



Getting started

ArchUnit

Ricardo de Luna Galdino
Software Engineer

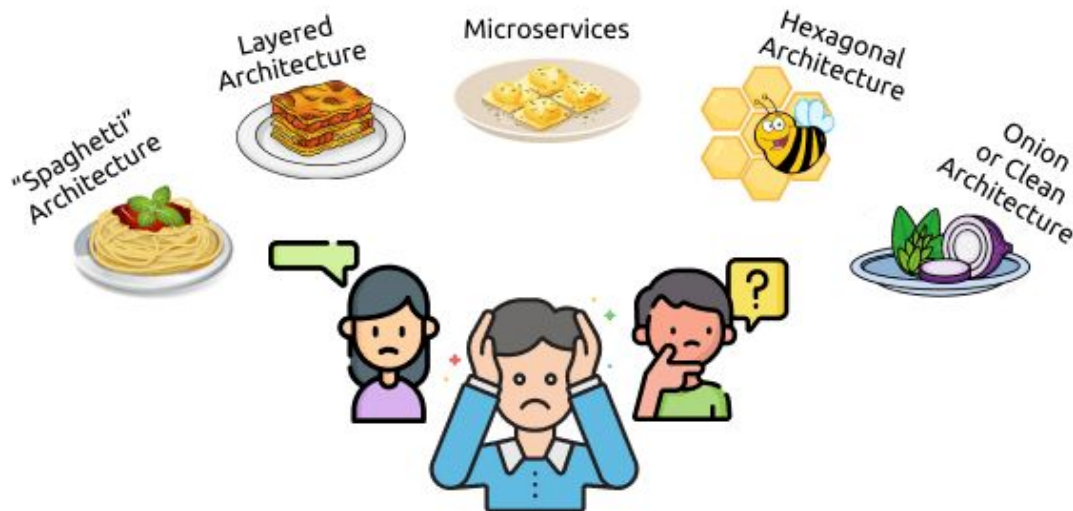
github.com/ricardogaldino/microlearning-archunit-dotnet

Software Architecture

É a **forma como** as “partes de um software”, ou “**componentes estruturais**”, são **organizados** em um sistema.

Traz questões como:

- **Definição da Estrutura** (organização) de um sistema de software;
- Identificação dos **relacionamentos** entre os componentes **Internos** e dos relacionamentos com componentes **Externos**;
- Separação das **responsabilidades** de cada componente, ou seja, o conjunto específico de funções que cada um deve realizar.



Software Architecture

Common web application architectures

Common web application architectures

Leitura:

docs.microsoft.com/en-us/dotnet/architecture/modern-web-apps-azure/common-web-application-architectures

Common web application architectures

Article • 04/14/2022 • 20 minutes to read • 14 contributors



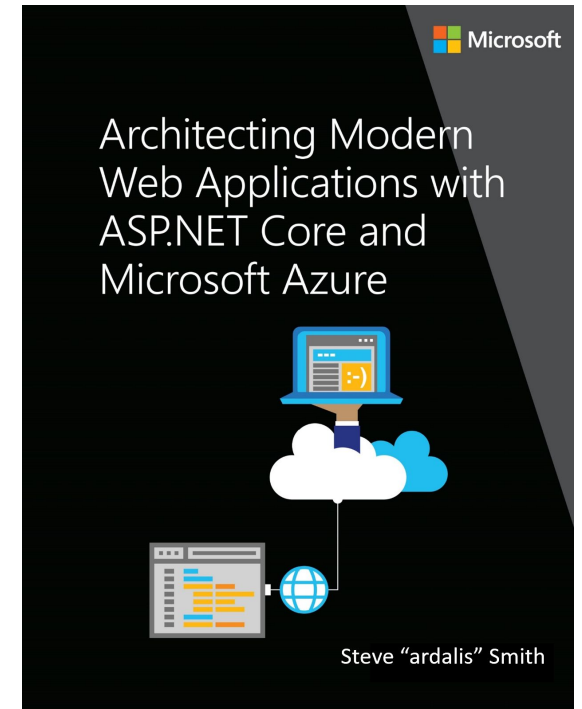
Tip

This content is an excerpt from the eBook, Architect Modern Web Applications with ASP.NET Core and Azure, available on .NET Docs or as a free downloadable PDF that can be read offline.

[Download PDF](#)



"If you think good architecture is expensive, try bad architecture." - Brian Foote and Joseph Yoder



Software Architecture

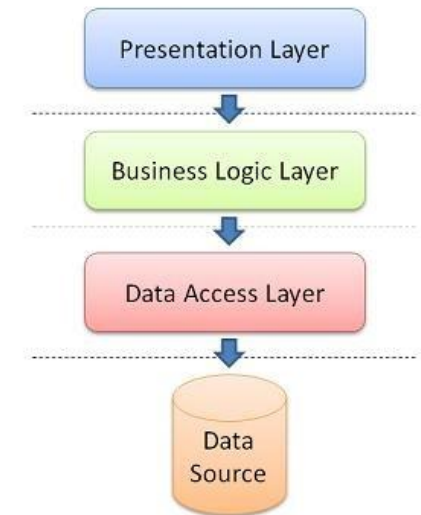
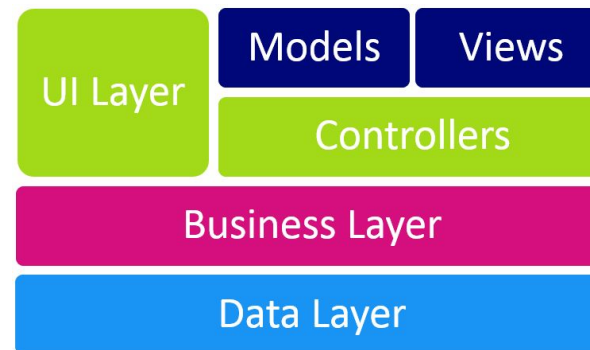
Common web application architectures

Three Layer Architecture

Arquitetura em 3 Camadas

Leitura:

docs.microsoft.com/en-us/dotnet/architecture/modern-web-apps-azure/common-web-application-architectures#traditional-n-layer-architecture-applications



Essas camadas são frequentemente abreviadas como **UI** (Interface do Usuário), **BLL** (Camada de Lógica de Negócios) e **DAL** (Camada de Acesso a Dados). Usando essa arquitetura, os usuários fazem solicitações por meio da camada de interface do usuário, que interage com a BLL. A BLL, por sua vez, pode chamar a DAL para solicitações de acesso a dados. A camada de interface do usuário não deve fazer solicitações à DAL diretamente nem interagir com persistência diretamente por outros meios. Da mesma forma, a BLL só deve interagir com persistência por meio da DAL. Assim, cada camada tem sua própria responsabilidade conhecida.

Software Architecture

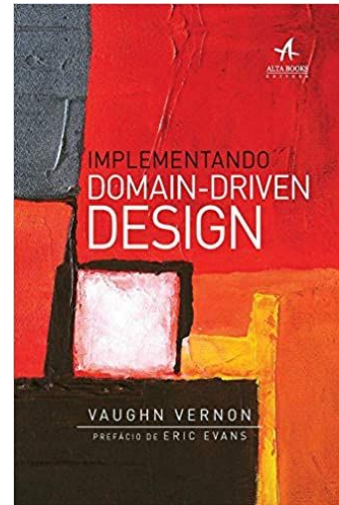
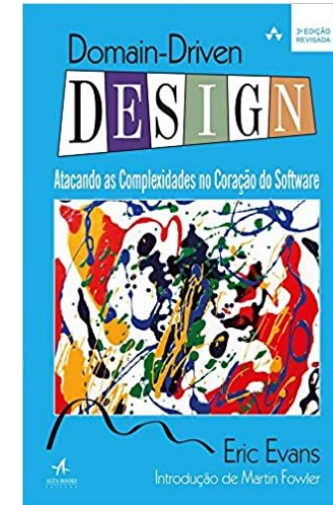
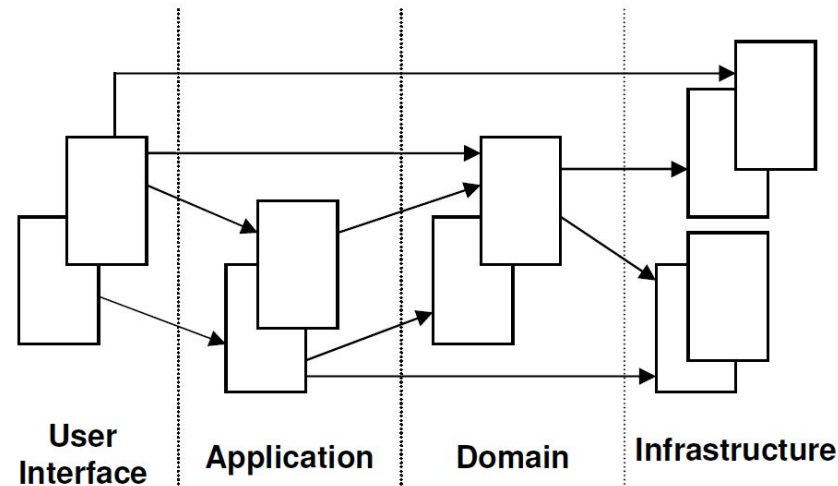
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Domain-Driven Design (DDD)

Arquitetura orientada ao Domínio

(Compreensão dos processos e regras de um domínio)

Leitura: martinfowler.com/bliki/DomainDrivenDesign.html



Tradicionalmente separa as responsabilidades nas **camadas** de “**UI**” (User Interface), “**Application**” (Regras de negócio específicas da Aplicação), “**Domain**” (Entidades e Regras de negócio específicas da Entidade) e “**Infrastructure**” (Banco de Dados e Agentes Externos).

