

# State of .NET

## .NET 6 Preview

Markus Egger

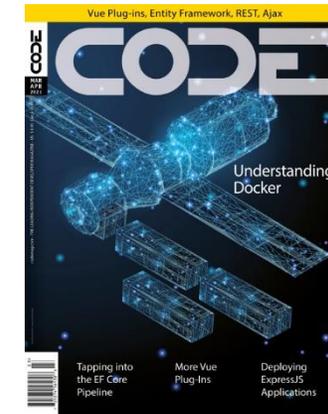
President and Chief Software Architect

CODE Magazine & Consulting

# Kicking Things Off

## Jim Duffy

- Director of Business Development  
CODE Magazine & Consulting
- Former Developer – Drawn to the Dark Side: Now Responsible for  
Marketing & Business Development
- [jduffy@codemag.com](mailto:jduffy@codemag.com) / [My Bio](#)
- International Author and Speaker
- Former Microsoft RD (Regional Director) 9 years
- Former 11 time Microsoft Most Valuable Professional (MVP)
- Twitter: @jmduffy



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- Project Rescue, App Modernization (VB, VFP, Access, etc.)
- Development Team Staff Augmentation
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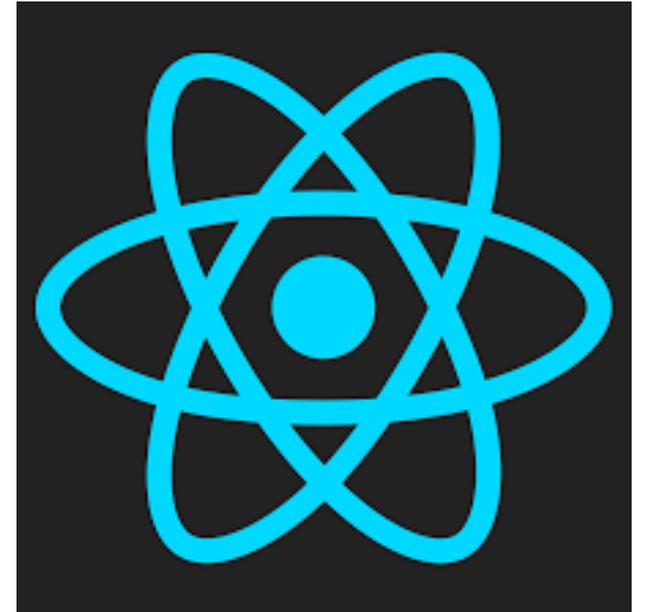


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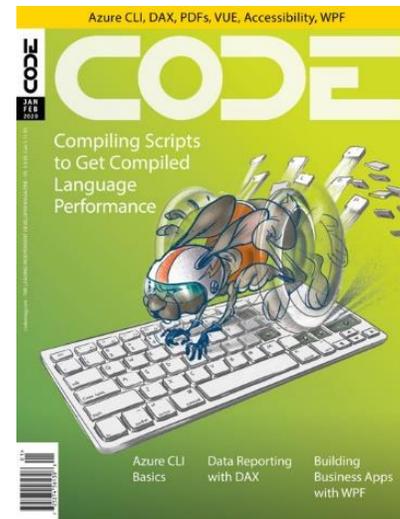
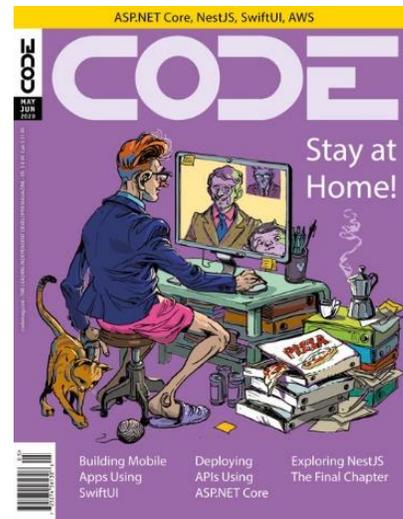
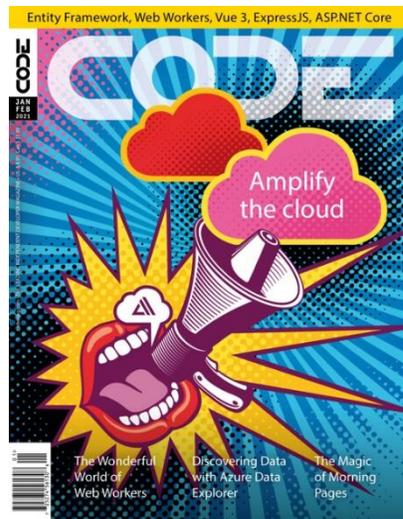
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# Event Survey – Win \$100!

- Complete this very short 12 question survey for a chance at a \$100 Amazon Gift Card!

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- Survey must be completed by 11:59pm ET on Friday 10/29/2021 to be eligible!
- Name selected from registered attendee list. Completed survey is required to win.

## State of .NET - NET 6 Preview

The survey will take just a couple of minutes to complete.

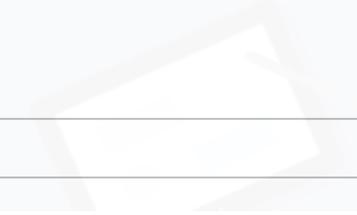
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**THIS SLIDE WILL BE REPEATED AT THE END AND SURVEY LINK REPEATED IN THE CHAT WINDOW!**

# Build Cross Platform Apps With Photino



- Build native, cross-platform desktop apps that are lighter than light.
- Lightweight **open-source** framework for building native, cross-platform desktop applications with Web UI technology.
- Photino is maintained by the CODE Magazine team with the help of the open-source community.
- [tryphotino.io](https://tryphotino.io)
- [Github.com/tryphotino](https://github.com/tryphotino)

# Prior Webinar Recordings

- Slides & Videos:
- State of .NET Webinar Series
  - <https://www.codemag.com/StateOfDotNet>
- CODE Presents Webinar Series
  - <https://www.codemag.com/CODEPresents>

## Recent Event Recordings

State of .NET - .NET 6 Preview

10/27/2021



State of .NET - Azure Architecture

9/29/2021



State of .NET - Windows 11 for Developers

7/28/2021



State of .NET - .NET 5 and .NET 6 Preview - with Markus Egger

6/30/2021



# About the Presenter

- **Markus Egger**
- President and Chief Software Architect  
EPS Software Corp. (dba CODE Consulting)
- Publisher – CODE Magazine
- International Author and Speaker
- Microsoft RD (Regional Director)
- Microsoft MVP 1995-2019
- [Email: markus@codemag.com](mailto:markus@codemag.com)
- Twitter: @markusegger



# Agenda

- .NET 6 Overview
- Visual Studio 2022
- Visual Studio Code
- Language Improvements
- Web Development (ASP.NET, Blazor, APIs,...)
- Desktop Development (WinForms, WPF, MAUI, Blazor, Windows App SDK,...)

