State of .NET
.NET 5 and .NET 6 Preview

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CODE Magazine & Consulting

Kicking Things Off

Jim Duffy

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- International Author and Speaker
- Former Microsoft RD (Regional Director) 9 years
- Former 11 time Microsoft Most Valuable Professional (MVP)
- Twitter: @jmduffy

Microsoft Most Valuable Professional

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- Development Team Staff Augmentation
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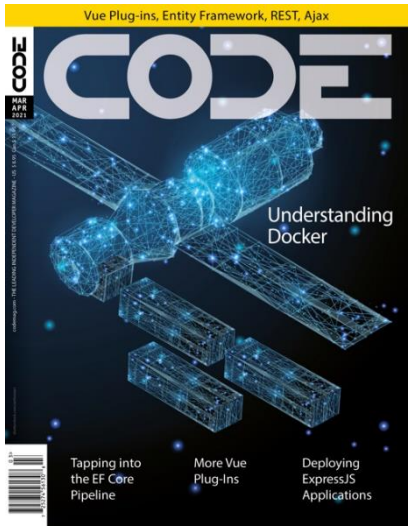

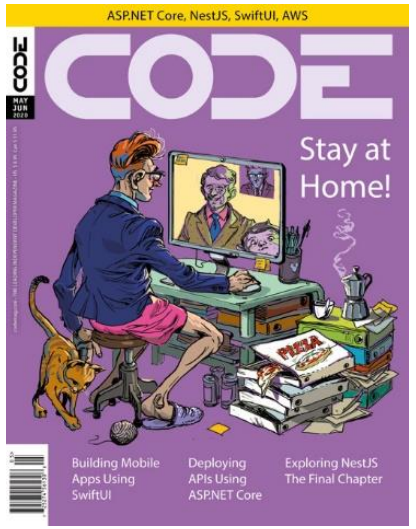

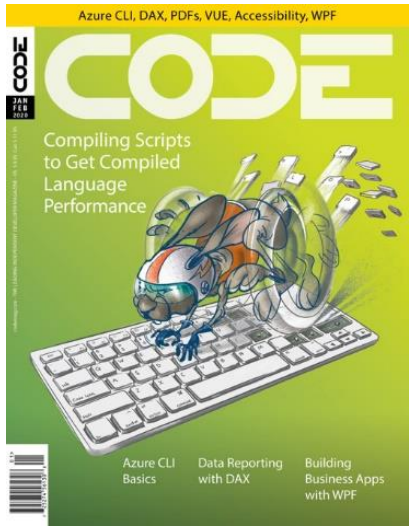

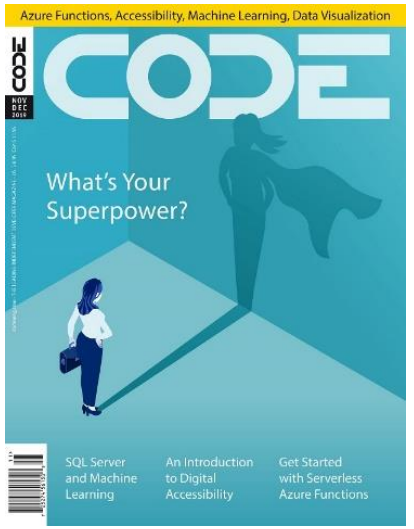

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- Survey must be completed by 11:59pm ET on 7/2/2021 to be eligible!
- Name selected from registered attendee list. Completed survey is required to win.

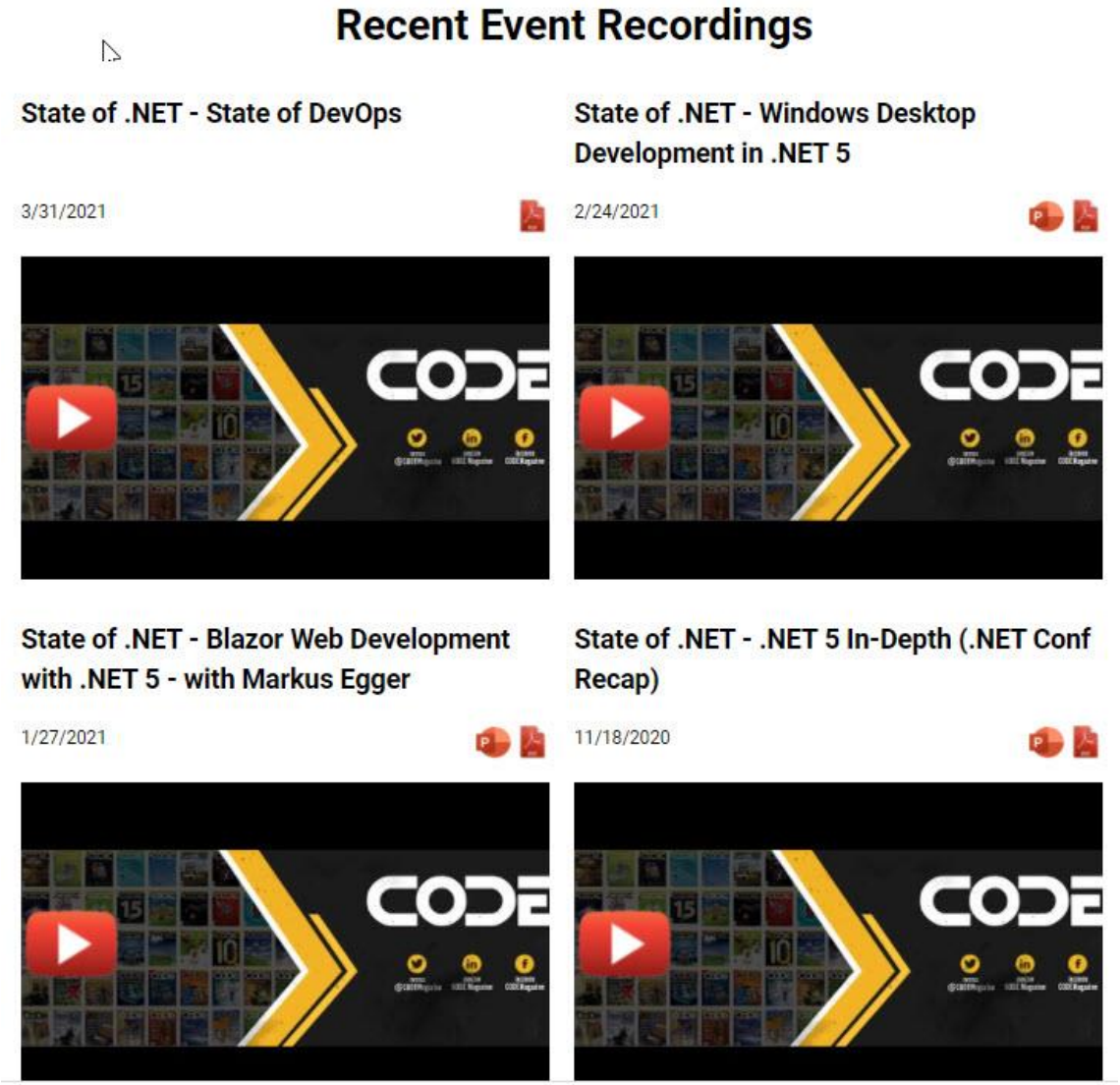
THIS SLIDE WILL BE REPEATED AT THE END AND SURVEY LINK REPEATED IN THE CHAT WINDOW!

