

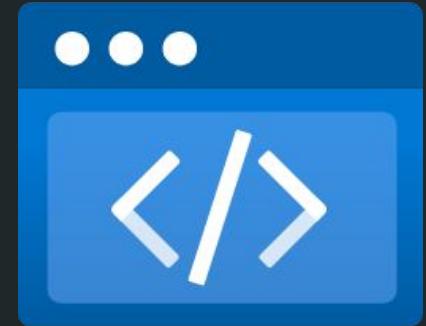
November 9-11, 2021  
[www.dotnetconf.net](http://www.dotnetconf.net)

# .NET Conf

Discover the world of .NET



# Developing and Deploying a Static Web App with Blazor and Azure Functions



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Matthias Koch | @matkoch87  
matthias@jetbrains.com



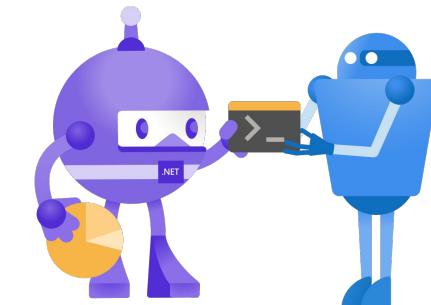
# Developing and Deploying a Static Web App with Blazor and Azure Functions

Matthias Koch | @matkoch87



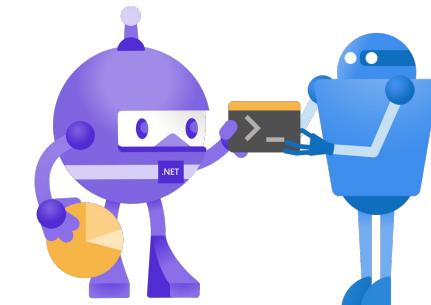
# What are Static Web Apps?

- Web hosting for static content
- Integrated API support
- GitHub and Azure DevOps integration
- Globally distributed
- Free SSL certificates
- Custom domains
- Seamless security model
- Authentication providers
- Customizable authorization
- Staging versions



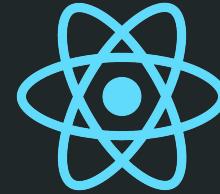
# What are Static Web Apps?

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- ~~GitHub and Azure DevOps integration~~
- Globally distributed
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- Authentication providers
- Customizable authorization
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# Front-end choices

