CODE
STATE OF .NET

State of .NET Online

Fundamental .NET Technologies

Markus Egger
President and Chief Software Architect
CODE Magazine & Consulting

About the Presenter

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  EPS Software Corp. (dba CODE Consulting)
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- International Author and Speaker
- Microsoft RD (Regional Director)
- Microsoft MVP since 1995
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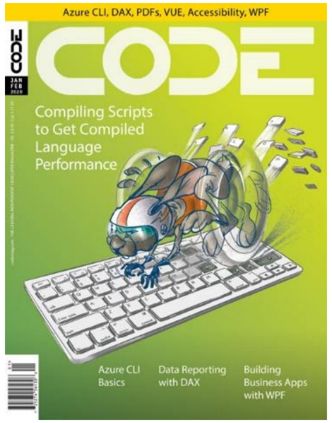
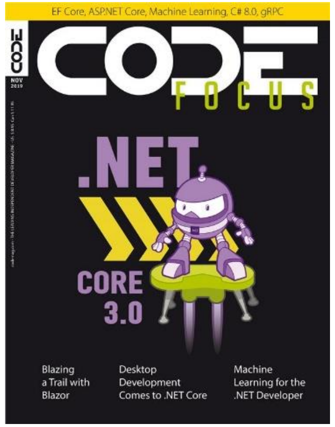
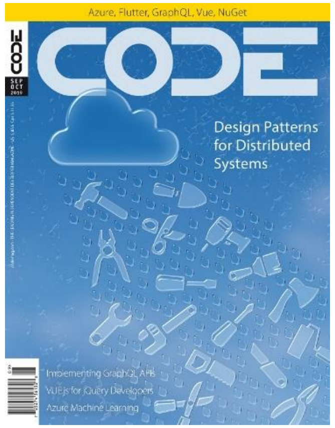
- Twitter: @markusegger


Azure CLI, DAX, PDFs, VUE, Accessibility, WPF
CODE
JAN FEB 2020
Compiling Scripts to Get Compiled Language Performance
Azure CLI Basics
Data Reporting with DAX
Building Business Apps with WPF


EF Core, ASP.NET Core, Machine Learning, C# 8.0, gRPC
CODE FOCUS
NOV 2019
.NET CORE 3.0
Blazing a Trail with Blazor
Desktop Development Comes to .NET Core
Machine Learning for the .NET Developer


Azure, Flutter, GraphQL, Vue, NuGet
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SEP OCT 2019
Design Patterns for Distributed Systems
Implementing GraphQL APIs
VUE.js for jQuery Developers
Azure Machine Learning

About CODE & EPS Software Corp.

- **“Helping People Build Better Software”**

- Custom App Development, Consulting, Training, Mentoring
- Windows, Web, Mobile, Cloud, Serverless, Databases
- User Interface and Interaction Design
- Project Rescue, Legacy Conversions
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- Microsoft Certified Partner

GraphQL, VS Code, Machine Learning, CSLA, Azure
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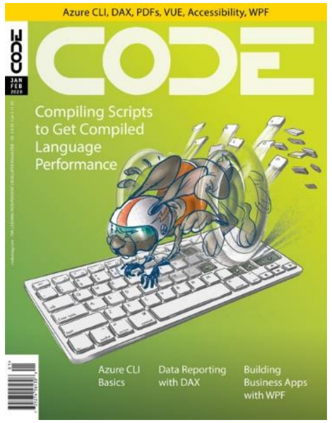
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Compiling Scripts to Get Compiled Language Performance
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Azure Functions, Accessibility, Machine Learning, Data Visualization
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What's Your Superpower?
SQL Server and Machine Learning
An Introduction to Digital Accessibility
Get Started with Serverless Azure Functions

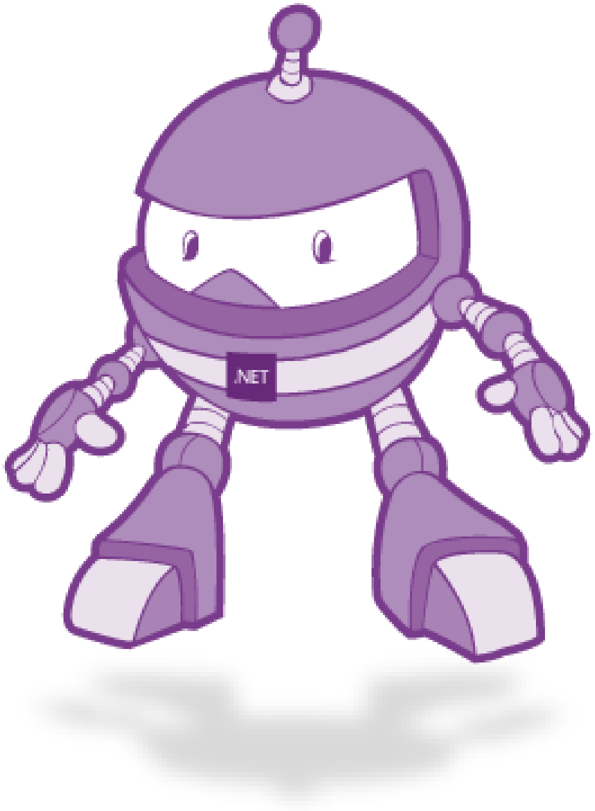
State of .NET Online

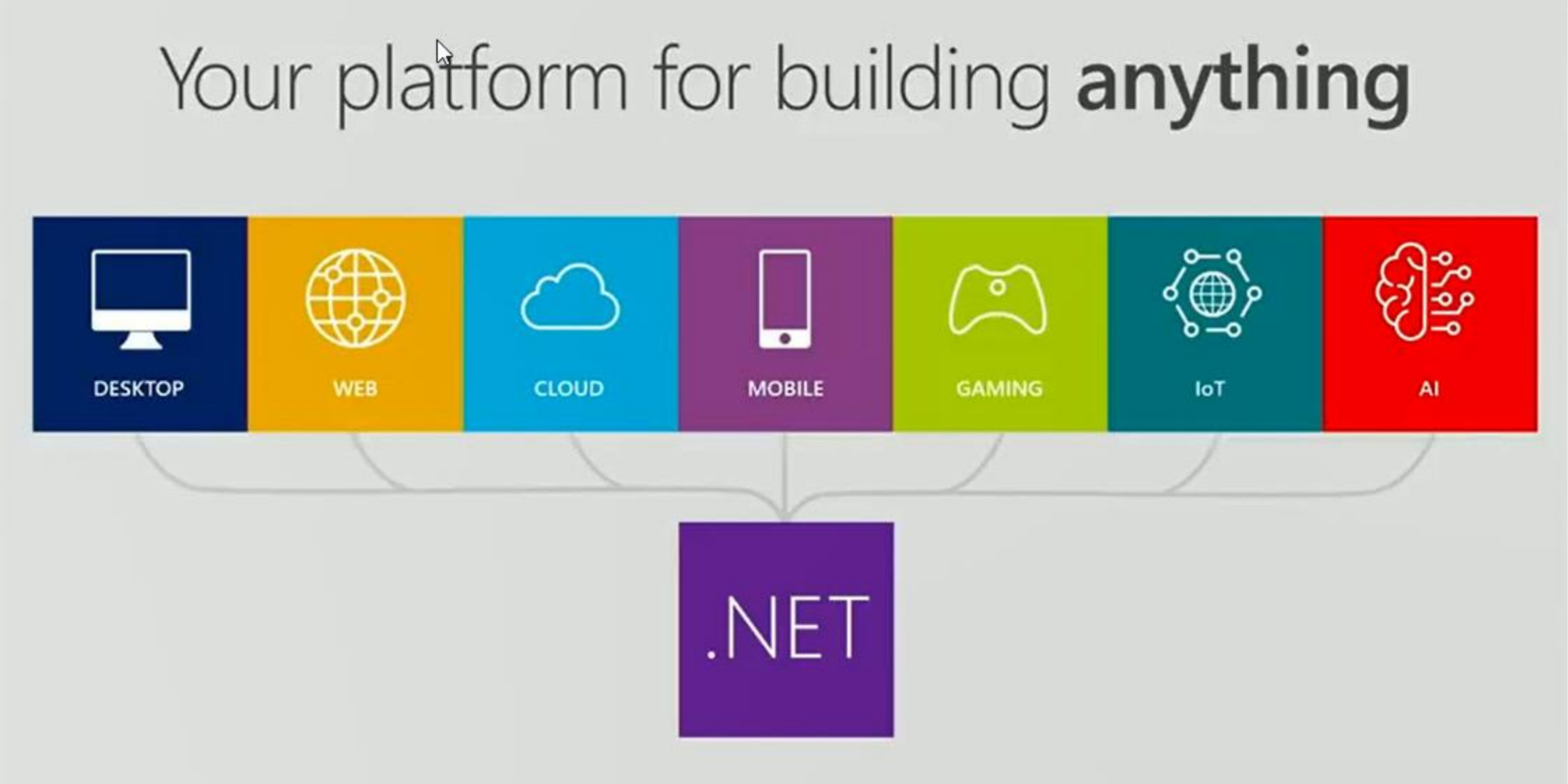
- Due to the Coronavirus Crisis, State of .NET has turned from “sometimes online” to “an online series”
- Expect monthly online events going forward
  - Future topics: Azure, Cognitive Services, DevOps, Other Clouds, Blazor,…
  - Let us know what you are interested in!
- Note that live-events will also continue to be scheduled at various locations once that is possible again

Agenda

- Focus on fundamental .NET technologies
- Where are we at with .NET?
- How did we get here?
- Where are we going?
- Various platforms and frameworks
- What’s new with Visual Studio?

