

# Implementing C# Unit Testing using Visual Studio 2019 and .NET 5

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## Why You Need Unit Testing



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# Course Overview



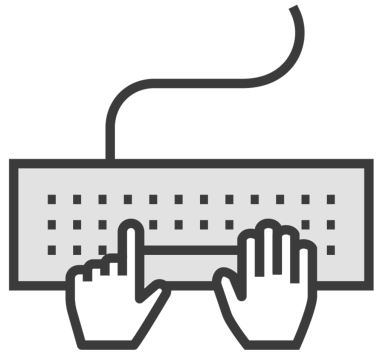
- **Unit testing tools in Visual Studio**
- **Build your first unit tests**
- **Learn to use Assert classes**
- **Create data-driven tests**
- **Automate tests using command line**



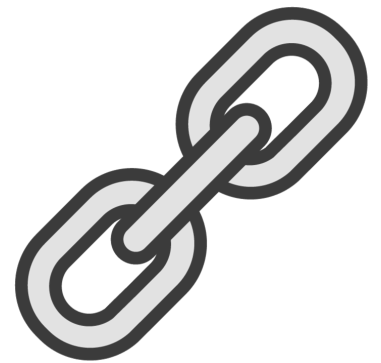
**I assume you...**

- Are a C# developer**
- Are familiar with Visual Studio**
- Want to learn to build unit tests**

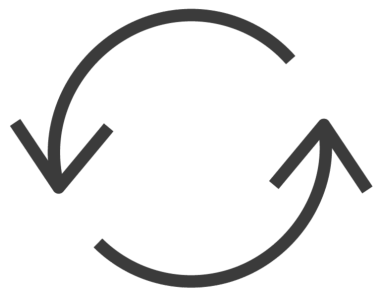
# What Is Unit Testing?



**Write method(s) to test methods in your class**



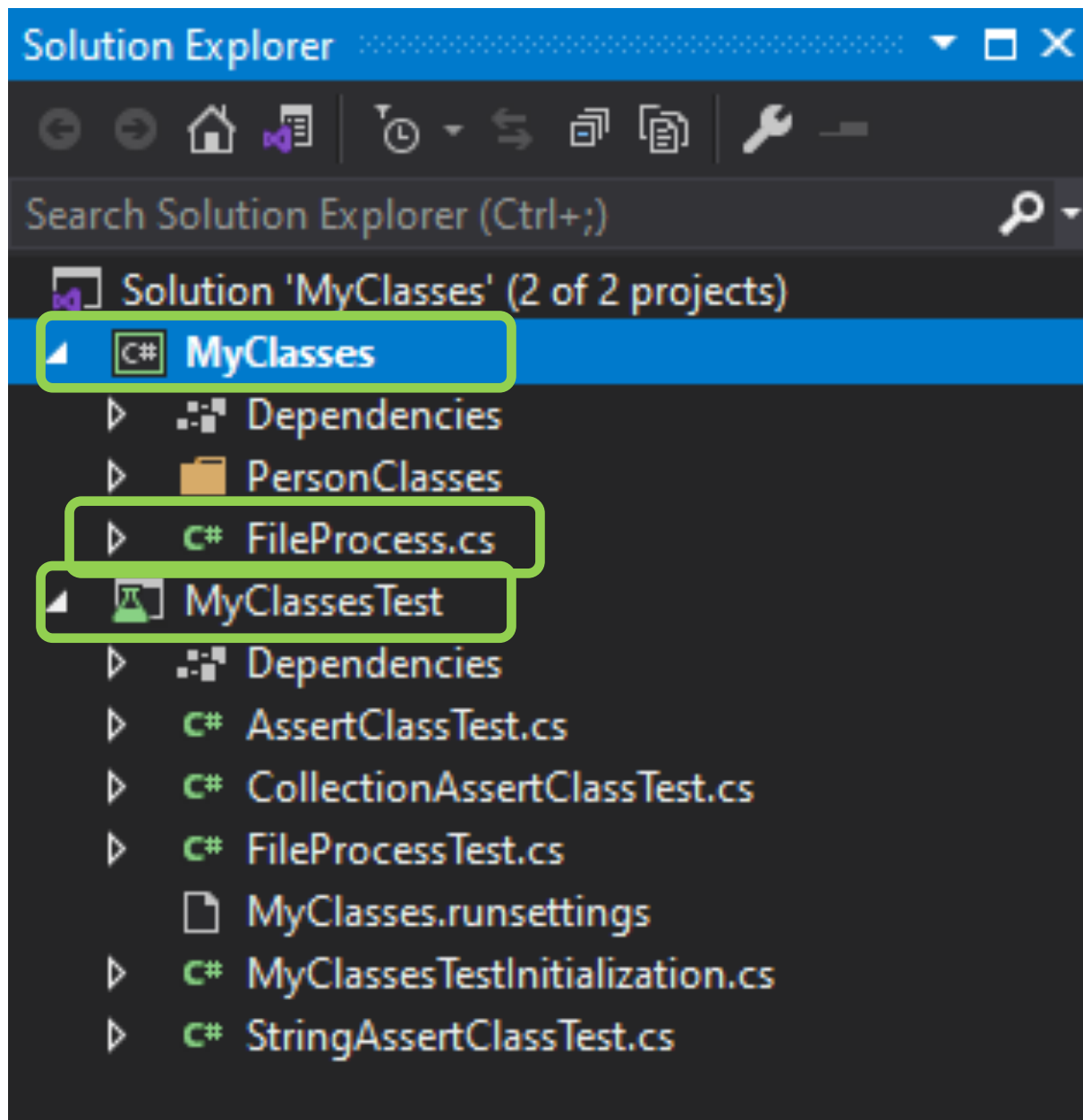
**Include all if, case, do, until, while, for, etc.**



