Custom JWT Auth System

This document describes the step-by-step process on how the authentication system functions within the market.io Blazor web app.

Step 1: Registration -> Direct Login

Before a user can login, they must already have in account it the database.

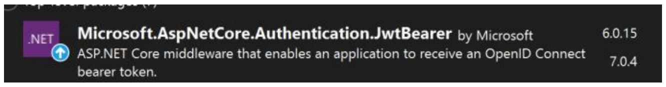
When a user completes the registration form or a user logs in with their credentials, an HTTP request is made. Inside the body of the request, the form data is sent to the web API controller where it runs validation on the user's entered details. If validation is passed, the API will create the user inside of the database (if the user initially registered). Once registered, the user will be logged in automatically upon registration (login explained in next step)

Step 2: Login and Token Generation

When a user logs in, a token is generated in the web API then stored in the browser's session and cookie variables.

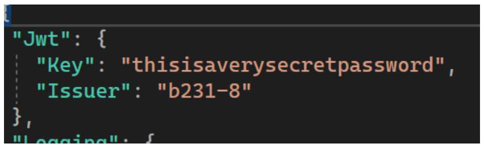
The ASP.NET Core Web API is configured with JWT Token generation, this is how it was setup:

1. ASP.NET Core JWT Bearer package was installed



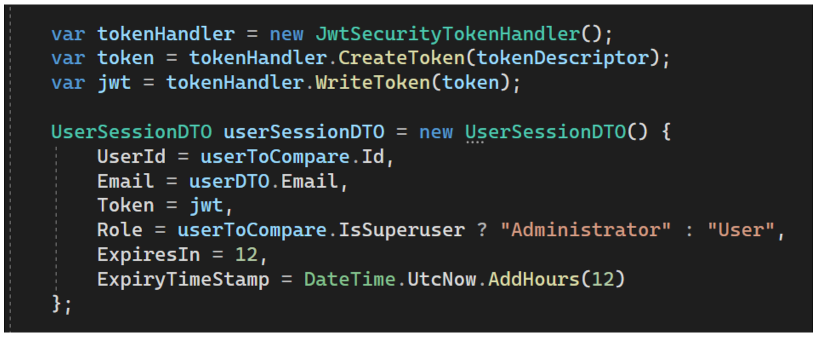
Microsoft.AspNetCore.Authentication.JwtBearer by Microsoft — 6.0.15 / 7.0.4
ASP.NET Core middleware that enables an application to receive an OpenID Connect bearer token.

2. Secret key and issuer key was added to appSettings.JSON file



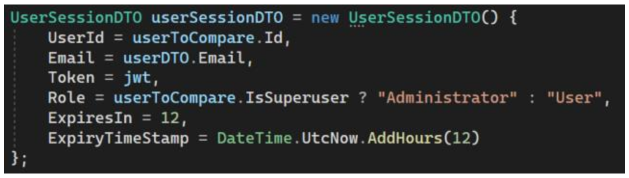
```
{
"Jwt": {
  "Key": "thisisaverysecretpassword",
  "Issuer": "b231-8"
},
```

3. The login POST request handler method generates a json web token and embeds it into a token object (called UserSessionDTO) if the login credentials are valid



```
var tokenHandler = new JwtSecurityTokenHandler();
var token = tokenHandler.CreateToken(tokenDescriptor);
var jwt = tokenHandler.WriteToken(token);

UserSessionDTO userSessionDTO = new UserSessionDTO() {
    UserId = userToCompare.Id,
    Email = userDTO.Email,
    Token = jwt,
    Role = userToCompare.IsSuperuser ? "Administrator" : "User",
    ExpiresIn = 12,
    ExpiryTimeStamp = DateTime.UtcNow.AddHours(12)
};
```

4. The UserSessionDTO object contains details about the session token including the user's ID, email, role, token age, and the JWT that was just created.
   This object is then sent back as an HTTP response.