.NET





Your platform for building **anything**

DESKTOP

WEB

CLOUD

MOBILE

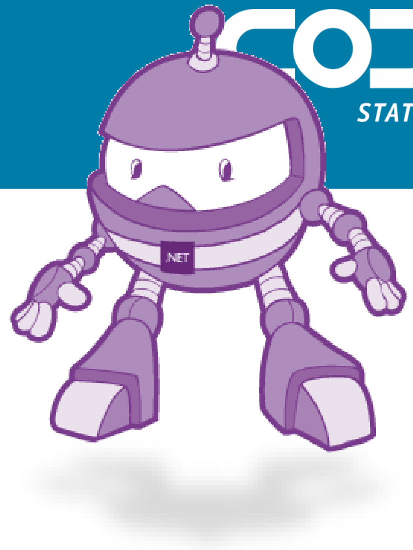
GAMING

IoT

AI

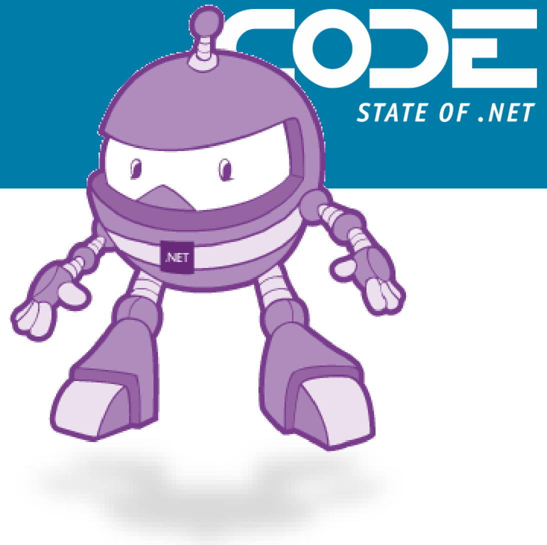
.NET

.NET Overview



- .NET is going strong
- .NET Core is being adopted industry wide
- .NET Framework is NOT going away
  - Current version: 4.8
- According to Microsoft, over a **million** new monthly active .NET developers were added in the last year

.NET Framework



- Current and FINAL Version: 4.8
    - YES, Microsoft is committed to supporting it (bug fixes, security, stability, etc.)
    - Slower update cadence
- Expect all enhancements to be made in .NET Core
- Office 365, Dynamics, SharePoint, Bing and others will all continue to use .NET Framework

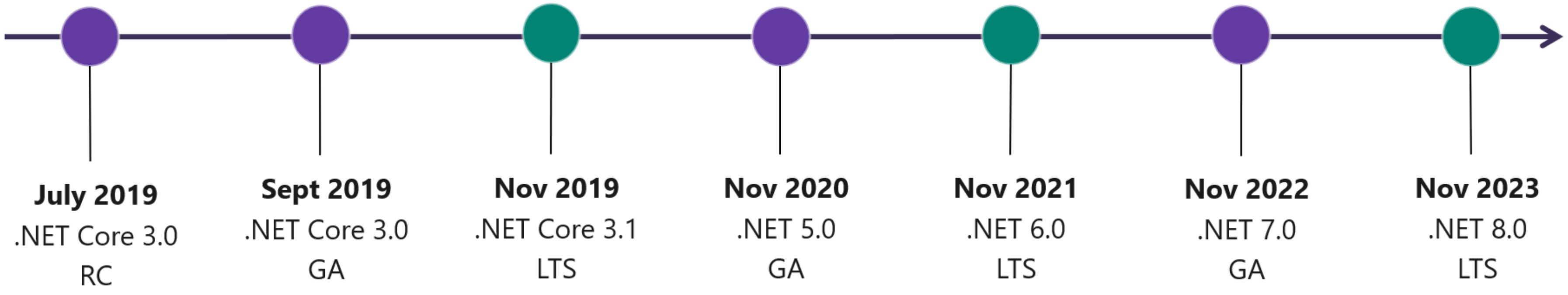
.NET Framework Roadmap

- .NET Framework 4.8
  - Modern browser and modern media controls
  - Access to touch and UWP Controls
  - High DPI improvements
- Focus on NOT breaking people's apps with any new .NET Framework update
  - **2 billion installs worldwide**
- Goal is to make desktop apps more modern
- No Side-by-Side support

.NET Core

- Re-write of the .NET Runtime
- Re-envisioning of .NET for today’s scenarios
- Open-source framework
- Cross-platform (Windows, Linux & Mac)
- Subset of .NET Framework
- Side-by-Side Support
- All major new features will be added to .NET Core
- http://dot.net

.NET Core Roadmap



July 2019
.NET Core 3.0
RC

Sept 2019
.NET Core 3.0
GA

Nov 2019
.NET Core 3.1
LTS

Nov 2020
.NET 5.0
GA

Nov 2021
.NET 6.0
LTS

Nov 2022
.NET 7.0
GA

Nov 2023
.NET 8.0
LTS

- .NET Core 3.0 release in September
- .NET Core 3.1 = Long Term Support (LTS)
- .NET 5.0 release in November 2020
- Major releases every year, LTS for even numbered releases
- Predictable schedule, minor releases if needed

.NET Core 3.0

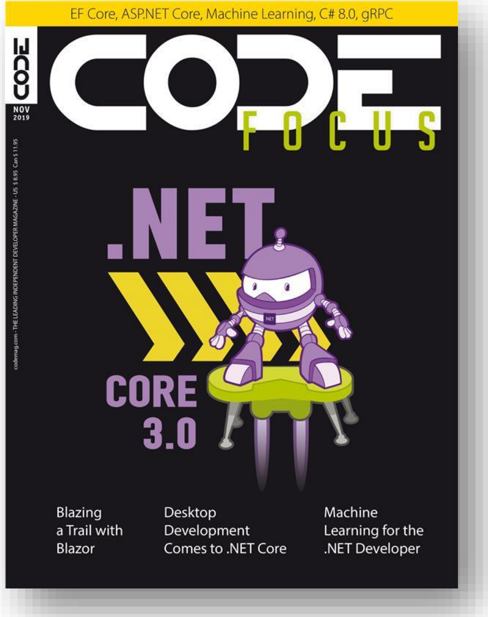
- Released Fall 2019

https://devblogs.microsoft.com/dotnet/announcing-net-core-3-0/

- Major Features:
  - Support for Desktop Development
  - Mobile Development Advances (Xamarin)
  - gRPC as a replacement for WCF
    - CODE Focus article: https://www.codemag.com/article/1911102
  - C# 8
  - Machine Learning grows ever more prominent

CODE Focus Magazine - .NET Core 3.0

- We teamed up with Microsoft to bring you a free CODE Focus issue for .NET Core 3.0, chockfull with in-depth .NET Core 3.0 content
- You will see articles referenced throughout this talk, which are all freely available for those who want to dig deeper
- www.codemag.com/Magazine/Issue/NetCore3



EF Core, ASP.NET Core, Machine Learning, C# 8.0, gRPC

CODE FOCUS

NOV 2019

.NET CORE 3.0

Blazing a Trail with Blazor

Desktop Development Comes to .NET Core

Machine Learning for the .NET Developer

CODE Magazine - .NET Core 2.1

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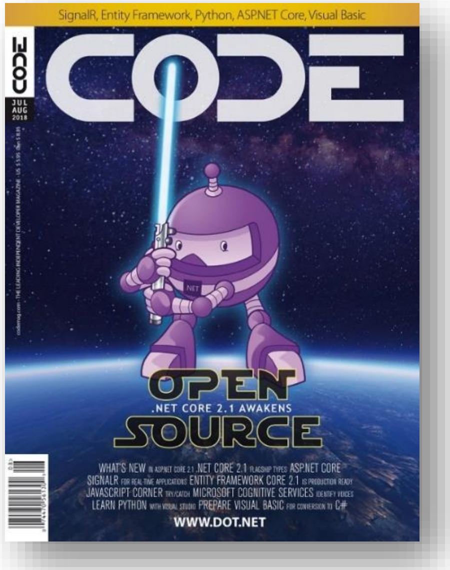
- Our July/August 2018 issue was produced in conjunction with Microsoft and has lots of info specific to .NET Core 2.1
  - Many of these articles still provide valuable content even for .NET Core 3 developers!
- https://www.codemag.com/Magazine/Issue/JulAug18


SignalR, Entity Framework, Python, ASP.NET Core, Visual Basic
CODE
JUL AUG 2018
OPEN
.NET CORE 2.1 AWAKENS
SOURCE
WHAT'S NEW IN ASP.NET CORE 2.1 .NET CORE 2.1 FLAGSHIP TYPES ASP.NET CORE
SIGNALR FOR REAL-TIME APPLICATIONS ENTITY FRAMEWORK CORE 2.1 IS PRODUCTION READY
JAVASCRIPT CORNER TRY/CATCH MICROSOFT COGNITIVE SERVICES IDENTIFY VOICES
LEARN PYTHON WITH VISUAL STUDIO PREPARE VISUAL BASIC FOR CONVERSION TO C#
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.NET Core 3.0