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
- Github.com/tryphotino

Prior Webinar Recordings

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



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
- Twitter: @markusegger

Agenda

- .NET 5 and .NET 6 Overview
- Visual Studio 2022
- Language Improvements
- Web Development (Blazor, APIs,…)
- Desktop Development (WinForms, WPF, MAUI, Blazor, Windows App SDK,…)
- Some Windows 11 News

.NET 6 Overview

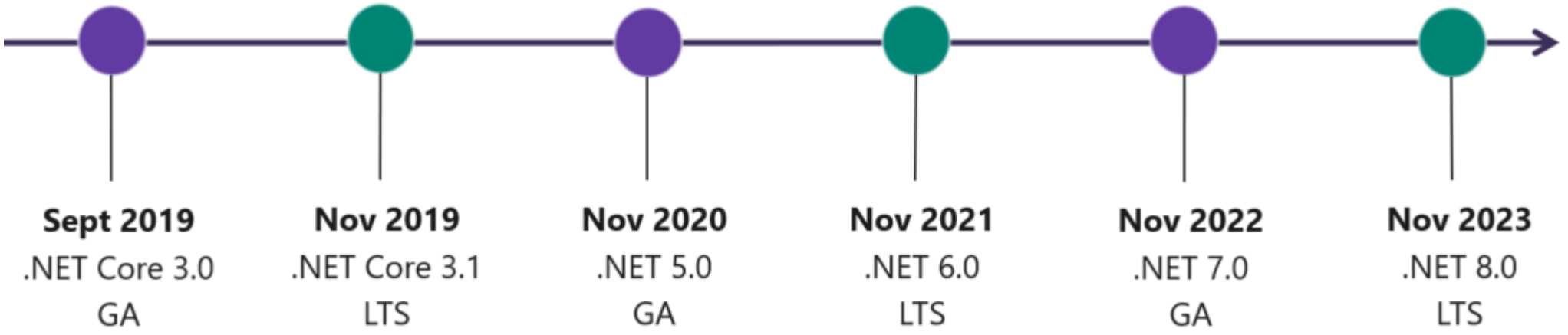
The .NET 6 Vision

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 5 Release: November 10th, 2020
- .NET 6 Release: November 9th, 2021
- Annual, predictable releases (started with .NET Core 3.1)
- Minor Releases if needed

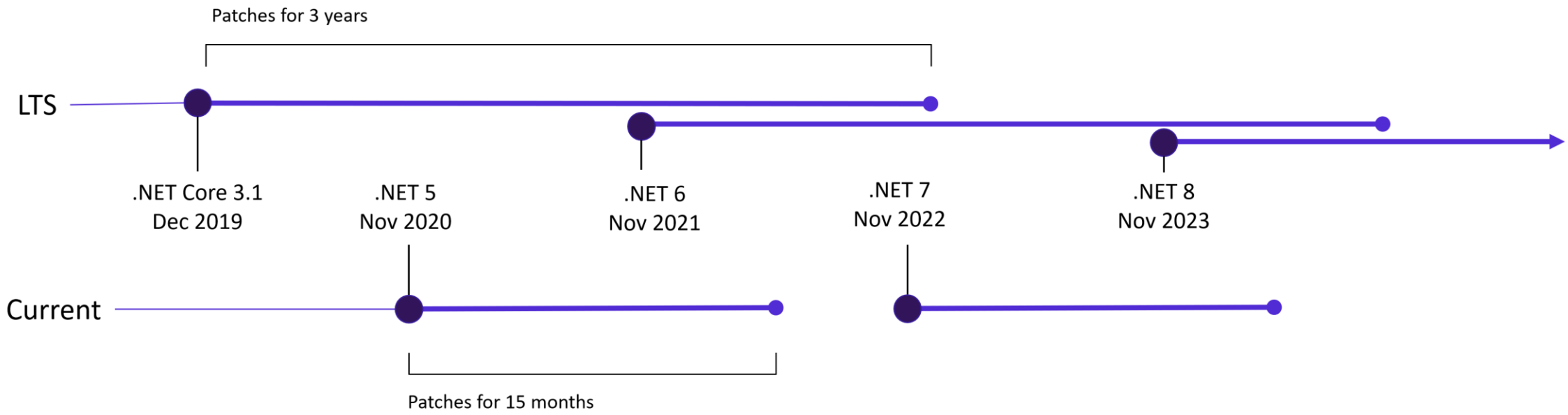
.NET 6 Preview

- .NET 6 (Preview 5) is currently available to download
- The same is true for Visual Studio 2022

