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A Sophisticated Study on Best Practices of Software Testing

Bharti Bhattad
[*1,2] Acropolis institute of technology and research, Indore, India
bhartibhattad118@gmail.com

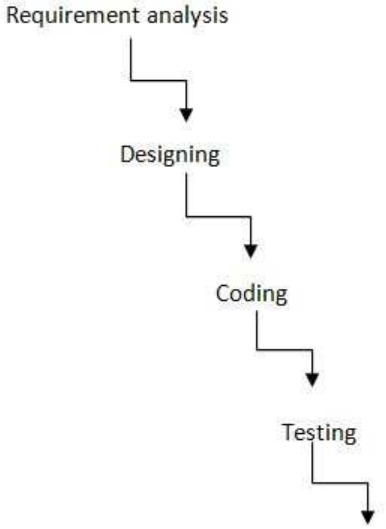
Abstract

Software testing provides a medium to reduce the errors and overall cost of the system. Various software testing techniques, methods and tool are available to enhance software quality. This paper provides a short study material on software testing, objectives, principles of software testing. Further It also answer the question raised by people about what are the basic skills are required for software testers that is who wants to make their career in testing. Also deals with the basic things that are kept in mind while doing planning, making test cases. This paper also deals with how to write good test cases this is one of the important factors in testing.

Keywords: Manual Testing: Test Matrix, Test Data, Test cases, Test plans, Black box testing, Bug Traking.

Introduction

Software is set of instruction executed by computer which are made and designed to perform a particular task. Software development process includes various phases like requirement analysis, Designing, coding, testing, deployment and maintenance of the software. Among all the phases of software development, software testing is the one of the important phase .Before deployment the software, testing is performed.(Fig.1)Software testing is a process of identifying defects, where a defect can be any variance between actual and expected result. Software testing is a process of analyzing or operating software for the purpose of finding bugs.



Need of Software Testing

To demonstrate that the software is doing what it is supposed to do as well as the software is not doing what it is not supposed to do.

Fundamental objective:

The fundamental objective of testing is to find the defects as early as possible and get them fixed that is main objective of testing is not to correct the code but to search for a bug from the program or code at the earliest phase and to find the bugs in short possible time. If one can't detect the bug or can't find the bug from the code then it indicates that testing process required improvement or test cases need improvement. It's the tester's work to write pin pointed test cases so that it can find out hidden defects from the software or program.

2.2 Bugs:

Before understanding the concepts of how to find defects or bugs from code, we must know about that how these bugs or defects are come in software. Software has bugs because of the following reasons:

- Unclear requirements: Either customer is not clear about the requirements or things they wants or sometimes they are not able to articulate their requirements.
- Programming errors: Sometimes it's also happens that there is wrong implementation by developers may be due to wrong assumption or sometimes they don't have as good programming skills as required for developing the software.
- Poor documentation: Sometimes some developers leave their current project in

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midsession of their work in this cases new developers are assigned midway in project so lack of knowledge transfer adds to the problem.

- Communication gap: Many times there is communication gap between the developers and the persons who deals with the requirements, this results wrong understanding of project developers.
- Changing requirements: any change becomes an overhead on the whole team and due to this requirements are implemented wrongly or some may be missed out from the code.

Defect

Defect is anything that we have to remove from our code by applying testing. Defect can be defined in following manner as Defect is anything that software should not do but product specification says that software has to do. Defect is anything that software does do but product specification says that it software should not do. Defect is anything that software is doing but product specification does not mention. Defect is anything that software is not doing and product specification does not mention but software should do.

Software Testing Process

Testing is doing to detect the defects in code and make the software defect free. For implementing testing in correct manner one should have to follow systematic process of testing to get the more good results. Testing process includes

Test planning: In this test objective ,test schedule ,test approach is defined that is before starting of testing tester have to do proper planning, define the objective for the testing that what we want to test and then decide the timing or schedule with correct approach that at what time testing will be get completed. In this test plan is also included which answers such questions as:

- What we have to test?
- What are the pass and fail criteria for the test case?
- What are the hardware and software environment is necessary?
- What features we have to test that are all features or some of the features that we have to decide in test plan?
- What features that we don't want to test?
- As there are so many people involved in tem so what are the jobs or the responsibilities of individuals and organizations involved in the project?

As planning will be good then to some extent test results will be good so there is some guidelines to develop the test plan like

- Start early.
- Keep the test plan flexible.
- Frequently review the test plan.
- Keep test plan short or concise and readable to others.
- Calculate the planning efforts.

Test Design: As schedule is get decided one must design the different test cases, prioritize test cases. After designing these are review by reviewer or inspector or any higher authorized person like test manager and so on. In this tester has to make good test cases.Test Case is set of inputs, execution precondition, and expected outcomes developed for a particular objective. IEEE Standard 610 (1990) defines test case as set of test inputs, execution conditions, and expected results developed for a particular objective, such as to exercise a particular program path or to verify compliance with a specific requirement.

For designing some essentials are:

- As we make the test cases then it should covers all the essential features
- There is balance between normal, abnormal, and boundary test cases
- There is balance between testing methods either black box and white box testing or functional and non functional testing or static and dynamic testing and so on.

Some characteristics of Good test cases are: A good test case must be accurate, economical, repeatable, traceable, self standing and self cleaning.

- A good test case is one that will be accurate that is according to their description they will test.
- A good test case has only the essential *steps* that fulfill the purpose that is unnecessary steps will be avoided.
- A good test case is self standing that is it will give the same results on each time no matter who test it.
- A good test case will be appropriate for both testers and environment.