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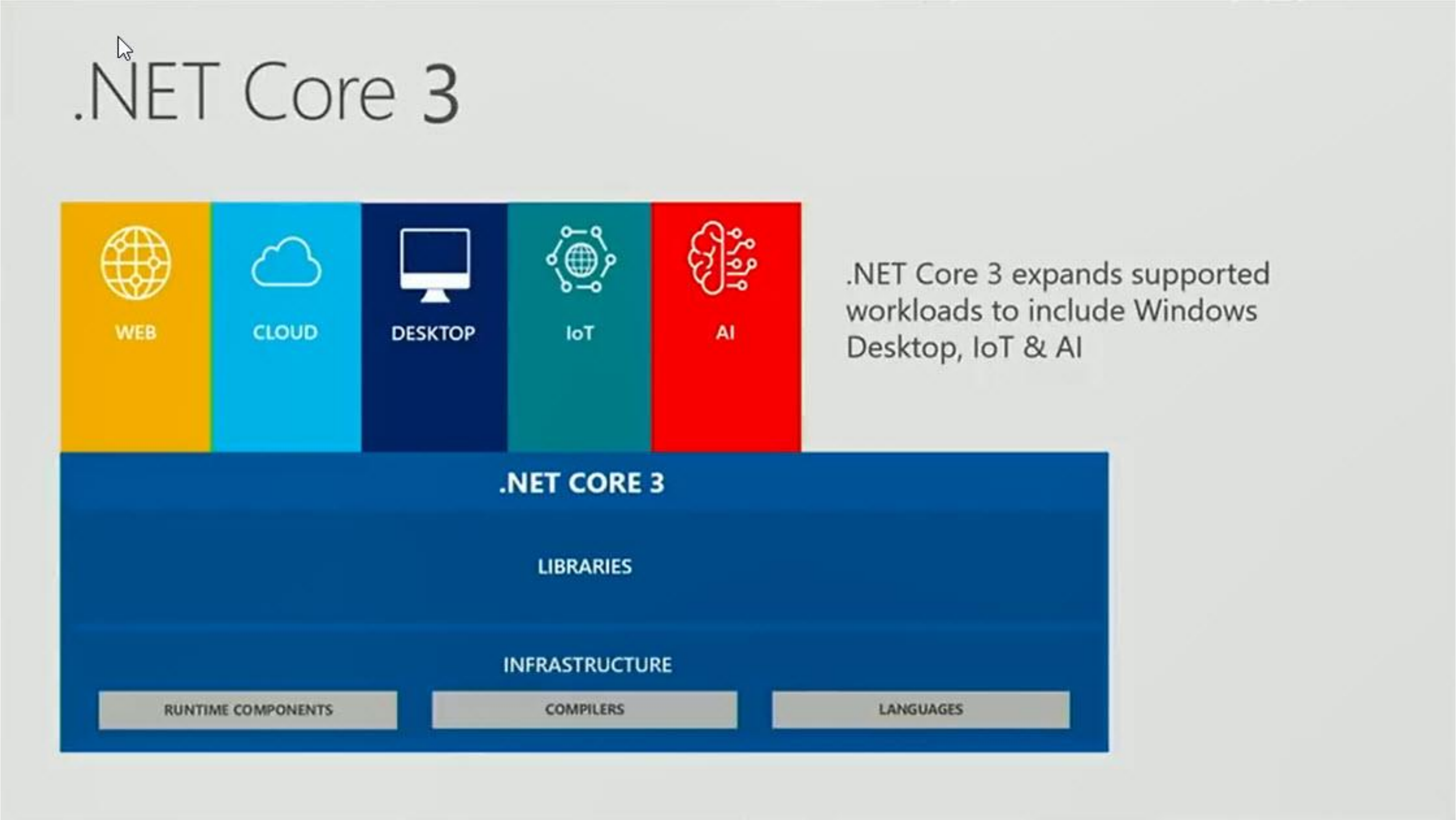


.NET Core 3

.NET Core 3 expands supported workloads to include Windows Desktop, IoT & AI

.NET Core 3.0

- Side-by-side versions of .NET that support WinForms and WPF
  - Allow multiple versions of .NET on a machine
- Embed .NET directly into an application
  - Ship the framework as part of your application
- Take advantage of .NET Core features
  - Use the latest enhancements without risk of breaking compatibility

.NET Core 3.0 and Windows Desktop

- .NET Core 3.0 runs Desktop applications (WinForms & WPF)
  - Note: Designer support (especially for WinForms) is still shaky
  - Introducing .NET Core Windows Forms Designer Preview 1 https://devblogs.microsoft.com/dotnet/introducing-net-core-windows-forms-designer-preview-1/
- Flexible deployment and side-by-side support
- Note: WinForms & WPF rely on Windows as an underlying operating system
  - WPF requires DirectX 9 to run, which is only available on Windows
  - Not all .NET Core is “cross platform”. Windows Desktop apps are still Windows specific
- .NET Core App Bundler
  - Single self-contained .exe

.NET Core 3.1

- What's new in .NET Core 3.1
- https://docs.microsoft.com/en-us/dotnet/core/whats-new/dotnet-core-3-1

- Primary feature is long-term support (LTS)
  - Supported for the next three years.
- Support lifecycle of other major releases
  - .NET Core 3.0: End of life on March 3, 2020.

.NET Core is the Future of .NET

- https://devblogs.microsoft.com/dotnet/net-core-is-the-future-of-net/
- “After .NET Core 3.0 we will not port any more features from .NET Framework.”
- “With the .NET Core 3.0 release in September 2019 we think that all *new* .NET applications should be based on .NET Core.”
- “.NET Framework 4.8 will be the last major version of .NET Framework.”
- “All future investment in .NET will be in .NET Core.”

Converting WPF/WinForms to .NET Core

- In many cases, this is as straightforward as changing projects to the new project format
- Your WPF or WinForms apps may use things that are not available in .NET Core, or may require some slight re-writes
    - The Portability Analyzer is available to assess compatibility https://docs.microsoft.com/en-us/dotnet/standard/analyzers/portability-analyzer
- It’s a good idea to convert, as all the “new stuff” will happen on this platform

- CODE Focus article: https://www.codemag.com/article/1911032

New in ASP.NET Core 3.0

- This is the 3rd version of ASP.NET Core, Many consider this to be the first mature version of ASP.NET Core
- ASP.NET is now an “SDK” rather than a collection of packages, making it easier to reference it
- New routing
- gRPC support: High perf contract-based RPC services
- Worker Service: Starting point for long running services
- Native JSON support without 3rd party packages
- CODE Focus article: https://www.codemag.com/article/1911072

New in Entity Framework Core 3

- Many small tweaks and enhancements to improve the overall technology
- Support for C# 8 features
- Support for Cosmos DB

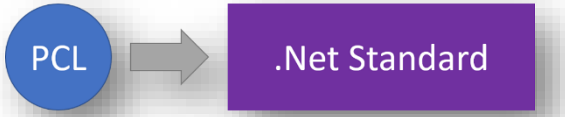
- CODE Focus article: https://www.codemag.com/article/1911062

Food for Thought: .NET Core

- .NET Core is a refresh of the aging .NET platform
- It gives Microsoft ways to fix and change things that are outdated
- This is the platform on which “new stuff” will happen
- This is why it is important that WPF and WinForms move to .NET Core
- At this point, we would not start new projects on older versions and go with .NET Core instead
  - In fact, we are now thinking more and more about converting older apps to .NET Core (a change in recommendation from the past)
  - We also move older VB code to C# while we are in this process

.NET Standard

- A standard set of APIs that all .NET platforms have to implement
- Unifies the .NET platforms and prevents future fragmentation
- Think of this as an evolution of portable libraries
  - Do not use PCL! Use .NET Standard now!


PCL
.Net Standard

- NET Standard 2.0 is a big step forward and is implemented by:
  - .NET Framework
  - .NET Core
  - Xamarin
- .NET Standard 2.0 supports .NET Core 2.0
- .NET Standard 2.1 supports .NET Core 3.0+
- https://docs.microsoft.com/en-us/dotnet/standard/net-standard

.NET Foundation

- https://dotnetfoundation.org/
- The .NET Foundation supports .NET open source in a number of ways.
    - Promote the broad spectrum of software available to .NET developers through NuGet.org, GitHub, and other venues
    - Advocate for the needs of .NET open source developers in the community
    - Evangelize the benefits of the .NET platform to a wider community of developers
    - Promote the benefits of the open source model to developers already using .NET
    - Offer administrative support for a number of .NET open source projects

Microsoft Blazor

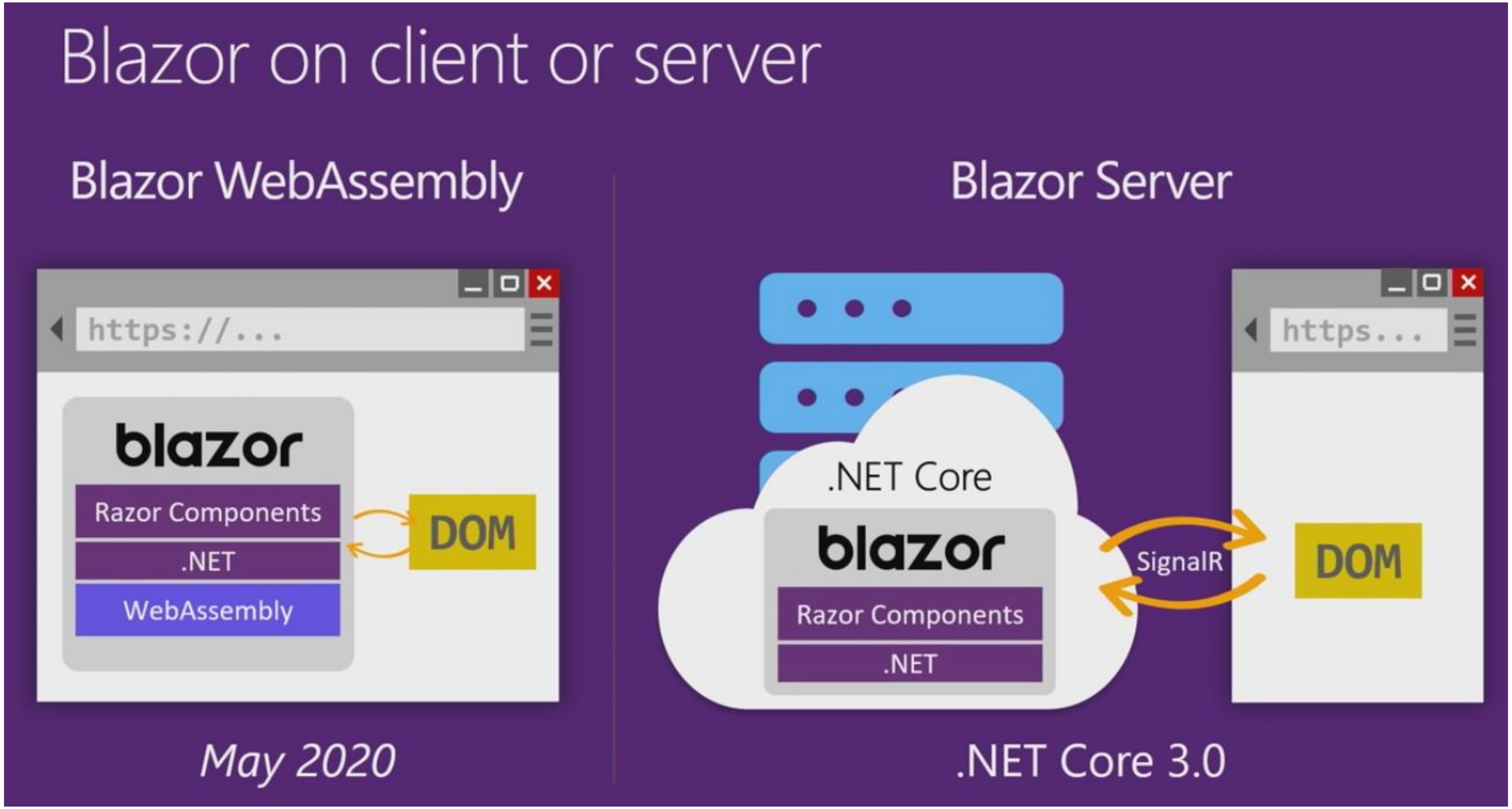
What is Blazor?

