dymaptic

Blazor for JavaScript Developers

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DevUp Conf

August, 2025

dev up

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Federal Small Business Specialty

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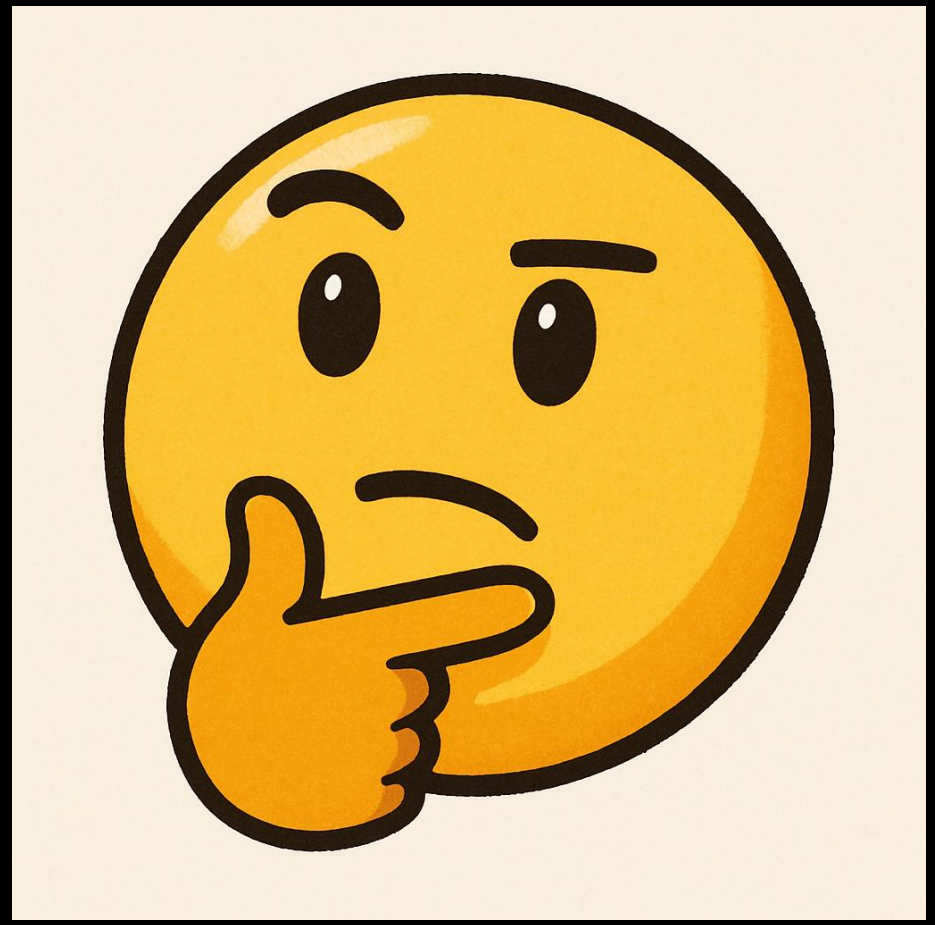
Why Did You Come to This Session?




You know, I'm something of a web developer myself

Goals of the Session

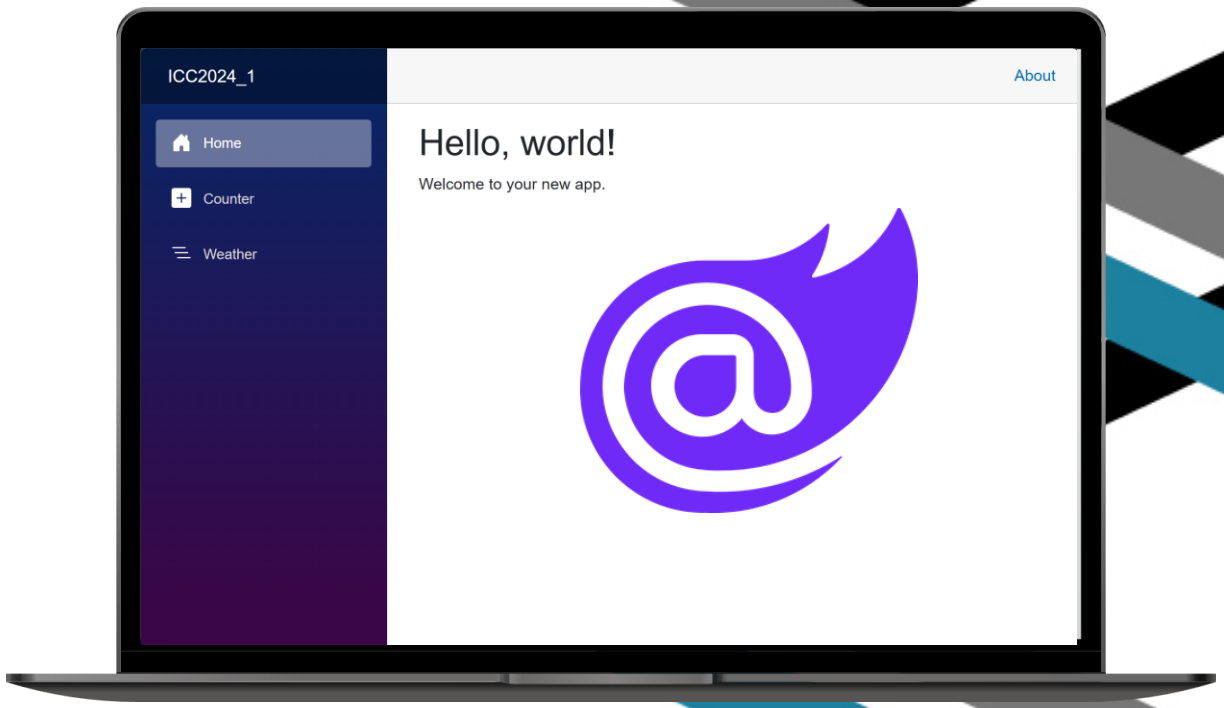
- *Why* using Blazor
- Getting started
- Unique features and functionality
- Compare & contrast to JavaScript frameworks
- Pitfalls and drawbacks
- How it ties into the Asp.NET Core back-end Ecosystem
- How you can write interop code between Blazor and JS

