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Dependency Injection in Xunit

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Intro

一个好的项目，它的背后有一系列的测试用例

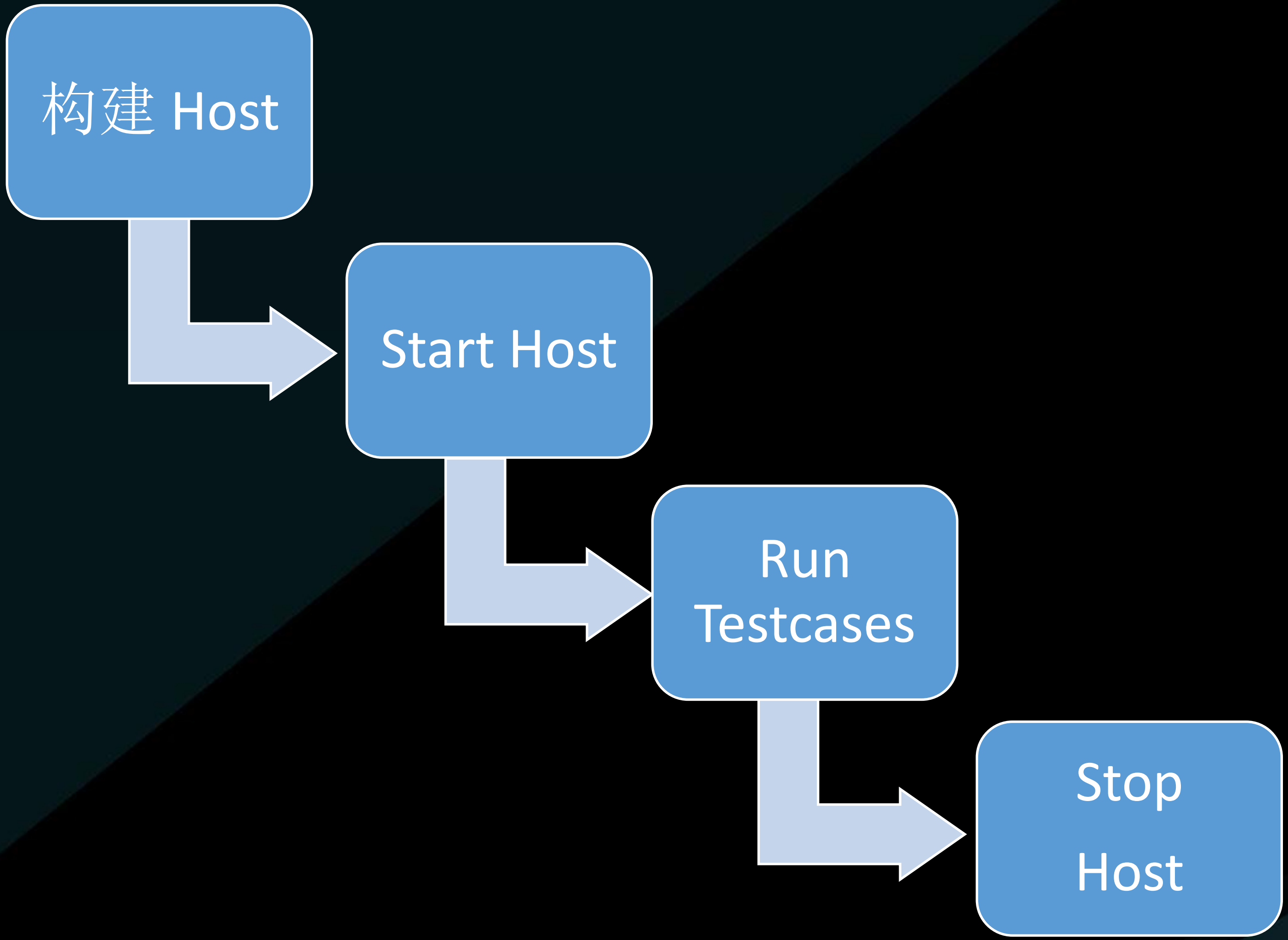
测试覆盖率是高质量项目的重要指标

依赖注入已经是现代化应用的标配，asp.net core 也是从一开始就集成了依赖注入

对于测试项目，依赖注入也不能缺席，依赖注入可以使得测试项目更容易

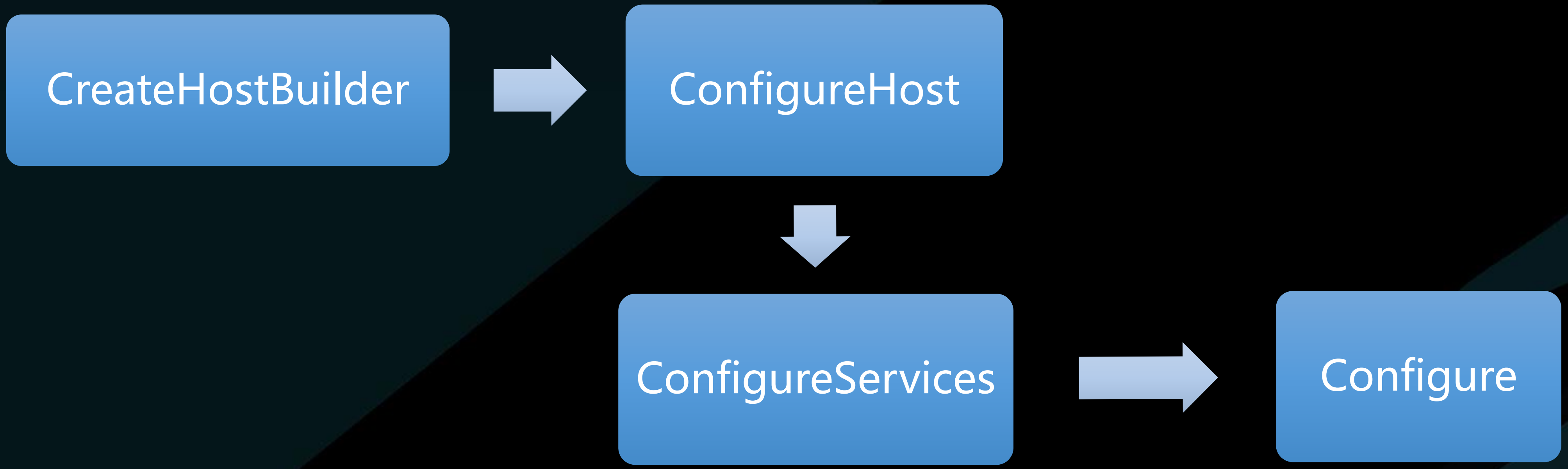
Xunit.DependencyInjection 是基于微软的 GenericHost 来实现的 xunit 扩展，能够让你更方便的在测试项目中使用依赖注入，可以更好的和 .net core 集成

