Discovering .NET Codebases using Code Coverage



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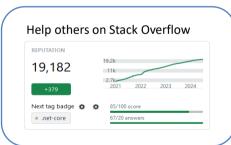
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About your teacher

Name: Tore Nestenius

Teaches:

- Web application security,
- · OpenID-Connect,
- .NET and C#,
- Software Architecture
- Azure cloud...





- Default Azure Credentials Under the Hood
- Improving ASP.NET Core Security By Putting Your Cookies On A Diet
- Demystifying OpenID Connect's State and Nonce Parameters
- Exploring what is inside the ASP.NET Core cookies
- · Debugging cookie problems in ASP.NET Core
- BearerToken: The new Authentication handler in .NET 8
- Debugging JwtBearer Claim Problems in ASP.NET Core
- Debugging OpenID Connect Claim Problems in ASP.NET Core
- Troubleshooting JwtBearer authentication problems in ASP.NET Core

• ...

Past Projects









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My training courses

Fundamentals

- Containers and Kubernetes
- Introduction to Git and GitHub

Architecture

- Modern Application Architecture
- Service Communication REST vs. GraphQL vs. gRPC

OpenID Connect and OAuth

- Introduction to OIDC and OAuth
- Securing ASP.NET Using OIDC and IdentityServer
- IdentityServer in Production

Web

Web Security Fundamentals

.NET

- Applied Domain-Driven Design in .NET
- CQRS and Event Sourcing in .NET
- Building ASP.NET Core APIs
- Asynchronous Programming in C#
- C# Expert
- C# Fundamentals
- TDD.NET

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Important Notes!

- Interrupt me!
- Discuss!
- Ask questions!

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Code Coverage

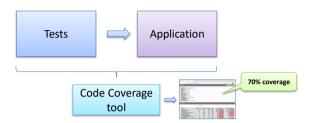
It is a measure of the percentage of code executed during tests

How do you calculate it?

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Code Coverage

We use a tool to calculate the coverage



How can the coverage be presented?



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Code Coverage

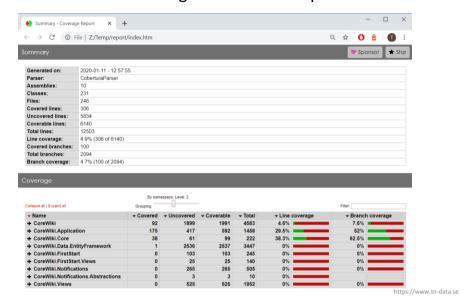
Some tools shows code coverage in the editor:

```
foreach (var c:char in content) ← Test coverage
21
22
23
                           continue;
24
                       if (Char.IsLetterOrDigit(c))
25
26
                           letterCount++;
27
28
                       else if (letterCount > 0)
29
30
                           letterCount = 0;
31
32
                           wordCount++;
33
                                              No coverage
35
                   if (letterCount > 0)
36
                       wordCount++;
```

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Code Coverage

Other tools generate static reports:



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Code Coverage Tools

Code Coverage tools

There are many tools available for calculating code coverage

Name	Description
Visual Studio	Enterprise edition includes a code coverage tool
Ncover	Popular commercial tool https://www.ncover.com
altcover	Open-source tool https://github.com/SteveGilham/altcover
dotCover	Commercial and free tool from JetBrains https://www.jetbrains.com/dotcover/
NCrunch	Continuous testing tool https://www.ncrunch.net/
NDepend	Code analysing tool that can import coverage data from the tools above. https://www.ndepend.com
Coveralls	Code coverage as a service, for your build pipeline https://coveralls.io/
Coverlet	Cross platform code coverage for .NET https://github.com/tonerdo/coverlet

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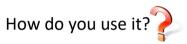
Coverlet

It is an open-source NuGet package



It is included in the .NET Test projects

```
ÍtjêņĞsộuř
```



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Coverlet

To calculate the code coverage:

dotnet test --collect:"XPlat Code Coverage"

What is the output?



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Coverlet

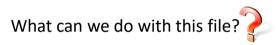
It will create a coverage.cobertura.xml file:





Cobertura is a free Java code coverage reporting tool.

It is a standard file format for code coverage



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Coverlet

We can install a report generator tool:

dotnet tool install -g dotnet-reportgenerator-globaltool

And then run it in the report folder:

reportgenerator -reports:coverage.cobertura.xml -targetdir:coveragereport

We run it in the
Cobertura folder

How can we improve this?

ReportGenerator - Powerful code coverage visualization https://reportgenerator.io/

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NCrunch



https://www.ncrunch.net

https://www.tn-data.se

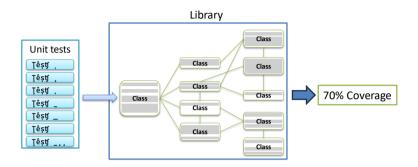
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Code Coverage Summary

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Code Coverage Summary

We typically have many tests



That's great!, but....

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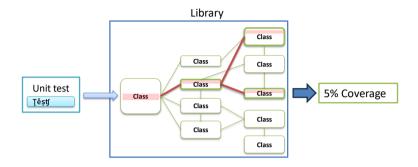
What happens if we only have a single test?



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Code Coverage Summary

With only one test, we get a trace through the system

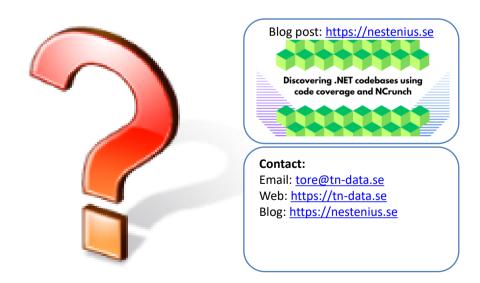


How can we make any use of this?

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QUESTIONS?



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Thanks for listening!



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Questions? tore@tn-data.se