What IS a Good Test Case?

Cem Kaner, JD, PhD

STAR East 2003
Orlando, FL March 2003
Copyright © Cem Kaner. All Rights Reserved.

This research was partially supported by NSF Grant EIA-0113539 ITR/SY+PE: "Improving the Education of Software Testers." Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation (NSF).

For more details, read the paper that comes with this presentation.
What’s a Test Case?

- Focus on procedure?
  - “A set of test inputs, execution conditions, and expected results developed for a particular objective, such as to exercise a particular program path or to verify compliance with a specific requirement.” (IEEE)

- Focus on the test idea?
  - “A test idea is a brief statement of something that should be tested. For example, if you're testing a square root function, one idea for a test would be ‘test a number less than zero’. The idea is to check if the code handles an error case.” (Marick)
**Test Case**

- In my view, a test case is a question that you ask of the program. The point of running the test is to gain information, for example whether the program will pass or fail the test.

- **Implications of this approach:**
  - The test must be CAPABLE of revealing valuable information
  - The SCOPE of a test changes over time, because the information value of tests changes as the program matures
  - The METRICS that count test cases are essentially meaningless because test cases merge or are abandoned as their information value diminishes.
Factors Involved in Test Case Quality

- Information Objectives
- Test Attributes

Testing Styles / Paradigms

Test Cases
Test Cases: Information Objectives

- Find defects
- Maximize bug count
- Block premature product releases
- Help managers make ship / no-ship decisions
- Minimize technical support costs
- Assess conformance to specification
- Conform to regulations
- Minimize safety-related lawsuit risk
- Find safe scenarios for use of the product
- Assess quality
- Verify correctness of the product
- Assure quality
Test Cases:
Test Attributes

- For These Objectives:
  - Find bugs that will be considered relevant
  - Get these bugs fixed

- Attributes: One test is better than another if it is:
  - More powerful
  - More likely to yield significant (more motivating, more persuasive) results
  - More credible
  - Representative of events more likely to be encountered by the user
  - Easier to evaluate.
  - More useful for troubleshooting
  - More informative
  - More Appropriately complex
  - More likely to help the tester or the programmer develop insight into some aspect of the product, the customer, or the environment
Test Cases:
Testing Styles / Paradigms

- Function testing
- Domain testing
- Specification-based testing
- Risk-based testing
- Stress testing
- Regression testing
- User testing
- Scenario testing
- State-model based testing
- High volume automated testing
- Exploratory testing
Concluding Notes

- There’s no simple formula or prescription for generating “good” test cases. The space of interesting tests is too complex for this.
- There are tests that are *good for your purposes*, for bringing forth the type of information that you’re seeking.
- Given a purpose, we can evaluate tests as better or worse along *several dimensions*, in terms of how they advance that purpose.
- *Test types differ along the dimensions.*
- Many test groups stick with a few types of tests. To achieve the broad range of value from our tests, we have to use a broad range of techniques, consciously selected to help us achieve our information goals.