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# Blazor

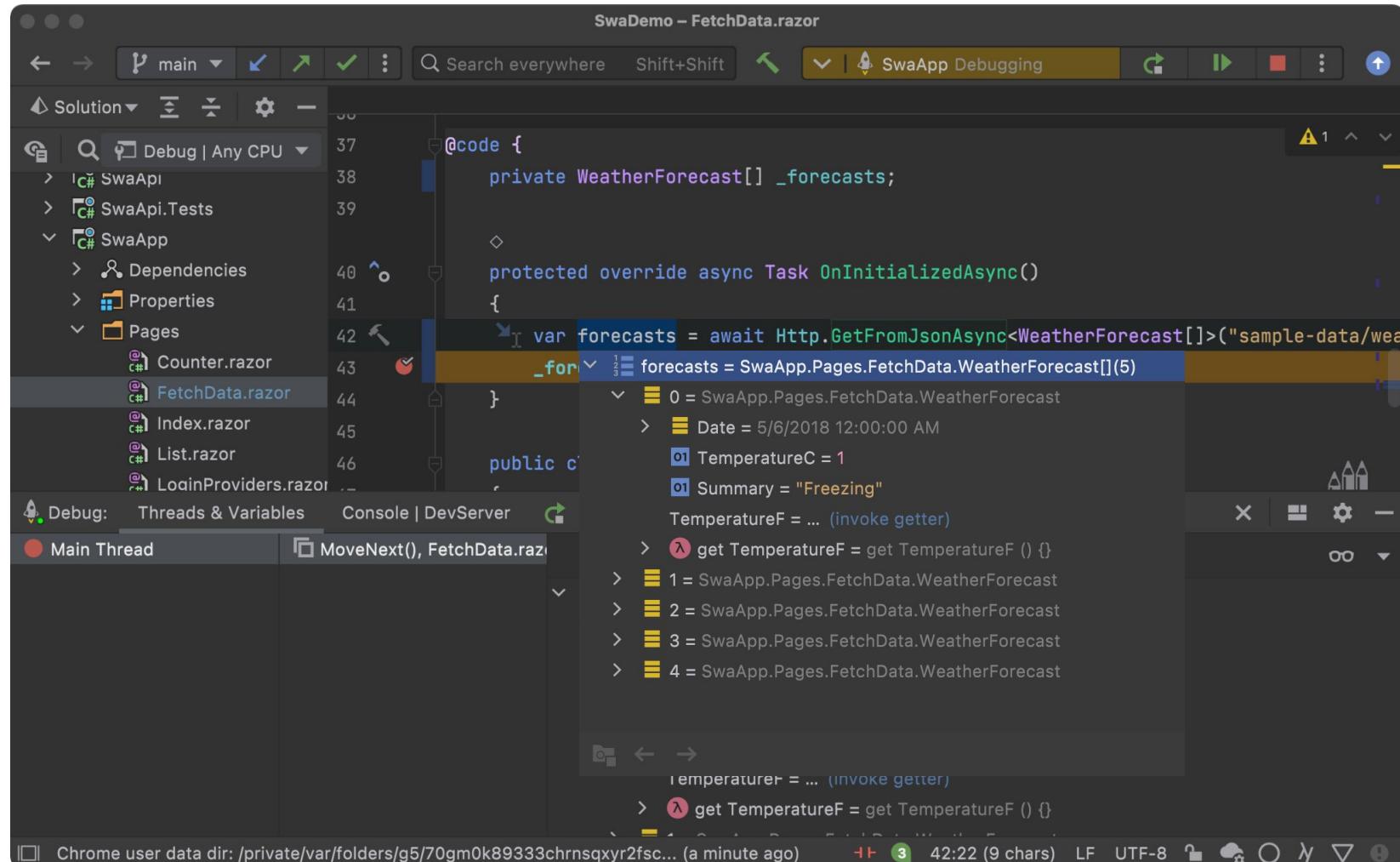


- C#/.NET on WASM
  - Open web standards
  - JavaScript interop
  - Development experience
-

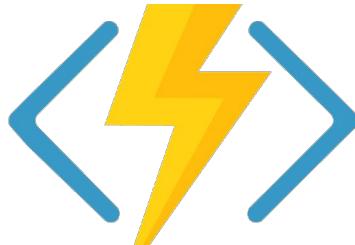
The screenshot shows a dark-themed IDE interface with the following details:

- Solution Explorer:** On the left, it shows the "SwaDemo · 5 projects" solution. Under the "Pages" folder, the "List.razor" file is selected.
- Editor Area:** The main area displays the code for "List.razor".

```
ul
5   <input type="text" placeholder="Add new item"
6     @bind="newValue"
7     @onkeyup="OnTextInput" />
8   <ul> 5 days ago • add list and quote
9     @foreach (var item in items)
10    {
11      <li @onclick="() => items.Remove(item)">@item</li>
12    }
13  </ul>
14  @code
15  {
16    private string newValue = string.Empty;
17    private List<string> items = new List<string>();
18
19    ◇
20    private void OnTextInput(KeyboardEventArgs args)
21    {
22      if(args.Key == "Enter")
23      {
24        items.Add(newValue);
25        newValue = string.Empty;
26      }
27    }
28  }
```
- Status Bar:** At the bottom, it shows "1 file committed: build (a minute ago)" and system status icons for battery, signal, and network.