Software Architecture

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Hexagonal Architecture (Ports-and-Adapters), Onion Architecture e Clean Architecture

Os softwares que seguem o princípio da Inversão de Dependência, bem como os princípios de DDD (Design Controlado por Domínio), tendem a chegar a uma arquitetura semelhante. Essa arquitetura foi conhecida por muitos nomes ao longo dos anos. Um dos primeiros nomes foi Arquitetura Hexagonal (Portas e Adaptadores). Mais recentemente, Arquitetura Cebola e agora Arquitetura Limpa.

Embora essas arquiteturas variem um pouco em seus detalhes, elas são muito semelhantes. Todas elas têm o mesmo objetivo, que é a separação de interesses em camadas.

Cada uma tem pelo menos uma camada independente para "Entidades e Regras de negócio específicas da Entidade", "Regras de negócio específicas da Aplicação", "Interface do Usuário", "Banco de Dados" e "Agentes Externos".

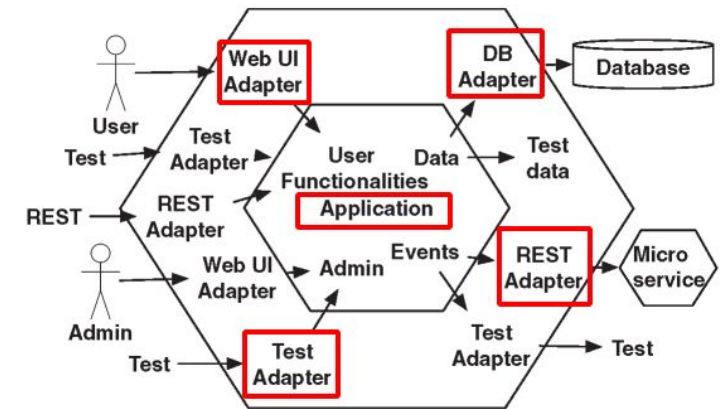
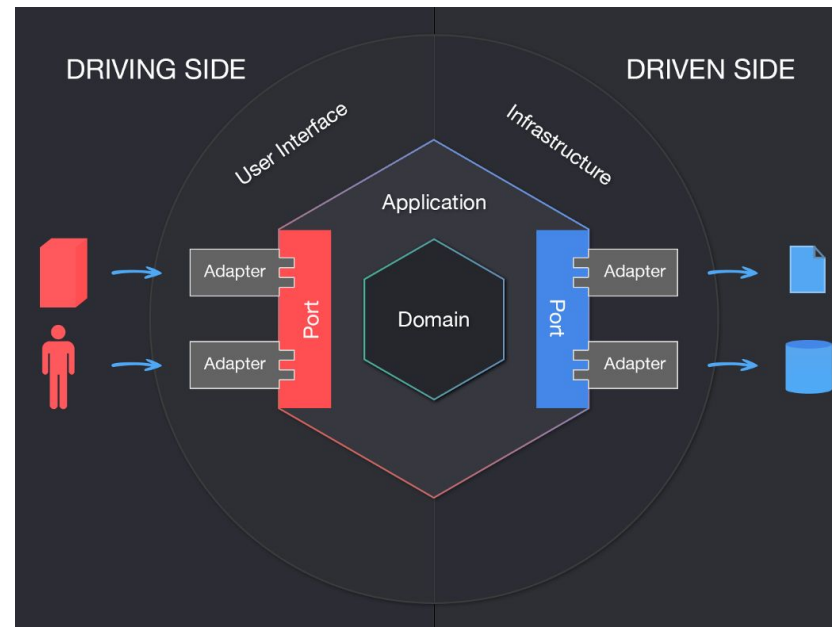
Hexagonal Architecture

(Ports-and-Adapters)

Leitura: alistair.cockburn.us/hexagonal-architecture

Software Architecture

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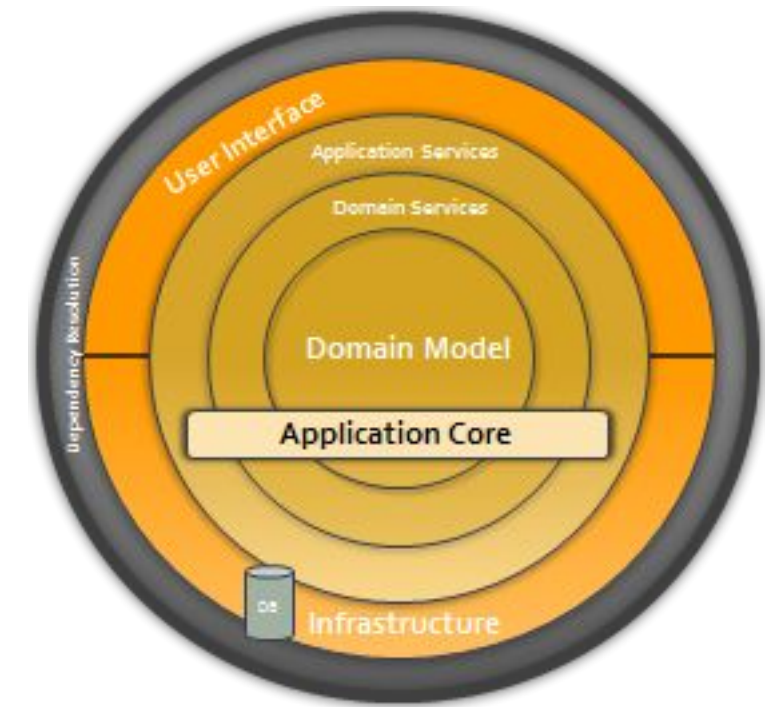
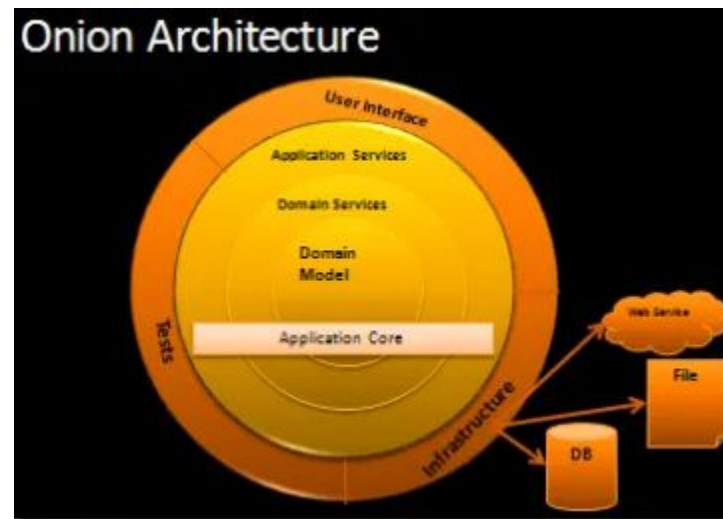
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Onion Architecture

(Arquitetura Cebola)

Leitura: jeffreypalermo.com/2008/07/the-onion-architecture-part-1



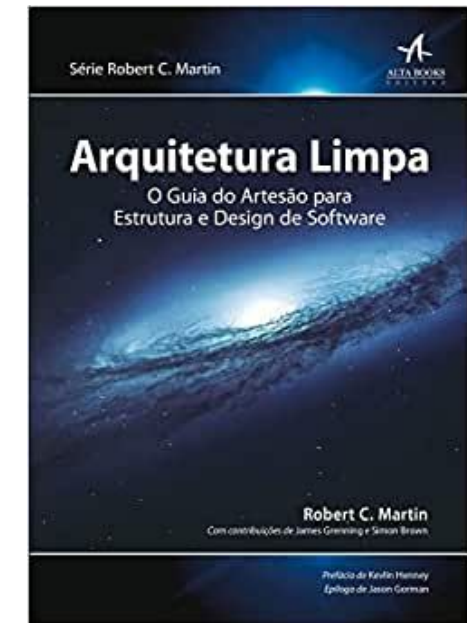
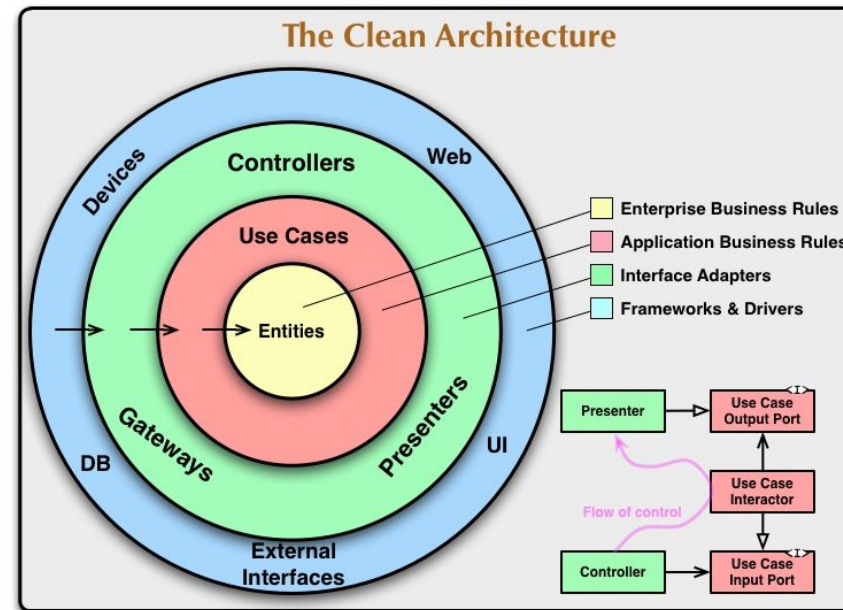
Software Architecture

