.NET

Documentation

Abstract

In this module I learn different concepts .NET which help us to develop better application in .NET

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FILTERS

1.1 INTRODUCTION

- Filters allow us to run custom code before or after executing the action method.
- They provide ways to do common repetitive tasks on our action method.
- The filters are invoked on certain stages in the request processing pipeline.
- There are many built-in filters available with ASP.NET Core MVC, and we can create custom filters as well.
- Filters help us to remove duplicate codes in our application.
    - Authorization filter
    - Resource filter
    - Action filter
    - Exception filter
    - Result filter

Authorization filter:

- The Authorization filters are executed first.
- This filter helps us to determine whether the user is authorized for the current request or not.
- It can short-circuit a pipeline if a user is unauthorized for the current request.
- We can also create custom authorization filter.

Resource filters:

- The Resource filters handle the request after authorization.
- It can run the code before and after the rest of the filter is executed.
- This executes before the model binding happens.
- It can be used to implement caching.

Action filters:

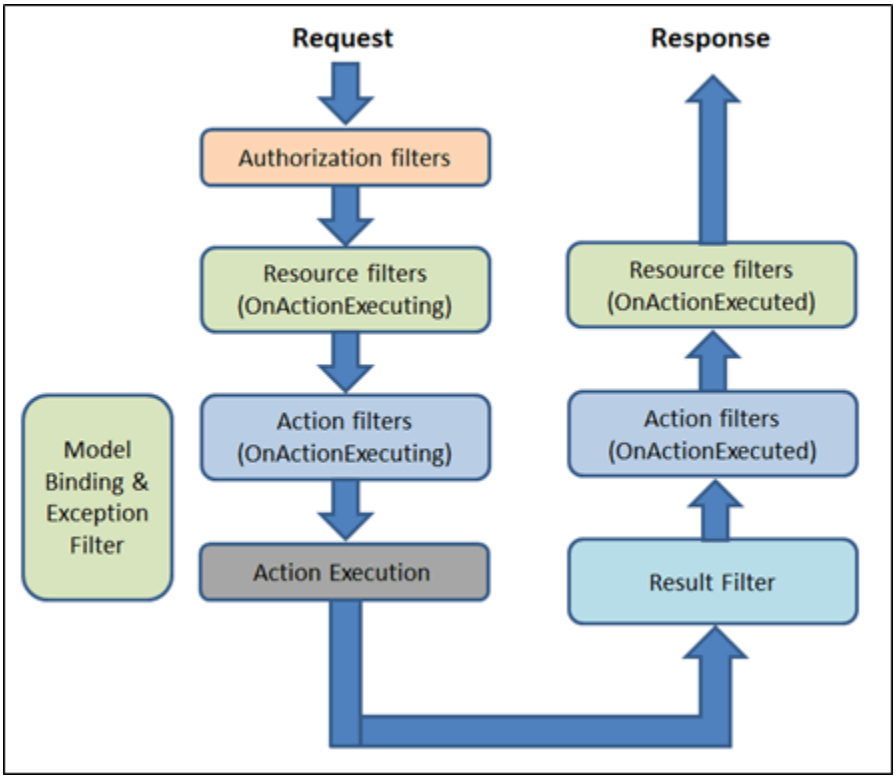
- The Action filters run the code immediately before and after the controller action method is called.
- It can be used to perform any action before or after execution of the controller action method.
- We can also manipulate the arguments passed into an action.

Exception filters:

- The Exception filters are used to handle exception that occurred before anything written to the response body.

Result filters:

- The Result filters are used to run code before or after the execution of controller action results.
- They are executed only if the controller action method has been executed successfully.



- Filter supports two types of implementation.
  - Synchronous
  - Asynchronous

Synchronous:

- The Synchronous filters run the code before and after their pipeline stage defines OnStageExecuting and OnStageExecuted.
- For example: ActionFilter, The OnActionExecuting method is called before the action method and OnActionExecuted method is called after the action method.

