

Software Quality Assurance and Testing

Lecture - 02



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SOFTWARE TESTING TERMINOLOGY & METHODOLOGY

Failure



- When the software is tested, failure is the first term being used. It means the inability of a system or component to perform a required function according to its specification. In other words, when results or behavior of the system under test are different as compared to specified expectations, then failure exists.

Fault



- Fault is a condition that in actual causes a system to produce failure. Fault is synonymous with the words defect or bug. Therefore, fault is the reason embedded in any phase of SDLC and results in failures.

Error



- Whenever a development team member makes a mistake in any phase of SDLC, errors are produced. It might be a typographical error, a misleading of a specification, a misunderstanding of what a subroutine does, and so on. Error is a very general term used for human mistakes. Thus, an error causes a bug and the bug in turn causes failures



Error, Fault & Failure



```
Module A()
{
    ...•

    while(a > n+1);
    {
        ...
        print("The value of x is", x);
    }

    ...•
}
```

Test Case



- Test case is a well-documented procedure designed to test the functionality of a feature in the system. A test case has an identity and is associated with a program behavior. The primary purpose of designing a test case is to find errors in the system. For designing the test case, it needs to provide a set of inputs and its corresponding expected outputs.

Test Case Template



Test Case ID

Purpose

Preconditions

Inputs

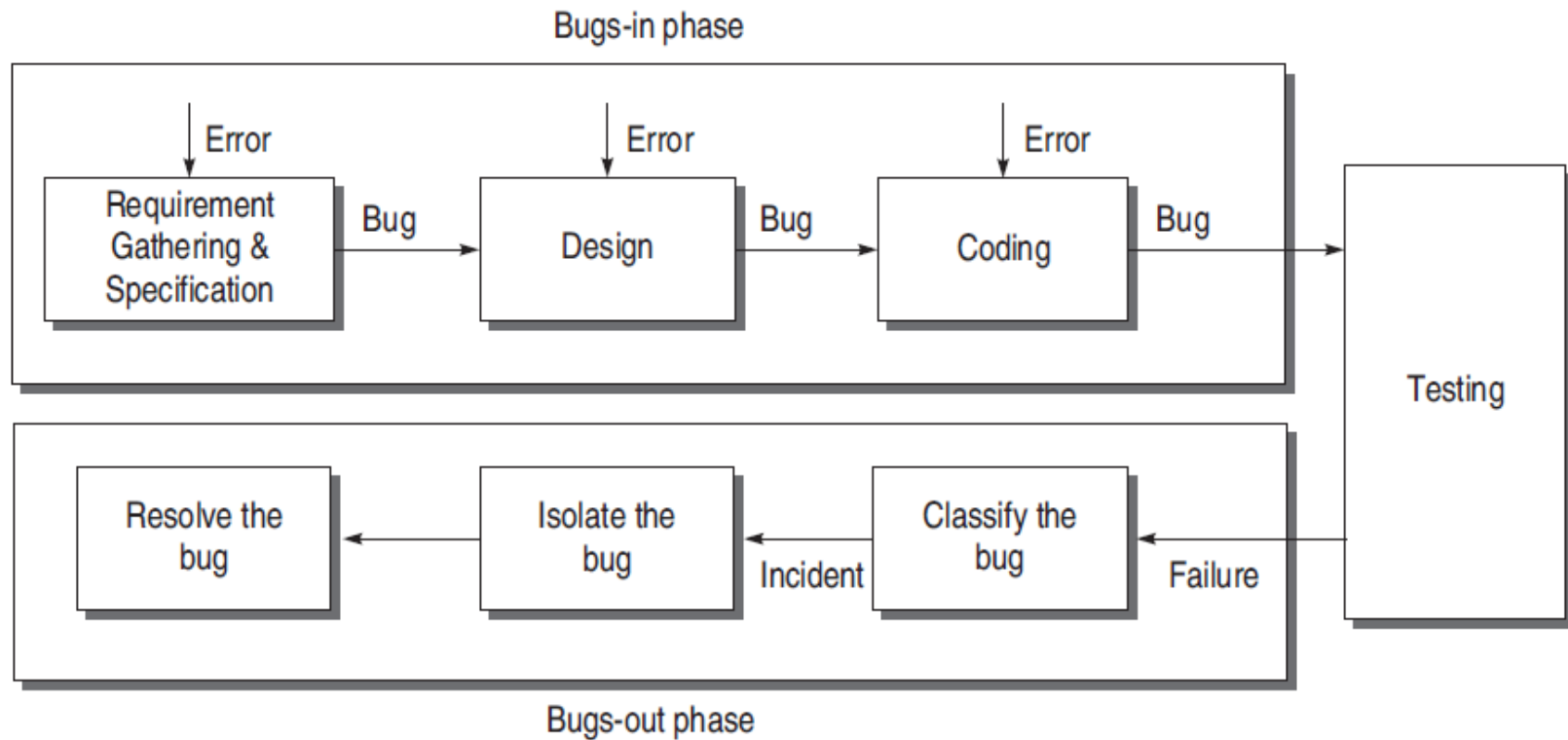
Expected Outputs

Testware, Incident & Test Oracle

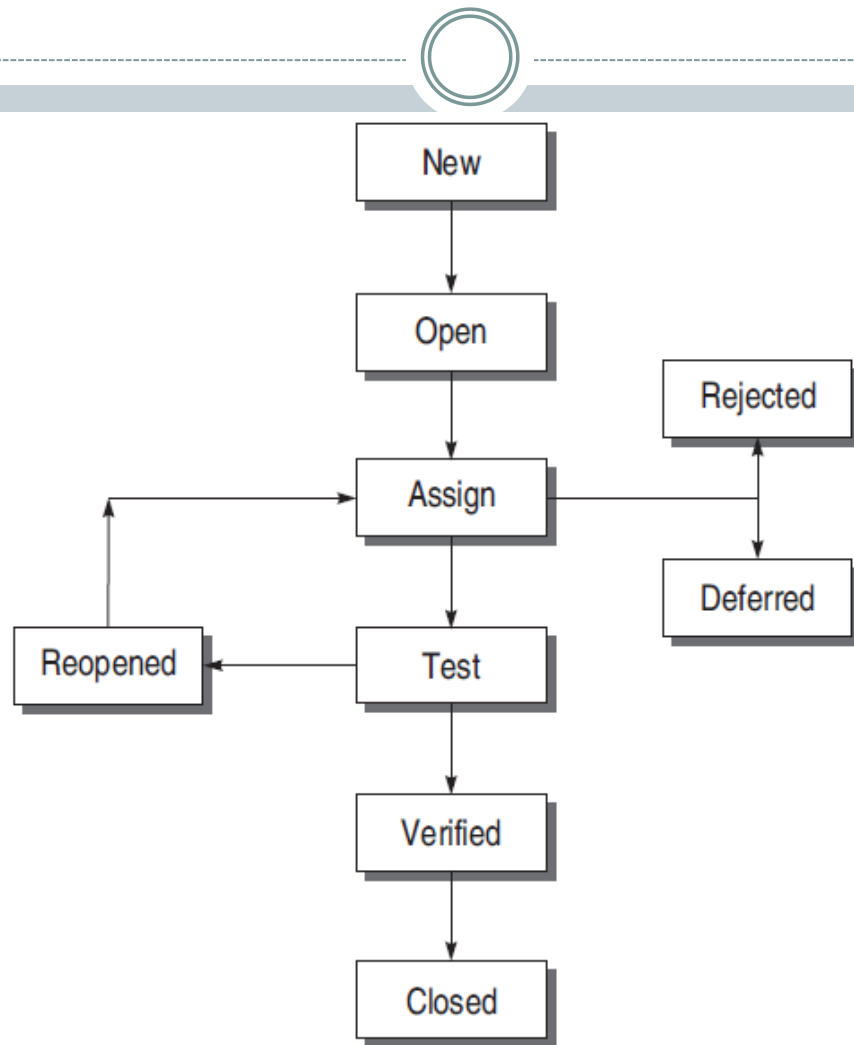


- **Testware:** The documents created during testing activities are known as testware. Taking the analogy from software and hardware as a product, testware are the documents that a test engineer produces. It may include test plans, test specifications, test case design, test reports, etc. Testware documents should also be managed and updated like a software product.
- **Incident:** When a failure occurs, it may or may not be readily apparent to the user. An incident is the symptom(s) associated with a failure that alerts the user about the occurrence of a failure.
- **Test oracle:** An oracle is the means to judge the success or failure of a test, i.e. to judge the correctness of the system for some test. The simplest oracle is comparing actual results with expected results by hand. This can be very time consuming, so automated oracles are sought.

