Filters

.NET

Filters in ASP.NET Core allow code to be run before or after specific stages in the request processing pipeline. Filters help developers encapsulate cross-cutting concerns, like ***exception handling*** *or* ***authorization.***

[HTTPS://DOCS.MICROSOFT.COM/EN-US/ASPNET/CORE/MVC/CONTROLLERS/FILTERS?VIEW=ASPNETCORE-5.0](https://docs.microsoft.com/en-us/aspnet/core/mvc/controllers/filters?view=aspnetcore-5.0)

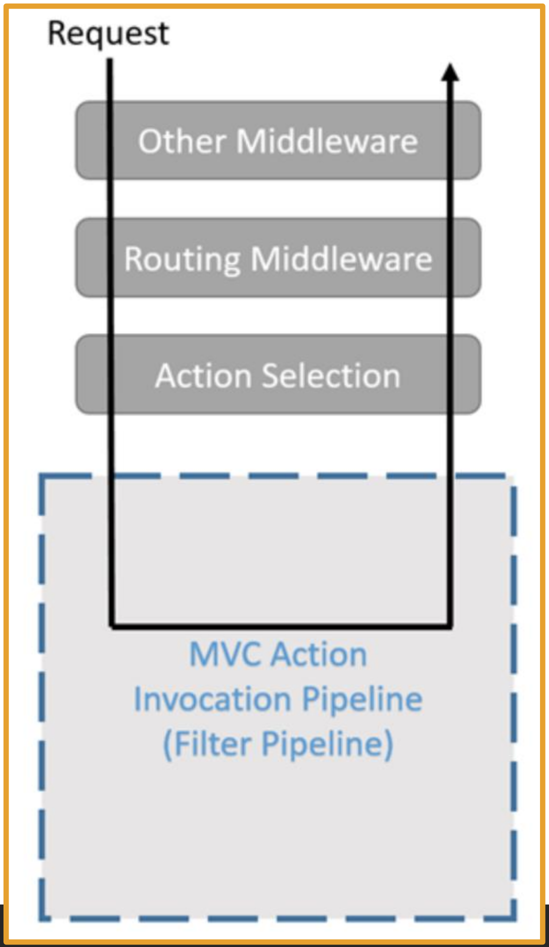
Filters – Overview

https://docs.microsoft.com/en-us/aspnet/core/mvc/controllers/filters?view=aspnetcore-5.0

Built-in NET filters handle tasks like ***Authorization*** and ***Response caching***.

Custom filters can be created to handle cross-cutting concerns like ***error handling***, ***caching***, ***configuration***, ***authorization***, and ***logging***.

Filters run within the ASP.NET Core ***Action Invocation Pipeline***. The ***Action Invocation Pipeline*** begins running after ASP.NET Core selects the ***Action*** method to execute.



Filter Types

https://docs.microsoft.com/en-us/aspnet/core/mvc/controllers/filters?view=aspnetcore-5.0#action-filters

