**Notes for Blazor (WebAssembly)**

Ref. project in GitHub <https://github.com/aleph0mc/BlazorMoviesSol>

1. Lifecycle of a Blazor Component (check **MoviesListGen.razor** component under BlazorMovies.Client\Shared)

* **OnInitialized** and **OnInitializedAsync** (to initialize the component (ex. to get data) after the HTTP request)
* **OnParametersSet** and **OnParametersSetAsync** (triggered any time a parameter is updated)
* **OnAfterRender** and **OnAfterRenderAsync** (triggered after component has been rendered)
* **ShouldRender** (define if a component has to be rendered again after rendering, ex. after the user performs some actions on the UI)
* **StateHasChanged()** to notify a change on the component

1. Dependency Injection refers to supply dependencies of a class from another class (services), and it can be performed using the **@inject** attribute.  
   Defailt services
   * HttpClient for HTTP requests to server
   * IJSRuntime to interact with JavaScript
   * NavigationManager to manage navigation through code

Lifecycle of a service

* Scoped, the service lives within a context (ex. during HTTP request). In the client side, it is like a singleton.
* Singleton
* Transient, different instances are created each time the service is requested

Let us create a new class for services in the client project called **Services.cs**

public class SigletonServices

{

. . . . . .

}

public class TransientServices

{

. . . . . . . . .

}

then we need to configure the DI in the **Program.cs** class in the following way



Then in the component we can inject the instance with

@inject SigletonService singleton  
@inject TransientService transient  
@inject IRepository repo

1. We can separate HTML code from c# code using partial classes, the partial class must have the same name as the component ex. **Counter.razor** and the class must be **Conter.razor.cs**, in this way we have a sort of code-behind, the class must be declared as partial, as following



And the component html will be



In a component it’s possible to invoke a method from JavaScript, ex.

[JSInvokable]

public static async Task<int> GetCurrentCount()

{

return await Task.FromResult(currentCountStatic);

}

And from JavaScript

function dotnetStaticInvokation() {

DotNet.invokeMethodAsync("BlazorMovies.Client", "GetCurrentCount")

.then(result => {

console.log("count from javascript", result);

});

To invoke an instance method the logic s the same it’s important to mark the c# method with the attribute **[JSInvokable]**.

1. **Using Identity Server  
   Ref.** <https://github.com/aleph0mc/BlazorMoviesSol/tree/IdentityServer4>
   * DataContext class must inherit from IdentityDbContext   
     public class DataContext : IdentityDbContext //DbContext

Import the namespace from NuGet as

Microsoft.AspNetCore.Identity.EntityFrameworkCore

* + In DataContext make sure under the OnModelCreating to have the line  
    base.OnModelCreating(builder);  
    after the builder.Entity statements otherwise there will be an error during migration.
  + Under Startup.cs in ConfigureServices make sure to add the following lines  
     // Using Identity Server

services.AddIdentity<IdentityUser, IdentityRole>()

.AddEntityFrameworkStores<DataContext>()

.AddDefaultTokenProviders();

* + Finally run the command for a new migrations in order to create the table for IdentityServer. Open the terminal window, make sure to be in the Server folder then run  
    **dotnet ef migrations add IdentityTables** (or **Add-Migration IdentityTables 🡸** under Package Manager Console)  
    Then run  
    **dotnet ef database update** (or **Update-Database 🡸** under Package Manager Console)
  + To update db tools:  
    **dotnet tool install --global dotnet-ef --version 3.1.5**