执行流程



Host 构建流程

在测试项目中创建一个 Startup 类来控制 Host 的构建



Samples

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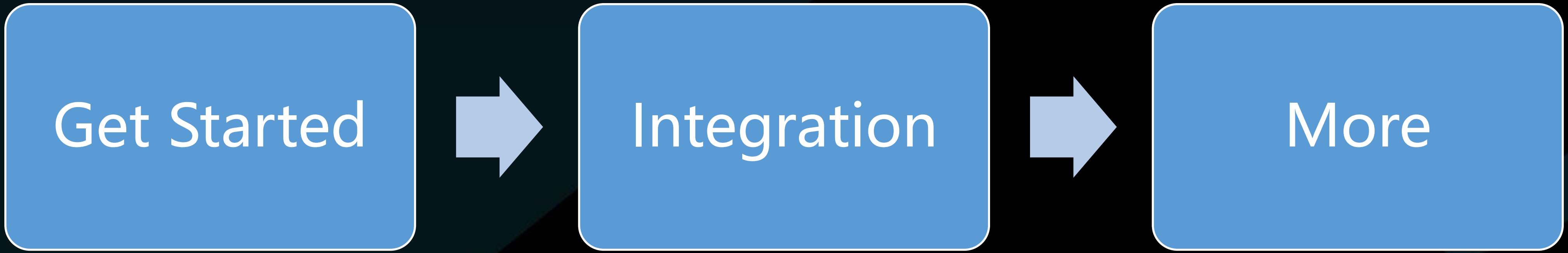
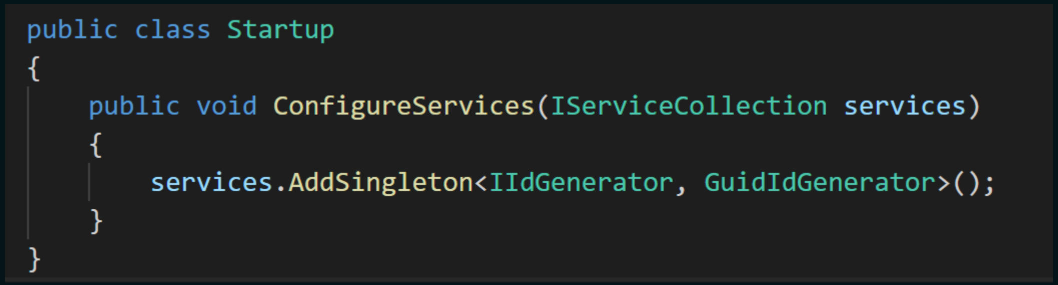
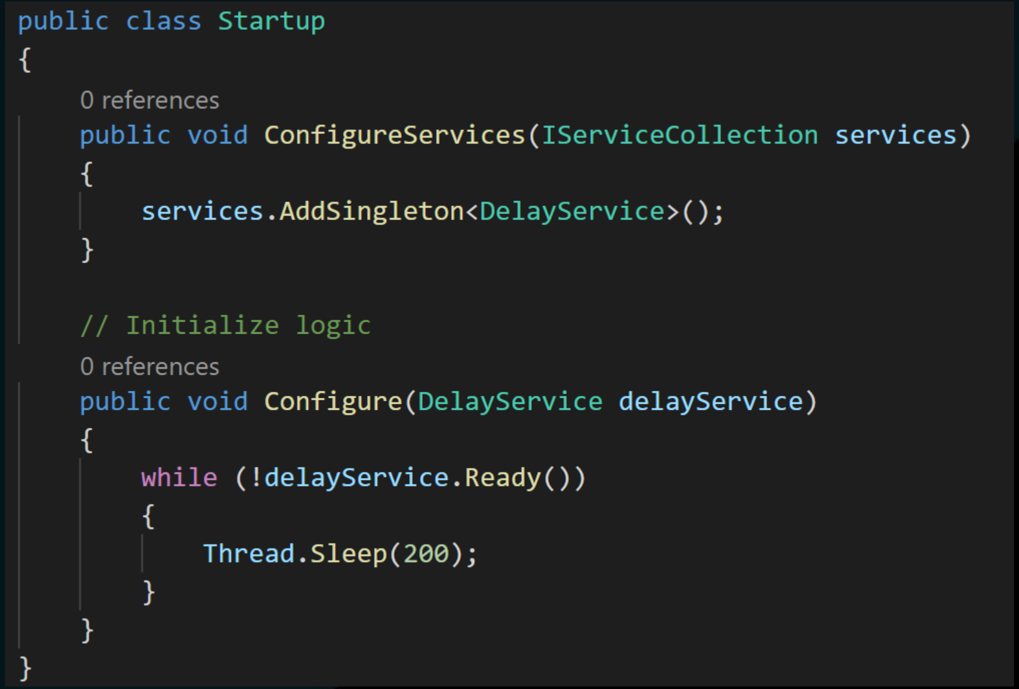


Get Started

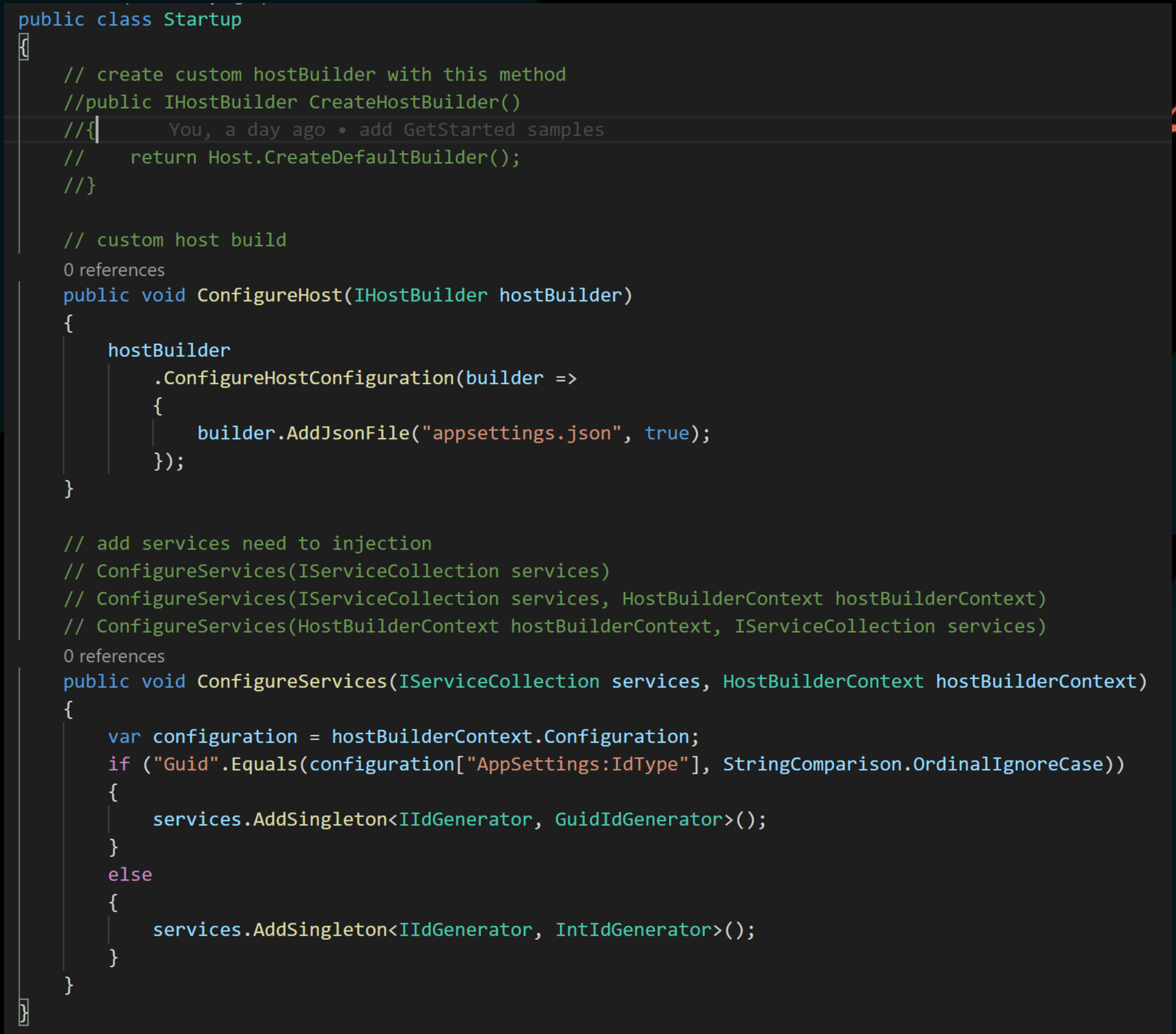


```
public class Startup
{
    public void ConfigureServices(IServiceCollection services)
    {
        services.AddSingleton<IIdGenerator, GuidIdGenerator>();
    }
}
```



```
public class Startup
{
    0 references
    public void ConfigureServices(IServiceCollection services)
    {
        services.AddSingleton<DelayService>();
    }

    // Initialize logic
    0 references
    public void Configure(DelayService delayService)
    {
        while (!delayService.Ready())
        {
            Thread.Sleep(200);
        }
    }
}
```