These above all ,are the factors that show the good teat cases but to write good test cases is the another thing so to write the good test cases , some of the important things are:

- Improve testability of the test cases: testability means easy to test. Test steps will be written in active cases as the link or steps should be clear

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and understandable to any person who executes the test cases.
- Improve accurately: accurately means testers follow the directions, the result of pass or fail will be right.

Test Cases common mistakes:

- Don't make too long test cases or not to combine two or most test cases in single one test case. It may be possible that single test case may contain many results and verifies many criteria.
- Incomplete, Incorrect test cases results confusion to testers.
- Try not to leave any step in teat cases as leaving any step will create problems for testers executing test cases as they may not be know that how to complete the test cases.
- Sometimes, it is unclear whether tester or system does anything or action that causes a situation for tester and without any clue what is to be done next.

Test Case Design stages:
Before execution of test cases, test case must be design in proper way so that testing process will be executed with fewer problems.

- Identify the test resources: The recommended method is that the amount of resources allocated for the test data tool is determined and then process is created.
- As before identify the test conditions that we have to use in test cases so for that testing matrix is used.
- Ranking of test condition will be done that is which conditions will be tested first. Based on ranking, condition that we want to test is got selected and at this time conditions should be very specific.
- A unique number should be given to each test case.

Test Implementation: To execute test cases that we create for testing purpose we can also create the test scripts using various automated tools according to the requirement

Test Execution: In this, execute the test cases or test scripts on test environment and report defects with defect reporting tools to managers and to developers so that that defects can be fixed and code become defect free.

Test Analysis: Use of test metrics and project metrics is done to calculate key indicators.

Test Review: It's used for future perspective that is discussion is carried out about the lesson learned from the problems phased and identifies the strategies so that we can prevent such problems in future.

Test Initiation Criteria

There is another issue that when to start the testing. So for this, Timing is the major factor that as soon as we get software requirements or baselines we can start testing because incorrect requirements results wrong design and implementation and after implementation has been done it becomes very difficult and also expensive to find the defects and correct them. So objective for starting testing is to trap the requirements related defects as early as possible.

Test complete criteria:

As complete testing is not possible and also it's not possible to make the entire defect free software but we need to consider some parameters or factors on the basis of that we can stop the testing process. for ending of testing various criteria are considered like Deadlines as release deadlines, testing deadlines of the project, Test cases completed with certain percentage passed, Alpha and Beta testing period ends or As we reach optimum level of testing. According to graph, the number of defects goes on decreasing as time goes on but at same time cost are also increases exponentially, so the crossover of these two lines or graphs gives us optimum level of testing.(Fig. 2) Anyone can stop testing at they reach at this point for balancing both cost and risk of testing.

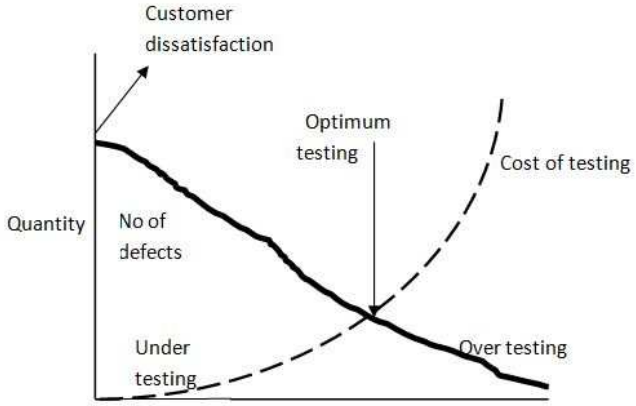

Fig: 2 Diagram for optimum level of testing

Participants in testing:

If we consider the testing process carefully and minutely we notice that almost all the representatives of the software development team along with users or

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customers are participated in the testing process. May be its possible that their level of involvement may be different but their presence is equally important for the successful of testing process. Like Customers may involve in analysis phase, user in alpha and beta testing, developers in unit testing, management involve in releasing issues and auditors are involving in verifying different policies and processes of the software testing process.

Challenges in testing: As there are many challenges in testing process like

- Testing considered late in project.
- Requirements are not testable.
- Test progress is hard to measure.
- Complete testing is not possible.

  So to avoid those challenges there may be some guiding factors like as software team start the project at same time test planning and preparation can be started, As we make the small code we can test it that is not to wait for last moment to test the entire product or code. Also use repeatable processes to order the manner in which one integrate and test the system.

Skills for Testers

There are various skills are required to become a good tester and to make career in software testing some following skills are necessary like Reading skills, Questioning skills and Communication skills.

- Reading skills: As this skill is considered one must know that what you read. Some of the things that one should considered while reading like ask the questions related to information gathering and search for the answers, as more information is there then categorize them and then read them again.
- Questioning skills: To become a good tester one should have to ask questions like who is my client or customer, what problems this product intend to solve, what problems could this product create, are you the right person to answer this question, is there anyone else who can give some more relevant and additional information, is there any thing that I miss to ask or that I want to ask, may I come back to you with more questions later etc.
- Communication skills: this is the essential skills for all testers. This skill will be needed during the interaction with customers or clients, developers etc. If communication is not good or poor then it causes misunderstanding or disagreement.
- Other skills: apart from all above other skills are also included like negative thinking to make negative test cases, for testing decision making is required that is good judgment is essential, tester should be multitasking that is reading srs document, execute test also, team builder etc are the other essential skills for the testers.

Conclusion

Testing is widely used now days to help the developers to make the defect free software. Although there are so many testing techniques are there but still main important things to do the proper planning for testing process. As if proper test planning will be done then result will be a high quality defect free software or product. For proper planning, designing of test cases is also very important. It should cover each steps of the execution. Not only planning is required for the successful of testing process but also self skills are also required that is testers should do the testing as considering not to complete the task but also they do this from their heart.

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