



Testing Introduction

IEEE Definitions

- ***Software testing*** is the process of analyzing a software item to detect the differences between existing and required conditions (that is, bugs) and to evaluate the features of the software item
- ***Reliability*** is the ability of a system or component to perform its required functions under stated conditions for a specified period of time

Validation vs. verification

- **Validation:** *process of evaluating a system or component during or at the end of the development process to determine whether it satisfies specified **requirements***
 - Validation: Are we building the right product?
- **Verification:** *the process of evaluating a system or component to determine whether the products of a given development phase satisfy the conditions imposed at the start of that phase*
 - Verification: Are we building the product right?
- **IEEE definitions**

Verification Are we building the product <u>right</u> ?	Validation Are we building the <u>right</u> product?
 <p>"I landed on "Go" but didn't get my \$200!"</p>	 <p>"I know this game has money and players and "Go" – but this is not the game I wanted."</p>

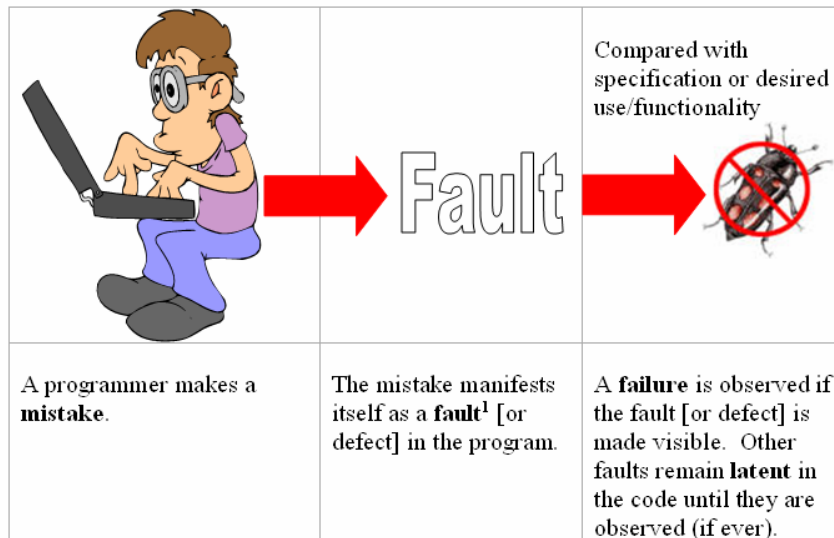
Verification vs. Validation

Mistake, Fault, Failure, etc.

- **Mistake** – a human action that produces an incorrect result.
- **Fault [or Defect]** – an incorrect step, process, or data definition in a program.
- **Failure** – the inability of a system or component to perform its required function within the specified performance requirement.
- **Error** – the difference between a computed, observed, or measured value or condition and the true, specified, or theoretically correct value or condition.

- Our job as testers is to write test cases to cause failures.
- But, there is no way to guarantee that all faults have been detected.
- **Work smart:** write as few test cases as possible to cause failures; don't have more than one test cause the same failure.

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The progression of a software failure. A purpose of testing is to expose as many failures as possible before delivering the code to customers.

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Testing Models

- **Black box testing . . . You know the functionality**
 - Given that you know what it is supposed to do, you design tests that make it do what you think that it should do
 - From the outside, you are testing its functionality against the specs
 - For software this is testing the interface
 - » What is input to the system?
 - » What you can do from the outside to change the system?
 - » What is output from the system?
 - Tests the functionality of the system by observing its external behavior
 - No knowledge of how it goes about meeting the goals

Testing Models - 2

- **White box testing . . . You know the code**
 - Given knowledge of the internal workings, you thoroughly test what is happening on the inside
 - Close examination of procedural level of detail
 - Logical paths through code are tested
 - » Conditionals
 - » Loops
 - » Branches
 - Status is examined in terms of expected values
 - Impossible to thoroughly exercise all paths
 - » Exhaustive testing grows without bound
 - Can be practical if a limited number of “important” paths are evaluated
 - Can be practical to examine and test important data structures

Types of Testing

- > **Unit Testing**
 - testing of individual hardware or software units or groups of related units
 - Done by programmer(s)
 - Generally all white box
 - Automation desirable for repeatability
- > **Integration Testing**
 - testing in which software components, hardware components, or both are combined and tested to evaluate the interaction between them
 - Done by programmer as they integrate their code into code base
 - Generally white box, maybe some black box
 - Automation desirable for repeatability
- > **Functional/System Testing**
 - testing conducted on a complete, integrated system to evaluate the system compliance with its specified requirements
 - Stress testing, performance testing, usability testing
 - It is recommended that this be done by external test group
 - Mostly **black box** so that testing is not 'corrupted' by too much knowledge
 - Test automation desirable
- > **Acceptance Testing**
 - formal testing conducted to determine whether or not a system satisfies its acceptance criteria (the criteria the system must satisfy to be accepted by a customer) and to enable the customer to determine whether or not to accept the system
 - Generally done by customer/customer representative in their environment through the GUI . . . Definitely **black box**
- > **Regression Testing**
 - Regression testing is selective retesting of a system or component to verify that modifications have not caused unintended effects and that the system or component still complies with its specified requirements
 - Smoke test group of test cases that establish that the system is stable and all major functionality is present and works under "normal" conditions
- > **Beta Testing**

Fill in chart

Testing Type	Specification [what you look at to write tests]	Black or white? Valid. or verif?
Unit		
Integration		
Functional and System		
Acceptance		
Beta		
Regression		