**Regression testing**

# Overview of Creating and Running Unit Tests

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## File > New Project

- Class library
- FileProcess class

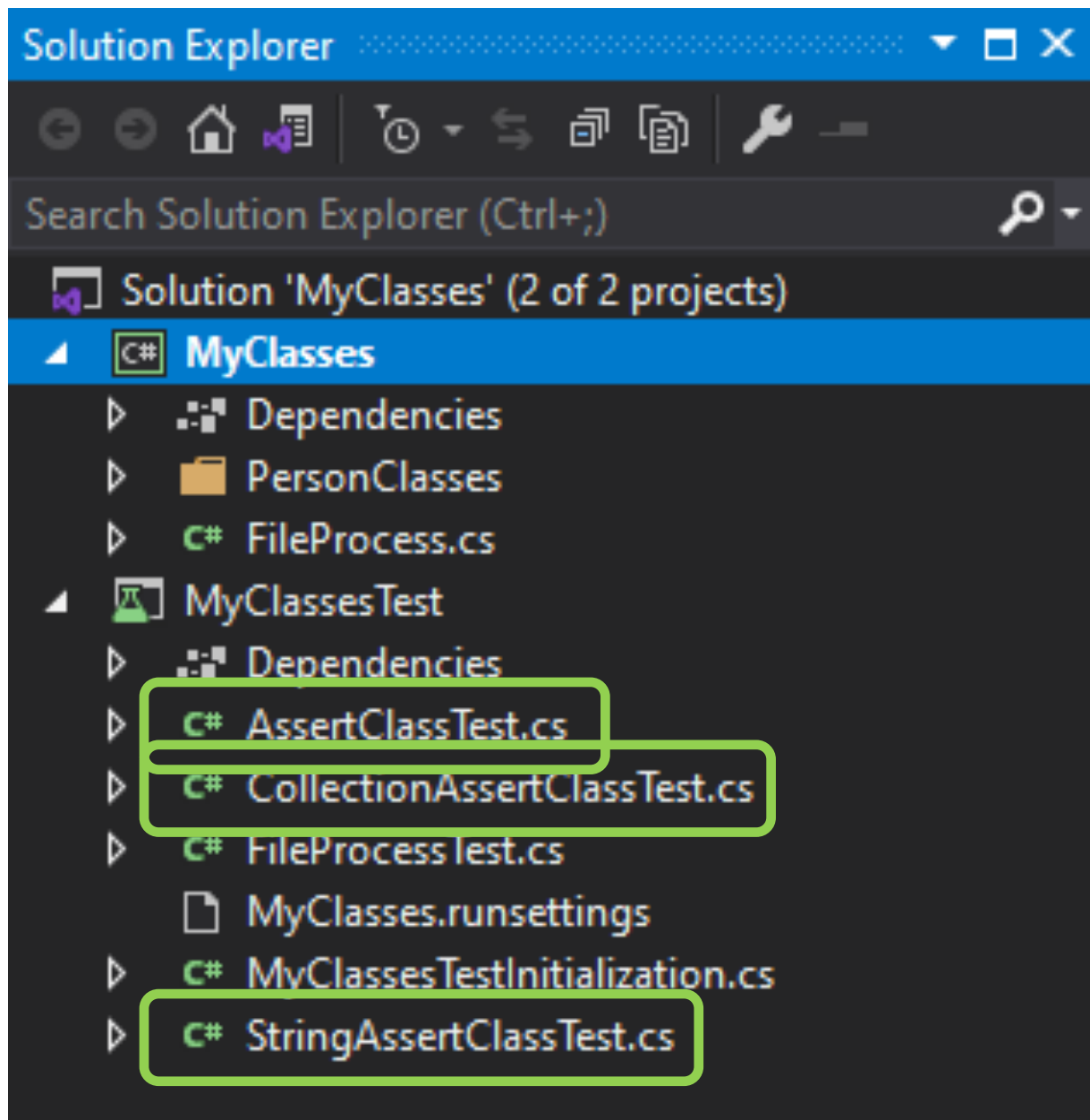
## Unit test project

- Several unit test classes

Test Explorer				
<div> <div>▶ ▶ ▶ ▶ ▶</div> <div>21 16 5</div> <div> <div>🔍</div> <div>Search Test</div> </div> </div>				
Test	Duration	Traits	Error Message	
✖ MyClassesTest (21)	85 ms			
✖ MyClassesTest (21)	85 ms			
✔ AssertClassTest (7)	35 ms			
✔ AreEqualCaseSensi...	19 ms	Owner [Jo...		
✔ AreEqualTest	< 1 ms	Owner [Pa...		
✔ AreNotEqualTest	< 1 ms	Owner [Jo...		
✔ AreNotSameTest	16 ms	Owner [Jo...		
✔ AreSameTest	< 1 ms	Owner [Pa...		
✔ IsInstanceOfTypeTest	< 1 ms	Owner [Pa...		
✔ IsNullTest	< 1 ms	Owner [Jo...		
✔ CollectionAssertClass...	3 ms			
✔ AreCollectionsEqua...	1 ms	Owner [Jo...		
✔ AreCollectionsEqua...	< 1 ms	Owner [Jo...		
✔ AreCollectionsEqua...	< 1 ms	Owner [Pa...		
✔ AreCollectionsEqui...	2 ms	Owner [Pa...		
✔ IsCollectionOfType...	< 1 ms	Owner [Pa...		
✖ FileProcessTest (5)	47 ms			
✖ FileNameDoesExist	47 ms	NoExcepti...	Initialization met...	
✖ FileNameDoesNot...	< 1 ms	NoExcepti...	Initialization met...	
✖ FileNameNullOrEm...	< 1 ms	Exception,...	Initialization met...	
✖ FileNameNullOrEm...	< 1 ms	Exception,...	Initialization met...	
✖ SimulateTimeout	< 1 ms		Initialization met...	
✔ StringAssertClassTest...	< 1 ms			
✔ ContainsTest	< 1 ms	Owner [Jo...		
✔ IsAllLowerCaseTest	< 1 ms	Owner [Pa...		
✔ IsNotAllLowerCase...	< 1 ms	Owner [Pa...		
✔ StartsWithTest	< 1 ms	Owner [Jo...		