# .NET 6 Overview

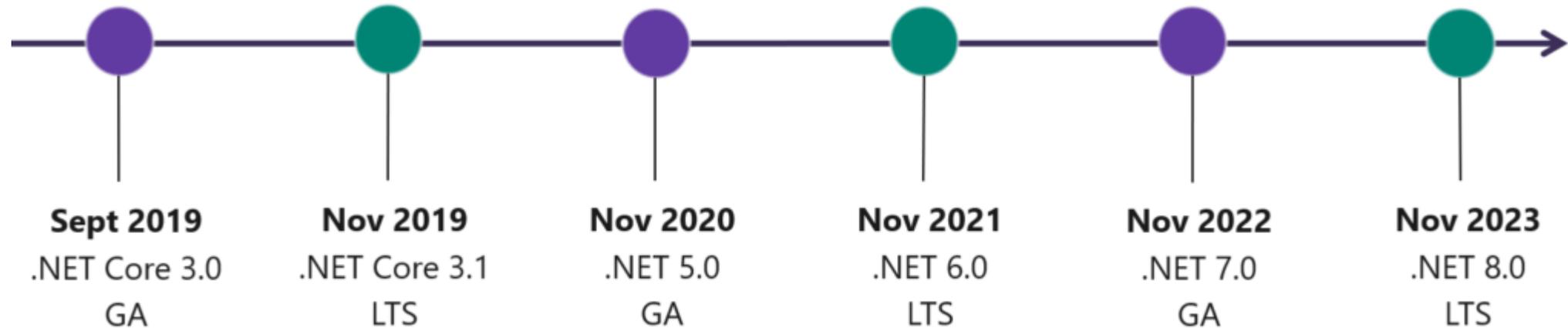
# The .NET 6 Vision

One .NET from Desktop, to  
Web, Mobile, and Beyond!

# The Journey to One .NET

- .NET now looks back at a history lasting two decades...
- ...with many twists and turns
- .NET Framework, .NET Core, Mono, Xamarin, UWP, Silverlight, Windows Phone,...
- Different components, project structures, APIs,...
- .NET 6 completes the journey to reunification of the .NET platform
- The goal is to get away from worrying about “what runs where” and simply “targeting .NET” with code that runs everywhere

# .NET Timeline/Roadmap



- .NET 6 Release: November 9<sup>th</sup>, 2021
  - DotNetConf, and our DotNetConf Recap SODN are coming up shortly!
- Annual, predictable releases (started with .NET Core 3.1)
- Minor Releases if needed

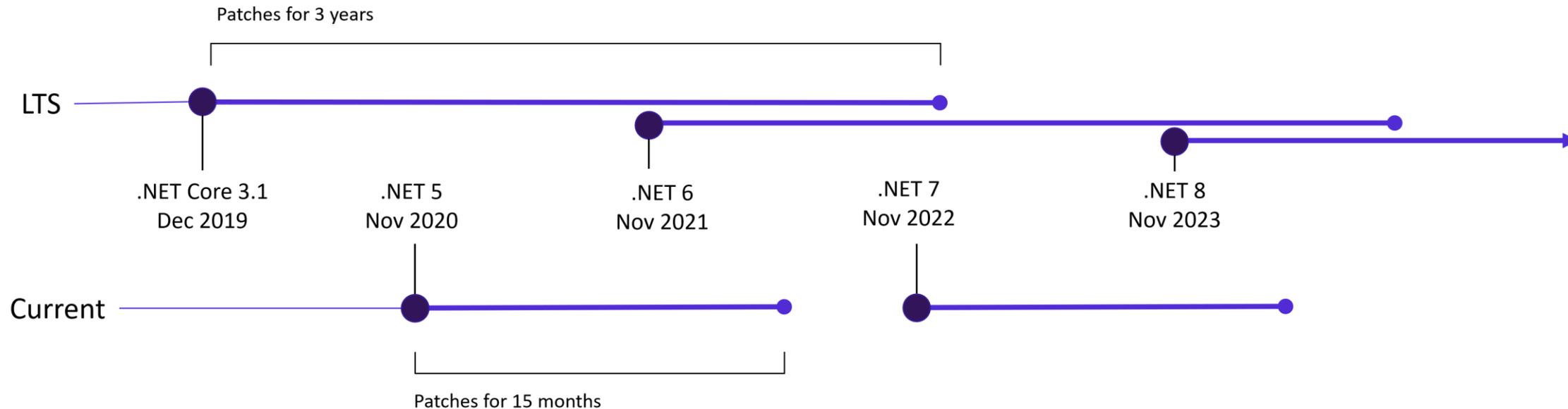
# .NET 6 Preview

- .NET 6 (Release Candidate) is currently available to download
- Visual Studio 2022 is also available as a preview
- Official release date is November 9<sup>th</sup>, 2021

# .NET 5 vs. .NET 6

- Originally, .NET 5 was supposed to be “One .NET”...
  - ...but Covid (and probably a few other things) made that impossible
- In a way, many of the things I will say for .NET 6 today, you may have heard in similar fashion for .NET 5
- .NET 6 brings us full circle and provides the full vision for “One .NET”
- .NET 6 is the LTS (Long Term Support) version of the current generation of .NET
- .NET 6 may also be the most significant new .NET release since .NET Core 1.0, when you consider the support for new platforms (especially ARM64)

