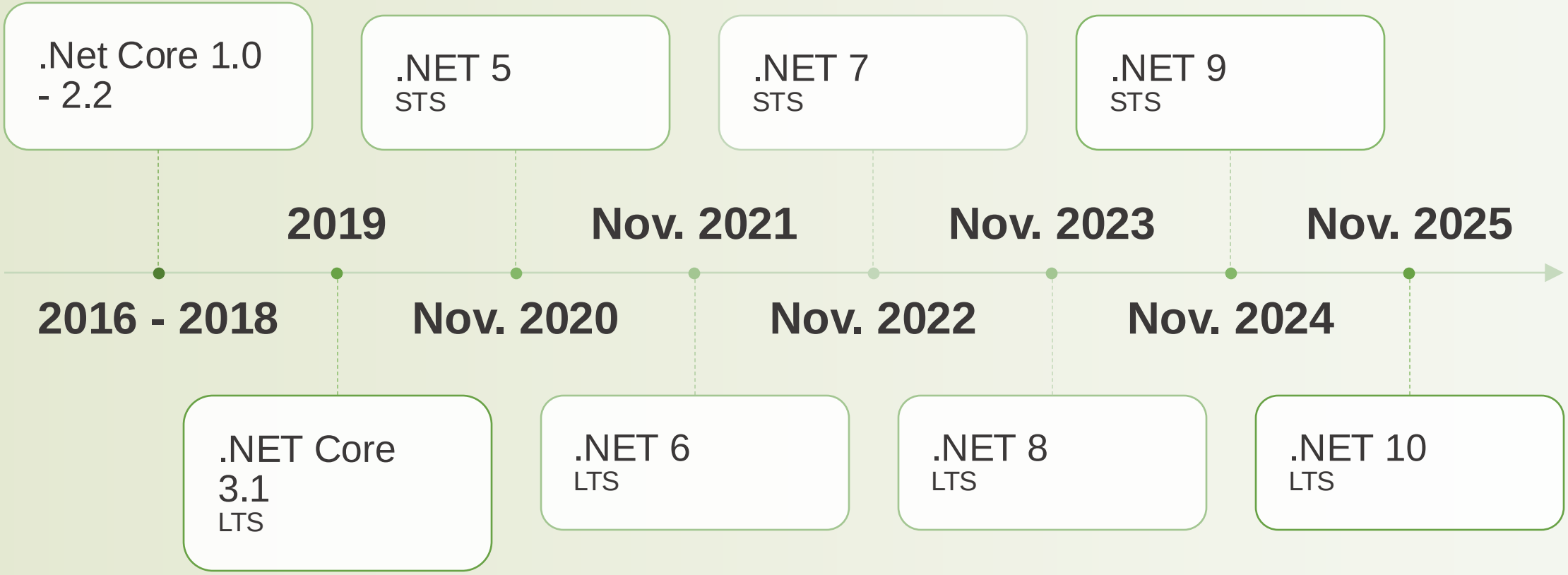
What’s new in .NET 9

Ralph Bodmer
Manu Sidler

.NET Plattform
Roadmap

Long Term Support = 3 Jahre
Short Term Support = 18 Monate



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.NET 8

Rückblick

- C#12
  Primary Constructors, Collection Expressions, …

- ASP.NET Core
  Keyed Services, Short circuit, BackgroundServices, …

- .NET Aspire
  Cloud-ready Stack für verteilte Applikationen

.NET 9

Features

Language Feature Status

- C#13
  Params Collections, New Lock, Count-/AggregateBy

- .NET Aspire
  Einfacheres Setup, Dashboard Verbesserungen, Erweiterte Orchestierung

- ASP.NET Core
  Verbessertes Static Asset Delivery, OpenApi Support, Neuer HybridCache

.NET 9

Upgrade

```
--- a/csharp/Upgrade/Upgrade.csproj
+++ b/csharp/Upgrade/Upgrade.csproj
@@ -2,14 +2,14 @@

     <PropertyGroup>
         <OutputType>Exe</OutputType>
-        <TargetFramework>net8.0</TargetFramework>
-        <LangVersion>12</LangVersion>
+        <TargetFramework>net9.0</TargetFramework>
+        <LangVersion>13</LangVersion>
         <ImplicitUsings>enable</ImplicitUsings>
         <Nullable>enable</Nullable>
     </PropertyGroup>

     <ItemGroup>
-      <PackageReference Include="Microsoft.EntityFrameworkCore" Version="8.0.12" />
+      <PackageReference Include="Microsoft.EntityFrameworkCore" Version="9.0.1" />
     </ItemGroup>

 </Project>
```