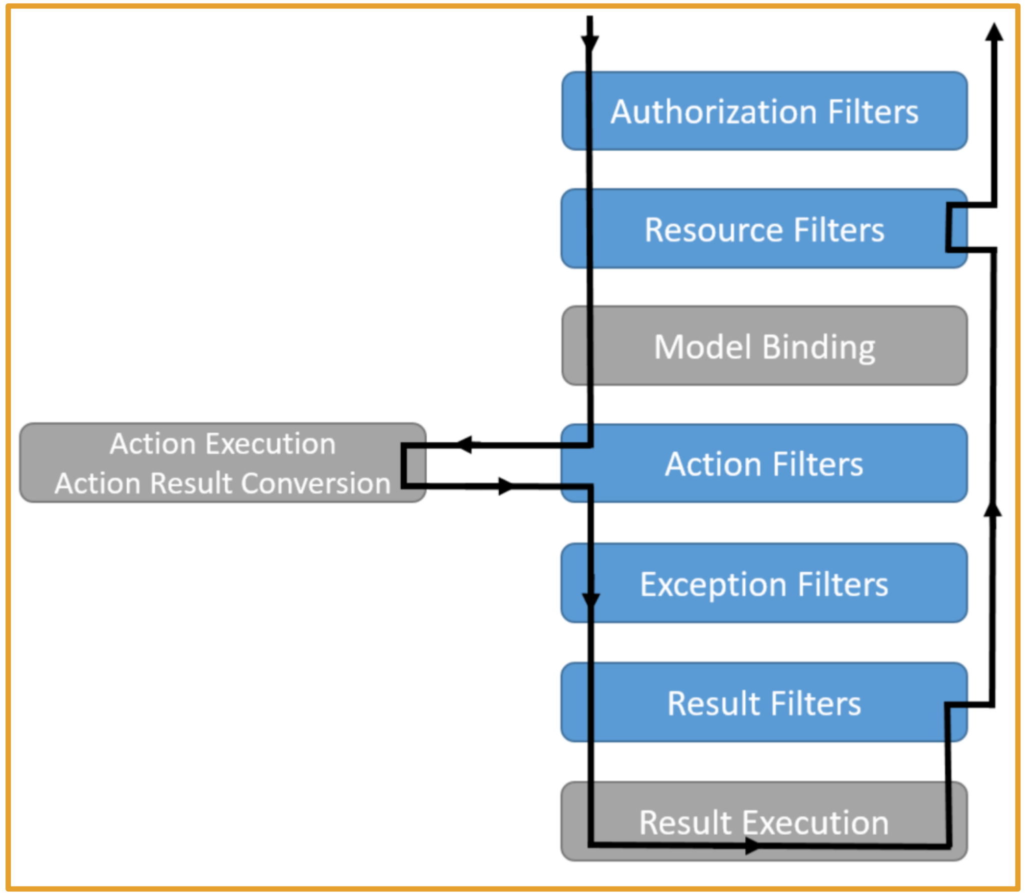
Filter	Description
Authorization Filter	Runs first. Used to determine if the user is authorized for the request. Authorization filters stop the pipeline if the request is not authorized.
Resource Filter	Runs after authorization and encapsulates all other filters. OnResourceExecuting() runs code before ***model binding*** and OnResourceExecuted() runs after the pipeline has completed.
Action Filter	Runs OnActionExecuting() immediately before an Action method and OnActionExecuted() immediately after an ***Action*** method runs. These filters can change both the arguments passed into an ***Action*** and the ***Result*** returned from the ***Action***.
Exception Filter	Applies global policies to ***unhandled*** exceptions that occur before the response body has been written to.
Result Filter	Runs immediately before and after the execution of ***Action*** results. They run only after the ***Action*** method has executed successfully.

Filter Interaction in the Filter Pipeline

https://docs.microsoft.com/en-us/aspnet/core/mvc/controllers/filters?view=aspnetcore-5.0#filter-types
https://docs.microsoft.com/en-us/aspnet/core/mvc/controllers/filters?view=aspnetcore-5.0#using-middleware-in-the-filter-pipeline

Resource filters work like middleware in that they surround the execution of everything that comes later in the pipeline. Filters differ from middleware in that they're part of the runtime, which means that they have access to context and constructs.

Even if you don't have any filters, middleware, try-catch, etc, ASP.NET Core will itself catch any exceptions within the pipeline of ***Controller***, ***Action*** method, filters, ***View***, etc. An exception in the Startup class will probably crash the whole app, but that doesn't happen with exceptions anywhere else. They'll be caught and typically an HTTP 500 will be sent.



Filter Order-of-Execution and Scope

https://docs.microsoft.com/en-us/aspnet/core/mvc/controllers/filters?view=aspnetcore-5.0#default-order-of-execution

Filters are nested inside each other during different stages of the data lifecycle of an application. How filters are nested determines their scope. ***Global filters*** surround ***class (Controller) filters***, which surround ***method (Action) filters***. As a result of filter nesting, the 'On...Executed()' filter method runs in the reverse order of the 'On...Executing()' filter method.

- The '*OnResourceExecuting*' method of global filters.
    - The '*OnResultExecuting*' code of Controller filters.
        - The '*OnActionExecuting*' code of Action method filters.
        - The '*OnActionExecuted*' code of Action method filters.
    - The '*OnResultExecuted*' code of Controller filters.
- The '*OnResourceExecuted*' code of global filters.

