# Software Testing Process and Types

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# Presentation Outline

- What is Software Testing Process?
- Software Unit Testing
- Software Integration Testing
- Software Function Validation
- Software System Testing

# What is Software Testing Process?

Testing is a process rather than a single activity. This process starts from test planning then designing test cases, preparing for execution and evaluating status till the test closure. So, we can divide the activities within the fundamental test process into the following basic steps:

1) Planning and Control
2) Analysis and Design
3) Implementation and Execution
4) Evaluating exit criteria and Reporting
5) Test Closure activities

# Software Test Planning?

Test planning has following major tasks:

i. To determine the scope and risks and identify the objectives of testing.

ii. To determine the test approach.

iii. To implement the test policy and/or the test strategy.

iv. To determine the required test resources like people, test environments, PCs, etc.

v. To schedule test analysis and design tasks, test implementation, execution and evaluation.

vi. To determine the Exit criteria we need to set criteria such as Coverage criteria.

# Software Test Control

**Test control has the following major tasks:**

**i. To measure and analyze the results of reviews and testing.**

**ii. To monitor and document progress, test coverage and exit criteria.**

**iii. To provide information on testing.**

**iv. To initiate corrective actions.**

**v. To make decisions.**

# Software Test Analysis and Design

Test analysis and Test Design has the following major tasks:

i. To review the test basis.

ii. To identify test conditions.

iii. To design the tests.

iv. To evaluate testability of the requirements and system.

v. To design the test environment set-up and identify and required infrastructure and tools.

# Software Test Implementation and Execution

**During test implementation and execution, we take the test conditions into test cases and procedures and other test-ware such as scripts for automation, the test environment and any other test infrastructure.**

**Test implementation has the following major task:**

**a) To develop and prioritize test cases and test data by using well-defined test methods.**

**- Define some operation instructions (known as procedures)**

**- May automate some tests using test harness and tests scripts.**

**b) To create test suites from the test cases for efficient test execution.**

**c) To implement and verify the environment.**

# Software Test Implementation and Execution

a) To execute test suites and individual test cases by following procedures

b) To re-execute the tests that previously failed in order to confirm a fix. This is known as confirmation testing or re-testing.

c) To log the outcome of the test execution and record the identities and versions of the software under tests. The test log is used for the audit trial.

c) To Compare actual results with expected results.

d) To report the problems if there are differences between actual and expected results.

# Evaluating Exit criteria and Reporting

**The criteria for each level is set up based on the risk assessment of the project. The criteria may vary from project to project.**

**Exit criteria come into picture, when:**
**– Maximum test cases are executed with certain pass percentage.**
**– Bug rate falls below certain level.**
**– When achieved the deadlines.**

**Evaluating exit criteria has the following major tasks:**

**i. To check the test logs against the exit criteria specified in test planning.**
**ii. To assess if more test are needed or if the exit criteria specified should be changed.**
**iii. To write a test summary report for stakeholders**