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C# 11

- Raw string literals
- Required properties
- Extended list patterns

```
const string json = $$"""
    [
        {
            "firstName": "{{firstName}}",
            "lastName": "{{lastName}}"
        }
    ]
    """;

public class Person
{
    public required string FirstName { get; set; }
    public required string LastName { get; set; }
    public int Age { get; set; }
}

var numbers = new int[] { 1, 2, 4, 8, 16 };
numbers is [1, 2, 4, 8, 16]; // true
numbers is [_, _, _, 8]; // false
numbers is [1, ..]; // true
numbers is [1, var a, ..]; // true
```

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C#

12

- Primary Constructors
- Collection Expressions
- Default lambda parameters

```
public class PersonService(IPersonRepository personRepository)
{

}

int[] array = [1, 2, 3, 4];

var IncrementBy = (int source, int increment = 1)
  => source + increment;
```

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C#
13

Demo Time !

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AI

Microsoft.Extensions.AI Preview

- Abstraktion für AI-Integrationen
- Gängige Patterns (Chat, Embeddings)
- Support für OpenAI, Azure AI und Ollama

AI

```
using OpenAI;
using Microsoft.Extensions.AI;

var apiKey = Environment.GetEnvironmentVariable("OPENAI_API_KEY");
IChatClient client = new OpenAIClient(apiKey)
  .AsChatClient(modelId: "gpt-4o");

var response = await client.CompleteAsync("...");
```

```
IChatClient client = environment.IsDevelopment
    ? new OllamaChatClient(...)
    : new OpenAIClient(...);
```

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.NET Aspire

- Cloud-ready Stack für verteilte Anwendungen
- Übernimmt Orchestrierung von Projekten und Services
- Einbindung via NuGet Pakete

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.NET Aspire

.NET 9

- Einfacheres Setup
  Installation via NuGet, kein separater .NET workload

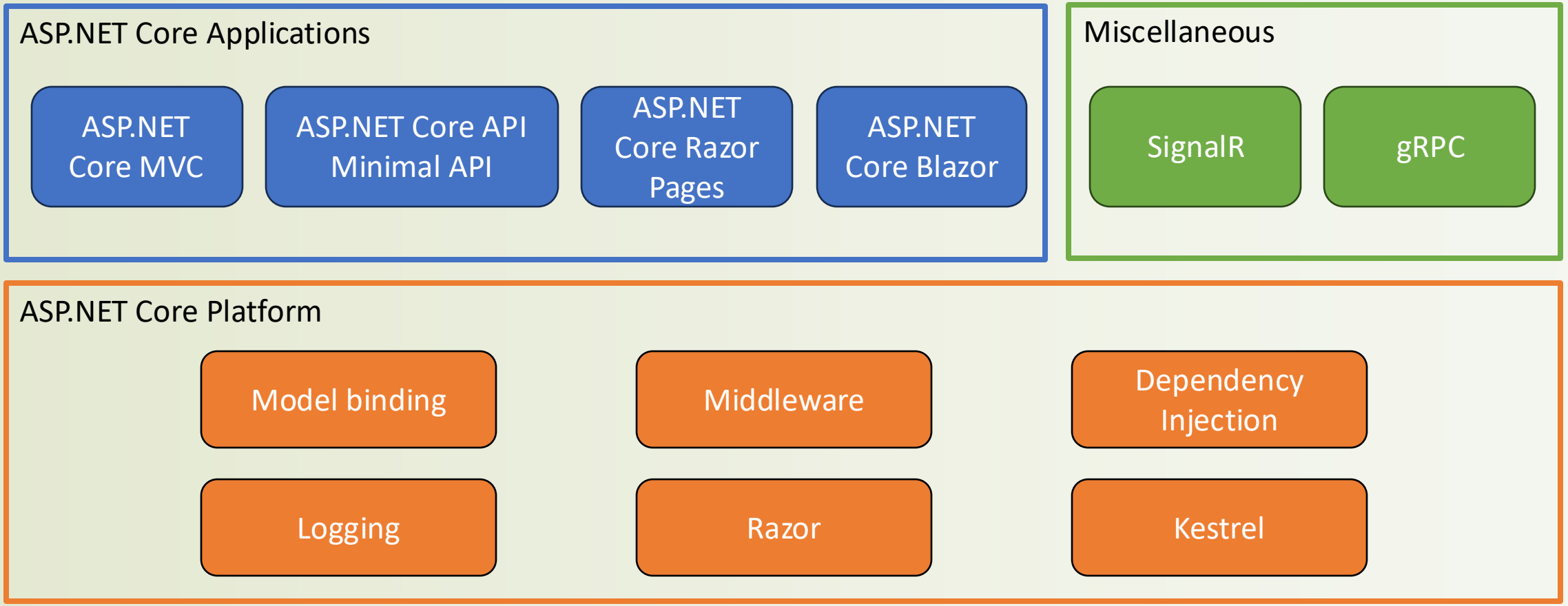
- Dashboard Verbesserungen
  Resource Lifecycle Management, Mobile und responsive

- Erweiterte Orchestrierung
  Dependency Management

.NET Aspire

Demo Time !