Why Use Blazor?

- Single language, full stack
- Shared data models
- Strongly-typed language
- Utilize existing developer skillsets
- Expanding an existing Asp.NET Core application
- Unique, server-first rendering modes unavailable in JS
- Shared code with .NET MAUI for desktop/mobile

What is Blazor?

- Modern full-stack web framework
- Built on Asp.NET Core and Modern .NET
- Released with.NET Core 3.1 in 2018
- Static and dynamic Server-Side rendering
- Client WebAssembly SPA applications or individual components
- High productivity with a single unifying language and framework
- Hot-reload == rapid development with robust dev tools



Modern .NET & C#

- Rewritten from scratch with .NET Core in 2016
- Open-source, code available on GitHub
- .NET 5 2020+ Yearly release cycle
- Roslyn compiler runs C# to compile C#
- Runs on Windows, Mac, Linux, iOS, Android
- Scripts, web services, websites, mobile and desktop applications
- Robust Nuget package ecosystem
- Performance focus
- Both JIT and AOT Compilers

Asp.NET Core Performance

Composite Framework Scores

Each framework's peak performance in each test type (shown in the colored columns below) is multiplied by the weights shown above. The results are then summed to yield a weighted score. Only frameworks that implement all test types are included. 159 total frameworks ranked, 10 visible, 149 hidden by filters. See filter panel above.

Rnk	Framework	JSON	1-query	20-query	Fortunes	Updates	Plaintext	Weighted score
13	actix	1,194,185	429,376	22,538	405,144	15,658	6,970,300	**6,288** 77.8%
15	asp.net core	1,042,029	392,709	25,329	363,344	18,197	7,014,298	**6,143** 76.0%
27	fiber	955,738	348,092	18,374	328,620	11,543	4,868,585	**4,882** 60.4%
88	spring	236,259	147,907	15,932	24,082	7,131	506,087	**1,507** 18.6%
106	nestjs	270,076	76,938	5,975	61,081	3,641	419,035	**1,099** 13.6%
117	koa	215,740	54,531	5,094	43,896	1,800	365,806	**782** 9.7%
130	express	92,604	37,488	4,806	33,868	2,005	113,117	**555** 6.9%
134	rails	85,460	21,382	5,578	14,804	2,869	93,140	**515** 6.4%
138	laravel	77,648	37,275	4,656	22,501	1,666	81,052	**462** 5.7%
143	django	177,099	19,032	1,623	14,707	871	300,170	**413** 5.1%

Round 22 results

TechEmpower Framework Benchmarks Oct. 2023

Getting Started

- Get .NET
  - Download from https://dotnet.microsoft.com
  - winget install Microsoft.DotNet.SDK.9
- Get Language Support
  - VS Code + VS License – C# Dev Kit Extension
  - Visual Studio - Community Edition (free), Professional, Enterprise
  - JetBrains Rider – Free Community License, Paid Prof. License

Getting Started (2)

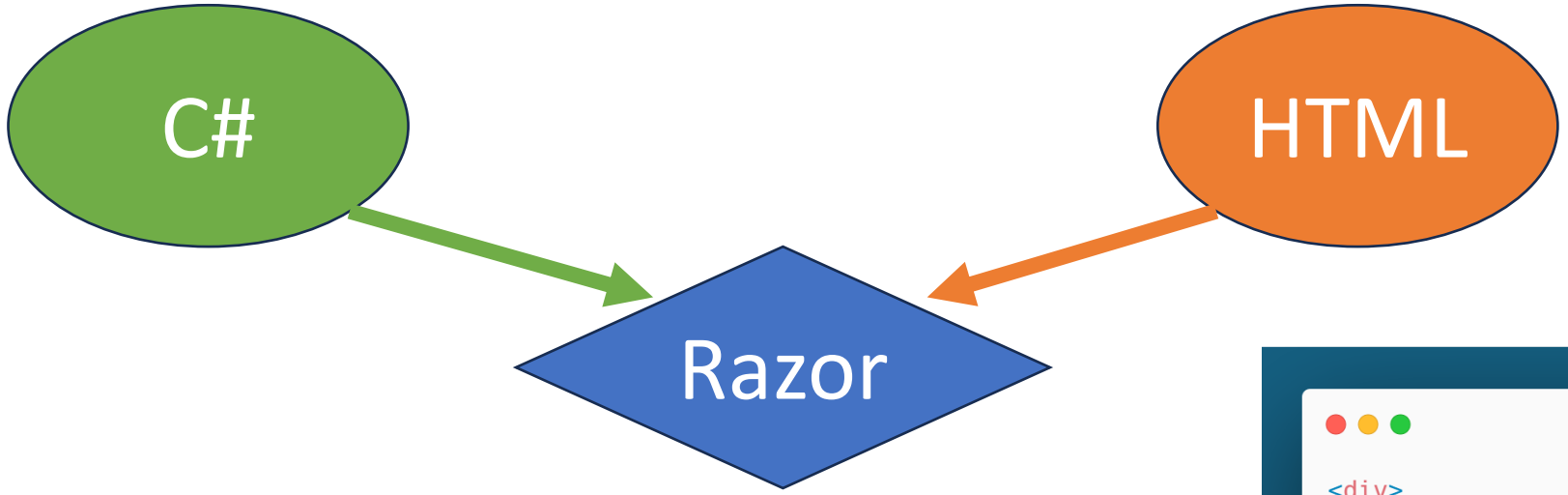
- `dotnet new list` – shows all the available templates
- `dotnet new blazor -h` – displays help for completions
- `dotnet new blazor -int Auto -au Individual -o HelloWorld`
  - `-int Auto` – auto interactive mode
  - `-au Individual` – adds individual authentication user accounts
  - `-o HelloWorld` – sets the name and output folder of the project
- `cd HelloWorld` – navigate
- `code .` – open the folder for editing


