Impact Factor (SJIF): 4.542

International Journal of Advance Research in Engineering, Science & Technology

e-ISSN: 2393-9877, p-ISSN: 2394-2444
Volume 4, Issue 5, May-2017

Study on Software Testing and Software Quality Assurance

Ankita Pimputkar [1], Pinal Patel [2]

[1] GEC Gandhinagar, Sector-28, Gujarat, India
[2] GEC Gandhinagar, Sector-28, Gujarat, India

Abstract — ***Assessing the product framework is a perplexing issue Software Testing gives an approach to investigating a product thing to recognize the contrasts amongst existing and required conditions. It likewise intends to locate the different blunders that happen in the product as a result of which the product is not ready to give the right yield. There are different methods accessible for software testing. Software testing is a piece of software quality assurance. To assess the nature of a product item and to keep its level high is substantially more troublesome than to do them for the other modern items. For keeping up the quality, execution, speed, productivity and cost of the product the Software quality Assurance exercises, standards and its techniques are actualized in the early phases of programming designing improvement stages.***

This Paper endeavors to give an extensive perspective of the field programming Testing Techniques. This paper gives data about idea of programming quality confirmation for quality programming

Keywords- *Software Testing, life cycle of testing, level of testing, testing strategies, Software testing life cycle (STLC), Testing methods, software quality assurance*

I. INTRODUCTION

Software is a set of instructions that execute a specific task, called a program. There are two categories of software are system software and application software. A software product has to be gone through a process of development of software, testing and identify errors/fixing bugs after that software should only be released, Testing is the process of evaluating a system/software with the purpose of verifying whether it is perfect to release in market for end users and it would satisfies the specified requirements or not. Software testing is a critical element of software quality assurance and represents the ultimate review of specification, design, and code generation. Software testing plays a vital role in the software development life-cycle to recognize the difficulties in the process very well [1]. Testing plays an important role in achieving and assessing the quality of a software Product [2]. It is aimed at evaluating the capability or usability of a system. Software testing is an important way of accessing quality of software. Various techniques are used to perform testing. Testing is an important phase of SDLC to ensure quality of software and error free software. Different levels of testing are performed. Software quality assurance (SQA) is defined as a planned and systematic approach to the evaluation of the quality, software product standards, processes and procedures. SQA includes the process of assuring that standards and procedures are established and are followed throughout the software life cycle. Software quality assurance (SQA) is a process that ensures that developed software meets and complies with defined or standardized quality specifications. SQA is an ongoing process within the software development life cycle (SDLC) that routinely checks the developed software to ensure it meets desired quality measures.

II. OBJECTIVES OF TESTING

- A good testing is one that has a probability of finding an as yet undiscovered error.
- A good test is not redundant.
- A successful test is one that uncovers a yet undiscovered error.
- A good test should be “best of breed”.
- A good test should neither be too simple nor too complex.
- To check if the system does what it is expected to do.
- To check if the system is “Fit for purpose”.
- To check if the system meets the requirements and be executed successfully in the Intended environment.
- It is a process of executing program with intent of finding defect or error.

III. METHODOLOGIES OF TESTING

There are different methods of testing. Following are the methods used for software testing.

i. Static testing:

Static testing is also referred as inspection or reviews. During programming compilers and text editor are used to check syntax error or programming structure errors. It checks dataflow as static programming structure. Static testing is verification.

ii. Dynamic testing:

Dynamic testing is done when program is running. It checks error or defect in code while program is running. It performs validation.

iii. White box testing:

White-box testing, sometimes called *glass-box testing* is a test case design method that uses the control structure of the procedural design to derive test cases [3]. It is also referred as structural testing. It checks internal structure of program. In white box testing control flow and data flow of program is checked. Tester performs source code testing. Tester has a complete knowledge of how each components of program interact. In white box testing clear testing of whole program is done so it is also called a *clear box testing.*

Types of white box testing:
1. Basis path testing
2. Loop testing
3. Control structure testing [5]

iv. Black box testing:

In black box testing software treated as a black box so it is known as a black box testing. Black-box testing, also called *behavioral testing* [3]. Software is tested without any knowledge of internal structure or coding. Tester does not have any knowledge about source code or internal structure of program. It checks only input and output. The Tester is only concerned about what the software is intended to do, not how it does it. Testers are only aware about the part that is accessible outside the program.