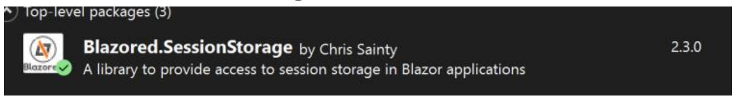
```
UserSessionDTO userSessionDTO = new UserSessionDTO() {
    UserId = userToCompare.Id,
    Email = userDTO.Email,
    Token = jwt,
    Role = userToCompare.IsSuperuser ? "Administrator" : "User",
    ExpiresIn = 12,
    ExpiryTimeStamp = DateTime.UtcNow.AddHours(12)
};
```

5. From there, the client app will receive the user session object and set it as a cookie / session variable inside of the user's browser. (Explained in next step)

Step 3: How the Client Handles the Token Object Upon Login

2 Methods are used for JWT storage (Session and Cookie)

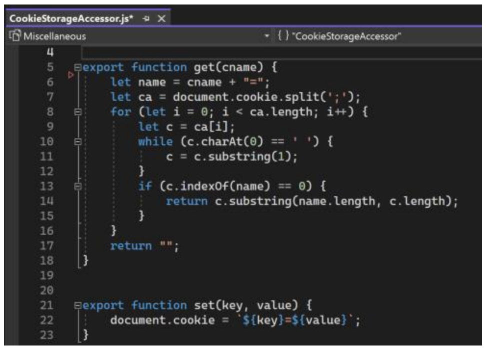
1. Blazored.SessionStorage



Top-level packages (3)

Blazored.SessionStorage by Chris Sainty 2.3.0
A library to provide access to session storage in Blazor applications

2. Javascript code for cookie logic to get and set token in browser cookie store

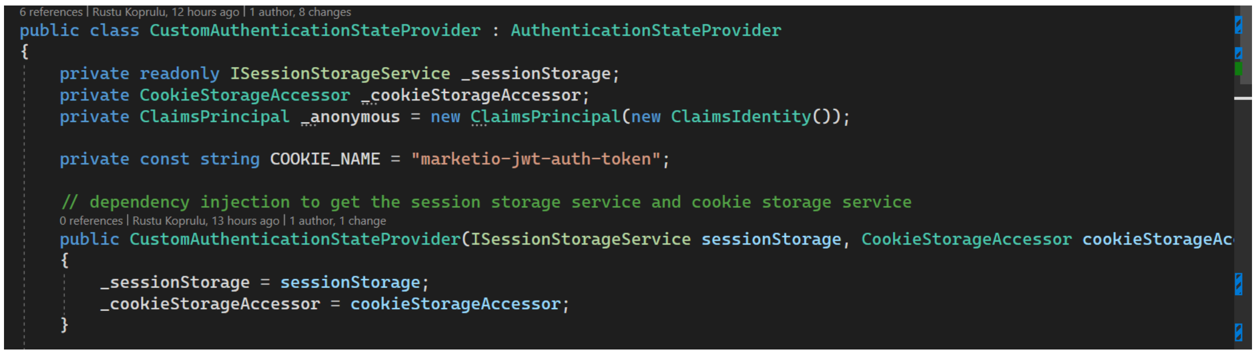


CookieStorageAccessor.js*

Miscellaneous | { } "CookieStorageAccessor"

```
export function get(cname) {
    let name = cname + "=";
    let ca = document.cookie.split(';');
    for (let i = 0; i < ca.length; i++) {
        let c = ca[i];
        while (c.charAt(0) == ' ') {
            c = c.substring(1);
        }
        if (c.indexOf(name) == 0) {
            return c.substring(name.length, c.length);
        }
    }
    return "";
}


export function set(key, value) {
    document.cookie = `${key}=${value}`;
}
```

These two methods are responsible for storing the token locally, there is a class that manages authentication and authorization throughout the app.



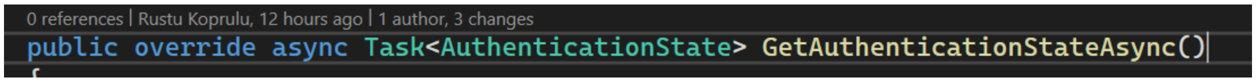
```
6 references | Rustu Koprulu, 12 hours ago | 1 author, 8 changes
public class CustomAuthenticationStateProvider : AuthenticationStateProvider
{
    private readonly ISessionStorageService _sessionStorage;
    private CookieStorageAccessor _cookieStorageAccessor;
    private ClaimsPrincipal _anonymous = new ClaimsPrincipal(new ClaimsIdentity());

    private const string COOKIE_NAME = "marketio-jwt-auth-token";

    // dependency injection to get the session storage service and cookie storage service
    0 references | Rustu Koprulu, 13 hours ago | 1 author, 1 change
    public CustomAuthenticationStateProvider(ISessionStorageService sessionStorage, CookieStorageAccessor cookieStorageAc
    {
        _sessionStorage = sessionStorage;
        _cookieStorageAccessor = cookieStorageAccessor;
    }
```

Quick notes:

- The class uses dependency injection to initialize the session and cookie storage helpers (ISessionStorageService from BlazoredStorage package, and CookieStorageAccessor which can call the JS function using C# - JavaScript runtime)
- ClaimsPrincipal is used to set the authentication state which is an ASP.NET built in system
- The _anonymous object you see above is simply set when there is no token available (giving the user the un-authenticated state where they are not logged in)

This class inherits from 'AuthenticationStateProvider' which is an ASP.NET class that handles authentication and authorization in the background.

