Secure a backend web API

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In this article

Sample code

The Tailspin Surveys application uses a backend web API to manage CRUD operations on surveys. For example, when a user clicks "My Surveys", the web application sends an HTTP request to the web API:

```
HTTP
GET /users/{userId}/surveys
```

The web API returns a JSON object:

```
HTTP
{
  "Published":[],
  "Own":[
    {"Id":1,"Title":"Survey 1"},
    {"Id":3,"Title":"Survey 3"},
    ],
  "Contribute": [{"Id":8,"Title":"My survey"}]
}
```

The web API does not allow anonymous requests, so the web app must authenticate itself using OAuth 2 bearer tokens.

> **Note**
>
> This is a server-to-server scenario. The application does not make any AJAX calls to the API from the browser client.

There are two main approaches you can take:

- Delegated user identity. The web application authenticates with the user's identity.
- Application identity. The web application authenticates with its client ID, using OAuth 2 client credential flow.

The Tailspin application implements delegated user identity. Here are the main differences:

Delegated user identity:

- The bearer token sent to the web API contains the user identity.
- The web API makes authorization decisions based on the user identity.

- The web application needs to handle 403 (Forbidden) errors from the web API, if the user is not authorized to perform an action.
- Typically, the web application still makes some authorization decisions that affect UI, such as showing or hiding UI elements).
- The web API can potentially be used by untrusted clients, such as a JavaScript application or a native client application.

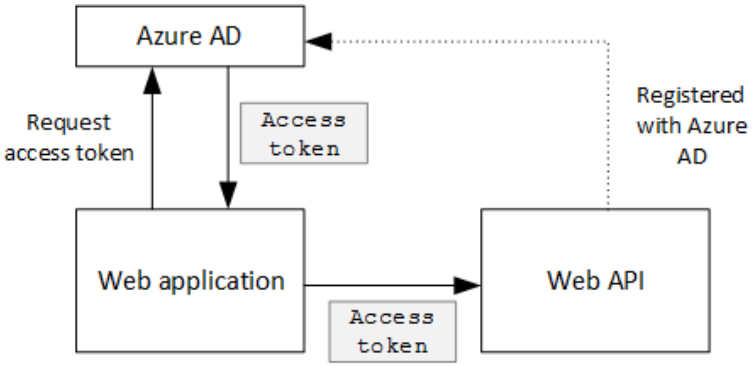
Application identity:

- The web API does not get information about the user.
- The web API cannot perform any authorization based on the user identity. All authorization decisions are made by the web application.
- The web API cannot be used by an untrusted client (JavaScript or native client application).
- This approach may be somewhat simpler to implement, because there is no authorization logic in the Web API.

In either approach, the web application must get an access token, which is the credential needed to call the web API.

- For delegated user identity, the token has to come from the IDP, which can issue a token on behalf of the user.
- For client credentials, an application might get the token from the IDP or host its own token server. (But don't write a token server from scratch; use a well-tested framework like IdentityServer4.) If you authenticate with Azure AD, it's strongly recommended to get the access token from Azure AD, even with client credential flow.

The rest of this article assumes the application is authenticating with Azure AD.



Register the web API in Azure AD

In order for Azure AD to issue a bearer token for the web API, you need to configure some things in Azure AD.

1. Register the web API in Azure AD.

2. Add the client ID of the web app to the web API application manifest, in the `knownClientApplications` property. See Update the application manifests.

3. Give the web application permission to call the web API. In the Azure Management Portal, you can set two types of permissions: "Application Permissions" for application identity (client credential flow), or "Delegated Permissions" for delegated user identity.

API	APPLICATION PERMI...	DELEGATED PERMISS...
Surveys.WebAPI	0	1
Windows Azure Active Directory	0	1

Getting an access token

Before calling the web API, the web application gets an access token from Azure AD. In a .NET application, use the Azure AD Authentication Library (ADAL) for .NET.