Advantage of black box testing is that no any programming knowledge is required. It checks only input and required output.

Types of black box testing:

1. Equivalent partitioning
2. Boundary value analysis
3. Comparison testing
4. Fuzz testing
5. Model based testing [5].

v. Grey box testing:

Grey-box testing involves having knowledge of internal programming structures and algorithms for purposes of designing tests, while executing those tests at the user, or black-box level. The tester is not required to have full access to the source code. Tester only has knowledge about some internal part of software. It uses internal data structures and algorithms for designing the test cases more than black box testing but much less than white box testing [5]. Grey box testing is used during integration testing of two or more modules. It is a combination of white box testing and black box testing.

IV. LEVEL OF TESTING:

Software testing has a different level of testing during testing process. Following are the different levels of testing:

1. Unit testing
2. Integration testing
3. System testing
4. Acceptance testing

i. Unit testing:

Unit testing tests the specific section of code, usually at function level. Unit testing refers to testing program units in isolation [2]. There are two reasons for testing a unit in a stand-alone manner. First, errors found during testing can be attributed to a specific unit so that it can be easily fixed. Moreover, unit testing removes dependencies on other program units. Second, during unit testing it is desirable to verify that each distinct execution of a program unit produces the expected results [2]. Unit testing is performed to check particular usefulness of program. Program is partitioned in modules every module is tried to check whether it is working legitimately or not. Unit testing may incorporate static code examination, information stream investigation, measurements investigation, peer code audits, code scope examination.

ii. Integration testing:

Integration testing is any sort of programming testing that tries to check the interfaces between parts against a product plan. Programming segments might be incorporated in an iterative way or all together.

iii. System testing:

System testing tests a completely integrated system to verify that the system meets its requirements. For example, a system test might involve testing a logon interface, then creating and editing an entry, plus sending or printing results, followed by summary processing or deletion (or archiving) of entries, then logoff.

iv. Acceptance testing:

Acceptance testing performed by the customer is known as user acceptance testing (UAT). It is done by end user to check the working of final product. Acceptance testing is performed in the last phase. Acceptance testing is done to assure that final product is working properly.

V. TYPES OF TESTING:

There are various types of testing performed in software testing. Following are the different types of testing.

i. Regression testing:

Regression testing is performed to ensure that whether any changes in source code or structure results in side effects. It is performed to check working of software against changes of internal structure or source code.

ii. Compatibility testing:

Compatibility testing is done to check compatibility of software against various hardware platform, operating system, system requirements etc.

iii. Alpha testing:

Alpha testing is performed at developer side. It is performed before software given to the end user. The software is used in a natural setting with the developer "looking over the shoulder" of the user and recording errors and usage problems [3]. It is done in controlled environment.

iv. Beta testing:

Beta testing is performed after alpha testing by end user in user environment. Beta testing is also known as **pre-release testing**. It is done by end user to check errors and faults in software.

v. Functional testing:

Functional testing is performed to check specific function of software. It is done to check whether software is working or not according to functional requirements.

vi. Non Functional testing:

Nonfunctional testing involves testing software against non-functional requirement such as security, performance, scalability and user interface.

vii. Performance testing:

Performance testing is done to check performance of software under various attributes such as scalability, security, load, stress etc. It checks working of software against different condition.

VI. SOFTWARE TESTING LIFE CYCLE (STLC):
VII.

STLC consists of following phases:

