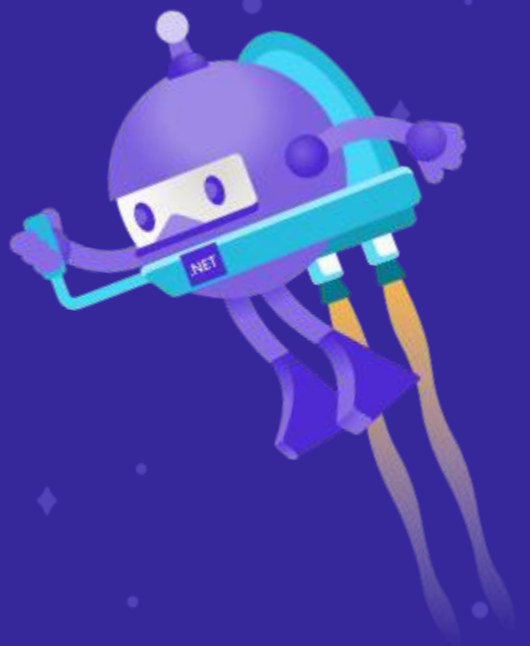
What's new in C# 10 and .NET 6



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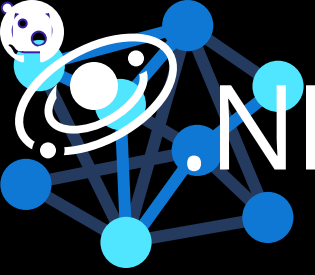
.NET – A unified development platform