- Blazor is a new web development framework from Microsoft
- It can run both server-side as well as client-side
- Both models are syntax compatible
- The more exciting part is the client-side framework, although it is nice that there is a fully compatible server-side version as well
- Server-side is available now, client-side is available in preview

Welcome Blazor

- Browser + Razor = Blazor!
- An experimental web UI framework using C#/Razor and HTML, running in the browser via WebAssembly
  - Not a way of deploying existing UWP or Xamarin mobile apps in the browser
- Requires no plugin or code transpilation
- Works in all modern browsers including mobile browsers
- https://blazor.net/
- https://github.com/aspnet/blazor
- CODE Focus article: https://www.codemag.com/article/1911052

Blazor Versions



What’s the Big Idea with Blazor?

- Running .NET Code right in the browser…
- …and providing a good framework around that
- All of this is based on WebAssembly

WebAssembly is changing the Web

- In simple terms: binary code for web browsers
- Native performance for the web
  - Think of it as executing native compiled code in a browser
- Cross platform compilation target for any language
- Available in all major browsers
- Provides a “compilation target” for all kinds of languages
- Originally, this was mostly used by C++ game developers

.NET (Mono) on WebAssembly

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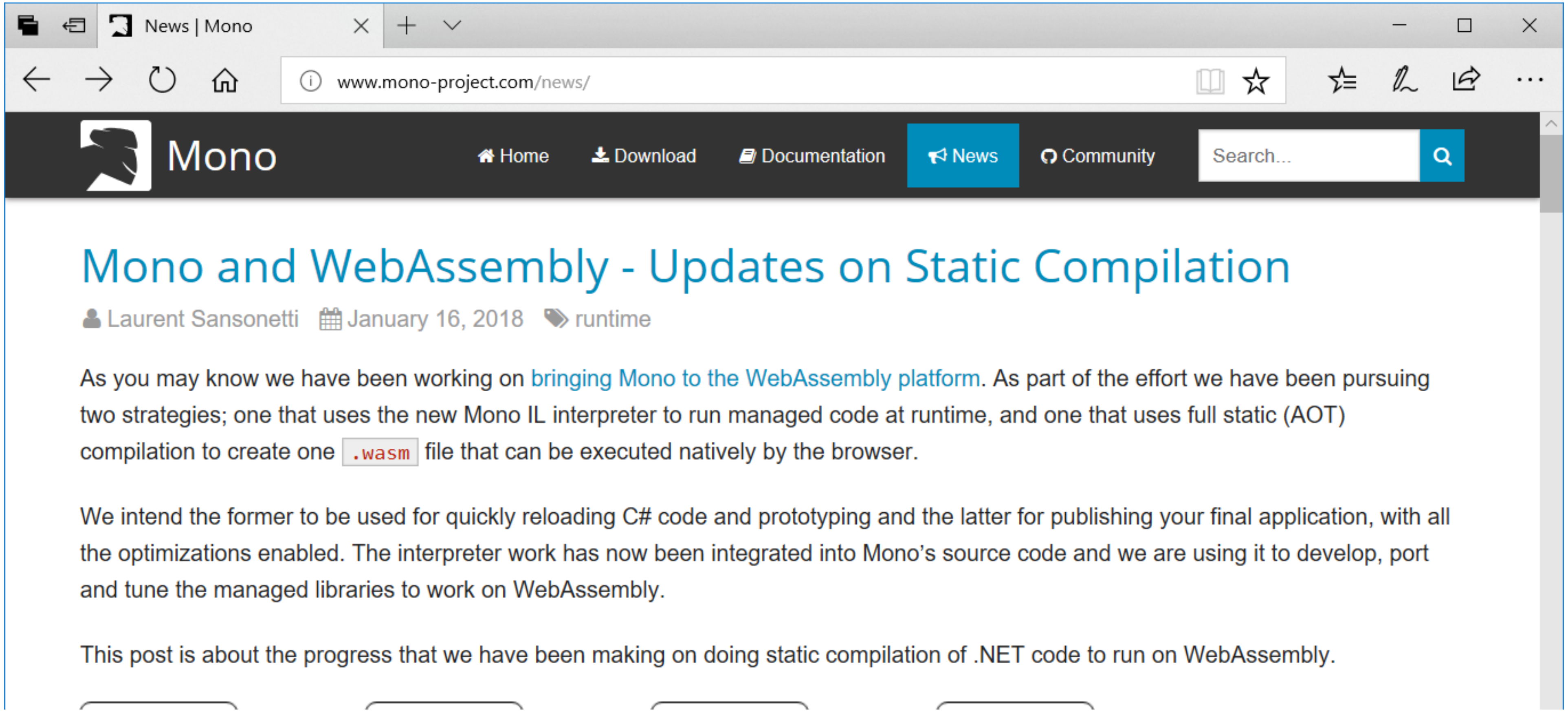
http://www.mono-project.com/news/2018/01/16/mono-static-webassembly-compilation/



Mono and WebAssembly - Updates on Static Compilation

Laurent Sansonetti January 16, 2018 runtime

As you may know we have been working on bringing Mono to the WebAssembly platform. As part of the effort we have been pursuing two strategies; one that uses the new Mono IL interpreter to run managed code at runtime, and one that uses full static (AOT) compilation to create one `.wasm` file that can be executed natively by the browser.

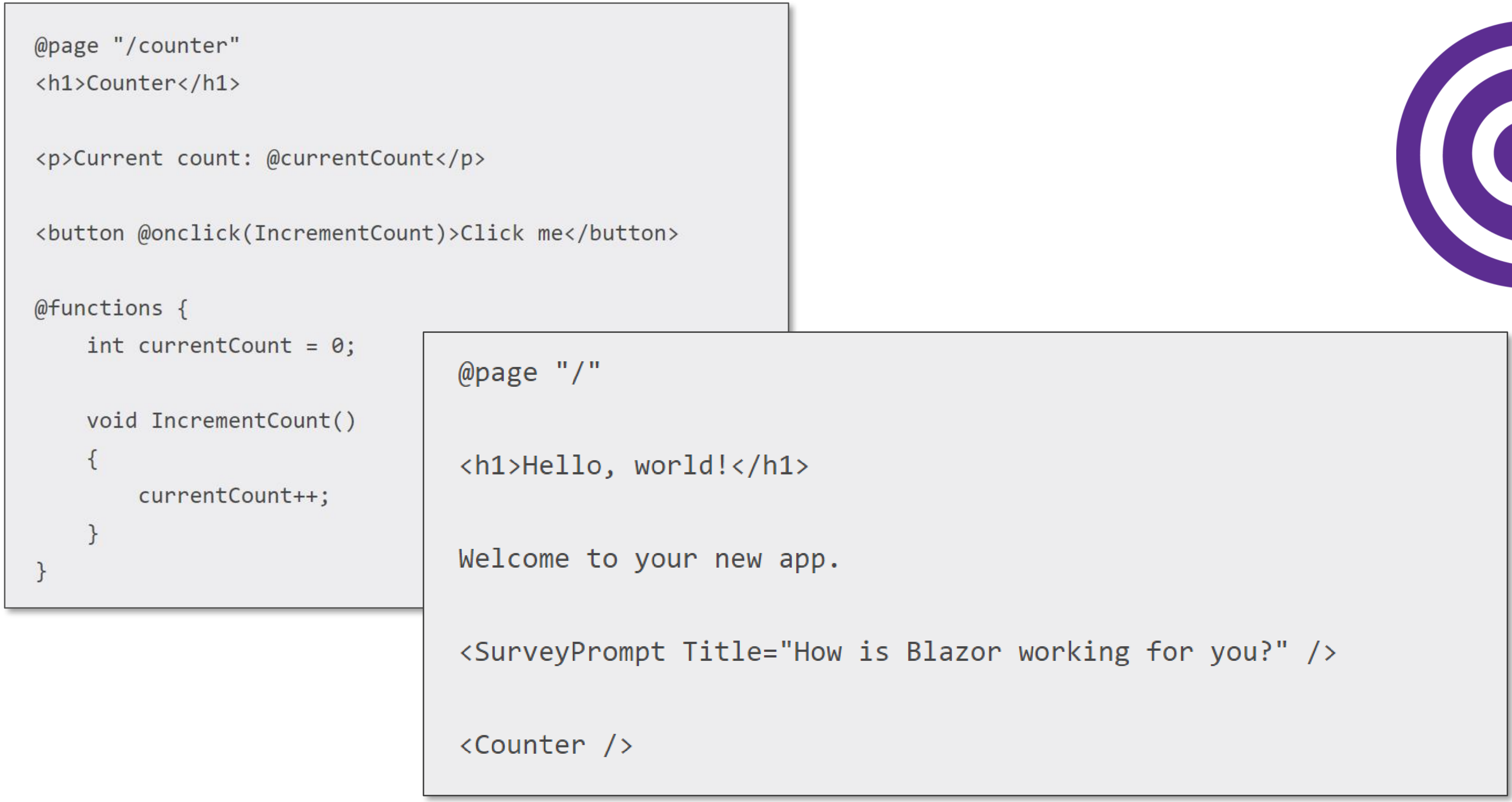
We intend the former to be used for quickly reloading C# code and prototyping and the latter for publishing your final application, with all the optimizations enabled. The interpreter work has now been integrated into Mono's source code and we are using it to develop, port and tune the managed libraries to work on WebAssembly.

This post is about the progress that we have been making on doing static compilation of .NET code to run on WebAssembly.

Why use .NET for browser apps?

