F# for Testing And Analysis

at the Community For F#

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- Time and Place -

The first Monday of every month at Microsoft NERD

- User Group Leads -

Talbott Crowell, Michael de la Maza, Rick Minerich

For more information (and video) visit us @ **fsug.org**

"A programming language is low level when its programs require attention to the irrelevant.“

-Alan J. Perlis

What Stops You From Using COP/TDD?

Time

Money

Rigidity

Existing Code

Prototyping

Infrastructure

Complexity

Testing in the Small

Why are idiomatic C#/VB classes difficult to test?

They have…

- Hidden State
- Unknown Side Effects
- Rigid Structure
- Implicit Event Ordering
- Have poorly constrained return values

Why are idiomatic F# functions easy to test?

They have…

- Only one output for one set of outputs
- No side effects
- Flexible Structure
- Continuations instead of events
- The restriction of not returning null and need not throw exceptions

Why do C#/VB classes make for poor testing Infrastructure?

They have…

- Bulky syntax and class overhead
- Stateful but reused resources
- Rigid Structure
- No dynamic object construction
- Dynamic function construction only in terms of an existing delegate
- Implicit type conversion

Why do F# functions make for great testing infrastructure?

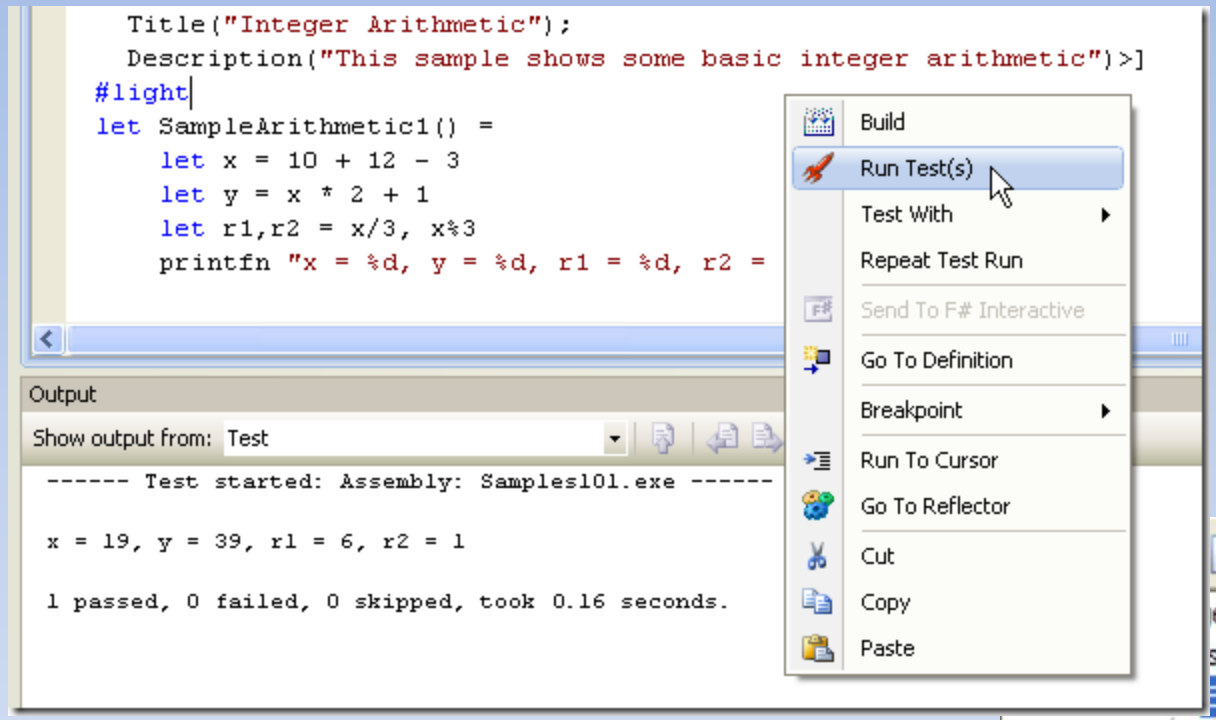
They have…

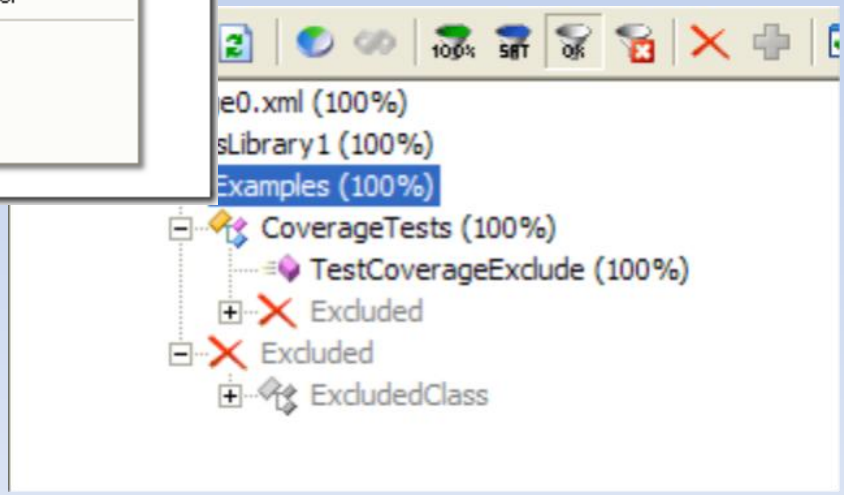
- Very concise syntax and no class overhead
- The tools to avoid reusing stateful resources
- Flexible structure
- Dynamic, anonymous object instantiation on interfaces
- Fully dynamic function construction
- No implicit type conversion

(In my humble opinion)

The winner is clear.

TestDriven.NET and NCover





NCover Image: http://www.mutantdesign.co.uk/weblog/images/CoverageExclude_D00C/CoverageExcludeTree2.png
TD.NET Image: http://weblogs.asp.net/nunitaddin/archive/2008/10/10/microsoft-f-and-testdriven-net-2-16.aspx

xUnit.NET

Open Source, No Classes Needed, F# Friendly

```
[<Fact>]
let IsPrime_WithPrimeNumber_ShouldReturnTrue() =
  Assert.True(isPrimeNumber 7)

[<Fact>]
let IsPrime_WithNonPrimeNumber_ShouldReturnFalse() =
  Assert.False(isPrimeNumber 21)
  Assert.False(isPrimeNumber 45)
```

FsCheck

A Framework For Random Property Based Testing

Example from: http://www.fsharp.it/2008/12/28/random-testing-in-f-with-fscheck/

FsCheck
High Reliability Environments

- Automated Trading Systems
- Communication Technologies
- Power Delivery
- Medical Technologies

FsCheck
Missed Edge Cases

- Domain edges are easy to test
- Unexpected edges are always a problem

Reflection Sample

Office Automation Sample

Visualization Sample

Check out our F# User Group @ http://fsug.org

Our Next Meeting is **Monday, April 5th**

Thank you for your time.