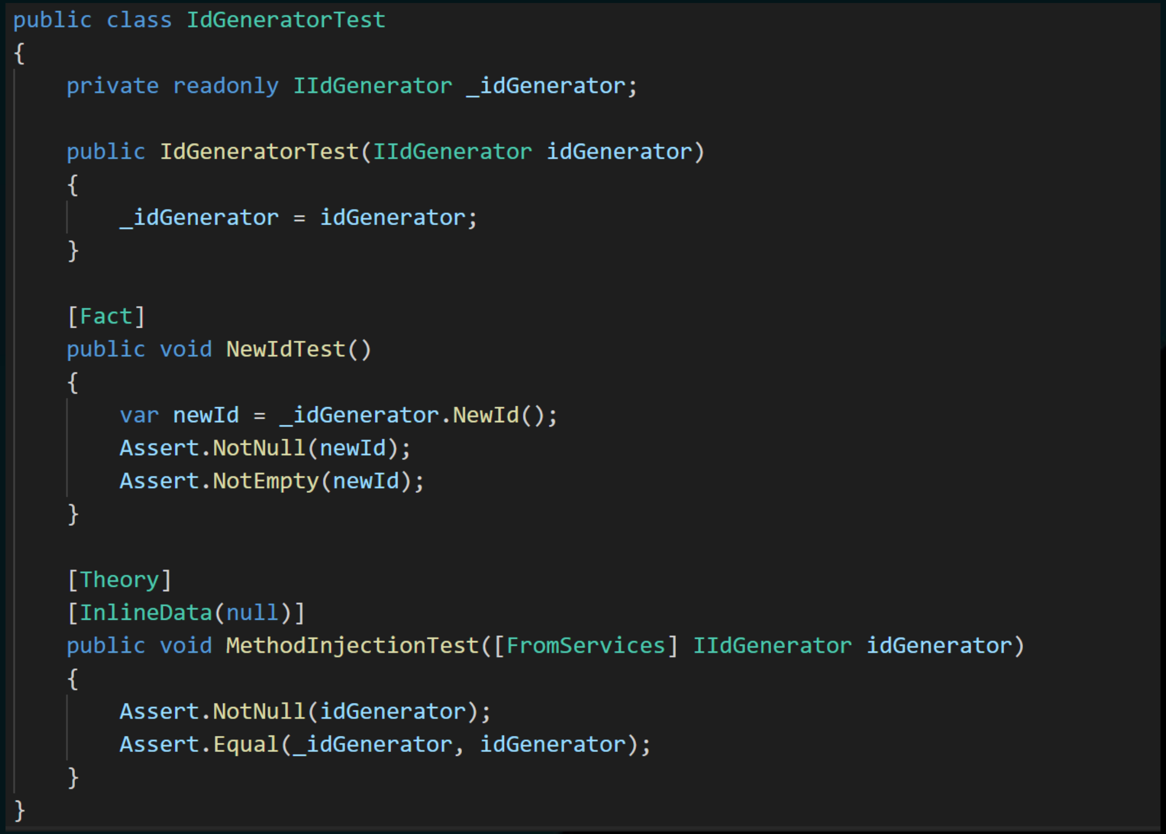


```
public class Startup
{
    // create custom hostBuilder with this method
    //public IHostBuilder CreateHostBuilder()
    //{       You, a day ago • add GetStarted samples
    //    return Host.CreateDefaultBuilder();
    //}

    // custom host build
    0 references
    public void ConfigureHost(IHostBuilder hostBuilder)
    {
        hostBuilder
            .ConfigureHostConfiguration(builder =>
            {
                builder.AddJsonFile("appsettings.json", true);
            });
    }

    // add services need to injection
    // ConfigureServices(IServiceCollection services)
    // ConfigureServices(IServiceCollection services, HostBuilderContext hostBuilderContext)
    // ConfigureServices(HostBuilderContext hostBuilderContext, IServiceCollection services)
    0 references
    public void ConfigureServices(IServiceCollection services, HostBuilderContext hostBuilderContext)
    {
        var configuration = hostBuilderContext.Configuration;
        if ("Guid".Equals(configuration["AppSettings:IdType"], StringComparison.OrdinalIgnoreCase))
        {
            services.AddSingleton<IIdGenerator, GuidIdGenerator>();
        }
        else
        {
            services.AddSingleton<IIdGenerator, IntIdGenerator>();
        }
    }
}
```

Get Started

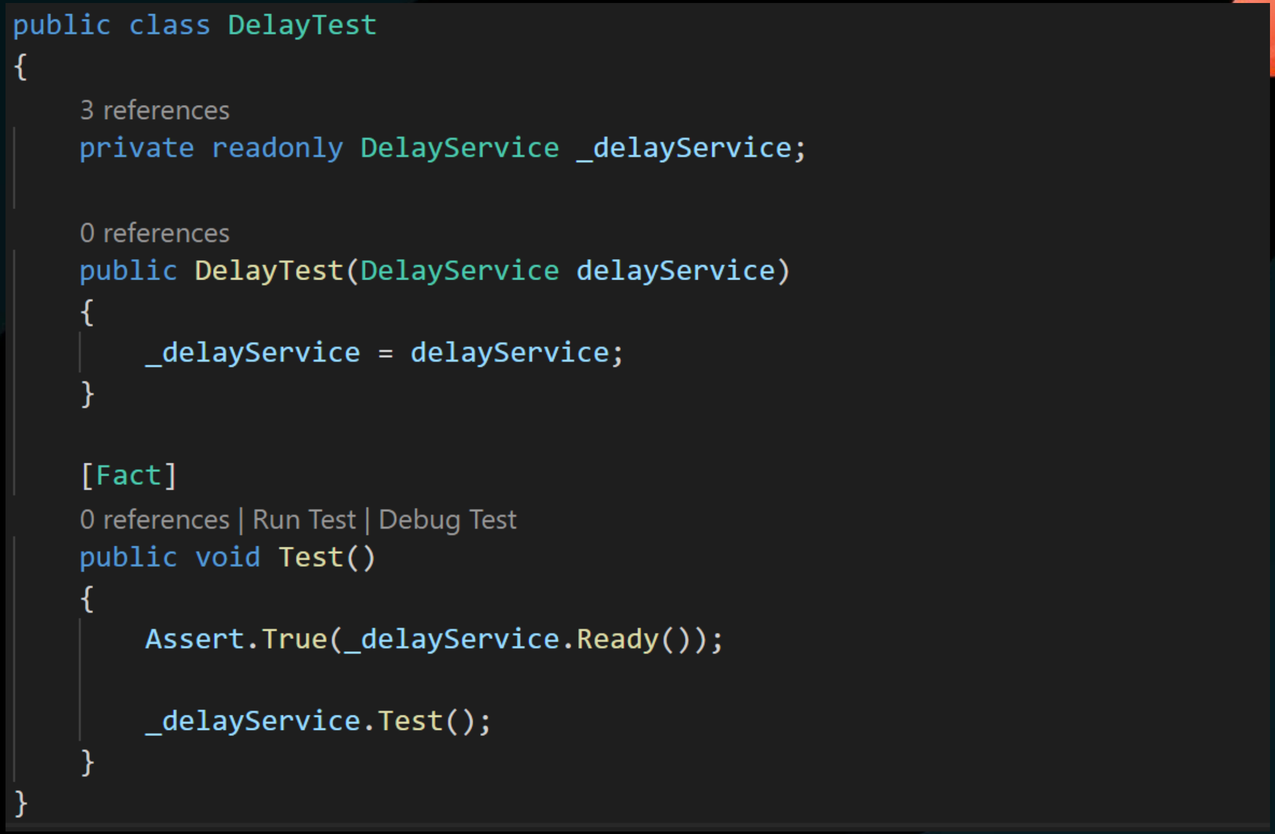


```
public class IdGeneratorTest
{
    private readonly IIdGenerator _idGenerator;

    public IdGeneratorTest(IIdGenerator idGenerator)
    {
        _idGenerator = idGenerator;
    }

    [Fact]
    public void NewIdTest()
    {
        var newId = _idGenerator.NewId();
        Assert.NotNull(newId);
        Assert.NotEmpty(newId);
    }

    [Theory]
    [InlineData(null)]
    public void MethodInjectionTest([FromServices] IIdGenerator idGenerator)
    {
        Assert.NotNull(idGenerator);
        Assert.Equal(_idGenerator, idGenerator);
    }
}
```



```
public class DelayTest
{
    3 references
    private readonly DelayService _delayService;

    0 references
    public DelayTest(DelayService delayService)
    {
        _delayService = delayService;
    }

    [Fact]
    0 references | Run Test | Debug Test
    public void Test()
    {
        Assert.True(_delayService.Ready());

        _delayService.Test();
    }
}
```