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Clean Architecture

Arquitetura Limpa

Leitura: blog.cleancoder.com/uncle-bob/2012/08/13/the-clean-architecture.html

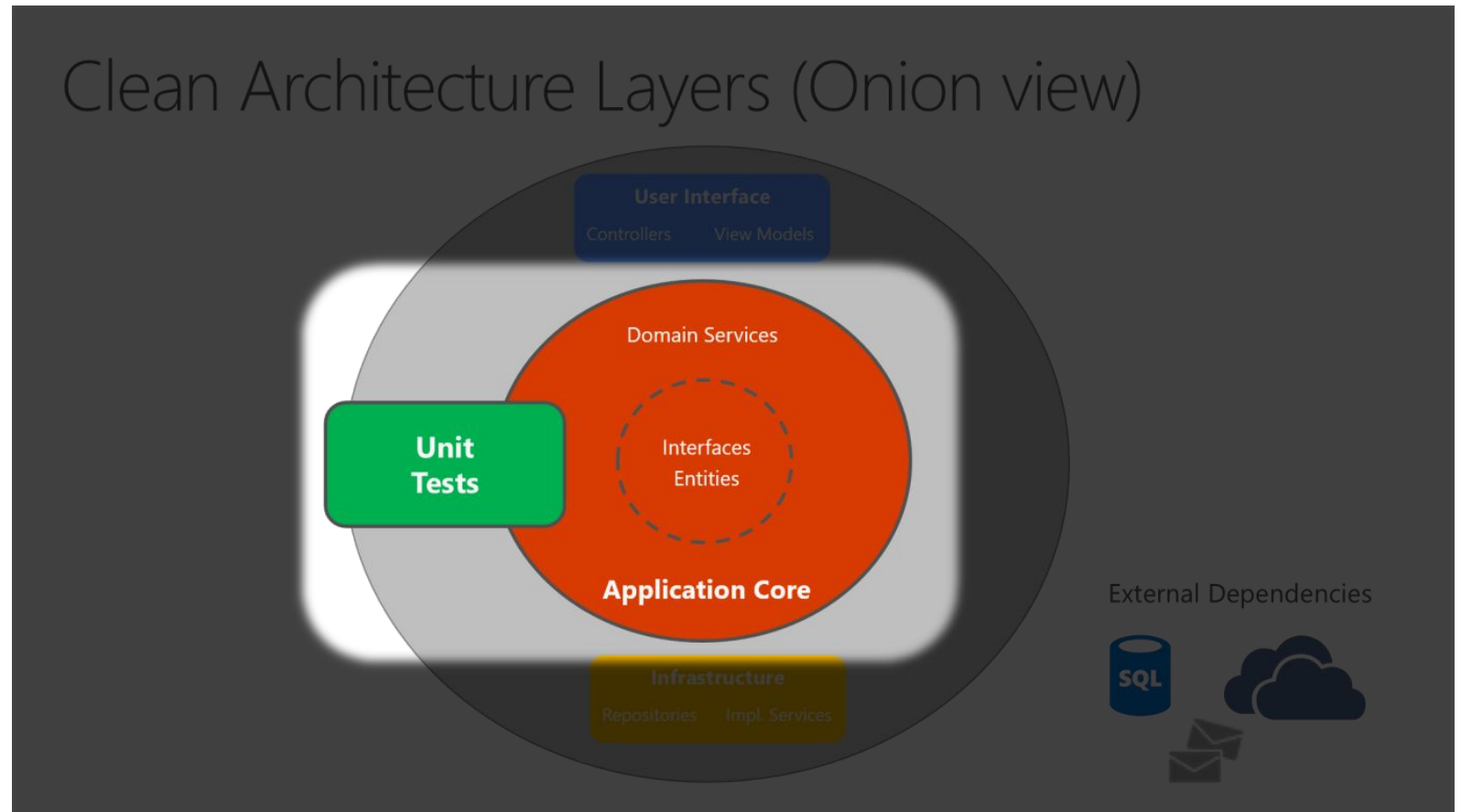


Baseada no Domain-Driven Design (DDD) separa as responsabilidades nas camadas de “Enterprise Business Rules” (**Entities**), “Application Business Rules” (**Use Cases**), “Interface Adapters” (**Controllers (UI)**, **Presenters (UI)** e **Gateways (DB)**) e “Frameworks & Drivers” (**UI**, **DB** e **Externals Agents**)

Software Architecture

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Unit Test Architecture

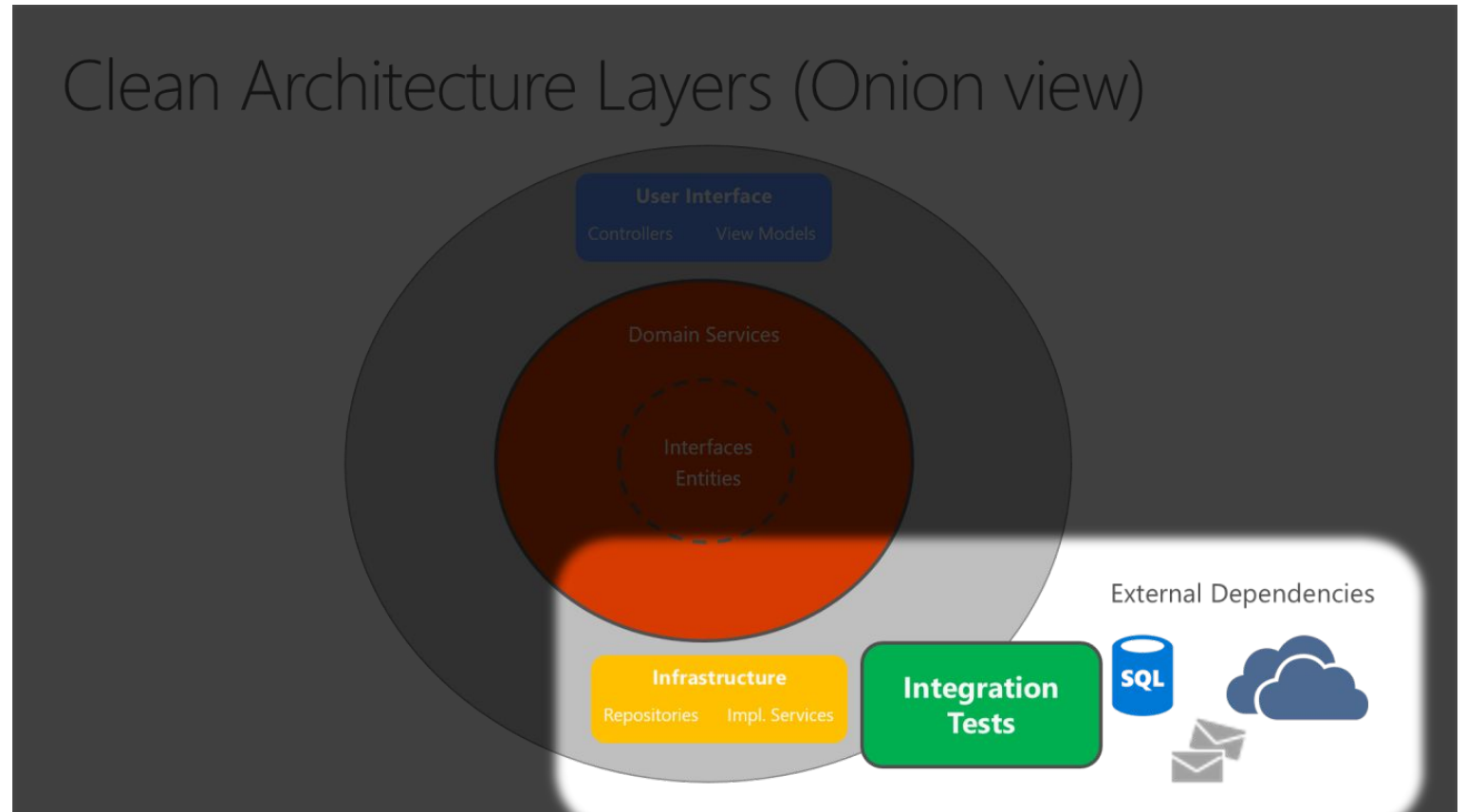


Com as arquiteturas baseadas no **Domain-Driven Design (DDD)** conseguimos isolar os **Testes Unitários** somente para as camadas que contém **Regra de Negócio: "Application"** e **"Domain"**. A Regra de negócio não deve e não depende dos componentes de UI, Database ou Agentes Externos!