.NET 5 vs. .NET 6

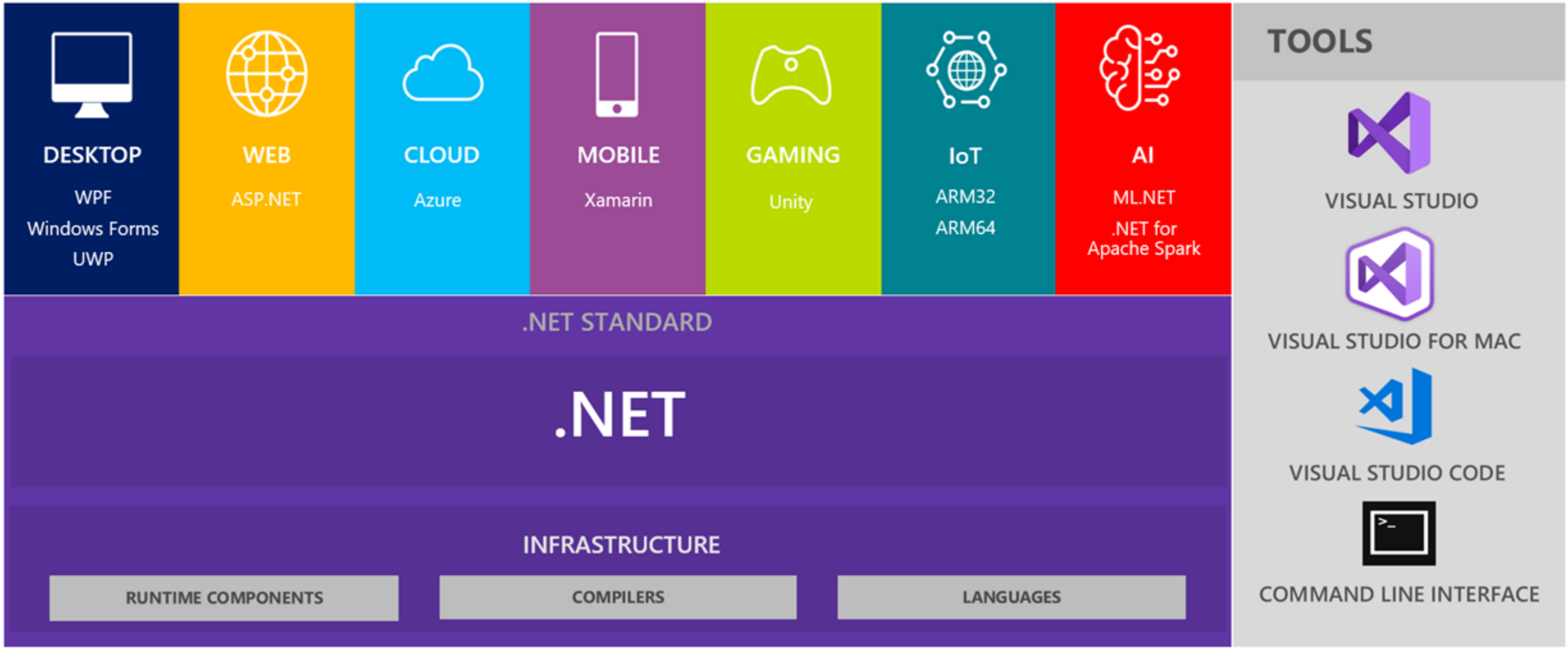
- Originally, .NET 5 was supposed to be “One .NET”…
  - …but Covid (and probably a few other things) made that impossible
- In a way, many of the things I will say for .NET 6 today, you may have heard in similar fashion for .NET 5
- .NET 6 brings us full circle and provides the full vision for “One .NET”
- .NET 6 is the LTS (Long Term Support) version of the current generation of .NET

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 – 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
github.com/aspnet

Top 5

Language on GitHub

C#

7X

Faster than Node.js

ASP.NET Core

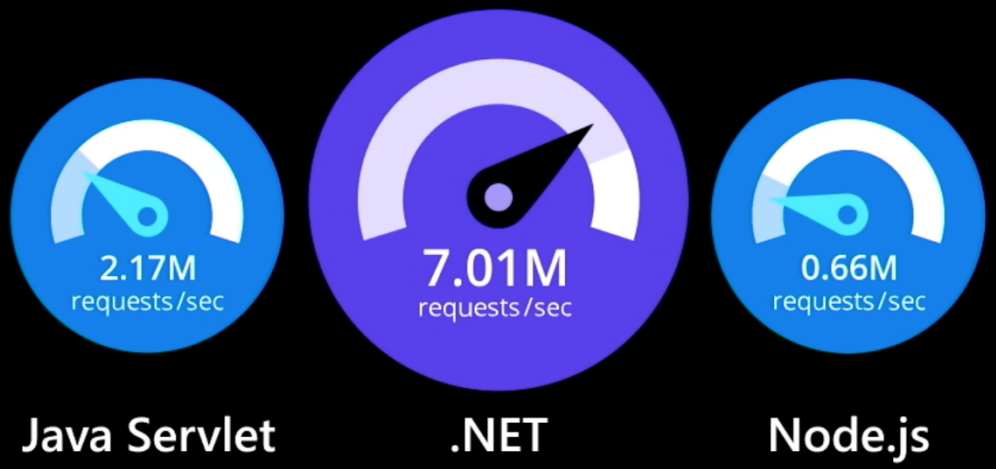
40%

New to .NET are students

dot.net download survey

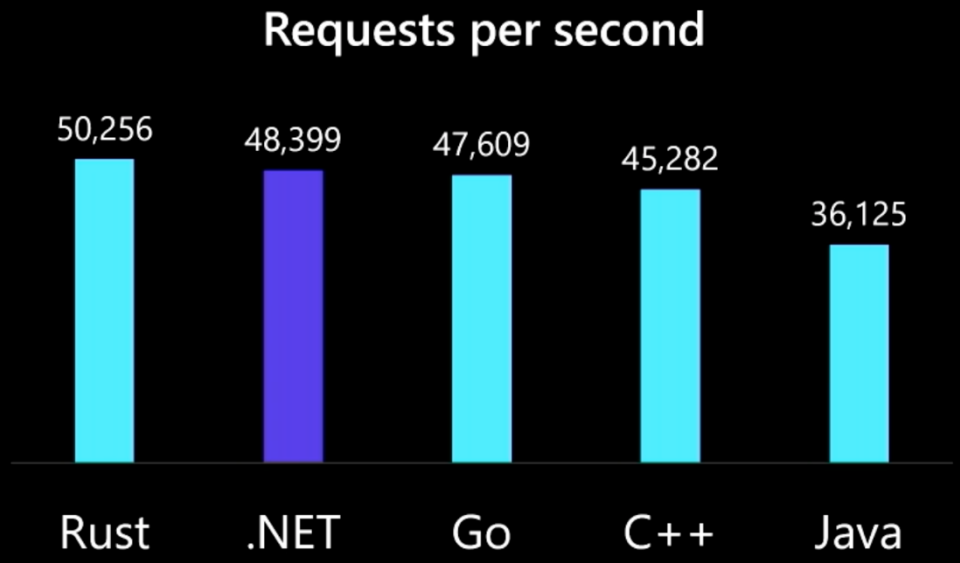
Sources: insights.stackoverflow.com/survey/2019#most-loved-dreaded-and-wanted & insights.stackoverflow.com/survey/2020#most-loved-dreaded-and-wanted github.com/cncf/velocity/ octoverse.github.com/ www.techempower.com/benchmarks/#section=data-r18&hw=ph&test=plaintext