# Azure Functions



- Serverless
  - Flexible scaling
  - Powerful programming model
  - Development experience
-

SwaDemo – GetQuote.cs

← → ⚙️ main ▾ ↺ ↻ ✓ ⚖️ ⚒️ Search everywhere Shift+Shift ⚓ SwaApp ▾ ▶ Run ⚛️ Debug ⚖️ ⚒️

⚠️ 1 ⚖️ ⚒️

Solution ▾ 🔍 Debug | Any CPU ▾

SwaDemo · 5 projects

- > \_build · not built
- ✓ SwaApi
  - > Dependencies
  - C# GetQuote.cs
  - host.json
  - local.settings.json
  - C# SendUpdates.cs
  - C# Startup.cs
  - C# StaticWebAppsPrincipal
  - C# WebJobsStartup.cs
- > SwaApi.Tests
- > SwaApp
- > SwaApp.Tests

> Scratches and Consoles

File SwaApi (.NETCoreApp 3.1) › SwaApi › GetQuote

```
21
22     [FunctionName("GetQuote")]
23     public async Task<IActionResult> RunAsync(
24         [HttpTrigger(AuthorizationLevel.Function, "get", "post", Route = null)]
25         HttpRequest request,
26         ILogger log,
27         ClaimsPrincipal principal)
28     {
29         log.LogInformation("C# HTTP trigger function processed a request.");
30
31         var response = await _client.GetAsync("https://quotes.rest/qod");
32         if (!response.IsSuccessStatusCode)
33             return new OkObjectResult("Out of quotes for another hour! :(");
34
35         var content = await response.Content.ReadAsStringAsync();
36         dynamic json = JsonConvert.DeserializeObject(content);
37         string quote = json.contents.quotes[0].quote;
38         return new OkObjectResult(quote);
39     }
40 }
41 }
```

Chrome user data dir: /private/var/folders/g5/70gm0k89333chrnsqxyr2fsc0000gn/T/... (5 minutes ago) 14:6 LF UTF-8

SwaDemo - ~/Library/Application Support/JetBrains/Rider2021.3/scratches/Trigger\_GetQuote.http

main ▾ Run all requests in file Add request Add environment file Convert... Open log \*Examples

Debug | Any CPU

SwaDemo · 5 projects

- C# \_build · not built
- C# SwaApi
  - Dependencies
  - C# GetQuote.cs
  - host.json
  - local.settings.json
  - C# SendUpdates.cs
  - C# Startup.cs
  - C# StaticWebAppsPrincipal

GET http://localhost:7071/api/GetQuote

11 ► 12  
13 ↳ <> 2021-11-04T182224.200.txt  
14 ↳ <> 2021-10-30T104938.200.txt  
15 ↳ <> 2021-10-30T093333.200.txt  
16  
17     ###  
18  
19     *# Call the following administrative endpoint to trigger non-HTTP functions:*  
20  
21 ► POST http://localhost:7071/admin/functions/GetQuote

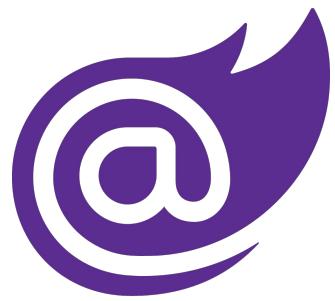
Services

HTTP/1.1 200 OK  
Content-Type: text/plain; charset=utf-8  
Date: Thu, 04 Nov 2021 17:22:24 GMT  
Server: Kestrel  
Transfer-Encoding: chunked

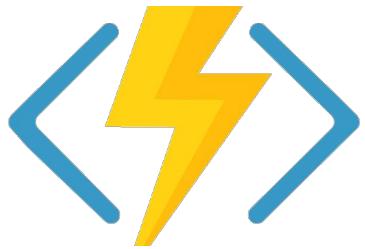
You gotta commit. You've gotta go out there and improvise and you've gotta be co