Software Architecture

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Integration Test Architecture



Com as arquiteturas baseadas no **Domain-Driven Design (DDD)** conseguimos isolar os **Testes de Integração** somente para as **camadas de comunicação externa: "UI" e "Infrastructure"** (Banco de Dados e Agentes Externos).

ArchUnit .NET

Architectural Unit Testing



ArchUnit .NET é uma biblioteca simples e gratuita para **verificar a arquitetura do código** em C#. É o fork do ArchUnit Java.

Com ela podemos verificar **dependências** entre **camadas**, nomenclatura de **classes**, **membros**, **interfaces** e muito mais.

Seu foco principal é **testar** automaticamente a **arquitetura** e as **regras de codificação**.

ArchUnit .NET

Architectural Unit Testing

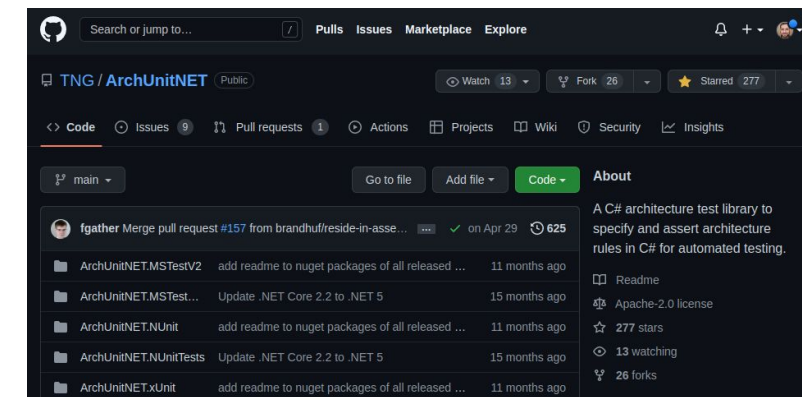
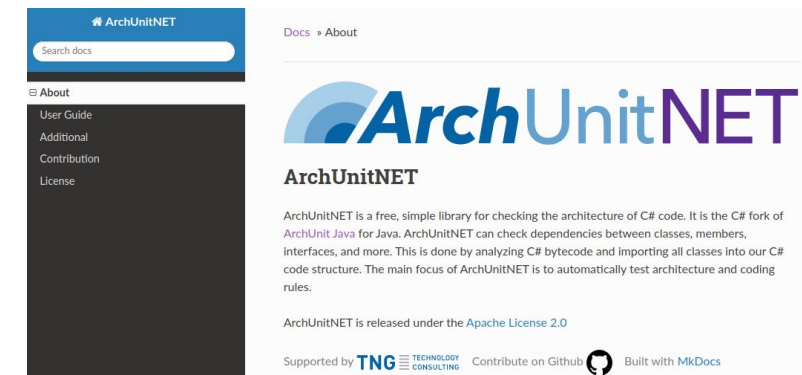
Referências

- **Docs:** archunitnet.readthedocs.io/en/latest
- **Git**Hub: github.com/TNG/ArchUnitNET
- **NuGet:** www.nuget.org/profiles/fgather



fgather

-  **TngTech.ArchUnitNET** by: fgather
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ArchUnit .NET

Architectural Unit Testing

Por onde começar?

Definição de regras, camadas e componentes a serem avaliados

Componentes:

- Em nosso exemplo estaremos avaliando as camadas “Application”, “Domain”, “Infrastructure” e “UI” e os componentes “Controller”, “Service” e “Repository”.

Regras:

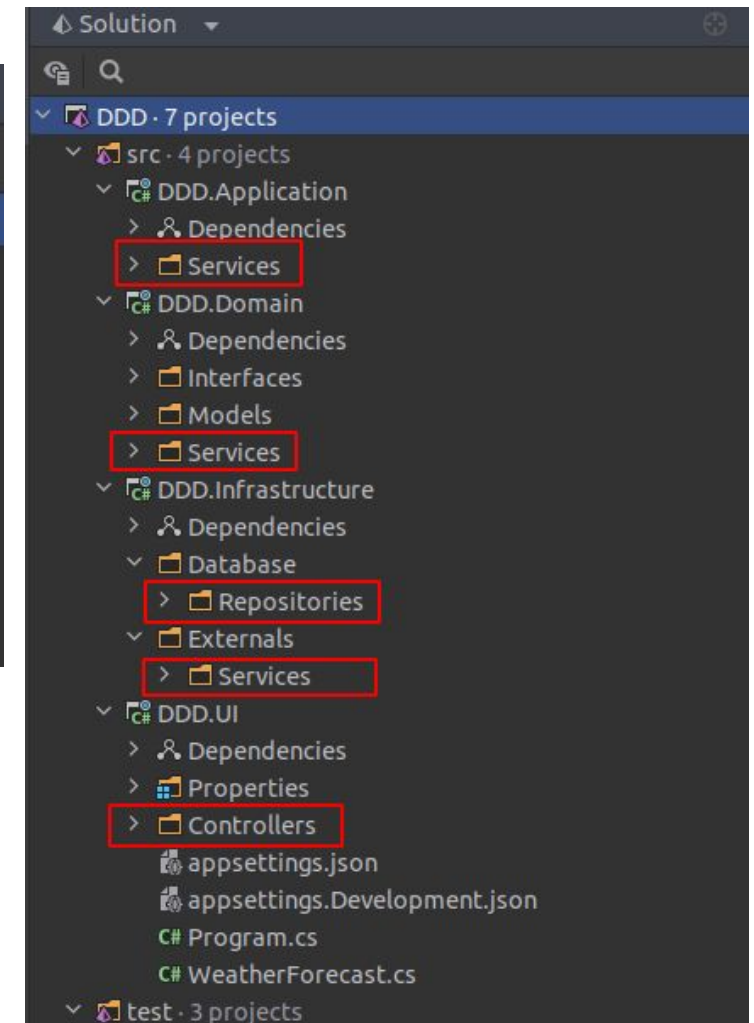
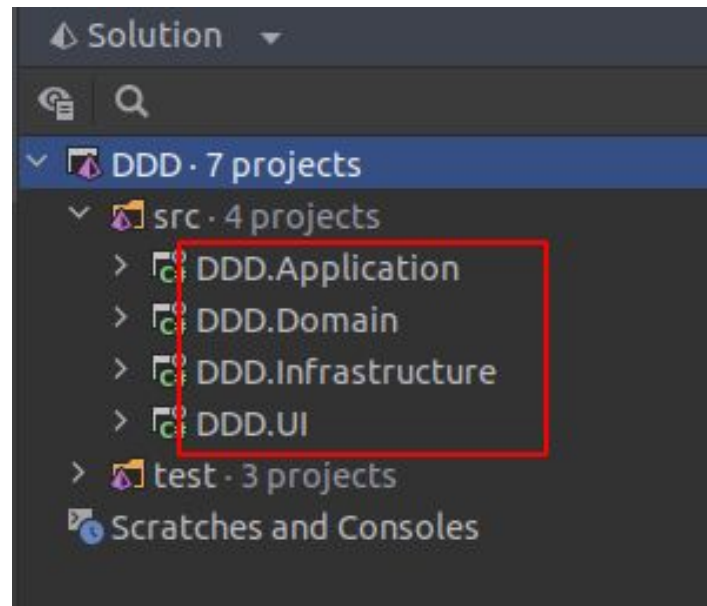
- **Nomenclatura** de Classes e Interfaces;
- **Namespace**;
- **Dependência** entre Camadas;
- **Injeção de Dependência**.

ArchUnit .NET

Architectural Unit Testing

Camadas e Componentes

Domain-Driven Design (DDD)

