Code Quality Assurance

Peter Kofler, ‘Code Cop’
FH Technikum Wien, Dec. 2010
Peter Kofler

• Ph.D. (Appl. Math.)

• Professional Software Developer for 11 years

• Lead Developer at System One

• “fanatic about code quality”
Zero-Defect Mindset (MSF)
Robert C. Martin
(“Uncle Bob”)
Software
Craftsmanship
Craftsmanship

Engineering
Craftsmanship Over Crap
Mindset
The Prime Factors Kata
The Requirements.

- Write a class named “PrimeFactors” that has one static method: generate.
  - The generate method takes an integer argument and returns a List<Integer>.
  - That list contains the prime factors in numerical sequence.

http://butunclebob.com/ArticleS.UncleBob.ThePrimeFactorsKata
Demo
Keep the bar green to keep the code clean
Unit Testing

• test individual units
• isolate each part
• show that the individual parts are correct
• regression testing
• sort of living documentation
• executed within a framework

http://en.wikipedia.org/wiki/Unit_testing
xUnit Frameworks

- e.g.
- Smalltalk - SUnit
- Java - JUnit, TestNG
- .NET - NUnit, Typemock
- C++ - CppUTest
- Groovy, PHP, Python, Ruby, Scala, etc.

http://en.wikipedia.org/wiki/List_of_unit_testing_frameworks
I FIND YOUR LACK OF TESTS DISTURBING.
Test-Driven Development

- add a test
- run all tests and see if the new one fails
- write some code
- run all tests and see them succeed
- refactor code
- „Red Green Refactor“

http://en.wikipedia.org/wiki/Test_Driven_Development
A minute ago all their code worked
The Addison-Wesley Signature Series

Test-Driven Development
By Example

Kent Beck
Testing is a mindset
You have to want it
Code Coverage

comprehensiveness of tests
Beware!

comprehensiveness ≠ quality!
Some Code Coverage Tools

- Java - EMMA, Cobertura, Clover
- .NET - NCover, PartCover
- C++ - Covtool, gcov
- Ruby - rcov
- commercial products
Demo
Demo
Daily Builds
Nightly Builds
Continuous Integration
Continuous Integration

- Maintain a code repository
- Automate the build
- Make the build self-testing
- Everyone commits every day
- Every commit should be built
- Keep the build fast
- Everyone can see the results of the build

http://en.wikipedia.org/wiki/Continuous_integration
Immediate Feedback and Early Warning
YOU BROKE THE BUILD!

This is Agnes and she's none too pleased with you, Bub. You broke the build. You should have known that you were making breaking changes, but you checked them in anyway.

If you start using continuous integration, Agnes won't have to come back.

www.YouBrokeTheBuild.com
Some CI Servers

- Java - CruiseControl, Hudson
- .NET - CruiseControl.NET, Hudson
- C++ - Hudson (Shell/Make)
- Ruby - CruiseControl.rb
- commercial products - TeamCity, ALA
Good Enough?
Demo
Check What?

• Lexical analysis
  – naming, coding conventions, design idioms
• Flow/path analysis
  – null-pointer, dead code (conditional)
• Dependency analysis
  – architectural/design flaws
• Verification
  – mathematical proof of correctness
Some Static Analysis Tools

- Java - Checkstyle, Findbugs, PMD
- .NET - FxCop, (ReSharper, NDepend)
- C++ - (Sp)Lint
- Ruby - Roodi, Dust, Flog, Saikuro
- commercial products
Good Enough?
Thank You
www.code-cop.org
Links #1

**Mindset**
- [http://pragprog.com/the-pragmatic-programmer](http://pragprog.com/the-pragmatic-programmer)

**Kata**
Links #2

Test
• http://en.wikipedia.org/wiki/Unit_testing
• http://en.wikipedia.org/wiki/XUnit
• http://en.wikipedia.org/wiki/List_of_unit_testing_frameworks
• http://en.wikipedia.org/wiki/Test_Driven_Development

Code Coverage
• http://en.wikipedia.org/wiki/Code_coverage
• http://www.ibm.com/developerworks/java/library/j-cq01316/

Continuous Integration
• http://hudson-ci.org/
• http://www.codinghorror.com/blog/archives/000818.html
• http://www.stevemcconnell.com/ieeesoftware/bp04.htm
Links #3

**Continuous Integration**

**Static Code Analysis**
CC Images

- spray face: http://www.flickr.com/photos/iangallagher/4115047191/
- broken egg: http://www.flickr.com/photos/nickwheeleroz/2475011402/
- broken windows: http://www.flickr.com/photos/sketchglass/4281424410/
- shoe maker: http://www.flickr.com/photos/tbatty/1450209613/
- shoe factory: http://www.flickr.com/photos/94693506@N00/4643248587/
- red-green: http://www.flickr.com/photos/30830597@N08/3630649274/
- Darth Vader: http://rubystammtisch.at/
- covered car: http://www.flickr.com/photos/paulk/3166328163/
- works: http://www.codinghorror.com/blog/archives/000818.html
- Agnes: http://www.youbrokethebuild.com/
- questions: http://www.flickr.com/photos/seandreilinger/2326448445/