# Software Test Closure Activities

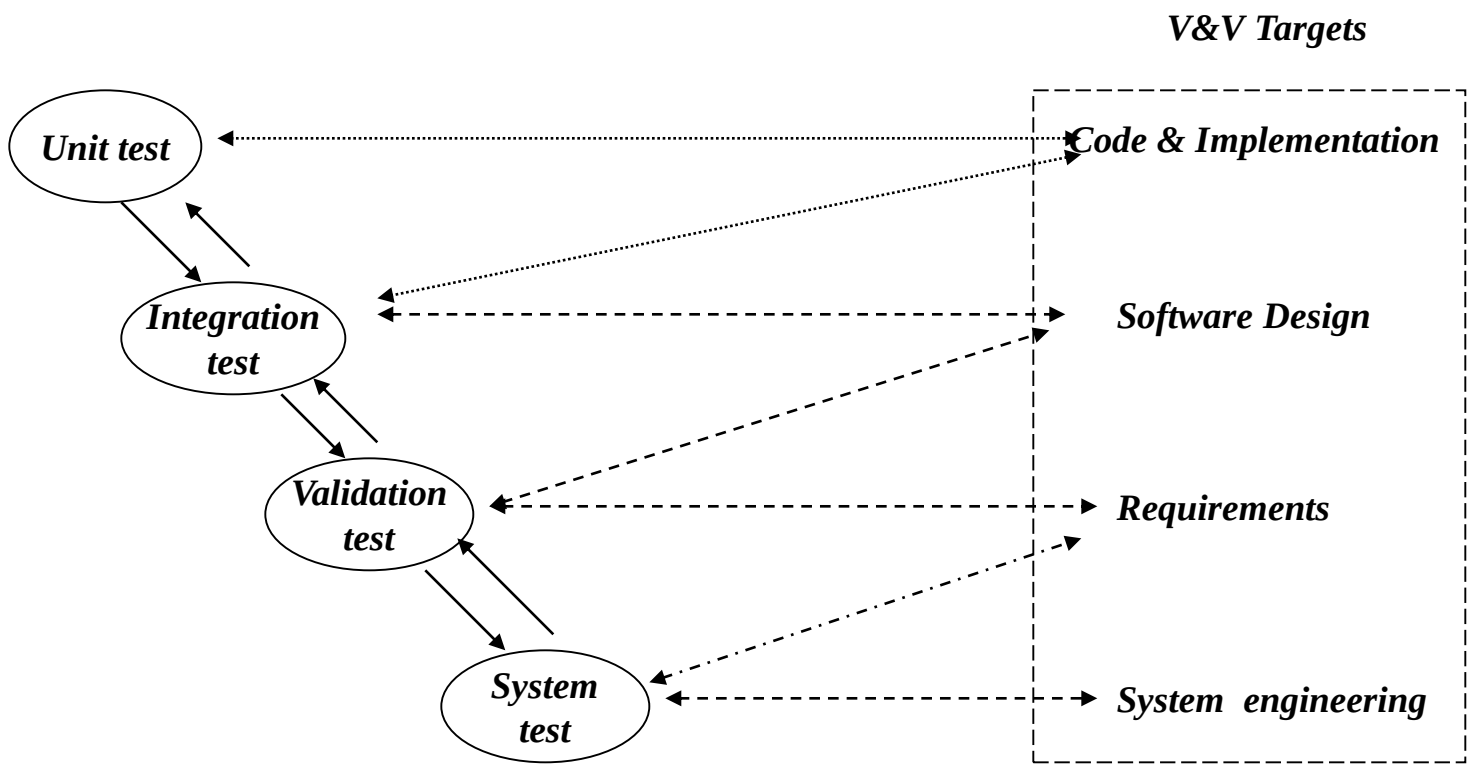
**Test closure activities are done when software is delivered. The testing can be closed for the other reasons also like:**

- **When all the information has been gathered which are needed for the testing.**
- **When a project is cancelled.**
- **When some target is achieved.**
- **When a maintenance release or update is done.**

**Test closure activities include the following major tasks:**

**i. To check which planned deliverables are actually delivered and to ensure that all incident reports have been resolved.**
**ii. To finalize and archive test-ware such as scripts, test environments, etc. for later reuse.**
**iii. To handover the test-ware to the maintenance organization. They will give support to the software.**
**iv To evaluate how the testing went and learn lessons for future releases and projects.**

