Developing Cross-Platform Web Apps With Blazor

Wael Kdouh - @waelkdouh

Senior Customer Engineer

v1.0

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Module 5: Routing

Module Overview

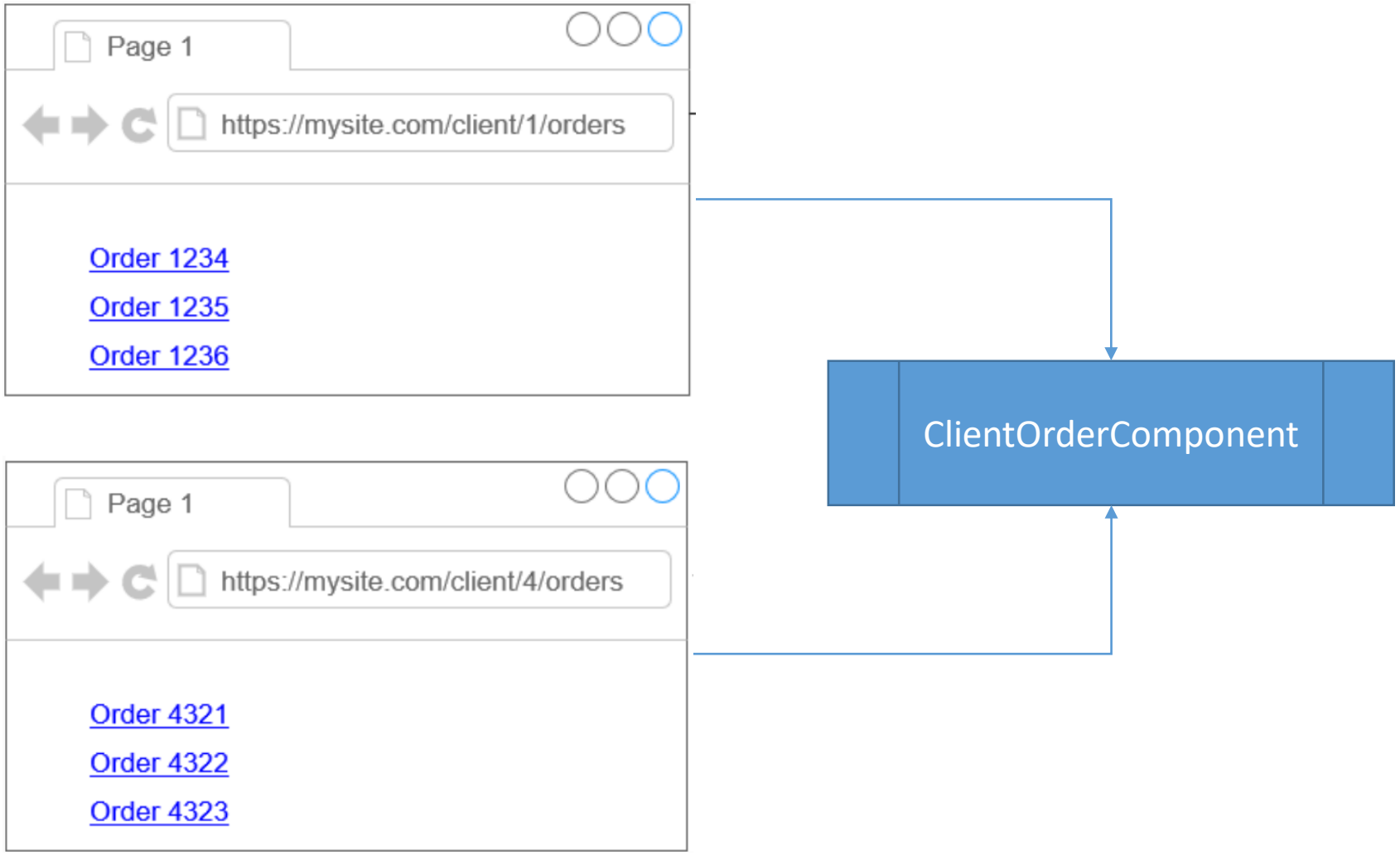
Module 5: Routing

Section 1: Routing

Lesson: Overview

Routing

- As with a standard ASP.NET MVC, Blazor **routing is a technique for inspecting the browser's URL and matching it up to a page to render**