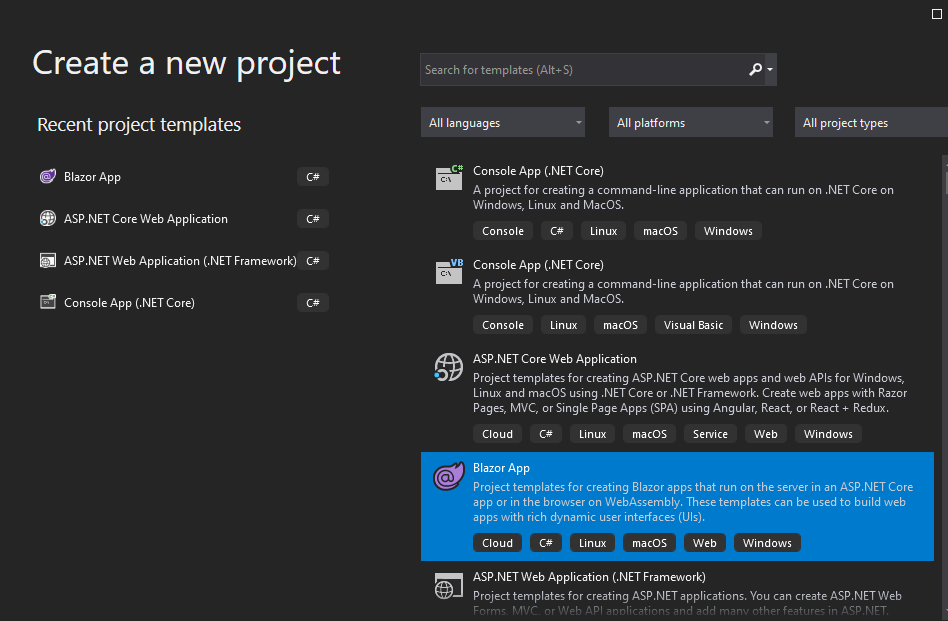
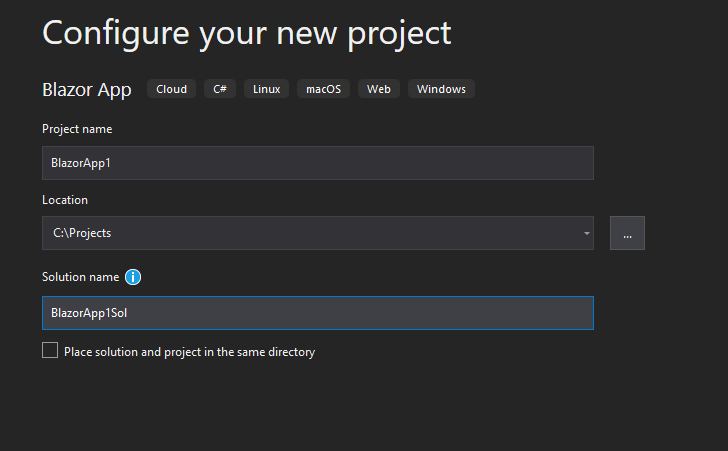
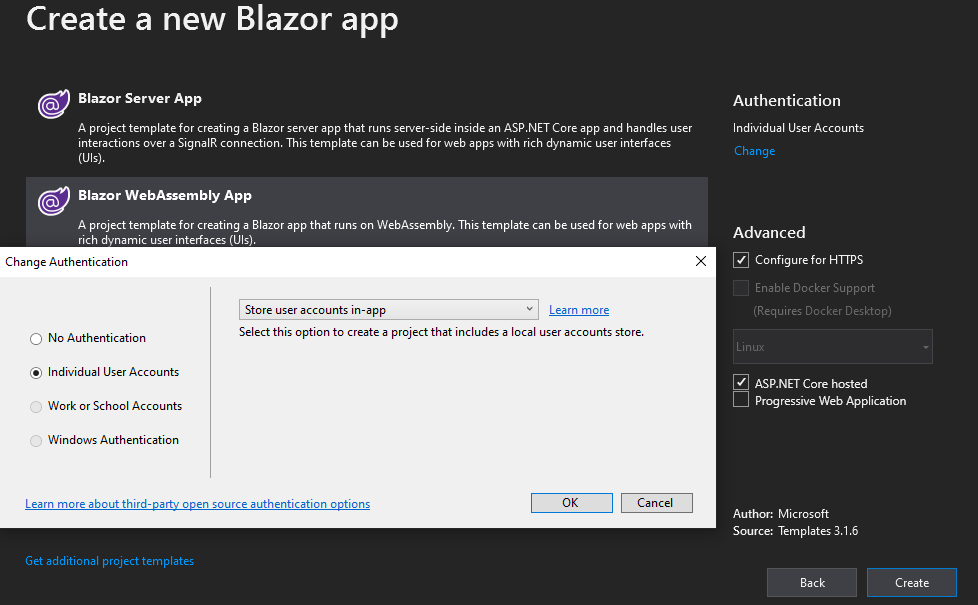
Ref. <https://www.nuget.org/packages/dotnet-ef/>

If issues to install the latest version, remove the previous version

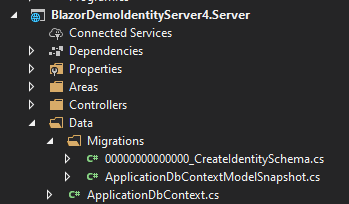
**dotnet tool uninstall -g dotnet-ef**

and then run the install again

The identity tables should be now created in our database.

1. **IdentityServer4** project
   * Create a Blazor App, then Next ****
   * Name the app  
     ****
   * Choose the following config with Authentication on Individual User Account ****
   * In appsettings.json update the DB connection to something like

"DefaultConnection": "Server=.\\SS2017DEV;Database=BlazorDemoIdentityServer4;User Id=aaaaaa;Password=xxxxxx;MultipleActiveResultSets=true"

* + In the Server project under the Data folder there is predefined migration  
    
  + In the terminal, uder the Server folder, run the command  
    **dotnet ef database update** (or **Update-Database** in the Package Manager Console)  
      
    in order to create the identity server database.
  + In order to change the password policy in the Server project, inside Startup.cs, method ConfigureServices it is possible to add some options for identity service, as follows  
      
    services.AddDefaultIdentity<ApplicationUser>(options =>

{

options.SignIn.RequireConfirmedAccount = false; // true if we want the user to confirm his account via email