Autofac Integration

```csharp
public class Startup
{
    // custom host build
    public void ConfigureHost(IHostBuilder hostBuilder)
    {
        hostBuilder.UseServiceProviderFactory(new AutofacServiceProviderFactory(builder =>
        {
            builder.RegisterType<GuidIdGenerator>()
                .As<IIdGenerator>()
                .SingleInstance()
                ;
        }));
    }
}
```

AspectCore Integration

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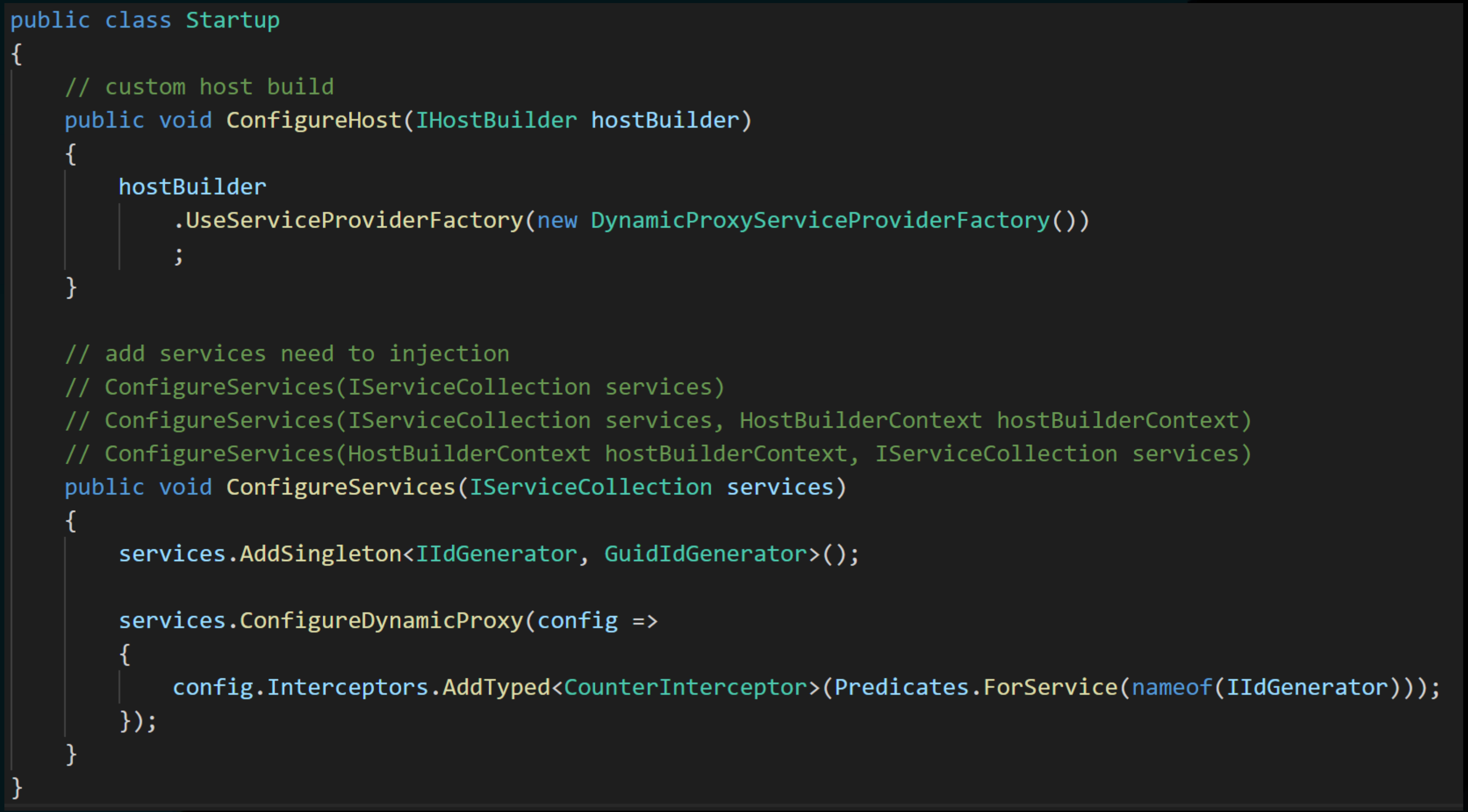


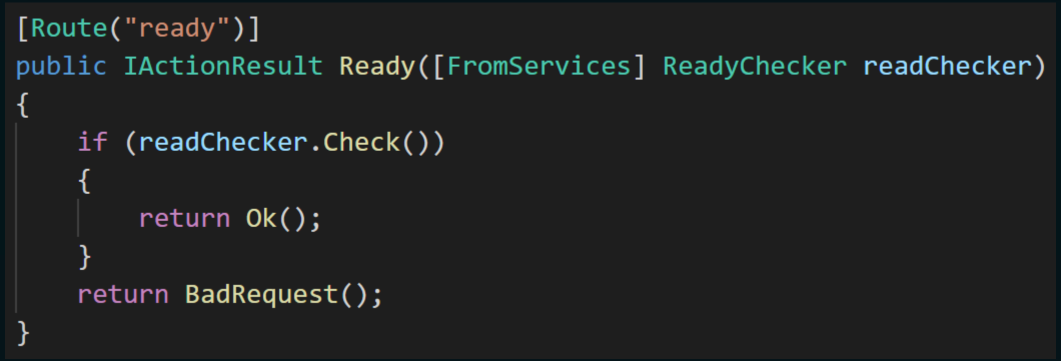
```csharp
public class Startup
{
    // custom host build
    public void ConfigureHost(IHostBuilder hostBuilder)
    {
        hostBuilder
            .UseServiceProviderFactory(new DynamicProxyServiceProviderFactory())
            ;
    }

    // add services need to injection
    // ConfigureServices(IServiceCollection services)
    // ConfigureServices(IServiceCollection services, HostBuilderContext hostBuilderContext)
    // ConfigureServices(HostBuilderContext hostBuilderContext, IServiceCollection services)
    public void ConfigureServices(IServiceCollection services)
    {
        services.AddSingleton<IIdGenerator, GuidIdGenerator>();

        services.ConfigureDynamicProxy(config =>
        {
            config.Interceptors.AddTyped<CounterInterceptor>(Predicates.ForService(nameof(IIdGenerator)));
        });
    }
}
```

TestServer Integration

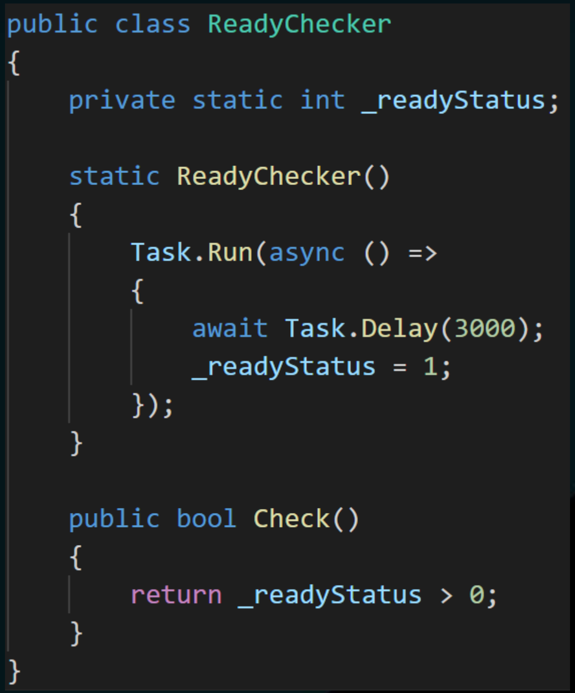
```csharp
public class Startup
{
    // custom host build
    public void ConfigureHost(IHostBuilder hostBuilder)
    {
        hostBuilder
            .ConfigureWebHostDefaults(builder =>
            {
                builder.UseStartup<TestWebApp.Startup>();

                builder.UseTestServer();
                builder.ConfigureServices(services =>
                {
                    services.AddSingleton(sp => sp.GetRequiredService<IHost>()
                        .GetTestClient()
                    );
                });
            })
            ;
    }
}
```

```csharp
public class ApiTest
{
    private readonly HttpClient _httpClient;

    public ApiTest(HttpClient httpClient)
    {
        _httpClient = httpClient;
    }

    [Fact]
    public async Task GetTest()
    {
        var response = await _httpClient.GetAsync("api/test");
        Assert.True(response.IsSuccessStatusCode);

        var responseText = await response.Content.ReadAsStringAsync();
        Assert.NotEmpty(responseText);

        var result = JsonSerializer.Deserialize<Result<bool>>(responseText, new JsonSerializerOptions()
        {
            PropertyNamingPolicy = JsonNamingPolicy.CamelCase,
        });
        Assert.NotNull(result);
        Assert.True(result.Data);
    }
}
```