Authorization Filter

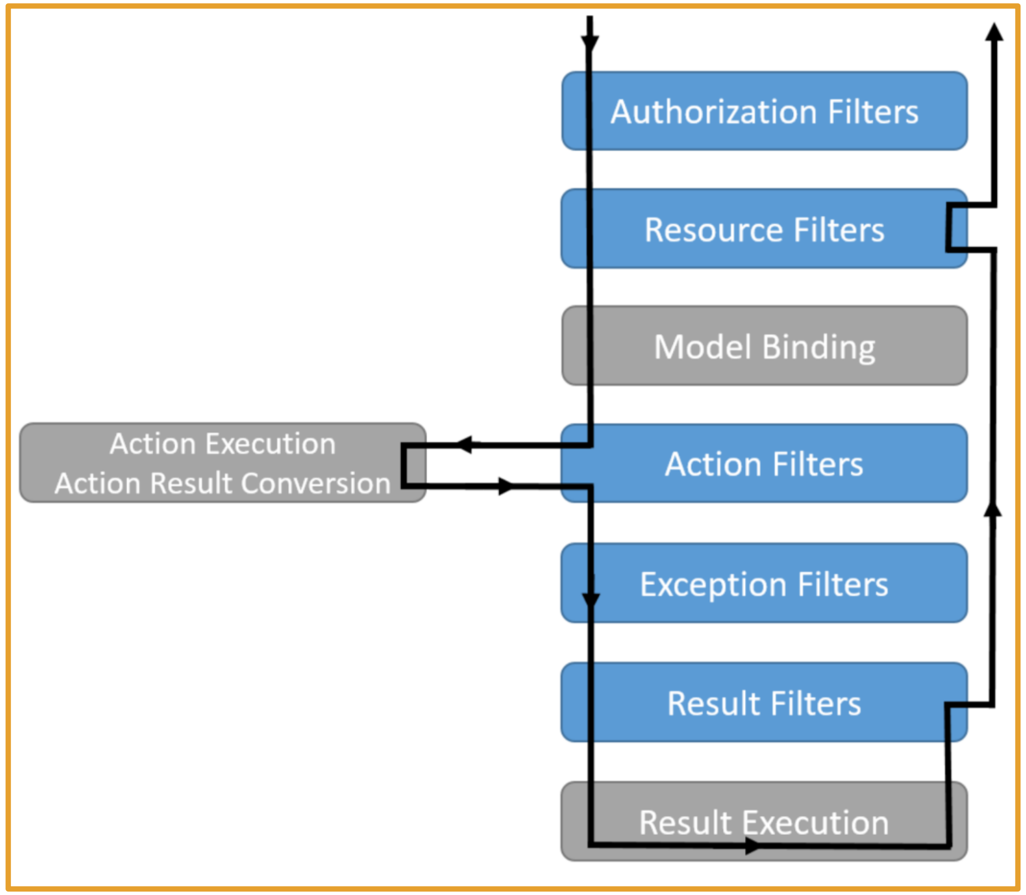
https://docs.microsoft.com/en-us/aspnet/core/mvc/controllers/filters?view=aspnetcore-5.0#authorization-filters

Authorization filters:

- Are the first filters to run in the filter pipeline.
- Control access to ***Action*** methods.
- Have a OnExecuting() method, but no OnExecuted() method.

The built-in ***Authorization*** filter:

- Calls the authorization system.
- Does not authorize requests.
- cannot handle thrown exceptions.