Routing is more flexible than simply matching a URL to a page. It allows us to match based on patterns of text so that, for example, both URLs in the preceding image will map to the same component and pass in an ID for context (either a 1 or a 4 in this example)

Simulated Navigation

- Navigating to a new URL within the same app doesn’t navigate in the traditional WWW sense
- No request is sent to the server requesting the content for the new page. Instead, Blazor rewrites the browser’s URL and then renders the relevant content
- When a navigation is made to a new URL that resolves to the same type of component as the current page, the component will not be destroyed before navigation. The OnInitialized lifecycle methods will not be executed. The navigation is simply seen as a change to the component’s parameters

Defining Routes

- To define a route add a @page declaration at the top of the component

```
@page "/"

<h1>Hello, world!</h1>

Welcome to your new app.

<SurveyPrompt Title="How is Blazor working for you?" />
```

Defining Routes

- If you open the **generated source** code for index.razor (in **\obj\Debug\netstandard2.1\Razor\Pages**) you will see the @page directive compiled to the following code:

```
[Microsoft.AspNetCore.Components.RouteAttribute("/")]
public partial class Index : Microsoft.AspNetCore.Components.ComponentBase
{
    #pragma warning disable 1998
    protected override void BuildRenderTree(Microsoft.AspNetCore.Components.Rendering.RenderTreeBuilder __builder)
    {
        __builder.AddMarkupContent(0, "<h1>Hello, world!</h1>\r\n\r\nWelcome to your new app.\r\n\r\n");
        __builder.OpenComponent<Module5.Shared.SurveyPrompt>(1);
        __builder.AddAttribute(2, "Title", "How is Blazor working for you?");
        __builder.CloseComponent();
    }
    #pragma warning restore 1998
}
```

Defining Routes

- During start-up, Blazor scans for classes decorated with RouteAttribute and builds its route definitions accordingly

```
[Microsoft.AspNetCore.Components.RouteAttribute("/")]
public partial class Index : Microsoft.AspNetCore.Components.ComponentBase
{
    #pragma warning disable 1998
    protected override void BuildRenderTree(Microsoft.AspNetCore.Components.Rendering.RenderTreeBuilder __builder)
    {
        __builder.AddMarkupContent(0, "<h1>Hello, world!</h1>\r\n\r\nWelcome to your new app.\r\n\r\n");
        __builder.OpenComponent<Module5.Shared.SurveyPrompt>(1);
        __builder.AddAttribute(2, "Title", "How is Blazor working for you?");
        __builder.CloseComponent();
    }
    #pragma warning restore 1998
}
```

Route Discovery

- Route discovery is performed automatically by Blazor in its default project template

- If you look inside the App.razor file you will see the use of a Router component:

```
<Router AppAssembly="@typeof(Program).Assembly">
    <Found>...</Found>
    <NotFound>
        <LayoutView>...</LayoutView>
    </NotFound>
</Router>
```

Route Discovery

```
<Router AppAssembly="@typeof(Program).Assembly">
    <Found>...</Found>
    <NotFound>
        <LayoutView>...</LayoutView>
    </NotFound>
</Router>
```

The Router component scans all classes within the specified assembly that implement IComponent, it then reflects over the class to see if it is decorated with any RouteAttribute attributes

For each RouteAttribute it finds, it parses its URL template string and adds a relationship from the URL to the component into its internal route table

Route Discovery

- A single component may be decorated with zero, one, or many RouteAttribute attributes (@page declarations)
- A component with zero attributes cannot be reached via a URL, whereas a component with multiple attributes can be reached via any of the URL templates it specifies

Counter.razor

```
1   @page "/counter"
2   @page "/counter/{CurrentCount:int}"
3
4   <h1>Counter</h1>
5
6   <p>Current count: @CurrentCount</p>
7
8   <button class="btn btn-primary" @onclick="IncrementCount">Click me</button>
9
```

Module 5: Routing

Section 1: Routing

Lesson: Route Parameters

Route Parameters

- If you want the same component to render different views based on information in the URL (such as a customer ID) then you would need to use route parameters

```
@page "/counter"
@page "/counter/{CurrentCount:int}"

<h1>Counter</h1>

<p>Current count: @CurrentCount</p>

<button class="btn btn-primary" @onclick="IncrementCount">Click me</button>

<ul>
    <li><a href="/counter/42">Navigate to /counter/42</a></li>
    <li><a href="/counter/123">Navigate to /counter/123</a></li>
    <li><a href="/counter/">Navigate to /counter</a></li>
</ul>

@code {
    [Parameter]
    public int? CurrentCount { get; set; }
```

