



```
$ mcs --about  
The Turbo C# compiler
```

Rolsyn vs Turbo C# Compiler

```
bogat@egorbopc /cygdrive/c/prj/mono/mcs/class/System.Core
$ time csc mt.cs
Microsoft (R) Visual C# Compiler version 2.3.1.61919 (57c81319)
Copyright (C) Microsoft Corporation. All rights reserved.

real    0m16.166s
user    0m0.000s
sys     0m0.015s

bogat@egorbopc /cygdrive/c/prj/mono/mcs/class/System.Core
$ time mcs mt.cs
real    0m3.505s
user    0m0.000s
sys     0m0.031s

bogat@egorbopc /cygdrive/c/prj/mono/mcs/class/System.Core
$
```

Embeddinator-4000

Consume your C# code from other languages:

- C# as .jar/.aar for Java (Android)
- C# as .dll/.so/.dylib for C/C++
- C# as .framework for Xcode projects

Demo: C# lib to



Thanks!



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