Response code: 200 (OK); Time: 4167ms; Content length: 208 bytes

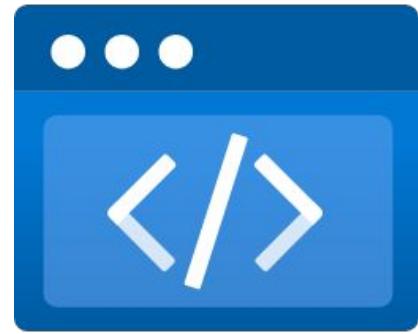
Auto fetch: finished (moments ago) 24:3 LF UTF-8



+



=





401

Unauthorized



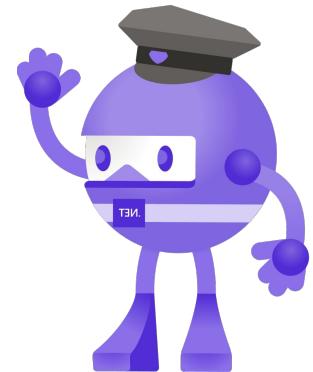
403

Forbidden

<https://http://> 

# Authentication + Authorization

- Provide links to `/.auth/login/<provider>`
- Add `Microsoft.Azure.Functions.Authentication.WebAssembly` package
- Add `AddStaticWebAppsAuthentication` for builder
- Use `CascadingAuthenticationState` and `AuthorizeRouteView` in App
- Use `AuthorizeView` with `Authorized` and `NotAuthorized` blocks
- Use `AuthorizeAttribute` for pages



SwaDemo – MainLayout.razor

```
<div class="page">
    <div class="main">
        <div class="top-row px-4">
            <AuthorizeView>
                <Authorized>
                    Hello, @context.User.Identity!.Name!
                    <a href="/.auth/logout?post_logout_redirect_uri=/">Log out</a>
                </Authorized>
                <NotAuthorized>
                    <a href="/login-providers">Log in</a>
                </NotAuthorized>
            </AuthorizeView> one week ago · authentication
        </div>
        <div class="content px-4">
            @Body
        </div>
    </div>
</div>
```

Auto fetch: finished (2 minutes ago) 19:29 LF UTF-8

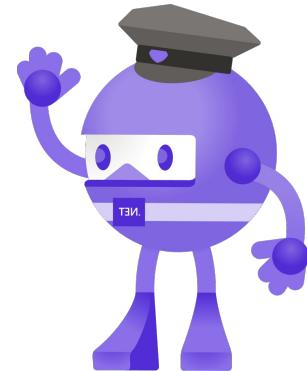
SwaDemo – Quote.razor

```
1  @page "/quote"
2  @using Microsoft.AspNetCore.Authorization
3  @inject HttpClient Http
4  @attribute [Authorize(Roles = "admin")]
5
6  <h1>Quote</h1>
7
8  <p>@result</p>
9
10 @code {
11     private string result = "loading...";
12
13     ◇
14     protected override async Task OnInitializedAsync()
15     {
16         var response = await Http.GetStringAsync("/api/GetQuote");
17         result = response.ToString();
18     }
19 }
```

Auto fetch: finished (3 minutes ago)

# Authentication + Authorization <⚡>

- Parse JWT from `x-ms-client-principal`
- Create `ClaimsPrincipal` instance
- Check on:
  - `principal.Identity.IsAuthenticated`
  - `principal.IsInRole("admin")`



