October 23, 2019

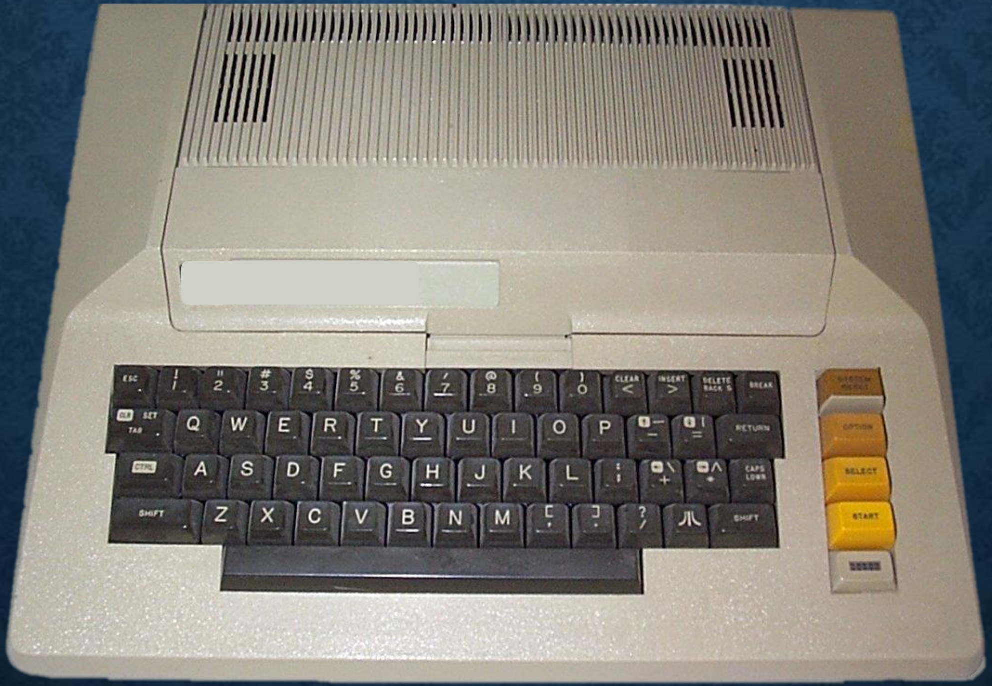
.NET Core 3

with Grant Erickson

Microsoft Partner
Microsoft

Gold DevOps
Gold Cloud Platform
Silver Application Development

WHAT IS THIS?



How much can you know?

8 Bit Legacy: The Curious History of Video Games

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HIGHLIGHTS

- Evolutionary Change
- C# 8 goodness
- Native JSON
- EF Enhancements
- ASP.NET Core improvements
- Stand-alone executables