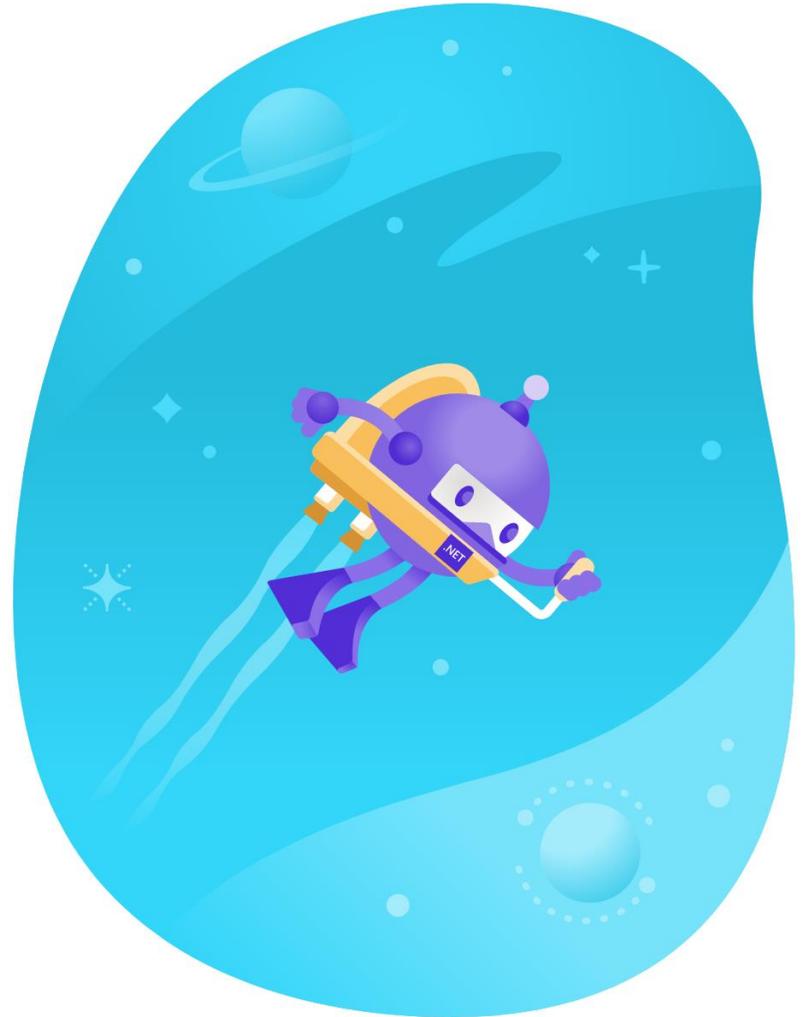
# GA/Current vs. LTS



- Current versions (GA) are supported 15 months
  - (3 months after the next version's release date)
- LTS versions are supported for 3 years
- It should be easy to update from GA to LTS versions

# .NET Conf 2021

- <https://www.dotnetconf.net/>
- November 9 - 11
- .NET 6 Launch Event



# Side-Note: CODE Focus Magazine - .NET 6

- We created CODE Focus issue on .NET 6
- Great source of free information
- Produced in conjunction with Microsoft
- All CODE Magazine subscribers get this special issue for free
- Get a free subscription at:  
[www.codemag.com/subscribe/CF2021](http://www.codemag.com/subscribe/CF2021)



# Side-Note: CODE Focus Magazine - .NET 5

- We also created CODE Focus issue on .NET 5
- Also produced in conjunction with Microsoft
- Content is still available online and very applicable today



# .NET – A unified platform



# .NET ecosystem momentum

> 5M

.NET developers

In Visual Studio family

#1

Most Loved Framework (2019 & 2020)

.NET Core

Top 30

Highest velocity OSS projects

[github.com/dotnet](https://github.com/dotnet)  
[github.com/aspnet](https://github.com/aspnet)