SwaDemo – GetQuote.cs

Solution: SwaDemo · 5 projects

Debug | Any CPU

Search everywhere Shift+Shift

SwaApp Run Debug

Auto fetch: finished (4 minutes ago)

```
public async Task<IActionResult> RunAsync(
    [HttpTrigger(AuthorizationLevel.Function, "get", "post", Route = null)]
    HttpRequest request,
    ILogger log,
    [StaticWebAppsPrincipal] ClaimsPrincipal principal)
{
    log.LogInformation("C# HTTP trigger function processed a request.");

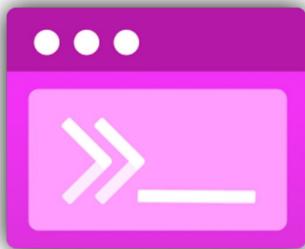
    if (principal == null || !principal.Identity.IsAuthenticated)
        return new UnauthorizedResult(); one week ago • authentication

    if (!principal.IsInRole("admin"))
        return new ForbidResult(principal.Identity.AuthenticationType);

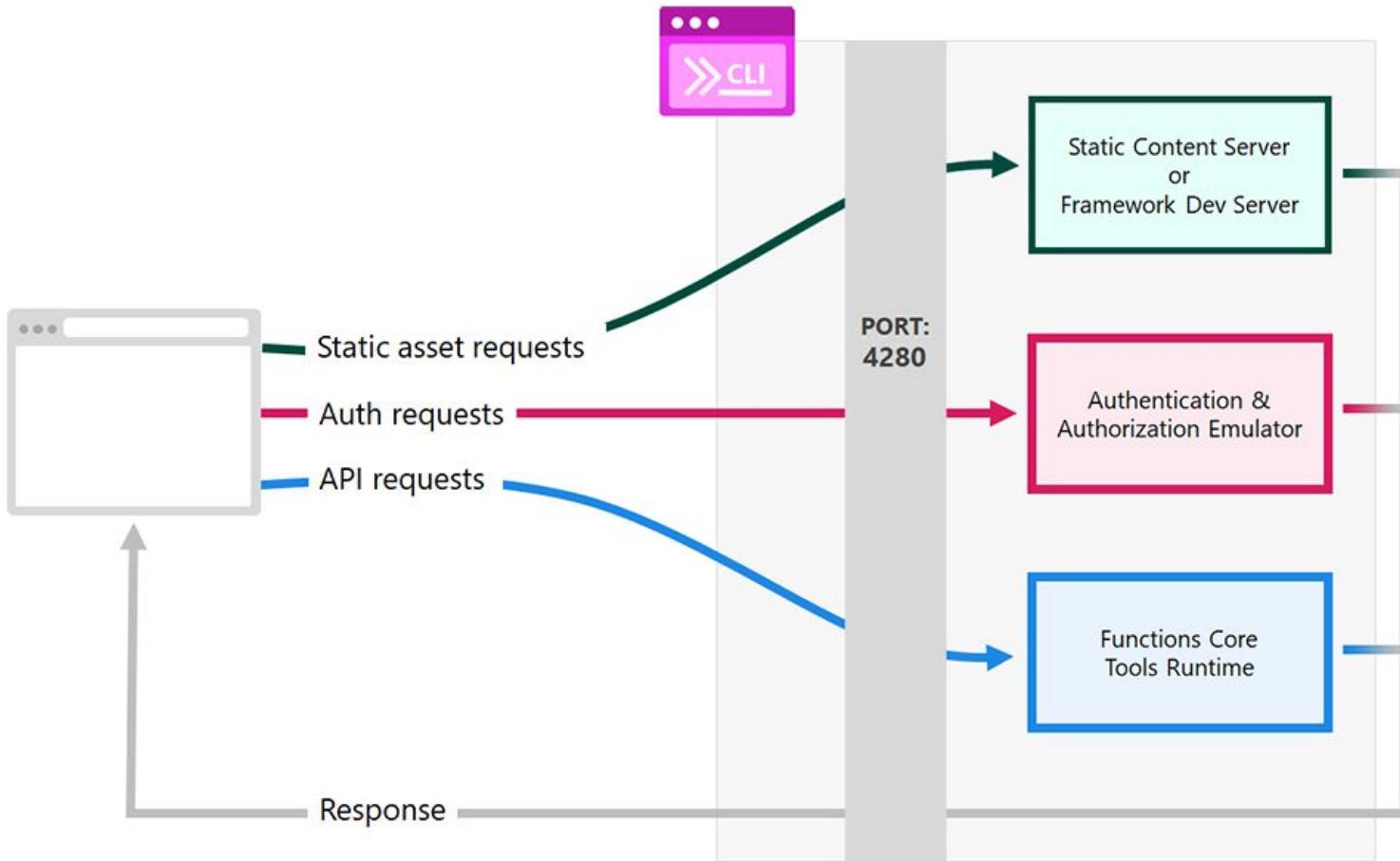
    var response = await _client.GetAsync("https://quotes.rest/qod");
    if (!response.IsSuccessStatusCode)
        return new OkObjectResult("Out of quotes for another hour! :( ");

    var content = await response.Content.ReadAsStringAsync();
    dynamic json = JsonConvert.DeserializeObject(content);
    string quote = json.contents.quotes[0].quote;
    return new OkObjectResult(quote);
}
```

