Logging

Setting up your application for logging

1. Use the application from the [Lab 2](2. Introduction to ASP.NET Core.md) (or setup steps from the Lab 2).

2. Verify that the `Microsoft.Extensions.Logging.Console` package is listed as a dependency in `project.json`:

   ```
   "dependencies": {
     "Microsoft.Extensions.Logging.Console": "1.0.0"
   },
   ```

3. Navigate to `Startup.cs` and change the `Configure` method to:

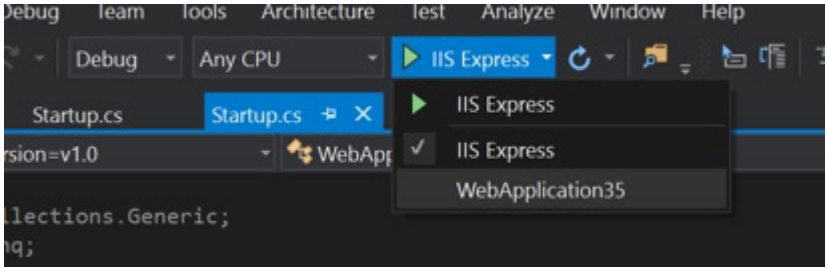
   ```
   public void Configure(IApplicationBuilder app, IHostingEnvironment env,
       ILoggerFactory loggerFactory)
   {
       loggerFactory.AddConsole();

       var startupLogger = loggerFactory.CreateLogger<Startup>();
       ...
   }
   ```

4. Add a log statement to the end of the `Configure` method:

   ```
   public void Configure(IApplicationBuilder app, IHostingEnvironment env,
       ILoggerFactory loggerFactory)
   {
       ...
       startupLogger.LogInformation("Application startup complete!");
   }
   ```

5. If using Visual Studio, change the active launch host to the application itself (self-host) by navigating to the play/run button and changing the drop-down to the entry named after the application.



6. Run the application and browse to the application root (This will be `http://localhost:8081/` if you're continuing from Lab 2 code, or `http://localhost:5000` if you've started with a new project). You should see the default log messages from the framework as well as your custom log message in the console window.

Filtering logs

1. Add a couple more logging statements to the `Configure` method:

   ```
   public void Configure(IApplicationBuilder app, IHostingEnvironment env,
   ```

```
    ILoggerFactory loggerFactory)
{
    ...
    startupLogger.LogInformation("Application startup complete!");

    startupLogger.LogCritical("This is a critical message");
    startupLogger.LogDebug("This is a debug message");
    startupLogger.LogTrace("This is a trace message");
    startupLogger.LogWarning("This is a warning message");
    startupLogger.LogError("This is an error message");
}
```

2. Change the minimum log level for the console logger in `Startup.cs`:

```
public void Configure(IApplicationBuilder app, ILoggerFactory loggerFactory)
{
    loggerFactory.AddConsole(LogLevel.Trace);
    ...
}
```

3. Run the application and open a browser window with `http://localhost:8081/` as the address. You should see more verbose logging from the framework and startup including debug messages.

4. Change the application to only show logs from the Startup category:

```
public void Configure(IApplicationBuilder app, ILoggerFactory loggerFactory)
{
    loggerFactory.AddConsole((category, level)
        => category == typeof(Startup).FullName);
    ...
}
```

5. Run the application and open a browser window with `http://localhost:8081/` as the address. You should only logs written by the Startup logger.

   Note: Completed code for this section is found /Labs/Code/Lab4A.

Adding other logging providers

1. Add the Serilog logger provider to `project.json`:

```
  "dependencies": {
    ...
    "Serilog.Extensions.Logging":  "1.0.0",
    "Serilog.Sinks.File": "2.0.0"
  },
```

2. Configure Serilog in `Startup.cs` to write to a file called `logfile.txt` in the project root (resolving usings for System.IO and Serilog):

```
public Startup(IHostingEnvironment env)
{
    Configuration = new ConfigurationBuilder()
                        .SetBasePath(env.ContentRootPath)
                        .AddJsonFile("appsettings.json")
                        .Build();

    var logFile = Path.Combine(env.ContentRootPath, "logfile.txt");

    Log.Logger = new LoggerConfiguration()
```

```
        .WriteTo.File(logFile)
        .CreateLogger();
}
```

3. Add the Serilog provider in `Configure`:

```
public void Configure(IApplicationBuilder app, IHostingEnvironment env,
    ILoggerFactory loggerFactory)
{
    loggerFactory.AddConsole();
    loggerFactory.AddSerilog();
    ...
}
```

4. Run the application and open a browser window with `http://localhost:8081/` as the address. You should observe a file called `logfile.txt` appear in your application root.