.NET Performance



>10X faster than Node.js

ASP.NET Core web framework



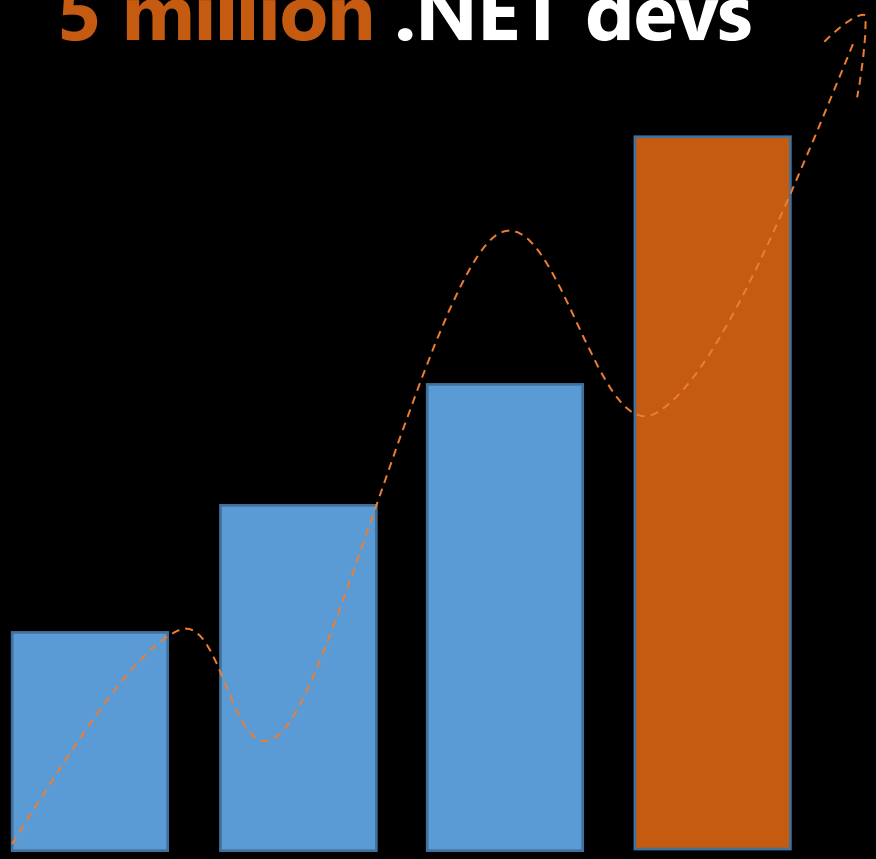
Faster than Go, C++, and Java

gRPC server performance

Sources: https://www.techempower.com/benchmarks/#section=data-r20&hw=ph&test=plaintext; https://github.com/LesnyRumcajs/grpc_bench/wiki/2020-08-11-bench-results

.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

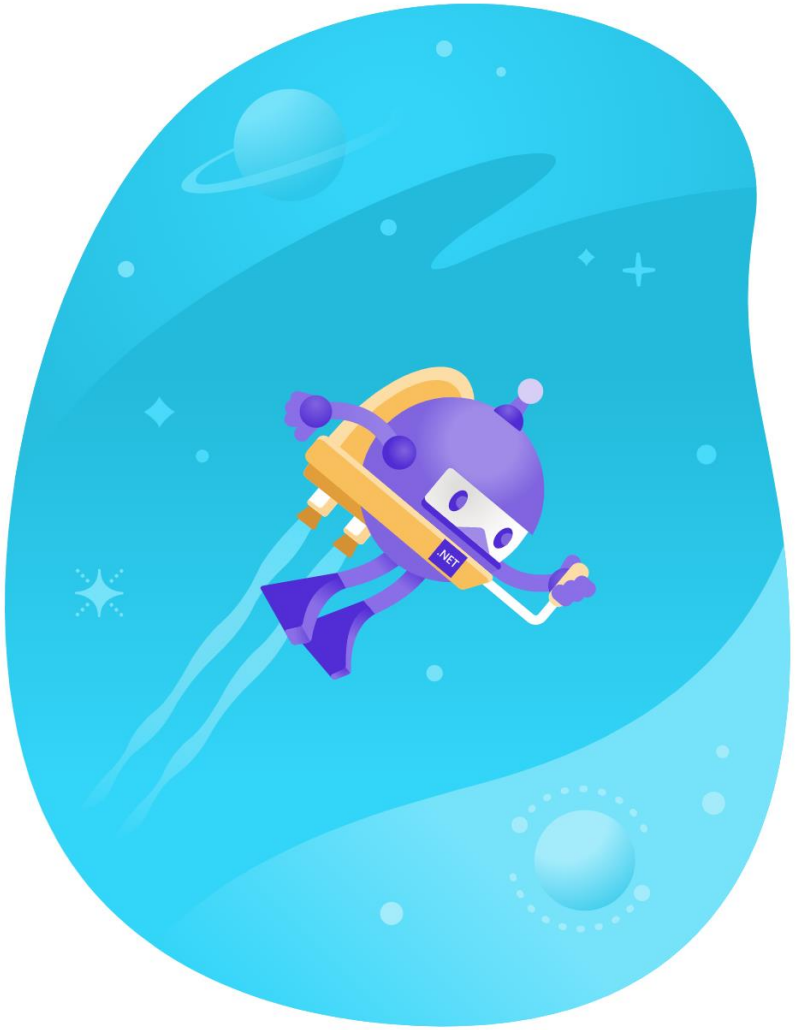
.NET on Linux

2 million

Publishes to Linux from Visual Studio

.NET Conf 2021

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



Side-Note: CODE Focus Magazine - .NET 5

- We created CODE Focus issue on .NET 5
- 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/CF2020

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
  - Note: Turn on preview features
- Improved debugging and productivity
- AI IntelliCode

Hot Reload

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

Visual Studio AI IntelliCode

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

Side-Note: Visual Studio Code

- This presentation is not about Visual Studio Code, but that is not meant to take away from the significance of VS Code!
- VS Code is a great editor for code-focused development!