In the OAuth 2 authorization code flow, the application exchanges an authorization code for an access token. The following code uses ADAL to get the access token. This code is called during the `AuthorizationCodeReceived` event.

C# Copy

```
// The OpenID Connect middleware sends this event when it gets the authorization code.
public override async Task AuthorizationCodeReceived(AuthorizationCodeReceivedContext context)
{
    string authorizationCode = context.ProtocolMessage.Code;
    string authority = "https://login.microsoftonline.com/" + tenantID
    string resourceID = "https://tailspin.onmicrosoft.com/surveys.webapi" // App ID URI
    ClientCredential credential = new ClientCredential(clientId, clientSecret);

    AuthenticationContext authContext = new AuthenticationContext(authority, tokenCache);
    AuthenticationResult authResult = await authContext.AcquireTokenByAuthorizationCodeAsync(
        authorizationCode, new Uri(redirectUri), credential, resourceID);

    // If successful, the token is in authResult.AccessToken
}
```

Here are the various parameters that are needed:

- `authority`. Derived from the tenant ID of the signed in user. (Not the tenant ID of the SaaS provider)
- `authorizationCode`. the auth code that you got back from the IDP.
- `clientId`. The web application's client ID.
- `clientSecret`. The web application's client secret.
- `redirectUri`. The redirect URI that you set for OpenID Connect. This is where the IDP calls back with the token.
- `resourceID`. The App ID URI of the web API, which you created when you registered the web API in Azure AD
- `tokenCache`. An object that caches the access tokens. See Token caching.

If `AcquireTokenByAuthorizationCodeAsync` succeeds, ADAL caches the token. Later, you can get the token from the cache by calling AcquireTokenSilentAsync:

C# Copy

```
AuthenticationContext authContext = new AuthenticationContext(authority, tokenCache);
var result = await authContext.AcquireTokenSilentAsync(resourceID, credential, new UserIdenti-
fier(userId, UserIdentifierType.UniqueId));
```

where `userId` is the user's object ID, which is found in the `http://schemas.microsoft.com/identity/claims/objectidentifier` claim.

Using the access token to call the web API

Once you have the token, send it in the Authorization header of the HTTP requests to the web API.

HTTP Copy

```
Authorization: Bearer xxxxxxxxxx
```

The following extension method from the Surveys application sets the Authorization header on an HTTP request, using the **HttpClient** class.

C# Copy

```
public static async Task<HttpResponseMessage> SendRequestWithBearerTokenAsync(this HttpClient
httpClient, HttpMethod method, string path, object requestBody, string accessToken, Cancella-
tionToken ct)
{
    var request = new HttpRequestMessage(method, path);
    if (requestBody != null)
    {
        var json = JsonConvert.SerializeObject(requestBody, Formatting.None);
        var content = new StringContent(json, Encoding.UTF8, "application/json");
        request.Content = content;
    }

    request.Headers.Authorization = new AuthenticationHeaderValue("Bearer", accessToken);
    request.Headers.Accept.Add(new MediaTypeWithQualityHeaderValue("application/json"));

    var response = await httpClient.SendAsync(request, ct);
    return response;
}
```

Authenticating in the web API

The web API has to authenticate the bearer token. In ASP.NET Core, you can use the Microsoft.AspNet.Authentication.JwtBearer package. This package provides middleware that enables the application to receive OpenID Connect bearer tokens.

Register the middleware in your web API `Startup` class.

C# Copy

```
public void Configure(IApplicationBuilder app, IHostingEnvironment env, ApplicationDbContext
dbContext, ILoggerFactory loggerFactory)
{
    // ...

    app.UseJwtBearerAuthentication(new JwtBearerOptions {
        Audience = configOptions.AzureAd.WebApiResourceId,
        Authority = Constants.AuthEndpointPrefix,
        TokenValidationParameters = new TokenValidationParameters {
            ValidateIssuer = false
        },
        Events= new SurveysJwtBearerEvents(loggerFactory.CreateLogger<SurveysJwtBearerEvents>
())
    });
```

```
    // ...
}
```

- **Audience**. Set this to the App ID URL for the web API, which you created when you registered the web API with Azure AD.
- **Authority**. For a multitenant application, set this to `https://login.microsoftonline.com/common/`.
- **TokenValidationParameters**. For a multitenant application, set **ValidateIssuer** to false. That means the application will validate the issuer.
- **Events** is a class that derives from **JwtBearerEvents**.