Top 5

Language on GitHub

C#



7X

Faster than Node.js

ASP.NET Core

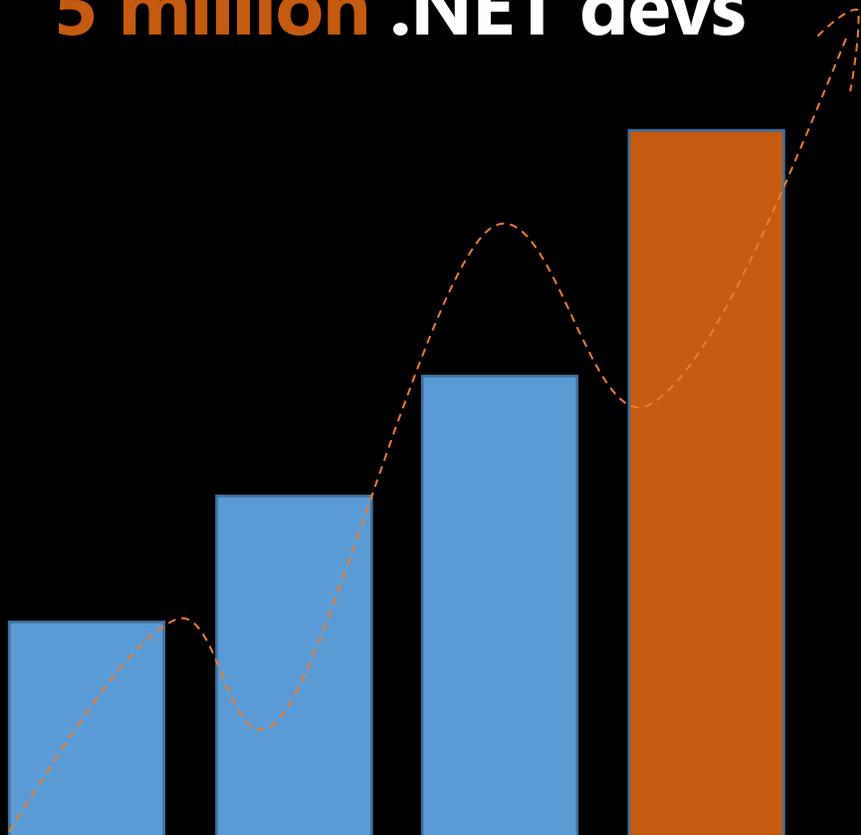
40%

New to .NET are students

dot.net download survey

# .NET adoption

**5 million .NET devs**



**Visual Studio**

**+1 million new**

Monthly active .NET developers in the last year

**.NET Core**

**+600K new**

Monthly active .NET Core developers in the last year

**.NET on Linux**

**2 million**

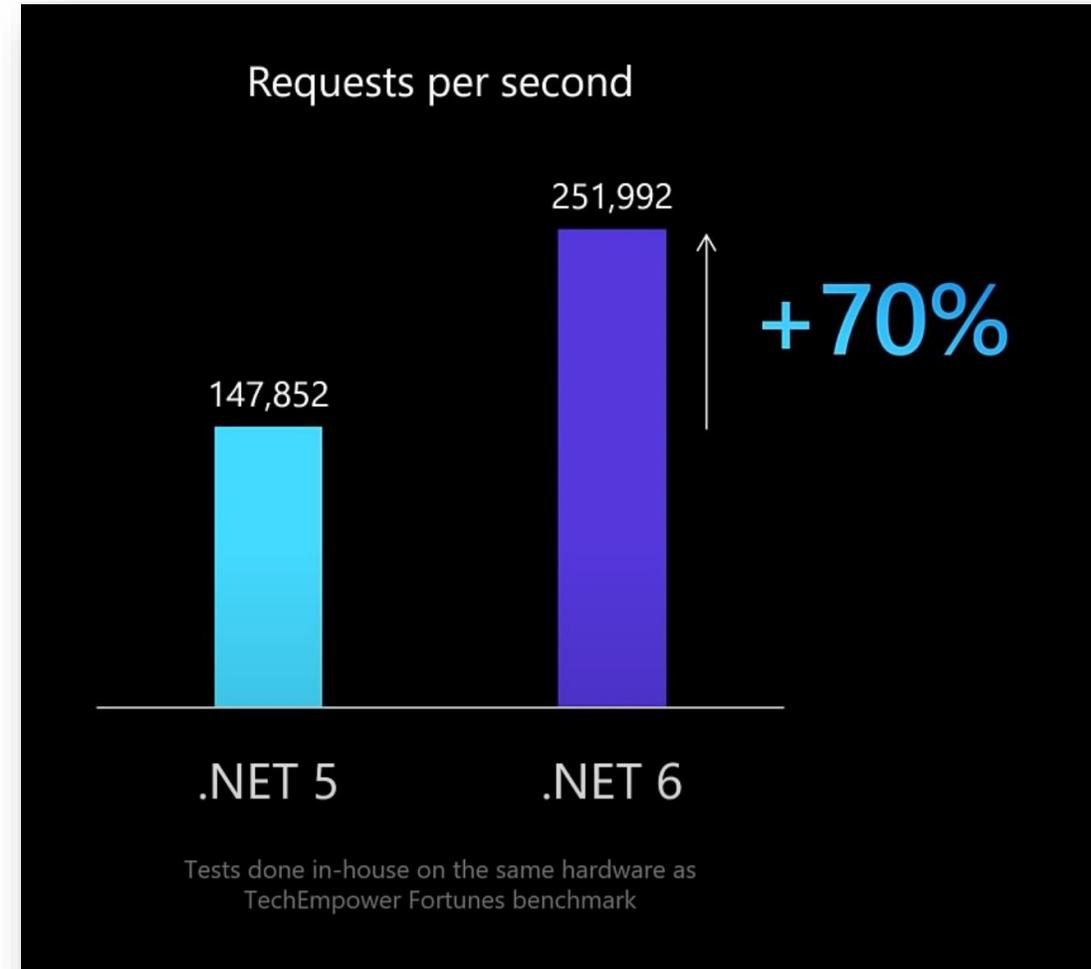
Publishes to Linux from Visual Studio

# ARM64

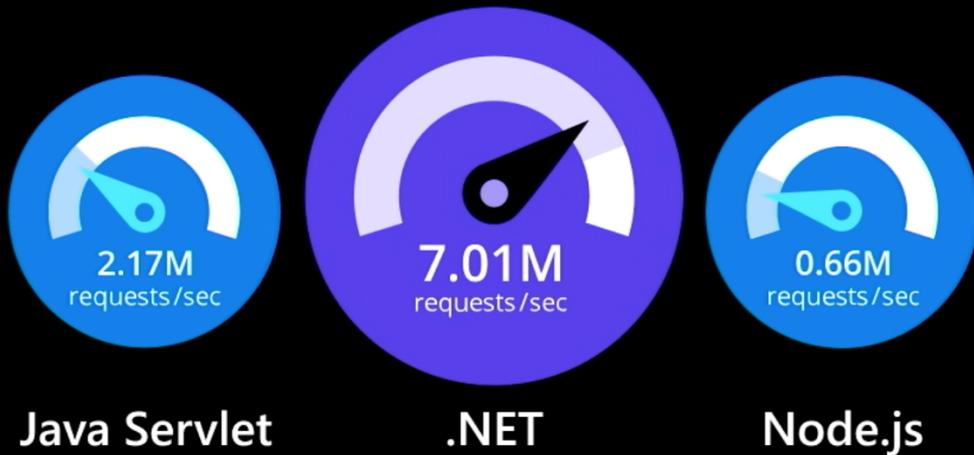
- .NET has many performance and size optimizations specifically driven by support for ARM chips
- ARM chips are very popular in phones, but they are also becoming more popular in laptops
- Surface Pro X is ARM-based
- Apple has announced that their future Apple Silicon-based Macs will be ARM based
- IoT devices are often based on ARM chips
- Raspberry Pi 3 & 4 are ARM-based

# Entity Framework Core Performance

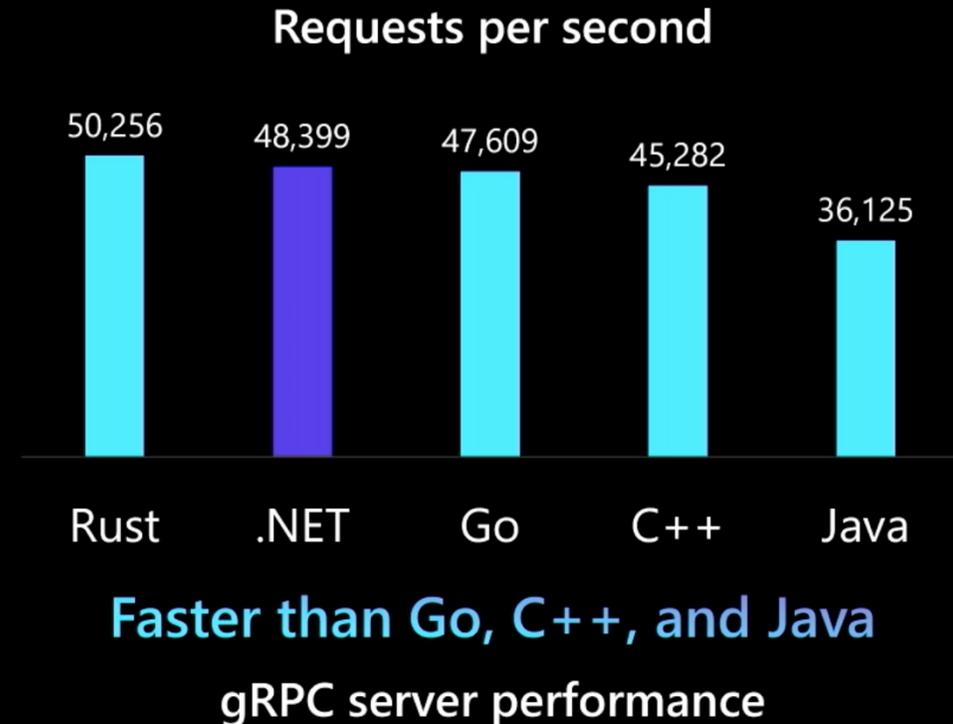
- 70% faster with .NET 6
- 31% faster query performance
- Up to 43% reduced memory allocation



# .NET Performance



**> 10X** faster than Node.js  
ASP.NET Core web framework



# .NET 6 Performance Details

- For more details and specifics on performance improvements, check out our CODE Focus Magazine on .NET6!