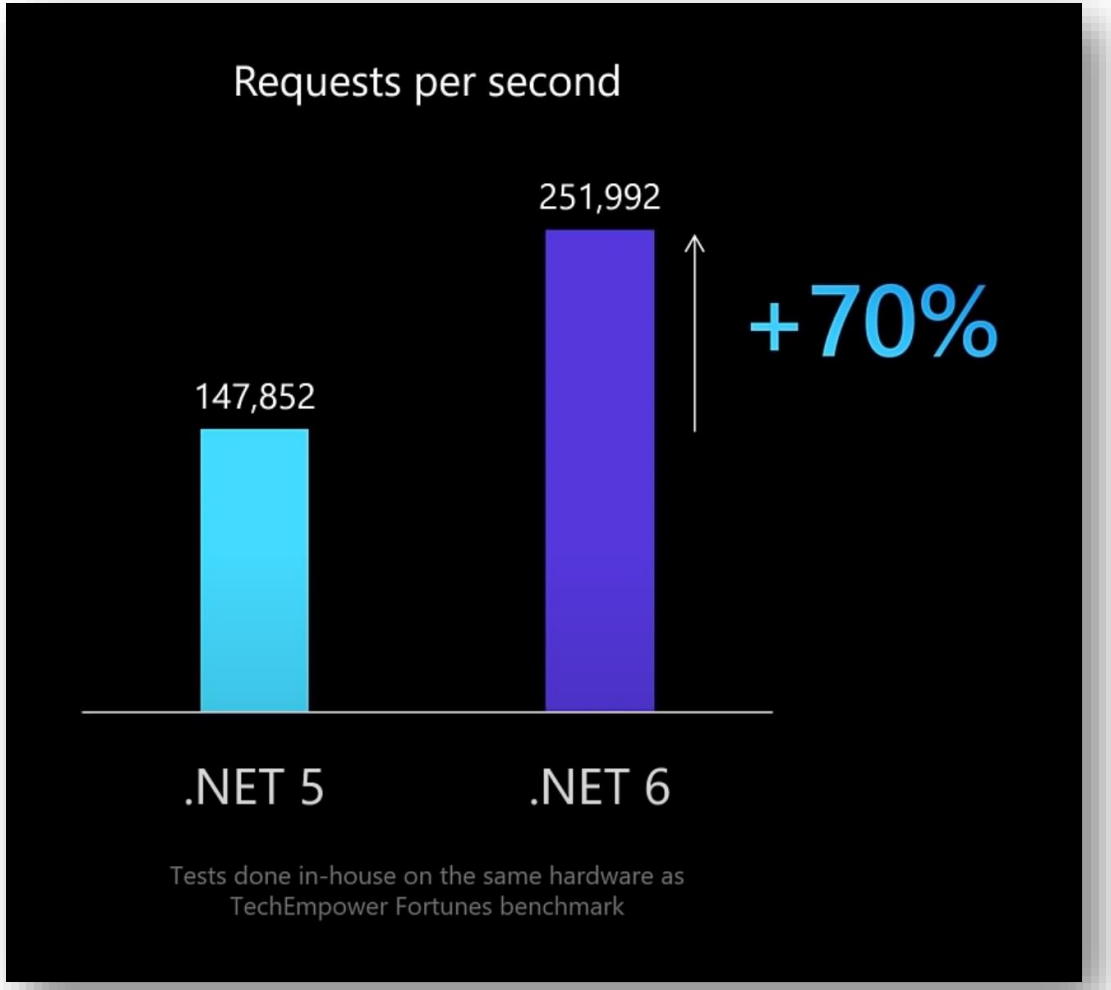
.NET 6 - The Platform

.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

Entity Framework Core Performance

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



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!");
        }
    }
}
```

C# 9

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

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
        }
    }
}
```