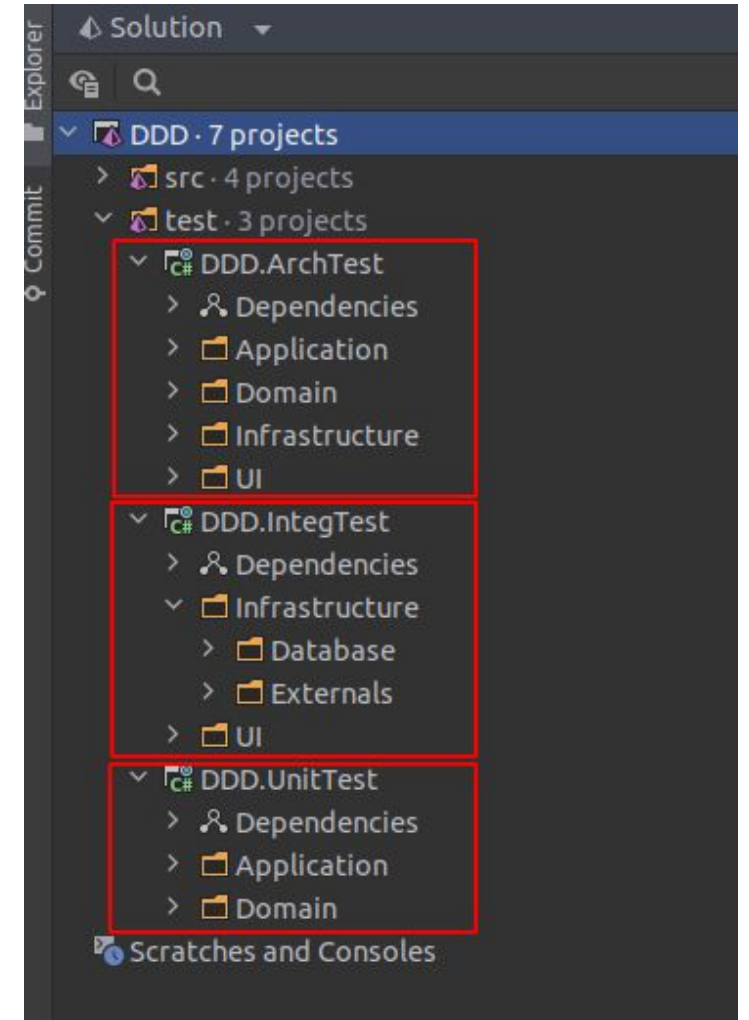
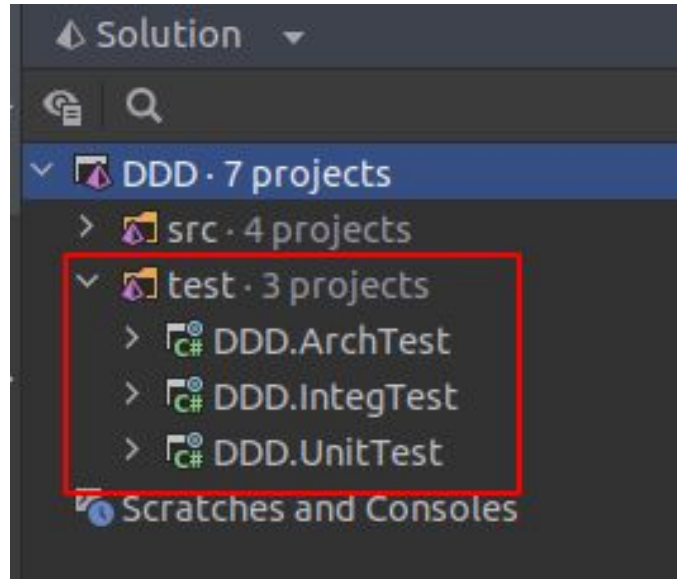


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Testes e Camadas

Domain-Driven Design (DDD)

