MiddleWare

➡ *A function that sit between an incoming request and the final response handler in an application*

➡ *Middleware functions have access to the request, response and the next function (next) in the request-response cycle*

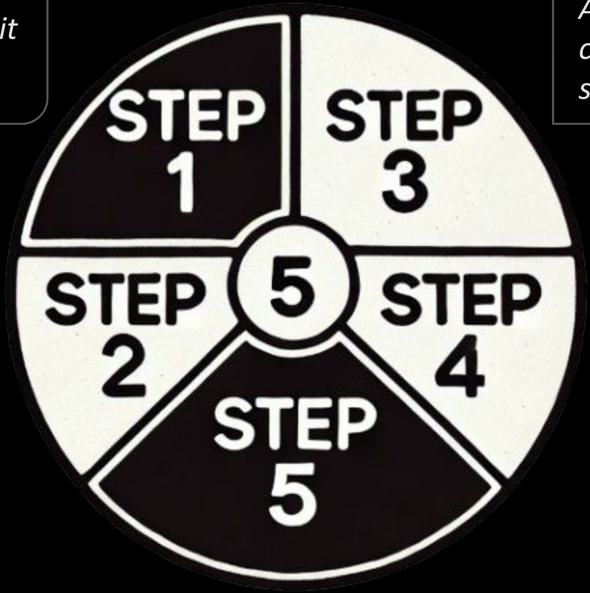
➡ *They are commonly used as :*

- *Logging requests*
- *Authentication & authorization*
- *Parsing request bodies (JSON, URL-encoded data)*
- *Error handling*
- *Modifying requests and responses*

MiddleWare Process

When a client sends an HTTP request, it first reaches the middleware pipeline

The request passes through multiple middleware components one by one



If no middleware short-circuits the request, it reaches the final endpoint

The response moves back through the middleware pipeline in reverse order

After passing through all middleware components, the final HTTP response is sent back to the client

Middleware Cautions

➡ **Always Call next()**

- *If you forget to call next(), the request will hang indefinitely*
- *If next() is called multiple times, it may trigger unexpected behavior*

➡ **Order of Middleware Matters**

- *Middleware is executed in the order it is defined*
- *Incorrect ordering can cause unintended behavior*

➡ **Be Careful with Global Middleware**

- *Applying middleware globally affects all routes, which might not be intended*
- *Apply middleware only where needed for better efficiency*

Middleware Cautions - Cont..

➡ **Avoid Overuse of Middleware**

- *Too many middleware layers slow down requests*
- *Optimize by combining functionalities where possible*

➡ **Avoid Blocking the Event Loop**

- *Middleware should be non-blocking to ensure smooth performance*
- *Avoid synchronous operations like heavy computations inside middleware*

➡ **Be Careful with Third-Party Middleware**

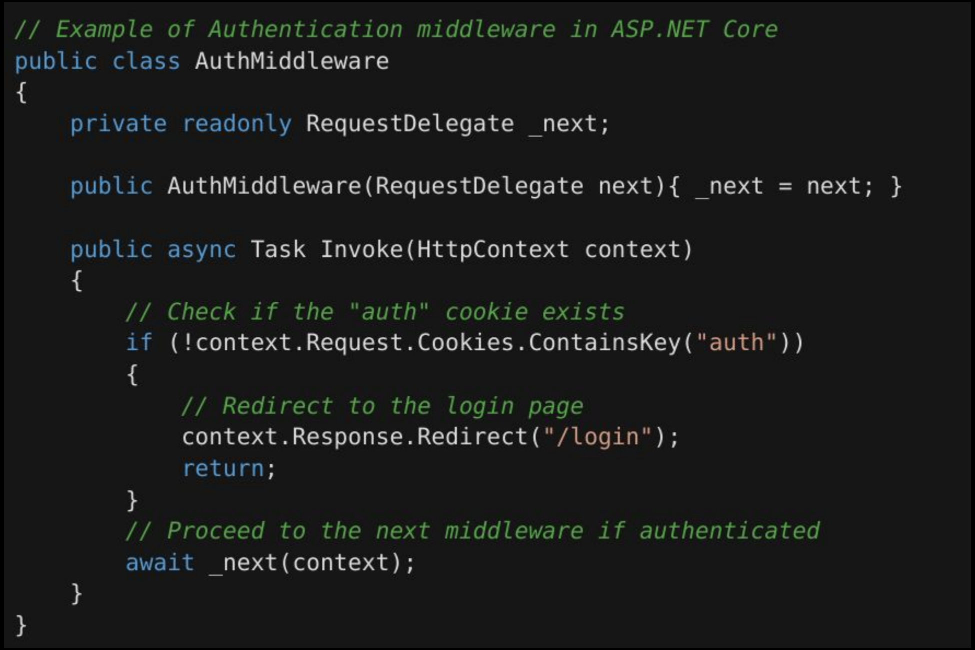
- *Always review third-party middleware before using it*
- *Avoid outdated, unmaintained, or insecure packages*