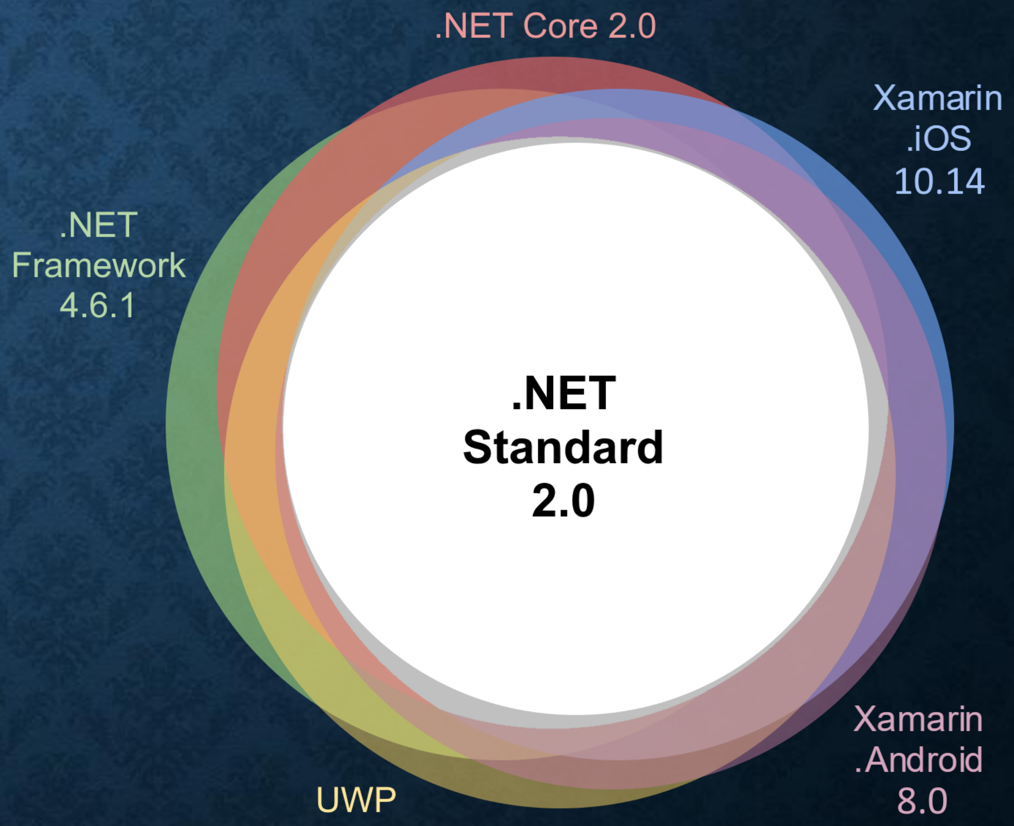
VERSIONING

Change	.NET Core Runtime	.NET Core SDK (*)
Initial release	2.2.0	2.2.100
SDK Patch	2.2.0	2.2.101
Runtime and SDK Patch	2.2.1	2.2.102
SDK Feature change	2.2.1	2.2.200

- **Major**: Significant changes occur to the product, or a new product direction. Breaking changes were taken.
- **Minor**: Public API surface area is added. A new behavior is added.
- **Patch**: Bug fixes are made. Support for a newer platform is added.

.NET STANDARD

.NET Core	.NET Standard
1.0	up to 1.6
2.0	up to 2.0
2.1	up to 2.0
2.2	up to 2.0
3.0	up to 2.1



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VERSIONS AND LINKING

- Version Call Differences
- Single File Executables

```
<PropertyGroup>
  <RuntimeIdentifier>win10-x64</RuntimeIdentifier>
  <PublishSingleFile>true</PublishSingleFile>
</PropertyGroup>
-- OR --
dotnet publish -r win10-x64 -p:PublishSingleFile=true
```

TREE SHAKING

- XML

```
<PropertyGroup>
  <PublishTrimmed>true</PublishTrimmed>
</PropertyGroup>
```

- CLI

```
dotnet publish -r <rid> -c Release
```

COMPILATION, BUILDS AND .NET CORE VERSION

- Tiered
    - Default is on
    - Options
        - lower-quality-but-faster
        - higher-quality-but-slower
    - Ready to Run Images
        - Natively compiled
        - Limited cross-targeting
- Build copies NuGet dependencies
- Major-version Roll Forward

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INDEXES AND RANGES

- Index i1 = 3 // 4th element from beginning
- Index i5 = ^1 // Last element in collection
- Index i9 = ^2 // 2nd element from the end

- Range r1 = 0..3 // First three elements
- Range r2 = 1..^0 // All elements except the first
- Range r3 = 0..^2 // All elements except the last two

ASYNC STREAMS

- Ability to await foreach

```
async IAsyncEnumerable<int> GetBigResultsAsync()
{
    await foreach (var result in GetResultsAsync())
    {
        if (result > 20) yield return result;
    }
}
```

IEEE FLOATING-POINT IMPROVEMENTS

- BitIncrement(Double) and BitDecrement(Double)
- MaxMagnitude(Double, Double) and MinMagnitude(Double, Double)
- Plus several more esoteric ones that are more accurate and IEEE compliant