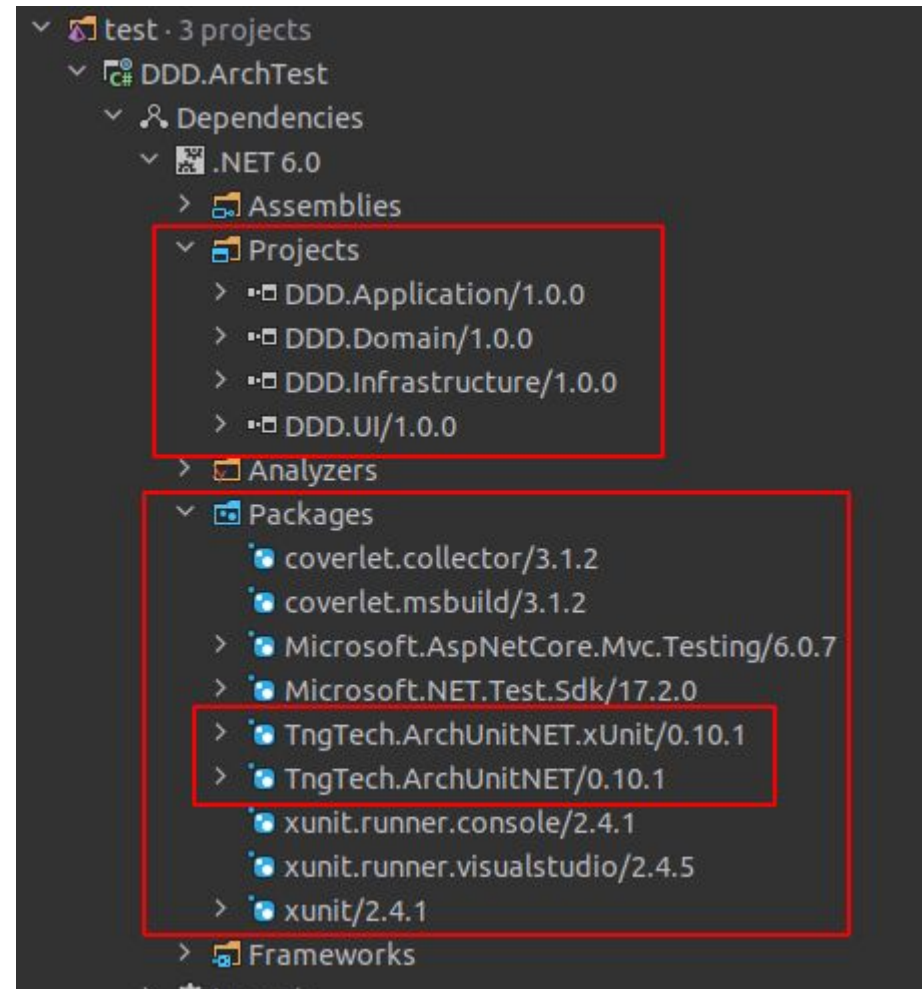


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ArchUnit Libraries

NuGet Packages

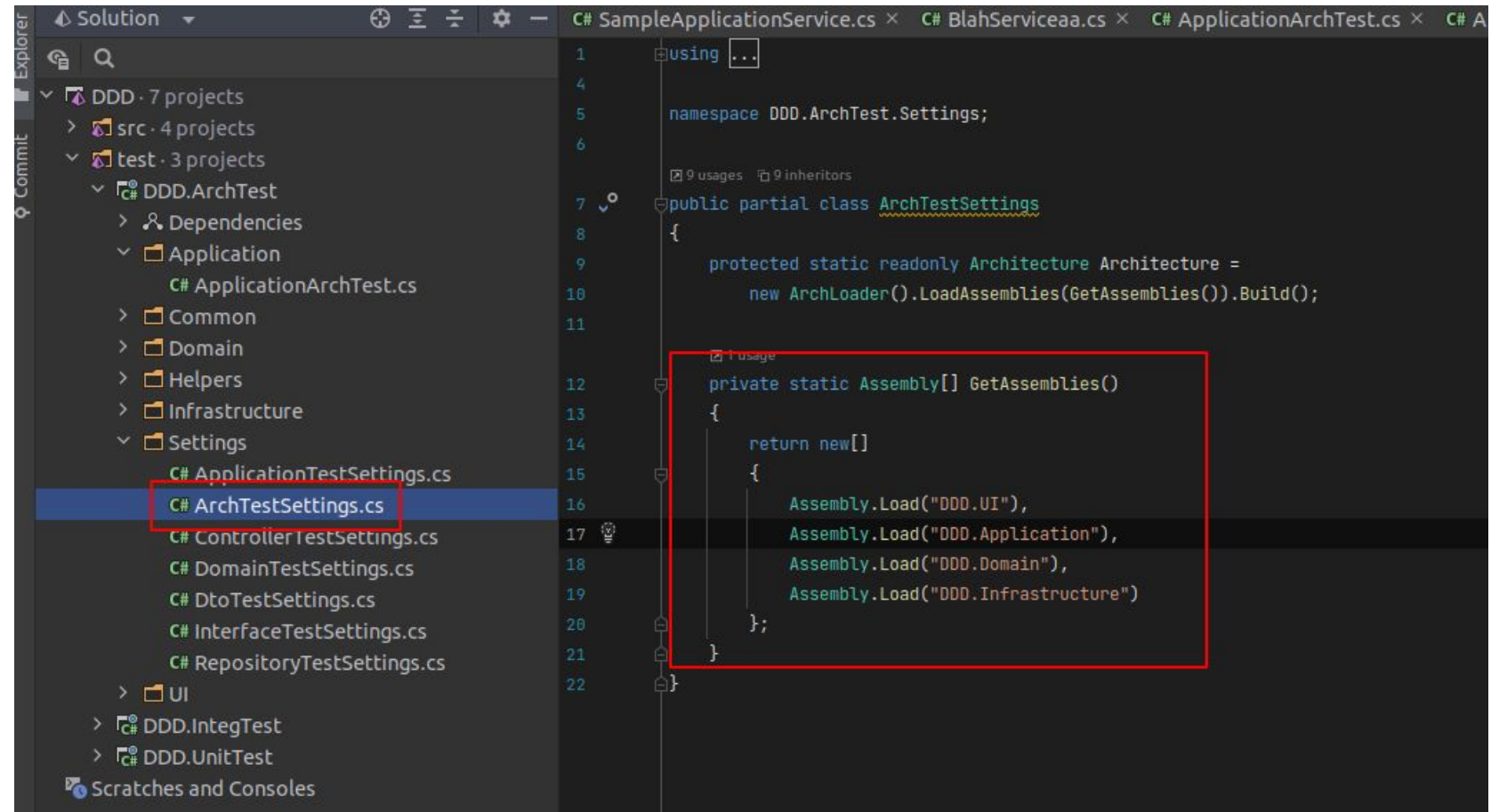


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ArchUnit Settings

Definição da Arquitetura

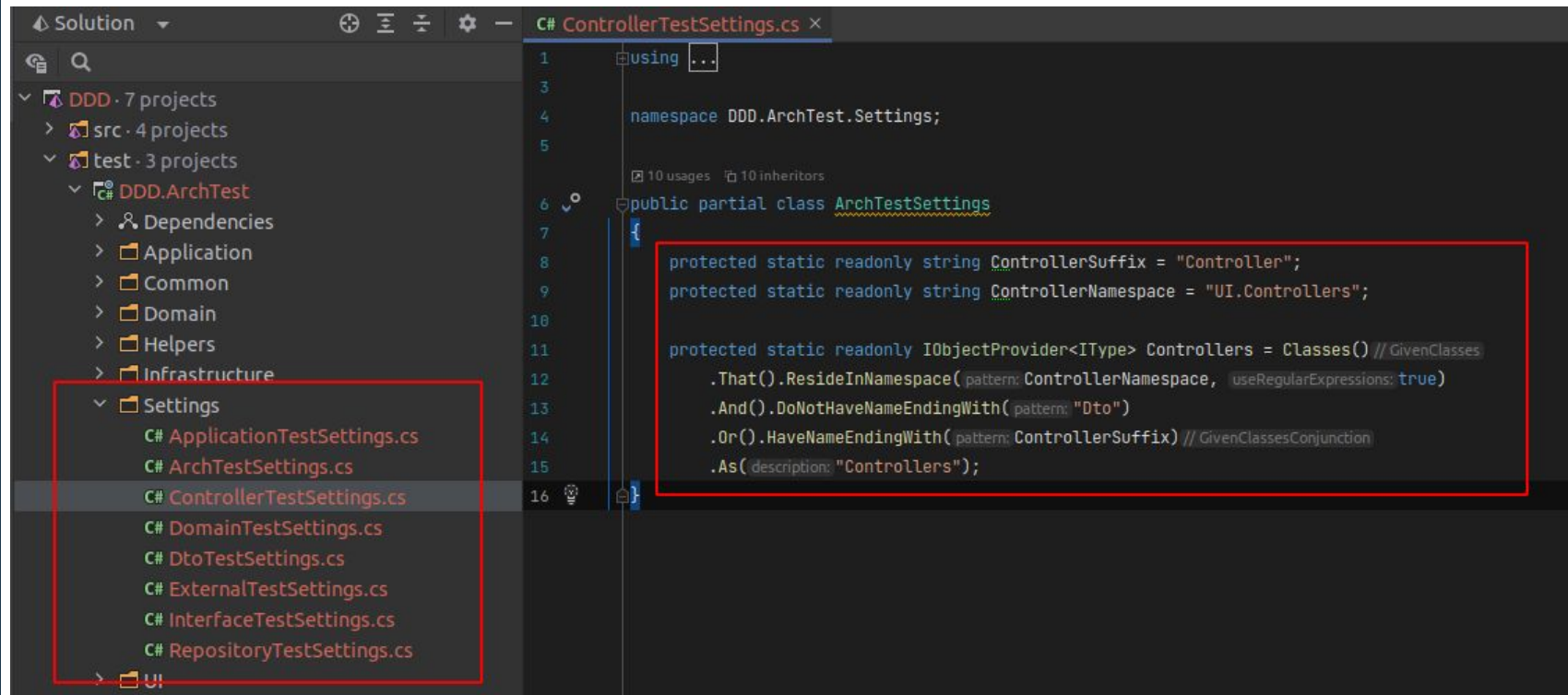


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ArchUnit Settings

Definição dos Componentes

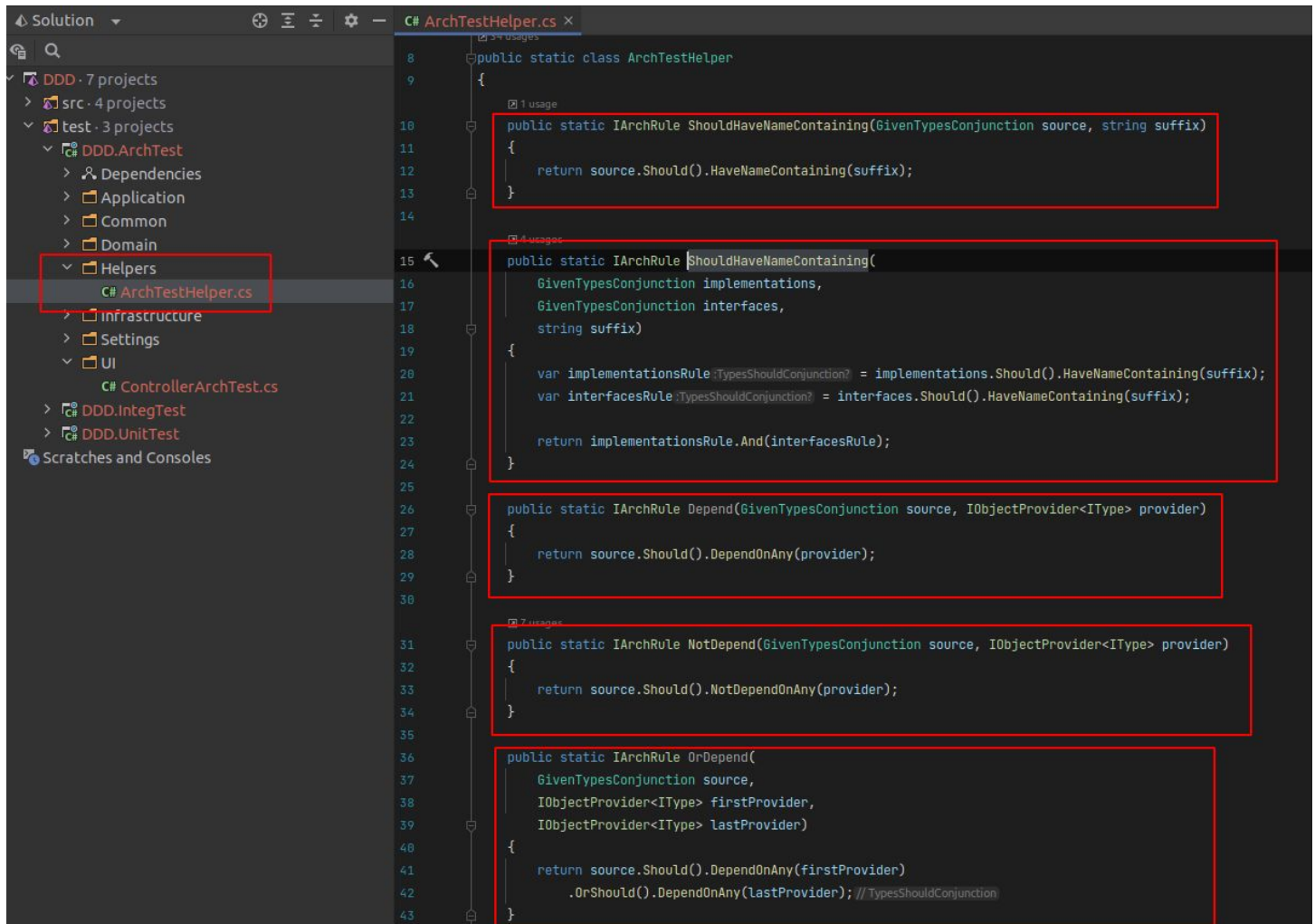


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ArchUnit Rules

Definição das Regras



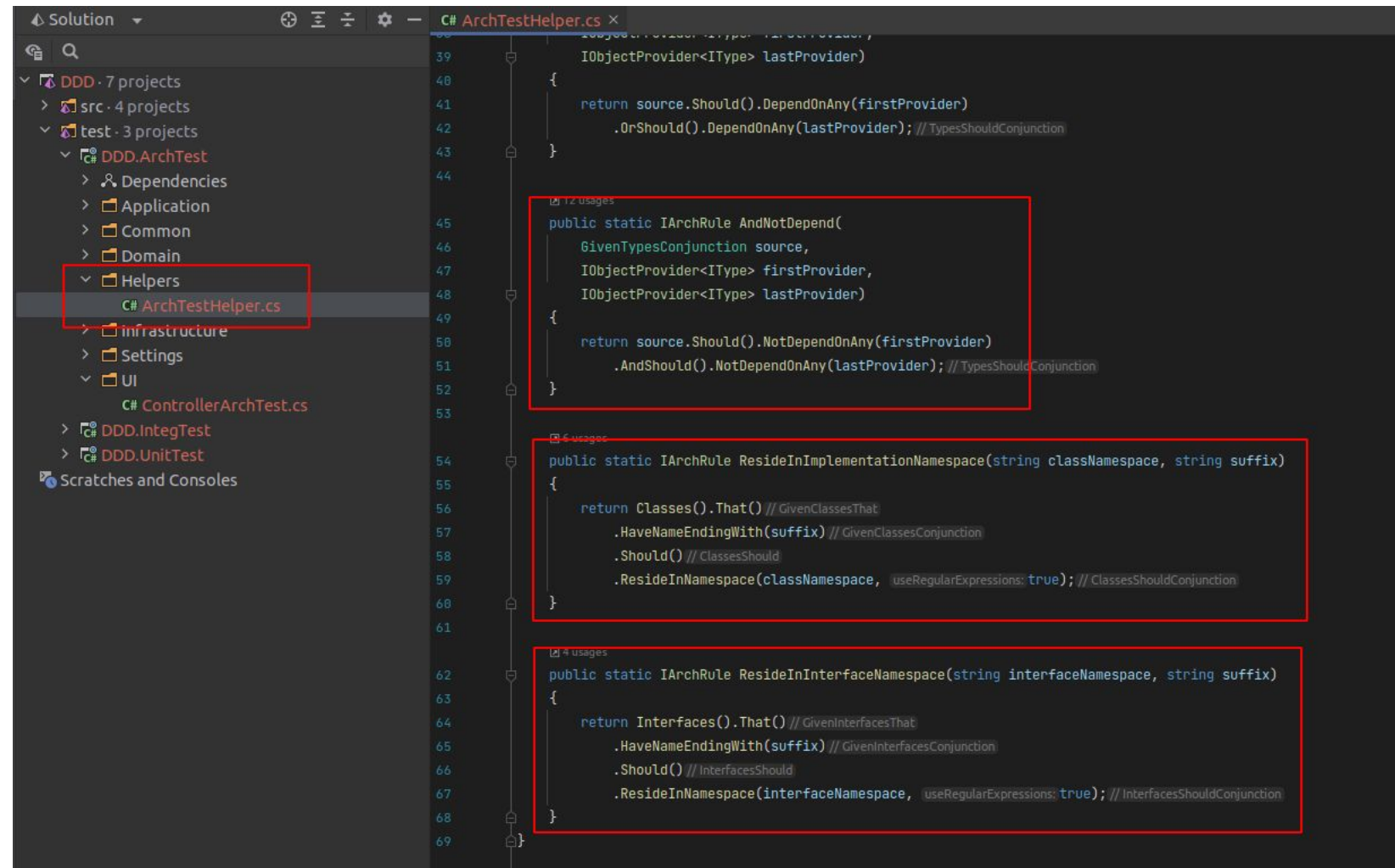
```
8 public static class ArchTestHelper
9 {
10     public static IArchRule ShouldHaveNameContaining(GivenTypesConjunction source, string suffix)
11     {
12         return source.Should().HaveNameContaining(suffix);
13     }
14
15     public static IArchRule ShouldHaveNameContaining(
16         GivenTypesConjunction implementations,
17         GivenTypesConjunction interfaces,
18         string suffix)
19     {
20         var implementationsRule :TypesShouldConjunction? = implementations.Should().HaveNameContaining(suffix);
21         var interfacesRule :TypesShouldConjunction? = interfaces.Should().HaveNameContaining(suffix);
22
23         return implementationsRule.And(interfacesRule);
24     }
25
26     public static IArchRule Depend(GivenTypesConjunction source, IObjectProvider<IType> provider)
27     {
28         return source.Should().DependOnAny(provider);
29     }
30
31     public static IArchRule NotDepend(GivenTypesConjunction source, IObjectProvider<IType> provider)
32     {
33         return source.Should().NotDependOnAny(provider);
34     }
35
36     public static IArchRule OrDepend(
37         GivenTypesConjunction source,
38         IObjectProvider<IType> firstProvider,
39         IObjectProvider<IType> lastProvider)
40     {
41         return source.Should().DependOnAny(firstProvider)
42             .OrShould().DependOnAny(lastProvider); // TypesShouldConjunction
43     }
44 }
```


ArchUnit .NET

Architectural Unit Testing

ArchUnit Rules

Definição das Regras



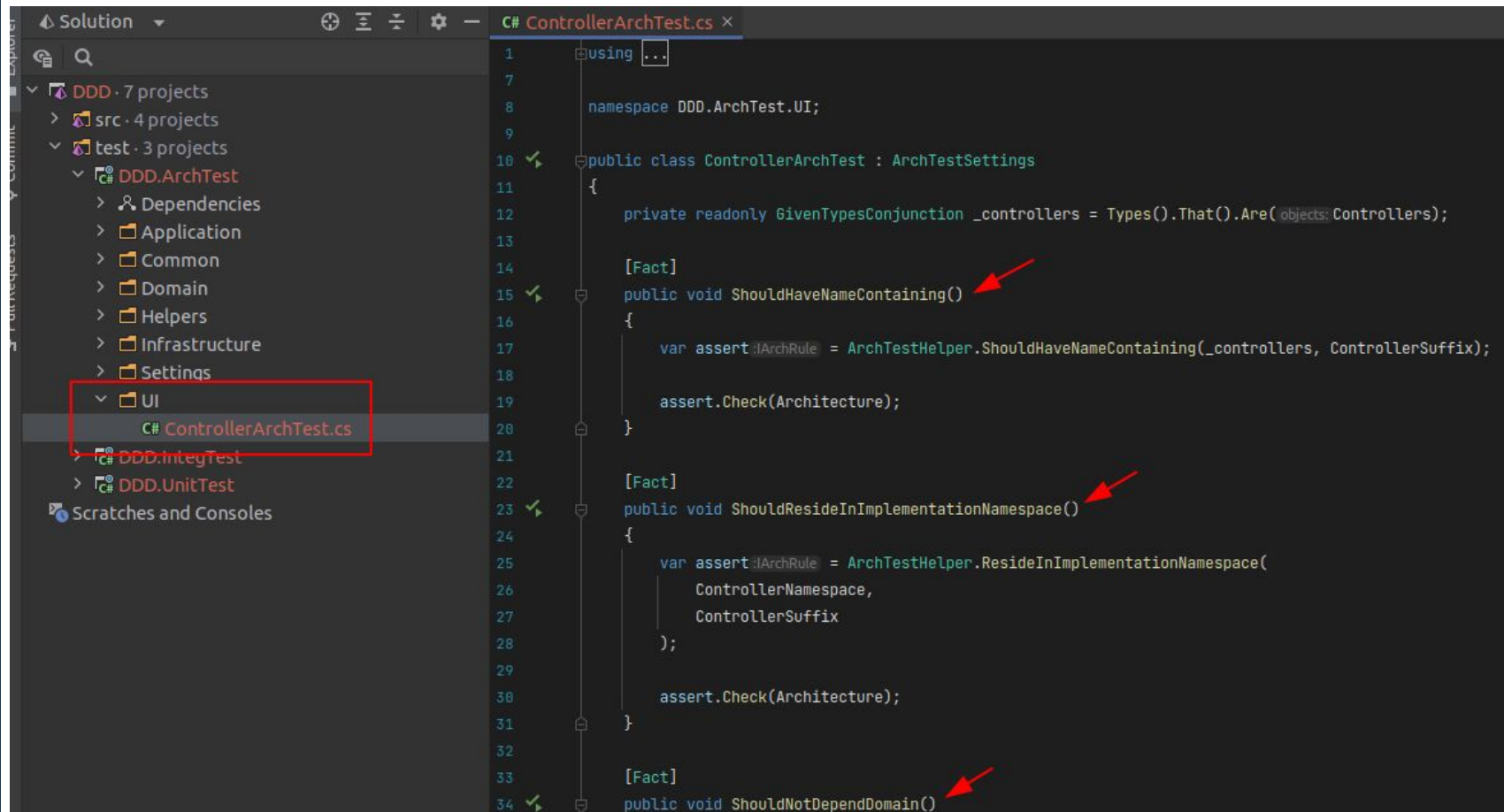
```
39     IObjectProvider<IType> lastProvider)
40     {
41         return source.Should().DependOnAny(firstProvider)
42             .OrShould().DependOnAny(lastProvider); // TypesShouldConjunction
43     }
44
45     public static IArchRule AndNotDepend(
46         GivenTypesConjunction source,
47         IObjectProvider<IType> firstProvider,
48         IObjectProvider<IType> lastProvider)
49     {
50         return source.Should().NotDependOnAny(firstProvider)