ASP.NET Core 9
Übersicht



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ASP.NET Core 9

Kleinere Verbesserungen

```
// Regular registration
builder.Services.AddSingleton<ILoggingService, FileLogService>();
builder.Services.AddSingleton<ILoggingService, DatabaseLogService>();

// Keyed registration
builder.Services.AddKeyedSingleton<ILoggingService, FileLogService>("file");
builder.Services.AddKeyedSingleton<ILoggingService, DatabaseLogService>("db");
```

- Keyed Dependency Injection in Middleware

```
//Microsoft sample code
var builder = WebApplication.CreateBuilder(args);
builder.Services.AddKeyedSingleton<MySingletonClass>("test");
builder.Services.AddKeyedScoped<MyScopedClass>("test2");

var app = builder.Build();
app.UseMiddleware<MyMiddleware>();
app.Run();

internal class MyMiddleware
{
    private readonly RequestDelegate _next;

    public MyMiddleware(RequestDelegate next, [FromKeyedServices("test")] MySingletonClass service)
    {
        _next = next;
    }

    public Task Invoke(HttpContext context, [FromKeyedServices("test2")] MyScopedClass scopedService) => _next(context);
}
```

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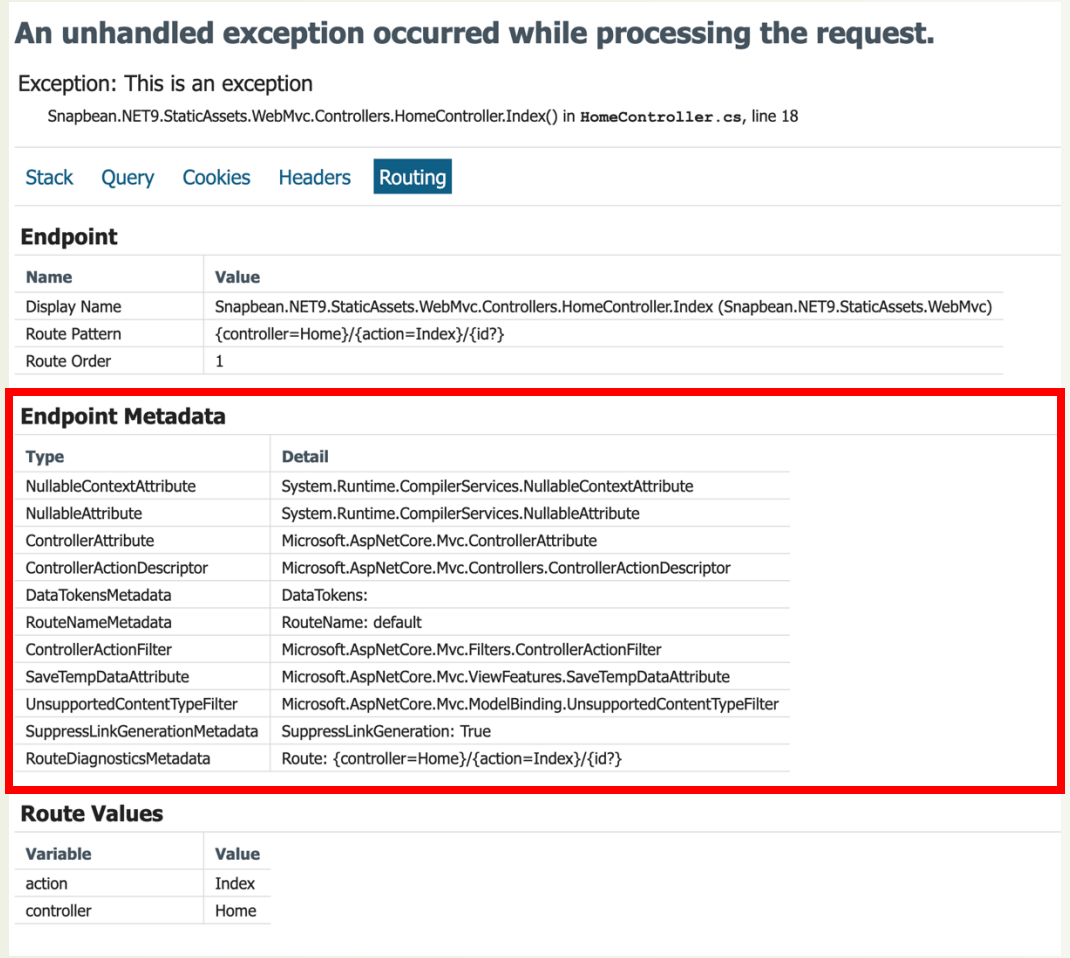
ASP.NET Core 9