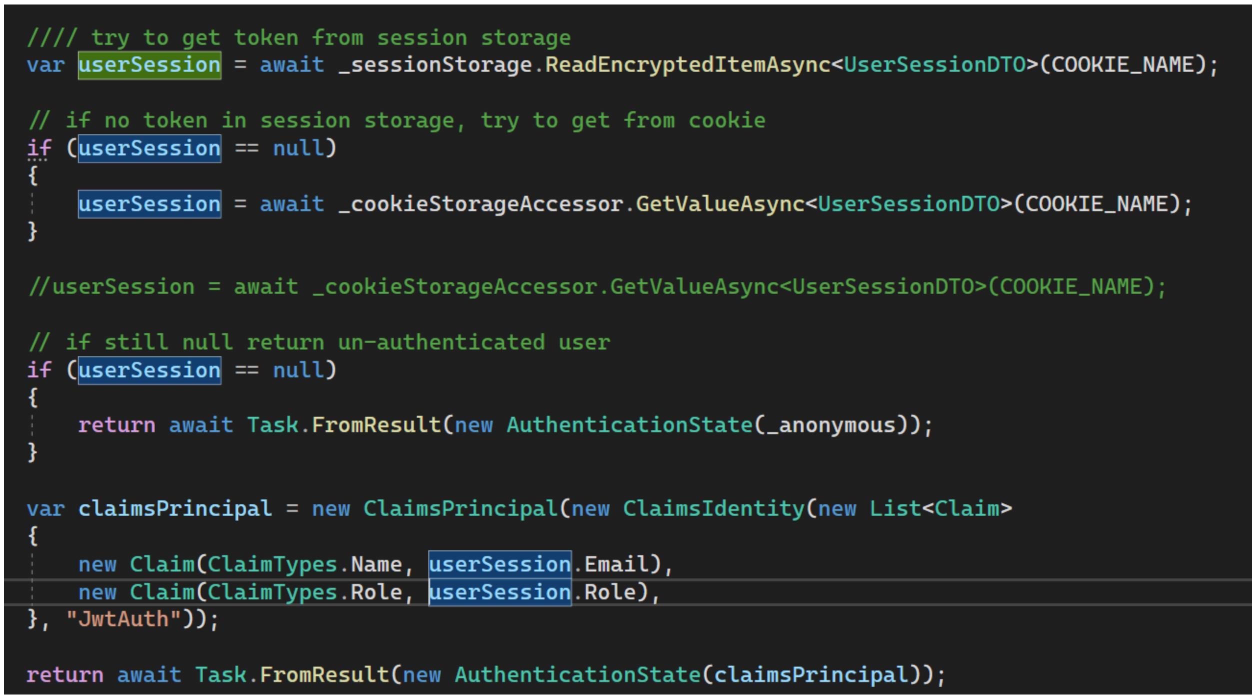
Because I am inheriting from this class, I can override the 'GetAuthenticationStateAsync()'



```
0 references | Rustu Koprulu, 12 hours ago | 1 author, 3 changes
public override async Task<AuthenticationState> GetAuthenticationStateAsync()
```

This method is automatically called before a user starts the Blazor site in their browser and returns an authentication state to the client app.

What my implementation is, is I am reading the token object from my cookie and session storage then setting the auth state using the data in the token object.

