Different Types of Testing in Software Testing

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Abstract - *In software organization testing is done which is use to identify quality of software application. Now a day's organizations mainly focus on software testing field so that the developed application should satisfy the customer as well as organizations needs. Testing is done with the intent of identifying the correctness, completeness, and security of developed software application. The paper attempts to provide the overview of software testing field. There are different types of testing which are* conducted at different stages .The objective is to put all the levels of testing with their objective and its purpose in a single unified context. Although with respect to vastness of the field the paper gives the idea about how different types of testing should be done at different levels*.*

Key Words: **Software testing, V-model, Tools, Alpha testing, Beta testing, SRS etc**

1. INTRODUCTION

Software testing is a set of activities conducted for finding errors in software. It is a process used to measure the quality of the software. There are different types of testing which are done at different levels. Each testing is done with different purpose. V model is used to represent different testing activities and it also provides links to SDLC. V model consist of Left arm and Right arm. Left arm is known as Verification and right arm is known as Validation .Each verification activity has its corresponding validation activity. Automation tools are available for some type of testing and the rest of testing types are done manually. Also there are different participants which are involved in different testing activity

1.1 Software Testing (1)

Due to some challenges in software development some issues were created so to find out these issues and detects the defects before they are seen by customer software testing is used**.**

1.2 Software testing tasks

-To find out defects as early as possible
-Defect reporting.

-Checking corrections done for defects**.**
-Verifying that no new defect have come after correction*.*

2. V-Model (2)

V model is a model which is use to represent the testing activity from beginning of application till its deployment.
V model consist of two arms which represents different activities with their applicable level of testing.

Fig: V Model
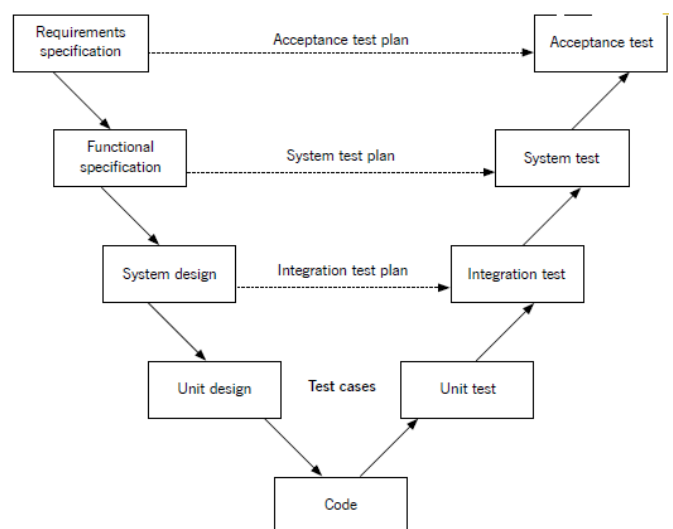
2.1 Types of testing

Testing is broadly divided into two types on the basis of their activity
-Verification
-Validation

3. Verification (3)

In verification testing software application is not actually executed but the documents or code is checked statically to find out defects.
Software development is based on the customer requirement so the software application needs to confirm to the predefined requirement specification.

As the software development goes through different phases it is necessary to ensure that deliverable of each phase is as per the specification

Verification makes sure that the software application is getting developed in the correct way with respect to requirement.

Verification focuses on find defects as early as possible.

It means "Are we doing the right job".

Verification is also known as Static Testing

Verification process ends before validation process starts.

3.1 Verification process

During verification all the outcomes of software development including code are read and reviewed by one or more responsible team members to find defect in them.

Verification activity are conducted for the deliverables of development phases on left arm of v model

Following are the different document on which verification is done to find out defects.

- • Software requirements specification

It contains user requirements which are checked in verification activity.

It provides acceptance test plan which is use in Acceptance testing.

- • High level design document

High level design document involves software specification.

It provides system test plan which are used during system testing.

- • Detailed design document

Detailed design involves unit test plan.

Unit test plan is use to conduct unit testing.

- • Code

Code is also checked statically to find out defects.

3.2 Methods of Verification

Walkthrough and reviews are two methods of verification which are used to stop the incrementing defects in next phases so they are use to reduce the amount of rework.

3.3 Walkthrough

Walkthrough is an informal process with the intent of providing information and receiving improvements.

During walkthrough meeting author describes the document to all the participants of the meeting and then knowledge/doubts is shared.

Walkthrough is carried out in following ways.

Author explains the product.

Participants come out with defects and suggestion

Author provides clarification.

Suggestions are noted and correction action is taken.

3.4 Reviews

Review is formal process which is used to conduct verification activity

It is used to find out defects in formalized manner.

Customer, Management, Peer and Audit team are involved in review activity

Testers are also involved in requirement reviews

Following are the stages of the review process.