51             .AndShould().NotDependOnAny(lastProvider); // TypesShouldConjunction
52     }
53
54     public static IArchRule ResideInImplementationNamespace(string classNamespace, string suffix)
55     {
56         return Classes().That() // GivenClassesThat
57             .HaveNameEndingWith(suffix) // GivenClassesConjunction
58             .Should() // ClassesShould
59             .ResideInNamespace(classNamespace, useRegularExpressions: true); // ClassesShouldConjunction
60     }
61
62     public static IArchRule ResideInInterfaceNamespace(string interfaceNamespace, string suffix)
63     {
64         return Interfaces().That() // GivenInterfacesThat
65             .HaveNameEndingWith(suffix) // GivenInterfacesConjunction
66             .Should() // InterfacesShould
67             .ResideInNamespace(interfaceNamespace, useRegularExpressions: true); // InterfacesShouldConjunction
68     }
69 }
```

ArchUnit .NET

Architectural Unit Testing

ArchUnit Tests

Definição dos Testes



The screenshot shows the Visual Studio IDE. On the left, the Solution Explorer displays a project structure for 'DDD'. Under the 'test' folder, there are three projects: 'DDD.ArchTest', 'DDD.IntegTest', and 'DDD.UnitTest'. The 'DDD.ArchTest' project is expanded, showing subfolders: 'Dependencies', 'Application', 'Common', 'Domain', 'Helpers', 'Infrastructure', 'Settings', and 'UI'. The 'UI' folder is selected, and the file 'ControllerArchTest.cs' is highlighted. On the right, the code editor shows the contents of 'ControllerArchTest.cs'. The code defines a class 'ControllerArchTest' that inherits from 'ArchTestSettings'. It includes three test methods, each marked with a '[Fact]' attribute: 'ShouldHaveNameContaining()', 'ShouldResideInImplementationNamespace()', and 'ShouldNotDependDomain()'. Red arrows point to the method names in the code editor.

```
1  using ...
2
3  namespace DDD.ArchTest.UI;
4
5  public class ControllerArchTest : ArchTestSettings
6  {
7      private readonly GivenTypesConjunction _controllers = Types().That().Are(objects: Controllers);
8
9      [Fact]
10     public void ShouldHaveNameContaining()
11     {
12         var assert : ArchRule = ArchTestHelper.ShouldHaveNameContaining(_controllers, ControllerSuffix);
13
14         assert.Check(Architecture);
15     }
16
17     [Fact]
18     public void ShouldResideInImplementationNamespace()
19     {
20         var assert : ArchRule = ArchTestHelper.ResideInImplementationNamespace(
21             ControllerNamespace,
22             ControllerSuffix
23         );
24
25         assert.Check(Architecture);
26     }
27
28     [Fact]
29     public void ShouldNotDependDomain()
```

