

F# for Testing And Analysis

at the Community For F#

March 16th 2010

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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

Rigidity

Money

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

```
Title("Integer Arithmetic");
Description("This sample shows some basic integer arithmetic")>]
#light|
let SampleArithmetic1() =
    let x = 10 + 12 - 3
    let y = x * 2 + 1
    let r1,r2 = x/3, x%3
    printfn "x = %d, y = %d, r1 = %d, r2 = %d" x y r1 r2
```

Output

Show output from: Test

----- Test started: Assembly: Samples101.exe -----

x = 19, y = 39, r1 = 6, r2 = 1

1 passed, 0 failed, 0 skipped, took 0.16 seconds.

Build

Run Test(s)

Test With

Repeat Test Run

Send To F# Interactive

Go To Definition

Breakpoint

Run To Cursor

Go To Reflector

Cut

Copy

Paste

Examples (100%)

- CoverageTests (100%)
 - TestCoverageExclude (100%)
 - Excluded
 - Excluded
 - ExcludedClass

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

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.