// The pasword rules can be changed here

options.Password.RequireDigit = false; // no need for the password to contain numbers

options.Password.RequireLowercase = false; // no need of lowercase characters

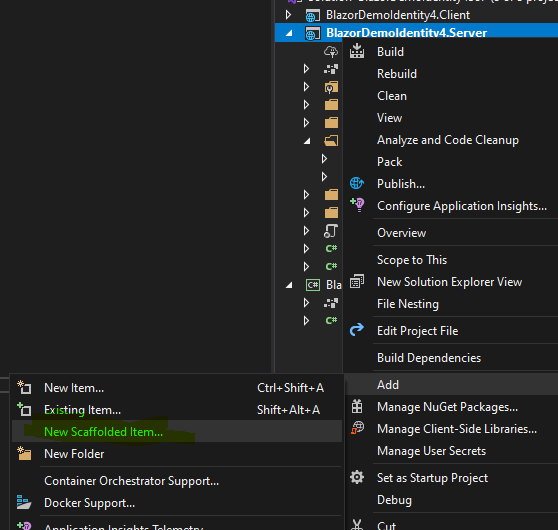
options.Password.RequireUppercase = false; // no need of uppercase characters

options.Password.RequireNonAlphanumeric = false; // no need of non alphanumeric characters (@#?...)

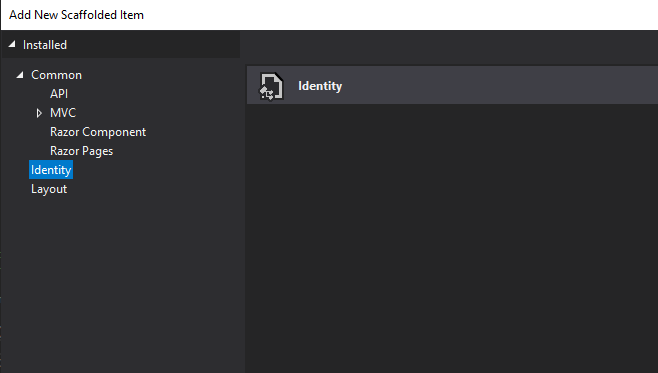
})

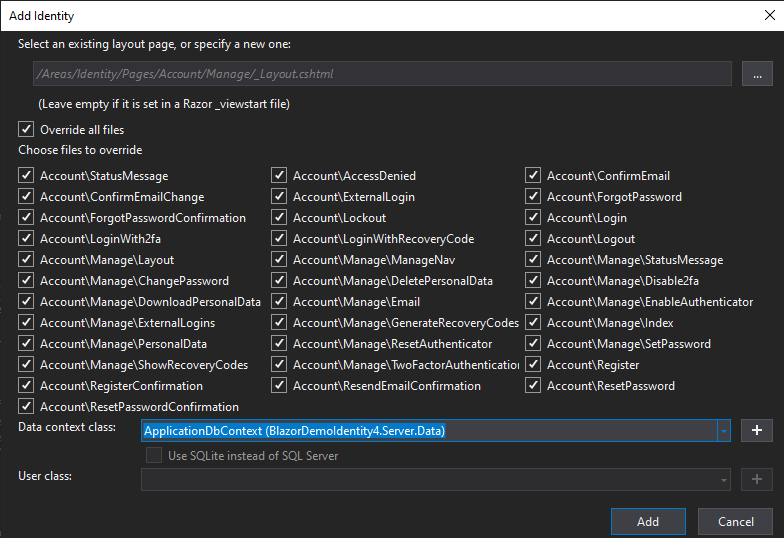
.AddEntityFrameworkStores<ApplicationDbContext>();

* + How modify the Login page or other scaffolded pages  
      
    Right click on the server project and select Add | New Scaffolded item



* + Then select Identity and press Add or double click on Identity item



* + After few seconds it is possible to select a particular layout page or select all the pages, then press Add  
      
    We can find the selected pages under server project folder Areas\Identity\Pages\Account.

In order to make it work, it is **IMPORTANT** to check under the server project, file **\_Layout.cshtml** in folder **Pages\Shared** that the scripts are not required as shown by the following code

. . . .

<body>

<div class="main">

<div class="content px-4">

@RenderBody()

**@RenderSection("Scripts", required: false**) 🡸 **IF THIS LINE IS NOT INCLUDED THEN ERROR**

</div>

</div>

</body>

. . . .

The file **ScaffoldingReadMe.txt** can be deleted either, as we don’t need it anymore.

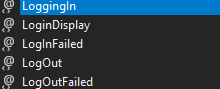
* + After pressing the **Log out button** it is possible to be redirected to any page required, in order to do that we need to perform some change to the file **Authentication.razor** under the Client project, folder Pages, in the following way, adding a RenderFragment under the tag <**RemoteAuthenticatorView** **Action**="@Action" /> therefore we get  
    . . . .  
    <**RemoteAuthenticatorView** **Action**="@Action">

<**LogOutSucceeded**>

**@ On logout succeeded redirect to Home page \*@**

**@{ nm.NavigateTo("/"); }**

</**LogOutSucceeded**>

</**RemoteAuthenticatorView**>  
. . . .  
There are other types of RenderFragment for logging such as  


1. How to add **IdentityServer4** to an existing project.
   * In the **Server** project, perform an update to all the packages, if required, then install the following packages:

Microsoft.AspNetCore.Identity.UI  
Microsoft.VisualStudio.Web.CodeGeneration.Design  
Microsoft.AspNetCore.ApiAuthorization.IdentityServer

* + Open in the Server folder the file **DataContext.cs** (or whatever the name is) and let the class to inherit now from **ApiAuthorizationDbContext**,while for IdentityServer it just was IdentityDbContext

public class DataContext : ApiAuthorizationDbContext<IdentityUser>

as we are using as representation of the user for authentication/authorization the **IdentityUser**.