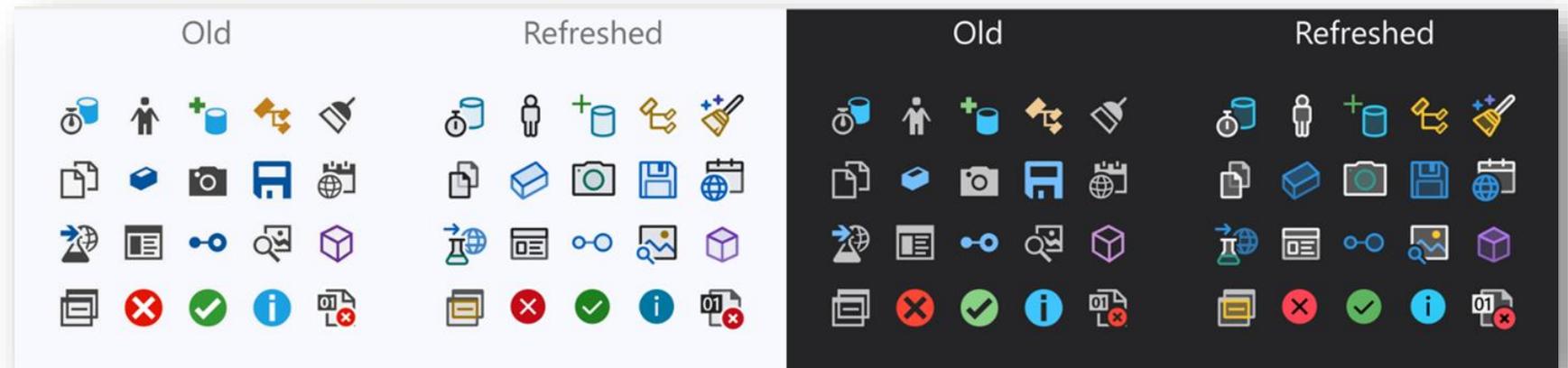
# .NET Upgrade Assistant

- <https://aka.ms/dotnet-upgrade-assistant>
- Helps to analyze and upgrade older codebases
- Understands dependencies
- Provides guidance and assistance
- Surprisingly capable and extensible conversion tool
- Multiple project types supported (and more coming)
  - Class libraries, Console apps, ASP.NET MVC and WebAPI, WinForms and WPF projects
  - C# and Visual Basic

# Visual Studio 2022

# What's New in VS 2022

- Native 64-bit Application
- Improved performance, especially on very large projects
- Improved look with new icons and colors
- Improved color themes and customizations
- Improved debugging and productivity
- AI IntelliCode



# Cool New Editor Features

- Inheritance Margins
- Inline Hints
- Improved Refactoring
  - Including Refactoring from the Solution Explorer
- Remove Unused References
- Improved EditorConfig files (and application of styles after the fact)
- Improved IntelliSense Completions (date/time and regex)
- IntelliCode suggestions based on AI

# Debugger Improvements

- Improved Breakpoint Management
- Remote debugging/testing
- ...

# GitHub and Azure DevOps Improvements

- Improved Git integration
  - In the Git UI...
  - ...as well as the editor window
- Improved repository management

# Visual Studio AI IntelliCode

- IntelliCode analyzes your editing patterns to provide various AI-driven features
- Auto-completions
- Auto-refactorings

# Hot Reload

- Edit & Continue on steroids
- Applies code changes while debugging without restarting the debug session (not even behind the scenes)

# New Razor Editor

- Better support for editing Razor files
- Including refactorings and code fixes
- Improved syntax coloring
- Go-to-definition
- Filtering in IntelliSense

# Visual Studio Code

- Visual Studio Code remains a highly popular editor for editing code-based assets
- Visual Studio Code is now available as a browser-based version in addition to the stand-alone app
  - It can also be used directly from GitHub

# .NET 6 - The Platform

# .NET 6 Main Features

- C# 10 aims to simplify your code base
- Minimal Web APIs
- MAUI (Multi-Platform App UI) for cross-platform apps
- Blazor desktop web apps with native device capabilities
- More Device Targets
- WinForms and WPF on ARM64 and single EXE deployment
- Developer Productivity (like hot reload)
- Performance improvements in the runtime

# C# 9 and C#10

- C# now releases a major version in sync with .NET releases
  - C# 9 = .NET 5
  - C# 10 = .NET 6

# C# 9: Top-Level Statements

- Simplification of simple apps

```
using System;

namespace HelloWorld
{
    class Program
    {
        static void Main(string[] args)
        {
            Console.WriteLine("Hello World!");
        }
    }
}
```

```
using System;
Console.WriteLine("Hello World!");
```

C# 9

# C# 9: Record Types

- Provide immutable reference types that are very easy to handle
- Simplified declaration of this kind of type and its properties
- Easy cloning
- Value-type-style comparison

# C# 9: Init-Only Setters

- Ability to create properties that are read-only after the type has been initialized
- Works great with Record types

# C# 9: Enhanced Pattern Matching

- Type patterns match a variable as a type
- Parenthesized patterns enforce or emphasize the precedence of pattern combinations
- Conjunctive and patterns require both patterns to match
- Disjunctive or patterns require either pattern to match
- Negated not patterns require that a pattern doesn't match
- Relational patterns require that the input be less than, greater than, less than or equal, or greater than or equal to a given constant

# C# 9: Odds and Ends

- Types in new() expressions can be omitted

```
PersonX x = new();
```

- Static modifier on Lambda expressions
- Covariant return types in virtual functions
- Discards (\_) as parameters to lambda expressions
- Attributes on local functions (especially useful for nullable)

# What's new in C# 10

- Required initializers
- `field` keyword in get/set
- Null parameter checking (`string foo!!`)
- `global using` directives
- Namespace declarations with semi-colons (apply for the whole file)

# C# 10 Simplifications

- Simplification of simple apps

```
using System;

namespace HelloWorld
{
    class Program
    {
        static void Main(string[] args)
        {
            Console.WriteLine("Hello World");
        }
    }
}
```

```
using System;
Console.WriteLine("Hello World!");
```

C# 9

```
// some other file
global using System;

// current file
namespace HelloWorld;
Console.WriteLine("Hello World!");
```

C# 10

# .NET 6/C# 10 Minimal APIs

```
using Microsoft.AspNetCore.Builder;
```

```
var app = WebApplication.Create(args);
```

```
app.MapGet("/", (
```

```
app.Run());
```

```
using var httpClient = new HttpClient();  
httpClient.BaseAddress = new Uri("https://atlas.microsoft.com/weather/");  
var baseQuery = $"api-version=1.0&subscription-key={app.Configuration["SubscriptionKey"]}&unit=imperial";  
  
Task<T> GetAsync<T>(string path, string query) => httpClient.GetFromJsonAsync<T>($"{{path}}?{{baseQuery}}{query}");  
  
app.MapGet("/weather/{location}", [EnableCors("weather")] async (Coordinate location) =>  
{  
    var currentQuery = GetAsync<CurrentWeather>("currentConditions/json", $"&query={{location}}");  
    var hourlyQuery = GetAsync<HourlyForecast>("forecast/hourly/json", $"&query={{location}}&duration=24");  
    var dailyQuery = GetAsync<DailyForecast>("forecast/daily/json", $"&query={{location}}&duration=10");  
  
    // Wait for the 3 parallel requests to complete and combine the responses.  
    await Task.WhenAll(currentQuery, hourlyQuery, dailyQuery);  
  
    return new  
    {  
        CurrentWeather = currentQuery.Result.Results[0],  
        HourlyForecasts = hourlyQuery.Result.Forecasts,  
        DailyForecasts = dailyQuery.Result.Forecasts,  
    };  
});  
  
app.Run();
```