- **Easy to get started**: File -> New project, dotnet new blazor
- **Stable and consistent**: .NET Standard, MSBuild
- **Modern innovative languages**: C#, F#, Razor
- **Industry leading tools**: Visual Studio, IntelliSense
- **Fast and scalable**: .NET Core for backend services, IL trimming

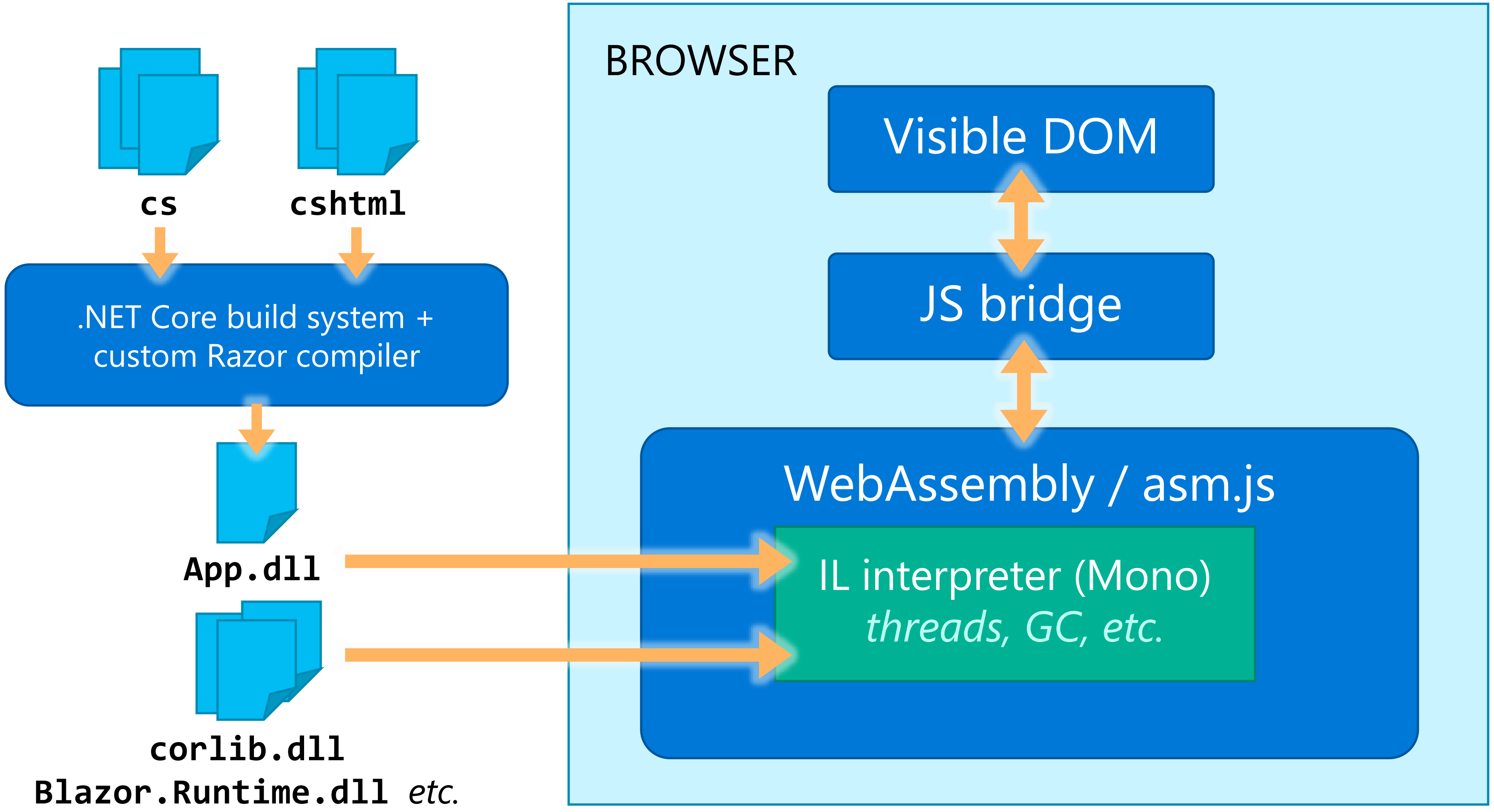
What Blazor is like:



```
@page "/counter"
<h1>Counter</h1>

<p>Current count: @currentCount</p>

<button @onclick(IncrementCount)>Click me</button>

@functions {
    int currentCount = 0;

    void IncrementCount()
    {
        currentCount++;
    }
}
```

```
@page "/"

<h1>Hello, world!</h1>

Welcome to your new app.

<SurveyPrompt Title="How is Blazor working for you?" />

<Counter />
```

How Blazor works



Blazor Features

- Component model
- Routing
- Layouts
- Forms and validation
- Dependency injection
- Live reload
- JavaScript interop
- Server-side rendering
- Debugging (browser & IDE)
- Rich IntelliSense and tooling
- Fallback to asm.js
- Publishing
- App size trimming

Blazor Benefits

- Build client-side web UI with .NET instead of JavaScript
- Write reusable web UI components with C# and Razor
- Share .NET code with both the client and server
- Call into JavaScript libraries & browser API as needed

Server-Side Blazor

- Runs all the .NET code on the server
- Events from the clients are routed to the server using SignalR
- Doesn’t that take all the fun out of it? Yes, kinda. But it’s a good option to have
- And it’s out now!

Getting Started with Blazor

1. Go to https://blazor.net
2. Install .NET Core 3.1
3. Install the Blazor WebAssembly template

.NET 5

.NET 5

- .NET 5 will be the next major release of .NET
  - Think of it as “.NET Core vNext”
- No more differentiation between “.NET Core” and “.NET Framework”. There will be just “One .NET”
- Microsoft announcement: https://devblogs.microsoft.com/dotnet/introducing-net-5/

.NET 5 – Major Goals

- Combine the best attributes of different .NET runtimes
  - Example: Mono Runtime
- Unified .NET SDK Experience
  - Single BCL (Base Class Library) across all .NET 5 applications
  - Mobile development (Xamarin) is integrated into .NET 5
- Native Apps supporting multiple platforms
- Web Apps supporting multiple platforms
- Cloud Native Applications
- Continuous Improvements such as faster algorithms in the BCL, better support for containers, support for HTTP3,…

.NET 5 – Visual Basic

- Fundamental Visual Basic support to provide Visual Basic projects a path forward
- Supported technologies:
  - Console apps
  - Class library
  - Windows Forms
  - WPF
  - Worker Service
  - ASP.NET Core WebApi

.NET 5 Preview 2 is now available

- https://dotnet.microsoft.com/download/dotnet/5.0

Development Environment and Languages

Languages

- .NET Languages
  - C#: Leader of the pack
  - VB: Still going strong in general, but not so much on .NET Core
  - F#: Darling of a dedicated smaller functional programming community
  - All have a bright future with specific roles to play
- Other Languages
  - JavaScript
  - TypeScript
  - Python, R,…

Visual Studio 2019

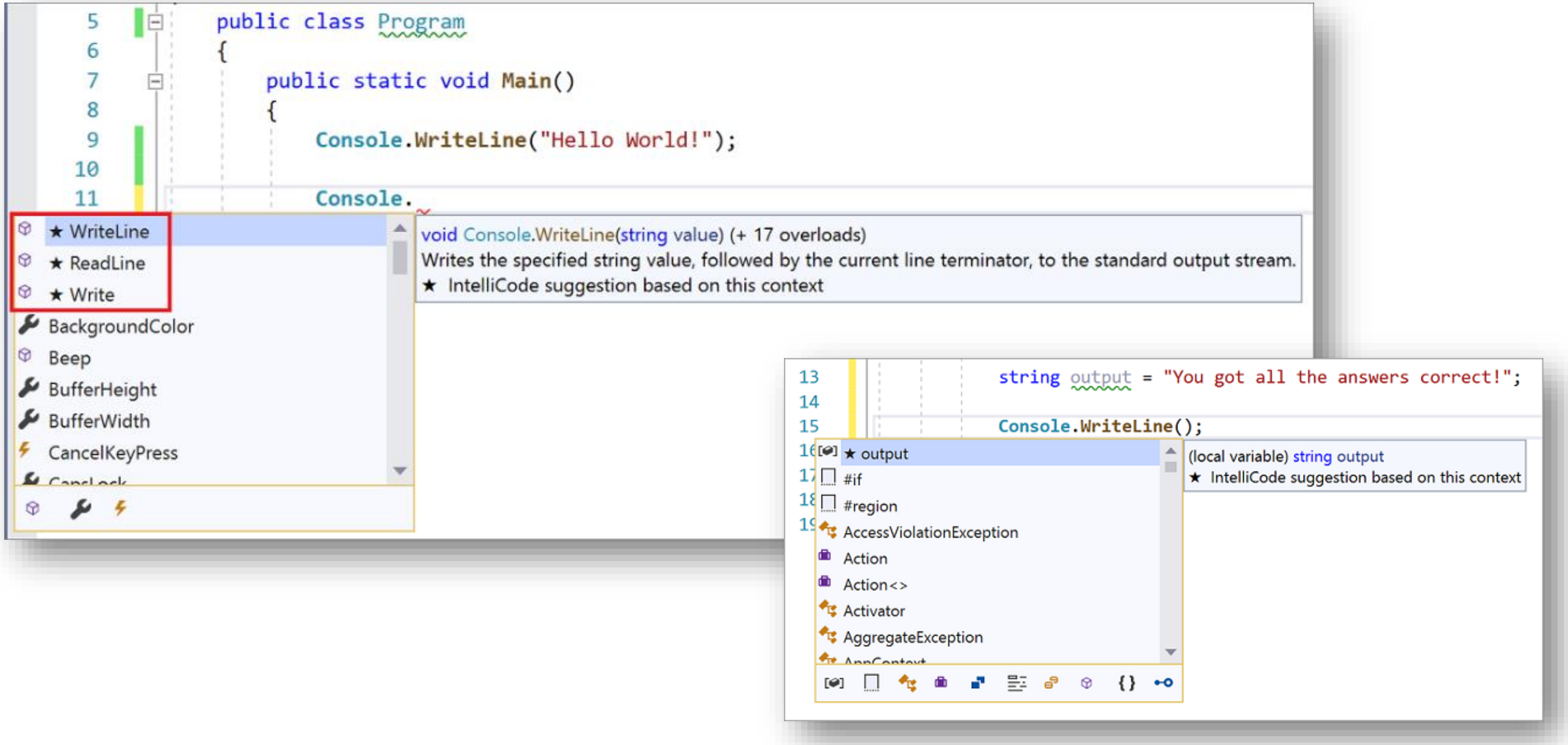
- Much what you would expect: An all-around improved version of Visual Studio
- Support for new features in .NET Core 3.1 and Azure
- Enhanced editor (faster, more configurable,…)
- …
- We recommend to switch to this version