Life Cycle of A Bug



States of a Bug



Why Do Bugs Occur?



- To Err is Human
- Bugs in Earlier Stages go Undetected and Propagate

Bug Classification Based On Criticality



- Critical Bug
- Major Bug
- Medium Bug
- Minor Bug

Bug Classification Based On SDLC



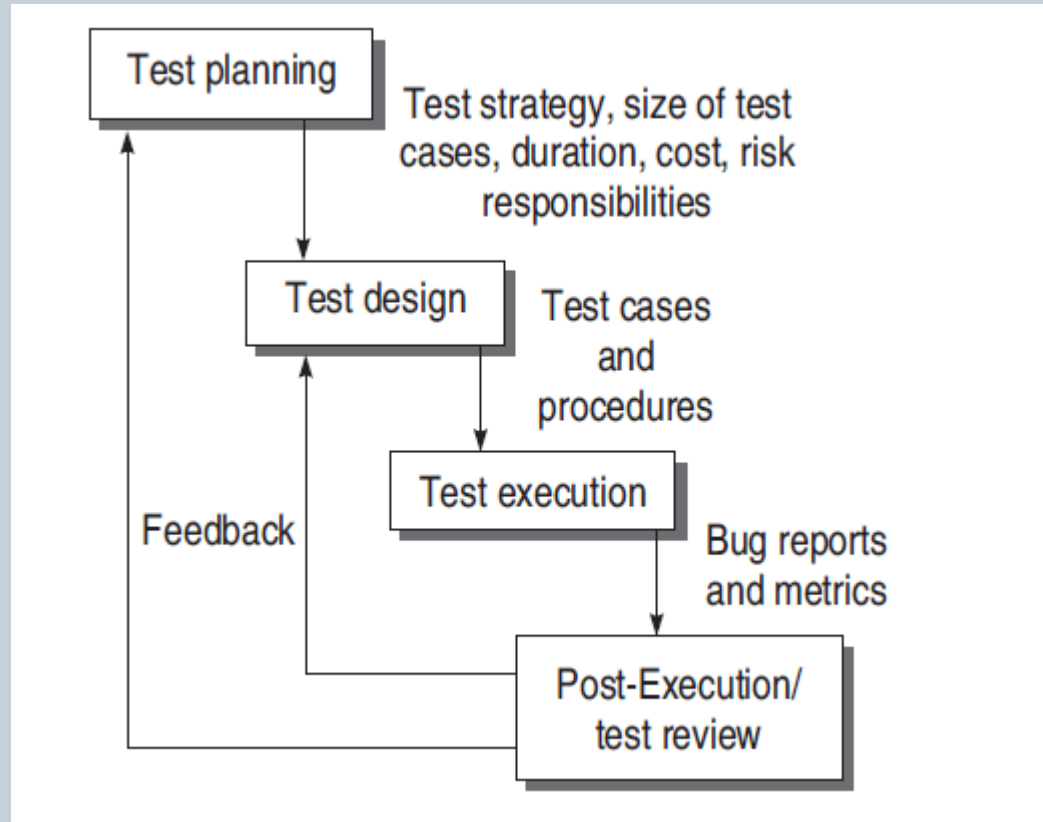
- Requirements and Specifications Bugs
- Design Bugs
 - Control flow bugs
 - Logic bugs
 - Processing bugs
 - Data flow bugs
 - Error handling bugs
 - Race condition bugs
 - Boundary-related bugs
 - User interface bugs
- Coding Bugs
- Interface and Integration Bugs
- System Bugs
- Testing Bugs