# Software Testing Process

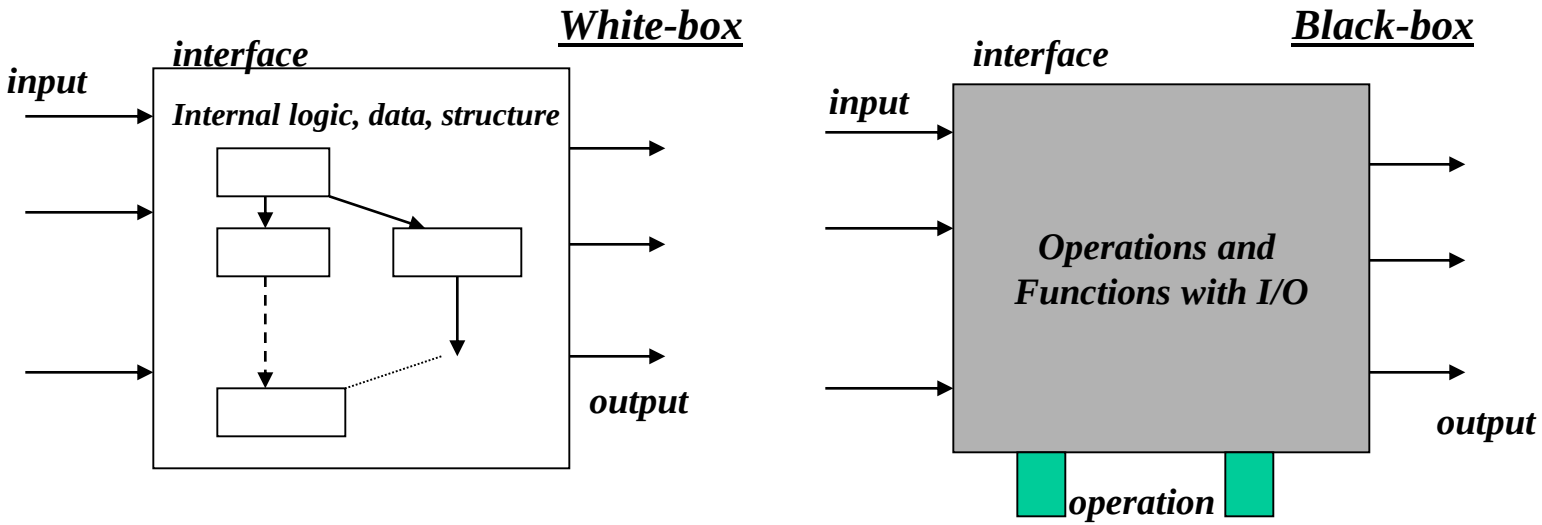


# Unit Test (Component Level Test)

***Unit testing: Individual components are tested independently to ensure their quality. The focus is to uncover errors in design and implementation, including***

- ***data structure in a component***
- ***program logic and program structure in a component***
- ***component interface***
- ***functions and operations of a component***