ArchUnit .NET

Architectural Unit Testing

ArchUnit Tests

Definição dos Testes

```
[Fact]
public void ShouldHaveNameContaining()
{
    var assert :IArchRule = ArchTestHelper.ShouldHaveNameContaining(
    );

    assert.Check(Architecture);
}
```

```
[Fact]
public void ShouldNotDependDomain()
{
    var assert :IArchRule = ArchTestHelper.AndNotDepend(
        _controllers,
        firstProvider: IDomainServices,
        lastProvider: DomainServices
    );

    assert.Check(Architecture);
}
```

```
[Fact]
public void ShouldNotDependRepository()
{
    var assert :IArchRule = ArchTestHelper.AndNotDepend(
        _controllers,
        firstProvider: IRepositories,
        lastProvider: Repositories
    );

    assert.Check(Architecture);
}
```

```
[Fact]
public void ShouldResideInImplementationNamespace()
{
    var assert :IArchRule = ArchTestHelper.ResideInImplementationNamespace(
        ControllerNamespace,
        ControllerSuffix
    );

    assert.Check(Architecture);
}
```

```
[Fact]
public void ShouldNotDependExternals()
{
    var assert :IArchRule = ArchTestHelper.AndNotDepend(
        _controllers,
        firstProvider: IExternalServices,
        lastProvider: ExternalServices
    );

    assert.Check(Architecture);
}
```

```
[Fact]
public void ShouldNotDependApplicationImplementations()
{
    var assert :IArchRule = ArchTestHelper.NotDepend(_controllers);

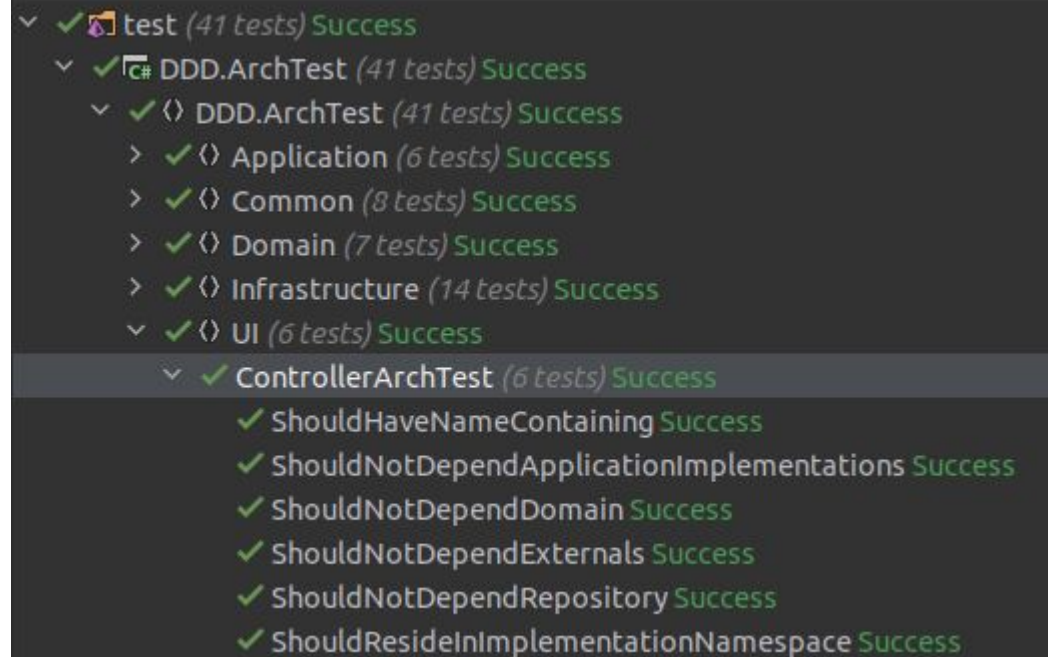
    assert.Check(Architecture);
}
```

ArchUnit .NET

Architectural Unit Testing

ArchUnit Run Tests

Caso de Sucesso



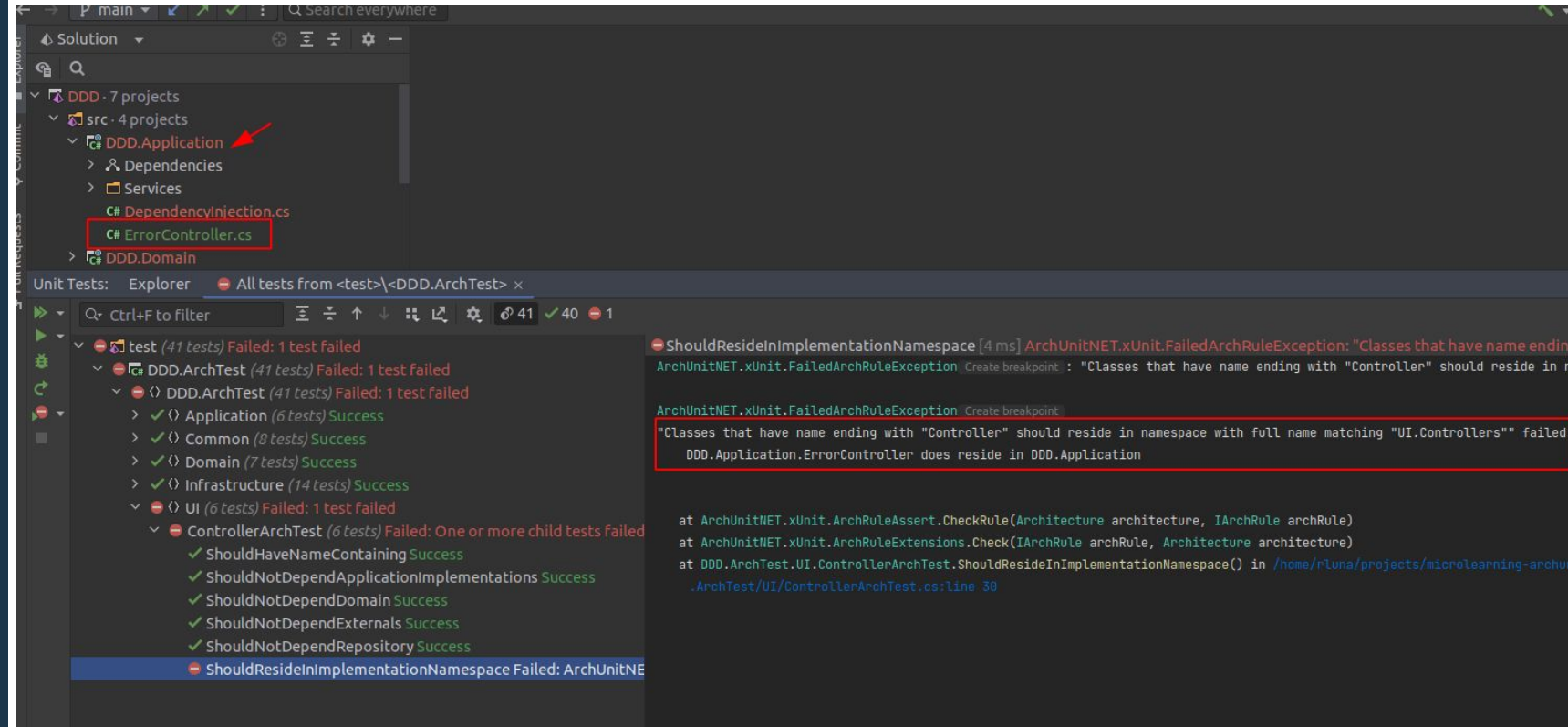
```
✓ test (41 tests) Success
  ✓ DDD.ArchTest (41 tests) Success
    ✓ {} DDD.ArchTest (41 tests) Success
      > ✓ {} Application (6 tests) Success
      > ✓ {} Common (8 tests) Success
      > ✓ {} Domain (7 tests) Success
      > ✓ {} Infrastructure (14 tests) Success
      > ✓ {} UI (6 tests) Success
        ✓ ControllerArchTest (6 tests) Success
          ✓ ShouldHaveNameContaining Success
          ✓ ShouldNotDependApplicationImplementations Success
          ✓ ShouldNotDependDomain Success
          ✓ ShouldNotDependExternals Success
          ✓ ShouldNotDependRepository Success
          ✓ ShouldResideInImplementationNamespace Success
```


ArchUnit Run Tests

Caso de Falha

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Architectural Unit Testing



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That's all folks!

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