Types of Software Testing

Introduction:-

Testing is the process of executing a program with the aim of finding errors. To make our software perform well it should be error-free. If testing is done successfully it will remove all the errors from the software.

Principles of Testing:-

(i) All the test should meet the customer requirements

(ii) To make our software testing should be performed by a third party

(iii) Exhaustive testing is not possible. As we need the optimal amount of testing based on the risk assessment of the application.

(iv) All the test to be conducted should be planned before implementing it

(v) It follows the Pareto rule(80/20 rule) which states that 80% of errors come from 20% of program components.

(vi) Start testing with small parts and extend it to large parts.

1. Unit Testing

It focuses on the smallest unit of software design. In this, we test an individual unit or group of interrelated units. It is often done by the programmer by using sample input and observing its corresponding outputs.
Example:

```
a) In a program we are checking if loop, method or
   function is working fine
b) Misunderstood or incorrect, arithmetic precedence.
c) Incorrect initialization
```

2. Integration Testing

The objective is to take unit tested components and build a program structure that has been dictated by design. Integration testing is testing in which a group of components is combined to produce output.

Integration testing is of four types: (i) Top-down (ii) Bottom-up (iii) Sandwich (iv) Big-Bang
Example

```
(a) Black Box testing:- It is used for validation.
In this we ignore internal working mechanism and
focus on what is the output?.

(b) White Box testing:- It is used for verification.
In this we focus on internal mechanism i.e.
how the output is achieved?
```

5. Alpha Testing

This is a type of validation testing. It is a type of *acceptance testing* which is done before the product is released to customers. It is typically done by QA people.

Example:

```
When software testing is performed internally within
the organization
```

6. Beta Testing

The beta test is conducted at one or more customer sites by the end-user of the software. This version is released for a limited number of users for testing in a real-time environment

Example:

```
When software testing is performed for the limited
number of people
```

7. System Testing

This software is tested such that it works fine for the different operating systems. It is covered under the black box testing technique. In this, we just focus on the required input and output without focusing on internal working.
In this, we have security testing, recovery testing, stress testing, and performance testing

Example:

```
This include functional as well as non functional
testing
```

9. Performance Testing

It is designed to test the run-time performance of software within the context of an integrated system. It is used to test the speed and effectiveness of the program. It is also called load testing. In it we check, what is the performance of the system in the given load.

Example:

```
Checking number of processor cycles.
```

Software Engineering | Black box testing

Difficulty Level : **Hard**   •   Last Updated : 30 Apr, 2019

Prerequisite – Software Testing | Basics
Black box testing is a type of software testing in which the functionality of the software is not known. The testing is done without the internal knowledge of the products.

Black box testing can be done in following ways:

1. Syntax Driven Testing – This type of testing is applied to systems that can be syntactically represented by some language. For example- compilers,language that can be represented by context free grammar. In this, the test cases are generated so that each grammar rule is used at least once.

2. Equivalence partitioning – It is often seen that many type of inputs work similarly so instead of giving all of them separately we can group them together and test only one input of each group. The idea is to partition the input domain of the system into a number of equivalence classes such that each member of class works in a similar way, i.e., if a test case in one class results in some error, other members of class would also result into same error.

Software Engineering | White box Testing

Difficulty Level : **Easy**   •   Last Updated : 09 Mar, 2022

Prerequisite – Software Testing | Basics

White box testing techniques analyze the internal structures the used data structures, internal design, code structure and the working of the software rather than just the functionality as in black box testing. It is also called glass box testing or clear box testing or structural testing.

Working process of white box testing:

- **Input:** Requirements, Functional specifications, design documents, source code.
- **Processing:** Performing risk analysis for guiding through the entire process.
- **Proper test planning:** Designing test cases so as to cover entire code. Execute rinse-repeat until error-free software is reached. Also, the results are communicated.
- **Output:** Preparing final report of the entire testing process.