JSON GOODNESS

- Utf8JsonReader & Utf8JsonWriter
  - Used for building JSON Parsers
  - 2x faster than Json.Net
  - UTF8 rather than UFT16
- JsonDocument: Reader
- JsonSerializer with deserializer
- Newtonsoft.Json has been removed
- Serialization challenges with nullable
- Reference loops are not baked

HTTP/2 SUPPORT

- Data compression of HTTP headers
- HTTP/2 Server Push
- Fixing the head-of-line blocking problem in HTTP 1.x
- Multiplexing multiple requests over a single TCP connection
- Enabled by Default (negotiation)

- TLS 1.3 & OpenSSL 1.1.1 on Linux

CRYPTOGRAPHY

- Cryptographic ciphers
    - AES-GCM
    - AES-CCM

EF CORE 3.0

- Reworked LINQ
  - Faster, Better queries
- Exception for client-side query evaluation
- `dotnet ef: dotnet tool install --global dotnet-ef`
- Cosmos DB Support
- Interception of database operations
  - Before or After they happen
- EF 6.3 runs on .NET Core 3.0
- Nullability support
- Lazy Loading from 2.1, but this is the Devil

ASP.NET CORE 3.0

- Blazor
  - C# on the client side, Render HTML from C#
- gRPC
  - Contract based, Protobuf over HTTP/2, Streaming
- SignalR Updates
  - Autoreconnect, Custom authorization
- Identity Server 4
- Certificate Authorization
- IIS exceptions written to Windows Event Log

C# 8 STUFF

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DEFAULT INTERFACE IMPLEMENTATION

- Why?
- Fewer contract breakages
- Java and iOS compatibility
- Multiple inheritance
- Only .NET Core not Full Framework

```
interface IDeveloper  {
    void LearnNewLanguage(string language, DateTime dueDate);
    void LearnNewLanguage(string language) {
        // default implementation
       LearnNewLanguage(language, DateTime.Now.AddMonths(6));
    }
}
```

SWITCH STATEMENT UPGRADES (FAT ARROWS)

```
public static RGBColor FromRainbow(Rainbow colorBand) =>
    colorBand switch {
        Rainbow.Red => new RGBColor(0xFF, 0x00, 0x00),
        Rainbow.Orange => new RGBColor(0xFF, 0x7F, 0x00),
        Rainbow.Yellow => new RGBColor(0xFF, 0xFF, 0x00),
        Rainbow.Green => new RGBColor(0x00, 0xFF, 0x00),
        Rainbow.Blue => new RGBColor(0x00, 0x00, 0xFF),
        Rainbow.Indigo => new RGBColor(0x4B, 0x00, 0x82),
        Rainbow.Violet => new RGBColor(0x94, 0x00, 0xD3),
        _ => throw new ArgumentException(
            message: "invalid enum value", paramName: nameof(colorBand)),
    };
```

SWITCH STATEMENT UPGRADES (PROPERTIES)

```
public static decimal ComputeSalesTax(Address location, decimal salePrice) =>
        location switch {
                { State: "WA" } => salePrice * 0.06M,
                { State: "MN" } => salePrice * 0.75M,
                { State: "MI" } => salePrice * 0.05M,
                // ...
                _ => 0M
        };
```

SWITCH STATEMENT UPGRADES (TUPLES)

```
public static string RockPaperScissors(string first, string second) =>
        (first, second) switch {
                ("rock", "paper") => "rock is covered by paper. Paper wins.",
                ("rock", "scissors") => "rock breaks scissors. Rock wins.",
                ("paper", "rock") => "paper covers rock. Paper wins.",
                ("paper", "scissors") => "paper is cut by scissors. Scissors wins.",
                ("scissors", "rock") => "scissors is broken by rock. Rock wins.",
                ("scissors", "paper") => "scissors cuts paper. Scissors wins.",
                (_, _) => "tie"
        };
```

NULLABLE TYPE

- Null Reference Exception
- Object not set to an instance of an object
- <nullable>enable</nullable>
- Not nullable by default
- Implicitly nullable
- Dereferencing issues
  - Use null!
  - Turn off null checking for the file

VS2019 Launch Slides, Sample Code, …

IntelliTect.com/VS2019Launch