C# 9

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

C# 10

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

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

.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();
```

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

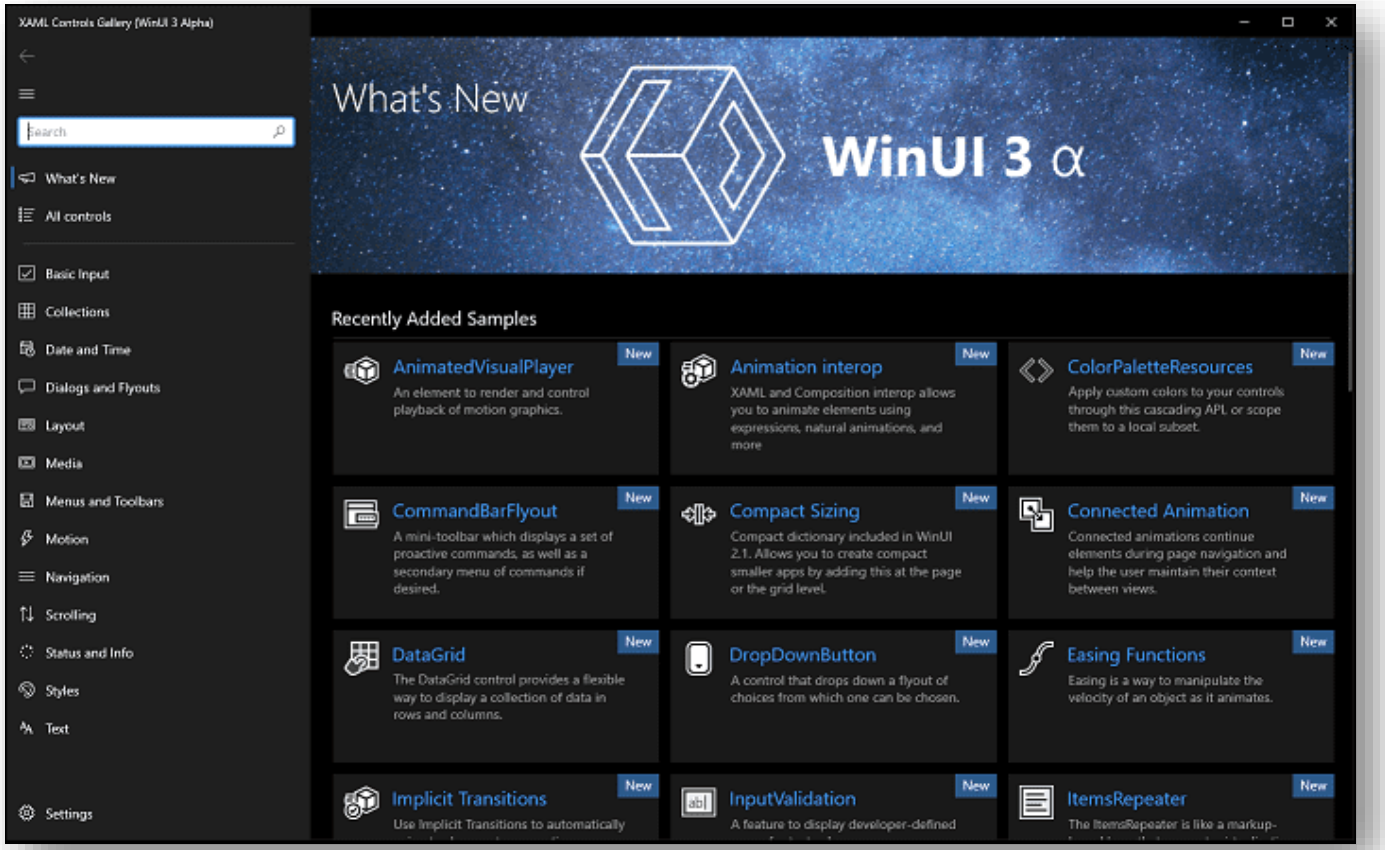
- This is the former “Project Reunion”
- Re-unification of various Windows/Desktop UI technologies
- WinForms, WPF, UWP, WinUI, Xamarin

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

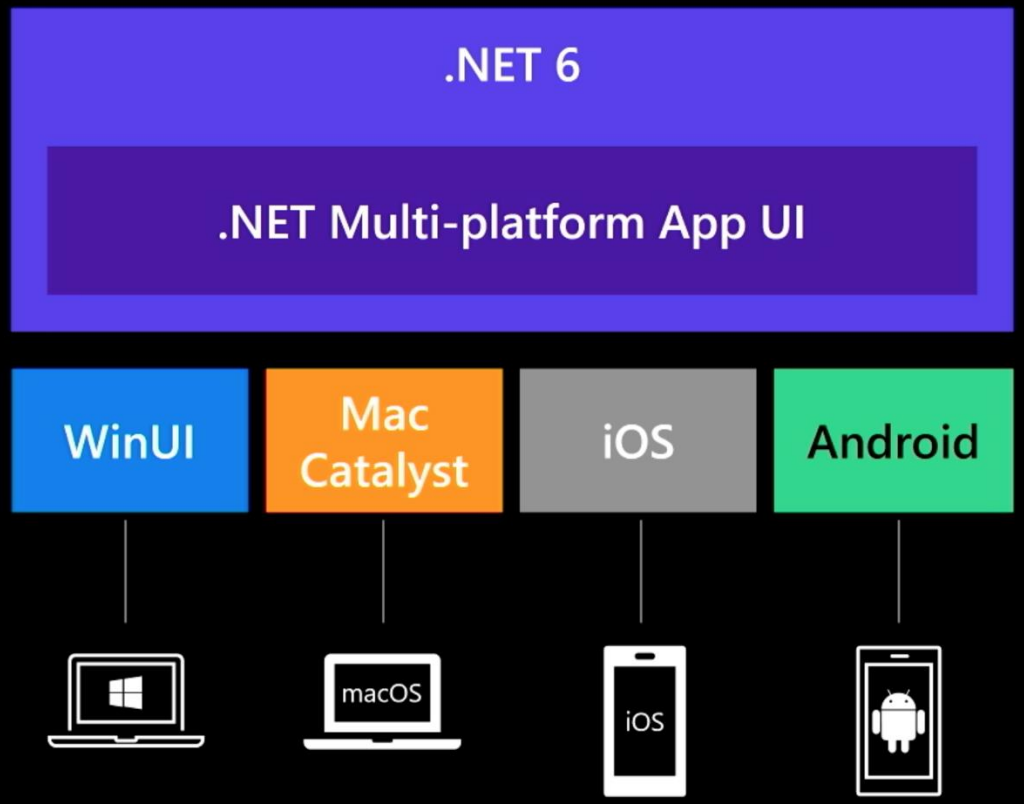
- Continuation of WinRT, XAML Islands,…
- Windows 10/11 only
- Currently available as a preview



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

.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

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

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

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

.NET Upgrade Assistant

- https://aka.ms/dotnet-upgrade-assistant
- Helps to analyze and upgrade older codebases
- Understands dependencies