***Unit testers: developers of the components.***



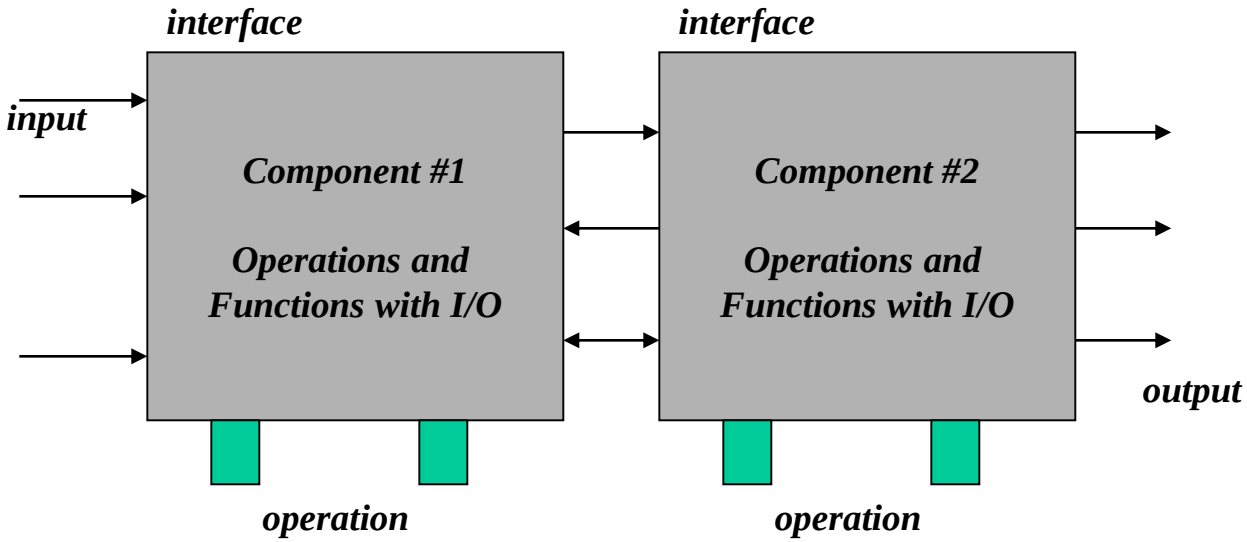
# Integration Testing

***Integration test:*** ***A group of dependent components are tested together to ensure their the quality of their integration unit.***

***The focus is to uncover errors in:***

- ***Design and construction of software architecture***
- ***Integrated functions or operations at sub-system level***
- ***Interfaces and interactions between them***
- ***Resource integration and/or environment integration***

***Integration testers: either developers and/or test engineers.***



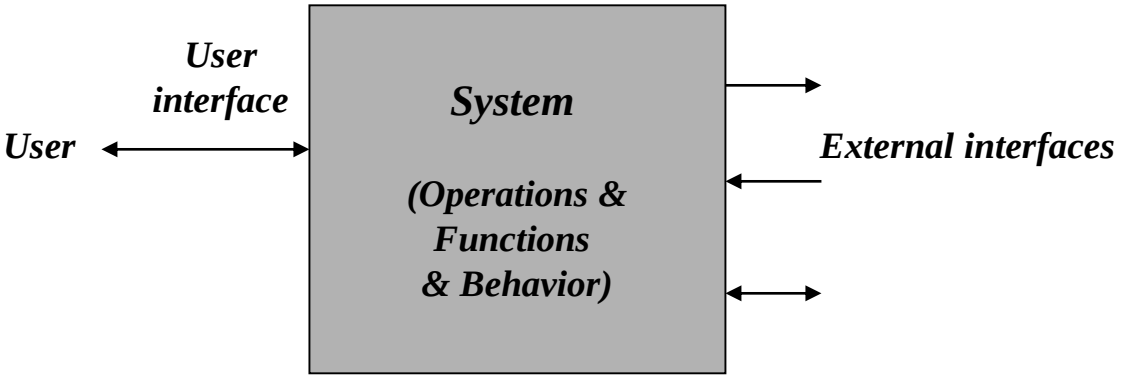
# Function Validation Testing

***Validation test:*** ***The integrated software is tested based on requirements to ensure that we have a right product.***

***The focus is to uncover errors in:***

- ***System input/output***
- ***System functions and information data***
- ***System interfaces with external parts***
- ***User interfaces***
- ***System behavior and performance***

***Validation testers:*** ***test engineers in ITG or SQA people.***



# System Testing

***System test:*** *The system software is tested as a whole. It verifies all elements mesh properly to make sure that all system functions and performance are achieved in the target environment.*

***The focus areas are:***

- *System functions and performance*
- *System reliability and recoverability (recovery test)*
- *System installation (installation test)*
- *System behavior in the special conditions (stress and load test)*
- *System user operations (acceptance test/alpha test)*
- *Hardware and software integration and collaboration*
- *Integration of external software and the system*

***System testers:*** *test engineers in ITG or SQA people.*

*When a system is to be marketed as a software product, a testing process called beta testing is often used.*

# Current Test Issues and Challenges

***Software testing is very expensive.***

***How to achieve test automation?***

***When should we stop software testing?***

***Test criteria, test coverage, adequate testing.***

***Other software testing challenges?***

- ***GUI Testing***
- ***Testing Components and Component-Based Software***
- ***Testing Web-based Systems***
- ***Testing Mobile APPs and Mobile Web Applications***
- ***Testing System Security***
- ***Testing SaaS Applications***