Unit Testing with C#

How to Effectively Test Web and Windows Applications

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About Me

- Started Front Range Systems to help organizations meet technology goals

- Been developing professionally since 2000

- Used .Net since Beta 2

- When I'm not at my computer, you'll find me mountain biking or at our son's hockey games

Connect

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Overview

In this discussion you will learn:

- Why Unit Test are valuable
- What makes a good Unit Test
- How to write Unit Tests
- How to test Web Applications
- How to test Windows Applications
- We will touch on TDD, Mocks and Dependency Injection

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The Value of Unit Tests

- Ensures decoupled design
- Repeatable
- Can be part of the build
- Confidence to refactor / add features
- Helps new developers get up to speed
- Address critical pieces of the application
- A good way to fix bugs
    - Write a series of failing tests that will pass once the bug is fixed

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Good vs Bad Unit Tests

Good

- Only test one thing
- Are fast
- Idempotent
- Triggered by a check in
- Part of the Definition of Done

Bad

- Depends on external resources
  - File system
  - Web services
  - Databases
- Test more than one thing
- Not up to date
- Not run as part of a build

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Anatomy of a Unit Test

```csharp
[TestMethod]
// 0 references | Matt Dixon | 1 day ago | 1 author, 1 change
public void MathServiceTest_Divide_RandomNumbers_ReturnsQuotient()
{
    var first = Random.NextDecimal(1000);
    var second = Random.NextDecimal(1000);
    var expected = decimal.Divide(first, second);

    var actual = ItemUnderTest.Divide(first, second);

    Assert.That(actual, Is.EqualTo(expected));
}
```

Test Attribute

Class Under Test

Method

Input or Conditions

Expected Result

Arrange

Act

Assert

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Initialization and Cleanup

MS Test and NUnit Equivalents

MS Test		NUnit
TestClass		TestFixture
ClassInitialize		OneTimeSetUp
TestInitialize	Per Test	SetUp
TestMethod		Test
TestCleanup		TearDown
ClassCleanup		OneTimeTearDown

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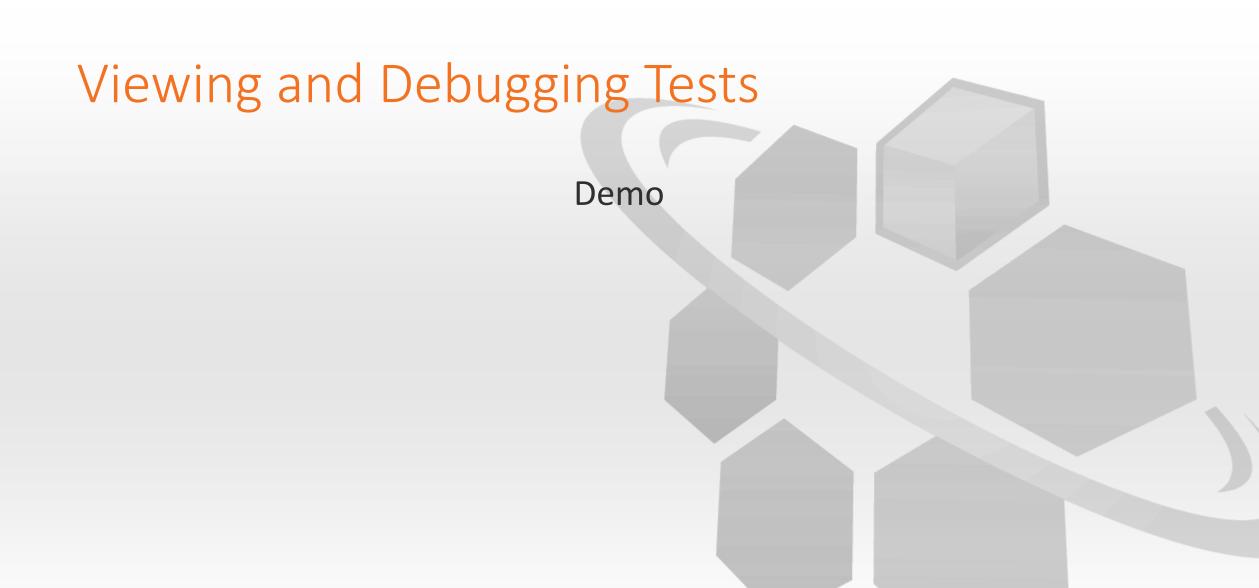
Viewing and Debugging Tests

Demo

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Mocks and Dependency Injection

Mocks

- Removes any external dependencies
- Those dependencies can be tested separately
- Moq

Dependency Injection

- Specify mapping between class and interface
- Handles object creation
- Web
  - NinjectWebCommon.cs – line: 65
- WPF
  - AppBootstrapper.cs – line: 25

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Testing Web Applications

- MVC
- Web API
- Ninject

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Testing Web Applications

Demo

Testing Windows Applications

- MVVM
  - Caliburn Micro
- Test the View Model
- Test the Model
- Test Converters, Behaviors, etc.

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Testing Windows Applications

Demo

TDD – Test Driven Development

Red
- Write a failing test

Green
- Change the code to fix the test

Refactor
- How can I make this code better?
- Simplify
- Think like an Architect

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Test Driven Development

Demo

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Resources

- Source Code and Slides
  - https://github.com/mattdixon/unit-testing
- Dependency Injection
  - Ninject – http://www.ninject.org/
- Mocking
  - Moq – https://github.com/moq/moq4
- MVVM
  - Caliburn Micro – http://caliburnmicro.com/
- Resharper
  - https://www.jetbrains.com/resharper/

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