-Read the documents and check the code

-Find out defects

-Document it

-Close the defect by taking corrective action

-Confirm closure of the defect through review

4. Validation (4)

Validation approach is use to evaluate whether the developed application should functionally do what it is supposed to do and it should satisfy the requirements of the customer.

Validation is done by executing the code of the developed functionality

Validation is also called as Dynamic testing as validation includes actual execution of the functionality to find out the defects.

It focuses on "Are we building the right product"

It is represented on the right arm of V model

It contains

-Unit testing,

-Integration testing,

-System testing and

-Acceptance testing.

4.1 Unit testing

Unit testing includes testing of smallest piece of software to verify its behavior.

It ensures that the code should satisfy the requirements.

It is done by developers.

Unit testing is done manually or by using tools also like JUnit, NUnit.

It is done to reduce future cost due to early detection of errors.

It tests smaller components so that it is easy to find out errors.

Enhancement can be performed.

4.2 Integration testing

Integration testing is done to ensure that individually tested components can work together to perform the intended task. Integration testing is important because modules work individually but they may not work together when they are integrated

It is used to uncover the problems which are occur in interfaces between different modules.

Following approaches are used in Integration testing

- Bottom up approach
  In bottom up approach the modules are combined and tested which belong to the bottom of the application hierarchy starting with modules at the top module.
  When top module is not ready but bottom modules are developed at that time this approach is used.
  Driver is used in bottom up approach.

- Top down approach
  When all the bottom modules are not ready at that time top down approach is used.
  Stubs are used in top down approach.
  Stub is a special purpose program which is written to test the integration between modules.

- Critical Part First approach
  In this approach critical parts of the system are implemented and tested first.
  When focusing on entire application is not possible due to time constraint then Functionality which is important is concentrated first.

- Big bang approach
  Big bang approach is a common approach in which all modules are integrated at once.
  No stub and drivers are required in this approach.
  But it is difficult to debug the code and find out the location of the defect.

4.3 System testing

System testing is conducted to check that the system meets its functional and non-functional requirements
System testing is done after integration testing.
It is conducted on a complete, integrated system to evaluate the system specified features.
It is done by a tester.
When all modules are in integrated state and working as a single application at that time system testing is done.
Performance testing, Security testing, Confignation testing and Installation testing are done during system testing.

4.4 User Acceptance testing

User Acceptance testing is a final testing before the system is accepted for its intended use.
It is based on requirement document.
UA testing validates both functional as well as non functional specifications.
UA testing is done according to user requirement to confirm that application is behaving as expected by the customer.
It is usually done by customer or end user.
There are two types of UA testing
-Alpha testing
-Beta testing

Alpha testing
It is done after system testing.
It is done at the developer site by a customer.
It is performed in a controlled environment

Beta testing
It is done after alpha testing
In beta testing developer is not present at the location.
It is conducted at customer site by an end user.

Table1: Comparison of different levels of testing(4)

	Unit testing	Integration testing	System testing	User Acceptance Testing
Done by	Developer	Testers and developers	Testers and developers	Customers and end users
Testing object	Code is tested	Interfaces between modules are tested	Complete software application is tested	Testing with respect to requirements
Focus Of testing	Unit meeting its specification	Interfaces	Functional and Non functional requirements	Functionality from end users side
Defect	Code related error	Control flow error	Functionality is not correctly working	Not as per user needs

5. Non-Functional Testing (5)

These type of testing are carried out during system testing.
Aim is to test the software under different condition

5.1 Usability testing

Usability testing is done to check the ease of use an application
Usability testing determines how it is easy for a new user to carry out basic tasks of an application.

5.2 Load Testing

A load testing is conducted to understand the behavior of the system under a specific load which is mentioned in requirement document.

5.3 Volume testing

Volume testing refers to testing an application with a huge amount of data and checks its limitation.

5.4. Stress Testing

Stress testing is use to determine the ability of an application to maintain a certain level of performance under unfavorable condition.

5.5. Performance Testing

Performance testing tests how well an application behaves with respect to performance requirements.

5.6 Configuration testing

Configuration testing is done to check how application behaves on the range of hardware and software configurations for which it is designed.

5.7 Compatibility Testing

It is done to test the application for the configuration for which it is not designed and check its compatibility.
It includes testing of an application on different platforms.

5.8 Security testing

Security testing is done to determine that an application protects data and maintains functionality access as intended.

3. CONCLUSIONS

In Software testing there are different types of testing which are done for different purpose so that quality product is developed. The main objective behind this is to develop error free software. Adequate verification will lead to less issues being present during the validation phase as most of issues are already discovered and corrected during verification and Adequate validation will ensure that software application is developed is as per software artifacts finalized in verification. Therefore it is important to know all the testing activities as Validation and Verification process goes hand in hand and they reduces the future rework and cost.

ACKNOWLEDGEMENT

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