CLOUD

Azure

WEB

ASP.NET

Blazor

DESKTOP

.NET MAUI

WPF

WinForms

MOBILE

.NET MAUI

Xamarin

GAMING

Unity

IoT

ARM32

ARM64

AI

ML.NET

.NET for Apache Spark

.NET 6

COMMON BASE LIBARIES/APIs

INFRASTRUCTURE

RUNTIME COMPONENTS

COMPILERS

LANGUAGES

ECOSYSTEM

TOOLS

NuGet

Visual Studio

GitHub

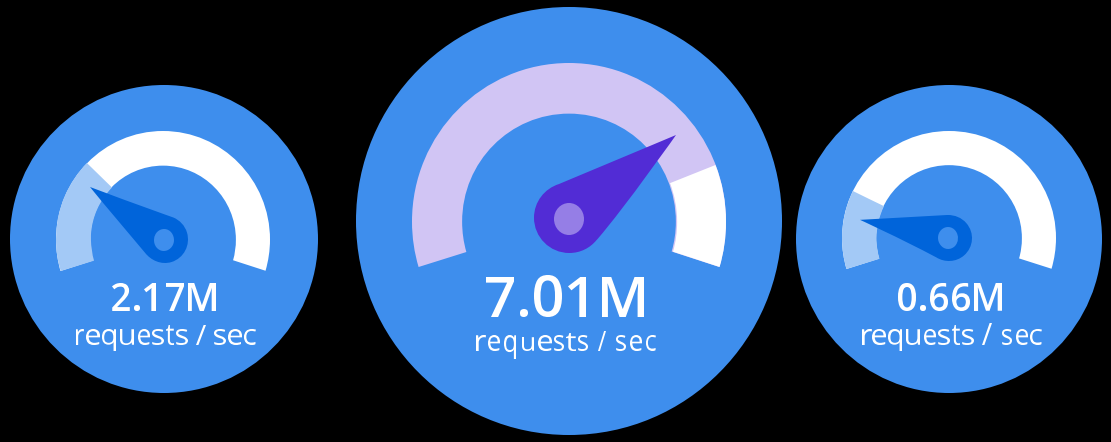
Visual Studio for Mac

Components, tools, library vendors

Visual Studio Code

CLI

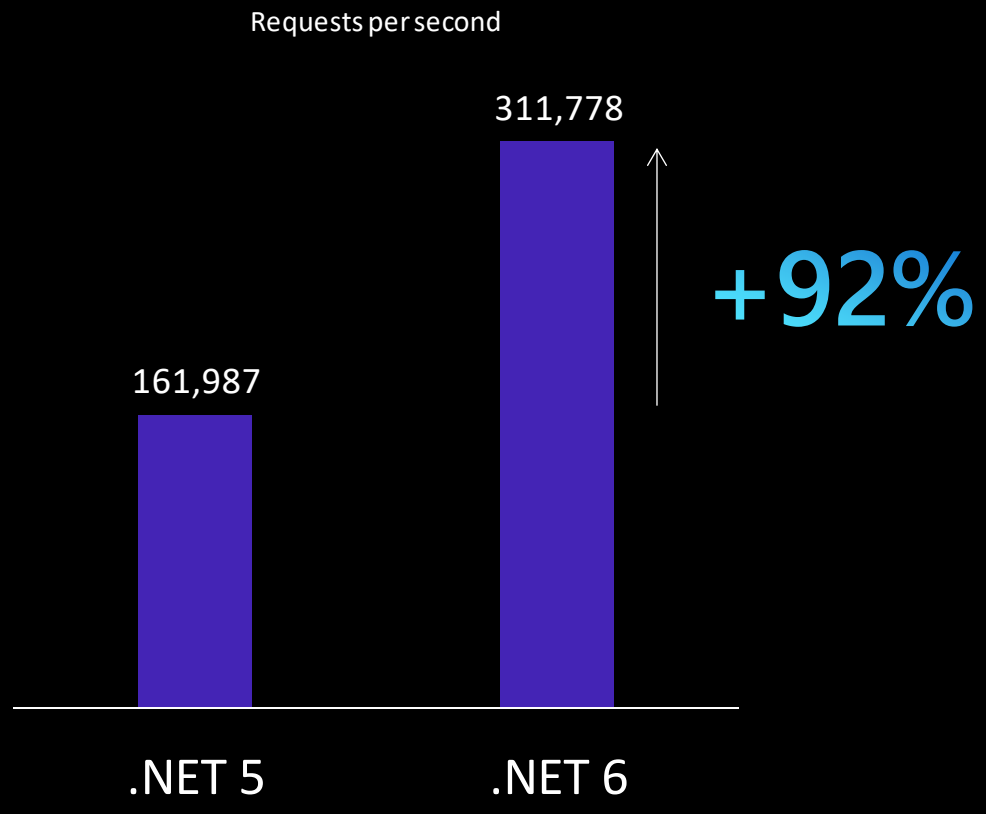
.NET 6 Performance



Java Servlet .NET Node.js

>10X faster than Node.js

ASP.NET Core web framework



Entity Framework Core Performance

Sources:
https://www.techempower.com/benchmarks/#section=data-r20&hw=ph&test=plaintext
https://www.techempower.com/benchmarks/#section=test&runid=3fc99e53-f60d-428e-9937-e809880d3da2&hw=ph&test=fortune&a=2&o=e

RELEASED

.NET 6

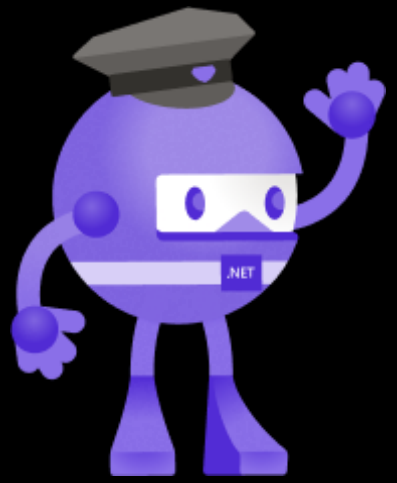
- Unified common base libraries & SDK
- Industry leading performance
- Simplified development, easier to get started
- New C# 10, F# 6 releases
- Apple Silicon (Arm64) support
- Long-Term Support Release

get.dot.net/6

Global Usings

```
global using Model;  // Global usings apply to entire project
// using System;     // Implicit usings for each project type

global using static System.Console;
```

```
<PropertyGroup>
    <ImplicitUsings>true</ImplicitUsings> // MSBuild feature
</PropertyGroup>
```