# Single File Applications

- .NET aims to re-introduce the experience of publishing small, self-contained version of applications
  - Across all .NET application formats (Windows, Web,...)
  - Across all the platforms (Windows, Mac, Linux)
- Required Framework components are included in the deployment
- True xcopy-enabled, single-file executables
- Assembly Trimming
- .NET has come a long way for this

# Windows Development

- WPF and Windows Forms supported as first-class citizens in .NET
- Improved Designer Support (both WinForms and XAML)
- Improved ClickOnce Support

# Windows App SDK

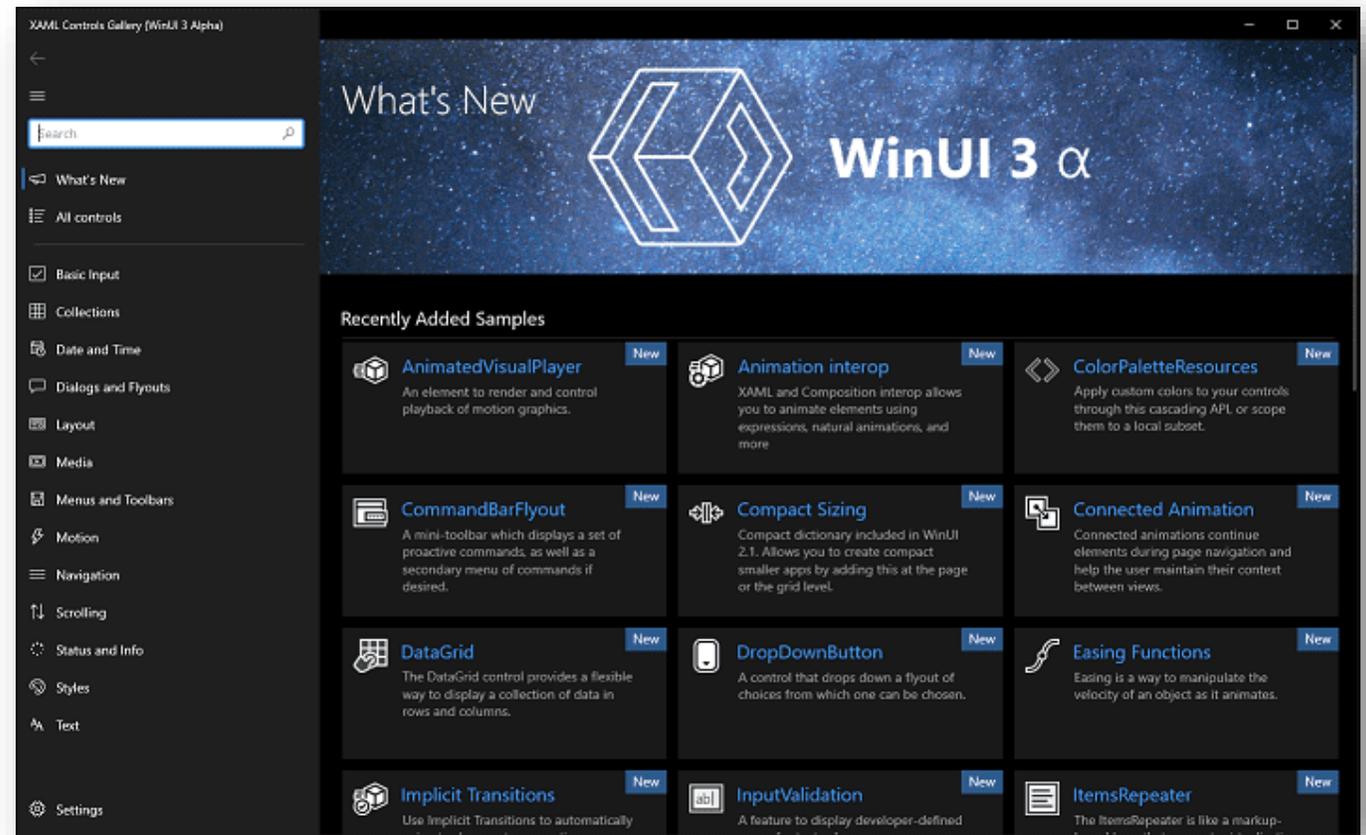
- This is the former “Project Reunion”
- Re-unification of various Windows/Desktop UI technologies
- WinForms, WPF, UWP, WinUI, Xamarin

# WebView2

- New Edge-Chromium-based HTML control
- Available in Windows Forms, WPF
- .NET Framework, .NET Core 3.x, and .NET 5/6
- Windows 7 and later
- Evergreen (updated every 6 weeks)
- WebView2 Evergreen is now a Windows component

# WinUI 3

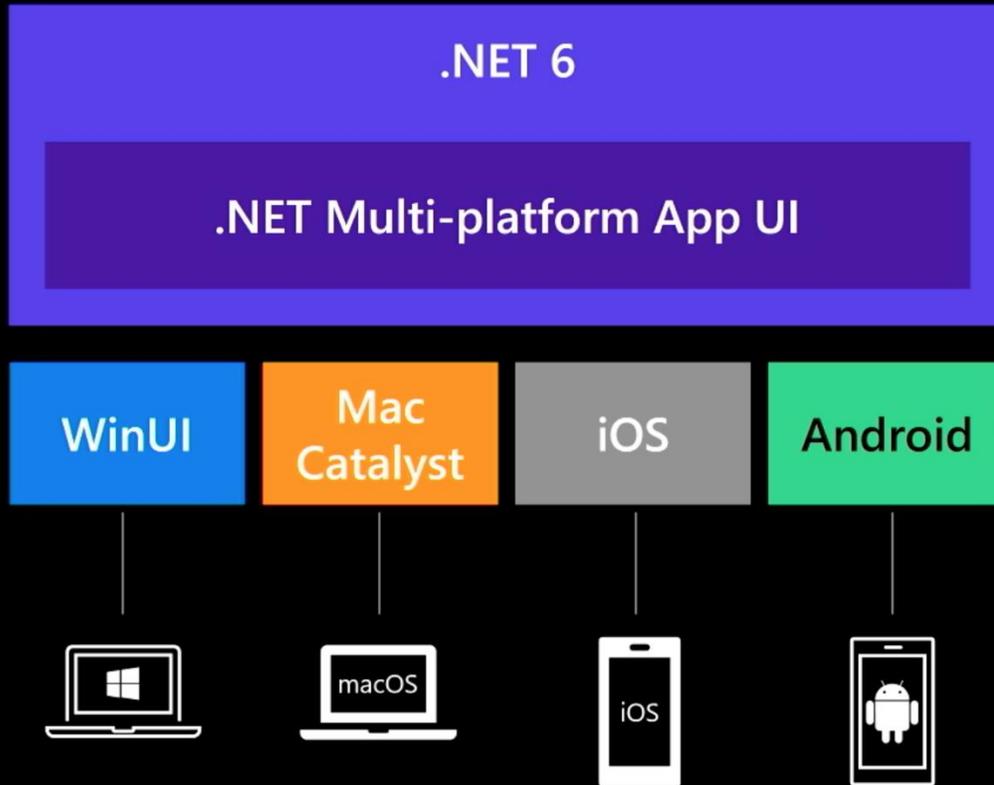
- Continuation of WinRT, XAML Islands,...
- Windows 10/11 only
- Currently available as a preview



