Seven Principles of (highly effective) Software Testing

by

Bertrand Meyer

Presented by

Jerry Sun Peter Guy

Who is Bertrand Meyer?

Long-time Computer Scientist

Author of *Object-Oriented* Software Construction

Created the programming Language Eiffel

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- Design-by-Contract

Teaches at ETH Zurich



Software Testing

What is the scope of software testing?

Quality assessment?

Finding bugs?

Employing interns?

回 ESET NOD32 Antivirus -User interface - Setup - Tools - Help **ESET NOD32 Antivirus 4** Protection status On-demand computer scan Computer scan Smart scan ③ Update Local disk scan 🕨 Custom scan... 🛈 Setup Selection of scan profile and targets to scan Tools Scan setup... Date and time of the last scan: 2009/11/21 下午 12:05:36 Help and support 0 infected files Last scan result: Virus signature database used in last scan: 4625 (20091120) Display: Advanced mode Change... we protect your digital worlds (ese

Principle 1: Definition

To test a program is to try to make it fail

- keeps the process focused single goal
- don't correct faults, just find them



Testing is about producing failures.

Principle 2: Tests versus specs

Tests are no substitute for specifications

Tests are only instances

 points - that can be
 interpolated into a curve,
 but the area between the
 points is uncovered.



 Specifications can produce tests (model-based testing, fc example), but tests cannot generate specifications.

Principle 3: Regression testing

Any failed execution must yield a test case, to remain a permanent part of the project's test suite.

- Once you have uncovered a fault it must remain part of y life forever.
- AV Software performs regression testing by rescanning a files and by keeping a virus definition in the dictionary.

Principle 4: Applying Oracles

Determining success or failure of tests must be an automatic process.

- As the number of test cases increases, manually examini the results becomes less feasible
- Anti-Virus software interprets the results of scanning files and only tells you when it finds malware.

Date and time of the last scan:

Last scan result:

Virus signature database used in last scan:

2009/11/21 下午 12:05:36

0 infected files 4625 (20091120)

Principle 5: Manual and automatic tectors cases

An effective testing process must include both manually and automatically produced test cases.

- Manual tests take advantage of the tester's domain knowledge to do more in-depth testing.
- Automatic tests take advantage of tireless machines to demore testing than humans can.



Principle 6: Empirical assessment o testing strategies

Evaluate any testing strategy, however attractive in principle through objective assessment using explicit criteria in a reproducible testing process.

- Don't rely on intuition testing is tricky.
- There is no substitute for empirical assessment.



Principle 7: Assessment criteria

A testing strategy's most important property is the number of faults it uncovers as a function of time.

- What matters is how fast a strategy can produce failures revealing faults.
- The relevant function is fault count against time.
 - Criteria for principle 6.
 - Fault density.
 - $_{\odot}$ When to stop testing.

Conclusion

"Testing a program tells us little about its quality, since 10 or even 10 million test runs are a drop in the ocean of possible cases."

Therefore:

- Don't try to do too much find bugs, don't fix them!
- Automate!

"Testing is tricky"

Therefore:

• Try it out - your intuition may not be right.