File-scoped namespaces

```
namespace Model;  // One namespace per file

namespace Model // Full declaration prior to C# 10
{
}
```

* dotnet tool install --global dotnet-format

csharp_style_namespace_declarations = file_scoped:error

* dotnet format style

Record structs

```
// Records can be structs as well as classes

public record struct Point(double X, double Y, double Z);

public record class Point(double X, double Y, double Z);
```

(Extras) Expression 'with' in structs
(Extras) Expression 'with' in anonymous types
(Extras) Assignment and declaration in the same deconstruction

Minimal APIs for cloud native apps

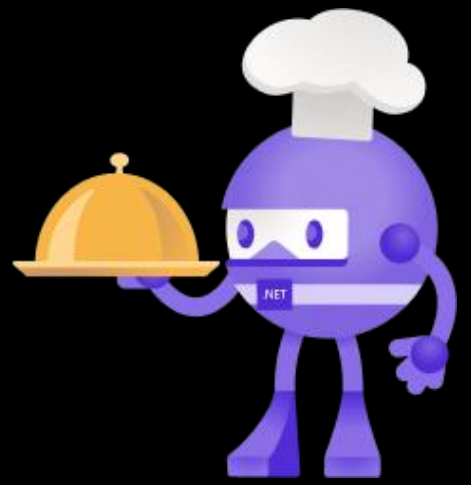
```
var app = WebApplication.Create(args);

app.MapGet("/", () => "Hello World!");

app.Run();
```

Lightweight, single-file, cloud native APIs

Low ceremony, top-level C# programs

Easy to get started

Path to MVC



(Extras) Explicit return type in lambdas
(Extras) Lambdas with attributes
(Extras) Constant interpolated strings
(Extras) Hot Reload

Partial Methods and high-performance logging with LoggerMessage

```
public static class LoggerExtensions
{
    private static readonly Action<ILogger, string, Exception?> logHelloWorld =
        LoggerMessage.Define<string>(LogLevel.Information, 0, "Hello {Message}");

    public static void LogHelloWorld(this ILogger logger, string message) =>
        logHelloWorld(logger, message, default!);
}
```

```
// new way in .NET 6
public partial class HelloWorldService
{
    [LoggerMessage(0, LogLevel.Information, "Hello {Message}")]
    partial void LogHelloWorld(string message);
}
```

CallerArgumentExpression

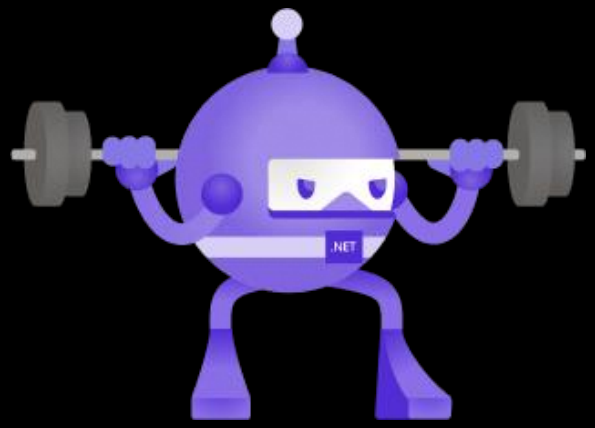
```
using System.Runtime.CompilerServices;

public static void Assert(
    bool condition, [CallerArgumentExpression("condition")] string? expr = default)
```