- CODE Focus article: https://www.codemag.com/article/1911022

Visual Studio®
visualstudio.com

Feature Spotlight – Intelligent Code Completion

- Machine Learning/AI in the editor



```
public class Program
{
    public static void Main()
    {
        Console.WriteLine("Hello World!");

        Console.
```

★ WriteLine
★ ReadLine
★ Write
BackgroundColor
Beep
BufferHeight
BufferWidth
CancelKeyPress
CapsLock

void Console.WriteLine(string value) (+ 17 overloads)
Writes the specified string value, followed by the current line terminator, to the standard output stream.
★ IntelliCode suggestion based on this context

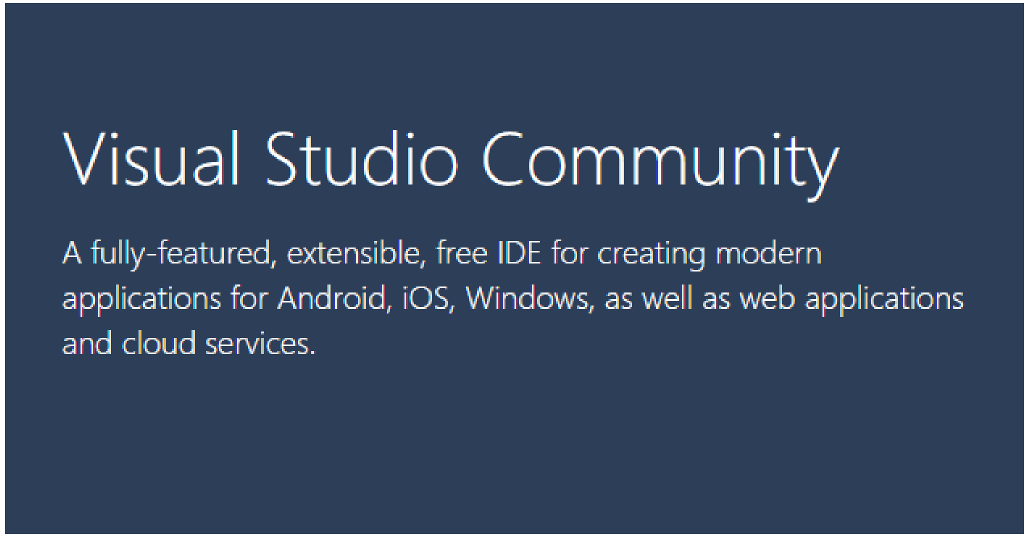
```
            string output = "You got all the answers correct!";

            Console.WriteLine();
```

★ output
#if
#region
AccessViolationException
Action
Action<>
Activator
AggregateException
AppContext

(local variable) string output
★ IntelliCode suggestion based on this context

Visual Studio Community Edition

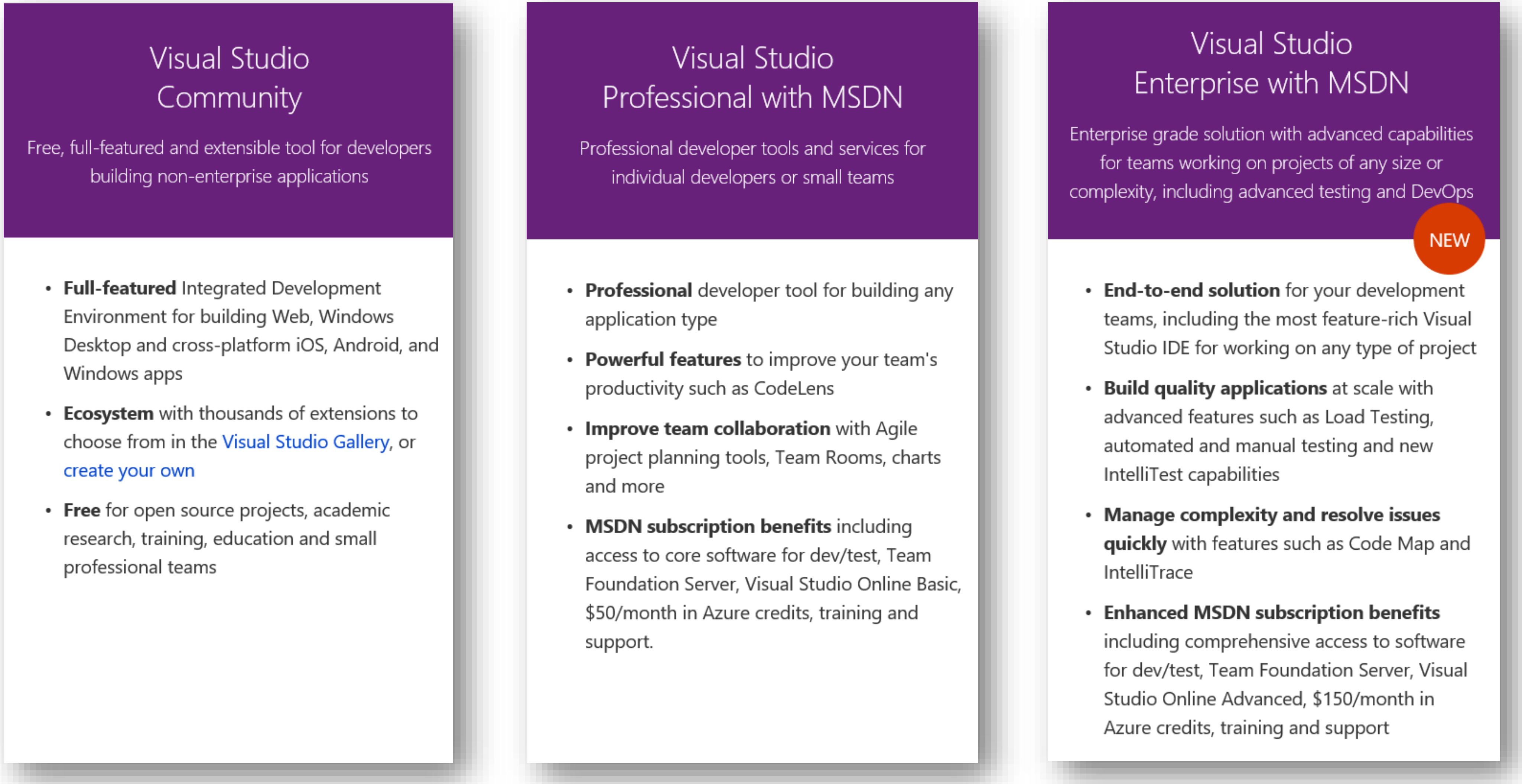
- Free version of Visual Studio
  - You can think of this as "Visual Studio Professional"
- Full support for features such as add-ins and extensions
- Free for non-Enterprise developers
- visualstudio.com/vs/community/



Visual Studio Community

A fully-featured, extensible, free IDE for creating modern applications for Android, iOS, Windows, as well as web applications and cloud services.

Visual Studio Editions



Visual Studio Community

Free, full-featured and extensible tool for developers building non-enterprise applications

- **Full-featured** Integrated Development Environment for building Web, Windows Desktop and cross-platform iOS, Android, and Windows apps
- **Ecosystem** with thousands of extensions to choose from in the Visual Studio Gallery, or create your own
- **Free** for open source projects, academic research, training, education and small professional teams

Visual Studio Professional with MSDN

Professional developer tools and services for individual developers or small teams

- **Professional** developer tool for building any application type
- **Powerful features** to improve your team's productivity such as CodeLens
- **Improve team collaboration** with Agile project planning tools, Team Rooms, charts and more
- **MSDN subscription benefits** including access to core software for dev/test, Team Foundation Server, Visual Studio Online Basic, $50/month in Azure credits, training and support.

Visual Studio Enterprise with MSDN

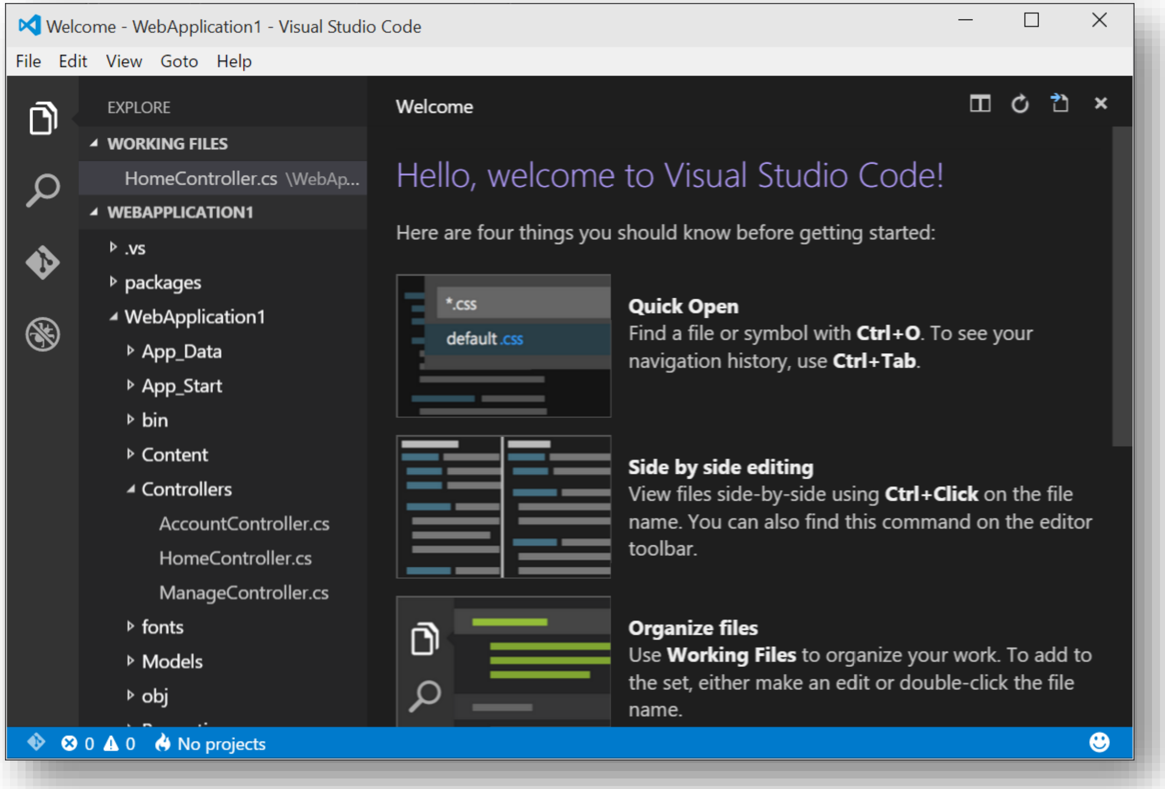
Enterprise grade solution with advanced capabilities for teams working on projects of any size or complexity, including advanced testing and DevOps

