

Analysis of Different Software Testing Techniques

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Abstract- A Software testing is an action which is intended for estimate feature or an ability of a program and guarantee that it meets the necessary effect. Software produced will never be faultless without being tested and approved. This makes us discover a technique for testing concealed bugs at different stages by a superior technique. Testing is a procedure where we can spot concealed bugs, code faults or any unused code in certain software. Currently, there are lots of techniques being used for testing faults in software; among them, most proficient techniques for testing software are black-box testing, white-box testing, and gray-box testing. In sort to take testing, via various techniques involves extreme use of resources and time. Many techniques have resulted in duplication of effort because they locate the same kind of faults. For this intention, appropriate selection of testing techniques is essential. So there is required to evaluate testing techniques. Most of the empirical study had performed to estimate software testing techniques in terms of accuracy and efficiency. In this paper, we have illustrated and compared the three most common and frequently used software testing techniques for discovering errors; they are white-box testing, black box testing, and grey-box testing.

Keyword- Software Testing; Black Box Testing, Grey Box Testing, White Box Testing

I. INTRODUCTION

The meaning of testing according to ANSI/IEEE-1059 standard is that testing is the procedure of analyze a software module to spot the differences among existing and necessary conditions (that is defects/errors/bugs) and to assess the features of software item [1]. The aim of testing is verification, confirmation (validation) and fault finding in order to catch problems – and the intention of ruling those problems is to get them fixed [2]. Software testing is one of the major and primary techniques for achieving high quality software [3]. Software testing is ready to spot presence of faults, which cause software breakdown. However, software testing is a time consuming and expensive job [4].

Software testing is the important stage of SDLC. While developing software, software testing costs between 20% to 40% of the full amount of software development. The main intention of testing is to spot faults and failures that occurred in development and to guarantee that software is bug-free. Improper and inadequate testing has resulted many social issues, financial problems and software related problems. To test the system exhaustively is one such solution, but with limited resources, time and money, it is not practical. For this purpose, appropriate selection of testing techniques is important, so it is possible to choose effective testing techniques [5]. To get sufficient information regarding how well they do? How much source they exploit, and depend on

parameters that they have taken into consideration, is difficult. In sort to bring out testing, using numerous techniques, involves excessive use of resources and time. Many techniques have resulted in replication of efforts because they discover same kind of faults. Therefore, there is need to assess testing techniques. Most of the studies conducted to estimate software testing [2], [6].

To recognize which testing method is suitable and having the appropriate information concerning to efficiency and rate of testing and resources of testing in such are testing scheme [13].

Software testing is important activity in Software-Development-Life-Cycle [8]. Software testing is the procedure of assess the functionality and suitability of a program through execution or study [9].

Software testing is a method of verifying and validating that a software application or program meets the business and scientific requirements that guided its design and development and works as projected and also identifies essential errors or flaws categorized as per the severity level in the application that must be set [3],[5],[8],[10].

The whole work isolated into four parts. The initial segment demonstrates the related work done in the field of research,

Second part demonstrates the exploration procedure and stream of research to get an outcome, third it is a most critical piece of the paper that demonstrate the discoveries of research work and last part demonstrate the conclusion of our work.

II. RELATED WORK

1. Testing Technology –

There are numerous testing techniques but we discuss only some important techniques in this paper they are:-

1.1. Black Box-

Black-Box Testing is testing with no information of the inner mechanism of the software under test. Also known as functional testing or input-output driven testing. A software testing method whereby the inner mechanism of the item being tested are not known by the tester is called black-box testing [11],[12].

Black-Box testing treats the software as a “Black Box” – with no information of inner working and it only checks the essential aspects of the system. While performing black box testing, a tester must know the system design and will not have access to the source code [13],[14].