(Extras) ArgumentNullException.ThrowIfNull
(Extras) Extended property patterns

System.Threading.Tasks.Parallel.ForEachAsync

```
// Executes a for-each operation on an IEnumerable<T> in which iterations may run in parallel.
Task ForEachAsync<TSource>(IEnumerable<TSource> source, Func<TSource,CancellationToken,ValueTask> body);

// Executes a for-each operation on an IAsyncEnumerable<T> in which iterations may run in parallel.
Task ForEachAsync<TSource>(IAsyncEnumerable<TSource> source, Func<TSource,CancellationToken,ValueTask> body);
```

```
// Gets a Task that will complete when this Task completes, when the specified timeout expires, or
when the specified CancellationToken has cancellation requested.
(Extras) Task.WaitAsync(TimeSpan, CancellationToken)

(Extras) Random.Shared
```



System.Threading.PeriodicTimer

```
using var timer = new PeriodicTimer(TimeSpan.FromSeconds(1));

while (await timer.WaitForNextTickAsync(CancellationToken.None))
{
    Process();
}
```

(Extras) System.Numerics.BitOperations

System.Collections.Generic.PriorityQueue

```
PriorityQueue<string, int> priorityQueue = new();
priorityQueue.Enqueue("Second", 2);
priorityQueue.Enqueue("First", 1);

while (priorityQueue.Count > 0)
{
    var item = priorityQueue.Dequeue();
}
```

LINQ Improvements

```
// Chunking
// Splits the elements of a sequence into chunks of size at most size.
Enumerable.Chunk<TSource>(IEnumerable<TSource> source, int size)

// Index Support for ElementAt
Enumerable.ElementAt<TSource>(IEnumerable<TSource> source, Index index)

// Range Support for Take
Enumerable.Take<TSource>(IEnumerable<TSource> source, Range range)

// Default Parameters for Common Methods
Enumerable.FirstOrDefault<TSource>(IEnumerable<TSource> source, TSource defaultValue)

// MaxBy and MinBy
Enumerable.MaxBy<TSource, TKey>(IEnumerable<TSource> source, Func<TSource,TKey> keySelector)
```

System.DateOnly and System.TimeOnly

```
// public DateOnly(int year, int month, int day)
// public DateOnly(int year, int month, int day, Calendar calendar)
DateOnly dateOnly = new(2021, 11, 25);
Console.WriteLine(dateOnly);
// Output: 25-Nov-21

// public TimeOnly(int hour, int minute)
// public TimeOnly(int hour, int minute, int second)
// public TimeOnly(int hour, int minute, int second, int millisecond)
// public TimeOnly(long ticks)
TimeOnly timeOnly = new(16, 0, 0);
Console.WriteLine(timeOnly);
// Output: 16:00 PM
```

System.Text.Json

```
var order = new JsonObject
{
    ["OrderId"] = 1,
    ["Discounts"] = new JsonArray(
        new JsonObject
        {
            ["DiscountId"] = 1,
            ["Value"] = .05,
        },
    ),
};
```

Serialization Notification

Property Ordering

IAsyncEnumerable support

Streams support

Working with JSON DOM

System.Text.Json Version="6.0.0"

Upgrade

* `dotnet tool install --global upgrade-assistant`
* `dotnet tool install --global dotnet-outdated-tool`

- Reduce time and difficulty modernizing older .NET codebases
- Guided, step-by-step experience
- Multiple project types supported
- C# & VB.NET languages
- Supports .NET 6

aka.ms/dotnet-upgrade-assistant

Q&A

- Source code

  https://github.com/NikiforovAll/whats-new-in-dotnet6

  https://github.com/NikiforovAll/whats-new-in-dotnet6-vnext

- Blog post

  https://dev.to/nikiforovall/whats-new-in-net-6-and-c-10-everything-you-wanted-to-know-n2p

- Coding Story

  https://bit.ly/2YKKYGU

- .NET 5 & C# 9

  https://github.com/NikiforovAll/csharp_workshop

- .NET Conf 2021 Recordings

  https://bit.ly/3DcMZe1

- Find more at:

  https://www.theurlist.com/whats-new-in-dotnet6-and-csharp10