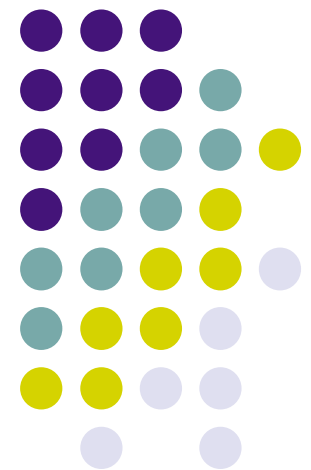


Test-Driven Development

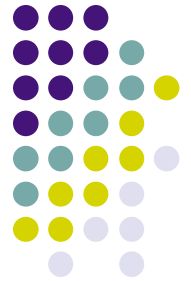
Jason Sliss

plethora@optonline.net

October 31, 2007

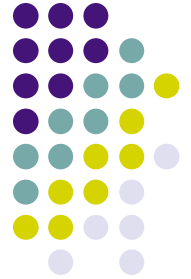


What is Test-Driven Development?



- A straightforward method of writing clear and accurate code
- Code, and TESTS for the code, are developed simultaneously
- Tests are created in code and thus are code themselves

Test Examples



```
[Test]
public void YellowAndBlueMakeGreen()
{
    ColorSpace blendedColor = new ColorSpace(ColorSpace.Blue);
    ColorSpace yellowColor = new ColorSpace(ColorSpace.Yellow);

    blendedColor.Blend(yellowColor);

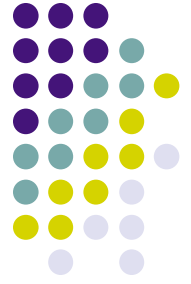
    Assert.AreEqual(blendedColor.Color, ColorSpace.Green);
}
```

```
[Test]
public void TwoWrongsDontMakeARight()
{
    ValueJudgement aWrong = new ValueJudgement(Values.Wrong);
    ValueJudgement anotherWrong = new ValueJudgement(Values.Wrong);

    ValueJudgement judgement = ValueJudgement.Judge(new ValueJudgement[] {
    aWrong,
    anotherWrong });

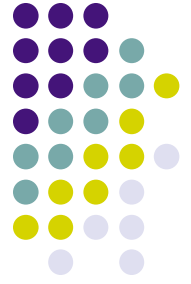
    Assert.IsFalse(judgement.Value == Values.Right);
}
```

Test-Driven Development Steps



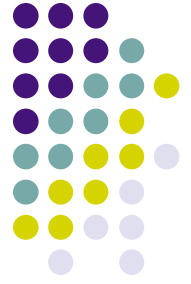
- Red
- Green
- Refactor

Test-Driven Development Steps - Red



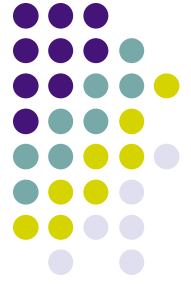
- Write Code for a Test Case
- Compile Test Case and Fail Compilation
- Write just enough code to get Test case to Compile
- Run Test Case and Fail Test

Test-Driven Development Steps - Green



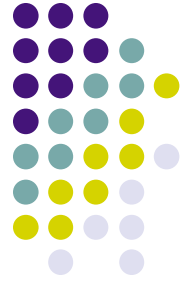
- Write just enough code to get the Test case to Pass the Test
- Compile and Run Test
- Repeat until test Passes

Test-Driven Development Steps - Refactor



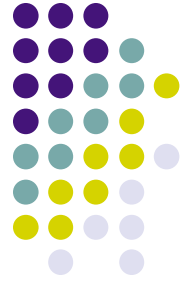
- Remove constants from code
- Remove/consolidate duplicate code
- Update code and design for clarity
- Compile and Run all Tests
- Ensure that all Tests Pass

Test-Driven Development Example



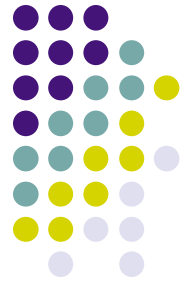
- Let's develop some code together

Test-Driven Development Tenets



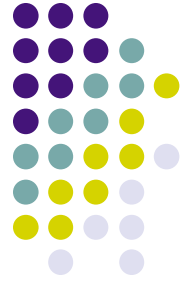
- Tests should be able to be run and re-run repeatedly and very quickly
- Each test should represent one and only one specific test case
- Each test should be named in plain language, clearly describing the test to be performed
- Tests should be easily readable to other developers
- **Red/Green/Refactor** – do the simplest thing that could possibly work

Test-Driven Development Benefits



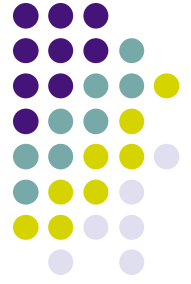
- Drudgery of Testing is replaced by more Fun Activities, like Coding
- Instant Feedback to Code Changes
- Built-in Documentation of Code API and Usage
- Promotes Collaboration with other Developers
- Promotes Iterative and Incremental Development
- Promotes Discovery and Usage of Patterns
- Validation of Requirements and Solution Space

Test-Driven Development Risks

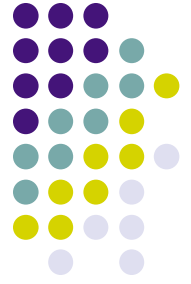


- We may write the wrong tests
- We may not write enough tests
- We may write the tests against a pre-conceived design that may be flawed
- We may write tests that cannot be easily re-run and repeated
- Someone else may not understand the actual test conditions

xUnit Testing Framework



- Test Harness
- Test Fixtures
- Assertions
- Red Bars
- Green Bars
- Setup
- Teardown
- Available in MANY development languages and environments



Acronyms to Remember

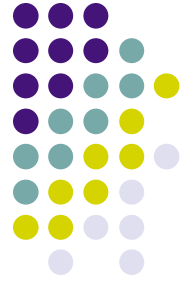
- DRY – Don't Repeat Yourself
- YAGNI – You Aren't Gonna Need It
- OAIO – Once And Only Once
- KISS – Keep It Simple

Further Adventures in Testing



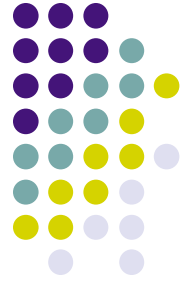
- Unit Tests
 - Individually tests the code
 - Individually tests very small scenarios
 - Essentially what we covered here

Further Adventures in Testing

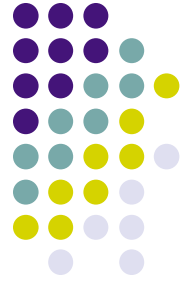


- Scenario Tests
 - Synthesize larger requirements and test scenarios (i.e. Chessboard scenarios, On-line purchases, bank transactions)
 - Can also be repeatable
 - Other test harness tools are available (Fit, Fitnessse, Mercury, etc.)

Further Adventures in Testing



- Interface Testing
 - Stubs and Mocks
 - Can simulate databases and GUI interactions without directly instantiating or involving them
- Development Frameworks with Built-In Testing Support
 - Active Record (Ruby on Rails, Castle MonoRail)



Additional Resources

- <http://c2.com/cgi/wiki?TestDrivenDevelopment>
- <http://groups.google.com/group/Test-Driven-Development>
- http://www.gamesfromwithin.com/articles/cat_testdriven_development.html