Build a series of unit tests step-by-step

Run tests and see success or failure

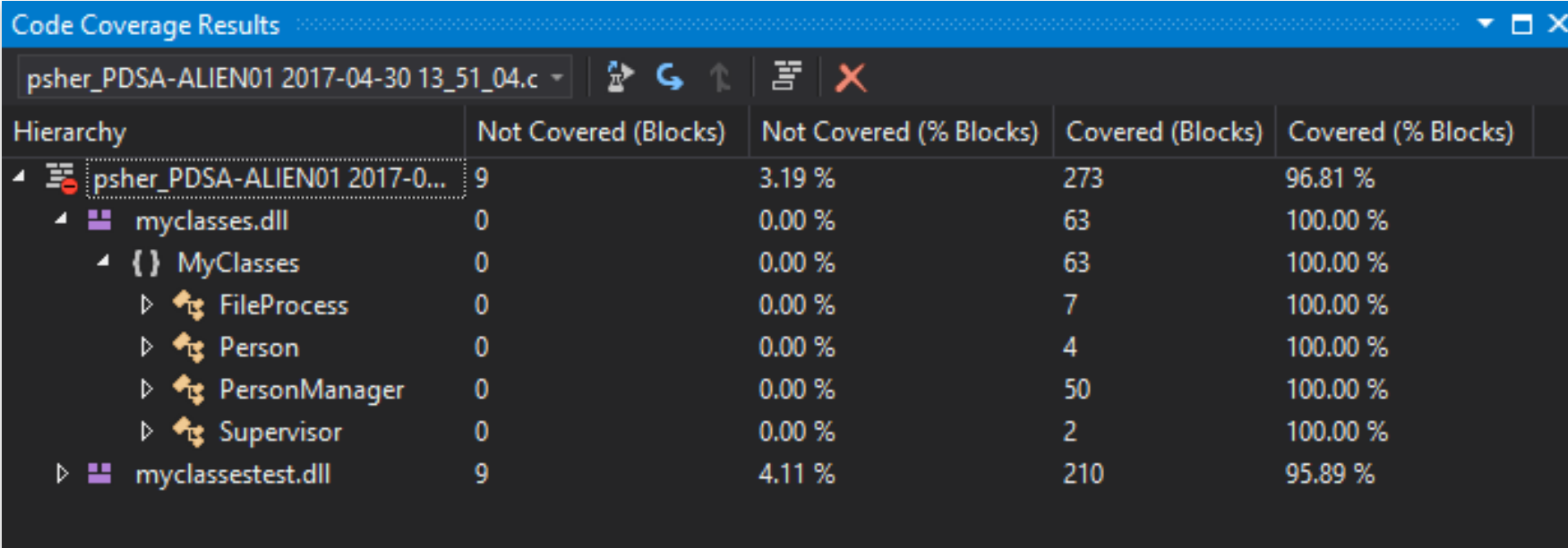


## Use different Assert classes

- Assert
- StringAssert
- CollectionAssert



# Code Coverage



The screenshot shows the 'Code Coverage Results' window in Visual Studio. The window title is 'Code Coverage Results'. The file path is 'psher\_PDSA-ALIEN01 2017-04-30 13\_51\_04.c'. The table below shows the hierarchy of code blocks and their coverage percentages.