* + The construct must become as follows

public DataContext(DbContextOptions<DataContext> options,

IOptions<OperationalStoreOptions> operationalStoreOptions

) : base(options, operationalStoreOptions) { }

* + At this point we can add a new migration, therefore under the Server folder, we can run the commanddotnet ef migrations add NewIdentitySystem (or **Add-Migration NewIdentitySystem 🡸** under Package Manager Console)

then, after checking the migration went well, run the command

dotnet ef database update (or **Update-Database 🡸** under Package Manager Console)

* + Then we need to perform some changes to the **Startup.cs** file in the Server project, in method ConfigureServices

// Using Identity Server

//services.AddIdentity<IdentityUser, IdentityRole>()

// .AddEntityFrameworkStores<DataContext>()

// .AddDefaultTokenProviders();

// Using IdentityServer4

**services.AddDefaultIdentity<IdentityUser>(options =>**

**{**

**options.SignIn.RequireConfirmedAccount = false; //Probably true in production**

**})**

**.AddRoles<IdentityRole>()**

**.AddEntityFrameworkStores<DataContext>();**

Then we can comment out the code for JWT token for IdentityServer will take care of that

//JWT token - authentication scheme

//services.AddAuthentication(JwtBearerDefaults.AuthenticationScheme)

// .AddJwtBearer(options =>

// options.TokenValidationParameters = new TokenValidationParameters

// {

// ValidateIssuer = false,

// ValidateAudience = false,

// ValidateLifetime = true,

// ValidateIssuerSigningKey = true,

// IssuerSigningKey = new SymmetricSecurityKey(

// Encoding.UTF8.GetBytes(Configuration["jwt:key"])),

// ClockSkew = TimeSpan.Zero

// });

**services.AddAuthentication()**

**.AddIdentityServerJwt();**

Then in method **Configure**, we need to use the **IdentityServer** therefore we have the following

//Add authentication and authorization for IdentityServer

app.UseAuthentication();

app.UseIdentityServer();

app.UseAuthorization();

* + Then we can delete the **AccountController.cs** file undwer Controllers folder for we don’t need it anymore and we can remove from each **[Authorize]** attribute the reference to the JWT bearer

[Authorize(~~AuthenticationSchemes = JwtBearerDefaults.AuthenticationScheme~~, Roles = "Admin")]

Just becomes

[Authorize(Roles = "Admin")]

In the **appsettings.json** we can remove the item

~~"jwt": {~~

~~"key": "KLASMDKL3M4KLMSDLKM3LKM4KLMSK543643341332S5DA3S5D453"~~

~~}~~

Then we need to add info for the Client is using IdentityServer, therefore we can add the following

. . . .

"IdentityServer": {

"Key": {

"Type": "Development"

},

"Clients": {

"BlazorMovies.Client": {

"Profile": "IdentityServerSPA"

}

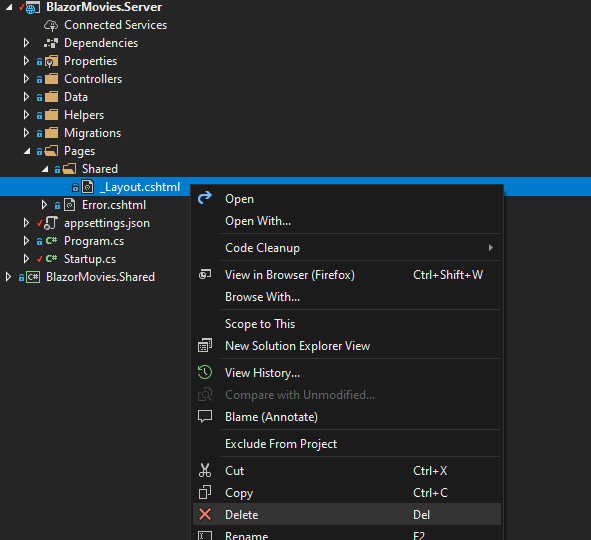
}

}

. . . .

The Client will use the profile called IdentityServerSPA, now we need to configure this profile

In order to do that we need the scaffolding, but first we need to remove the \_Layout.cshtml file from the Server project



After that, we can proceed with the scaffolding as mentioned above.

* + Under the Client project we need to add a script to the **index.html** file under the **wwwroot** Client folderin the following way

. . . .

</div>

<script src="\_content/Microsoft.AspNetCore.Components.WebAssembly.Authentication/AuthenticationService.js">

</script> <script src="\_framework/blazor.webassembly.js"></script>

<script src="https://cdn.jsdelivr.net/npm/sweetalert2@9"></script>

<!-- CUSTOMS JS FILES GOES HERE -->

<script src="js/utilities.js"></script>

. . . .