NEW

- **End-to-end solution** for your development teams, including the most feature-rich Visual Studio IDE for working on any type of project
- **Build quality applications** at scale with advanced features such as Load Testing, automated and manual testing and new IntelliTest capabilities
- **Manage complexity and resolve issues quickly** with features such as Code Map and IntelliTrace
- **Enhanced MSDN subscription benefits** including comprehensive access to software for dev/test, Team Foundation Server, Visual Studio Online Advanced, $150/month in Azure credits, training and support

Visual Studio Code

- A new, lightweight IDE / code editor that is part of the Visual Studio family
- Completely free of charge
- Runs on Windows, Mac, and Linux
- Great for modern web and cloud development
- Lots of add-ins
- Embraced by the community
- https://code.visualstudio.com/



Hello, welcome to Visual Studio Code!

Here are four things you should know before getting started:

Quick Open
Find a file or symbol with **Ctrl+O**. To see your navigation history, use **Ctrl+Tab**.

Side by side editing
View files side-by-side using **Ctrl+Click** on the file name. You can also find this command on the editor toolbar.

Organize files
Use **Working Files** to organize your work. To add to the set, either make an edit or double-click the file name.

Xamarin

- Very important for building native mobile apps on iOS, Android, and more… using .NET
- Key scenario: Code reuse across platforms
- https://www.xamarin.com/

Xamarin

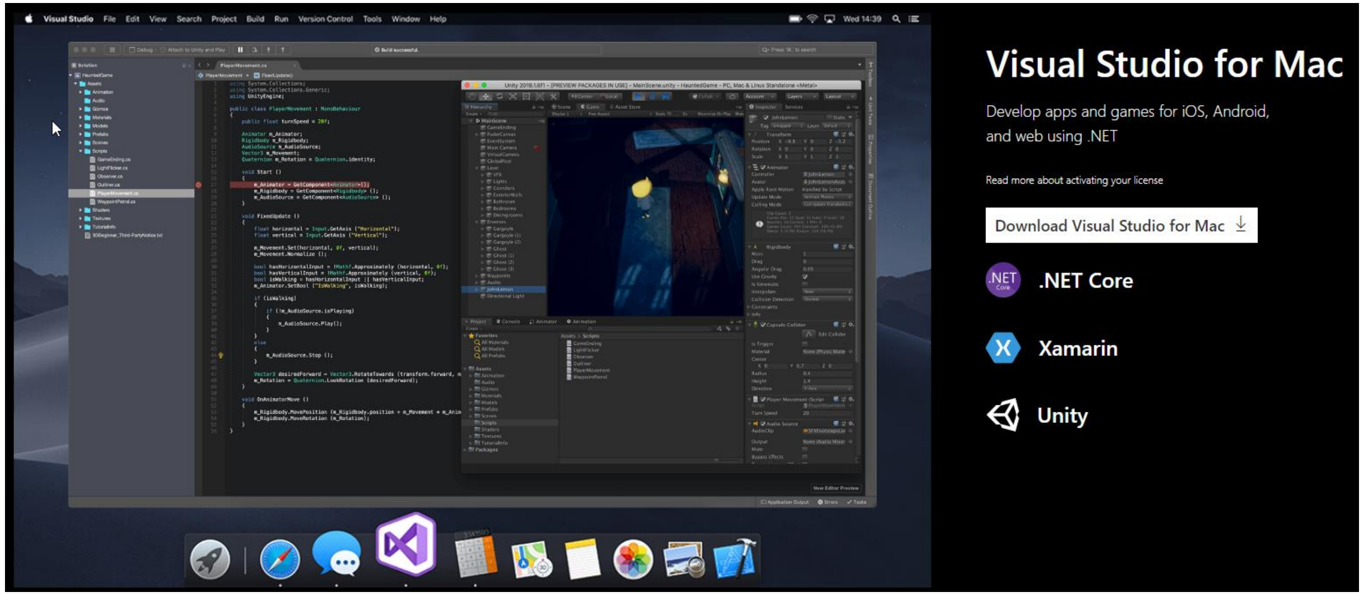
Microsoft Ignite 2018 - Build You First Xamarin.Forms Application session:

https://www.youtube.com/watch?v=BIritDZLYy0

Visual Studio for the Mac

CODE STATE OF .NET

- .NET IDE for the Mac v8.3
- Geared towards creating .NET Core, Xamarin and Unity apps
- https://visualstudio.microsoft.com/vs/mac/
- CODE Focus Article: https://www.codemag.com/article/1911082



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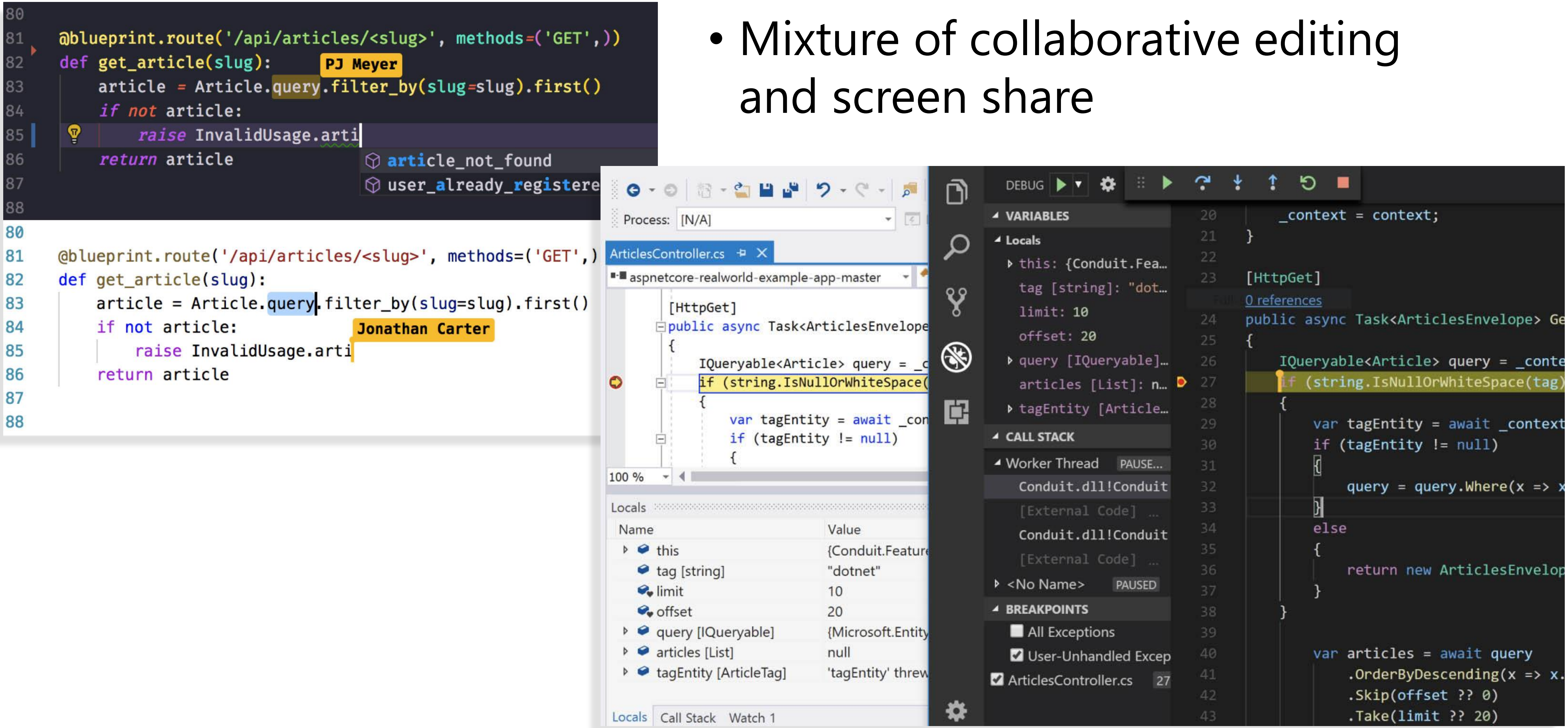
.NET Core

Xamarin

Unity

Visual Studio Live Share

- Mixture of collaborative editing and screen share



```
@blueprint.route('/api/articles/<slug>', methods=('GET',))
def get_article(slug):        PJ Meyer
    article = Article.query.filter_by(slug=slug).first()
    if not article:
        raise InvalidUsage.arti
    return article          article_not_found
                            user_already_registere
```

```
@blueprint.route('/api/articles/<slug>', methods=('GET',)
def get_article(slug):
    article = Article.query.filter_by(slug=slug).first()
    if not article:                Jonathan Carter
        raise InvalidUsage.arti
    return article
```

Process: [N/A]

ArticlesController.cs

aspnetcore-realworld-example-app-master

```
[HttpGet]
public async Task<ArticlesEnvelope
{
    IQueryable<Article> query = _c
    if (string.IsNullOrWhiteSpace(
    {
        var tagEntity = await _con
        if (tagEntity != null)
        {
```