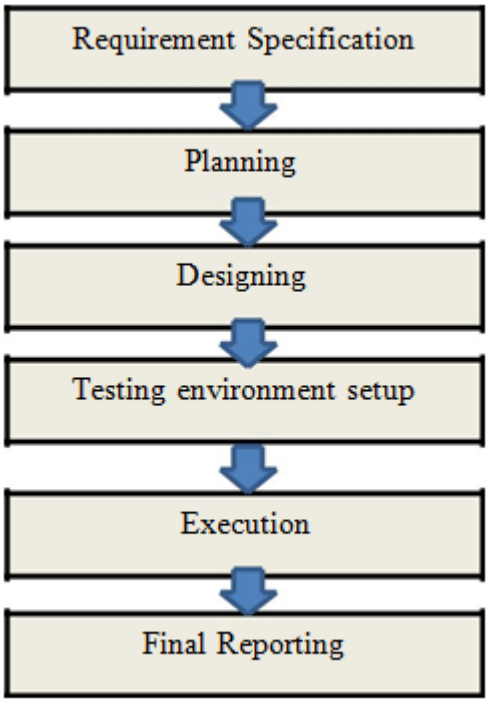

Fig. 1 STLC

i. Requirement specification:

An investigation about requirement is conducted to state the problem to be solved [7]. Requirement analysis is done to meet the requirement of customer.

ii. Planning:

Tests are planned in this phase. Test scheduling, test estimation is done in this step.

iii. Designing:

Test cases are designed in this phase. Various test scripts are designed on the basis of requirements.

iv. Testing environment setup:

Environment for testing is formed. Various system requirements are formed.

v. Execution:

Test cases and test scripts are executed to check the software.

vi. Final reporting:

After execution final reporting is done. Errors/defects found during testing are reported.

VII. SOFTWARE QUALITY ASSURANCE:

Software quality assurance (SQA) is defined as a planned and systematic approach to the evaluation of the quality, software product standards, processes and procedures [8]. It evaluates product to check its effectiveness and quality. Software quality assurance (SQA) is an umbrella activity that is applied throughout the software process [3]. SQA performs auditing and reporting. SQA provides data necessary to check the quality of software. Software testing is a part of SQA.

SQA Activities:

1. Participates in the software description process.
2. Review software engineering activities.
3. Audits designed software.
4. Ensures that deviation in software product recorded according to a documented Process
5. Records any defects or noncompliance and reports it.

CONCLUSION

In the product advancement prepare Software testing is a critical movement and it has a solid connection with alternate stages of programming advancement prepare. Testing is in some cases tedious and an escalated handle, so upgrade in programming testing strategies and imaginative procedures are basic. For improvement in testing methodologies, to computerize a product testing process is One of the target of programming testing, along these lines fundamentally decreasing its cost and Time, minimizing human error and to make a software more reliable. SQA concept is used to make error free software and to complete software as per the decided cost and schedule.

REFERENCES

[1] Introduction to software testing available at http://www.onestopsoftwaretesting.com/introduction and-importance-of-software-testing-in-sdlc/

[2] Software testing and quality assurance Kshirasagar naik, Priyadarshi tripathy

[3] Software engineering, by Roger Pressman

[4] Software Testing Techniques

Shivkumar Hasmukhrai Trivedi [B.com, M.Sc I.T (Information Technology), P.G.D.B.M –Pursuing] Senior System Administrator, S.E.C.C [Socio Economic and Cast Census] Central Govt. Project – Bhavnagar [Gujarat – India].

International Journal of Advanced Research in Computer Science and Software Engineering.

[5] Latest Research and Development on Software Testing Techniques and Tools

Rasneet Kaur Chauhan and Iqbal Singh

Department of Computer Science and engineering, Department of ECE, Guru Nanak Dev University, RC Gurdaspur, India

[6] Review on Software Testing Techniques

Bindia Tarika

Computer Programmer Computer Science & Engineering Department Guru Nanak Dev Engg. College, Ludhiana. Punjab-India

International Journal on Recent and Innovation Trends in Computing and Communication

[7] Importance of Software Testing in Software Development Life Cycle

Mohd. Ehmer Khan1, Farmeena Khan2

Musanna College of Technology, Sultanate of Oman.

International Journal of Computer Science Issues (IJCSI).

[8] A Literal Review of Software Quality Assurance

C. Senthi Murugan PhD Scholar, S.

Prakasam Ph.D., Asst .Professor

Dept. of CSA, SCSVMV University

AUTHORS

First Author: Ankita Pimputkar, M.E. Student(CSE Department), GEC Gandhinagar, Sector-28, Gujarat, India.

Second Author: Pinal Patel, Professor, CSE Department, Government Engineering College, Sector – 28, Gandhinagar, Gujarat, India.