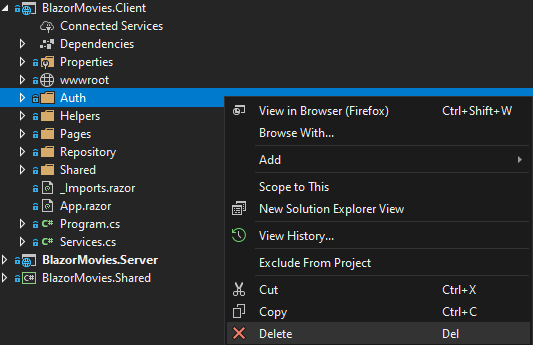
* + Then in the Server project we need to add a new controller under Controllers that we can call **OidcConfigurationController** containing the following code



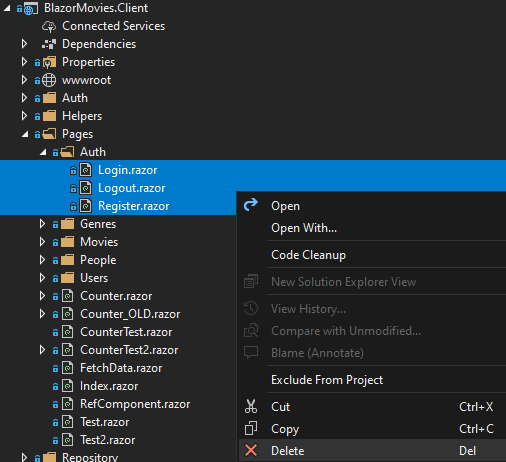
* + Now we need to change the **LoginLink.razor** component in Client\Shared foldcer in order to better manage the **login** and **logout** , the code is as follows



* + We can now remove the Auth folder in the Client project



Then we can delete as well the files under Client\Pages\Auth folder



And add a new component under that folder called **Authentication.razor** with the following code



* + Finally in the Client **Program.cs** we can add some code for the DI system where we can delete the following code

~~services.AddAuthorizationCore(); //Authorization component~~

~~//In JWTAuthenticationStateProvider there is the ILoginService and to use the DI we need to add this code~~

~~//Create an instance of JWTAuthenticationStateProvider~~

~~services.AddScoped<JWTAuthenticationStateProvider>();~~

~~//Use same instance of JWTAuthenticationStateProvider for both AuthenticationStateProvider~~

~~services.AddScoped<AuthenticationStateProvider, JWTAuthenticationStateProvider>(~~

~~provider => provider.GetRequiredService<JWTAuthenticationStateProvider>()~~

~~);~~

~~//And ILoginService~~

~~services.AddScoped<ILoginService, JWTAuthenticationStateProvider>(~~

~~provider => provider.GetRequiredService<JWTAuthenticationStateProvider>()~~

~~);~~

~~//Used to renew the token automatically (if required) as a background task~~

~~services.AddScoped<TokenRenewer>();~~

And add the following line

//IdentityServer4 authorization

**services.AddApiAuthorization();**

* + In order to work with claims we need to add a new Service, call it IdentityProfileService under the Server\Helpers folder with the following code



Then we need to add this service in the Server **Startup.cs** file as follows

services.AddIdentityServer()

.AddApiAuthorization<IdentityUser, DataContext>()

.AddProfileService<IdentityProfileService>();

The highlighted line is important as it is the service required to manage the claims in IdentityServer4.

* + Finally we need a HTTPClient to send the web token to the server, in order to do that we have to install a Nuget package under the **Client** project called

Microsoft.Extensions.Http

Then we need to create two classes under the Client\Helpers folder called

HttpClientWithToken and HttpClientWithoutToken having the code as follows





Then we need to instantiate these services in the Client Program.cs file under the method Main as follows

. . . .

//builder.Services.AddTransient(sp => new HttpClient { BaseAddress = new Uri(builder.HostEnvironment.BaseAddress) });

builder.Services.AddHttpClient<**HttpClientWithToken**>(

client => client.BaseAddress = new Uri(builder.HostEnvironment.BaseAddress))

.AddHttpMessageHandler<BaseAddressAuthorizationMessageHandler>();

builder.Services.AddHttpClient<**HttpClientWithoutToken**>(

client => client.BaseAddress = new Uri(builder.HostEnvironment.BaseAddress));

. . . .

Now in files **HttpService.cs** we want to inject the HTTPClient with token therefore the constructor must become as follows

. . . .

private readonly **HttpClientWithToken** \_httpClient;

. . . . .

public HttpService(**HttpClientWithToken** httpClient)

{

\_httpClient = httpClient;

}

Then we need to change the signature in I**HttpService.cs** for the following two methods

Task<HttpResponseWrapper<T>> Get<T>(string url**, bool includeToken = true**);

Task<HttpResponseWrapper<TResponse>> Post<T, TResponse>(string url, T data**, bool includeToken = true**);

and the following line in **HttpService.cs** for those methods

~~var httpClient = GetHttpClient();~~

must become

var httpClient = GetHttpClient(includeToken);

Then the code for the class must be arranged accordingly (check file in GitHub repository).