MiddleWare Types

Middleware Type	Purpose
Built-in Middleware	*Predefined middleware like UseRouting(), UseAuthentication()*
Custom Middleware	*Custom classes for processing requests (UseMiddleware<T>())*
Inline Middleware	*Middleware written directly in Program.cs*
Terminal Middleware	*Ends request processing (app.Run())*
Conditional Middleware	*Applies middleware based on conditions (UseWhen())*

Middleware Example - Authentication MW

When there is no cookie named “auth” exists, which means user is not authorized yet, hence following middleware redirect user to /login



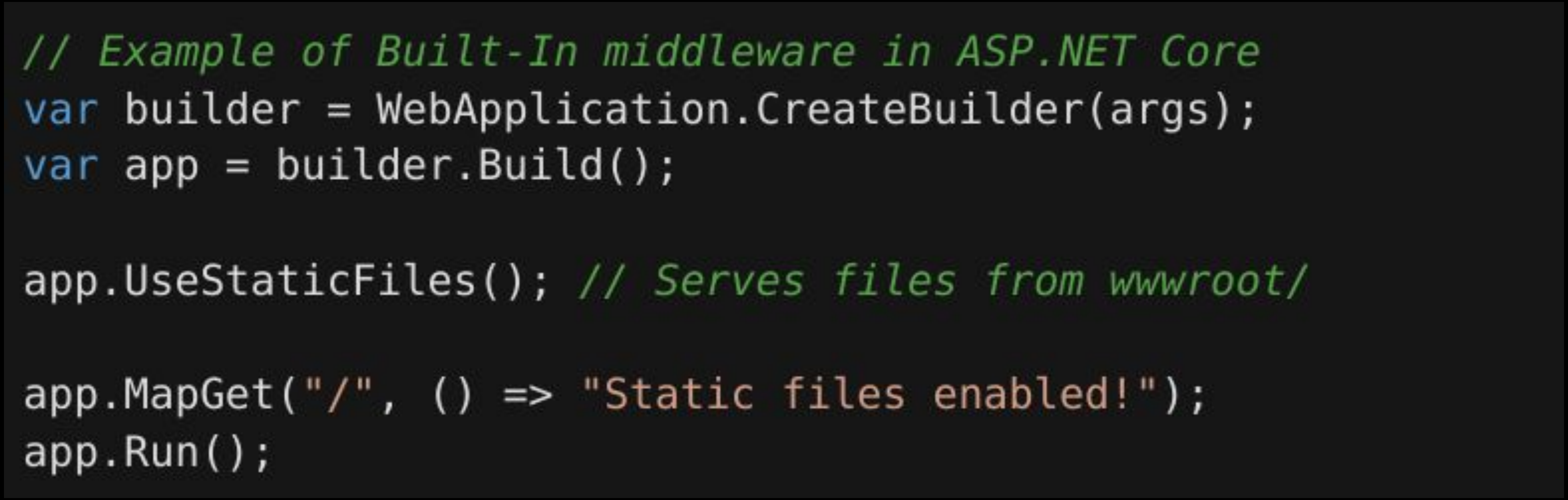
```
// Example of Authentication middleware in ASP.NET Core
public class AuthMiddleware
{
    private readonly RequestDelegate _next;

    public AuthMiddleware(RequestDelegate next){ _next = next; }

    public async Task Invoke(HttpContext context)
    {
        // Check if the "auth" cookie exists
        if (!context.Request.Cookies.ContainsKey("auth"))
        {
            // Redirect to the login page
            context.Response.Redirect("/login");
            return;
        }
        // Proceed to the next middleware if authenticated
        await _next(context);
    }
}
```