Resource Filters

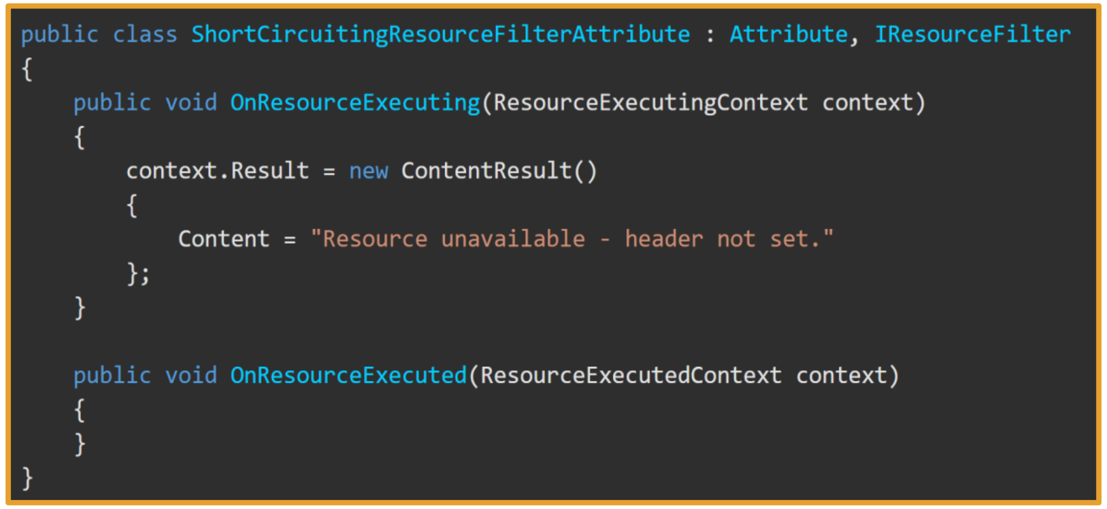
https://docs.microsoft.com/en-us/aspnet/core/mvc/controllers/filters?view=aspnetcore-5.0#resource-filters

Resource filters:

- Runs after the Authorization filter.
- Implement either the *IResourceFilter* or *IAsyncResourceFilter* interface.
- It wraps most of the rest of the filter pipeline.

Resource filter example:

- *DisableFormValueModelBindingAttribute*
- Prevents model binding from accessing the form data.
- Used for large file uploads to prevent the form data from being read into memory.



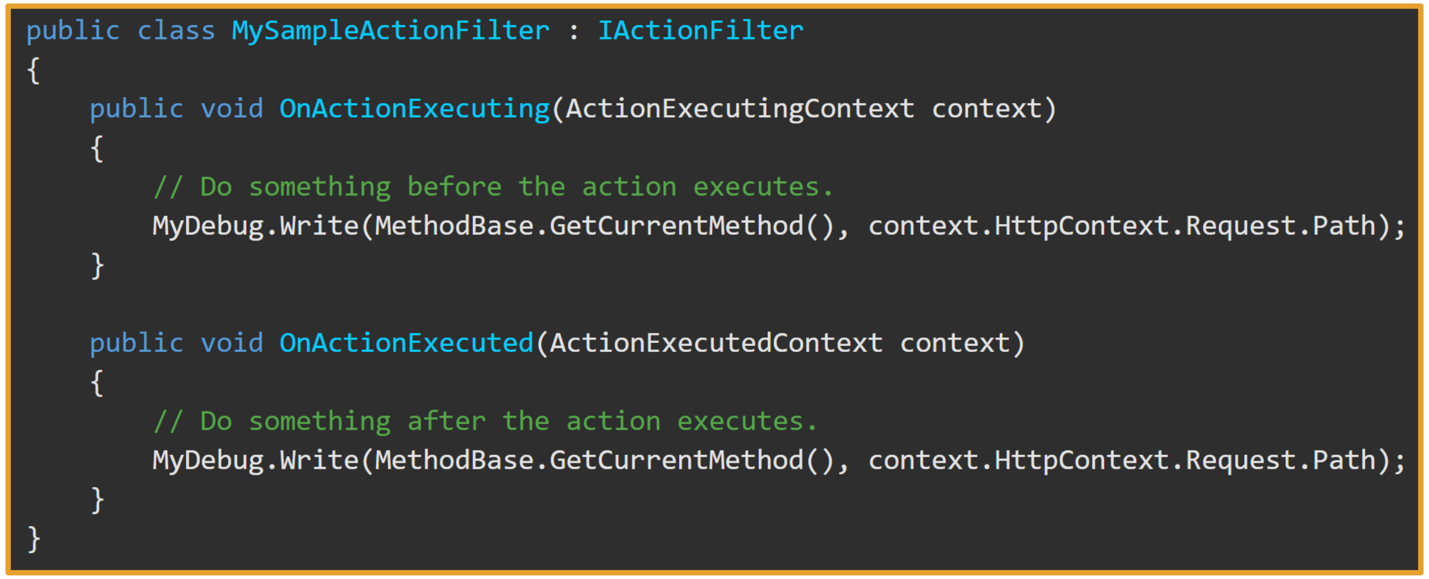
```
public class ShortCircuitingResourceFilterAttribute : Attribute, IResourceFilter
{
    public void OnResourceExecuting(ResourceExecutingContext context)
    {
        context.Result = new ContentResult()
        {
            Content = "Resource unavailable - header not set."
        };
    }

    public void OnResourceExecuted(ResourceExecutedContext context)
    {
    }
}
```