Then there is an issue with the mapping from JWT token and Identity token for Admin users (or other roles), in order to fix this we must perform the following changes in Server **Startup.cs** file, adding the highlighted lines

. . . .

using System.IdentityModel.Tokens.Jwt;

. . . .

public Startup(IConfiguration configuration)

{

JwtSecurityTokenHandler.DefaultInboundClaimTypeMap.Clear();

Configuration = configuration;

}

. . . .

In this way we clear the JWT token and the mapping is correct.

Finally IHttpServiceExtensionMethods must be changed to include the new option

public static async Task<T> GetHelper<T>(this IHttpService httpService, string url**, bool includeToken = true**)

public static async Task<PaginatedResponse<T>> GetHelper<T>(this IHttpService httpService, string url, PaginationDTO paginationDTO**, bool includeToken = true**)

and **GenreRepository.cs** and **MovieRepository.cs** accordingly (see solution in GitHub for these two files).

1. We can generate the database script (queries) from one migraton to another using the command

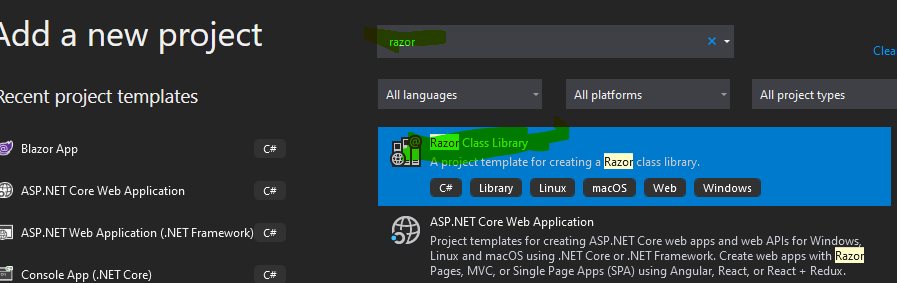
dotnet ef migrations script AdminRole AdminUser

in Package Manager Console it is possible to use the command

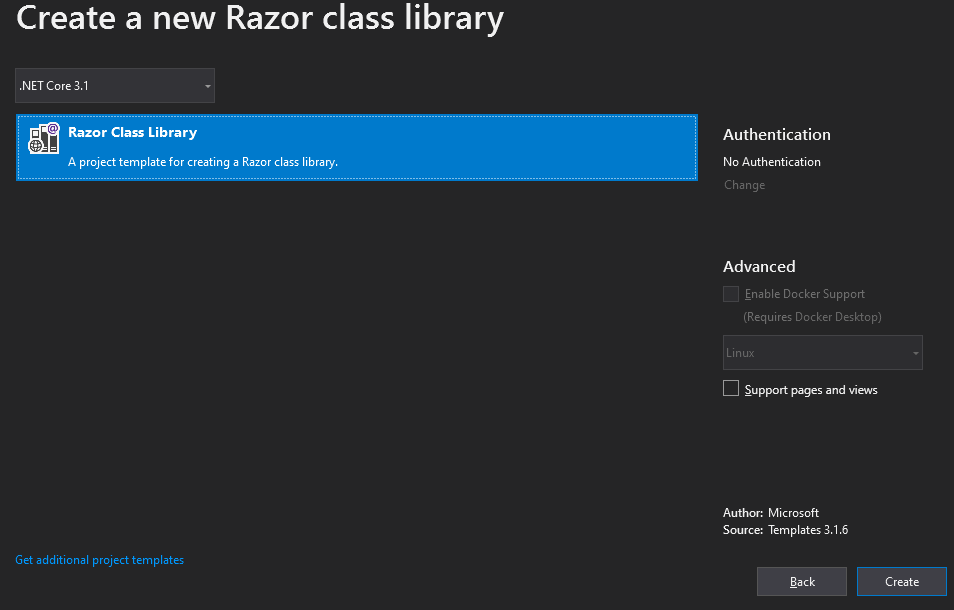
Script-Migration -from AdminRole –to AdminUser

Where AdminRole and AdminUser are migration names.

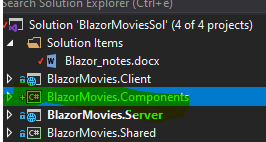
This create a standard SQL database script.