dev up
DON'T PANIC

Blazor Supports Modern Web Standards

- HTML
  - Full support, only changes would be to escape `@` text characters
  - Can create nested components primarily out of HTML simply for organizational structure, even if not using other functionality
  - Declarative head tags, links, scripts, and component-level injection of extra head content, links, and scripts
- CSS
  - Inline support
  - ***/wwwroot*** files imported with link tags
  - *Scoped* CSS files per component: e.g., `Component1.razor` => `Component1.razor.css`
- W {
  - {
  - L / `IJSRuntime` L w

Razor (the Syntax and Components behind Blazor)



- `.razor` file extension
- Encapsulate UI and functionality
- Reusable and composable
- Each one can run client-side or server-side
- @ symbol identifies start of C# code
- Parentheses and Braces define code scopes
- Markup tags can be nested inside conditional logic on new lines

```
<div>
    <h1>Sample</h1>
    <p>This is a sample component.</p>
    <button @onclick="CSharpMethod">@CSharpVariable</button>
    <p>Current count: @CSharpCount</p>
    <AnotherRazorComponent Count="CSharpCount" />
</div>

@code {
    private int CSharpCount = 0;
    private string CSharpVariable = "Click me";

    private void CSharpMethod()
    {
        CSharpCount++;
    }
}
```

Razor Component Structure

Razor Markup

```
<div>
    <h1>Sample</h1>
    <p>This is a sample component.</p>
    <button @onclick="CSharpMethod">
        @CSharpVariable
      </button>
    <p>Current count: @CSharpCount</p>
</div>
```

Code Block

```
@code {
    private int CSharpCount = 0;
    private string CSharpVariable = "Click me";

    private void CSharpMethod()
    {
        CSharpCount++;
    }
}
```

Razor Partial Class ("Code-Behind" Pattern)

MyComponent.razor

```razor
<div>
    <h1>Sample</h1>
    <p>This is a sample component.</p>
    <button @onclick="CSharpMethod">
        @CSharpVariable
      </button>
    <p>Current count: @CSharpCount</p>
</div>
```

MyComponent.razor.cs

```csharp
namespace MyBlazorProject;

public partial class MyComponent
{
    private int CSharpCount = 0;
    private string CSharpVariable = "Click me";

    private void CSharpMethod()
    {
        CSharpCount++;
    }
}
```

Dependency Injection

```
// Program.cs
builder.Services.AddScoped<IRepository, MyRepository>();
```

