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Software Testing Basics & Testing Methods

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Abstract: Software testing is a critical and integral phase within the software development lifecycle, aiming to evaluate a software application to identify defects, ensure its adherence to specified requirements, and ultimately enhance its overall quality, reliability, and performance. This systematic process encompasses various techniques and methodologies, including both manual and automated approaches, as well as functional and non-functional testing types. The objective is to proactively detect and mitigate bugs and errors, thereby reducing post-release failures, improving user experience, and minimizing maintenance costs. The increasing complexity of modern software systems necessitates robust testing strategies and the continuous integration of testing practices within agile and DevOps frameworks. Ultimately, effective software testing is essential for delivering high-quality products that meet customer expectations and build trust in the competitive digital landscape. Software testing is the process of identifying the correctness and quality of software program. Software testing is a process with intending to find defects. Software testing is done by software tester. Developer can also make error.

Keywords: Software Testing, errors, bugs, test case, test plan.

I. INTRODUCTION

Software Testing is the process of executing a program or software with the intent of finding errors validating against requirements. Software Testing is the process of exercising a software component using a selected set of test cases, with the intent of revealing defects and evaluating quality. Software testing is a technical investigation of a product, i.e.an empirical search for quality-related information of value to a project's stakeholders

II. OBJECTIVES & TERMS RELATED TO SOFTWARE TESTING

A. Objectives of Software Testing:

- Finding defects.
- Creating high quality test cases.
- Quality Improvement
- Satisfying Customer Requirements
- Reliability & Quality
- To find defects before they cause a production system to fail.
- To bring the tested software, after correction of the identified defects and retesting, to an acceptable level of quality.
- To perform the required tests efficiently and effectively, within the limits budgetary and scheduling limitation.
- To compile a record of software errors for use in error prevention (by corrective and preventive actions)

B. Bug, Fault & Failure:

Error: An error is a human action that produces the incorrect result that results in a fault.
Bug: The presence of error at the time of execution of the software.
Fault: State of software caused by an error.
Failure: Deviation of the software from its expected result. It is an event.
Defect: A **defect is an error or a bug**, in the application which is created. A programmer while designing and building the software can make mistakes or error. These mistakes or errors mean that there are flaws in the software. These are called defects.

C. Categories of Software Errors:

- User interface errors such as output errors or incorrect user messages.
- Function errors
- Hardware defects

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- Incorrect program version
- Requirements errors
- Design errors
- Documentation errors
- Architecture errors
- Module interface errors
- Performance errors
- Logic errors such as calculation errors

D. Sources of defects

Education

- Developers does not understand well enough what he or she is doing
- Lack of proper education leads to errors in specification, design, coding, and testing

Communication

- Developers do not know enough
- Information does not reach all stakeholders
- Information is lost

Oversight

- Omitting to do necessary things

Transcription

- Developer knows what to do but simply makes a mistake

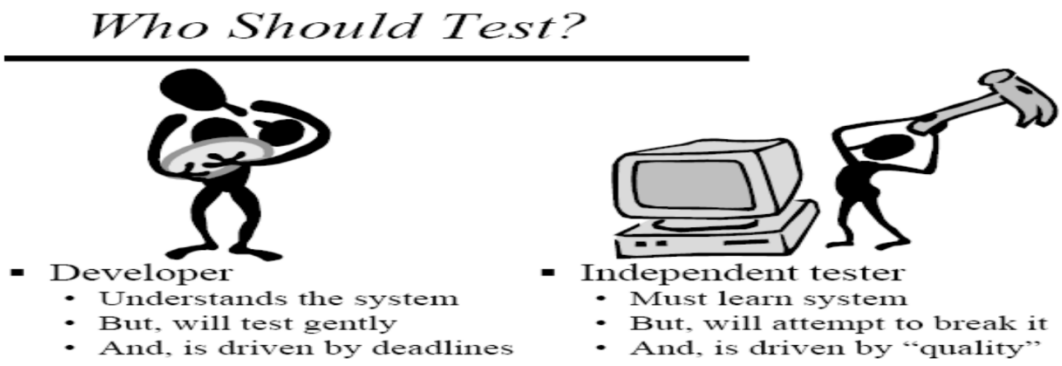
Process

- Process is not applicable for the actual situation
- Process places restrictions that cause errors

III. SKILLS REQUIRES FOR SOFTWARE TESTER

Who is a Software Tester??.

Software Tester is the one who performs testing and find bugs, if they exist in the tested application.



Skills Required for Tester

- Testers are explorers
- They must be troubleshooter
- They are relentless (keeps trying)
- They are creative
- They are perfectionist
- They exercise good judgements
- They are tactful and diplomatic
- Communication skills, Domain knowledge, Desire to learn
- Technical skills, Analytical skills, Planning, Integrity, Curiosity
- Thinking from users perspective

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IV. WHEN TO START AND STOP TESTING?

When to start Testing:

- Testing starts right from requirement phase and continues till end of SDLC.
- An early start to testing reduces the cost, time to rework and error free software that is delivered to the client.
- In SDLC testing can be started from gathering phase and lasts in the deployment phase.
- It also depends on development model that it being used.
- Testing is done in different forms at every phase of SDLC.
- Reviewing the design in the design phase is also considered as testing
- Testing performed by a developer in coding phase also considered as unit testing

When to stop Testing:

- Testing deadlines
- Completion of test execution
- Completion of functional and code coverage to a certain point
- Management decision

V. TEST PLAN, TEST CASE, TEST SCENARIO

Test Plan

A test plan is a systematic approach to testing a system i.e. software. The plan typically contains a detailed understanding of what the eventual testing workflow will be.

Test Case

A test case is a specific procedure of testing a particular requirement.
It will include:

- Identification of specific requirement tested
- Test case success/failure criteria
- Specific steps to execute test
- Test Data

Test Scenario: Verify the login functionality (what to test)

Test case: (How to test)
Case 1: Enter valid username and valid password.
Case 2: Enter valid username and invalid password.
Case 3: Enter invalid username and valid password.
Case 4: Enter invalid username and invalid password.

Test case Format:

Test Case ID:	Test Designed By:<Name>
Test Priority(Low/Medium/High)	Test Designed Date:<Date>
Module Name:	Test Executed By:<Name>
Test Title:	Test Execution Date:<Date>
Description:	
Pre-Conditions:	

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Test case Example:

Step	Test Steps	Test Data	Expected Result	Actual Result	Status(Pass /Fail)
1	Navigate to login page	–	–	–	–
2	Provide valid user name	Username=example@gmail.com	Shall accept the username	Accepts the username	Pass
3	Provide valid user password	Password=1234	Shall accept the password	Accepts the password	Pass
4	Click on Login button	Press Submit Button	User should be able to login	User success full– logged in	Pass

Step	Test Steps	Test Data	Expected Result	Actual Result	Status(Pass /Fail)
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VI. CONCLUSION

Software testing is key process to find the bugs in a software. It is very fast process to get the quality software. To improve quality of software, testing is the key criteria that is to used. Its the finest way to improve a quality of software and get a bug free software.

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