Example:

```
using Microsoft.AspNetCore.Mvc.Filters;
namespace Filters
{
    public class CustomActionFilter : IActionFilter
    {
        public void OnActionExecuting(ActionExecutingContext context)
        {
            //To do : before the action executes
        }

        public void OnActionExecuted(ActionExecutedContext context)
        {
            //To do : after the action executes
        }
    }
}
```

Asynchronous:

- Asynchronous filters are defined with only single method, OnStageExecutionAsync that takes a FilterTypeExecutingContext and FilterTypeExecutionDelegate as The FilterTypeExecutionDelegate execute the filter's pipeline stage.
- For example: ActionFilter, ActionExecutionDelegate calls the action method and we can write the code before and after we call action method.

Example:

```
using System.Threading.Tasks;
using Microsoft.AspNetCore.Mvc.Filters;

namespace Filters
{
    public class CustomAsyncActionFilter : IAsyncActionFilter
    {
        public async Task OnActionExecutionAsync(ActionExecutingContext
context, ActionExecutionDelegate next)
        {
            //To do : before the action executes
            await next();
            //To do : after the action executes
        }
    }
```

```
}
```

- We can implement interfaces for multiple filter types (stage) in single class.
- We can either implement synchronous or the async version of a filter interface, not both.
- The .net framework checks first for async filter interface, if it finds it, it called, If it is not found it calls the synchronous interface's method(s).
- If we implement both, synchronous interface is never called.

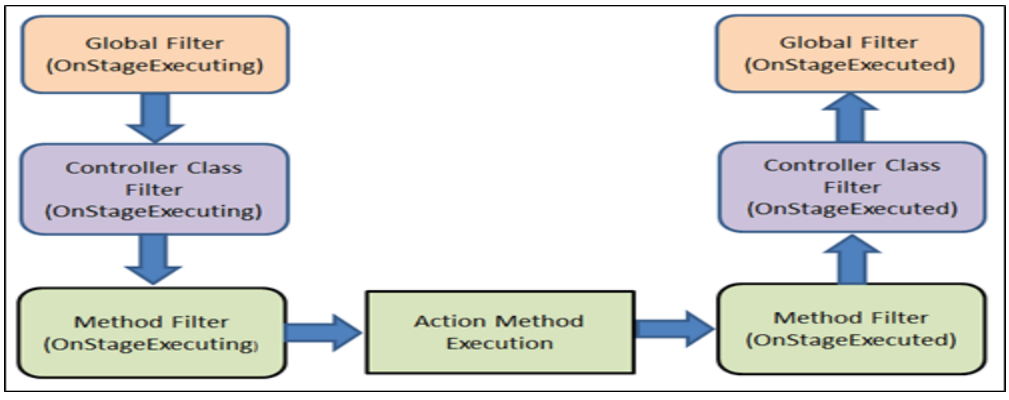
1.2 Scope and Order

- A filter can be added to the pipeline at one of three scopes.
  - By action method
  - By controller class
  - Globally (which be applied to all the controller and actions).
- We need to register filters in to the MvcOption.Filters collection within ConfigureServices method.

Example:

```
public void ConfigureServices(IServiceCollection services)
{
    // Add framework services.
    services.AddMvc(options=> {
    //an instant
    options.Filters.Add(new CustomActionFilter());
    //By the type
    options.Filters.Add(typeof(CustomActionFilter));
    });
}
```

- When multiple filters are applied to the particular stage of the pipeline, scope of filter defines the default order of the filter execution.



- The global filter is applied first, then class level filter is applied and finally method level filter is applied.

Overriding the default order:

- We can override the default sequence of filter execution by using implementing interface IOrderedFilter.
- This interface has property named "Order" that use to determine the order of execution.
- The filter with lower order value execute before the filter with higher order value.
- We can setup the order property using the constructor parameter.