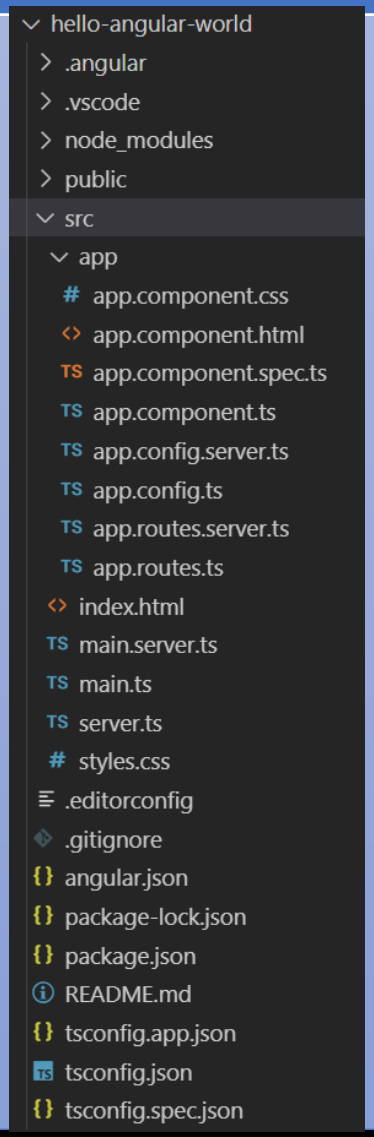
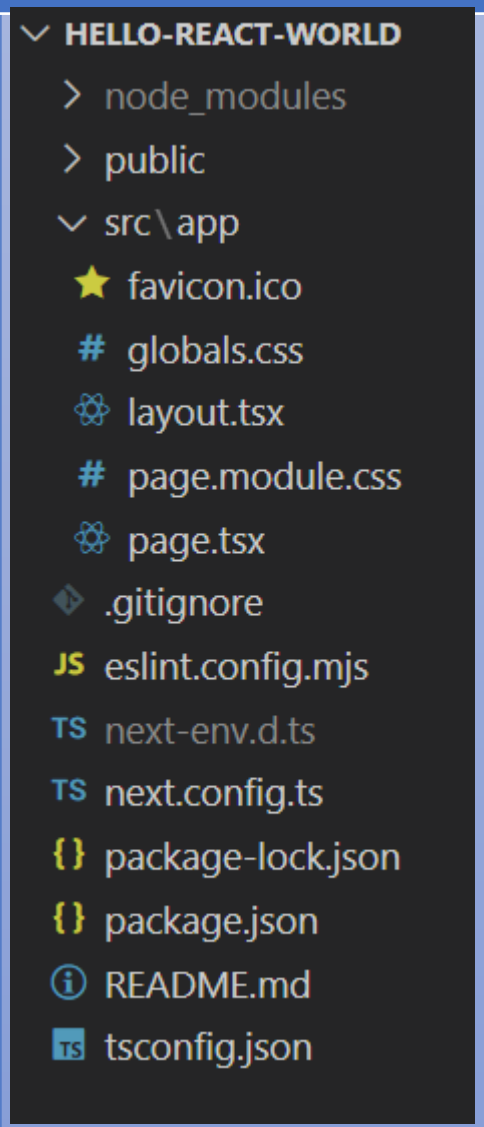
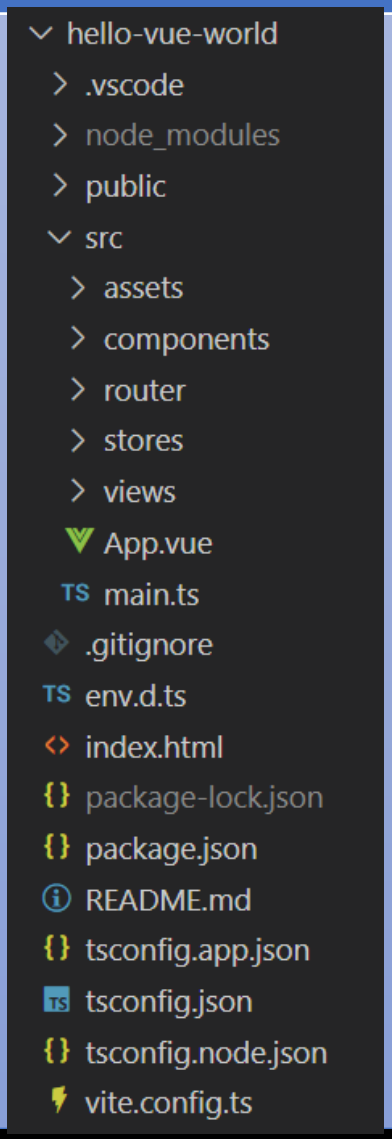
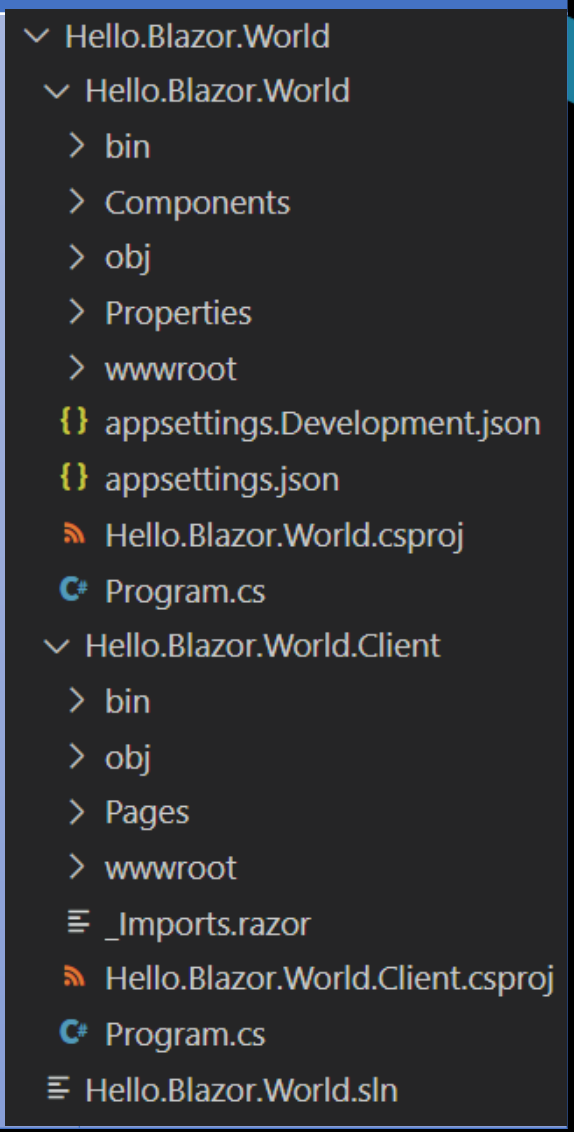
```
// MyComponent.razor
@inject IRepository Repository

<div>
  ...
```

```
// Code Block or MyComponent.razor.cs
[Inject]
public required IRepository Repository { get; set; }
```