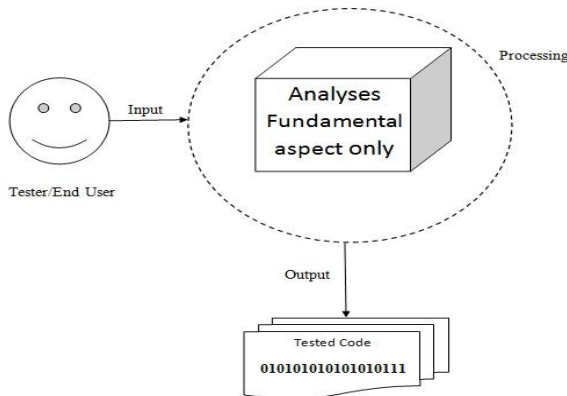


Fig.1 Represent Black Box Testing

1. 2. White-Box

White-Box testing based on a scrutiny of inner working and structure of a section of the software. White-Box testing is the procedure of giving the input to the system and inspection how the system processes to facilitate input to produce the essential output. It is crucial for a tester to have the complete information of the source code. White-Box testing is relevant at integration, unit and system levels of the software testing procedure. In white-Box testing, one can be confident that all parts through the test items are correctly performed [3],[4],[8],[10].

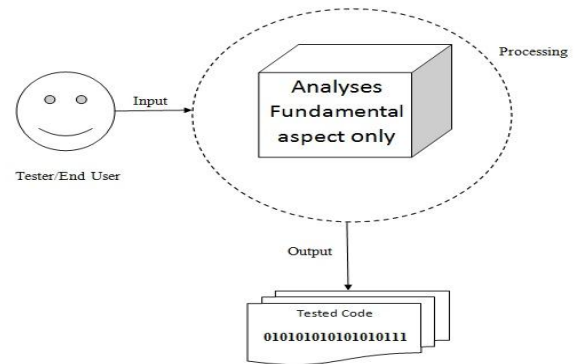


Fig. 2 Represent White-Box Testing

White-Box Testing is the testing of a software solution's inner coding and infrastructure. It focuses mostly on escalation safety, the flow of inputs and outputs through the application, and improving intend and usability. White-Box testing is also identified as Clear-Box testing, Open-Box testing, Structural testing, Transparent-Box testing, Code-Based testing, and Glass-Box testing [10].

1.3. Grey-Box

Grey-Box testing is also identifying as translucent testing [15]. It blends of black-box testing and white-box testing. A tester will have limited information of inner structure /logic. It increases the area of testing by focusing on all complex system's layers by blending all existing black-box and white-box testing. A tester can check both the output and the process that leads to output. It is useful to most testing stages, mainly in integration testing [2],[5],[13],[16],[17].

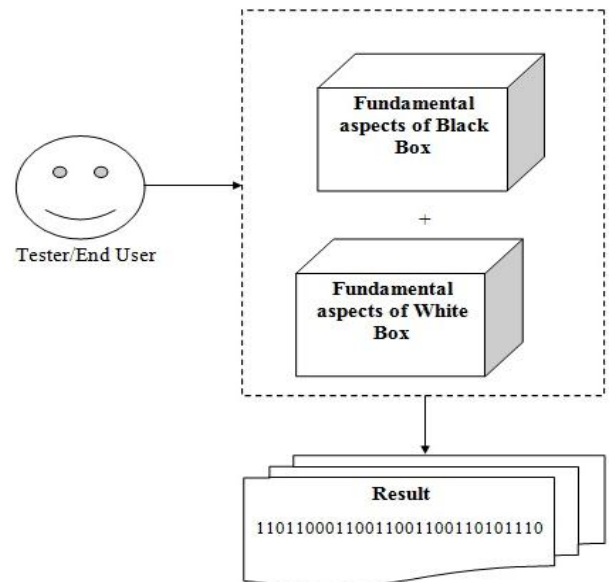


Fig. 2 Represent Grey-Box Testing

2. Principal of Testing –

Testing an application can only expose that one or more faults subsist in the application, however, testing alone cannot prove that the application is fault free. Therefore, it is essential to propose test-cases which find as many faults as possible [18].

1. Testing must be based on the client requirements.
2. Testing time and resources are limited.
3. In-depth testing is not possible.
4. Use effective resources to test.
5. Testing planning should be done early.
6. Testing must begin in small and progress in large.
7. Testing must be carried out by a different testing team or external team.
8. All tests should be according to customer requirements.
9. Assign the best person for testing.
10. The test should be planned to show software defects and not their absence.
11. Prepare the test reports including test-cases and test results to summarize the result of testing.
12. Advance test planning is must be updated timely.
13. Testing actions must begin as early as possible in the software or system development life cycle and must be paying attention to defined objectives.
14. Defect grouping refers to a small number of part contain most of the faults exposed through executing testing, or are responsible for the most operational failure. [19],[20],[21].