A route parameter is defined in the URL by wrapping its name in a pair of { braces } when adding a component's @page declaration

Capturing the value of a parameter is as simple as adding a property with the same name and decorating it with a [Parameter] attribute

Route Parameters

- If you want the same component to render different views based on information in the URL (such as a customer ID) then you would need to use route parameters

```
@page "/counter"
@page "/counter/{CurrentCount:int}"

<h1>Counter</h1>

<p>Current count: @CurrentCount</p>

<button class="btn btn-primary" @onclick="IncrementCount">Click me</button>

<ul>
    <li><a href="/counter/42">Navigate to /counter/42</a></li>
    <li><a href="/counter/123">Navigate to /counter/123</a></li>
    <li><a href="/counter/">Navigate to /counter</a></li>
</ul>

@code {
    [Parameter]
    public int? CurrentCount { get; set; }
```

When a navigation is made to a new URL that resolves to the same type of component as the current page, the component will not be destroyed before navigation and the OnInitialized lifecycle methods will not be executed. The navigation is simply seen as a change to the component's parameters

Constraining Route Parameters

```
@page "/counter"
@page "/counter/{CurrentCount:int}"

<h1>Counter</h1>

<p>Current count: @CurrentCount</p>

<button class="btn btn-primary" @onclick="IncrementCount">Click me</button>

<ul>
    <li><a href="/counter/42">Navigate to /counter/42</a></li>
    <li><a href="/counter/123">Navigate to /counter/123</a></li>
    <li><a href="/counter/">Navigate to /counter</a></li>
</ul>

@code {
    [Parameter]
    public int? CurrentCount { get; set; }
```

Will only match a URL to a component if the value of CurrentCount is an integer

Constraining Route Parameters

Constraint	.NET type	Valid	Invalid
bool	System.Boolean	•true •false	•1 •Hello
:datetime	System.DateTime	•2001-01-01 •02-29-2000	•29-02-2000
:decimal	System.Decimal	•2.34 •0.234	•2,34
:double	System.Double	•2.34 •0.234	•2,34
:float	System.Single	•2.34 •0.234	•2,34
:guid	System.Guid	•99303dc9-8c76-42d9-9430-de3ee1ac25d0	•{99303dc9-8c76-42d9-9430-de3ee1ac25d0}
:int	System.Int32	•-1 •42	•12.34
:long	System.Int64	•-1 •42	•12.34

Localization

- Blazor constraints do not currently support localization
  - Numeric digits are only considered valid if they are in the form 0..9, and not from a non-English language such as ૦..૯ (Gujarati)
  - Dates are only valid in the form MM-dd-yyyy, MM-dd-yy, or in ISO format yyyy-MM-dd
  - Boolean values must be true or false

Unsupported Constraint Types

- Blazor constraints do not support the following constraint types:
  - **Greedy parameters**
    - In ASP.NET Core MVC it is possible to provide a parameter name that starts with an asterisk and catches a chunk of the URL including forward slashes
    - /articles/{Subject}/{*TheRestOfTheURL}
  - **Regular expressions**
    - Blazor does not currently support the ability to constrain a parameter based on a regular expression
  - **Enums**
    - It's not currently possible to constrain a parameter to match a value of an enum
  - **Custom constraints**
    - It is not possible to define a custom class that determines whether or not a value passed to a parameter is valid

Optional Route Parameters

- Optional route parameters aren't supported explicitly by Blazor, but the equivalent can be easily achieved by adding more than one @page declaration on a component

```
@page "/counter"
@page "/counter/{CurrentCount:int}"
```