Comparing Blazor to JavaScript Frameworks

Feature / Aspect	Angular	React	Vue	Blazor
Created By	Google	Meta	Evan You (ex-Google)	Microsoft
First Release	2010	2013	2014	2018
Language	TypeScript	JavaScript / Typescript	JavaScript / TypeScript	C#/WebAssembly
Architectural Patterns	MVC, MVVM, Modules, Templates, Components, Dependency Injection Hexagonal, Onion, Vertical Slice	SPA, Flux, Redux, Components, HOC, SSR, Code Splitting, Reactive	MVVM, Components, Templates, Flat Structure, Modules, Micro Front Ends, Reactive	Reactive, Components, Dependency Injection, SSR, InteractiveServer

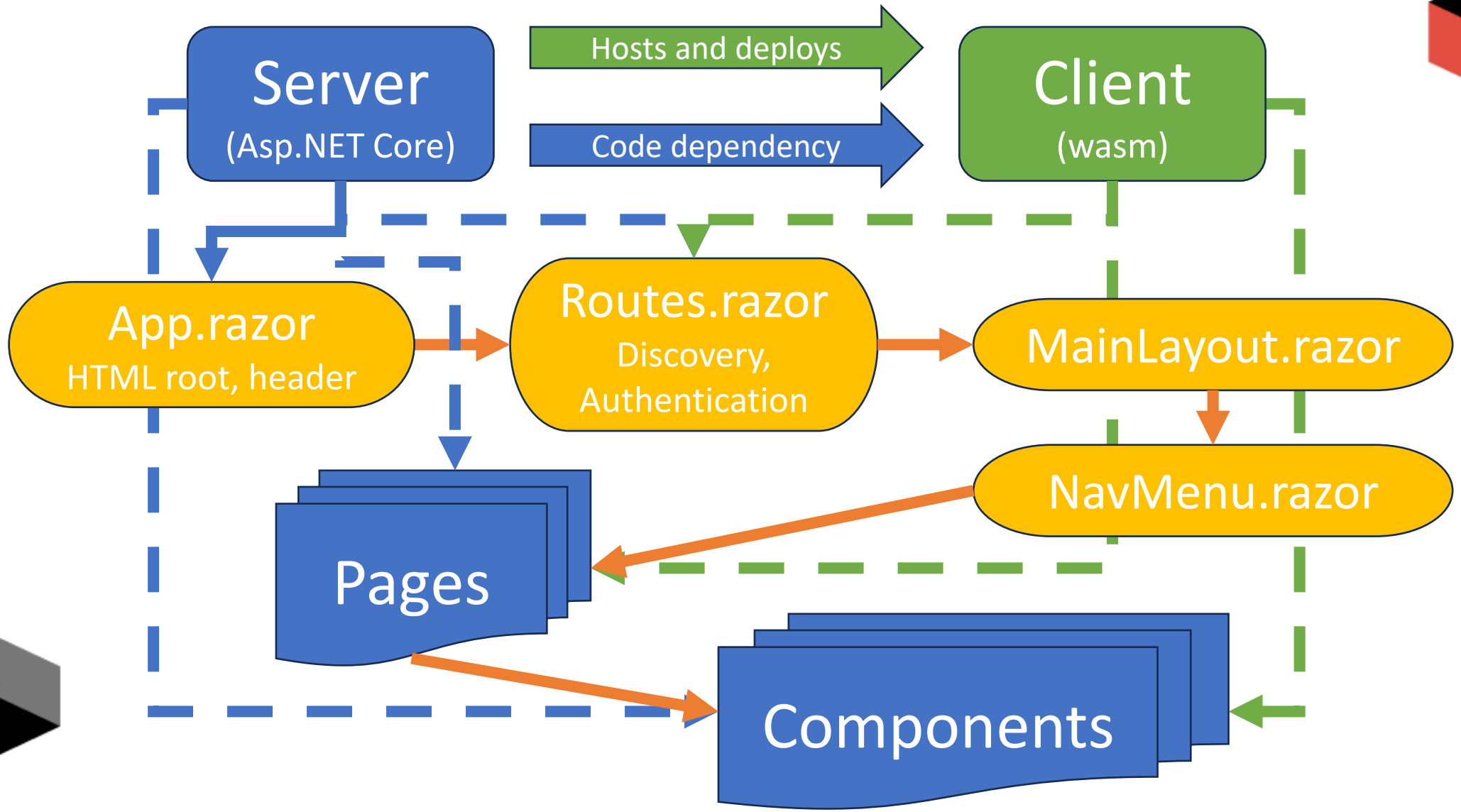
Comparing Blazor to JavaScript Frameworks

Feature / Aspect	Angular	React	Vue	Blazor
Project Structure				

Comparing Blazor to JavaScript Frameworks

Feature / Aspect	Angular	React	Vue	Blazor
Markup Syntax	HTML Templates	JSX	SFC	Razor
File Structures	app.component.html app.component.css app.component.ts	page.tsx page.module.css	App.vue	Home.razor Home.razor.cs Home.razor.css Home.razor.js
Field/Property Injection	 {{ propVal }} 	 { propVal } 	 {{ propVal }} 	 @propVal
Property Binding	[src]="variableUrl"	src={variableUrl}	:src="variableUrl"	src="@variableUrl"
Click Handler	(click)="jsFunction()"	onClick={jsFunction}	@click="jsFunction"	@onclick="CsharpMethod"
Two-way Form Binding	@angular/forms [(ngModel)]="model.item"	value={item} onChange={setItem}	v-model="item"	@bind="item" OR @bind:get="item" & @bind:set="method"

