ADVANCED API

Documentation

Abstract

In this module I learned advanced concept of API development in ASP.NET

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ACTION RESULT

1.1 INTRODUCTION

- We have four types of result which is possible to return in ASP.NET web API.
  - HttpResponseMessage
  - IHttpActionResult
  - Void
  - Any type of entity

1.2 VOID:

- Void means our action return nothing.

Example:

```
[HttpGet]
public void Ok()
{
    // code...
}
```

1.3 ENTITY:

- In this case our action return some entity in type of object which should be like, int, string, Product.

Example:

```
[HttpGet]
public List<Product> Ok()
{
    List<Product> products = new List<Product>();
    return products;
}
```

1.4 HTTPRESPONSEMESSAGE

- HttpResponseMessage represents HTTP Response Message as per MSDN definition.
- If the return type of the action method is one of the Web API's action results, then the API converts the return value to a HTTP Response Message.

- This action result gives us more flexibility to create our own custom message using it's properties.

Example:

```
[HttpGet]
public HttpResponseMessage Ok()
{
    return new HttpResponseMessage()
    {
        Content = new StringContent("This is content"),
        StatusCode = HttpStatusCode.OK, // 200
        RequestMessage = new HttpRequestMessage(HttpMethod.Get, "request
uri")
    };
}
```

1.5 IHttpActionResult

- The IHttpActionResult action result was introduced in Web API 2.
- It also returns the HttpResponseMessage. But the code we write to send the HTTP Response Message will be reduced with this interface.
- The preceding code returns the HTTP Response message as 200 Ok Status Code.
- As per IHttpActionResult's definition in the ASP.Net/Web API, it acts like a factory for HttpResponseMessage and comes with built-in responses, like Ok, BadRequest, NotFound, Unauthorized, Exception, Conflict and Redirect.

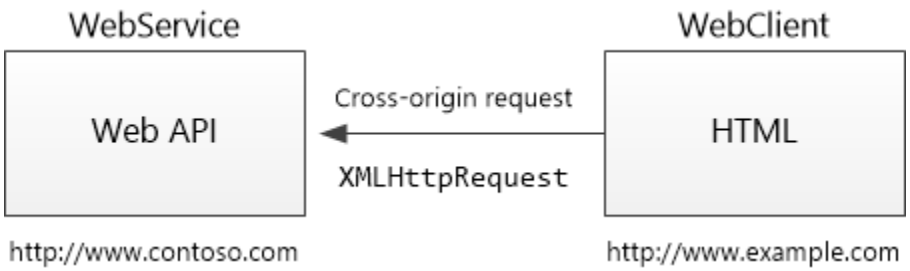
Example:

```
[HttpGet]
public IHttpActionResult Ok()
{
    return Ok("This is Content");
}
```

CORS

2.1 INTRODUCTION:

- When we use web API and frontend on different origins at that time CORS come in picture.
- CORS means cross origin resource sharing.
- For security reason browser restrict the cross origin requests.
- CORS allows us to access cross origin resource.



- Here is the example of same origin,
  - http://example.com/foo.html
  - http://example.com/bar.html
- Here is the example of cross origin,
  - http://example.net - Different domain
  - http://example.com:9000/foo.html - Different port
  - https://example.com/foo.html - Different scheme
  - http://www.example.com/foo.html - Different subdomain

2.2 ENABLE CORS

- We can enable CORS using “Microsoft.AspNet.WebApi.Cors” package.
- We can configure CORS using EnableCorsAttribute at action level, controller level and global level.
- We have four properties in for CORS.

Origins:

- Here, we need to set Origins which means from which domain the requests will accept.
- If we have more than one domain, then you can set as comma separated.
- Additionally, if you want any domain request to be accepted then use wild card as "*".

Request Headers:

- The Request header parameter specifies which Request headers are allowed.
- To allow any header set value to "*".

HTTP Methods:

- The methods property specifies which HTTP methods are allowed to access the resource.
- We can use comma-separated values when you have multiple HTTP methods like "get, put, post".
- When we want to allow all HTTP methods, then we should use the wildcard value "*".

Exposed Headers:

- By default, the browser does not expose all of the response headers to the application.
- Which mean browser only give access to client these headers which is exist in default set like, Cache-Control, Content-Language, Content-Type, Expires, Last-Modified, Pragma.
- Which means if we add any custom header in response then it don't accessed by client.
- So exposed header should help us to accessed our custom header by client which requested from cross origin.