Kleinere Verbesserungen

- Developer Exception Page
  - Metadaten bei Routing
  - Verbessertes UI



An unhandled exception occurred while processing the request.

Exception: This is an exception

Snapbean.NET9.StaticAssets.WebMvc.Controllers.HomeController.Index() in `HomeController.cs`, line 18

Stack | Query | Cookies | Headers | Routing

Endpoint

Name	Value
Display Name	Snapbean.NET9.StaticAssets.WebMvc.Controllers.HomeController.Index (Snapbean.NET9.StaticAssets.WebMvc)
Route Pattern	{controller=Home}/{action=Index}/{id?}
Route Order	1

Endpoint Metadata

Type	Detail
NullableContextAttribute	System.Runtime.CompilerServices.NullableContextAttribute
NullableAttribute	System.Runtime.CompilerServices.NullableAttribute
ControllerAttribute	Microsoft.AspNetCore.Mvc.ControllerAttribute
ControllerActionDescriptor	Microsoft.AspNetCore.Mvc.Controllers.ControllerActionDescriptor
DataTokensMetadata	DataTokens:
RouteNameMetadata	RouteName: default
ControllerActionFilter	Microsoft.AspNetCore.Mvc.Filters.ControllerActionFilter
SaveTempDataAttribute	Microsoft.AspNetCore.Mvc.ViewFeatures.SaveTempDataAttribute
UnsupportedContentTypeFilter	Microsoft.AspNetCore.Mvc.ModelBinding.UnsupportedContentTypeFilter
SuppressLinkGenerationMetadata	SuppressLinkGeneration: True
RouteDiagnosticsMetadata	Route: {controller=Home}/{action=Index}/{id?}

Route Values

Variable	Value
action	Index
controller	Home

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ASP.NET Core 9

Static Asset Delivery

- Pre .NET 9
  - UseStaticFiles()
- Ab .NET 9
  - MapStaticAssets()
    - Caching (ETag)
    - Komprimierung
  - Publish only

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ASP.NET Core 9

Static Asset Delivery

Demo Time !

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ASP.NET Core 9

OpenAPI Support

- Pre .NET 9
  - Swashbuckle / Swagger
- Ab .NET 9
  - Support OpenApi Spezifikation 3.0
    - Microsoft.AspNetCore.OpenApi

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ASP.NET Core 9

OpenAPI Support

Demo Time !

ASP.NET Core 9

Native AOT

```
// Regular builder
var builder = WebApplication.CreateBuilder(args)

// AOT builder
var builder = WebApplication.CreateSlimBuilder(args)
```

- Ab .NET 8
  - Support für folgende Templates:
    - gRPC Template
    - Minimal APIs
- Ab .NET 9
  - Support von:
    - built-in OpenApi
    - SignalR

ASP.NET Core 9

HybridCache

- Two-Level Cache
  - L1: Lokal (In-Memory)
  - L2: Distributed Cache (z.B. Redis)
  - Fallback «Fetch-Data»-Request