Action Filters

https://docs.microsoft.com/en-us/aspnet/core/mvc/controllers/filters?view=aspnetcore-5.0#action-filters

Action filters:

- Implement either the *IActionFilter* or *IAsyncActionFilter* interface.
- Their execution surrounds the execution of *Action* methods.



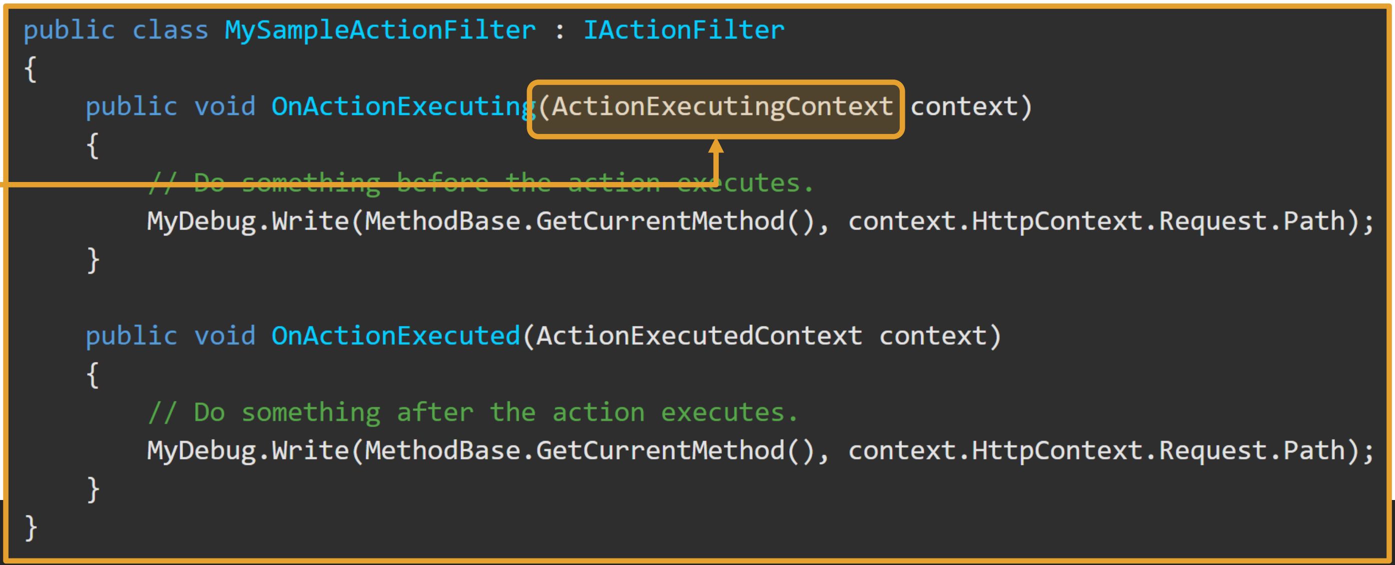
```
public class MySampleActionFilter : IActionFilter
{
    public void OnActionExecuting(ActionExecutingContext context)
    {
        // Do something before the action executes.
        MyDebug.Write(MethodBase.GetCurrentMethod(), context.HttpContext.Request.Path);
    }

    public void OnActionExecuted(ActionExecutedContext context)
    {
        // Do something after the action executes.
        MyDebug.Write(MethodBase.GetCurrentMethod(), context.HttpContext.Request.Path);
    }
}
```