5. Close the conosle window and open the file, the application logs should be in there.

   Note: Completed code for this section is found /Labs/Code/Lab4B.

Extra

1. Try adding more advanced filters with different levels.
2. Try configuring logging using the Configuration system (`IConfiguration`).

Diagnostic pages

Write some buggy code

1. Add a middleware to the above application that throws an exception. Your `Configure` method should look something like this:

```
public void Configure(IApplicationBuilder app, ILoggerFactory loggerFactory)
{
    loggerFactory.AddConsole();

    loggerFactory.AddSerilog();

    ...

    app.Run((context) =>
    {
        throw new InvalidOperationException("Oops!");
    });

    ...
}
```

   Note: You can ignore the warning from Visual Studio recommending the use of awaitable code.

Understanding the diagnostics middleware

1. Observe that the dependencies section of `project.json` includes the `Microsoft.AspNetCore.Diagnostics` package. This package was included in the "ASP.NET Core

Web Application (.NET Core)" templates.

```
"dependencies": {
    "Microsoft.NETCore.App": {
    "version": "1.0.0",
    "type": "platform"
    },
    "Microsoft.AspNetCore.Diagnostics": "1.0.0",
    ...
  },
```

2. Observe that the `Configure()` method in `Startup.cs` includes a call to configure the developer experience middleware when running in the Development environment. Ensure that your new buggy code occurs after the exception page is wired up, as shown below:

```
if (env.IsDevelopment())
{
    app.UseDeveloperExceptionPage();
}

app.Run(async (context) =>
{
    throw new InvalidOperationException("Oops!");
});
```

3. Run the application and open a browser window with `http://localhost:8081/` as the address. The debugger will break at the InvalidOperationException. `If you type`F5` again to continue, you should see an application exception page in the browser.

Adding an handler for non-development environments

1. Add exception handler middleware to the `Configure` method. Make sure it only runs when not in development:

```
if (env.IsDevelopment())
{
    app.UseDeveloperExceptionPage();
}
else
{
    app.UseExceptionHandler(subApp =>
    {
        subApp.Run(async context =>
        {
            context.Response.ContentType = "text/html";
            await context.Response.WriteAsync(
                "<strong> Application error. Please contact support. </strong>");
            await context.Response.WriteAsync(
                new string(' ', 512));  // Padding for IE
        });
    });
}
```

2. Run the application in "Production" and open a browser window with `http://localhost:8081/` as the address. Type `F5` at the exception and you should see the custom error page instead of the exception.

   Note: Completed code for this section is found /Labs/Code/Lab4C.

Showing custom pages for non 500 status codes

1. Change the middleware throwing the exception message to instead set a 404 status code:

   ```
   app.Run((context) =>
   {
       context.Response.StatusCode = 404;
       return Task.FromResult(0);
   });
   ```

   Note: Make sure you get the change on the first line of this code block - we've removed the `async` keyword!

2. Add the status code pages middleware above the exception handler middleware in `Configure`:

   ```
   app.UseStatusCodePages(subApp =>
   {
       subApp.Run(async context =>
       {
           context.Response.ContentType = "text/html";
           await context.Response.WriteAsync(
               $"<strong> You got a {context.Response.StatusCode}<strong>");
           await context.Response.WriteAsync(
               new string(' ', 512));  // Padding for IE
       });
   });

   ...
   ```

3. Run the application and open a browser window with `http://localhost:8081/` as the address. You should see the custom error page instead of the browser's default 404 page.

   Note: Completed code for this section is found /Labs/Code/Lab4D.

Extra

1. Access the exception when using the exception handler middleware, log it to the logging system. (**Note: The exception handler middleware does log the exception via the logging system.**)
2. Serve an html page when an exception occurs using the static files middleware and the exception handler middleware.
3. Serve an html page for a 404 status using the static files middleware and status code pages middleware.
4. Write a custom logging provider