Specifying a Default Value For Optional Parameters

```
@page "/counter"
@page "/counter/{CurrentCount:int}"

<h1>Counter</h1>

<p>Current count: @CurrentCount</p>

<button class="btn btn-primary" @onclick="IncrementCount">Click me</button>

<ul>
    <li><a href="/counter/42">Navigate to /counter/42</a></li>
    <li><a href="/counter/123">Navigate to /counter/123</a></li>
    <li><a href="/counter/">Navigate to /counter</a></li>
</ul>

@code {
    [Parameter]
    public int? CurrentCount { get; set; }

    public async override Task SetParametersAsync(ParameterView parameters)
    {
        await base.SetParametersAsync(parameters);
        CurrentCount = CurrentCount ?? 1;
        Console.WriteLine("SetParametersAsync lifecycle hook called");
    }

    private void IncrementCount()
    {
        CurrentCount++;
    }
}
```

SetParametersAsync is called whenever the parameters change and their values are pushed into the component's properties, such as during a navigation

null coalescing operator (??) ensures that a value is set for CurrentCount if /counter is entered into the url

Demo: Route Parameters

404 – Not found

- When Blazor fails to match a URL to a component we might want to tell it what content to display

- The Router component has a parameter named **NotFound** which **is a RenderFragment**. Any Razor mark-up defined within this parameter of the Router component will be displayed when attempting to reach a URL the router cannot match to any component

Module 5: Routing

Section 1: Routing

Lesson: Navigation Options

Navigating The App Via HTML

- The simplest way to link to a route within a Blazor component is to use an HTML hyperlink

```
@page "/counter"
@page "/counter/{CurrentCount:int}"

<h1>Counter</h1>

<p>Current count: @CurrentCount</p>

<button class="btn btn-primary" @onclick="IncrementCount">Click me</button>

<ul>
    <li><a href="/counter/42">Navigate to /counter/42</a></li>
    <li><a href="/counter/123">Navigate to /counter/123</a></li>
    <li><a href="/counter/">Navigate to /counter</a></li>
</ul>
```

Hyperlinks in Blazor components are intercepted automatically. When a user clicks a hyperlink the browser will not send a request to the server, instead Blazor will update the URL in the browser and render whichever page is associated with the new address

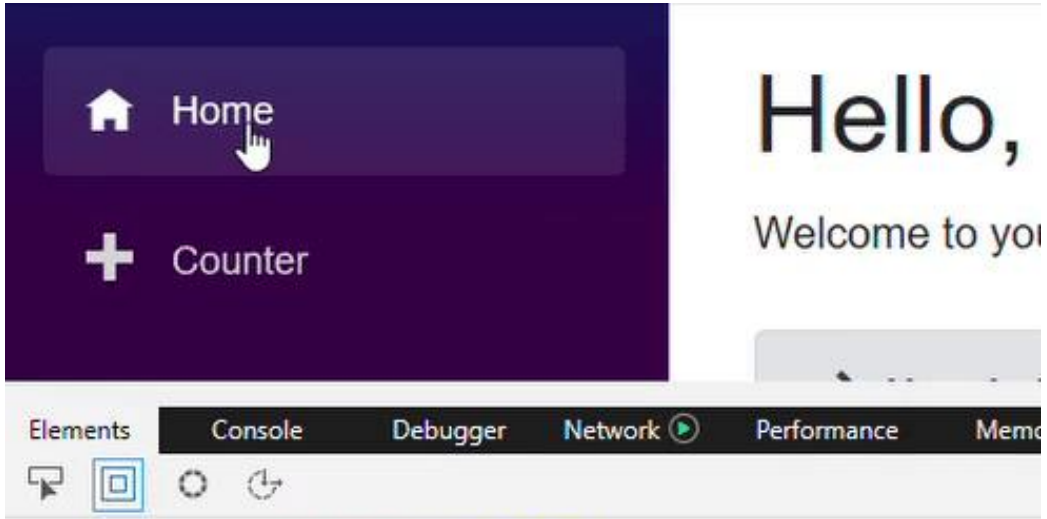
Using the NavLink Component

- Blazor also includes a component for rendering hyperlinks with **additional support for changing the HTML element's CSS class when address matches the URL**

- If you look inside the /Shared/NavMenu.razor component in the default Blazor application you will see the following markup:

```
<div class="@NavMenuCssClass" @onclick="ToggleNavMenu">
    <ul class="nav flex-column">
        <li class="nav-item px-3">
            <NavLink class="nav-link" href="" Match="NavLinkMatch.All">
                <span class="oi oi-home" aria-hidden="true"></span> Home
            </NavLink>
        </li>
        <li class="nav-item px-3">
            <NavLink class="nav-link" href="counter">
                <span class="oi oi-plus" aria-hidden="true"></span> Counter
            </NavLink>
        </li>
    </ul>
</div>
```