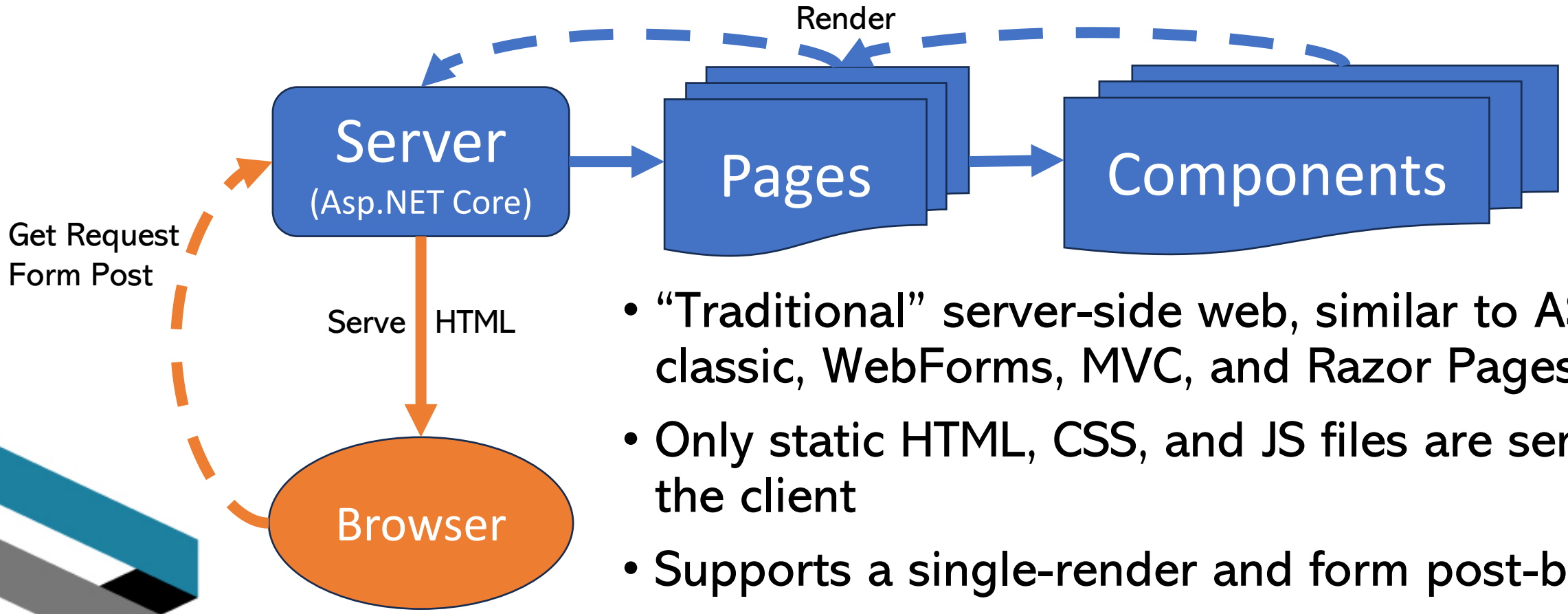
Project Structure



Blazor Component Render Modes

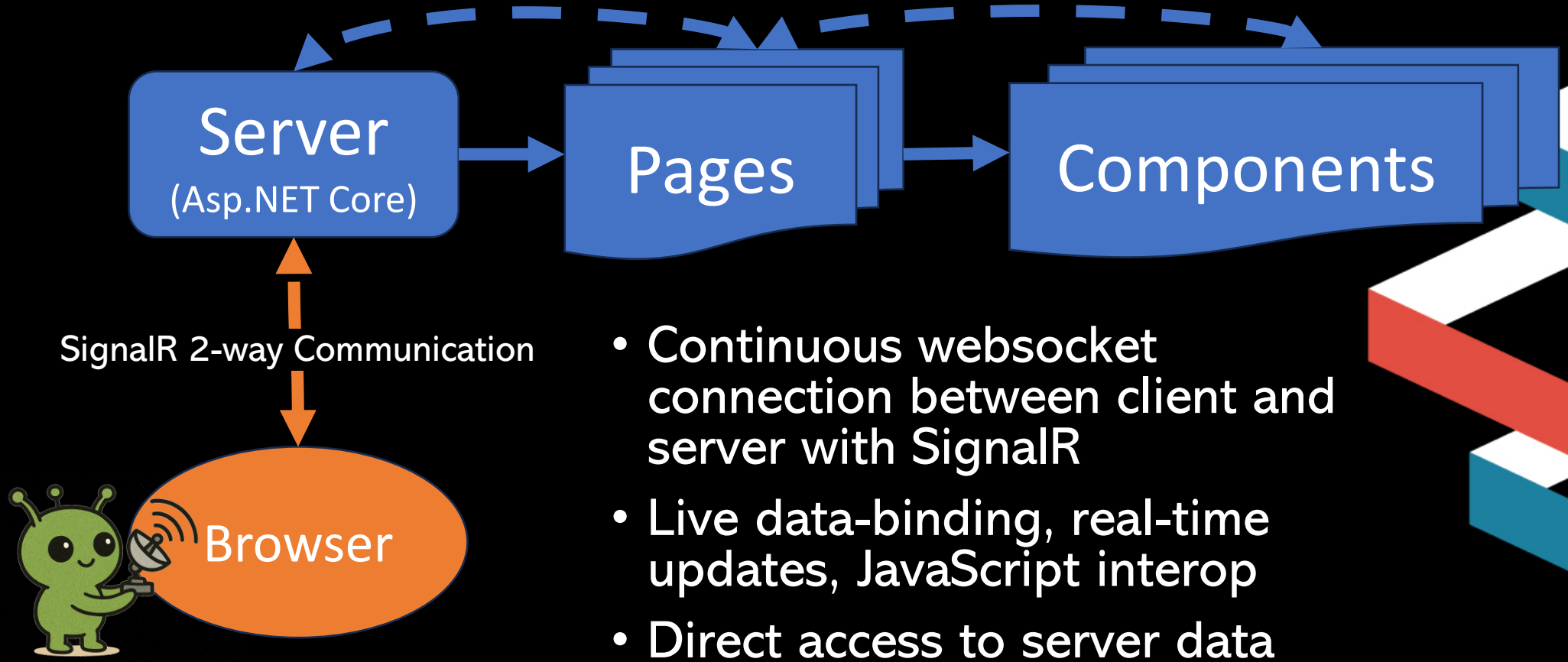
- Static Server Mode
- Interactive Server Mode
- Interactive WebAssembly Mode
- Interactive Auto Mode
- Blazor Hybrid (MAUI)