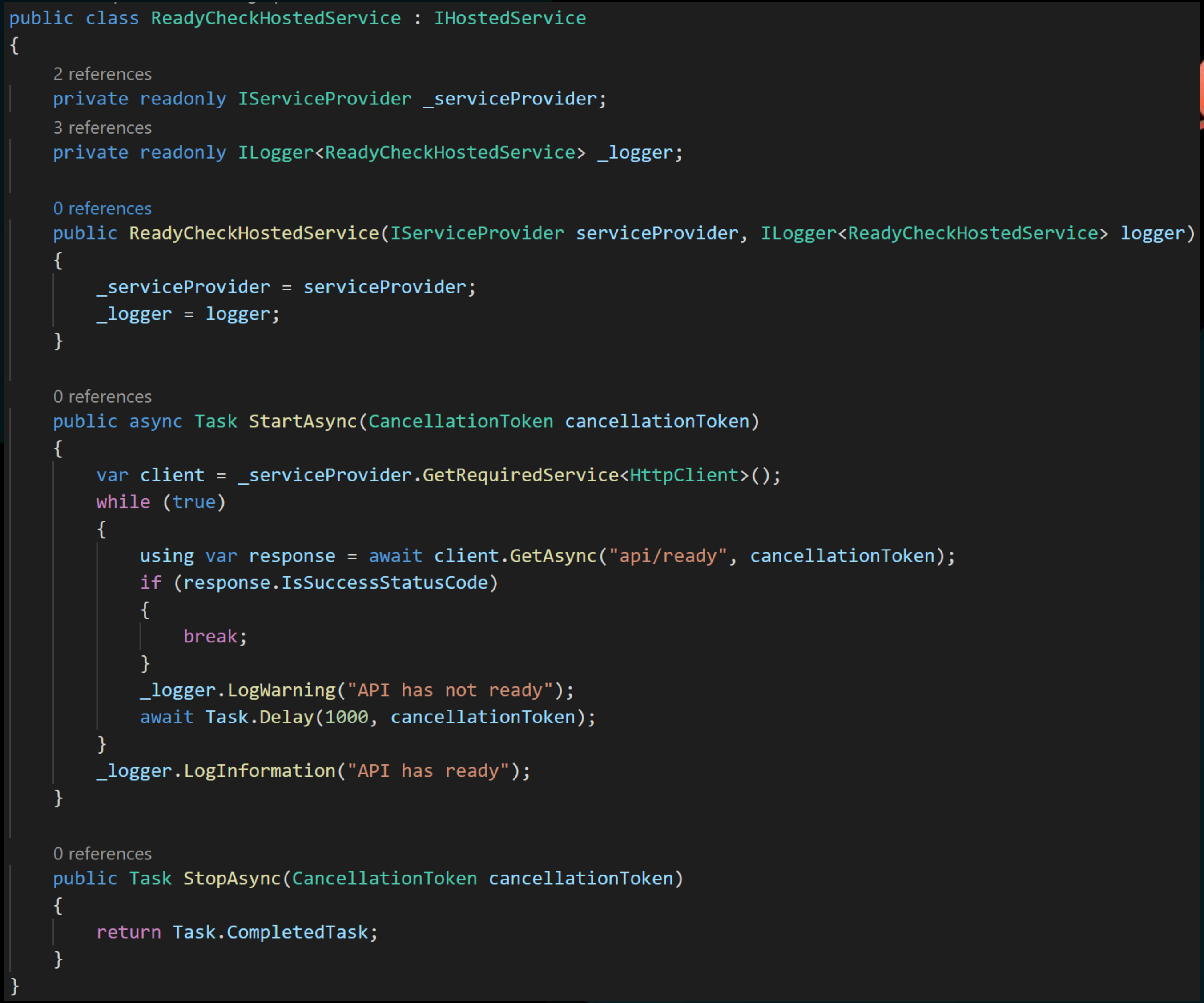
Hosted Service



```csharp
[Route("ready")]
public IActionResult Ready([FromServices] ReadyChecker readChecker)
{
    if (readChecker.Check())
    {
        return Ok();
    }
    return BadRequest();
}
```

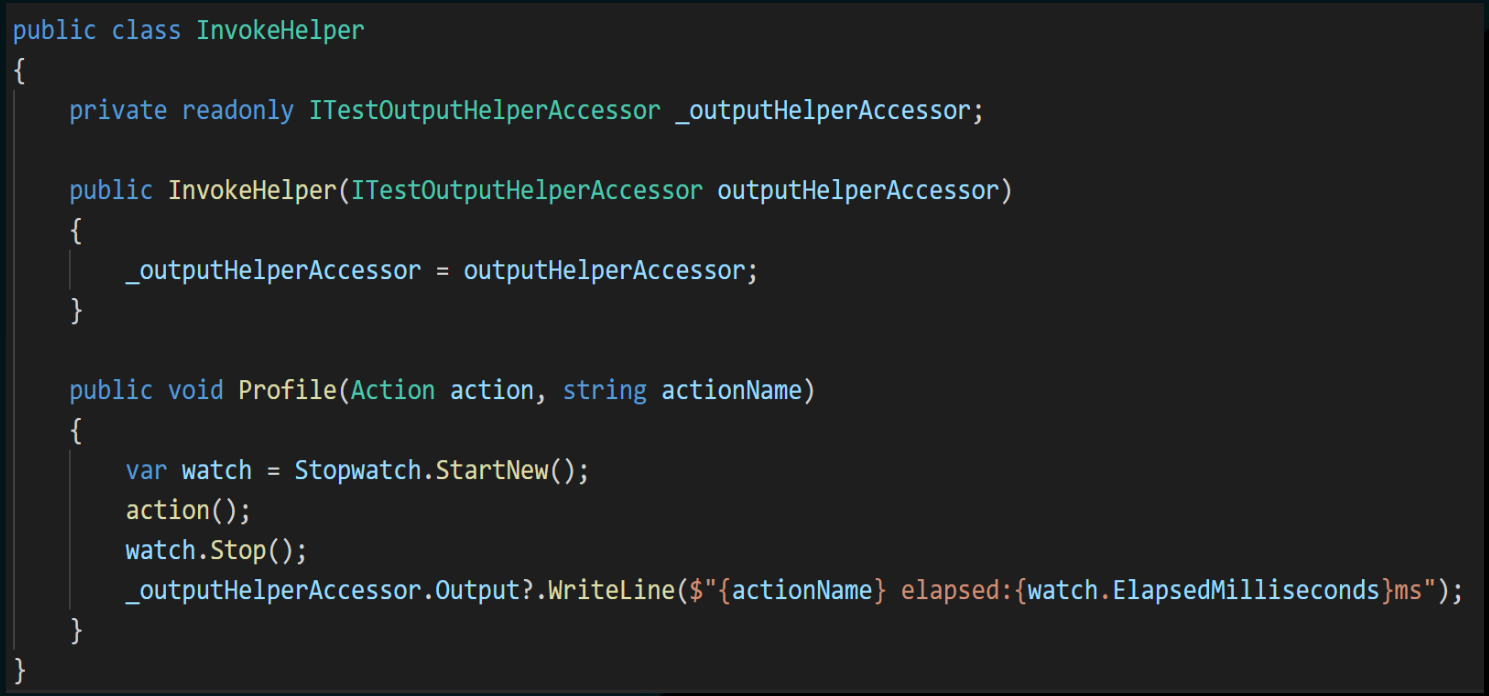


```csharp
public class ReadyChecker
{
    private static int _readyStatus;

    static ReadyChecker()
    {
        Task.Run(async () =>
        {
            await Task.Delay(3000);
            _readyStatus = 1;
        });
    }

    public bool Check()
    {
        return _readyStatus > 0;
    }
}
```