- Provides guidance and assistance
- Multiple project types supported (and more coming)
- Currently in preview

Related:
Windows 11 Announcements

Windows 11

- Windows 11 is the next version of Windows
  - Now available as a preview
  - Expected to release October 20th
- It's a refresh of the Windows UI
- Watch the recording from Microsoft's recent live event: https://www.microsoft.com/en-us/windows/event
- "What's next for Developers [in Windows 11]" video:| https://www.youtube.com/watch?v=egZ82QGshX8&t=1557s

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More
Get Started
Welcome to Windows
Travel itinerary
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Brand Guidelines
2h ago
Expense Worksheet
12h ago
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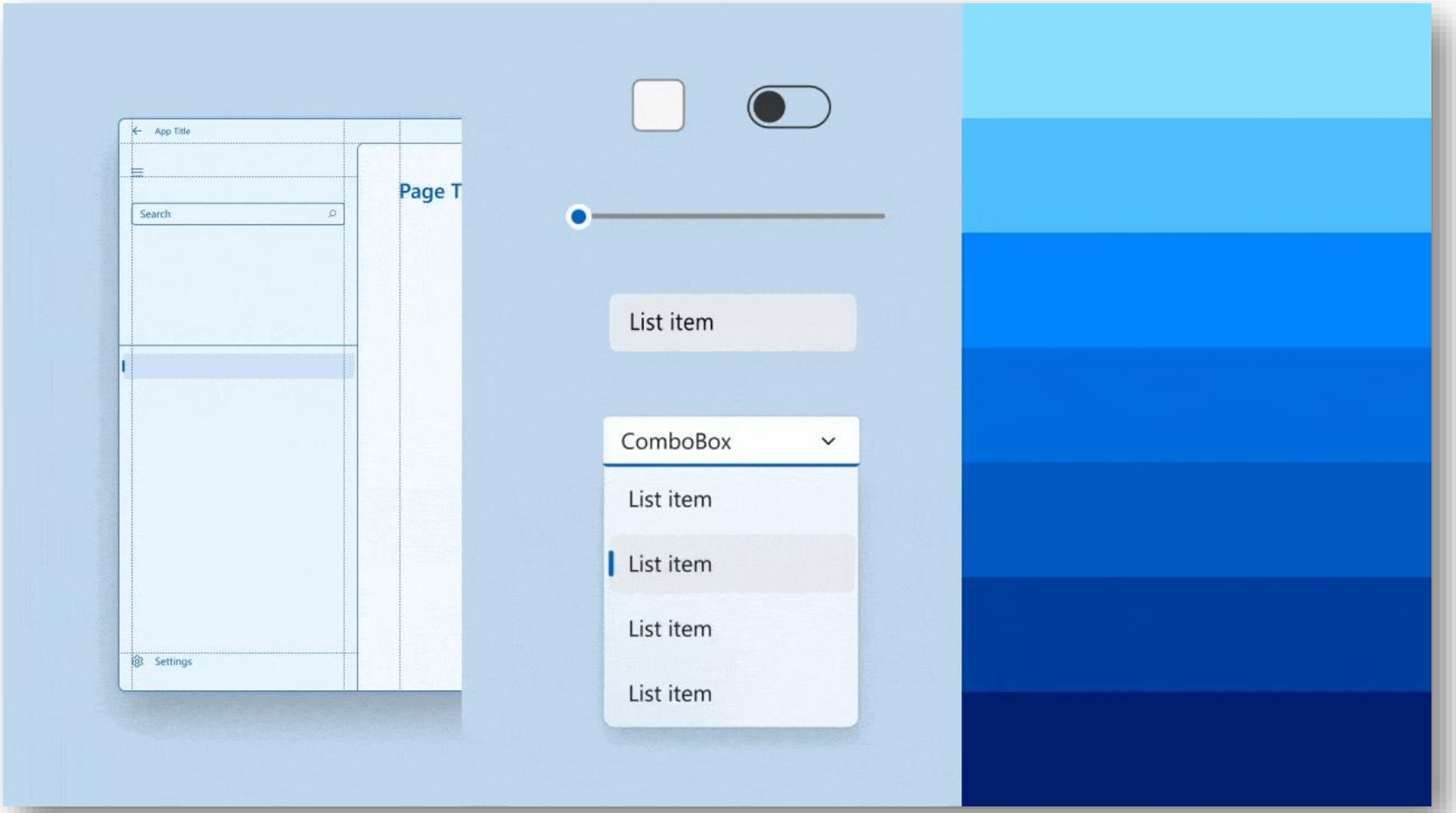
10/20/2021

Refreshed Control Look and Flow



Microsoft Store

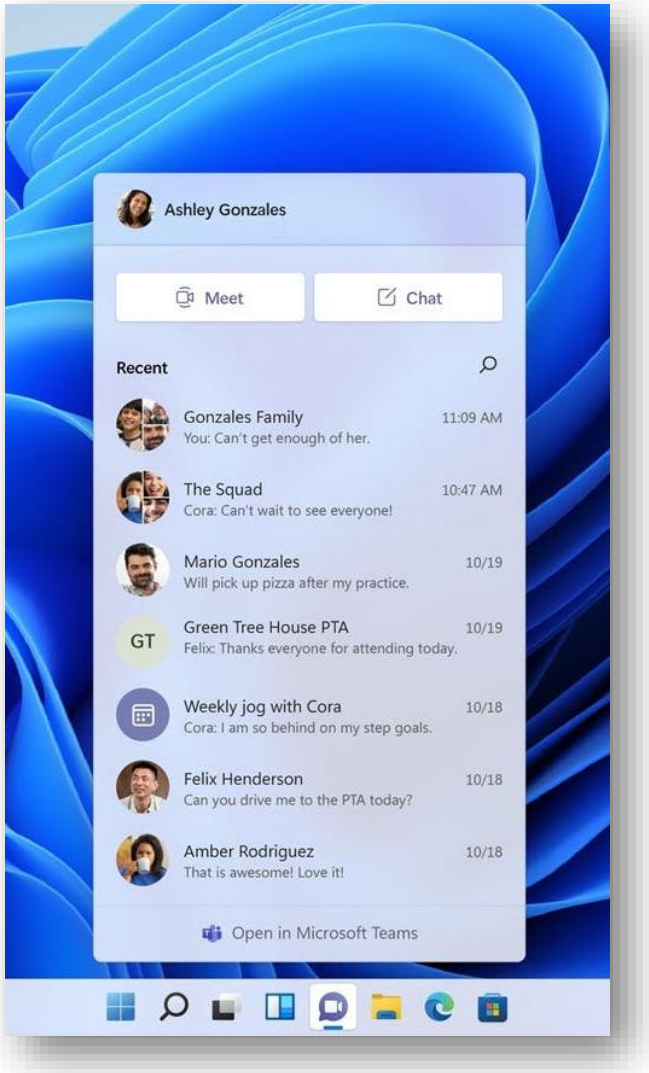
- A great way to reach all Windows customers/users
- A store for all Windows apps…
- …as well as other digital assets
- New commerce models
  - Including models where Microsoft does not take a cut!