Blazor Render Modes: Static Server



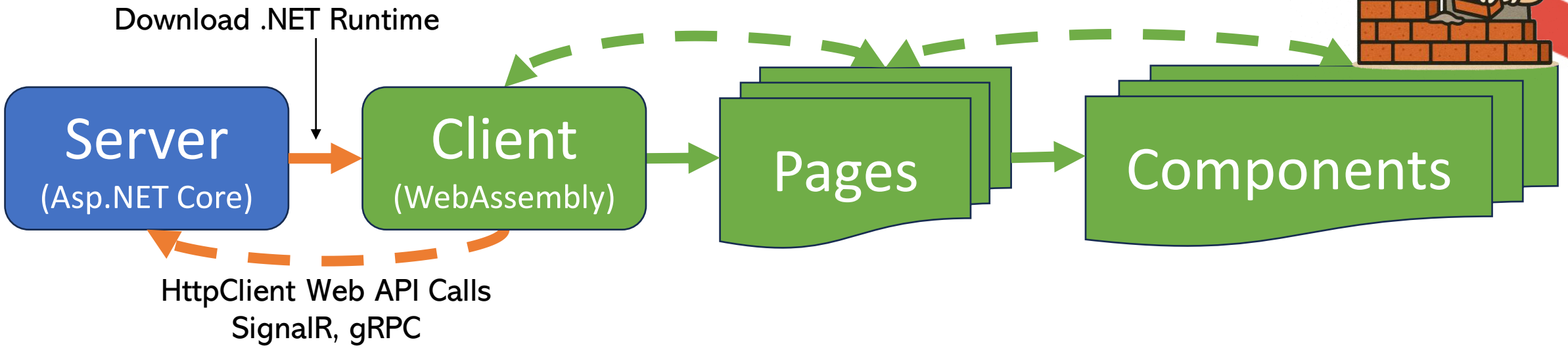
- "Traditional" server-side web, similar to ASP classic, WebForms, MVC, and Razor Pages
- Only static HTML, CSS, and JS files are sent to the client
- Supports a single-render and form post-backs
- No interactive updates via C# (can still use JS)
- Great for blog posts or other readonly content and simple forms

Blazor Render Modes: Interactive Server



- Continuous websocket connection between client and server with SignalR
- Live data-binding, real-time updates, JavaScript interop
- Direct access to server data store
- Fast on first load
- Leaving browser tabs open can cause disconnection issues

Blazor Render Modes: Interactive WebAssembly



- Runs in the client browser
- Live data-binding, real-time updates, JavaScript interop
- HttpClient calls to communicate with server web API

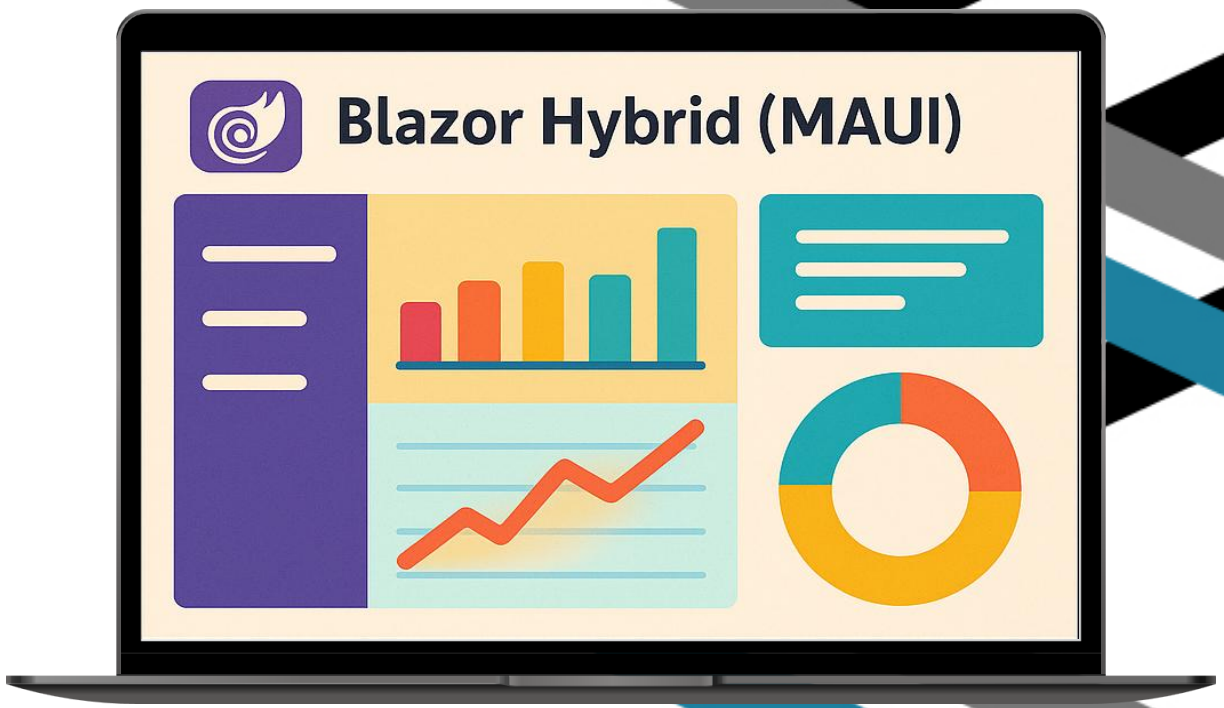
- Single-threaded
- Large/slow first load
- Fast interactions after load
- Closest in approach to most JS SPA frameworks