Testing Principles

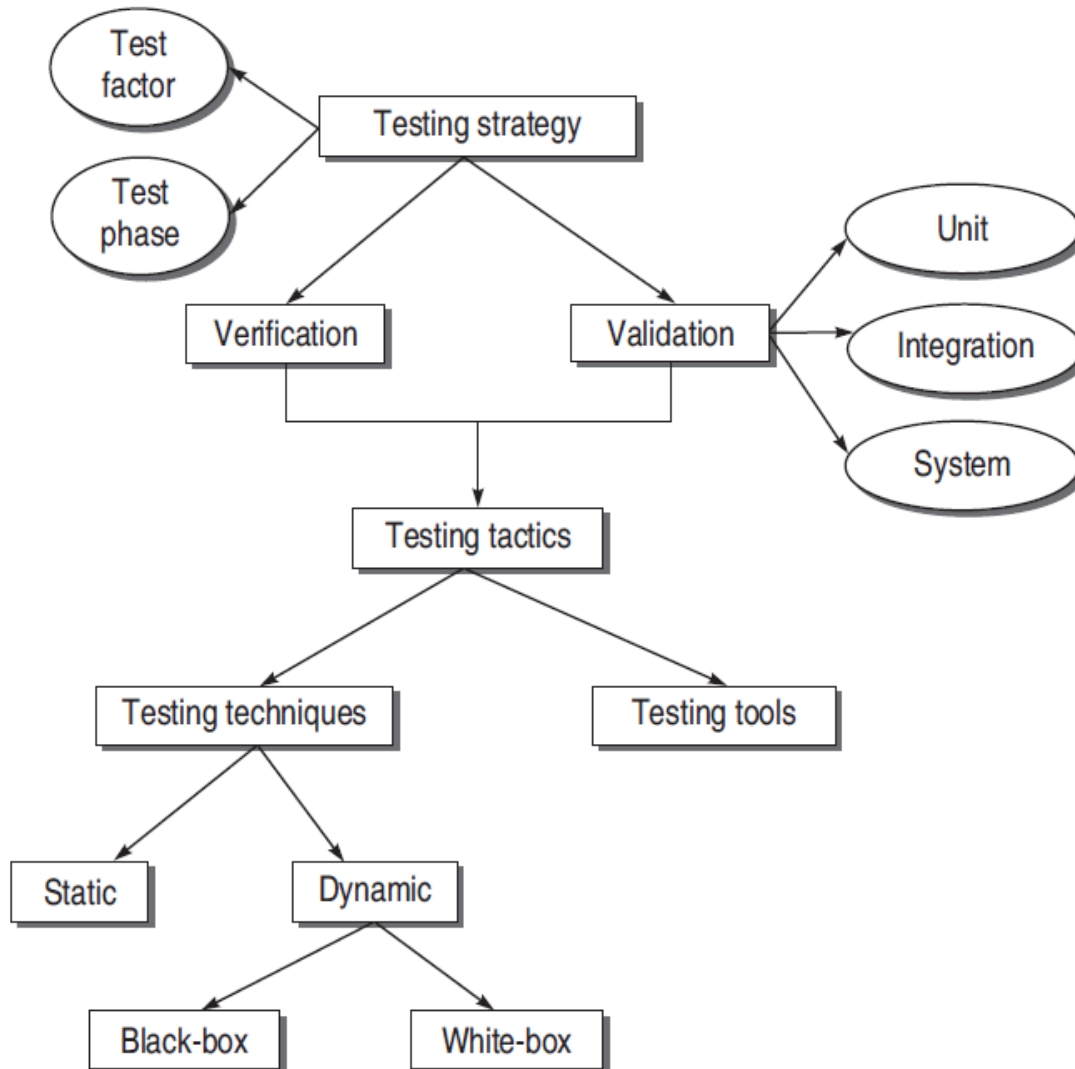


1. Effective testing, not exhaustive testing
2. Testing is not a single phase performed in SDLC
3. Destructive approach for constructive testing
4. Early testing is the best policy
5. Probability of existence of an error in a section of a program is proportional to the number of errors already found in that section
6. Testing strategy should start at the smallest module level and expand towards the whole program
7. Testing should also be performed by an independent team
8. Everything must be recorded in software testing
9. Invalid inputs and unexpected behavior have a high probability of finding an error
10. Testers must participate in specification and design reviews

Software Testing Life Cycle (STLC)



Testing Methodology



- Verification is 'Are we building the product right?'
- Validation is 'Are we building the right product?'

Thank You



END OF CHAPTER