# SWA CLI



- Static web app
  - Azure Functions API
  - Authentication and Authorization
  - Routing and configuration
-



# Local Development

-  Use node v14
- `npm install -g @azure/static-web-apps-cli`
- `swa start http://localhost:5000 --api-location http://localhost:7071`
- Open `http://localhost:4280` in browser
- Reverse proxy:
  - `/.auth/**` requests are forwarded to the Auth emulator server
  - `/api/**` requests are forwarded to the localhost API function
  - `/**` all other requests are forwarded to the static assets server (serving the front-end app)

 Home

 Counter

 Todo List

 Fetch data

 Quote

Not authorized

# Azure Static Web Apps Auth

Provider  Name of the identity provider

User ID  An Azure Static Web Apps-specific unique ID for the user

Username  Username or email address of the user

User's roles   
Roles used during authorisation. One role per line.  
Note: roles "authenticated" and "anonymous" will be added automatically if not provided.



 Home Counter Todo List Fetch data Quote

# Quote

You gotta commit. You've gotta go out there and improvise and you've gotta be completely unafraid to die. You've got to be able to take a chance to die. And you have to die lots. You have to die all the time.

# Unit Testing

# Standard Deployment

# Overview

**SwaDemo2** ...

Static Web App

Search (Cmd+)

Browse Delete Manage deployment token Send us your feedback

Overview

Access control (IAM)

Tags

Resource group (change) : TEST

Subscription (change) : Azure subscription

Subscription ID : [REDACTED]

Location : Global

Sku : Free

URL : <https://brave-island-0aac52b03.azurestaticapps.net>

Source : GitHub

Deployment history : GitHub Action runs

Edit workflow : azure-static-web-apps-brave-island-0aac52b03.yml

Tags (change) : Click here to add tags

Essentials

Configuration

Application Insights

Custom domains

Functions

Environments

Role management

Identity

Hosting Plan

Private endpoints (preview)

Locks

Requests

3
2.5
2

Data out

16kB
14kB
12kB
10kB

# Environments / Staging

 **foooooobar | Environments** 

Static Web App

 Refresh  Delete

---

 Overview

 Access control (IAM)

 Tags

 Settings

 Configuration

 Application Insights

 Custom domains

 Functions

 Environments

 Role management

 Identity

 Hosting Plan

 Staging environments are automatically created when a pull request is generated, and are promoted into production once the pull request is merged.

**Production**

There is one production environment per app. Check its status and last update time here.

Branch	Last Update Time	Status
main	September 3, 2021, 3:37:38 AM GMT+2	 Ready

**Staging**

Open pull requests against the linked repository to create a staging environment.

Title	Branch	Last Update Time	Status
<input type="checkbox"/> title	branch	October 25, 2021, 10:07:29 AM G...	 Ready

# Role Management

 **foooooobar** | Role management ...

Static Web App

«  Invite  Refresh  Delete

Overview Access control (IAM) Tags

Settings Configuration Application Insights Custom domains Functions Environments Role management Identity

Filter by user identity... Authentication Provider == all Role == all

<input type="checkbox"/> User Identity ↑↓	Authentication Provider ↑↓
<input type="checkbox"/> matkoch	GitHub

# Role Management

## Create invitation link

Invitation links grant specific users access to your domain. You can specify when the links expire.