Blazor Render Modes: Interactive Auto

- On first load, runs from server, creating SignalR connection
- In the background, downloads .NET runtime and client code
- On next load, switches to running from WebAssembly
- “Best of both worlds”
  - Fast start on first load (server)
  - More responsive and robust interactions (client)
- Requires flexible data handling/abstraction to handle both client and server modes

Blazor Hybrid (MAUI)

- Runs in a WebView in .NET MAUI (iOS, Android, Mac, Windows)
- Native .NET multi-threaded code execution (not WebAssembly)
- Access to device APIs (GPS, Bluetooth, photos, etc.)
- Can reuse components or entire UI applications between web, desktop, and mobile



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Escaping Back into JavaScript…


```
<script>
    window.getWindowWidth = () => {
        return window.innerWidth;
    };
</script>
```

```
[Inject]
public required IJSRuntime JSRuntime { get; set; }

protected async Task OnAfterRenderAsync(bool firstRender)
{
    double width = await JSRuntime.InvokeAsync<double>("getWindowWidth");
}
```

dev up

Escaping Back into JavaScript…

module.js

```
export async function printDomElement(elementId) {
    let canvas = await html2canvas(document.getElementById(elementId));
    return base64ToArrayBuffer(canvas.toDataURL("image/png").split(",")[1]);
}

function base64ToArrayBuffer(base64): Uint8Array {
    const binaryString = atob(base64);
    const bytes = new Uint8Array(binaryString.length);
    for (let i = 0; i < binaryString.length; i++) {
        bytes[i] = binaryString.charCodeAt(i);
    }
    return bytes;
}
```

Escaping Back into JavaScript…

Importing a JavaScript module

```
[Inject]
public required IJSRuntime JSRuntime { get; set; }

protected async Task OnAfterRenderAsync(bool firstRender)
{
    var module = await JSRuntime.InvokeAsync<IJSObjectReference>("import", "./js/module.js");
    var jsStreamRef = await JsModule!.InvokeAsync<IJSStreamReference>("printDomElement",
                MapView!.Id);
}
```

dev up

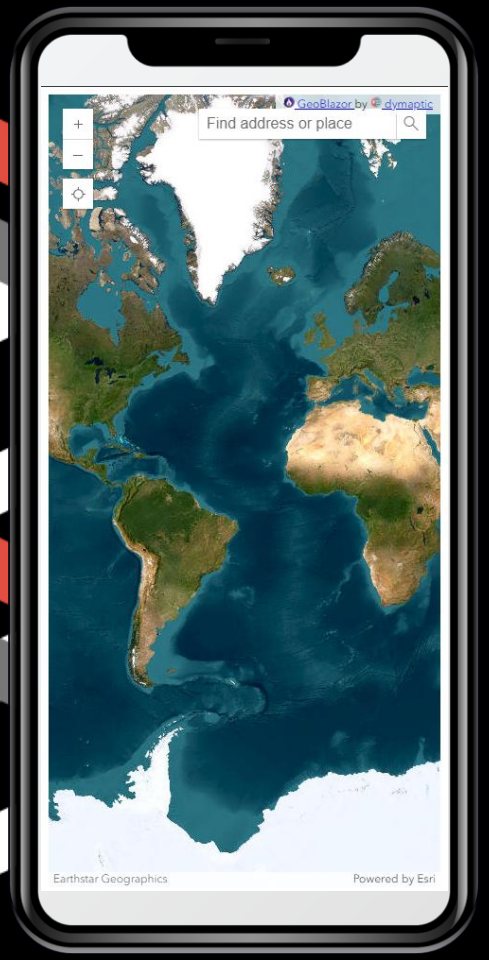
Escaping Back into JavaScript…

Calling .NET from JavaScript

```
window.initialize = (dotNetRef) => {
  window.addEventListener('resize', async () => {
      const width = window.innerWidth;
      const height = window.innerHeight;
      await dotNetRef?.invokeMethodAsync('OnViewSizeChanged', width, height);
  });
}
```

```
[JSInvokable]
public async Task OnViewSizeChanged(double width, double height)
{
    // update C# code
}
```

https://nation-finder.geoblazor.com



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