2.2.1 Action Level:

- Here we use EnableCors attribute on action method.
- Action level configuration override configuration of controller level as well as global level configuration.

Example:

```
public HttpResponseMessage Get(int id, string name)
{
    HttpContext.Current.Response.Headers.Add("X-Id", id.ToString());
    HttpContext.Current.Response.Headers.Add("X-Name", name);
    return new HttpResponseMessage()
    {
        Content = new StringContent(JsonConvert.SerializeObject(new
{id,name})),
        StatusCode = HttpStatusCode.OK
    };
}
```

2.2.2 Controller Level:

- Here we use EnableCors attribute on controller, so it applied all the method of controller.

- Controller level configuration override global level configuration.

Example:

```
[EnableCors(origins: "www.something1.com, www.somthing2.com", headers: "X-
Header1, X-Header2", methods: "GET,PUT,POST,DELETE", exposedHeaders: "X-
Id,X-Name")]
public class HomeController : ApiController
{
    [HttpGet]
    public HttpResponseMessage Get(int id, string name)
    {
        HttpContext.Current.Response.Headers.Add("X-Id", id.ToString());
        HttpContext.Current.Response.Headers.Add("X-Name", name);
        return new HttpResponseMessage()
        {
            Content = new StringContent(JsonConvert.SerializeObject(new {
id, name })),
            StatusCode = HttpStatusCode.OK
        };
    }

    [HttpPost]
    public HttpResponseMessage Set(int id, string name)
    {
        HttpContext.Current.Response.Headers.Add("X-Id", id.ToString());
        HttpContext.Current.Response.Headers.Add("X-Name", name);
        return new HttpResponseMessage()
        {
            Content = new StringContent(JsonConvert.SerializeObject(new {
id, name })),
            StatusCode = HttpStatusCode.OK
        };
    }
}
```

2.2.3 Global Level:

- Here we configure COES in WebConfig.cs file.
- This configuration applied on whole application.

Example:

```
using System.Web.Http;
using System.Web.Http.Cors;
```

Advanced API

```
namespace CORSLearn
{
    public static class WebApiConfig
    {
        public static void Register(HttpConfiguration config)
        {
            // Web API configuration and services

            // CORS configuration
            EnableCorsAttribute cors = new EnableCorsAttribute("*", "*",
"*", "X-Id, X-Name");
            config.EnableCors(cors);

            // Web API routes
            config.MapHttpAttributeRoutes();

            config.Routes.MapHttpRoute(
                name: "DefaultApi",
                routeTemplate: "api/{controller}/{action}/{id}",
                defaults: new { id = RouteParameter.Optional }
            );
        }
    }
}
```

FILTERS

3.1 INTRODUCTION:

- Web API includes filters to add extra logic before or after action method executes.
- Filters can be used to provide cross-cutting features such as logging, exception handling, performance measurement, authentication and authorization.
- Filters are actually attributes that can be applied on the Web API controller or one or more action methods.
- Every filter attribute class must implement IFilter interface included in System.Web.Http.Filters namespace.
- However, System.Web.Http.Filters includes other interfaces and classes that can be used to create filter for specific purpose.
- We have different types of filter,

Filter Type	Interface	Class	Description
Simple Filter	IFilter	-	Defines the methods that are used in a filter
Action Filter	IActionFilter	ActionFilterAttribute	Used to add extra logic before or after action methods execute.
Authentication Filter	IAuthenticationFilter	-	Used to force users or clients to be authenticated before action methods execute.
Authorization Filter	IAuthorizationFilter	AuthorizationFilterAttribute	Used to restrict access to action methods to specific users or groups.
Exception Filter	IExceptionFilter	ExceptionFilterAttribute	Used to handle all unhandled exception in Web API.
Override Filter	IOverrideFilter	-	Used to customize the behaviour of other filter for individual action method.

- All filters have two types of methods,
  - OnExecuting – which called before task
  - OnExecuted – which called after task

HTTP CACHING

4.1 INTRODUCTION

- In ASP.NET Web API, HTTP caching is a technique used to improve performance and reduce network traffic by storing and reusing previously retrieved HTTP responses.
- It allows clients (such as web browsers or other API consumers) to cache the responses of API requests and use them for subsequent requests instead of making a new request to the server.
- HTTP caching is based on the cache-related headers defined in the HTTP protocol.
- Here are some commonly used cache-related headers:

Cache-Control:

- This header specifies caching directives for both the client and intermediary caching servers.
- It can include directives like "public" (indicating that the response can be cached by any client), "private" (indicating that the response is specific to a particular client), "max-age" (indicating the maximum time the response can be cached), and more.