1. Sharing Components using a component library (branch ComponentLibrary)
   * We need to add a new project for a Razor Class Library  
     

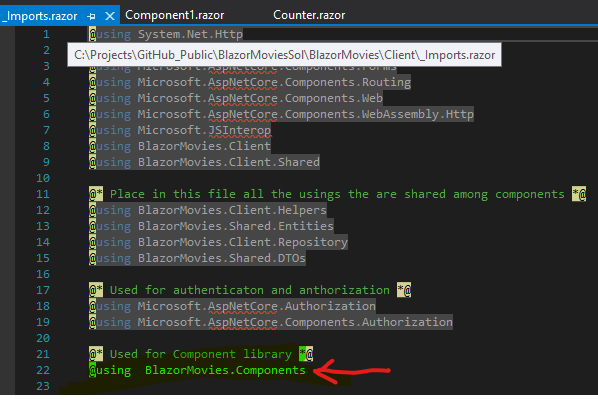
We can call this project **BlazorMovies.Components**. Then on the following screen press Create



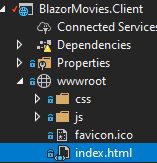
At this point, the structure of our solution will be similar to the following



* + There is a sample component called **Component1.razor** that we can, for instance, share with our client project. In order to do that we need to add a reference of this project to the Client project. In addition it is a good idea to add the reference to the components project in the \_Imports.razor in the Client project, something similar to the following



* + We can use both CSS and javascript files as well from the components project, in order to do that we need to reference the files in the client project, for this reason we have to use the special keyword \_**content** which tells the compiler to check for the resource in another project, in our case the project is called **BlazorMovies.Components**. We add this reference to the **index.html** file under the folder Client\wwwroot



Then we add the reference in the following way

**\_content/<project name>/<css or js file name>**

As shown here

. . . .

<link href="css/app.css" rel="stylesheet" />

<link href="css/custom.css" rel="stylesheet" />

<!-- REFERENCE TO AN EXTERNAL PROJECT - IMPORTANT TO USE THE KEYWORD \_content -->

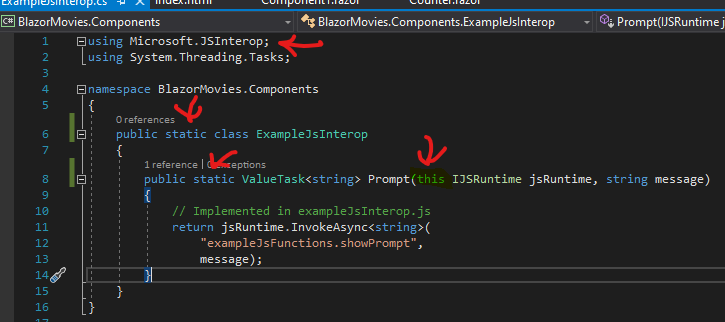
<link href="\_content/BlazorMovies.Components/styles.css" rel="stylesheet" />

. . . .

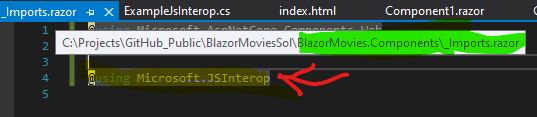
Same for javascript files, the js file reference is called **exampleJsInterop.js**, but before we need to perform some little changes.

We have a class in the components project called ExampleJsInterop.cs and in order to make it work with the current version of Blazor we need to install the following libraries from NuGet

Microsoft.JSInterop

Then we can change the cs file in order to have an extension method as follows  


After performed this operation we need to add the reference in the **\_Imports.razor** file under the components project, this is important, we have the following



. . . .

<script src="js/utilities.js"></script>

<!-- REFERENCE TO AN EXTERNAL PROJECT - IMPORTANT TO USE THE KEYWORD \_content -->

<script src="\_content/BlazorMovies.Components/exampleJsInterop.js"></script>

. . . .

Finally the Component1.razor can become as follows



* + How to use dependency injection in our components library. As a sample we can create the following Interface in the components project, call it IExampleInterface.cs



Now, we can implement the interface inside the components project, but it is better to implement that in our Client project so that we can customize the method according to our needs. We then have to instantiate the class, which implements, we can create a new class in the **Helpers** folder of the **Client project**, call it **ExampleImplementation.cs** in the following way



Then we need to implement the dependency inject to instantiate that class in the **Program.cs** file under the **Client** project

//used to instantiate the ExampleImplementation for the DI

services.AddTransient<IExampleInterface, ExampleImplementation>();

Finally we can use the class in out Component1.razor which will become



The possibility to implement the interface in another project can give us the possibility to implent it both in the Client and Server project, this is what is called **Dual Architecture**.

* + It is possible to share routable components as well, therefore we can create in the components project a routable component, call it **RoutableComponent.razor** with the following sample code



Now if we try to navigate to that component we get an error for we need to register this routable component in the **App.razor** file in the **Client project** in the following way, using the **AddionalAsseblies** parameter

<**Router** **AppAssembly**="@typeof(Program).Assembly"

**AdditionalAssemblies**="new[] { typeof(Component1).Assembly }">  
. . . .

In the array inside the typeof function we can insert any component or class we want to reference, in our case we have only one component Component1, therefore we can just register that.

It is possible to pass a parameter to a routable component using the **CascadingParameter** option as defined in the code above. Then we can use this cascading parameter in our App.razor file wrapping the **Router** tag inside **CascadingValue** tag, as follows

<**CascadingValue** **Value**="7" **Name**="Value">

<**Router** **AppAssembly**="@typeof(Program).Assembly"

**AdditionalAssemblies**="new[] { typeof(Component1).Assembly }">

. . . .