Action Filter - ActionExecutingContext

https://docs.microsoft.com/en-us/aspnet/core/mvc/controllers/filters?view=aspnetcore-5.0#action-filters

ActionExecutingContext provides the following properties:

- ***ActionArguments*** - enables reading the inputs to the ***Action*** method.
- Access to various ***Controller*** Properties like HttpContext, ModelState, etc. These enable direct manipulation of the ***Controller*** instance and properties inherited from Controller class.
- ***Result*** – This gets or sets the ***ActionResult*** returned by the ***Action*** method. Setting Result to anything not-null skips execution of the ***Action*** method and subsequent ***Action*** filters.



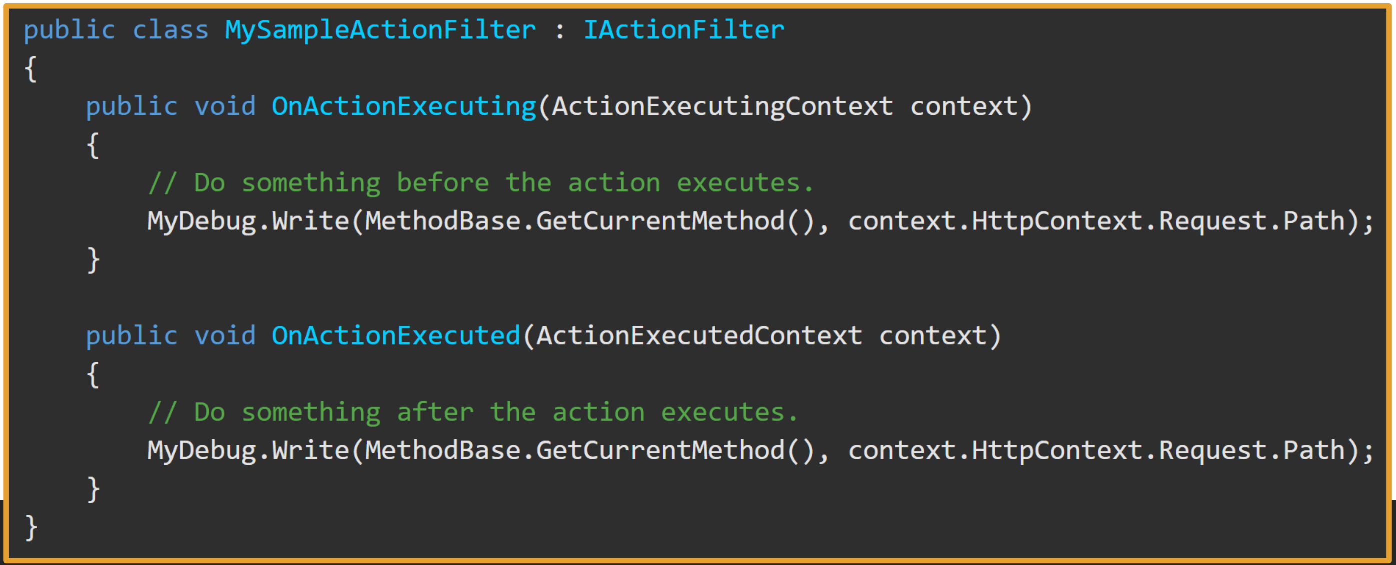
```
public class MySampleActionFilter : IActionFilter
{
    public void OnActionExecuting(ActionExecutingContext context)
    {
        // Do something before the action executes.
        MyDebug.Write(MethodBase.GetCurrentMethod(), context.HttpContext.Request.Path);
    }

    public void OnActionExecuted(ActionExecutedContext context)
    {
        // Do something after the action executes.
        MyDebug.Write(MethodBase.GetCurrentMethod(), context.HttpContext.Request.Path);
    }
}
```

Action Filter

https://docs.microsoft.com/en-us/aspnet/core/mvc/controllers/filters?view=aspnetcore-5.0#action-filters