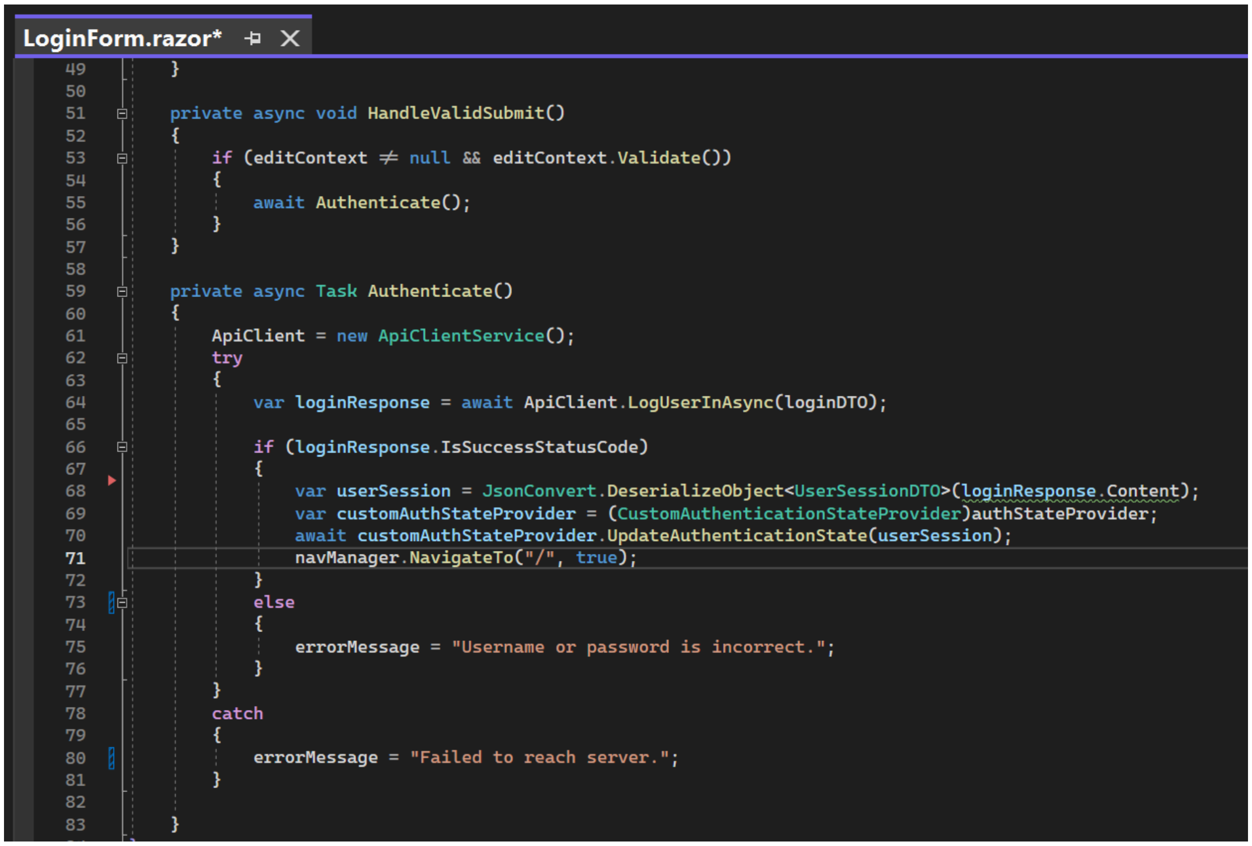


```
//// try to get token from session storage
var userSession = await _sessionStorage.ReadEncryptedItemAsync<UserSessionDTO>(COOKIE_NAME);

// if no token in session storage, try to get from cookie
if (userSession == null)
{
    userSession = await _cookieStorageAccessor.GetValueAsync<UserSessionDTO>(COOKIE_NAME);
}

//userSession = await _cookieStorageAccessor.GetValueAsync<UserSessionDTO>(COOKIE_NAME);

// if still null return un-authenticated user
if (userSession == null)
{
    return await Task.FromResult(new AuthenticationState(_anonymous));
}

var claimsPrincipal = new ClaimsPrincipal(new ClaimsIdentity(new List<Claim>
{
    new Claim(ClaimTypes.Name, userSession.Email),
    new Claim(ClaimTypes.Role, userSession.Role),
}, "JwtAuth"));

return await Task.FromResult(new AuthenticationState(claimsPrincipal));
```

If a valid token is found, create a claim and set that that as the authentication state for the app. If not, the '_anonymous' user object is used.

Examples: How This is Used Inside the App

Example 1: Logging the user in:

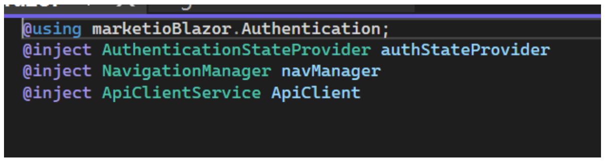


LoginForm.razor*

```
}

private async void HandleValidSubmit()
{
    if (editContext != null && editContext.Validate())
    {
        await Authenticate();
    }
}

private async Task Authenticate()
{
    ApiClient = new ApiClientService();
    try
    {
        var loginResponse = await ApiClient.LogUserInAsync(loginDTO);

        if (loginResponse.IsSuccessStatusCode)
        {
            var userSession = JsonConvert.DeserializeObject<UserSessionDTO>(loginResponse.Content);
            var customAuthStateProvider = (CustomAuthenticationStateProvider)authStateProvider;
            await customAuthStateProvider.UpdateAuthenticationState(userSession);
            navManager.NavigateTo("/", true);
        }
        else
        {
            errorMessage = "Username or password is incorrect.";
        }
    }
    catch
    {
        errorMessage = "Failed to reach server.";
    }

}
```