# MAUI

- .NET Multi-Platform Application UI
- An evolution of the Xamarin.Forms Toolkit
- XAML-based development experience for rich applications
- Supported on Android, iOS, macOS, and Windows
- Access to each platform's native features
  
- *Note: MAUI has been delayed into 2022, but is available as a preview version*

# .NET Multi-platform App UI



Cross-platform, native UI

Single project system, single codebase

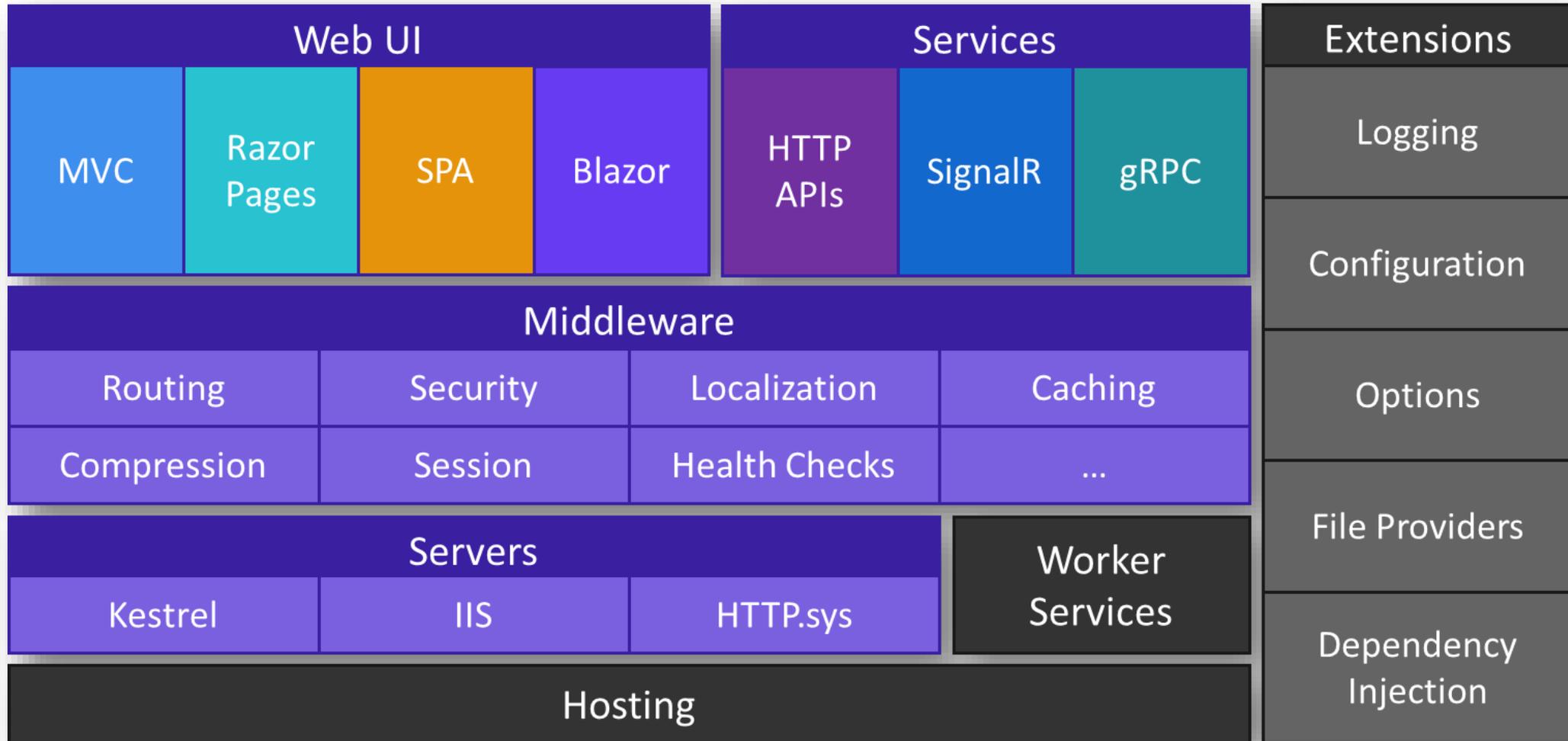
Deploy to multiple devices:  
mobile and desktop

General availability in .NET 6

[github.com/dotnet/maui](https://github.com/dotnet/maui)

# .NET 6 – Web Development

# .NET 6 – Web Development Overview



# Important ASP.NET Web “Themes”

- Reduction of code base and complexity
- Developer productivity
- Performance improvements
- Faster Razor compilation
- Hot Reload support
- Improved support for JavaScript frameworks

# Blazor Overview

- Microsoft's latest web development framework
- An "application programming model"
- Based entirely on HTML and Web Standards
- Client-side Blazor using Web Assembly (web standard)
- Server-side Blazor
- Desktop Blazor built on top of MAUI

# Blazor Updates in .NET 5

- Move to the new .NET runtime (away from Mono)
- Significant Performance Improvements
  - Computational performance up to 30% faster
  - Component rendering 2-4x faster
- Virtualization support
  - Virtualize component rather than foreach-loops
- Prerendering for performance and search optimization
- CSS Isolation
- Lazy Loading of assemblies

# Blazor Updates in .NET 6

- Blazor Desktop on top of MAUI
- Error Boundaries
- Performance Improvements
  - Blazor WebAssembly ahead-of-time (AOT) compilation

# Blazor vs MAUI

- Blazor is an HTML-based app development model/framework
  - Can be deployed in different ways (server, client, desktop)
  - Server and Client models work on any platform (Windows, Mac, Android, iOS, Linux, ...)
  - In exceptional cases, can bring in native elements on various platforms
- MAUI is a cross-platform native app development model
  - Windows, Mac, Android, iOS
  - In exceptional cases, can bring in hosted HTML
- Blazor Desktop sits on top

# Blazor Popularity

- The final verdict on Blazor popularity is still out, but...
- ...Blazor is the fastest growing .NET workload ever
- ...Blazor is generally described as “red hot”
- ...Blazor is engrained enough to feel comfortable about its future
- ...Blazor is the most popular topic we cover

# ASP.NET Core new features

## Runtime

- HTTP/3
- HTTP logging middleware
- Shadow copying for IIS deployment
- OpenTelemetry support
- Higher throughput & reduced memory usage

## APIs

- Minimal APIs
- Async streaming
- IAsyncDisposable support
- gRPC client retries & load balancing

## Web UI

- CSS isolation for Pages & Views
- Improved SPA support

# Other Announcements

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\* Required

1. Full Name \*

2. Company Name \*

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Mark Your Calendar For Our Next State of .NET Event!