Using the NavLink Component




```
◢ <li class="nav-item px-3">
    <!--!-->
    <!--!-->
  ◢ <a class="nav-link active" href="" match="All">
      <!--!-->
      <span class="oi oi-home" aria-hidden="true"></span>
      Home
    </a>
    <!--!-->
  </li>
  <!--!-->
◢ <li class="nav-item px-3">
    <!--!-->
    <!--!-->
  ▷ <a class="nav-link" href="counter">…</a>
    <!--!-->
  </li>
```

The ActiveClass parameter specifies which CSS class to apply to the rendered <a> element when the URL of the browser matches the URL of the href attribute. If not specified, Blazor will apply a CSS class named “active”

Demo: ActiveClass

NavLinkMatch

- The **Match parameter** of the NavLink component accepts a value of the type NavLinkMatch. This tells the NavLink component how you want the browser's URL compared with the href attribute of the <a> element it renders to determine whether they are the same or not

- There are two NavLinkMatch options that you can assign to the Match attribute of the <NavLink> element:
  - **NavLinkMatch.All** – The NavLink is active when it matches the entire current URL
  - **NavLinkMatch.Prefix** (default) – The NavLink is active when it matches any prefix of the current URL

NavLinkMatch

```
<div class="@NavMenuCssClass" @onclick="@ToggleNavMenu">
    <ul class="nav flex-column">
        <li class="nav-item px-3">
            <NavLink class="nav-link" href="" Match="NavLinkMatch.All">
                <span class="oi oi-home" aria-hidden="true"></span> Home
            </NavLink>
        </li>
        <li class="nav-item px-3">
            <NavLink class="nav-link" href="MyComponent" Match="NavLinkMatch.Prefix">
                <span class="oi oi-plus" aria-hidden="true"></span> My Component
            </NavLink>
        </li>
    </ul>
</div>
```

NavLink href="" matches the home URL (for example, https://localhost:5001/)

NavLink href="MyComponent" matches when the user visits any URL with a MyComponent prefix (for example, https://localhost:5001/MyComponent and https://localhost:5001/MyComponent/AnotherSegment)

Demo: URL Matching

Module 5: Routing

Section 1: Routing

Lesson: Navigating With Code

Navigating App Via Code

- Access to browser navigation from Blazor is provided via the **NavigationManager service**. This can be injected into a Blazor component using @inject in a razor file, or the [Inject] attribute in a CS file (when using code behind)

Navigating App Via Code

Member	Description
`Uri`	Gets the current absolute URI.
`BaseUri`	Gets the base URI (with a trailing slash) that can be prepended to relative URI paths to produce an absolute URI. Typically, `BaseUri` corresponds to the `href` attribute on the document's `<base>` element in *wwwroot/index.html* (Blazor WebAssembly) or *Pages/_Host.cshtml* (Blazor Server).
`NavigateTo`	Navigates to the specified URI. If `forceLoad` is `true`: • Client-side routing is bypassed. • The browser is forced to load the new page from the server, whether or not the URI is normally handled by the client-side router.
`LocationChanged`	An event that fires when the navigation location has changed.
`ToAbsoluteUri`	Converts a relative URI into an absolute URI.
`ToBaseRelativePath`	Given a base URI (for example, a URI previously returned by `GetBaseUri`), converts an absolute URI into a URI relative to the base URI prefix.

Navigating App Via Code

- The following component navigates to the app's Counter component when the button is selected:

```
@page "/navigate"
@inject NavigationManager NavigationManager

<h1>Navigate in Code Example</h1>

<button class="btn btn-primary" @onclick="NavigateToCounterComponent">
    Navigate to the Counter component
</button>

@code {
    private void NavigateToCounterComponent()
    {
        NavigationManager.NavigateTo("counter");
    }
}
```

Demo: Navigating App Via Code

Module Summary

- In this module, you learned about:
  - Defining Routes
  - Route Parameters
  - Constraining Route Parameters
  - Optional Route Parameters
  - Navigating Via HTML
  - Navigating Via Code
  - Detecting Navigation Events

Lab 5: Routing

References

- Microsoft Docs

- Blazor University

Microsoft