100 %

Locals

Name	Value
this	{Conduit.Featur
tag [string]	"dotnet"
limit	10
offset	20
query [IQueryable]	{Microsoft.Entity
articles [List]	null
tagEntity [ArticleTag]	'tagEntity' threw

Locals Call Stack Watch 1

VARIABLES

Locals
- this: {Conduit.Fea…
- tag [string]: "dot…
- limit: 10
- offset: 20
- query [IQueryable]…
- articles [List]: n…
- tagEntity [Article…

CALL STACK
- Worker Thread PAUSE…
- Conduit.dll!Conduit
- [External Code] …
- Conduit.dll!Conduit
- [External Code] …
- <No Name> PAUSED

BREAKPOINTS
- □ All Exceptions
- ☑ User-Unhandled Excep
- ☑ ArticlesController.cs 27

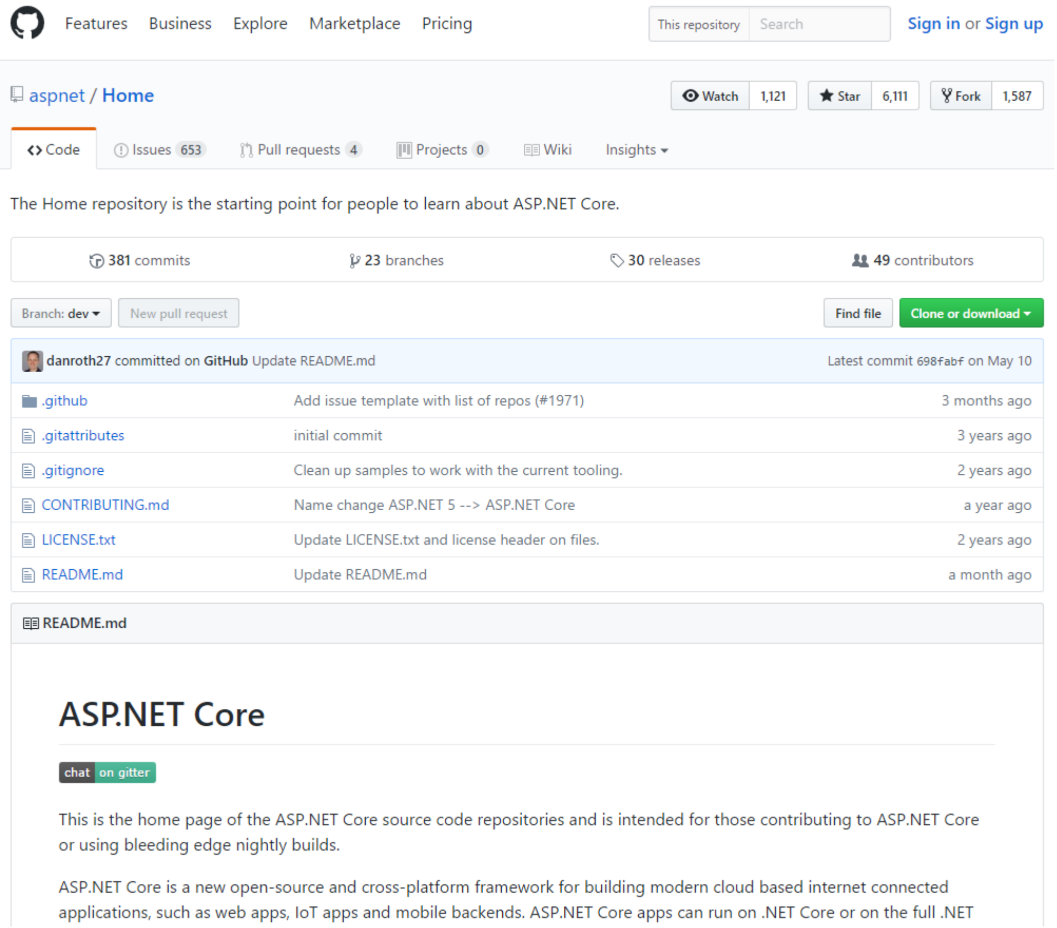
```
        _context = context;
    }

    [HttpGet]
    0 references
    public async Task<ArticlesEnvelope> Ge
    {
        IQueryable<Article> query = _conte
        if (string.IsNullOrWhiteSpace(tag)
        {
            var tagEntity = await _context
            if (tagEntity != null)
            {
                query = query.Where(x => x
            }
            else
            {
                return new ArticlesEnvelop
            }
        }

        var articles = await query
            .OrderByDescending(x => x.
            .Skip(offset ?? 0)
            .Take(limit ?? 20)
```

C# 8

- Nullable reference types
- Async streams
- Ranges and indices
- Default implementations of interface members
- Recursive patterns
- Switch expressions
- Target-typed new-expressions
- May gain importance with Web Assembly
- https://blogs.msdn.microsoft.com/dotnet/2018/11/12/building-c-8-0/
- CODE Focus article: https://www.codemag.com/article/1911112

Microsoft Buys GitHub

- Interesting scenarios about combining Visual Studio Online and GitHub
- Free Private Repos
- https://github.com/pricing



The Home repository is the starting point for people to learn about ASP.NET Core.

danroth27 committed on GitHub Update README.md — Latest commit 698fabf on May 10

.github	Add issue template with list of repos (#1971)	3 months ago
.gitattributes	initial commit	3 years ago
.gitignore	Clean up samples to work with the current tooling.	2 years ago
CONTRIBUTING.md	Name change ASP.NET 5 --> ASP.NET Core	a year ago
LICENSE.txt	Update LICENSE.txt and license header on files.	2 years ago
README.md	Update README.md	a month ago

README.md

ASP.NET Core

chat on gitter

This is the home page of the ASP.NET Core source code repositories and is intended for those contributing to ASP.NET Core or using bleeding edge nightly builds.

ASP.NET Core is a new open-source and cross-platform framework for building modern cloud based internet connected applications, such as web apps, IoT apps and mobile backends. ASP.NET Core apps can run on .NET Core or on the full .NET

Git

- Git (the technology) has won the “asset-management wars”
- It is now used for anything from source code to content management
- It is used as a central technology for things such as DevOps
- Don’t be afraid of branching (or initial setup)!
- Visual Studio Integration
  - Git is integrated in pretty much any IDE
  - Git can be accessed from the command line and (with third party tools) from Explorer, GitHub for Windows, and many others

Other Announcements

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- Take advantage of our Free Hour of Code offer if
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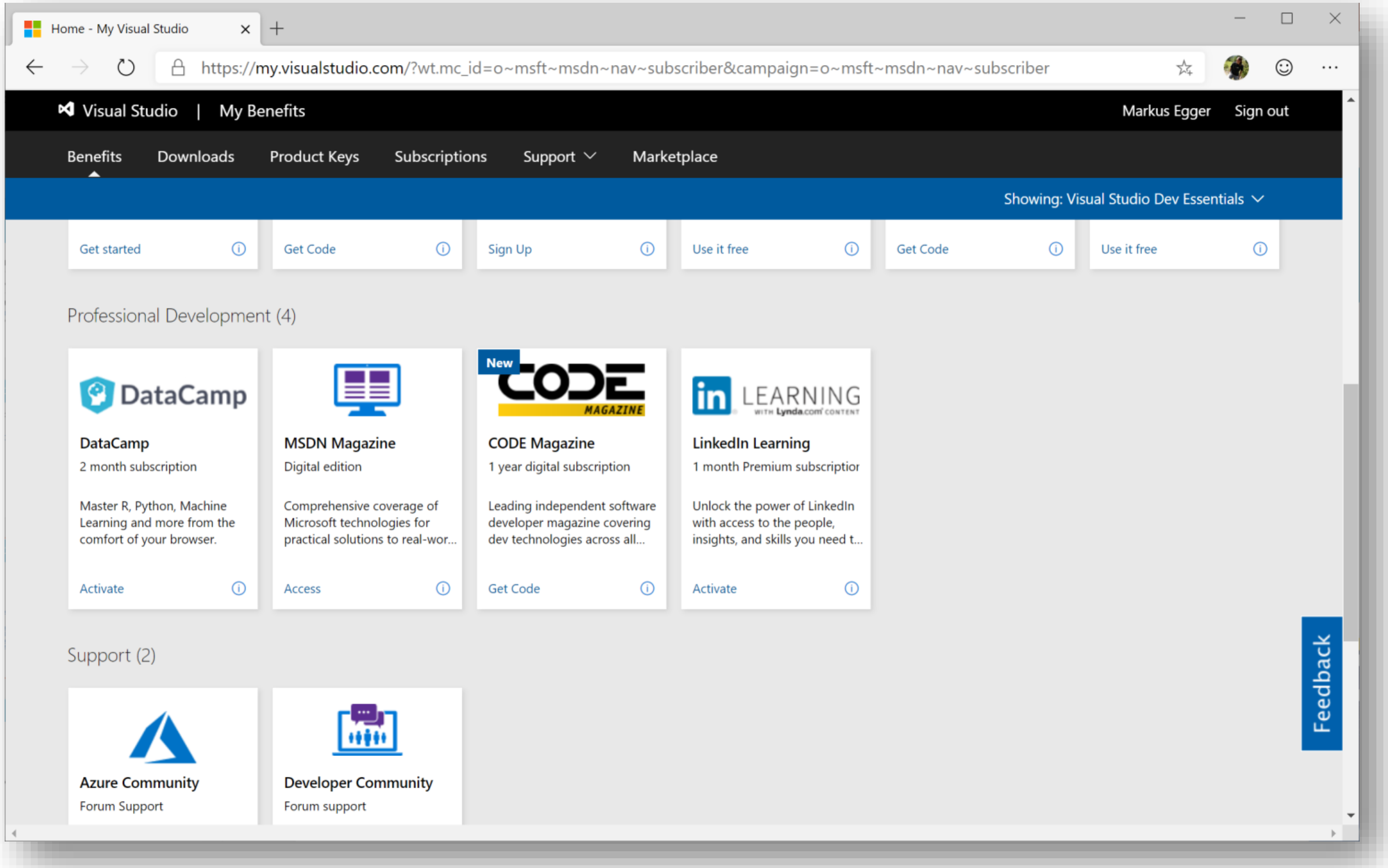

Home - My Visual Studio

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Next Event:

Azure & Cloud

May 27th

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