III. METHODOLOGY

The study investigates various software testing techniques in software Development procedure .And also analyze that what how the testing approach is effected and give a appropriate result. This will help us to emphasize the significance of testing techniques. To achieve our thesis aim, we used analytical and empirical studies. Empirical study will be done through the information gathered through various data sources and analytical study is made through the text Analysis on various research articles related to our subject area. And finally the constant comparative method is used to compare the Empirical findings with the facts discover from our analytical finding. These Analysis and research studies are leads to find various testing techniques Issues in software development.

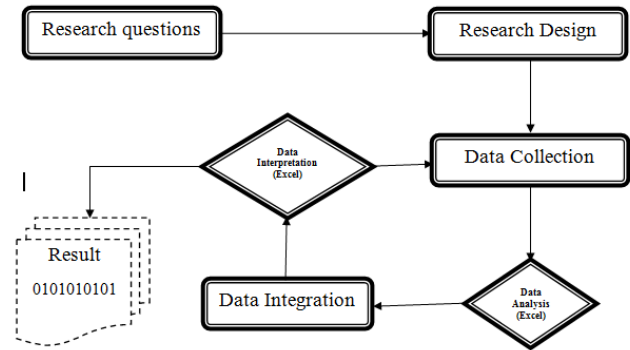


Fig.4. Represent Research Methodology

IV. RESULT AND DISCUSSION

In this research report Show the comparative analysis of the three testing techniques. Although the tester cannot implement all the testing technique in assemble and produce the direct effect of the project. Since the time, cost, accuracy, effort and bug detection percentage are the major constraints for the testing. We comparatively analyze the three testing techniques and on the survey study, it has found that some data that show below –

Table1. Comparative Table

| Keys/Methodology | Black Box | White box | Grey Box |
|-----------------------|-----------|-----------|----------|
| Accuracy | 81.6% | 88.4% | 91.6% |
| Bug Detection | 18.40% | 20.40% | 23.00% |
| Efforts taken to test | 08.40% | 11.40% | 18.40% |
| Time taken to test | 38min | 50min | 54min |
| Cost | 8.0% | 10.0% | 18% |

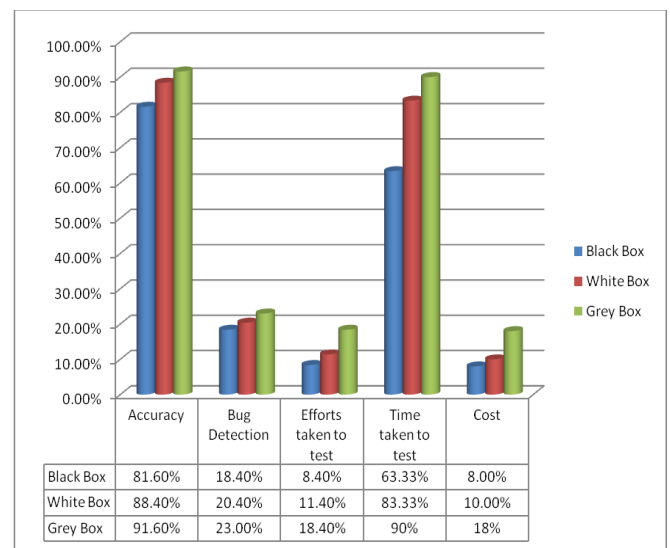


Fig.5. Represent the Comparison

In the fig.5 , the horizontal axis shows the keys of testing techniques and the vertical axis shows the percentage value of keys .The bars show the key different between testing techniques, here blue bar indicate Black box testing technique, red bar indicate White box testing techniques and green bar indicate Grey box testing techniques.

V. CONCLUSION

To conclude our survey, we return to the problem that how to get a suitable technique to test a software system and find out errors. But it is really not possible to find out all the errors in the program. Thus, the major question arises, which techniques we would adopt to test. For this purpose, we have taken and analyzed a number of testing techniques. Finally, the results of the analysis have been presented. The major conclusions are that our current testing technique knowledge is very limited and is based on impressions and perceptions, but according to the Survey result and observation there are some result concluded, that are listed below

- 1) Gray-Box testing provides the more accurate result as compare to other techniques.
- 2) Gray-Box testing gets more bugs as compared to other techniques.
- 3) Black-Box testing takes least effort to test a test-case as compare to other techniques.
- 4) Black-Box testing takes minimum time to test a test-case as compare to other techniques.

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