**State of .NET - .NET Conf Recap**

**November 17, 2021**

**1:00pm ET (UTC-4), 12:00pm CT**

**<https://bit.ly/3E7viMI>**

## November 2021

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

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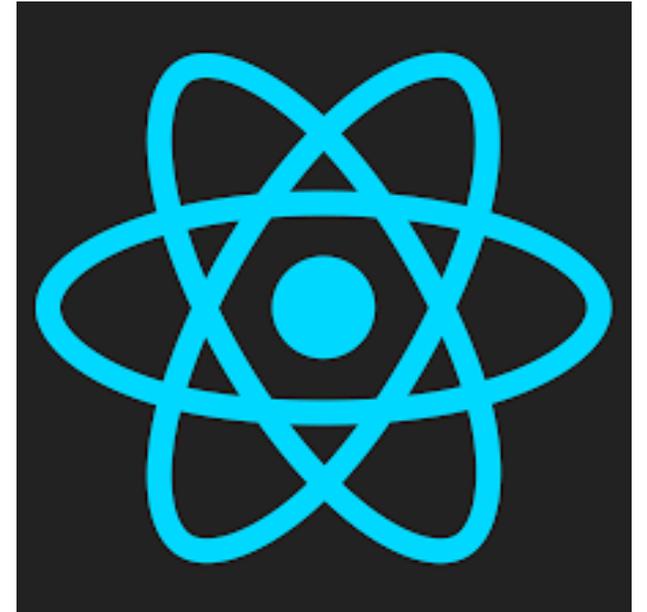
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- Just help from our team of experience software developers.
- Got questions? Stuck on an issue? Platform and/or architecture decisions to make? We can help!

<https://codemag.com/OneHourConsulting>



Contact us at [info@codemag.com](mailto:info@codemag.com) or [jduffy@codemag.com](mailto:jduffy@codemag.com)

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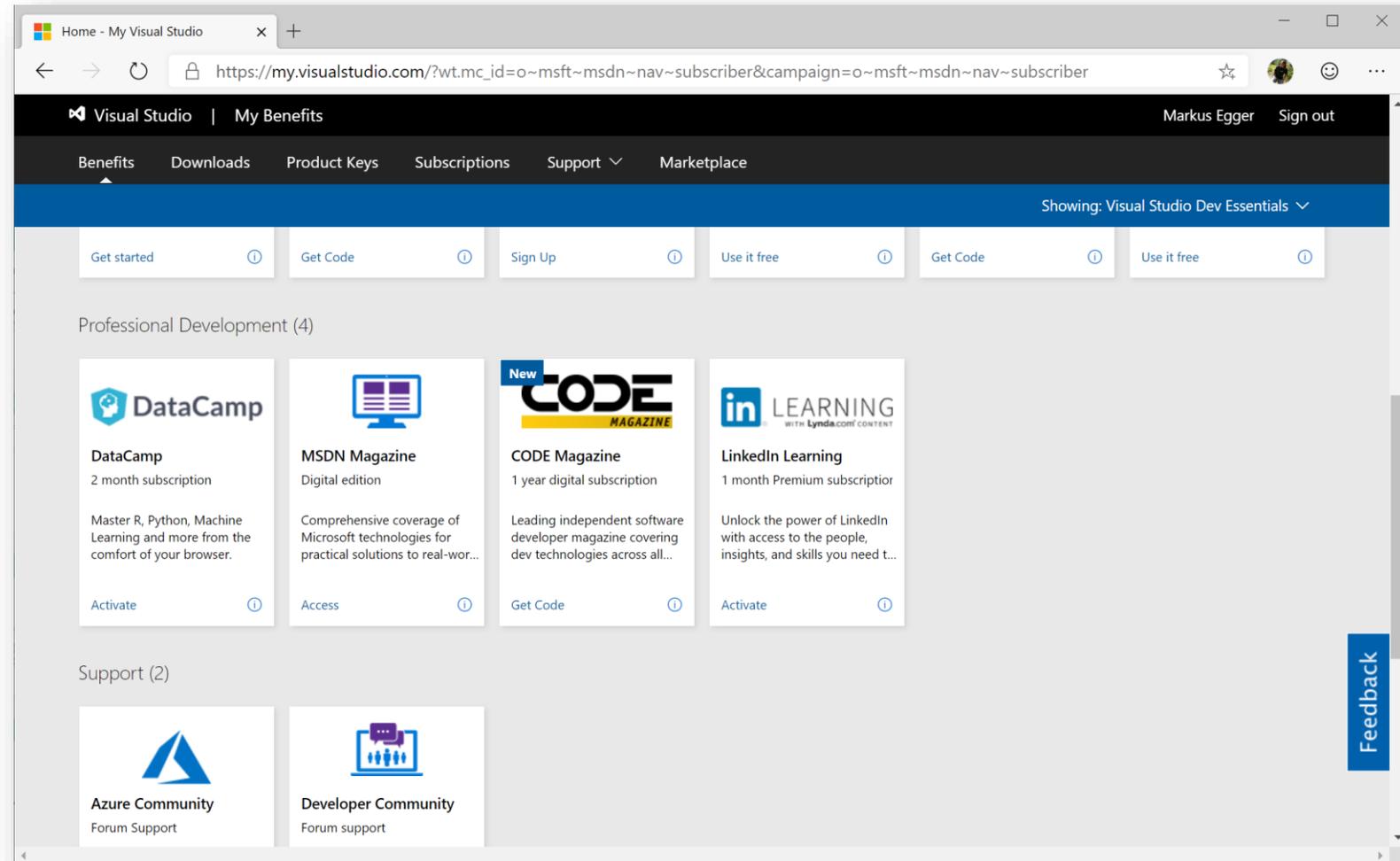
- Check out the new CODE Magazine Mobile application!
- Available for iOS & Android

<https://codemag.com/mobile>



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# Q&A

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