Authentication Provider == all	Authentication provider *	GitHub
Authentication Provider	User handle *	
GitHub	Domain *	lemon-wave-0ec70bd03.azurestaticapps.net
	Role *	contributor,reader
	Invitation expiration (in hours) *	1

# NUKE



- C# MAKE
  - Powerful programming model
  - Development experience
  - Scalable
-

```
90
91     [Solution(GenerateProjects = true)] readonly Solution Solution;
92     [Parameter] [Secret] readonly string ApiToken;
93
94     // https://docs.microsoft.com/en-us/azure/static-web-apps/configuration#restrictions
95     <Matthias Koch>
96     Target Deploy => _ => _
97         .Requires(() => ApiToken != null || IsLocalBuild)
98         .DependsOn(Test)
99         .Executes(() =>
100             {
101                 DockerTasks.DockerRun(_ => _
102                     .SetImage("mcr.microsoft.com/appsvc/staticappsclient:stable")
103                     .SetWorkdir("/deploy")
104                     .AddVolume($"{RootDirectory}:/deploy")
105                     .AddArgs((StaticSitesClientSettings _) => _
106                         .SetDeploymentAction("upload")
107                         .SetApiToken(ApiToken ?? GetApiToken())
108                         .SetApiLocation(RootDirectory.GetUnixRelativePathTo(Solution.SwaApi.Directory))
109                         .SetAppLocation(RootDirectory.GetUnixRelativePathTo(Solution.SwaApp.Directory))
110                         .SetOutputLocation("wwwroot")));
111             });
112
113 }
```