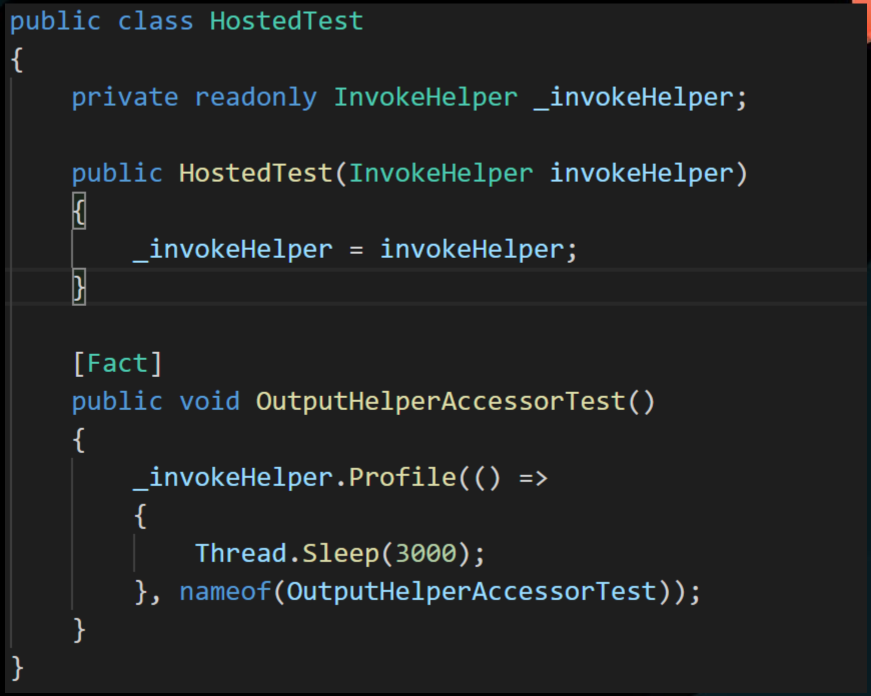


```csharp
public class ReadyCheckHostedService : IHostedService
{
    2 references
    private readonly IServiceProvider _serviceProvider;
    3 references
    private readonly ILogger<ReadyCheckHostedService> _logger;

    0 references
    public ReadyCheckHostedService(IServiceProvider serviceProvider, ILogger<ReadyCheckHostedService> logger)
    {
        _serviceProvider = serviceProvider;
        _logger = logger;
    }

    0 references
    public async Task StartAsync(CancellationToken cancellationToken)
    {
        var client = _serviceProvider.GetRequiredService<HttpClient>();
        while (true)
        {
            using var response = await client.GetAsync("api/ready", cancellationToken);
            if (response.IsSuccessStatusCode)
            {
                break;
            }
            _logger.LogWarning("API has not ready");
            await Task.Delay(1000, cancellationToken);
        }
        _logger.LogInformation("API has ready");
    }

    0 references
    public Task StopAsync(CancellationToken cancellationToken)
    {
        return Task.CompletedTask;
    }
}
```

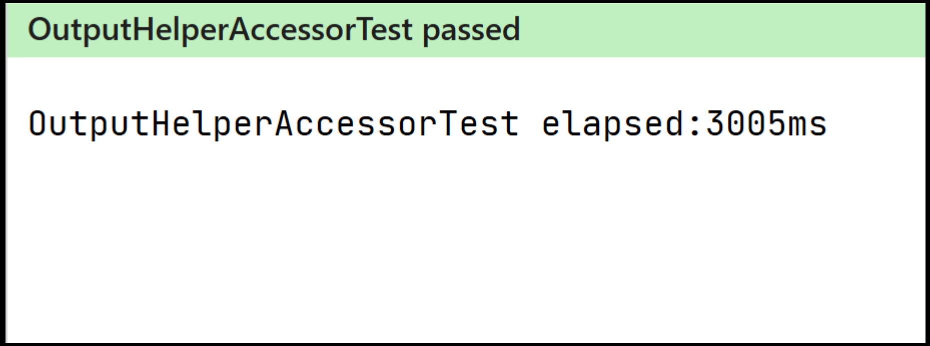
TestOutputHelperAccessor



```csharp
public class InvokeHelper
{
    private readonly ITestOutputHelperAccessor _outputHelperAccessor;

    public InvokeHelper(ITestOutputHelperAccessor outputHelperAccessor)
    {
        _outputHelperAccessor = outputHelperAccessor;
    }

    public void Profile(Action action, string actionName)
    {
        var watch = Stopwatch.StartNew();
        action();
        watch.Stop();
        _outputHelperAccessor.Output?.WriteLine($"{actionName} elapsed:{watch.ElapsedMilliseconds}ms");
    }
}
```



```csharp
public class HostedTest
{
    private readonly InvokeHelper _invokeHelper;

    public HostedTest(InvokeHelper invokeHelper)
    {
        _invokeHelper = invokeHelper;
    }

    [Fact]
    public void OutputHelperAccessorTest()
    {
        _invokeHelper.Profile(() =>
        {
            Thread.Sleep(3000);
        }, nameof(OutputHelperAccessorTest));
    }
}
```



OutputHelperAccessorTest passed

```
OutputHelperAccessorTest elapsed:3005ms
```

Logging

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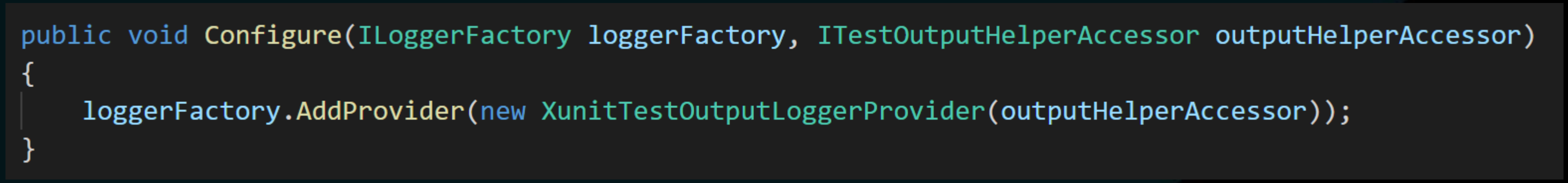
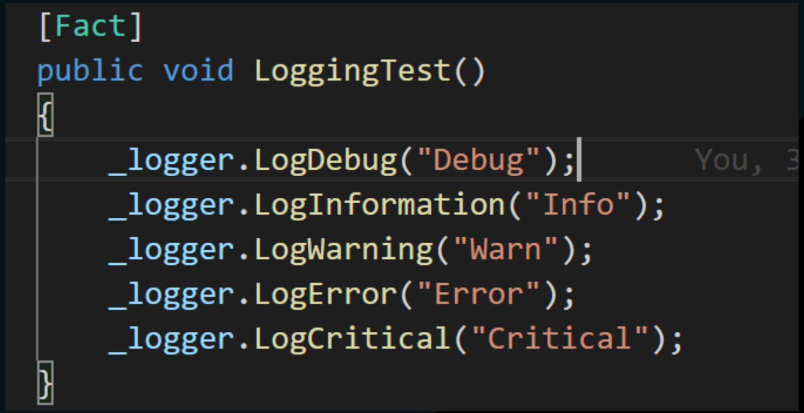
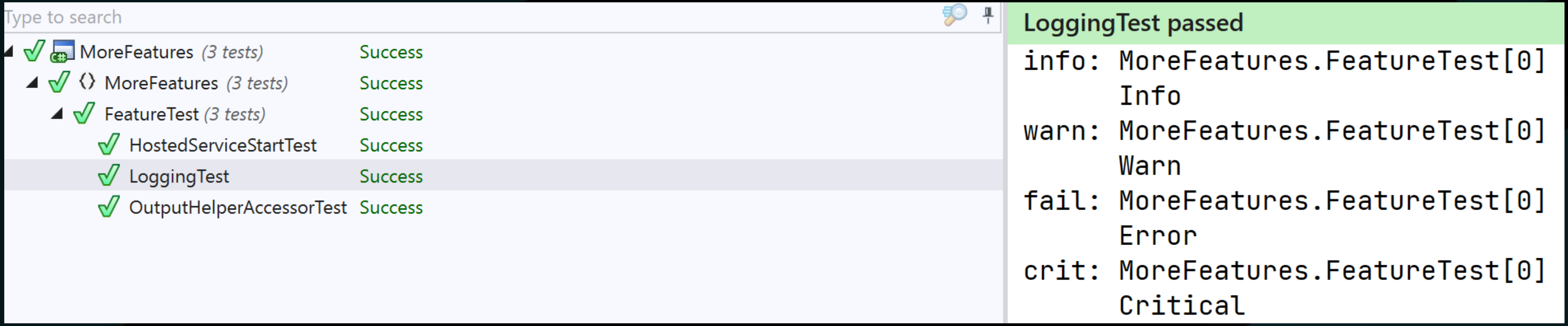


```
public void Configure(ILoggerFactory loggerFactory, ITestOutputHelperAccessor outputHelperAccessor)
{
    loggerFactory.AddProvider(new XunitTestOutputLoggerProvider(outputHelperAccessor));
}
```



```
[Fact]
public void LoggingTest()
{
    _logger.LogDebug("Debug");        You, 3
    _logger.LogInformation("Info");
    _logger.LogWarning("Warn");
    _logger.LogError("Error");
    _logger.LogCritical("Critical");
}
```