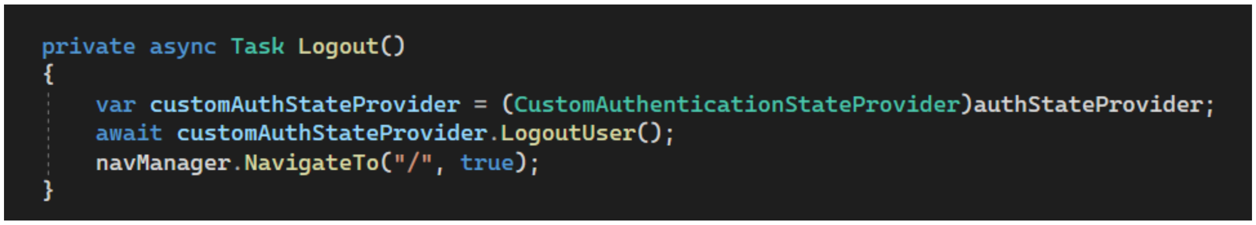
1. When email + password is submitted, send a request to Login POST handler in API
2. Receive the UserSessionDTO object from API
3. Update the Auth state with UserSessionDTO object

Note: Make sure the following are injected into your razor component to use them



```
@using marketioBlazor.Authentication;
@inject AuthenticationStateProvider authStateProvider
@inject NavigationManager navManager
@inject ApiClientService ApiClient
```

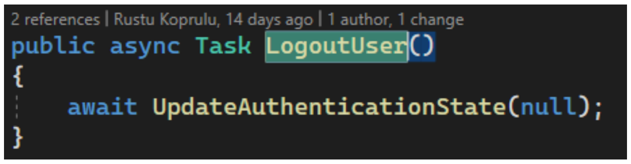
Example 2: Logging the user out



```
private async Task Logout()
{
    var customAuthStateProvider = (CustomAuthenticationStateProvider)authStateProvider;
    await customAuthStateProvider.LogoutUser();
    navManager.NavigateTo("/", true);
}
```

- This method clears the JWT token and returns the user to the landing page

Closer look at LogoutUser() method:

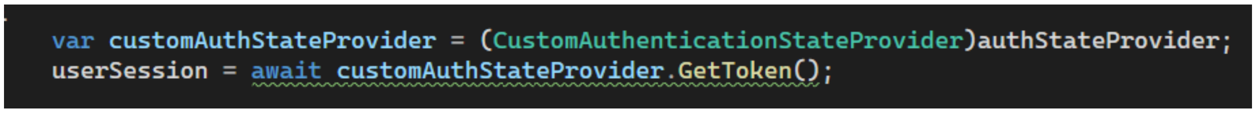


```
2 references | Rustu Koprulu, 14 days ago | 1 author, 1 change
public async Task LogoutUser()
{
    await UpdateAuthenticationState(null);
}
```

- This simply passes in a null auth state which will automatically assign the _anonymous Object if you recall from step 3.

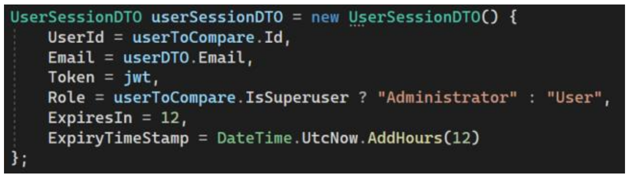
Example 3: Getting the Users session object

If you want to access the session object (maybe to compare User Id, or email with other API data) here is how you do that:



```
var customAuthStateProvider = (CustomAuthenticationStateProvider)authStateProvider;
userSession = await customAuthStateProvider.GetToken();
```

This is the object that gets returned from GetToken() method:



```
UserSessionDTO userSessionDTO = new UserSessionDTO() {
    UserId = userToCompare.Id,
    Email = userDTO.Email,
    Token = jwt,
    Role = userToCompare.IsSuperuser ? "Administrator" : "User",
    ExpiresIn = 12,
    ExpiryTimeStamp = DateTime.UtcNow.AddHours(12)
};
```