SwaDemo – Build.cs

Search everywhere Shift+Shift ↻ SwaApp ▶ Run Debug ⋮

Solution Debug | Any CPU

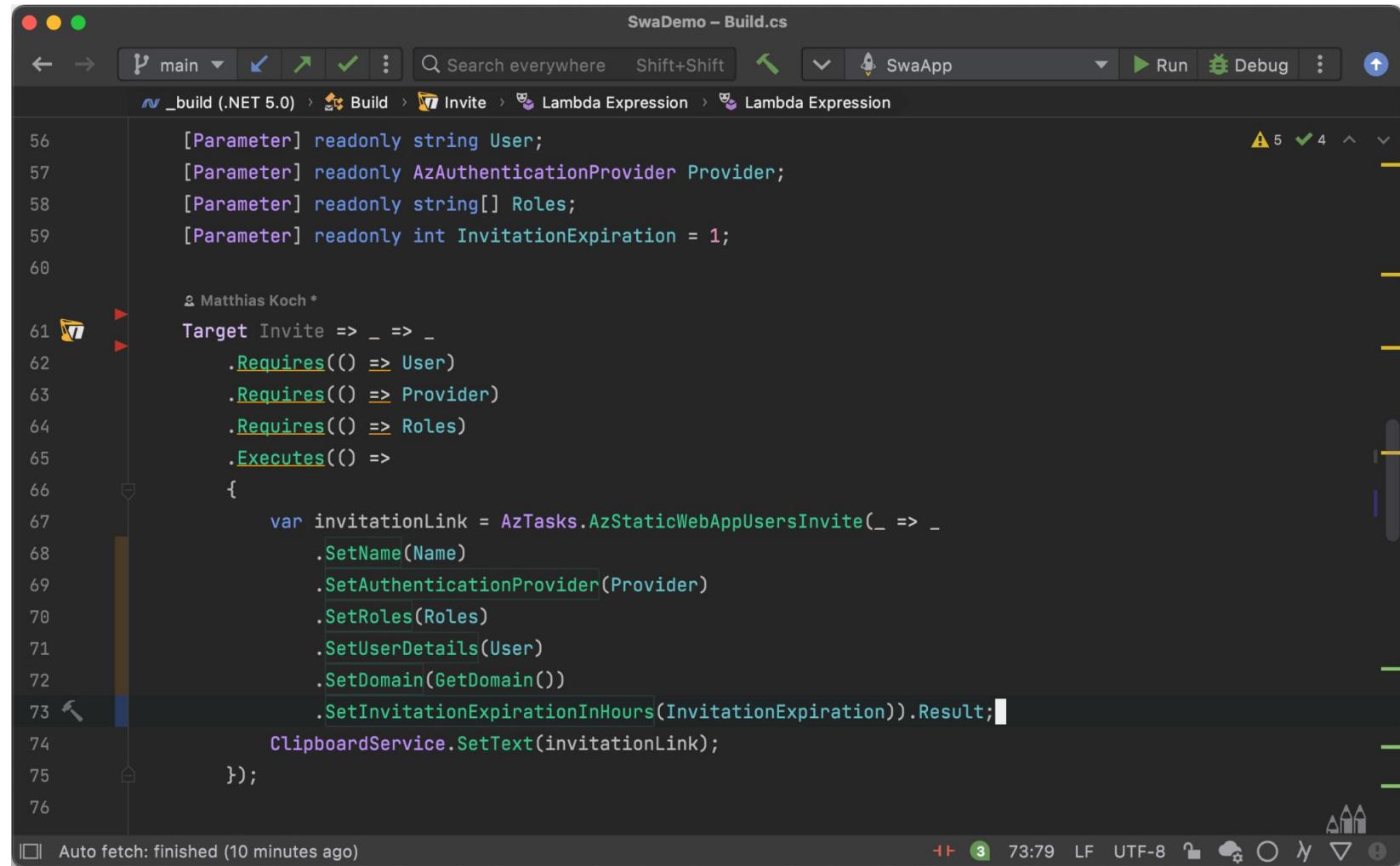
SwaDemo · 5 projects

- ↳ C# \_build · not built
  - > Dependencies
  - > ci
  - > config
  - > Ext
- C# Build.cs
- C# Configuration.cs
- create-swa.json
- Directory.Build.props
- Directory.Build.targets
- > C# SwaApi
- > C# SwaApi.Tests
- > C# SwaApp
- > C# SwaApp.Tests
- > Scratches and Consoles

Auto fetch: finished (6 minutes ago) 3 47:23 LF UTF-8

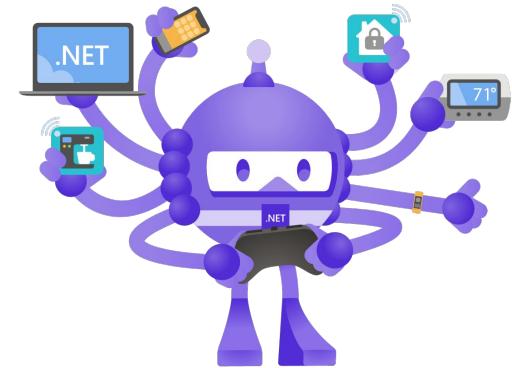
```
35
36     [Parameter] readonly string Name;
37     [Parameter] readonly string Location;
38     [Parameter] readonly string ResourceGroup;
39
40     AbsolutePath TemplateFile => BuildProjectDirectory / "create-swa.json";
41
42 // SOURCE: https://docs.microsoft.com/en-us/azure/azure-resource-manager/templates/deployment-tutorial-create-template
43
44 Target Create => _ => _
45     .Requires(() => Name)
46     .Executes(() =>
47     {
48         AzTasks.AzDeploymentGroupCreate(_ => _ one week ago * build
49             .SetResourceGroup(ResourceGroup)
50             .SetTemplateFile(TemplateFile)
51             .AddParameter("name", Name)
52             .AddParameter("Location", Location));
53
54         SaveParameter(() => Name);
55     });

```



# Conclusion

- Static Web Apps in Azure are cool 😎
- Fast and scalable
- Front and back-end as a unit
- Authentication providers
- Role management
- Great development experience



# Thanks for joining!

 matkoch/swa-demo

 matkoch87