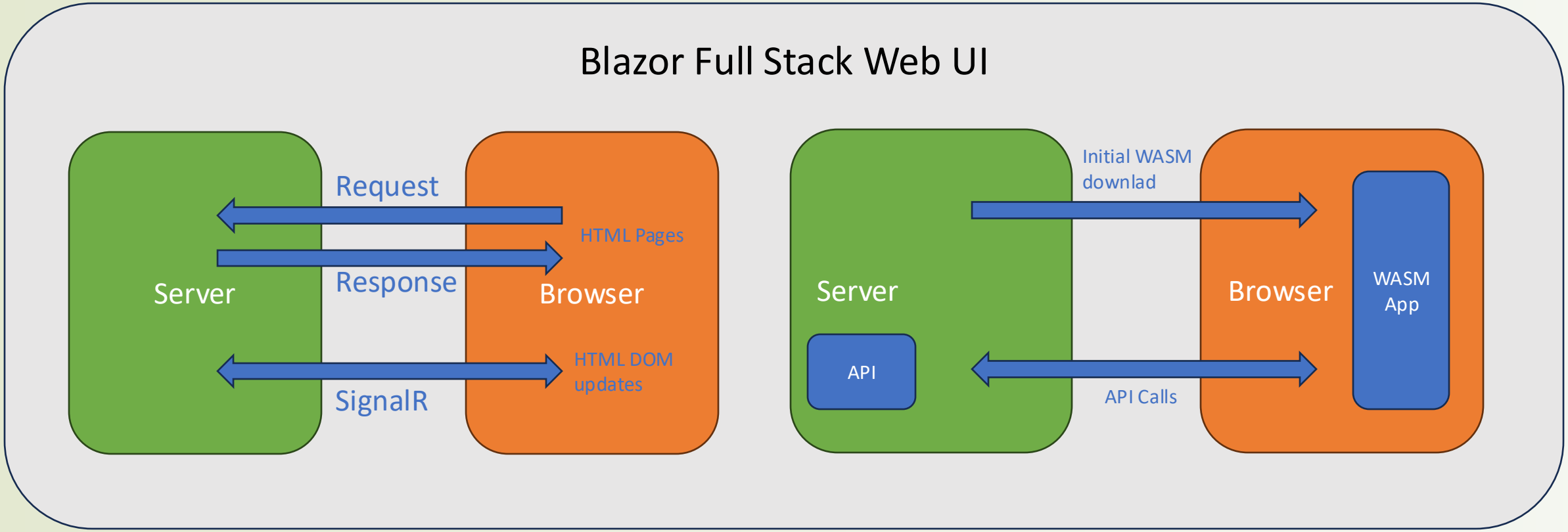
- Microsoft.Extensions.Caching.Hybrid
  - Noch in Preview!

ASP.NET Core 9
HybridCache

Demo Time !

ASP.NET Core 8

Blazor



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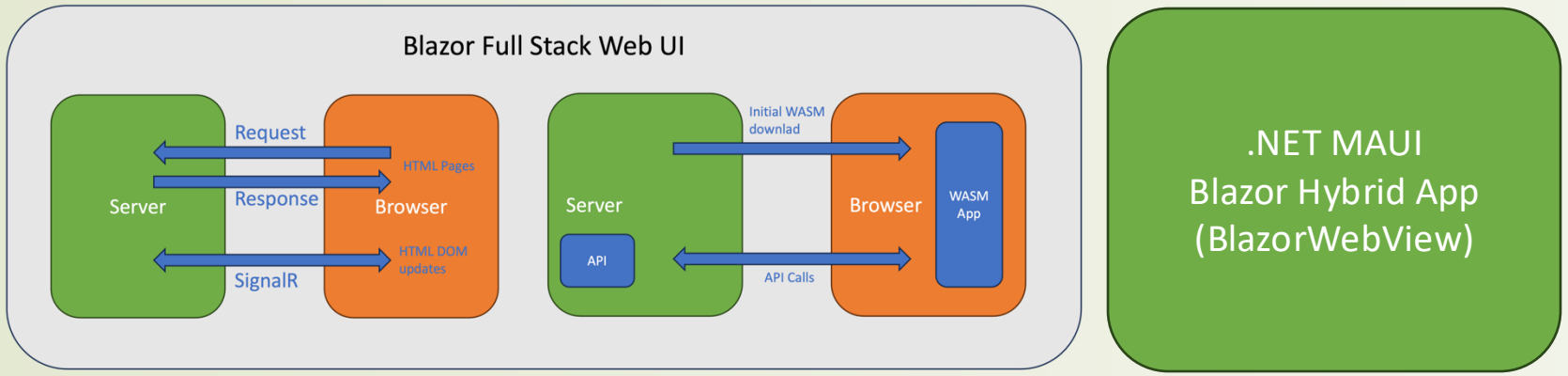
ASP.NET Core 9

Blazor

- Neues Template:
  - .NET MAUI Blazor Hybrid and Web App (.Net MAUI Workload)



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ASP.NET Core 9

Blazor

- Api zur Erkennung von
  - Ausführungsort
  - Interaktiv oder nicht
- Erweiterungen / Verbesserungen bei UI Komponenten
  - QuickGrid
  - InputNumber
- Verbesserte server-side reconnection
- Constructor Injection bei Razor Komponenten

ASP.NET Core 9

Security Themen

- AuthN / AuthZ
  - OIDC
    - Support von Pushed Authorization Requests (PAR)
    - Default, sofern unterstützt
- Logging
  - HttpClientFactory-Protokollierung
    - Default: Header werden bearbeitet

ASP.NET Core 10

.NET 10

- OpenAPI support 3.1
- ...

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Vielen Dank

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