Type to search

```
MoreFeatures (3 tests)          Success
  MoreFeatures (3 tests)        Success
    FeatureTest (3 tests)       Success
      HostedServiceStartTest    Success
      LoggingTest               Success
      OutputHelperAccessorTest  Success
```

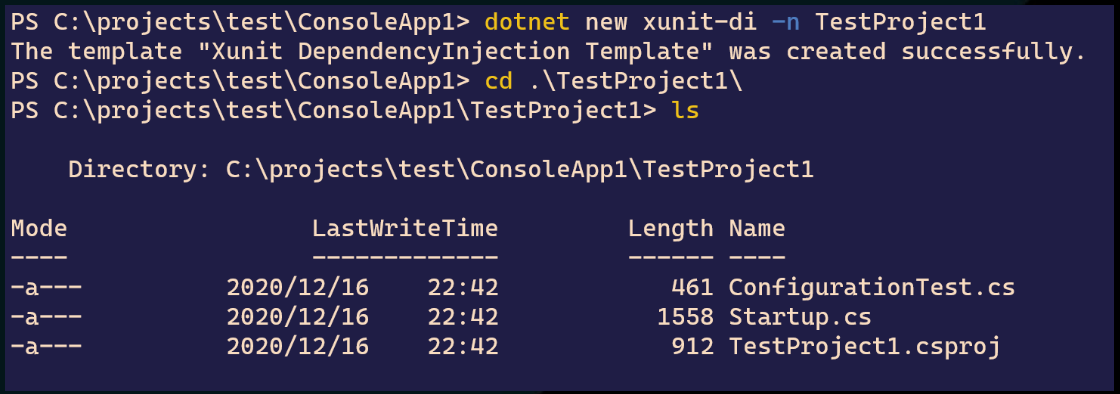
LoggingTest passed

```
info: MoreFeatures.FeatureTest[0]
      Info
warn: MoreFeatures.FeatureTest[0]
      Warn
fail: MoreFeatures.FeatureTest[0]
      Error
crit: MoreFeatures.FeatureTest[0]
      Critical
```

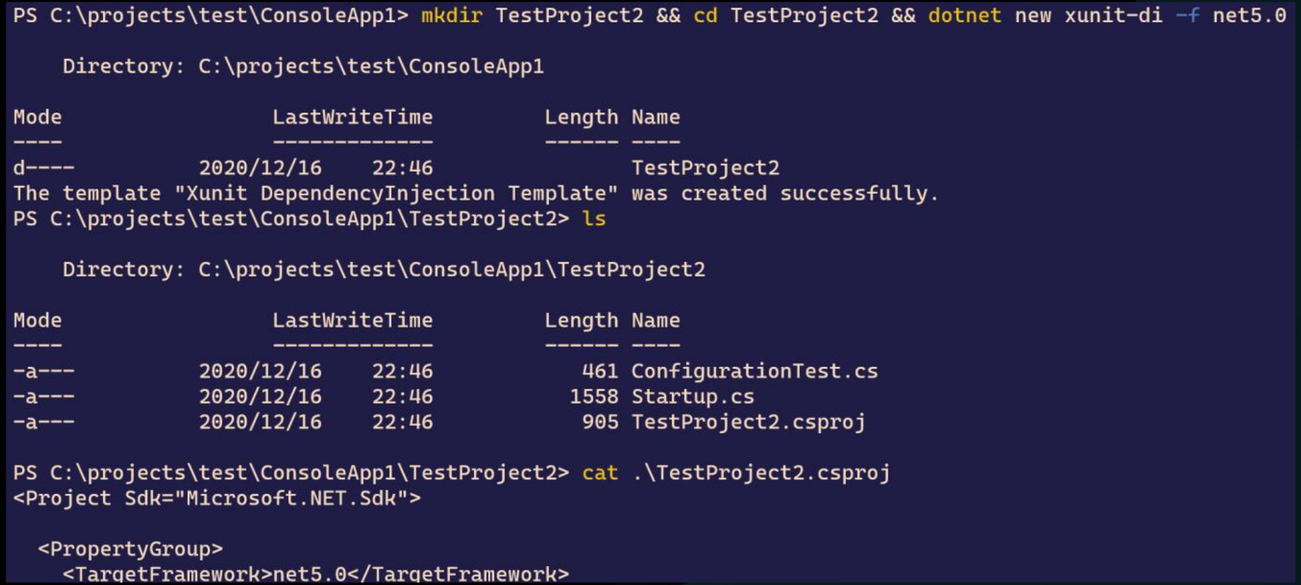
Project Template

安装项目模板：dotnet new -i Xunit.DependencyInjection.Template

创建项目:
dotnet new xunit-di –n TestProjectName
dotnet new xunit-di –n TestProject1 –f net5.0
makedir TestProject2 && cd TestProject2 && dotnet new xunit-di –f net5.0

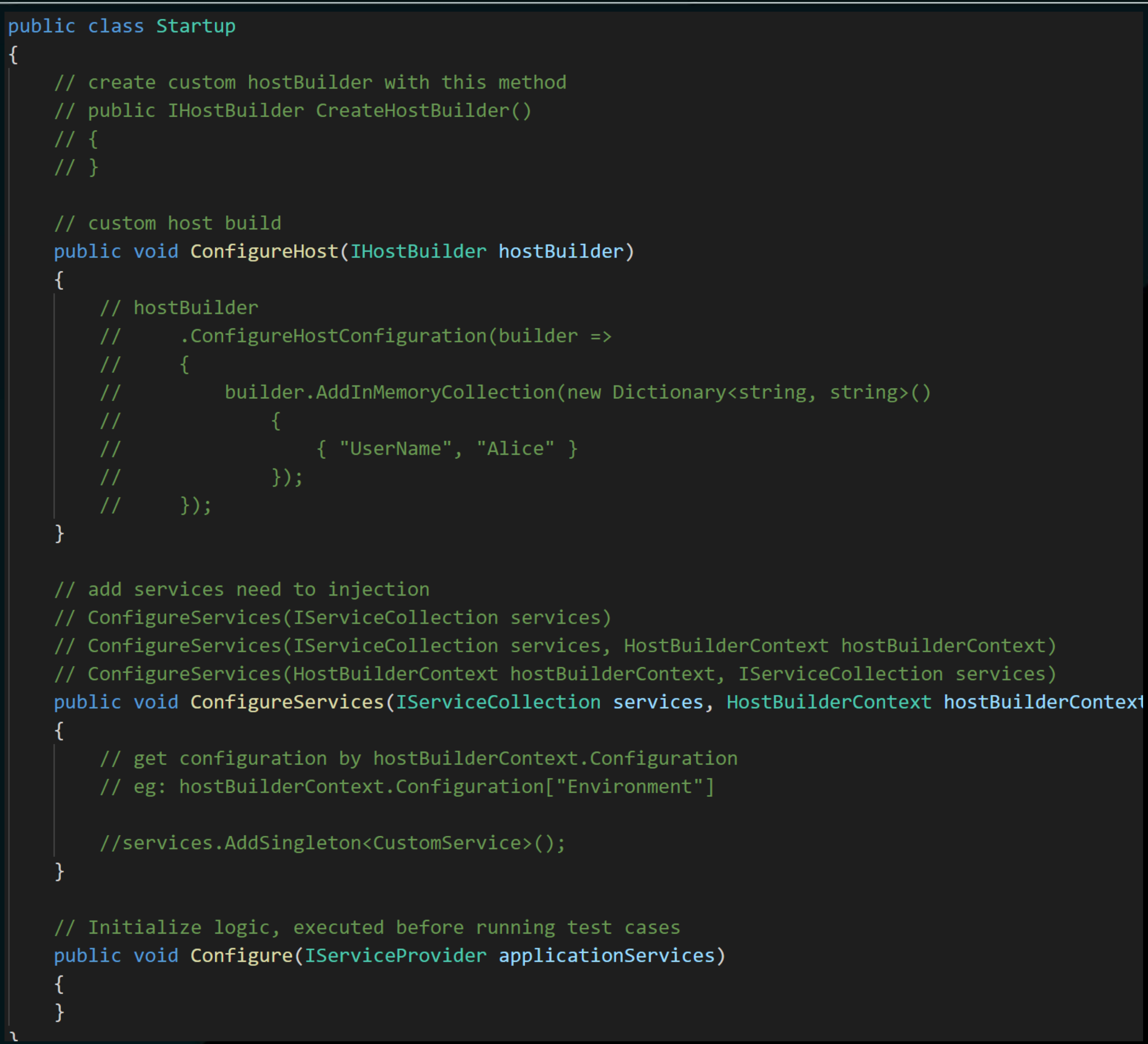


```
PS C:\projects\test\ConsoleApp1> dotnet new xunit-di -n TestProject1
The template "Xunit DependencyInjection Template" was created successfully.
PS C:\projects\test\ConsoleApp1> cd .\TestProject1\
PS C:\projects\test\ConsoleApp1\TestProject1> ls

    Directory: C:\projects\test\ConsoleApp1\TestProject1

Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
-a---          2020/12/16     22:42            461 ConfigurationTest.cs
-a---          2020/12/16     22:42           1558 Startup.cs
-a---          2020/12/16     22:42            912 TestProject1.csproj
```

