

# The Realm of Software Quality Assurance

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**Abstract-** This paper is an attempt to study the role of software quality assurance with respect to the testing and the system development life cycle. The approach is to concentrate on how to develop defect free software and to lower maintenance cost by establishing standardized process and procedure. The first section of this study concentrates on the different kinds of testing and how quality is assured in each case. Then it is followed by the role of quality assurance in the system development life cycle (SDLC). In the final section the study explores some of the related works.

**Keywords:** Software quality assurance, testing, system development life cycle

## I. INTRODUCTION

Quality Assurance in software testing ensures the implementation of process, procedures and standards for the verification of activities involving identification of bugs, errors or defects in software.

It focuses on the processes or procedures that are conducting the actual testing. So, it has been considered that it is a process-oriented and testing is a product-oriented activity. The purpose of quality assurance deals with clear formative agenda. It contributes to the process of assuring and enhancing the quality in the work. It helps to improve, develop and ensures that the quality of the work undertaken is at the highest level. It also tries to establish whether there are appropriate and effective procedures and mechanisms for quality assurance.

The QA team is responsible for establishing quality assurance methods, practices and standards. This paper focuses on quality assurance with respect to software testing and software development life cycle.

## II. KINDS OF TESTING AND HOW QUALITY IS ASSURED IN EACH CASE

Different kinds of testing are as follows:

1. Functional Testing – Functional testing focuses on both desirable and undesirable function of the software. Each new function of the software is individually targeted and tested in isolation from the other existing functions of the software.

Quality is assured as follows:

- a> Positive testing: Valid data is used in framing the test case
- b> Negative testing: Invalid data is used in preparing the test case
- c> Data driven testing: It ensures that the application will consistently support the users to perform the same operations repeatedly by executing the same functionality with the help of variations in data.
- d> Boundary testing: The boundaries of the data accepted are assured. The minimum and the maximum boundaries are checked.
- e> Security testing: It assures that the application is not vulnerable to security violence and hostage usage.

User acceptance testing: The objective here is to verify the end product for its readiness in the market place. The attempt is to assure the customers that the software is ready to be used.

2. Integration testing: Test is conducted on the combined form of the several functional units in the form of a module, subsystem or system. Quality is assured through verification of the different components of the system whether they are working as per the requirements approved.

3. System testing: Black box testing is conducted here. The test environment framed here is close to the production including hardware setup, database size and complexity.

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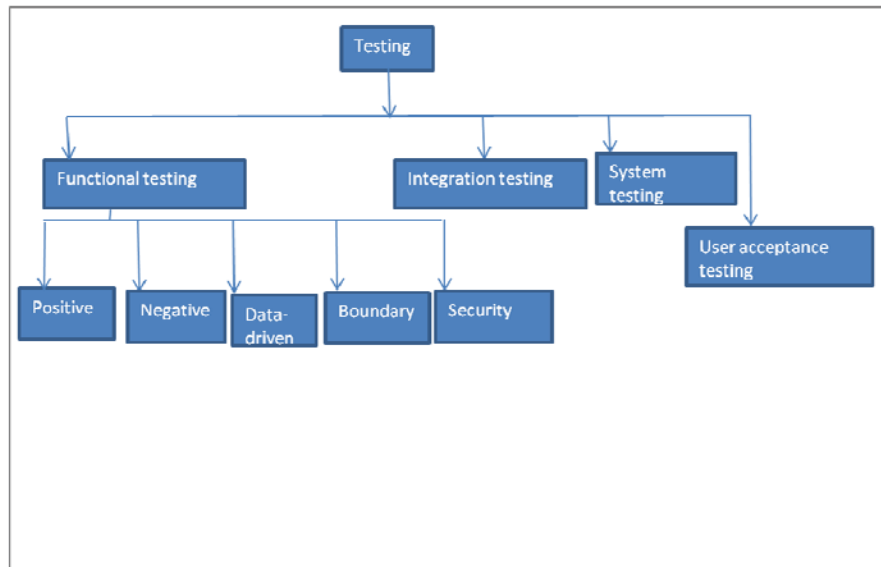


Figure 1. Kinds of Testing processes

### III. QUALITY ASSURANCE IMPLEMENTED IN SDLC PROCESS

Below are the different phases of quality assurance implemented in system development life cycle:

1. Planning: Quality assurance plan is created
2. Analysis: Review of the specifications
3. Design: Test case is developed in accordance with the SRS document
4. Development: Test cases is developed for the validation purpose
5. Testing: Quality is assured of the software developed
6. Deployment: Validation is done through user acceptance testing



Figure 2. Role of Quality Assurance in each phase of SDLC

#### IV. RELATED WORK

In the reference paper [1] Isha Sahni and Anshul Anand focuses on the involvement of software quality assurance (SQA) in the entire software development process. It ensures that the agreed upon standards and procedures has been followed and the problems found are effectively dealt with. The approach is towards prevention of bugs and therefore will result in quality software. Further the software quality assurance has been compared with the software testing. SQA is a preventive approach and software testing is a corrective approach. Several reasons have been identified for software bugs like miscommunication, complexity in software, code errors, frequent changes in requirements, and time and pressure deadlines. Finally it talks of capability maturity model (CMM) that aims at making sure that the organization is following a good process and develops quality products. It defines five levels to quantify the software development methodology. In paper [2] Peggy Doerschuk has explained how effectively a team can work to develop quality software. How the student should focus on assuring quality assurance at each step of the development process. It describes how quality assurance can be met at each stage of the software life cycle covering analysis, design, implementation and integration. And further how to incorporate a UML based team project using Use-Case diagram and sequence diagram into an object oriented software engineering course. This paper is backed up with an example project which includes the problem requirement timetable of deliverables and sample deliverables. In Research paper [3] Nayyar Iqbal and M. Rizwan Jamel Quershi speaks of how SQA is the combination of the entire software design, coding, source code control, code review, change management, configuration management and release management. It describes the key problems involved in the software testing and how one should deal with each problem to assure quality. The recommended strategies to be followed to deal with the problems like shortcuts in testing, reduction in the testing time, let go-deliver now, correct errors later attitude, poor planning and coordination planning, lack of user involvement, poor documentation, lack of management support, inadequate knowledge of application environment, improper staffing, poor testability. In study paper [4] Maneela Tuteja and Gaurav Dubey explains how software testing is becoming more and more popular and important in the software development industry. Software testing covers a very broad aspect which includes both technical and non-technical areas. The study has also focussed on the various testing techniques and also the latest techniques representing a future direction and dimension in this arena. The paper describes different process models of SDLC (Software development life cycle) and how quality is assured in each case. Finally it implements a SDLC testing model. The authors Divya Bindal and Jyoti Tamak in their study paper [5] emphasizes on the importance of software quality assurance in the product life cycle and how it improves the software quality. Here the product quality has been defined with some of the characteristics or attributes like functionality, portability, usability, reliability, maintainability and efficiency. It has also focussed on the role of SQA staff to ensure quality assurance work. It has also framed the SQA architecture, the various quality assurance activities and finally the advantages of SQA.

#### V. CONCLUSION

Quality assurance plays a pivotal role in a software development process. It is a means to develop a quality process in order to build a quality product. A proper application of Software quality assurance (SQA) activities in the earlier phases like analysis, design reduces the job in the later phases. An effective SQA activity largely reduces the time and effort in maintenance. The overall cost of the system produced remains minimum. So, it becomes quite clear that SQA takes up a very critical role.

Maintaining and following a proper quality assurance standard not only results in quality software development but also leads to enhancement in customer satisfaction.

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