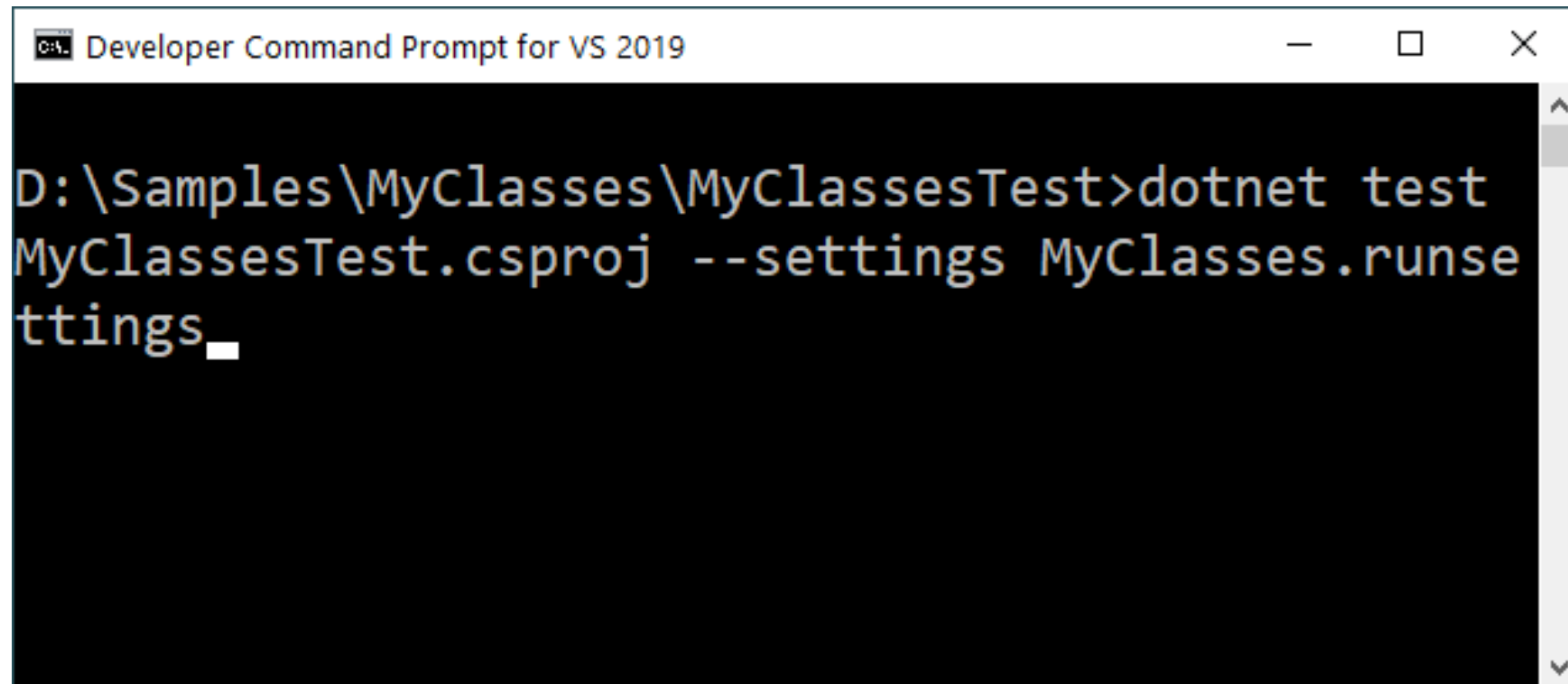
Hierarchy	Not Covered (Blocks)	Not Covered (% Blocks)	Covered (Blocks)	Covered (% Blocks)
▲ psher_PDSA-ALIEN01 2017-0...	9	3.19 %	273	96.81 %
▲ myclasses.dll	0	0.00 %	63	100.00 %
▲ { } MyClasses	0	0.00 %	63	100.00 %
▶ FileProcess	0	0.00 %	7	100.00 %
▶ Person	0	0.00 %	4	100.00 %
▶ PersonManager	0	0.00 %	50	100.00 %
▶ Supervisor	0	0.00 %	2	100.00 %
▶ myclassetest.dll	9	4.11 %	210	95.89 %