Example:

```
// ExampleFilter.cs

using System;
using Microsoft.AspNetCore.Mvc.Filters;
namespace Filters
{
    public class ExampleFilterAttribute : Attribute, IActionFilter,
IOrderedFilter
    {
        public int Order { get; set; }

        public void OnActionExecuting(ActionExecutingContext context)
        {
            //To do : before the action executes
        }

        public void OnActionExecuted(ActionExecutedContext context)
        {
            //To do : after the action executes
        }
    }
}
```

```
// HomeController.cs

using System;
using Microsoft.AspNetCore.Mvc;
using Filters;
```

```
namespace Filters.Controllers
{
    [ExampleFilter(Order = 1)]
    public class HomeController : Controller
    {
        public IActionResult Index()
        {
            return View();
        }
    }
}
```

- When filters are run in pipeline, filters are sorted first by order and then scope.
- All built-in filters are implemented by IOrderFilter and set the default filter order to 0.

1.3 CANCELLATION OR SHORT-CIRCUITING FILTERS

- We can short circuit the filter pipeline at any point of time by setting the "Result" property of the "Context" parameter provided to the filter's methods.

```
using System;
using Microsoft.AspNetCore.Mvc;
using Microsoft.AspNetCore.Mvc.Filters;
namespace Filters
{
    public class Example1FilterAttribute : Attribute, IActionFilter
    {
        public void OnActionExecuting(ActionExecutingContext context)
        {
            //To do : before the action executes
            context.Result = new ContentResult()
            {
                Content = "Short circuit filter"
            };
        }
        public void OnActionExecuted(ActionExecutedContext context)
        {
            //To do : after the action executes
        }
    }
}
```

1.4 Dependency Injection in Filters

- As we learned, the filter can be added by the type or by the instance.
- If we added filter as an instance, this instance will be used for every request and if we add filter as a type, instance of the type will be created for each request.
- Filter has constructor dependencies that will be provided by the DI.
- The filters that are implemented as attributes and added directly to the controller or action methods, cannot have constructor dependencies provided by the DI.
- In this case, contractor parameter must be supplied when they are applied.
- This is a limitation of attribute.
- There are many way to overcome this limitation.
- We can apply our filter to the controller class or action method using one of the following,
    - ServiceFilterAttribute
    - TypeFilterAttribute
    - IFilterFactory implemented on attribute

ServiceFilterAttribute:

- A ServiceFilter retrieves an instance of the filter from dependency injection (DI).
- We need to add this filter to the container in ConfigureService and reference it in a ServiceFilter attribute in the controller class or action method.
- One of the dependencies we might require to get from the DI, is a logger. Within filter, we might need to log something happened.

Example:

```
// Filter
using Microsoft.AspNetCore.Mvc.Filters;
using Microsoft.Extensions.Logging;
namespace FiltersSample.Filters
{
    public class ExampleFilterWithDI : IActionFilter
    {
        private ILogger _logger;
        public ExampleFilterWithDI(ILoggerFactory loggerFactory)
        {
            _logger = loggerFactory.CreateLogger<ExampleFilterWithDI>();
        }
        public void OnActionExecuting(ActionExecutingContext context)
        {
            //To do : before the action executes
            _logger.LogInformation("OnActionExecuting");
```

```
        }
        public void OnActionExecuted(ActionExecutedContext context)
        {
            //To do : after the action executes
            _logger.LogInformation("OnActionExecuted");
        }
    }
}
```

```
// Register filter in ConfigureService method
public void ConfigureServices(IServiceCollection services)
{
    services.AddScoped<ExampleFilterWithDI>();
}
```

```
// Use filter for Action method of Controller class
[ServiceFilter(typeof(ExampleFilterWithDI))]
public IActionResult Index()
{
    return View();
}
```

TypeFilterAttribute:

- It is very similar to ServiceFilterAttribute and also implemented from IFilterFactory interface.
- Here, type is not resolved directly from the DI container but it instantiates the type using class "Microsoft.Extensions.DependencyInjection.ObjectFactory".
- Due to this difference, the types are referenced in TypeFilterAttribute need to be register first in ConfigureService method.
- The "TypeFilterAttribute" can be optionally accept constructor arguments for the type.

Example:

```
[TypeFilter(typeof(ExampleFilterAttribute), Arguments = new object[]
{"Argument if any" })]
public IActionResult About()
{
    return View();
}
```