</**Router**>

</**CascadingValue**>

Then we can use this value in any component which references the cascading parameter, such as

Shown in the code above for **RoutableComponent.razor** file. For App.razor we have the following code



1. **Localization**, in order to do that we need to add to the **Client** or Server project project the NuGet package

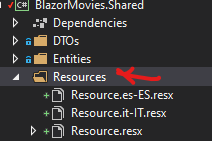
Microsoft.Extensions.Localization

Then in the Client **Program.cs** we add

**services.AddLocalization();**

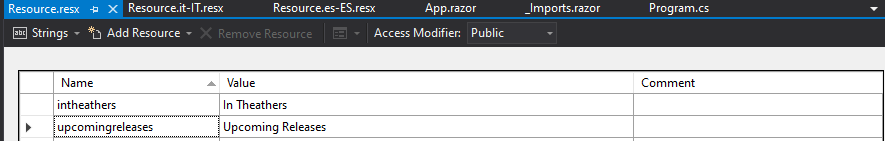
After that we need to create as may resource file as the languages we decide to use.

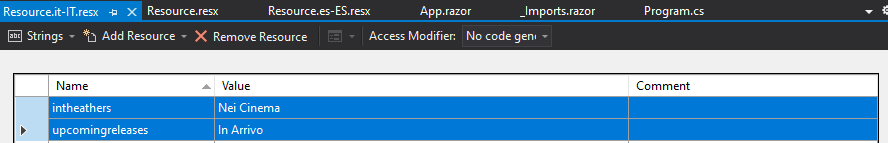
It is a good idea to create a resource file in the Shared project so that it can be available both on the Client and on the Server projects. Therefore we can create in the Shared project a folder called **Resources** where we can add the localizations reuired for our project

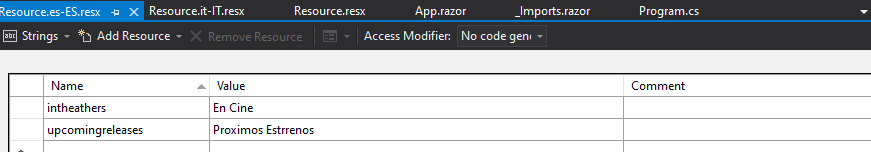


Which represents the localization for en-US (English as default), Italian and Spanish.

Then we can add items to the resource







It is important to set the Access Modifier to Public.

Then we need to add in the \_Imports.razor file under the Client project the reference to the resources, that is

@\* Localization \*@

@using Microsoft.Extensions.Localization

@using BlazorMovies.Shared.Resources

And we can start using the localizer in the following way

. . . .

@\* Used for Localization \*@

@inject IStringLocalizer<Resource> localizer

. . . .

<h3>@localizer["intheathers"]</h3>

. . . .

We can then build a component to let user select his own localization in the following way:

* + First we create a new component in Client\Shared, call it **CultureSelector**, with the following code



* + In the js **Utilities.js** file, under **Client\wwwroot\js** we add the following two functions

function setInLocalStorage(key, value) {

localStorage[key] = value;

}

function getFromLocalStorage(key) {

return localStorage[key];

}

Used to save the current selected culture in the local storage

Then in the Client Program.cs file we can add, under the Main method the following lines  
 //Get the localization from the localStorage, if any

var host = builder.Build();

//Get an instance of the IJSRuntime

var js = host.Services.GetRequiredService<IJSRuntime>();

var culture = await js.InvokeAsync<string>("getFromLocalStorage", "culture");

CultureInfo.DefaultThreadCurrentCulture = CultureInfo.DefaultThreadCurrentUICulture =

null == culture ? new CultureInfo("en-US") : new CultureInfo(culture);

await host.RunAsync();

This helps to get the current culture from the local storage otherwise select the default culture, which in our case is en-US.

* + In case we need there is the possibility to separate the culture from the UI culture, this may be required when we need to localize some text but we want to keep some values in the original format, e.g. currency, prices, dates and so forth. Basically, Culture sets the format of data and UI Culture sets the language to be used, according to the resource files available.

In order to to that we need to wotk with Current Culture, which defines the format for numbers, dates, currency, while the UICulture defines which resource file to use according to our selected culture. In order to do that we need to define a default culture and to do that we need to add some code to the **MainLayour.razor** file in the client project, with the following code

. . . .

@using System.Globalization

. . . .

protected async override Task OnInitializedAsync()

{

//Set the default UICulture to en-US

**CultureInfo.DefaultThreadCurrentCulture = new CultureInfo("en-US");**

. . . .

}

. . . .

Finally in the CultureSelector.razor component we can amend a bit the code to the following

. . . .

//get => CultureInfo.CurrentCulture;

// This uses the default UI culture defined in MayLayout.razor file

**get => CultureInfo.CurrentUICulture;**

. . . .

In this way we have a default UI culture (en-US) for numbers, dates, etc, and the language we want to use, it-IT, es-ES, ru-RU, etc., corresponding to the available resource files. In case we set a culture with a resource file not available, then the default culture is selected, in this case en-US.