Issuer validation

Validate the token issuer in the **JwtBearerEvents.TokenValidated** event. The issuer is sent in the "iss" claim.

In the Surveys application, the web API doesn't handle tenant sign-up. Therefore, it just checks if the issuer is already in the application database. If not, it throws an exception, which causes authentication to fail.

C# Copy

```
public override async Task TokenValidated(TokenValidatedContext context)
{
    var principal = context.Ticket.Principal;
    var tenantManager = context.HttpContext.RequestServices.GetService<TenantManager>();
    var userManager = context.HttpContext.RequestServices.GetService<UserManager>();
    var issuerValue = principal.GetIssuerValue();
    var tenant = await tenantManager.FindByIssuerValueAsync(issuerValue);

    if (tenant == null)
    {
        // The caller was not from a trusted issuer. Throw to block the authentication flow.
        throw new SecurityTokenValidationException();
    }

    var identity = principal.Identities.First();

    // Add new claim for survey_userid
    var registeredUser = await userManager.FindByObjectIdentifier(principal.GetObjectIdenti-
fierValue());
    identity.AddClaim(new Claim(SurveyClaimTypes.SurveyUserIdClaimType, registeredUser.Id.To-
String()));
    identity.AddClaim(new Claim(SurveyClaimTypes.SurveyTenantIdClaimType, registeredUser.Tenan-
tId.ToString()));

    // Add new claim for Email
    var email = principal.FindFirst(ClaimTypes.Upn)?.Value;
    if (!string.IsNullOrWhiteSpace(email))
    {
        identity.AddClaim(new Claim(ClaimTypes.Email, email));
    }
}
```

As this example shows, you can also use the **TokenValidated** event to modify the claims. Remember that the claims come directly from Azure AD. If the web application modifies the claims that it gets, those changes won't show up in the bearer token that the web API receives. For more information, see Claims transformations.

Authorization

For a general discussion of authorization, see Role-based and resource-based authorization.

The JwtBearer middleware handles the authorization responses. For example, to restrict a controller action to authenticated users, use the **[Authorize]** attribute and specify **JwtBearerDefaults.AuthenticationScheme** as the

authentication scheme:

C# Copy

```
[Authorize(ActiveAuthenticationSchemes = JwtBearerDefaults.AuthenticationScheme)]
```

This returns a 401 status code if the user is not authenticated.

To restrict a controller action by authorizaton policy, specify the policy name in the **[Authorize]** attribute:

C# Copy

```
[Authorize(Policy = PolicyNames.RequireSurveyCreator)]
```

This returns a 401 status code if the user is not authenticated, and 403 if the user is authenticated but not authorized. Register the policy on startup:

C# Copy

```
public void ConfigureServices(IServiceCollection services)
{
    services.AddAuthorization(options =>
    {
        options.AddPolicy(PolicyNames.RequireSurveyCreator,
            policy =>
            {
                policy.AddRequirements(new SurveyCreatorRequirement());
                policy.RequireAuthenticatedUser(); // Adds DenyAnonymousAuthorizationRequire-
ment
                policy.AddAuthenticationSchemes(JwtBearerDefaults.AuthenticationScheme);
            });
        options.AddPolicy(PolicyNames.RequireSurveyAdmin,
            policy =>
            {
                policy.AddRequirements(new SurveyAdminRequirement());
                policy.RequireAuthenticatedUser(); // Adds DenyAnonymousAuthorizationRequire-
ment
                policy.AddAuthenticationSchemes(JwtBearerDefaults.AuthenticationScheme);
            });
    });

    // ...
}
```

Next