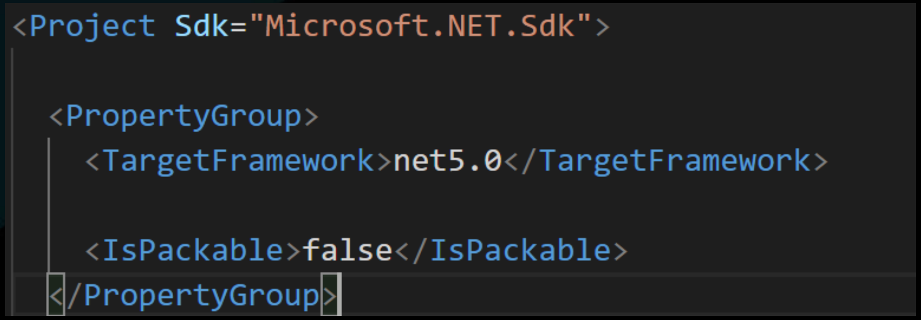


```
PS C:\projects\test\ConsoleApp1> mkdir TestProject2 && cd TestProject2 && dotnet new xunit-di -f net5.0

    Directory: C:\projects\test\ConsoleApp1

Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d----          2020/12/16     22:46                TestProject2
The template "Xunit DependencyInjection Template" was created successfully.
PS C:\projects\test\ConsoleApp1\TestProject2> ls

    Directory: C:\projects\test\ConsoleApp1\TestProject2

Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
-a---          2020/12/16     22:46            461 ConfigurationTest.cs
-a---          2020/12/16     22:46           1558 Startup.cs
-a---          2020/12/16     22:46            905 TestProject2.csproj

PS C:\projects\test\ConsoleApp1\TestProject2> cat .\TestProject2.csproj
<Project Sdk="Microsoft.NET.Sdk">

  <PropertyGroup>
    <TargetFramework>net5.0</TargetFramework>
```

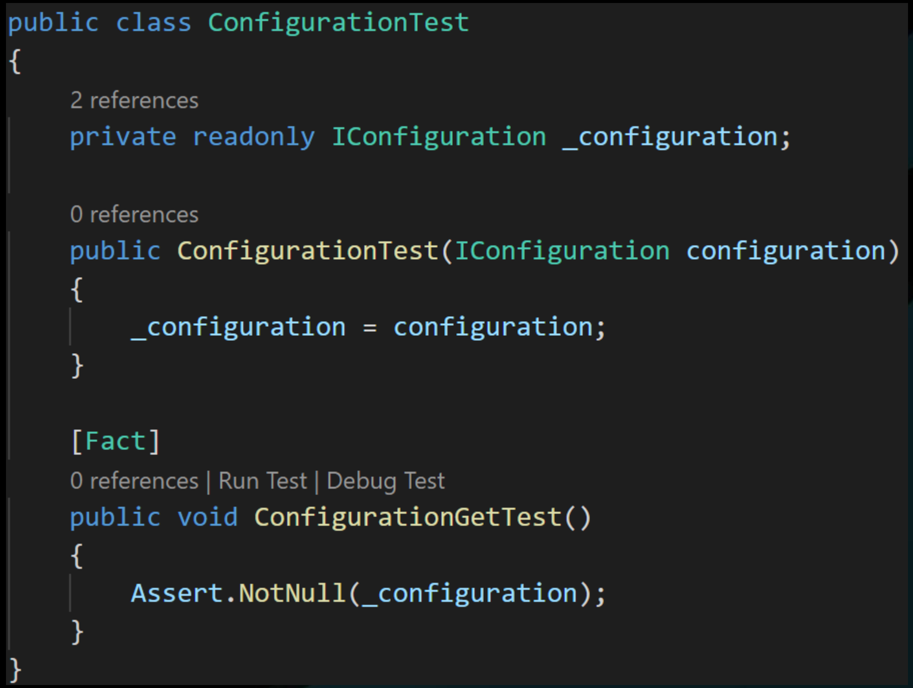
Project Template



```
public class Startup
{
    // create custom hostBuilder with this method
    // public IHostBuilder CreateHostBuilder()
    // {
    // }

    // custom host build
    public void ConfigureHost(IHostBuilder hostBuilder)
    {
        // hostBuilder
        //     .ConfigureHostConfiguration(builder =>
        //     {
        //         builder.AddInMemoryCollection(new Dictionary<string, string>()
        //             {
        //                 { "UserName", "Alice" }
        //             });
        //     });
    }

    // add services need to injection
    // ConfigureServices(IServiceCollection services)
    // ConfigureServices(IServiceCollection services, HostBuilderContext hostBuilderContext)
    // ConfigureServices(HostBuilderContext hostBuilderContext, IServiceCollection services)
    public void ConfigureServices(IServiceCollection services, HostBuilderContext hostBuilderContex
    {
        // get configuration by hostBuilderContext.Configuration
        // eg: hostBuilderContext.Configuration["Environment"]

        //services.AddSingleton<CustomService>();
    }

    // Initialize logic, executed before running test cases
    public void Configure(IServiceProvider applicationServices)
    {
    }
}
```



```
<Project Sdk="Microsoft.NET.Sdk">

  <PropertyGroup>
    <TargetFramework>net5.0</TargetFramework>

    <IsPackable>false</IsPackable>
  </PropertyGroup>
```



```
public class ConfigurationTest
{
    2 references
    private readonly IConfiguration _configuration;

    0 references
    public ConfigurationTest(IConfiguration configuration)
    {
        _configuration = configuration;
    }

    [Fact]
    0 references | Run Test | Debug Test
    public void ConfigurationGetTest()
    {
        Assert.NotNull(_configuration);
    }
}
```

Reference

- https://github.com/pengweiqhca/Xunit.DependencyInjection
- https://github.com/WeihanLi/XunitDependencyInjection.Samples
- https://www.nuget.org/packages/Xunit.DependencyInjection
- https://www.nuget.org/packages/Microsoft.AspNetCore.TestHost
- https://www.nuget.org/packages/Xunit.DependencyInjection.Logging
- https://www.nuget.org/packages/Xunit.DependencyInjection.Template/

Thank You