Expires:

- This header specifies an expiration date and time after which the response should be considered stale and no longer valid.
- It is an alternative to the "Cache-Control" header.

ETag:

- This header provides a unique identifier for a specific version of a resource.
- It allows clients to send the ETag value in subsequent requests using the "If-None-Match" header.
- If the resource hasn't changed (as indicated by the ETag), the server can respond with a "304 Not Modified" status code, indicating that the cached response can be used.

Last-Modified:

- This header indicates the last modified date and time of the resource.
- It is used in conjunction with the "If-Modified-Since" header sent by the client in subsequent requests.

- If the resource hasn't been modified since the provided date, the server can respond with a "304 Not Modified" status code.
- To enable HTTP caching in ASP.NET Web API, you can use the CacheCow library, which provides an implementation of the HTTP caching standards.
- It allows you to apply caching attributes to API methods or controllers to control the caching behaviour.
- Additionally, you can manually set the cache-related headers in your code using the HttpResponseMessage object.
- It's important to note that caching is effective for static or relatively static resources.
- For dynamic content, we may need to implement additional strategies such as conditional caching or cache invalidation to ensure that clients receive up-to-date data when necessary.

VERSIONING

5.1 INTRODUCTION

- Versioning in ASP.NET Web API 2 refers to the practice of managing and supporting multiple versions of an API.
- It allows you to introduce changes to your API while ensuring backward compatibility for existing clients.
- This way, you can evolve your API over time without breaking existing client applications.
- We have four commonly used approaches,
- You can also consider using external libraries or frameworks to help with versioning, such as Microsoft's Microsoft.AspNet.WebApi.Versioning package, which provides additional features and options for versioning your Web API.
    - Url versioning
    - Query parameter versioning
    - Header versioning:
    - Media type

5.2 URL Versioning

- In this approach, the version number is included in the URL of the API endpoint.
- For example:
    - https://api.example.com/v1/products
    - https://api.example.com/v2/products
- This method is straightforward and easy to understand, but it can lead to longer URLs and can be cumbersome if you have many versions or frequent changes.

5.3 QUERY PARAMETER VERSIONING

- With query parameter versioning, the version number is specified as a query parameter in the API URL.
- For example:
    - https://api.example.com/products?version=1
    - https://api.example.com/products?version=2
- This approach keeps the base URL clean and allows for simpler routing.
- However, it may require additional effort to parse and handle the version parameter in your code.

5.4 Header Versioning:

- In header versioning, the version number is sent as a custom header in the HTTP request.
- For example:
  - GET /products HTTP/1.1
  - Host: api.example.com
  - Accept: application/json
  - Api-Version: 1
- This method keeps the URL clean and doesn't affect the routing.
- It allows for more flexibility and doesn't require modifying the URL structure.
- However, it may require additional effort to handle and interpret the custom header in your code.

5.5 Media Type

- Certainly! Media type versioning, also known as content negotiation or MIME type versioning, is another approach to versioning in ASP.NET Web API 2.
- In this approach, the version number is embedded in the media type (MIME type) of the request or response.
- There are two commonly used methods for media type versioning,
  - Media Type Parameter Versioning
  - Media Type Subtype Versioning

5.5.1 Media Type Parameter Versioning:

- In this approach, a version parameter is added to the media type as a parameter.
- For example:
  - Accept: application/json; version=1.0
  - Content-Type: application/json; version=2.0
- By including the version as a parameter in the media type, the client can specify the desired version in the request, and the server can respond accordingly.
- This method allows for explicit versioning and precise control over the version specified.

5.5.2 Media Type Subtype Versioning:

- In this approach, the version number is embedded as a subtype within the media type.
- For example:
  - Accept: application/versionlearn.v1+json
  - Content-Type: application/versionlearn.v2+json
- The version number is included as a separate subtype, denoted by the "v1" or "v2" in the examples above.

- This method provides a clear distinction between different versions and can be useful when we have significant changes between versions.

Advanced API