Middleware Example - Built-In MW - UseStaticFiles()

A middleware which serves CSS, JS, images, and other static files



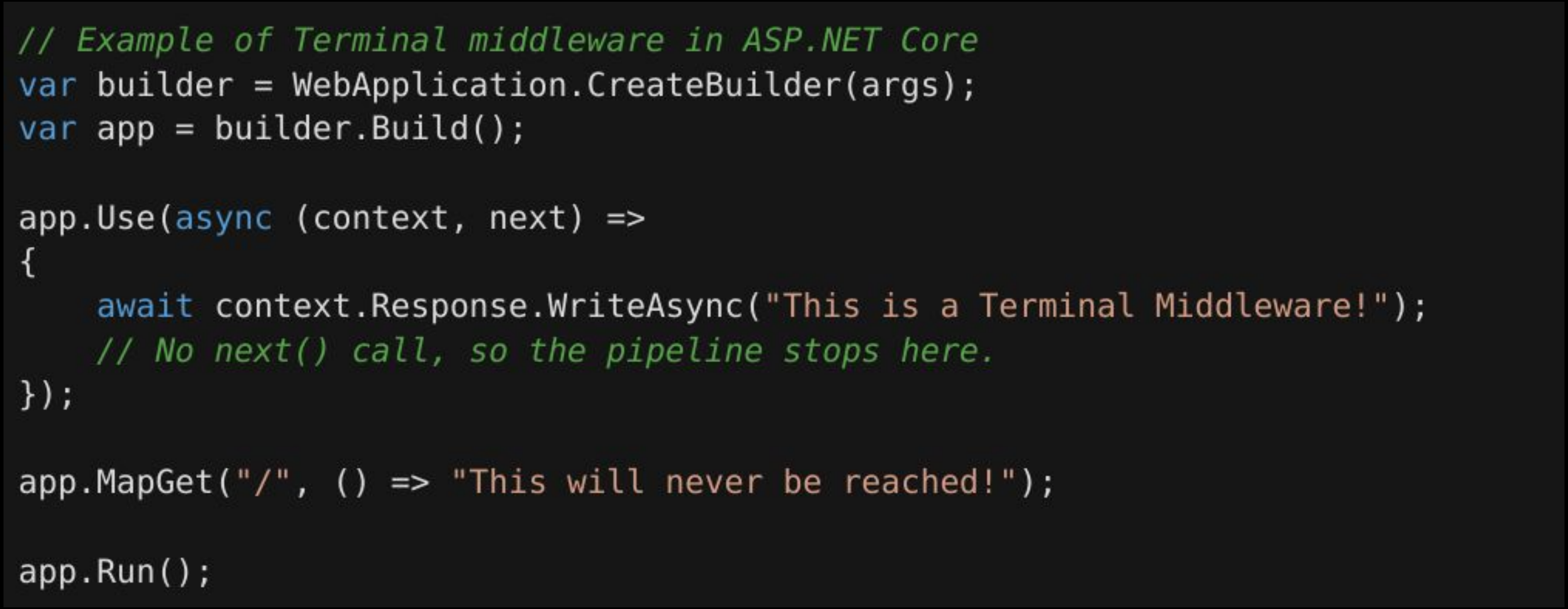
```
// Example of Built-In middleware in ASP.NET Core
var builder = WebApplication.CreateBuilder(args);
var app = builder.Build();

app.UseStaticFiles(); // Serves files from wwwroot/

app.MapGet("/", () => "Static files enabled!");
app.Run();
```

Middleware Example - Terminal MW

No next() executed, following middleware always stops execution after returning a response



```
// Example of Terminal middleware in ASP.NET Core
var builder = WebApplication.CreateBuilder(args);
var app = builder.Build();

app.Use(async (context, next) =>
{
    await context.Response.WriteAsync("This is a Terminal Middleware!");
    // No next() call, so the pipeline stops here.
});

app.MapGet("/", () => "This will never be reached!");

app.Run();
```

Resources

https://learn.microsoft.com/en-us/aspnet/core/fundamentals/middleware

https://theonetechnologies.com/blog/post/middleware-in-net-core-application

https://medium.com/@shubhadeepchat/net-core-middleware-explained-8c21bf646700