After the ***Action*** method executes, the ***ActionExecutedContext*** provides ***Controller*** access, ***Result,*** and the properties ***Canceled*** and ***Exception***.
Canceled is set to True if ***Action*** execution was short-circuited by another filter.
Exception is Non-null if the ***Action*** or a previously run ***Action*** filter threw an exception.
Setting ***Exception*** to null:

- Effectively handles the exception.
- ***Result*** is executed as if it was returned from the ***Action*** method.



```
public class MySampleActionFilter : IActionFilter
{
    public void OnActionExecuting(ActionExecutingContext context)
    {
        // Do something before the action executes.
        MyDebug.Write(MethodBase.GetCurrentMethod(), context.HttpContext.Request.Path);
    }

    public void OnActionExecuted(ActionExecutedContext context)
    {
        // Do something after the action executes.
        MyDebug.Write(MethodBase.GetCurrentMethod(), context.HttpContext.Request.Path);
    }
}
```

Exception Filter

https://docs.microsoft.com/en-us/aspnet/core/mvc/controllers/filters?view=aspnetcore-5.0#exception-filters

Exception filters:

- handle exceptions thrown at any previous step
- Are an alternative to error-handling middleware (e.g. ***UseExceptionHandler***), which is put in Startup.cs and is global
- Implement ***IExceptionFilter*** or ***IAsyncExceptionFilter***.
- Can be used to implement common error handling policies.

```csharp
public class CustomExceptionFilter : IExceptionFilter
{
    private readonly IWebHostEnvironment _hostingEnvironment;
    private readonly IModelMetadataProvider _modelMetadataProvider;

    public CustomExceptionFilter(
        IWebHostEnvironment hostingEnvironment,
        IModelMetadataProvider modelMetadataProvider)
    {
        _hostingEnvironment = hostingEnvironment;
        _modelMetadataProvider = modelMetadataProvider;
    }

    public void OnException(ExceptionContext context)
    {
        if (!_hostingEnvironment.IsDevelopment())
        {
            return;
        }
        var result = new ViewResult {ViewName = "CustomError"};
        result.ViewData = new ViewDataDictionary(_modelMetadataProvider,
                                                context.ModelState);
        result.ViewData.Add("Exception", context.Exception);
        // TODO: Pass additional detailed data via ViewData
        context.Result = result;
    }
}
```

This custom exception filter uses a custom exception handler to handle exceptions that occur when the app is in development.

```csharp
[TypeFilter(typeof(CustomExceptionFilter))]
public class FailingController : Controller
{
    [AddHeader("Failing Controller",
               "Won't appear when exception is handled")]
    public IActionResult Index()
    {
        throw new Exception("Testing custom exception filter.");
    }
}
```

This code tests the custom exception filter to the right.

Result Filter

https://docs.microsoft.com/en-us/aspnet/core/mvc/controllers/filters?view=aspnetcore-5.0#result-filters

Result filters:

- Only execute when an ***Action*** produces an ***ActionResult***.
- Implement an interface:
  - IResultFilter or IAsyncResultFilter
  - IAlwaysRunResultFilter or IAsyncAlwaysRunResultFilter
- Run before and then after preparing the result to be sent and sending it a [HttpPost] attribute.
- Provides access to the Canceled and Exception properties.

This code shows a result filter that adds an HTTP header:

```csharp
public class AddHeaderResultServiceFilter : IResultFilter
{
    private ILogger _logger;
    public AddHeaderResultServiceFilter(ILoggerFactory loggerFactory)
    {
        _logger = loggerFactory.CreateLogger<AddHeaderResultServiceFilter>();
    }

    public void OnResultExecuting(ResultExecutingContext context)
    {
        var headerName = "OnResultExecuting";
        context.HttpContext.Response.Headers.Add(
            headerName, new string[] { "ResultExecutingSuccessfully" });
        _logger.LogInformation("Header added: {HeaderName}", headerName);
    }

    public void OnResultExecuted(ResultExecutedContext context)
    {
        // Can't add to headers here because response has started.
        _logger.LogInformation("AddHeaderResultServiceFilter.OnResultExecuted");
    }
}
```