**Identifies areas of code not tested**

**Built-in to enterprise edition of Visual Studio**

- Not available in community edition**

# Command Line

A screenshot of a Windows command prompt window titled "Developer Command Prompt for VS 2019". The window has a black background and white text. The command entered is "D:\Samples\MyClasses\MyClassesTest>dotnet test MyClassesTest.csproj --settings MyClasses.runsettings\_". The cursor is at the end of the command.

```
D:\Samples\MyClasses\MyClassesTest>dotnet test  
MyClassesTest.csproj --settings MyClasses.runse  
ttings_
```

**Automate tests**

**Command line utility**

**– dotnet test**

# Why Unit Testing

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# Why Test Code?

**Ensure code works**

**Under varying  
circumstances**

**With different  
inputs**

# Why Test Code?

**Improve quality**

**Helps you focus on quality**

**Break code into smaller chunks**

**You add more error handling**

# Methods of Unit Testing

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# QA Department Testing

## Advantages

**Think of different things to test**

**Can test UI code easier**

**Less start-up time/cost**

## Disadvantages

**Regression testing time intensive**

**Setup and tear down time intensive**

**Frustrating and boring**

# Automated Testing

## Advantages

**Repeatable**

**Better code coverage**

**Regression testing is faster**

**Automate setup and tear down**

## Disadvantages

**More time up-front**

**Only as good as dev who  
develops test**

**Harder to test UI**



# Which Approach?

**Combination of  
both**

**QA should work with  
developers**

**Help create unit  
tests**

**Help with setup and  
tear down**

**Help with UI testing**

# Testing Tools

**Unit test  
framework**

**Set of classes  
and tools  
In all editions  
of Visual  
Studio**

**Data-  
driven  
testing**

**Read data  
from table to  
guide testing**

**dotnet  
test**

**Automate  
tests  
Command line  
utility  
Log results**

**Code  
coverage**

**Determines if  
any methods  
have not been  
tested  
Enterprise  
Edition only**

# Module Summary



- **Unit testing helps with...**
  - **Code quality**
  - **Regression testing**
- **Use a combination of QA and unit testing**
- **Great tools available in Visual Studio**
  
- **Search for unit testing at**  
[www.pdsa.com/blog](http://www.pdsa.com/blog)

Up Next:  
Your First Unit Tests

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