- Also available on Win10

Android Apps

- Served up by the Amazon App Store
- Windows Sub-System for Android
  - Similar to WSL (Linux)
- Intel Bridge Tech is used to run ARM binaries, completely transparent for users

MS Teams Integration

- Teams is now part of Windows
- Adds significance to Teams being an extensible development platform



Additional Native Components

- WebView2 Evergreen always available
- Windows Terminal always available

Other Announcements

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- Survey must be completed by 11:59pm ET on 7/2/2021 to be eligible!
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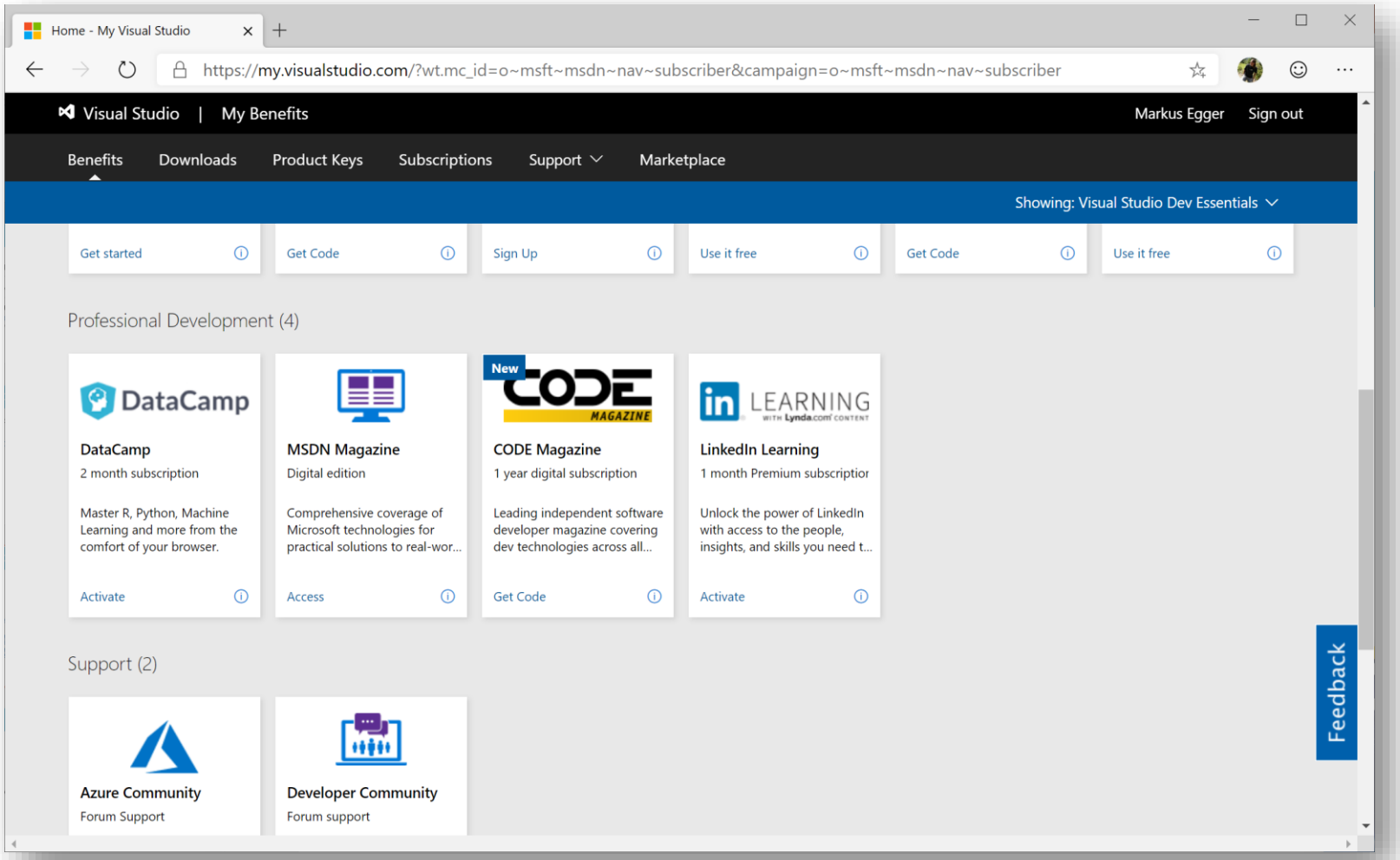

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- Available for iOS & Android

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GET IT ON Google Play

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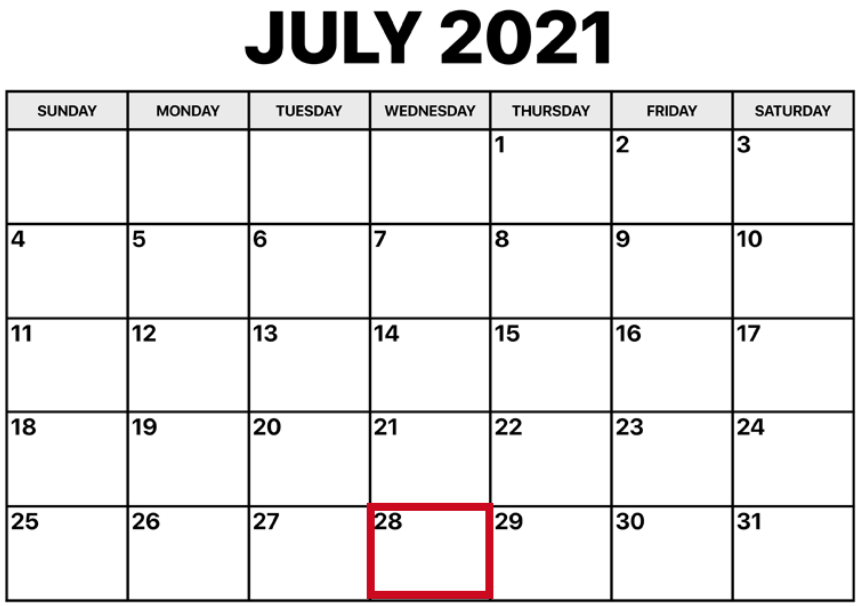
Tentative Topic:

Windows 11 for Developers

July 28, 2020!

Register Today!



Q&A

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